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Installation & Operating Manual
D-EOMOC01203-24_02EN

iCM Gateway

1 ICM GATEWAY VERSIONING

Revision	Software Version	Changelog
0 – 03/2024	iCM_Adv-Gtw_1.00	First release
1 – 07/2025	iCM-Gtw_2.00.A	VPF Bypass valve Management
2 – 08/2025	iCM-Gtw_2.10	Bypass valve management based on differential pressure via iPM
3 – 10/2025	iCM-Gtw_2.11	Added in HMI iCM Adv Maintenance section datapoints for temperature setpoint limits (CoolSpLowLim, CoolSpHighLim, HeatSpLowLim, HeatSpHighLim, MinCoolCapCtrlLWTSp, MaxHeatCapCtrlLWTSp).

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2 WHAT IS ICM GATEWAY

2.1 Before starting

iCM Gateway consists in an external panel that provides control functions to manage more than one modular Water-cooled scroll unit as a single unit. Moreover, it is able to manage more than one modular susbsytem in a plant-room, connecting more iCM Gtw panels to each other or connecting iCM Gtw panels to Water-cooled Screw unit controllers through DCN (Daikin Communication Network).

iCM Gtw is only applicable with Daikin Modular Water-Cooled Scroll units.

iCM Gtw contains two Unit Management Logics:

- **MUSE**: Modular Unit SEquencer, able to manage up to four EW#T-Q (modular water-cooled scroll) together with Pump Skid Module as a single water-cooled unit
- **iCM**: intelligent chiller manager, able to manage
  a) up to eight iCM Gtw panels, so that up to thirty two EWWT-Q

Figure 1 Water-Cooled Plant-room with Up to 8 iCM Gtw panels

b) up to eight among iCM Gtw panels and controllers of Water Cooled (WC) Screw Units.

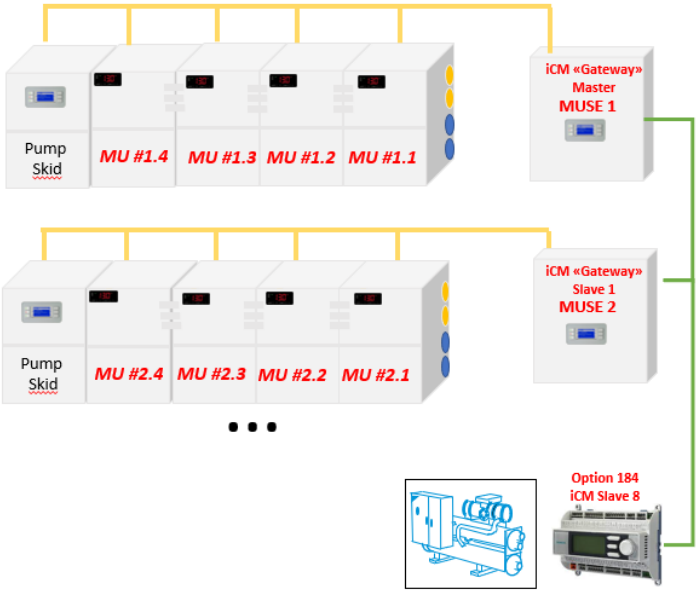


Figure 2 Water-Cooled Plant-room with iCM of iCM Gtw panels and WC Screw Units

In water-cooled plant-room, an iCM Gtw panel is elected as iCM Master and, while it manages the connected Modular Units (through MUSE), it is able to manage the other iCM Slaves consisting in other iCM Gtw panels or Water-Cooled Screw units. Water cooled Screw units must have Option 184 (iCM Standard) to communicate with iCM Gtw.

2.1.1 Acronyms

In the following chapters, Acronyms will be used to refer to some devices:

Acronym	Extended Name	Description
DCN	Diakin Communication Network	Communication Network connecting more Daikin Units ot iCM Gateway composing a plant-room
iCM	intelligent Chiller Manager	Logic able to provide communication through DCN among up to 8 units and to provide management of a plant-room
MUSE	Modular Unit SEquencer	Logic able to manage up to 4 EW#T-Q modular units + eventual Pump Kid module
iCM Gtw	iCM Gateway	Panel able to - manage a MUSE subsystem - be connected to DCN
MUSE subsystem	MUSE subsystem	Group of Modular Units connected to one iCM Gtw and managed as a single Water-cooled Scroll unit
MU	Modular Unit	Modular Unit EWWT-Q or EWHT-Q or EWLT-Q
iCM Gtw Master iCM Master Master	iCM Gateway Master	Panel elected as "Master" able to manage a plant-room composed by its own MUSE-subsystem and up to 7 MUSE subsystems through other iCM Gtw panels. Management Logic at Plant-room level is activated only on "Master"
iCM Gtw Slave iCM Slave Slave	iCM Gateway Slave	Panel elected as "Slave" able to exchange information with iCM Master about its own MUSE susbsytem (sending data and receiving commands trough DCN)
WC C/O Unit	Water-Cooled Chiller-only Unit	Water -cooled unit that can work only in cool mode
WC H/P Unit	Water-Cooled Heat Pump Unit	Water -cooled unit that can change operation mode and satisfy Cool request or Heat Request
Cmn LWT	Common Leaving Water Temperature	Sensor equipped on each iCM Gtw and installed on Common supply pipe to detect the temperature from a MUSE subsystem (group of MU)
Sys LWT	System Leaving Water Temperature	Sensor equipped only on iCM Master and installed on Common supply header to detect the temperature from the group of iCM Gtw panels or WC Screw Unit

Table 1 Acronyms

2.2 Available Control functions

In this section are resumed all the control function provided by iCM Gtw. Therefore, it is necessary to divide the functions of primary system management (by iCM logic) from those of modular water-cooled unit management (by MUSE).

As mentioned earlier, MUSE manages modular units as if they were a single water-cooled unit.
MUSE logic provides the following functions:

- **Modular Unit Sequencing**: allows to equalize the operation hours of the modular units through their rotation.
- **Modular Unit Staging:** allows to provide a stable common leavind water, minimizing the number of running modular units and consequently reducing the power consumption.
- **Modular Unit Capacity control:** allows to manage the capacity generation of each modular unit, in order to increase or decrease the overall MUSE subsystem capacity according to building load demand. Thus, this function provides energy efficiency optimization.
- **Modular Unit Changeover:** allows to set the operating mode of the system and consequently on all the units able to perform the changeover.

- **Speed Control of Pump Skid:** Speed of the pump is controlled at plant-room level by iCM Gtw and communicated to Evaporator and Condenser pumps managed by Pump Skid controller.

iCM Logic provides the following functions:

- **Unit Sequencing**: allows to equalize the operation hours of the units through rotation of units.
- **Unit Staging:** allows to provide a stable system leaving water, minimizing the number of running units and consequently reducing the power consumption.
- **Controlled temperature configuration:** allows to select the controlled temperature which Unit Staging is based on. Possible configurations are:
  - Control on Leaving water temperature:
  - Control on Entering water temperature:
- **System Changeover:** allows to set the operating mode of the system and consequently on all the units able to perform the changeover.
- **System Variable primary flow management with dedicated pumps:** (available only for units with Pump Skid) allows to manage the speed of primary pumps dedicated to each unit in order to afford the building flow demand and assuring minimum flow to running units exchanger.
- **Evaporator Pump Manager:** (available only with additional “accessory” “iPMxx": external panel) allows to monitor the evaporator water distribution management based on manifolded piping.
- **Condenser Pump Manager:** (available only with additional “accessory” “iPMxx": external panel) allows to monitor the condenser water distribution management based on manifolded piping.
- **Cooling tower Manager** (available only with additional “accessory” “iPMxx": external panel, configured as Condenser Pump Manager) allows to monitor water distribution management based on manifolded piping and the cooling tower management.
- **Secondary Pump Manager:** (available only with additional “accessory” “iSM": external panel) allows to monitor the pump groups on secondary water distribution.

2.3 Possible configurations

iCM Gtw panels can manage, through MUSE logic, up to four modular water-cooled units in the following configuration:

- EWWT-Q Water-Cooled Chiller/Heatpump: with inversion on water side. Therefore, in Cool mode, MUSE try to achieve cool setpoint on evaporator side; whereas in Heat Mode, MUSE tries to achieve heat Setpoint on condenser side.
- EWHT-Q Water-Cooled Heatpump with inversion on refrigerant side. MUSE manages the exchanger connected to primary side to achieve Cool or Heat Setpoint according to Operating mode of the system; whereas pump skid managed the entering water temperature of the other exchanger.
- EWLT-Q Condenser-less Chiller. MUSE manages the evaporator side connected to primary side. Condenser-side must be managed by customer.

iCM Gtw panel allows to manage the Modular units as single unit and connect them in a water cooled plant-room composed by other iCM Gtw panels (Multi-Modular units) or Water Cooled Screw units.
iCM Gtw panel can manage up to eight water-cooled units, and it can be configured as:

- **Gateway Master:** beside the MUSE logic, the iCM logic is able to manage up to one Master (iCM Gtw panel itself) and up to seven iCM Slaves (other iCM Gtw panels or Water-Cooled Screw Units)
- **Gateway Slave:** beside the MUSE logic, the iCM logic is configured as Slave unit commanded by iCM Gtw Master

> Only other iCM Gtw panel configured as Slave or other Water-Cooled Screw unit with Option 184 (iCM Standard embedded) can be connected to iCM Gtw panel configured as Master

iCM Gtw Master can detect the type of the connected units. Moreover, iCM Gtw Master can detect the type of System Management option (Option 184 licensed on Units) from the connected units.
If the combination between Daikin unit type is not compatible or Water-cooled screw units does not have licensed the Option 184, iCM Gtw Master controller disables the Daikin System Manager and provide a configuration error.

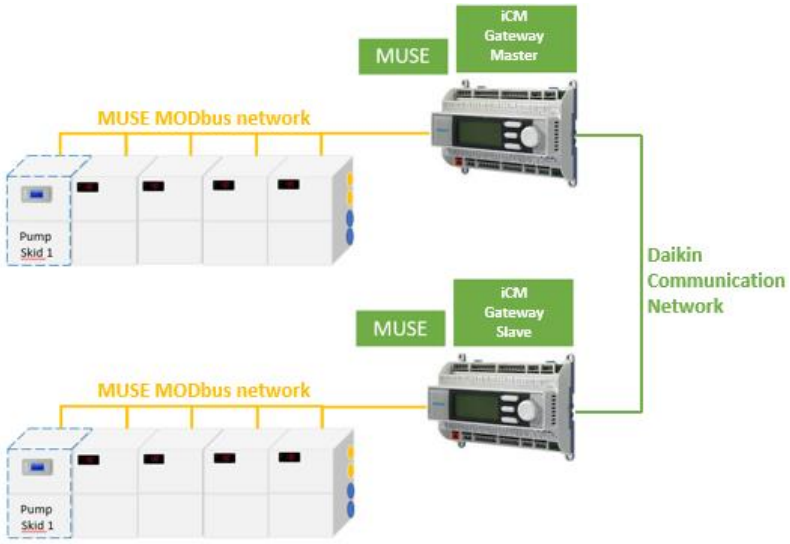


Figure 3 iCM Gtw Master / Slave Configurations

2.4 Limitations

As mentioned in the previous Section 2.3, there are limitations in using iCM Gtwin some plant layout.
The following Table 2 resumes the possible configurations and limitations:

System Type	iCM Gtw
For each iCM Gtw panel	
Up to 4 Modular units (MUs)	✓
All EWWT-Q (Water Inversion)	✓
All EWHT-Q (Refrigerant inversion)	✓
All EWLT-Q (Condenser-less)	✓
Mix EWWT-Q and EWHT-Q	×
Mix EWWT-Q and EWLT-Q	×
Mix EWHT-Q and EWLT-Q	×
In the Plant-room	×
Up to 8 Units	✓
All iCM Gtw panels for EWWT-Q	✓
All iCM Gtw panels for EWHT-Q	✓
All iCM Gtw panels for EWLT-Q	✓
Mix of iCM Gtw for EWWT-Q and iCM Gtw for EWHT-Q	×
Mix of iCM Gtw for EWWT-Q and iCM Gtw for EWLT-Q	×
Mix of iCM Gtw for EWHT-Q and iCM Gtw for EWLT-Q	×
Mix of iCM Gtw for EWWT-Q and Water Cooled Screw Units (with Option 184)	✓
Mix of iCM Gtw for EWWT-Q and WC Screw Unit with Master/Slave option	×
Mix of iCM Gtw for EWWT-Q and Water Cooled Centrifugal Units	×
Mix of iCM Gtw for EWHT-Q and Water-Cooled Units	×
Mix of iCM Gtw for EWLT-Q and Water-Cooled Units	×
Mix of iCM Gtw and Air-Cooled Units	×
Mix of iCM Gtw and Multipurpose Units	×
Mix of iCM Gtw and iCM Advanced	×

Table 2: iCM Gtw allowed configurations.

In case of doubts about what iCM Gtw can and cannot do, please refer to the following sections or contact your Sales Support referent in Daikin Applied Europe S.p.A.

2.5 Integration in a Building Management System

iCM Gtw panel through the MUSE function, can retrieve the most important information from the connected Water-cooled Modular units, working as single point of integration.
iCM Gtw panel, elected as the “iCM Master” of the plant-room, is able to collect the most important information of all the other “iCM Slave” units (other iCM Gtw Slaves or other Water-Cooled Screw units) and of the equipment managed by additional Panels (Evaporator or Condenser Pump Manage) connected to Daikin Communication Network.
Thus, as iCM Master, iCM Gtw panel works as single point of integration with the BMS that will be able to gather all that information through protocol communication:

- BACnet over IP
- BACnet MSTP
- Modbus over RS485
- Modbus over IP

Moreover, BMS will be able even to set the most important setpoints related to Daikin Unit Manager.

Please refer to document “BAS Integration – iCM Gtw Modbus protocol” or “iCM BACnet protocol” where all the datapoints are listed.

ⓘ	Not all the variables regarding the single unit are accessible through Master controller. In case all the information about single unit are requested, even Slave controller must be integrated by BMS

2.6 **Daikin on Site**

iCM Gtw is integrated within Daikin on Site (DoS).
When a iCM Gtw Controller is connected to DoS, the most important status info of the EW*T-Q modular units, together with MUSE setpoints, settings and configuration are displayed.
Moreover, if iCM Gtw Controller is configured as “iCM Master”, even the most important status info of the “iCM Slaves”, together with iCM setpoints, settings and configuration of the management of the whole plant-room are displayed.
Daikin on Site provide monitoring and control of the plant-room through textual menus, and moreover it provides trending function and alarm monitoring of all the integrated variables.

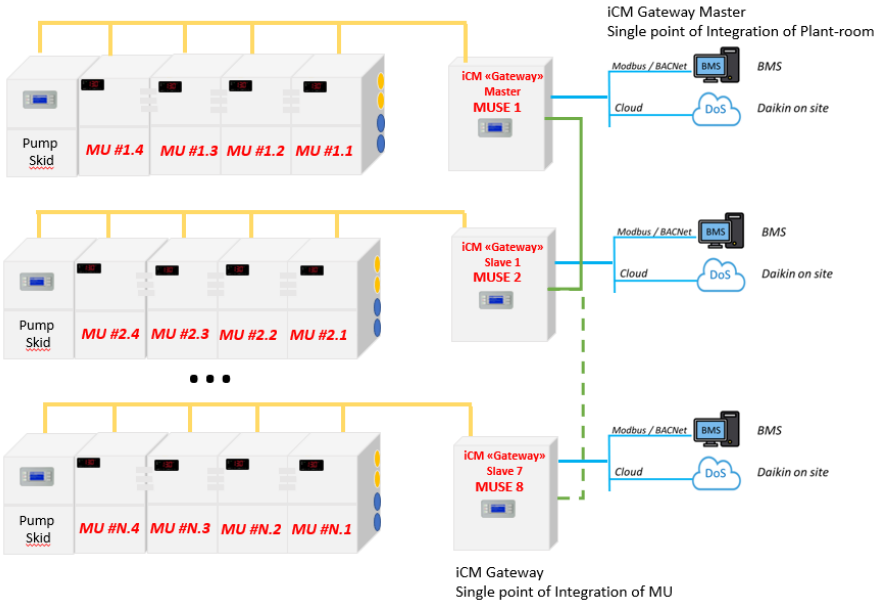


Figure 4 iCM Gtw as Single point of integration towards DoS or BMS

3 LICENSING

3.1 When license is needed

iCM Gtw panel has the “Option 184” (iCM Standard) automatically enabled.
At the same time, if Water-Cooled Screw units should be connected to the iCM Gtw, those must have software Option 184 licensed.

> For license management of Daikin Units, it is recommended to read the dedicated section "LICENSING" within Manual.

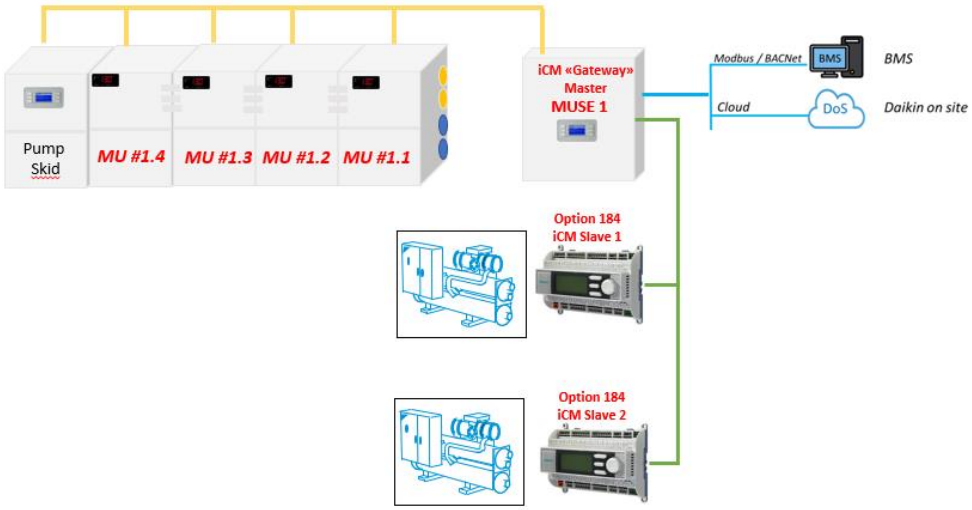


Figure 5 iCM Gtw and Water-Cooled Screw units' License

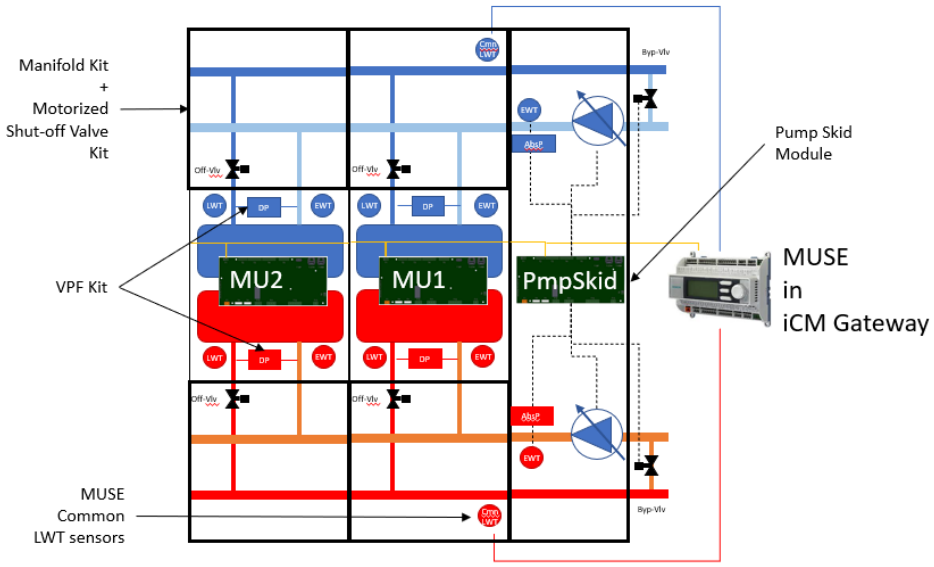
4 FIELD WIRINGS

4.1 iCM Gateway and managed Modular Water-Cooled Scroll Units

For an optimal management by iCM Gtw of the respective Modular units through MUSE function, it is recommended that the units are equipped with specific kits provided by Factory:

2. Common Leaving water temperature for Evaporator and Condenser supply pipes
3. Manifold Kit
4. Motorized Shut-off Valve Kit
5. VPF kit (only in case of variable flow management)
6. Pump Skid Module (only in case of dedicated pump management)

The picture below shows the recommended Modular units design in cases of Pump skid module:



4.2 iCM Gateway Communication Networks

iCM Gtw controller has two type of communication:

- MUSE network: based on Modbus RTU / RS485. to be connected with Water-Cooled Modular Units and Pump Skid Controller
- DCN: based on P2P, Daikin Communication Network: to be connected to other iCM Gtw Panels or Water-Cooled Screw controllers

4.2.1 MUSE Communication Network connection

The following diagram shows how to connect iCM Gtw controller to Modular WC Scroll unit controllers and/or Pump skid controller.

> Please refer to the wiring diagram of the Modular unit or Pump Skid controller to retrieve the correct enumeration of the Terminals.

Starting from iCM Gtw controller, the RS485 terminals [Ref1, A+, B-] of each controller must be connected in parallel.

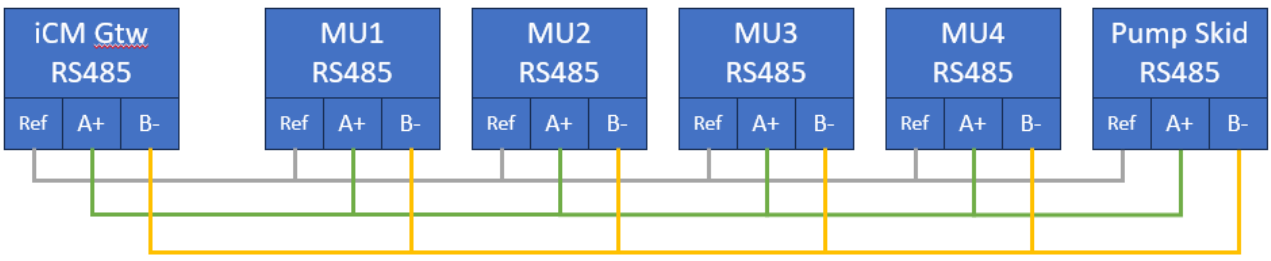


Figure 6 MUSE Communication Network

Do not connect additional devices to this network except of Modular Unit or Pump Skid Controller

It is important to respect the below limitation to avoid instability in the communication network:

- Twisted and Shielded 3-wire cable
- Bus cable length between 2 Units Max. 700 m
- Total bus cable length Max. 1,000 m

4.2.2 Daikin Communication Network connection

The following diagram shows how to connect the iCM Gtw Controller and/or Daikin Unit controller to each other to establish the Daikin communication Network. Starting from first iCM Gtw panel, connect in parallel the PB terminals [CE+ / CE-] of every controller.

Please refer to the wiring diagram of the iCM Gtw and Daikin unit controller retrieve the correct enumeration of the Terminals.

A shielded twisted pair cable must be used to make the connection.

