**BALTIMORE
AIRCOIL COMPANY**

TRF   Adiabatic Cooler
Recirculation Mode

SOFTWARE INSTRUCTIONS - FACTORY
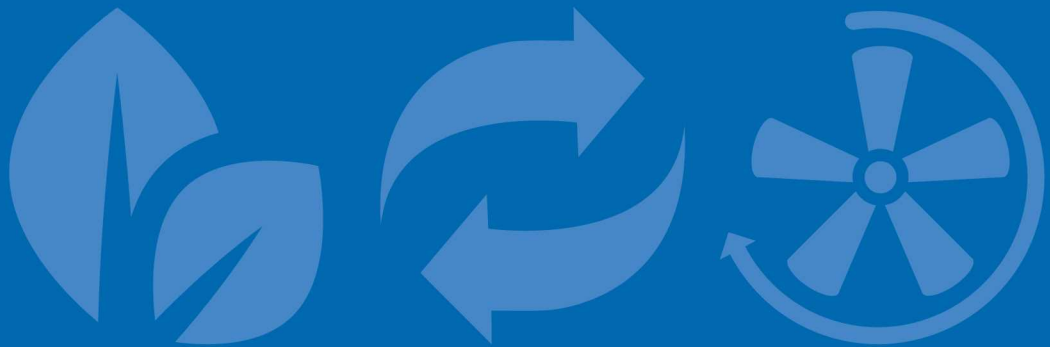
Table of contents

**SOFTWARE INSTRUCTIONS - FACTORY**

Recirculation execution

The TRF is a V-shaped dry cooler equipped with **adiabatic pre-coolers (1)** that cool the warm **process fluid (2)** by sensible heat transfer. **Water flows (3)** evenly over evaporative cooling pads located in front of the **dry finned coil (4)**. With the **make up (9)** situated on top of the pads, adiabatic precooling of the air can also be guaranteed when the pump is not in operation. **Axial (5) fans** draw **air (6)** through the pads where a portion of the water evaporates and cools down the saturated air. This increases the cooling capacity of the incoming air for cooling the **process fluid (7)** inside the coil. The **recirculation system (8)** can further reduce the total water consumption.

2

CONTROL LOGIC
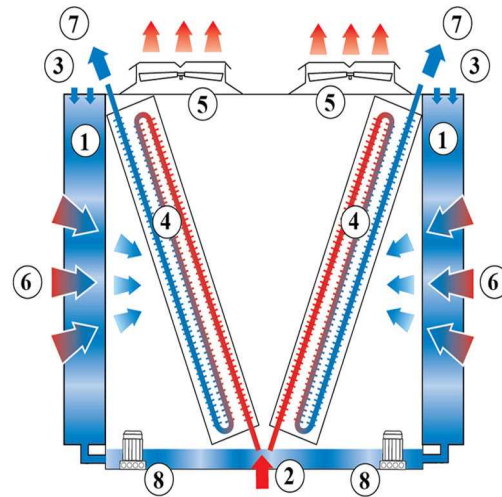
Self-contained mode

The PLC controls the fan speed based on the actual fluid outlet temperature and the set point, ensuring a minimum electrical consumption and noise level.
The PLC will activate and deactivate the adiabatic pre-coolers, one by one, based on a logical combination of fan speed and an ambient temperature switch point.
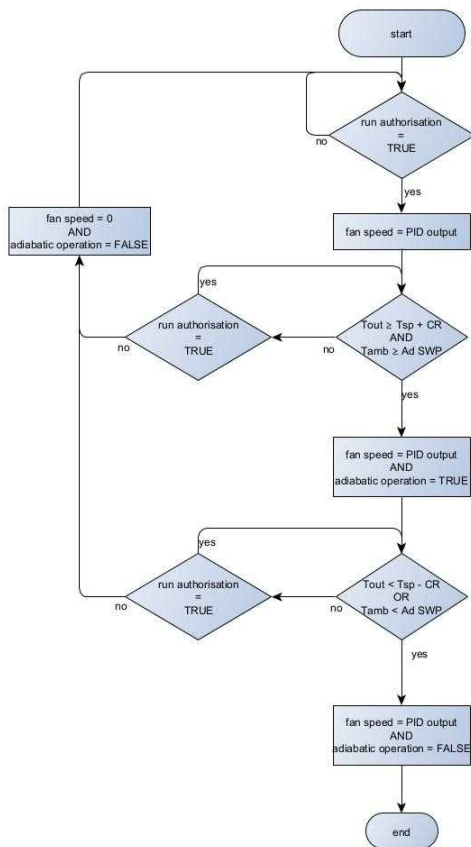
T_{out}: process fluid outlet temperature
T_{sp}: process fluid temperature set point
T_{amb}: ambient dry bulb temperature
PID output: calculated signal based on T_{out} and T_{sp}
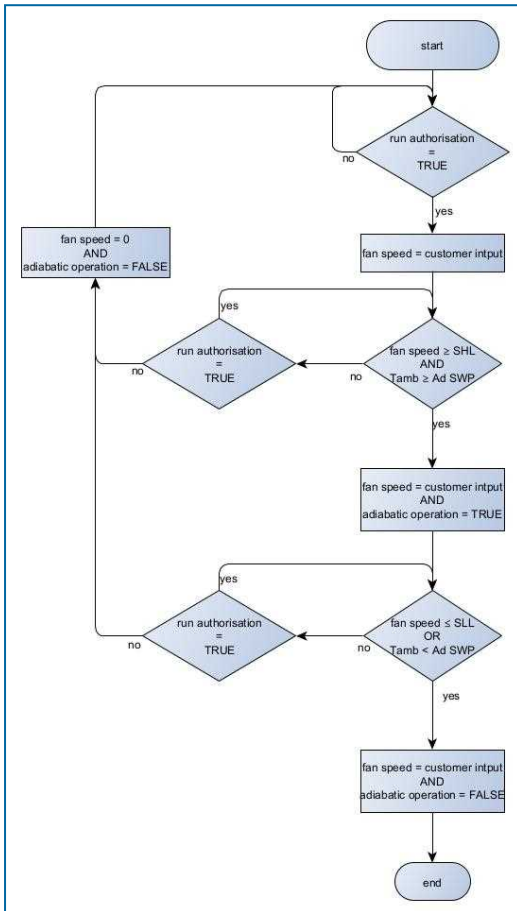CR: control range - dT to prevent hunting
Ad SWP: adiabatic switch point - ambient dry bulb temperature at which pre-cooling is allowed

All temperatures are adjustable via the set points menu. The PLC continuously measures the fluid outlet temperature via a temperature sensor installed in the fluid outlet pipe. The ambient temperature is measured via a temperature sensor that is factory installed on the unit.

Customer input mode

The PLC controls the fan speed based on a customer provided signal.
The PLC will activate and deactivate the adiabatic pre-coolers, one by one, based on a logical combination of fan speed and an ambient temperature switch point.

T_{out}: process fluid outlet temperature
T_{sp}: process fluid temperature set point
T_{amb}: ambient dry bulb temperature
SHL: speed high limit
SLL: speed low limit
PID output: calculated signal based on T_{out} and T_{sp}
CR: control range - dT to prevent hunting
Ad SWP: adiabatic switch point - ambient dry bulb temperature at which pre-cooling is allowed

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CAUTION

Changing the PLC's parameters may result in an undesired operation of the unit such as a hunting phenomenon, premature activation of pre-cooling (hence increased water consumption) or in late pre-cooling activation resulting in condenser pressure exceeding the design pressure.

