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Installation & Operating Manual
D-EOMOC00710-21_01EN

Intelligent Pump Manager

Table of contents

1 WHAT IS iPM©

1.1 Before starting

iPM© (Intelligent Pump Manager) is a control panel that can manage only manifolded pump systems and water circuit devices such as Pumps, Header Bypass Valve and Sensors on Evaporator or Condenser side of Daikin Units.
iPM© has two different hardware configurations:

- iPM05: management up to five pumps.
- iPM10: management up to ten pumps.

iPM© is an "*accessory"* of Daikin Units and it can be used in conjunction with iCM© (Intelligent Chiller Manager Software Option 184).
To work, iPM© must be connected in the Controller communication network of the Daikin Unit (Daikin Communication Network: DCN).

1.2 Available control functions

iPM© can be configured to manage pump system

- on evaporator side: **Evaporator Pump Manager**
- on condenser side: **Condenser Pump Manager**

In case of Daikin Air cooled units, only one iPM© is necessary, whereas in case of Daikin water-cooled Units, two iPM© could be applied (one for Evaporator circuit and one for Condenser circuit)
iPM© provides the following control functions for the management of the water circuits connected to Daikin Units:

- Pump Sequencing functions:
  - Lead/Lag management;
  - Lead/Stand-by management;
  - Pump Rotation management;

  to minimize pumps running hours.
- Pump Staging functions:
  - Fixed number;
  - Demand Number of running Daikin units;
  - Speed Threshold for VFD pumps

  to assure minimum primary flow and to afford building flow demand.
- Anti-freeze protection.
- Pump Manual Management.
- Pump Speed Control: management of Variable speed driver pumps according to specific controlled sensor (configurable: Delta Temperature, Differential Pressure, Absolute Pressure).
  - Constant Flow
  - Variable Flow
- Header Bypass Valve Control:
  a) In primary circuit: to assure Minimum Flow on Primary circuit for Daikin Units
  b) In cooling tower circuit: to regulate Entering Water Temperature.
- Pump System Energy consumption: monitoring of electrical consumption of pumps system.

Those functions can be applied to manage the devices on primary circuit or cooling tower circuit, and they make iPM© able to manage a wide range of water circuit distribution layout.

iPM© electrical panel is always provided with a NTC10K temperature sensors to be installed on System Entering (Return) water header of the circuit.
Moreover, according to plant layout to be managed and configuration of Speed Control function or Bypass Valve control function on Pump Manager, additional sensors are necessary (differential pressure sensor, absolute pressure sensor and/or flow sensor); these sensors are not part of Factory provision because strictly dependant on plant-room design.

1.3 Managed Plant-room Layouts

iPM© can manage plants with the following possible layout:

1) As *Evaporator Pump Manager*:
   - Constant primary system with Open Bypass. (Air cooled Chillers or Heat Pumps or Water-cooled Chillers or Multipurpose units)
   - Variable Primary-Only system (VPF) with Bypass Valve for Minimum Flow (Air cooled Chillers or Heat Pumps or Water-cooled Chiller units)

- Variable Primary-Variable Secondary system with Open Bypass (Air cooled Chillers or Heat Pumps or Water-cooled Chiller units)
- Constant evaporator system with Bypass Valve for Maximum Entering temperature (Water-cooled units in Heat-Only)
- Variable evaporator system with Bypass Valve for Maximum Entering temperature (Water-cooled units in Heat-Only)

2) As *Condenser Pump Manager*:
   - Constant Hot Primary system with Open Bypass. (Water-cooled units in Heat-Only or Multipurpose units)
   - Variable Hot Primary-Only system (VPF) with Bypass Valve for Minimum Flow (Water-cooled units in Heat-Only)
   - Constant condenser system with Bypass Valve for Minimum Entering temperature (Water-cooled Chiller units)
   - Variable condenser system with Bypass Valve for Minimum Entering temperature (Water-cooled Chiller units)
   - Variable condenser system with no Bypass (Water-cooled Chiller units)

The below table resumes the most common plant layouts, type of Daikin units and consequently iPM configuration necessary to manage the manifolded pump piping system.

Daikin units	Pump Driver	Plant Layout	iPM© type
AC Chiller WC Chiller AC Heat pump Multipurpose	CDS	Constant Primary / Variable Secondary (Chilled/Heat production)	Evap iPM
AC Chiller WC Chiller AC Heat pump	VFD	Variable Primary Only (Chilled/Heat production)	Evap iPM
AC Chiller WC Chiller AC Heat Pump	VFD	Variable Primary / Variable Secondary (Chilled/Heat production)	Evap iPM
WC in Heat Only	CSD	Constant Evaporator Circuit (Cool Rejection – Cool Exchanger)	Evap iPM
WC in Heat Only	VFD	Variable Evaporator Circuit (Cool Rejection – Cool Exchanger)	Evap iPM
Multipurpose WC in Heat Only	CSD	Constant Primary / Variable Secondary (Heat production)	Cond iPM
WC in Heat Only	VFD	Variable Primary / Variable Secondary (Only Heat production)	Cond iPM
WC in Heat Only	VFD	Variable Primary Only (Only Heat produtcion)	Cond iPM
WC Chiller	CSD	Constant Condenser Circuit (Heat Rejection – Cooling Tower))	Cond iPM
WC Chiller	VFD	Variable Condenser Circuit (Heat Rejection – Cooling Tower)	Cond iPM

1.4 Limitations

As mentioned in the previous paragraph **1.1 Before starting**, iPM© cannot work as a standalone pump manager. iPM© must be connected to Daikin communication network of the Daikin Units with iCM©; in this way, it is able to retrieve data from those controllers and, in particular, from iCM© Master, necessary for pump management, alarm management and control management.

Due to the wide range of the possible layout of water distribution circuits inside a plant, iPM© is not able to manage all of them. Paragraph **1.3 Managed Plant-room Layouts** proposes a list of the most common water circuit layout managed by iPM and recommended for the correct functioning of the connected Daikin Units.
In case of Air-cooled Heat Pump units, iPM can be applied only in 2-pipes systems. In fact, iPM cannot manage changeover valves connected to Unit evaporator, generally used in the 4-pipe systems to divert the water production from Cool Headers to Hot Headers and vice versa. In this case a BMS should take in charge the management of the changeover valves.
Likewise, in case of Water-cooled units in Heat mode, Evaporator iPM and Condenser iPM can be configured respectively as Cool Exhausting Pump Manager and Hot Primary Pump Manager, losing the control of Bypass Valve for entering water management in Cooling system. This configuration is fixed; in other word, the two iPM are not able to change dynamically configuration according to Water-cooled units operating mode.

In case of doubts about possible plant layout configuration managed by iPM, please refer to the following sections or contact your Sales Support reference.

1.5 Daikin on Site

Daikin on Site (DoS: cloud remote monitoring and trending service) is available for iPM controller.
DoS will retrieve all the status, settings, configuration parameters and those will be visible in menus and web graphics. Moreover, DoS provides trend of values and alarm notification.
Alternatively, iCM Master Controller collects the most important data from iPM through Daikin communication network and provides these values on Daikin on Site. So, most important information about pump, setpoints for pump control functions and web graphics regarding iPM will be visible through Daikin on Site of the iCM master controller in dedicated menu and web graphics.

2 FIELD WIRING

This section explains hardware input/output, integrated by iPM© and needed to perform pump management logic. Moreover, this section gives recommendations about installation of additional sensors.

2.1 iPM Input/Output Map

In the following table are described the input/output map of iPM© controller with the related hardware configuration. According to iPM© Type (iPM05 or iPM10) electrical panel will contains additional Input/Output extension modules.

Controller and Modules			iPM Configuration	Point Description	Hardware Configuration	
Main Controller POL688	T1	X9	iPM05 or IPM10	-	Ai	-
		X10		System EWT	Ai	None / NTC10K / Pt1000
		X11		-	Ai	-
	T2	X1		Pump Speed Signal 1	Ao	0-10VDC output
		X2		Pump Speed Signal 2	Ao	0-10VDC output
		X3		Pump Speed Signal 3	Ao	0-10VDC output
		X4		Pump Speed Signal 4	Ao	0-10VDC output
	T3	X5		Pump Speed Signal 5	Ao	0-10VDC output
		X6		System Differential Pressure / Absolute Pressure	Ai	None / 0-10VDC / 4-20mA Input
		X7		System By-pass Valve	Ao	None / 0-10VDC Output
		X8		System Flow	Ai	None / 0-10VDC / 4-20mA Input
	T4	Di1		Pump Op State 1 (Stop/Run)	Di	Dry Voltage Input
		Di2		Pump Op State 2 (Stop/Run)	Di	Dry Voltage Input
	T5	Di3		Pump Op State 3 (Stop/Run)	Di	Dry Voltage Input
		Di4		Pump Op State 4 (Stop/Run)	Di	Dry Voltage Input
	T6	Modbus Master RS485 Port 2		Cooling Tower Input/Output Boards	A2 +	
					A2 -	
					REF 2	
	T9	Do1		Pump Command 1 (Off/On)	Do	Dry Voltage Output
	T10	Do2		Pump Command 2 (Off/On)	Do	Dry Voltage Output
		Do3		Pump Command 3 (Off/On)	Do	Dry Voltage Output
		Do4		Pump Command 4 (Off/On)	Do	Dry Voltage Output
	T11	Do5		Pump Command 5 (Off/On)	Do	Dry Voltage Output
		Do6		System Op State	Do	Dry Voltage Output
		Do7		System Alarm	Do	Dry Voltage Output
		Do8		-	Do	-
	T12	Do9		-	Do	-
		Do10		-	Do	-
	T13	Di5		Pump Op State 5 (Stop/Run)	Di	Dry Voltage Input
		Di6		-	Di	-
	T14			Pumps Power Supply	A1 +	

		Modbus Master RS485 Port 1		Energy Meter	A1 -	
					REF 1	
	T15	KNX		Daikin Communication Network	CE +	
					CE -	
Module 1 POL965 (Address 2)	T1	Do1	iPM10 ONLY	Pump Command 6 (Off/On)	Do	Dry Voltage Output
		Do2		Pump Command 7 (Off/On)	Do	Dry Voltage Output
		Do3		Pump Command 8 (Off/On)	Do	Dry Voltage Output
		Do4		-	Do	-
	T2	Do5		-	Do	-
		Do6		-	Do	-
	T3	Di1		-	Di	-
	T4	X1		Pump Speed Signal 6	Ao	0-10VDC output
		X2		Pump Speed Signal 7	Ao	0-10VDC output
		X3		Pump Speed Signal 8	Ao	0-10VDC output
		X4		Pump Speed Signal 9	Ao	0-10VDC output
	T5	X5		Pump Speed Signal 10	Ao	0-10VDC output
		X6		Pump Op State 6 (Stop/Run)	Di	Dry Voltage Input
		X7		Pump Op State 7 (Stop/Run)	Di	Dry Voltage Input
		X8		Pump Op State 8 (Stop/Run)	Di	Dry Voltage Input
Module 2 POL945 (Address 3)	T1	Do1	iPM10 ONLY	Pump Command 9 (Off/On)	Do	Dry Voltage Output
		Do2		Pump Command 10 (Off/On)	Do	Dry Voltage Output
		Do3		-	Do	-
		Do4		-	Do	-
	T3	Di1		Pump Op State 9 (Stop/Run)	Di	Dry Voltage Input
	T4	Di2		Pump Op State 10 (Stop/Run)	Di	Dry Voltage Input
		Di3		-	Di	-
		Di4		-	Di	-

Table 1 Input/output Map of Main controller and extension modules

2.2 Daikin Network connection

The following diagram shows how to connect the iPM controller to Daikin network of Daikin Unit Controllers provided of iCM©. Starting from the last Daikin unit, cable must be connected in parallel on terminals PB [CE+ / CE-] of each unit controller, accessible on the terminal board of the electrical panels. Refer to the unit wiring diagram for the enumeration of the terminals.
A shielded twisted pair cable is necessary to make the connection available.

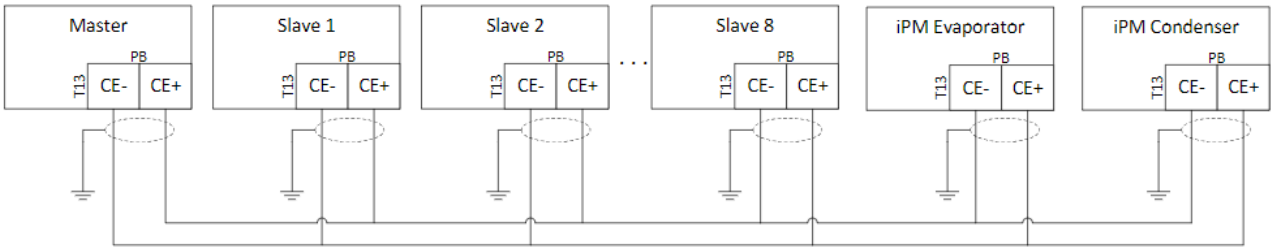

Figure 1: Connecting the network

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

- Bus cable length between consecutive controllers Max. 700 m
- Total bus cable length Max. 1,000 m

2.3 Controlled sensors

According to plant layout and requested pump management, control functions must be configured on iPM and additional sensors are needed. Those sensors must be installed in specific location in the water distribution system to assure the correct measurements and functioning of the Control Logic.

