Water to water heat pump units with scroll compressors

EWWQ~KC/ EWLQ~KC

Original Instruction

Contents

List of tables

1. SAFETY CONSIDERATIONS

1.1. General

Installation, start-up and servicing of equipment can be hazardous if certain factors particular to the installation are not considered: operating pressures, presence of electrical components and voltages and the installation site (elevated plinths and built-up up structures). Only properly qualified installation engineers and highly qualified installers and technicians, fully trained for the product, are authorized to install and start-up the equipment safely.

During all servicing operations, all instructions and recommendations, which appear in the installation and service instructions for the product, as well as on tags and labels fixed to the equipment and components and accompanying parts supplied separately, must be read, understood and followed.

Apply all standard safety codes and practices.

Wear safety glasses and gloves.

> ⚠️ **WARNING The emergency stop causes all motors to stop, but does not switch off power to the unit.**
> **Do not service or operate on the unit without having switched off the main switch.**

1.2. Before switching the unit

Before switching on the unit read the following recommendations:
- When all the operations and all the settings have been carried out, close all the switchbox panels
- The switchbox panels can only be opened by trained personnel
- When the UC requires to be accessed frequently the installation of a remote interface is strongly recommended
- LCD display of the unit controller may be damaged by extremely low temperatures (see chapter 2.3). For this reason, it is strongly recommended to never power off the unit during winter, especially in cold climates.

1.3. Avoid electrocution

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components. It is particularly recommended that all sources of electricity to the unit be shut off before any work is begun. Shut off main power supply at the main circuit breaker or isolator.

IMPORTANT: This equipment uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

> ⚠️ **WARNING Direct intervention on the power supply can cause electrocution, burns or even death. This action must be performed only by trained persons.**

> ⚠️ **WARNING RISK OF ELECTROCUTION: Even when the main circuit breaker or isolator is switched off, certain circuits may still be energized, since they may be connected to a separate power source.**

> ⚠️ **WARNING RISK OF BURNS: Electrical currents cause components to get hot either temporarily or permanently. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.**

> ⚠️ **WARNING In accordance with the operating conditions the fans can be cleaned periodically. A fan can start at any time, even if the unit has been shut down.**

2.   GENERAL DESCRIPTION

2.1.   Basic Information

POL468.85/MCQ/MCQ is a system for controlling single or dual-circuit air/water cooled chillers. POL468.85/MCQ/MCQ controls compressor start-up necessary to maintain the desired heat exchanger leaving water temperature. In each unit mode, by installing proper bypass options, it can control the operation of the condensers to maintain the proper condensation process in each circuit. Safety devices are constantly monitored by POL468.85/MCQ/MCQ to ensure their safe operation.

Abbreviations used

In this manual, the refrigeration circuits are called circuit #1 and circuit #2. The compressor in circuit #1 is labelled Cmp1. The other in circuit #2 is labelled Cmp2. The following abbreviations are used:

W/C	Water Cooled	ESRT	Evaporating Saturated Refrigerant Temperature
CP	Condensing Pressure	EXV	Electronic Expansion Valve
CSRT	Condensing Saturated Refrigerant Temperature	HMI	Human Machine Interface
DSH	Discharge Superheat	MOP	Maximum operating pressure
DT	Discharge Temperature	SSH	Suction Super-Heat
EEWT	Evaporator Entering Water Temperature	ST	Suction Temperature
ELWT	Evaporator Leaving Water Temperature	UC	Unit controller (POL468.85/MCQ/MCQ)
EP	Evaporating Pressure	R/W	Readable/Writable

2.2.   Controller Operating Limits

Operation (IEC 721-3-3):
- Temperature -40...+70 °C
- Humidity < 95 % r.h (no condensation)
- Air pressure min. 700 hPa, corresponding to max. 3,000 m above sea level

Transport (IEC 721-3-2):
- Temperature -40...+70 °C
- Humidity < 95 % r.h (no condensation)
- Air pressure min. 260 hPa, corresponding to max. 10,000 m above sea level.

2.3.   Controller Architecture

The overall controller architecture is the following:
- One POL468.85/MCQ main controller
- Peripheral Bus is used to connect I/O extensions to the main controller.
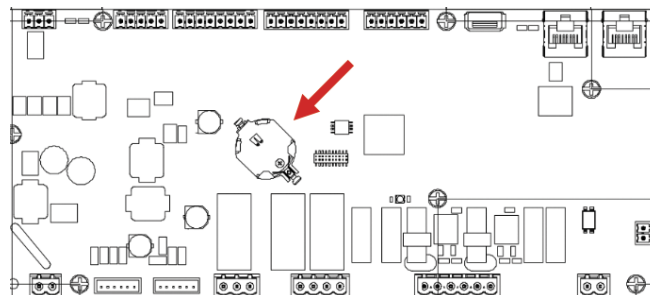
2.4.   Controller maintenance

The controller requires to maintain the installed battery. Every two years it's required to replace the battery. Battery model is: BR2032 and it is produced by many different vendors.

⚠️ ***WARNING To replace the battery, it is important to remove the power supply to all unit.***

Refer to picture below for battery installation.

2.5. Embedded Web Interface (Optional)

The `POL468.85/MCQ/MCQ` controller has an embedded web interface, available with accessory `EKRSCBMS` (Connectivity for external BMS communication), that can be used to monitor the unit when connected to a `TCP-IP` network. It is possible to configure the IP addressing of the `POL468.85/MCQ` as a fixed IP of DHCP depending on the network configuration.
With a common web browser, a PC can connect with the unit controller entering the IP address.
When connected, it will be required to enter a username and a password. Enter the following credential to get access to the web interface:

```
User Name: ADMIN
Password: SBTAdmin!
```

2.6. Application Save and Reset

Every variations of the HMI parameters will be lost after a power loss and it's necessary to execute a saving command to make them permanent. This action can be done via the `Application Save` command.

The controller automatically makes an `Application Save` after a change of value of one of following parameters:

Parameters	Name
1.00	Unit Enable
1.01	Circuit 1 Enable
1.02	Circuit 2 Enable
2.00	Available Modes
4.00	Control Source(da collegare in sapro se necessario)
5.00	Cool Setpoint 1
5.01	Cool Setpoint 2
5.02	Heat Setpoint 1
5.03	Heat Setpoint 2
8.07	Evaporator Delta T setpoint
8.20	Condenser Delta T Setpoint
9.09	Thermostatic Source Control
13.00	DHCP Enable
14.03	Number of circuit
14.01	Evaporator Pump control mode
15.03	EWT Sensor Enable
15.10	Water reversing valve Normal behaviour
15.11	Water reversing valve Delay To Cool
15.12	Water reversing valve Delay To Heat
15.13	Low Pressure Unload Restart Number
15.16	Low Pressure Alarm First Run Delay
18.00	Reset Type
19.15	Bas Protocol

⚠️ **WARNING Some parameters present in the interface require a restart of the UC to become effective after a change of value. This operation can be done using the Apply Changes command.**

These commands can be found in Page [23]:

Menu	Parameter	R/W
20	00 (Application Save)	W
(PLC)	01 (Apply Changes)	W

The path in the Web HMI interface for Application Save is "`Main Menu`".
The path in the Web HMI interface for Apply Changes is "`Main Menu → View/Set Unit → Controller IP Setup → Settings`".

3. WORKING WITH THIS UNIT

3.1. Unit Interface

The user interface installed in the unit is divided into **4 functional groups**:

1. Numeric value Display (f.g.1)
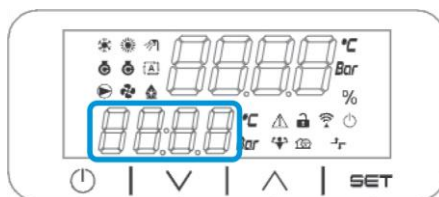
2. Actual Parameter/Sub-Parameter group (f.g.2)
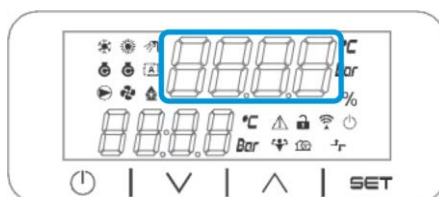
3. Icon indicators (f.g.3)
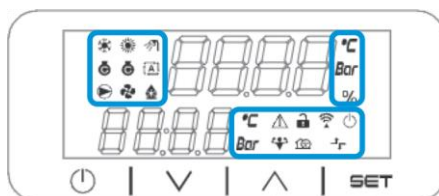
4. Menu/Navigation keys (f.g.4)
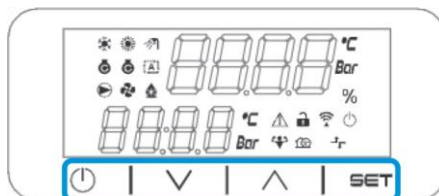
The interface has a multi-level structure divided as follows:

Main Menu	Parameters	Sub-Parameters
Page [1]	Parameter [1.00]	Sub-Parameter [1.0.0]
		…
		Sub-Parameter [1.0.XX]
	…	…
	Parameter [1.XX]	Sub-Parameter [1.XX.0]
		…
		Sub-Parameter [1.XX.YY]
Page [2]	Parameter [2.00]	Sub-Parameter [2.0.0]
		…
		Sub-Parameter [2.0.XX]
	…	…
	Parameter [2.XX]	Sub-Parameter [2.XX.0]
		…
		Sub-Parameter [2.XX.YY]
…	…	…
Page [N]	Parameter [N.00]	Sub-Parameter [N.00.0]
		…
		Sub-Parameter [N.XX.YY]
	..	…
	Parameter [N.XX]	Sub-Parameter [N.00.0]
		…
		Sub-Parameter [N..XX.YY]

Parameters can be writable, only readable or give access to other sub-parameters (see table in 3.22 chapter).
The list of actions for browsing through the menu is:

1. Press [▲] [▼], in the navigation keys, to browse through the parameter groups, that is shown in (f.g.2) by its number, and in (f.g.1) by its name.
2. Press [SET] to select a parameter group.
3. Press [▲] [▼] to browse through the parameters in the specific group or menu.
4. Press [SET] to start value setting phase.
    a. During this phase, the value string (f.g.1) of the HMI will start to blink
5. Press [▲] [▼] to set/change the parameter value, that is shown in the numeric display (f.g.1).
6. Press [SET] to accept the value.
    a. After exiting the setting phase, the value string of the HMI will stop to blink. If an unavailable value is selected the value will continue to blink and value won't be set.