3 PROGRAMMABLE LOGIC CONTROLLER

Progammable Logic Controller (PLC)

The PLC with built-in display:

The manual is valid for the following program version:
Software version: T3.3.0.26
Control version: 1.19

4 SOFTWARE

Overview menu

The screen or Human Interface Machine (HMI) is divided into 4 sections:
HMI header (top)
Main menu (bottom)
Sub menu (left)
Information section (right)
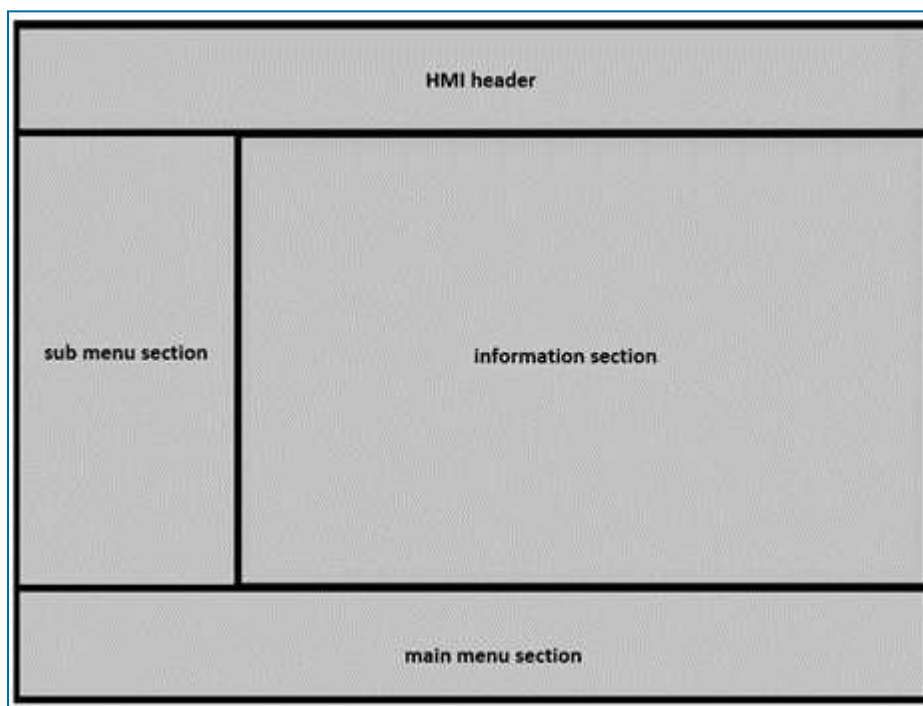
Menu	Function
Home	Unit overview, system messages
Fans	Overview Analog data Fan alarms Manuals

Menu	Function
Setpoints	Leaving fluid control Basin water quality Load limiting Maintenance
Input/Output	Temperatures Make up Starts and hours Manual
Alarms	
Settings	Set up Software version Technician Manufacturing Engineering

HMI header
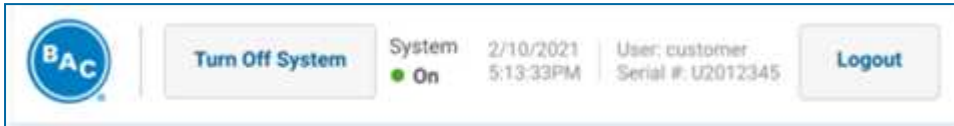
The HMI header contains:
- enable/disable the run authorization
- unit status (on/off)
- system date/time info
- unit serial number
- currently logged on user role and log in / log out button

There are various access levels to choose from:
- User (not password protected)
- Technician: username (Tech) & password (4734)
- Manufacturing: username (Manu) & password (7674)
- Engineering: username (Eng) & password (2275)

Home

The main home screen shows information with regard to the overall unit status. The system message can show a number of messages, explained below the picture.

Cycles of concentration	Counter to keep track of number of basin refills. After a set value is reached (see settings menu), the basin is drained in order to flush out a build-up of excess minerals.
Cycles of concentration drain	The unit is flushing the sump in order to prevent the excessive build up of minerals in the spray water.
Pump 1 anti-reclycle timer	timer to prevent excessive on/off cycling of the pre-cooler circulation pump

Pump 2 anti-reclycle timer	timer to prevent excessive on/off cycling of the pre-cooler circulation pump
Water usage disabled	indicates if the water usage mode disabled mode is active or not during this mode, the unit is forced to operate dry
Night quiet mode active	indicates if the night quiet mode disabled mode is active or not during this mode, the maximum fan speed is limited
Night dry mode active	indicates if the night dry mode disabled mode is active or not during this mode, the unit is forced into dry mode overnight
Emergency mode active	indicates if the emergency mode is active or not during this mode, the fan speed is no longer controlled by the PLC but rather fixed at a pre-defined level.

Fans

This menu provides information about parameters and lets you set certain parameters for the fans. You can do this either for all fans simultaneously by selecting the unit on the left, of individually by selecting a specific fan on the right.

The following sub menu's are available for both all fans & individual fans:

- overview
- analog data
- fan alarms
- manual

Overview

Here you can set the maximum fan speed (the fans will never run faster as the value that is indicated here) as well as the emergency speed (speed at which the fans will run in case of loss of communication).
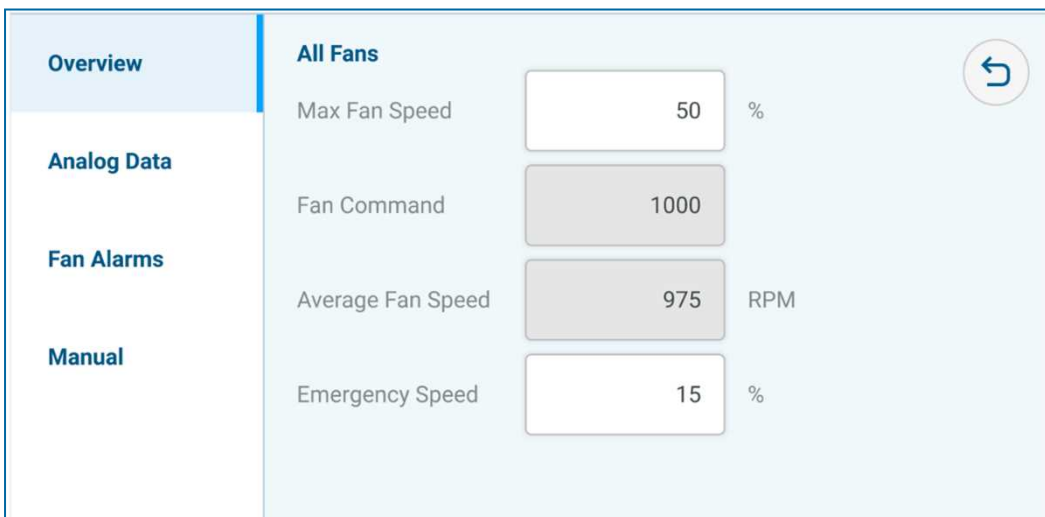
The 'average fan speed' is only available in the All Fans overview, not when you have selected a specific fan.

Analog data

All Fans					
Actual Speed	0	RPM	Current Set Value	0	RPM
DC Link Voltage	0	V	Enable/Disable State	Disabled	
DC Link Current	0.0	A	Current Power	0	W
Module Temp.	0	°C	Operating Hours	0	
Motor Temp.	0	°C			
Current Rotation	Reverse				

(Menu items shown: Overview, Analog Data, Fan Alarms, Manual)

Fan alarms

This provides an overview of the possible alarms. There are 2 possible statuses. A red dot indicates an alarm is active, a green dot indicates all is well.

All Fans

- Current Limit Active
- Line Impedance High
- Power Limit Active
- Output Temp High
- Motor Temp High
- Elect. Temp High
- DC Link Voltage Low
- Braking Mode
- Rotor Cal. In Prog.
- Low Speed
- Open Circuit At AI
- DC Link Voltage High

< Previous   Page 1 of 2   Next >

(Menu items shown: Overview, Analog Data, Fan Alarms, Manual)

Manual

The manual menu allows to override the fan speed, rotation direction and to read out the Modbus address.

To change a Modbus address, refer to Settings, Technician menu.

The Modbus address is only available for a specific fan, not when you have selected "All Fans".
Set manual mode to "off", if normal operation needs to be resumed.

Setpoints

With the parameters that can be set in this menu, the user can finetune the behaviour of the unit.

Leaving fluid control

This menu is only available if the control type in the relevant settings menu is set to "leaving fluid temperature control". This value depends on how the unit is physically configured.
This can be verified in the Settings – Manufacturing menu.
The "leaving fluid temperature control" mode allows the user to program a process fluid temperature set point in which case the unit will independently operate to achieve this temperature.