The following picture contains all the sensors that iPM can integrate and correct location for the installation.
It is worth noting that in a real plant-room layout, not all sensors are needed and only some of them must be installed and connected to iPM.

	***System leaving water temperature sensor is connected to iCM master controller. If the sensors is installed, the value is communicated by iCM Master to iPM through Daikin Communication Network Dedicated shut -off valve are commanded by respective Daikin unit controller through "Pump 1 Request " output.***

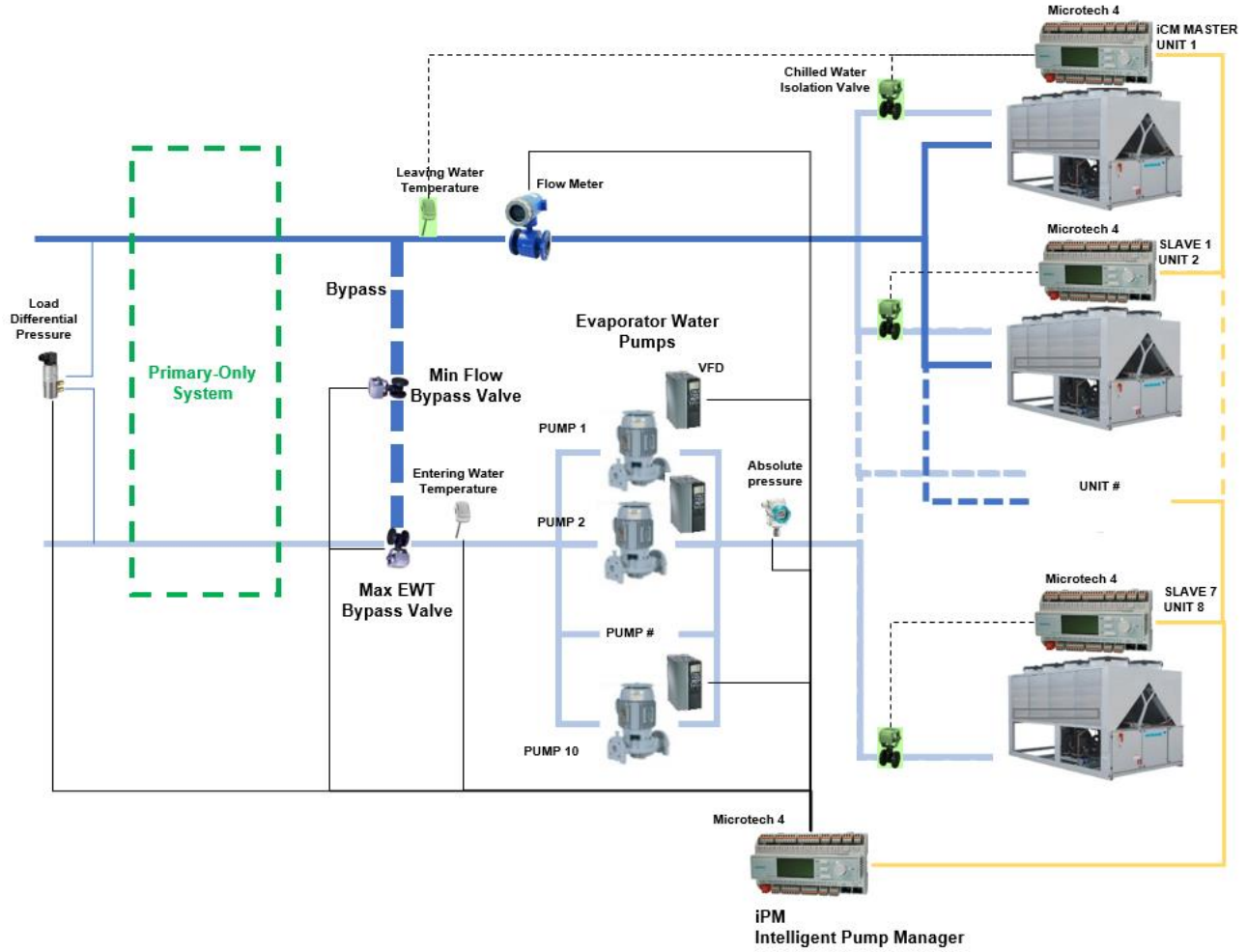

Figure 2 Controlled Sensors installation

2.3.1 Entering Water Temperature sensor

The sensor must be always installed on the main return pipe to the Daikin Unit Exchangers between an eventual header bypass and pumps.

a) In Variable Primary – Variable Secondary system, it is used by Evaporator PM (Pump Manager) to calculate Chilled Delta Temperature (System Entering water temperature – System Leaving water temperature).

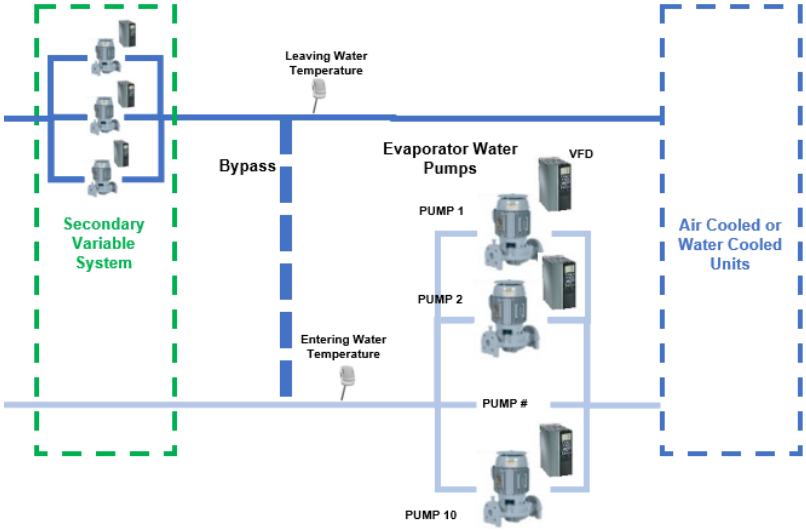

Figure 3 Entering water temperature sensor location on primary circuit

	***System Leaving water temperature, connected to iCM Master controller, must be installed on the primary loop, upstream to crossing of the by-pass pipe and supply header to building.*** ***In case no Leaving water temperature is installed, iPM will use average of leaving water temperature of the running units.***

b) In Cooling Tower circuit, it is used by Condenser PM to assure minimum entering water temperature to the condenser of Dakin units controlling the 3way Bypass valve.

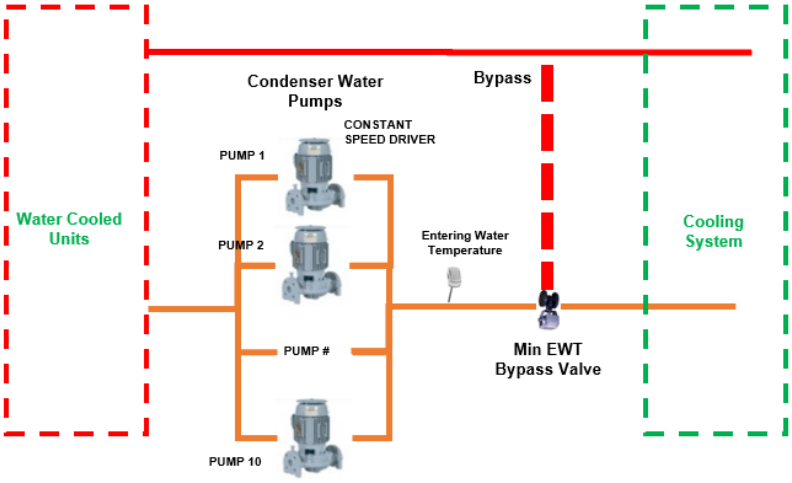

Figure 4 Entering water temperature sensor location on condenser circuit

c) In Cooling Tower circuit with variable speed driver pumps, it is used by Condenser PM to calculate the Condenser Delta temperature (Condenser Leaving water temperature – System Entering water temperature)

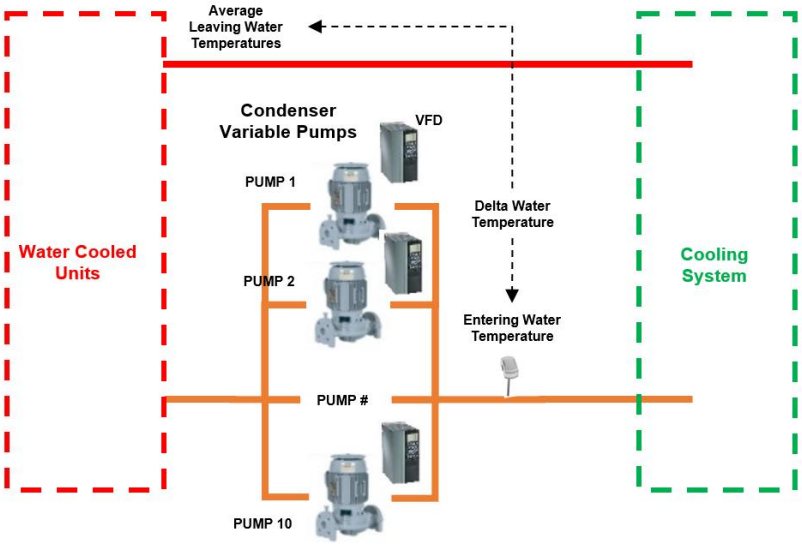

Figure 5 Entering water temperature sensor location on variable condenser circuit

	In case no Leaving water temperature sensor is installed on supply pipe, iPM will use average of leaving water temperature sensors of the running units.

Hardware input can be configured on iPM as follows:

- NTC10K
- Pt1000

2.3.2 Load Differential Pressure sensor

The sensor must be used in Variable Primary-only system and it must be installed on the most disadvantaged load of the circuit.
Differential pressure measurement will be used by PM for VFD Pump Speed Control.

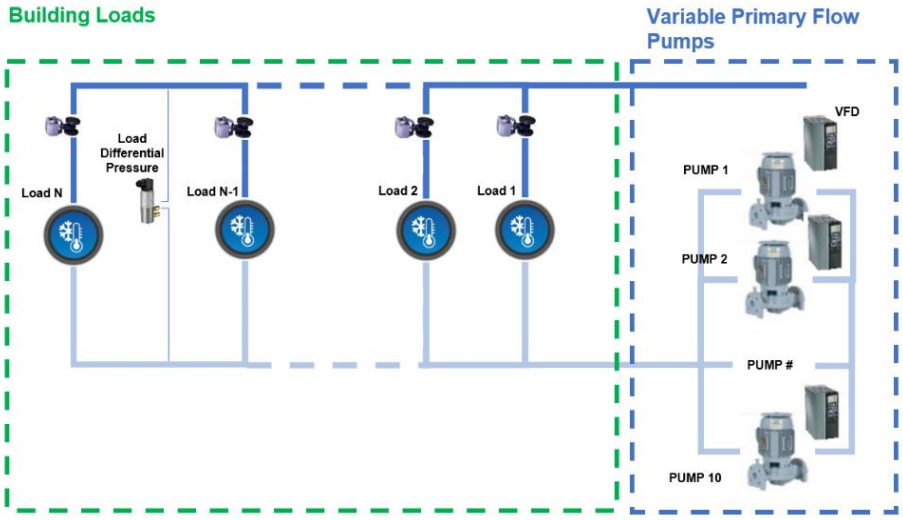

Figure 6 Load Differential pressure sensor location

Hardware input can be configured on iPM as follows:

- Input Signal: 0…10VDC:
- Input Signal: 4…20mA

2.3.3 Absolute Pressure sensor

The sensor can be used in Variable Flow system and it must be always installed downstream VFD pumps on return pipe. Absolute pressure measurement will be used by PM for VFD Pump Speed Control.

