Energy SB-SD-SCW600
Compact controller with Hot Water management for domestic heat pumps

Controls

CONTENTS

1 HOW TO USE THIS MANUAL

This manual is designed to permit quick, easy reference with the following features:

References

References column**:**
A column to the left of the text contains *references* to subjects discussed in the text to help you locate the information you need quickly and easily.

Cross references

Cross references:
All words written in *italics* are referenced in the subject index to help you find the page containing details on this subject; supposing you read the following text:
" If there are 2 compressors in the installation, the *minimum time* between the switching on and the switching off) of the two compressors is observed. "
The italics mean that you will find a reference to the page on the topic of compressors listed under the item compressors in the index.
If you are consulting the manual "on-line" (using a computer), words which appear in italics are hyperlinks: just click on a word in italics with the mouse to go directly to the part of the manual that discusses this topic.

Icons for emphasis

Some segments of text are marked by icons appearing in the *references* column with the meanings specified below:

Warning! : **information which is essential for preventing negative consequences for the system or a hazard to personnel, instruments, data, etc., and which users MUST read with care.**

Take note: information on the topic under discussion which the user ought to keep in mind

Tip: a recommendation which may help the user to understand and make use of the information supplied on the topic under discussion.

2 INTRODUCTION

2.1 General Description

Eliwell, the leading manufacturer of controllers for small and medium air conditioning plants, presents SBW600 in the Energy Flex product family, a compact heat pump controller with advanced functions (sanitary hot water and *anti-legionnaire's disease* in a dedicated accumulator) for domestic applications.

Control of centralized air-conditioning systems with up to 2 circuits and a maximum of 4 compressors (steps) such as:

- Chillers:
  - air-air;
  - air-water;
  - water-water;
- Heat pumps:
  - air-air;
  - air-water;
  - water-water with gas reversal;
  - water-water with water reversal;
- Motorised condensers;
  - Air chillers;
  - Air heat pumps;
  - Water chillers;
  - Water heat pumps.

2.1.1 Typical applications:

- Mini-markets,
- Industrial installations,
- Offices,
- Hotels,
- Residential buildings.

2.1.2 Technical data:

The Energy SBW600 is available in 2 *models* offering 6 *digital inputs*, 5 relay outputs, up to *TRIAC* outputs, 2 PWM *analogue outputs*, up to 3 configurable 0...10V/0...20mA/4...20mA *analogue outputs* and up to 2 open collector *digital outputs* for external relay.
The standard Eliwell 32x74mm format ensures ease and versatility of installation.

Energy SDW - SCW - SE 600 is available in several *models* offering 6 *digital inputs*, 5 relay outputs, up to 2 *TRIAC* outputs, 2 PWM *analogue outputs*, up to 3 configurable *analogue outputs* 0...10V/0...20mA/4...20mA and up to 2 open collector *digital outputs* for external relay.
The 4DIN format guarantees maximum flexibility and easy installation.
- - -
Power supply is 12-24V~ or 12-24V~/24V⎓
All inputs and outputs are independent and configurable, meaning they can be adapted to fit any system.

2.1.3 Main functions:

- Sanitary hot water with auto-adaptative setpoint
- Sanitary Water and *Anti-legionnaire's Disease* with weekly programming
- INVERTER compressor management
- User interface with configurable *keys*
- Menus with configurable displays
- Parameter settings via keyboard or PC
- Alarm log registration
- *Multi Function Key* (MFK) for up/downloading parameter maps
- Remote keyboard (up to 100m cable) with direct connection without *serial* interface
- NTC, 4...20mA, 0...1V, 0...5V, 0...10V or Digital Input parameter-configurable inputs
- Temperature control via input or output probe depending on configuration and installation
- Automatic change-over
- Dynamic setpoint
- Digital/analogue condensation control without external devices up to 2A
- Boiler control or supplementary electrical heater control for heating mode
- Electrical heater for hot sanitary water
- Internal ventilation control
- Control of semi-hermetically sealed, scroll and screw compressors with one or two power steps
- Control of a single circuit with up to 4 compressors or 1 compressor with 4 power stages
- Control of double circuits up to a maximum of two compressors/power stages per circuit.

2.2 Models and Features

-->See Annex A - *Models* and *Accessories* and the Specifications chapter
NOTE: unless expressly indicated otherwise, *references* to SBW600 also apply to SDW600 SCW600 and SE600

3 USER INTERFACE (FOLDER PAR/UI)

The front panel of the device functions as the user interface and is used to perform all operations relating to the device.

SBW600	SDW600
	

SKP 10


NOTE:

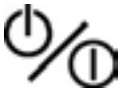
- the SCW600 module is not provided with a *display*. To operate the instrument, use remote terminal SKP 10 or SKW22/22L
- the expansion module SE600 is not provided with a *display*.

3.1 Keys

Refer to *models* SBW600 SDW600 and SKP 10.
There are 4 *keys* on the front panel. Each key has (see the two tables below)

- o A "direct" action (indicated on the key)
- o An "associated" function (indicated on the front panel of the device beside the key). In the manual, this is shown in square brackets (e.g. [UP])
- o a "combined" action involving two *keys*. In the manual, this is shown in square brackets (e.g.[UP+DOWN])

3.1.1 Description of keys and associated functions

Key	Description of key	Single press (press and release)	Key [associated function]	Prolonged press [press and hold for about 3 seconds]	Menu / Comments
	**UP**	• Increases a value • Goes to the next *label* • Modify Set Point (if *UI25*=1)		[Activate Sanitary Water function)	Sanitary Water / *Manual defrost* depending on model Functions menu see Functions chapter (*folder* FnC)
	**DOWN**	• decreases a value • Goes to the previous *label* • Modify Set Point (if *UI25*=1)		(Standby)	Standby / Local ON/OFF according to model

Key	Description of key	Single press (press and release)	Key [associated function]	Prolonged press [press and hold for about 3 seconds]	Menu / Comments
	**Esc(ape) Quit** (Without saving new settings)	• Quit without saving new settings • go back to previous level	**mode**	[Change-over] --- See section on Changing operating mode	*Operating mode menu*
	**Set Confirm** (and save new settings)	• Confirms value / quit and save new settings • Move to next level (open *folder*, subfolder, parameter, value) • Open *States Menu*	**disp**	[Main *display*] --- See Main *Display* section	[*Main Display Menu*]
	UP+DOWN	Activate Time Bands			
			By parameter (see parameters chapter, parameters *UI20*-21-22-23-24) the function [associated] can be enabled or disabled: • 0 = Key not enabled for the function • 1 = Key enabled for the function		

The following indications refer to the SBW600 user interface. Navigation for SDW600 and SKP 10 is identical

3.1.2 Stand-by

3.1.2.1 Device ‘On’ --> ‘Standby’

	Press the [DOWN] key for about 3 seconds from the main *display*
	The Standby icon will appear on the *display*. All other LEDs will be off

3.1.2.2 Device ‘Standby’ --> ‘On’

	The Standby icon will appear on the *display* Press the [DOWN] key for about 3 seconds
	Energy SBW600 will return to the "normal" screen

3.1.3 Description of keys - combined action

Symbol [function associated to combined operation of the *keys*]	Key combination	Combined press Single press (press and release	[associated function]	[Menu] / Comments
		**[UP + DOWN]**	[Activate/Deactivate]	See paragraph on Time Bands Time Bands / Reset depending on model
				
		**[Esc + Set]**	[Open *Programming menu*]	[*Programming menu*]
				

3.1.3.3 Manual alarm acknowledgment and reset

Alarm messages blink. How to acknowledge an alarm is explained below.
All error messages are shown in the AL *folder* (see *States Menu*)

	An error message will be shown, alternating with the error alert...
	...and the main *display*. The ALARM LED will be permanently on.

	ALARM ACKNOWLEDGMENT
	An error can be acknowledged by pressing any key once. After pressing any key, the alarm LED will start to blink.
	MANUAL RESET
	See Functions chapter *Manual Reset* paragraph

3.2 LEDs and Display

The *display* has 18 icons (LEDs) split into 3 categories:

- States and *Operating Modes*
- Values and Units of Measure
- Utilities

3.2.1 Display

Values of up to 4 digits or 3 digits plus a sign can be displayed.

3.2.2 LEDs: decimal point

Values are always shown in tenths of a degree/bar

3.2.3 LEDs: States and Operating Modes

LED states and *Operating Modes*	icon	description	Colour	Permanently on	Blinking
 The *display* shows the value/resource set for the "main *display*". In the event of an alarm, it will alternate with the alarm code Exx. (when more than one alarm occurs at the same time, the one with the lowest number will be shown - see *Alarms* and Diagnostics chapter)		Alarm	red	Active alarm	Alarm acknowledged
		Heating*	green	Heating mode	Antifreeze with heat pump active Remote heating mode
		Cooling*		Cooling mode	Remote cooling mode
		Standby*		Local standby mode (from keyboard)	Remote standby
		Defrost		*Defrost* active	*Manual defrost* activated
		Economy		Configurable ---- See Parameters chapter ---- Ui /dS *folder* Parameters *UI07* /*dS00*	Configurable ---- See Parameters chapter ---- Ui /dS *folder* Parameters *UI07* /*dS00*
*In AS (sanitary water) mode the Mode LED is OFF					

3.2.4 LEDs: Values and Units of Measure

LED Unit of measure	icon	description	Colour	Permanently on	Blinking
 Values can be displayed with a decimal point by setting parameter **Ui08** (see parameters chapter, Ui *folder*)		Clock (RTC) --- Time Bands	red	Shows current time (24hr format) --- Time Bands enabled	Set time --- Program Time Bands
	°C	Degrees centigrade		/	/
	Bar	Pressure (Bar)		/	/
	%RH	Relative humidity (% RH)		Not used	Not used
	ABC	Menu (ABC)		Menu navigation	/

3.2.5 LEDs: utilities

LED utilities		description	Colour	Permanently on	Blinking
		utility	amber	Configurable (°) ---- See Parameters chapter ---- Ui *folder* Parameters *UI00..UI06*	Configurable (°°) ---- See Parameters chapter ---- Ui *folder* Parameters *UI00..UI06*

(°) permanently on: utility active
(°°) blinking: *UI00..UI06*= 50...53 (power steps 1...4) indicates safety timing
Note: In the case of LED configured as sanitary water valve, the LED blinks when AS mode is enabled but not active. Permanently on when serving a sanitary water request

Default **configuration**
LEDs for utilities are all configurable (see parameters chapter, *folder* Ui). The factory settings are listed in the table below:

LED symbol on *display*	LEDs	***Default*** **SBW600**	***default*** **icon on front panel SBW600**
	LED 1 (first from left)	Power step 1	
		Power step 2	
	LED 3	Internal circuit water pump 1	
	LED 4	External circuit water pump	
	LED 5	Internal exchanger electric heater	
	LED 6	Sanitary water valve / pump	
	LED 7	Boiler	

3.3 First switch on

	When Energy SBW600 is powered on for the first time, a lamp test is carried out to check its state and operation. --- The Lamp Test lasts for a few seconds. During this short time, all LEDs and digits flash at the same time.
	After the lamp test, based on preselected settings, the following are displayed: • The time, • the real setpoint • the parameter setpoint • the value of the analogue input selected (AIL1...AIL5) --- In the example, the main *display* is the real set point

3.4 Access to folders - menu structure

Access to folders is organised into menus.
Access is determined by the *keys* on the front panel (see relative sections).
Access to each individual menu is explained below (or in the sections indicated).
There are 4 menus:

- *Main Display Menu* → See *Main Display Menu* section
- *Operating Mode menu* → see *Operating Mode Menu* section
- *States Menu* → See *States Menu* section
- *Programming Menu* → See *Programming Menu* section

There are 4 folders/submenus in the *Programming Menu*:

- Parameters Menu (Par *folder*) → see Parameters chapter;
- Functions Menu (Fnc *folder*) → see Functions chapter;
- Password PASS
- Alarm codes EU

3.4.1 Main Display Menu

The Main *Display* refers to the contents of the *default display*, i.e. when *keys* are not used.

Main *Display*	Ai	AIL1	AIL2	AIL3	AIL4	AIL5
		AIE1	AIE2	AIE3	AIE4	AIE5
		Air1	Air2			
	rtC	HH:MM				
	SetP	SetP				
	Setr	Setr				

In Energy SBW600, the main *display* can be customized to suit personal requirements. The various contents can be selected from the "disp" menu which is opened by pressing and holding the [set] key for more than 3 seconds. The main *display* can be selected from:

- analogue inputs AiL1, AiL2, AiL3, AiL4, AiL5, AiE1, AiE2, AiE3, AiE4, AiE5, Air1, Air2
  when configured as *digital inputs*
  - 0 or 0.0 = input not active (equivalent to input shortcircuited to ground)
  - 1 or 0.1 = input active (equivalent to input open)
- rtC,
- Setpoint
  - SetP= set from parameter
  - Setr= real with any decalibration;

Step by step instructions are provided below.

	To open the [disp] menu to modify the main *display* setup, press and hold the set key for at least 3 seconds. [set]
	This opens the blinking menu for the previous *display* (in this case rtC, i.e. current time).

	To modify the *display*, use the "up" and "down" *keys* to scroll through the menu and press the set key to confirm.
	On selection of your preferred *display*, press the set key to confirm. You will be automatically returned to the main *display* set.

3.4.2 Operating Mode Menu

Operating mode	HEAt
	COOL
	StdBY
	AS

Instructions are provided below on how to change the operating mode
There are three different *operating modes*:

- standby mode (StbY)
- Heat mode (HEAT)
- Cool mode (COOL)
- Sanitary Water mode (AS)

	**For example, let's say you want to change from StbY to COOL mode** To change operating mode, press and hold the mode key for at least 2 seconds. PS The main *display* is set as rtc (current time)
	A blinking menu will open containing the values StbY (standby), HEAt (heat), COOL (cool) and AS (Sanitary Water)
	Select your required operating mode and press the set key.

	You will be automatically returned to the main *display* and you will see that the Stby LED that was previously on has gone off and the COOL LED has come on

3.4.3 States Menu

From the *states menu* you can view the values of each resource.
For some resources, a "dynamic" view is possible:

- For example, when declared as not present / probe not configured (see System Configuration chapter (*folder* Par/CL), parameter *CL01*=0), analogue input AIL2 will not be displayed
- For example the hours of functioning of compressor 2 - *CP02* - not available on single compressor machines

The resources may be present / not present depending on the model (e.g. dOL6 is only present on the SBW655)

folder								**Visibility**	**description**	**change**
Ai	AIL1	AiL2	AIL3	AIL4	AIL5			Dynamic	LOCAL analogue inputs	//
Ai	AIE1	AiE2	AIE3	AIE4	AIE5			Dynamic	EXTENDED analogue inputs(§)	//
Ai	Air1	Air2						Dynamic	REMOTE TERMINAL analogue inputs	//
di	diL1	diL2	diL3	diL4	diL5	diL6	//	Dynamic	LOCAL *Digital inputs*	//
di	diE1	diLE2	diE3	diE4	diE5	diE6	//	Dynamic	EXTENDED analogue inputs(§)	//
AO	tCL1	AOL1	AOL2	AOL3	AOL4	AOL5	//	Dynamic	LOCAL *Analogue outputs*	//
AO	tCE1	AOE1	AOE2	AOE3	AOE4	AOE5	//	Dynamic	EXTENDED *analogue outputs*(§)	//
dO	dOL1	dOL2	dOL3	dOL4	dOL5	dOL6	//	Dynamic	LOCAL *Digital outputs*	//
dO	dOE1	dOE2	dOE3	dOE4	dOE5	dOE6	//	Dynamic	EXTENDED *digital outputs*(§)	//
CL	HOUr	dAtE	YEAr						Clock	YES
AL	Er00	....	...	...	...	Er97	Er98	Dynamic	*Alarms*	//
SP	Value	//	//	//	//	//	//		setpoint (set)	YES
Sr	Value	//	//	//	//	//	//		real setpoint	//
Hr	*CP01*	*CP02*	*CP03*	CP04	PU01	PU02	PU03	Dynamic	Tens of hours of operation compressors/pumps	YES

(§) only if SE600 expansion module present

As you will be able to see from the table, the setpoint SP and time can be modified and viewed:

3.4.3.1 Display Inputs/Outputs (AiL, diL, tCL1/AOL, dOL)

	Press the set key from the main *display*

	**Example of *display* of Analogue Inputs. The same procedure applies for all other I/Os***** The *label* Ai will appear on the *display*. (Use the UP and DOWN *keys* to scroll through the other labels until you find the *label* required)
	Press the set key to view the *label* for the first analogue input (AiL1 in this case)
	Press the set key again to view the value of AiL1. Note that the °C icon lights up to indicate that the value shown is in degrees centigrade ***For *digital inputs*/analogue inputs configured as digital, the value will be: - 0 = input not active (for *digital inputs* this is equivalent to input open, for analogue inputs configured as digital to input shortcircuited to ground) - 1 = input active (for *digital inputs* this is equivalen to input shortcircuited to ground, for analogue inputs configured as digital to input open) --- Press the esc key to go back to the main *display*.

3.4.3.2 Setting the clock (CL)

The Energy SBW600 has a clock (RTC) to run the alarm log and time bands, just like a programmable timer thermostat. Instructions are provided below on how to set the time: the same procedure applies to change the date and year.

	To change the clock on your machine, press the set key from the main *display*.
	Pressing the set key once will open a list of the various folders. Use the “UP” and “DOWN” *keys* to find the CL *folder*.

	Press the set key to open the CL menu.
	On entering this menu, you will see HOUr. Use the “UP” and “DOWN” *keys* to select the time, date or year. Once you have decided what you want to set, press the [set]** key to open the modification menu for the variable selected. **press and hold for about 3 seconds
	
	
	To set the time, date and year, use the "UP" and "DOWN" *keys* to enter the required value, then...
	... press set.

	Press the Esc key repeatedly to exit the set clock menu and go back to the main *display*.

3.4.3.3 Alarm Display (AL)

	Press the set key from the main *display*
	The *label* Ai will appear on the *display*. Use the UP and DOWN *keys* to browse the other labels until you find the AL *label*
	Press the set key to view the *label* of the first active alarm (if it exists)
	In this case, the first alarm is Er01. Use the UP and DOWN *keys* to scroll any other *alarms*. --- NOTE: the menu is not cyclical. For example, if the active *alarms* are Er01, Er02 and Er03, the *display* will show Er01 ->Er02->Er03 <-Er02<-Er01 NOTE: -> UP, <-DOWN Press the esc key repeatedly to go back to the main *display*.

