SYSAQUA

20 / 25 / 30 / 35 / 40 / 45 / 50 / 65 / 75 / 90 / 105 / 125
140 / 150 / 170 / 190 / 210

Air Cooled Water Chillers and Heat Pumps

R410A

19.5 ➔ 217.6kW

19.3 ➔ 208.8kW

CE

REGULATION MANUAL

MANUEL DE REGULATION

REGELUNGSHANDBUCH

MANUALE DI REGOLAZIONE

MANUAL DE REGULACIÓN

English

Français

Deutsch

Italiano

Español

English

CONTENTS

English

1. DESCRIPTION

1.1. ABBREVIATIONS

Abb.	Unit	Description
BP	bar	Evaporation pressure
BMS	-	Building Management System
CDT	°C	Compressor backflow temperature
CST	°C	Compressor aspiration temperature
EEV	-	Electronic pressure reducing valve
EWT	°C	Entering water temperature
HMI	-	Human-Machine interface = display
HP	bar	Condensation pressure
LWT	°C	Leaving water temperature
WPS	-	Pressure switch for lack of water
OAT	°C	Outside air temperature
OCT	°C	Battery temperature
SPC	°C	Temperature setting in cool mode defined by the user
SPH	°C	Temperature setting in heat mode defined by the user
SP*	°C	Actual water temperature setting
WPT	-	Hydraulic pressure transducer

1.2. APPLICABLE UNITS

Temperature	°C
Pressure	gauge bar
Voltage	V
Current	A
Power	W

1.3. APPLICATION VERSIONS

This manual is intended for the software versions and electrical boards listed below.

Refer to the electrical schematics provided with the unit that incorporate subsequent developments and possible customizations.

1.3.1. SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

1.3.1.1. SOFTWARE VERSION SYSAQUA1-2.423.10103

Equipment	Hardware	Firmware
Main regulator	POL423	V11.42
Integrated HMI	POL871	V9.12
Remote HMI	POL895	TBD

Ventilation		SYSAQUA 20 to 55	SYSAQUA 65 to 75	SYSAQUA 90 to 125
PV/GV	Power	SE4629	SE4631	SE4633
	Command	SE4630	SE4632	SE4634
Modulating	Power	SE4635	SE4637	SE4639
	Command	SE4636	SE4638	SE4640

Options		SYSAQUA 20 to 40	SYSAQUA 45 to 125
Soft Starter		SE4641	SE4641
Variable Pump	Single	SE4711	SE4711
	Double	/	SE4712

1.3.1.2. SOFTWARE VERSION SYSAQUA1-2. 688.10101

Equipment	Hardware	Firmware
Main regulator	POL688	V11.22
Integrated HMI	POL871	V9.12
Remote HMI	POL895	TBD

Ventilation		SYSAQUA 20 to 55	SYSAQUA 65 to 75	SYSAQUA 90 to 125
PV/GV	Power	SE4745	SE4747	SE4749
	Command	SE4746	SE4748	SE4750
Modulating	Power	SE4751	SE4753	SE4755
	Command	SE4752	SE4754	SE4756

Options		SYSAQUA 20 to 40	SYSAQUA 45 to 125
Soft Starter		SE4757	SE4757
Variable Pump	Single	SE4758	SE4758
	Double	/	SE4759
Electric heating		/	SE4802

1.3.2. SYSAQUA 140/150/170/190/210

1.3.2.1. SOFTWARE VERSION: 112

Equipment	Hardware	Firmware
Main regulator	POL687	V11.32
Extension	POL96	V10.32
Extension	POL98	V10.32
Integrated MMI	POL871	V9.12
Remote IHM	POL895	TBD
Communication BacNet MS/TP	POL904	V10.30
Communication LON	POL906	V9.26
Communication BacNet IP	POL908	V10.30

Ventilation		SYSAQUA 140 to 210
PV/GV	Power	SE4595 / SE4596
	Command	SE4597 / SE4598
Modulating	Power	SE4605 / SE4606
	Command	SE4607 / SE4608
EC	Power	SE4767 / SE4768
	Command	SE4769/ SE4770

2. PURPOSE

2.1. INTRODUCTION

This document describes the functioning of the SIEMENS regulator for units of the **SYSAQUA** range. It is intended for the installation technician and the end user More complete information is available in the following documents:

- **EDM** : technical description of units and performances
- **IOM** : installation and maintenance recommendations, commissioning procedure

2.2. APPLICATION

The SIEMENS regulatoris programmed to control a thermodynamic unit of the **SYSAQUA** range. This range is used for the production of chilled water (chiller) and / or hot water (heat pump) using the outside air as a primary source of energy..

2.3. OPERATING PRINCIPLE

The **SYSAQUA** range consists of:

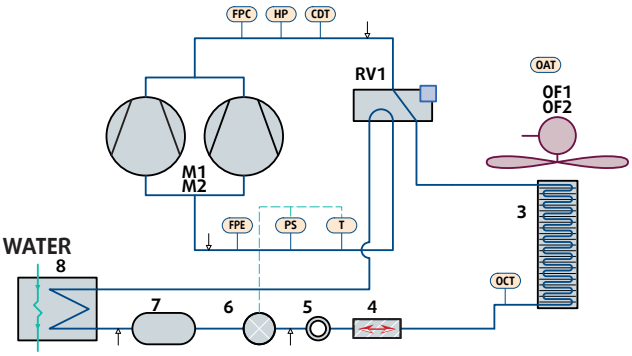
- **SYSAQUA 1** : single-circuit units - R410A - size 20 to 40
- **SYSAQUA 2** : single-circuit units - R410A - size 45 to 125
- **SYSAQUA 3** : dual-circuit units - R410A - size 140 to 210

SYSAQUA 1

SYSAQUA 2

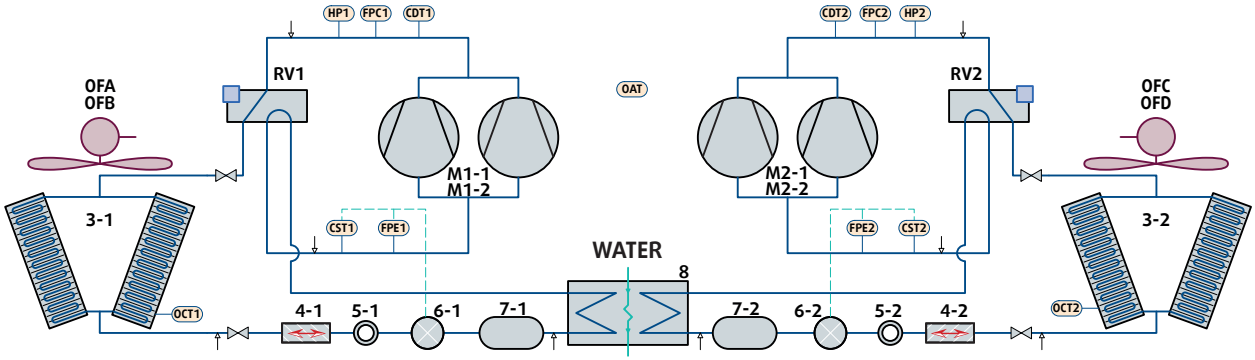
SYSAQUA 3

As illustrated by the block diagrams, the single-circuit units are equipped with two single-speed compressors mounted in tandem (M1 / M2), an air / refrigerant battery (3) swept by one or two axial fans (OF1 / OF2), a thermostatic expansion valve (6) and a water / refrigerant plate heat exchanger (8). The **SYSAQUA.H** heat pump type units are equipped with a 4-way valve (RV1) enabling teh switchover beween the hot and cold modes.



M1/2	Compressors 1 et 2	6	Thermostatic expansion valve	CDT	Discharge temperature sensor
RV1	Cycle reversal valve	7	Liquid reservoir	FPE	Low pressure transducer
OF1/2	Outdoor fan motor	8	Plate heat exchanger	PS	Expansion valve pressure tap
3	Air cooled condenser		Pressure tapping point 5/16"	T	Expansion valve bulb
4	Filter drier	FPC	High pressure transducer	OAT	Outdoor air temperature sensor
5	Sight glass	HP	High pressure switch	OCT	Condenser outdoor temperature sensor

The dual-circuit units are identical to the single-circuit units with the exception of the (electronic) expansion and the plate heat exchanger (dual type - common to both circuits).



M1-1 M1-2 M2-1 M2-2	circuit 1 circuit 1 circuit 2 circuit 2	Compressors 1 Compressors 2 Compressors 1 Compressors 2	5-1 5-2	circuit 1 circuit 2	Sight glass	HP1 HP2	circuit 1 circuit 2	High pressure switch
			6-1 6-2	circuit 1 circuit 2	Electronic expansion valve	CDT1 CDT2	circuit 1 circuit 2	Discharge temperature sensor
RV1 RV2	circuit 1 circuit 2	Cycle reversal valve	7-1 7-2	circuit 1 circuit 2	liquid receiver	FPE1 FPE2	circuit 1 circuit 2	Low pressure transducer
OFA/B OFC/D	circuit 1 circuit 2	Outdoor fans motor	8		Plate heat exchanger	CST1 CST2	circuit 1 circuit 2	Suction temperature sensor
3-1 3-2	circuit 1 circuit 2	Air condenser			Pressure tapping point 5/16"	OCT1 OCT2	circuit 1 circuit 2	Condenser outdoor temperature sensor
4-1 4-2	circuit 1 circuit 2	Filter drier	FPC1 FPC2	circuit 1 circuit 2	High pressure transducer	OAT		Outdoor air temperature sensor

The **SYSAQUA** range proposes as an option items of equipment adding features to the units:

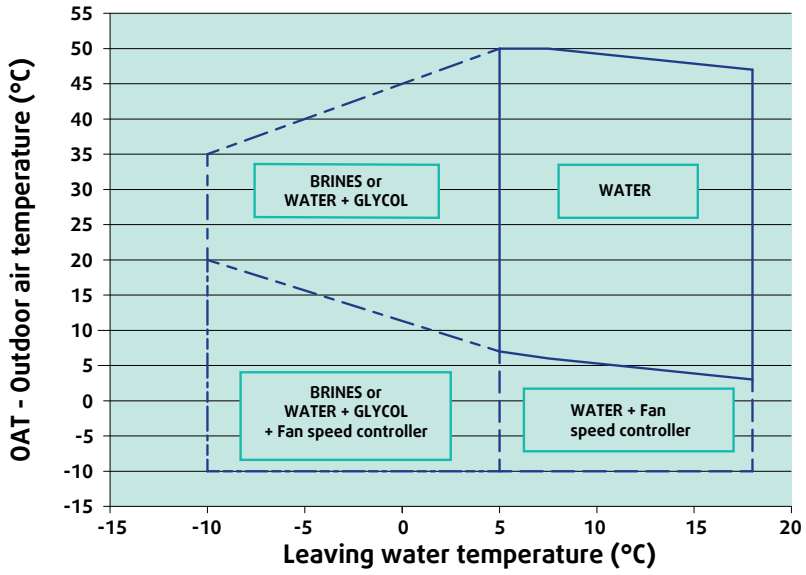
- "All Seasons" option: the axial fans are powered by one or two frequency inverters (depending on the size) to ensure the correct operation of the machine in cold mode at low outside temperatures (Refer to the § **"ALL SEASONS" OPTION**, page 22)
- "High Pressure Fans" option : the axial fans are of AC type and controlled analogically with the "All Seasons" option (Refer to the § **"HIGH PRESSURE FANS" OPTION**, page 23)
- "Hydraulic Pump" option : the units have one or several integrated pumps allowing them to ensure their water feed and distribution in the customer network.
- "Variable Primary Flow" option : a frequency converter enables the speed of the hydraulic pump to be modulated (Refer to the § **"VARIABLE PRIMARY FLOW" OPTION**, page 24)

2.4. OPERATING ENVELOPES

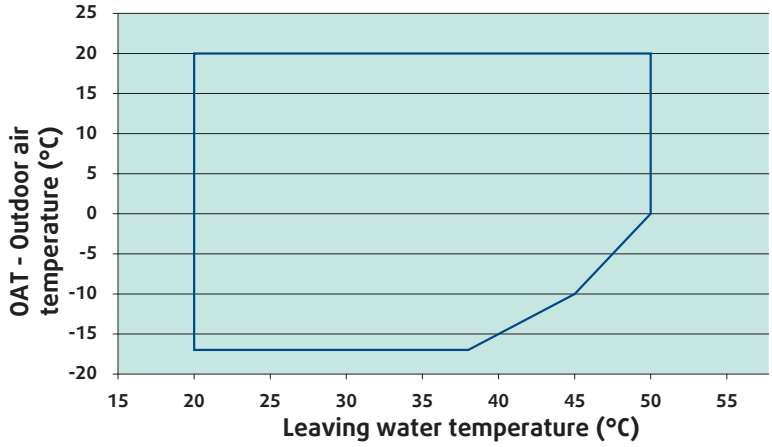
The **SYSAQUA** machines are thermodynamic machines,designed to operate within certain ranges of air and water temperature. The regulation sets up the security limits that guarantee units a correct operating point but also allow them to operate temporarily outside of this range in a secure manner (e.g. commissioning with a hot water loop in summer or a cold water loop in winter).

The following envelopes indicate the leaving water temperature, LWT, ranges as a function of outside air temperature, OAT, in both operating modes.

2.4.1. SYSAQUA.L/SYSAQUA.H IN COOLING MODE



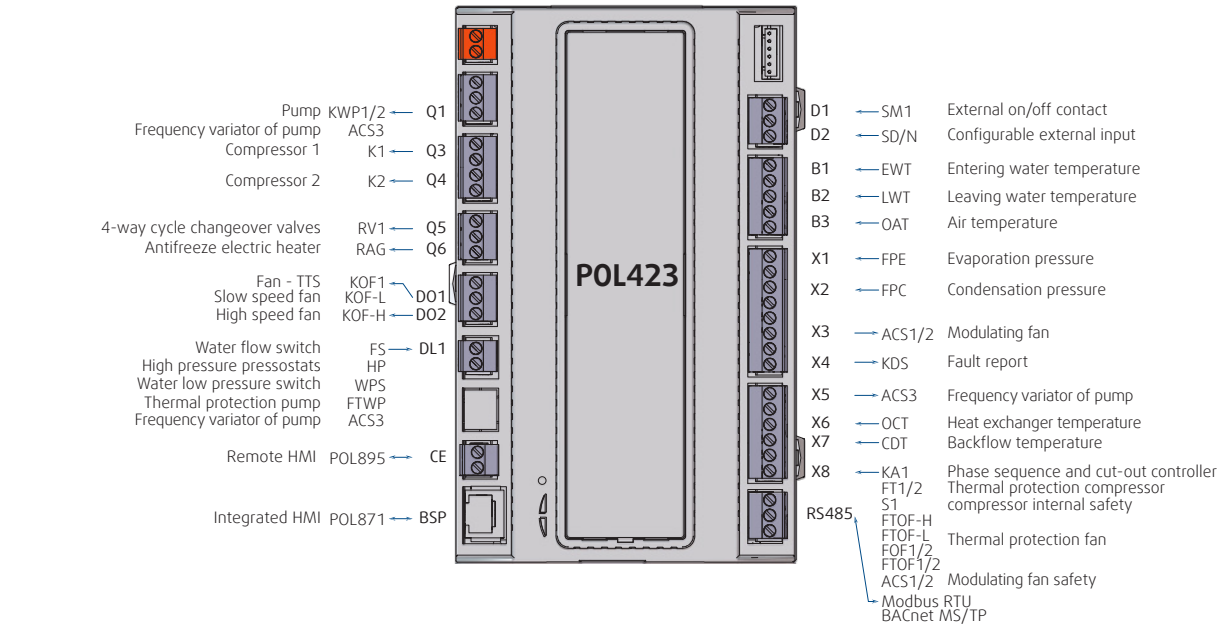
2.4.2. SYSAQUA.H IN HEATING MODE

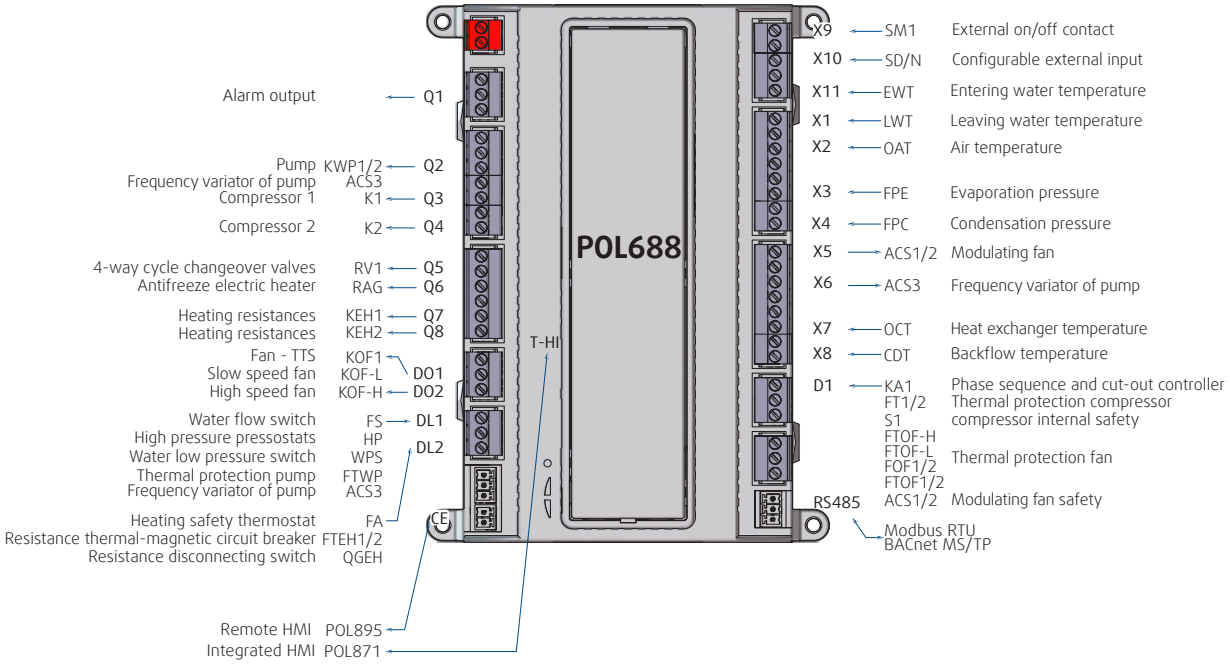


English

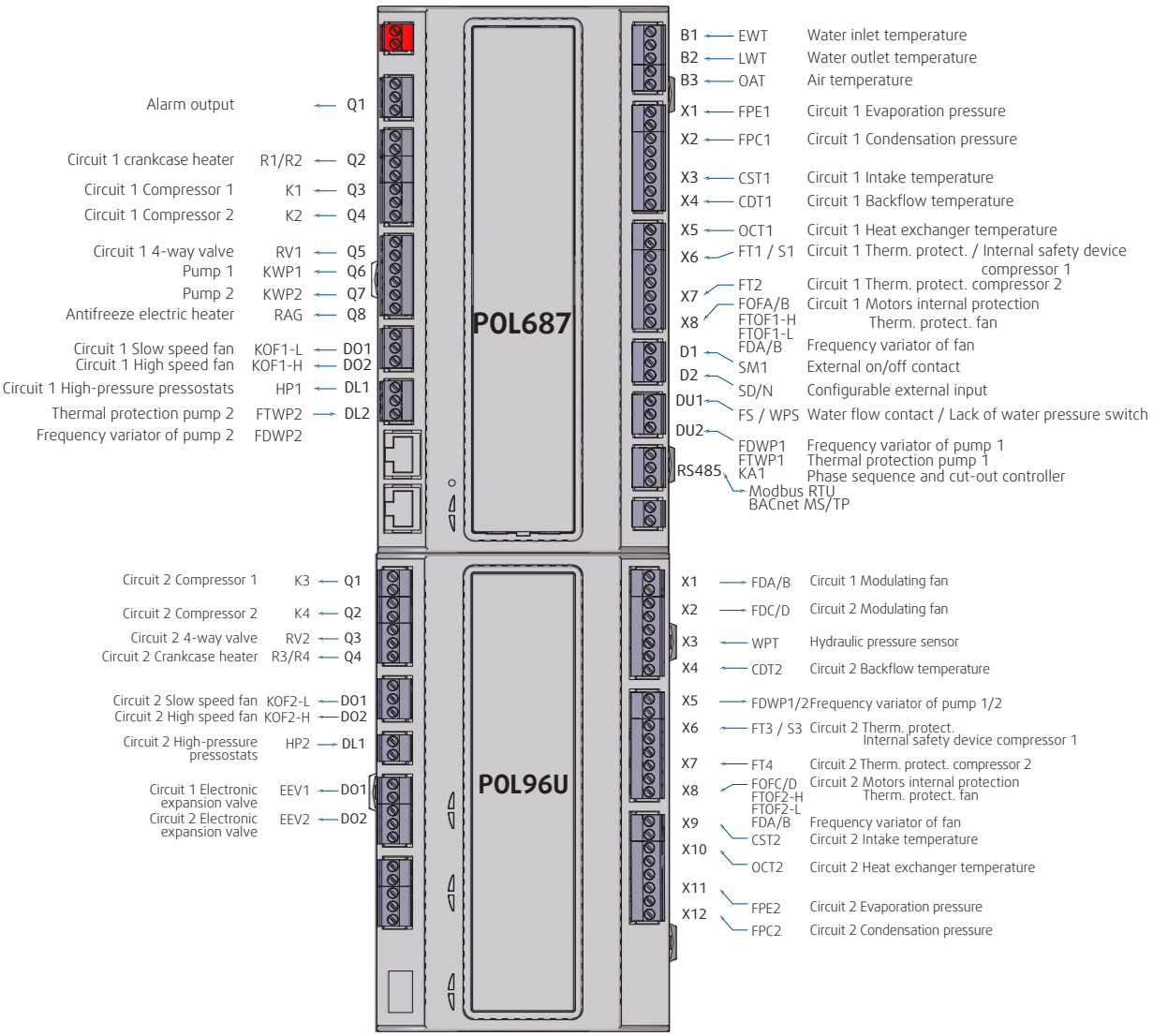
3. INTERFACES

3.1. INPUTS / OUTPUTS OF THE SYSAQUA CONTROLLER 20/25/30/35/40/45/55/65/75/90/105/125



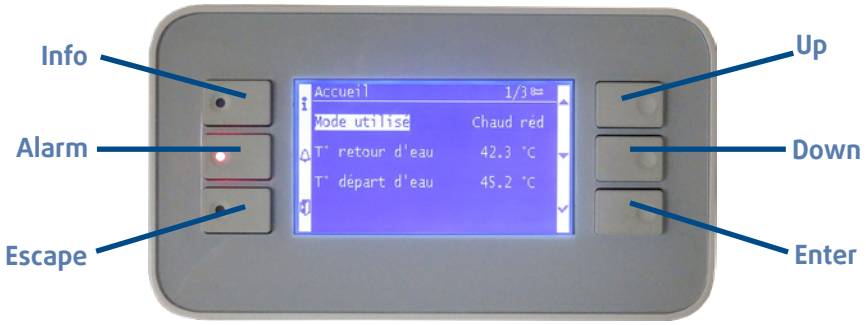


3.2. INPUTS / OUTPUTS OF THE SYSAQUA CONTROLLER 140/150/170/190/210



3.3. INTEGRATED DISPLAY

This user interface is a liquid crystal display with 6 buttons. It is connected to the "BSP BUS" port of the regulators POL423, POL688 and POL687 with an RJ45 cable (maximum distance 2.5m).



INFO	From any screen, this button returns the user to the main menu or home screen and, like the ESCAPE button, invalidates a current modification.
ALARM	When pressing the alarm button (the red LED flashes if an alarm is active), the alarm management menu is displayed. (see § alarms)
ESCAPE	Returns to the previous level in the menu tree. Pressing this button during modification invalidates the change being made and returns the user to the previous menu. This function is very important if a setting is inadvertently modified.
UP/DOWN	These buttons have two functions. 1. In a menu, they are used to move up and down the list of possible options. 2. They can change the value of a setting when it has been selected.
ENTER	This button has three functions 1. It is used to access a submenu 2. Activate the modification of a setting 3. Validate the modification of a setting

3.4. REMOTE DISPLAY

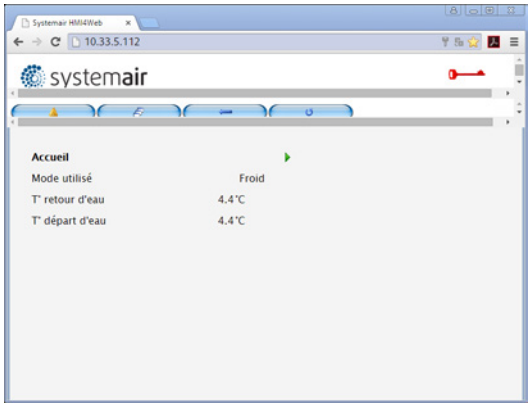
This user interface is a liquid crystal display with 3 buttons and a scroll wheel. It can be connected to the POL423, POL688 and POL687 regulators one of in 2 ways:

- to the “BSP BUS” port with an RJ45 cable: maximum distance 2.5m
- to the “PB BUS” port with 2-wire cable: maximum distance 100m. The display then accesses all of the regulators present on this bus.