Operating mode	determines the balance between energy and water usage. This can be set to either default, energy saver or water saver. Switching these modes will revert the parameters in the table below to their pre-programmed settings.
Leaving fluid temp setpoint	the set-point for the fluid outlet temperature
Control range	offset on set point to switch between control stages/operating modes
Adiabatic switchpoint	ambient temperature at which adiabatic operation becomes possible
Run authorization type	source signal to switch the unit between stand-by and active. This can be set to either HMI, digital input or BMS. HMI refers to the button on the top left of the screen, digital input refers to input card EL1008 channel 6 or contacts X5:7 and X5:8 on the terminal strip, BMS refers to the "BMSrunEn" variable in the BMS communication table. The HMI button is always taken into account to enable the unit to run (also when the type is set to digital input or BMS).

Variable	Default	Energy Saver	Water saver
Control range	2.0 °C	0.5 °C	5.5 °C
Adiabatic switchpoint	X	X - 5.5 °C	X
Stage timer	120 sec	60 sec	300 sec

Operating mode pre-programmed parameters

Customer input control

This menu is only available if the control type in the relevant Settings menu is set to "customer input". This value depends on how the unit is physically configured.
This can be verified in the Settings - Manufacturing menu (page 3).

The customer input control mode allows the user to provide an input signal in either an analog way or through the digital bus system to control the unit's capacity between 0% and 100%.

Operating mode	determines the balance between energy and water usage. This can be set to either default, energy saver or water saver. Switching these modes will revert the parameters in the table below to their pre-programmed settings.
Signal type	defines the type of input signal. This can be set to either 4-20mA, 0-10V, 10-0V or BMS 0-100%. The current signal is supplied to input card EL3014 channel 2 or contacts X7:27 and X7:28. The voltage signal is supplied to input card EL3174 channel 1 or contacts X7:17 and X7:18. The BMS signal refers to the "CIFanCMD" variable in the BMS communications table.

Adiabatic switchpoint	ambient temperature at which adiabatic operation becomes possible
Run authorization type	source signal to switch the unit between stand-by and active. This can be set to either HMI, digital input or BMS. HMI refers to the button on the top left of the screen, digital input refers to input card EL1008 channel 6 or contacts X5:7 and X5:8 on the terminal strip, BMS refers to the "BMSrunEn" variable in the BMS communication table. The HMI button is always taken into account to enable the unit to run (also when the type is set to digital input or BMS).

Variable	Default	Energy Saver	Water saver
Control range	2.0 °C	0.5 °C	5.5 °C
Adiabatic switchpoint	X	X - 5.5 °C	X
Stage timer	120 sec	60 sec	300 sec

Operating mode pre-programmed parameters

Basin water quality

Disable water usage	manually disable water usage (prevent adiabatic operation)
Basin retention time	time after switch to dry operation before fully draining the water in the basin
Precooler 1/2 run hours	number of adiabatic operating hours on each pre-cooler

Number of cycles until basin drain	amount of water evaporation in number basin refills before a deconcentration cycle is activated and the basin is drained until low level.

Load limiting

Night quiet mode allows to limit the maximum fan speed. A lower adiabatic switchpoint can be programmed. Also, this can be used to make up for the reduced available thermal performance.

Night quiet	allows to either enable or disable the feature. If enabled, the "max fan speed" and "adiabatic switchpoint" parameters will become active during the times set in the schedule on page 2.
Night quiet override	if enabled, the "max fan speed" and "adiabatic switchpoint" parameters will become active regardless of the schedule on page 2. In addition to the on-screen button, the override can also be enabled with the "NightQuietOverride" variable in the BMS communication table.

Max fan speed	maximum fan speed that needs to observed when "night quiet" mode is active
Adiabatic switchpoint	reduced ambient temperature at which adiabatic operation becomes possible. This second (reduced versus the standard) adiabatic switchpoint allows adiabatic operation at lower ambient temperatures in order to make up for the lower available thermal performance due to the lower fan speed.

Night quiet schedule allows to programme the night hours during which this mode becomes active when enabled at page 1.

Night dry allows to prevent the use of water and hence adiabatic operation between a time on one day and another the next day.

Night dry	allows to either enable or disable the feature. If enabled, no water will be used during the times set in the schedule on page 4.
Night dry override	if enabled, no water will be used regardless of the schedule on page 4. In addition to the on-screen button, the override can also be enabled with the "NightDryOverride" variable in the BMS communication table.

Night dry schedule allows to program the night times during which this mode becomes active when enabled at page 3.

Schedule Dry allows to prevent the use of water and hence adiabatic operation between 2 times on the same day.

Schedule dry	allows to either enable or disable the feature. If enabled, no water will be used during the times set in the schedule on page 6.
Schedule dry override	if enabled, no water will be used regardless of the schedule on page 6. In addition to the on-screen button, the override can also be enabled with the "ScheduleDryOverride" variable in the BMS communication table.

Schedule Dry allows to program the day times during which this mode becomes active when enabled at page 5.

Maintenance

Coil clean allows to reverse the fans for a short period of time in order to blow away any dust that might have collected on the coil fins.

Coil clean	allows to either enable or disable the feature. If enabled, the fans will do a daily cycle at a 100% fan speed in reverse direction at the time programmed.
Cleaning high limit temperature	maximum ambient temperature at which the coil cleaning cycle can start. Since the fans run in reverse, they will push warm ambient air over the coils in summer.
Cleaning low limit temperature	minimum ambient temperature at which the coil cleaning cycle can start. Since the fans run a maximum fan speed, there would be an undercooling and/or coil freezing risk if allowed to become too low.
Coil clean duration	time in seconds the coil cleaning cycle lasts
Time between coil clean	number of hours between coil cleaning cycles
Coil clean start time	time of the day when the coil cleaning cycle will start

Pad clean allows to force adiabatic operation for a period of time to rinse any dust that might have collected on the pads.

Pad clean	allows to either enable or disable the feature. If enabled, the pads will be rinsed at the time programmed.
Pad clean duration	time in seconds the pad cleaning cycle lasts.
Time between pad cleans	number of hours between pad cleaning cycles
Pad clean start time	time of the day when the pad cleaning cycle will start, preferably set in the afternoon to take advantage of the increased cooling effect during the warmest period of the day.

Complete drain and dry allows to fully drain the sump and dry out the pads.

Drain and dry	allows to either enable or disable the feature. If enabled, the fans will do a daily cycle at a 100% fan speed in reverse direction at the time programmed.
Drain and dry duration	time in seconds the drain and dry cycle lasts.
Time between drain and dry's	number of hours between pad drain and dry cycles
Drain and dry start time	time of the day when the drain and dry cycle will start

Technician

Kp	set the value for the proportional band of the fan speed PI controller
Ki	set the value for the integration time of the fan speed PI controller
Stage time	time to switch between different operating modes

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CAUTION

Changing the PI-Parameters or stage time may result in a hunting phenomenon.

Input & Output

With the parameters that can be set in this menu, the user can read the current status of all available in- and out puts. In addition, some output signals can be forced in a certain position to overrule the default programming.

Temperatures

Leaving fluid temperature	process fluid temperature
Outside air temperature	ambient dry bulb temperature

Make up
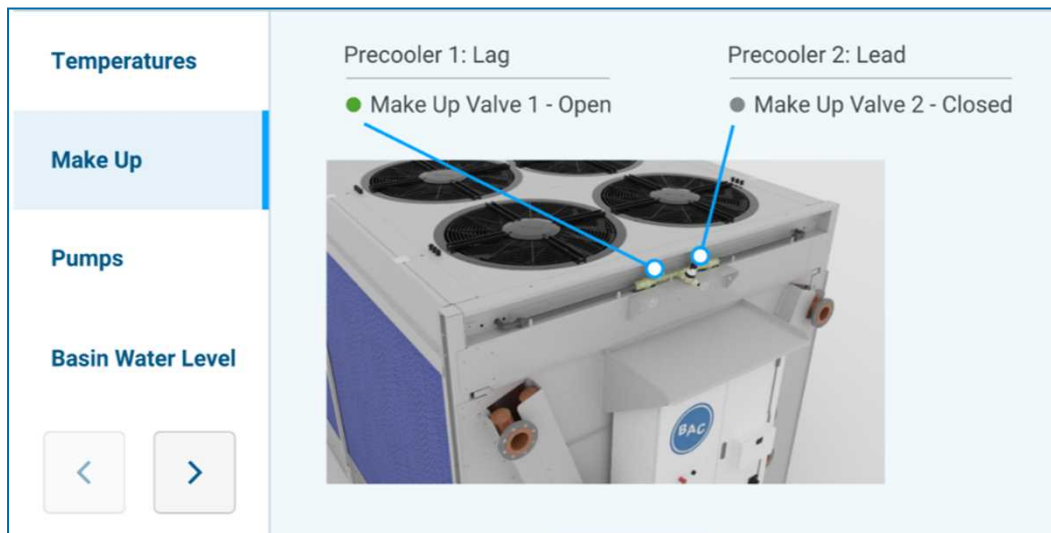
Precooler 1/2	indicates which pre-cooler will start first (lead) or last (lag)
Make-up valve 1/2	indicates the state of each valve (open/closed)