3.4.3.4 Example of how to set the setpoint (SP)

By way of example, we will change the setpoint value in COOL mode from 12.0 degrees centigrade to12.6 degrees centigrade.

	To change the setpoint on your machine, press the set key from the main *display*.
	Pressing the set key once will open a list of the various folders. Use the “UP” and “DOWN” *keys* to scroll through the menu and find the SP *folder*.
	Press the set key to open the SP *folder*.
	The first screen you see will be the COOL mode then, using the "up" and "down" *keys*, the HEAT and ACS mode (shown beside each view).
	
	

	Let's say you want to change the COOL mode setpoint. Select COOL from the menu, then press the set key.
	The device will show the current machine setpoint, which in this case is 12.0 degrees centigrade. Use the “up” and “down” *keys* to increase or decrease it. For example, if you want to change the setpoint to 12.6 degrees, press the "up arrow" key until you reach the required value.
	Once you have reached the required setpoint, press the set key. The device will save the value 12.6
	To get back to the main *display*, press the esc key repeatedly or allow a 15 second timeout to elapse for each menu.

Setpoint edit function enable from main screen
Parameter *Ui25* allows you to enable Set Point modification on the main *display* with the UP and DOWN *keys*.
By way of example, we will change the setpoint value in COOL mode from 12.0 degrees centigrade to12.6 degrees centigrade.

First set parameter ***UI25*=1 (*folder* Par/Ui/*UI25*)**
See Parameters section (*folder* PAr)

	Let's say you want to change the COOL mode setpoint. **The device must be in COOL mode (or in StdBy from COOL)** To change the set point of the HEAT mode, proceed in the same way by first changing the device’s mode from COOL to HEAT see *Operating Mode Menu* section To change the setpoint on your machine, press the UP or DOWN key in the main *display*.

	The device will show the current machine setpoint, which in this case is 12.0 degrees centigrade.
	Use the “up” and “down” *keys* to increase or decrease it For example, if you want to change the setpoint to 12.6 degrees, press the "up arrow" key until you reach the required value.
	Once you have reached the required setpoint, press the set key. The device will save the value 12.6

3.4.3.5 Display and reset compressor/pump hours

	**Example *display* and reset (tens of) hours for Pump 2** Press the set key from the main *display*
	The *label* Ai will appear on the *display*. Use the UP and DOWN *keys* to scroll through the other labels until you find the Hr *label*
	Press the set key to view the first *label* - which in this case is the running time for compressor 1 (*CP01*)
	Scroll with the UP and DOWN *keys* to view (if the relative resources are present) the running time for compressor 2 (*CP02*) and the pump running time (PU01, PU02, PU03) Press the set key to view the pump running time PU02
	The tens of hours of functioning are 2. (Hours expressed in tens: 2 means 20 hours of operation) To reset the hours of functioning of pump PU02, press and hold [set] Note: repeat the above procedure to reset the hours of functioning of the other resources ---------- Press the esc key repeatedly to go back to the main *display*.

3.4.4 Programming menu

Menu	*folder*								description	comments
Parameters	PAr	CL	Cr	CF	Ui	St	...	Al	parameters	
Functions	FnC	dEF	tA	tA	tA	St	CC	EUr	functions	See Functions chapter (*folder* FnC)
Passwords	PASS								password	
EU	EU	Eu00	...	...	...	...	...	...		

3.4.4.6 Parameters (folder PAr)

Modifying a parameter

Instructions are provided below on how to change a machine parameter. By way of example, let's look at the CL configuration parameters *folder*, parameter *CL01* (*folder* PAr/CL/*CL01*).

	Press the esc and set *keys* together to open the parameters menu. This will open the PAr menu.
	The PAr parameters menu contains all device parameter folders. Press the set key to view all folders.
	The first *folder* the controller shows is the CL configuration *folder*. Simply press the set key again to modify individual CL parameters.
	The *CL00* parameter will be shown on the device (factory *default* settings). Press the "up" key to scroll through the various parameters or move to the next parameter (*CL01* in this case) or the “down” key to go back to the previous parameter (*CL97* in this case) CF00->*CF01*->CF02->...->*CL97*->*CL00* *CL97*<-*CL00*<-*CL01*->...<-*CL96*<-*CL97* NOTE: -> UP, <-DOWN

	Press the set key to view the value of the parameter (*CL01* in this case).
	For parameter *CL01*, the value shown will be 2. Press the “up” and “down” *keys* to modify this value.
	Press the set key once you have entered the required value. ** Press the esc key to exit this *display* and go back to the previous level. **N.B. pressing the set key will confirm the value entered; pressing the esc key will take you back to the previous level without saving the value entered

3.4.5 Functions (Par/FnC folder)

See Functions chapter (*folder* FnC)

3.4.6 Entering a password (Par/PASS folder)

Levels of visibility

Four levels of visibility can be set by assigning suitable values to each parameter and *folder*, by ***serial*, software** (*DeviceManager* or other communication softwares) **or by programming key**

The visibility levels are:

- Value 3 = parameter or *folder* always visible;
- Value 2 = **manufacturer level;** these parameters can only be seen by entering the manufacturer's password (see parameter *Ui28*) (all parameters specified as always visible, parameters that are visible at the installation level, and manufacturer level parameters will be visible)
- Value 1 = **installation level**; these parameters can only be viewed by entering the installation password (see parameter *Ui27*) (all parameters specified as always visible and parameters that are visible at the installation level will be visible)
- Value 0 = parameter or *folder* NOT visible

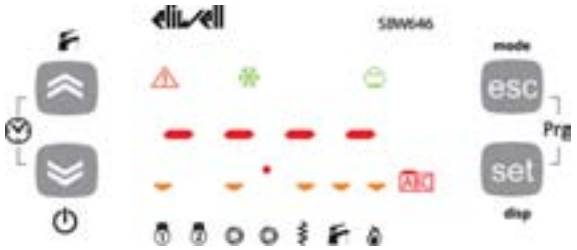
1. Parameters and/or folders with visibility level <>3 (i.e. password protected) will only be visible if the correct password is entered (installer or manufacturer) following the procedure outlined below:
2. Parameters and/or folders with visibility level =3 are always visible and no password is required; in this case, the procedure below is not required.

To view parameters visible for the given password, open *folder* PASS (press esc and set together [esc+set] from the main *display* and search the *folder* using the up/down *keys*) and set the PASS value

	Press the esc and set *keys* together from the main *display* to enter the PASS *folder*. [esc+set]
	Pressing the two *keys* will open the menu containing the list of folders. Use the "up" and "down" *keys* to scroll through the list until you find the PASS *folder*.
	Press the set key to open the PASS *folder*. Enter the password (installation or manufacturer) from here, press the set key and exit. Now access the parameters to *display* and change their values (see parameters chapter)

3.4.7 Alarm events (Par/EU folder)

	To view *folder* PAr from the main *display*, press the Esc and Set *keys* at the same time. [esc+set]
	Pressing the two *keys* will open the menu containing the list of folders. Use the "up" and "down" *keys* to find the EU *folder*
	Press set to view the last alarm event - if it exists - EU00. NB: EU00 indicates the last alarm recorded, EU01 the second last, and so on. Scroll with the UP and DOWN *keys* to view (if present) any other alarm events

	Press the set key again to view details of the selected event (EU00 in this case)
	The first *label* will be shown (alarm code) With the UP and DOWN *keys* you can scroll: **Alarm code** (as previously indicated)
	**Alarm start time**
	**Alarm start date**
	**Alarm stop time** (in this case, the alarm is still active)
	**Alarm stop date** (in this case, the alarm is still active)

 	**Type of alarm** (automatic) or alternatively (manual)

4 SYSTEM CONFIGURATION (FOLDER PAR/CF)

Before doing anything, make sure the device is connected to a suitable external *transformer*. The following rules must be followed when connecting cards to each other and to the application:

- **Loads that exceed the maximum limits set forth herein must not be applied to outputs;**
- **When connecting loads, follow connection diagrams carefully;**
- **To avoid electric pairings, wire all SELV (*) utilities separately from high voltage ones.**

(*) SELV: SAFETY EXTRA LOW VOLTAGE

Instrument configuration is determined by the values of the parameters associated with the inputs and outputs.

4.1 Configuration of analogue inputs

SBW SDW SCW 600 Analogue inputs

The analogue inputs referred to below as AiL1...AiL5 are 5 in total.
Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be "physically" configured for each type of input:

- 3 inputs can be configured as *temperature probes*, an NTC type probe, or as *digital inputs*
- 2 inputs (AiL3 and AiL4) can be configured as *temperature probes*, an NTC type probe, as *digital inputs* or current/voltage input (signal 4-20mA / 0-10V, 0-5V, 0-1V)

4.1.1 Configuration of SE600 expansion analogue inputs

SE600 analogue inputs

The analogue inputs referred to below as AiE1...AiE5 are 5 in total.
Using the parameters, - a physical resource (sensor, digital input, voltage/current signal) can be "physically" configured for each type of input:

- 3 inputs can be configured as temperature sensors, an NTC type sensor, or as *digital inputs*
- 2 inputs (AiE3 AiE4) can be configured as temperature sensors, an NTC type sensor, *digital inputs* or as a voltage/current input (signal 4-20mA / 0-10V, 0-5V, 0-1V)

4.1.2 Configuring SKW remote terminal analogue inputs

SKW Analogue inputs

The analogue inputs referred to below as AIR1...AIR2 are 2 in total.
Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be "physically" configured for each type of input:

- 1 input configurable as NTC type temperature probe
- 1 input configurable as NTC type temperature probe, digital input or current input (4-20mA signal)

Using parameters, a logical meaning can be given to each analogue input
Inputs can be "physically" configured as specified in the table below.

Analogue inputs: Configuration table

Parameter	Description	Value						
		0	1	2	3	4	5	6
CL00	AiL1 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	//	//	//	//
CL01	AiL2 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	//	//	//	//
CL02	AiL3 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	4-20 mA	0-10 V	0-5 V	0-1 V
CL03	AiL4 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	4-20 mA	0-10 V	0-5 V	0-1 V
CL04	AiL5 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	//	//	//	//
CE01	AiE2 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	//	//	//	//
CE02	AiE3 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	4-20 mA	0-10 V	0-5 V	0-1 V
CE03	AE4 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	4-20 mA	0-10 V	0-5 V	0-1 V
CE04	AiE5 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	//	//	//	//
CE00	AiE1 analogue input type	Sensor not configured	Sensor configured as no voltage digital input	NTC sensor	//	//	//	//
CE01	AiE2 analogue input type	Sensor not configured	Sensor configured as no voltage digital input	NTC sensor	//	//	//	//
CE02	AiE3 analogue input type	Sensor not configured	Sensor configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V
CE03	AiE4 analogue input type	Sensor not configured	Sensor configured as no voltage digital input	NTC sensor	4-20 mA	0-10 V	0-5 V	0-1 V
CE04	AiE5 analogue input type	Sensor not configured	Sensor configured as no voltage digital input	NTC sensor	//	//	//	//
Parameter	**Description**	**Value**						
		0	**1**	**2**	**3**			

Cr00	AIr1 type analogue input	Probe not configured	//	NTC probe	//
Cr01	Air2 type analogue input	Probe not configured	Probe configured as no voltage digital input	NTC probe	4...20mA
			See *Configuration of digital inputs*		

NOTE: // indicates that value is not present

Analogue input AI	Parameter	*range*	Description
AiL3	***CL10***	*CL11*...99.9	Analogue input AiL3 full scale value
AiL3	***CL11***	-50.0...*CL10*	Analogue input AiL3 start of scale value
AiL4	***CL12***	*CL13*...99.9	Analogue input AiL4 full scale value
AiL4	***CL13***	-50.0...*CL12*	Analogue input AiL4 start of scale value
AiE3	***CE10***	*CE11*...99.9	Analogue input AiE3 full scale value
AiE3	***CE11***	-50.0...*CE10*	Analogue input AiE3 start of scale value
AiE4	***CE12***	*CE13*...99.9	Analogue input AiE4 full scale value
AiE4	***CE13***	-50.0...*CE12*	Analogue input AiE4 start of scale value
Air1	***Cr10***	*CR11*...99.9	Analogue input Air2 full scale value
Air2	***Cr11***	-50.0...*CR10*	Analogue input Air2 start of scale value

The values read by analogue inputs can be calibrated using parameters *CL20*...*CL24* / *Cr20*...*Cr21*

Parameter	Description	Measurement Unit	*range*
CL20	Analogue input AiL1 differential	°C	-12.0..12.0
CL21	Analogue input AiL2 differential	°C	-12.0..12.0
CL22	Analogue input AiL3 differential	°C / Bar	-12.0..12.0
CL23	Analogue input AiL4 differential	°C / Bar	-12.0..12.0
CL24	Analogue input AiL5 differential	°C	-12.0..12.0
CE20	Analogue input AiE1 differential	°C	-12.0..12.0
CE21	Analogue input AiE2 differential	°C	-12.0..12.0
CE22	Analogue input AiE3 differential	°C / Bar	-12.0..12.0
CE23	Analogue input AiE4 differential	°C / Bar	-12.0..12.0
CE24	Analogue input AiE5 differential	°C	-12.0..12.0
Parameter	**Description**	**Measurement Unit**	***range***
Cr20	Analogue input Air1 differential	°C	-12.0..12.0
Cr21	Analogue input Air2 differential	°C / Bar	-12.0..12.0

See the following tables:

Table A - parameter association - *configuration of analogue inputs*

Parameter	Description	value	Description	Notes
CL30	Configuration of analogue input AiL1	0...16	See table B	If *CL00*=1 (AiL1 configured as DI) set *CL30*=0
CL31	Configuration of analogue input AiL2	0...16	See table B	If *CL01*=1 (AiL2 configured as DI) set *CL31*=0
CL32	Configuration of analogue input AiL3	0...30	See table B	If *CL02*=1 (AiL3 configured as DI) set *CL32*=0
CL33	Configuration of analogue input AiL4	0...30	See table B	If *CL03*=1 (AiL4 configured as DI) set *CL33*=0
CL34	Configuration of analogue input AiL5	0...16	See table B	If *CL04*=1 (AiL5 configured as DI) set *CL34*=0
CE30	Configuration of analogue input AiE1	0...16	See table B	If *CE00*=1 (AiE1 configured as DI) set *CE30*=0
CE31	Configuration of analogue input AiE2	0...16	See table B	If *CE01*=1 (AiE2 configured as DI) set *CE31*=0
CE32	Configuration of analogue input AiE3	0...30	See table B	If *CE02*=1 (AiE3 configured as DI) set *CE32*=0
CE33	Configuration of analogue input AiE4	0...30	See table B	If *CE03*=1 (AiE4 configured as DI) set *CE33*=0
CE34	Configuration of analogue input AiE5	0...16	See table B	If *CE04*=1 (AiE5 configured as DI) set *CE34*=0
Parameter	**Description**	**value**	**Description**	**Notes**
CR30	Configuration of analogue input Air1	0...15	See table B	
CR31	Configuration of analogue input Air2	0...29	See table B	If *CR01*=1 (AIR2 configured as DI), set *CR31*=0

Table B - analogue input logical meaning & parameter values *CL30*...*CL34* / *CR30*, *CR31*

Analogue input AiL/AiE	Analogue input AiL Remote terminal	Value	Description
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	0	input disabled
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	1	Ai*r/w*ater inlet temperature internal exchanger
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	2	Water/air outlet temperature internal exchanger
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	3	Outlet water temperature internal exchanger circuit 1
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	4	Outlet water temperature internal exchanger circuit 2
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	5	External exchanger temperature circuit 1
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	6	External exchanger temperature circuit 2
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	7	Inlet water temperature recovery (or external) exchanger
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	8	Outlet water temperature recovery (or external) exchanger
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	9	External temperature
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	10	NOT USED
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	11	Sanitary water temperature
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	12	NOT USED
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	13	NOT USED
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	14	NOT USED
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	15	NOT USED
AiL1 AiL2 AiL3 AiL4 AiL5 AiE1 AiE2 AiE3 AiE4 AiE5	AIR1 AIR2	16	Temperature *display*
AiL3 AiL4 AiE3 AiE4	AIR2	17	NOT USED
AiL3 AiL4 AiE3 AiE4	AIR2	18	NOT USED
AiL3 AiL4 AiE3 AiE4	AIR2	19	NOT USED
AiL3 AiL4 AiE3 AiE4	AIR2	20	NOT USED
AiL3 AiL4 AiE3 AiE4	AIR2	21	High pressure input circuit 1
AiL3 AiL4 AiE3 AiE4	AIR2	22	High pressure input circuit 2
AiL3 AiL4 AiE3 AiE4	AIR2	23	Low pressure input circuit 1
AiL3 AiL4 AiE3 AiE4	AIR2	24	Low pressure input circuit 2
AiL3 AiL4 AiE3 AiE4	AIR2	25	Dynamic setpoint input
AiL3 AiL4 AiE3 AiE4	AIR2	26	Internal exchanger pressure circuit 1
AiL3 AiL4 AiE3 AiE4	AIR2	27	Internal exchanger pressure circuit 2
AiL3 AiL4 AiE3 AiE4	AIR2	28	External exchanger pressure circuit 1
AiL3 AiL4 AiE3 AiE4	AIR2	29	External exchanger pressure circuit 2
AiL3 AiL4 AiE3 AiE4	AIR2	30	Pressure *display*

NOTE: // indicates that value is not present

4.2 Configuration of digital inputs

Digital inputs

The no voltage *digital inputs* referred to below as DI1...DI6 are 6 in total
These can be added to by AiL1...AiL5 if the latter are configured as *digital inputs* (via parameters *CL50*...5L4+*CR50* respectively).

Hence a total of 11+1 *digital inputs* are available.