INFO	From any screen, this button returns the user to the main menu or home screen and, like the ESCAPE button, invalidates a current modification.
ALARM	When pressing the alarm button (the red LED flashes if an alarm is active), the alarm management menu is displayed. (see § alarms)
ESCAPE	Returns to the previous level in the menu tree. Pressing this button during modification invalidates the change being made and returns the user to the previous menu. This function is very important if a setting is inadvertently modified.
OK	The scroll wheel has five functions: 1. In a menu, it is used to move up and down the list of possible options. 2. It can change the value of a setting when it has been selected. 3. It is used to access a submenu 4. Activate the modification of a setting 5. Validate the modification of a setting

3.5. WEB DISPLAY

This interface is available on dual-circuit units connected to an IP network. A Web browser enables access to a unit indicating its IP address and using the WEB account (password: SBTAdmin!).



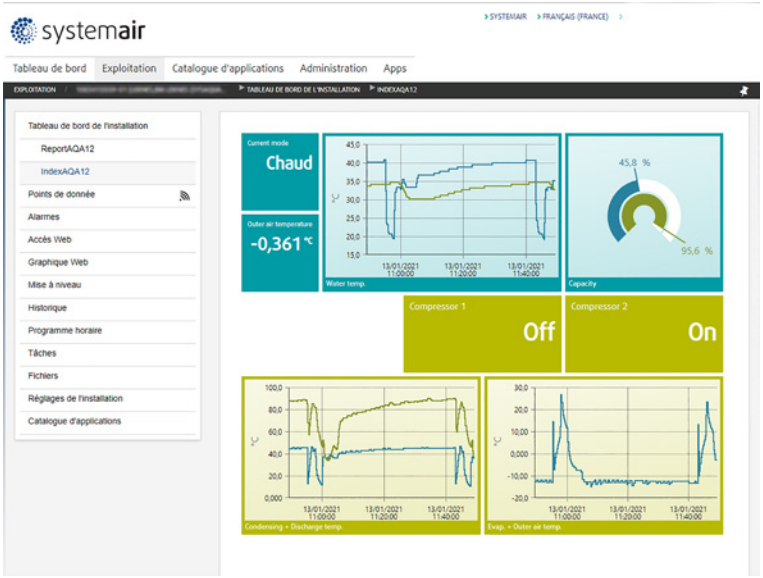
3.6. COMMUNICATION PROTOCOLS

The available communication protocols depend on the unit regulator. Some are native to the regulator and others require an additional communication module.

Protocols	SYSAQUA 20 to 125		SYSAQUA 140 to 210
Standard regulator	POL423	POL688	POL687
RTU Modbus	Standard (by default)	Standard	Standard (by default)
TCP/IP modbus	Not available	Standard (by default)	Standard
BacNet MS/TP	Standard	Standard	Module POL904
BacNet IP	Not available	Standard	Module POL908
LON	Not available	Module POL906	Module POL906

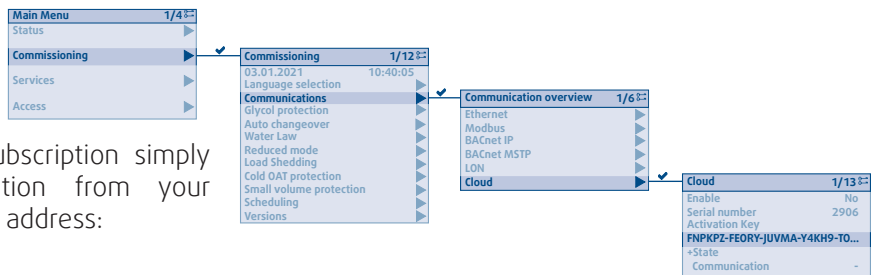
3.7. SYSTEMAIR CLOUD

The SYSTEMAIR cloud allows the units to be remotely supervised. In particular, it gives access to the main unit parameters and alarms, saves the values sent by the regulator and enables updating of the entire application (temperature control, configuration, user interface, list of network variables).



For access to the Cloud, you need:

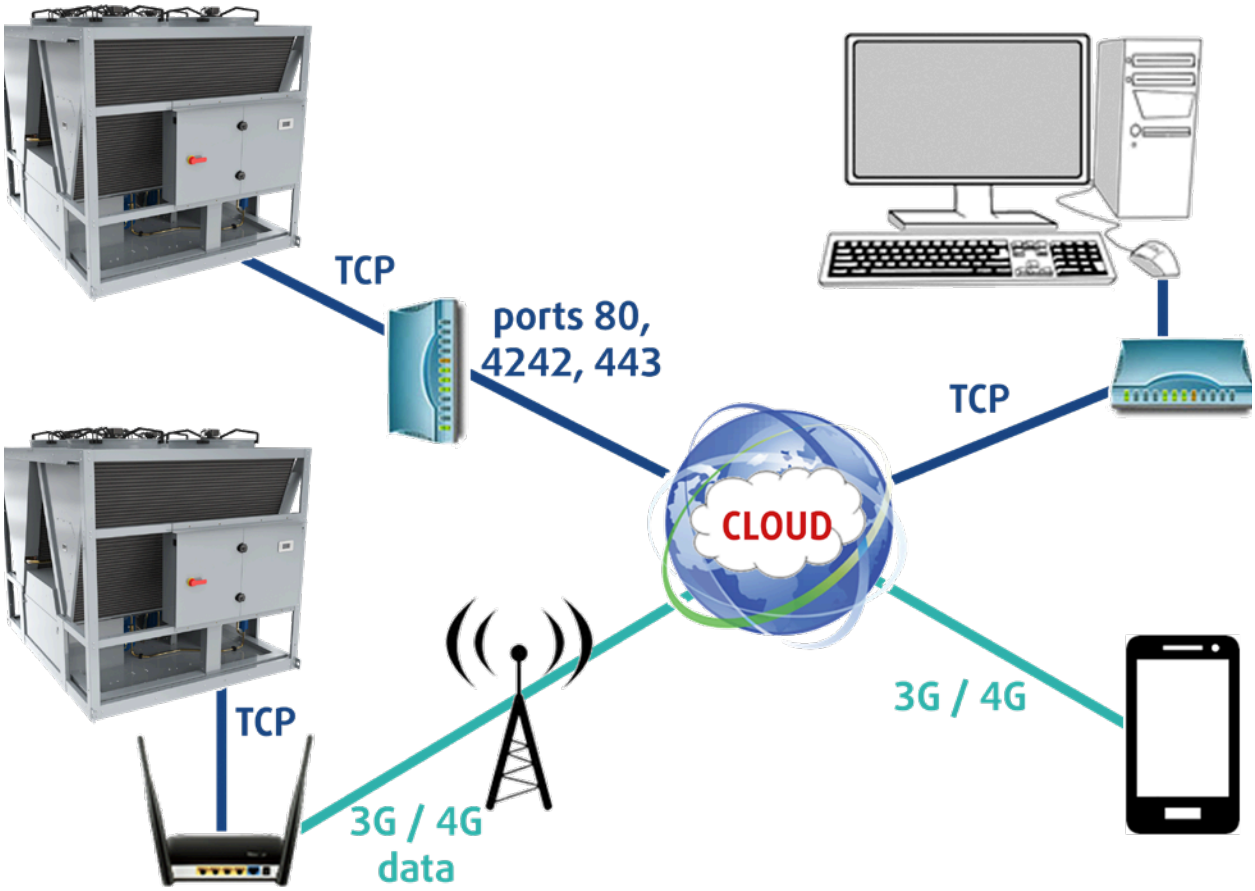
- an Internet connection
- an annual or monthly subscription



To activate your AC CLOUD subscription simply send the following information from your ac-cloud@systemair.com email address:

1. option activation key
2. **SYSAQUA** serial number
3. the name of the site where the **SYSAQUA** is located
4. the e-mail addresses authorized for access to the **SYSAQUA**

The units are connected either via the customer intranet or independently of the customer intranet via an optional 3G or 4G router.

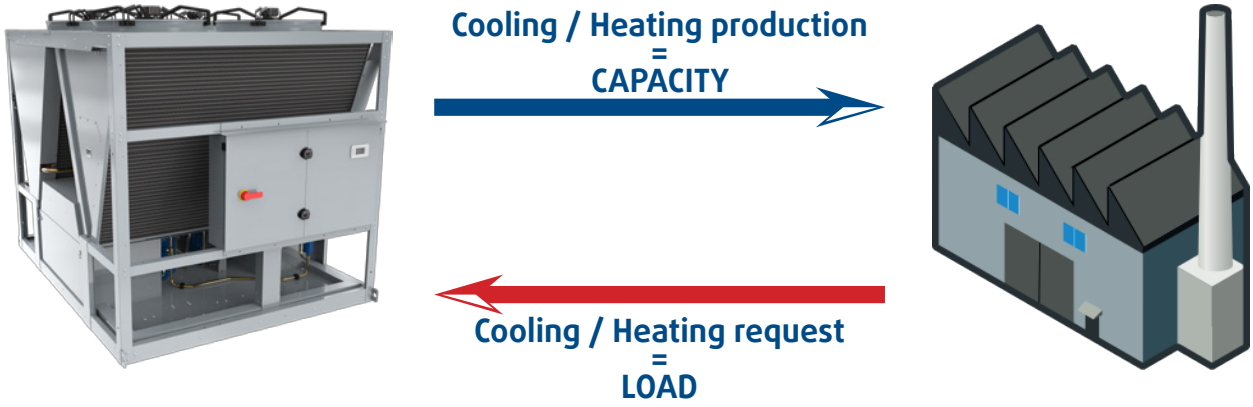


4. THERMAL CONTROL

4.1. INTRODUCTION

4.1.1. LOAD AND CAPACITY

The function of the **SYSAQUA** units is to maintain the client water circuit at the temperature specified by the client. The temperature of the water from the client network translates the client's "**charge**" to which the unit must respond. The temperature of the water delivered by the unit translates its "**capacity**".



4.1.2. CONTROL OF UNITS

The **SYSAQUA** units are controlled in order of priority:

1. The HMI: the commands are given by the user directly on the unit (integrated display) or remotely (remote display)
2. Digital inputs: the client can send commands electromechanically via 2 dry contacts (not supplied) on two controller ports
   - ✔ Input D1: Forced OFF
   - ✔ Input D2: configurable
3. The BMS : the remote supervision transmits it commands according to the communication protocols
4. Timing programming: this scheduling is integrated in the regulator

HMI	Status D1	BMS	Scheduling	Resulting order
Off	OFF Current status	✘	✘	OFF
Delegate	OFF Current status	✘ W.O. (*)	✘ W.O. (*)	OFF Delegate
On	OFF Current status	✘	✘	OFF On
Reduced mode	OFF Current status	✘	✘	OFF Reduced mode
Load shedding	OFF Current status	✘	✘	OFF Load shedding

(*) without Order

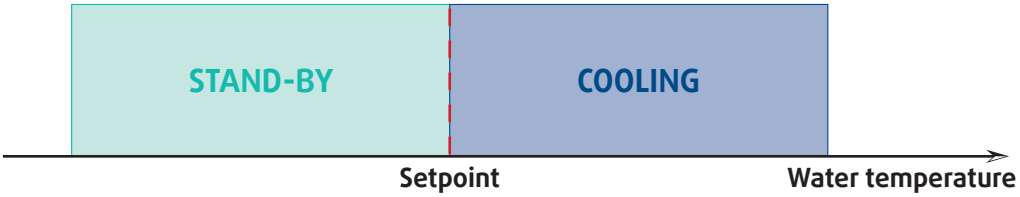
4.1.3. OPERATING MODES

The **SYSAQUA** units offer three operating modes:

➢ Cooling mode = the unit cools the water circuit. The unit is regulated according to the water temperature sensor:

✔ If the measurement is less than the set-point: the unit is in stand-by, the pump is operating

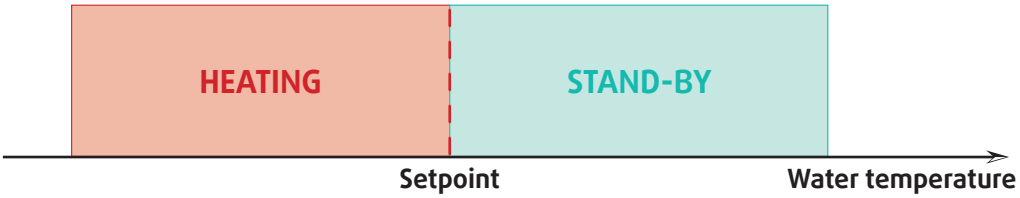
✔ If the measurement is above the set-point: the thermodynamic cycle operates



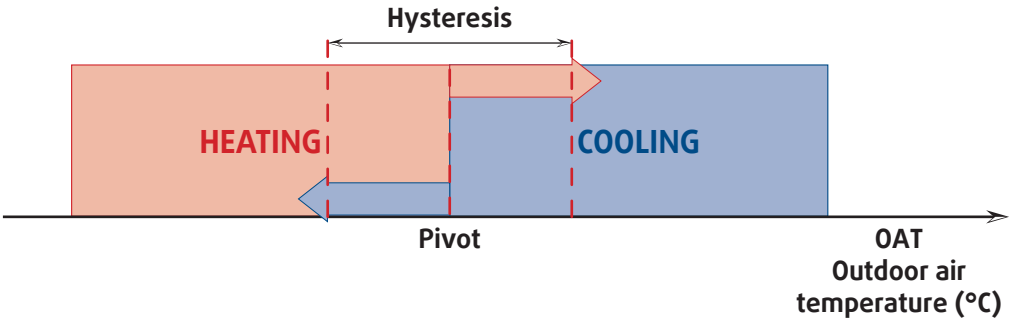
➢ Heating mode = the unit heats the water circuit. The unit is regulated according to the water temperature sensor:

✔ If the measurement is below the set-point: the thermodynamic cycle operates

✔ If the measurement is above the set-point: the unit is in stand-by, the pump is operating



➢ Auto-changeover mode = the unit automatically switches between the cooling mode and the heating mode described above. The changeover is carried out according to the air temperature. A 30-minute timer and hysteresis are introduced to stabilize the water circuit.



4.2. WATER SETTINGS AND WATER ANTI-FREEZE PROTECTION

The user can definethe water temperature setting to control according to the range:

➢ **SYSAQUA** 20 to 125 (2 compressors) : either the entering water temperature RWT (by default), or the leaving water temperature LWT

➢ **SYSAQUA** 140 to 210 (4 compressors) : the leaving water temperature LWT (by default), or the entering water temperature RWT.

For each mode the user can define the temperature setting to be controlled:

➢ Heating mode SPH (by default 40°C) : between 20 and 50°C

➢ Cooling mode SPC (by default 12°C) : maximum value is 18°C, the minimum value depends on the water anti-freeze protection. By default, the water circuit is considered unprotected and the minimum value is set at +5°C (RWT). To define a lower set-point, it is mandatory to protect the water circuit against frost and to check the glycol level.

Glycol level	SPC minimum value
0%	+5°C
10%	0°C
20%	-3°C
30%	-10°C

Regulation uses an actual set-point SP*, calculated automatically, that can differ from the SPC and SPH user settings in the case of water law being activated (Refer to the § **WATER LAW**, page 20) and for reduced modes (Refer to the § **REDUCED MODE**, page 21).

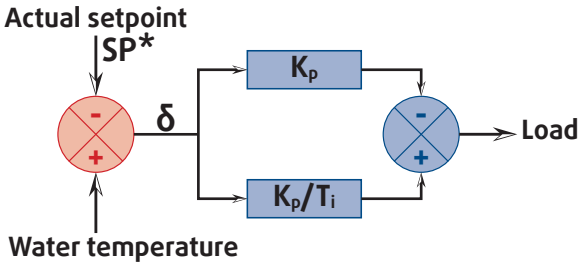
4.3. TEMPERATURE CONTROL

Temperature control ensures that the water sensor selected by the client (RWT or LWT) attains the actual set-point, SP*. To manage the compressors more efficiently, the control uses the concepts of load and capacity.

Load formulation

The load is calculated via an algorithm PI minimizing the difference between the unit measurement and the set-point.

The coefficients of PI depend on the range, the water temperature to be controlled and the operating mode. They correspond to the minimum volumes of water circuits indicated in the IOM.



Range	Temperature to be controlled	Coefficient	Units	Cool mode	Heat mode
SYSAQUA 20 to 125	RWT	K_p	%/K	10	10
		T_i	s	60	60
	LWT	K_p	%/K	4	4
		T_i	s	50	50
SYSAQUA 140 to 210	RWT	K_p	%/K	10	10
		T_i	s	60	60
	LWT	K_p	%/K	4	5
		T_i	s	180	60

Control of the water outlet temperature (LWT sensor), especially for **SYSAQUA** 20 to 125, requires precise adjustment of the coefficients Kp and Ti. This adjustment depends on the installation, it can only be made once the **SYSAQUA** is connected to the water circuit.

Information

The Kp and Ti coefficients can only be modified by a Systemair technician working on-site.

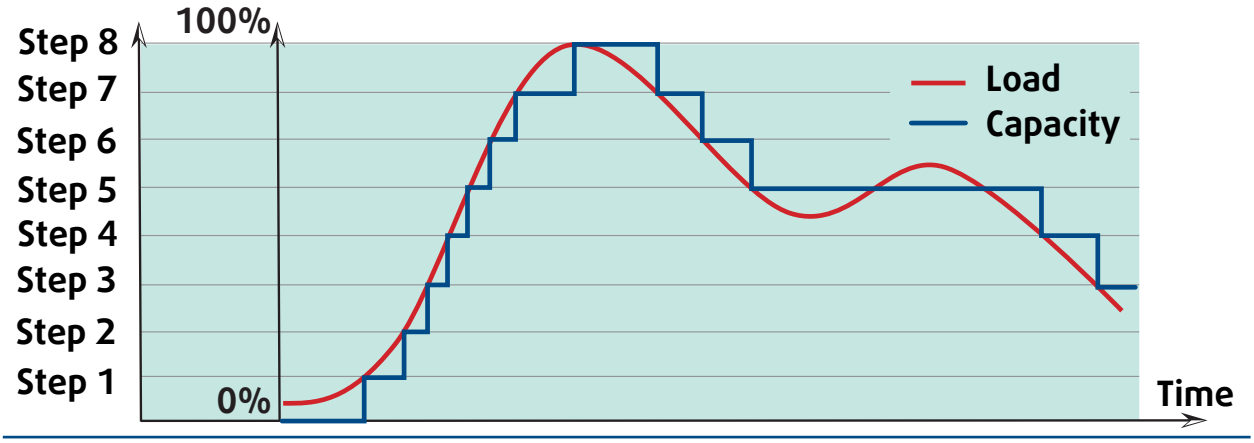
Capacity steps

The capacity of the unit is staged by combining the activations of the compressors. The capacity of a step is proportional to the power of the activated compressors as is shown in the following table for a **SYSAQUA 210** :

Compressor			Stepping								
Circuit	N°	Power	0	1	2	3	4	5	6	7	8
1	C2	39.7	OFF	ON	OFF	ON	ON	OFF	ON	OFF	ON
	C1	64.7	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	ON
2	C2	39.7	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	ON
	C1	64.7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON
Capacity (%)			0	19	31	38	50	62	69	81	100

Response to the client load

The temperature control dynamically adapts to the stepping of the capacity of the unit to the load of the client water circuit.



5. EQUIPMENT MANAGEMENT

5.1. TEMPERATURE SENSORS

The temperatures are measured by CTN sensors 10kΩ. Resistance measurements are converted to temperature with coefficients scaled over the entire temperature range to ensure sufficient accuracy (<1 K) regardless of the operating point of the unit.

Specific case of outside air temperature (OAT)

The measurement of the CTN sensor undergoes several post-treatments.

- Stabilized operation: the temperature corresponds to the instantaneous measurement.
- Defrost cycle: the temperature is fixed at its last value before the start of the cycle.
- Unit is start-up phase after a stoppage: la température correspond à la mesure instantanée

5.2. PRESSURE SENSORS

Pressure transducers

The relative pressures of refrigerant (BP, HP) and water (WPT) are measured by ratiometric transducers. The voltage signal is converted into a pressure value by the regulation.

HP pressure switch

This normally closed pressure switch trips when the condensing pressure is too high.

PME pressure switch (WPS)

This normally closed pressure switch trips when the hydraulic pressure is insufficient.

5.3. COMPRESSORS

The compressors are activated/deactivated according to the unit capacity stepping (Refer to the § **TEMPERATURE CONTROL**, page 17). The following anti short-cycles secure the duration of compressors:

- Minimum activation time = 60s
- Maximum activation time = 120s
- Maximum of 12 start-ups per hour

5.4. FANS

The regulator controls the speed of the fans according to the condensing pressure (cooling mode) or the evaporation pressure (heating mode):

- Dual-speed ventilation: obtained by supplying the AC motor with star or triangle
- Modulating ventilation: obtained by supplying the AC motor with a frequency converter.

Modulating ventilation is intrinsic to the option "All Seasons" (Refer to the § **"ALL SEASONS" OPTION**, page 22) and "High Pressure Fans" (Refer to the § **"HIGH PRESSURE FANS" OPTION**, page 23).

5.5. ELECTRONIC PRESSURE REDUCING VALVE

The electronic pressure reducing valve is controlled directly by the regulator. This enables the regulator to:

- Pre-position the pressure reducing valve at start-up according to the operating conditions
- Pre-position the pressure reducing valve before a chang in capacity
- Control the evaporation pressure
- Control over-heating
- Stabilize the opening of the pressure reducing valve during specific transients (e.g. defrosting)
- Close the pressure releasing valve when the circuit is stopped

5.6. 4-WAY VALVE

The 4-way valve enables switching between cooling mode (valve deactivated) and heating mode (valve activated). Switchover requires either stopping the tandem for more than a minute, or a gap of less than 4 bar between the BP and the HP.

5.7. CARTER RESISTANCE

5.7.1. SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

The carter resistances are not controlled directly by the regulator but are coupled to the compressors:

- Compressor deactivated : resistance activated
- Compressor activated : resistance deactivated

5.7.2. SYSAQUA 140/150/170/190/210

The carter resistances are controlled directly by the regulator coupled to the circuit:

- The two compressors of the tandem are activated : resistances deactivated
- One compressor deactivated for over 15min : resistances activated

5.7.3. PREHEATING

If the unit has been powered off for more than 3 hours (e.g. power failure, 1st power up at start-up, etc.), the regulator requires a preheating phase of the compressors before starting the temperature control. By default this phase takes 30min

5.8. ANTI-FREEZE RESISTANCE

The antifreeze resistances are bonded to the plate heat exchanger and covered with thermal insulation. They participate in the protection of the hydraulic circuit when ambient conditions create a risk of freezing (Refer to the § **ANTIFREEZE PROTECTION OF THE PLATE EXCHANGER**, page 31).

5.9. HYDRAULIC PUMP

Units can optionally include 1 pump, 2 pumps mounted in parallel (**SYSAQUA** 45 to 125) or 1 double pump (**SYSAQUA** 140 to 210). In the latter two cases, only one motor operates at a time the other being a backup. The pumps are controlled in terms of:

- Fixed speed (standard) : directly by the regulator
- Modulating speed: the AC motor of the pump is powered by a variable frequency drive The "Variable Primary Flow" option offers the modulating speed (Refer to the § **OPERATING PRINCIPLE**, page 7).

The regulator:

- Either powers or stops the pump when the unit is on stand-by
- For pumps mounted in parallel, the change from one pump to another is implemented manually (**SYSAQUA** 45 to 125 - see IOM).
- In the case of a double pump, automatically switches to the second motor in the case of a problem with the first motor (**SYSAQUA** 140 to 210).
- Periodically restarts the pump in order to avoid any clogging due to inactivity. This functionality can be adjusted and is deactivated by default:
  - ✔ Restart frequency: 72h
  - ✔ Duration of restart: 120s

5.10. IMMERSION HEATERS

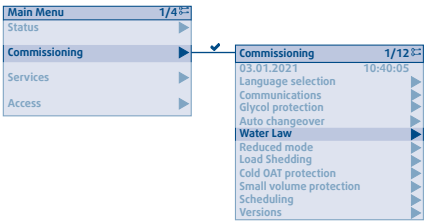
Immersion heaters, available on the **SYSAQUA** 45 to 125, are activated/deactivated depending on the unit capacity stepping (Refer to the § **"ELECTRIC HEATING" OPTION**, page 27). The following anti-short cycles protect their service life:

- Minimum activation time = 60s
- Maximum inactivation time = 60s

6. ADDITIONAL FUNCTIONALITIES

6.1. WATER LAW

The water law allows the temperature set-point to be adapted according to the exterior temperature. By default the water law is deactivated.



Caution

The water law automatically activates auto-changeover mode.