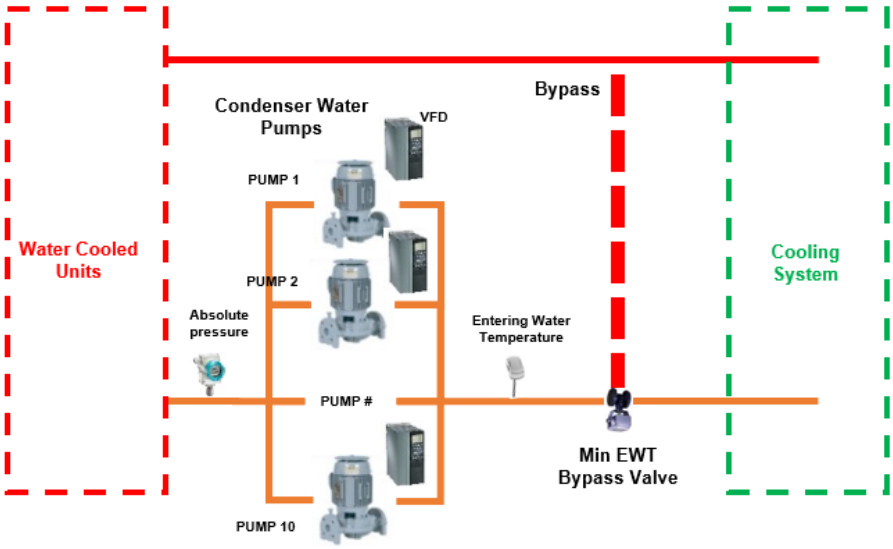

Figure 7 Absolute Pressure sensor location

Hardware input can be configured on iPM as follows:

- Input Signal: 0…10VDC
- Input Signal: 4…20mA

2.3.4 Flow Sensor

The sensor is used in Variable Primary-Only System and it must be always installed on the Supply header upstream Header Bypass.
Flow measurement will be used by PM for Bypass Valve Control to assure minimum flow to Unit Exchanger.

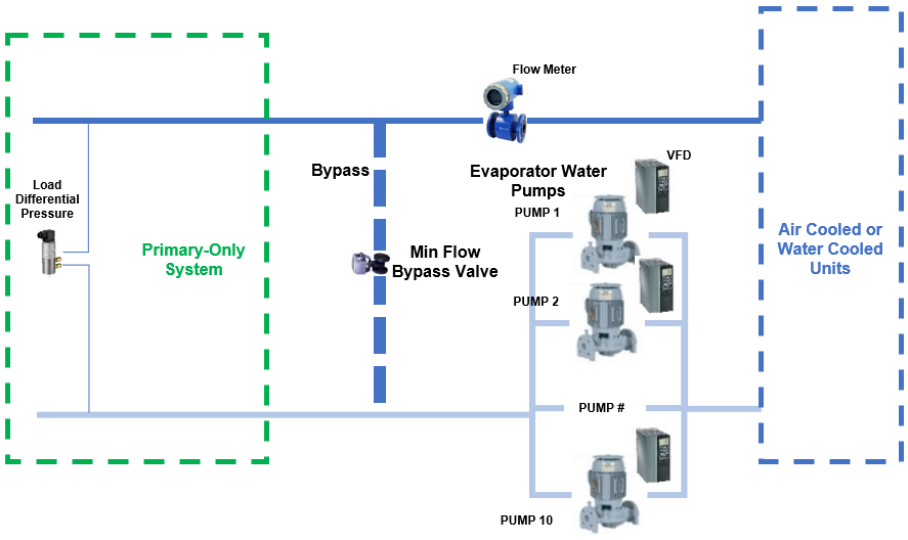

Figure 8 Flow Sensor Location

Hardware input can be configured on iPM as follows:

- Input Signal: 0…10VDC
- Input Signal: 4…20mA

2.4 Pump hardware Input/output

iPM can manage the pump using the following input/output:

- "Pump operating state": Digital Input: to be connected to "Run state" of Constant pump actuator or Variable frequency driver (VFD)
- "Pump command": Digital Output: to be connected to "Enable" input of Constant pump actuator or VFD
- "Pump signal": 0…10VDC Signal: to be connected to "Percentage Frequency" input of VFD.

	***Pump "Operating State" and "Command" connection are mandatory to allow Pump Manager to perform its logic and pump alarm management.***

2.5 By-pass Valve hardware output

iPM can manage both By-pass Valves:

1) installed between Primary Supply and Return Headers,
2) installed between Cooling Supply and Return Headers (in system with water cooled units)

using the following ouput:

- "System Bypass Valve": 0…10VDC output: to be connected to Opening Signal on Valve actuator.

	***By-pass Valve must be a "Modulating" Valve.*** ***Valve actuator must be externally power supplied.***

3 HMI DESCRIPTION

3.1 Introduction

The following sections will go into the configuration or navigation of iPM© (Intelligent Pump Manager). All the menus and submenus 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 M/S: 2…4	2
This is a link to a subpage	▶		4

Table 2: 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	Maintenance	extended access to settings and parameters
2	Service	full access to configuration, settings and parameters

Table 3:Access levels

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

3.2 Main Overview

The first menu always visible on the HMI (human machine interface of controller) is the “Main overview” that collects the most important information about Pump Management and Pump data; moreover, it shows actual values of controlled sensor and actual setpoints used by control functions.

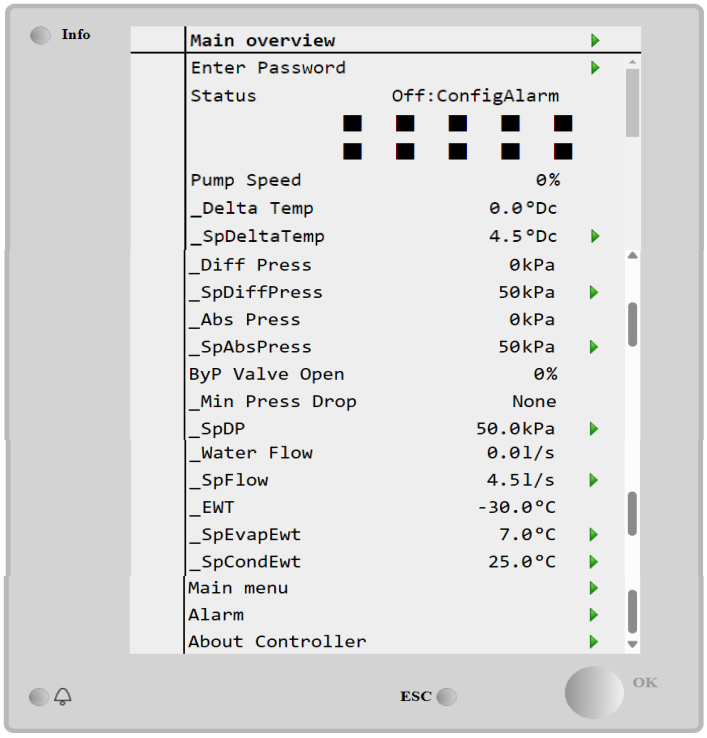

Figure 9 - Main Overview

Description	Default	Range and function	AL
Enter Password	▶	Menu to enter password	4
Menu to enter password and consequently access with specific user level to HMI			
Status	-	Off:Auto On:Auto Off:Local Off:SensAlarm On:SensAlarm Off:CommErr On:CommErr Configuration Off:ConfigAlarm	2
Status of Pump Manager, composed by Operating State (Off/On) and actual reason			
Pumps Status	-	■: Stop ▶: Run ▶M: Manual Run ■M: Manual Off 🔔: Off Alarm 🔧: Test -- : NOT configured	
Icons representation of pump Status			
Pump Speed	0…100%	Pump Speed in percentage	
According to Speed Control Configuration, one of the following controlled sensors and setpoints are displayed			
_Delta Temp	°Dc	Delta Temperature between primary headers	
_SpDeltaTemp	5,0°Dc / ▶	Actual Setpoint / Link to Setpoint Menu	
Alternatively,			
_DiffPress	kPa	Load Differential pressure	
_SpDiffPress	50 kPa / ▶	Actual Setpoint / Link to Setpoint Menu	
Alternatively			
_AbsPress	kPa	Absolute Pressure downstream pumps	

_SpAbsPress	50 kPa / ▶	Actual Setpoint / Link to Setpoint Menu	
According to Bypass Valve Control configuration, one of the following controlled sensors and setpoints are visible			
ByP Valve Opening	0…100%	Bypass Valve opening rate	
_Min Press Drop	Off	Off/On Minimum pressure drop signal from Daikin Units	
_SpDP	50 kPa / ▶	Bypass Valve Differential Pressure Actual Setpoint / Link to Setpoint Menu	
Alternatively			
_Flow	l/s	Primary Flow of supply header	
_SpFlow	50 l/s / ▶	Actual Setpoint / Link to Setpoint Menu	
If Bypass Valve Control is based on temperature			
_EWT	°C	Entering Water Temperature (Return Temperature to Diakin Units)	
Alternatively			
_SpEvapEwt	7°C / ▶	Maximum Entering water temperature setpoint to evaporators of Water cooled units / Link to Setpoint Menu	
_SpCondEwt	25°C / ▶	Minimum Entering water temperature setpoint to condensers of Water cooled units / Link to Setpoint Menu	
Main Menu	▶	Link to Main Menu	
Alarm	▶	Link to Alarm Menu	
About Controller	▶	Link to general information about controller	

Table 4 - Main Overview parameters and submenus

3.3 Setpoint Menu

This menu shows the actual setpoint for the Control functions managing Speed of the pumps or Bypass Valve Opening and make available all the setpoint values received by the different control sources.
The possible control sources are:

- Local: from local HMI
- Network: from Modbus or BACnet communication with BMS
- iCM: from intelligent Chiller Manager through Daikin communication network

If Speed Control or Bypass Valve Control are not configured, those functions are disabled and the related setpoints will not be displayed.

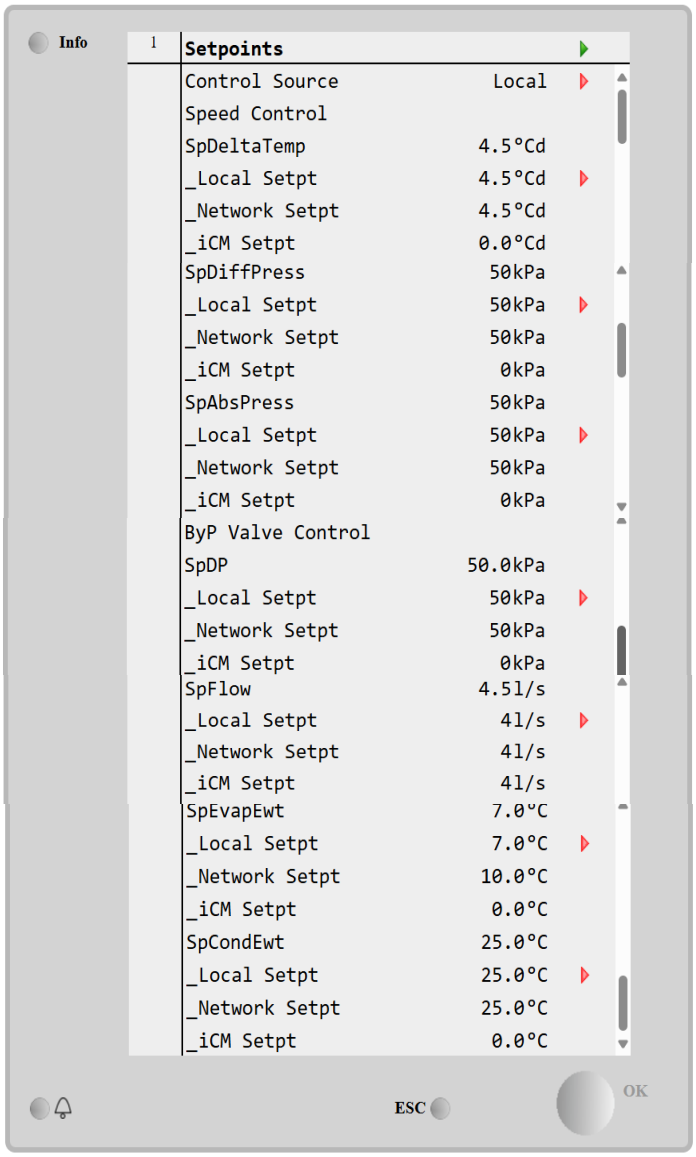

Figure 10 - Setpoint Menu

Description	Default	Range and function	AL
Control Source	Local	Control Source for setpoints selection - Local: from local HMI - Network: from Modbus or BACnet communication with BMS - iCM: from iCM Master through Daikin Network	4
This setpoint defines which Control Source is taken in account to retrieve the actual setpoint for the control functions			
Speed control	-	Sensor used for speed pump regulation: - None: No control for CSD (Constant) pump - DTemp: based on Delta Temperature	2