See the following tables:

Table A - parameter association - *configuration of digital inputs*

Parameter	Description	value	Description	Notes
CL40	Configuration of digital input DIL1	-58...+58	See table B	
CL41	Configuration of digital input DIL2	-58...+58	See table B	
CL42	Configuration of digital input DIL3	-58...+58	See table B	
CL43	Configuration of digital input DIL4	-58...+58	See table B	
CL44	Configuration of digital input DIL5	-58...+58	See table B	
CL45	Configuration of digital input DIL6	-58...+58	See table B	
CL50	Configuration of analogue input AiL1 if configured as a digital input	-58...+58	See table B	Set to 0 if AiL1 is NOT configured as a DI
CL51	Configuration of analogue input AiL2 if configured as a digital input	-58...+58	See table B	Set to 0 if AiL2 is NOT configured as a DI
CL52	Configuration of analogue input AiL3 if configured as a digital input	-58...+58	See table B	Set to 0 if AiL3 is NOT configured as a DI
CL53	Configuration of analogue input AiL4 if configured as a digital input	-58...+58	See table B	Set to 0 if AiL4 is NOT configured as a DI
CL54	Configuration of analogue input AiL5 if configured as a digital input	-58...+58	See table B	Set to 0 if AiL5 is NOT configured as a DI
CE40	Configuration of digital input DIE1	-58...+58	See table B	
CE41	Configuration of digital input DIE2	-58...+58	See table B	
CE42	Configuration of digital input DIE3	-58...+58	See table B	
CE43	Configuration of digital input DIE4	-58...+58	See table B	
CE44	Configuration of digital input DIE5	-58...+58	See table B	
CE45	Configuration of digital input DIE6	-58...+58	See table B	
CE50	Configuration of analogue input AiE1 if configured as a digital input	-58...+58	See table B	Set to 0 if AiE1 is NOT configured as a DI
CE51	Configuration of analogue input AiE2 if configured as a digital input	-58...+58	See table B	Set to 0 if AiE2 is NOT configured as a DI
CE52	Configuration of analogue input AiE3 if configured as a digital input	-58...+58	See table B	Set to 0 if AiE3 is NOT configured as a DI
CE53	Configuration of analogue input AiE4 if configured as a digital input	-58...+58	See table B	Set to 0 if AiE4 is NOT configured as a DI
CE54	Configuration of analogue input AiE5 if configured as a digital input	-58...+58	See table B	Set to 0 if AiE5 is NOT configured as a DI
Parameter	**Description**	**value**	**Description**	**Notes**
CR50	Configuration of analogue input AIR2 if configured as a digital input	-58...+58	See table B**	Set to 0 if AIR2 is NOT configured as a DI

Digital inputs: Configuration table

Table B - *Digital inputs: Configuration table*
Polarity is defined below:

	Value	Description
+	Positive	Active when contact closed
-	Negative	Active when contact open

Value	Description	Notes
0	Input disabled	
±1	Remote STD-BY	
±2	Remote OFF	Local ON/OFF ineffective
±3	Remote Summer/Winter	
±4	Power step 1 request	
±5	Power step 2 request	
±6	Power step 3 request	
±7	Power step 4 request	
±8	Digital input heat step 1 request	See also *digital temperature control*
±9	Digital input heat step 2 request	See also *digital temperature control*
±10	Digital input heat step 3 request	See also *digital temperature control*
±11	Digital input heat step 4 request	See also *digital temperature control*
±12	Digital input cool step 1 request	See also *digital temperature control*
±13	Digital input cool step 2 request	See also *digital temperature control*
±14	Digital input cool step 3 request	See also *digital temperature control*
±15	Digital input cool step 4 request	See also *digital temperature control*
±16	Block compressor 1	

Value	Description	Notes
±17	Block compressor 2	
±18	Block compressor 3	
±19	Block compressor 4	
±20	Block heat pump	See section *Block heat pump (folder PAr/HP)*
±21	Power stage forced to 50%	See section Forced power stage (*folder* PAr/PL)
±22	Economy input	See section *Operating modes* - Temperature control (*folder* PAr/tr)
±23	NOT USED	
±24	General alarm	
±25	End of *defrost* C1	
±26	End of *defrost* C2	
±27	NOT USED	
±28	NOT USED	
±29	NOT USED	
±30	High pressure pressure switch C1	
±31	High pressure pressure switch C2	
±32	Low pressure pressure switch C1	
±33	Low pressure pressure switch C2	
±34	Compressor 1 oil pressure switch	
±35	Compressor 2 oil pressure switch	
±36	Compressor 3 oil pressure switch	
±37	Compressor 4 oil pressure switch	
±38	NOT USED	
±39	External exchanger fan thermal switch C1	
±40	External exchanger fan thermal switch C2	
±41	Internal exchanger fan thermal switch	
±42	NOT USED	
±43	Compressor 1 thermal switch	
±44	Compressor 2 thermal switch	
±45	Compressor 3 thermal switch	
±46	Compressor 4 thermal switch	
±47	Primary circuit pump 1 thermal switch	
±48	Primary circuit pump 2 thermal switch	
±49	External circuit pump thermal switch	
±50	Internal exchanger electric heater 1 thermal switch	
±51	Internal exchanger electric heater 2 thermal switch	
±52	Auxiliary output alarm	
±53	NOT USED	
±54	NOT USED	
±55	Primary circuit flow switch	
±56	External (recovery) circuit flow switch	
±57	NOT USED	
±58	*Display*	

NOTE: If more than one digital input in the table is configured with the same value, the function is activated when the input with the highest index is piloted

4.3 Configuration of digital outputs

Digital outputs

See the chapter on *Electrical Connections* for the number and capacity of relays/open collectors and for information on the symbols used on labels supplied with the device.

- High voltage outputs (relays) are identified as DO1, DO2, DO3, DO4 and DO6
- The low voltage (SELV), open collector output is called DO5

All *digital outputs* can be configured as outlined in the table below:

Table A - parameter association - configuration of outputs

Parameter	Description	value	Description	Notes
CL90	Configuration of digital output DOL1	-53...+53	See table B	Present in all *models*
CL91	Configuration of digital output DOL2	-53...+53	See table B	Present in all *models*
CL92	Configuration of digital output DOL3	-53...+53	See table B	Present in all *models*
CL93	Configuration of digital output DOL4	-53...+53	See table B	Present in all *models*
CL94	Configuration of digital output DOL5	-53...+53	See table B	Present in all *models* **(Open collector output)**
CL95	Configuration of digital output DOL6	-53...+53	See table B	Present in *models* with 5 relays
CL96	Configuration of digital output AOL1	-53...+53	See table B	See table A - *Analogue outputs* and *Models* **(Applies if *CL71*=0, set *CL80* appropriately)**
CL97	Configuration of digital output AOL2	-53...+53	See table B	See table A - *Analogue outputs* and *Models* **(Applies if *CL72*=0, set *CL81* appropriately)**
CE90	Configuration of digital output DOE1	-53...+53	See table B	Present in all *models*
CE91	Configuration of digital output DOE2	-53...+53	See table B	Present in all *models*
CE92	Configuration of digital output DOE3	-53...+53	See table B	Present in all *models*
CE93	Configuration of digital output DOE4	-53...+53	See table B	Present in all *models*
CE94	Configuration of digital output DOE5	-53...+53	See table B	Present in all *models* **(Open Collector Output)**
CE95	Configuration of digital output DOE6	-53...+53	See table B	present in *models* with 5 relays
CE96	Configuration of digital output AOE1	-53...+53	See table B	See Table A – *Analogue Outputs* and *Models* **(Applies if *CE71*=0, configure *CE80* appropriately)**
CE97	Configuration of digital output AOE2	-53...+53	See table B	See Table A – *Analogue Outputs* and *Models* **(Applies if *CE72*=0, configure *CE81* appropriately)**

Table B - Outputs: Configuration table
Polarity is defined below:

	Value	Description
+	Positive	Active when contact closed
-	Negative	Active when contact open

Value	Description	Type
0	Output disabled	Digital
±1	Compressor 1	Digital
±2	Compressor 2	Digital
±3	Compressor 3	Digital
±4	Compressor 4	Digital
±5	Reversal valve circuit 1	Digital
±6	Reversal valve circuit 2	Digital
±7	NOT USED	Digital
±8	NOT USED	Digital
±9	Sanitary water valve	Digital
±10	NOT USED	Digital
±11	NOT USED	Digital
±12	NOT USED	Digital
±13	NOT USED	Digital
±14	Internal circuit water pump 1	Digital
±15	Internal circuit water pump 2	Digital
±16	External circuit water pump	Digital
±17	NOT USED	Digital
±18	Recirculation fan	Digital
±19	Fan External exchanger circuit 1	Digital
±20	Fan External exchanger circuit 2	Digital
±21	NOT USED	Digital
±22	NOT USED	Digital

Value	Description	Type
±37	NOT USED	Digital
±38	NOT USED	Digital
±39	NOT USED	Digital
±40	NOT USED	Digital
±41	NOT USED	Digital
±42	NOT USED	Digital
±43	NOT USED	Digital
±44	NOT USED	Digital
±45	NOT USED	Digital
±46	NOT USED	Digital
±47	NOT USED	Digital
±48	NOT USED	Digital
±49	NOT USED	Digital
±50	NOT USED	Digital
±51	NOT USED	Digital
±52	NOT USED	Digital
±53	NOT USED	Digital
±54	NOT USED	Digital
±55	NOT USED	Digital
±56	Fan External exchanger circuit 1	Analogue
±57	Fan External exchanger circuit 2	Analogue
±58	NOT USED	//
±59	Internal circuit modulating water	Analogue

±23	Electrical heating element 1 internal exchanger	Digital
±24	Electrical heating element 2 internal exchanger	Digital
±25	Electrical heating element External exchanger 1	Digital
±26	Electrical heating element External exchanger 2	Digital
±27	Auxiliary output	Digital
±28	Sanitary Water Electric Heater	Digital
±29	NOT USED	Digital
±30	Boiler	Digital
±31	Alarm	Digital
±32	NOT USED	Digital
±33	NOT USED	Digital
±34	NOT USED	Digital
±35	NOT USED	Digital
±36	NOT USED	Digital

	pump 1	
±60	Internal circuit modulating water pump 2	Analogue
±61	NOT USED	Analogue
±62	Analogue stage 1 for compressor	Analogue
±63	Analogue stage 2 for Compressor	Analogue
±64	NOT USED	Analogue
±65	NOT USED	Analogue
±66	NOT USED	Analogue
±67	NOT USED	Analogue
±68	NOT USED	Analogue
±69	NOT USED	Analogue
±70	NOT USED*	Digital
±71	NOT USED*	Digital
±72	NOT USED*	Digital
±73	NOT USED*	Digital
±74	NOT USED*	Digital
	*see LED Configuration	

If multiple outputs are configured to run the same resource, the outputs will be activated in parallel.

4.4 Configuration of analogue outputs

Analogue outputs

See the chapter on Electric Connections for the number and type of *analogue outputs* used and for information on the symbols used on labels supplied with the device.

There are 6 *analogue outputs*. 1 high voltage one and 5 low (SELV) voltage ones, the exact number depending on the following *models* and with the following characteristics:

Table A2 - *Analogue outputs* and *Models*

			High voltage		SELV			Base *models*			Expansion *models*			
	output	*Label* on *display*	*Models* 636	*Models* 646	PWM/ Open collector	0-10V	0...20mA 4...20mA	636	646	655	632	636	646	655
	TC1	TCL1	3A 230V	2A 230V				●	●					
	TC2	TCL2	3A 230V					●						
	AO1	AOL1			●			●	●	●				
	AO2	AOL2			●				●	●				
	AO3	AOL3						●	●	●				
	AO4	AOL4						●	●	●				
	AO5	AOL5					●	●	●	●				
	TC1	TCE1	3A 230V	2A 230V							●	●	●	
	TC2	TCE2	3A 230V									●		
	AO1	AOE1			●	●					●	●	●	●
	AO2	AOE2			●	●					●		●	●
	AO3	AOE3				●						●	●	●
	AO4	AOE4				●						●	●	●
	AO5	AOE5				●	●					●	●	●

Triac analogue outputs **(TC1, TC2)**

High voltage output generally used to pilot fans or water pumps.
The output can be configured for proportional operation (continuous speed variation) or as ON/OFF.

Remote control switches downstream from the *Triac* are NOT permitted

The TC1 output can be configured as described in the table "Analogue Output TC1 - AO1 AO2: Configuration table"

Configuration of low voltage (SELV) *analogue outputs*

- AO1 always available. If configured as digital, see parameter *CL96*/*CE96*
- AO2 always available. If configured as digital, see parameter *CL97*/*CE97*
  They can be configured as:
  - o PWM (via CFS modules) or
  - o open collector (On/Off).

- AO3 - AO4 - low voltage (SELV) output to pilot external modules to run fans. Can be used to pilot 0-10V fans (via parameters *CL61*/*CL62* - *CE61*/*CE62*))
- AO5 - low voltage (SELV) output to pilot external modules to run fans.
  Can be used to pilot 4-20mA fans or 0-20mA fans (via parameter *CL60*/*CE60*)

To configure, see the table below. All *analogue outputs* can be configured as digital or proportional.
Table B - *Analogue Outputs* - Configuration parameters

Analogue output TC1 - AO1 AO2 : Configuration table

output	Parameter	Description	values	Notes
TC1 (63x 64x *models* only)	***CL73*** ***CE73***	Phase shift analogue output TCL1 Phase shift analogue output TCE1	0...90	phase shift values to pilot *Triac* with cut-off in the event of inductive loads.
	CL76 ***CE76***	Analogue output TCL1 pulse length Analogue output TCE1 pulse length	5...40 units (347...2776 µs)	pulse length to pilot *Triac* (1 unit = 69.4 µs).
	CL79 ***CE79***	Configuration of analogue output TCL1 Configuration of analogue output TCE1	-53...+53 if digital (see polarity) 56...61 if proportional	See **Table B Outputs: configuration table, paragraph *Configuration of Digital Outputs***
TCE1	**CE70**	Configuration of *TRIAC* output TCE1	0= SE65x *models*	See *CE95*
			1= SE63x SE64x *models*	see *CE73* – *CE76* – *CE79*
AO1	***CL71*** ***CE71***	Enabling analogue output AOL1 Enabling analogue output AOE1	0= Output configured as digital	If =0 see parameter ***CL96*** / ***CE96***
			1= Output configured as *Triac*	(for pulse piloting) If =1 see parameters *CL74* - *CL77* - *CL80* *CE74* - *CE77* - *CE80*
	CL74 ***CE74***	Phase shift analogue output AOL1 Phase shift analogue output AOE1	0...90	Active if ***CL71*****=1** / ***CE71*****=1**
	CL77 ***CE77***	Analogue output AOL1 pulse length Analogue output AOE1 pulse length	5...40 units (347...2776 µs)	Active if ***CL71*****=1** / ***CE71*****=1** (1 unit = 69.4 µs).
	CL80 ***CE80***	Configuration of analogue output AOL1 Configuration of analogue output AOE1	-53...+53 if digital (see polarity) 56...61 if proportional	See **Table B Outputs: Configuration table**
AO2*	***CL72*** ***CE72***	Enabling analogue output AOL2 Enabling analogue output AOE2	0= Output configured as digital	If =0 see parameter ***CL97*** / ***CE97***
			1= Output configured as *Triac*	(for pulse piloting) If =1 see parameters *CL75* - *CL78* - *CL81* *CE75* - *CE78* - *CE81*
	CL75 ***CE75***	Phase shift analogue output AOL2 Phase shift analogue output AOE2	0...90	Active if ***CL72*****=1** / ***CL72*****=1**

output	Parameter	Description	values	Notes
	CL78 ***CE78***	Analogue output AOL2 pulse length Analogue output AOE2 pulse length	5...40 units (347...2776 µs)	Active if ***CL72*=1 / *CL72*=1** (1 unit = 69.4 µs).
	CL81 ***CE81***	Configuration of analogue output AOL2 Configuration of analogue output AOE2	-53...+53 if digital (see polarity) 56...61 if proportional	See **Table B Outputs: Configuration table**

*in 636 *models* AO2 is used as *TRIAC* (TC2)

Low voltage (SELV) analogue output AO3-4-5: Configuration table

Parameter	Description	values	Notes
CL60 ***CE60***	Type of output analogue AOL5 Type of output analogue AOE5	0=4-20mA Analogue output - current 1=0-20mA Analogue output - current	See table entitled Configuration of analogue output
CL61 ***CE61***	Configuration Analogue output AOL3 Configuration Analogue output AOE3	-53...+53 if digital (see polarity) 56...61 if proportional	Modulated piloting or on/off via 10V external relay
CL62 ***CE62***	Configuration analogue output AOL4 Configuration analogue output AOE4	-53...+53 if digital (see polarity) 56...61 if proportional	Modulated piloting or on/off via 10V external relay
CL63 ***CE63***	Configuration analogue output AOL5 Configuration analogue output AOE5	-53...+53 if digital (see polarity) 56...61 if proportional	Modulated piloting or on/off

The following can be piloted:
- loads with output modulation (values from 56 to 61) or
- loads with on/off type switching using
  - the *Triac* as switch (TC1 AO1 AO2)
  - the output as switch 0-10V (AO3-4)
  - the output as switch 0/4...20mA (AO5)

4.5 Serial configurations - Protocol parameters

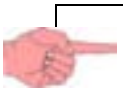
Present on all 2 *serial models*:
- TTL : channel for
  - *Multi Function Key* connection to up/download parameters
  - *serial* communication with personal computer
- LAN: channel for *serial* communication with standard Eliwell keyboard / SE600

Serial TTL can be used for
- configuring parameters with the *DeviceManager* software using the Eliwell protocol
- configuring device parameters, states, and variables with the Modbus via the Modbus protocol
- supervising using *DeviceManager* software via the Modbus protocol

See the table below:

Parameter	Description	value	
		0	**1**
CF01	**Select COM1 (TTL) protocol**	Eliwell	Modbus
CF20	**Eliwell protocol controller address**	**0...14**	
CF21	**Eliwell protocol controller family**		
CF31	**Modbus protocol controller address**	**1...255**	
CF31	**Modbus protocol Baudrate**	• 0=1200 baud • 1=2400 baud • 2=4800 baud • 3=9600 baud • 4=19200 baud • 5=38400 baud • 6=58600 baud • 7=115200 baud	
CF32	**Modbus protocol parity**	• 0= STX • 1= EVEN • 2= NONE • 3= ODD	

4.6 SKP 10 32x74 terminal



LAN - the LAN output manages the LED / 4 digit 32x74 terminal

- The SKP 10 terminal exactly replicates the information displayed by SBW600 and SDW600
- The SKP 10 terminal is used with the keyboard for the blank module SCW600

4.7 SKW22 - SKW22L remote LCD terminal

LAN - the LAN output controls the remote LCD terminal with integral ambient temperature control

--> See instruction sheet 9IS24102 remote terminal / terminale remoto LCD GB-I
--> See manual
8MA00218 terminale remoto LCD ITA
8MA10218 remote terminal LCD GB
8MA20218 terminal à distance LCD FR
8MA30218 terminal remoto LCD ES
8MA50218 LCD ferbedienung DE
8MAA0218 remote terminal LCD RUS

5 OPERATING MODES – TEMPERATURE CONTROL (FOLDER PAR/TR)

Temperature control parameters can be viewed and configured in *folder* **tr** (see User Interface and Parameters chapter).