In order to go back through the pages, press the On/Stand-by button ⏻.

3.1.1. Icons Description

Icons provide an indication about current unit status.

ICON	Description	LED ON	LED OFF	LED BLINKING
❄	LED Functioning mode Chiller	Running in cooling mode	-	-
☀	LED Functioning mode Heat Pump	-	Running in heat mode	-
⏻	LED Compressor ON (Circuit 1 Left, Circuit 2 Right)	Compressor ON	Compressor OFF	Compressor performing preopen or pump-down procedure
▷	LED Circulation Pump ON	Pump ON	Pump OFF	-
°C	LED Temperature	Temperature Value displayed	-	-
Bar	LED Pressure	Pressure Value displayed	-	-
%	LED Percentage	Percentage Value displayed	-	-
⚠	LED Alarm	-	No Alarm	Alarm Presence
🔓	LED Setting mode	Customer parameter unlocked	-	-
📶	LED Connection status on Daikin on site	Connected	No Connection	Requesting Connection
⏻	LED on/stand-by	Unit Enabled	Unit Disabled	-
⌐	LED remote BMS control	BMS control ON	BMS control OFF	-

3.2. Insert Password

In order to unlock customer functionalities, the User has to insert the Password through the HMI menu [0]:

Menu	Parameter	Range	Description	R/W
00	00 (**Insert Password**)	0-9999	To insert all the 4 digits of the password, press "Set" after the insertion of the number to move on the next digit.	W

The password to access the customer' setting pages is: **2526**

3.3. Chiller On/Off

Unit controller provides several features to manage unit start/stop:

1. Keypad On/Off
2. Scheduler (Time programmed On/Off)
3. Network On/Off (optional with Accessory EKRSCBMS)
4. Unit On/Off Switch

3.3.1. Keypad On/Off

Keypad On/Off allows to enable or disable the unit from local controller. If needed, single refrigerant circuit can be also enabled or disabled. By default, all refrigerant circuits are enabled.

Menu	Parameter	Range	Description	R/W
01	00 (`Unit Enable`)	0-2	0 = Unit disabled	W
			1 = Unit enabled	W
			2 = Unit enabling state based on Scheduler programming. Refer to chapter 3.3.2	W
	01 (`Circuit 1 Enable`)	0-1	0 = Circuit 1 disabled	W
			1 = Circuit 1 enabled	W
	02 (`Circuit 2 enable`)	0-1	0 = Circuit 2 disabled	W
			1 = Circuit 2 enabled	W

The path in the Web HMI interface is "`Main Menu → Unit Enable`".

3.3.2. Scheduler

The activation / deactivation of the unit can be managed automatically through the Schedule function, activated when the Unit Enable parameter is set to Schedule.

The operating modes during the different daily time bands are managed through the interface page [17] containing the following registers to be set:

Menu	Page	Parameter	R/W	Psw
[17] = Scheduler (`Scheduler`)	[17.00] = Monday (`Monday`)	[17.0.0] Time 1	W	1
		[17.0.1] Value 1	W	1
		[17.0.2] Time 2	W	1
		[17.0.3] Value 2	W	1
		[17.0.4] Time 3	W	1
		[17.0.5] Value 3	W	1
		[17.0.6] Time 4	W	1
		[17.0.7] Value 4	W	1
	[17.01] = Tuesday (`Tuesday`)	[17.1.0] Time 1	W	1
		[17.1.1] Value 1	W	1
		[17.1.2] Time 2	W	1
		[17.1.3] Value 2	W	1
		[17.1.4] Time 3	W	1
		[17.1.5] Value 3	W	1
		[17.1.6] Time 4	W	1
		[17.1.7] Value 4	W	1
	[17.02] = Wednesday (`Wednesday`)	[17.2.0] Time 1	W	1
		[17.2.1] Value 1	W	1
		[17.2.2] Time 2	W	1
		[17.2.3] Value 2	W	1
		[17.2.4] Time 3	W	1
		[17.2.5] Value 3	W	1
		[17.2.6] Time 4	W	1
		[17.2.7] Value 4	W	1
	[17.03] = Thursday (`Thursday`)	[17.3.0] Time 1	W	1
		[17.3.1] Value 1	W	1
		[17.3.2] Time 2	W	1
		[17.3.3] Value 2	W	1
		[17.3.4] Time 3	W	1
		[17.3.5] Value 3	W	1
		[17.3.6] Time 4	W	1
		[17.3.7] Value 4	W	1
	[17.04] = Friday (`Friday`)	[17.4.0] Time 1	W	1
		[17.4.1] Value 1	W	1
		[17.4.2] Time 2	W	1
		[17.4.3] Value 2	W	1
		[17.4.4] Time 3	W	1
		[17.4.5] Value 3	W	1
		[17.4.6] Time 4	W	1
		[17.4.7] Value 4	W	1
	[17.05] = Saturday (`Saturday`)	[17.5.0] Time 1	W	1
		[17.5.1] Value 1	W	1
		[17.5.2] Time 2	W	1
		[17.5.3] Value 2	W	1
		[17.5.4] Time 3	W	1
		[17.5.5] Value 3	W	1
		[17.5.6] Time 4	W	1
		[17.5.7] Value 4	W	1
	[17.06] = Sunday (`Sunday`)	[17.6.0] Time 1	W	1
		[17.6.1] Value 1	W	1
		[17.6.2] Time 2	W	1
		[17.6.3] Value 2	W	1

		[17.6.4] Time 3	W	1
		[17.6.5] Value 3	W	1
		[17.6.6] Time 4	W	1
		[17.6.7] Value 4	W	1

The path in the Web HMI interface is "**Main Menu → View/Set Unit → Scheduler**".

The user can indicate four time slots for each day of the week and set one of the following modes for each of them:

Parameter	Range	Description
Value [17.x.x]	0 = Off	Unit disabled
	1 = On 1	Unit enabled – Water primary setpoint selected
	2 = On 2	Unit enabled – Water secondary setpoint selected

The Time slots can be set from in "Hour:Minute":

Parameter	Range	Description
Time [17.x.x]	"00:00-24:60"	Time of the day can vary from 00:00 to 23:59. If Hour = 24 the HMI will display "An:Minute" as string and the Value# related to Time# is set for all hours of the associated day. If Minute = 60 the HMI will display "Hour:An" as string and the Value# related to Time# is set for all minutes of the selected hours of the day.

3.3.3. Network On/Off

Chiller On/Off can be managed also with BACnet or Modbus RTU communication protocol.
To control the unit over the network, follow below instructions:

1. Unit On/Off switch = closed
2. Unit Enable = Enable (refer to 3.3.1)
3. Control Source = 1 (refer to 3.7)

The HMI menu is:

Menu	Parameter	Range	R/W
04	00	Off = Local	W
	(**Control Source**)	On = Network	W

Modbus RTU is available as default protocol on RS485 port. The HMI page [22] is used to change between Modbus and BACnet protocol and set parameters for both MSTP and TCP-IP communication, as shown in chapter 3.22.

The path in the Web HMI interface for Network Control Source is "**Main Menu View/Set → Unit → Network Control**".

3.3.4. Unit On/Off Switch

For unit start up is mandatory to close the electrical contact between terminals: XD-703 → UC-D1 (UNIT ON/OFF SWITCH).

This short circuit can be realized through:
- External electrical switch
- Cable

UNIT ON/OFF SWITCH	EVAPORATOR WATER FLOW SWITCH	EXTERNAL ALARM/EMERGENCY STOP	COOL/HEAT SWITCH	COMPRESSOR 1 ON/OFF FEEDBACK STATE (NO)

C400 - POL468.85
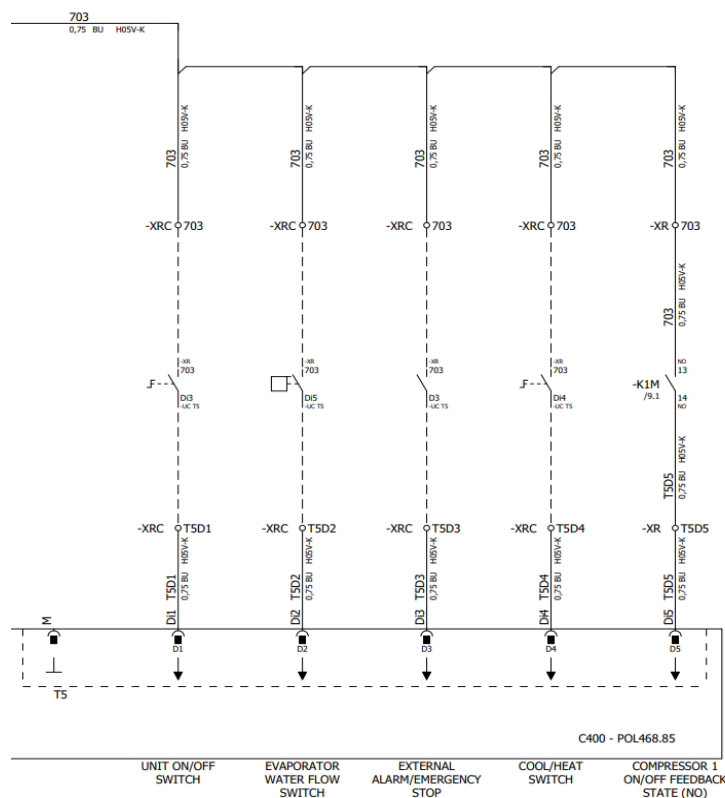
3.4. Water Setpoints

Purpose of this unit is to cool or to heat (in case of heat mode) the water, to the setpoint value defined by the user and displayed in the main page:

The unit can work with a primary or a secondary setpoint, that can be managed as indicated below:

1. Keypad selection + Double Setpoint digital contact
2. Keypad selection + Scheduler Configuration
3. Network
4. Setpoint Reset function

As first step the primary and secondary setpoints need to be defined.

Menu	Parameter	Range	Description	R/W
05	00 **(Cool LWT 1)**	-10°C … 20°C	Primary cooling setpoint.	W
	01 **(Cool LWT 2)**	-10°C … 20°C	Secondary cooling setpoint.	W
	02 **(Heat LWT 1)**	20°C … 55°C	Primary heating setpoint.	W
	03 **(Heat LWT 1**)	20°C … 55°C	Secondary heating setpoint.	W

The change between primary and secondary setpoint can be performed using the **Double setpoint** contact, available with accessory EKRSCBMS, or through the **Scheduler** function.