		- DPres: based on Differential pressure - AbsP: Based on Absolute pressure	
If Speed control = “None”, control function is disabled and setpoints are not displayed.			
SpDeltaTemp / SpDiffPress / SpAbsPress	°Dc kPa kPa	Actual setpoint chosen according to Control source	
According to Speed Control Sensor Configuration only one of the “Actual Setpoint” and related setpoints from the different Control sources will be visible			
_Local Setpt	4,5°Dc 50kPa 50kPa	Setpoint from local HMI of Pump Manager	
_Network Setpt	°Dc kPa kPa	Setpoint from BMS through Modbus or BACnet	
_iCM Setpt	°Dc kPa kPa	Setpoint from iCM (intelligent Chiller Manager) through Daikin network	
ByP Valve Control	-	Sensor used for Bypass Valve Opening regulation. - None: No Bypass Valve Installed - MinDPres: based Minimum pressure drop alarm from Daikin Units - MinFlow: based on minimum flow sensor - Ewt: based on Ewt sensor	
If Bypass Valve control is “None”, control function is disabled and setpoint are not displayed			
_SpDp _SpFlow _SpEvapEwt _SPCondEwt	kPa l/s °C °C	Actual Setpoint chosen according to Control Source	
The choice between Evaporator Ewt and Condenser Ewt depends on type of managed pumps and consequently “iPM Type” configuration.			
_Local Setpt	50kPa 4,5l/s 7,0°C 35,0°C	Setpoint from local HMI of Pump Manager	
_Network Setpt	kPa l/s °C °C	Setpoint from BMS through Modbus or BACnet	
_iCM Setpt	kPa l/s °C °C	Setpoint from iCM (intelligent Chiller Manager) through Daikin network	

Table 5 - Setpoint Menu parameters

3.4 Main Menu

This menu contains the link to submenus that will show:

- Data of the Pump Manager and
- Settings of the function
- Configuration
- Settings and Data of the controller

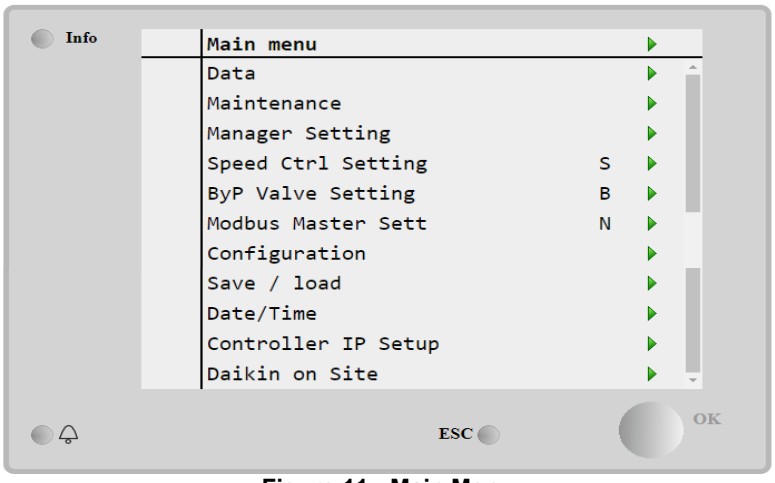

Figure 11 - Main Menu

Description	Default	Range and function	AL
Data	▶	It shows information about actual Pump Management and Control functions and actual statuses of the Pump	4
Maintenance	▶	It shows setpoint for manual management and settings for Hardware Input/Output of Pumps and sensors	2
Manager Setting	▶	It shows and sets all the settings regarding pump staging and sequencing	
Speed Ctrl Setting	▶	It shows and set all the settings for Speed Control regulation	
ByP Valve Setting	▶	It shows and set all the settings for Bypass valve Opening regulation	
Modbus Master Setting	▶	It contains setpoints and parameters for Modbus RS485 communication with Energy Meter	
Configuration	▶	It shows and set all the parameters that configure and make visible the Control functions and devices managed by iPM	
Save/Load	▶	It allows to save current configuration and settings on SD card and eventual upload of previous configuration and settings from SD card	
Date/Time	▶	It allows to set Date and time of controller	
Controller IP setup	l/s °C	It allows to set IP settings of controller (embedded TCP/IP port)	
Daikin On Site	l/s °C	It allows to enable and check status of Daikin On Site connection	

Table 6 - Main Menu submenus

ⓘ	***According to Configuration parameters contained in Configuration menu other menus will display:*** - ***Speed Control Settings will display only if Speed Sensor is different from None*** - ***Bypass Valve Control Settings will display only if Byp Valve Ctrl is different from None*** - ***Modbus Master Setting will display only if Energy Mtr Model is different from None***

3.5 Configuration

To give a better overview of the Control functions and related setpoints and settings, Configuration menu will be explained at first.
This menu contains the parameters that configure the type of IPM, pump control functions and sensor measurements. According to the configuration, some functions are performed by iPM© logic or they are disabled; therefore, related menus containing settings and values will be visible or not shown.

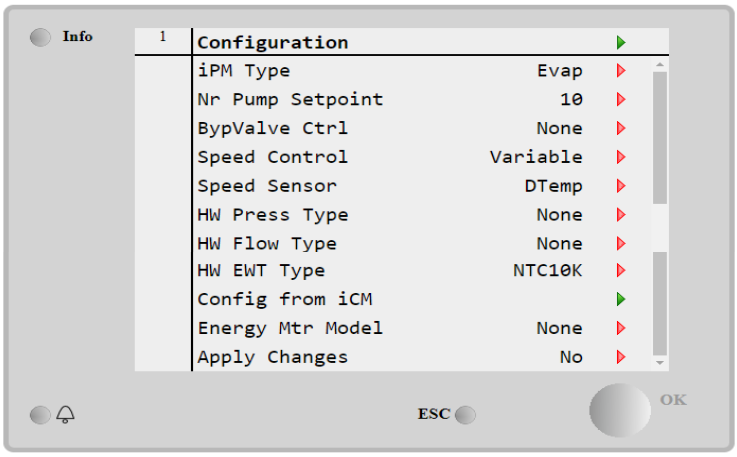

Figure 12 Configuration Menu

Description	Default	Range and function	AL
iPM Type	-	It sets type of iPM - Config: Configuration - Evap: Evaporator Pump Manager - Cond: Condenser Pump Manager	4
Nr Pump Setpoint	0…10	It sets Number of Pump managed by iPM.	2
BypValve Ctrl	None	It sets presence and sensor used for Bypass Valve Opening regulation - None: No Bypass Valve installed - MinDPres: based on Minimum Pressure drop from units - MinFlow: based on Flow sensor - Ewt: based on Entering water Temperature	
Speed Control	Constant	It sets Speed control function. - Constant: No Speed Control and Constant Speed driver pump - Fixed: VFD pump with fixed speed - Steps: VFD pump with step speed - Variable: VFD pump with variable speed - Var+Step: VFD pump with variable speed and step minimum speed.	
Speed Sensor	None	It sets the sensor used to regulate Variable Speed. (Not available with CDS or Fixed and Step VFD) - None: No Sensor - DTemp: based on Delta Temperature, calculated as EWT (sensor) minus LWT (from iCM) sensor - DPres: based on Differential pressure sensor - AbsP: based on Absolute pressure sensor	
HW Press Type	None	It sets the kind of hardware input for the signal coming from Speed Control Sensor (DP sensor or AbsP sensor) - None: No Sensor - 0-10VDC: Signal 0…10 VDC - 4-20mA: Signal 4…20mA	
HW Flow Type	None	It sets the kind of hardware input for the signal coming from Flow sensor	

		- None: No Sensor - 0-10VDC: Signal 0…10 VDC - 4-20mA: Signal 4…20mA	
HW EWT Type	None	It sets the kind of hardware input for the signal coming from Temperature sensor - None: No Sensor - NTC10K - PT1K	
Config from iCM	▶	Submenu that shows the parameters configured on iCM Master (through Daikin network) and used by iPM for control logic	
Energy Mtr Model	None	It sets the kind of Enegry meter connected to Modbus Network from iPM - None: No Energy meter installed or connected - NemoD4-L - NemoD4-Le	
Apply Changes	No	Setpoints that make effective the configuration. It forces a reboot of the controller	

Table 7 Configuration parameters

3.5.1 Configuration parameters from iCM Master

As already explained, iPM© is connected to Daikin network and it is able to retrieve information from Daikin units. The configuration parameters from iCM Master will be used by iPM© logic and to generate Configuration Errors.
The parameter will update once the "EvapPM" and/or "CondPM" has been enabled on iCM Master and "iPM© Type" has been set on IPM and controller has been rebooted with "Apply Changes". After rebooting, Daikin Communication should be established and iPM© will retrieve parameters from iCM Master controller.

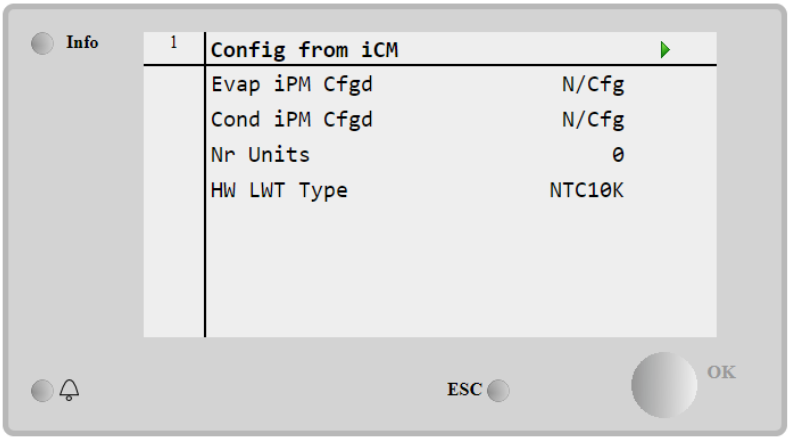

Figure 13 Configuration from iCM Menu

Description	Default	Range and function	AL
Evap iPM Cfgd	N/Cfgd	It indicates if Evaporator iPM has been enabled on iCM Master. - N/Cfgd: Not configured - Cfgd: Confgiured	
Cond iPM Cfgd	N/Cfgd	It indicates if Condenser iPM has been enabled on iCM Master. - N/Cfgd: Not configured - Cfgd: Configured	
Nr Units	0…8	It indicates the Number of Daikin units configured and connected on Daikin Network	
HW LWT Type	None	It indicates if Leaving water sensor is installed and measured by iCM Master - None: No sensor installed on iCM Master - NTC10K sensor - Pt1K sensor	

Table 8 Configuration parameters from iCM Master through Daikin Network

3.6 Manager Settings

This menu contains all the setting for the Sequencing and Staging function of Pump Manager:

1) Sequencing decides which pump should start or stop (respectively NEXT-On and NEXT-Off).
2) Staging decides when a pump should start or stop.

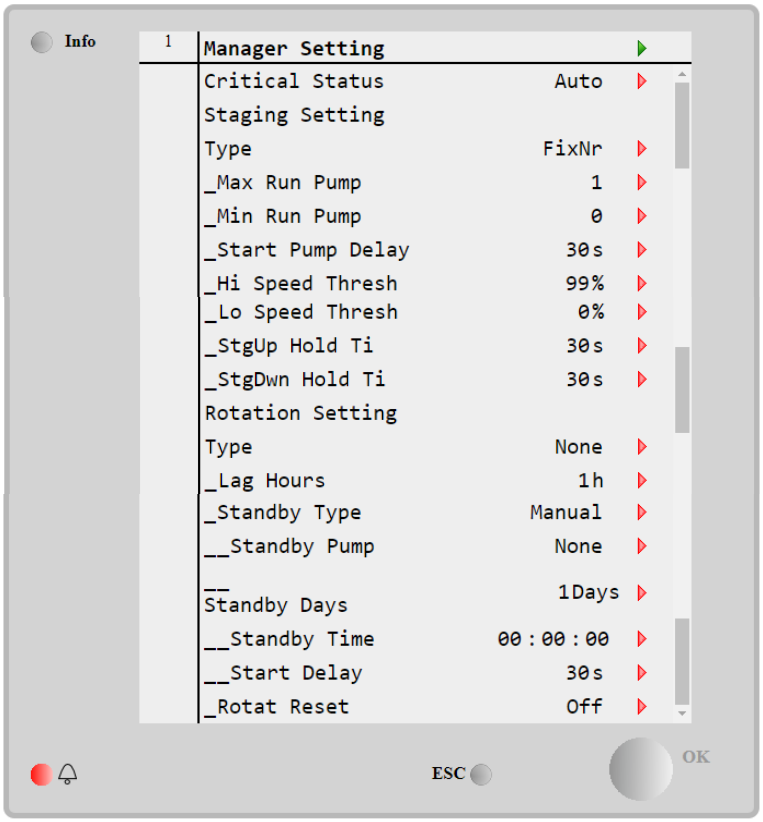

Figure 14 Manager Setting Menu

Description	Default	Range and function	AL
Critical Status	Auto	It sets the behaviour of iPM in case of controlled sensor Alarm or Communication Error on Daikin Network. - Auto: iPM will keep the last command received - Off: iPM stops all the pumps	
Staging Setting		Following settings are used for staging function	
Type	FixNr	It selects the kind of staging logic used by iPM to decide when a pump should start or stop: - FixNr: iPM stage always the same number of pump (number of running pumps is set by “Max Run Pump”) - DmdUnit: iPM stages a number of pump equal to number of running Daikin Unit - Speed: iPM stage up according to achievement of Speed Thresholds. - Spd+Dmd: combination of demand and speed thresholds	
_Max Run Pump	0…10	It sets the maximum number of pumps that iPM will run. iPM will never start more pumps than this number	
_Min Run Pump	0…10	It sets the minimum number of pumps that iPM will keep running. iPM will never stop less pumps than this	
_Start Pump Delay	0…600s	It sets the delay between each start of a new pump to reach the minimum number of pumps at the startup of the system.	
_High Threshold	0…100%	It sets the high threshold that actual speed must exceed to start a new pump	
_Low Threshold	0…100%	It sets the low threshold that actual speed must decrease to stop a running pump	