6.1.1. COOLING MODE

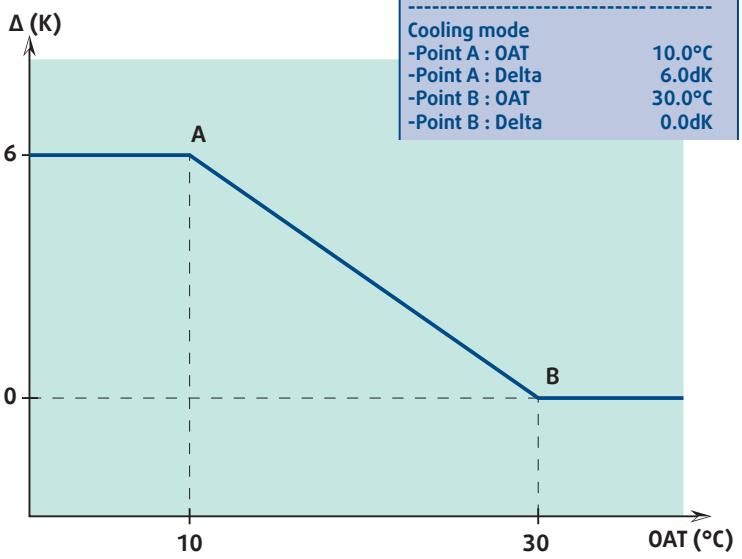
The water law adds to the set-point SPC defined by the user a temperature Δ offset function :

$$SP^* = SPC + \Delta(OAT)$$

The offset is defined by the points A and B

Points	Coordinates	unit	Min.	Max.	default
A	OAT	°C	10	30	10
	Delta	K	Δ_B	8	6
B	OAT	°C	20	36	30
	Delta	K	0	Δ_A	0

Water Law	1/15
Compensation	Enable
Cooling mode	
-Point A : OAT	10.0°C
-Point A : Delta	6.0dK
-Point B : OAT	30.0°C
-Point B : Delta	0.0dK

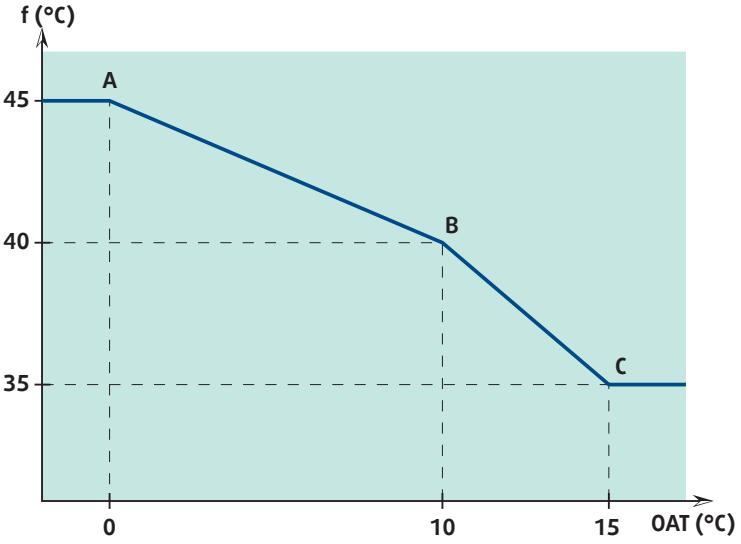


6.1.2. HEATING MODE

The water law recalculates the set-point according to the outside temperature. The function f is defined by the points A, B and C:

Water Law	1/15
Compensation	Enable
Cooling mode	
-Point A : OAT	10.0°C
-Point A : Delta	6.0dK
-Point B : OAT	30.0°C
-Point B : Delta	0.0dK
Heating mode	
-Point A : OAT	0.0°C
-Point A : f	45.0 °C
-Point B : OAT	10.0 °C
-Point B : f	40.0 °C
-Point C : OAT	15.0 °C
-Point C : f	35.0 °C

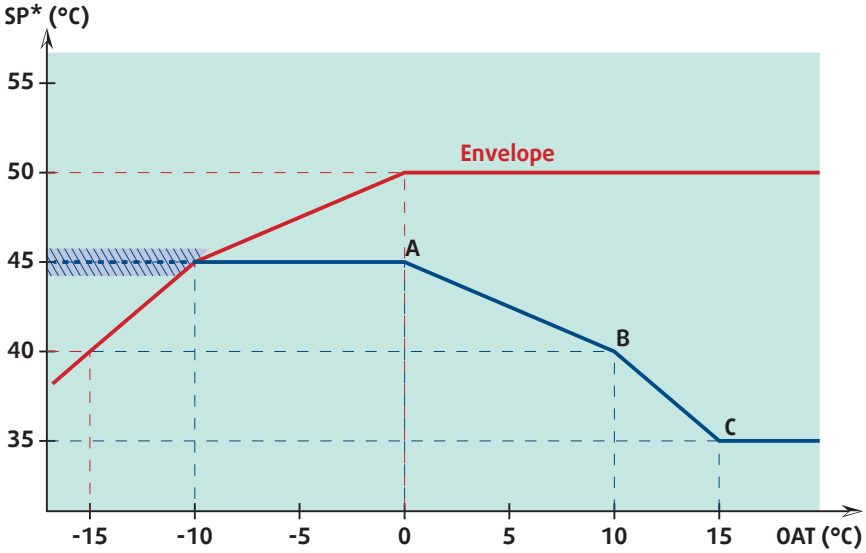
Points	Coordinates	unit	Min.	Max.	default
A	OAT	°C	-20	OAT_B	0
	f	°C	f_B	50	45
B	OAT	°C	OAT_A	OAT_C	10
	f	°C	f_C	f_A	40
C	OAT	°C	OAT_B	50	15
	f	°C	20	f_B	35



To secure the unit at low temperatures, the water law automatically limits the effective set-point to the operating envelope (Refer to the § **OPERATING ENVELOPES**, page 9) :

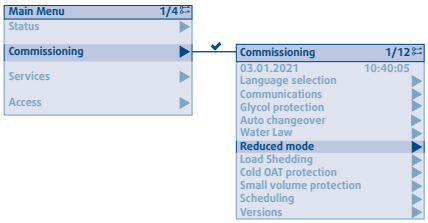
SP* = min [f(OAT), envelope heating mode]

In the example below, the water law substitutes the operating envelope for function f below OAT -10 ° C. The shaded part of teh function f is therefore not retained.



6.2. REDUCED MODE

The reduced modes enable the electrical consumption to be reduced and/or reduce the noise level. By default the reduced mode is deactivated.

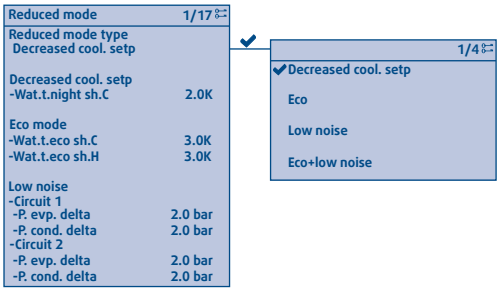


"Decreased cool. setp" (cooling mode only)

This mode offsets the set-point downward to accumulate cold in the water loop when electricity is cheaper:

SPC reduced = SPC - offset

The offset can be adjusted between 0 and 15 K and by default is at 2 K.



"Eco"

This mode enables the set-points to be relaxed that there is less stress on the compressors:

SPC reduced = SPC + cold offset

SPH reduced = SPH - heat offset

The offsets can be adjusted between 0 and 15 K and by default is at 3 K.

"Low noise"

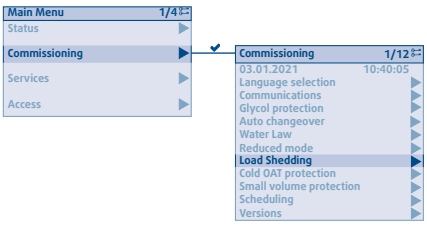
This mode enables the fans to be slowed down so that they make less noise. The slowdown is achieved by offsetting the pressure set-point:

SPPEvap reduced = SPPEvap – BP offset

SPPCnd reduced = SPPCnd + HP offset

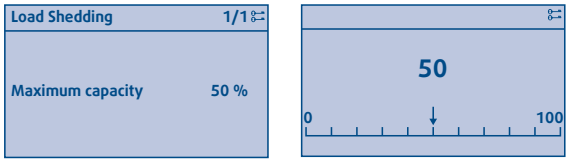
The offsets can be adjusted between 0 and 2 bar and by default is at 2 bar.

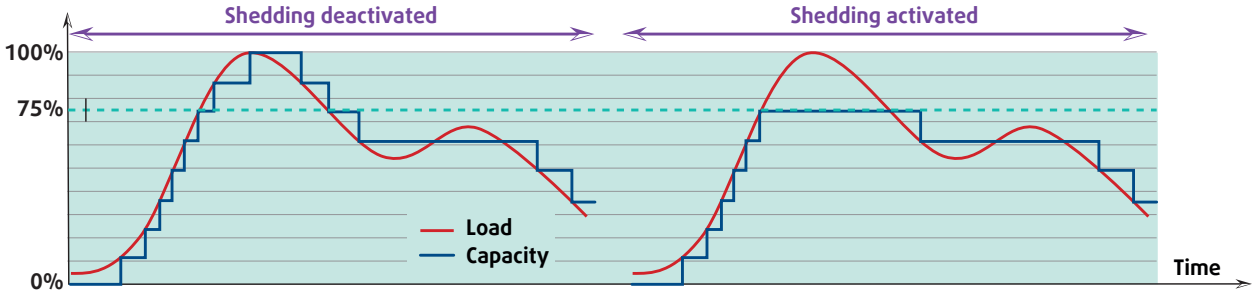
6.3. LOAD SHEDDING MODE



The load shedding mode limits the electrical power consumption of the unit by limiting its capacity. The amount limited is defined by a maximum value of capacity, setting between 0 and 100%. By default the load shedding mode is deactivated.

The example below illustrates the limiting of the unit to 75% of its capacity. As long as load shedding is not activated, the unit adjusts its capacity to respond to load. When load shedding is activated, the unit limits its capacity below the limiting value.

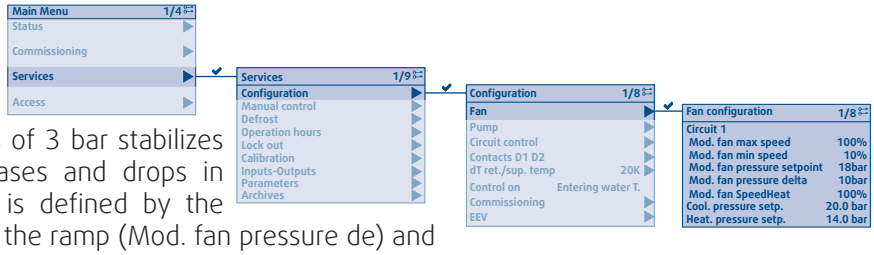




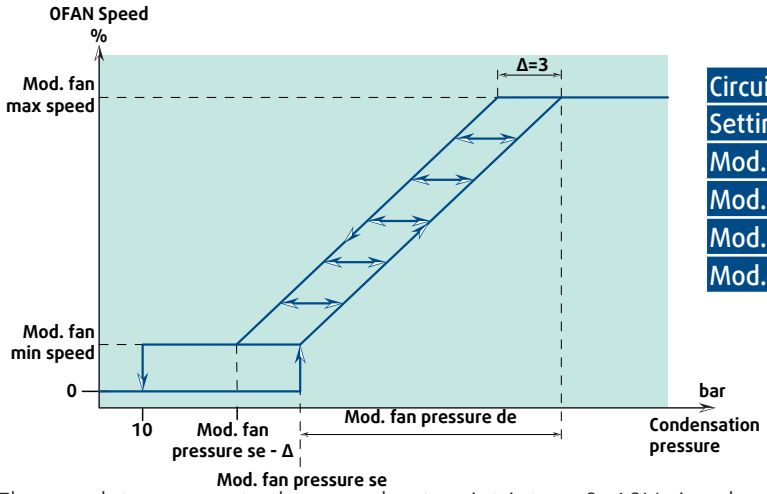
6.4. "ALL SEASONS" OPTION

The option "All Seasons" allows the exchanges of the battery with the outside air throughout the year to be adjusted by modulating the flow of air. This adjustment is obtained by powering the fans via the frequency inverters controlled by the regulator.

6.4.1. COOLING MODE

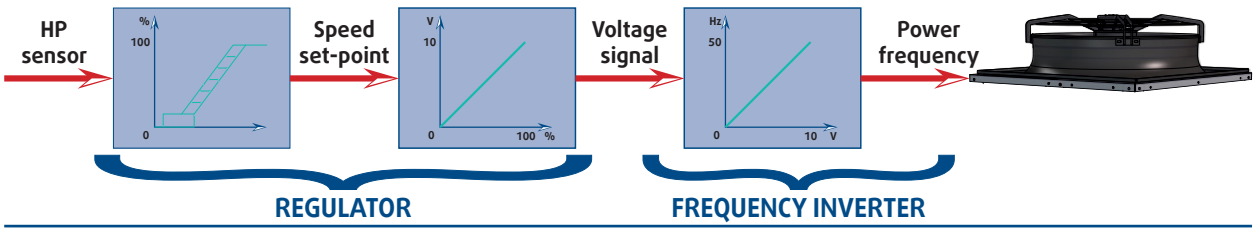


The regulator controls the condensation pressure, speeding up the fans as the pressure increases. A hysteresis of 3 bar stabilizes the fan speed, both for increases and drops in pressure. The speed set-point is defined by the setpoint (Mod. fan pressure se), the ramp (Mod. fan pressure de) and the speed range (Mod. fan max speed, Mod. fan min speed).



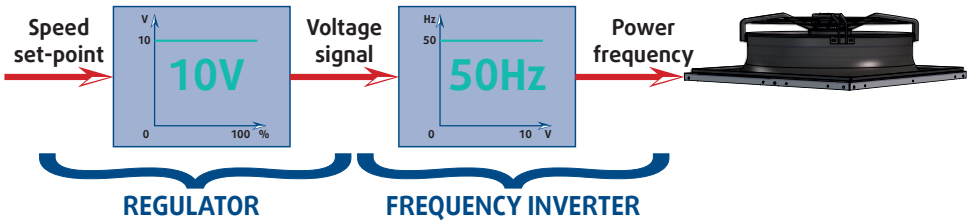
Circuit 1 / 2			
Setting	default	min	max
Mod. fan max speed	100%	0%	100%
Mod. fan min speed	10%	0%	100%
Mod. fan pressure se	18 bar	15 bar	28 bar
Mod. fan pressure de	10 bar	4 bar	10 bar

The regulator converts the speed set-point into a 0..10V signal and sends it to the frequency inverter. The inverter converts the 0..10V signal into a 0..50Hz fan power frequency.



6.4.2. HEATING MODE

The fans turn at a fixed speed, that can be regulated between 0 and 100%.

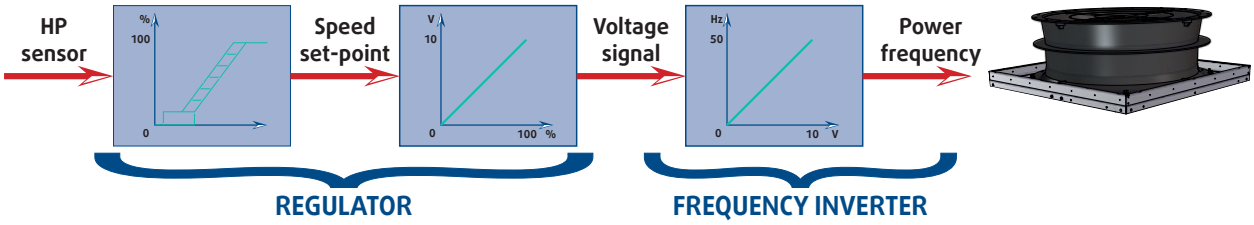


6.5. "HIGH PRESSURE FANS" OPTION

The "High Pressure Fans" option allows air rejected by the fans to be funneled. To meet the load drop due to the funneling, the fans deliver more pressure than the standard fans and are of AC type. These fans are controlled by the regulator, with frequency inverters.

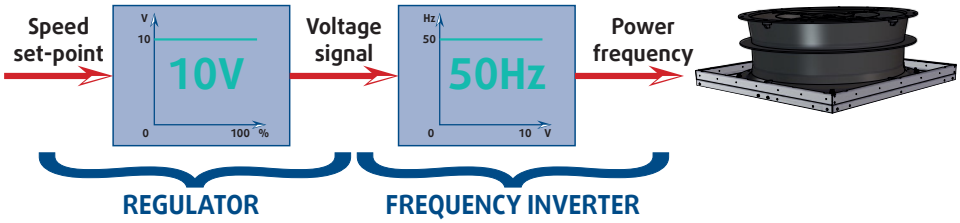
6.5.1. COOLING MODE

The principle for controlling the fans is identical to that of the "All Seasons" option

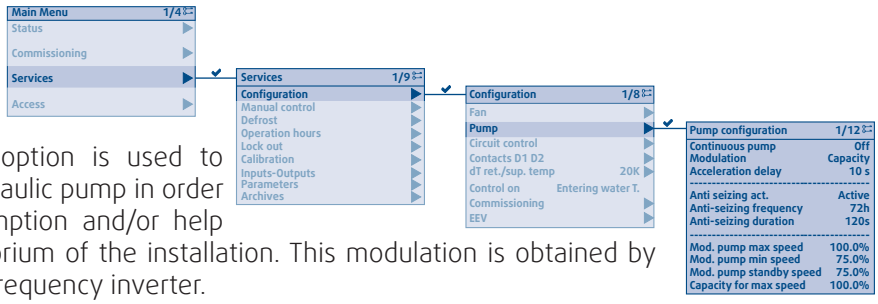


6.5.2. HEATING MODE

The principle for controlling the fans is identical to that of the "All Seasons" option



6.6. "VARIABLE PRIMARY FLOW" OPTION



The "Variable Primary Flow" option is used to modulate the power of the hydraulic pump in order to reduce its electrical consumption and/or help maintain the hydrostatic equilibrium of the installation. This modulation is obtained by powering the pump through a frequency inverter.

Caution

The minimum frequency of the pump must not be less than the manufacturer's recommendations (e.g. 30Hz) and must ensure a sufficient rate for teh unit (Voir § PHYSICAL CHARACTERISTIC in the Installation and maintenance manual).

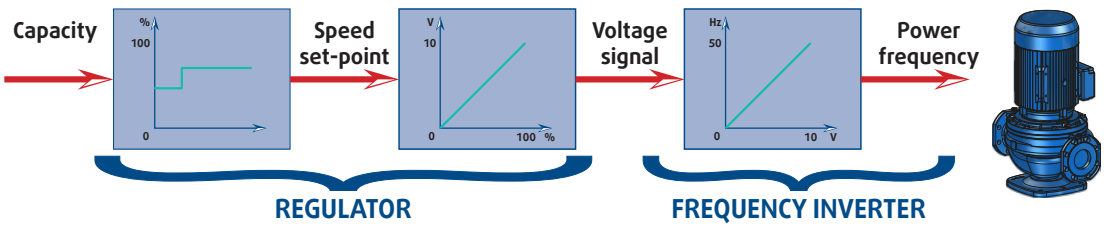
6.6.1. V2 MODE - DOUBLE SPEED

As soon as the load to which the unit must respond is higher than the 1st stage of capacity, the pump operates at a fixed speed. This speed is determined during commissioning to adjust the power of the pump to the load drops of the installation.

When the load is insufficient to activate the 1st stage of capacity, the pump runs at a reduced speed to limit the consumption of electricity.

Setting	default	min	max
Mod. pump max speed	100%	0%	100%
Mod. pump standby speed	75%	0%	100%

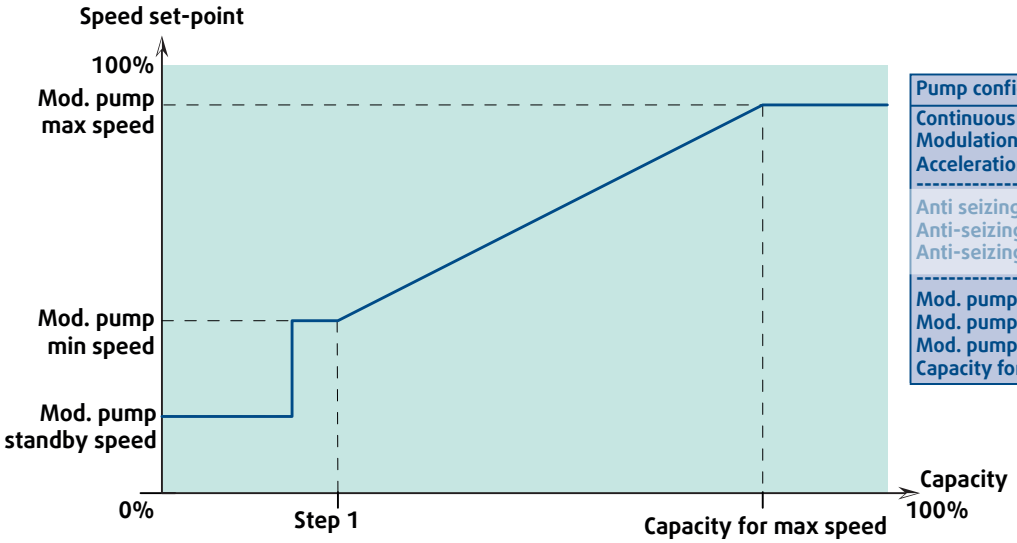
The regulator converts the speed set-point into a 0..10V signal and sends it to the frequency inverter. The inverter converts the 0..10V signal into a 0..50Hz frequency for the pump.



6.6.2. VC MODE - CONSTANT SPEED VS CAPACITY

The speed of the pump depends on the capacity of the unit. This speed range is determined during commissioning to adjust the power of the pump to the load drops of the installation.

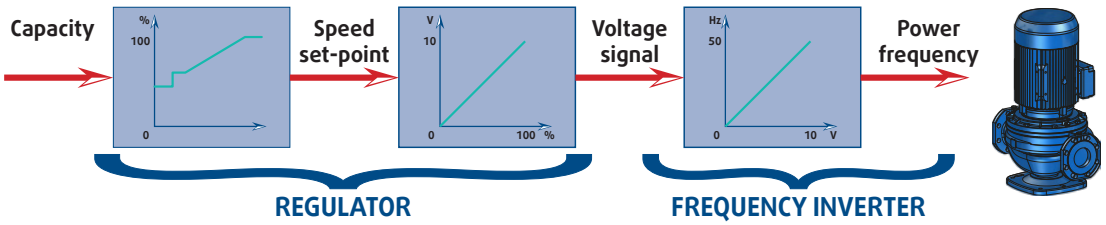
When the load is insufficient to activate the 1st stage of capacity, the pump runs at a reduced speed to limit the consumption of electricity.



Pump configuration	1/12
Continuous pump	Off
Modulation	Capacity
Acceleration delay	10 s
Anti seizing act.	Active
Anti-seizing frequency	72h
Anti-seizing duration	120s
Mod. pump max speed	100.0%
Mod. pump min speed	75.0%
Mod. pump standby speed	75.0%
Capacity for max speed	100.0%

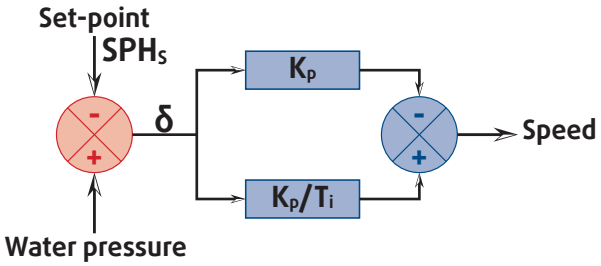
Setting	default	min	max
Mod. pump max speed	100%	0%	100%
Mod. pump min speed	75%	0%	100%
Mod. pump standby speed	75%	0%	100%
Capacity for max speed	100%	0%	100%

The regulator converts the speed set-point into a 0..10V signal and sends it to the frequency inverter. The inverter converts the 0..10V signal into a 0..50Hz frequency for the pump.



6.6.3. VP MODE - CONSTANT OUTPUT PRESSURE

The pump modulates its speed to maintain constant water pressure at the unit output. This pressure is measured by a pressure transducer mounted on the heat exchanger outlet tube. The load is calculated via an algorithm PI minimizing the difference between the transducer measurement and the set-point.



The set-point depends on the installation. It can be adjusted during commissioning.

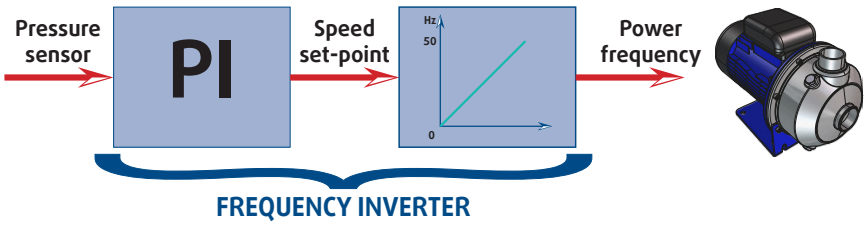
- **SYSAQUA** 20 to 125: in the frequency inverter ACS3 (See IOM - § **CONSTANT OUTPUT PRESSURE**)
- **SYSAQUA** 140 to 210: in the regulator POL687 (See IOM - § **CONSTANT OUTPUT PRESSURE**)

The PI coefficients depend on the range and the installation. They can be adjusted during commissioning.

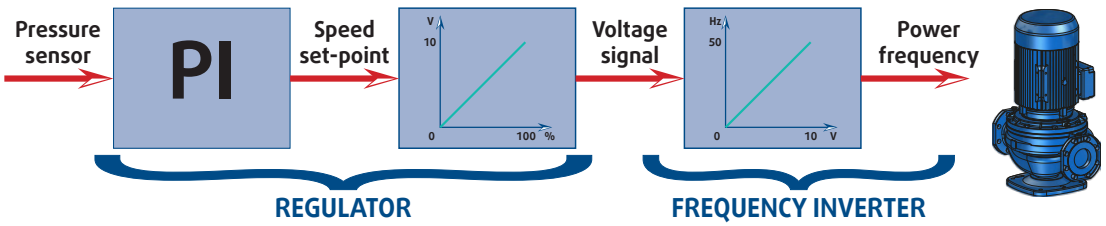
Range	Coefficient	Units	Default	min	max
SYSAQUA 20 to 125 (ACS3)	K_p	-	1	0.1	100
	T_i	s	1	0	3 600
SYSAQUA 140 to 210 (POL687)	K_p	-	4	0	100
	T_i	s	50	0	500

The PI algorithm is in the frequency inverter in the ranges **SYSAQUA** 20 to 125, and in the regulator in the range **SYSAQUA** 140 to 210. The pressure transducer is connected to the equipment in charge of the PI algorithm.

SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

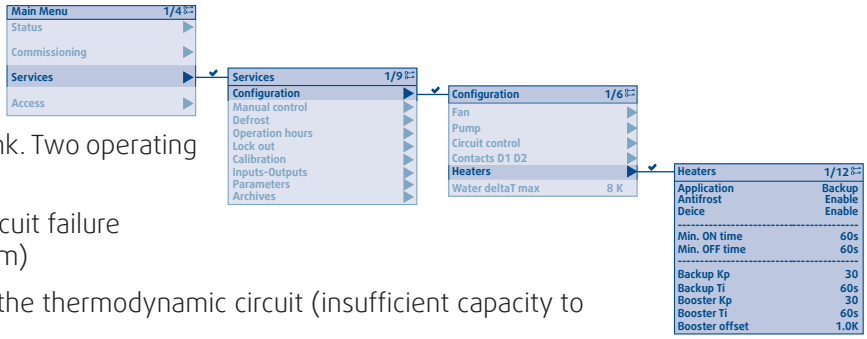


SYSAQUA 140/150/170/190/210



6.7. "ELECTRIC HEATING" OPTION

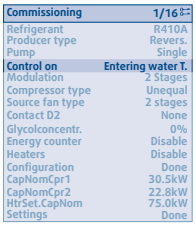
The "Electric heating" option offers an electric assistance to the thermodynamic circuit thanks to four immersion heaters mounted in the buffer tank. Two operating modes are available:



- **Backup:** thermodynamic circuit failure (compressor alarm, fan alarm)
- **Booster:** reinforcement for the thermodynamic circuit (insufficient capacity to respond to the load)

Caution

Backup and Booster modes are only compatible with an EWT water inlet temperature control.



Immersion heaters can also be used in the following phases:

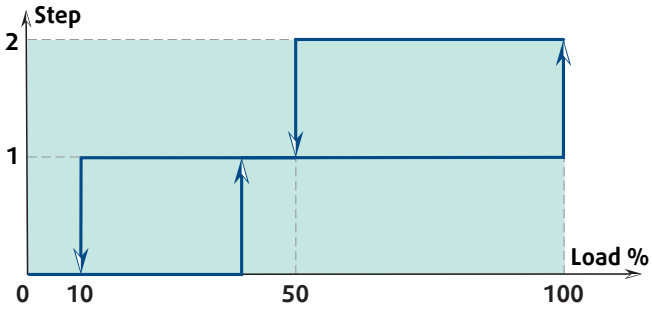
- **Anti-freeze protection**: preventive heating of the water circuit
- **Defrost cycle**: limitation of temperature drops in the water circuit

Capacity and rotation stages

The immersion heaters are wired in two stages of the same capacity. Rotation equals their operating time.

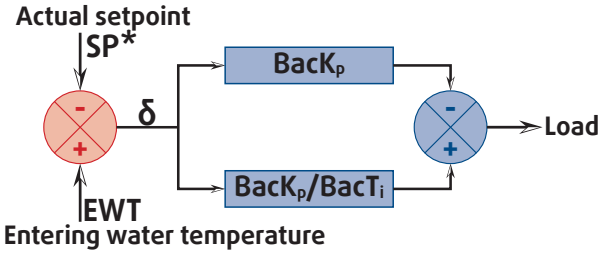
Response to the client load

The stages are activated according to the electric heating load required, separate from the load of the thermodynamic circuit.

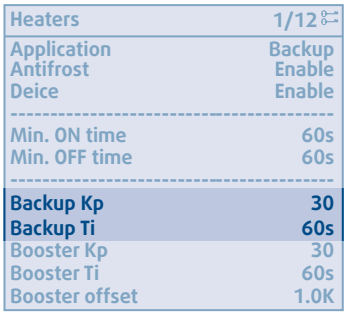


Load formulation in backup mode

The load is zero by default and is only calculated if the thermodynamic circuit fails. The calculation is performed by an algorithm PI minimizing the difference between the unit measurement and the set-point.



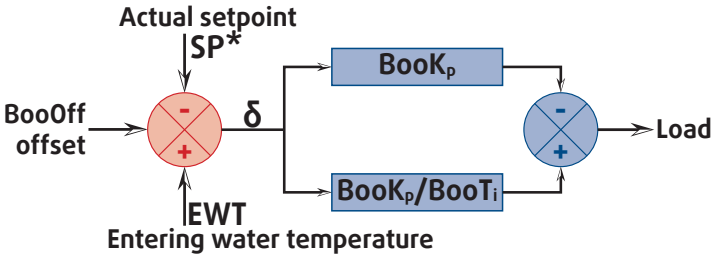
The PI coefficients depend on the water volume of the installation. They can be changed. The default values are the minimum volumes of the water circuits (Refer to the § **MINIMUM WATER VOLUME REQUIREMENTS**, page 14 of the Installation and Maintenance Manual).



Range	Coefficient	Units	Default	min	max
SYSAQUA 45 to 125	BacKp	%/K	30	0	100
	BacTi	s	60	0	1 200

Load formulation in booster mode

The load is zero by default and is only calculated if the thermodynamic circuit reaches 100%. The BooOff offset for the set point switches off the immersion heaters before the compressors in order to give priority to thermodynamic operation. The calculation is performed by an algorithm PI minimizing the difference between the unit measurement and the set-point:



The PI coefficients depend on the water volume of the installation. They can be changed. The default values are the minimum volumes of the water circuits (Refer to the § **MINIMUM WATER VOLUME REQUIREMENTS**, page 14 of the Installation and Maintenance Manual).

Heaters	1/12
Application	Backup
Antifrost	Enable
Deice	Enable
Min. ON time	60s
Min. OFF time	60s
Backup Kp	30
Backup Ti	60s
Booster Kp	**30**
Booster Ti	**60s**
Booster offset	**1.0K**

Range	Coefficient	Units	Default	min	max
SYSAQUA 45 to 125	BooKp	%/K	30	0	100
	BooTi	s	60	0	1 200
	BooOff	K	1	0	10

Caution

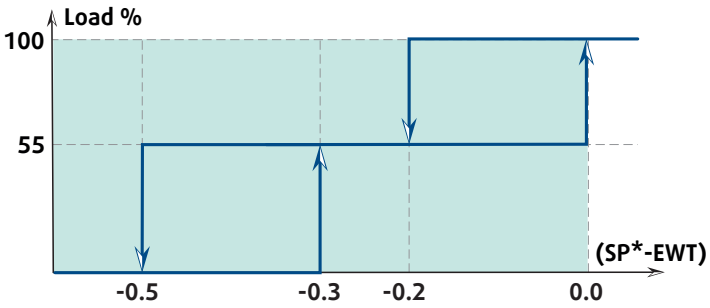
In the event of an alarm on the thermodynamic circuit, the immersion heaters remain available.

Load formulation for anti-freeze protection

The load is set at 50% so that only one stage is used.

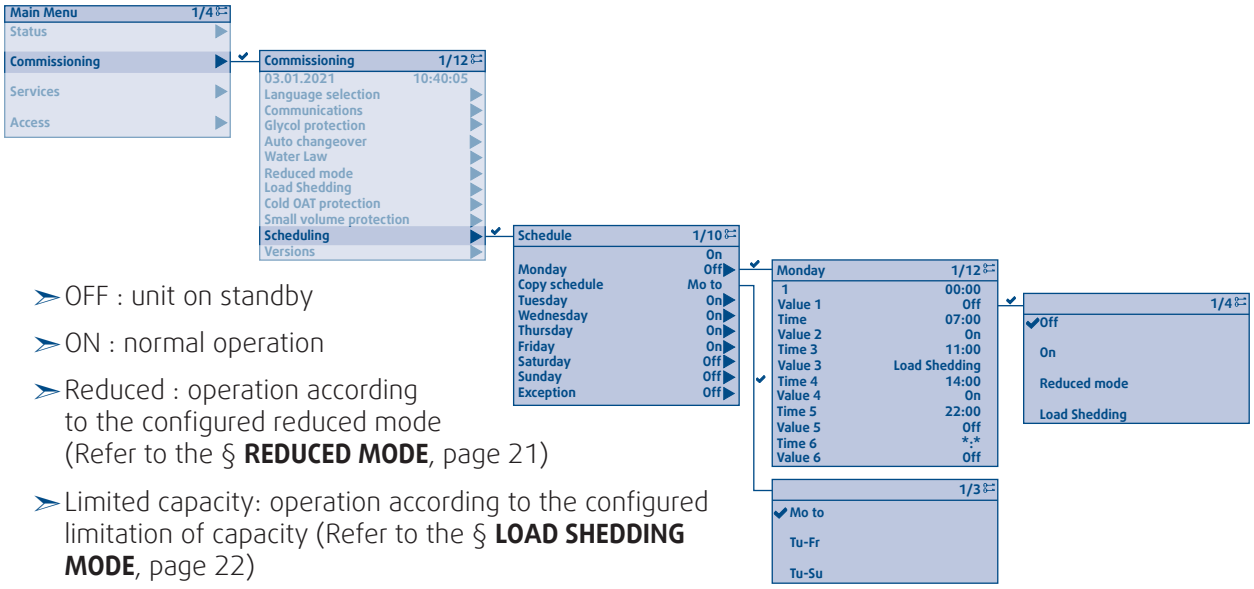
Load formulation during the defrost cycle

The load is set at 100% in order to compensate, as far as possible, for the temperature drop of the water circuit below the set point. The load is reduced if the circuit heats up.



6.8. SCHEDULING

Scheduling enables operating commands to be programmed throughout the week:

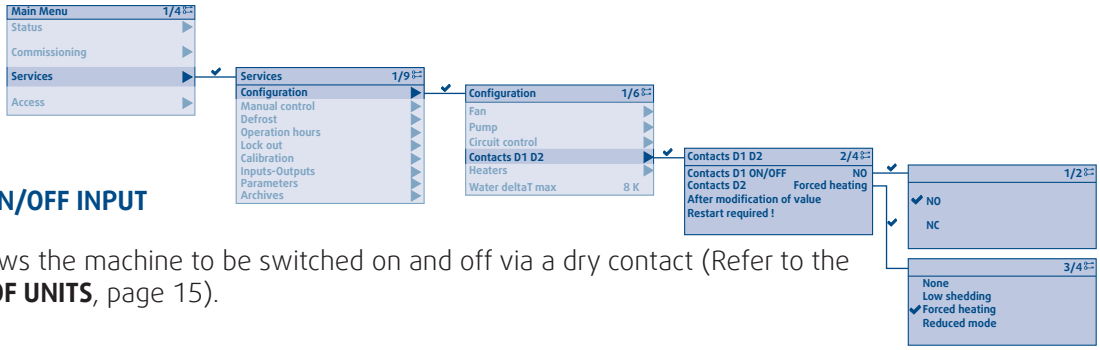


- OFF : unit on standby
- ON : normal operation
- Reduced : operation according to the configured reduced mode (Refer to the § **REDUCED MODE**, page 21)
- Limited capacity: operation according to the configured limitation of capacity (Refer to the § **LOAD SHEDDING MODE**, page 22)

Information

It is possible to program up to 6 command changes per day.

7. CLIENT DIGITAL INPUTS AND PRIORITIES



7.1. D1 ON/OFF INPUT

Input D1 allows the machine to be switched on and off via a dry contact (Refer to the § **CONTROL OF UNITS**, page 15).

The input **D1** can be configured as Normally Open (by default) and Normally Closed:

Configuration	Contact open	Contact closed
Normally Open NO	Operation order (ON)	Stop order
Normally Closed NC	Stop order	Operation order (ON)

7.2. D2 CONFIGURABLE INPUT

The input **D2** enables activation and stoppage of an option remotely with a dry contact. It ranks just after the input **D1** in the order of priorities (Refer to the § **CONTROL OF UNITS**, page 15).

The options available via the input **D2** are :

- Reduced mode (Refer to the § **REDUCED MODE**, page 21)
- Load shedding mode (Refer to the § **LOAD SHEDDING MODE**, page 22)
- Forcing in heating mode (by default)

The input **D2** is Normally Open:

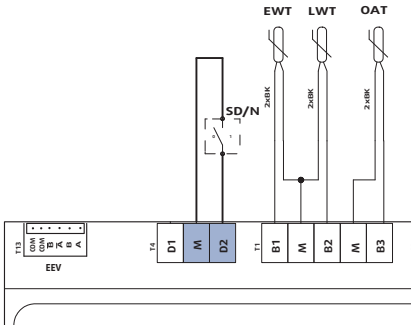
Configuration	Contact open	Contact closed
Normally Open	Option deactivation	Option activation

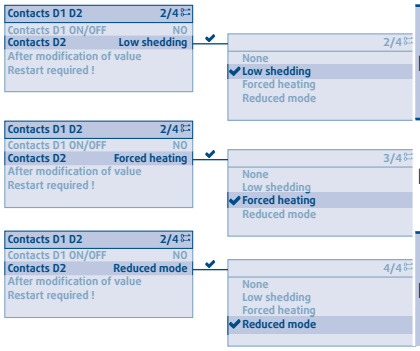
7.3. CASCADE OF PRIORITIES

The table below shows the operating mode of the unit resulting from demands of various regulators according to their priority.

Information

The HMI and the D1 contact are set to ON





Status D2	MMI	BMS	Scheduling	Resulting order
None	W.O. (*)	W.O. (*)	W.O. (*)	W.O. (*)
Low shedding	Auto	✘	✘	Auto / Load shedding
	Cooling	✘	✘	Cooling / Load shedding
	Heating	✘	✘	Heating / Load shedding
Forced heating	Auto	✘	✘	Forced heating
	Cooling	✘	✘	
	Heating	✘	✘	
Reduced mode	Auto	✘	✘	Auto / Reduced mode
	Cooling	✘	✘	Cooling / Reduced mode
	Heating	✘	✘	Heating / Reduced mode

(*) without Order

8. PROTECTIONS, EVENTS AND ALARMS

The application has equipment protection procedures based on the sensors of the unit (temperature, pressure) and on the electromechanical safety devices (pressure switch, magneto-thermal circuit breaker, internal safety, etc.).

Some procedures may temporarily change the operation of the unit and give rise to a event (e.g. preheating compressors, defrosting the battery, partial load operation, activation of antifreeze heaters, etc.) while others may stop a circuit or even the unit and lead to an alarm an alarm (e.g. HP cutoff, phase order regulator, etc.).

Most of the alarms are cleared automatically. In the case of repetition, they may cause the logging of a circuit or even the unit requiring a manual acknowledgment after inspection of the unit and installation.

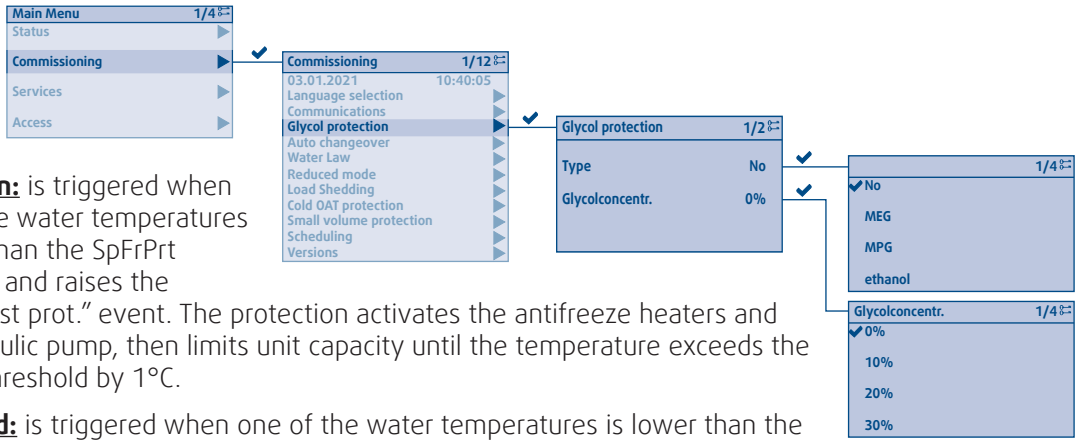
8.1. INTERNAL CLOCK

The date and time must be entered during commissioning otherwise the regulator logs the unit and raises the alarm "Set date & time". The alarm is automatically resolved by regulating the date and time.

8.2. WATER CIRCUIT

8.2.1. ANTIFREEZE PROTECTION OF THE PLATE EXCHANGER

If the water freezes (with or without glycol) the plate exchangers can be damaged. To prevent this risk, two protection methods are implemented depending on the water temperatures (**EWT** or **LWT**):



1. **<u>Protection:</u>** is triggered when one of the water temperatures is lower than the SpFrPrt threshold and raises the "Warn.frost prot." event. The protection activates the antifreeze heaters and the hydraulic pump, then limits unit capacity until the temperature exceeds the SpFrPrt threshold by 1°C.
2. **<u>Safeguard:</u>** is triggered when one of the water temperatures is lower than the LoLm limit and raises the "FrPrt" alarm. The safeguard suspends the unit.

The threshold and limit values depend on the level of glycol:

		Glycol level			
		0%	10%	20%	> 30%
Threshold SpFrPrt	°C	4	-1	-4	-11
Limit LoLm	°C	3	-2	-5	-12

8.2.2. EWT-LWT DEVIATION

An abnormally high deviation between these sensors can signal the drift of a sensor or a lack of flow of water not detected by the flow sensor. The alarm "FltDeltaT" is triggered when the deviation is greater than the limit ΔTmax (by default 10K) and is automatically resolved when it returns below 2K of the ΔTmax.

8.2.3. WATER CIRCULATION

8.2.3.1. SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

Good water circulation is controlled by a safety system comprising the following, depending on options:

- a water flow sensor (**FS**)
  The triggering of sensor (**FS**) represents a drop in water flow rate, below the minimum value for the unit.
- a "lack of water" pressure switch (**WPS**)
  The triggering of pressure switch (**WPS**) represents a de-pressurization of the water circuit. A lack of pressure can damage the hydraulic pump.
- a thermal magnetic breaker (**FTWP**)
- the internal safety of the frequency inverter (**ACS3**)

If the safety system is triggered the control stops the unit and raises the "Flow dedector" event. After a 30-second timer, the hydraulic circuit is returned to operation. If the safety system is triggered three times in less than one hour, the control suspends the unit and raises the "Crt.hydrau.lck" alarm.

8.2.3.2. SYSAQUA 140/150/170/210

Good water circulation is controlled by 3 safety systems comprising the following, depending on options:

1. a water flow sensor (**FS**)
   The triggering of sensor (**FS**) represents a drop in water flow rate, below the minimum value for the unit.
   a "lack of water" pressure switch (**WPS**)
   The triggering of pressure switch (**WPS**) represents a de-pressurization of the water circuit. A lack of pressure can damage the hydraulic pump.
2. a thermal magnetic breaker (**FTWP1**)
   the internal safety of the frequency inverter (**FDWP1**)
3. a thermal magnetic breaker (**FTWP2**)
   the internal safety of the frequency inverter (**FDWP2**)

If one of the safety systems is triggered the control stops the unit and raises the "Flow dedector" event. After a 30-second timer, the hydraulic circuit is returned to operation. If the safety system is triggered three times in less than one hour, the control suspends the unit and raises the "Crt.hydrau.lck".

8.2.4. INSUFFICIENT VOLUME OF THE WATER CIRCUIT

The unit operates in concert with the installation water circuit. The coefficients of the PI algorithms and the delays governing the behavior of the equipment in the transient phases are adapted to the expected inertia of the circuit.

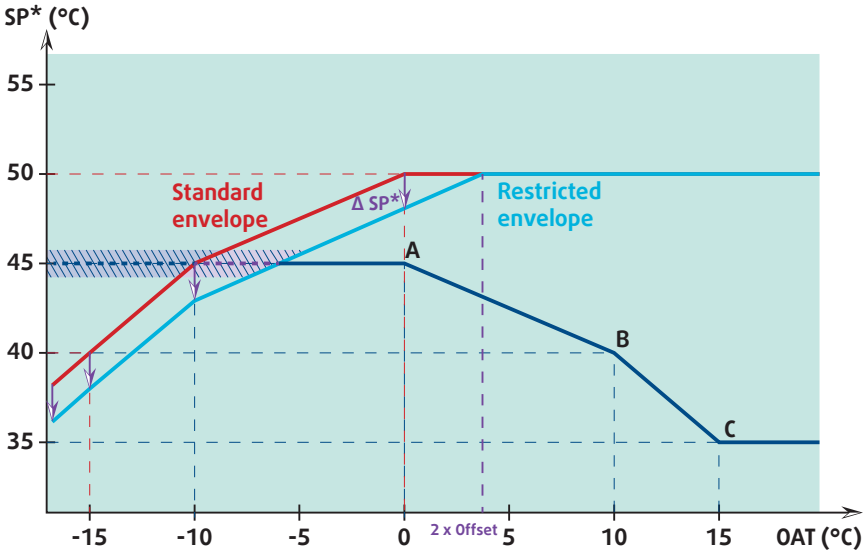
The inertia of the water circuit is a reflection of its volume. The IOM specifies the minimum volumes depending on the operating mode and the range:

Range	Coefficient	Units	Cooling	Heating
SYSAQUA 20 to 125	Application comfort	L/kW	3.5	12.5
	Application process	L/kW	10.0	12.5
SYSAQUA 140 to 210	Application comfort	L/kW	3.5	6.5
	Application process	L/kW	10.0	6.5

Insufficient volume of the water circuit can prevent the establishment of a stabilized coupling between the unit and installation. Unstable functioning can raise alarms that in the case of repetitions can restrict the unit.

In such a situation, it is recommended to notify this installation defect and note the actual volume, install a buffer tank and activate the "Low volume protection":

- **Heat Mode/Cold Mode:** adjusting coefficient Kp for calculation of the load using a setpoint corrected by an adjustable deviation. This adjustment can slow down variations in capacity around the setpoint
- **Hot Mode:** restriction of the unit operating envelope by limiting the maximum real setpoint based on an external temperature lower than 2 x the offset (by default 2°C).
  ΔSP* is set at 0.5°C/°C OAT



Information

Modification of the Kp coefficients, temperature deviations and the Offset can only be made by a Systemair technician working on-site.

8.3. COMPRESSORS

8.3.1. THERMAL PROTECTION

Compressors are protected from over-current by manual reset circuit breakers:

- **SYSAQUA 20 to 125 :** the circuit breaker contact is connected in series with that of the fans and the order controller and phase breaker. The "3phdet" alarm is triggered and stops the unit.
- **SYSAQUA 140 to 210 :** the alarm is triggered and suspends the circuit concerned
  - ✔ **circuit 1 :** Therm.flt.cpr1 Circuit 1 or Therm.flt.cpr2 Circuit 1
  - ✔ **circuit 2 :** Therm.flt.cpr1 Circuit 2 or Therm.flt.cpr2 Circuit 2

The alarm is automatically acknowledged by reactivating the circuit breaker.

8.3.2. BACKFLOW TEMPERATURE

Excessive discharge temperature can damage the compressor. Two levels of protection are implemented:

1. **Protection:** is triggered when the temperature reaches 120°C for 5s and raises an event. The protection limits the capacity of the circuit concerned to 50% until the temperature returns below 110°C.
   - ✔ **SYSAQUA 20 to 125** T.discharge.prot Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** T.discharge.prot Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** T.discharge.prot Circuit 2
2. **Safeguard:** is triggered when the temperature reaches 130°C, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** T.discharge.prot Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** T.discharge.prot Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** T.discharge.prot Circuit 2

8.3.3. OVERHEATING

A minimum overheating is necessary to ensure that the compressors do not draw in liquid. Two levels of protection are implemented:

1. **Protection:** is triggered when the overheating temperature is lower than 2°C for 30s and raises an event.
   - ✔ **SYSAQUA 20 to 125** Pdc:SH.LowLim
   - ✔ **SYSAQUA 140 to 210 circuit 1** Pdc:SH.LowLim
   - ✔ **SYSAQUA 140 to 210 circuit 2** Pdc2:SH.LowLim
2. **Safeguard:** is triggered when three events take place within 1 hour, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** Pdc:SHAlmCnt
   - ✔ **SYSAQUA 140 to 210 circuit 1** Pdc:SHAlmCnt
   - ✔ **SYSAQUA 140 to 210 circuit 2** Pdc2:SHAlmCnt

8.3.4. EVAPORATION PRESSURE

Too low or too high a pressure at the suction of the compressor can damage it.

Three levels of protection against too low pressure are implemented:

1. **Protection:** is triggered when the pressure is too low and raises an event. The protection limits the capacity of the circuit until the pressure rises above the protection threshold.
   - ✔ **SYSAQUA 20 to 125** LOP.prot.envelo. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** LOP.prot.envelo. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** LOP.prot.envelo. Circuit 2
2. **afeguard level 1:** is triggered when the pressure drops despite being under protection, raises an alarm and stops the circuit concerned. The alarm is automatically acknowledged after 3 minutes..
   - ✔ **SYSAQUA 20 to 125** LOP envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** LOP envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** LOP envelope Circuit 2
3. **Safeguard level 2:** is triggered if three stops by safeguard level 1 take place within 30 minutes, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** LOP envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** LOP envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** LOP envlp.lck Circuit 2

Two levels of protection against too high pressure are implemented:

1. **Safeguard level 1:** is triggered when the pressure is higher than 13.4 bar, raises an alarm and stops the circuit concerned. The alarm is automatically acknowledged after 3 minutes.
   - ✔ **SYSAQUA 20 to 125** MOP envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** MOP envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** MOP envelope Circuit 2
2. **Safeguard level 2:** is triggered if three stops by safeguard level 1 take place within 1 hour, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** MOP envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** MOP envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** MOP envlp.lck Circuit 2

8.3.5. CONDENSATION PRESSURE

Too low or too high a pressure on the compressor discharge can damage it.