Double setpoint contact works as below:
- Contact opened, the primary setpoint is selected
- Contact closed, the secondary setpoint is selected

In order to change between primary and secondary setpoint with the Scheduler function, refer to the section 3.3.2.

⚠️ **WARNING When the scheduler function is enabled, the Double setpoint contact is ignored.**

To modify the active setpoint through network connection, refer to "Network control" section 3.7.

The active setpoint can be further modified using the "Setpoint Reset" function as explained in section 3.11.1.

3.5. The path in the Web HMI interface for Water Setpoint configuration is "`Main Menu → Unit Mode → Mode`"

The Unit Mode is used to define if the chiller is configured to produce chilled or heated water. This parameter is related to the unit type and is set in factory or during commissioning operation.
Current mode is reported in the main page.
The path in the Web HMI interface for Unit mode configuration is "`Main Menu → Unit Mode → Mode`".

Menu	Parameter	Range	Description
02	00 (`Unit Mode`)	`0 = Cool`	Set if chilled water temperature up to 4°C is required. No glycol is generally needed in the water circuit unless ambient temperature may reach low values. In case of water greater than 4°C, but water circuit with glycol, set mode "Cool with glycol".
		`1 = Cool with glycol`	Set if chilled water temperature below 4°C is required. This operation requires proper glycol/water mixture in the plate heat exchanger water circuit.
		`2 = Cool / Heat`	Set in case a dual cool/heat mode is required. This setting implies an operation with double functioning which is activated through the physical switch or BMS control. ="=! • `COOL:` The unit will work in cooling mode with the Cool LWT as the Active Setpoint. • HEAT: The unit will work in heat pump mode with the Heat LWT as the Active Setpoint.
		`3 = Cool / Heat with glycol`	Same behavior of "Cool / Heat" mode but Chilled water temperature below 4°C is required or glycol is present in the water circuit.

3.5.1. Heat/Cool Mode

Heat/Cool operating mode can be set using a Digital Input.

All settings related to Cooling-Heating operation will produce a real mode change only if Unit Mode parameter (refer to menu 01) is set to:
- `Heat/Cool`
- `Heat/Cool w/Glycol`

In all other cases no mode switch will be allowed

Menu	Parameter	Range	Description
02	00 (`Unit Mode`)	`0 = Cool`	Only cooling mode is permitted
		`1 = Cool with glycol`	
		`2 = Cool / Heat`	Both heating and cooling mode is permitted
		`3 = Cool / Heat with glycol`	

Digital input reference	Digital input state	Description
`Cool/Heat switch`	`Opened`	Cooling mode is selected
	`Closed`	Heating mode is selected

3.6. Pumps and Variable Flow

The UC can manage one water pump connected to the water plate heat exchanger. The pump control type is configured in page [15] and can operate in two different ways:
1. `Fixed Speed`
2. `DeltaT`

Menu	Parameter	Descriptiion	R/W	Psw
15 (`Customer Configuration`)	00 (`Evaporator Pump Ctrl Mode`)	0 = On- Off 1 = Fixed Speed 3 = DeltaT	W	1
	04 (`Cond Pump Ctrl Mode`)	0 = On- Off 1 = Fixed Speed 3 = DeltaT	W	1

The path in the Web HMI interface for Pump Ctrl Type is "`Main Menu → Commission Unit → Configuration → Options → Evap Pump Type`"/"`Main Menu → Commission Unit → Configuration → Options → Cond Pump Type`".

3.6.1. Fixed Speed

First control mode, `Fixed Speed`, allows an automatic pump speed variation, between two different speeds.
Main Settings are:
1. `Speed 1`
2. `Standby Speed`

Unit controller switches the pump frequency on the basis of:
1. Actual unit capacity
2. Double Speed digital input state

If there are no active compressors (Unit Capacity = 0%) pump speed is set to `Standby Speed`, otherwise `Speed 1` is selected depending on the `Double Speed` input state.

3.6.2. DeltaT

The third control mode is the `DeltaT` mode where the pump speed is modulated through a PID to ensure a constant difference between Evaporator Entering Water Temperature and Evaporator Leaving Water Temperature.

This mode is regulated by following setting:
- `Evaporator DeltaT in Cool Mode`
- `Condenser Delta T in Heat Mode`

All settings related to pump management are available in the menu [8].

Menu	Parameter	Range	Description	R/W	Psw
08	00 (`Recirculation time`)	0-300	Minimum time required within flow switch has to be closed to allow unit startup.	W	1
	01 (`Standby Speed`)	0-100	Pump speed with Unit Capacity = 0	W	1
	02 (`Evap pump Speed`)	0-100	Actual Evaporator feedback pump speed.	R	1
	03 (`Max Speed`)	0-100	Maximum value for pump speed.	W	1
	04 (`Min Speed`)	0-100	Minimum value for pump speed.	W	1
	05 (`Sp Speed1`)	0-100	First target value for pump speed in Fixed Speed control conditions.	W	1
	06 (`Parameter-K`)	1-10	This value scales the PI algorithm parameters to obtain a faster response.	W	1
	07 (`Evap Setpoint DeltaT`)	0-10	Evaporator Water Temperature difference setpoint.	W	1
	08 (`Evap Delta T`)	0-10	Evaporator Delta temperature Between EWT and LWT	R	1
	09 (`Evap Pump Run Hours 1`)	0-99999	Evaporator Operation Hours	R	1
	10 (`Evap Pump Run Hours 2`)	0-99999	Evaporator Operation Hours	R	1
	11 (`Evap Pump Mode`)	Auto/Manual	Pump mode. This parameter allows to switch the control of the pump to a fixed speed.	W	1
	12 (`Evap Manual Speed)`	0-100	Manual Pump Speed. Pump speed when the manual mode is selected.	W	1
	13 (`Evap Thermo off Stanby Speed`)	0-100	Pump Speed in Thermostat Off Unit condition	W	1
	14 (`Cond Stanby Speed`)	0-100	Speed when there are no compressors running	W	1
	15 (`Cond Pump Speed`)	0-100	Actual Condenser feedback pump speed.	R	1
	16 (`Cond Max Speed`)	0-100	Maximum value for pump speed.	W	1
	17 (`Cond Min Speed`)	0-100	Minimum value for pump speed.	W	1
	18 (`Cond Speed 1`)	0-100	Speed when the input Speed Switch is open	W	1
	19 (`Cond Parameter-K`)	0-10	This value scales the PI algorithm parameters to obtain a faster response.	W	1
	20 (`Cond Setpoint DT`)	0-10	Condenser Water Temperature difference setpoint.	W	1
	21 (`Cond Delta T`)	0-10	Condenser Delta temperature Between EWT and LWT	R	1
	22 (`Cond Pump Run Hours`)	0-99999	Condenser Operation Hours	R	1
	23 (`cond Pump Mode`)	Auto/Manual	Pump mode. This parameter allows to switch the control of the pump to a fixed speed.	W	1
	24 (`cond Manual Speed`)	0-100	Manual Pump Speed. Pump speed when the manual mode is selected.	W	1
	25 (`Cond Thermo off Stably Speed`)	0-100	Pump Speed in Thermostat Off Unit condition	W	1

The path in the Web HMI interface for Pump Settings is "`Main Menu à View/Set Unit à Pumps`".

Delta T control must have both water probes at the evaporator inlet in order to operate. The path in the Web HMI interface for EWT Sensor enabling is "`Main Menu à Commission Unit à Configuration →Options`".

3.7. Network Control

To allow unit's control from BMS system the Control Source parameter [4.00] needs to be set in Network. All settings related to BSM control communication can be visualized in Page [4]:

Menu	Parameter	Range	Description		R/W
04	00 (`Control Source`)	0-1	0 = Network control disabled	On/Off command from network	W
			1 = Network control enabled		
	01 (`Enable`)	0-1	0 = Unit is Enable	On/Off command from network visualization	R
			1 = Unit is Disabled		
	02 (`Cool LWT`)	0..30°C	-	Cooling water temperature setpoint from network	R
	03 (`Heat LWT`)	30..60°C	-	Heating water temperature setpoint from network	R
	04 (`Mode`)	CH/HP	-	Operating mode from network	R

Refer to communication protocol documentation for specific registers addresses and the related read/write access level.

The path in the Web HMI interface is "`Main Menu à View/Set Unit à Network Control`".
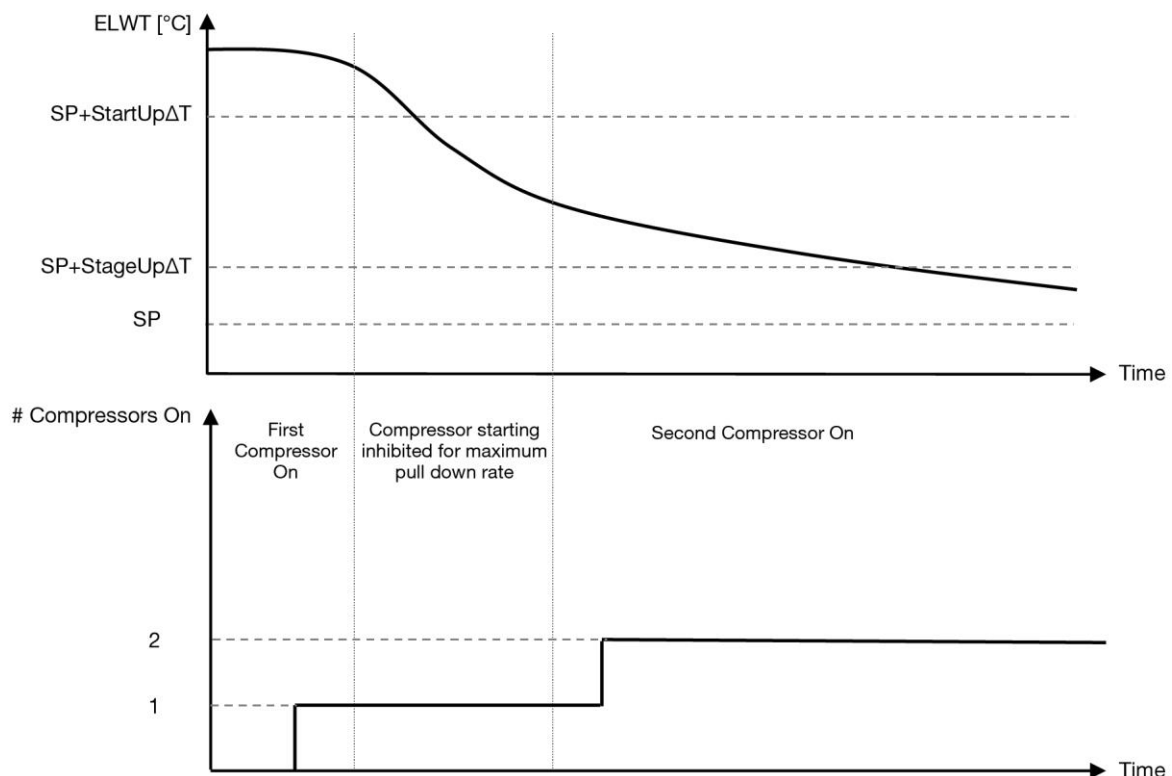
3.8. Thermostatic Control

Thermostatic control settings allow to set up the response to temperature variations. Default settings are valid for most application, however plant specific conditions may require adjustments to have a smooth control or a quicker response of the unit.
The unit controller will start the first compressor if the controlled temperature is higher (Cool Mode) or lower (Heat Mode) than the active setpoint of at least a Start Up DT value, whereas second compressor when available is started if the controlled temperature is higher (Cool Mode) or lower (Heat Mode) than the active setpoint (AS) of at least a Stage Up DT (SU) value. Compressors stop if performed following same procedure looking to the parameters Stage Down DT and Shut Down DT.