The Energy SB600 controls the main temperature control setpoint by dynamically modifying its value using special algorithms and events to maximise plant efficiency and output.

The action on the setpoint can be:

- Direct: modifies the principal setpoints
- Indirect: modifies by using the sum of the values (positive or negative) called the setpoint differentials with the principal setpoints for the Cool and Heat modes.

There are several setpoint differentials:

- Dynamic setpoint differential on dedicated input or external temperature
- Economy function setpoint differential
- *Adaptive function* setpoint differential (see section in question)

In the same way (by means of the same direct and indirect actions) the *temperature controller* regulator hysteresis can be dynamically controlled. This only affects the compressor power stages; the other steps, such as boiler and heaters, have parameter-set hysteresis.
The main hysteresis differentials for the compressors are:

- *Adaptive function* hysteresis differential (see section in question)

The results of the direct and indirect actions on the principal setpoints and hysteresis are the *real setpoint and hysteresis*.

In general, we can say that the main temperature control is based on these 4 values:

1. Real Cool setpoint
2. Real Heat setpoint
3. Real Cool hysteresis (compressors only)
4. Real Heat hysteresis (compressors only)

The main *temperature controller* calculates the thermal power to be delivered, both in Heat and Cool mode.
The thermal power is expressed a number of steps (not or cold) to deliver.

5.1 Temperature controller setpoint and hysteresis

5.1.1 Setpoint and hysteresis from parameter value

We list below the parameters used to set the main working setpoints, one for each operating mode:

Parameter		
COOL	**HEAT**	**Description**
tr10	***tr20***	***Temperature controller*** **setpoint in Cool / Heat**
tr11	***tr21***	***Temperature controller*** **minimum setpoint in Cool / Heat**
tr12	***tr22***	***Temperature controller*** **maximum setpoint in Cool / Heat**
tr13	***tr23***	**Temperature control hysteresis in Cool / Heat**

There are direct modifications to the setpoint and hysteresis (direct action on the principal values, such as modification via COM1) and indirect modifications, which sum the differentials to obtain the *real setpoint and hysteresis*.

5.1.2 Real setpoint and hysteresis

The real setpoints and hysteresis are calculated from the parameters described above and summing the total differentials calculated in a specific way from the components described above.

- Real **setpoint** Heat = Main setpoint Heat + **setpoint differential Heat**
- Real **setpoint** Cool = Main setpoint Cool + **Setpoint differential Cool**

Setpoint differential = Dynamic *temperature controller* differential on dedicated input or external temperature
+ Economy function setpoint differential
+/- *Adaptive function* setpoint differential
+ Remote setpoint differential (from *serial*)

- Real **hysteresis** Heat = Main hysteresis Heat + **Hysteresis differential Heat**
- Real **hysteresis** Cool = Main hysteresis Cool + **Hysteresis differential Cool**

Hysteresis differential = *Adaptive function* hysteresis differential + Remote hysteresis differential (da seriale)

5.1.2.1 Setpoint differential: dynamic differential

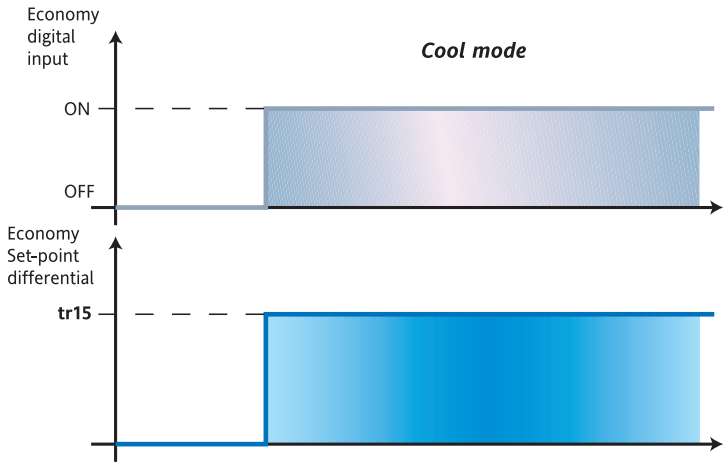
See dynamic setpoint chapter (*folder* PAr/dS)

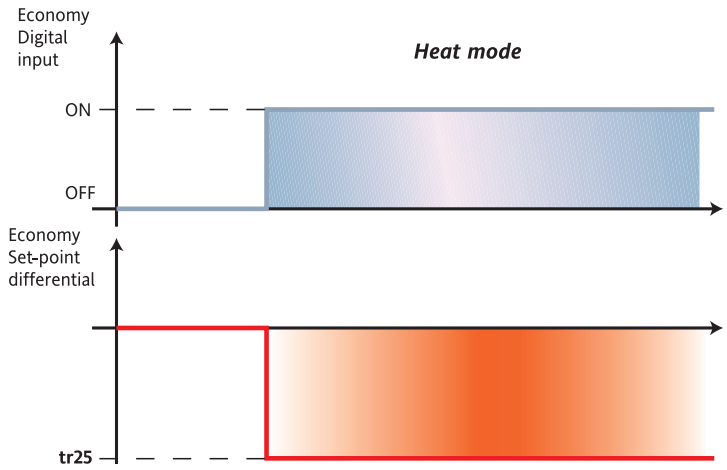
5.1.2.2 Setpoint differential: Economy differential

Enabling
The function is enabled only if a digital input has been configured as Economy input (at least one of *CL40*...*CL45*, *CL50*...*CL54*=22)

When the digital input is enabled, the setpoint is increased by a differential equal to the value of parameter ***tr15*** or ***tr25*** depending on the current operating mode (Cool or Heat):

tr15**:** *Setpoint differential in Cool from economy input* (typically positive) if the operating mode is Cool





tr25**:** *Setpoint differential in Heat from economy input* (typically negative) if the operating mode is Heat.

The activation of Economy mode is indicated by the Economy led (if so configured)

5.1.2.3 Setpoint and hysteresis differentials Adaptive function

See Adaptive chapter (*folder* PAr/Ad)

5.1.2.4 Setpoint and hysteresis differentials Remote differentials (from serial)

There are differentials, called "remote", on both the setpoints and the hysteresis, normally set to 0, which can be modified (= activated) only via *serial*, for further details see the *Supervision* chapter.

In general, the setpoint can also be modified via COM1.
The modification may affect:

- values in EEPROM (dedicated parameters), non volatile memory
- values in RAM, volatile memory

Modifications via *serial* to setpoints in non volatile memory (e.g. with Device Manager, DM) have clear effects: they modify the parameters:

- ***tr10*** *Temperature control setpoint in Cool*
- ***tr20*** *Temperature control setpoint in Heat*

Modifications via *serial* to setpoints in volatile memory (e.g. specific *serial* command) can only affect the main setpoints in use at that time, and not the real setpoints.

The effect is temporarily modify the main setpoints, and this automatically cancelled if there is a black out (the setpoints present in the EEPROM are loaded into RAM on reset), or at the next event in case of timed operation, etc.

Note. In the same way as indicated in the chapter Time band operation, the setpoints visible in the *states menu* (values Sp) are those in use and, hence, may differ from the values of the EEPROM parameter ***tr10*** and ***tr20*** if, for example, they have been modified by *serial* commands.

The same applies to the hysteresis parameters (and simplified, e.g. time band operation has no effect on hysteresis) as for the setpoints.

5.2 Temperature controller

The SB600 has five types of temperature control, which are selected with ***tr00*** *Type of temperature controller*:

- **Proportional:** Calculates the power the unit must supply in relation to the distance of the air/water temperature from the setpoint
  - *tr00*=0 *Proportional temperature control* **- see diagrams A and B**
- **Differential:** Calculates the power the unit must supply in relation to difference in temperature between two analogue inputs
  - *tr00*=1 *Differential temperature control* **- see diagrams C and D**
- **Digital (motor condensing)**
  - *tr00*=2 *Digital temperature control*
- **Proportional at INVERTER** Calculates the power the unit must supply in relation to the distance of the air/water temperature from the setpoint
  - *tr00*=3 *Proportional temperature control* at INVERTER **- see diagrams A' and B'**
- **Differential at INVERTER** Calculates the power the unit must supply in relation to difference in temperature between two analogue inputs
  - *tr00*=4 *Differential temperature control* at INVERTER

Temperature control parameters can be viewed and configured in *folder* **tr** (see User Interface and Parameters chapter).

5.2.1 Temperature control probes

Table A Regulation probe selection

Heat regulation	COOL	HEAT	description	Probe 1	Probe 2
proportional	***tr02***	***tr03***	**Probe selection for temperature control in Cool/Heat modes**	**See table B**	N.A.
differential	***tr04***	***tr05***	**Select probe for *differential temperature control* in Cool/Heat modes**	**See table B**	**See table B**

Table B Control probes

value	Probe 1	Probe 2
0	Internal exchanger water/air inlet temperature **(*CL30*...*CL34*=0)**	External temperature NTC input **(*CL30*...*CL34*=8)**
1	Internal exchanger water/air outlet temperature **(*CL30*...*CL34*=1)**	
2	Circuit 1 and 2 internal exchanger water outlet average temperature **Average ((*CL30*...*CL34*=2), (*CL30*...*CL34*=3))**	
3	External exchanger inlet water temperature **(*CL30*...*CL34*=6)**	
4	External exchanger outlet water temperature **(*CL30*...*CL34*=7)**	
5	Circuit 1 and 2 external exchanger average temperature **Average ((*CL30*...*CL34*=4), (*CL30*...*CL34*=5))**	

* if one of the probes in is error or not configured, the average is a probe error

5.2.2 Proportional temperature control

This is a type of control which activates the power steps as a function of the divergence of the actual temperature from the real setpoint.

Homogeneous or power stage compressors
The steps (heat or cool) are discrete and there are a limited number of them (max 4 for SB devices).
The number of steps (resources) requested is linked to the difference between the control temperature and the real setpoint; the greater the difference, the larger the number of steps (resources) used to achieve the setpoint.
The temperature interval between application of one power step and the next depends on the proportional band and the number of resources available (see Compressors chapter).

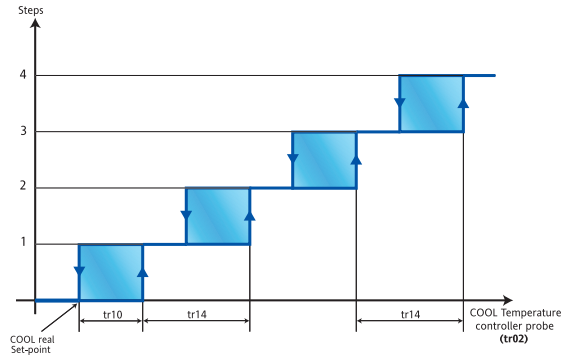
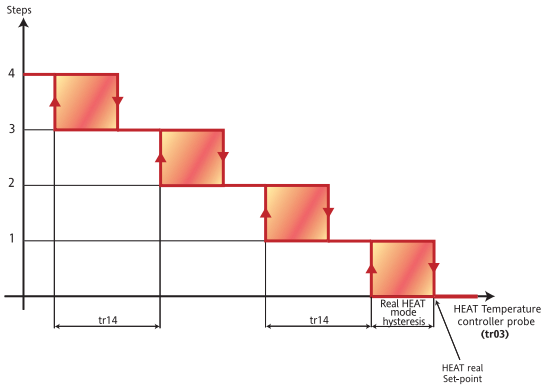
Temperature control is usually dependent on the inlet/outlet water/air temperature of the internal exchanger. Installations with double internal exchanger can control the temperature as a function of the average of the two temperatures measured at the exchanger outlets.

In some applications (e.g. machines with water reversal in Heat mode) it may be necessary to use the external (recovery) exchanger inlet/outlet water temperature for temperature control.

Various *temperature control probes* can be selected for Heat and Cool modes using the parameters given in **Table B Control probes**

5.2.3 Proportional power step temperature control in Cool/Heat mode

Temperature control is enabled in Heat mode only if *Enable heat pump* ***tr01*** = 1
Case *tr00*=0

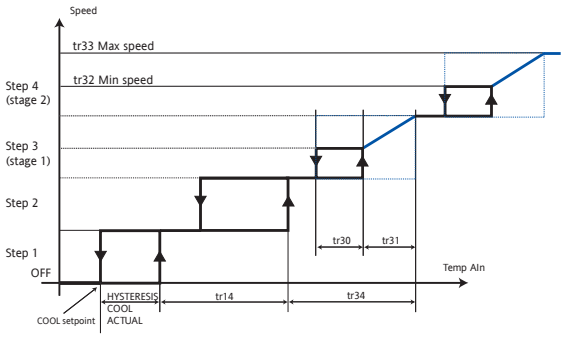
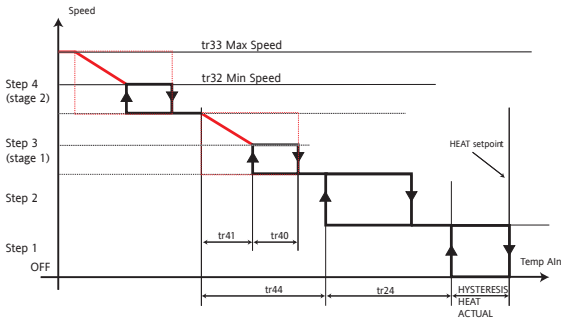
Diagram A	Diagram B
COOL	**HEAT**
	

Parameter		Description
COOL	**HEAT**	**Description**
tr02	***tr03***	*Select temperature control probe* **in Cool / Heat**
tr14	***tr24***	*Steps/compressors insertion differential* **in Cool / Heat**
Setpoint		Real setpoint in Cool / Heat
Hysteresis		Real control hysteresis in Cool / Heat

Note: The real hysteresis may not be greater than the differential. In this case the hysteresis is considered equal to the differential.

5.2.4 Temperature control at INVERTER in Cool / Heat mode

The *temperature controller* in Cool / Heat mode is enabled only if the parameter *Enable heat pump* ***tr01*** = 1
Case *tr00*=3

Diagram A'		**Diagram B'**	
COOL		**HEAT**	
			
AIn Temp	Temperature read by the probe selected for temperature control in Cool (parameter ***tr02*** - **Select probe for temperature control in Cool**) Or for ***differential*** *temperature control* in Cool (parameter ***tr04*** - **Select probe for temperature control in Cool**)	**AIn Temp**	Temperature read by the probe selected for temperature control in Cool (parameter ***tr03*** - **Select probe for temperature control in Heat**) Or for ***differential*** *temperature control* in Cool (parameter ***tr05*** - **Select probe for temperature control in Heat**)

	Par.		**Description**
	COLD	**HEAT**	
	tr14	***tr24***	*Steps/compressors insertion differential* **in Cool / Heat**
	tr30	***tr40***	***Temperature controller*** **hysteresis with inverter in Cool / Heat**
	tr31	***tr41***	***Temperature controller*** **band with inverter in Cool / Heat**
Speed	***tr32***	***tr42***	**Minimum speed with inverter in Cool / Heat**
Speed	***tr33***	***tr43***	**Maximum speed with inverter in Cool / Heat**
	tr34	***tr44***	**Inverter/compressors insertion differential in Cool / Heat**

Note: The real hysteresis may not be greater than the differential. In this case the hysteresis is considered equal to the differential.

Cool Case
Note: the sum *tr30*+*tr31* must be less than ***tr34***
Heat Case
Note: the sum *tr40*+*tr41* must be less than ***tr44***
If this is not the case, the hysteresis + band value is considered equal to the differential.

5.2.5 Differential temperature control

Differential temperature control is enabled with parameter ***tr00*** *Type of temperature controller*.
E.g. *tr00*=1 (differential) / *tr00*=4 (differential at INVERTER)
The aim of *differential temperature control* is to maintain a constant difference between the external temperature and the temperature of the air/water used for heating/cooling.
The temperature difference in question is defined by

temperature control value = Probe 1 - Probe 2

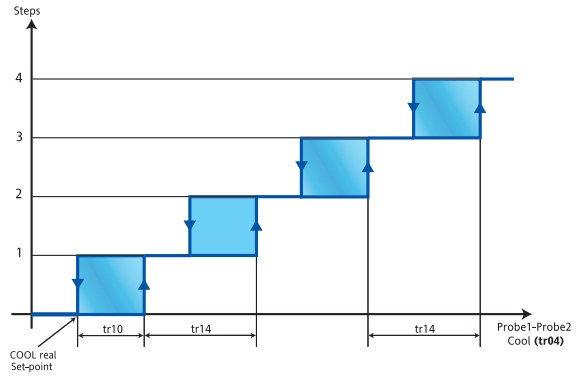
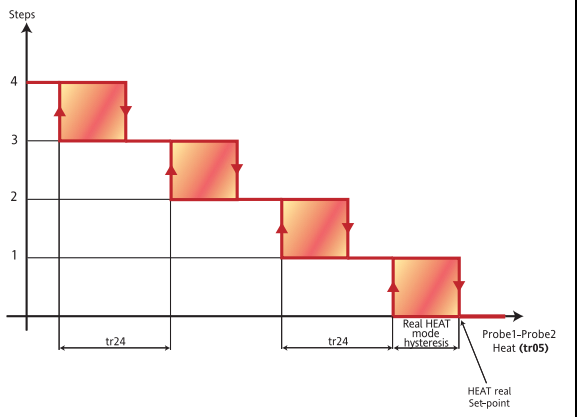
where ***Probe 2*** is the external temperature.

See **Table B Control probes**

Installations with double internal exchanger can control the temperature as a function of the average of the two temperatures measured at the exchanger outlets. The same applies to the external exchangers.