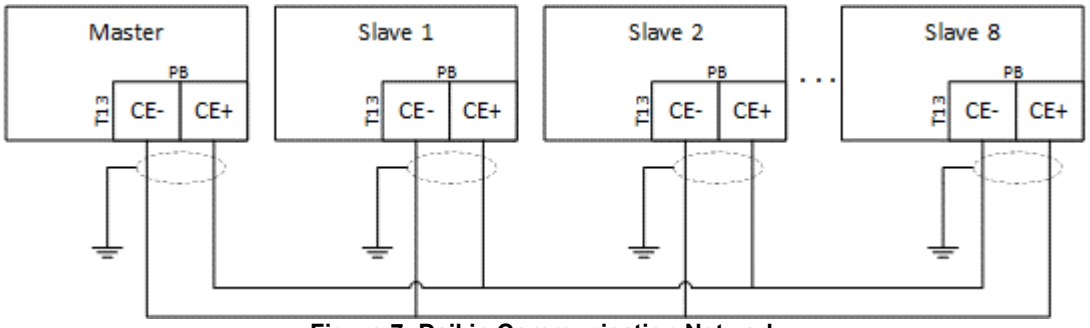


Figure 7: Daikin Communication Network

It is important to respect the below limitation to avoid instability in the communication network:

- Twisted and Shielded 2-wire cable
- Bus cable length between 2 Units Max. 700 m
- Total bus cable length Max. 1,000 m

4.3 Common water temperature sensors

As explained in par. 2.3 Possible configurations, iCM Gtw panel contains the logic of MUSE and logic of iCM. According to

1) configuration of iCM Gtw as “iCM Master” or “iCM Slave”
2) configuration of the Modular units to be managed by MUSE,

a certain number of temperature sensors must be connected to controller.

Option	MUSE Evap LWT	MUSE Cond LWT	iCM Evap LWT	iCM Evap EWT	iCM Cond LWT	iCM Cond EWT
iCM Gtw for EWWT-Q “Master” (Only chiller mode)	M	M	M	M	✓	✓
iCM Gtw for EWWT-Q “Master” (chiller and heat pump mode)	M	M	M	M	M	M
iCM Gtw for EWHT-Q “Master” (Refrigerant inversion)	M	✓	M	M	✓	✓
iCM Gtw for EWLT-Q “Master” (Condenser-less)	M	×	M	M	×	×
iCM Gtw for EWWT-Q “Slave” (Only chiller)	M	M	×	×	×	×
iCM Gtw for EWWT-Q “Slave” (chiller and heat pump mode)	M	M	×	×	×	×
iCM Gtw for EWHT-Q “Slave” (Refrigerant inversion)	M	✓	×	×	×	×
iCM Gtw for EWLT-Q “Slave” (Condenser-less)	M	×	×	×	×	×

Table 3 Common water temperature in plant room

Configurations with the “M” highlights that installation of the sensors are mandatory.

Type of sensors that can be used are:

- Daikin NTC10K (with a beta of 3977), that can be bought as an “accessory” of the Daikin unit in the material request
- Generic PT1000 sensors.

Please refer to the iCM Gtw Wiring Diagram for the connection to the correct terminal.

These sensors must be installed in a proper position:

1. Regarding Supply / Return water temperatures of the system (connected to iCM Gtw “Master”), the sensor must be installed upstream an eventual bypass pipe or tank or common header that decouple primary circuit from secondary circuit.
2. Regarding Supply Evaporator /Condenser temperatures of Multi-Modular Units (managed by iCM Gtw through MUSE), the sensors must be installed in the respective tube wells already mounted in “Manifold Module”.

Please refer to the IOM of the Modular Water-Cooled Scroll unit and Manifold Module.

Below picture shows the recommended position of the System temperature sensors:

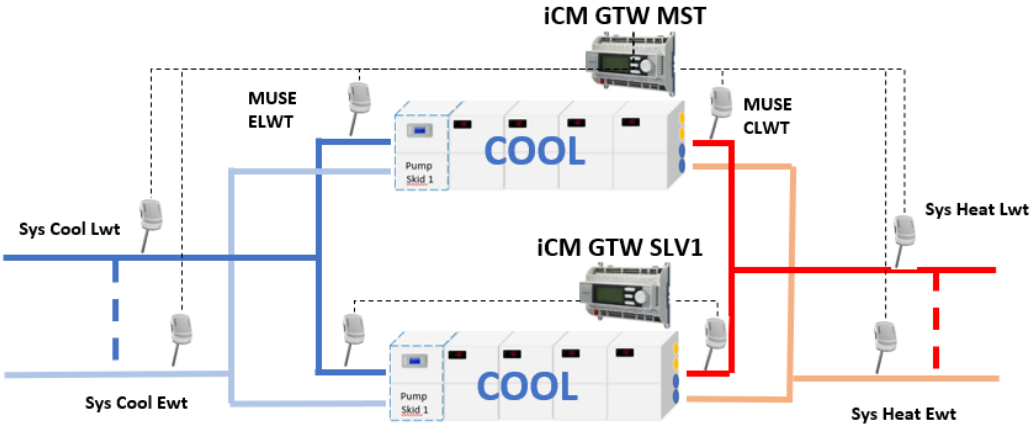


Figure 8 – MUSE and ICM temperature installation position for EWWT-Q

4.4 System Variable primary flow with Pump Skid

iCM Gtw has an embedded Variable Primary Flow function able to manage the speed of the primary pumps according to a Differential Pressure sensor to assure the correct flow to the building, and to manage the opening of the by-pass valve to assure minimum flow to running units.

Only on iCM Gtw “Master” controller, By-pass valve actuator and Differential pressure sensor on the building must be connected:

1. “Load Differential pressure”: 0…10Vdc Input Signal to gather the measurement of the sensor (controller provides 24Vdc for power supply)
2. “By-pass Valve Request”: 0…10Vdc Analog Output to command the closing/opening of the valve actuator.

Load Differential Pressure sensor and By-pass Valve actuator and body are not part of Factory provision

Please refer to the iCM Gateway Wiring diagrams for a correct hardwired connection of the equipment to the controller terminals.
The equipment installation and connection to Daikin units is shown in the following picture:

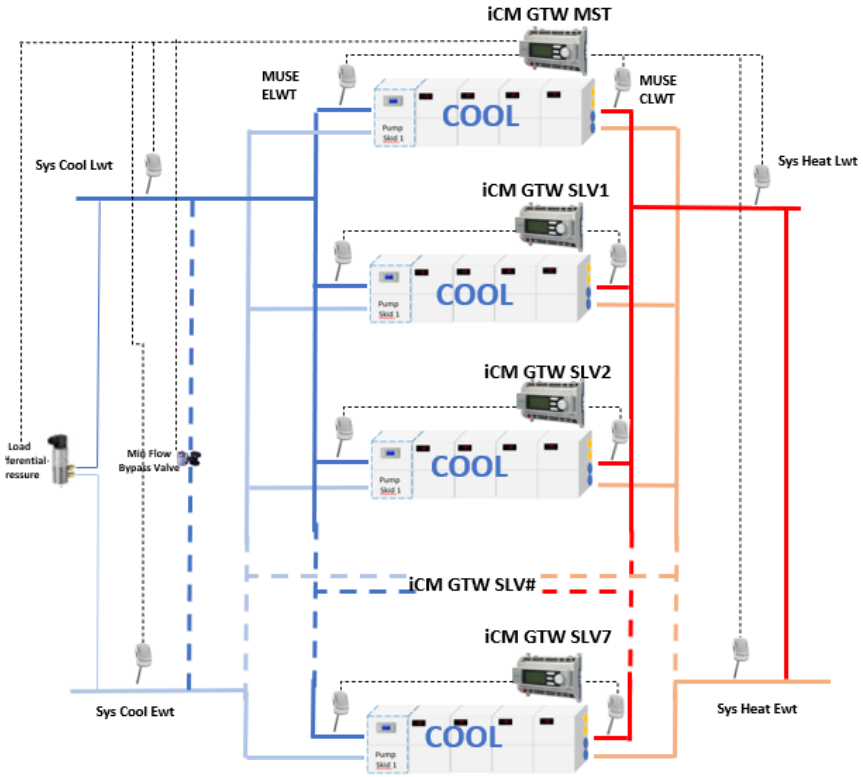


Figure 9 - Variable Flow based on DP in primary system with Modular units with Pump Skid

EWWT-Q or EWHT-Q composing the MUSE subsystem must be equipped with

1) "VPF Kit": the Kit offers two differential pressure sensors already mounted on evaporator and condenser exchangers.to detect "Minimum Pressure Drop Alarm" on the exchanger.
2) Manifold Kit with Motorized valve

Each MUSE subsystem must be equipped with Pump Skid to manage the pumps and prevent over pressure on the exchanger of the Modular units.

4.5 System Variable primary flow with manifolded pump: Intelligent Primary Pump Manager

In plant-rooms with manifolded piping, intelligent Pump Manager can manage the primary pumps and variable primary flow, in conjunction with iCM Gtw panels.
In those plant-rooms:

1. iPM will manage all the equipment related to water distribution:
   - VFD pump
   - Bypass Valve
   - Load Differential pressure
2. No Pump Skid must be connected to iCM Gtw
3. Each Modular unit must be equipped with "VPF Kit" to measure the Evaporator/Condenser Differential Pressure
4. Each Modular unit must be equipped with Manifold Module and Motorized Shut-off Valve kit

The following picture shows the hardwired connections to iPM and Daikin units:

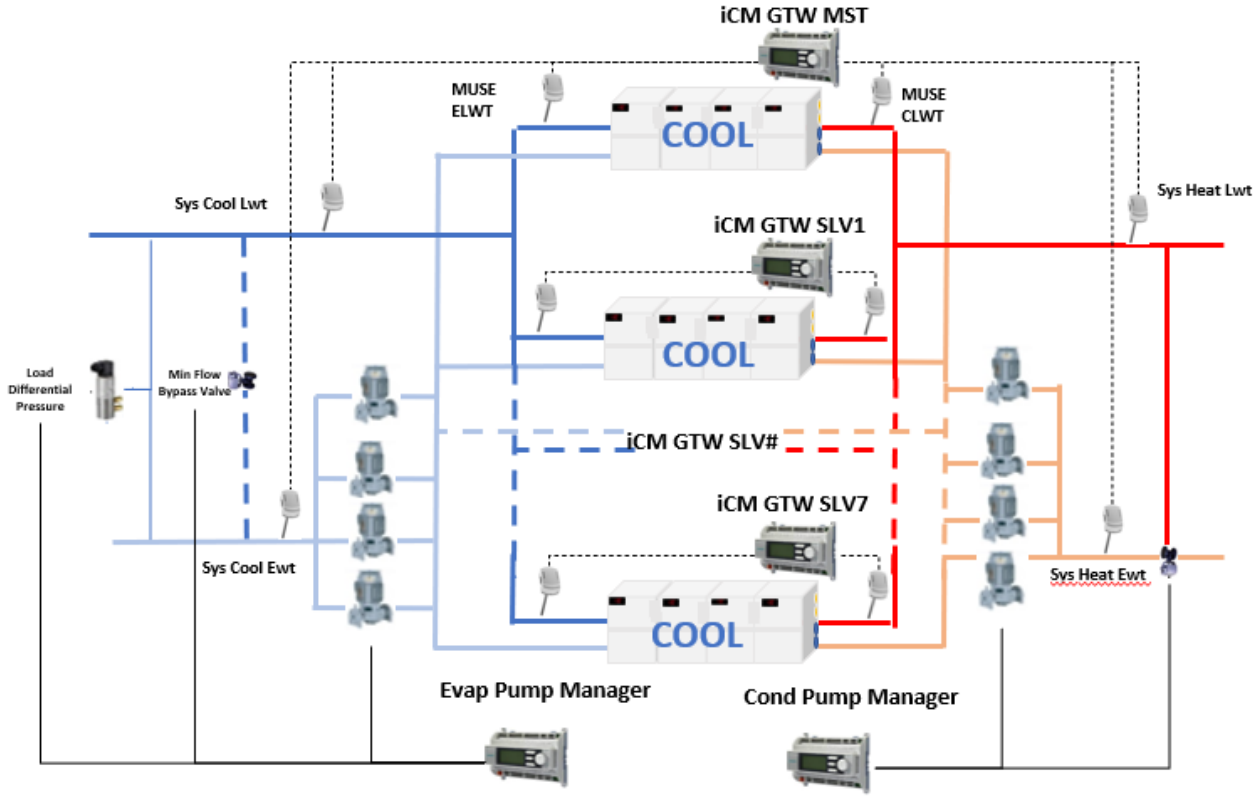


Figure 10 - Variable Primary Flow on Evaporator side with iCM Gtw and iPM

5 HMI DESCRIPTION

5.1 Introduction

The following sections will go into the configuration and navigation of iCM Gtw. All the menu and submenu will be described in terms of purpose and contents. All the pages will be described in terms of parameters and settings. The two classes can be easily identified referring to the below table.

Description	Default	Range and function	AL
This is a parameter	7.6°C	-15.0°C…30.0°C This is a parameter	4
This is a setting	2	iCM: 2…8	2
This is a link to a subpage	u		4

Table 4: Example of parameter and setting representation

The description of any setting or parameter will also include the required Access Level (AL). Access level is defined by the password entered to access the different menus of the Microtech© 4. Please refer to the Unit's Operating Manual for more details.
Access levels are the following:

AL	Profile	Access rights
6	Basic user	Limited access to settings and parameters
4	Trained user	extended access to settings and parameters
2	Service	full access to configuration, settings and parameters

Table 5:Access levels

Some of the settings for the lower profile users can be limited to read only but can be changeable with a higher access level.

5.1.1 Web HMI Introduction

Before explaining the details of various menus, is necessary to make a differentiation between writable and read-only variables.

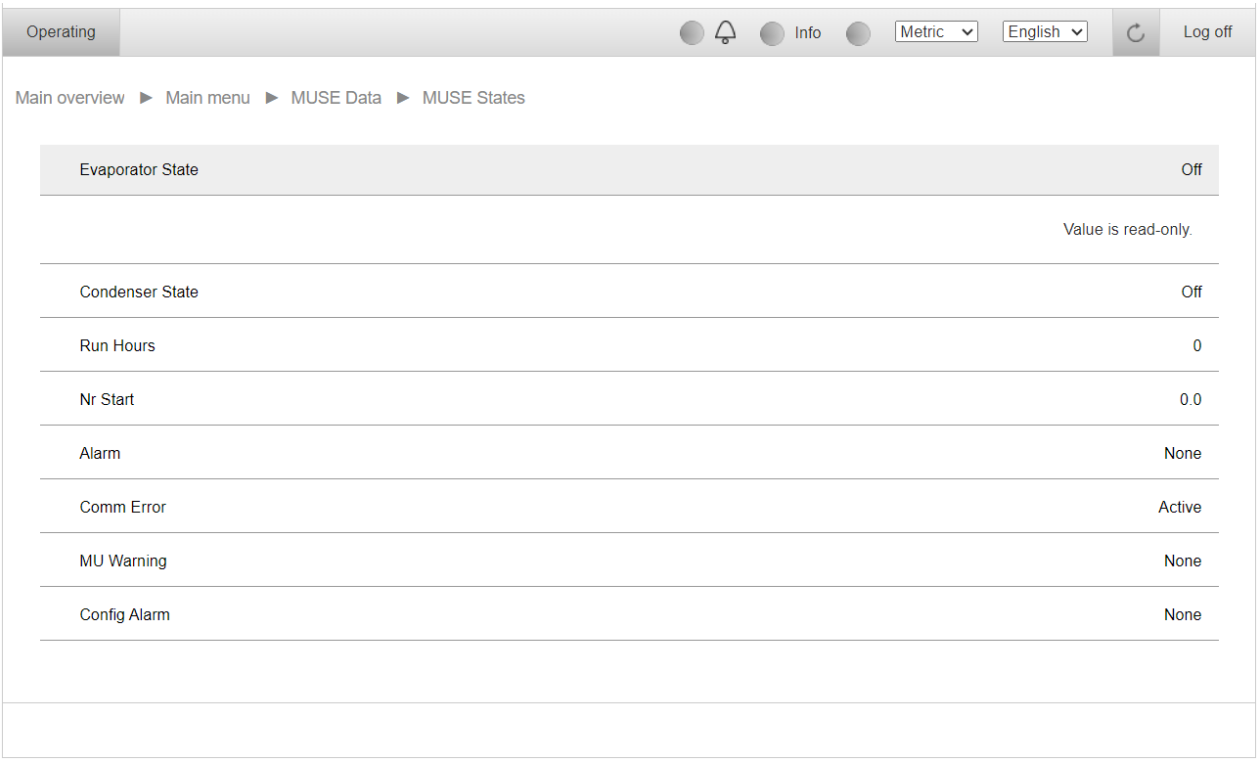


Figure 11: Read-only value in Web HMI

A ready-only value is not editable. These values represent monitoring data, it is possible recognize them by the label "Value is read-only".

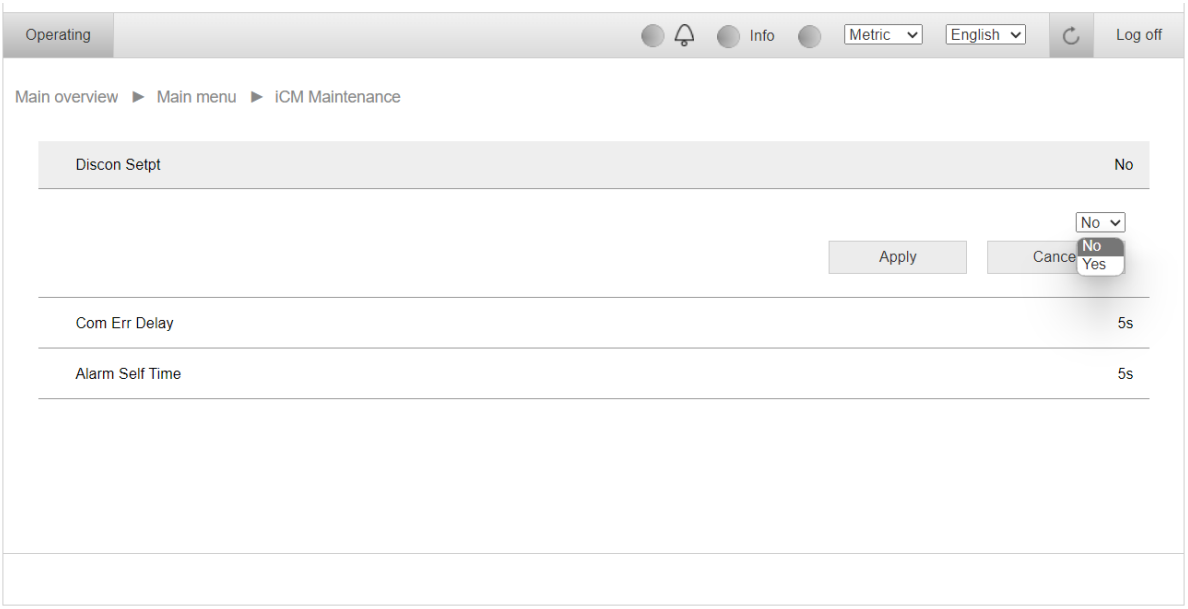


Figure 12: Writable value in Web HMI

A writable value is editable via the drop-down. In case of numeric value is mandatory to set a value between the lower bound limit and the upper bound limit.

5.2 Main Overview

The Main Overview contains the link to Main Menu page and a data display list regarding the status of the system.

5.3 Main Menu

The Main Menu contains the links to all configuration and visualization pages. The following table will list all the sections and the related contents.

Section	Content	AL
MUSE Data	MUSE Data menu contains data on the MUSE subsystem and data on each modular unit connected to the system.	
iCM Data	iCM Data menu contains data on the iCM system and data on each water-cooled unit connected to the iCM.	
Evap Speed Ctrl	Menu contains data and setpoint about the Dedicated Evaporator Speed Control embedded in each iCM Gtw Controller	
Cond Speed Ctrl	Menu contains data and setpoint about the Dedicated Condenser Speed Control, embedded in each iCM Gtw Controller	
Evap iPM Data	Menu contains data and setpoint exchanged between iCM Gtw Master and Pump Manager controller that manage Manifold Evaporator Pumps	
Cond iPM Data	Menu contains data and setpoint exchanged between iCM Gtw Master and Pump Manager controller that manage Manifold Condenser Pumps	
iCT Data	Menu contains data and setpoint exchanged between iCM Gtw Master and Cooling Tower manager (inside Condenser Pump manager controller)	
iSM Data	Menu contains the data about the Secondary Pump Manager communicated by iSM to iCM Gtw Master	
iCM Setting	iCM Setting menu allows to define all the settings for Intelligent Chiller Manager logic	
iCM Maintenance	iCM Maintenance menu allows to define the limit values of delays and offsets about iCM parameters	
MUSE Setting	MUSE Setting menu allows to define all the settings for Modular Unit SEquencer	
MUSE Maintenance	MUSE Maintenance menu allows to define the limit values of delays and offsets about MUSE parameters	
Alarming	Display page of active alarms and alarm history	
Configuration	Configuration menu allows to set the MUSE, iCM, iPM configuration parameters. It also possible configure the touch panel	
Controller SetUp	Controller SetUp menu allows to set the controller IP address and the parameters about BACnet and Modbus communication	
Controller Info	Controller Info contains the software version and the information about the plant	

Table 6: Main Menu

5.4 **MUSE Data**

This section will describe the parameters accessible in the MUSE Data page. It will also describe the links to other sub-sections.