_StgUp Hold Ti	0…3600s	It sets a time after any stage during which Stage Up is inhibited	
_StgDwn Hold Ti	0…3600s	It sets a time after any stage during which Stage down is inhibited	
Rotation Setting		Following settings are used for configuring the eventual rotation of the pumps	
Type	None	It selects if Rotation is enabled and kind of rotation for the pumps: - None: No rotation will occur - Lag: Rotation of Lag pumps is enabled - Standby: rotation of standby pump is enabled	
_Lag Hours	0…720h	It sets the number of hours from the last stage before forcing stage Up of a lag pump.	
_Standby Type	Manual	It selected the kind of standby rotation that iPM will perform - Manual: user must choose the standby pump though HMI - MaxHours: iPM automatically set in standby the pump with most running hours - Sequence: iPM automatically set in standby the pump based on ID	
__Standby pump	None…P10	It sets the pump in standby when Rotation is Manual	
__Standby days	0…15days	It sets number of days in standby	
__Standby time	hh:mm:ss	It sets the time at which the standby rotation will occur	
__Start Delay	0…900s	It sets the delay after the standby rotation to force the start of a stopped pump (if needed)	
_Rotat Reset	No	It forces the rotation of lag pump or standby pump	

Table 9 Manager Settings parameters

3.7 Speed Valve Control Setting

This menu contains all the parameters to set the speed control function.
This menu will display only if *Speed Control Type* configuration is *Variable* or *Step+Variable*.

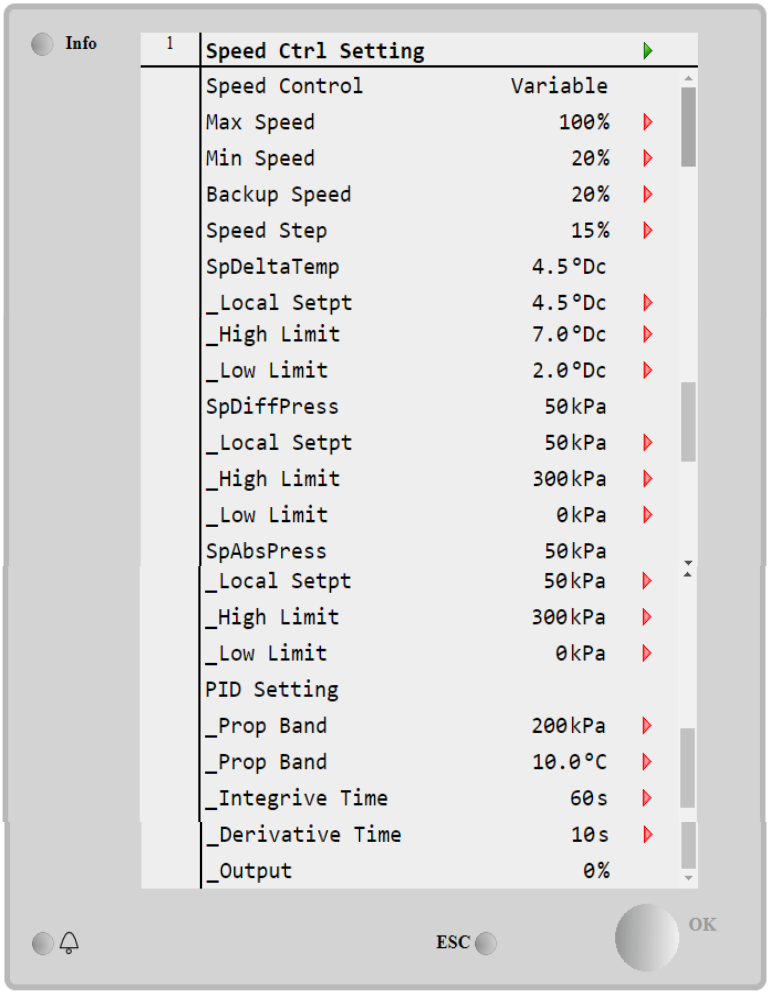

Figure 15 Speed Control Setting Menu

Description	Default	Range and function	AL
Speed Control	Constant	It indicates the Configuration value for Speed Control: - Constant - Fixed - Steps - Variable - Var+Step	
Max Speed	0…100%	It sets Value of speed that iCM never exceed	
Min Speed	0…100%	It sets Value of speed that iCM never	
Backup Speed	0…100%	It sets the value of speed when: - there is a Sensor alarm - iPM is in comm error - Speed control is *Fixed*	
Speed Step	0…100%	It sets the value of speed that will be added or subtracted when there is a Unit staging by iCM. It is used only if Speed Control is *Steps* or *Var+Step*	
SpDeltaTemp / SpDiffPress / SpAbsPress	°Dc kPa kPa	Actual setpoint for the controlled sensor based on Configuration --> Speed Sensor	
_Local Setpt	4,5°Dc 50kPa 50kPa	Setpoint from local HMI of Pump Manager	

_High Limit	7°C 300kPa 300kPa	It sets the maximum value of setpoint that could be accepted from HMI, BMS or iCM	
_Low Limit	2°C 0kPa 0kPa	It sets the minimum value of setpoint that could be accepted from HMI, BMS or iCM	
PID setting		If Speed Control is Variable, PID function (Proportional, Integrative, Derivative) is used to calculate the percentage of speed in order to achieve setpoint for controlled sensor	
_Prop Band	1…20°C 0…2000kPa	It sets proportional band for PID. It represents the range of variation of controlled variable	
_Integral Time	0…3600s	It sets the Integral time for PID. The longer is that time, the longer it will be the variation.	
_Derivative Time	0…3600s	It sets the derivative time for PID. It represents the reaction to sudden changes of controlled variable.	

Table 10 Speed Control parameters

3.8 Bypass Valve Control Setting

This menu contains the parameters to set the regulation of opening of the bypass valve.
This menu will display only if *ByP Valve Control* is different from *None* in Configuration menu.

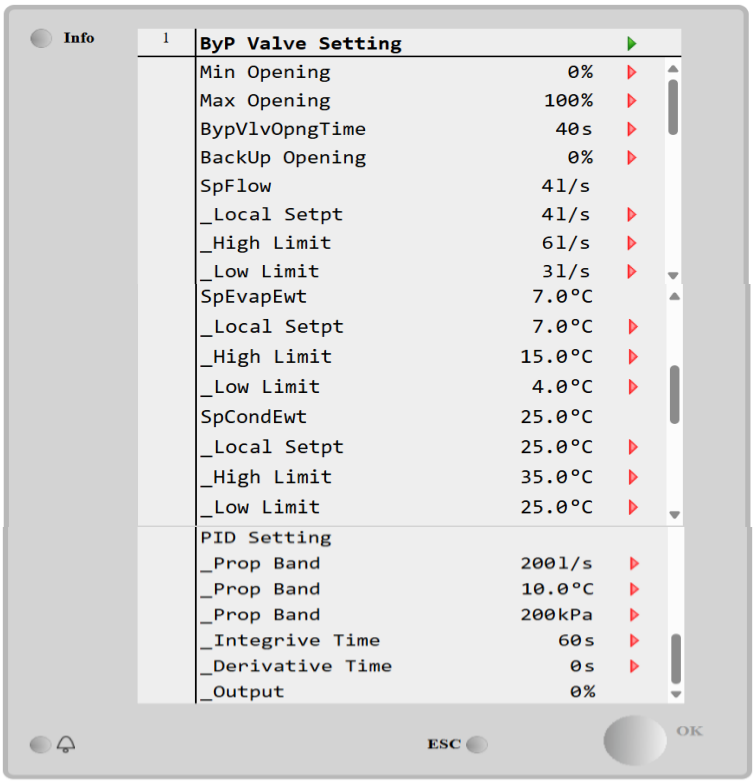

Figure 16 Bypass Valve Setting Menu

It is worth noting that iPM© can manage manifolded pumps on evaporator side or manifolded pumps con condenser side.
The need of the by-pass valve is strictly related to circuit layout, kind of pump s and kind of units.
In a schematic way:

- In primary variable system and primary VFD pumps management, a two-way Bypass Valve is installed on bypass pipe between main headers and needed to assure minimum flow to the units
- In condenser loop (only for water-cooled units), a three-way Bypass Valve is installed to recirculate Leaving water into Entering water pipe and needed to protect unit condensers from wrong entering water temperature.

Description	Default	Range and function	AL
Min Opening	0…100%	It sets the minimum value of opening that iPM always commands to the valve	
Max Opening	0…100%	It sets the maximum value of opening that iPM always commands to the valve	

BypVlvOpngTime	40s	It sets the time required to shift the minimum opening value of the bypass valve, either towards Max Opening when opening is requested, or towards Min Opening when closing is requested.	
Backup Opening	0…100%	It sets the backup value of opening that iPM forces when controlled sensor is in alarm	
SpDP/ SpFlow / SpEvapEwt / SpCondEwt	kPa l/s °C °C	Actual setpoint for the controlled sensor based on Configuration → ByP Valve Control	
_Local Setpt	kPa l/s °C °C	Setpoint from local HMI of Pump Manager	
_High Limit	500kPa 3…100l/s 4…30°C 18…40°C	It sets the maximum value of setpoint that could be accepted from HMI, BMS or iCM	
_Low Limit	0kPa 0…6l/s -8…7°C 15…35°C	It sets the minimum value of setpoint that could be accepted from HMI, BMS or iCM	
PID setting		If Speed Control is Variable, PID function (Proportional, Integrative, Derivative) is used to calculate the percentage of speed in order to achieve setpoint for controlled sensor	
_Prop Band	0…2000kPa 0…2000l/s 0…50°C 0…50°C	It sets proportional band for PID. It represents the range of variation of controlled variable	
_Integral Time	0…3600s	It sets the Integral time for PID. The longer is that time, the longer it will be the variation.	
_Derivative Time	0…3600s	It sets the derivative time for PID. It represents the reaction to sudden changes of controlled variable.	

Table 11 Bypass Valve control parameters

3.9 Modbus Master Communication Settings

This menu contains the parameters to set Modbus Communication between iPM© and external Energy Meter. On the Modbus network iPM© will be the Master and Energy Meter will be the Slave.
This menu will display only if *Energy Mtr Model* is different from *None* in Configuration Menu.

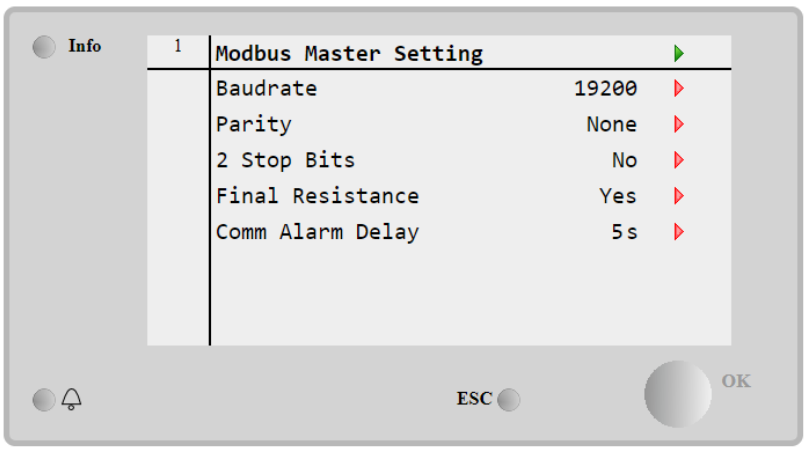

Figure 17 Modbus Master Setting Menu

Description	Default	Range and function	AL
Baudrate	4800 9600 19200	It sets the speed of Modbus communication	
Parity	None Even Odd	It sets the parity bit for telegrams error check	
2 Stop Bits	No Yes	It sets if one stop bit or two stop bits are used to terminate the communication telegrams	

Final Resistance	No Yes	It activates the resistance on the Modbus network	
Comm Alarm Delay	0…600s	It sets the delay to evaluate a Modbus communication failure	

Table 12 - Modbus Master parameters

ⓘ	***Same Communication parameters must be set on Energy Meter Modbus configuration:*** ***1) Baud rate*** ***2) Parity*** ***3) Stop bits*** ***On Energy Meter, Address on Modbus network is necessary and that must be Addr =21***

3.10 Maintenance

This menu contains specific parameters to set iPM© in Test mode, set the Pump in Manual, configure the sensors scale.