5.2.5.1 Differential temperature control in Cool / Heat mode

Temperature control is enabled in Heat mode only if ***tr01*****:** *Enable heat pump* = 1.

Diagram C	Diagram D
COOL	**HEAT**
	

Parameter		Description
COOL	**HEAT**	**Description**
tr04	***tr05***	*Select differential temperature control probe* **in Cool / Heat**
tr14	***tr24***	*Steps/compressors insertion differential* **in Cool / Heat**
Setpoint		Real setpoint in Cool / Heat
Hysteresis		Real control hysteresis in Cool / Heat

Note: The real hysteresis may not be greater than the differential. In this case the hysteresis is considered equal to the differential.

5.2.6 Digital temperature control

This function is active if parameter ***tr00*: *Type of temperature controller*** = 2.
In the case of *digital temperature control*, the power step request depends on the state of specific *digital inputs*, typically driven by external thermostats, rather than analogue variables.
The operating mode can also be selected via a digital input.
Note: Safety timings, settings (compressor ON delay, pump ON, ..) and *alarms* are active as usual.

The digital input configuration depends on the type of thermostat used in the application.
We list below the meanings which can be associated with the *digital inputs* in question.

Type 1 thermostat

Value DIL1÷DIL5 / AIL1÷AIL5	**Description**
±8	Digital input heat step 1 request
±9	Digital input heat step 2 request
±10	Digital input heat step 3 request
±11	Digital input heat step 4 request
±12	Digital input cool step 1 request
±13	Digital input cool step 2 request
±14	Digital input cool step 3 request
±15	Digital input cool step 4 request

Type 2 thermostat

Value DIL1÷DIL5 / AIL1÷AIL5	**Description**
±3	Remote Summer/Winter
±4	Power step 1 request
±5	Power step 2 request
±6	Power step 3 request
±7	Power step 4 request

For further details, see System Configuration (*folder* PAr/CL-Cr-CF) /
paragraph *Configuration of digital inputs* (DIL1÷DIL5 and AIL1÷AIL5) /
Table B - *Digital inputs: configuration table*

Notes:
- If two *digital inputs* are configured as heat step request and cool step request, activating both at the same time generates a *configuration error;* for further details see the *alarms* table;
- If a digital input has been configured as heat request and the digital input for summer/winter is in the summer position, this generates a *configuration error*;
- Temperature control depends directly on the activation of *digital inputs* which thus must be activated in a logical sequence. For example, power steps must be activated and deactivated in the fixed sequence 1-2-3-4 and 4-3-2-1.

6 OPERATING STATES (FOLDER PAR/ST)

Once it has been configured, the Energy SBW600 is ready to control the utilities as a function of the temperature and pressure measured by the probes and the temperature control functions defined via its parameters.

Operating mode parameters can be viewed and configured in *folder* **St** (see User Interface and Parameters sections)

When Energy SBW600 is not OFF or on StdBy, it is in heat or cool mode

Operating states

Three *operating states* can be set in parameter ***St00*- Select *operating modes***:

- *St00*=0 Cool only **COOL**
- *St00*=1 Heat only **HEAT**
- *St00*=2 Heat and cool **HEAT + COOL**

Operating modes

Operating modes can be selected:

- from the keyboard - if *keys* are enabled in parameters:
  - **UI 21 - Enable MODE function from key** Enables/disables mode selection from a key
  - **UI 23 - Enable ON/OFF function from key** Enables/disables ON/OFF key for switching the device on or off
- from appropriately configured *digital inputs*:
  - i.e. Remote ON/OFF
  - Remote STD-BY

		St00		
		0	**1**	**2**
		COOL	**HEAT**	**HEAT+COOL**
Operating mode	Cooling	x	**NA**	x
	Heating	**NA**	x	x
	Standby (Stdby)	x	x	x
	Remote Standby (Stdby)	x	x	x
	OFF	x	x	x
	Remote OFF	x	x	x
	AS (see section on Sanitary Water)	**NA**	X	X
	Remote AS (see section on Sanitary Water)	**NA**	X	X

If different states are requested at the same time, the following priorities are assigned (in decreasing order):

		Current operating State (current mode)			**Operating state after request**
	priority	**COOL**	**HEAT**	**HEAT+COOL**	
action	1	Digital input configured as ON/OFF (§)	Digital input configured as ON/OFF (§)	Digital input configured as ON/OFF (§)	Remote OFF (§)
	2	ON/OFF key enabled (press and hold DOWN key)	ON/OFF key enabled (press and hold DOWN key)	ON/OFF key enabled (press and hold DOWN key)	OFF
	3	Digital input configured as Standby	Digital input configured as Standby	Digital input configured as Standby	Standby
	4	Mode key enabled (press and hold ESC key)	Mode key enabled (press and hold ESC key)	NA	Mode selected by user (see mode key, *mode change*over function)
	4	NA	NA	Mode key enabled (*)	Standby (*)
	5	NA	NA	Select mode (**)	(**)
	6	NA	NA	Mode key enabled (press and hold ESC key)	Mode selected by user (see mode key, *mode change*over function)

(§) In this case the key [local ON/OFF] has no effect on the operating mode

(*) it will not be possible to switch from COOL mode to HEAT mode (HEAT *label* not visible by pressing and holding ESC key (Mode, change mode function))

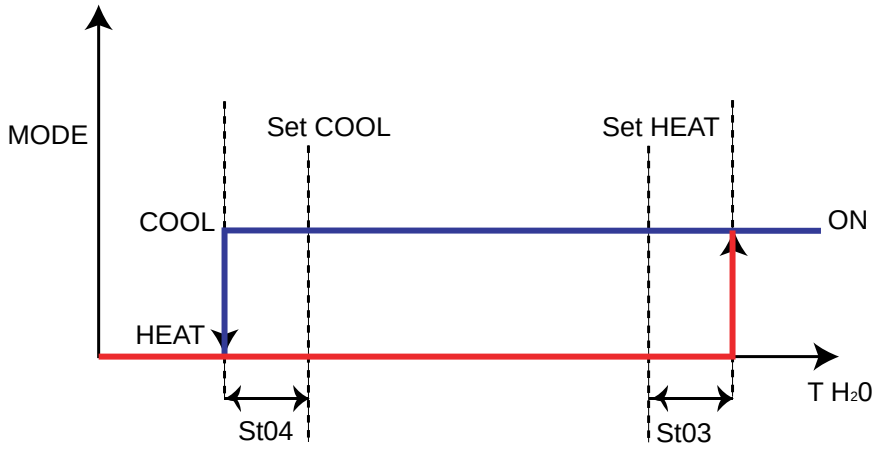
(**) it will not be possible to switch from HEAT mode to COOL mode (COOL *label* not visible by pressing and holding ESC key (Mode, change mode function))

6.1 Automatic changeover

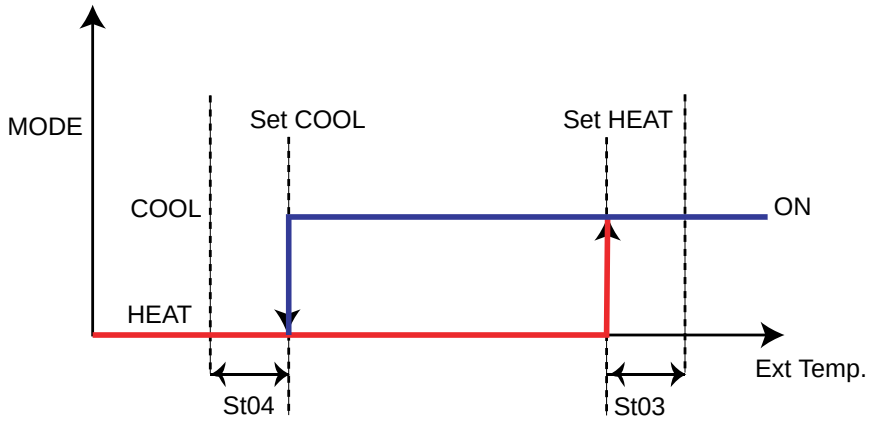
The *automatic changeover* function is enabled by parameter ***St01*- Enable changeover from analogue input**

The Cool/Heat modes are selected by means of two different differentials set by parameter (***St03* - Differential for automatic *mode change* in Heat** for Heat mode, and ***St04* - Differential for automatic *mode change* in Cool** for Cool mode); in the neutral zone (between the two setpoints), the mode can be set from a key as well (if enabled). See the graph below for more details;

6.1.1 Example of automatic changeover based on water temperature



6.1.2 Example of automatic changeover based on external air temperature



MODE	Operating mode
T H2O	Water temperature (*)
Ext Temp	External temperature (*)
SET COOL	**Real temperature control setpoint in Cool (**)**
SET HEAT	**Real temperature control setpoint in Heat (**)**
St03	Differential for automatic *mode change* in Heat
St04	Differential for automatic *mode change* in Cool

(*) If *St01*= 1 see parameters *St02*
(**) The real setpoints may differ from the values of parameters *tr10* and *tr20* - see *Operating modes* - Temperature control (*folder* PAr/tr)

Note: *St04* is added to COOL setpoint; *St03* is added to HEAT setpoint.
Note: *St03*+*St04* < HEAT setpoint - COOL setpoint, or the sum of differentials must never be more than HEAT setpoint - COOL setpoint

6.2 Operating states table

Operating states and associated functions/algorithms enabled/disabled for each one are listed in the table below.
● Function enabled
Example: The Hot Start function can be enabled ONLY in HEAT mode

Function	Cooling COOL	Heating HEAT	Std-By and remote Std-By	OFF and remote OFF
User interface	●	●	●	● (°)
Temperature controller	●	●		
Select operating mode	●	●	●	
Compressor	●	●	●	
Internal circuit water pump	●	●	●	
Recirculation fan	●	●		
External exchanger fan	●	●	●	
External circuit water pump	●	●	●	
Internal circuit heaters	●	●	●	
External circuit heaters	●	●	●	
Auxiliary output	●	●	●	
Boiler		●	●	
Defrost		●		
Dynamic setpoint	●	●		
Economy	●	●		
Adaptive function	●	●		
Antifreeze with heat pump	●	●	●	
Hot Start		●		
Power limitation	●	●		
Record running time	●	●	●	●
Manual alarm reset	●	●	●	●
Manual defrost		●		
MFK	●	●	●	●
Alarms log	●	●	●	●
Diagnostics	●	●	●	●
Serial communication	●	●	●	●

(°) In this case the key [local ON/OFF] has no effect on the operating mode

6.3 Reversal valve management

SB600 allows you to set the valve switching modes (slow/fast switching) based on the type of system by configuring parameter ***St05*** **- Reversal valve switching delay**

If the switching time ***St05*** is different from zero, the inversion of the valve happens only with compressors switched off ("**soft inversion**"). The compressors are switched off and on according to set rules and times. It is a prudent mode, but one which ensures the required efficiency and speed.

6.3.1 Mode Change

- The operation is described below – diagrams A...D.
- Operation in *defrost* or in antifreeze with heat pump is described in the related chapters.
- Note that the *mode change* with ***St05***=0 also occurs with compressors on and the operation is also identical in *defrost* and antifreeze with heat pump

Diagram	Parameter	*Mode Change*
A	*St05* different from 0	COOL - HEAT
B		HEAT - COOL
C	*St05* = 0	COOL - HEAT
D		HEAT - COOL

Diagram A

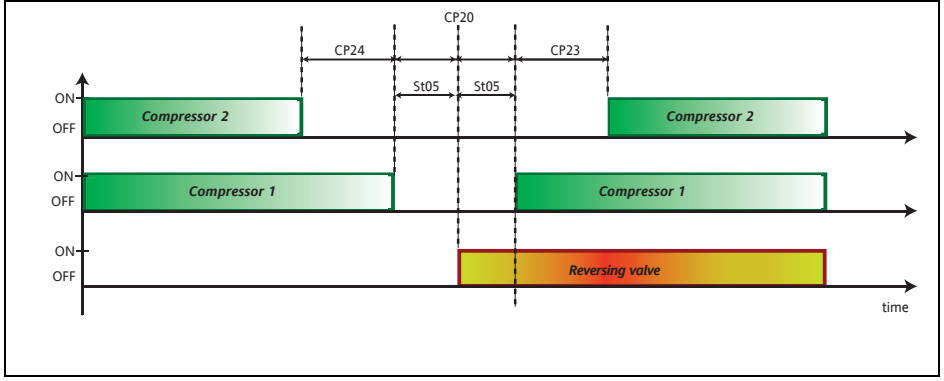
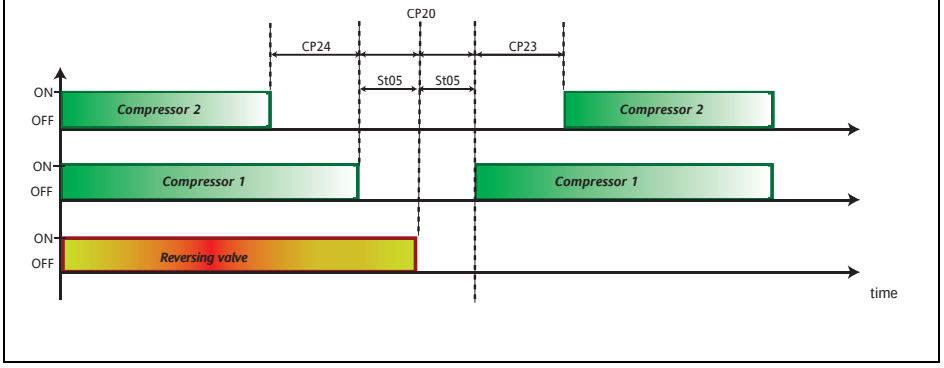


Diagram B



Parameter	Description
St05 different from 0	Reversal valve switching delay
CP20	Minimum off/on for same compressor
CP23	Minimum on/on time for same compressor
CP24	Minimum off/off time for different compressors

Diagram C

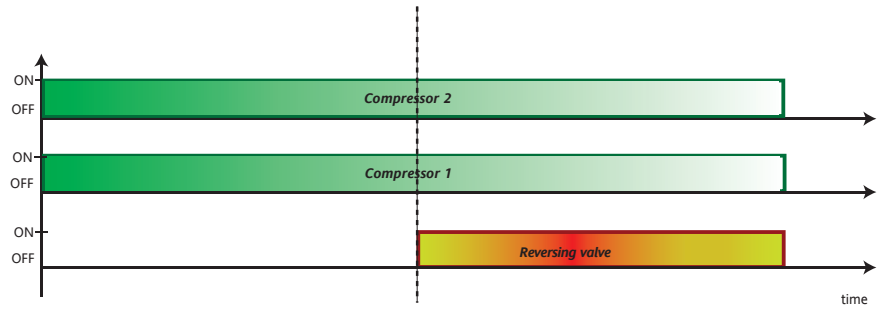
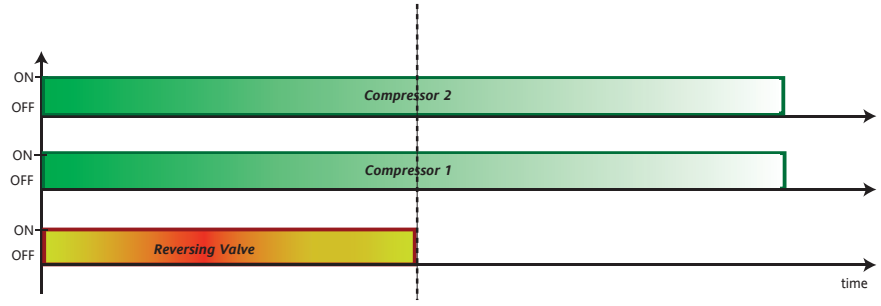


Diagram D



Parameter	Description
St05 = 0	Reversal valve switching delay

7 COMPRESSORS (FOLDER PAR/CP)

Compressor parameters can be viewed and configured in *folder* **CP** (see User Interface and Parameters chapters).
The parameters are:

- *CP00*, *CP01* to define the type and number of compressors in the installation;
- *CP03*..*CP10* to set timings.

The Energy SBW600 is able to control "Alternate", "Scroll" and "Screw" compressors in a *range* of configurations.
The Energy SBW600 controls up to two cooling circuits, with one or two evaporators.
The Energy SBW600 can control from one to four power steps, at most two per cooling circuit.
The Energy SBW600 is also able to pilot the inverters for compressors by means of the following *analogue outputs*

- *Analogue stage 1 for Compressor*
- *Analogue stage 2 for Compressor*

The type of compressor control depends on the configuration of the *analogue outputs*;
The Energy SBW600 has 3 *analogue outputs*, 2 with voltage output 0-10V and one with current output 0-20mA or 4-20mA. Of these only a maximum of 2 can be configured as *analogue outputs* for compressor inverter control; depending on the number of outputs configured, only the first or both analogue stages are available (equivalent of step).
NOTE: compressor management with converter is only suitable for systems with non-staged compressors.

Safety timings can be set for the actuation of compressors and power stages to prevent damage.
Special on/off sequences can be programmed to optimise the use of the available compressors and power.

General conditions of operation
In **Off** the compressors are switched off immediately and always (even when the safeties are active).
In *Stand-by* the compressors are normally switched off; during the transition from On to *Stand-by*, they are switched off in accordance with their timings. In *Stand-by*, the compressors are activated in anti-freeze with heat pump mode.

In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:

the compressors are switched off immediately in case of compressor shut-down *alarms* (see *alarms* table)

7.1 Types of compressor

Compressors may be controlled in a variety of ways according to their number, size and construction.
Parameter ***CP00*** indicates the **type of compressor:**

Value *CP00*	Description
0	Non-power stage compressors
1	Alternate power stage compressors
2	Screw power stage compressors

Configuring *digital outputs* as compressor:
The compressor or compressors, or compressor and its power stage is/are connected to one of the available relay outputs **D01...D04, D06 or to the D05 open collector output,** by setting the following parameters:

- ***CL90...CL95***= ±1...±4 for compressor1..4
- ***CL90...CL95***= ±50...±53 for power steps 1...4

7.1.1 Non-power stage compressors (CP00 = 0)

This is the most simple case, the individual compressor is switched on/off via a single digital output. If more compressors are present, they can be of the same or a different power rating and switched on according to the power requirements of the installation.