Description	Default	Range and function	AL
Status	Off	Off, Start, WaitLoad, Run, Run-WrngAlm, Off-WrngAlm, Off-ShutAlm, Discon, Off-PmpAlm	6
This is the general MUSE subsystem status. - Off-ByMaster: the MUSE subsystem is disabled by iCM Gtw Master Logic - Off-RemSwi: the MUSE subsystem is disabled by Remote switch on iCM Gtw panel - Off-bySetp: the MUSE subsystem is disabled through Enable Setpoint by HMI or by BMS - Start: the MUSE subsystem is starting - WaitLoad: the MUSE subsystem is waiting for load - Run: the MUSE subsystem is running - Run-WrngAlm: the MUSE subsystem is running but there is an alarm on at least one unit - Off-WrngAlm: the MUSE subsystem is off and there is an alarm on at least one unit - Off-ShutAlm: the MUSE subsystem is off and there is at least one alarm on all units - Discon: MUSE is disconnected from iCM logic - Off-PmpAlm: the MUSE subsystem is off and Pump Skid is in alarm			
Running	Off	Off, On	6
This shows the MUSE Subsystem Running state (if at least one modular unit is running). A link from this data will show a page with additional information related to the status of MUSE, such as evaporator state, condenser state, run hours, number of starts, alarm.			
Load	0%	0…100%	6
This is the average of Capacity of running Modular Unit on the total number of configurated Modular Units.			
Enabled	Off	Off, On	6
This is set to On if: - Enabled by setpoint on “MUSE Setpoint” menu - Enabled by iCM Gtw Master A link from this data will show a page with additional information related to local/network setpoints.			
Act Mode	Cool	Cool, Ice, Heat	6
This the actual MUSE operating mode, received by iCM Gtw Master. A link from this data will show a page with additional information related to local/network setpoints.			
Act Setpoint	-.-°C		6
This is the actual value of controlled temperature setpoint for MUSE, received by iCM Gtw Master. For water cooled heat pump, this could be Cool Setpoint or Heat Setpoint according to System operating mode. A link from this data will show a page with additional information related to local/network setpoints.			
Evap LWT	-.-°C		6
This is the actual value of the Common Evaporator Leaving Water Temperature of the MUSE subsystem.			
Cond LWT	-.-°C		6
This is the actual value of the Common Condenser heated water temperature MUSE subsystem.			
Control Temp	-.-°C		6
This is the actual value of the controlled temperature. It may change according to the Unit mode (Cool or Heat).			
Next On	-	MU1, MU2, MU3, MU4	6
This is the elected next on Unit.			
Next Off	-	MU1, MU2, MU3, MU4	6
This is the elected next off Unit.			
Stg Up Time Left	0s		6
This is the average of Capacity of running unit on the total number of Units.			
Stg Dwn Time Left	0s		6
This is the time left before the next stage down of the Next Off Modular Unit.			
Clear Timer	Off	Off, Reset	6
This allows to reset the Stage down and Stage Up inhibition timers.			
Clear Alarm MUs	Off	Off, On	6
This allows to reset alarms on all Modular Units			
MU1	Off	Off, Run, NotAvail, Alm, Stdaln, ComErr	6
This is the status of Modular Unit #. A link from this data will show a page with additional information related to Modular Unit #. - Off: the Modular Unit is off - Run: the Modular Unit is running - NotAvail: the Modular Unit in not available and stopped by MUSE - Alm: the Modular Unit is in alarm - Stdaln: the Modular unit work independently from MUSE logic - ComErr: the Modular Unit is in communication error			
MU2	Off	Off, Run, NotAvail, Alm, Stdaln, ComErr	6
MU3	Off	Off, Run, NotAvail, Alm, Stdaln, ComErr	6
MU4	Off	Off, Run, NotAvail, Alm, Stdaln, ComErr	6

Pump Skid			6
A link from this data will show a page with additional information related to Pump Skid.			

Table 7: MUSE Data parameters

Following is some detailed information on some states of the modular units.

- "Not Available": the Modular Unit is stopped by MUSE, for one of the following conditions:
  - "Unit Switch" Input or all the "Compressor Switch" on unit MU panel are turned OFF.
  - MU is disabled by Local Enable Setpoint on MU HMI
  - MU is set with "Operation Mode" (Cool/Heat), different from MUSE Operation Mode.
- "Standalone": Modular Unit is set in "Disconnect" by MU HMI. MUSE considers the MU out of sequencing and staging control and MU works independently from MUSE. Those MUs can be managed by MU controller itself.

If MUSE is set in the "MUSE maintenance → Discon Setp"= TRUE, all the Modular Units will work independently from MUSE.

- "Communication Error": the Modular Unit is not communicating with the MUSE and requires actions to re-establish a proper communication. When a Modular Unit is in communication error, it will run autonomously and in Standalone mode. Please refer to the **Troubleshooting section** for further details.

5.4.1 MUSE: States

This section will list the additional current data status of MUSE.

Description	Default	Range and function	AL
Evaporator State	Off	Off, Start, Run	6
This shows the Evaporator State:			
Condenser State	Off	Off, Start, Run	6
This shows the Condenser State			
Run Hours	0	0…4294967295	6
This shows the running run hours of the MUSE subsystem			
Nr Start	0	0…4294967295	6
This shows the number of starts of the MUSE subsystem			
Alarm	None	None, Active	6
This shows shutdown alarm, this is caused if all configured units are simultaneously in alarm			
Comm Error	None	None, Active	6
This shows is if at least one Modular Units is in communication error			
MU Warning	None	None, Active	6
This shows is if at least one Modular Units is in alarm			
Config Alarm	None	None, Active	6
This shows the MUSE configuration Alarm			

Table 8: MUSE - States overview

5.4.2 MUSE: Setpoints

This section will list the current setpoints configured for the MUSE logic. Some of these setpoints are communicated from MUSE to the Modular Units connected to it and are used in the unit logic.

Description	Default	Range and function	AL
Ctrl Source	Loc	Loc, Ntwk	6
This allows to set the Control Source type - Local: From iCM Gtw/MUSE HMI - Network: received by BMS, evenutally connected via BACnet or Modbus communication			
Enable Setpoint	Off	Off, On	6
This variable is set ON if all the following condition are achieved: - Remote switch on iCM Gtw Panel is turned ON. - Local Setpoint is set ON - Network setpoint is set ON by BMS and Control Source is Network A link from this data will show a page with additional information related to local/network setpoints.			
Remote Switch	Off	Off, On	6
This shows the Remote Switch state on the iCM Gtw Panel			
Local Setp	Off	Off, On	6
Enable setpoint from HMI			
Network Setp	Off	Off, On	6
Enable setpoint sent by BMS when MUSE is in Control Source = Network			
Mode Sp	Cool	Cool, Ice, Heat	6
This value shows the operating mode set on MUSE. - If Control Source = Local, it depends on Cool/Heat Switch on iCM Gtw Panel - If Control Source = Network, it depends on Network Setpoint			

Cool-Heat Switch	Cool	Cool, Heat	6
This shows the Cool-Heat switch state			
Network Setp	Cool	Cool, Ice, Heat	6
Operating mode sent by BMS when MUSE is in Control Source = Network			
Cool Setp	-.-°C		6
This shows the Cool temperature set on MUSE: - If Control Source = Local, it depends on Local Setpoint - If Control Source = Network, it depends on Network Setpoint			
Local Setp	-.-°C		6
Cool temperature setpoint from Local HMI			
Network Setp	-.-°C		6
Cool temperature setpoint sent by BMS when MUSE is in Control Source = Network			
Heat Setp	-.-°C		6
This shows the Heat temperature set on MUSE: - If Control Source = Local, it depends on Local Setpoint - If Control Source = Network, it depends on Network Setpoint			
Local Setp	-.-°C		6
Heat temperature setpoint from Local HMI			
Network Setp	-.-°C		6
Heat temperature setpoint sent by BMS when MUSE is in Control Source = Network			
Demand Lim Setp	0%	0%,…, 100%	6
This shows the Demand Limit setpoint set on MUSE - If Control Source = Local, it depends on Local Setpoint - If Control Source = Network, it depends on Network Setpoint			
Local Setp	0%	0%,…, 100%	6
Demand Limit setpoint from Local HMI			
Network Setp	0%	0%,…, 100%	6
Demand Limit setpoint sent by BMS when MUSE is in Control Source = Network			

Table 9: MUSE - setpoints overview

The aforementioned setpoints are active on MUSE logic only if the iCM Gtw is set in "Discon Mode" in the Menu: "iCM Maintenance →Discon Setpoint".
Otherwise, MUSE uses the setpoints received by iCM Gtw Master

5.4.3 MUSE: Sensor

This section lists the current water temperature data read from the evaporator/condenser entering sensors.

Description	Default	Range and function	AL
Evap EWT	-.-°C		6
This shows the Evaporator Entering Water Temperature (Average Value of Running MU)			
Cond EWT	-.-°C		6
This shows the Condenser Entering Water Temperature (Average Value of Running MU)			

Table 10: MUSE - sensor overview

5.4.4 MUSE: Modular Unit # data

This section will list the data received from the Modular Unit connected to MUSE logic.
# indicates the index of Modular Unit, # can be assume the value 1,2,3,4.

Description	Default	Range and function	AL
Op State	Stop	Stop, Run	6
This shows the operating state			
Enable Cmd	Off	Off, On	6
This show the command sent to Modular Unit			
Act Mode	Cool	Cool, Ice, Heat, Test, Pursuit	6
This shows the actual operating mode			
Load	0%	0,…, 100%	6
This shows the actual capacity			
ELWT	-.-°C		6
This shows the Evaporator Leaving Water Temperature of			
EEWT	-.-°C		6
This shows the Evaporator Entering Water Temperature			
CLWT	-.-°C		6
This shows the Condenser Leaving Water Temperature			
CEWT	-.-°C		6
This shows the Condenser Entering Water Temperature			
Run Hours	0	0…4294967295	6

This shows the operating hours			
Nr Start	0	0…4294967295	6
This shows the number of starts			

Table 11: MUSE - Modular Unit # data

5.4.5 MUSE: Pump Skid

This section will list the Pump Skid data.

Description	Default	Range and function	AL
Evap Op Sta	Stop	Stop, Run	6
This shows the Evaporator Pump Operating State			
Evap Shut Alarm	None	None, Active	6
This shows the Evaporator Pump Shutdown Alarm			
Cond Op Sta	Stop	Stop, Run	6
This shows the Condenser Pump Operating State			
Cond Shut Alarm	None	None, Active	6
This shows the Condenser Pump Shutdown Alarm			

Table 12: MUSE – Pump Skid data

5.5 iCM Data

This menu and all the sub menus display only on iCM Gtw configured a Master

This section will describe the parameters accessible in the iCM Data page.
It will also describe the links to other sub-sections.

Description	Default	Range and function	AL
System Run	Off	Off, On	6
This is the system status.			
Nr Run Units	0	0,…, 8	6
This is the number of Units in run			
Sys Capacity	0%	0…100%	6
This is the average of Capacity of running unit on the total number of Units.			
Enable Setpoint	Off	Off, On	6
This is set to On if enabling from the control source and remote switch are enabled. A link from this data will shows a page with additional information related to local/network setpoints.			
Mode Sp	Cool	Cool, Ice, Heat, Multi	6
This the actual System operating mode. It's defined by operating mode of the Master. Multi is not available in iCM Gtw. A link from this data will shows a page with additional information related to local/network setpoints.			
Act Setpoint	-.-°C		6
This is the actual value of setpoint for the system. It may change according to System mode. For water cooled heat pump, this could be Hot Setpoint or Cool Setpoint according to System operating mode. A link from this data will shows a page with additional information related to local/network setpoints.			
Staging			
Control Temp	-.-°C		6
This is the actual value of the controlled temperature. It may change according to the Unit mode (Cool or Heat). For a water-cooled heat pump unit it may change if operating in Cool mode (evaporator side) or Heat mode (condenser side).			
Control Heat Temp	-.-°C		6
This is the actual value of the Heat controlled temperature. It is enabled only if at least one water cooled heat pump is configured.			
Next On	-	Master, Slave1,…, Slave7	6
This is the elected next on Unit.			
Next Off	-	Master, Slave1,…, Slave7	6
This is the elected next off Unit.			
Stg Up Time Left	0s		6
This is the time left before the next stage up of the Next On Unit.			
Stg Dwn Time Left	0s		6
This is the time left before the next stage down of the Next Off Unit.			
Clear Timer	Off	Off, Reset	6
This allows to reset the Stage down and Stage Up inhibition timers.			
Standby Unit	-		6
This shows the actual Unit in standby mode			

Demand Limit Op Sta	No	No, Yes	6
This is the Demand Limit Operating System.			
Cmn LWT	-.-°C	Off, Run, NotAvail, Alm, Stdaln, ComErr	6
System Common Leaving Water Temperature. A link from this data will show a page with additional information related to iCM temperature sensors.			
ClearAlarm Units	Off	Off, On	6
This allows to reset the alarms on all Units			
Master	Off	Off, Run, Alarm, ComErr, N/Avail, N/Cfgd	6
This shows the Master operating status.			
Slave #	Off	Off, Run, Alarm, ComErr, N/Avail, N/Cfgd	6
This shows the Slave # operating status. # can assume the value between 1 and 7.			

Table 13: iCM Data overview

iCM Gtw Master manages the embedded MUSE function of iCM Gtw Slaves as it was a single Unit. For simple explanation, in the following section the group of Modular units managed by each iCM Gtw Slave is referred as MUSE sub-system

The MUSE sub-system can assume the following values:

- Off: the MUSE sub-system (or WC Screw Unit) is currently Off
- Run: MUSE sub-system (or WC Screw Unit) is currently running
- Alarm: MUSE sub-system (or WC Screw Unit) has an active alarm
- ComErr: iCM Gtw Slave (or WC Screw Unit) is not communicating with iCM Gtw Master controller and requires actions to re-establish a proper communication. When iCM Gtw Slave is in communication error, the respective MUSE sub-systems run autonomously as in standalone mode. Please refer to the **Troubleshooting section** for further details.
- N/Av: MUSE sub-system (or WC Screw Unit) is "Not Available" and stopped by iCM
    - iCM Gtw "Slave" is enabled:
        - by Remote switch on panel
        - by Enable setpoint of MUSE on HMI
        - by Enable setpoint Network (By BMS)
        - all the "Circuit Switch" on Modular units' panel are turned OFF.
    - MUSE sub-system (or WC Screw Unit) has "Available Capacity" less than 5%, i.e. a shut-down alarm prevents unit from starting.
    - MUSE sub-system (or WC Screw Unit) is set with "Operation Mode" (Cool/Heat), different from iCM Gtw Master Operation Mode. (This is applicable only in case system composed by Heat-pump units or in mixed system with Heat-pump and Chiller units).
    - MUSE sub-system (or WC Screw Unit) is in Test Mode.
    - MUSE sub-system (or WC Screw Unit) is elected in "Stand-by" on iCM Gtw Master sequencing logic.

Each iCM Gtw panel can be set in "Standalone" mode through menu "iCM Maintenance → Discon Setp". When iCM Gtw is Standalone is considered "Not available for the sequencing and thermostatic control by iCM Gtw Master and the MUSE subsystem can be managed through MUSE menus, independently from plant-room management.

5.5.1 iCM: System Capacity

This section will list the actual system capacity by mode.

Description	Default	Range and function	AL
Sys Cooling Cap	0%	0,…, 100%	6
This shows the actual system cooling capacity			
Sys Heating Cap	0%	0,…, 100%	6
This shows the actual system heating capacity			

Table 14: iCM – System Capacity

5.5.2 iCM: Setpoints

This section will list the current setpoints on iCM Gtw Master to manage the plant-room.
Some of these setpoints are communicated from iCM Gtw Master to other iCM Gtw Slaves and respective MUSE sub-system.

Description	Default	Range and function	AL
Ctrl Source	Loc	Loc, Ntwk	6
This allows to set the Control Source type: - Local: setpoints set through iCM Gtw HMI - Network: setpoints set by an eventual BMS communicating in BACnet or Modbus protocol			

Enable Setpoint	Off	Off, On	6
This is set to On if all the following condition are satisfied - Enabled by Local Setpoint - Enable by network if the control source = Ntwk - Enabled by remote switch on iCM Gtw Master panel. A link from this data will show a page with additional information related to local/network setpoints.			
Remote Switch	Off	Off, On	6
This shows the Remote Switch state			
Local Setp	Off	Off, On	6
This setting allows to send setpoint for Enable Setpoint from Local HMI			
Network Setp	Off	Off, On	6
This value indicates the setpoint for Enable Setpoint sent by BMS if Control Source = Network			
Mode Sp	Cool	Cool, Ice, Heat	6
This shows the actual operating mode of iCM Gtw Master and consequently of Plant-room			
Cool-Heat Switch	Cool	Cool, Heat	6
This shows the Cool-Heat switch state of the iCM Gtw Panel			
Local Setp	Cool	Cool, Ice, Heat	6
This allows to set the actual mode setpoint operating mode setpoint from Local HMI			
Network Setp	Cool	Cool, Ice, Heat	6
This value indicates the actual mode setpoint sent by BMS if Control Source = Network			
Cool Setp	-.-˚C		6
This shows the actual cool temperature setpoint			
Local Setp	-.-˚C	-8.0˚C,…, 20.0˚C	6
This allows to set the actual cool temperature setpoint from Local HMI			
Network Setp	-.-˚C		6
This value indicates the actual cool temperature setpoint sent by BMS if Control Source = Network			
Heat Setp	-.-˚C		6
This shows the actual heat temperature setpoint			
Local Setp	-.-˚C	25.0˚C,…, 75.0˚C	6
This allows to set the actual heat temperature setpoint from Local HMI			
Network Setp	-.-˚C		6
This value indicates the actual heat temperature setpoint sent by BMS if Control Source = Network			
Ice Setp	-.-˚C		6
This shows the actual ice temperature setpoint			
Local Setp	-.-˚C	-20.0˚C,…, 5.0˚C	6
This allows to set the actual ice temperature setpoint from Local HMI			
Network Setp	-.-˚C		6
This value indicates the actual ice temperature setpoint sent by BMS if Control Source = Network			
Demand Lim Setp	0%	0%,…, 100%	6
This shows the actual Demand Limit setpoint			
Local Setp	0%	0%,…, 100%	6
This allows to set the actual Demand Limit setpoint from Local HMI			
Network Setp	0%	0%,…, 100%	6
This value indicates the actual Demand Limit setpoint sent by BMS if Control Source = Network			

Table 15: iCM – Setpoints overview

5.5.3 iCM: Sensor

This section lists the current Common Entering/Leaving water temperature data and the outside air temperature read from the sensors.

Description	Default	Range and function	AL
Cmn EWT	-.-˚C		6
This shows the actual System Entering Water Temperature			
Cmn Heat LWT	-.-˚C		6
This shows the actual System Heat Leaving Water Temperature			
Cmn Heat EWT	-.-˚C		6
This shows the actual System Heat Entering Water Temperature			
Outside Air Temp	-.-˚C		6
This shows the actual Outside Air Temperature			

Table 16: iCM – Sensor overview

5.5.4 Slave # data

This section will list the data received from the Slave # Unit connected to iCM Gtw master.
# indicates the index of Unit, # can be assume the value 1,2,3,4,5,6,7.

Slave# Data are the information gathered by iCM Gtw Master from the MUSE sub-system inside the other iCM Gtw controller configured as “Slave”

It will also describe the links to other sub-sections.

Description	Default	Range and function	AL
Op Sta	Stop	Stop, Run	6
This shows the actual operating state. A link from this data will show a page with additional information related to Slave # states			
Act Mode	Cool	Cool, Ice, Heat, Test, Multi	6
This shows the actual operating mode. Multi mode is not available for iCM Gtw			
Act Capacity	0%	0,…, 100%	6
This shows the Slave # actual capacity.			
Act Setpoint	-.-°C		6
This shows the Slave # actual temperature setpoint. It may change according to System mode			
ELWT	-.-°C		6
This shows the Evaporator Leaving Water Temperature			
EEWT	-.-°C		6
This shows the Evaporator Entering Water Temperature			
CLWT	-.-°C		6
This shows the Condenser Leaving Water Temperature			
CEWT	-.-°C		6
This shows the Condenser Entering Water Temperature			
Rapid Restart State	No	No, Yes	6
This shoes the Rapid Restart State. Rapid Restart is enabled only if configured			
Clear Alarm	Off	Off, On	6
This allows to reset the Slave # alarms			
Slave # - Circuit1			6
A link that will show a page with additional information related to Circuit1 data			
Slave # - Circuit 2			6
A link that will show a page with additional information related to Circuit2 data			
Slave # Configuration			6
A link that will show a page with additional information related to configuration data			
Enable Cmd	Off	Off, On	6
This shows the unit On/Off command			
Mode Sp	Cool	Cool, Ice, Heat, N/A, Multi	6
This shows the actual operating mode setpoint. Multi mode is not available with iCM Gtw			

Table 17: iCM – Slave # data

5.5.4.1 Slave # – states

This section lists the current states received by iCM Gtw Master from the iCM Gtw Slaves #.
# indicates the index of Slave unit, # can be assume the value 1,2,3,4,5,6,7.

Description	Default	Range and function	AL
Availability	No	No, Yes	6
This shows if the unit is available			
Standalone	No	No, Yes	6
Unit, set in Standalone mode will work independently from iCM sequencing even if connected on Daikin Chiller network. Those Unit can be managed by Unit controller itself.			
Evaporator State	Off	Off, Start, Run	6
This value indicates the Evaporator operating state			
Condenser State	Off	Off, Start, Run	6
This value indicates the Condenser operating state			
Run Hours	0	0…4294967295	6
This shows the Unit operating hours			
Nr Start	0	0…4294967295	6
This shows the Unit number of start			
Alarm	None	None, InAlarm	6
This value indicates that an alarm occurred on Unit			
Comm Error	None	None, Active	6
This value shows if the Unit is in communication error with iCM			

Miss Alarm	None	None, Active	6
This alarm notifies that the present unit flag has not been configured			

Table 18: Slave # – states overview

5.5.4.2 Slave # – Circuit @

This section lists the current data about circuit # received by iCM Gtw Master from iCM Gtw Slaves.
# indicates the index of Slave unit, # can be assume the value 1,2,3,4,5,6,7.
@ indicates the index of circuit, @ can be assume the value 1 or 2.

Description	Default	Range and function	AL
Availability	No	No, Yes	6
This shows if the unit circuit is available			
Act Mode	Off	Water, Cool, Heat	6
This shows the circuit # actual operating mode. Water mode is not available in iCM Gtw configuration			
Act Capacity	0%	0,…, 100%	6
This shows the circuit # actual capacity			
Run Hours	0	0…4294967295	6
This shows the Unit Circuit # operating hours			
Nr Start	0	0…4294967295	6
This shows the Unit Circuit # number of start			

Table 19: Slave # – Circuit @ data overview

5.5.4.3 Slave# – Configuration

This section lists the current configuration data received by iCM Gtw from iCM Gtw Slaves.

Description	Default	Range and function	AL
Unit Type	0	0,…,16	6
This shows if the unit circuit is available			
iCM Option Type	iCMAdv	Mst/Slv, iCMstd, iCMAdv	6
This shows the configured unit iCM Option. Only iCMstd is available with iCM Gtw configuration			
Nr Circuit	0	0, 1, 2, 3	6
This shows the number of configured circuits			
Energy Mon config	No	No, Yes	6
This shows if the energy monitoring is configured			

Table 20: Slave # – Configuration data overview

5.6 Dedicated Evap/Cond Pump Speed Control

This section lists the current data about the Evaporator Pump Speed Control function embedded in iCM Gtw Logic.
This menu displays only if iCM Gtw is configured to manage Speed of the Pump Skid for MUSE sub-system or of dedicated VFD pump of WC Screw units.
The Evaporator and Condenser Pump Speed Control share the same logics and menus, for this reason only Evaporator Speed Control will be explained.
It will also describe the links to other sub-sections.

Description	Default	Range and function	AL
Exch Type	AC Evap	AC Evap, WC Evap, WC Cond	6
- WC Evap: Only Cooling - WC Cond: Only Heating			
Speed	0%	0, …, 100%	6
This shows the pump actual speed. - on iCM Gtw Master, calculated according to Speed Control Configuration/Settings - on iCM Gtw Slave received by iCM Gtw Master A link that will show a page with additional maintenance data related to evaporator pump speed			
BypValve Cmd	Close	Close, Open	6
This shows the bypass valve opening request received by MUSE sub-system on each iCM Gtw Slave and sent to iCM Gtw Master			
BypValve Opening	0%	0, …, 100%	6
This shows the percentage of bypass valve opening only on iCM Gtw Master			
Dif Press	-.- kPa		6
This shows the evaporator differential pressure connected only to iCM Gtw Master and if “Configuration→Evap Ctrl Type”=VPF			
Dpres Setp	-.- kPa		6
This shows the evaporator differential pressure setpoint only on iCM Gtw Master and if “Configuration→Evap Ctrl Type”=VPF A link that will show a page with additional setpoints related to evaporator pump speed			
Delta Temp	-.-°Dc		6

This shows the evaporator differential temperature setpoint only on iCM Gtw Master and if "Configuration→Evap Ctrl Type"=VarDT			
Dtemp Setp	-.-°Dc		6
This shows the evaporator differential temperature setpoint only on iCM Gtw Master and if "Configuration→Evap Ctrl Type"=VarDT A link that will show a page with additional setpoints related to evaporator pump speed			
Evap Speed Settings	▶		6
A link that will show a page with additional settings related to evaporator pump speed			

Table 21: Evaporator Pump speed control overview

5.6.1 Evaporator Pump Speed Control – Maintenance

This section lists the current maintenance settings about the Evaporator Pump Speed Control.
Some Settings are displayed on iCM Gtw configured both as Master and Slave. Some other are shown only on iCm Gtw Master.