Two levels of protection against too low pressure are implemented:

1. **Safeguard level 1:** is triggered when the pressure is lower than 4.46 bar, raises an alarm and stops the circuit concerned. The alarm is automatically acknowledged after 3 minutes.
   - ✔ **SYSAQUA 20 to 125** HPMin envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** HPMin envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HPMin envelope Circuit 2
2. **Safeguard level 2:** is triggered if three stops by safeguard level 1 take place within 1 hour, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** HPMin envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** HPMin envlp.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HPMin envlp.lck Circuit 2

Three levels of protection against too high pressure are implemented:

1. **Protection:** is triggered when the pressure is higher than 39.7 bar and raises an event. The protection limits the capacity of the circuit until the pressure returns below the protection threshold.
   - ✔ **SYSAQUA 20 to 125** HPMax env.prot. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** HPMax env.prot. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HPMax env.prot. Circuit 2
2. **Safeguard:** is triggered when the pressure increases despite being under protection, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** HPMax envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** HPMax envelope Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HPMax envelope Circuit 2
3. **Electro-mechanical safeguard:** is triggered when the pressure increases despite the safeguard. The pressure switch cuts off the 230V power supply to the compressor relays. An alarm is raised and the circuit concerned is suspended.
   - ✔ **SYSAQUA 20 to 125** High pr.detect. Circuit 1 (HP pressure switch, calibrated for 42bar)
   - ✔ **SYSAQUA 140 to 210 circuit 1** High pr.detect. Circuit 1 (HP1 pressure switch, calibrated for 45bar)
   - ✔ **SYSAQUA 140 to 210 circuit 2** High pr.detect. Circuit 2 (HP2 pressure switch, calibrated for 45bar)

8.3.6. PRESSURE RATIO

A ratio of (condensing pressure) / (evaporation pressure) too low or too high can damage the compressor

Two levels of protection against too low or too high a ratio are implemented:

1. **Safeguard level 1:** an alarm is triggered if the ratio is too low or too high and stops the circuit concerné. The alarm is automatically acknowledged after 3 minutes
   - ✔ **SYSAQUA 20 to 125** HP/BPmin.envel. Circuit 1 or HP/BPmax.envel. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** HP/BPmin.envel. Circuit 1 or HP/BPmax.envel. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HP/BPmin.envel. Circuit 2 or HP/BPmax.envel. Circuit 2
2. **Safeguard level 2:** is triggered if three stops by safeguard level 1 take place within 30 minutes, raises an alarm and suspends the circuit concerned.
   - ✔ **SYSAQUA 20 to 125** HP/BPmin.env.lck Circuit 1 or Pdc:PRmaxCnt
   - ✔ **SYSAQUA 140 to 210 circuit 1** HP/BPmin.env.lck Circuit 1 or HP/BPmax.env.lck Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** HP/BPmin.env.lck Circuit 2 or HP/BPmax.env.lck Circuit 2

8.4. FANS

The fans are protected from over-current by manual reset circuit breakers: In the case of modulating speed, the inverter fault report is wired in series.

➢ **SYSAQUA 20 to 125 :** the circuit breaker contact is connected in series with that of the compressors and the order controller and phase breaker. The "3phdet" alarm is triggered and stops the unit. The alarm is automatically acknowledged by reactivating the circuit breaker.

➢ **SYSAQUA 140 to 210 :** Two levels of protection are implemented.

1. **Safeguard level 1:** the alarm is triggered and suspends the circuit concerned. The alarm is automatically acknowledged after 3 minutes.
   - ✔ **circuit 1** Fault fan Circuit 1
   - ✔ **circuit 2** Fault fan Circuit 2
2. **Safeguard level 2:** is triggered if three stops by safeguard level 1 take place within 1 hour, raises an alarm and suspends the circuit concerned.
   - ✔ **circuit 1** Flt.fan klixon Circuit 1
   - ✔ **circuit 2** Flt.fan klixon Circuit 2

8.5. HYDRAULIC PUMPS

The pumps are protected from over-current by manual reset circuit breakers:

- **SYSAQUA 20 to 125 :** the circuit breaker contact (**FTWP**) is wired in series with the flow sensor and the "Lack of Water" pressure switch. Triggering is treated in the same way.(Refer to the § **WATER CIRCULATION**, page 31)
- **SYSAQUA 140 to 210 :**the circuit breaker contact (**FTWP**) is wired separately (in the case of modulating speed, the inverter fault report (**FDWP**) is wired in series). Triggering is treated in the same way as the safety system ensuring good water circulation. (Refer to the § **WATER CIRCULATION**, page 31)

8.6. ELECTRIC HEATING

The immersion heaters are protected from over-currents by manual reset circuit breakers (**FTEH1/2**).

The buffer storage tank is protected from overheating by an automatic reset thermostat (**FA**).

These safety devices are wired in series and disconnect the 230 V power supply to the immersion heater relays.

In the event of a fault, the “Flt. heater” alarm is triggered and shuts down the immersion heaters. It is automatically acknowledged by reactivating the circuit-breakers and resetting the thermostat.

Information

The QGEH disconnecting switch for the immersion heaters option has an additional safety contact used to determine the power supply status of the resistors by means of the same safety system.

Information

An insufficient water flow rate automatically cuts off the power supply for the immersion heaters.

8.7. TEMPERATURE AND PRESSURE SENSORS

When an analog sensor fails, the regulator disables a circuit or stops the unit and raises the alarm "*.openLoop" (e.g. sensor disconnected, broken wire) or the alarm "*.shortedLoop" (e.g. outside of read range). These alarms consign the circuit or the complete unit.(Refer to the § **LIST OF EVENTS**, page 62 / Refer to the § **LIST OF ALARMS**, page 63)

8.8. MISCELLANEOUS PROTECTIONS

8.8.1. ORDER CONTROLLER AND PHASE BREAKER

The controller, installed in the electrical panel at the head of the distribution of the phases to the equipment, ensures the correct direction of rotation of compressors, fans and hydraulic pumps.

- **SYSAQUA 20 to 125 :** the controller **KA1** is connected in series with the fan and compressor safety devices. Triggering is treated in the same way. (Refer to the § **COMPRESSORS**, page 33)
- **SYSAQUA 140 à 210 :** the controller **KA1** is connected in series with the pump 1 safety devices. Triggering is treated in the same way. (Refer to the § **HYDRAULIC PUMPS**, page 36)

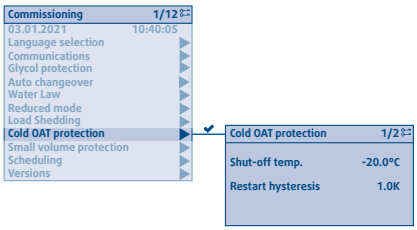
8.8.2. COOLANT LEAK

If condensation pressure is lower than 1 bar(g), an alarm is triggered and the circuit concerned is suspended..

- **SYSAQUA 20 to 125 :** Refrigerant level Circuit 1
- **SYSAQUA 140 to 210 circuit 1 :** Refrigerant level Circuit 1
- **SYSAQUA 140 to 210 circuit 2 :** Refrigerant level Circuit 2

8.8.3. FALL IN OUTSIDE TEMPERATURE

This protection enable the unit to be stopped before other protections if the outside temperature is too cold. The protection is activated when the temperature drops to -20 ° C (adjustable stop value) and is deactivated when the temperature rises to -19 ° C (adjustable hysteresis).



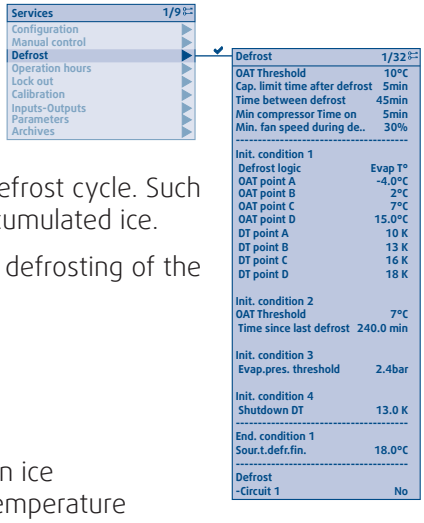
8.9. ERROR LOGGING OF THE UNIT

The triggering or repeated occurrence of an alarm after a certain lapse of time may reflect a problem with the unit's equipment or at installation level. To safeguard the equipment, the control suspends the unit or circuit concerned (Refer to the § **LIST OF EVENTS**, page 62 / Refer to the § **LIST OF ALARMS**, page 63).

8.10. DEFROST CYCLE

8.10.1. PRINCIPLES

When the unit is operating in heating mode and the outdoor temperature is cool, air humidity may freeze on contact with the fins. Over time, frost accumulates on the batteries, preventing proper heat transfer. These operating conditions degrade the performance of the unit and stress the compressors.



The regulator prevents excessive icing of the batteries by initiating a defrost cycle. Such a cycle consists in operating the unit in cooling mode to liquefy the accumulated ice.

On the **SYSAQUA** 140 to 210, the regulator prevents the simultaneous defrosting of the circuits.

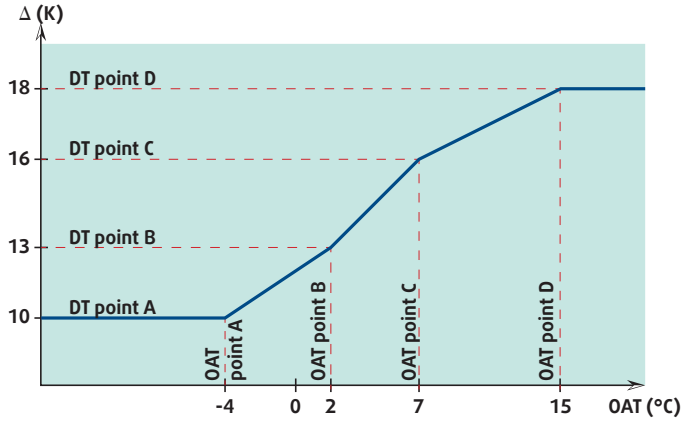
8.10.2. DEFROST CYCLE INIATIATION CONDITIONS

Four conditions can initiate the defrosting cycle:

1. **Difference in air / battery temperature (normal condition) :** when ice accumulates, the difference in outside temperature and battery temperature diverges. The regulator starts the cycle when the difference reaches a threshold value Δ and raises the event :

   - ✔ **SYSAQUA 20 to 125**
     Defrost req.delta temp. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1**
     Defrost req.delta temp. Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2**
     Defrost req.delta temp. Circuit 2

   The difference is calculated between the sensor **OAT** and, one of, evaporation temperature (by default) or the sensor **OCT**.
   The threshold value Δ depends on the outside temperature. The values "DT point *" and "OAT point *" can be adjusted.



2. **Delay between 2 cycles :** when air humidity is low, frost accumulates slowly but still creates stressful conditions for the compressors. The regulator starts the cycle if the circuit has run for 240min combined with an outside temperature lower than 7 ° C and raises the event "Deice OAT"

3. **Fall in evaporation pressure (protection condition) :** some ice accumulations can lead to a rapid fall in evaporation pressure. The regulator starts the cycle if the evaporation pressure drops to 2.4 bar and raises the event :

   - ✔ **SYSAQUA 20 to 125** Deice low BP Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** Deice low BP Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** Deice low BP Circuit 2

4. **Drying prior to circuit stop :** when a circuit is about to stop because the unit is close to the set-point and the batteries are slightly frosted (temperature difference with outside air equal to 13 ° C), the regulator starts the cycle so that the batteries are dry for the next start and raises the event :

   - ✔ **SYSAQUA 20 to 125** Defrost before shutdown Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** Defrost before shutdown Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** Defrost before shutdown Circuit 2.

8.10.3. CYCLE STOPPAGE CONDITIONS

Three conditions can stop the defrosting cycle:

1. **Dry battery (normal condition) :** the battery is considered to be dry when the temperature reaches 18°C (adjustable between 16 and 20°C)
2. **Cycle too long :** the regulator stops the cycle after 10 min and raises the alarm
   - ✔ **SYSAQUA 20 to 125** Time-out defrost Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** Time-out defrost Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** Time-out defrost Circuit2

   The alarm is automatically acknowledged after 3 minutes.
3. **Water temperature too low (protection condition) :** the regulator stops the cycle if the water flow temperature drops to 10 ° C and raises the event :
   - ✔ **SYSAQUA 20 to 125** Supply temp. defrost end Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 1** Supply temp. defrost end Circuit 1
   - ✔ **SYSAQUA 140 to 210 circuit 2** Supply temp. defrost end Circuit 2

9. USER INTERFACE

9.1. ORGANIZATION OF INFORMATION AND LEVEL OF ACCESS

The HMI allows the state of the unit to be visualized and certain adjustments to be made. The information displayed depends upon:

- the configuration of the unit: information not related to the unit do not appear
- the access level: information requiring a higher access level are not displayed

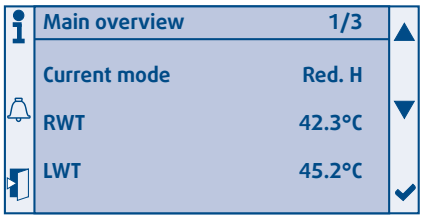
The information is organized into 5 menus.

Access level	Final user	Installer	Maintenance
Menu "Access"	✔	✔	✔
Menu "Status"	✔	✔	✔
Menu "Commissioning"	✘	✔	✔
Menu "Service"	✘	✘	✔
Menu "Alarms"	✔	✔	✔

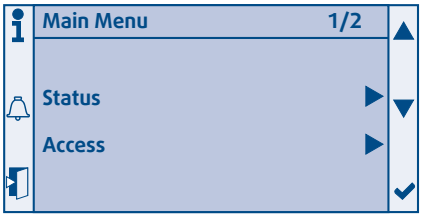
9.2. HOME PAGE AND MAIN MENU

The home page is used quickly display the state of the unit:

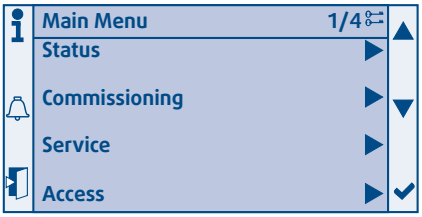
- Operating mode
- Water inlet temperature (RWT)
- Water outlet temperature (LWT)



The "Info" button i is used to alternate between the home page and the main menu, as well as to return to the main menu at any time. The main menu gives access to other menus depending on access level.



Final user



Maintenance

9.3. MENU "ACCESS"

The "Access" menu enables entry of the password corresponding to the desired level. A pictogram then shows the level of access.

Access level	Final user	Installer	Maintenance
Password	0000	0534	3260
Pictogram			

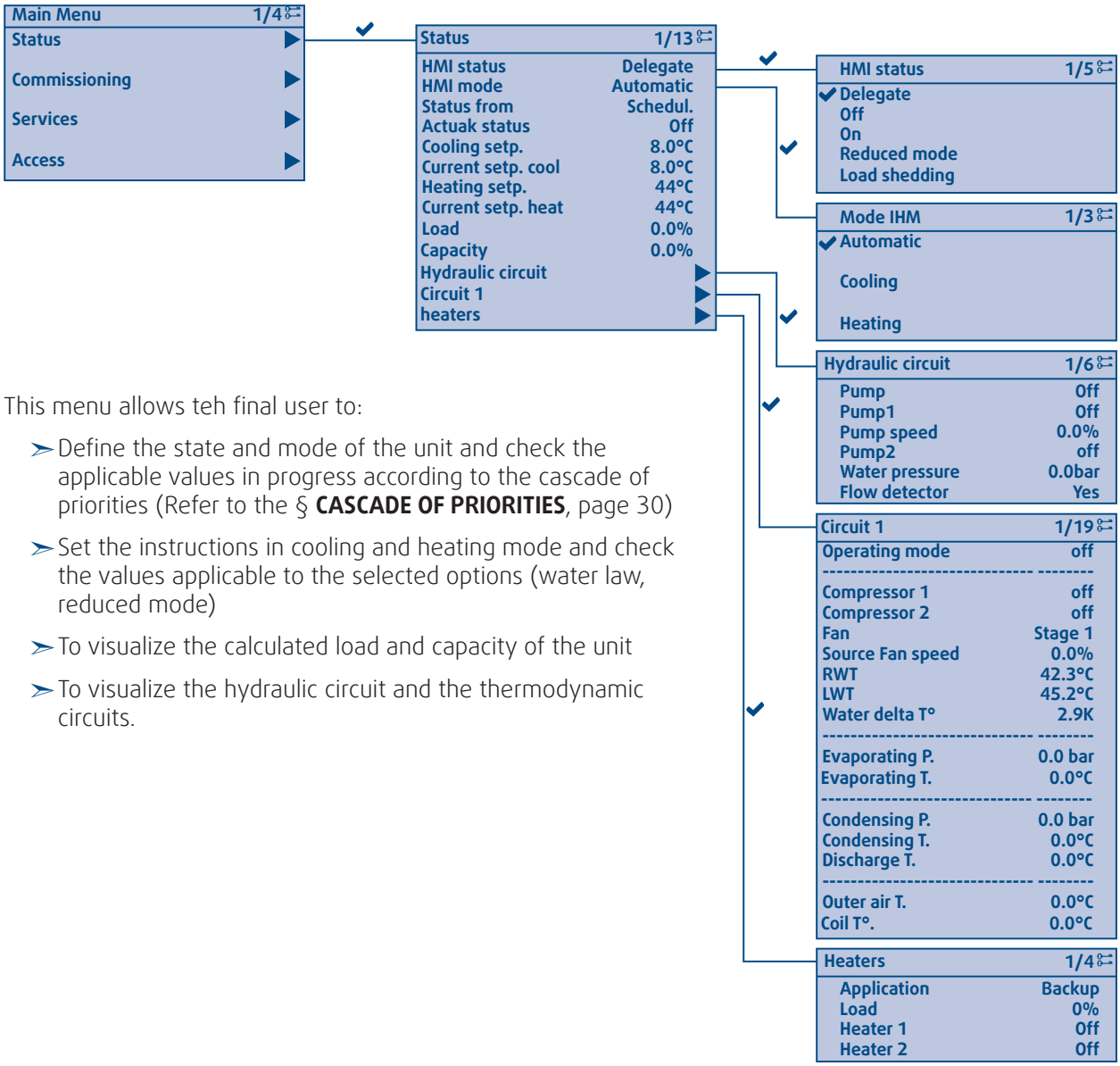
Caution

When the maintenance or installation phase is finished, set the access level to that of the "Final user" so as not to leave access to the information that are restricted.

Information

The access level is automatically reset to "Final user" level after a few minutes of inactivity.

9.4. STATUS MENU

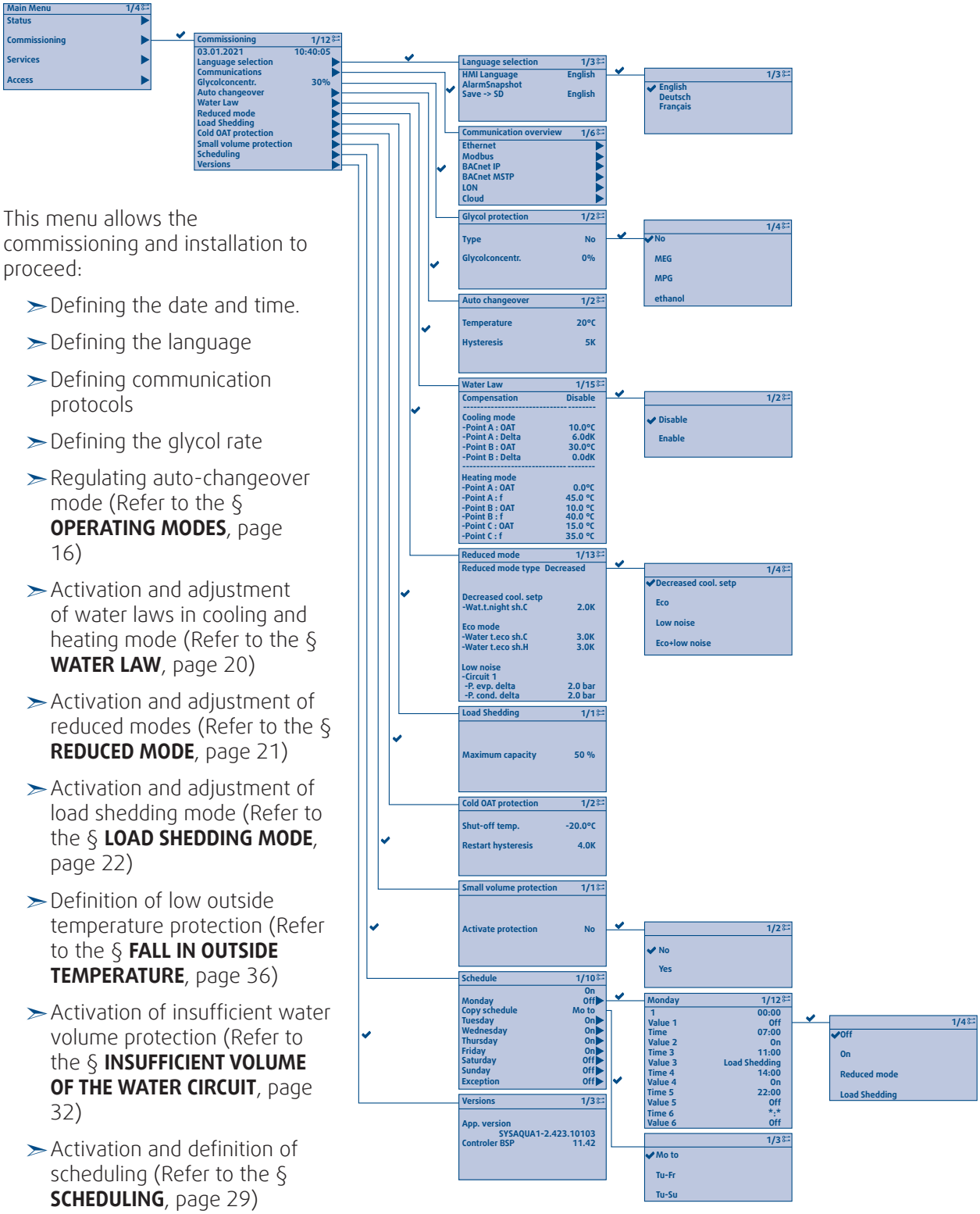


This menu allows teh final user to:

- Define the state and mode of the unit and check the applicable values in progress according to the cascade of priorities (Refer to the § **CASCADE OF PRIORITIES**, page 30)
- Set the instructions in cooling and heating mode and check the values applicable to the selected options (water law, reduced mode)
- To visualize the calculated load and capacity of the unit
- To visualize the hydraulic circuit and the thermodynamic circuits.

9.5. INSTALLATION MENU

Limited access with the "Installer" or "Maintenance".

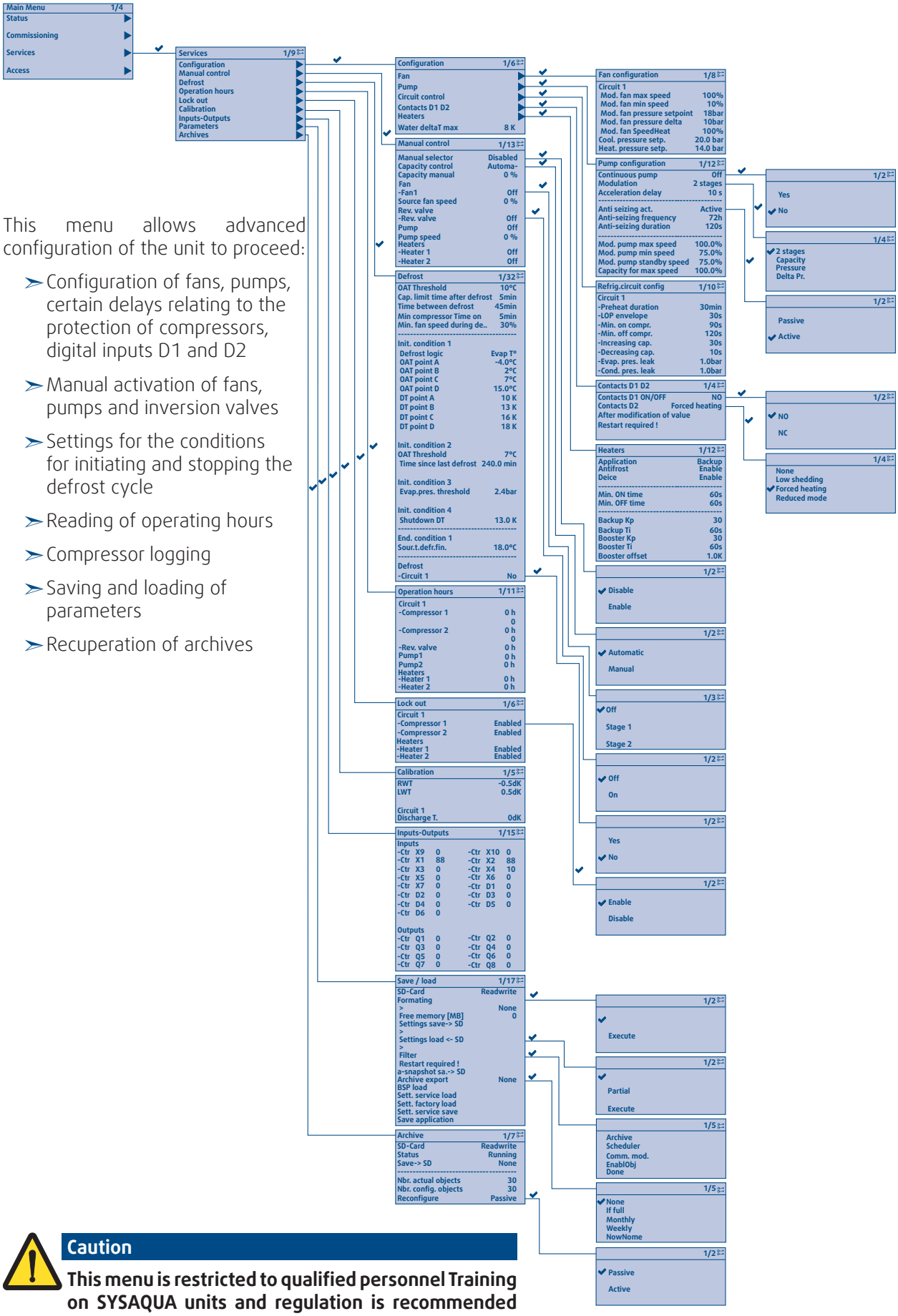


This menu allows the commissioning and installation to proceed:

- Defining the date and time.
- Defining the language
- Defining communication protocols
- Defining the glycol rate
- Regulating auto-changeover mode (Refer to the § **OPERATING MODES**, page 16)
- Activation and adjustment of water laws in cooling and heating mode (Refer to the § **WATER LAW**, page 20)
- Activation and adjustment of reduced modes (Refer to the § **REDUCED MODE**, page 21)
- Activation and adjustment of load shedding mode (Refer to the § **LOAD SHEDDING MODE**, page 22)
- Definition of low outside temperature protection (Refer to the § **FALL IN OUTSIDE TEMPERATURE**, page 36)
- Activation of insufficient water volume protection (Refer to the § **INSUFFICIENT VOLUME OF THE WATER CIRCUIT**, page 32)
- Activation and definition of scheduling (Refer to the § **SCHEDULING**, page 29)
- Visualization of application versions and regulator firmwares.