	Cool Mode	Heat Mode
First compressor start	Controlled Temperature > Setpoint + `Start Up DT`	Controlled Temperature < Setpoint - `Start Up DT`
Other compressors start	Controlled Temperature > Setpoint + `Stage Up DT`	Controlled Temperature < Setpoint - `Stage Up DT`
Last compressor stop	Controlled Temperature < Setpoint - `Shut Dn DT`	Controlled Temperature > Setpoint + `Shut Dn DT`
Other compressors stop	Controlled Temperature < Setpoint - `Stage Dn DT`	Controlled Temperature > Setpoint + `Stage Dn DT`

A qualitative example of compressors start-up sequence in cool mode operation is shown in the graph below.

Graph 1 – Compressors start-up sequence - Cool mode

Thermostatic control settings are accessible from menu [9]:

Menu	Parameter	Range	Description	R/W	Psw
09	00 (`Start Up DT`)	0-10	Delta temperature respect the active setpoint to start the unit (startup of first compressor)	W	1
	01 (`Shut Down DT`)	0-MIN(5, 60.5-LwtSp)	Delta temperature respect the active setpoint to stop the unit (shutdown of latest compressor)	W	1

02 (`Stage Up DT`)	0-5	Delta temperature respect the active setpoint to start second compressor	W	1
03 (`Stage Down DT`)	0-MIN(5, 60-LwtSp)	Delta temperature respect the active setpoint second compressor	W	1
04 (`Stage Up Delay`)	1÷60 [min]	Minimum time between the compressor startup	W	1
05 (`Stage Down Delay`)	0÷30 [min]	Minimum time between the compressor shutdown	W	1
06 (`Evaporator Freeze`)	if Unit mode = 1 or 3 -18 ÷ 6 [°C] if Unit mode = 0 or 2 +2 ÷ 6 [°C]	Defines the minimum water temperature before the unit alarm for evaporator freezing in triggered	W	2
07 (**Condenser Freeze**)	if Unit mode = 1 or 3 -18 ÷ 6 [°C] if Unit mode = 0 or 2 +2 ÷ 6 [°C]	Defines the minimum water temperature before the unit alarm for condenser freezing in triggered		
08 (`Low Pressure Unload`)	if Unit mode = 1 or 3 150÷800 [kPa] if Unit mode = 0 or 2 600÷800 [kPa]	Minimum pressure before compressor starts unload action in order to increase evaporating pressure		

The path in the Web HMI interface is "**Main Menu → View/Set Unit → Thermostatic Control**".

3.9. External Alarm

The External Alarm is a digital contact that can be used to communicate to the UC an abnormal condition, coming from an external device connected to the unit. This contact is located in the customer terminal box and depending on the configuration can causes a simple event in the alarm log or also the unit stop. The alarm logic associated to the contact is the following:

Contact state	Alarm State	Note
Opened	Alarm	The alarm is generated if the contact remains opened for at least 5 seconds
Closed	No Alarm	The alarm is reset just the contact is closed

The configuration is performed from Page [15] as shown below:

Menu	Parameter	Range	Description
15	09 (`Ext Alarm`)	`0 = No`	External Alarm disabled
		`1 = Event`	Event configuration generates an alarm in the controller but takes the unit running
		`2 = Rapid Stop`	Rapid Stop configuration generates an alarm in the controller and performs a rapid stop of the unit

The web HMI path for the External Alarm configuration is: `Commissioning → Configuration → Options`

3.9.1. Thermostatic Source Control

The unit allows water control based on entering water temperature or leaving water temperature.
Thermostatic Control Parameters **(Page 9)** must be set according to customer requirements in order to fit as much as possible the Water Plant conditions.
Thermostatic Control can be set into:
- EWT Control (Selectable only if EWT Sensor are enabled (15.03→1)
- LWT Control (Default)

3.9.1.1. Entering Water Temperature Control

In EWT Control, compressor starts/stops depend on Entering Water Temperature value, with respect to the thermostatic control parameters.

Parameter	Description/Value
`Control Temperature`	Entering Water Temperature
`SP`	Based on Entering Water Temperature
`Startup DT`	2.7 dK (default value as described in previous chapter)
`Shutdown DT`	1.7 dK (default value as described in previous chapter)
`Nominal DT`	Depends on Unit Mode, set it in 15.14, 15.15 parameters (Nominal Evap DT, Nominal Cond DT)
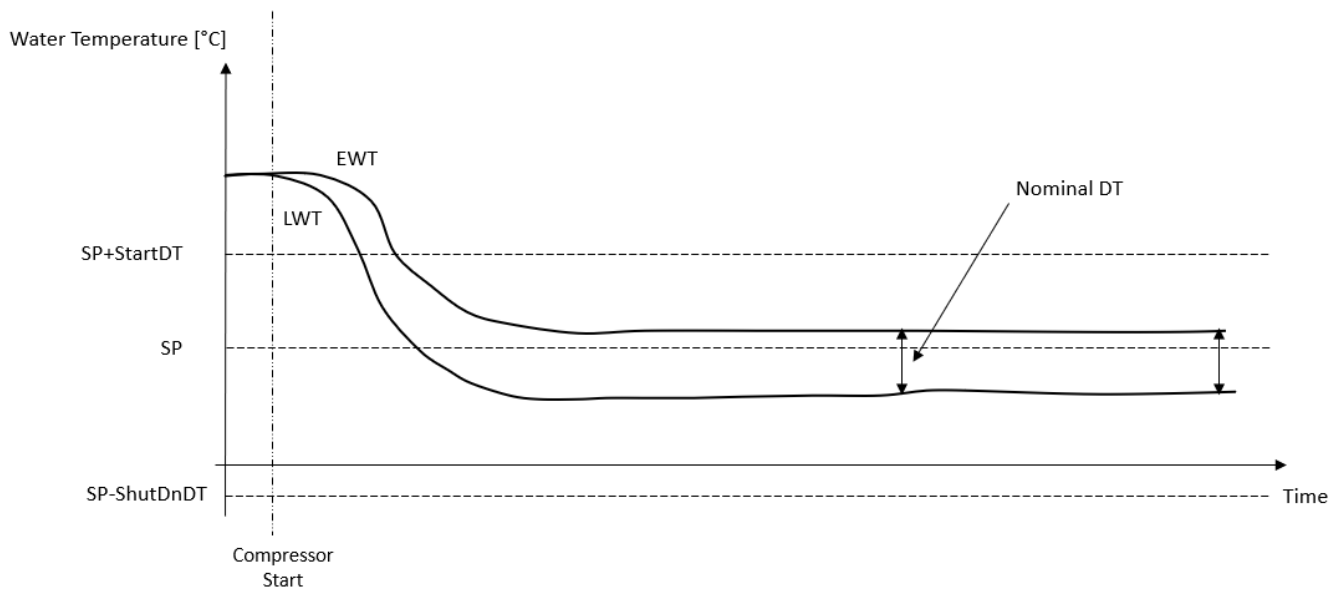
3.9.1.2. Leaving Water Temperature Control

In LWT Control, compressor starts/stops depend on Leaving Water Temperature value with respect to the thermostatic control parameters.

Depending on setting of StartupDT, thermoregulation control could lead to:
1. More accurate Thermostatic control → Frequent compressor starts/stops. (Default Configuration)
   Note: UC always ensures amount of compressor start and stop does not exceed safety limit

Parameter	Description/Value
Control Temperature	Leaving Water Temperature
SP	Based on Leaving Water Temperature
Startup DT	2.7 dK (default value as described in previous chapter)
Shutdown DT	1.7 dK (default value as described in previous chapter)
Nominal DT	Depends on Unit Mode, set it in 15.14, 15.15 parameters (Nominal Evap DT, Nominal Cond DT)

2. Reduced amount of compressor Start/Stop → Less accurate Thermostatic Control.
   To reduce amount of compressor start/stop, customer can modify the StartupDT parameter according to following indication:

$$StartUpDT > \frac{Nominal\ DT^*}{Number\ of\ Unit\ Compressors}$$

*Nominal DT is the difference between entering and leaving water temperature when the unit is operating at full capacity with nominal plant water flow rate.