Pumps
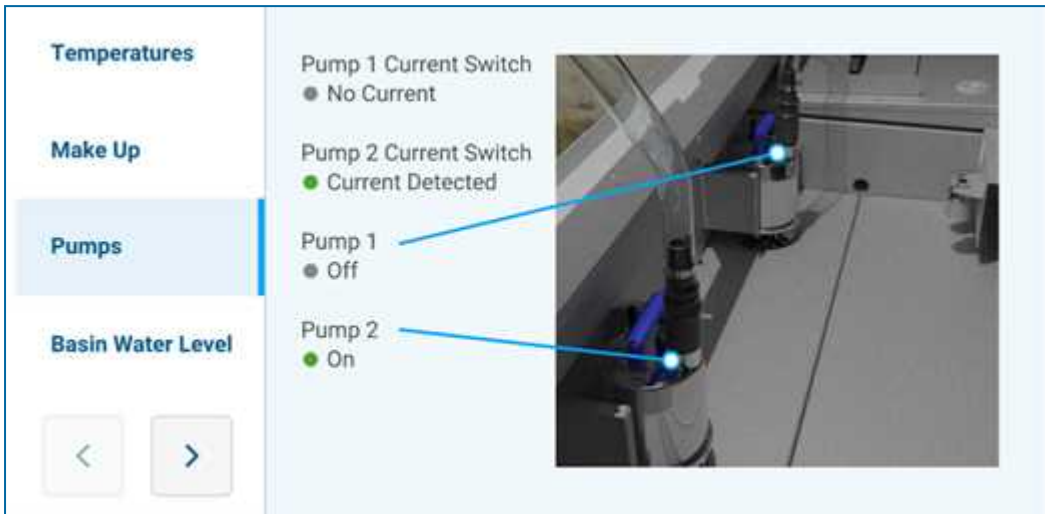
Pump 1/2 current switch	indicates if the pump is properly running (current detected) or not (no current). The current switch gives an indication of electrical current draw.
Pump 1/2	indicates if the pump is commanded on or off.

Basin water level
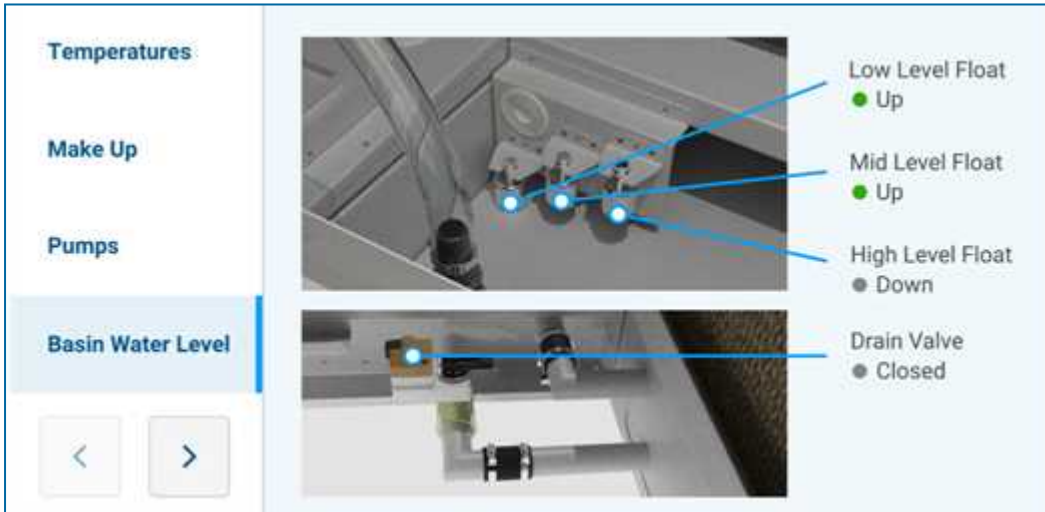
Low level float	indication whether the sensor detects water (up) or not (down)
Mid level float	indication whether the sensor detects water (up) or not (down)
High level float	indication whether the sensor detects water (up) or not (down)
Drain valve	indication if the valve is open (water draining from the sump) or closed (keeping water in the sump)

Starts and hours

In this menu the starts and amounts of operating hours can be consulted. Pressing the reset button shall reset the starts and hours for the corresponding device.

A reset can only be done with access level Technician or higher.

Precooler 1	number starts and amount of operating hours
Precooler 2	number starts and amount of operating hours

MUP1	number starts and amount of operating hours for make-up valve 1
MUP2	number starts and amount of operating hours for make-up valve 2

Pump 1	number starts and amount of operating hours
Pump 2	number starts and amount of operating hours
Drain valve	number starts and amount of operating hours

Manual

In this menu, digital outputs can be controlled manually. This is only available for access level Technician or above.

Make up valve 1/2	force either make-up valve on or off
Pump 1/2	force either pump on or off (greyed out and not available for once through units)
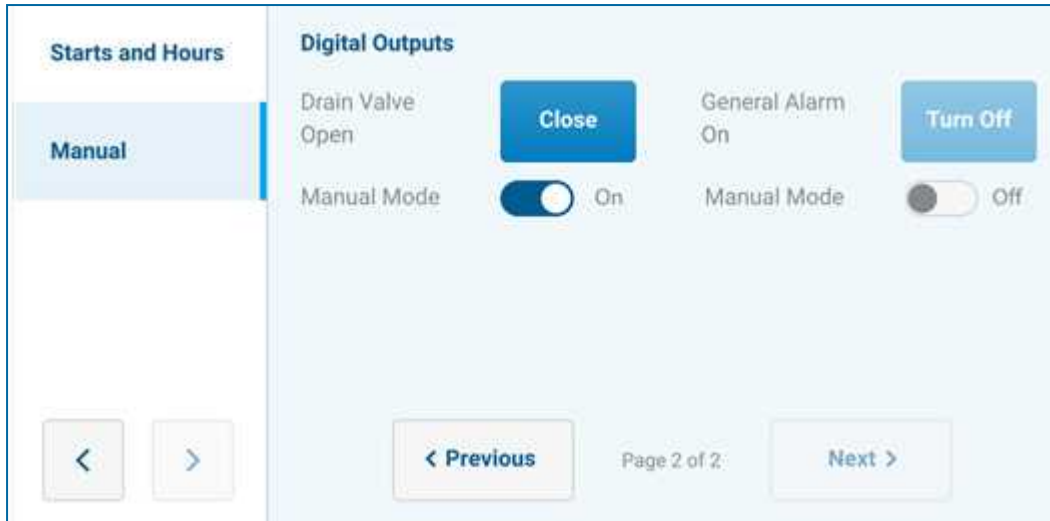
Drain valve	force the drain valve open or closed
General alarm	force the general alarm contact on or off

Alarms

This menu allows to get an overview of and clear any existing alarms. All active alarms are displayed with a red font, inactive alarms are displayed in a black font.
For a detailed overview of the different alarms, see chapter 5.