Compressor without power stage: ***CP00*** = 0.
Note: Set *CP03* = 0

Power	Compressor
0	Off
100%	On

4 Homogeneous compressors without power stage: ***CP00*** = 0

Power	Compressor 1	Compressor 2	Compressor 3	Compressor 4
0	Off	Off	Off	Off
25%	On	Off	Off	Off
50%	On	On*	Off	Off
75%	On	On*	On*	Off
100%	On	On*	On*	On*

*In this case, the switching on sequence is fixed. This may not always be the case.

Systems with inverters: since only two *analogue outputs* are available for compressor piloting, if the system has a greater number of compressors, management will be mixed between analogue and relays; in these cases the analogue steps are always the "highest" steps or those which are most distant from the setpoint. Refer to the paragraph *Compressor Configuration* / **Permitted configurations** in the case of non-staged compressors (***CP00*** = 0)
forthe various combinations and configurations permitted based on the type of system, understood as the number of compressors and the number of circuits

7.1.2 Power stage compressors (CP00 = 1,2)

The construction of these compressors enable them to modulate their power delivery by means of power stage activation. Each compressor is switched on or off by a single digital output, but other *digital outputs* control its power stage depending on the power requirements of the installation.
The compressor is always switched on or off without power stage.

There are two ways in which the power stage is activated: for alternate multi-cylinder compressors, for screw compressors. In the first case, the power stage is obtained by short circuiting the suction and discharge valves of the cylinders, in screw compressors by deviating the discharge flow to various positions along the screw.
The actuation logic for the power stage relays is different in each case, see the following table:

Alternate power stage compressors with 3 power stages: ***CP00*** = 1
There are 3 power stages, i.e. the compressor can supply 0%, 25%, 50%, 75% or 100% of its power

Power	Compressor	Power stage 1	Power stage 2	Power stage 3
0	Off	Off	Off	Off
25%	On	On	On	On
50%	On	On	On	Off
75%	On	On	Off	Off
100%	On	Off	Off	Off

Note: The compressor control timings are different from those of the power stages. See *Compressor timings* for more details.

Note: note that, with ***CP00*** = 2, the compressor starts (at 25% power) when two relays are actuated at the same time.

7.2 Compressor configuration

the SBW600 can control from one to a maximum of four steps on a single circuit, or up to two steps per circuit for a total of two circuits.
The installation is configured with the parameters:

- ***CP01*** **- Number of circuits**
- ***CP02*** **- Number of compressors per circuit**
- ***CP03*** **- Number of power stages per compressor.**

Multi*compressor configurations* always use compressors of the same type/construction.

Multicircuit installations always employ symmetrical circuits.

Permitted configurations:

- In the case of *non-power stage compressors (**CP00** = 0)*

CP00 = 0 (set ***CP03***=0)		**Non-power stage compressors**			
		CP02 **= 1**	***CP02*** **= 2**	***CP02*** **= 3**	***CP02*** **= 4**
Circuits	***CP01*** **= 1**	Compressor 1(§)	Compressor 1 (*) Compressor 2 (**) (§)	Compressor 1 Compressor 2 Compressor 3	Compressor 1 Compressor 2 Compressor 3 Compressor 4
	CP01 **= 2**	Compressor 1(*)	Compressor 1 Compressor 2	Not allowed	Not allowed
		Compressor 2(**)	Compressor 1 Compressor 2		
NOTE: Set *CP03*=0					

(§) Step replaced by analogue stage 1 if only one analogue output is configured as compressor
(*) Step replaced by analogue stage 1 if 2 *analogue outputs* are configured as compressor
(**) Step replaced by analogue stage 2 if 2 *analogue outputs* are configured as compressor
NOTE: asymmetrical or unbalanced distributions of inverter controls for compressors are not permitted

- In the case of power stage compressors (***CP00*** = 1 and 2) with 1 power stage per compressor (***CP03*** = 1)

CP00 = 1 and 2 ***CP03*** = 1		**Compressors with 1 power stage**			
		CP02 **= 1**	***CP02*** **= 2**	***CP02*** **= 3**	***CP02*** **= 4**
Circuits	***CP01*** **= 1**	Compr. 1, Step 0 Compr. 1, Step 1	Compr. 1, Step 0 Compr. 1, Step 1 Compr. 2, Step 0 Compr. 2, Step 1	Not allowed	Not allowed
	CP01 **= 2**	Compr. 1, Step 0 Compr. 1, Step 1 Compr. 2, Step 0 Compr. 2, Step 1	Not allowed	Not allowed	Not allowed

LEGEND: (Compr. = compressor, Step = Step)

- In the case of power stage compressors (*Type of compressor* ***CP00*** = 1 and 2) with 2 power stages per compressor (*Number of power stages per compressor* ***CP03*** = 2)

CP00 = 1 and 2 ***CP03*** = 2		**Compressors with 2 power stages**			
		CP02 **= 1**	***CP02*** **= 2**	***CP02*** **= 3**	***CP02*** **= 4**
Circuits	***CP01*** **= 1**	Compr. 1, Step 0 Compr. 1, Step 1 (Compr. 1, Step 2	Not allowed	Not allowed	Not allowed
	CP01 **= 2**	Not allowed	Not allowed	Not allowed	Not allowed

- In the case of power stage compressors (***CP00*****:** *Type of compressor* = 1 and 2**) with 3 power stages per compressor (*CP03*:** *Number of power stages per compressor* 3 =)

CP00 = 1 and 2 ***CP03*** = 2		**Compressors with 3 power stages**			
		CP02 **= 1**	***CP02*** **= 2**	***CP02*** **= 3**	***CP02*** **= 4**
Circuits	***CP01*** **= 1**	Compr. 1, Step 0 Compr. 1, Step 1 Compr. 1, Step 2 Compr. 1, Step 3	Not allowed	Not allowed	Not allowed
	CP01 **= 2**	Not allowed	Not allowed	Not allowed	Not allowed

7.3 Compressor timing

Compressor and power stage on/off states must be limited in time, to ensure the mechanical and electrical safety of the equipment.
The SBW600 provides a set of safety parameters for compressors and power stages.
In some cases these parameters are not relevant, as during defrosting, to ensure machine performance. In other cases, the safety timings may influence or modify the compressor operation logic.

- ***CP20*****:** ***Minimum time between switching off/on for a given compressor*** **[Secx10]**
- ***CP21*****:** ***Minimum time between switching on/on for a given compressor*** **[Secx10]**
- ***CP22*****: Minimum on time for a compressor** **[Secx10]**
- ***CP23*****:** ***Minimum time*** **between switching on/on for different compressors** **[Sec]**
- ***CP24*****:** ***Minimum time*** **between switching off/off for different compressors** **[Sec]**
- ***CP25*****:** ***Minimum compressor on time for power stage increase*** **[Sec]**
- ***CP26*****:** ***Minimum compressor on time*** **for power stage decrease** **[Sec]**
- ***CP27*****:** ***Minimum time between switching on/off in defrost mode*** **[Sec]**

7.3.1 Minimum time between switching off/on for a given compressor

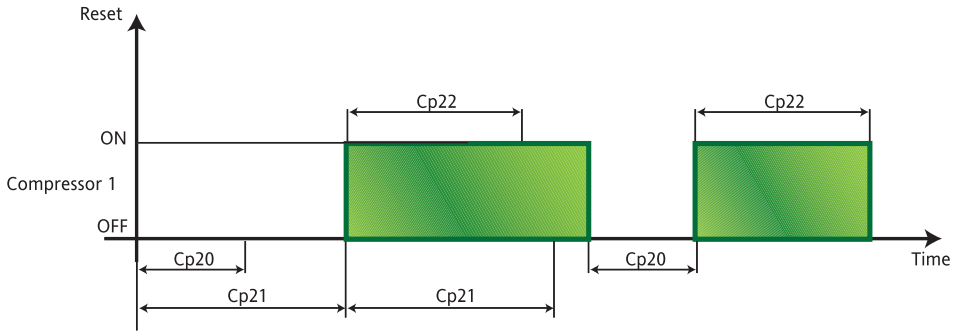
Defined by parameter ***CP20*****:** *Minimum Off-On time for a given compressor* . This is the *minimum time* that must elapse between one switch-off and the next start-up. This is expressed in seconds x 10 and is active even after a reset.

7.3.2 Minimum time between switching on/on for a given compressor

Defined by parameter ***CP21*****:** *Minimum On-On time for a given compressor*. This is the *minimum time* that must elapse between one start-up and the next. This is expressed in seconds x 10 and is active even after a reset.

7.3.3 Minimum compressor on time

Parameter ***CP22*****:** *Minimum compressor on time* defines the *minimum time* between a compressor switching on and off again. It is expressed in seconds x 10.

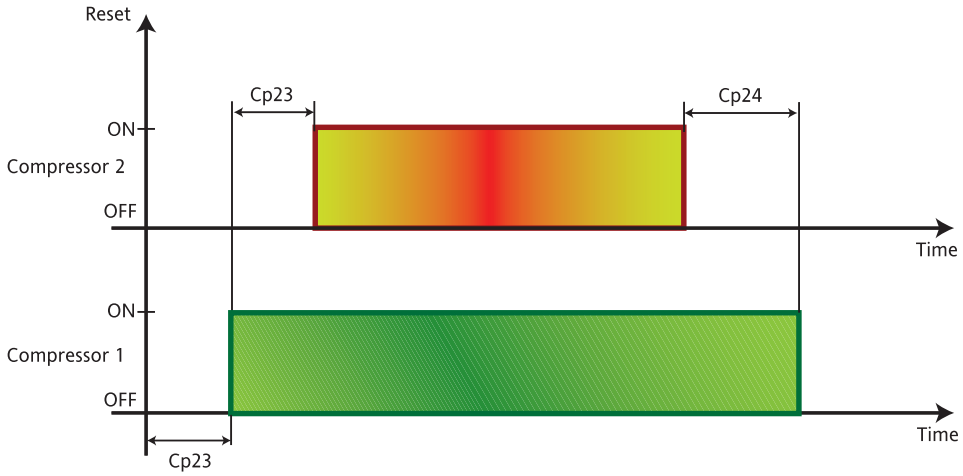


7.3.4 Minimum time between the switching on of more than one compressor

Parameter ***CP23***: *Minimum compressor on/on time for different compressors* defines the *minimum time* between two compressors switching on. If requested, a compressor can be switched on only after this time has elapsed since the previous compressor was switched on. This is expressed in seconds and is active even after a reset.

7.3.5 Minimum time between the switching off of more than one compressor

Parameter ***CP24***: *Minimum off/off time for different compressors* defines the *minimum time* between two compressors switching off. If requested, a compressor can be switched off only after this time has elapsed since the previous compressor was switched off. This is expressed in seconds and is active even after a reset.



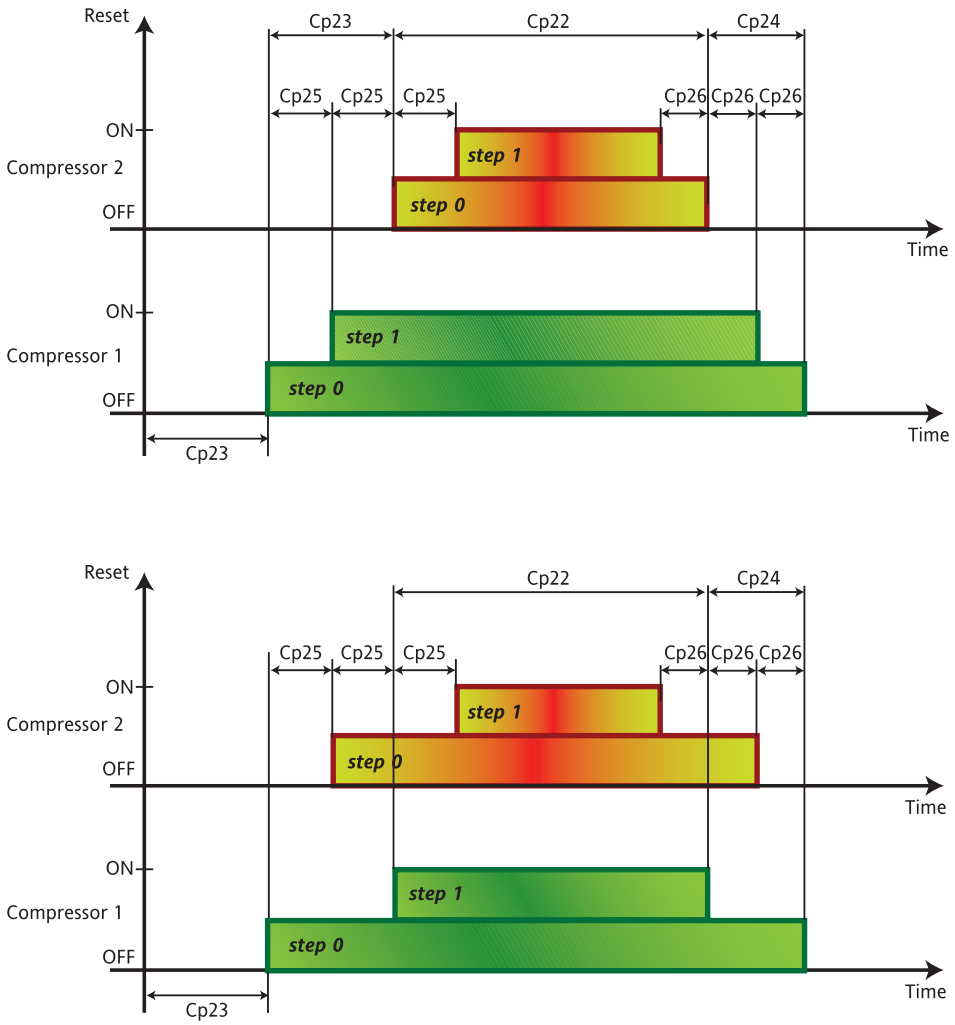
7.3.6 Minimum compressor on time for power stage increase

Parameter ***CP25***: *Minimum compressor on time for power stage increase* defines the *minimum time* between power stage increases (steps). It is expressed in seconds.

7.3.7 Minimum compressor switch on time for decrease in power stages

Parameter ***CP26***: *Minimum compressor on time for decrease in power stages* defines the *minimum time* between power stage (step) decreases. It is expressed in seconds.

Note. ***CP25*** and ***CP26*** have priority over ***CP23*** and ***CP24***



Note. When safety timings overlap, the longest one prevails.

7.3.8 Minimum time between switching on/off in defrost mode

During defrosting and in anti-freeze with heat pump mode, the timings ***CP23***, ***CP24***, ***CP25*** and ***CP26*** are ignored, and instead parameter ***CP27*****:** *Minimum time between switching on/off in defrost mode* is the unique *minimum time* for increasing or decreasing a general power stage.
In other words, this safety timing applies to both compressors, power stages and compressors/power stages.
All other safety timings are ignored in this phase. This speeds up the start and end of defrosting, or at least, controls their duration.

7.3.9 Other timings

Compressors also obey *other timings* related to the operational status of other services such as water pumps, reversing valves, etc.
For details, see the chapters dealing with such services.

7.4 Compressor on/off sequence

7.4.1 Availability of resources

A resource is available if it can be used (switched on/off).

A compressor (or its power stage, if applicable) is available if
- it is not blocked due to an alarm (see *alarms* section)
- it is not blocked by safety timings (see compressors section)
- it is not blocked by the configuration (see compressors section)
- it is not blocked by regulation (e.g. block heat pump function, power limitation, etc.)

In checking the *availability of resources*, the sequence Compressors → Circuits is always followed.

When selecting (actuating/deactivating) resources, one follows the opposite sequence: Circuits → Compressors (selecting an evaporator selects its circuit).

A circuit is said to be saturated when it is delivering all the power stages available from its compressors. A circuit is said to be active or on if it has at least one active compressor; it is off if none of its compressors is on. The current activation level of a particular circuit is defined as the total number of power steps that the compressors are supplying at the time (for example, a circuit that has 2 compressors with 1 power stage can supply up to 4 activation levels/steps)

A compressor is said to be saturated when it is supplying its maximum number of deliverable steps (for example, a compressor with 3 power stages can supply at most 4 levels/steps of activation). A compressor is said to be active or on if it has at least one active step. The current activation level of a particular compressor is defined as the total number of power steps that it is supplying at the time (for example, a compressor that has 2 power stages can supply up to 3 activation levels/steps)

7.4.2 Managing resources

If the number of active steps satisfies the current request, it is not modified.

If the *temperature controller* requests to activate/deactivate a step, the availability of the compressors and circuits is first analysed to control the services on the basis of two logics, that of saturation and that of balancing.
The procedure is to first select the best circuit and then the best compressor in that circuit.

Saturation: The saturation policy attempts to distribute resources equally over the smallest possible number of services compatible with the constraints imposed by other requirements, for example compressor safety timings.
The resulting allocation is intended to have the largest possible number of compressors switched of and circuits deactivated at any one time.

Balancing: The balancing policy attempts to distribute resources equally over the largest possible number of services compatible with the constraints imposed by other requirements, for example compressor safety timings.
The resulting allocation is intended to have compressor and circuit output levels equalized as much as possible (in other words, the smallest number of compressors and circuits off).

There are two parameters which establish circuit (and evaporator) activation as well as activation of the compressors for each circuit:
- ***CP10*: Circuit balancing enable**
- ***CP11*: Compressor balancing enable**

Value *CP10* *CP11*	Description *CP10*	Description *CP11*
0	Saturation (circuits)	Saturation (compressors)
1	Balancing (circuits)	Balancing (compressors)

7.4.3 Resource selection criterion

When the two control selections are applied (saturation and balancing), it may happen that one has to choose between resources which are equally available (for example, when switching on the very first service of all). This selection must therefore also take into account factors like hours of operation and fixed on/off sequences.
the hours of operation of a circuit is the sum of the hours of operation of its compressors.

Hours of operation: One chooses the circuit or compressor which has the least hours of operation when switching on, and most hours of operation when switching off. This tends to use all resources equally.

Fixed sequence: **On(1-2-3-4), Off(4-3-2-1)**
In this case, the selection of the circuit or compressor follows a fixed sequence (given availability). This option uses the resources in a fixed manner, which can be useful in case of steps of different power or when managing secondary backup resources in special circumstances.