Description	Default	Range and function	AL
Backup Speed	50%	0, …, 100%	
This allows to set the backup speed and it displays only if "Configuration→Evap Ctrl Type"=VPF or VarDT			
Fix Stanby Speed	50%	0, …, 100%	
This allows to set the backup speed and it displays only if "Configuration→Evap Ctrl Type"=Fixed			
Manual Selector	Auto	Auto, Manual	6
This allows to manually change the speed of the pump and position of the Bypass Valve on iCM Gtw Master and consequently on all iCM Gtw Slaves			
Manual Speed	0%	0, …, 100%	6
This allows to set the manual speed value on iCM Gtw Master and consequently on all iCM Gtw Slaves			
Valve Manual	Closed	Closed, Opened	6
This allows to select the bypass valve manual command value on iCM Gtw Master and consequently on all iCM Gtw Slaves			
Manual Position	0%	0, …, 100%	6
This allows to set the bypass valve manual position value on iCM Gtw Master and consequently on all iCM Gtw Slaves			
Dif Press	-.- kPa		6
This shows the actual differential pressure value. It displays only on iCM Gtw Master			
Offset	0kPa	-100kPa… 100kPa	6
This allows to set the offset value related to pressure sensor. It displays only on iCM Gtw Master			
Max Scale	150kPa	0kPa… 1000kPa	6
This allows to select the maximum scale value related to pressure sensor. It displays only on iCM Gtw Master			
Min Scale	0kPa	-100kPa… 50kPa	6
This allows to set the minimum scale value related to pressure sensor. It displays only on iCM Gtw Master			
Raw Value			6
This shows the raw input value related to pressure sensor. It displays only on iCM Gtw Master			

Table 22: Evaporator Pump Speed Control – Maintenance overview

5.6.1.1 Backup Speed And Fixed Speed

The value of Back-up speed will be used in the following situation:

5. An alarm occurs on the Controlled sensor (Field Differential Pressure sensor or System Temperature Sensor) connected to iCM Gtw Master
6. Exchanger side is not controlled as Primary Side of the Water-Cooled Plant-room, according to System Mode setpoint
   - In Cool mode: Primary exchanger is evaporator side and calculated speed is used; whereas Condenser side is commanded with "Back-up Speed"
   - In Heat mode: Primary exchanger is condenser side and calculated speed is used; whereas Evaporator side is commanded with "Back-up Speed"
7. iCM Gtw Slave is set in Standalone mode, working independently by Dedicated Pump Speed Control of iCM Gtw Master

The value of Fixed Stand-by Speed will be used in the following situation:

8. iCM Gtw Slave is set in Standalone mode, working independently by Dedicated Pump Speed Control of iCM Gtw Master

5.6.2 Evaporator Pump Speed Control – Setpoint

This section lists the current setpoint about the Evaporator Pump Speed Control.

This menu will display only on iCM Gtw configured a Master

Description	Default	Range and function	AL
Dpres Setp	-.- kPa		6
This shows the actual differential pressure setpoint			
Local Setp	300kPa	LoLim,…, HiLim	6
This setting allows to send setpoint for differential pressure to Pump Manager from Local HMI on iCM			
Network Setp	-.- kPa		6
This value indicates the setpoint for differential pressure sent by BMS when iCM is in Control Source = Network			
Hi Lim	500kPa	LoLim,…, 10000kPa	6
This allows to set the High Limit related to pressure setpoint			
Low Lim	10kPa	10kPA,…, HiLim	6
This allows to set the Low Limit related to pressure setpoint			
DTemp Setp	-.-°Dc		6
This shows the actual differential temperature setpoint			
Local Setp	5.0°Dc	LoLim,…, HiLim	6
This setting allows to send setpoint for differential temperature to Pump Manager from Local HMI on iCM			
Network Setp	-.-°Dc		6
This value indicates the setpoint for differential temperature sent by BMS when iCM is in Control Source = Network			
Hi Limit	10.0°Dc	LoLim,…, 20.0°Dc	6
This allows to set the High Limit related to temperature setpoint			
Low Limit	2.0°Dc	0.0°Dc,…,HiLim	6
This allows to set the Low Limit related to temperature setpoint			

Table 23: Evaporator Pump Speed Control –Setpoint overview

iCM Gtw Setpoints for Evaporator Pump Speed Control are chosen according "Control Source" setting:

1) ***If "Control Source" is Local:***
   _Setpt Local: Local setpoint on HMI of Master controller will be communicated to Pump Manager
2) ***If "Control Source" is Network***
   _Setpt Ntwk: Writeable setpoint by BMS through Modbus or BACnet communication

5.6.3 Evaporator Pump Speed Control – Setting

This section list, the current setting data about the Evaporator Pump Speed Control.

This menu will display only on iCM Gtw configured a Master

Description	Default	Range and function	AL
Max Speed	0%	0, …, 100%	
This allows to set the maximum speed			
Minimum Speed	0%	0, …, 100%	
This allows to set the minimum speed			
ThermoOff Speed	0%	0, …, 100%	
This allows to set the speed valu when unit is enabled with capacity=0%			
ThermoOff Time	0s		
This allows to set the time value to set "ThermoOff Speed" when unit is enabled with capacity=0%			
Fix Speed Sel	0	0, 1	
This allows to select the actual fixed speed selector value. - 0: Fixed speed 1 - 1: Fixed Speed 2			
Fix Speed 1	0%	0, …, 100%	
This allows to set the actual fixed speed1 value			
Fix Speed 2	0%	0, …, 100%	
This allows to set the actual fixed speed2 value			
PID_PropBand	200kPa	10kPa,…, 1000kPa	
This allows to set the actual PID proportional value related to DP			
PID_PropBand	10.0°Dc	1.0*Dc,…, 20.0°Dc	
This allows to set the actual PID proportional value related to DT			
PID_Integr Time	60s	0s,…,3600s	
This allows to set the actual PID integration time			
PID_Deriv Time	0s	0s,…,3600s	
This allows to set the actual PID derivative time			

Table 24: Evaporator Pump Speed Control –Setting overview

5.7 Evap / Cond PM (Evaporator or Condenser Primary Pump Manager Menu)

This menu contains all the values communicated by the Pump Manager to iCM Gtw Master.
Moreover, it contains the setpoint for Manifolded Pump Speed control and Header Bypass Valve opening that iCM can set on the Pump Manager controller through Daikin Communication Network.

Description	Default	Range and function	AL
App Version	#.#		
This shows the application version			
Status	Off: Auto	Off:Auto, On:Auto, Off:Local, Off:SensAlarm, On:SensAlarm, Off:CommErr, On:CommErr, Configuration, Off:ConfigAlarm	
This value indicated the Status of Pump Manager to iCM			
Op Sta	Off: Auto	Off, On	
This value indicates the operating state of Pump Manager			
Clear Alarm	Off	Off, On	
This setting allows to send a reset of the active alarms on Pump Manager from iCM.			
Pump # Status	Off	Off, On, ManOn, ManOff, Alm, Test, N/Cfg	
This shows the actual operating status of Pump #. # can be assume the value from 1 to 10.			
Nr Run Pump	0	0,…, 10	
This value indicates the number of running pump			
Speed	0%	0%...100%	
This value indicates the speed percentage of the pump			
Ctrl DTemp	-.-°Dc		
This value indicates the controlled sensor measurement on Pump Manager			
Act Setpoint	-.-°Dc		
This value indicates the actual setpoint on Pump Manager for actual controlled delta temperature			
Setp iCM	5.0°Dc	0.5°Dc…20.0°Dc	
This setting allows to send setpoint forcontrolled temperaturel to Pump Manager from Local HMI on iCM			
Setp Network	-.-°Dc		
This value indicates the setpoint for controlled delta temperature to Pump Manager sent by BMS when iCM is in Control Source = Network			
Diff Press	-.-kPa		
This value indicates the controlled sensor measurement on Pump Manager			
Act Setpoint	-.-kPa		
This value indicates the actual setpoint on Pump Manager for actual dirrential pressure			
Setp iCM	50.0kPa	0.0kPa…300.0kPa	
This setting allows to send the setpoint dirrential pressure to Pump Manager from Local HMI on iCM			
Setp Network	-.-kPa		
This value indicates the setpoint for dirrential pressure to Pump Manager sent by BMS when iCM is in Control Source = Network			
Abs Press	-.-kPa		
This value indicates the controlled sensor measurement on Pump Manager			
Abs Press Act Setp	-.-kPa		
This value indicates the actual setpoint on Pump Manager for actual absolute pressure			
Abs Press Setp iCM	50.0kPa	0.0kPa…300.0kPa	
This setting allows to send the setpoint for absolute pressure to Pump Manager from Local HMI on iCM			
Speed Abs Press Sp Ntwk	-.-kPa		
This value indicates the setpoint for absolute pressure to Pump Manager sent by BMS when iCM is in Control Source = Network			
Valve Opening	0%	0%...100%	
This value indicates the opening percentage of header bypass valve			
Ctrl Min Diff Press Unit	None	None, Active	
This value indicates that Minimum pressure drop has been reached by one of the Units and force opening of the header bypass Valve			
Act Setpoint	-.-kPa		
This value indicates the actual setpoint for bypass valve control based on differential pressure on Pump Manager			
Setp iCM	50.0kPa	0.0kPa…500.0kPa	

This setting allows to send the setpoint for bypass valve control based on differential pressure to Pump Manager from Local HMI on iCM			
Setp Network	-.-kPa		
This value indicates the setpoint for bypass valve control based on differential pressure to Pump Manager sent by BMS when iCM is in Control Source = Network			
Flow	-.- l/s		
This value indicates the controlled sensor measurement on Pump Manager			
Act Setpoint	-.- l/s		
This value indicates the actual flow setpoint on Pump Manager			
Setp iCM	50.0 l/s	50.0l/s…300l/s	
This setting allows to send the flow setpoint for absolute pressure to Pump Manager from Local HMI on iCM			
Setp Network	-.- l/s		
This value indicates the flow setpoint to Pump Manager sent by BMS when iCM is in Control Source = Network			
Bypass Ctrl EWT	-.-°C		
This value indicates the controlled sensor measurement on Pump Manager			
Act Setpoint	-.-°C		
This value indicates the actual setpoint for bypass control entering water temperature on Pump Manager			
Setp iCM	7.0°C	4.0°C…30.0°C	
This setting allows to send the setpoint for bypass control entering water temperature to Pump Manager from Local HMI on iCM			
Setp Network	-.-°C		
This value indicates the setpoint for bypass control entering water temperature to Pump Manager sent by BMS when iCM is in Control Source = Network			
Elect Active Pwr	-.- kW		
This value indicates the Active Electrical Power consumption			

Table 25: Evaporator or Condenser Pump Manager Menu

Pump Speed Controlled sensor and related setpoint will display only if Speed Control is different from "Constant"

Header by-pass Valve controlled sensor and setpoint will display only if BypValve Control is different from "None"

Active Power value will display only if Energy Mtr is configured on Pump Manager

iCM can set the values of control functions of the Pump Manager.
The values chosen depend on "Control Source" setting of Master Unit controller.

3) ***If "Control Source" is Local:***
   _Setpt iCM: Local setpoint on HMI of Master controller will be communicated to Pump Manager
4) ***If "Control Source" is Network***
   _Setpt Ntwk: Writeable setpoint by BMS through Modbus or BACnet communication with Master Unit controller, that will be communicated by iCM to the Pump Manager

5.8 Cooling Tower Manager

This menu contains all the values communicated by the Cooling Tower Manager to iCM. Moreover, it contains the setpoint for Cooling tower management and Cooling tower speed control that iCM can set on the Condenser Pump Manager controller through Daikin Communication Network.

Description	Default	Range and function	AL
Status	Off:Auto	Off:Auto, On:Auto, Off:Local, Off:SensAlarm, On:SensAlarm, Off:CommErr, On:CommErr, Configuration, Off:ConfigAlarm	
This value indicated the Status of Pump Manager to iCM			
Op Sta	Off	Off, On	
This value indicates the operating state of Pump Manager			
Clear Alarm	None	None, Active	
This allows to clear the alarms related to Pump Manager			

Nr Run Tower	0%	0,…, 10	
This value indicates the number of running pump			
Next On	-	0,…, 10	
This is the elected next on cooling tower			
Next Off	-	0,…, 10	
This is the elected next off cooling tower			
LWT	-.-°C		
This value common leaving water temperature from cooling system			
Setp Reset Type	None	None, Toa, Twb	
This value indicates if leaving water temperature setpoint Reset function is enabled on Cooling tower controller and which type of reset is active: - None: Disabled - ToA: Reset based on Outside air temperature - Twb: Reset of LWT setpoint based on Web bulb temperature Setpoint Reset function affects the Actual Lwt Setpoint value			
Act Setpoint	-.-°C		
This value indicates the actual setpoint for Cooling tower manager for Tower Staging and Tower speed control			
Setp iCM	5°C		
This setting allows to send setpoint for Cooling Tower Manager from Local HMI on iCM			
Setp Network	-.-°C		
This value indicates the setpoint for Cooling Tower Manager sent by BMS to iCM Master if it is in Control Source = Network			
Outside Air Temp	-.-°C		
This value indicates the outside air temperature read by Cooling Tower Manager			
Outside Relative Humidity	-.-%rH		
This value indicates the outside air relative humidity read by Cooling Tower Manager			
Outside Wet Bulb Temp	-.-°C		
This value indicates Wet bulb temperature based on Outside Air temperature and Relative Humidity calculated by Cooling Tower Manage			
Cooling Tower #: (# can be assume the value 1,…,10)			
Status	Off	Off, On, ManOn, ManOff, Alm, Test, N/Cfg	
This value indicated the actual tower operating status			
Fan Status	Off	Off, On, Manual On, Manual Off, Alarm, Test	
This value indicated the actual tower fan operating status			
Fan Speed	0%	0, …, 100%	
This shows the actual fan speed			
Inlet Valve Status	None	None, Cgfd	
This shows the actual inlet valve status			
LWT	-.-°C		
This shows the actual tower leaving water temperature			

Table 26: CoolingTower Manager Menu

iCM can set the values of control functions of the Cooling Tower Manager.
The values chosen depend on "Control Source" setting of Master Unit controller.

5) ***If "Control Source" is Local:***
   _Setpt iCM: Local setpoint on HMI of Master controller will be communicated to Pump Manager
6) ***If "Control Source" is Network***
   _Setpt Ntwk: Writeable setpoint by BMS through Modbus or BACnet communication with Master Unit controller, that will be communicated by iCM to the Pump Manager

This menu is available only if "ICT" is enabled and after reboot of controller

5.9 Secondary Pump Managers

This menu contains all the values communicated by the Secondar Pump Manager controller to iCM Gtw Master through Daikin Communication Network. Moreover, iSM controller communicates its own data and even the data of other two iSM controllers connected to it through Secondary Manager Network (Please refer to IOM of iSM). The menu contains all the relevant data from Secondary Managers

Description	Default	Range and function	AL
Nr iSM Connected	0	0, 1, 2, 3, 4	
This shows the number of iCM connected. Each iSM is able to manage up to 4 pump groups			
Tot Cool Thrm Pwr	kW		
This shows the actual total cooling thermal power			
Tot Heat Thrm Pwr	kW		
This shows the actual total heating thermal power			
iSM01			
PG# Status	Off:Auto	Off:Auto, On:Auto, Off:Local, Off:SensAlarm, On:SensAlarm, Off:CommErr, ConfigStaus, Off, ConfigAlm, Test, Off:Remote, Off:Network	
This shows the Pump Group # actual operating status. # can be assume the value 1, 2, 3, 4			
iSM02			
As iSM01			
iSM03			
As iSM01			
iSM04			
As iSM01			

Table 27: Secondary Pump Managers Menu

This menu is available only if “ISM” is enabled and after reboot of controller

5.10 iCM Gtw Settings

This section will describe the parameters to fine-tune the management of iCM Gtw Master.

This menu and submenus will display only on iCM Gtw configured a Master

Description	Default	Range and function	AL
Min Unit Run	1	0,…, Max Unit Run	4
This setting allows to define the minimum number of Units that will always run in the system.			
Max Unit Run	1	1,…,8	4
This setting allows to define the maximum number of Units that can be started by iCM.			
Ctrl Temp Type	Leaving	Leaving, Entering	4
This value indicates what temperature is used to stage up and down the Units: - Leaving: in this case the additional common water temperature sensor(s) is required - Entering: in this case the controlled temperature will be the average of the entering water temperature to the Units. In iCM Gtw configuration the control temperature type is not configurable as Entering			
Staging Temperature:			
Start DT Cool	2.5°Dc	0.5°Dc…5.0°Dc	4
This setting defines what is the delta temperature with setpoint to force a Unit stage up in Cool mode.			
Shut DT Cool	2.5°Dc	0.5°Dc…5.0°Dc	4
This setting defines what is the delta temperature with setpoint to force a Unit stage up in Cool mode.			
Start DT Heat	2.5°Dc	0.5°Dc…5.0°Dc	4
This setting defines what is the delta temperature with setpoint to force a Unit stage up in Heat mode.			
Shut DT Heat	1.5°Dc	0.5°Dc…5.0°Dc	4
This setting defines what is the delta temperature with setpoint to force a Unit stage up in Heat mode.			
Stage Dead Band	0.5°Dc	0.2°Dc…2.5°Dc	2
This setting defines what is the temperature range around the actual setpoint in which the system manager will not do staging actions or capacity control.			
Staging Timers:			
Act Stg Up Time	600s	60s…3600s	6
This value indicates what is the actual stage up time to start the Next On Unit. This is a calculated value.			

Max Stg Up Time	600s	60s…3600s	2
This setting defines what is the maximum delay between to Unit starts.			
Min Stg Up Time	300s	60s…3600s	2
This setting defines what is the minimum delay between to Unit starts.			
Start DT Err	3°Dc	0.5°Dc…5.0°Dc	2
This setting defines what is the error which corresponds to the minimum delay in a linear interpolation. The maximum delay is calculated at 0.0°C of error			
Act Stg Dwn Time	600s	60s…3600s	6
This value indicates what is the actual stage up time to start the Next Off Unit. This is a calculated value.			
Max Stg Dwn Time	600s	60s…3600s	2
This setting defines what is the maximum delay between Unit stops.			
Min Stg Dwn Time	300s	60s…3600s	2
This setting defines what is the minimum delay between Unit stops.			
Stop DT Err	3°Dc	0.5°Dc…5.0°Dc	2
This setting defines what is the error which corresponds to the minimum delay in a linear interpolation. The maximum delay is calculated at 0.0°C of error.			
Changeover Mngt	Disable	Disable, Enable	2
This allows to set the mode changeover management. This setpoint can be enabled and iCM will be able to change Operating mode of the connected unit			
Standby Setting	▶		4
A link that will show a page with standby settings			
Demand Limit Setting	▶		4
A link that will show a page with demand limit settings			
Unit # Setting	▶		4
A link that will show a page with Unit # settings. # can be assume the value 1,.., 8			

Table 28: iCM Setting Menu

iCM Gtw cannot be configured with Control Temperature Type= Entering

5.10.1 iCM Setting: Standby Settings

This section will describe the settings needed to configure the standby function.

Description	Default	Range and function	AL
Unit Selection	No	No, Auto, Unit1, Unit2, Unit3, Unit4, Unit5, Unit6, Unit7, Unit8	
This allows to select the unit that will go into standby.			
Type	Run Hours	Run Hours, Sequence	
This setting is used to define how to select the standby Unit - Run Hours: the Unit with the higher number of run hours will be selected. - Sequence: the Unit with the next numeral id is selected. If the Unit in standby is the Slave 3 the next standby Unit will be Slave 4 and so on.			
Rot Days	7Day	1,…365 days	
This setting is used to define after what number of days the standby Unit is rotated.			
Rot Time	00:00:00	00:00:00…23:59:59	
This setting is used to define at what time of the day the standby Unit is rotated. This might be useful to command the rotation of the standby Unit when the system is off			
Rot Reset	Off	Off, Reset	
This setting is used to reset the Standby Unit calculation. The elected Standby Unit will be re-defined if the reset is activated.			
Temp Comp En	No	No, Yes	
This setting is used to activate the standby Unit for temperature compensation. If the active setpoint cannot be reached for multiple reasons different from a Unit alarm, the standby Unit can become operational and compensate the lack of capacity			
Temp Comp Time	120min	0min…600min	
This setting is used to define the how long the system manager should wait before activating the standby Unit to compensate the lack of capacity.			
Temp Comp Dly Off	10min	0min…600min	
This allows to set the delay before set unit in standby when temperature compensation is no more needed			
Min Before Stanby Switch	1min	0min…600min	
This allows to set the time in minute before the time switch			

Table 29: Standby chiller configuration

If the switch time is improperly set, the Standby Unit changeover may have an impact on the water temperature stability. Please, check with the plant Manager if there are specific limitations on the changeover time (i.e. process applications).

5.10.2 iCM Setting: Demand Limit Settings

This section will describe the settings needed to configure the demand limit function.

Description	Default	Range and function	AL
Type	Unit	Unit, Sys	
This allows to select the demand limit type			
Delta	3%		
This allows to select the Demand Limit Hysteresis value			

Table 30: Demand limit configuration

5.10.3 iCM Setting: Unit # Settings

This section will describe the settings needed to configure the Unit #.
can be assume the value 1,2,3,4,5,6,7,8.

Description	Default	Range and function	AL
Priority	1	1,…, 4	
These settings are used to define the individual Unit priority when operating in cooling mode. If properly set, they will allow Units grouping.			
Priority Heat	1%	1,…, 4	
These settings are used to define the individual Unit priority when operating in heating mode. If properly set, they will allow Units grouping.			
Stg Dwn Thresh	80%	0%…Stg Up Thresh	
These settings are used to set the individual stage down thresholds on each Unit in cool mode. This threshold is used for staging down the Units and, if properly set, can let the iCM achieve an improved system efficiency			
Stg Dwn Thresh Heat	80%	0%…Stg Up Thresh Heat	
These settings are used to set the individual stage down thresholds on each Unit in heat mode. This threshold is used for staging down the Units and, if properly set, can let the iCM achieve an improved system efficiency			
Stg Up Thresh	30%	Stg Dwn Thresh…100%	
These settings are used to set the individual stage up thresholds on each Unit in cool mode. This threshold is used for staging up the Units and, if properly set, can let the iCM achieve an improved system efficiency			
Stg Up Thresh Heat	30%	Stg Dwn Thresh Heat…100%	
These settings are used to set the individual stage up thresholds on each Unit in heat mode. This threshold is used for staging up the Units and, if properly set, can let the iCM achieve an improved system efficiency			

Table 31: Unit # configuration

5.11 iCM Gtw Maintenance

This section will describe the parameters accessible in the Maintenance page.