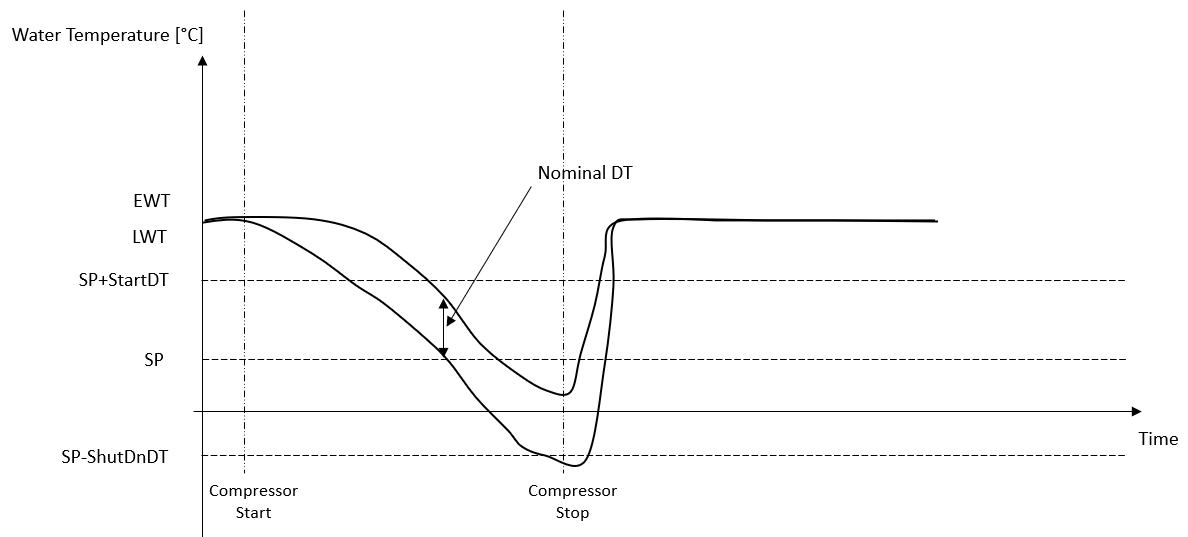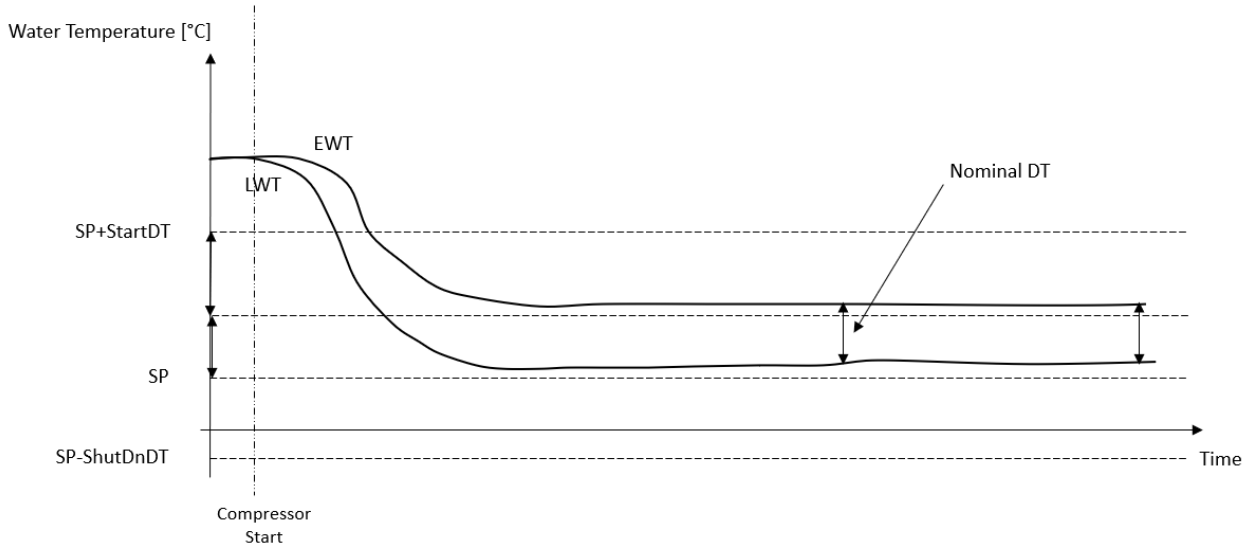| Parameter	Description/Value
Control Temperature	Leaving Water Temperature
SP	Based on Leaving Water Temperature
Startup DT	7.7 dK (example with 5 °C of nominal flow rate and unit with 1 compressor)
Shutdown DT	1.7 dK (default value as described in previous chapter)
Nominal DT	Depends on Unit Mode, set it in 15.14, 15.15 parameters (Nominal Evap DT, Nominal Cond DT)

3.10. Unit Capacity

Information about the unit's current and individual circuit capacities can be accessed from menu Page [3].

Menu	Parameter	Range	Description	R/W
03	00 (Circuit 1 Capacity)	0-100%	Circuit 1 capacity in percentage	R
	01 (Circuit 2 Capacity)	0-100%	Circuit 2 capacity in percentage	R

In the HMI Web Interface, some of this information is available in the paths:
* Main Menu → View/Set Circuit → Circuit 1 (or Circuit 2) → Data
* Main Menu → View/Set Circuit → Circuit 1 (or Circuit 2) → Compressors

3.11. Power Conservation

In this chapters will be explained the functions used to reduce the unit power consumption.

3.11.1. Setpoint Reset

The "Setpoint Reset" function can override the chiller water temperature active setpoint when certain circumstances occur. The aim of this function is to reduce the unit energy consumption whilst maintaining the same comfort level. To this purpose, three different control strategies are available:

* Setpoint Reset by an external signal (0-10V)
* Setpoint Reset by Evaporator/Condenser ΔT (EEWT/CEWT)

The controlled Delta T is set in accord of actual unit mode: if unit is operating in Cool Mode, Evaporator Delta T will be considered to activate Setpoint Reset, otherwise if it is operating in Heat Mode, Condenser Delta T will be considered to activate Setpoint Reset.

In order to set the desired setpoint-reset strategy, go to the parameter group number [20] "Setpoint Reset", according to the following table:

Menu	Parameter	Range	Description	R/W
18	00 (Reset Type)	0-2	0 = No	W
			1 = 0-10V	
			2 = DT	

The path in the HMI Web interface to set the desired strategy is "`Main Menu à Commission Unit à Configuration à Options`" and modify the **Setpoint Reset** parameter.

| Parameter	Range	Description
`LWT Reset`	No	Setpoint reset not enabled
	0-10V	Setpoint reset enabled by an external signal between 0 and 10V
	DT	Setpoint reset enabled by Evaporator Water Temperature

Each strategy needs to be configured (although a default configuration is available) and its parameters can be set navigating to "`Main Menu à View/Set Unit à Power Conservation à Setpoint Reset`" in the HMI Web interface.

> ⚠️ **WARNING Note that the parameters corresponding to a specific strategy will be available only once the Setpoint Reset has been set to a specific value and the UC has been restarted.**

3.11.1.1. Setpoint Reset by 0-10V signal

When the **0-10V** is selected as **Setpoint Reset** option, the LWT active setpoint(AS) is calculated applying a correction based on an external 0-10V signal: 0 V corresponds to 0°C correction, i.e. AS = LWT setpoint, whereas 10 V corresponds to a correction of the Max Reset (MR) quantity, i.e. AS = LWT setpoint + MR(-MR) as shown in the following picture:
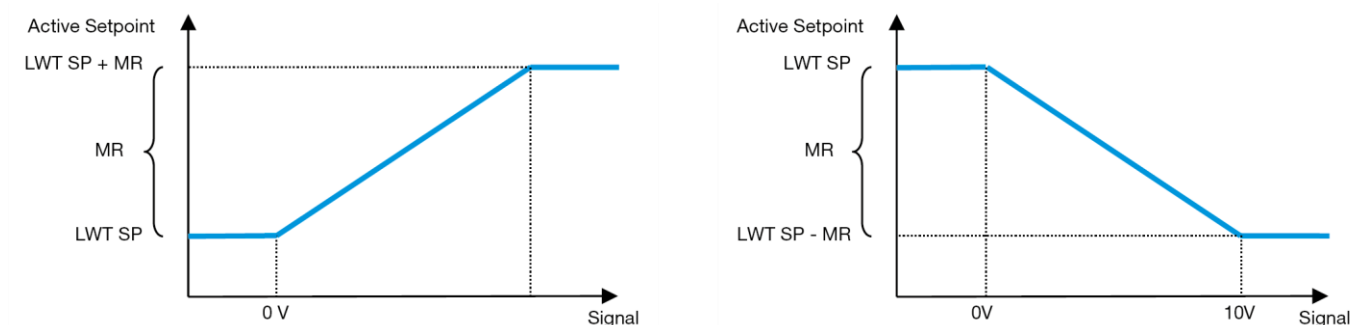
Graph 2 – External signal 0-10V vs Active Setpoint - Cooling mode(left)/ Heating mode(right)

Several parameters can be configured, and they are accessible from the `Setpoint Reset` menu, go to the parameter group number [16] "Setpoint Reset", according to the following table:

Menu	Parameter	Range	Description	R/W
20	01 (`Max Reset`)	0..10 [°C]	Max Reset setpoint. It represents the maximum temperature variation that the selection of the Setpoint Reset logic can cause on the LWT.	W

3.11.1.2. Setpoint Reset by DT

When the **DT** is selected as **Setpoint Reset** option, the LWT active setpoint(AS) is calculated applying a correction based on the temperature difference ΔT between the leaving water temperature(LWT) and the evaporator entering(returning) water temperature (EWT). When the |ΔT| becomes smaller than the Start Reset ΔT setpoint(SRΔT), the LWT active setpoint is proportionally increased (if Cooling mode set) or decreased (if Heating mode is set) of a maximum value equal to the Max Reset(MR) parameter.

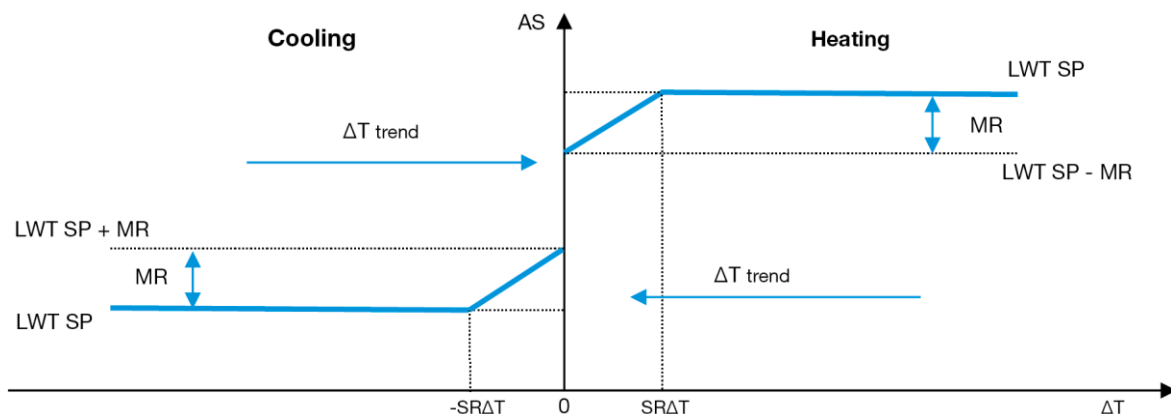**Graph 3 – Evap ΔT vs Active Setpoint - Cooling mode(left)/ Heating mode(right)**

Several parameters can be configured, and they are accessible from the `Setpoint Reset` menu, as shown below:

Menu	Parameter	Range	Description	R/W
18	01 (**Max Reset**)	0..10 [°C]	Max Reset setpoint. It represents the maximum temperature variation that the selection of the Setpoint Reset logic can cause on the LWT.	W
	02 (**Start Reset DT**)	0..10 [°C]	It represents the "threshold temperature" of the DT to activate the LWT setpoint reset, i.e. the LWT setpoint is overwritten only if the DT reaches/overpasses the SRΔT.	W

3.12. Controller IP Setup

The Controller IP Setup can be accessed from menu [13] where is possible to choose between the static or dynamic IP and manually set IP and network Mask.