Fixed sequence INVERTER compressor: **On(1-2-3-4), Off(4-3-2-1)**
Only usable option in the case of single-circuit configuration with at least one compressor managed by INVERTER

Operating time: This option applies on when there is a single circuit with two compressors (non-power stage) or two circuits with two compressors each, and uses the compressor resources (in this case, non-homogeneous) in a manner equalised to the load.
If the effective operating time of the circuit (TE, time between switching the first compressor on and the last compressor off during the previous cycle) is less than the time set in the parameter, on the next request from the *temperature controller* (for that circuit) the first resource to be activated shall be that with the lowest index ("resource 1") and then resource 2; if the effective operating time of the circuit is greater than the time set in the parameter, on the next request from the *temperature controller* the first resource to be activated shall be that with the highest index ("resource 2") and then resource 1;

There are two parameters which establish circuit and activation as well as activation of the compressors for each circuit:

- ***CP12*: Circuit selection criterion**
- ***CP13*: Compressor selection criterion**

Value	Description *CP12*	Description *CP13*
0	Hours balancing	Hours balancing
1	Sequence On 1,2; Off 2, 1	Sequence On 1,2,3 and 4; Off 4,3,2 and 1
2	//	Operating time

7.4.4 Selecting the circuit/evaporator

Parameter ***CP10*: *Enable circuit balancing*** is only relevant if there are two circuits. If set to 0 (saturation) all the power steps of a given circuit are first activated, followed by those of the other circuit. If set to 1 (balancing), the power steps are activated in such a way that both circuits deliver the same power, or the difference is at most one step.
The circuit is selected according to the value of ***CP12*: Circuit selection criterion**

CP12	Saturation *CP10* = 0	Balancing *CP10* = 1
Hours of operation *CP12* = 0	When switching on, the circuit with least hours of operation is selected (with compressors available for switching on) up to saturation, after which the second circuit is activated. When switching off, teh circuit with least steps active is selected (with compressors available for switching off) or (if the same number of steps are active on each), that with the highest number of hours of operation.	When switching on, the procedure starts with a step of the circuit with least hours of operation (with compressors available for switching on), this is then balanced with a step from the other circuit and so on until both are saturated. When switching off, the opposite sequence is followed, giving priority to the circuit with most hours of operation (with compressors available for switching off).
Fixed sequence On(1,2) Off(2,1) *CP12* =1	When switching on, the first circuit is used up to saturation, after which the second circuit is activated. When switching off, first all the second circuit and then the first circuit is switched off.	When switching on, the procedure starts with a step of the first circuit, this is then balanced with a step from the other circuit and so on until both are saturated. When switching off, the opposite sequence is used.

7.4.5 Selecting the compressor or power stage

Parameter ***CP11*****:** *Enable compressor balancing* is only relevant if there are 2 power stage compressors in the same circuit (which for the SBW600 remains single, since it cannot control a second one with the same characteristics).
If set to 0 (saturation) all the power steps of one compressor are first activated, followed by those of the other compressor. If set to 1 (balancing), the power steps are activated in such a way that both compressors deliver the same power, or the difference is at most one step. The compressor is selected according to the value of ***CP13*****:** *Compressor selection criterion*.
Parameter ***CP14*****:** *Compressor operation time for on sequence* is used if the operation time of the previous cycle is used as the selection criterion.

CP13	**Saturation** ***CP11*** **= 0**	**Balancing** ***CP11*** **= 1**
Hours of operation ***CP13*** **= 0**	When switching on, the available compressor with the least hours of operation is selected until it is saturated, after which the other compressors are selected. When switching off, first the available compressor with least power stages active is selected, or (for an equal number of power stages active) the one with the greater hours of operation.	When switching on, the procedure starts with the first power stage of the compressor with least hours of operation, then the first stage of the next compressor until all compressors are operating, then the second stages, etc.. When switching off, the procedure switches off the power stages of the available compressors with the same logic, favouring those with the greater hours of operation.
Fixed sequence **On(1,2,3,4)** **Off(4,3,2,1)** ***CP13*** **= 1**	When switching on, the first compressor is used up to saturation, after which the second compressor is activated, and so on. When switching off, the first to be selected is that with the highest index, until it is completely switched off, and so on.	When switching on, the procedure starts with the first power stage of the first compressor, then the first stage of the second compressor until all compressors are operating, then the second stages, etc.. When switching off, the stages are switched off with the same logic, starting from the one with the highest index.
Operating time ***CP13*** **= 2**	*CP11* is irrelevant inasmuch as selection by operating time is not required if there are two power stage compressors in the same circuit. If the effective operating time of the *circuit* is less than the time set in parameter *CP14*, on the next *temperature controller* request the sequences On(1,2) and Off(2,1) are used. In the case of two circuits with two compressors each, the sequences are On(3,4) and Off(4,3), independently for the two circuits. Whereas, if the operating time is greater than *CP14* the next sequences will be On(2,1) and Off(1,2).	

8 INTERNAL CIRCUIT PUMP (FOLDER PAR/PI)

The **SBW600** controls one or two hydraulic pumps on the internal exchanger water circuit. Control may be digital or analogue, and depends on a number of system variables such as *temperature controller* status, external exchanger fan speed and internal exchanger water temperature.
For systems with two pumps, these are connected in parallel, and at most one is operational at a time.

Internal circuit water pump parameters can be viewed and configured in *folder* **PI** (see User Interface and Parameters chapters).

The following must be configured:

Digital control

- at least one digital output as internal circuit water pump 1, using the parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±14.**
- **at least one digital output as internal circuit water pump 2, using the parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±15.**

Analogue control

- at least one analogue output as modulating internal circuit water pump 1, using the parameters ***CL80-CL81*** **if analogue /** ***CL61...CL63*** **if analogue = ±59.**
- **at least one analogue output as modulating internal circuit water pump 2, using the parameters ***CL80-CL81*** **if analogue /** ***CL61...CL63*** **if analogue = ±60.**

** in the case of two pumps

The configurable outputs for digital pump control are relays, whereas in modulating operation they are the internal *triac* (for direct control) or the pulse outputs (for external triacs) and the *analogue outputs*.

8.1 Configuration of internal circuit water pump

Enabling
The controller is enabled by setting parameter (***Pi00*** **-Select internal circuit water pump operating mode)** not equal to 0.
Control of the second pump is enabled only if parameter **(*Pi05* - Maximum internal circuit water pump changeover start time** is not equal to 0.

Table 1

	Parameter	Description	value		
			0	**1**	**2**
I pump	**P100**	**Select internal circuit water pump operating mode**	Pump disabled	*Continuous operation* (Always ON)	on request (pump on when compress or on)
			0	**Not equal to 0**	
II pump	***PI05***	**Maximum internal circuit water pump changeover start time**	Pump disabled	after this time (in minutes) the active pump is switched off and replaced by the second pump if available.	

Table 2

	Par	Description	value		
			0	**1**	**2**
antifreeze heater	***PI10***	**Enable internal circuit water pump on when antifreeze heaters active**	Internal circuit water pump disabled	Internal circuit water pump enabled	//
Boiler	***PI11***	**Enable internal circuit special water pump**	No enabling	Enable pump when the boiler is on	Enable modulating pump on the basis of the difference between internal exchanger water/air inlet temperature and Internal exchanger water/air outlet temperature. See *configuration of analogue inputs*

General conditions of operation
At any given time, only one of the pumps may be operating, so that we will talk below of "the pump", rather than "the pumps".

- In **Off** the internal circuit pump is immediately and always off (even if post-pumping is underway).
- In **Standby** the internal circuit pump is normally off; during the transition from On to *Stand-by*, the pump is switched off in accordance with its timings (e.g. post-pumping). In Standby, the pump is activated in: antilock, antifreeze with water pump, antifreeze with internal heater, antifreeze with heat pump.
- In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:
- In *Defrosting* the internal circuit pump is always on (at maximum speed if of the modulating type);
- The pump is forced on (at maximum speed if of the modulating type) if *antifreeze with water pump* is active, which is also active in Standby;
- The pump is forced on (at maximum speed if of the modulating type) if *antilock* is active, which is also active in Standby;
- The pump is forced on (without delays) if the internal heater is on in integration mode, both to prevent damage to the exchanger and to ensure that the heat is effectively dispersed/used.
- The pump be forced on (at maximum speed if of the modulating type) if *antifreeze with* internal circuit heater is active, depending on parameter ***Pi10*****:** *Enable internal circuit water pump on when antifreeze heaters active* (also active in Standby);
- The pump may be forced on (without delays and at maximum speed if modulating) if the *boiler* is active, depending on parameter ***Pi11*****:** *Enable internal circuit special water pump*; with ***Pi11*** = 0, if only the boiler is active and the pump is enabled on request, the pump is normally off;
- The pump is influenced by the Sanitary Water regulator if the value of parameter *AS00* is 4 or 6 e.g. with systems provided with the Sanitary Water pump rather than the Sanitary Water valve. This influence is due to the fact that the two pumps cannot both be ON at the same time; see the section on Sanitary Water
- The pump is switched off immediately in case of pump block alarm (see *alarms* table and flow switch paragraph).

Note: If an *automatic reset flow switch alarm* occurs, the pump is kept on to allow it to be reset; if the alarm becomes *manual reset*, the pump is switched off.

Note: The minimum pump off/on period is fixed at 10 seconds. This applies to both pumps individually.

8.1.1 Control of the second pump

The system's two pumps are connected in parallel, and at most one is operational at a time.
At each activation request the pump with least operating hours is activated, if available, i.e. if there is no thermal switch alarm.
If it is not available, the other pump is activated.

If the active pump is active for longer than the time given in parameter ***Pi05*** **- Maximum internal circuit water pump changeover start time**, it is switched off and the other is turned on (if available, otherwise the timer is set to zero and the same pump keeps running).

8.2 Continuous operation

Case ***Pi00***= 1.

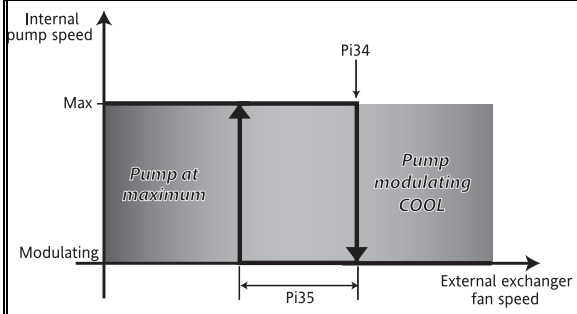
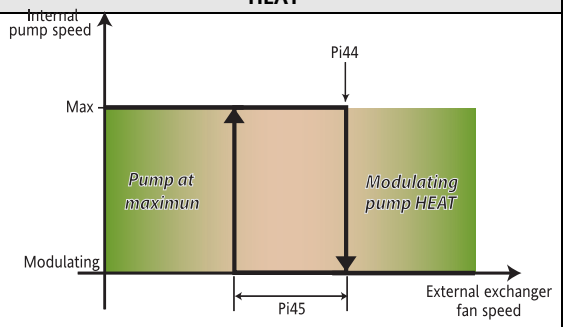
8.2.1.1 Internal circuit pump digital control in Cool / Heat

One of the two *digital outputs* is always active.

8.2.1.2 Internal circuit pump analogue control in Cool / Heat

One of the two *analogue outputs* is always active and controlled in continuous mode.

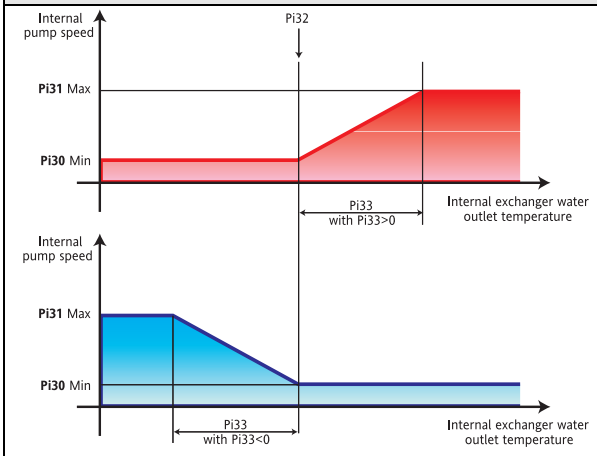
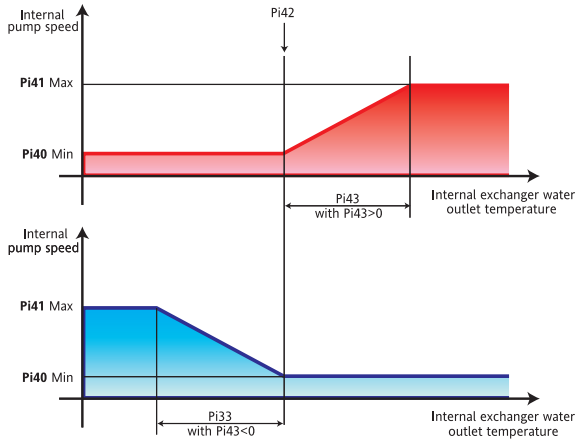
The modulating operation of the internal circuit water pump is either active or not depending on the external exchanger fan speed. In the case of two circuits, we take the average speed of the two fans.

Diagram A	Diagram B
COOL	HEAT
	

Parameter		
COOL	HEAT	Description
PI02		**Internal circuit water pump pick-up time.**
PI30	*PI40*	**Minimum speed internal circuit water pump in Cool / Heat**
PI31	*PI41*	**Maximum speed internal circuit water pump in Cool / Heat**
PI34	*PI44*	**Fan speed setpoint to modulate internal circuit water pump in Heat**
PI35	*PI45*	**Fan speed hysteresis to modulate internal circuit water pump in Heat**
Control sensor		**Internal exchanger water/air outlet temperature or the difference between** • **Internal exchanger water/air inlet temperature and** • **Internal exchanger water/air outlet temperature**

Modulating function in Cool / Heat mode

The internal circuit modulating pumps connected to the *analogue outputs* are switched on at maximum speed (relative to the current mode of operation) for a period given in parameter ***Pi02*** **- Internal circuit water pump pick-up time**. After this time, the pump is run at the speed requested by the controller.

Diagram C	Diagram D
COOL	HEAT
	

Parameter		
COOL	HEAT	Description
PI02		**Internal circuit water pump pick-up time.**
PI30	*PI40*	**Minimum speed internal circuit water pump in Cool / Heat**
PI31	*PI41*	**Maximum speed internal circuit water pump in Cool / Heat**
PI32	*PI42*	**Minimum internal circuit water pump speed setpoint in Cool/Heat**
PI33	*PI43*	**Internal circuit water pump proportional band in Cool / Heat**
Control sensor		**Internal exchanger water/air outlet temperature or the difference between** • **Internal exchanger water/air inlet temperature and** • **Internal exchanger water/air outlet temperature**

Note The pump runs *at minimum speed* if the compressors are off.
Note A probe must be configured as *Internal exchanger water/air outlet temperature* and if two probes are so configured, the average **is taken.**
Note: If *Pi00*=2 e.g. if the difference between
- Internal exchanger water/air inlet temperature and
- Internal exchanger water/air outlet temperature

is considered, it is not permitted to have two output probes.

8.3 Operation on call

Case ***Pi00***= 2.

8.3.1.1 Internal circuit pump digital control in Cool / Heat

One of the two *digital outputs* is active in parallel with the compressor. The internal circuit pump is activated when the main *temperature controller* calls the first step. The compressor starts after the delay given in parameter ***Pi20*****:** *Delay internal circuit water pump on and compressor on* (Pre-pumping). Once the last power stage of the compressor is off, the pump is switched off after the delay given in ***Pi21***: *Delay compressor off - internal circuit water pump off* (Post-pumping).

Note: Post-pumping is also observed in standby mode.

8.3.1.2 Internal circuit pump analogue control in Cool / Heat

The two *analogue outputs* are activated in the same situations in which the *digital outputs* are activated (with pre / post-pumping) but allow for analogue control, with modulating operation according to the diagrams in the previous paragraphs for *continuous operation* (modulation as a function of the internal exchanger water/air outlet temperature probe value or the **average** of the two).

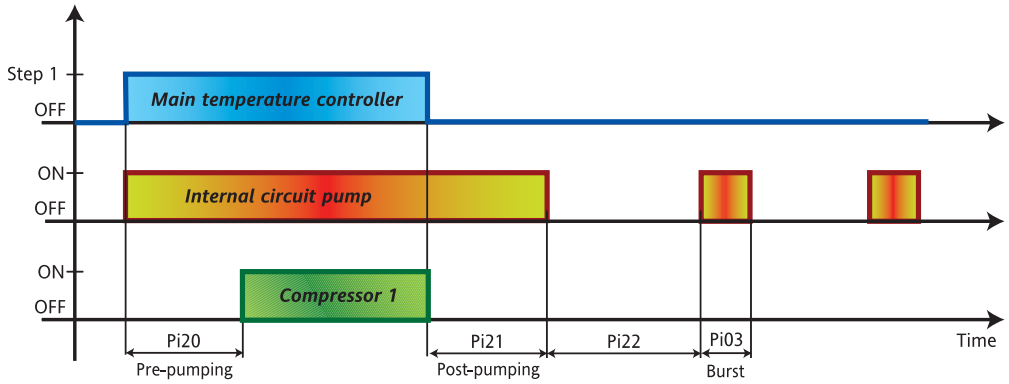
Note. The pump runs *at minimum speed* if the compressors are blocked by *alarms*.

8.3.1.3 Operation on call: periodic pump activation

The function is **enabled** of ***Pi22*** is not equal to 0, and allows water to be driven round the circuit at regular intervals for improved temperature control (the real water temperature in the circuit can always be measured periodically), with consequent energy savings.

Use **parameter *Pi22*: *Maximum pump of time in operation on call*** to establish a maximum time for the pump to stay off after which it is forced on (so long as there are no block *alarms*, and at maximum speed if modulating) for the *minimum time* defined in ***Pi03*: *Minimum pump on time.***

Note: This function is disabled in standby.



Note: The activation of the compressor could also be delayed by other safety timings, this means that the pre-pumping time could be longer (never shorter).

8.4 Pump antilock mode

This function prevents any mechanical faults due to extended disuse.