Description	Default	Range and function	AL
Discon Sept	No	No, Yes	
This allows to disconnect the iCM Gtw/MUSE subsystem from control of iCM Gtw Master			
Cool Sp LowLim	4°C	-8°C … Cool Sp HighLim	
This allows to set the Low Limit of temperature setpoint when the system operates in cooling mode			
Cool Sp HiLim	15°C	Cool Sp LowLim … 20 °C	
This allows to set the High Limit of temperature setpoint when the system operates in cooling mode			
Heat Sp LowLim	20°C	25°C … Heat Sp HiLim	
This allows to set the Low Limit of temperature setpoint when the system operates in heating mode			
Heat Sp HiLim	60°C	Heat Sp LowLim … 95°C	
This allows to set the High Limit of temperature setpoint when the system operates in heating mode			
Min Cool CapCtrl LWT Sp	4°C	-20°C … 30°C	
This allows to set the minimum cool leaving water temperature setpoint when Capacity Control is active			
Max Heat CapCtrl LWT Sp	50°C	20°C… 90°C	
This allows to set the maximum heat leaving water temperature setpoint when Capacity Control is active			
Freeze Limit	4°C	-20°C… 6°C	
This allows to set the freeze limit			
Cmn LWT Ofs	0dK	-5dK… 5dK	
This allows to set the common leaving water temperature offset in cool mode			
Cmn EWT Ofs	0dK	-5dK… 5dK	
This allows to set the common entering water temperature offset in cool mode			
Cmn Heat LWT Ofs	0dK	-5dK… 5dK	

This allows to set the common leaving water temperature offset in heat mode			
Cmn Heat EWT Ofs	0dK	-5dK… 5dK	
This allows to set the common entering water temperature offset in heat mode			
Com Err Delay	5s	0s…300s	
This allows to set the communication error delay between iCM Gtw Master and iCM Gtw Slaves			
Alarm Self Timer	5s	0s…300s	
This allows to set the timer for all the self-release alarm			

Table 32: iCM Maintenance menu

In the above menu only `Discon Sept, Com Err Delay, Alarm Self Timer` are displayed for iCM Gtw Slaves

5.11.1.1 Disconnection from iCM Gtw Master Logic

Through this setting, each iCM Gtw Slave can be disconnected from management of iCM Gtw Master. Consequently the iCM Gtw Slave will assume the "Standalone" mode and the respective MUSE sub-system can be managed by Local Setpoint and Settings.
If Discon Setp is set on iCM Gtw Master, all the iCM Gateway will run in "Standalone" mode and they should be managed by respective HMI.

5.12 MUSE Settings

This section will describe the parameters accessible in the MUSE Settings menu, necessary to fine-tune the management of MUs by MUSE functions

Description	Default	Range and function	AL
Avail Mode	OnlyCool	OnlyCool, W-Cool/Heat, R-Cool/Heat	6
This shows the actual available mode			
Min MU Run	1	1,…,4	
This setting allows to define the minimum number of Modular MUs that will always run in the system.			
Sequencing & Staging:			
Priority 1st	1	1,…,4	
This allows to set the Modular MU with 1st priority in sequencing function			
Priority 2nd	1	1,…,4	
This allows to set the Modular MU with 2nd priority in sequencing function			
Priority 3rd	1	1,…,4	
This allows to set the Modular MU with 3rd priority in sequencing function			
Priority 4th	1	1,…,4	
This allows to set the Modular MU with 4th priority in sequencing function			
Start Up DT	2.7°C	0°C…5.0°C	
This setting defines what is the delta temperature with setpoint to force a MU stage up			
Shutdown Dt	1.5°C	0°C…Start Up DT	
This setting defines what is the delta temperature with setpoint to force a MU stage down			
Dead Band	0.2°C	0.1°C…MIN(ShutDwnDT,StartUpDT)	
This setting defines what is the temperature range around the actual setpoint in which the system manager will not do staging actions or capacity control.			
High Capacity Thres	80%	30%...100%	
These setting is used to set the individual stage up threshold on each Modular MU. This threshold is used for staging up the Modular MUs and, if properly set, can let the MUSE achieve an improved system efficiency			
Low Capacity Thres	40%	0%...High Capacity Thres	
These setting is used to set the individual stage down threshold on each Modular MU. This threshold is used for staging down the Modular MUs and, if properly set, can let the MUSE achieve an improved system efficiency			
Stage Up Time	300s	15s…1800s	
This allows to set the Stage Up timer			
Stage Dwn Time	180s	15s…1800s	
This allows to set the Stage Down timer			
Load Control:			
Load Control En	No	No, Yes	
This setting specifies if the MU capacity control shall be done by the MUSE (Enable) or if a staging only control is needed (Disable).			
Load Control Type	Fixed	Fixed, Regime, Next Off	
This setting specifies the type of load control: • Fixed: MUSE will control the load/unload of the MU since start-up of the system • Regime: MUSE will control the load/unload of the MUs until the system temperature is inside Stage for Load/Unload temperature range.			
Unload Type	Hi Load	Hi Load, Lo Load, Next Off	

This setting specifies the type of unload control: • Hi Load: the MU with the higher capacity will be unloaded first • Lo Load: the MU with the lower capacity will be unloaded first • Next Off: the elected Next Off MU will be downloaded first			
Load Inhib Time	15s	0s…600s	
This allows to set the inhibition timer between delta load			
Delta Load	15%	10%...100%	
This setting defines the capacity step that the MU needs to perform during load or unload of compressors, after MUSE swaps to another MU to load or unload			

Table 33: MUSE Settings menu

5.13 MUSE Maintenance

This section will describe the parameters accessible in the MUSE Maintenance page.

Description	Default	Range and function	AL
Discon Setp	No	No, Yes	
This allows to disconnect all the MUs from MUSE control			
Min Cool Setp	4.0°C	-15°C…10°C	
This allows to disconnect the minimum cool leaving water temperature setpoint			
Max Heat Setp	55.0°C	25°C…80°C	
This allows to disconnect the maximum heat leaving water temperature setpoint			
Freeze Limit	2.0°C	-20°C…4°C	
This allows to set the freeze limit			
Evap Cmn LWT Ofs	0.0dK	-5dk…5dk	
This allows to set the evaporator leaving water temperature offset			
Cond Cmn LWT Ofs	0.0dK	-5dk…5dk	
This allows to set the condenser leaving water temperature offset			
Pump Off Delay	4s	0s…30s	
This allows to set the pump delay off			
Com Err Delay	5s	0s…300s	
This allows to set the communication error delay			
Alarm Self Time	5s	0s…300s	
This allows to set the alarm self-release timer			
App Version	#.#		6
This shows the application version			

Table 34: MUSE Maintenance menu

5.14 Configuration

This section will describe the parameters accessible in the Configuration page. This page contains the main system configuration.

Description	Default	Range and function	AL
Apply Changes	No	No, Yes	
This allows the controller reboot. This is required for saving parameters after they have been changed			
MUSE Enable	Off	Off, On	
This allows to enable the MUSE option			
Config MUSE	▶		
A link that will show a page with data configuration related to MUSE			
iCM Option Type	iCMAdv	iCMStd, iCMAdv	
This shows the iCM Option Type.Gateway configuration is a consequence of enabling MUSE. In this case the option displayed will be iCMStd			
iCM Adv Adr	iCMAdv	iCMAdv, Master, Slave1, Slave2, Slave3, Slave4, Slave5, Slave6, Slave7, Slave 8	
This allows to set the iCM Address. In gateway configuration is possible to set from Master address to Slave7 address			
Config iCM	▶		
A link that will show a page with data configuration and data visualization related to iCM			
Config Dedic Pump	▶		
A link that will show a page with data configuration related to the dedicated pumps			
Config iPumpManagers	▶		
A link that will show a page with data configuration and data visualization related to iPM			
Touch Panel	N/Cfg	N/Cfg, Cfg	
This allows to configure the external touch panel			

Table 35: Configuration menu

5.14.1 MUSE Configuration

This section will describe the parameters accessible in MUSE configuration page.

Description	Default	Range and function	AL
Nr Modular Units	0	0,…,4	
This allows to set the number of connected modular units			
Sensor Type	None	None, NTC10K, PT1k	
This allows to set the temperature sensor type			
Pump Skid Enable	N/Cfg	N/Cfg, Cfg	
This allows to enable pump skid option			

Table 36: MUSE configuration menu

5.14.2 iCM Configuration

This section will describe the parameters accessible in iCM configuration page.

Description	Default	Range and function	AL
Nr of Units	0	0,…,8	
This allows to set the number of connected units			
Sys Temp Sens Type	None	None, NTC10K, PT1000	
This allows to set the temperature sensor type			
Plant Layout	2pipe	2pipe, 4pipe	
iCM Gtw option allows only 2pipe plant layout			
Plant Type	Undef	Undef, OnlyCO, OnlyHP, CO-HP, Only4Z, 4Z-CO, 4Z-HP, MixUnit	
iCM Gtw option allows only "Undef", "OnlyCO", "OnlyHO", "CO-HP" plant types. A link that will show on one page the type of each connected unit.			
Alarm Reason	None	None, ModeErr, ComprErr, CondErr, UndefErr, iCMOptErr, PltErr	
This shows the configuration alarm reason. For more details see the troubleshooting section.			

Table 37: iCM configuration menu

5.14.2.1 iCM Configuration – Plant Type

This page will show the type of each connected unit.

Description	Default	Range and function	AL
Unit Type #	Undef	Undef, OnlyCO, OnlyHP, CO-HP, Only4Z, 4Z-CO, 4Z-HP, MixUnit	
iCM Gtw option allows only "Undef", "OnlyCO", "OnlyHP", "CO-HP" unit type. # can assume the value between 1 and 8.			

Table 38: Units type menu

5.14.3 Dedicated Pump Control Configuration

This section will describe the parameters accessible in the Dedicated Pump Control configuration page.

Description	Default	Range and function	AL
Evap Ctrl Type	On-Off	On-Off, FixSpd, VPF, VarDT	
This allows to select the evaporator speed control type: - On-Off: Pump Speed Control is disabled and not managed by iCM Gtw - FixSpd: Pump Speed Control is a fixed value management - VPF: Pump Speed Control is Variable Primary Flow and based on Field Differential pressure control - VarDT: Pump Speed Control is Variable Primary and based on Difference between System Leaving and Entering Water Temperature Control			
Evap Diff Prs Hw Type	None	None, 0-10V, 4-20mA	
This allows to select the evaporator differential pressure sensor hardware input type. This value can be selected only if Evap Ctrl Type=VPF			
Cond Ctrl Type	On-Off	On-Off, FixSpd, VPF, VarDT	
This allows to select the condenser differential pressure hardware type			
Cond Diff Prs Hw Type	None	None, 0-10V, 4-20mA	
This allows to select the condenser speed control type			

Table 39: Dedicated Pump Control configuration menu

5.14.4 Pump Manager Configuration

This section will describe the parameters accessible in the Pump Manger configuration page.

Configuration of Intelligent Pump Managers is allowed only on iCM Gtw Master

Description	Default	Range and function	AL
Evap PM Enable	No	No, Yes	
This allows to enable the communication on evaporator pump manager			
Nr of Pumps	0	0…10	
Number of evaporator pumps configured and managed by Pump Manager			
Speed Ctrl Type	None	None, MinDiffOress, Flow, Ewt	
This value indicates which kind of sensor is used by evaporator Pump Manager to control speed of the pumps			
Valve Ctrl Type	None	None, MinDiffPress, Flow, Ewt	
This parameter specifies which kind of sensor is used by Pump Manager to control opening of Headers Bypass Valve			
Cond PM Enable	No	No, Yes	
This allows to enable the condenser pump manager			
Nr of Pumps	0	0…10	
Number of condenser pumps configured and managed by Pump Manager			
Speed Ctrl Type	None	None, MinDiffOress, Flow, Ewt	
This value indicates which kind of sensor is used by condenser Pump Manager to control speed of the pumps			
Valve Ctrl Type	None	None, MinDiffPress, Flow, Ewt	
This parameter specifies which kind of sensor is used by Pump Manager to control opening of Headers Bypass Valve			
iCT Enable	No	No, Yes	
This allows to enable the cooling tower manager			
Nr of Towers	0	0…10	
Number of cooling tower configured and managed by Cooling Tower Manager			
Inlet Valve En	None	None, Cfgd	
This value indicates each Cooling tower has installed an inlet shut-off valve			
Fan Type	CSD	CSD, VFD	
This value indicates which kind of Cooling tower fan driver is configured on Cooling Tower			
iSM Enable	No	No, Yes	
This allows to enable the secondary pump manager			
iSM0# Nr Group	0	0…4	
This value indicates the number of Pump Groups managed by iSM panel. # can assumes the value from 0 to 3			

Table 40: Pump Managers configuration menu

Evap/Cond menu is available only if “Evap PM Enable or Cond PM Enable” is enabled. Reboot of controller is needed.

iCT menu is available only if “iCT Enable” is enabled. Reboot of controller is needed.

iSM menu is available only if “iSM Enable” is enabled. Reboot of controller is needed.

5.15 Controller Setup

This section will describe the parameters accessible in the Controller Setup page. It will also describe the links to other sub-sections.

Description	Default	Range and function	AL
Ip-Config	▶		
A link that will show a page with IP configuration			
DoS - Cloud Set Up	▶		
A link that will show a page with Daikin on Site configuration			
Inbuilt RS485:	ModbusRS485	ModbusRS485, BACnetMSTP	
This allows to select inbuilt communication option between ModbusRS485 and BACnetMSTP			
BACnet Embed	▶		
A link that will show a page with BACnet embedded configuration			
MODbus Embed	▶		
A link that will show a page with MODbus embedded configuration			
BACnet IP module	▶		
A link that will show a page with BACnet IP module configuration			
Save/load	▶		

A link that will show a page with data related memory

Table 41: Controller Setup menu

5.15.1 IP Configuration

This section will describe the parameters accessible IP Configuration page.

Description	Default	Range and function	AL
DHCP	Passive	Passive, Active	4
This allows to enable DCHP			
IP address	___.___.___.___		4
This allows to set the IP address			
Subnet mask	___.___.___.___		4
This allows to set the subnet mask			
Default gateway	___.___.___.___		4
This allows to set the default gateway			
Preferred DNS server	___.___.___.___		4
This allows to set the preferred DNS server			
Alternate DNS server	___.___.___.___		4
This allows to set the alternative DNS server			
Host name	POL688_******		4
This shows the host name			
MAC address	_		4
This shows the MAC address			
Link	Active	Disable, Active	4
This shows the actual IP link state			
100MBit	Active	Disable, Active	4
Restart	None	None, Execute	4
The controller reboot is required after values modification			

Table 42: IP configuration menu

5.15.2 DoS – Cloud Set Up

This section will describe the parameters accessible Daikin on Site – Cloud Configuration page.

Description	Default	Range and function	AL
Enable	Disabled	Disabled, Enabled	
This allows to enable Daikin on Site			
Serial Number	-		
This shows the serial number			
Activation Key	-		
This shows the activation key			
Communication	-		
This shows the communication state			
Cloud server	-		
This shows the cloud server state			
Upgrade allowed	Wait	Wait, Yes, No	
This allows to set the upgrade			
Upgrade request	-		
This shows the request of upgrade			

Table 43: DoS setup menu

5.15.3 BACnet Embedded

This section will describe the BACnet embedded parameters accessible in the follow page.

Description	Default	Range and function	AL
Application state	-		
This shows the application state			
Device Name	-		4
Thos allows to set the device name			
Device ID	-		4
Thos allows to set the device ID			
BACnet TCP/IP	Passive	Passive, Active	4
This allows to set the BACnet TCP/IP			
Port	-		4
This allows to set the BACnet number port			
RS485:2	Passive	Passive, Active	4

This allows to enable RS485:2			
MSTP-Address	255		4
This allows to set the MSTP address			
Baud Rate	76800		4
This allows to set the baud rate value			
Max Master	127		4
This allows to set the maximum master value			
Max Info Frames	10		4
This allows to set de maximum value of information frame			
Imperial Unit sys	OK	OK, Init, NoActivePort, StacErr, Term, NoLic	4
This allows to select the imperial unit system			
Restart	Passive	Passive, Active	4
The controller reboot is required after values modification			

Table 44: BACnet embedded menu

5.15.4 MODbus Embedded

This section will describe the MODbus embedded parameters accessible in the follow page.

Description	Default	Range and function	AL
Address	22		4
This allows to set the address			
RS485:2			
Baud Rate	19200	4800, 9600, 19200, 38400	4
This allows to set the baud rate			
Parity	None	None, Even, Odd	4
This allows to select the parity bit			
Two StopBits	Yes	Yes, No	4
This allows to select the stop bits			
Delay [ms]	100ms		4
This allows to select the delay time in ms			
Modbus IP config	Disable	Disable, Enable	4
This allows to set the Modbus IP configuration			
Restart	Passive	Passive, Active	4
The controller reboot is required after values modification			

Table 45: MODbus embedded menu

5.15.5 BACnet IP module

This section will describe the BACnet IP module parameters accessible in the follow page.

Description	Default	Range and function	AL
State	-		4
This shows the state value			
BACnet:			
Device name	-		4
This allows to set de device name			
Device ID	-		4
This allows to set de device ID			
Port	-		4
This allows to set the BACnet number port			
Host name	-		4
This allows to set the host name			
Link	Passive	Passive, Active	4
This shows the actual IP link state			
DHCP	Passive	Passive, Active	4
This allows to enable DHCP option			
Actual IP address	___.___.___.___		4
This shows actual IP address			
Actual subnet mask	___.___.___.___		4
This shows the actual subnet mask			
Actual Default gateway	___.___.___.___		4
This shows the actual default gateway			
Restart	Passive	Passive, Active	4

The controller reboot is required after values modification

Table 46: BACnet IP module menu

5.15.6 Save/Load

This section will describe the Save/Load page.

Description	Default	Range and function	AL
SD-Card	NoCard	NoCard, Card	4
This shows if the SD card is inserted			
Config save to SD	Passive	Passive, Active	4
This allows to Save the configuration in SD card			
Config load to SD	Passive	Passive, Active	4
This allows to load the configuration from SD card			

Table 47: Save-Load menu

5.16 Controller Info

This section will describe the Controller Info page.

Description	Default	Range and function	AL
Appplication Info	-		6
This shows the application name			
Version	-		6
This shows the version number			
Application			
Plant Info	-		4
This allows to set the plant information			
Target ID	-		6
This shows the target ID			
BSP version	-		6
This shows the BSP version			

Table 48: Controller Info menu

6 SYSTEM COMMISSIONING

This section explains how the iCM Gtw shall be configured and set to provide proper control of the system. The purpose would be to provide a guideline that, starting from some example, can help to extend the same operations to any plant covered by the iCM Gtw

Before starting to read the following, it's strongly suggested to read the HMI description to get familiarity with some terminology and choices.

6.1 How to configure the iCM Gtw and the MUSE

Configuration parameters are available in

➔ *Main Menu → Configuration.*

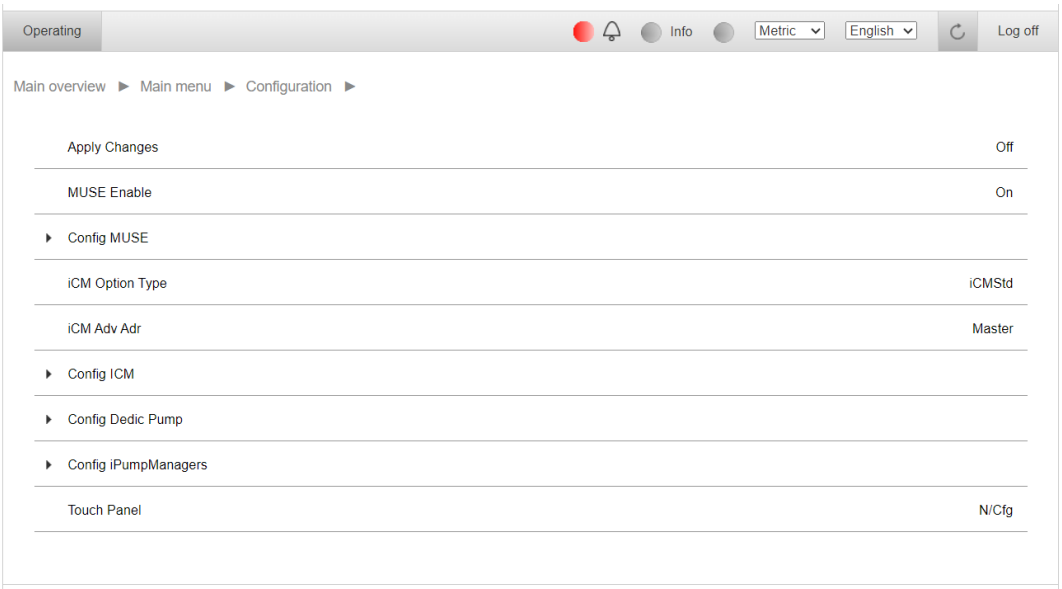


Figure 13: Configuration menu

The configuration can be resumed in the following steps:

1. Configuration of MUSE subsystem
2. Configuration of iCM Gtw
3. Configuration of Dedicated Pump Control if iCM Gtw is Master
4. Configuration of intelligent Pump Managers if iCM Gtw is Master

6.1.1 Configuring MUSE

First operation is to set "MUSE Enable" to ON.
Then, in menu:

➔ `Configuration → Config MUSE`

It is possible to set the number of modulars units, the LWT sensor type and presence of the Pump Skid composing the MUSE subsystem managed by iCM Gtw panel.
In the following image the MUSE is configurated with 2 Modular Unit, with NTC10k temperature sensor and without Pump Skid option.

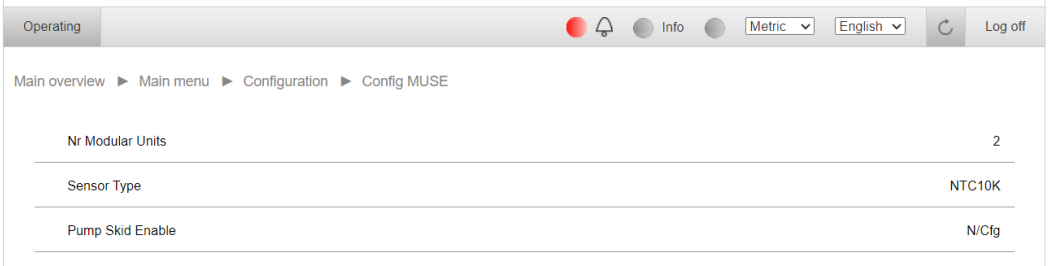


Figure 14: Main Menu → Configuration → Config MUSE

The type of the first modular unit, connected to iCM Gtw, automatically sets the available operation mode of the MUSE subsystem among the following type:

1. “Water-OnlyCool”: EWWT-Q chiller-only → WC Scroll Chiller
2. “Water-Cool/Heat”: EWWT-Q heat pump →
3. “Refrigerant-Cool/Heat”: EWHT-Q heat pump

This parameter is visible in menu

➔ `Main Menu → MUSE Setting → Avail Mode.`

Figure 15: MUSE available mode

6.1.2 Configuring iCM

First operation is to set the Address for iCM Gtw in the plant-room and consequently the role as iCM Gtw Master or iCm Gtw Slave.