Menu	Parameter	Sub-Parameter	Description	R/W
13	00 (**DHCP**)	N/A	Off = DHCP Off The DHCP option is disabled.	W
			On = DHCP On The DHCP option is enabled.	
	01 (**IP**)	N/A	"xxx.xxx.xxx.xxx" Represent the current IP address. Once entered [13.01] parameter, the HMI will automatically switch between all four IP-Address fields.	R
	02 (**Mask**)	N/A	"xxx.xxx.xxx.xxx" Represent the current Subnet Mask address. Once entered [13.02] parameter, the HMI will automatically switch between all four Mask fields.	R
	03 (**Manual IP**)	00 IP#1	Defines the first field of IP-Address	W
		01 IP#2	Defines the second field of IP-Address	W
		02 IP#3	Defines the third field of IP-Address	W
		03 IP#4	Defines the fourth field of IP-Address	W
	04 (**Manual Mask**)	00 Msk#1	Defines the first field of Mask	W
		01 Msk#2	Defines the second field of Mask	W
		02 Msk#3	Defines the third field of Mask	W
		03 Msk#4	Defines the fourth field of Mask	W

In order to modify the MTIV IP Network configuration, do the following operations:
- access the **Settings** menu
- set the DHCP option to Off
- modify the IP, Mask, Gateway, PrimDNS and ScndDNS addresses, if needed, taking care of the current network settings
- set **Apply changes** parameter to **Yes** to save the configuration and restart the MTIV controller.

The default internet configuration is:

Parameter	Default Value
IP	192.168.1.42
Mask	255.255.255.0
Gateway	192.168.1.1
PrimDNS	0.0.0.0
ScndDNS	0.0.0.0

Note that if the DHCP is set to On and the MTIV internet configurations shows the following parameter values then an internet connection problem has occurred (probably due to a physical problem, like the Ethernet cable breaking).

Parameter	Value
IP	169.254.252.246
Mask	255.255.0.0
Gateway	0.0.0.0
PrimDNS	0.0.0.0
ScndDNS	0.0.0.0

3.13. Daikin On Site

Daikin on site connection can be enabled and monitored through menu [12]:

Menu	Parameter	Range	Description	R/W	Psw
12	00 (**Enable**)	Off = Connection Off	DoS connection is disabled	W	1
		On = Connection On	DoS connection is enabled		
	01 (**State**)	0-6 = Not connected	DoS actual connection state	R	1
		7 = Connected			

In order to use the DoS utility, the customer has to communicate the **Serial Number** to Daikin company and subscribe to the DoS service. Then, from this page, it is possible to:

- Start/Stop the DoS connectivity
- Check the connection status to DoS service
- Enable/Disable the remote update option

In the unlikely event of UC replacement, the DoS connectivity can be switched from the old PLC to the new one just communicating the current **Activation Key** to Daikin company.

The Daikin on Site (DoS) page can be accessed navigating through the HMI Web Interface, with path `Main Menu → View/Set Unit → Daikin On Site`.

3.14. Date/Time

The unit controller can take stored the actual date and time, that are used for Scheduler, and can be modified going in [10] and [11] menu:

Menu	Parameter	Range	Description	R/W
10	00 (**Day**)	0…7	Defines actual day stored in UC	W
	01 (**Month**)	0…12	Defines actual month stored in UC	W
	02 (**Year**)	0..9999	Defines actual year stored in UC	W
11	00 (**Hour**)	0…24	Defines actual hour stored in UC	W
	(**Minute**) 01	0…60	Defines actual minute stored in UC	W

The Date/Time information can be found at path "`Main Menu → View/Set Unit → Date/Time`".

> **WARNING Remember to check periodically the controller battery in order to maintain updated date and time even when there is no electrical power. Refer to controller maintenance section.**

3.15. Master/Slave

Master/Slave protocol integration requires the selection of the address for each unit that we want to control. In each system we can have only one master and a maximum of three slaves and it's necessary to indicate the correct number of slaves. `Address` and `Number of Units` can be selected through the parameters [15.04] and [15.07].

Notice that Master/Slave is not compatible with `Pump Control Mode` VPF and DT.
.

Menu	Parameter	Description	R/W
15 (**Customer Configuration**)	08 (**Address**)	0 = Standalone 1 = Master 2 = Slave1 3 = Slave2 4 = Slave3	W
	10 (**Number of Units**)	0 = 2 Units 1 = 3 Units 2 = 4 Units	W

Address and Number of Units can be also set in the Web HMI path "`Main Menu → Commission Unit → Configuration → Options`".

Master Slave parameter can be set in Page [16] and are available only in Master Unit:

Menu	Parameter	Range	R/W	Psw
[16] Master/Slave (Available only for Master Unit)	[16.00] **Start Up Limit**	0-5	W	1
	[16.01] **Shut Dn Limit**	0-5	W	1
	[16.02] **Stage Up Time**	0-20 min	W	1
	[16.03] **Stage Dn Time**	0-20 min	W	1
	[16.04] **Stage Up Load**	30-100	W	1
	[16.05] **Stage Dn Load**	30-100	W	1
	[16.06] **PrioSlave#1**	1-4	W	1
	[16.07] **PrioSlave#2**	1-4	W	1
	[16.08] **PrioSlave#3**	1-4	W	1
	[16.09] **MasterPriority**	1-4	W	1
	[16.10] **Master Enable**	Off-On	W	1
	[16.11] **Standby Chiller**	None/Auto/Master/Slave1/Slave2/Slave3	W	1
	[16.12] **Cycling Type**	Run Hours/Sequence	W	1

	[16.13] `Interval Time`	1-365	W	1
	[16.14] `Switch Time`	1-24	W	1
	[16.15] `Temp Compensation`	Off-On	W	1
	[16.16] `Tmp Cmp Time`	0-600 minutes	W	1
	[16.17] `M/S Alarm Code`	0..511	R	1

The path in the Web HMI interface for Master/Slave configuration is "`Main Menu → Commission Unit → Configuration → Master/Slave`". Please refer to specific documentation for more information about of this topic.

3.16. Customer Unit Configuration

Except for factory configurations, the client can custom the unit depending on his needs and options acquired. The allowed modifications regard `Unit Boost, Fan Boost, IO Ext Module, HMI Type, Pump Ctrl Type, SCM Address, External Alarm, Costant Heating Capacity, SCM Number OF Units, Fan Silent Speed, Domestic Hot Water`.

All these customer configurations for the unit can be set in page [15].

Page	Parameter	Range	Description	R/W	Psw
15	00 (`Evaporator Pump Ctrl Mode`)	0-3	0 =On-Off Mode 1 = Fixed Speed 3 = DeltaT Mode	W	1
	01 (`Evap Control Measure`)	0-2	0=No 1=EvapIn 2=EvapOut	W	1
	02 (`Evap Control Device`)	0-2	0=No 1=Valve 2=VFP	W	1
	03 (`Evaporator EWT Sensor Enable`)	0-1	0=Sensor not connected 1=Sensor Connected	W	1
	04 (`Condenser Pump Ctrl Mode`)	0-3	0 =On-Off Mode 1 = Fixed Speed 3 = DeltaT Mode	W	1
	05 (`Cond Control Measure`)	0-2	0=No 1=CondIn 2=CondOut	W	1
	06 (`Cond Control Device`)	0-2	0=No 1=Valve 2=VFP	W	1
	07 (`Condenser EWT Sensor Enable`)	0-1	0=Sensor not connected 1=Sensor Connected	W	1
	08 (`SCM Address`)	0-4	0 = Standalone 1 = Master 2 = Slave1 3 = Slave2 4 = Slave3	W	1
	09 (`External Alarm`)	0-3	0 = No 1 = Event 2 = Rapid Stop	W	1
	10 (`SCM Number of Units`)	0-2	0 = 2 Units 1 = 3 Units 2 = 4 Units	W	1
	11 (`Water Reversing Valve Behaviour`)	0-1	0=Normally Close 1=Normally Open	W	1
	12 (`Water Reversing Valve To Cool Delay`)	0-120	0-120s	W	1
	13 (`Water Reversing Valve To Heat Delay`)	0-120	0-120s	W	1

The path in the Web HMI interface for Customer Configuration settings is "`Main Menu → Commission Unit → Options`"

3.17. Water Reversing Valve

The Water Reversing Valve(WRV), depending on the model (NC/NO), goes to exchange externally to the chiller the hot water with the cold water or the other way around. to control the correct functioning of the valve it has been given the possibility to give a delay to the opening in the passage between cold and hot water and the other way around.

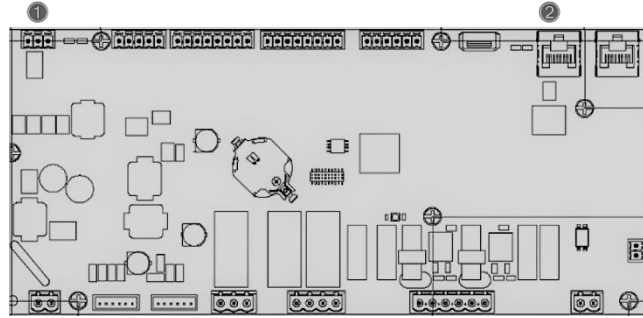| Page	Parameter	Range	Description	R/W	Psw
15	11 (`Water Reversing Valve Behaviour`)	0-1	0=Normally Close 1=Normally Open	W	1
	12 (`Water Reversing Valve To Cool Delay`)	0-120	0-120s	W	1
	13 (`Water Reversing Valve To Heat Delay`)	0-120	0-120s	W	1

The path in the Web HMI interface for Water Reversing Valve settings is "**Main Menu → View/Set Unit → Water Reversing Valve**"

3.18. Connectivity Kit & BMS Connection

The UC has two access ports for communications via Modbus RTU / BACnet MSTP or Modbus / BACnet TCP-IP protocol: RS485 port and Ethernet port. While the RS485 port is exclusive, on TCP-IP port it's possible to communicate simultaneously in both Modbus and BACnet.