9.6. MAINTENANCE MENU

Limited access with the "Maintenance" profile.



This menu allows advanced configuration of the unit to proceed:

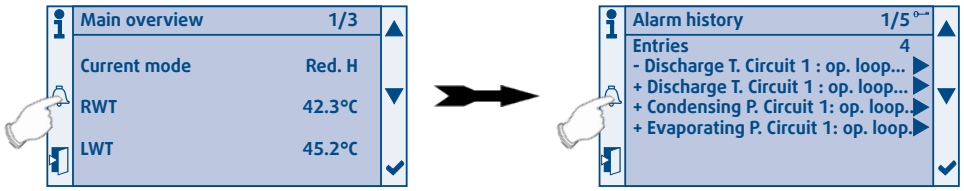
- Configuration of fans, pumps, certain delays relating to the protection of compressors, digital inputs D1 and D2
- Manual activation of fans, pumps and inversion valves
- Settings for the conditions for initiating and stopping the defrost cycle
- Reading of operating hours
- Compressor logging
- Saving and loading of parameters
- Recuperation of archives

Caution

This menu is restricted to qualified personnel Training on SYSAQUA units and regulation is recommended before using this menu

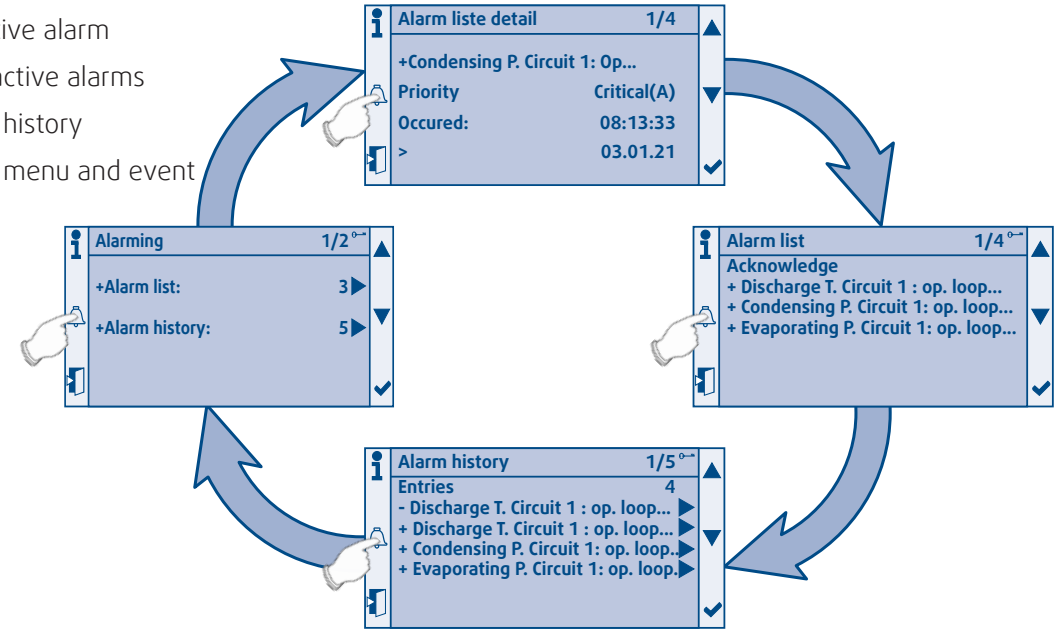
9.7. ALARMS MENU

If no alarm is active, pressing the "Alarm" button takes you to the alarm history



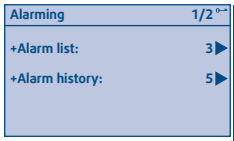
If at least one alarm or event is active, the alarm button flashes. Pressing the "alarm" button, will display successively :

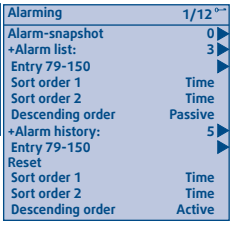
- The last active alarm
- The list of active alarms
- The alarms history
- The alarms menu and event



The information displayed in the "Alarming" menu depend on the access level

User	Installer	Maintenance	Alarms	
		✘	EventHistory	Display the events history
	✘	✘	AlarmSnapshot	Display unit state in the case of alarms
✘	✘	✘	+Alarm list:	Access the list of active alarms
	✘	✘	Sort order 1	Primary classification of active alarms
	✘	✘	Sort order 2	Secondary classification of active alarms
	✘	✘	Descending order	Classification direction of active alarms
✘	✘	✘	+Alarm history	Access the alarms history
	✘	✘	Reset	Reset the alarms history
	✘	✘	Sort order 1	Primary classification of the alarms history
	✘	✘	Sort order 2	Secondary classification of the alarms history
	✘	✘	Descending order	Classification direction of the alarms history
		✘	+Eventhistory	Access the events history
		✘	Reset	Reset the events history
		✘	Sort order 1	Primary classification of the events history
		✘	Sort order 2	Secondary classification of the events history
		✘	Descending order	Classification direction of the events history

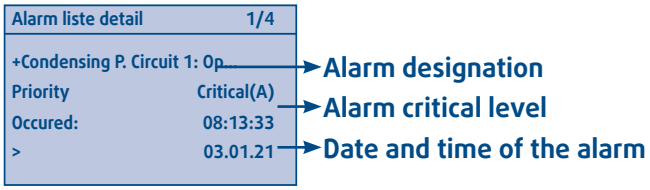




9.7.1. ALARM DETAILS

This page is displayed :

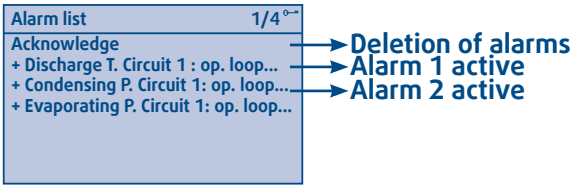
- Details of the last active alarm
- If you request the details of an alarm in the list of active alarms
- If you request the details of an alarm in the alarms history



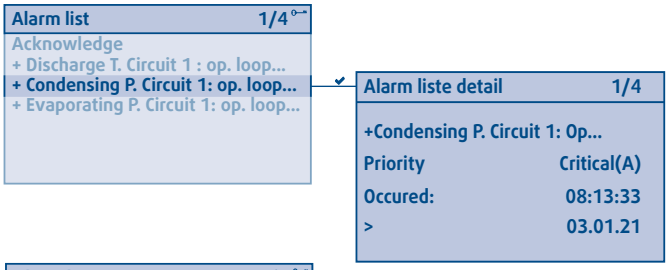
9.7.2. THE LIST OF ACTIVE ALARMS

The list of active alarms allows visualization of current alarms

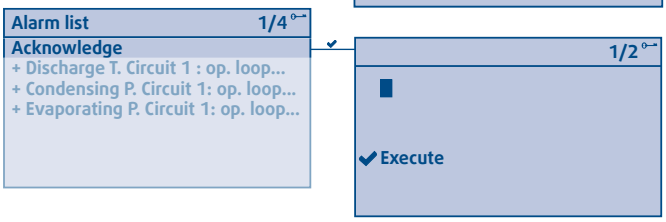
The first line shows the number of active alarms (3 in the example below)



You can access the alarm details by selecting an alarm and pressing the "Enter" button ✔.



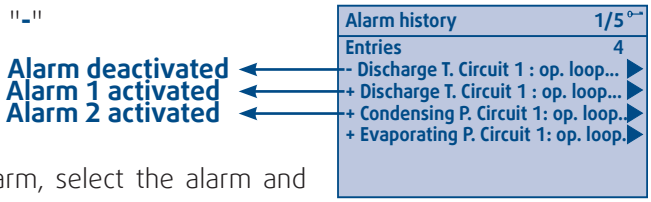
With installation or maintenance level access, you can acknowledge active blocking alarms. To do this select delete, confirm and select "Execute". Only the alarms that are no longer active will be deleted from the list.



9.7.3. ALARMS HISTORY

This history reports the 150 most recent activation or deactivation of alarms:

- Activation of an alarm will be indicated by a "**+**"
- Deactivation of an alarm will be indicated by a "**-**"

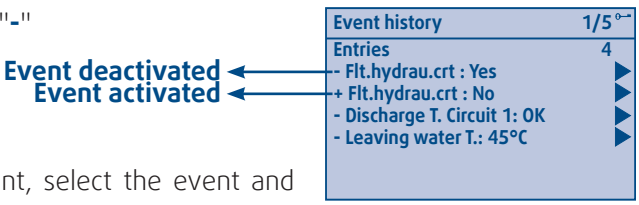


For the activation and deactivation time of an alarm, select the alarm and press the "enter" button ✔.

9.7.4. EVENTS HISTORY

This history reports the 150 most recent activation or deactivation of events:

- Activation of an event will be indicated by a "**+**"
- Deactivation of an event will be indicated by a "**-**"



For the activation and deactivation time of an event, select the event and press the "enter" button ✔.

10. AUTOMATIC ARCHIVING

10.1. SAVING ARCHIVES

Information

Activating this function requires integration of an SD card into the regulator.

The regulator records the variables of the unit in CSV format. The values are recorded according to the principle of the circular buffer in the controller internal memory.

The data is transferred to the standard SD card depending on the configuration set up during the installation.

- None: no automatic transfer
- If complete: automatic transfer as soon as internal memory is full._
- Monthly: automatic transfer every month
- Weekly: automatic transfer every week
- Hold.None: manual transfer

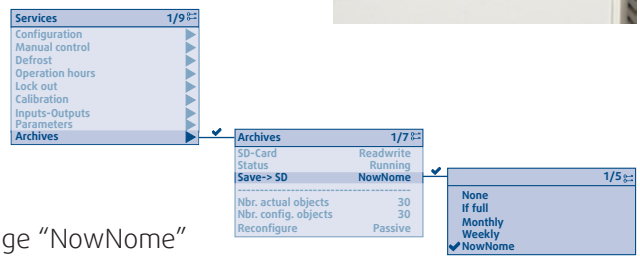
Caution

As soon as internal memory is full, the alarm appears without "ArchFull" lock-out

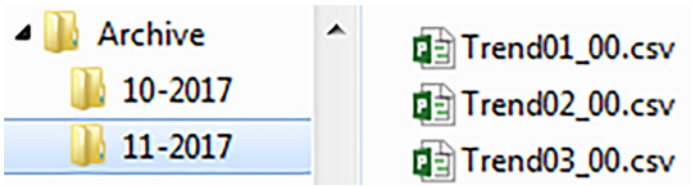
The following procedure allows for transferring archive files:

1. Put the SD card in read / write mode
2. Insert the SD card into the regulator

3. Access "Service" then go to the menu "Service ➤ Archives ➤ Save -> SD".
4. Press on “NowNome”
5. During the recuperation, the message “NowNome” is displayed.
6. When the recuperation has finished, the message “NowNome” is deleted.
7. Recover the SD card



The archive files are in csv. format The files are arranged in a chronological tree:



Information

The files saved onto the SD cards must be sent to a Systemair technician for analysis.

11. MANAGEMENT OF SITE AND APPLICATION PARAMETERS

11.1. SAVING OF PARAMETERS ON AN SD CARD

The unit parameters can be recovered with a standard SD card. This conserves a copy of he settings made during commissioning or after an intervention.

1. Insert the unlocked SD card into the regulator

POL 423

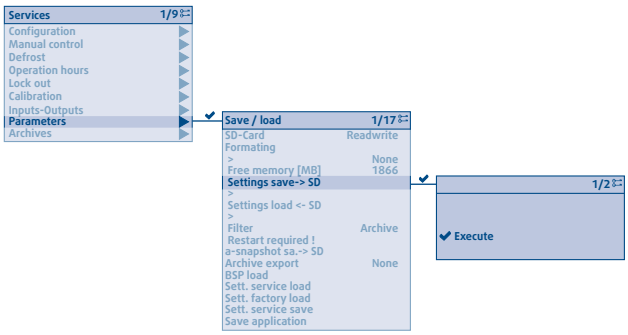
POL 687

POL 688

2. Access "Service" then go to the menu "parameters"

3. Select “Settings save -> SD"

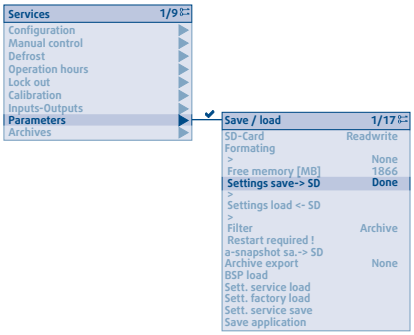
4. Press “Execute”



5. When the save is completed, the message “Done” is displayed

6. Switch off the regulator

7. Recover the SD card



8. Put the SD card in read only

11.2. RELOADING PARAMETERS FROM AN SD CARD

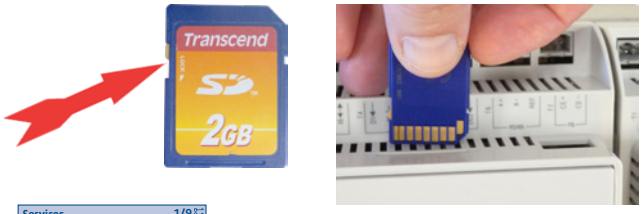
The unit parameters contained on the SD card can be reinserted into the regulator.

Caution

The SD card must contain only one parameters file (*.ucf)

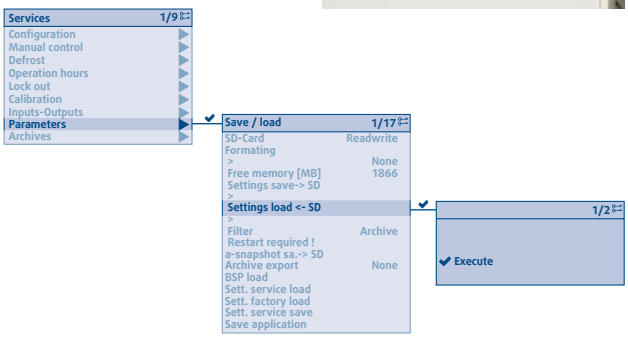
1. Switch on the regulator.

2. Insert the **locked** SD card into the regulator.

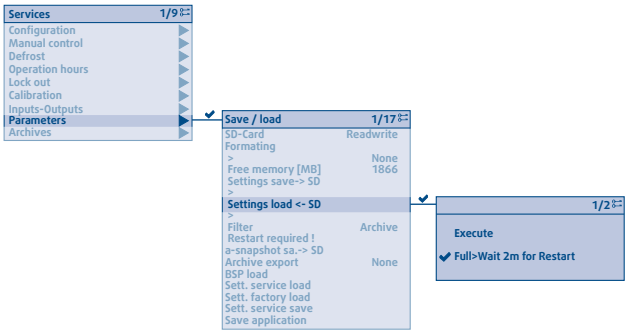


3. Access the "Maintenance" level, then go to "Maintenance ➤ Parameters ➤ Settings load. <- SD"

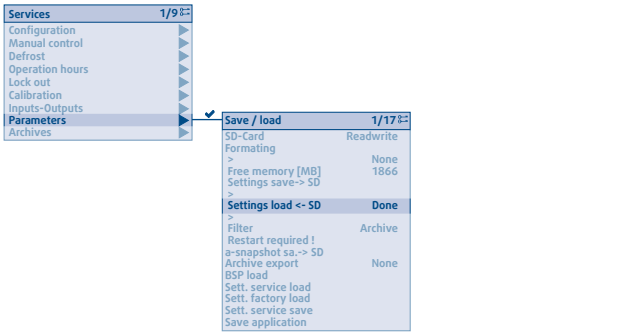
4. Select "Execute".



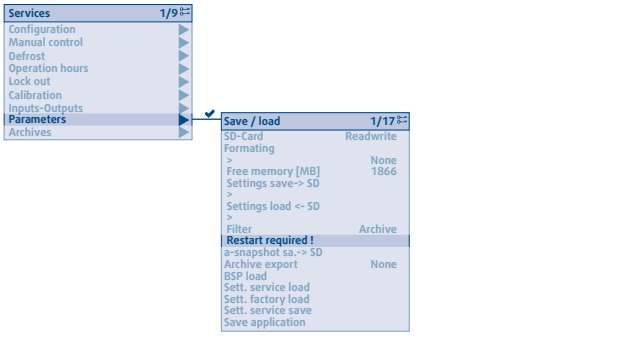
5. The "Full>Wait 2m for Restart" message appears.



6. When the loading is completed, the message "Done" is displayed



7. Wait 2min then press "Restart required!"



8. Recover the SD card.

12. COMMUNICATION

12.1. MODBUS

12.1.1. FACTORY CONFIGURATION

The configuration can be modified using the removable or remote HMI.

Setting	Default value	Range
Physical layer	RTU	RTU (RS485), TCP/IP (Ethernet)
RTU		
Address	1	1 ... 247
Speed	9600 bauds	2400, 4800, 9600, 19200, 38400
Parity	none	none, even, odd
Number of stop bits	1 bit	1 ... 2
TCP/IP		
DHCP	active	inactive, active

12.1.2. REGISTER AND FUNCTIONS

Table	Registry number	Permissions	Length	Type
Coil	1 – 9 999	RW	1 bit	Bit
State	10 001 – 19 999	R		
Input	30 001 – 39 999	R	16 bit	UW : unsigned word SW: signed word
Holding	40 001 – 49 999	RW		

Code	Command
1	Reading a coil register
2	Reading a state register
3	Reading a holding register
4	Reading an input register
5	Writing a coil register
6	Writing a holding register
15	Writing several coil registers
16	Writing several holding registers

12.1.3. MAPPING

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
UNIT STATUS								
remote operating status : 0 = time scheduler program 1 = OFF 2 = ON 3 = reduced mode 4 = load shedding	ComSta	enum	UW	1	0	40 001	✔	✔
remote operating mode: 1 = auto-changeover 2 = cooling 3 = heating	ComMod	enum	UW	1	0	40 002	✔	✔
HMI operating status : 0 = time scheduler program 1 = OFF 2 = ON 3 = reduced mode 4 = load shedding	OpModHMI	enum	UW	1	0	40 039	✔	✔
HMI operating mode: 1 = auto-changeover 2 = cooling 3 = heating	ChoHMI	enum	UW	1	0	40 040	✔	✔
control of operating status : 0 = time scheduler program 1 = HMI emergency OFF 2 = low OAT 3 = remote ON/OFF (DI1) 4 = reduced mode 5 = load shedding 6 = HMI 7 = communication	CtrlSta	enum	UW	1	0	30 001	✔	✔
control of operating mode: 0 = default 1 = SwiHtg (DI2) 2 = HMI 3 = communication 4 = AUTO 5 = LON	CtrlMod	enum	UW	1	0	30 002	✔	✔
current operating mode : 0 = OFF 1 = cooling 2 = cooling reduced mode 3 = cooling load shedding 4 = heating 5 = heating reduced mode 6 = heating load shedding	CurOp	enum	UW	1	0	30 003	✔	✔
EWT value	EWT	°C	SW	0.01	0	30 004	✔	✔
LWT value	LWT	°C	SW	0.01	0	30 005	✔	✔
OAT sensor value	OAT	°C	SW	0.01	0	30 006	✔	✔
requested load	Req	%	UW	0.01	0	30 007	✔	✔
produced capacity	Cap	%	UW	0.01	0	30 008	✔	✔
antifrost heater status : 0 = OFF 1 = ON	Heaters	enum	B	1	0	10 001	✔	✔
DI1 contact order: 0 = AUTO 1 = OFF	DI1	enum	B	1	0	10 002	✔	✔
DI2 contact state: 0 = open 1 = closed	DI2	enum	B	1	0	10 003	✔	✔

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
UNIT SETTINGS								
EWT/LWT setpoint								
cooling mode setpoint	SPC	°C	SW	0.01	0	40 003	✔	✔
heating mode setpoint	SPH	°C	SW	0.01	0	40 004	✔	✔
calculated cooling mode setpoint	SPC*	°C	SW	0.01	0	30 031	✔	✔
calculated heating mode setpoint	SPH*	°C	SW	0.01	0	30 032	✔	✔
Reduced mode								
reduced mode type : 0 = sub-cooling 1 = eco shift 2 = low noise 3 = eco shift + low noise		enum	UW	1	0	40 005	✔	✔
sub-cooling		K	SW	0.01	0	40 006	✔	✔
eco shift in cooling mode		K	SW	0.01	0	40 007	✔	✔
eco shift in heating mode		K	SW	0.01	0	40 008	✔	✔
circuit 1 low noise shift in cooling mode		bar	SW	0.01	0	40 009	✔	✔
circuit 1 low noise shift in heating mode		bar	SW	0.01	0	40 010	✔	✔
circuit 2 low noise shift in cooling mode		bar	SW	0.01	0	40 011	✘	✔
circuit 2 low noise shift in heating mode		bar	SW	0.01	0	40 012	✘	✔
Load shedding								
capacity upper limit	CapULm	%	UW	1	0	40 013	✔	✔
Water law								
water law activation: 0 = disabled 1 = enabled	WLAct	enum	B	1	0	20	✔	✔
cooling mode : point A OAT	WLCAT	°C	SW	0.01	0	40 014	✔	✔
cooling mode : point A delta	WLCAD	K	SW	0.01	0	40 015	✔	✔
cooling mode : point B OAT	WLCBT	°C	SW	0.01	0	40 016	✔	✔
cooling mode : point B delta	WLCBD	K	SW	0.01	0	40 017	✔	✔
heating mode : point A OAT	WLHAT	°C	SW	0.01	0	40 018	✔	✔
heating mode : point A f	WLHAF	°C	SW	0.01	0	40 019	✔	✔
heating mode : point B OAT	WLHBT	°C	SW	0.01	0	40 020	✔	✔
heating mode : point B f	WLHBF	°C	SW	0.01	0	40 021	✔	✔
heating mode : point C OAT	WLHCT	°C	SW	0.01	0	40 022	✔	✔
heating mode : point C f	WLHCF	°C	SW	0.01	0	40 023	✔	✔
Electrical heaters								
Function: 0 = Backup 1 = Booster	-	-	B	1	0	30	✔	✘
Availability for anti-frost protection: 0 = not available 1 = available	-	-	B	1	0	31	✔	✘
Availability for deice cycle: 0 = not available 1 = available	-	-	B	1	0	32	✔	✘
Backup proportional constant	BacKp	%/K	UW	1	0	40 050	✔	✘
Backup integral time	BacTi	s	UW	1	0	40 051	✔	✘
Booster proportional constant	BooKp	%/K	UW	1	0	40 052	✔	✘
Booster integral time	BooTi	s	UW	1	0	40 053	✔	✘
Booster offset	BooOff	K	UW	1	0	40 054	✔	✘
Cold OAT protection								
Shut-off temperature	OATOffLLm	°C	SW	0.01	0	40 024	✔	✔
Restart hysteresis	OATOffHys	K	UW	1	0	40 025	✔	✔