Alarms	↓🖉	ⓘ	✓	✓☰
	Time raised ▴		**Text ⇕**	
1	9:57:47.078 AM		Fan 3 Output Stage Overheated	
2	9:57:47.078 AM		Fan 3 Communications Error	
3	9:57:47.078 AM		Fan 3 Three Phase Failure	
4	9:57:42.855 AM		Fan 3 Fan Bad	

Download to USB	pressing the download button (USB stick with down arrow icon) will verify if a USB storage device is present in the PLC and download the alarm log (a progress bar will indicate the status of the process).
Information	pressing the Information button (lower case 'i' in a circle) will display the alarm detail page of the selected alarm where the trigger criteria, release criteria and the trouble shooting steps can be consulted (press the back button in the top right corner to return).
Acknowledge current	pressing the 'single checkmark' will clear the selected alarm
Acknowlegde all	pressing the 'multi-checkmark' will clear all active alarms and change the text from a red to a black font. A pop-up window will ask for a confirmation first

Settings

With the parameters that can be set in this menu, the user can configure the behaviour of the unit.

SET UP

Language	determines the interface language
Units	determines the units of measurements for the different variables. This can be set to either SI or imperial
Date format	determines in what order the day, month and year are shown. This can be set at MM/DD/YYYY, DD/MM/YYYY or YYYY/MM/DD
Date	allows to change the current date (in the format chosen above).

24 hour time	allows to change the current time
Daylight savings	enable or disable daylight savings time
BMS protocol	select and configure the BMS bus system
Touchscreen	calibrate the screen

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For more information on your BMS protocol, check the Protocols Manual.

IP address	set the correct value (in IPv4 format)
Subnet mask	set the correct value (in IPv4 format)
Default gateway	set the correct value (in IPv4 format)

SOFTWARE VERSION

Software version	indicates the current version
Control version	indicates the current version
TwinCAT version	indicates the current version
TwinCAT HMI server version	indicates the current version
OS version	indicates the current version

Config file	load a config file from a USB storage device. The file needs to be a text file stored as "E:\BAC\Config\..."
Export config	export the current settings
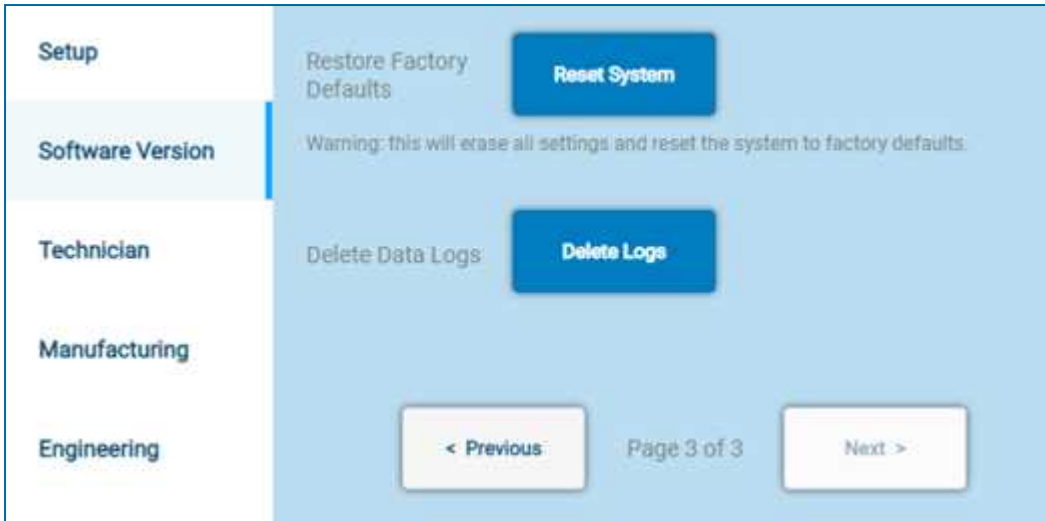
Reset factory defaults	reset all settings to the factory defaults, all custom settings will be removed (you will need to re-enter your password)
Delete data logs	delete all logs (you will need to re-enter your password)

TECHNICIAN

Data logging	allows to either enable or disable the feature. If enabled, all statuses will be logged at regular intervals (see sampling period).
Sampling period	interval at which all statuses are stored to the log (if enabled).
Download to USB	export to log file to a USB storage device

Fan replacement allows to set the correct Modbus address of the new fan.

Select fan to replace	choose the address that needs to programmed into the new fan
Detect new fan	search for the address of the new fan
Readdress new fan	set the correct address in the new fan

MANUFACTURING

BAC serial number	set the correct serial number of the units on which the controls are installed
Number of fans	program the correct number of fans
Coil type	program the type of coil and hence unit

Fluid/refrigerant	determines specific thresholds in the overall programming. Can be set to water, glycol or a condenser refrigerant.
Unit type	determines the overall behaviour of the program and needs to be aligned with he actual unit configuration. Can be set to once-through or recirculation.
Turbo start	allows to either enable or disable the feature. If enabled, the unit will go from stand-by directly to full performance (including adiabatic operation if required), skipping any timers.

Control type	determines the way the required thermal heat rejection is defined. Can be set to either 'leaving fluid temperature control' or 'customer input'.
Max fan speed	determines the maximum speed at which the fans can operate (note that the fans can never run faster than what is programmed as a limit in the fan itself).
BMS protocol	determines over which BMS bus system can be communicated. Can be set to either Modbus RTU, Modbus IP, BACnet MSTP or BACnet IP.

Basin sensor	determines the type of water level sensor the program takes into account and needs to be aligned with he actual unit configuration. Can be set to floats or radar.
Auto discrete	allows to either enable or disable the feature
Conductivity sensor	allows to either enable or disable the feature. If enabled, water deconcentration will happen based on a pre-programmed water conductivity threshold

ENGINEERING

Kp	set the value for the proportional band of the fan speed PI controller
Ki	set the value for the integration time of the fan speed PI controller
PID direction	can be set to either direct or reverse
PID deadband	can be set to a value between 0 and 1

High limit	
Low limit	
State transition time	

Cold weather treshold	
Pump proof time	
AR timer	

Pump on time	
Pump off time	

Stage time	
Stage time high	
Stage time low	

5

Alarms overview

An overview of all the possible alarms

Low leaving fluid temperature alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Control Type = LFT Ctrl AND Fluid Type = Water AND Leaving Fluid Temperature ≤ 10 °C for 3 consecutive seconds • Control Type = LFT Ctrl AND Fluid Type = Glycol AND Leaving Fluid Temperature ≤ 7.2 °C for 3 consecutive seconds
Release criteria	The unit shall release the alarm when any of the following is true: • Control Type = LFT Ctrl AND Fluid Type = Water AND Leaving Fluid Temperature > 13 °C for 3 consecutive seconds • Control Type = LFT Ctrl AND Fluid Type = Glycol AND Leaving Fluid Temperature > 10.2 °C for 3 consecutive seconds • Control Type ~= LFT Ctrl
Troubleshooting	• Check Leaving Fluid Temperature sensor installation • Check Leaving Fluid Temperature sensor and wiring
General alarm DO	True
Effect	Emergency flag = True

Leaving fluid temperature sensor alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Control Type = LFT Ctrl • Leaving Fluid Temperature > 90 °C OR Leaving Fluid Temperature < -50 °C OR EL3208-0010 Channel 2 cable break detected
Release criteria	The unit shall release the alarm when any of the following is true: • Control Type ~= LFT Ctrl • Leaving Fluid Temperature ≤ 87 °C • Leaving Fluid Temperature ≥ -47 °C • EL3208-0010 Channel 2 cable break undetected
Troubleshooting	• Check Leaving Fluid Temperature sensor installation • Check Leaving Fluid Temperature sensor and wiring
General alarm DO	True
Effect	Emergency flag = True

Pump 1 No current alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Pump 1 Contact is On for 10 consecutive seconds • Pump 1 Current Switch is False for 3 consecutive seconds
Release criteria	The unit shall release the alarm when any of the following is true: • Pump 1 Contact is Off • Pump 1 Contact is On AND Pump 1 Current Switch is True
Troubleshooting	• Check Pump 1 and wiring • Check Pump 1 Current Switch and wiring
General alarm DO	True
Effect	If this alarm occurs 3 times, the Pump 1 shall be locked out from starting and require the alarm to be cleared via the HMI

Pump 1 Lock out

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • 3 Pump 1 No Current Alarms have occurred
Release criteria	The unit shall release the alarm when any of the following is true: • Pump 1 Lockout is Cleared
Troubleshooting	• Check Pump 1 and wiring • Check Pump 1 Current Switch and wiring
General alarm DO	True
Effect	Pump 1 shall be locked out from starting