The Modbus protocol is set as default on the RS485 port while access to all the other functions of BACnet MSTP/TCP-IP and Modbus TCP-IP are unlocked through *EKRSCBMS* activation.

Please refer to the Databook for protocols incompatibility with other unit functionality.

	RS485		TCP-IP
❶	• Modbus RTU 　OR • BACnet MSTP	❷	• Modbus TCP-IP 　AND • BACnet TCP-IP

You can choose which protocol to use and set the communication parameters for both ports in Page [22].

Page	Parameter	Range	Description	R/W	Psw
19 (Protocol Communication)	00 (**Mb Address**)	1-255	Defines UC address in Modbus network.	W	1
	01 (**Mb BAUD**)	0-1000	Defines Modbus communication rate in Bps/100 and must be identical for all nodes of the bus.	W	1
	02 (**Mb Parity**)	0 = Even 1 = Odd 2 = None	Defines the parity used in Modbus communication and must be identical for all nodes of the bus.	W	1
	03 (**Mb 2StopBit**)	Off = 1 Stop-Bit On = 2 Stop Bits	Defines whether 2 stop bits should be used.	W	1
	04 (**Mb Timeout**)	0-10	Defines the timeout in second for the response of the slave before a communication error is reported.	W	1
	05 (**BN Address**)	1-255	Defines UC address in BacNET network.	W	1
	06 (**BN BAUD**)	0-1000 Bps/100	Defines BacNET communication rate in Bps/100 and must be identical for all nodes of the bus.	W	1
	07 BN (**Device ID**)	0-4.194.302 0-(X.XXX.---)	Defines the four most significant digits of Device ID, used in a BACnet network as the unique identifier of a specific device. The Device ID for each device must be unique on the entire BACnet network.	W	1
	08 BN (**Device ID**)	0-4.194.302 0-(-.---.XXX)	Defines the three less significant digits of Device ID, used in a BACnet network as the unique identifier of a specific device. The Device ID for each device must be unique on the entire BACnet network.	W	1
	09 (**BN Port**)	0-65535 0-(X-.---)	Defines the most significant digit of BacNET UDP Port.	W	1
	10 (**BN Port**)	0-65535 0-(-X.XXX)	Defines four less significant digits of BacNET UDP Port.	W	1
	11 (**BN Timeout**)	0-10	Defines the timeout in second for the response before a communication error is reported.	W	1
	12 (**License Manager**)	Off = Passive On = Active	Represent the actual state of *EKRSCBMS*.	R	1
	13 (**BacNETOverRS**)	Off = Passive On = Active	Defines whether to use the bacnet protocol instead of modbus on the RS485 port.	W	1
	14 (**BacNET-IP**)	Off = Passive On = Active	Defines the activation of BacNET TCP-IP protocol once *EKRSCBMS* is unlocked.	W	1

	15 (**BasProtocol**)	0 = None 1 = Modbus 2 = Bacnet	Defines which protocol's data the UC considers in its logic.	W	1
	16 (**BusPolarization**)	Off = Passive On = Active	Define the activation of internal polarization resistor of UC. It has to be set "Active" only on first unit of the network.	W	1

The path in the HMI Web interface to access this information is:
- **Main Menu → View/Set Unit → Protocols**

3.19. About Chiller

The application version and the BSP version represent the core of software installed on the controller. The [22] is only read page contains these informations.

Page	Parameter	R/W	Psw
21 (About)	00 (**App Vers**)	R	0
	01 (**BSP**)	R	0

The path in the HMI Web interface to access this information is:
- **Main Menu → About Chiller**

3.20. HMI Screen Saver

After 5 minutes of waiting the interface is automatically addressed to the Screen Saver menu. This is an only read menu composed of 2 pages switched each other every 5 seconds.

During this phase the following parameters are displayed:

Parameter	Description
Page 1	**String Up** = Leaving Water Temperature
	String Dn = Actual Water Setpoint
Page 2	**String Up** = Unit Capacity
	String Dn = Unit Mode

To exit the Screen Saver menu, it's necessary to press any of four HMI button. The interface will come back to Page [0].

3.21. Generic Controller Operation

The main controller operations available are "**Application Save**" and "**Apply Changes**". The first one is used to save the current configuration of parameters in the UC in order to avoid the possibility to lose it if a power fail happens while the second one is used for some parameters which require an UC reboot in order to become effective.

These commands can be accessed from menu [24]:

Page	Parameter	Range	Description	R/W	Psw
20 (UC)	00 (**AppSave**)	Off = Passive On = Active	PLC executes an Application Save command	W	1
	01 (**Apply Changes**)	Off = Passive On = Active	PLC executes an Apply Changes command	W	1

In the HMI Web Interface, Application Save is available at the paths:
- **Main Menu → Application Save**

While the Apply Changes setpoint can be set at the path:
- **Main Menu → View/Set Unit → Controller IP setup → Settings**

3.22. HMI Parameters Navigation Table

In this table is reported the whole interface structure from main menu to any single parameter including the screen saver pages. Typically, the HMI is composed by pages, containing the parameters, accessible from Main menu. In few cases there is a two-level structure where a page contains other pages instead of parameters; a clear example is the page [17] dedicated to Scheduler management.

Menu	Parameter	Sub-Parameter	R/W	PSW Level
[0] Password	[00.00] Enter PSW	N/A	W	0
[1] Unit	[01.00] UEN	N/A	W	1
	[01.01] C1EN	N/A	W	1
	[01.02] C2EN	N/A	W	1

Menu	Parameter	Sub-Parameter	R/W	PSW Level
[2] Mode	[02.00] Available Modes	N/A	W	2
[3] Capacity	[03.00] C1_Cap	N/A	R	0
	[03.01] C2_Cap	N/A	R	0
[4] Net	[04.00] Source	N/A	W	1
	[04.01] En	N/A	R	0
	[04.02] C.SP	N/A	R	0
	[04.03] H.SP	N/A	R	0
	[04.04] Mode	N/A	R	0
[5] Setp	[05.00] C1	N/A	W	0
	[05.01] C2	N/A	W	0
	[05.02] H1	N/A	W	0
	[05.03] H2	N/A	W	0
[6] Tmps	[06.00] Evap In	N/A	R	0
	[06.01] Evap Out	N/A	R	0
	[06.02] Cond In	N/A	R	0
	[06.03] Cond Out	N/A	R	0
	[06.04] Cool Syst	N/A	R	0
	[06.05] Heat Syst	N/A	R	0
[7] Alms	[07.00] Alarm List	N/A	R	0
	[07.01] Alarm Clear	N/A	W	1
[8] Pump	[08.00] RecT	N/A	W	1
	[08.01] Standby Speed	N/A	W	1
	[08.02] Speed	N/A	R	1
	[08.03] Max Speed	N/A	W	1
	[08.04] Min Speed	N/A	W	1
	[08.05] Speed 1	N/A	W	1
	[08.06] Parameter Ti	N/A	W	1
	[08.07] Setpoint DT	N/A	W	1
	[08.08] Evap DT	N/A	R	1
	[08.09] Evap Pump Run Hours 1	N/A	R	1
	[08.10] Evap Pump Run Hours 2	N/A	R	1
	[08.11] Evap Pump Mode	N/A	W	1
	[08.12] Evap Manual Speed	N/A	W	1
	[08.13] Evap Thermo Off Standby Sp	N/A	W	1
	[08.14] Cond Standby Spd	N/A	W	1
	[08.15] Cond Pump Speed (CondVfpOut)	N/A	R	1
	[08.16] Cond Max Spd	N/A	W	1
	[08.17] Cond Min Spd	N/A	W	1
	[08.18] CondSpd1	N/A	W	1
	[08.19] Cond Pump Ti (CondParamKD)	N/A	W	1
	[08.20] Cond Stanby DT	N/A	W	1
	[08.21] Cond DT	N/A	R	1
	[08.22] Cond Pump Run Hours 1	N/A	R	1
	[08.23] Cond Pump Mode	N/A	W	1
	[08.24] Cond Manual Speed	N/A	W	1
	[08.25] Cond Thermo Off Standby Sp	N/A	W	1
[9] Thermostatic control	[9.00] Startup DT	N/A	W	1
	[9.01] Shutdown DT	N/A	W	1
	[9.02] Stage up DT	N/A	W	1
	[9.03] Stage down DT	N/A	W	1
	[9.04] Stage up delay	N/A	W	1
	[9.05] Stage dn delay	N/A	W	1
	[9.06] Evap Freeze	N/A	W	2
	[9.07] Cond Freeze	N/A	W	2
	[9.08] Low Press Unld	N/A	W	2
	[9.09] Thermo Control	N/A	W	2