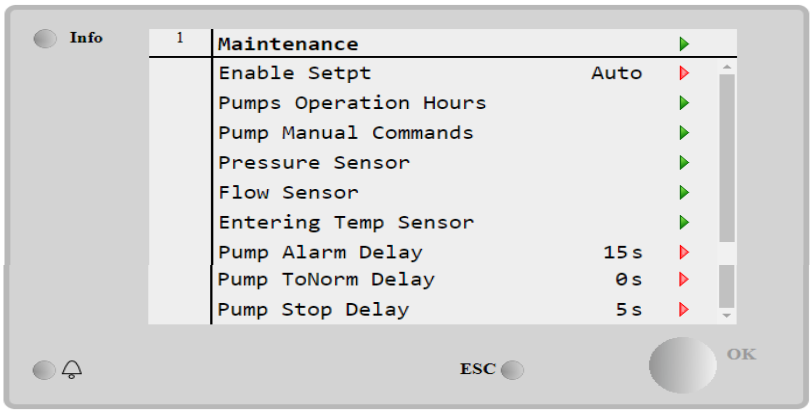

Figure 18 Maintenance Menu

Description	Default	Range and function	AL
Enable Setpt	Auto Off Test	It sets the Enable Command to iPM. - Auto: iPM will start according to Daikin Units request - Off: iPM is always stopped - Test: iPM is stopped and iPM Outputs can be tested through Manual Command	
Pump Operation Hours	▶	Sub Menu to check and set operation hours of pumps	
Pump Manual Commands	▶	Sub Menu to set Manual Command and Manual Speed to the pump. If Enable Setpt is “Test”, manual commands can be used for testing hardware outputs to the pumps	
a) Pressure Sensor b) Flow Sensor c) Entering water Sensor	No Yes	Submenus will display if related sensor has been configured in Configuration menu Sub menu to set scale of the controlled sensor	
Pump Alarm Delay	0…600s	It sets the delay to evaluate if pump alarm has occurred	
Pump ToNorm Delay	0…600s	It sets the delay to evaluate if pump alarm has disappeared	
Pump Stop Delay	0…600s	It sets the delay to actually stop the pump after a stage down occurs	

Table 13 Maintenance parameters and submenus

⚠	***Pump Alarm in NOT a self-reset. Operator must reset alarm manually through iPM© HMI or iCM Master HMI.*** ***Alarm State becomes active if alarm condition is true for more than AlarmDelay.*** ***Alarm State disappear if alarm condition is false for more than ToNormalDelay and then manually reset.***

3.10.1 Pump Operation Hours

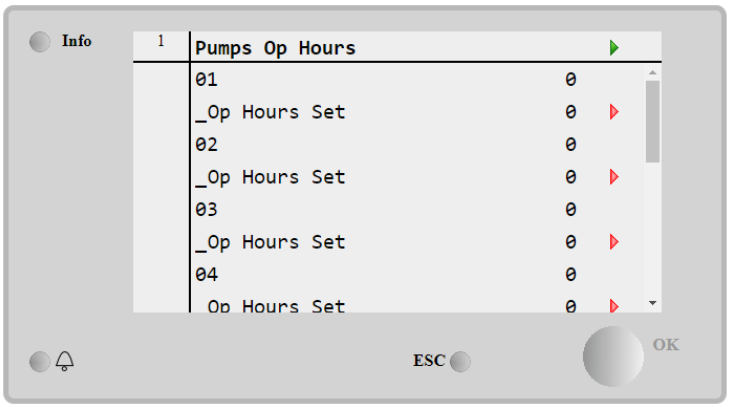

Figure 19 Operation Hours Menu

Description	Default	Range and function	AL
## (01…10)		It shows actual operation hours of the unit	
_Op Hour Set	0… 4294967295	It sets Operation hours for the specific pump	
Pump Manual Commands	▶	Sub Menu to set Manual Command and Manual Speed to the pump. If Enable Setpt is “Test”, manual commands can be used for testing hardware outputs to the pumps	

Table 14 Operation Hours parameters

3.10.2 Manual Commands

This sub menu can be used to force commands to the pumps. The manual command assumes two different meaning according to *Enable Setpoint* of iPM:

1) When iPM© *Enable Setpt* is set *Auto* or *Off:* user can force the commands to the pumps, but iPM© keeps on performing Alarm logic. So, if an alarm should occur, iPM© will stop the pump.
2) When iPM© *Enable Setpt* is set *Test*: Alarm logic is disabled. User can force the command to the pump that keeps the command even if alarm should occur.

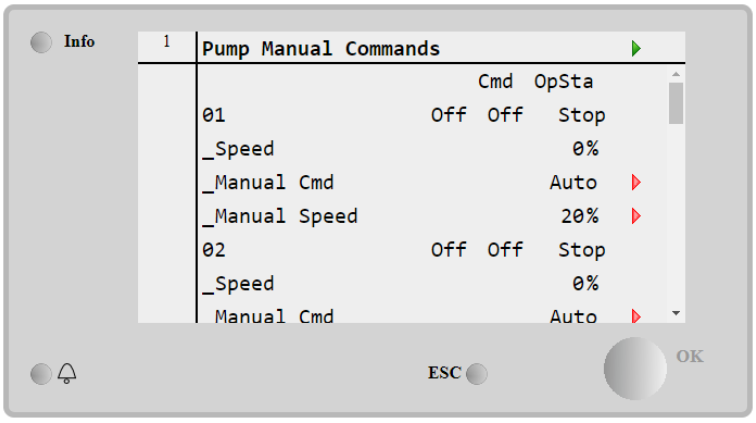

Figure 20 Manual Commands Menu

Description	Default	Range and function	AL
## (01…10)		It shows pump ID	
Status	Off	It shows actual status of the pump - Off: Pump Stopped - On: Pump Running - ManOn: Pump in Manual Run - ManOff: Pump in Manual Stop - Alm: Pump in Alarm - Test: Pump in Test (iPM in Test mode and Pump in Manual) - N/Cfgd: Pump not configured and not managed	

Cmd	Off On	It shows actual command output from iPM to pump	
OpSta	Stop Run	It shows actual state input from pump to iPM	
_Speed	0…100%	It shows actual signal output from iPM to pump	
_Manual Cmd	Auto Off On	It sets the Manual command to pump: - Auto: Manual is disabled; iPM take over command - Off: it forces Stop command to pump - On: it forces Run command to pump	
_Manual Speed	0…100%	It sets the Manual Speed signal output to pump. It is taken in consideration only is “Manual Cmd” is “On”	

Table 15 Manual Commands parameters

3.10.3 Sensor Processing Menu

This menu contains parameters to set range scale of the sensor and set offset value on the measurement.

Figure 21 Sensors Processing menus

Description	Default	Range and function	AL
Max Value	kPa l/s °C	Maximum value of sensor scale	
Min Value	kPa l/s °C	Minimum value of sensor scale	
NTC10K_C1 10^{-3} NTC10K_C2 10^{-4} NTC10K_C3 10^{-8}	1,1252 2,3474 8,5513	Used only for NTC10K Temperature sensor. Coefficient in the conversion expression of NTC10K element	
Raw Value	Ohm mV µA	It shows the value of the controller input. Temperature in Ohm Pressure or Flow in mV or µA according to Configuration of the HW type	
Actual Value	kPa l/s °C	It shows actual sensor measurement after conversion	
Offset	kPa l/s °C	It sets an offset on the measured value	

Table 16 Sensor Processing parameters

3.11 Data

This menu shows the general information on actual pump management.

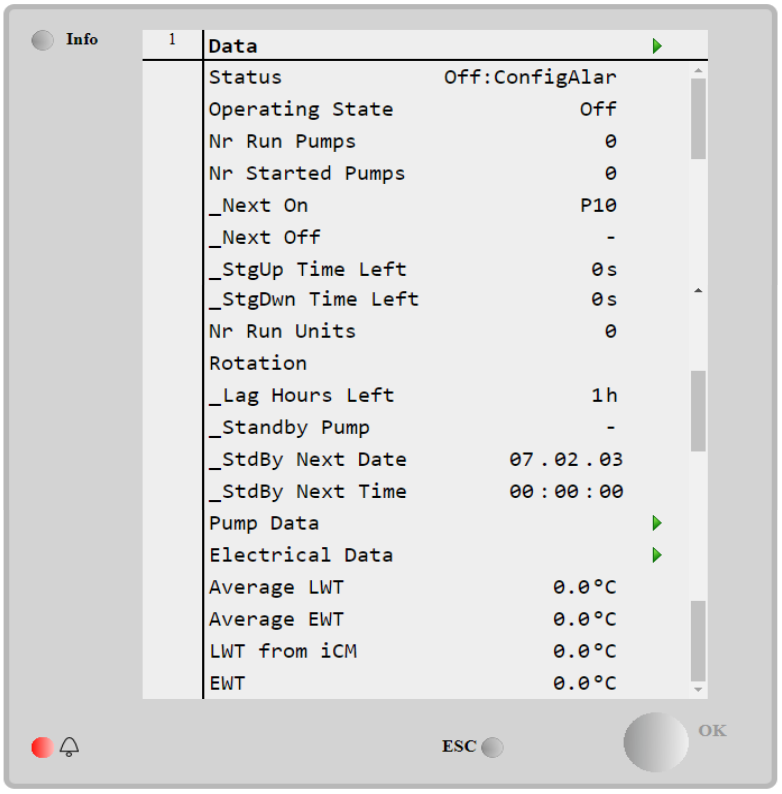

Figure 22 Data Menu

Description	Default	Range and function	AL
Status	Off	It shows the status of Pump Manager: - Off:Auto : iPM is in Auto Mode and Stopped - On:Auto : iPM is in Auto Mode and Running - Off:Local : iPM is stopped through *Enable Setpt* - Off:SensAlarm : iPM is stopped for sensor alarm - On:SensAlarm : iPM is running despite of sensor alarm - Off:CommErr : iPM is stopped for communication error - On:CommErr : iPM is running despite of comm error - Configuration : iPM must be configured - Off:ConfigAlarm : iPM is stopped for Wrong configuration	
Operating State	Off On	It shows the operating state of the pump manager	
Nr Run Pumps[-8]	0…10	It shows the number of running pumps	
Nr Started Pumps	0…10	It shows the number of pumps commanded by logic	
_Next On	0…10	It shows which unit is the next to be started	
_Next Off	0…10	It shows which unit is the next to be stopped	
_StgUp Time Left	s	It shows inhibition time left before a stage up is allowed	
_StgDwn Time Left	s	It shows inhibition time left before a stage down is allowed	
Nr Run Units	0…8	It shows the number of Running Daikin Units. It is even used for pump staging based on demand from Units	
Rotation	None Lag Standby	It indicates the actual configured rotation	
_Lag Hours Left	h	It shows the remaining hour before a rotation of the lag pump	
_Standby pump	-…P10	It shows the actual pump set in standby	
_Stdby Next Date	dd.MM.yy	It shows the date of the next swap of stand by pump	
_Stdby Next Time	hh.mm.ss	It shows the time of the next swap of stand-by pump	
Pump Data	▶	Sub Menu for actual pumps data	
Electrical Data	▶	Sub menu for electrical data measured by Energy Meter.	