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
Time								
Hour		h	UW	1	0	40 119	✔	✔
Minute		min	UW	1	0	40 120	✔	✔
Second		s	UW	1	0	40 121	✔	✔
Year		year	UW	1	0	40 122	✔	✔
Month		month	UW	1	0	40 123	✔	✔
Day		day	UW	1	0	40 124	✔	✔
CIRCUIT VALUES								
Water pump								
Single pump status: 0 = OFF 1 = ON		-	B	1	0	10 004	✔	✔
Twin pump 1 status: 0 = OFF 1 = ON		-	B	1	0	10 005	✘	✔
Twin pump 2 status: 0 = OFF 1 = ON			B	1	0	10 006	✘	✔
Modulating pump speed		%	UW	1	0	30 035	✔	✔
Circuit 1								
Coil temperature	OCT	°C	SW	0.01	0	30 010	✔	✔
Evaporating pressure	BP	bar	UW	0.01	0	30 011	✔	✔
Condensing pressure	HP	bar	UW	0.01	0	30 012	✔	✔
Suction temperature	CST	°C	SW	0.01	0	30 013	✘	✔
Discharge temperature	CDT	°C	SW	0.01	0	30 014	✔	✔
Superheat	SH	K	SW	0.01	0	30 015	✘	✔
Reverse valve status: 0 = inactive 1 = active	RV	enum	B	1	0	10 010	✔	✔
Compressor 1 status: 0= OFF 1 = ON	C1	enum	B	1	0	10 011	✔	✔
Compressor 2 status: 0= OFF 1 = ON	C2	enum	B	1	0	10 012	✔	✔
Cranckcase heater status: 0 = OFF 1 = ON	CCH	enum	B	1	0	10 013	✘	✔
AC FAN status: 0 = NULL 1 = OFF 2 = Stage 1 3 = Stage 2		enum	UW	1	0	30 016	✔	✔
Modulating fan speed		%	UW	1	0	30 033	✔	✔
EEV position order		%	UW	1	0	30 017	✘	✔
Evaporating temperature		°C	SW	0.01	0	30 018	✔	✔
Condensing temperature		°C	SW	0.01	0	30 019	✔	✔

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
Circuit 2								
Coil temperature	OCT	°C	SW	0.01	0	30 020	✘	✔
Evaporating pressure	BP	barg	UW	0.01	0	30 021	✘	✔
Condensing pressure	HP	barg	UW	0.01	0	30 022	✘	✔
Suction temperature	CST	°C	SW	0.01	0	30 023	✘	✔
Discharge temperature	CDT	°C	SW	0.01	0	30 024	✘	✔
Superheat	SH	K	SW	0.01	0	30 025	✘	✔
Reverse valve status: 0 = inactive 1 = active	RV	enum	B	1	0	10 020	✘	✔
Compressor 1 status: 0= OFF 1 = ON	C1	enum	B	1	0	10 021	✘	✔
Compressor 2 status: 0= OFF 1 = ON	C2	enum	B	1	0	10 022	✘	✔
Cranckcase heater status: 0 = OFF 1 = ON	CCH	enum	B	1	0	10 023	✘	✔
AC FAN status: 0 = NULL 1 = OFF 2 = Stage 1 3 = Stage 2		enum	UW	1	0	30 026	✘	✔
Modulating fan speed		%	UW	1	0	30 034	✘	✔
EEV position order		%	UW	1	0	30 027	✘	✔
Evaporating temperature		°C	SW	0.01	0	30 028	✘	✔
Condensing temperature		°C	SW	0.01	0	30 029	✘	✔
Electrical heaters								
Requested load	Req	%	UW	0.01	0	30 036	✔	✘
Heater 1 status : 0 = OFF 1 = ON	Htr1	enum	B	1	0	10 024	✔	✘
Heater 2 status : 0 = OFF 1 = ON	Htr2	enum	B	1	0	10 025	✔	✘
ALARMS								
Unit								
Reset Alarm history 0 = not used 1 = Execute		enum	B	1	0	21	✔	✔
Reset Event history 0 = not used 1 = Execute		enum	B	1	0	22	✔	✔
Number of alarms		-	UW	1	0	30 030	✔	✔
Time setting: 0 = alarm inactive 1 = alarm active		enum	B	1	0	10 029	✔	✔
Flowswitch protection : 0 = alarm (flowrate too small) 1 = no alarm (flowrate OK)	-	enum	B	1	0	10 030	✔	✔
EWT sensor alarm : 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 031	✔	✔
LWT sensor alarm : 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 032	✔	✔

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
OAT sensor alarm : 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 033	✔	✔
Water pump 1 alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 034	✘	✔
Water pump 2 alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 035	✘	✔
Frost protection alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 036	✔	✔
Circuit 1								
OCT sensor alarm: 0 = no sensor alarm 1 = in sensor alarm	-	enum	B	1	0	10 050	✔	✔
LP sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 051	✔	✔
HP sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 052	✔	✔
CST sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 053	✔	✔
CDT sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 054	✔	✔
SH alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 055	✘	✔
X8 breakers alarm (POL423): 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 056	✔	✘
D1 breakers alarm (POL688): 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 056	✔	✘
Fan circuit breaker alarm (POL687): 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 056	✘	✔
C1 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 057	✘	✔
C2 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 058	✘	✔
HP switch alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 059	✔	✔

Variable	Symbol	Unit	Type	Gain	Off.	Registre	SYSAQUA 20 to 125	SYSAQUA 140 to 210
Circuit 2								
OCT sensor alarm: 0 = no sensor alarm 1 = in sensor alarm	-	enum	B	1	0	10 070	✘	✔
LP sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 071	✘	✔
HP sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 072	✘	✔
CST sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 073	✘	✔
CDT sensor alarm: 0 = sensor alarm inactive 1 = sensor alarm active	-	enum	B	1	0	10 074	✘	✔
SH alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 075	✘	✔
Fan circuit breaker alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 076	✘	✔
C1 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 077	✘	✔
C2 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 078	✘	✔
HP switch alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 079	✘	✔
Electrical heaters								
Heaters alarm: 0 = alarm inactive 1 = alarm active	-	enum	B	1	0	10 080	✔	✘

12.2. BACNET

12.2.1. FACTORY CONFIGURATION

The configuration can be modified using the removable or remote HMI.

Maximum number of devices:

Speed	76800	38400	⩽ 19200
Number of devices	64	32	Not recommended

12.2.1.1. SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

Setting	Default value	Range
Address MS/TP Mac	1	1 ... 254
Master Device Addresses	1	1 ... 127
Slave Device Addresses	128	128 ... 254
Speed	76800 bauds	9600, 19200, 38400, 76800
Max info Frames	1	1 ... 32

12.2.1.2. SYSAQUA 140/150/170/190/210

Setting	Default value	Range
Status	active	inactive, active
UDP port	47808	47808 ... 47823
Device ID	2906	2906.....

12.2.2. MAPPING

Variable	Name	Name	Perm.	Type	Address	SYSAQUA 20 to 125	SYSAQUA 140 to 210
UNIT STATUS							
remote operating status : 1 = time scheduler program 2 = OFF 3 = ON 4 = reduced mode 5 = load shedding	ComSta	enum	RW	MS Value	60483	✔	✔
remote operating mode: 1 = heating 2 = cooling 3 = auto-changeover	ComMod	enum	RW	MS Value	34708	✔	✔
control of operating status : 1 = time scheduler program 2 = HMI emergency OFF 3 = low OAT 4 = remote ON/OFF (DI1) 5 = reduced mode (DI2) 6 = load shedding (DI2) 7 = HMI 8 = communication	CtrlSta	enum	R	MS Value	61037	✔	✔
control of operating mode: 2 = SwiHtg (DI2) 3 = HMI 4 = communication 5 = AutoChOv	CtrlMod	enum	R	MS Value	34234	✔	✔
actual operating mode : 1 = OFF 2 = cooling 3 = cooling reduced mode 4 = cooling load shedding 5 = heating 6 = heating reduced mode 7 = heating load shedding	CurOp	enum	R	MS Value	34983	✔	✔
entering water temperature	EWT	°C	R	Analog Input	109078	✔	✔
leaving water temperature	LWT	°C	R	Analog Input	100614	✔	✔
outer air temperature	OAT	°C	R	Analog Input	120124	✔	✔
requested load	Req	%	R	Analog Value	148194	✔	✔
produced capacity	Cap	%	R	Analog Value	138821	✔	✔
antifrost heater status : 0 = OFF 1 = ON	Heaters	enum	R	Binary Output	86162	✔	✔
DI1 contact order: 0 = AUTO 1 = OFF	DI1	enum	R	Binary Input	101546	✔	✔
DI2 contact state: 0 = open 1 = closed	DI2	enum	R	Binary Input	123149	✔	✔
UNIT SETTINGS							
EWT/LWT setpoint							
cooling mode setpoint	SPC	°C	RW	Analog Value	62388	✔	✔
heating mode setpoint	SPH	°C	RW	Analog Value	17119	✔	✔
calculated cooling mode setpoint	SPC*	°C	R	Analog Value	43886	✔	✔
calculated heating mode setpoint	SPH*	°C	R	Analog Value	6661	✔	✔
Reducted mode							
reduced mode type : 1 = sub-cooling 2 = eco shift 3 = low noise 4 = eco shift + low noise	RMTyp	enum	RW	MS Value	44236	✔	✔

Variable	Name	Name	Perm.	Type	Address	SYSAQUA 20 to 125	SYSAQUA 140 to 210
sub-cooling	RMAccDec	K	RW	Analog Value	61647	✔	✔
eco shift in cooling mode	RMEcoDecC	K	RW	Analog Value	19350	✔	✔
eco shift in heating mode	RMEcoDecH	K	RW	Analog Value	34868	✔	✔
circuit 1 low noise shift in cooling mode	RMLNRfCrt1DecC	bar	RW	Analog Value	223443	✔	✔
circuit 1 low noise shift in heating mode	RMLNRfCrt1DecH	bar	RW	Analog Value	245372	✔	✔
circuit 2 low noise shift in cooling mode	RMLNRfCrt2DecC	bar	RW			✘	✔
circuit 2 low noise shift in heating mode	RMLNRfCrt2DecH	bar	RW			✘	✔
Load shedding							
capacity upper limit	CapULm	%	RW	Analog Value	20968	✔	✔
Water law							
water law activation: 1 = disabled 2 = enabled	WLAct	enum	RW	MS Value	20252	✔	✔
cooling mode : point A OAT	WLCAT	°C	RW	Analog Value	49973	✔	✔
cooling mode : point A delta	WLCAD	K	RW	Analog Value	6888	✔	✔
cooling mode : point B OAT	WLCBT	°C	RW	Analog Value	28471	✔	✔
cooling mode : point B delta	WLCBD	K	RW	Analog Value	46826	✔	✔
heating mode : point A OAT	WLHAT	°C	RW	Analog Value	10236	✔	✔
heating mode : point A f	WLHAF	°C	RW	Analog Value	8986	✔	✔
heating mode : point B OAT	WLHBT	°C	RW	Analog Value	14301	✔	✔
heating mode : point B f	WLHBF	°C	RW	Analog Value	15459	✔	✔
heating mode : point C OAT	WLHCT	°C	RW	Analog Value	26488	✔	✔
heating mode : point C f	WLHCF	°C	RW	Analog Value	55364	✔	✔
Electrical heaters Function: 1 = Backup 2 = Booster	HtrFnct	°C	RW	MS Value	8126	✔	✘
Availability for ant-frost protection: 1 = not available 2 = available	HtrEnAntiFrost	°C	RW	MS Value	34522	✔	✘
Availability for deice cycle: 1 = not available 2 = available	HtrEnDeice	°C	RW	MS Value	61217	✔	✘
Backup proportional constant	HtrBacKp	°C	RW	Analog Value	27402	✔	✘
Backup integral time	HtrBacTi	°C	RW	Analog Value	64351	✔	✘
Booster proportional constant	HtrBooKp	°C	RW	Analog Value	48177	✔	✘
Booster integral time	HtrBooTi	°C	RW	Analog Value	11364	✔	✘
Booster offset	HtrBooOff	°C	RW	Analog Value	11810	✔	✘
Cold OAT protection							
shut-off temperature	OATOffLLm	°C	RW	Analog Value	115351	✔	✔
restart hysteresis	OATOffHys	K	RW	Analog Value	127985	✔	✔
CIRCUIT VALUES							
Water pump							
Single pump status: 0 = OFF 1 = ON	WSP	-	R	Binary Output	111819	✔	✔
Twin pump 1 status: 0 = OFF 1 = ON	WTP1	-	R			✔	✔
Twin pump 2 status: 0 = OFF 1 = ON	WTP2		R			✔	✔
Modulating pump speed	WPSpeed	%	R	Analog Output	123839	✔	✔

Variable	Name	Name	Perm.	Type	Address	SYSAQUA 20 to 125	SYSAQUA 140 to 210
Circuit 1							
Coil temperature	RfCrt1 OCT	°C	R	Analog Input	106613	✔	✔
Evaporating pressure	RfCrt1 LP	barg	R	Analog Input	122581	✔	✔
Condensing pressure	RfCrt1 HP	barg	R	Analog Input	129691	✔	✔
Suction temperature	RfCrt1 CST	°C	R			TBC	✔
Discharge temperature	RfCrt1 CDT	°C	R	Analog Input	116762	✔	✔
Superheat	RfCrt1 SH	K	R			TBC	✔
Reverse valve status: 0 = inactive 1 = active	RfCrt1 RV	enum	R	Binary Output	92685	✔	✔
Compressor 1 status: 0= OFF 1 = ON	RfCrt1 C1	enum	R	Binary Output	124122	✔	✔
Compressor 2 status: 0= OFF 1 = ON	RfCrt1 C2	enum	R	Binary Output	119993	✔	✔
Cranckcase heater status: 0 = OFF 1 = ON	RfCrt1 CCH	enum	R			✘	✔
AC FAN status: 0 = NULL 1 = OFF 2 = Stage 1 3 = Stage 2	RfCrt1 AC Fan	enum	R	MS Output	93630	✔	✔
Modulating fan speed	RfCrt1 Mod Fan	%	R	Analog Output	126742	✔	✔
EEV position order	RfCrt1 EEV	%	R			✘	✔
Evaporating temperature	RfCrt1 TEvp	°C	R	Analog Input	70692	✔	✔
Condensing temperature	RfCrt1 TCdn	°C	R	Analog Input	77930	✔	✔
Circuit 2							
Coil temperature	RfCrt2 OCT	°C				✘	✔
Evaporating pressure	RfCrt2 LP	barg	R			✘	✔
Condensing pressure	RfCrt2 HP	barg	R			✘	✔
Suction temperature	RfCrt2 CST	°C	R			✘	✔
Discharge temperature	RfCrt2 CDT	°C	R			✘	✔
Superheat	RfCrt2 SH	K	R			✘	
Reverse valve status: 0 = inactive 1 = active	RfCrt2 RV	enum	R			✘	✔
Compressor 1 status: 0= OFF 1 = ON	RfCrt2 C1	enum	R			✘	✔
Compressor 2 status: 0= OFF 1 = ON	RfCrt2 C2	enum	R			✘	✔
Cranckcase heater status: 0 = OFF 1 = ON	RfCrt2 CCH	enum	R			✘	✔
AC FAN status: 0 = NULL 1 = OFF 2 = Stage 1 3 = Stage 2	RfCrt2 AC Fan	enum	R			✘	✔
Modulating fan speed	RfCrt2 Mod Fan	%	R			✘	✔
EEV position order	RfCrt2 EEV	%	R			✘	✔
Evaporating temperature	RfCrt2 TEvp	°C	R			✘	✔
Condensing temperature	RfCrt2 TCdn	°C	R			✘	✔
Electrical heaters							
Requested load	HtrReq	%	R	Analog Value	133816	✔	✘
Heater 1 status: 0 = OFF 1 = ON	Htr1	enum	R	Binary Output	126599	✔	✘

Variable	Name	Name	Perm.	Type	Address	SYSAQUA 20 to 125	SYSAQUA 140 to 210
Heater 2 status: 0 = OFF 1 = ON	Htr2	enum	R	Binary Output	122596	✔	✘
ALARMS							
Unit							
Time setting: 0 = alarm inactive 1 = alarm active	Alm Time Setting	enum	R			✔	✔
Flowswitch protection : 0 = alarm (flowrate too small) 1 = no alarm (flowrate OK)	Alm Hyd	enum	R			✔	✔
Water pump 1 alarm: 0 = alarm inactive 1 = alarm active	Alm Frost	enum	R			✔	✔
Water pump 2 alarm: 0 = alarm inactive 1 = alarm active	Alm reset	enum	R			✔	✔
Frost protection alarm: 0 = alarm inactive 1 = alarm active	Wrn reset	enum	R			✔	✔
Circuit 1							
X8 breakers alarm (P0L423): 0 = alarm inactive 1 = alarm active	Alm RfCrt1 X8	enum	R			✔	✘
D1 breakers alarm (P0L688): 0 = alarm inactive 1 = alarm active	Alm RfCrt1 D1	enum	R			✔	✘
Fan circuit breaker alarm (P0L687): 0 = alarm inactive 1 = alarm active	Alm RfCrt1 Fan	enum	R			✘	✔
C1 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt1 C1	enum	R			✘	✔
C2 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt1 C2	enum	R			✘	✔
HP switch alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt1 HP switch	enum	R			✔	✔
Circuit 2							
Fan circuit breaker alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt2 Fan	enum	R			✘	✔
C1 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt2 C1	enum	R			✘	✔
C2 circuit breaker alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt2 C2	enum	R			✘	✔
HP switch alarm: 0 = alarm inactive 1 = alarm active	Alm RfCrt2 HP switch	enum	R			✘	✔
Electrical heaters							
Heaters security: 0 = inactive 1 = active	HtrFlt	enum	R	Binary Input	110414	✔	✘

English

13. OVERVIEW OF THE HMI

13.1. SYSAQUA 20/25/30/35/40/45/55/65/75/90/105/125

Main overview

Current mode	Red. H
RWT	42.3°C
LWT	45.2°C

Main Menu

Status
Commissioning
Services
Access

Status

HMI status	Delegate
HMI mode	Automatic
State from	Schedul.
Actual status	Off
Cooling setp.	8.0°C
Current setp. cool	8.0°C
Heating setp.	44°C
Current setp. heat	44°C
Load	0.0%
Capacity	0.0%
Hydraulic circuit	
Circuit 1	
heaters	

Commissioning

03.01.2021	10:40:05

Language selection
Communications
Glycol protection
Auto changeover
Water Law
Reduced mode
Load Shedding
Cold OAT protection
Small volume protection
Scheduling
Versions

Services

Configuration
Manual control
Defrost
Operation hours
Lock out
Calibration
Inputs-Outputs
Parameters
Archives

HMI status

✔Delegate
Off
On
Reduced mode
Load shedding

HMI mode

✔Automatic
Cooling
Heating

Hydraulic circuit

Pump	Off
Pump1	Off
Pump speed	0.0%
Pump2	off
Water pressure	0.0bar
Flow detector	Yes

Circuit 1

Operating mode	off
Compressor 1	off
Compressor 2	off
Source Fan	Stage 1
Source Fan	0.0%
RWT	42.3°C
LWT	45.2°C
Water delta T°	2.9K
Evaporating P.	0.0 bar
Evaporating T.	0.0°C
Condensing P.	0.0 bar
Condensing T.	0.0°C
Discharge T.	0.0°C
Outer air T.	0.0°C
Coil T°.	0.0°C

Heaters

Application	Backup
Load	0%
Heater 1	Off
Heater 2	Off

Language selection

HMI Language	English
AlarmSnapshot	
Save -> SD	English

Communication overview

Ethernet ▶
Modbus ▶
BACnet IP ▶
BACnet MSTP ▶
LON ▶
Cloud ▶

Glycol protection

Type	No
Glycolconcentr.	0%

Auto changeover

Temperature	20°C
Hysteresis	5K

Water Law

Compensation	Enable
Cooling mode	
-Point A : OAT	10.0°C
-Point A : Delta	6.0dK
-Point B : OAT	30.0°C
-Point B : Delta	0.0dK
Heating mode	
-Point A : OAT	0.0°C
-Point A : f	45.0 °C
-Point B : OAT	10.0 °C
-Point B : f	40.0 °C
-Point C : OAT	15.0 °C
-Point C : f	35.0 °C

Reduced mode

Reduced mode type	Decreased
Decreased cool. setp	
-Wat.t.night sh.C	2.0K
Eco mode	
-Water t.eco sh.C	3.0K
-Water t.eco sh.H	3.0K
Low noise	
-Circuit 1	
-P. evp. delta	2.0 bar
-P. cond. delta	2.0 bar

Load Shedding

Maximum capacity	50 %

Cold OAT protection

Shut-off temp.	-20.0°C
Restart hysteresis	1.0K

Small volume protection

Small volume protection	No

Schedule

	On
Monday	Off ▶
Copy schedule	Mo to
Tuesday	On ▶
Wednesday	On ▶
Thursday	On ▶
Friday	On ▶
Saturday	Off ▶
Sunday	Off ▶
Exception	Off ▶

Versions

App. version	
	SYSAQUA1-2.423.10103
Controler BSP	11.42

Configuration

Fan	▶
Pump	▶
Circuit control	▶
Contacts D1 D2	▶
dT ret./sup. temp	20K ▶
Control on	Entering water T.
Commissioning	▶
EEV	▶

Manual control

Manual selector	Disabled
Capacity control	Automa-
Capacity manual	0 %
Fan	
-Fan1	Off
Source fan speed	0 %
Rev. valve	
-Rev. valve	Off
Pump	Off
Pump speed	0 %
Heaters	
-Heater 1	Off
-Heater 2	Off

Defrost

OAT Threshold	10°C
Cap. limit time after defrost	5min
Time between defrost	45min
Min compressor Time on	5min
Min. fan speed during de..	30%
Init. condition 1	
Defrost logic	Evap T°
OAT point A	-4.0°C
OAT point B	2°C
OAT point C	7°C
OAT point D	15.0°C
DT point A	10 K
DT point B	13 K
DT point C	16 K
DT point D	18 K
Init. condition 2	
OAT Threshold	7°C
Time since last defrost	240.0 min
Init. condition 3	
Evap.pres. threshold	2.4bar
Init. condition 4	
Shutdown DT	13.0 K
End. condition 1	
Sour.t.defr.fin.	18.0°C
Defrost	
-Circuit 1	No

Operation hours

Circuit 1	
-Compressor 1	0 h
	0
-Compressor 2	0 h
	0
-Rev. valve	0 h
Pump1	0 h
Pump2	0 h
Heaters	
-Heater 1	0 h
-Heater 2	0 h

Lock out

Circuit 1	
-Compressor 1	Enabled
-Compressor 2	Enabled
Heaters	
-Heater 1	Enabled
-Heater 2	Enabled

Save / load

SD-Card	Readwrite
Formating	
>	None
Free memory [MB]	1866
Settings save-> SD	
>	
Settings load <- SD	
>	
Filter	Archive
Restart required !	
a-snapshot sa.-> SD	
Archive export	None
BSP load	
Sett. service load	
Sett. factory load	
Sett. service save	
Save application	

Archive

SD-Card	Readwrite
Status	Running
Save-> SD	None
Nbr. actual objects	30
Nbr. config. objects	30
Reconfigure	Passive

Fan configuration

Circuit 1	
Mod. fan max speed	100%
Mod. fan min speed	10%
Mod. fan pressure setpoint	18bar
Mod. fan pressure delta	10bar
Mod. fan SpeedHeat	100%
Cool. pressure setp.	20.0 bar

Pump configuration

Continuous pump	Off
Modulation	2 stages
Acceleration delay	10 s
Anti seizing act.	Active
Anti-seizing frequency	72h
Anti-seizing duration	120s
Mod. pump max speed	100.0%
Mod. pump min speed	75.0%
Mod. pump standby speed	75.0%
Capacity for max speed	100.0%

Refrig.circuit config

Forced defr.time	2min
Circuit 1	
-Preheat duration	30min
-LOP envelope	30s
-Min. on compr.	90s
-Min. off compr.	120s
-Evap. pres. leak	1.0bar
-Cond. pres. leak	1.0bar

Contacts D1 D2

Contacts D1 ON/OFF	NO
Contacts D2	None
After modification of value	
Restart required !	