ⓘ	It is highly recommended to configure at first the iCM Gtw Slaves or WC Srew Unit Slave and at last the iCM Gtw Master.

In case of selection of iCM Adr= Master, the menu

➔ `Configuration → Config iCM`

Allows to set the number of Daikin Units i.e number of iCM Gtw panels to be managed in the plant-room, and the system temperature sensor type.
In the below example the system is configured with 5 Daikin Unit and with NTC10K temperature sensor.

⚠	***Heat Recovery, Free Cooling and Plant-layout are not available for iCM Gtw***

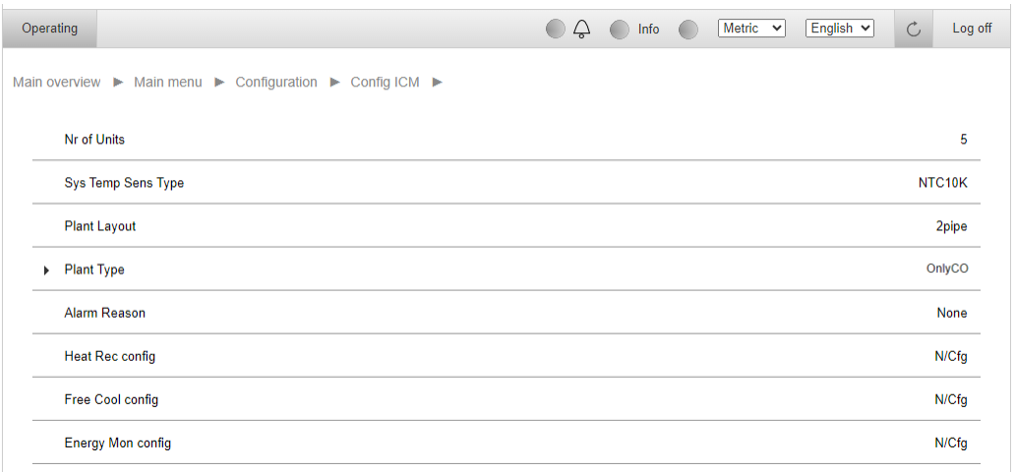


Figure 16: Main Menu → Configuration → Config iCM

ⓘ	Plant layout is set automatically to “2Pipe” with iCM Gtw option. Heat Recovery is set automatically to N/Cfg” with iCM Gtw option. Free Cooling is set automatically to N/Cfg” with iCM Gtw option. Energy Monitory is set automatically to N/Cfg” with iCM Gtw option.

6.1.2.1 Configuration Check

Once iCM Gtw is configurated as Master, the parameter “Plant Type” gives some indication about the plant type.
Inside menu

➔ `Main Menu → Configuration → Config ICM → Plant Type`

the user can have an overview of the iCM Gtw Master and Slave types.

At first start up, iCM Gtw Master detects the type of MUSE subsystem on the iCM Gtw or of WC Screw unit connected; then according to those types, it defines the “Plant type”.
MUSE subsystem or WC Screw unit can assume the following types:

Unit Type	Description
Undef	Slave is not coomunicating
WC C/O Screw	WaterCooled Chiller Screw
WC H/P Screw	WaterCooled Heat Pump Screw
WC C/O Scroll	EWWT-Q with set “Avail Mode” = Cool
WC H/P Scroll	EWWT-Q with set “Avail Mode” = Cool/Heat
AC H/P Scroll	EWHT-Q

Table 49 Unit Types

If communication errors between Master and Slaves occur, network between controllers is not properly installed. Before keeping on configuring system, all communication issues MUST be solved.

if “Plant Type” or at least one “Units: Type” is Undef, ConfigurationAlarm is raised by Master. Reset of Master is needed before keeping on configuration, to allow iCM Master

6.1.2.2 iCM configuration Error Alarm

As explained, iCM Gtw Master detects the “Unit Type” of connected iCM Gtw Slaves and consequently define the “Plant Type”. If configuration of the plant type is not supported as explained in the first Chapter, iCM Gtw Master raises a “Configuration Alarm” in the menu “Alarming”
The reason of this “ConfigAlarm” can be found in menu

➔ `Main Menu → Configuration → Config ICM → Alarm Reason`

If Configuration Alarm is raised, iCM logic cannot be started.

6.1.3 Configuring Dedicated Pump Speed Control

In system where is requested variable flow, user can configure this control function on iCM Gtw Master for the Evaporator and Condenser side of the plant-room through the following menu:

➔ `Main Menu → Configuration → Config Dedic Pump→ Speed Ctrl`

Operator can select the kind of Variable Flow:

1) Variable Primary Flow Only: based on System differential pressure
2) Variable Primary- Variable secondary: Based on difference between System LWT and System EWT

When Speed Control is set to “VPF”, control of bypass valve (to be installed on the bypass between the main headers) is automatically activate.
By-Pass Valve and power supply are NOT provided by Factory.

6.2 How to setup the Management Settings

The Main Menu contains the submenu to set management parameters of:

➔ `Main Menu → MUSE Setting` to manage the MUs connected
➔ `Main Menu → iCM Setting` to manage the iCM Gtw or WC Srew unit connecte.

Menu *iCM Setting* is visible only if the iCM Gtw is configured as Master.

Most of those settings are very similar between MUSE and iCM logic.

Min Unit Run	1
Max Unit Run	5
Ctrl Temp Type	Leaving
Staging Temperature:	
>Start DT Cool	2.5°Cd
>Shut DT Cool	1.5°Cd
>Stage Dead Band	0.5°Cd
Staging Timers:	
Act Stg Up Time	600s
>Max Stg Up Time	600s
>Min Stg Up Time	60s
>Start DT Err	3.0°Cd
Act Stg Dwn Time	60s
>Max Stg Dwn Time	600s
>Min Stg Dwn Time	60s
>Stop DT Err	3.0°Cd

Figure 17: iCM Setting menu

Min Unit Run	1.000
Sequencing & Staging:	
>Priority 1st	1.000
>Priority 2nd	1.000
>Priority 3rd	1.000
>Priority 4th	1.000
>Start Up DT	2.70 °C
>Shutdown DT	1.50 °C
>Dead Band	0.200 °C
>High Capacity Thres	80.0 %
>Low Capacity Thres	40.0 %
>Stage Up Time	300.0 s
>Stg Down Time	180.0 s

Figure 18: MUSE setting menu

6.2.1 Priority

MUSE and iCM allows to set individual MU or iCM Gtw priorities.
Units with the same priority are sequenced only looking to run hours and starts.
Setting different priority, user is deciding a fixed sequence.
By default, all the priorities are set to 1 so all the Units are sequenced to balance run hours and starts.

Changing the priorities will have an impact on the balancing of the run hours. Different priorities will be available for cool and heat mode.

In case of MUSE sequence settings, it is highly recommended to the same priority for all the MUs. In this way, MUSE subsystem will balance the running hour of the MU increasing the lifecycle of the MUSE Subsystem.

In case of iCM sequence settings, user can decide to give a priority to iCM Gtw/MUSE subsystem/Scroll units that generate a discrete capacity higher than WC Screw units that generate a continuous capacity. In this way, iCM Gtw and Scroll unit are used to generate a fixed capacity whereas Screw unit will be used only during sudden increase of building request.

6.2.2 Min and Max Run Units

Min and Max Run Units are used to define the minimum and maximum number of Units that can run.
With Min Run Units is possible to define a number of Units that will be always running. This can be useful in case of process application where part of the system load is fixed. In this case the iCM/MUSE will always keep this number of Units enabled. Operator cannot be set which units will be kept enabled, but they depend on sequencing function (at the start up the Next On Units; at system low demand the running Next Off Units)
The Max Run Units defines the maximum number of Units that can run at the same time. With this setting is possible to define a number of Units as backup to be started only in case of alarm of the running ones.

6.2.3 Staging Settings

Staging Settings affect the staging functions in different ways:

1. Staging Thresholds determine the behaviour of Staging for Capacity Range
2. Staging Differential temperatures determines the behaviour of Staging when the deviation between Common LWT setpoints is too wide
3. Staging delays are used by iCM/MUSE logic to stabilize the behaviour of staging function to changes in the system demand.

The following picture shows how the settings of Staging Thresholds, Staging Delta temperature, Staging Delays affects iCM Staging function:

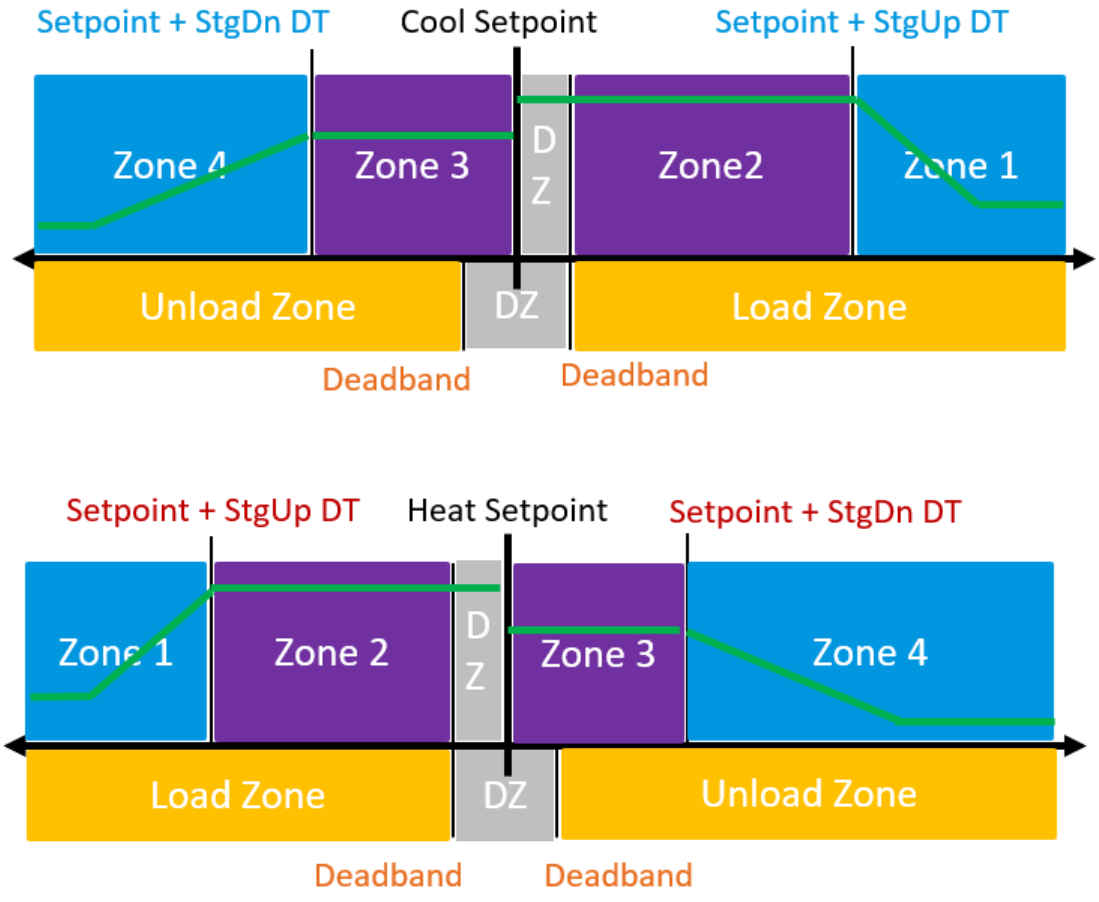


Figure 19 – iCM Staging Setting effects

In zone 2 and 3, Staging on Capacity Range is active; in zone 1 and 4 Staging on temperature takes over the staging on Capacity Range. Outside the Dead zone around the setpoint, MU Capacity control is working.

Thresholds are chosen after a process of fine tuning: during iCM commissioning, service engineer needs to test the response of the iCM to system load request and consequently refine the values.

6.2.4 Staging Capacity Thresholds

The staging Up and Down Thresholds define the management of the start and stop strategy of the MUs by MUSE and of the MUSE subsystem and WC Screw units by iCM Gtw Master.
iCM Staging provides specific Capacity Thresholds for each unit and according to operation mode of MUSE subsystem.
iCM Staging provides same Capacity Thresholds for all the MU and for both operation mode

Figure 20: iCM Staging thresholds in Cool operation

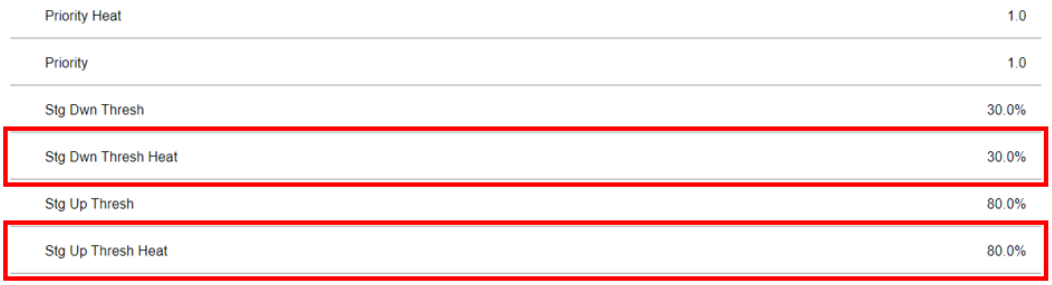


Figure 21: iCM Staging thresholds in Heat operation

Figure 22: MUSE capacity thresholds

Selection of optimal Staging thresholds depends on several factors: number and size of Unit, type of compressor, etc.
In general, Stage Up and Stage down thresholds are set in order to make the Unit work inside a capacity range in which the specific Unit has the higher efficiency.

6.2.4.1 MUSE capacity thresholds

The modular units are composed by one circuit with two scroll compressors. The capacity of the MU is discrete in two steps 50% (when one compressor is running) or 100% (when two compressors are running). For this reason Capacity thresholds must assume mandatory value:

4. 50% < **Stg Down Thresh** < Stg Up Thresh
5. Stg Down Thresh < Stg Up Thresh < 100%

Never set Stage down Threshold lower than 50% otherwise MUSE will never stop the MUs because one of them can run below that threshold.

6.2.4.2 iCM capacity thresholds

The choice of the Capacity thresholds is affected by the composition of each MUSE subsystem.
In fact, each MUSE subsystem generate steps of capacity according to number of running MUs and related running compressors.

For example, if a MUSE subsystem is composed by three MUs, its capacity can be divided by six compressors, so that capacity step for this MUSE subsystem is about 17%.
If user should set a Stg Down Thresh < 17%, iCM will never stop that unit for capacity range because the MUSE subsystem will never fall below that value.
If user should set a Stg Down Thresh > 17% and < 34%, iCM will stop the Next Off iCM Gtw if all the MUSE subsystems are running with only one compressor (last MU and one compressor)
If user should set a Stg Down Thresh > 34%, iCM will stop the Next Off iCM Gtw if all the MUSE subsystems are running with one MU running two compressors or two MUs running one compressor.
The higher is the threshold, the more are the number of MUs that will be stop in the same moment at the Stage Down of a MUSE subsystem by iCM Gtw Master.

If user should choose a a Stg Up Thresh < 68%, iCm Start start the Next On iCM Gtw subsystem even if all the MUSE subsystems are not running all the MUs.

If user should choose a a Stg Up Thresh > 68%, iCm Start start the Next On iCM Gtw subsystem only if all the MUSE subsystems are operating with all the MUs.
Regarding the Stg Up Thresh, the higher is the threshold the more are the MUs that should be running on each MUSE subsystem, before iCM Gtw Master start another Slave.

6.2.5 iCM Staging Temperature Differentials

The staging delta temperature and deadband are used to define the regulation zones iCM

Staging Temperature:	
>Start DT Cool	2.5°Cd
>Shut DT Cool	1.5°Cd
>Start DT Heat	2.5°Cd
>Shut DT Heat	1.5°Cd
>Stage Dead Band	0.5°Cd

Figure 23: iCM staging delta temperature

In comfort application, where a deviation from setpoint is not so relevant, it is recommended to widen the range between Start DT and Stop DT. In this way, iCM Gtw Master avoids unnecessary start or stop managed iCM Gtw panels waiting for the MUSE subsystems to regulate their own capacity to afford the change of request.
In process application, where a wide deviation from setpoint could not be not afforded, it is recommended to shorten the range between Start DT and Stop DT. It is worth noting that these settings can increase the number of start and stop of iCM Gtw panels /MUSE subsystem.

6.2.6 MUSE Staging Temperature Differentials

The staging delta temperatures and deadband are used to define - the regulation zones for the MUSE when Staging on Capacity Range and/or Unit Load Control (If enabled) are active.

>Start Up DT	2.70 °C
>Shutdown DT	1.50 °C
>Dead Band	0.200 °C

Figure 24: MUSE staging temperature thresholds configuration

Because a MUSE subsystem is referred as a single Water-cooled Scroll unit. It is recommended that Start Up and Shutdown timers should be set as the value of a normal WC screw unit.

Regarding the dead-band, it affects the MU Capacity Control. For this reason, if the deadband is wide, unit will be kept at reached capacity without asking for loading up or loading down, avoiding unnecessary start/stop of the compressors of the MUs. If the deadband is narrow, MUSE tries to keep the temperature as much as possible close to the setpoint, but that can cause a frequent start/stop of the compressors of the MUs.

6.2.7 Staging Delays or Timers

In both MUSE and iCM, Staging Timers inhibits the staging function to perform any action in order to avoid too frequent start/stop of MUs or iCM Gtw panels.

6.2.7.1 iCM staging timers

iCM Gtw Master provide dynamic value of those inhibition timers according to the deviation of the Common temperature from the setpoint. The further is the Common temperature from setpoint, the shorten is the timer that iCM logic must wait before starting/stopping a MUSE subsystem.

Staging Timers:	
Act Stg Up Time	600s
>Max Stg Up Time	600s
>Min Stg Up Time	60s
>Start DT Err	3.0°Cd
Act Stg Dwn Time	60s
>Max Stg Dwn Time	600s
>Min Stg Dwn Time	60s
>Stop DT Err	3.0°Cd

Figure 25: iCM stage delays setting

Below picture shows how stage timer change according to common LWT:

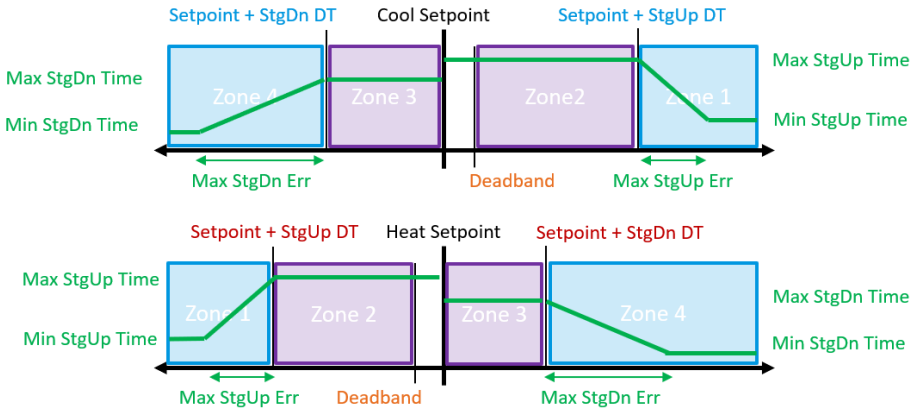


Figure 26: Staging delays calculations

When controlled temperature is inside stage delta temperature, iCM checks and manages the actual capacity of the Unit, so that a too long “Max Stage Up Time” could delay the start-up of an additional Unit, whereas a too short “Max Stage down Time” could cause shut-downs of Units too close in time. In the same way, when controlled temperature is outside stage delta temperature, where staging on temperature works as back up logic for sudden increase or decrease in building demand, a too long “Min Stage Up time” or a too high “Stage Error” could delay the start-up, whereas a too short “Min Stage down Time” can cause unnecessary shutdowns of Units.
Generally, Max Stage Up time is set at 5 minutes and Min Stage Up time at 2 minutes with a short Stage Up Error, about 1°C, because Stage Up DT is still quite high (default, 2,5°C). For the shut-down, Max Stage Down is set at 6 minutes, Min Stage Down time at 3 minutes and a short Stage down Error (about 0,5°C).

6.2.7.2 MUSE staging timers

MUSE provides fixed timers for Stage up or Stage Down Delays.
MU can increase the capacity after its own “Stage Up Delay” is expired or it can reduce its own capacity stopping a compressor after “Stage Down Delay” is passed.

it is recommended to set

1. MUSE Stg Up Time at least two times Stage Up Delay of MU
2. MUSE Stg Down Time at least two times Stage Down Delay of MU.

6.2.8 Modular Unit Capacity Control (only MUSE)

This setting enables the capacity control of each MUs by the MUSE. In this case, MUSE decides which running MU and when each MU have to increase (load up) or decrease (load down) its capacity, so that MUSE can keep controlled LWT close to MUSE Setpoint.
There is only one *Loading up strategy*, and it is based on **Minimum Load**: MUSE makes the Modular Units load up one by one, so that increase of system load will be shared homogeneously among the Modular Units.

On the other hand, there are three possible *Loading down strategies* each of those delivering different unloading profiles, described in the following paragraph.
In the menu

➔ *Main Menu → MUSE Setting*

It is possible to enable the Capacity Control and set management parameters.

Figure 27: Unload Type selection

There is only one *Loading up strategy*, and it is based on **Minimum Load**: MUSE makes the Modular Units load up one by one, so that increase of MUSE subsystem capacity is shared homogeneously among the MUs.

On the other hand, there are three possible *Loading down strategies* that may lead to different distribution of the capacities.
With **Hi Load**, the MUSE chose to load down the MU with highest capacity among the running ones at the moment. When all the running MUs are loaded down to stage down thresh, the Next Off MU is switched off. This strategy makes the MUs load down one by one, so that decrease of MUSE subsystem capacity is shared homogeneously among the MUs.
With **Lo Load** the MUSE chose to load down the MU with lowest capacity among the running ones, down to its stage down threshold; then another MU is loaded down. When all the running MUs are loaded down to stage down thresh, the Next Off MU is switched off. In this case, decrease of system load will be compensated by one MU at time while the remaining running ones keep the achieved capacity.
The **Next Off** the MUSE chose to load down the Next Off MU. When the MU capacity reaches the stage down threshold it is switched off. The decrease of system load is compensated by one Modular Unit at time till total shut-down. This strategy could be the right choice to minimize the number of running chillers so the number of running pumps.

It is recommended to set Unload Strategy = “Next Off”, in order to lower the number of running MUs

The last parameters to set are the ones related to MU Capacity control.