		That displays only if *Energy Mtr Model* is different from *None* in Configuration Menu	
Average LWT	˚C	It shows the average of the Leaving WTs communicated by running units	
Average LWT	˚C	It shows the average of the Entering WTs communicated by running units	
LWT from iCM	˚C	It shows the value of System Leaving water temperature measured and communicate by iCM	
EWT	˚C	It shows the value of System Entering water temperature measured by sensor on iPM	

Table 17 Data parameters

3.11.1 Pump Data Menu

This sub-menu contains actual statuses of pumps

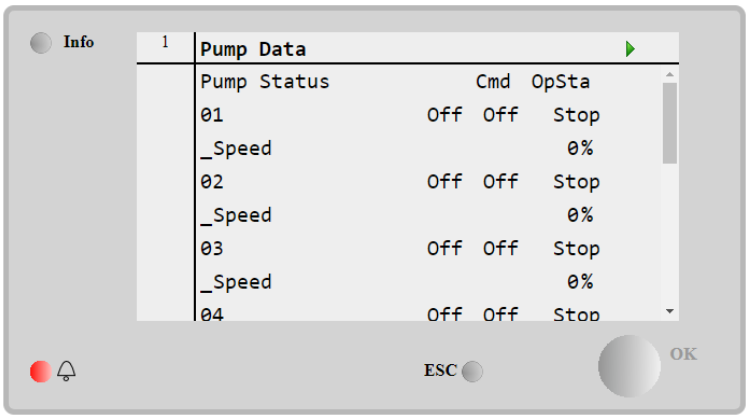

Figure 23 Pump Data Menu

Description	Default	Range and function	AL
## (01…10)		It shows pump ID	
Status	Off	It shows actual status of the pump - Off: Pump Stopped - On: Pump Running - ManOn: Pump in Manual Run - ManOff: Pump in Manual Stop - Alm: Pump in Alarm - Test: Pump in Test (iPM in Test mode and Pump in Manual) - N/Cfgd: Pump not configured and not managed	
Cmd	Off On	It shows actual command output from iPM to pump	
OpSta	Stop Run	It shows actual state input from pump to iPM	
_Speed	0…100%	It shows actual signal output from iPM to pump	

Table 18 Pump Data parameters

3.11.2 Electrical Data Menu

This sub-menu contains all the values Measured by Energy meter and communicated to iPM© through Modbus Communication.
This menu displays only if *Energy Mtr Model* is different from *None* in Configuration Menu.

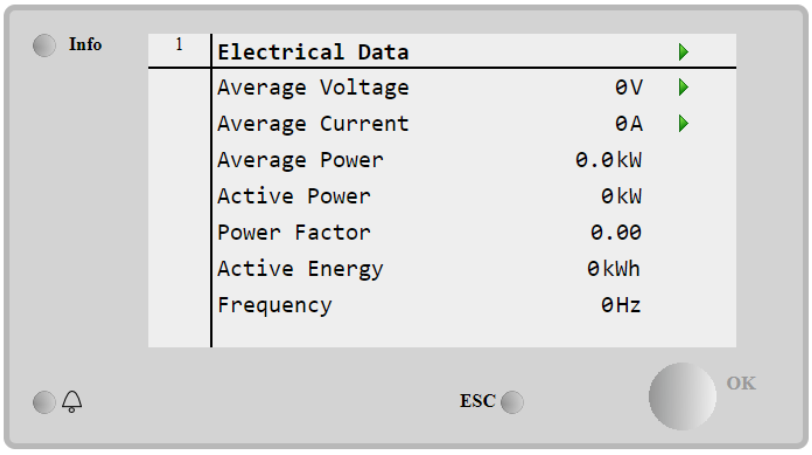

Figure 24 Electrical Data Menu

Description	Default	Range and function	AL
Average Voltage	V ▶	It shows average of the Voltage on the three lines Link to single line Voltage	
Average Current	A ▶	It shows average of the Current on the three lines Link to single line Current	
Average Power	kW	It shows average Power	
Active Power	kW	It shows the actual active Power	
Power Factor	0.0	It shows the power factor	
Active Energy	0kWh	It shows the active energy measured by Energy meter	
Frequency	Hz	It shows frequency of the current	

Table 19 Electrical Data parameters

3.12 Save/Load Menu

This menu allows to save configuration and settings from controlled to external SD card.
Moreover, it allows to upload on controller configuration and settings from external SD card.

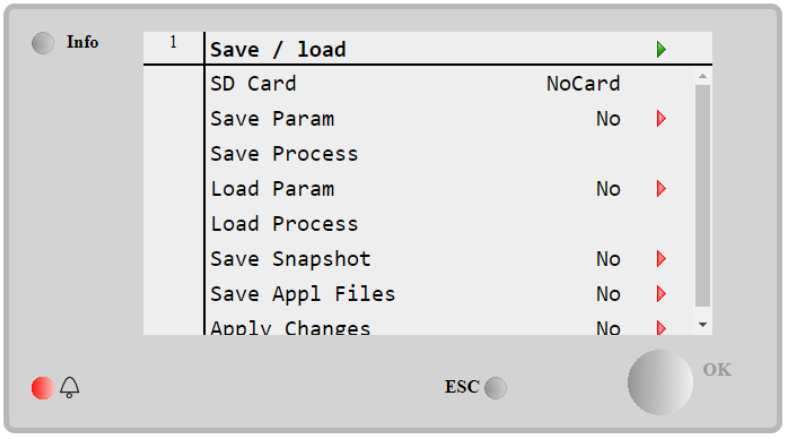

Figure 25 Save/Load Menu

Description	Default	Range and function	AL
SD card	No Card	It indicates if external SD card has been mounted on controller	
Save Param	No Yes	It allows to Save the parameter from controller to SD	
Save Process	_ Done	It indicates if Save process is successfully done	
Load Param	No Yes	It allows to Upload parameters from SD to controller	
Load Process	_ Done	It indicates if Upload process is successfully done	
Save Snapshot	No	It allows to save alarm snapshot from Controller to SD	

	Yes		
Save Appl Files	No Yes	It allows to export application files from Controller to SD	
Apply Changes	No Yes	It applies the changes and force a reboot of controller	

Table 20 Save/Load parameters

3.13 Controller IP setup

This menu allows to set TCP/IP communication parameters and check IP configuration.

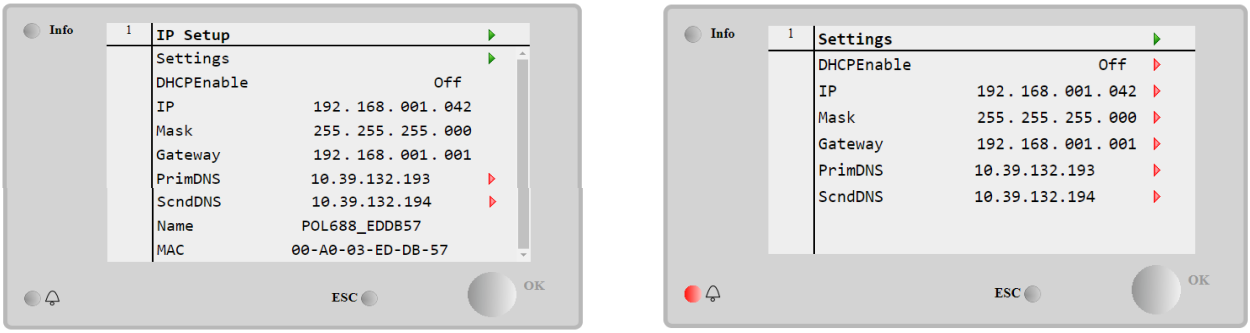

Figure 26 IP Setup Menu and IP Settings Menu

3.14 Daikin On Site Menu

This menu allows to enable communication with Daikin On Site (Cloud remote monitoring and tending service).

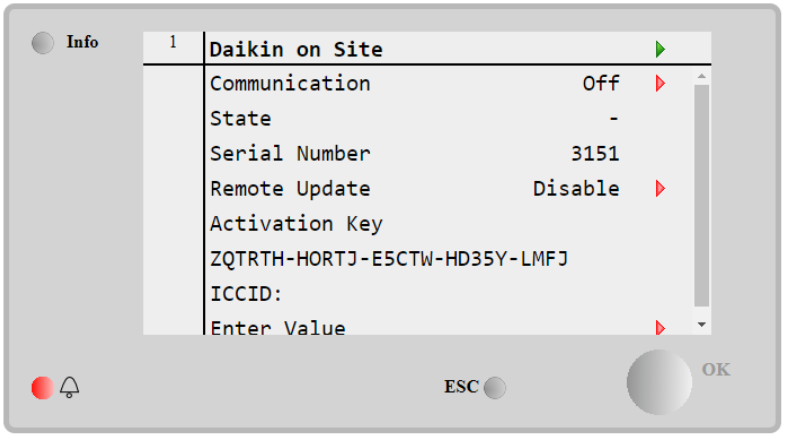

Figure 27 Daikin On Site Menu

Description	Default	Range and function	AL
Communication	Off On	It allows to enable communication with DoS Server	
State	-…Conn	It shows the communication status with DoS Server - -: Not connected - IPErr: Error on IP settings - Init: Initialization - InitReg: Initialization for Registration - Reg: Registration process - RegErr: Registration Error - Descr: Description process - Connected: registered and connected to Daikin On Site	
Serial Number	-	It shows Unique identification number of the controller	
Remote Update	DisableEnable	It allows to enable the update and download process of application files from Daikin On Site	
Activation Key	-	It shows the activation code to be communicated t Daikin On Site tenant to register controller on Daikin On Siste	
ICCID	-	It allows to enter the Alphanumeric code of 3G Router connected to controller IP port.	

Table 21 Daikin On Site parameters

4 iPM OPERATING

As explained in first chapter, iPM can work only in conjunction with option184 (iCM embedded) on the unit controller; consequently, iPM must be connected to Daikin Communication Network to work properly.

4.1 iPM Enable/Disable

Because of connection to DCN, iPM can read the necessary data from unit controllers and start/stop the pump sequencing and staging and control logic of managed devices (pumps, bypass valve, etc…).
The parameter:

- *Main Menu → Maintenance → Enable Setpoint*

allows user to set the iPM controller in:

1) Auto: iPM starts it logic when at least one of the unit controllers on DCN provide the status of "Enabled" (enable by iCM logic); whereas it stops it logic when all the unit controllers are disabled by iCM logic.
2) Off: iPM is forced to be stopped.
3) Test: iPM does not start its logic but put all the pump in test mode; user can force manually start and stop of each pump.

When at least one unit controller results "Enabled", iPM starts the pumps according to sequencing and staging setting.
When all the unit controllers are "Disabled", iPM stops all the running pumps.
It is worth noting that start/stop of sequencing and staging logic by iPM does not depends on the Status of iCM Master but on status of each unit controller connected to DCN.

4.1.1 Enable/Disable depending on Critical Status

Some alarms can generate a critical status on iPM; those are:

1) iPM Communication Error: iPM cannot communicate with none of the unit controllers connected to DCN.
2) iCM Leaving water temperature alarm: iCM communicates to IPM that "System Controlled Temperature" sensor is in alarm.

In those two cases, iPM shows the related alarm and it assumes a "Critical" functioning according to the following setpoint:

- *Main Menu → Manager Setting → Critical Status*

According to this setting, iPM performs a different action:

1) Auto: iPM keeps on working according to the status communicated by unit controllers
2) Off: iPM stop its logic and all the pumps.

4.2 iPM Setpoints

As shown in par. **3.3 Setpoint Menu,** if "Speed Control" and/or "Bypass Valve Control" functions are configured, it is possible to change the setpoint of the controlled variables through the following menu:

- *Main Menu → Setpoints*

This menu shows the:

- Actual setpoint: value of setpoint used by iPM for regulation of the device
- Local setpoint: setpoint writable by user HMI
- iCM setpoint: setpoint received by iCM Master controller through DCN.

Moreover, the menu gives the chance to change the source of the setpoint for the control functions through the following parameter:

- *Main Menu → Setpoint → Control Source*

Actual setpoint assumes the value of the corresponding control source.

ⓘ	***Control Source "Network" is not available at the moment.***

4.3 Pump Manual Command

As shown in par. **3.10.2 Manual Commands,** user can force the command of Start/Stop and Speed to each configured pump through the menu:

- *Main Menu → Maintenance → Pump Manual Commands*

The menu shows the actual status of the pump, the actual command from iPM and the feedback from the pump; moreover, it gives the chance to force the command

- Auto: pump is managed by Pump group manager
- ON: forces the On command to the pump
- OFF: forces the Off-command to the pump

Additionally, it shows the actual speed of the pump and it gives the chance to set a manual speed signal to the pump.

Manual speed is effective only if Manual Command is set "ON".

When a manual command is set, the related pump is not considered in staging and sequencing logic but it keeps the forced status.

If manual command to pump mismatches with received feedback from pump, iPM raises a feedback alarm and it will stop the pump, ignoring the manual command.

5 TROUBLESHOOTING

This chapter explains the alarms and events generated by the iPM© and guides you to resolution.
In the following sections all the alarms will be described. Alarms will disable the iPM© or will reduce their ability to control the system properly.