Pump 2 No current alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Pump 2 Contact is On for 10 consecutive seconds • Pump 2 Current Switch is False for 3 consecutive seconds
Release criteria	The unit shall release the alarm when any of the following is true: • Pump 2 Contact is Off • Pump 2 Contact is On AND Pump 2 Current Switch is True
Troubleshooting	• Check Pump 2 and wiring • Check Pump 2 Current Switch and wiring
General Alarm DO	True
Effect	If this alarm occurs 3 times, the Pump 2 shall be locked out from starting and require the alarm to be cleared via the HMI

Pump 2 Lock out

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • 3 Pump 2 No Current Alarms have occurred
Release criteria	The unit shall release the alarm when any of the following is true: • Pump 2 Lockout is Cleared
Troubleshooting	• Check Pump 2 and wiring • Check Pump 2 Current Switch and wiring
General alarm DO	True
Effect	Pump 2 shall be locked out from starting

Low water basin alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Unit Type = Recirculation • Low Level Float = False for 10 to 12 minutes • Drain Valve = Closed • Make Up Valve 1 = Open OR • Make Up Valve 2 = Open
Release criteria	The unit shall release the alarm when any of the following is true: • Low Level Float = True for 3 consecutive seconds
Troubleshooting	• Check Low Level Float and wiring • Check Drain Valve and wiring
General alarm DO	True
Effect	N/A

High basin water alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Unit Type = Recirculation • High Level Float = True for 6 to 24 minutes • Pump Current Switch 1 = On OR • Pump Current Switch 2 = On OR • Drain Valve = Open
Release criteria	The unit shall release the alarm when any of the following is true: • High Level Float = False for 3 consecutive seconds
Troubleshooting	• Check High Level Float • Check High Level Float wiring • Check Make Up Valve 1 and wiring • Check Make Up Valve 2 and wiring • Check Drain Valve and wiring • Check Drain Valve Piping
General alarm DO	True
Effect	N/A

Drain valve alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Drain Valve = Open • Low Level Float = True for 45 consecutive minutes
Release criteria	The unit shall release the alarm when any of the following is true: • Low Level Float = False for 3 consecutive seconds
Troubleshooting	• Check Low Level Float and wiring • Check Drain Valve and wiring
General alarm DO	True
Effect	N/A

Make up 1 alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Make Up Valve 1 = Open • Drain Valve = Closed • Low Level Float = False for 10 to 12 minutes
Release criteria	The unit shall release the alarm when any of the following is true: • Low Level Float = True for 3 consecutive seconds • Drain valve = Open
Troubleshooting	• Check Make Up Valve 1 and wiring • Check Low Level Float and wiring • Check Drain Valve and wiring
General alarm DO	True
Effect	N/A

Make up 2 alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Make Up Valve 2 = Open • Drain Valve = Closed • Low Level Float = False for 10 to 12 minutes
Release criteria	The unit shall release the alarm when any of the following is true: • Low Level Float = True for 3 consecutive seconds • Drain Valve = Open
Troubleshooting	• Check Make Up Valve 2 and wiring • Check Low Level Float and wiring • Check Drain Valve and wiring
General alarm DO	True
Effect	N/A

Water supply alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Make Up Valve 1 = Open OR Make Up Valve 2 = Open • Drain Valve = Closed • Low Level Float = False for 6 minutes
Release criteria	The unit shall release the alarm when any of the following is true: • Make Up Valve 1 Alarm is Active OR • Make Up Valve 2 is Active
Troubleshooting	• Check Make Up Valve 1 • Check Low Level Float and wiring • Check Drain Valve and wiring • Check Make Up Valve 2 • Check Low Level Float and wiring • Check Drain Valve and wiring
General alarm DO	True
Effect	N/A

Outside air temperature sensor

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Outside Air Temperature < -30 °C for 3 consecutive seconds • Outside Air Temperature > 60 °C for 3 consecutive seconds • EL3208-0010 Channel 2 cable break detected
Release criteria	The unit shall release the alarm when any of the following is true: • Outside Air Temperature ≥ -27 °C for 3 consecutive seconds AND Outside Air Temperature ≤ 57 °C for 3 consecutive seconds • EL3208-0010 Channel 2 cable break is not detected
Troubleshooting	• Check Outside Air Temperature sensor installation • Check Outside Air Temperature sensor and wiring
General alarm DO	True
Effect	Disable Water = True

Precooler 1 Temperature Sensor Alarm

The following shall be displayed only if the Precooler Temperature Sensor is Enabled.

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Precooler Temp Sensor is enabled • Precooler 1 Temperature > 60 °C • Precooler 1 Temperature < -30 °C • EL3208-0010 Channel 4 cable break detected
Release criteria	The unit shall release the alarm when all of the following is true: • Precooler Temp Sensor is disabled • Precooler 1 Temperature ≤ 57 °C • Precooler 1 Temperature ≥ -27 °C • EL3208-0010 Channel 4 cable break undetected
Troubleshooting	• Check Precooler 1 Temperature sensor installation • Check Precooler 1 Temperature sensor and wiring
General alarm DO	True
Effect	N/A

Precooler 2 Temperature Sensor Alarm

The following shall be displayed only if the Precooler Temperature Sensor is Enabled.

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Precooler Temp Sensor is enabled • Precooler 2 Temperature > 60 °C • Precooler 2 Temperature < -30 °C • EL3208-0010 Channel 4 cable break detected
Release criteria	The unit shall release the alarm when all of the following is true: • Precooler Temp Sensor is disabled • Precooler 2 Temperature ≤ 57 °C • Precooler 2 Temperature ≥ -27 °C • EL3208-0010 Channel 4 cable break undetected
Troubleshooting	• Check Precooler 1 Temperature sensor installation • Check Precooler 1 Temperature sensor and wiring
General alarm DO	True
Effect	N/A

Entering Fluid Temperature Sensor Alarm

The following shall be displayed only if the Entering Fluid Temperature Sensor is Enabled.

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Entering Fluid Temperature Sensor is enabled • Entering Fluid Temperature > 90 °C • Entering Fluid Temperature < -50 °C • EL3208-0010 Channel 3 cable break detected
Release criteria	The unit shall release the alarm when all of the following is true: • Entering Fluid Temperature Sensor is disabled • Entering Fluid Temperature ≤ 87 °C • Entering Fluid Temperature ≥ -47 °C • EL3208-0010 Channel 3 cable break undetected
Troubleshooting	• Check Entering Fluid Temperature sensor installation • Check Entering Fluid Temperature sensor and wiring
General alarm DO	True
Effect	N/A

Relative Humidity Sensor Alarm

The following shall be displayed only if the Relative Humidity Sensor is Enabled.

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • Humidity sensor = Enabled • OARH Current ≤ 3 mA
Release criteria	The unit shall release the alarm when all of the following is true: • Humidity sensor = Disabled • OARH Current > 3.7 mA
Troubleshooting	• Check Humidity sensor installation • Check Humidity sensor and wiring
General alarm DO	True
Effect	N/A

All fans offline / Emergency stop alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when any of the following are true: • All fans time out Modbus communications
Release criteria	The unit shall release the alarm when any of the following is true: • Any fan regains Modbus communications
Troubleshooting	• Check Emergency Stop button • Check Fan Modbus wiring between control panel and fan 1
General alarm DO	True
Effect	Disable Water = True

Low level float alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Low Level Float = False for 60 consecutive seconds • Mid Level Float = True • High Level Float = True
Release criteria	The unit shall release the alarm when any of the following is true: • Low Level Float = True for 3 consecutive seconds
Troubleshooting	• Check Low Level Float Switch • Check Low Level Float Switch wiring
General alarm DO	True
Effect	N/A

Mid level float alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Low Level Float = True • Mid Level Float = False for 60 consecutive seconds • High Level Float = True
Release criteria	The unit shall release the alarm when any of the following is true: • Mid Level Float = True for 3 consecutive seconds
Troubleshooting	• Check Mid Level Float Switch • Check Mid Level Float Switch wiring
General alarm DO	True
Effect	N/A