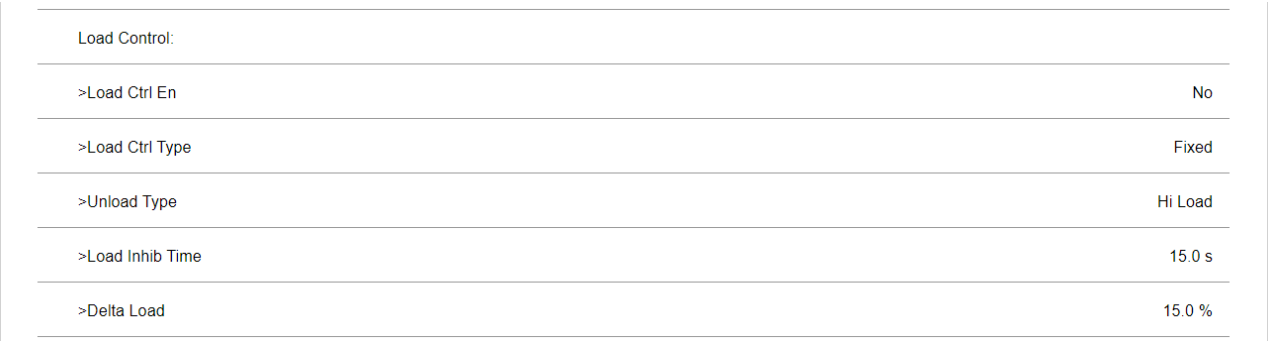


Figure 28: MU Capacity Control Settings

MUSE controls the load up and load down of the MUs one by one. The Delta Load represents the step of capacity to be performed by MU before MUSE switches to load/unload the next MU.

MUs can perform only two step of capacity corresponding to the start of the two compressors.
It is recommended to set Delta Load < 50%

After each Delta Load performed by one MU, MUSE waits for a “Load Inhibition time” before deciding which other unit should perform a further step of capacity.
The Load Inhibition timer should let MUSE evaluate the impact of each delta capacity increase or decrease on controlled temperature and, at the same time, prevent system capacity fluctuation. It is worth noting that a too short Load timer can cause an increase of MU capacity too close in time; whereas a too long Load time can bring to an increase of temperature.

Each MU has its own staging Delays preventing the compressors to start or stop in short time.
It is recommended to set Load Inhibition Timer higher than “Stage Up Delay” and “Stage Down Delay”

6.2.9 Standby Unit (only iCM)

iCM includes the management of Standby Unit.
Only one unit can be elected as “Standby” at time. iCM can start the stand-by unit only in case of alarm of the one running units or if all the units are running and System temperature setpoint is not achieved (temperature compensation).
The follow page is in

➔ *Main menu→ iCM Setting→Standby Setting*.

Unit Selection	No
Type	Run Hours
Rot Days	7Day
Rot Time	00:00:00
Rot Reset	Off
Temp Comp En	No
Temp Comp Time	120min
Temp Comp Dly Off	10min
Min Before Standby Switch	1min

Figure 29: Standby chiller configuration

First setting is to activate the Stand-by function selecting a value different from “No”.
The configuration parameter allow to set a fixed Standby Unit among all the units. In this case no rotation of the stand-by is active. Usually, an older unit or with lower efficiency than the others should be set as Stand-by.
The same configuration allows to set Auto rotation of the Standby Unit chosen by iCM according to two strategies:

3. Unit with More running hours; this strategy can be used to balance the running hour of the unit.
4. Sequence number of unit: (for example, Slave1, then Slave 2, then Slave 3, etc): too assure that every unit in the system will become Stand-by unit.

It is possible to select the period and time when rotation of the Standby unit will occur. Selecting properly this time the changeover can be executed when the system is off so not affecting the system stability.
Activating Temperature Compensation, iCM will start the Standby Unit if the system setpoint is not reached after a compensation timer. This delay can be increased or reduced to fit the application. In case of process application this delay can be reduced below default 120 min. This setting should be evaluated on the basis of the system requirements.

6.2.10 Dedicated Pump Speed Control

According to the configured type of speed control, user will find different settings in the menu*:*

➔ *Main Menu→Evap Speed Ctrl→Setting*
➔ *Main Menu→Evap Speed Ctrl→Setting*

This menu will display only on iCM Gtw Master.

6.2.10.1 Fixed Speed Control

In this case, operator can set two fixed speeds

A. Fix Speed 1
B. Fixed speed 2

Through the selector, can set which speed value will be send by iCM Gtw Master to all the Pump Skids of the MUSE subsystem composing the plant-room.

Generally, the two fixed speed are used in two-pipe system, when requested flow from building change according to the operation mode. For example, in Summer (Cool Mode) there are more consumers than in Winter (Heat mode). So, operator need to change the mode of the system and select the corresponding fixed speed.

iCM Gtw Slave receives the “Fixed Speed” from the Master and communicates it to its own Pump Skid. Pump skid consequently regulates the related pump.
If an iCM Gtw Slave should suffer a communication error with Master or if it is set in “Standalone Mode”, Pump Skid will be commanded by iCM Gtw Slave with a speed value that can be set in menu

➔ *Main Menu→ Evap / Cond Speed Ctrl → Speed → Fix Standby Speed*

This value should be set in order to afford the minimum differential pressure of the MUSE subsystem exchanger.

6.2.10.2 Variable primary flow-only and Variable Primary-Variable Secondary

In this case in the menu

➔ *Main Menu→Evap / Cond Speed Ctrl→Setting*

Operator will find the following

- Maximum and minimum speed,
- ThermoOff speed and time
- PID parameter like Proportional band, Integrative time and Derivative time.

Maximum and minimum speed are limit of the range of speed used by Evap/Cond Speed Control.
Evap/Cond Speed Control never set a value higher than Maximum speed or a value lower than Minimum speed.
Usually, Variable Frequency driver (VFD) of the pump can be affected by very low speed value; for this reason, it is highly recommended to set “Minimum Speed” higher than 20%.

“ThermoOff Speed” is the speed value used by Evap / Cond Speed Control when the system is not generating capacity; i.e. when all the compressors are shut down and only one MUSE subsystem is kept enabled.
It is recommended to set this value high enough to avoid “minimum pressure drop alarm from the MUs. (default = 30%)

Actual speed of the pump is regulated by iCM Gwt Master through PID (Proportional, derivative, Integrative) control.

iCM Gtw Slave receives this “Speed” output from Master and communicates it to its own Pump Skid. Pump skid consequently regulate the related pump.
If an iCM Gtw Slave should suffer a communication error with Master or if it is set in “Standalone Mode”, Pump Skid will be commanded by iCM Gtw Slave with a speed value that can be set in menu

➔ *Main Menu→ Evap / Cond Speed Ctrl → Speed → Backup Speed*

This value should be set to afford the minimum differential pressure of the MUSE subsystem exchangers.

6.2.10.3 PID control in Variable Flow

Actual speed of the pump is regulated by Master through PID (Proportional, derivative, Integrative) control. This control checks the error between the controlled variable (Differential pressure or Delta temperature) and the setpoint, and it calculates the value of the output (speed) to minimize this error and satisfy the request.
Three main parameters define the response of the PID control to a variation of the controlled value:

1) **Proportional band:** it defines how wide should be the response of PID to a variation of the measured variable. Therefore, the greater is the value the smaller will be the response; whereas the smaller is the value, the wider will be the output.
   The following picture shows an example of this behaviour. In case of a greater proportional band, the variation of the pressure provokes a little variation of the speed; whereas in case of a smaller proportional band, the variation of the pressure causes a big variation of the Speed.

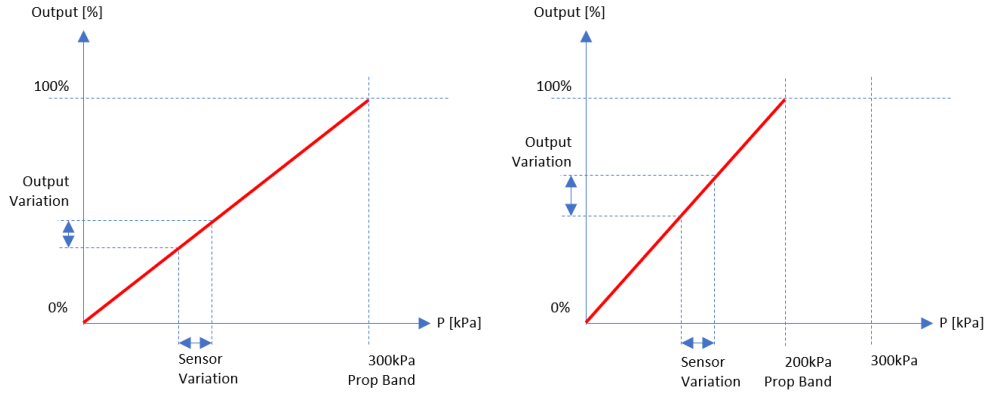


Figure 30 Comparison of Different Proportional Band based on Pressure sensor

Usually, Proportional band is set as wide as the variation of the controlled value. For example, if differential pressure can vary between 0 kPa and 400 kPa, 400kPa can be set. Likewise, if entering water temperature can vary between 10°C and 25°C (temperature setpoint on condenser side), proportional band should be set 25°C.

2) **Integral Time:** it defines how fast should be the response of the output to a variation of the controlled sensor. Thus, the longer is this time, the slower is the change of the output; on the other hand, the shorter is this time, the faster is the variation of the output.
   In general, for the Speed control this timer should be longer, to avoid unnecessary fluctuation of the output due to variation of the controlled variable.
   On the contrary, for the Bypass Valve control based on Minimum flow, this timer should be short, in order to open the valve as soon as the minimum flow setpoint is reached.
3) **Derivative Time:** it defines the action in response to a sudden variation of the controlled sensor. Indeed, if the sensor measurement varies smoothly (i.e. temperature), derivative time is not necessary, and it can be set at 0s. On the opposite, if the controlled variable could vary very fast (for example pressure), a derivative time helps to avoid sudden changes of the output applying a counter-action to the proportional and integrative actions; for this reason, a too long derivative time could bring to an oscillation of the output because of unbalance between Proportional and Integral action and Derivative action. Usually it is recommended not to set a timer longer than 10sec and, in any case, to fine-tune this value changing the time by 3 second per step and test.

7 SYSTEM OPERATING

This chapter explains how to interact with iCM Gateway Panel and related MUSE subsystem (group of Modular units managed by MUSE logic embedded in each iCM Gateway).
Firstly, it must be highlighted that one iCM Gtw panel is elected as “Master” in plant-room and the others as iCM Gtw “Slave”. Consequently, iCM Gateway “Master” manages the MUSE subsystems as Water Cooled Scroll Units of each iCM Gtw in the plant-room.
The main setpoints on iCM Gtw Master are used as “System Setpoints” and communicated to iCM Gtw Slave panels and related MUSE subsystems.
If an iCM Gtw Slave is not communicating anymore with Master or it is set in “Standalone” mode (not managed by Master) through HMI setting, “Slave” work using its own setpoints, i.e. the setpoints of the embedded MUSE subsystem.

7.1 Enable setpoint

To start iCM Logic and management of MUSE subsystems at plant-room level, user must satisfy some conditions on iCM Gtw Master panel. Those conditions are the following:

1. “Remote Switch” turned ON on the iCM Gtw cabinet (displayed on HMI).
2. *iCM Data→Setpoints→Enable Setpoint→Local Setpoint* = ON on controllerHMI
3. *iCM Data→Setpoints→Enable Setpoint→Network Setpoint* by third party BMS though protocol communication only if “Control Source” = Network, (displayed on HMI).

If all the above conditions are true on iCM Gtw Master controller, the user can visualize the system run state in

➔ *“Main Menu → iCM Data → System Run” = “On”*

and iCM sequencing and staging logic will be started.

If one of the above conditions is false on iCM Gtw Master, management at plant-room level is stopped and all the MUSE subsystems will be stopped.

7.1.1 MUSE subsystem enable on iCM Gtw Slave

To start the MUSE logic embedded in an iCM Gtw Slave, all the following condition must be satisfied:

1. “Remote Switch” turned ON on the iCM Gtw cabinet (displayed on HMI).
2. *MUSE Data→Enable Setpoint→Local Setpoint* = ON on controller HMI
3. *MUSE Data→Enable Setpoint→Network Setpoint* = ON by third party BMS though protocol communication only if “Control Source” = Network, (displayed on HMI).

AND

4. Receives “Enable command” by iCM Gtw Master

User can check the status of the MUSE subsystem in the menu

➔ *MUSE Data→Status*

That will show which condition disable the MUSE subsystem

ⓘ	If one of conditions from 1 to 3 is not satisfy, iCM Gateway Master detects the MUSE subsystem as “Not Available”. Consequently, iCM Gtw Slave is stopped and considered out of sequencing and staging logic at plant-room level

7.1.2 MUSE subsystem disable on iCM Gtw Master

If user would like to stop the MUSE subsystem managed by iCM Gtw Master, keeping iCM logic running at plant-room level, one of the following condition should occur

A. *MUSE Data→Enable Setpoint→Local Setpoint* = OFF on controller HMI
B. *MUSE Data→Enable Setpoint→Network Setpoint* = OFF by third party BMS though protocol communication only if “Control Source” = Network, (displayed on HMI).

In this way, iCM Gtw Master judges its own MUSE subsystem “Not Available”, stops it and takes it out of sequencing logic but iCM Logic can keep on managing the other available iCM Gtw Slave / MUSE subsystems.

⚠	***Turning off “Remote Switch” on iCM Gtw Master cabinet stops the whole plant-room management and consequently all the MUSE subsystems.***

7.2 Water temperature setpoints

To set temperature setpoints, used for management of the plant-room, user should operate on Cool or Hot setpoint on iCM Gtw Master. These setpoints will be communicated by iCM Gtw Master to all the iCM Gtw Slave and they will become “Active setpoint” for all the MUSE subsystems.

It must be highlighted that iCM Gtw Master manage the plant-room to reach the System Leaving water temperature on evaporator or condenser side, according to System operation Mode.

7.2.1 System Cool Setpoint

To set the cool setpoint of the System, user needs to operate on the following parameter:

- ➔ *iCM Data → Actual Setpoint → Local Setpoint* (in Cool Setpoint section) by controller HMI
- ➔ *iCM Data → Actual Setpoint → Network Setpoint* (in Cool Setpoint section) by third party BMS though protocol communication

According to "Control Source" setting, iCM Gtw Master will assume the setpoint from HMI or from BMS as System Cool setpoint.
In the *iCM Gtw Maintenance* section of the HMI interface 5.11, it's possible to configure the upper and lower bounds for the temperature setpoint. These limits are defined through the datapoints *CoolSpLowLim* and *CoolSpHighLim*, which respectively set the minimum and maximum allowable values when the system is operating in cooling mode. This functionality ensures that the temperature setpoint could be set only in a controlled range.

7.2.2 System Heat Setpoint

To set the cool setpoint of the System, user needs to operate on the following parameter:

- ➔ *iCM Data → Actual Setpoint → Local Setpoint* (in Heat Setpoint section) by controller HMI
- ➔ *iCM Data → Actual Setpoint → Network Setpoint* (in Heat Setpoint section) by third party BMS though protocol communication

According to "Control Source" setting, iCM Gtw Master will assume the setpoint from HMI or from BMS as System Heat setpoint.
In the *iCM Gtw Maintenance* section of the HMI interface 5.11, it's possible to configure the upper and lower bounds for the temperature setpoint. These limits are defined through the datapoints *HeatSpLowLim* and *HeatSpHighLim*, which respectively set the minimum and maximum allowable values when the system is operating in heating mode. This functionality ensures that the temperature setpoint could be set only in a controlled range.

7.2.3 System Active Setpoint

According to "System Operation Mode" (Cool/Heat), iCM Gtw Master selects one of the two setpoints to set ff as the "System Active Setpoint". This setpoint is used by Staging function to control the plant-room; moreover it is communicated to all the iCM Gtw Slave / MUSE subsystem to become "MUSE Active setpoint".
User can check this parameter in menu

- ➔ *iCM Data→Act Setpoint*

To check if the MUSE subsystem have assume the System setpoint, user can check the menus

- ➔ *iCM Data →Slave # → Act Setpoint*.

7.2.4 MUSE subsystem Setpoints and Active Setpoint

The System Active Setpoint from iCM Gtw Master is assumed as "Active Setpoint" by all the MUSE subsystem

Anyway, each iCM Gtw / MUSE subsystem has its own setpoints independent from plant-room management.
In the menu:

- ➔ *MUSE Data→Actual Setpoint→Local Setpoint (in Cool or Heat Setpoint section) by controller HMI*
- ➔ *MUSE Data→Actual Setpoint→Network Setpoint (in Cool or Heat Setpoint section) by third party BMS though protocol communication*

These setpoints are used by MUSE subsystem only if iCM Gtw Slave:

A. It is not communicating with iCM Gtw Master
B. It is set in "Standalone" mode in iCM Maintenance
C. It cannot follow the "System operation mode"

7.3 Operation mode and Mode setpoint

7.3.1 System Mode setpoint

According to type of first MU connected to iCM Gtw Master:

1) WC Scroll Chiller: EWWT-Q with "Unit Available Mode" = Cool
2) WC Scroll Heat pump : EWWT-Q with "Unit Available Mode" = Cool/Heat
3) AC Scroll Heat pump: EWHT-Q.

User can select the "Available mode" of iCM Gtw Master through the setpoint:

- ➔ *iCM Data→Act mode→Local Setpoint*.

Consequently, if iCM Gtw Master will manage WC Scroll Chiller subsystems, “Local Setpoint” can be changed between “Cool” or “Ice” (Cool/Ice)
If iCM Gtw Master will manage WC Scroll Heat-pump subsystems, “Local Setpoint” can be changed among “Cool”, “Ice” (Cool/Ice) or “Heat” (Cool/Heat).

System “Actual Mode” of iCM Gtw Master and consequently of all the plant-room depends on Local setpoint, Network Setpoint by BMS and Cool/Heat Switch on panel.
The following table shows the conditions that set the “Actual Mode” of iCM Gtw Master.

Control Source	Local Setp	Cool/Heat Switch	Network Setp	Actual Mode
Local	Cool	Any	Any	**Cool**
	Heat	Cool	Any	**Cool**
	Heat	Heat	Any	**Heat**
	Ice	Cool	Any	**Ice**
Network	Cool	Any	Any	**Cool**
	Heat	Any	Cool	**Cool**
	Heat	Any	Heat	**Heat**
	Ice	Any	Ice	**Ice**

If Control Source is set Local, Cool/Heat Switch select the mode.
If “Control Source” is set Network, Cool/Heat Switch is ignored and eventual BMS will set the mode.
In any case, “Local Setpoint” must be set to allow the specific “Available Mode”.

Once System Mode is changed on iCM Gtw Mater, it will be communicated to all the iCM Gtw Slave / MUSE subsystem only if the following parameter is set to ON:

➔ `iCM Setting→ Changeover Management = Enable`

To check if the MUSE subsystem have assumes the System Mode, user can access the menus

➔ `iCM Data →Slave # → Act Mode.`

7.3.2 MUSE subsystem Mode Setpoint and Active Mode

According to the type of first MU connected to iCM Gtw / MUSE subsystem

1) WC Scroll Chiller: EWWT-Q with “Unit Available Mode” = Cool
2) WC Scroll Heat pump : EWWT-Q with “Unit Available Mode” = Cool/Heat
3) AC Scroll Heat pump: EWHT-Q.

MUSE subsystem “Available mode” is set among:

A. Only Cool
B. Cool/Heat

System Actual Mode from iCM Gtw Master is assumed as “Active Mode” by MUSE subsystem only if this mode is an “Available mode”.

Each MUSE subsystem has its own mode setpoint, independent by plant-room management shown in the menu:

➔ *MUSE Data→ MUSE Setting→ Cool/Heat Switch (on iCM Gtw Panel)*
➔ *MUSE Data→ MUSE Setting→ Network Sepoint (on iCM Gtw Panel) by third party BMS though protocol communication*

These setpoints are used by MUSE subsystem only if iCM Gtw Slave:

A. It is not communicating with iCM Gtw Master
B. It is set in “Standalone” mode in iCM Maintenance
C. iCM Setting→ Changeover Management = Disable

If a MUSE subsystem should not follow the System setpoint, iCM Gateway Master detects the MUSE subsystem as “Not Available”. Consequently, iCM Gtw Slave is stopped and considered out of sequencing and staging logic at plant-room level

7.4 System controlled temperature

This variable represents the temperature at system level that iCM tries to affect with sequencing and staging of the units to achieve the system temperature setpoint.

The table below shows the values that "System Controlled temperature" can assume according to configuration of Common LWT sensor and System Operation Mode:

Common LWT Config	Unit Type	Sys Op. Mode	Sys Ctrl Temp
NTC10K	W/C	Cool	Common Evaporator Leaving WT sensor
NTC10K	W/C	Heat	Common Condenser Leaving WT sensor

Table 50: System controlled temperature based on system operating mode

7.5 Standalone Mode

In any moment, setting an iCM Gtw in "Standalone" mode allows to operate the MUSE subsystem independently from plant-room management of iCM Gtw Master.
User needs to set the related setpoint in menu:

➔ *iCM Maintenance → Disconnect setpoint = Yes*

iCM Gtw Master detects is a Slave is in Standalone mode and it considers MUSE subsystem no more controllable and out of plant-room management.
User can check which iCM Gtw Slave / MUSE subsystem is Standalone in menu:

➔ *iCM Data → Slave # → Op Sta → Standalone*

7.5.1 Setting iCM Gtw Slave in Standalone

When iCM Gtw Slave is set in Standalone mode, it works independently from iCM Gtw Master and System management. In this way, all the MUSE Setpoints can be used by operator to manage locally the MUSE subsystem.

Once iCM Gtw Slave is set back under plant-room control (setting "Disconnect setpoint" = No), iCM Gtw Master starts to operate the MUSE subsystem from the last found status. In other words, if the MUSE subsystem previously in "Standalone", was running, iCM Gtw Master lets it run and stops it only if Stage Down conditions are satisfied. Likewise, if the MUSE subsystem previously in "Standalone", was stopped, iCM Gtw Master keeps it stopped and consider it available again for sequencing and staging.

7.5.2 Setting iCM Gtw Master in Standalone

If iCM Gtw Master unit is set "Standalone", all the MUSE subsystems start to work in "Standalone" mode.
Moreover, iCM Gtw Slaves notify that iCM Gtw Master is "Standalone" raising an alarm of "Master Disconnect".
Only when iCM Gtw Master is set back to "Not standalone", it starts to manage the MUSE subsystem, keeping them in the last operating status and starting the plant-room management from that situation.

7.5.3 Setting MUSE in Standalone

MUSE logic can be set "Standalone" mode through the menu:

➔ *MUSE Maintenance → Disconnect Setpoint*

In this way each Modular unit connected to that iCM Gtw panel starts to work locally and independently from MUSE management.

It is strongly not recommended to set the MUSE in "Standalone" mode.
MUSE "Standalone" mode must be used only during Modular Units testing.

7.6 Dedicated Pump Speed Control setpoints

iCM Gtw Master regulates the speed of the pump managed by the Pump Skid Module of each MUSE subsystem (iCM Gtw on the DCN), according to the configuration.