Menu	Parameter	Sub-Parameter	R/W	PSW Level
[10] Date	[10.00] Day	N/A	W	0
	[10.01] Month	N/A	W	0
	[10.02] Year	N/A	W	0
[11] Time	[11.0] Hour	N/A	W	0
	[11.1] Minute	N/A	W	0
[12] DoS	[12.00] Enable	N/A	W	0
	[12.01] State	N/A	R	0
[13] IPst	[13.00] DHCP	N/A	W	0
	[13.01] Acutal IP	N/A	R	0
	[13.02] Actual Mask	N/A	R	0
	[13.03] Manual IP		R	0
		[13.3.0] IP#1	W	0
		[13.3.1] IP#2	W	0
		[13.3.2] IP#3	W	0
		[13.3.3] IP#4	W	0
	[13.04] Manual Mask		W	0
		[13.4.0] Msk#1	W	0
		[13.4.1] Msk#2	W	0
		[13.4.2] Msk#3	W	0
		[13.4.3] Msk#4	W	0
[15] Customer Configuration	[15.00] Evap Pump Control Mode	N/A	W	1
	[15.01] Evap Ctrl Meas	N/A	W	1
	[15.02] Evap Ctrl Dev	N/A	W	1
	[15.03] EWT Sen En	N/A	W	1
	[15.04] Cond Pump Control Mode	N/A	W	1
	[15.05] Cond Ctrl Meas	N/A	W	1
	[15.06] Cond Ctrl Dev	N/A	W	1
	[15.07] Address	N/A	W	1
	[15.08] Ext Alarm	N/A	W	1
	[15.09] Master Slave Number of Units	N/A	W	1
	[15.10] WRV Behaviour	N/A	W	1
	[15.11] WRV Cool Delay	N/A	W	1
	[15.12] WRV Heat Delay	N/A	W	1
	[15.13] Number of Restart	N/A	W	1
	[15.14] Evap Nominal DT	N/A	W	1
	[15.15] Cond Nominal DT	N/A	W	1
	[15.16] Low Pressure Alarm Delay	N/A	W	1
[16] Master/Slave (Available only for Master Unit)	[16.00] Start Up Limit	N/A	W	1
	[16.01] Shut Dn Limit	N/A	W	1
	[16.02] Stage Up Time	N/A	W	1
	[16.03] Stage Dn Time	N/A	W	1
	[16.04] Stage Up Threshold	N/A	W	1
	[16.05] Stage Down Threshold	N/A	W	1
	[16.06] PrioSlave#1	N/A	W	1
	[16.07] PrioSlave#2	N/A	W	1
	[16.08] PrioSlave#3	N/A	W	1
	[16.09] MasterPriority	N/A	W	1
	[16.10] Master Enable	N/A	W	1
	[16.11] Standby Chiller	N/A	W	1
	[16.12] Cycling Type	N/A	W	1
	[16.13] Interval Time	N/A	W	1
	[16.14] Switch Time	N/A	W	1
	[16.15] Temp Compensation	N/A	W	1
	[16.16] Tmp Cmp Time	N/A	W	1
	[16.17] M/S Alarm Code	N/A	R	1
[17] Scheduler	[17.00] Monday		W	1
		[17.0.0] Time 1	W	1
		[17.0.1] Value 1	W	1

Menu	Parameter	Sub-Parameter	R/W	PSW Level
		[17.0.2] Time 2	W	1
		[17.0.3] Value 2	W	1
		[17.0.4] Time 3	W	1
		[17.0.5] Value 3	W	1
		[17.0.6] Time 4	W	1
		[17.0.7] Value 4	W	1
	[17.01] Tuesday		W	1
		[17.1.0] Time 1	W	1
		[17.1.1] Value 1	W	1
		[17.1.2] Time 2	W	1
		[17.1.3] Value 2	W	1
		[17.1.4] Time 3	W	1
		[17.1.5] Value 3	W	1
		[17.1.6] Time 4	W	1
		[17.1.7] Value 4	W	1
	…	…	…	…
	[17.06] Sunday		W	1
		[17.6.0] Time 1	W	1
		[17.6.1] Value 1	W	1
		[17.6.2] Time 2	W	1
		[17.6.3] Value 2	W	1
		[17.6.4] Time 3	W	1
		[17.6.5] Value 3	W	1
		[17.6.6] Time 4	W	1
		[17.6.7] Value 4	W	1
[18] Setpoint reset	[20.00] Reset Type	N/A	W	1
	[20.01] Max Reset DT	N/A	W	1
	[20.02] Start Reset DT	N/A	W	1
[19] Protocol Communication	[22.00] Mb Address	N/A	W	1
	[22.01] Mb BAUD	N/A	W	1
	[22.02] Mb Parity	N/A	W	1
	[22.03] Mb 2StopBit	N/A	W	1
	[22.04] Mb Timeout	N/A	W	1
	[22.05] BN Address	N/A	W	1
	[22.06] BN BAUD	N/A	W	1
	[22.07] BN Device ID (X.XXX.---)	N/A	W	1
	[22.08] BN Device ID (-.---.XXX)	N/A	W	1
	[22.9] BN Port (X-.---)	N/A	W	1
	[22.10] BN Port(-X.XXX)	N/A	W	1
	[22.11] BN Timeout	N/A	W	1
	[22.12] Licence Mngr	N/A	R	1
	[22.13] BacNETOverRS	N/A	W	1
	[22.14] BacNET-IP	N/A	W	1
	[22.15] BasProtocol	N/A	W	1
	[22.16] BusPolarization	N/A	W	1
[20] PLC	[23.0] AppSave	N/A	W	1
	[23.1] Apply Changes	N/A	W	1
[21] About	[22.00] App Vers	N/A	R	0
	[22.01] BSP	N/A	R	0
[25] Screen Saver	- LWT (String Up) - Setpoint Act (String Dn)	- Unit Cap (String Up) - Actual Mode (String Dn)	R	0

4. ALARMS AND TROUBLE SHOOTING

The UC protects the unit and the components from damaging in abnormal conditions. Each alarm is activated when the abnormal running conditions require an immediate stop of the whole system or sub-system to prevent potential damages.

When an alarm occurs the proper alert icon will be turned on.
- In case of Master/Slave or VPF function enabled it's possible to have alert icon blinking with [07.00]'s value equal to zero. In these cases, unit is enabled to run because the alert icon refers to function errors, not unit ones, but registers [08.14] or [16.16] will report value greater than zero. Please refer to specific documentation for Master/Slave or VPF function troubleshooting.

In case of alarm occurrence, it's possible to try an "Alarm Clear" through the [7.01] parameter in order to allow the unit restart.

Please notice that:
- If alarm persist refer to table in chapter "Alarm List: Overview" for possible solutions.
- If alarm continue to occur after manual reset contact your local dealer.

4.1. Alarms List: Overview

The HMI displays the active alarms in the dedicated page [7]. Once entered this page the number of actual active alarms is displayed. In this page will be possible to scroll the complete list of active alarms and apply the "Alarm Clear" too.

Page	Parameter	Description	R/W	Psw
[7]	00 (Alarm List)	Alarm Mapping HMI	R	0
	01 (Alarm Clear)	Off = Maintain alarms On = Execute alarms reset	W	1

The table of possible codes for parameter [7.00] is:

Alarm Type	HMI Code	Mapping Alarm	Cause	Solution
Unit	U001	UnitOff ExtEvent	External signal mapped as Event detected by UC	▪ Check customer external signal source
	U003	UnitOff EvapFlowLoss	Water circuit malfunction	▪ Check that water flow is possible (open all valves in the circuit) ▪ Check wiring connection ▪ Contact your local dealer
	U004	UnitOff EvapFreeze	Water temperature under minimum limit	▪ Contact your local dealer
	U005	UnitOff ExtAlm	External signal mapped as Alarm detected by UC	▪ Check customer external signal source
	U006	UnitOff EvpLvgWTempSen	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	U007	UnitOff EvpEntWTempSen	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	U010	UnitOff BadSpOverInpt	Signal detected out of range	▪ Check signal applied to UC ▪ Check wiring connection ▪ Contact your local dealer
	U022	UnitOff CondFreeze	Water temperature under minimum limit	▪ Contact your local dealer
	U023	UnitOff CondLwtSenf	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	U024	UnitOff CondEwtSenf	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	U025	UnitOff EvapPump1Fault	Evaporator Pump Error	▪ Check Sensor pump connection ▪ Contact your local dealer
	U026	UnitOff EvapPump2Fault	Evaporator Pump Error	▪ Check Sensor pump connection ▪ Contact your local dealer
	U027	UnitOff CondPump1Fault	Condenser Pump Error	▪ Check Sensor pump connection ▪ Contact your local dealer
	U028	UnitOff CondPump2Fault	Condenser Pump Error	▪ Check Sensor pump connection ▪ Contact your local dealer

Alarm Type	HMI Code	Mapping Alarm	Cause	Solution
Circuit 1	C102	`Cir1Off NoPrChgAtStrt`	No pressure delta detected by UC	▪ Contact your local dealer
	C105	`Cir1Off LowEvPr`	Evaporating pressure under minimum limit	▪ Contact your local dealer
	C107	`Cir1Off HiDischTemp`	Discharge temperature over maximum limit	▪ Contact your local dealer
	C110	`Cir1Off EvapPSenf`	Pressure sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	C114	`Cir1Off DischTempSenf`	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	C122	`Cir1Off Compressor Alarm`	Disconnected contact between compressor and power supply	▪ Check the thermal switch ▪ Check the high pressure switch
Circuit 2	C202	`Cir2Off NoPrChgAtStrt`	No pressure delta detected by UC	▪ Contact your local dealer
	C205	`Cir2Off LowEvPr`	Evaporating pressure under minimum limit	▪ Contact your local dealer
	C207	`Cir2Off HiDischTemp`	Discharge temperature over maximum limit	▪ Contact your local dealer
	C210	`Cir2Off EvapPSenf`	Pressure sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	C214	`Cir2Off DischTempSenf`	Temperature sensor not detected	▪ Check sensor wiring connection ▪ Contact your local dealer
	C222	`Cir2Off Compressor Alarm`	Disconnected contact between compressor and power supply	▪ Check the thermal switch ▪ Check the high pressure switch

In the HMI Web Interface, this information is available in the paths:
`Main Menu → Alarms → Alarm List`

4.2. Troubleshooting

If one of the following malfunctions occur, take the measures shown below and contact your dealer.

> ⚠ **WARNING Stop operation and shut off the power if anything unusual occurs (burning smells etc.).**
>
> *Leaving the unit running under such circumstances may cause breakage, electric shock or fire. Contact your dealer.*

The system must be repaired by a qualified service person:

Malfunction	Measure
If a safety device such as a fuse, a breaker or an earth leakage breaker frequently actuates, or the ON/OFF switch does not properly work.	Turn off the main power switch.
If water leaks from the unit.	Stop the operation.
The operation switch does not work well.	Turn off the power.
If the operation lamp flashes and the malfunction code appears on the user interface display.	Notify your installer and report the malfunction code.

If the system does not properly operate except for the abovementioned cases and none of the abovementioned malfunctions is evident, investigate the system according to the following procedures.

Malfunction	Measure
The remote controller display is off.	• Check if there is no power failure. Wait until power is restored. If power failure occurs during operation, the system automatically restarts immediately after power is restored. • Check if no fuse has blown or breaker is activated. Change the fuse or reset the breaker if necessary. • Check if the benefit kWh rate power supply is active.
An error code is displayed on the remote controller.	Consult your local dealer. Refer to "4.1 Alarm List: Overview" for a detailed list of error codes.

Notes

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