5.1 Configuration Alarms

This alarm occurs when the iPM has been configured.
This indicates that the configuration on iPM mismatch with configuration on iCM Master controller.
The following table shows the possible alarms:

Symptom	Cause	Solution
iPM does not start. Status of iPM is "ConfigAlm" Bell icon is moving on controller's display. String in the Alarm list: *iCM Wrong Config: EvapPM*	Evaporator iPM has not been configured on iCM Master controller	On iCM Master Controller, go to menu: System → Configuration → Evap PM = Enabled and "Apply Changes" On IPM Controller, Reboot controller
iPM does not start. Status of iPM is "ConfigAlm" Bell icon is moving on controller's display. String in the Alarm list: *iCM Wrong Config: CondPM*	Condenser iPM has not been configured on iCM Master controller	On iCM Master Controller, go to menu: System → Configuration → Cond PM = Enabled and "Apply Changes" On IPM Controller, Reboot controller
iPM does not start. Status of iPM is "ConfigAlm" Bell icon is moving on controller's display. String in the Alarm list: *Wrong NrUnits by iCM*	Number of units has not been communicated by iCM to IPM.	Check if Communication Error with iCM Master has occurred. Reboot iPM controller when the communication error is fixed.
Reset		**Notes**
Local HMI ☑ Network ☑ Auto		The alarm clears automatically when the communication is re-established

5.2 Communication Errors

This alarm occurs when iPM loses communication with Daikin unit controllers, through Daikin Communication Network on Process bus.
According to *ManagerSettings→ CriticalStatus*, iPM could stop all the pumps or keep on working with the current number of enabled pumps.
Another communication alarm can occur when iPM loses communication through embedded Modbus/RS485 network with Energy Meter module.

5.2.1 iPM Communication Error

Symptom	Cause	Solution
iPM stops. iPM Status = *Off:CommErr* Bell icon is moving on controller's display. String in the alarm list: *iPM CommError* **NOTE:** iPM will stop only if *MainMenu→ManagerSetting→ Critical Status=Off*	Process bus network is not properly cabled.	Check the continuity of Process bus (Daikin Communication network) from last unit to iPM in the daisy chain cable installation.
	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 and IPM 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.

Symptom	**Cause**	**Solution**
iPM keeps the actual *Nr of Demanded Pumps* from units. iPM Status = *On:CommErr* Bell icon is moving on controller's display. String in the alarm list: *iPM CommError* **NOTE:** iPM will freeze its functioning only if *MainMenu→MnangerSetting→ Critical Status=Auto*	Process bus network is not properly cabled.	Check the continuity of Process bus (Daikin Communication network) from last unit to iPM in the daisy chain cable installation.
	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 and IPM 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.

5.2.2 Master or Slave Communication Errors

Symptom	**Cause**	**Solution**
iPM keeps on working normally. *Nr of Demanded Pumps* keeps the last value Bell icon is moving on controller's display. String in the alarm list: *Master Comm Err* *Slave# CommErr* # indicates the slave ID.	Process bus network is not properly cabled	Check the continuity of Process bus (Daikin Communication network) from the units with communication issues.
	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 and IPM 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.

5.2.3 Energy Meter Communication Error

Symptom	**Cause**	**Solution**
iPM keeps on working normally. Bell icon is moving on controller's display. String in the alarm list: *Energy Mtr CommErr*	RS485 bus network is not properly cabled.	Check the continuity of RS485 bus from iPM embedded RS485 port to Energy meter RS485 port.
	Process bus communication is not running properly.	Check that Address of Energy Meter is equal 20. Check that Baudrate, parity and Stopbits on iPM *ModBus Master setting* are the same as Energy Meter ones

	EM noise over the process bus	Check the cabling. It's required to use shielded and twisted 3-wire cable to connect the Energy meter and IPM. The shield properly connected to the system ground of the Modbus port. 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.

5.3 Master/Slave# Missing Error

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

Symptom	**Cause**	**Solution**
iPM Status= *Configuration* Bell icon is moving on controller's display. String in the alarm list: *Master Missing* *Slave# Missing* # identifies the Slave ID	Wrong configuration of the system. ICM did not communicate number of unit to iPM.	On iCM Master Controller, go to menu: *System→Configuration→ EvapPM=Enabled* and "Apply Changes" On IPM Controller, Reboot controller
Reset		**Notes**
Local HMI Network Auto	☑ ☑	The alarm clears automatically when the communication is re-established.

5.4 Sensor Fault Alarm

The following sensors:

1) iCM Leaving water temperature,
2) Entering water temperature,
3) Differential Pressure,
4) Absolute Pressure
5) Flow

are used by iPM for controlling the speed of the pumps or the opening of the bypass valve.
According to the kind of sensor and *ManagerSetting→Critical Status*, iPM will react in case of fault.

5.4.1 iCM LWT Alarm

This alarm can occur only if LWT sensor has been enabled on iCM master controller. The value and the alarm of this sensor is communicated by iCM master controller to iPM via Daikin Communication Network.

Symptom	**Cause**	**Solution**
iPM keep on working normally. SysLWT value is replaced with Average of LWT value from all the running units.		
Bell icon is moving on controller's display. String in the alarm list: *iCM LWT Sensor*	Sensor connected to iCM Master is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor connected to iCM Master is shorted	Check if sensor is shorted with a resistance measurement.
	Sensor connected to iCM Master 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.

Bell icon is moving on controller's display. String in the alarm list: *Master CommErr*	See Section 5.2.2 Master or Slave Communication Errors	See Section 5.2.2 Master or Slave Communication Errors
Reset		**Notes**
Local HMI Network	☑ ☑	

5.4.2 EWT Alarm

This alarm can occur only if EWT sensor has been configured on iPM.
This alarm can affect the iPM behaviour only in case of Bypass Valve control based on EWT for Condenser PM for water cooled chiller units or for Evaporator PM with Water cooled units in Heat mode only.

Symptom	**Cause**	**Solution**
iPM opens the bypass valve up to *BypassControlSetting→ BackupOpening* Bell icon is moving on controller's display. String in the alarm list: *EWT Sensor*	Sensor connected to iPM is broken.	Check for sensor integrity. according table and allowed kOhm (kΩ) range.
		Check correct sensors operation
	Sensor connected to iPM is shorted	Check if sensor is shorted with a resistance measurement.
	Sensor connected to iPM 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	☑ ☑	

5.4.3 iCM LWT sensor and EWT sensor Alarm: Delta Temperature Alarm

This alarm affects iPM behaviour only in case of Speed control based on Delta Temperature.
iPM calculates this value as difference between LWT communicated by iCM Master and EWT connected as signal input. If both sensors should go in alarm or iPM should lose communication with all Daikin units, calculation is not possible anymore and iPM can react in two way according to *ManagerSetting→Critical Status*.

Symptom	**Cause**	**Solution**
iPM stops. iPM Status = *Off:SensAlm* Bell icon is moving on controller's display. String in the alarm list: *iCM LWT Alm* and/or *EWT Sensor* and/or *iPM CommError* **NOTE:** iPM will stop only if *MainMenu→ManagerSetting→ Critical Status=Off*	Daikin Communication Network issues	Check **iPM Communication Error**
	EWT sensors issues.	Check **EWT Alarm**
	iCM Sensors issues	Check **iCM LWT Alarm**
Reset		**Notes**
Local HMI Network Auto	☑ ☑ ☑	The alarm clears automatically when the communication is re-established.

Symptom	**Cause**	**Solution**
iPM keeps on working iPM Status = *On:SensAlm*	Daikin Communication Network issues	Check **iPM Communication Error**

Pump Speed is forced at *SpeedControlSetting→ BackupSpeed* Bell icon is moving on controller's display. String in the alarm list: *iCM LWT Alm* and/or *EWT Sensor* and/or *iPM CommError* **NOTE:** iPM will stop only if *MainMenu→ManagerSetting→ Critical Status=Auto*	EWT sensors issues.	Check **EWT Alarm**
	iCM Sensors issues	Check **iCM LWT Alarm**
Reset		**Notes**
Local HMI Network Auto	☑ ☑ ☑	The alarm clears automatically when the communication is re-established.

5.4.4 Differential pressure or Absolute pressure Alarm

This alarm affects iPM behaviour only in case of Speed control based on Differential pressure or Absolute pressure.
In case of sensor alarm, iPM can react in two ways according to *ManagerSetting→Critical Status*.

Symptom	**Cause**	**Solution**
iPM stops. iPM Status = *Off:SensAlm* Bell icon is moving on controller's display. String in the alarm list: *Differential Pressure* or *Absolute Pressure* **NOTE:** iPM will stop only if *MainMenu→ManagerSetting→ Critical Status=Off*	Sensor connected to iPM is broken.	Check for sensor integrity.
		Check correct sensor operation
	Sensor connected to iPM is not properly connected (open)	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors to terminal board.
		Check for correct sensors wiring also according electrical scheme.
		Check Power supply to sensor coming from iPM terminal board.
Reset		**Notes**
Local HMI Network	☑ ☑	

Symptom	**Cause**	**Solution**
iPM keeps on working iPM Status = *On:SensAlm* Pump Speed is forced at *SpeedControlSetting→ BackupSpeed* Bell icon is moving on controller's display. String in the alarm list: *Differential Pressure* or *Absolute Pressure* **NOTE:** iPM will stop only if *MainMenu→ManagerSetting→ Critical Status=Auto*	Sensor connected to iPM is broken.	Check for sensor integrity.
		Check correct sensor operation
	Sensor connected to iPM is not properly connected (open)	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors to terminal board.
		Check for correct sensors wiring also according electrical scheme.
		Check Power supply to sensor coming from iPM terminal board.
Reset		**Notes**
Local HMI Network	☑ ☑	

5.4.5 Flow Sensor Alarm

This alarm can occur only if EWT sensor has been configured on iPM.

This alarm can affect the iPM behaviour only in case of Bypass Valve control based on Flow (in Primary Variable Flow Only – plant).

Symptom	Cause	Solution
iPM opens the bypass valve up to *BypassControlSetting→ BackupOpening*. Bell icon is moving on controller's display. String in the alarm list: *Flow Sensor*	Sensor connected to iPM is broken.	Check for sensor integrity.
		Check correct sensor operation
	Sensor connected to iPM is not properly connected (open)	Check for absence of water or humidity on electrical contacts.
	Sensor connected to iPM is not properly connected (open)	Check for correct plug-in of the electrical connectors to terminal board.
		Check for correct sensors wiring also according electrical scheme.
		Check Power supply to sensor coming from iPM terminal board.
Reset		**Notes**
Local HMI Network	☑ ☑	

5.5 Available Pumps Alarm

This alarm occurs only when *ManagerSetting→Stage Type* is set *Demand* or *Demand+Speed.*
The alarm becomes active if the number of alarmed pumps is exceeding the demand of running unit.

Symptom	Cause	Solution
Start of the pumps is inhibited on iPM. Start of the units is inhibited on iCM. Bell icon is moving on controller's display. String in the alarm list: *Not Avail Pumps*	Number of pumps in alarm exceed the number of running Daikin Units.	Check and fix the cause of Pump alarm (5.6 Pump Alarm) Reset the alarm on iPM.
Reset		**Notes**
Local HMI Network Auto	☑ ☑	The alarm clears automatically when all the pumps are available.

5.6 Pump Alarms

5.6.1 Pump Feedback Alarm

This alarm occurs when the command sent by iPM is mismatching with Operating State received by the pump for a configurable "Pump Alarm Delay".
The alarm can occur even when the pump is set in Manual and the command is forced.

Symptom	Cause	Solution
Pump is stopped and does not start Bell icon is moving on controller's display. String in the alarm list: *Pump# - Alarm* *# indicates the ID of the pump*	For Variable Frequency driver pump VFD of the pump is not working properly	Check VFD functioning (VFD is broken)
		Check VFD configuration (status output configured)
		Check VFD is power supplied (VFD is switched off)
	VFD is not properly connected to iPM (connection open)	Check for correct plug on the terminal board of VFD.
		Check for correct plug on the terminal board of iPM.
		Check for integrity of cable
	For Constant Speed Driver Differential pressure switch (DPS) is not working properly	Check DPS is correctly installed (to measure DP between inlet and outlet pipe f the pump)
		Check DPS functioning (DPS is broken)

	DPS is not properly connected to iPM	Check for correct plug on the terminal board of DPS.
		Check for correct plug on the terminal board of iPM.
		Check for integrity of cable
Reset		**Notes**
Local HMI Network	☑ ☑	This alarm is NOT self-reset. It keeps on being active until mismatch condition is true and the alarm on iPM has not been reset.

5.7 Pump Events

An event is an abnormal condition that affects iPM logic.
The events raised by the pumps are collected in the event log and they are not shown in the Alarm logs.

5.7.1 Pump in Manual Mode

Symptom	**Cause**	**Solution**
Pump is not controlled by iPM logic; so it is considered out of sequencing and staging. String in Event log is: *Pump# in Manual* *# indicates the ID of the pump*	Operator set in menu *Maintenance→ Pumps Manual Commands→ Manual Command* different from *Auto*	Set again the pump in Auto.
Reset		**Notes**
Local HMI Network Auto	☑ ☑	Event is self-reset.

DAIKIN APPLIED EUROPE S.p.A.
Via Piani di Santa Maria, 72 - 00072 Ariccia (Roma) - Italia
Tel: (+39) 06 93 73 11 - Fax: (+39) 06 93 74 014
http://www.daikinapplied.eu