Low customer input current alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Control Type = Customer Input • Customer Input Type = 4 – 20 mA • Customer Input Current Signal (EL3014-2) ≤ 3 mA
Release criteria	The unit shall release the alarm when any of the following is true: • Control Type = Customer Input AND Customer Input Type = 4 – 20 mA AND Customer Input Current Signal (EL3014-2) > 3 mA • Control Type ~= Customer Input • Customer Input Type ~= 4 – 20 mA
Troubleshooting	• Check Customer Input wiring • Verify proper software setup
General alarm DO	True
Effect	Emergency Mode = Active

High leaving fluid temperature alarm

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Control Type == LFT Control • LFT > 85.0 °C
Release criteria	The unit shall release the alarm when any of the following is true: • Control Type != LFT Control AND LFT <= 82.0 °C • Control Type != LFT Control
Troubleshooting	• Check fluid temperatures elsewhere in the loop • Check leaving fluid temperature sensor
General alarm DO	True
Effect	N/A

Fan X offline

Parameter	Condition
Trigger criteria	The unit shall issue the alarm when all of the following are true: • Fan X times out Modbus communications
Release criteria	The unit shall release the alarm when any of the following is true: • Fan X regains Modbus communications
Troubleshooting	Check Fan X's circuit breaker in control panel

Parameter	Condition
General alarm DO	True
Effect	N/A

Fan X DV-link undervoltage

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Check power supply to unit • Contact BAC support
General alarm DO	True
Effect	N/A

Fan X position sensor calibration error

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X speed limit exceeded

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X motor blocked

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Inspect Fan X and ensure there are no obstructions
General alarm DO	True
Effect	N/A

Fan X motor hall sensor error

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X motor overheating

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X fan bad (general error)

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X communication error

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Check Fan X communication wiring • Check Fan X communication shielding • Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X output stage overheating

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Triggered by fan X
Troubleshooting	• Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X phase failure

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Check power supply to unit • Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X Over Voltage

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	• Check power supply to unit • Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X Watchdog Failure

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X Hardware Overcurrent

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	Contact BAC Support
General alarm DO	True
Effect	N/A

Fan X MCdsp Dead

Parameter	Condition
Trigger criteria	Triggered by fan X
Release criteria	Released by fan X
Troubleshooting	Contact BAC Support
General alarm DO	True
Effect	N/A

Alarm codes

The status of different alarms is also available through the BMS system for which the following codes are used.

Alarm codes are enumerations porting a number code to a specific alarm. These codes shall be used in the Data Logging and BMS Communication to effectively communicate active alarms.

UNIT ALARM CODE

Alarm Code	Unit Alarm
0	No alarm
5	Low Leaving Fluid Temperature
9	Make Up 1 Alarm
10	Make Up 2 Alarm
12	Leaving Fluid Temperature Sensor Alarm
13	Outside Air Temperature Sensor Alarm
14	All Fans Offline / E-Stop Alarm
17	Low Customer Input Current
19	Precooler 1 Temperature Sensor Alarm
20	Precooler 2 Temperature Sensor Alarm
21	Entering Fluid Temperature Sensor Alarm
22	Relative Humidity Sensor Alarm

FAN ALARM CODE

Alarm Code	Fan Alarm
0	No Fan Alarm
1	Fan 1 Offline
2	Fan 1 DC-link Undervoltage
3	Fan 1 Position Sensor Cal Error
4	Fan 1 Speed Limit Exceeded
5	Fan 1 Motor Blocked
6	Fan 1 Hall Sensor Error
7	Fan 1 Motor Overheating
8	Fan 1 Fan Bad (General Error)
9	Fan 1 Communication Error
10	Fan 1 Output Stage Overheating
11	Fan 1 Phase Failure
12	Fan 2 Offline
13	Fan 2 DC-link Undervoltage
14	Fan 2 Position Sensor Cal Error
15	Fan 2 Speed Limit Exceeded
16	Fan 2 Motor Blocked
17	Fan 2 Hall Sensor Error
18	Fan 2 Motor Overheating
19	Fan 2 Fan Bad (General Error)
20	Fan 2 Communication Error
21	Fan 2 Output Stage Overheating
22	Fan 2 Phase Failure
23	Fan 3 Offline
24	Fan 3 DC-link Undervoltage
25	Fan 3 Position Sensor Cal Error
26	Fan 3 Speed Limit Exceeded
27	Fan 3 Motor Blocked
28	Fan 3 Hall Sensor Error
29	Fan 3 Motor Overheating
30	Fan 3 Fan Bad (General Error)
31	Fan 3 Communication Error
32	Fan 3 Output Stage Overheating
33	Fan 3 Phase Failure

Alarm Code	Fan Alarm
34	Fan 4Offline
35	Fan 4 DC-link Undervoltage
36	Fan 4 Position Sensor Cal Error
37	Fan 4 Speed Limit Exceeded
38	Fan 4 Motor Blocked
39	Fan 4 Hall Sensor Error
40	Fan 4 Motor Overheating
41	Fan 4 Fan Bad (General Error)
42	Fan 4 Communication Error
43	Fan 4 Output Stage Overheating
44	Fan 4 Phase Failure
45	Fan 5 Offline
46	Fan 5 DC-link Undervoltage
47	Fan 5 Position Sensor Cal Error
48	Fan 5 Speed Limit Exceeded
49	Fan 5 Motor Blocked
50	Fan 5 Hall Sensor Error
51	Fan 5 Motor Overheating
52	Fan 5 Fan Bad (General Error)
53	Fan 5 Communication Error
54	Fan 5 Output Stage Overheating
55	Fan 5 Phase Failure
56	Fan 6 Offline
57	Fan 6 DC-link Undervoltage
58	Fan 6 Position Sensor Cal Error
59	Fan 6 Speed Limit Exceeded
60	Fan 6 Motor Blocked
61	Fan 6 Hall Sensor Error
62	Fan 6 Motor Overheating
63	Fan 6 Fan Bad (General Error)
64	Fan 6 Communication Error
65	Fan 6 Output Stage Overheating
66	Fan 6 Phase Failure
67	Fan 7 Offline
68	Fan 7 DC-link Undervoltage
69	Fan 7 Position Sensor Cal Error
70	Fan 7 Speed Limit Exceeded

Alarm Code	Fan Alarm
71	Fan 7 Motor Blocked
72	Fan 7 Hall Sensor Error
73	Fan 7 Motor Overheating
74	Fan 7 Fan Bad (General Error)
75	Fan 7 Communication Error
76	Fan 7 Output Stage Overheating
77	Fan 7 Phase Failure
78	Fan 8 Offline
79	Fan 8 DC-link Undervoltage
80	Fan 8 Position Sensor Cal Error
81	Fan 8 Speed Limit Exceeded
82	Fan 8 Motor Blocked
83	Fan 8 Hall Sensor Error
84	Fan 8 Motor Overheating
85	Fan 8 Fan Bad (General Error)
86	Fan 8 Communication Error
87	Fan 8 Output Stage Overheating
88	Fan 8 Phase Failure
89	Fan 9 Offline
90	Fan 9 DC-link Undervoltage
91	Fan 9 Position Sensor Cal Error
92	Fan 9 Speed Limit Exceeded
93	Fan 9 Motor Blocked
94	Fan 9 Hall Sensor Error
95	Fan 9 Motor Overheating
96	Fan 9 Fan Bad (General Error)
97	Fan 9 Communication Error
98	Fan 9 Output Stage Overheating
99	Fan 9 Phase Failure
100	Fan 10 Offline
101	Fan 10 DC-link Undervoltage
102	Fan 10 Position Sensor Cal Error
103	Fan 10 Speed Limit Exceeded
104	Fan 10 Motor Blocked
105	Fan 10 Hall Sensor Error
106	Fan 10 Motor Overheating
107	Fan 10 Fan Bad (General Error)