Heaters

Application	Backup
Antifrost	Enable
Deice	Enable
Min. ON time	60s
Min. OFF time	60s
Backup Kp	30
Backup Ti	60s
Booster Kp	30
Booster Ti	60s
Booster offset	1.0K

Commissioning

Refrigerant	R410A
Producer type	Revers.
Pump	Single
Control on	Entering water T.
Modulation	2 Stages
Compressor type	Unequal
Source fan type	2 stages
Contact D2	None
Glycolconcentr.	0%
Energy counter	Disable
Heaters	Disable
Configuration	Done
CapNomCpr1	30.5kW
CapNomCpr2	22.8kW
HtrSet.CapNom	75.0kW
Settings	Done

13.2. SYSAQUA 140/150/170/190/210

Main overview

Current mode	Red. H
RWT	42.3°C
LWT	45.2°C

Main Menu

Status
Commissioning
Services
Access

Status

HMI state	Delegate
HMI mode	Automatic
State from	Schedul.
Mode from	HMI
Cooling setp.	8.0°C
Current setp. cool	8.0°C
Heating setp.	44°C
Current setp. heat	44°C
Load	0.0%
Capacity	0.0%
Hydraulic circuit	
Circuit 1	
Circuit 2	

Commissioning

03.02.2016	10:40:05

Language selection
Communications
Glycol protection
Auto changeover
Water Law
Reduced mode
Limited capacity
Cold OAT protection
Small volume protection
Calendar
Versions

Services

Configuration
Manual control
Defrost
Operation hours
Lock out
Calibration
Inputs-Outputs
Parameters
Archives

HMI state

✔ Delegate
Off
On
Reduced
Limited capacity

HMI mode

✔ Automatic
Cooling
Heating

Hydraulic circuit

Pump	Off
Pump1	Off
Pump speed	0.0%
Pump2	off
Water pressure	0.0bar
Flow detector	Yes

Circuit 1

Operating mode	off
Compressor 1	off
Compressor 2	off
Fan	Stage 1
Source Fan speed	0.0%
RWT	42.3°C
LWT	45.2°C
Water delta T°	2.9K
Evaporating P.	0.0 bar
Evaporating T.	0.0°C
Suction T.	0.0°C
Exp. valve	100%
Superheat	0.0dK
Condensing P.	0.0 bar
Condensing T.	0.0°C
Discharge T.	0.0°C
Outer air T.	0.0°C
Coil T°.	0.0°C

Language selection

HMI Language	English
+AlarmSnapshot	
Save -> SD	Français
+Modem	
SMS language	English

Communication overview

Ethernet
Modbus
BACnet IP
BACnet MSTP
LON
Cloud

Glycol protection

Type	No
Glycolconcentr.	0%

Auto change over

Pivot temperature	20°C
Pivot hysteresis	5K

Water Law

Compensation	Enable
Cooling mode	
-Point A : OAT	10.0°C
-Point A : Delta	6.0dK
-Point B : OAT	30.0°C
-Point B : Delta	0.0dK
Heating mode	
-Point A : OAT	0.0°C
-Point A : f	45.0 °C
-Point B : OAT	10.0 °C
-Point B : f	40.0 °C
-Point C : OAT	15.0 °C
-Point C : f	35.0 °C

Reduced mode

Reduced mode type	
Decreased cool. setp	
Decreased cool. setp	
-Wat.t.night sh.C	2.0K
Eco mode	
-Wat.t.eco sh.C	3.0K
-Wat.t.eco sh.H	3.0K
Low noise	
-Circuit 1	
-P. evp. delta	2.0 bar
-P. cond. delta	2.0 bar
-Circuit 2	
-P. evp. delta	2.0 bar
-P. cond. delta	2.0 bar

Limited capacity

Low load lim.	50 %

Cold OAT protection

Shut-off temp.	-20°C
Restart hysteresis	1K

Low water volume

Activate protection	No
SPH enveloppe limitation	
Offset	2.0K
Kp adaptation in cooling	
-temp dev.	2.0K
-Kp	2.0
Kp adaptation in heating	
-temp dev.	2.0K
-Kp	3.0

Calendar

	On
Monday	Off ▶
Copy schedule	Mo to
Tuesday	On ▶
Wednesday	On ▶
Thursday	On ▶
Friday	On ▶
Saturday	Off ▶
Sunday	Off ▶
Exception	Off ▶

Versions

App. version	
	112
Controler BSP	11.32
Extension BSP	10.32

Configuration

Fan	▶
Pump	▶
Circuit control	▶
Contacts D1 D2	▶
dT ret./sup. temp	20K ▶
Control on	Entering water T.
Commissioning	▶
EEV	▶

Manual control

Manual test	Disabled
Pump	Off
	0 %
Pump1	Off
Pump2	Off
Fan	
-Circuit 1	Off
	0 %
-Circuit 2	Off
	0 %
Reversing valve	
-Circuit 1	Off
-Circuit 2	Off
Exp. valve	
-Circuit 1	0 %
-Circuit 2	0 %

Deice

TOaDefr	15.0°C
DefrDlyForb	45min
DefrTiMinHtgOn	5min
Cir. 1 fan min spd	25%
Cir. 2 fan min spd	25%
Init. condition 1	
-OCt or TEvp	1.0
-DefrDTOAT1	2.0°C
-DefrDTOAT2	7.0°C
-DefrDTDT1	10.0 dK
-DefrDTDT2	13.0 dK
-DefrDTDT3	16.0 dK
-DefrDTDT4	18.0 dK
Init. condition 2	
-TOaPrvDefr	7.0°C
-Deice prev. delay	240min
Init. condition 3	
-PEvpDefrMin	2.4bar
Init. condition 4	
-dT defrost shutdown	9.0 K
End. condition 1	
-Dry coil temp.	18.0°C
Deice	
-Circuit 1	No
-Circuit 2	No

Operation hours

Circuit 1	
Compressor 1	0.0 h
	0
Compressor 2	0.0 h
	0
Reversing valve	0.0 h
Circuit 2	
Compressor 1	0.0 h
	0
Compressor 2	0.0 h
	0
Reversing valve	0
Pump1	0.0 h
Pump2	0.0 h

Lock out

Circuit 1	
-Compressor 1	Enabled
-Compressor 2	Enabled
-offCnd	AllCprAlm
Circuit 2	
-Compressor 1	Enabled
-Compressor 2	Enabled
-offCnd	AllCprAlm

Save / load

SD-Card	Readwrite
Settings save-> SD	
Set appli.default	
+Settings load <- SD	
Filter	
Restart required !	
Sett. service load	
Sett. factory load	
Sett. service save	
Sett. factory save	
a-snapshot sa.-> SD	
BSP load	

Archive

SD-Card	Readwrite
Status	Running
Save-> SD	None
Nbr. actual objects	30
Nbr. config. objects	30
Reconfigure	Passive

Fan configuration

Source fan type	Modulat.
Circuit 1	
-Mod. fan max speed	100%
-Mod. fan min speed	10%
-Mod. fan pressure se	18bar
-Mod. fan pressure de	10bar
Circuit 2	
-Mod. fan max speed	100%
-Mod. fan min speed	10%
-Mod. fan pressure se	18bar
-Mod. fan pressure de	10bar

Pump configuration

Pump	Single
Continuous pump	Off
Modulation	2 stages
Acceleration delay	10 s
Anti seizing act.	Active
Anti-seizing frequency	72h
Anti-seizing duration	120s
Mod. pump max speed	80.0%
Mod. pump min speed	40.0%
Mod. pump standby speed	20.0%
Capacity for max speed	100.0%
Wat. pres. setp.	8.0bar
Wat. press. val.	3.5bar

Refrig.circuit config

Forced defr.time	2min
Circuit 1	
-Preheat duration	30min
-LOP envelope	30s
-Min. on compr.	90s
-Min. off compr.	120s
-Evap. pres. leak	1.0bar
-Cond. pres. leak	1.0bar
Circuit 2	
-Preheat duration	30min
-LOP envelope	30s
-Min. on compr.	90s
-Min. off compr.	120s
-Evap. pres. leak	1.0bar
-Cond. pres. leak	1.0bar

Contacts D1 D2

Contacts D1 ON/OFF	NO
Contacts D2	None
After modification of value	
Restart required !	

Commissioning

Refrigerant	R410A
Producer type	Revers.
Pump	Single
Control on	Entering water T.
Modulation	2 Stages
Compressor type	Unequal
Source fan type	2 stages
Contact D2	None
Glycolconcentr.	0%
Configuration	Done
CapNomCpr1	41.3kW
CapNomCpr2	27.7kW
CapNomCpr1	41.3kW
CapNomCpr2	27.7kW
Settings	Done

14. LIST OF EVENTS

Message	Definition	Triggering threshold	Desc.
Defrost req.delta temp. Circuit 1	Defrosting by delta T	Variable according to OAT	§ 8.10. DEFROST CYCLE, page 37
Defrost req.delta temp. Circuit 2	Defrosting by delta T	Variable according to OAT	§ 8.10. DEFROST CYCLE, page 37
Defrost before shutdown Circuit 1	Defrosting prior to circuit stop	13K	§ 8.10. DEFROST CYCLE, page 37
Defrost before shutdown Circuit 2	Defrosting prior to circuit stop	13K	§ 8.10. DEFROST CYCLE, page 37
Supply temp. defrost end Circuit 1	Defrosting stopped due to cold water temperature	LWT<10°C	§ 8.10. DEFROST CYCLE, page 37
Supply temp. defrost end Circuit 2	Defrosting stopped due to cold water temperature	LWT<10°C	§ 8.10. DEFROST CYCLE, page 37
Deice low BP Circuit 1	defrosting by low evaporation pressure	FPE/FPE1<2.4bar	§ 8.10. DEFROST CYCLE, page 37
Deice low BP Circuit 2	defrosting by low evaporation pressure	FPE2<2.4bar	§ 8.10. DEFROST CYCLE, page 37
Flow dedector	Hydraulic line fault	/	§ 8.2. WATER CIRCUIT, page 31
Warn.frost prot.	Anti-freeze protection	According to glycol level	§ 8.2. WATER CIRCUIT, page 31
HPMax env.prot. Circuit 1	Max. condensation pressure protection	FPC/FPC1>39.7bar	§ 8.3. COMPRESSORS, page 33
HPMax env.prot. Circuit 2	Max. condensation pressure protection	FPC2>39.7bar	§ 8.3. COMPRESSORS, page 33
LOP.prot.envelo. Circuit 1	Min. evaporation pressure protection	FPE/FPE1 Cold: According to glycol level Heat: 3.44bar	§ 8.3. COMPRESSORS, page 33
LOP.prot.envelo. Circuit 2	Min. evaporation pressure protection	FPE2 Cold: According to glycol level Heat: 3.44bar	§ 8.3. COMPRESSORS, page 33
T.discharge.prot Circuit 1	High temperature protection CDT/CDT1	CDT/CDT1>125°C	§ 8.3. COMPRESSORS, page 33
T.discharge.prot Circuit 2	High temperature protection CDT2	CDT2>125°C	§ 8.3. COMPRESSORS, page 33
Pdc:SH.LowLim	low overheating	2°C	§ 8.3. COMPRESSORS, page 33
Pdc2:SH.LowLim	low overheating	2°C	§ 8.3. COMPRESSORS, page 33
Deice OAT	delayed defrosting	45mn	§ 8.10. DEFROST CYCLE, page 37

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
3-Phase dedector	Electrical line fault	unit	Cut-off of safety system POL423: X8 POL688: D1 POL687:DU2	1 time	Auto	3mn	§ 8.8. MISCELLANEOUS PROTECTIONS, page 36
Crt.hydrau.lck	Hydraulic line fault	unit	FlDet	3 alarms in 1 hour	Manual	/	§ 8.2. WATER CIRCUIT, page 31 § 8.5. HYDRAULIC PUMPS, page 36
Time-out defrost	Defrosting stopped because overlong	circuit	Defrosting time>10mn	1 time	Auto	3mn	§ 8.10. DEFROST CYCLE, page 37
Time-out defrost Circuit2	Defrosting stopped because overlong	circuit	Defrosting time>10mn	1 time	Auto	3mn	§ 8.10. DEFROST CYCLE, page 37
Pdc:ExpsVlv:no.Ouput	Fault in communication with electronic pressure reducing valve	circuit	/	1 time	Auto	3s	§ 8.8. MISCELLANEOUS PROTECTIONS, page 36
Pdc2:ExpsVlv:no.Ouput	Fault in communication with electronic pressure reducing valve	circuit	/	1 time	Auto	3s	§ 8.8. MISCELLANEOUS PROTECTIONS, page 36
Evap.p.defr.req.	defrosting by low evaporation pressure	circuit	Deice low BP Circuit 1	2 alarms in 1 hour	Auto	3mn	§ 8.10. DEFROST CYCLE, page 37
Evap.p.defr.req.cnt Circuit 2	defrosting by low evaporation pressure	circuit	Deice low BP Circuit 2	2 alarms in 1 hour	Auto	3mn	§ 8.10. DEFROST CYCLE, page 37
FltDeltaT	offset (LWT-EWT)	unit	8K	1 time	Manual	30s	§ 8.2. WATER CIRCUIT, page 31
Therm.flt.cpr1 Circuit 1	compressor circuit breaker C1.1 (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X6	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
Therm.flt.cpr2 Circuit 1	compressor circuit breaker C1.2 (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X7	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
Therm.flt.cpr1 Circuit 2	compressor circuit breaker C2.1 (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X6	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
Therm.flt.cpr2 Circuit 2	compressor circuit breaker C2.2 (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X7	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
Flt. heater	Immersion heaters line fault	Immersion heaters circuit	POL688:DL2 Cut-off of safety system	1 time	Auto	/	§ 8.6. ELECTRIC HEATING, page 36
Fault fan Circuit 1	Fault on fan line OFA/B (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X8	1 time	Auto	3mn	§ 8.4. FANS, page 35
Fault fan Circuit 2	Fault on fan line OFC/D (SYSAQUA 140 to 210)	circuit	Cut-off of safety system X8	1 time	Auto	3mn	§ 8.4. FANS, page 35
Flt.fan klixon Circuit 1	Fault on fan line OFA/B (SYSAQUA 140 to 210)	circuit	Fault fan Circuit 1	3 alarms in 1 hour	Manual	/	§ 8.4. FANS, page 35
Flt.fan klixon Circuit 2	Fault on fan line OFC/D (SYSAQUA 140 to 210)	circuit	Fault fan Circuit 2	3 alarms in 1 hour	Manual	/	§ 8.4. FANS, page 35
Fault supp.pump	single pump circuit breaker (SYSAQUA 140 to 210)	unit	Cut-off of safety system DU2	1 time	Auto	/	§ 8.5. HYDRAULIC PUMPS, page 36
Fault supp.pump 1	double pump circuit breaker no.1 (SYSAQUA 140 to 210)	/	Cut-off of safety system DU2	1 time	Auto	/	§ 8.5. HYDRAULIC PUMPS, page 36

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
Fault supp.pump 2	double pump circuit breaker no.2 (SYSAQUA 140 to 210)	/	Cut-off of safety system DL2	1 time	Auto	/	§ 8.5. HYDRAULIC PUMPS, page 36
Fault both pumps	General pump fault (SYSAQUA 140 to 210)	unit	Fault supp.pump 1 et Fault supp.pump 2	1 time	Auto	/	§ 8.5. HYDRAULIC PUMPS, page 36
Frost protection	Anti-freeze protection	unit	Warn.frost prot.	5 alarms in 1 hour	Manual	/	§ 8.2. WATER CIRCUIT, page 31
High pr.detect. Circuit 1	HP/HP1 pressure switch	circuit	42bar (SYSAQUA 20 to 120) 45bar (SYSAQUA 140 to 210)	1 time	Manual	3mn	§ 8.3. COMPRESSORS, page 33
HPMax envelope Circuit 1	Max. condensation pressure	circuit	FPC/FPC1>41.7bar	1 time	Manual	/	§ 8.3. COMPRESSORS, page 33
HPMin envelope Circuit 1	Min. condensation pressure	circuit	FPC/FPC1<4.46bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
HPMin envlp.lck Circuit 1	Min. condensation pressure	circuit	HPMin envelope Circuit 1	3 alarms in 1 hour	Manual	/	§ 8.3. COMPRESSORS, page 33
High pr.detect. Circuit 2	HP2 pressure switch	circuit	42bar (SYSAQUA 20 to 120) 45bar (SYSAQUA 140 to 210)	1 time	Manual	3mn	§ 8.3. COMPRESSORS, page 33
HPMax envelope Circuit 2	Max. condensation pressure	circuit	FPC2>41.7bar	1 time	Manual	/	§ 8.3. COMPRESSORS, page 33
HPMin envelope Circuit 2	Min. condensation pressure	circuit	FPC2<4.46bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
HPMin envlp.lck Circuit 2	Min. condensation pressure	circuit	HPMin envelope Circuit 2	3 alarms in 1 hour	Manual	/	§ 8.3. COMPRESSORS, page 33
LOP envelope Circuit 1	Min. evaporation pressure	circuit	FPE/FPE1 Cold: According to glycol level Heat: 2.44bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
LOP envlp.lck Circuit 1	Min. evaporation pressure	circuit	LOP envelope Circuit 1	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
LOP envelope Circuit 2	Min. evaporation pressure	circuit	FPE2 Cold: According to glycol level Heat: 2.44bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
LOP envlp.lck Circuit 2	Min. evaporation pressure	circuit	LOP envelope Circuit 2	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
MOP envelope Circuit 1	Max. evaporation pressure	circuit	FPE/FPE1>13.4bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
MOP envlp.lck Circuit 1	Max. evaporation pressure	circuit	MOP envelope Circuit 1	3 alarms in 1 hour	Manual	/	§ 8.3. COMPRESSORS, page 33
MOP envelope Circuit 2	Max. evaporation pressure	circuit	FPE2>13.4bar	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
MOP envlp.lck Circuit 2	Max. evaporation pressure	circuit	MOP envelope Circuit 2	3 alarms in 1 hour	Manual	/	§ 8.3. COMPRESSORS, page 33
No cpr.available Circuit 1	1 compressor unavailable	circuit	Exceeding internal timing C1.1 or C1.2	1 time	Auto	/	§ 8.3. COMPRESSORS, page 33
No cpr.available Circuit 2	1 compressor unavailable	circuit	Exceeding internal timing C2.1 or C2.2	1 time	Auto	/	§ 8.3. COMPRESSORS, page 33
Cpr/Fan Circuit 1	Tandem compressors unavailable	circuit	Exceeding internal timing C1.1 and C1.2	1 time	Auto	/	§ 8.3. COMPRESSORS, page 33
Cpr/Fan Circuit 2	Tandem compressors unavailable	circuit	Exceeding internal timing C2.1 and C2.2	1 time	Auto	/	§ 8.3. COMPRESSORS, page 33
Cpr.oil heating Circuit 1	Minimum preheating time for compressors	circuit	<30mn	1 time	Auto	30mn	§ 5.7. CARTER RESISTANCE, page 19

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
Cpr.oil heating Circuit 2	Minimum preheating time for compressors	circuit	<30mn	1 time	Auto	30mn	§ 5.7. CARTER RESISTANCE, page 19
Min.cond.press.	Sensor FPC/FPC1 at low limit	circuit	POL423: X2<0bar(g) POL688: X4<0bar(g) POL687: X2<0bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Condensing P.openLoop Circuit 1	Sensor FPC/FPC1 in open loop	circuit	Sensor disconnected POL423: X2 POL688: X4 POL687: X2	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Condensing P.shortedLoop Circuit 1	Sensor FPC/FPC1 in short circuit	circuit	POL423: X2>45bar(g) POL688: X4>45bar(g) POL687: X2>45bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Min.cond.press. Circuit 2	Sensor FPC2 at low limit	circuit	POL96: X12<0bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Condensing P.openLoop Circuit 2	Sensor FPC2 in open loop	circuit	Sensor disconnected POL96: X12	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Condensing P.shortedLoop Circuit 2	Sensor FPC2 in short-circuit	circuit	POL96: X12>45bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Min.evap.press.	Sensor FPE/FPE1 at low limit	circuit	POL423: X1<0bar(g) POL688: X3<0bar(g) POL687:X1<0bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Evaporating P.openLoop Circuit 1	Sensor FPE/FPE1 in open loop	circuit	Sensor disconnected POL423: X1 POL688: X3 POL687: X1	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Evaporating P.shortedLoop Circuit 1	Sensor FPE/FPE1 in short circuit	circuit	POL423: X1>45bar(g) POL688: X3>45bar(g) POL687: X1>45bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Min.evap.press. Circuit 2	Sensor FPE2 at low limit	circuit	POL96: X11<0bar(g)	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Evaporating P.openLoop Circuit 2	Sensor FPE2 in open loop	circuit	Sensor disconnected POL96: X11	1 time in 1s	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Evaporating P.shortedLoop Circuit 2	Sensor FPE2 in short-circuit	circuit	POL96: X11>45bar(g)	in	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
HP/BPmax.envel. Circuit 1	Max. pressure ratio	circuit	MAP compressor	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
HP/BPmax.env.lck Circuit 1	Max. pressure ratio	circuit	HP/BPmax.envel. Circuit 1	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
HP/BPmin.envel. Circuit 1	Min. pressure ratio	circuit	MAP compressor	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
HP/BPmin.env.lck Circuit 1	Min. pressure ratio	circuit	HP/BPmin.envel. Circuit 1	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
HP/BPmax.envel. Circuit 2	Max. pressure ratio	circuit	MAP compressor	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33
HP/BPmax.env.lck Circuit 2	Max. pressure ratio	circuit	HP/BPmax.envel. Circuit 2	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
HP/BPmin.envel. Circuit 2	Min. pressure ratio	circuit	MAP compressor	1 time	Auto	3mn	§ 8.3. COMPRESSORS, page 33

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
HP/BPmin.env.lck Circuit 2	Min. pressure ratio	circuit	HP/BPmin.envel. Circuit 2	3 times in 30 mins	Manual	/	§ 8.3. COMPRESSORS, page 33
Refrigerant level Circuit 1	Coolant leak, circuit 1	circuit	FPC/FPC1<1bar(g)	1 time	Manual	3mn	§ 8.8. MISCELLANEOUS PROTECTIONS, page 36
Refrigerant level Circuit 2	Coolant leak, circuit 2	circuit	FPC2<1bar(g)	1 time	Manual	3mn	§ 8.8. MISCELLANEOUS PROTECTIONS, page 36
Pdc:Discharge T.lowLimit	Sensor CDT/CDT1 at low limit	circuit	POL423: X7<-50°C POL688: X8<-50°C POL687: X4<-50°C	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc:Discharge T.openloop	Sensor CDT/CDT1 in open loop	circuit	Sensor disconnected POL423: X7 POL688: X8 POL687: X4	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc Discharge T.shortedloop	Sensor CDT/CDT1 in short circuit	circuit	POL423: X7>150°C POL688: X8>150°C POL687: X4>150°C	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc2Discharge T.lowLimit	Sensor CDT2 at low limit	circuit	POL96: X4<-50°C	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc2:Discharge T.openloop	Sensor CDT2 in open loop	circuit	Sensor disconnected POL96: X4	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc2:TDischarge T.shortedloop	Sensor CDT2 in short-circuit	circuit	POL96: X4>150°C	1 time in 1s	Auto	3mn	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
T.discharge.prot Circuit 1	High temperature protection CDT/CDT1	circuit	POL423: X7>130°C POL688: X8>130°C POL687: X4>130°C	1 time	Auto	POL423: X7<105°C POL688: X8<105°C POL687: X4<105°C	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
T.discharge.prot Circuit 2	High temperature protection CDT2	circuit	POL96: X4>130°C	1 time	Auto	POL96: X4<105°C	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Set date & time	Invalid date	unit	année=1970	1 time	Manual	/	§ 8.1. INTERNAL CLOCK, page 31
TOa.lowLimit	Sensor OAT at low limit	unit	POL423: B3<-20°C POL688: X2<-20°C POL687: B3<-20°C	1 time	Auto	POL423: B3>-16°C POL688: X2>-16°C POL687: B3>-16°C	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
TOa.openloop	Sensor OAT in open loop	unit	Sensor disconnected POL423: B3 POL688: X2 POL687: B3	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
TOa.shortedLoop	Sensor OAT in short-circuit	unit	POL423: B3>150°C POL688: X2>150°C POL687: B3>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
RWT.lowLimit	Sensor EWT at low limit	unit	According to glycol level POL423: B1<T°C POL688: X11<T°C POL687: B1<T°C	1 time	Auto	30mn time delay According to glycol level POL423: B1>T°C POL688: X11>T°C POL687: B1>T°C	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
RWT.openloop	Sensor EWT in open loop	unit	Sensor disconnected POL423: B1 POL688: X11 POL687: B1	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
RWT.shortedLoop	Sensor EWT in short-circuit	unit	POL423: B1>150°C POL688: X11>150°C POL687: B1>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.lowLimit Circuit 1	Sensor OCT/OCT1 at low limit	circuit	POL423: X6<-50°C POL688: X7<-50°C POL687: X5<-50°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.openloop Circuit 1	Sensor OCT/OCT1 in open loop	circuit	Sensor disconnected POL423: X6 POL688: X7 POL687: X5	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.shortedloop Circuit 1	Sensor OCT/OCT1 in short circuit	circuit	POL423: X6>150°C POL688: X7>150°C POL687: X5>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.lowLimit Circuit 2	Sensor OCT2 at low limit	circuit	POL96: X10<-50°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.openloop Circuit 2	Sensor OCT2 in open loop	circuit	Sensor disconnected POL96: X10	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Coil T.shortedloop Circuit 2	Sensor OCT2 in short-circuit	circuit	POL96: X10>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
LWT. lowLimit	Sensor LWT at low limit	unit	According to glycol level POL423: B2<T°C POL688: X1<T°C POL687: B2<T°C	1 time	Auto	According to glycol level POL423: B2>T°C POL688: X1>T°C POL687: B2>T°C	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
LWT.openloop	Sensor LWT in open loop	unit	Sensor disconnected POL423: B2 POL688: X1 POL687: B2	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36

Message	Definition	Lock-out	Triggering threshold	Occurrence	Reset	Deadlines	Desc.
LWT.shortedLoop	Sensor LWT in short-circuit	unit	POL423: B2>150°C POL688: X1>150°C POL687: B2>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.lowLimit Circuit 1	Sensor CST1 at low limit	circuit	POL687: X3<-50°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.openloop Circuit 1	Sensor CST1 in open loop	circuit	Sensor disconnected POL687: X3	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.shortedloop Circuit 1	Sensor CST1 in short-circuit	circuit	POL687: X3>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.lowLimit Circuit 2	Sensor CST2 at low limit	circuit	POL96: X9<-50°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.openloop Circuit 2	Sensor CST2 in open loop	circuit	Sensor disconnected POL96: X9	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Suction T.shortedloop Circuit 2	Sensor CST2 in short-circuit	circuit	POL96: X9>150°C	1 time	Auto	/	§ 8.7. TEMPERATURE AND PRESSURE SENSORS, page 36
Pdc:SHAlmCnt	Low overheating fault, circuit 1	circuit	Pdc:SH.LimitLow	3 alarms in 1 hour	Manual	3mn	§ 8.3. COMPRESSORS, page 33
Pdc2:SHAlmCnt	Low overheating fault, circuit 2	circuit	Pdc2:SH.LimitLow	3 alarms in 1 hour	Manual	3mn	§ 8.3. COMPRESSEURS, page 33
ArchFull	Internal memory full	/	/	1 time	Auto	/	§ 10. AUTOMATIC ARCHIVING, page 45

As part of our ongoing product improvement programme, our products are subject to change without prior notice. Non contractual photos.

Systemair AC SAS
Route de Verneuil
27570 Tillières-sur-Avre
FRANCE
✆ : +33 (0)2 32 60 61 00
🖷 : +33 (0)2 32 32 55 13

J581604GB

UM AQA 01-N-5GB
Part number : **J581604GB**
Supersedes : **UM AQA 01-N-4GB**