7.6.1 Fixed Speed Control Setpoint

The setpoints "Fixed speed 1" or "Fixed speed 2" on iCM Gtw Master menu:

➔ *Evap / Cond Speed Ctrl→ Speed Settings*

is communicated to all the iCM Gtws / MUSE subsystems / Pump Skid Modules. Pump Speed, in turn, sends this speed command to the related pump.
Selection of one of the two speeds setpoints is possible with

➔ *Evap / Cond Speed Ctrl→ Speed Settings→Fix Speed Selector*

If an iCM Gtw Slave should suffer a communication error with Master or if it is set in "Standalone Mode", Pump Skid will be commanded by iCM Gtw Slave itself with speed value that can be set in menu

➔ *Main Menu→ Evap / Cond Speed Ctrl → Speed → Fix Standby Speed*

7.6.2 Variable Primary Only Setpoint

The value of speed is calculated by iCM Gtw Master to satisfy the “Differential Pressure Setpoint” of primary circuit (through the System Differential Pressure sencor equipped only on iCM Gtw Master):
The actual setpoint depends by iCM Gtw Master “Control Source” setting, and it will be chosen between:

- ➔ *Evap/Cond Speed Ctrl→ DPress Setp→ Evap/Cond Speed Setpoint→ Local Setpt: through controller HMI*
- ➔ *Evap/Cond Speed Ctrl→ DPress Setp→ Evap/Cond Speed Setpoint→ Network Setpt: by third party BMS though protocol communication*

The menu “Speed Setpoint” will display only on iCM Gtw Master
The controlled Value of speed is communicated to all iCM Gtws/MUSE subsystem/Pump Skid Module. Pump Speed, in turn, sends this speed command to the related pump.

If an iCM Gtw Slave should suffer a communication error with Master or if it is set in “Standalone Mode”, Pump Skid will be commanded by iCM Gtw Slave itself with speed value that can be set in menu

➔ *Main Menu→ Evap / Cond Speed Ctrl → Speed → BackUp Speed*

7.6.3 Variable Primary – Variable Secondary Setpoint

The value of speed is calculated by iCM Gtw Master to satisfy the “Delta Temperature Setpoint” of primary circuit (difference between System EWT and System LWT connected only to iCM Gtw Master):
The actual setpoint depends by iCM Gtw Master “Control Source” setting, and it will be chosen between:

- ➔ *Evap/Cond Speed Ctrl→ DTemp Setp→ Evap/Cond Speed Setpoint→ Local Setpt: through controller HMI*
- ➔ *Evap/Cond Speed Ctrl→ DTemp Setp→ Evap/Cond Speed Setpoint→ Network Setpt: by third party BMS though protocol communication*

The menu “Speed Setpoint” will display only on iCM Gtw Master
The controlled value of speed is communicated to all iCM Gtws/MUSE subsystem/Pump Skid Module. Pump Speed, in turn, sends this speed command to the related pump.

If an iCM Gtw Slave should suffer a communication error with Master or if it is set in “Standalone Mode”, Pump Skid will be commanded by iCM Gtw Slave itself with speed value that can be set in menu

➔ *Main Menu→ Evap / Cond Speed Ctrl → Speed → BackUp Speed*

7.6.4 Manual Speed Control

Operator can force manually the speed of all the Pump Modules of all the MUSE subsystem / iCM through the following menu that will display only on iCM Gtw Master:

➔ *Evap/Cond Speed Ctrl→ Speed→ Evap/Cond Speed Maintenance→Manual Selector=Manual*

With this setting, operator will be able to force

- ➔ Manual Speed
- ➔ Manual position of the System Bypass valve (in case of Configuration of Variable Primary Only: “VPF”)

The manual speed value is communicated to all iCM Gtws/MUSE subsystem/Pump Skid Module. Pump Speed, in turn, sends this speed command to the related pump if it is running.

7.7 System Overview

On Master unit controller HMI, Main Overview shows an overview of the status of the units through icons:

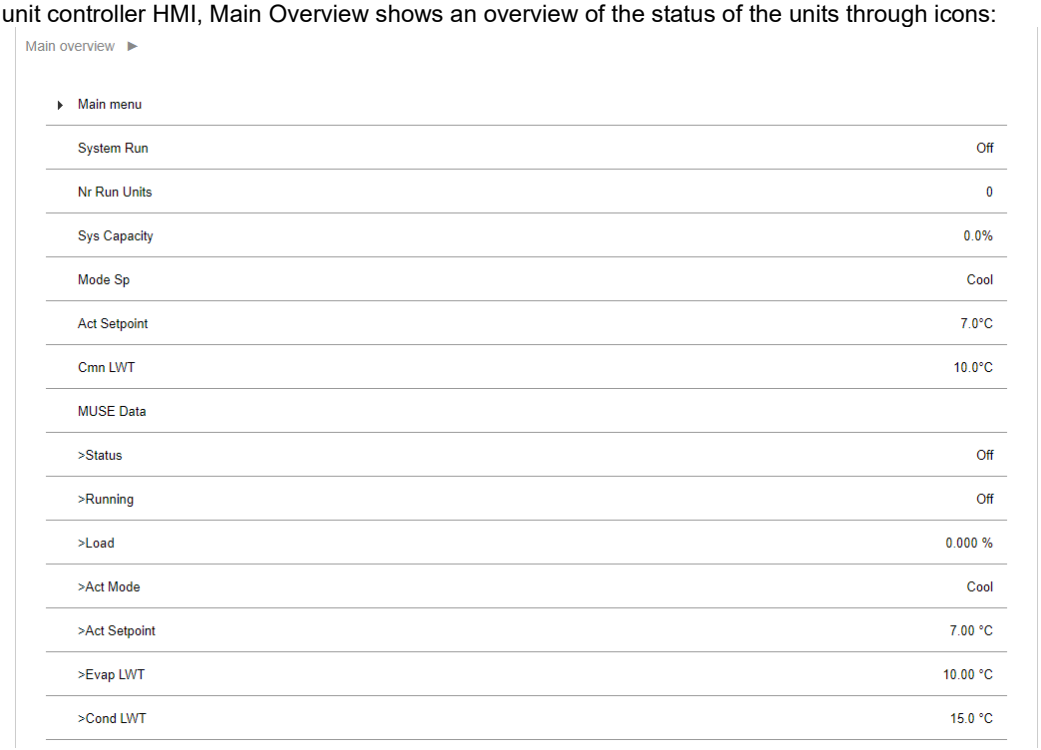


Figure 31: System Overview on Main menu of Master unit HMI

At any moment, user can check all the information about system management and unit statuses on HMI in menu:

- "Main Menu → iCM Data" contains the pages about iCM information.
- "Main Menu → MUSE Data" contains the pages about MUSE information.

8 TROUBLESHOOTING

This chapter will try to explain the alarms and events generated by the MUSE and iCM Gateway and guide to resolution. In the following sections all the alarms will be described. Alarms will disable the MUSE or iCM Gateway or will reduce their ability to control the system properly.

8.1 iCM Gateway Master Alarms

8.1.1 iCM Configuration Alarm

This alarm on **Gateway Master** controller can occur during configuration of System Control and it indicates that kinds of Unit (Unit Type) or kind of System Control Type from Units on process network is not correct.

The reason of configuration alarm can be checked in menu:
`Main menu --> Configuration --> Config iCM --> Alarm Reason.`

Available configurations and possible configuration alarms are explained on Paragragh 2.3

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *iCM Config Alm* System does not start even if enabled by Master Unit Switch NOTE: reason of configuration alarm can be read in menu: *Main menu --> Configuration --> Config iCM --> Alarm Reason*	*Main menu-->Configuration --> Config iCM --> Alarm Reason = Undef* Connected slaves did not send the "Unit Type".	Check if Communication Error with slaves occurred. Reboot Master controller when all the communication errors with slaves are fixed.
	Main menu-->Configuration --> Config iCM --> Alarm Reason = iCMTypeError System Control Type (Software Option is different among connected Units.	Check if iCM Standard (software option) is not unlocked on all the connected Units. Contact Factory for Unlock Key
	System→Configuration→ ConfigAlarm = CooledError WaterCooled + AirCooled Chiller or WaterCooled + Multipurpose Unit are connected to Master	Configuration NOT supported. Contact Factory
	Main menu-->Configuration --> Config iCM --> Alarm Reason = ModeError Multipurpose + HeatPump Units are connected to Master	Configuration NOT supported Contact Factory
	Main menu-->Configuration --> Config iCM --> Alarm Reason = ComprError Scroll + Centrifugal compressor Units are connected to Master	Configuration NOT supported Contact Factory
Reset	**.**	**Notes**
Local HMI Network	□ □	

8.1.2 System Lwt Sensor Fault

This alarm indicates that the sensor for the Cool/Heat water header on Evaporator side is not working properly. This alarm can occur if CommonLWT sensor is configured on all the Unit.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *iCM Cmn LWT Alm* Forced Start of all Units,	Sensor is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.

Load control disabled, All Units in Local.	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.1.3 System Ewt Sensor Fault

This alarm indicates that the sensor for the Cool/Heat water inlet on Evaporator side is not working properly. This alarm can occur if CommonEWT sensor is configured on all the Unit.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *iCM Cmn EWT Alm* Forced Start of all Units, All Units in Local.	Sensor is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.1.4 System Heat Lwt Sensor Fault

This alarm indicates that the sensor for the hot water header on condenser side is not working properly. This alarm can occur if CommonLWT sensor is configured only on WaterCooled heat-pump.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *iCM Heat Cmn LWT Alm* *→ Only with EWWT-Q* Forced Start of all Units, All Units in Local.	Sensor is broken.	Check for sensor integrity according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.1.5 System Heat Ewt Sensor Fault

This alarm indicates that the sensor for the hot water inlet on condenser side is not working properly. This alarm can occur if CommonEWT sensor is configured only on WaterCooled heat-pump.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *iCM Heat Cmn EWT Alm*	Sensor is broken.	Check for sensor integrity according table and allowed kOhm (kΩ) range.
		Check correct sensors operation

→ *Only with EWWT-Q* Forced Start of all Units, All Units in Local.	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.1.6 Controlled Temperature Alarm

This alarm on the **Master** controller appears when the System Temperature Sensor is in alarm.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *iCM Ctrl Temp Alm* iCM does not properly execute the Staging and Sequencing functions.	Refer to section 8.1.2 and section 8.1.3.	Refer to section 8.1.2 and section 8.1.3.
Reset		**Notes**
Local HMI Network	□ □	

8.1.7 Controlled Heat Temperature Alarm

This alarm on the **Master** controller appears when the System Heat Temperature Sensor is in alarm.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *iCM Ctrl Heat Temp Alm* iCM does not properly execute the Staging and Sequencing functions.	Refer to section 8.1.4 and section 8.1.5.	Refer to section 8.1.4 and section 8.1.5.
Reset		**Notes**
Local HMI Network	□ □	

8.1.8 Slave Standalone

This alarm on the **Master** controller indicates that the Slave # is not managed by Master anymore.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *Slv# Standalone* *# identifies the Slave number* The Unit# starts working in Local according to Unit logic, Enable Setpoints and Temperature setpoints	1) Parameter "Disconnect" on Master Unit controller is set "Yes" 2) An Alarm of System controlled sensor has occurred.	1) Set "Disconnect" = "No" on Master. 2) Fix the temperature sensor alarm on Master.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.1.9 Slave Alarm

This alarm on the **Master** controller indicates that the Slave # is not working properly and it is not managed by Master anymore.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *Slv# Alarm* *# identifies the Slave number* The Unit # in not available for sequencing and staging.	The Unit # is in alarm.	Check the cause of alarm on the HMI of the unit in alarm.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.1.10 Slave Communication Error

This alarm on the **Master** controller, indicates that the communication with one Slave is not working properly. There is the possibility that this alarm can be related to several Units in case of wrong wiring.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *Slv# Comm Err.* *# identifies the Slave number* Unit Not available for sequencing and staging.	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Unit which is not communicating.
	Process bus communication is not running properly.	Check Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.1.11 Slave Missing

This alarm on the **Master** controller, indicates that some of the Slaves are not visible in the network. This can happen during the system configuration if the Master is configured first.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *Slv# Miss DCN* *# identifies the Slave number* Unit Not available for sequencing and staging.	Wrong configuration of the system.	Check the number of configured Units and the corresponding individual Units' configurations. All the Units must be configured with a different address and the number of Units configured on the Master matches the number of Units in the system.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.1.12 MUSE Alarms

These alarms regarding MUSE Subsystem and Modular Units will be explained in section 8.3.

8.2 iCM Gateway Slave Alarms

8.2.1 Master Communication Error

This alarm on the **Slave** controller, indicates that the communication with the Master is not working properly. There is the possibility that this alarm can be related to several Units in case of wrong wiring.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *Mst Comm Err* Each Unit starts working in Local according to Unit logic, Enable setpoints and Temperature setpoints.	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Unit which is not communicating.
	Process bus communication is not running properly.	Check Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.2.2 Master Missing

This alarm on the **Slave** controller, indicates that the Master is not visible in the network. This can happen during the system configuration if the Slaves are configured first.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *Mst Miss* DCN Each Unit starts working in Local according to Unit logic, Enable Setpoints and Temperature setpoints	Wrong configuration of the system.	Configure the Master address and the number of Units on the Master.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.2.3 Master Disconnect

This alarm on the **Slave** controller, indicates Unit is not managed by Master anymore.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *Master Disconnect* Each Unit starts working in Local according to Unit logic, Enable Setpoints and Temperature setpoints	1) Parameter "Disconnect" on Master Unit controller is set "Yes" 2) An Alarm of System controlled sensor has occurred.	1) Set "Disconnect" = "No" on Master. 2) Fix the alarm of LWT sensor on Master
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.2.4 MUSE Alarms

These alarms regarding MUSE Subsystem and Modular Units will be explained in section 8.3.

8.3 MUSE Alarms

8.3.1 MUSE Configuration Alarm

This alarm on **Gateway** controller can occur during configuration of MUSE Subsystem Control and it indicates that kinds of Modular Unit or kind of Subsystem Control Type from MUs on process network is not correct.

8.3.2 Evaporator Lwt Sensor Fault

This alarm indicates that the sensor for the Cool water header on Evaporator side is not working properly. This alarm can occur if Evaporator LWT sensor is configured on all the Modular Unit.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE Evap LWT Alm* Forced Start of all Modular Units, Load control disabled, All Modular Units in Local.	Sensor is broken.	Check for sensor integrity according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.3.3 Condenser Lwt Sensor Fault

This alarm indicates that the sensor for the Cool water header on Condenser side is not working properly. This alarm can occur if Condenser LWT sensor is configured on all the Modular Unit.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE Cond LWT Alm* Forced Start of all Modular Units, Load control disabled, All Modular Units in Local.	Sensor is broken.	Check for sensor integrity according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network	□ □	

8.3.4 Shutdown Alarm

This alarm indicates that all configurated Modular Units are in alarm.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE ShutDwn Alm* *All MUs are switched off.*	All Modular Unit are in alarm.	Check on each Modular Units HMI the cause of alarm.

MUSE subsystem is not available for sequencing and staging.		
Reset		**Notes**
Local HMI Network	□ □	

8.3.5 Modular Units Warning

This alarm indicates that at least one configured Modular Unit is in alarm.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE MUs Wrng* *The MU in alarm is switched off.* *The MU in alarm is* not available for MUSE sequencing and staging.	At least one Modular Unit is in alarm.	Check the cause of alarm on the HMI of the unit in alarm.
Reset		Notes
Local HMI Network	□ □	The alarm clears automatically when all MUs are re-established.

8.3.6 Modular Units Communication Error

This alarm indicates that all configurated Modular Units are in communication error alarm.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE MUs Comm Err* *The MU in alarm is switched off.* *The MUSE subsystem is* not available for sequencing and staging.	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Modular Unit which is not communicating.
	Process bus communication is not running properly.	Check Modular Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.3.7 Modular Unit # Communication Error

This alarm indicates that the Modular Units # is in communication error alarm.

Symptom	Cause	Solution
Bell icon is blinking on controller's display. String in the alarm list: *MUSE MU# Comm Err* *The MU in alarm is switched off.* *The MU in alarm is* not available for MUSE sequencing and staging.	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Modular Unit which is not communicating.
	Process bus communication is not running properly.	Check Modular Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See

		section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.3.8 Pump Skid Communication Error

This alarm indicates that the Pump Skid is in communication error alarm.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *MUSE Skid Comm Err*	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Modular Unit which is not communicating.
	Process bus communication is not running properly.	Check Modular Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.3.9 Pump Skid Shutdown Alarm

This alarm indicates that the Pump Skid is in shutdown alarm.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *MUSE Skid Alm* *All MUs are switched off.* *MUSE subsystem is* not available for sequencing and staging.	All Modular Unit are in alarm.	Check on each Modular Units HMI the cause of alarm.
Reset		**Notes**
Local HMI Network	□ □	

8.4 Dedicated Pump Control Alarms

8.4.1 Pump Manager Differential Pressure Sensor Fault

This alarm on the **iCM Master** controller when Pump Controller Manager communicates the alarm of connected sensor used for evaporator\condenser pressure control.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *Evap Speed Ctrl DP* Or *Cond Speed Ctrl DP* If Control Type = Fixed: Evap\Cond pump run at Fixed Standby Speed	On iPM sensor is broken.	Check for sensor integrity according table and allowed 0-10 Volt (V) range.
		Check correct sensors operation
	On iPM sensor is shorted	Check if sensor is shorted with a resistance measurement.
	On iPM sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.

If Control Type = DT Or DP: Evap\Cond pump run at Buckup Speed		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when sensor issue is fixed.

8.5 Pump Managers Alarms

8.5.1 Pump Manager Configuration Error

This alarm on the **iCM Master** controller appears when Evaporator\Condenser Pump Manager is configured and in communication, but configuration of pump system as not been received. This can happen during the system configuration if the Master is configured first.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *EvapPM Config* Or *CondPM Config* System does not start even if enabled by Master Unit Switch	Configuration from Evap\Cond Pump Manager has not been received through Daikin Network and applied on iCM.	Check that no communication error is active and that iPM have sent its own configuration parameters to iCM. Then reboot iCM controller
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established, and controller is reboot.

8.5.2 Pump Manager Available Pump Alarm

This alarm on the **iCM Master** controller when Evaporator\Condenser Pump Manager communicates a cumulative alarm of the pumps.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *EvapPM Avail Pmp* Or *CondPM Avail Pmp* Staging Up of the Units is inhibited.	On iPM number of alarmed pumps exceed the number of Daikin Units.	Check pumps connected to iPM controller and solve the cause of alarm.
Reset		**Notes**
Local HMI Network Auto	□ □ □	This alarm clears automatically when pump issue is fixed.

8.5.3 Pump Manager Communication Error

This alarm can occur only on **iCM Master** if Evaporator pump Manager or Condenser pump manager has been configured but communication is not working properly.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *EvapPM Comm Err.* Or *CondPM Comm Err* Staging Up of the Units is inhibited.	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Unit which is not communicating.
	Process bus communication is not running properly.	Check Units' addresses in the Process bus network. All the addresses must be different.

	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.5.4 Pump Manager Missing

This alarm on the **iCM Master** controller indicates that Pump managers are not visible in the network. This can happen during the system configuration if the Master is configured first.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *EvapPM Miss Alm* Or *CondPM Miss Alm* System does not start even if enabled by Master Unit Switch	Wrong configuration of the system.	Check that iPM has been configured (on iPM controller). Check that same iPM has been configured on iCM.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.5.5 Pump Manager Sensor Fault

This alarm on the **iCM Master** controller when Pump Manager communicates the alarm of connected sensor used for pump speed control.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *EvapPM Spd Sensor* Or *CondPM Spd Sensor* Staging Up of the Units is inhibited.	On iPM sensor is broken.	Check for sensor integrity according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	On iPM sensor is shorted	Check if sensor is shorted with a resistance measurement.
	On iPM sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when sensor issue is fixed.

8.6 Cooling Tower Manager Alarms

8.6.1 Cooling Tower Manager Communication Error

This alarm can occur only on **iCM Master** if Condenser Manager controller and Cooling Tower Manager are not communicating.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *iCT Comm Err.*	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Unit which is not communicating.

	Process bus communication is not running properly.	Check Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.6.2 Cooling Tower Manager Missing

This alarm on the **iCM Master** controller indicates that Condenser Pump controller and Cooling Tower manager are not visible in the network.
This can happen during the system configuration if the Master is configured first.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *iCT Miss Alm*	Wrong configuration of the system.	Check that iCT has been configured (on Condenser PM controller). Check that same iCT has been configured on iCM.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.6.3 Cooling Tower Configuration Error

This alarm on the **iCM Master** controller when Cooling Tower Manager is configured and Condenser Pump Manager are communicating, but configuration of Cooling Tower system has not been received. This can happen during the system configuration if the Master is configured first.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *iCT Config Err* System does not start even if enabled by Master Unit Switch	Configuration from Pump Manager has not been received through Daikin Network and applied on iCM.	Check that no communication error is active with Cond iPM and that Cooing Tower Manager has sent its own configuration parameters to iCM. Then reboot iCM controller
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established, and controller is reboot.

8.6.4 Cooling Tower Manager Sensor Fault

This alarm on the **iCM Master** controller when Cooling Tower Manager communicates the alarm of connected sensor used for Cooling tower control.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *iCT LWT Sensor*	On iCT Main Board sensor is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	On iCT Main Board sensor is shorted	Check if sensor is shorted with a resistance measurement.
	On iCT Main Board sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.

		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when sensor issue is fixed.

8.6.5 Cooling Tower # Alarm

This alarm on the **iCM Master** controller when Cooling Tower # communicates the alarm.

Symptom	**Cause**	**Solution**
Bell icon is blinking on controller's display. String in the alarm list: *CT# Alarm* *# identifies the Cooling Tower number*	Wrong configuration of the system.	Check the number of configured Units and the corresponding individual Units' configurations. All the Units must be configured with a different address and the number of Units configured on the Master matches the number of Units in the system.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.6.6 Cooling Tower # Lwt Sensor Alarm

This alarm on the **iCM Master** controller when Cooling Tower # communicates the alarm of connected leaving water temperature sensor used for Cooling tower control.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *CT# LWT Sensor* *# identifies the Cooling Tower number*	On CT# sensor is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	On CT# sensor is shorted	Check if sensor is shorted with a resistance measurement.
	On CT# sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when sensor issue is fixed.

8.7 Secondary Pump Manager Alarms

8.7.1 Secondary Pump Manager Communication Error

This alarm can occur only on **iCM Master** if Secondary Pump is not communicating.

Symptom	**Cause**	**Solution**
Bell icon is moving on controller's display. String in the alarm list: *iSM Comm Err.*	Process bus network is not properly cabled.	Check the continuity of the RS485 network with the Unit which is not communicating.
	Process bus communication is not running properly.	Check Units' addresses in the Process bus network. All the addresses must be different.
	EM noise over the process bus	Check the cabling. It's required to use shielded twisted pairs to connect the different Units with the shield properly connected to the system ground. See section related to field wiring for further details.

Reset		Notes
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.7.2 Secondary Pump Manager Missing Alarm

This alarm on the **iCM Master** controller indicates that Secondary Pump Manager is not visible in the network.
This can happen during the system configuration if the Master is configured first.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *iSM Miss Alm*	Wrong configuration of the system.	Check that iSM has been configured. Check that same iSM has been configured on iCM.
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established.

8.7.3 Secondary Pump Manager Configuration Error

This alarm on the **iCM Master** controller appears when Secondary Pump Manager is configured and in communication, but configuration of Secondary Pump Manager system as not been received. This can happen during the system configuration if the Master is configured first.

Symptom	Cause	Solution
Bell icon is moving on controller's display. String in the alarm list: *iSM Config Err*	Configuration from Secondary Pump Manager has not been received through Daikin Network and applied on iCM.	Check that no communication error is active and that iSM have sent its own configuration parameters. Then reboot iSM controller
Reset		**Notes**
Local HMI Network Auto	□ □ □	The alarm clears automatically when the communication is re-established, and controller is reboot.

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