Alarm Code	Fan Alarm
108	Fan 10 Communication Error
109	Fan 10 Output Stage Overheating
110	Fan 10 Phase Failure
111	Fan 11 Offline
112	Fan 11 DC-link Undervoltage
113	Fan 11 Position Sensor Cal Error
114	Fan 11 Speed Limit Exceeded
115	Fan 11 Motor Blocked
116	Fan 11 Hall Sensor Error
117	Fan 11 Motor Overheating
118	Fan 11 Fan Bad (General Error)
119	Fan 11 Communication Error
120	Fan 11 Output Stage Overheating
121	Fan 11 Phase Failure
122	Fan 12 Offline
123	Fan 12 DC-link Undervoltage
124	Fan 12 Position Sensor Cal Error
125	Fan 12 Speed Limit Exceeded
126	Fan 12 Motor Blocked
127	Fan 12 Hall Sensor Error
128	Fan 12 Motor Overheating
129	Fan 12 Fan Bad (General Error)
130	Fan 12 Communication Error
131	Fan 12 Output Stage Overheating
132	Fan 12 Phase Failure
133	Fan 13 Offline
134	Fan 13 DC-link Undervoltage
135	Fan 13 Position Sensor Cal Error
136	Fan 13 Speed Limit Exceeded
137	Fan 13 Motor Blocked
138	Fan 13 Hall Sensor Error
139	Fan 13 Motor Overheating
140	Fan 13 Fan Bad (General Error)
141	Fan 13 Communication Error
142	Fan 13 Output Stage Overheating
143	Fan 13 Phase Failure
144	Fan 14 Offline

Alarm Code	Fan Alarm
145	Fan 14 DC-link Undervoltage
146	Fan 14 Position Sensor Cal Error
147	Fan 14 Speed Limit Exceeded
148	Fan 14 Motor Blocked
149	Fan 14 Hall Sensor Error
150	Fan 14 Motor Overheating
151	Fan 14 Fan Bad (General Error)
152	Fan 14 Communication Error
153	Fan 14 Output Stage Overheating
154	Fan 14 Phase Failure
155	Fan 15 Offline
156	Fan 15 DC-link Undervoltage
157	Fan 15 Position Sensor Cal Error
158	Fan 15 Speed Limit Exceeded
159	Fan 15 Motor Blocked
160	Fan 15 Hall Sensor Error
161	Fan 15 Motor Overheating
162	Fan 15 Fan Bad (General Error)
163	Fan 15 Communication Error
164	Fan 15 Output Stage Overheating
165	Fan 15 Phase Failure
166	Fan 16 Offline
167	Fan 16 DC-link Undervoltage
168	Fan 16 Position Sensor Cal Error
169	Fan 16 Speed Limit Exceeded
170	Fan 16 Motor Blocked
171	Fan 16 Hall Sensor Error
172	Fan 16 Motor Overheating
173	Fan 16 Fan Bad (General Error)
174	Fan 16 Communication Error
175	Fan 16 Output Stage Overheating
176	Fan 16 Phase Failure
177	Fan 17 Offline
178	Fan 17 DC-link Undervoltage
179	Fan 17 Position Sensor Cal Error
180	Fan 17 Speed Limit Exceeded
181	Fan 17 Motor Blocked

Alarm Code	Fan Alarm
182	Fan 17 Hall Sensor Error
183	Fan 17 Motor Overheating
184	Fan 17 Fan Bad (General Error)
185	Fan 17 Communication Error
186	Fan 17 Output Stage Overheating
187	Fan 17 Phase Failure
188	Fan 18 Offline
189	Fan 18 DC-link Undervoltage
190	Fan 18 Position Sensor Cal Error
191	Fan 18 Speed Limit Exceeded
192	Fan 18 Motor Blocked
193	Fan 18 Hall Sensor Error
194	Fan 18 Motor Overheating
195	Fan 18 Fan Bad (General Error)
196	Fan 18 Communication Error
197	Fan 18 Output Stage Overheating
198	Fan 18 Phase Failure
199	Fan 1 Over Current
200	Fan 1 Over Voltage
201	Fan 1 Watchdog Failure
202	Fan 1 Hardware Overcurrent
203	Fan 1 MCdsp Dead
204	Fan 2 Over Current
205	Fan 2 Over Voltage
206	Fan 2 Watchdog Failure
207	Fan 2 Hardware Overcurrent
208	Fan 2 MCdsp Dead
209	Fan 3 Over Current
210	Fan 3 Over Voltage
211	Fan 3 Watchdog Failure
212	Fan 3 Hardware Overcurrent
213	Fan 3 MCdsp Dead
214	Fan 4 Over Current
215	Fan 4 Over Voltage
216	Fan 4 Watchdog Failure
217	Fan 4 Hardware Overcurrent
218	Fan 4 MCdsp Dead

Alarm Code	Fan Alarm
219	Fan 5 Over Current
220	Fan 5 Over Voltage
221	Fan 5 Watchdog Failure
222	Fan 5 Hardware Overcurrent
223	Fan 5 MCdsp Dead
224	Fan 6 Over Current
225	Fan 6 Over Voltage
226	Fan 6 Watchdog Failure
227	Fan 6 Hardware Overcurrent
228	Fan 6 MCdsp Dead
229	Fan 7 Over Current
230	Fan 7 Over Voltage
231	Fan 7 Watchdog Failure
232	Fan 7 Hardware Overcurrent
233	Fan 7 MCdsp Dead
234	Fan 8 Over Current
235	Fan 8 Over Voltage
236	Fan 8 Watchdog Failure
237	Fan 8 Hardware Overcurrent
238	Fan 8 MCdsp Dead
239	Fan 9 Over Current
240	Fan 9 Over Voltage
241	Fan 9 Watchdog Failure
242	Fan 9 Hardware Overcurrent
243	Fan 9 MCdsp Dead
244	Fan 10 Over Current
245	Fan 10 Over Voltage
246	Fan 10 Watchdog Failure
247	Fan 10 Hardware Overcurrent
248	Fan 10 MCdsp Dead
249	Fan 11 Over Current
250	Fan 11 Over Voltage
251	Fan 11 Watchdog Failure
252	Fan 11 Hardware Overcurrent
253	Fan 11 MCdsp Dead
254	Fan 12 Over Current
255	Fan 12 Over Voltage

Alarm Code	Fan Alarm
256	Fan 12 Watchdog Failure
257	Fan 12 Hardware Overcurrent
258	Fan 12 MCdsp Dead
259	Fan 13 Over Current
260	Fan 13 Over Voltage
261	Fan 13 Watchdog Failure
262	Fan 13 Hardware Overcurrent
263	Fan 13 MCdsp Dead
264	Fan 14 Over Current
265	Fan 14 Over Voltage
266	Fan 14 Watchdog Failure
267	Fan 14 Hardware Overcurrent
268	Fan 14 MCdsp Dead
269	Fan 15 Over Current
270	Fan 15 Over Voltage
271	Fan 15 Watchdog Failure
272	Fan 15 Hardware Overcurrent
273	Fan 15 MCdsp Dead
274	Fan 16 Over Current
275	Fan 16 Over Voltage
276	Fan 16 Watchdog Failure
277	Fan 16 Hardware Overcurrent
278	Fan 16 MCdsp Dead
279	Fan17 Over Current
280	Fan 17 Over Voltage
281	Fan 17 Watchdog Failure
282	Fan 17 Hardware Overcurrent
283	Fan 17 MCdsp Dead
284	Fan 18 Over Current
285	Fan 18 Over Voltage
286	Fan 18 Watchdog Failure
287	Fan 18 Hardware Overcurrent
288	Fan 18 MCdsp Dead

6

FURTHER ASSISTANCE & INFORMATION

More information

REFERENCE LITERATURE

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- Voorkom Legionellose. Minsterie van de Vlaamse Gemeenschap. December 2002, 77p.
- Legionnaires' Disease. The Control of Legionella Bacteria in Water Systems. Health & Safety Commission. 2000, 62p.
- Hygienische Anforderungen an raumlufttechnische Anlagen. VDI 6022.

INTERESTING WEBSITES

Baltimore Aircoil Company	www.BaltimoreAircoil.com
BAC Service website	www.BACservice.eu
Eurovent	www.eurovent-certification.com
European Working Group on Legionella Infections (EWGLI)	EWGLI
ASHRAE	www.ashrae.org
Uniclima	www.uniclima.fr
Association des Ingénieurs et techniciens en Climatique, Ventilation et Froid	www.aicvf.org
Health and Safety Executive	www.hse.gov.uk

ORIGINAL DOCUMENTATION

This manual is originally made in English. Translations are provided for your convenience. In the event of discrepancies, the English original text shall prevail over the translation.

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