The antilock function is active when:

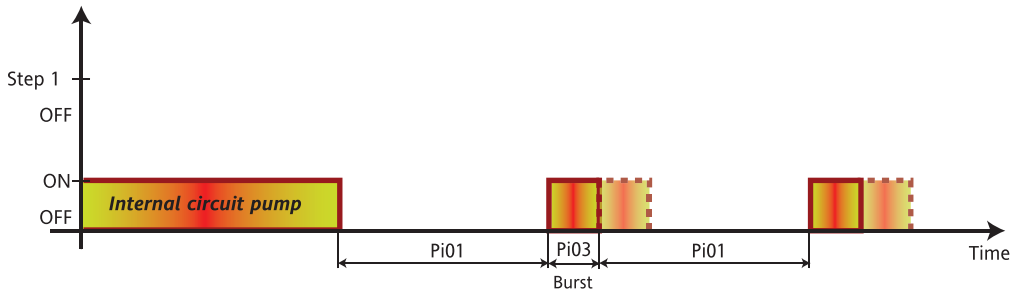
- enabled by parameter (***PI01*** **-** Internal circuit water pump idle time due to antilock > 0). See **table 3**
- always active, except for OFF (local and remote) unless *alarms* switch off the pump

If the pump stays off for longer than or equal to ***Pi01*****:** *Internal circuit water pump idle time due to antilock*, the controller forces it on (at maximum speed if modulating) for the time set in parameter ***Pi03*****:** *Minimum pump on time.*

Table 3

Antilock	Parameter	Description	Value	
			0	**>0**
	PI01	Internal circuit water pump idle time due to antilock	Function disabled	Function enabled
Diagram E	***PI03***	**Minimum internal circuit water pump start time**	Time in seconds x 10	

Diagram E Pump antilock



Note: the broken line indicates the second pump, if present

8.5 Antifreeze operation with pump

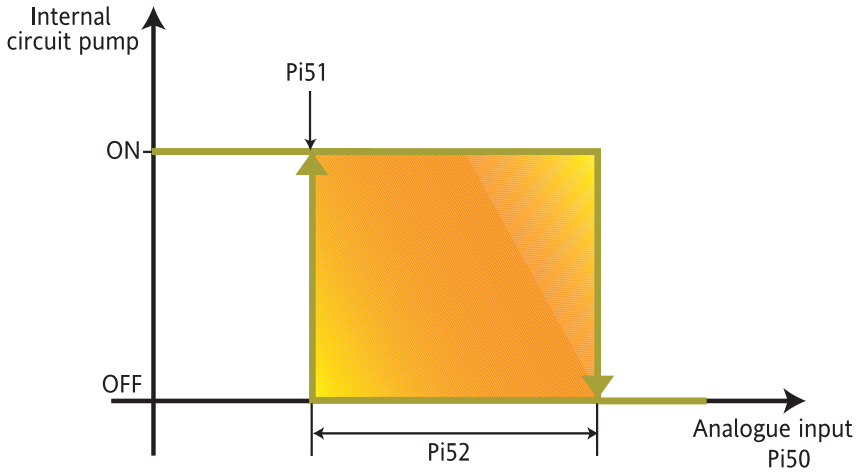
The antifreeze function runs when:
enabled by parameter ***Pi50*** **-Select probe for internal circuit + water pump antifreeze.**

- See **table 4**
- always active, except for OFF (local and remote) and Stdby (local and remote) unless *alarms* switch off the pump

Table 4 - ***Pi50***

Value	Probe
0	No probe (pump in antifreeze disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Internal exchanger water outlet temperature circuit 1
4	Internal exchanger water outlet temperature circuit 2
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature
6	External temperature

Diagram F ***Antifreeze operation with pump***



Parameter	Description
PI51	**Internal circuit water pump regulator setpoint for antifreeze**
PI52	**Internal circuit water pump regulator hysteresis for antifreeze**
Control probe ***Pi50***	**Select probe for internal circuit + water pump antifreeze**

Note. If the probe selected for antifreeze with the internal circuit pump is in error, the machine is blocked.

9 RECIRCULATION FAN (FOLDER PAR/FI)

The recirculation fan parameters are visible and can be set up in *folder* **FI** (see User Interface and Parameters chapters).

The following must be configured:

- at least one digital output as recirculation fan using parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±18.**

Enabling
The controller is enabled by setting parameter (***Fi00*** **-Select recirculation fan operation)** not equal to 0.

Table 1 - Parameter *Fi00*

	Parameter	Description	value		
			0	**1**	**2**
Enabling	***Fi00***	**Select recirculation fan operation**	Recirculation fan disabled	Recirculation fan *continuous operation*	Recirculation fan operation on *temperature controller* call

General conditions of operation

- In **Off** the recirculation fan is immediately off (even when *post-ventilation* in underway).
- In **Standby** teh fan is off, in accordance with established timings (e.g. *post-ventilation*). ote: the fan remains on until all of the compressors have been switched off
- In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:
  - In *defrost*, the recirculation fan is off (as per parameter ***Fi03*****:** *Post-ventilation time in Heat mode*);
  - if at least one of the internal exchanger heaters is on, the fan is *forced* on (absolute priority); after the last heater has been turned off, parameter ***Fi03*****:** *Post-ventilation time in Heat mode* applies;
  - if alarm **Er30:** *Internal circuit antifreeze alarm*, is active, the fan is forced on;
  - the recirculation fan is immediately switched off in case of a blocking alarm (see *alarms* table)

9.1.1 Continuous operation

Case *Fi00* = 1.
The digital output recirculation fan, is always on except in the conditions specified in the general conditions of operation section.

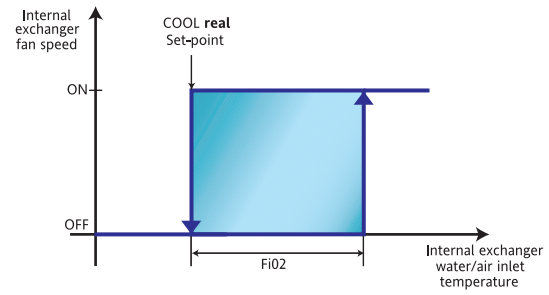
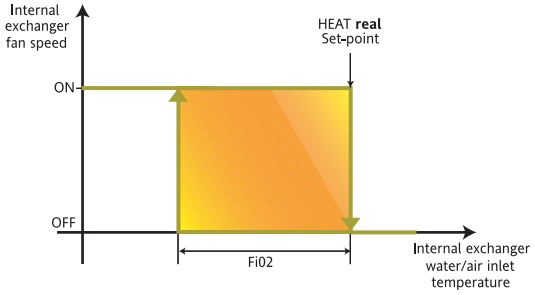
9.1.2 Operation on call

Case *Fi00* = 2.
Activation of the recirculation fan depends on the status of the compressors (not of the compressor *temperature controller*), of the temperature measured by the internal exchanger water/air inlet temperature probe, and the real *temperature controller* setpoint (Heat or Cool).
The fan is switched on only is at least one compressor is running and the exchanger inlet air temperature is adequate.

Note. if the Internal exchanger water/air inlet temperature is in error (or has not been configured), recirculation fan activation depends exclusively on the compressor status.

9.1.2.1 Recirculation fan in Heating / Cooling

Control is dependent on the real setpoint as shown

Diagram A	Diagram B
COOLING	HEATING
	

Parameter		
COOL	HEAT	Description
Fi01	***Fi02***	**Recirculation fan hysteresis in Cool / Heat**
Setpoint		**Real setpoint in Cool / Heat**
Control probe		**Internal exchanger water/air inlet temperature**

9.2 Post-ventilation

In Heat mode, the fan is switched off after a delay set in parameter ***Fi03***: *Post-ventilation time in Heat mode* after the internal circuit integration heaters have been switched off.
This *post-ventilation* time allows for the heat generated by the heaters to disperse, thus preventing damage or fire.

10 EXTERNAL EXCHANGER FAN (FOLDER PAR/FE)

The **SBW600** controls (via *digital outputs*) the ventilation of the air condensation units of the two chiller/heat pump temperature control circuits.
Alternatively, it can control ventilation in a modulating mode, via *analogue outputs* .

The configurable outputs for digital pump control are relays, whereas in modulating operation they are the internal *triac* (for direct control) or the pulse outputs and the *analogue outputs* (indirect control).

External exchanger fan parameters can be viewed and configured in *folder* **FE** (see User Interface and Parameters chapters).

The following must be configured:

- at least one digital output as external exchanger fan with parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±19 (circuit 1)/ ±20 (circuit 2).**

Enabling
The controller is enabled by setting parameter ***FE00*** **- External exchanger fan mode selection** not equal to 0.

Table 1 - Parameter *FE00*

	Parameter	Description	Value		
			0	1	2
Enabling	***FE00***	**External exchanger fan mode selection**	Ventilation disabled	*Continuous operation* (Always ON)	*Operation on call* (ON when compressor ON)

General conditions of operation

- In**Off** the fans are switched off immediately and always (even when the cut-off bypass is active).
- In **Standby** the fans are normally switched off; during the transition from On to Standby, the fans are switched off in accordance with their timings (e.g. bypass on current cut-off). If ***FE11***=2 the fans are active at the same time as the external exchanger heaters in antifreeze mode.
- In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:
- In *Defrost* the behaviour of the fans depends on parameter ***FE11***: *Enable special open system intercooler fan on* (see below for details);
- if the external exchanger heaters are on (or if at least one is on in the case of 2 heaters), the fans are activated if *FE11*=2 . In the case of two circuits, the fans of both circuits are activated;
    - the external exchanger fans are switched off immediately in case of fan shut-down *alarms* (see *alarms* table)

Parameter		
COOL	**HEAT**	**Description**
FE30	***FE50***	Minimum speed external exchanger fan **in Cool / Heat**
FE31	***FE51***	Average speed external exchanger fan **in Cool / Heat**
FE32	***FE52***	Maximum speed external exchanger fan **in Cool / Heat**
Setpoint		**Real setpoint in Cool / Heat**
Control probe		**External exchanger water/air inlet temperature**

External exchanger fan on pick-up
The external circuit modulating pumps connected to the *analogue outputs* **_AO_VenPerC1** and **_AO_VenPerC2** are switched on at maximum speed (relative to the current mode of operation) for a period given in parameter ***FE01*****:** *External exchanger fan pick-up time*. After this time, the pump is run at the speed requested by the controller.

External exchanger fan control input
Control is achieved with the value of the analogue input configured with parameters ***FE33*****:** Select probe for external exchanger fan regulation in Cool and ***FE53*****:** Select probe for external exchanger fan regulation in Heat.

Parameters table ***FE33*** and ***FE53***

Value	Description	Regulation
0	No probe	On or On/Off
1	External exchanger temperature (circuit 1 and 2)	Direct
2	High pressure input (circuit 1 and 2)	Direct
3	Low pressure input (circuit 1 and 2)	Reversal
4	External exchanger pressure (circuit 1 and 2)	Direct
5	Internal exchanger pressure (circuit 1 and 2)	Reversal
6	Internal exchanger water/air inlet temperature	Direct
7	Internal exchanger water/air outlet temperature	Direct

If the plant has two circuits, the fans on the two external exchangers are controlled independently, on separate probes: both circuits must have analogue inputs configured for this purpose.
If not, ventilation will always be active.

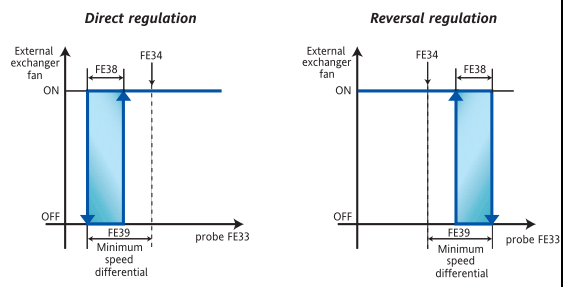
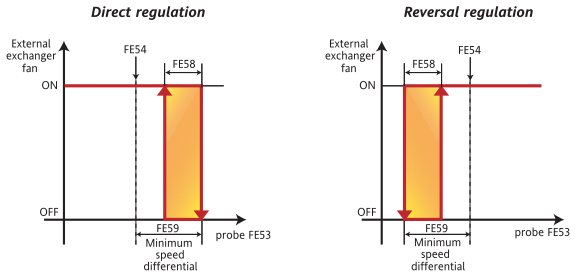
Analogue inputs for ventilation control

Description	*U.M.*
External exchanger temperature circuit 1	°C
External exchanger temperature circuit 2	°C
High pressure input circuit 1	Bar
High pressure input circuit 2	Bar
Low pressure input circuit 1	Bar
Low pressure input circuit 2	Bar
External exchanger pressure circuit 1	Bar
External exchanger pressure circuit 2	Bar
Internal exchanger pressure circuit 1	Bar
Internal exchanger pressure circuit 2	Bar
Internal exchanger water/air inlet temperature	°C
Internal exchanger water/air outlet temperature	°C

10.1.1 Continuous operation

Example ***FE00***= 1.
Ventilation is activated, independently of the state of the compressors on the basis of the value of the analogue input configured for control.
The parameter ***FE21*****- External exchanger fan preventilation time** must be set to 0.
Note: If an analogue input is not configured or if the configured analogue input is in error, ventilation is always active (at maximum speed if modulating).

10.1.1.1 External exchanger fan digital control in Cool / Heat

Diagram A		Diagram B	
COOLING		HEATING	
Analogue input control			
External exchanger temperature High pressure input External exchanger pressure	Low pressure input Internal exchanger pressure	External exchanger temperature Low pressure input External exchanger pressure	High pressure input Internal exchanger pressure
			

Parameter		
COOL	HEAT	Description
FE33	***FE53***	**Select external exchanger fan control probe in Cool/Heat**
FE34	***FE54***	**Minimum external exchanger fan speed setpoint in Cool / Heat**
FE38	***FE58***	**External exchanger fan cut-off hysteresis in Cool / Heat**
FE39	***FE59***	**External exchanger fan cut-off differential**
Control probe		**External exchanger water/air inlet temperature**

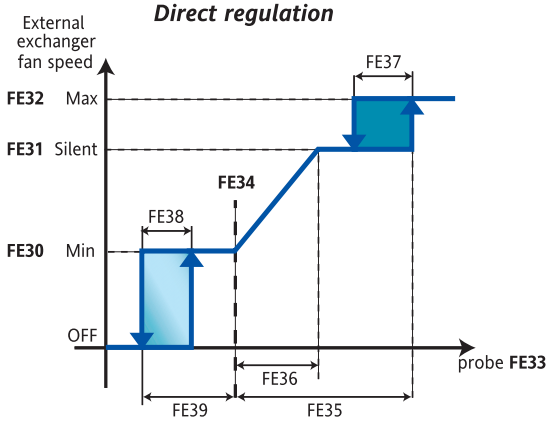
10.1.1.2 External exchanger fan analogue control in Cool / Heat

Analogue input control:
External exchanger temperature
High pressure input
External exchanger pressure circuit

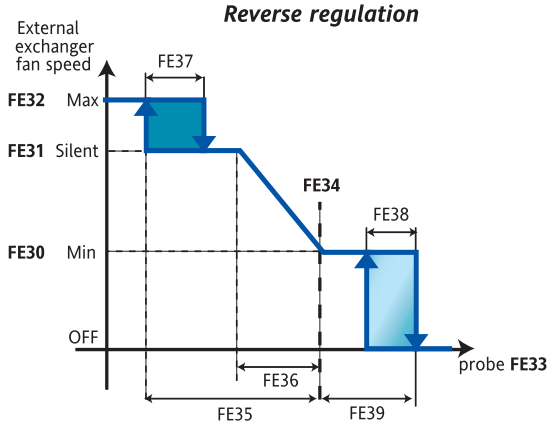
Analogue input control:
Low pressure input
Internal exchanger pressure

COOL

Direct regulation



Reverse regulation

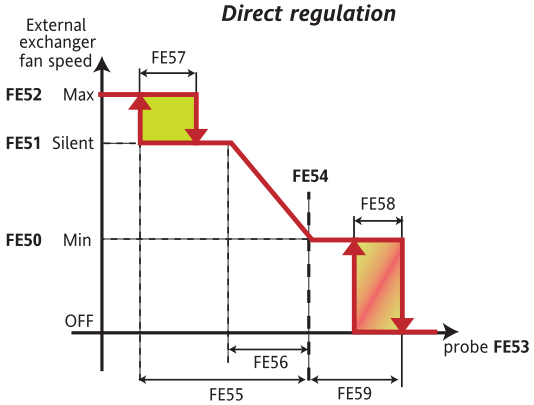


Analogue input control:
External exchanger temperature
Low pressure input
External exchanger pressure circuit

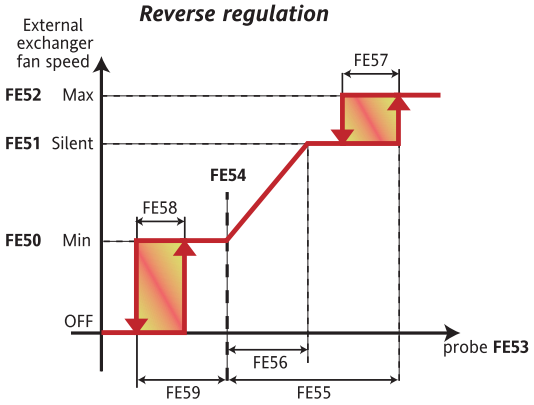
Analogue input control:
High pressure input
Internal exchanger pressure

HEAT

Direct regulation



Reverse regulation



Parameter		
COOL	**HEAT**	**Description**
Control probe		**Select probe for external exchanger fan control in Cool/Heat**
FE33	***FE53***	
FE34	***FE54***	**Minimum external exchanger fan speed setpoint in Cool / Heat**
FE35	***FE55***	Maximum external exchanger fan speed differential **in Cool / Heat**
FE38	***FE58***	**External exchanger fan cut-off hysteresis in Cool / Heat**
FE39	***FE59***	**External exchanger fan cut-off differential**
Control probe		Select external exchanger fan control probe in Cool/Heat

10.1.2 Operation on call

Case ***FE00*** = 2.
Ventilation is activated, on the basis of the value of the analogue input configured for control and depending on the state of the compressors

Note: If an analogue input is not configured or if the configured analogue input is in error, ventilation is activated exclusively on the basis of the state of the compressors (at maximum speed if modulating).

10.1.2.3 External exchanger fan digital control in Cool / Heat

External exchanger fan control is activated at the moment in which the main *temperature controller* calls the first step of the temperature control circuit (to which the external exchanger belongs).

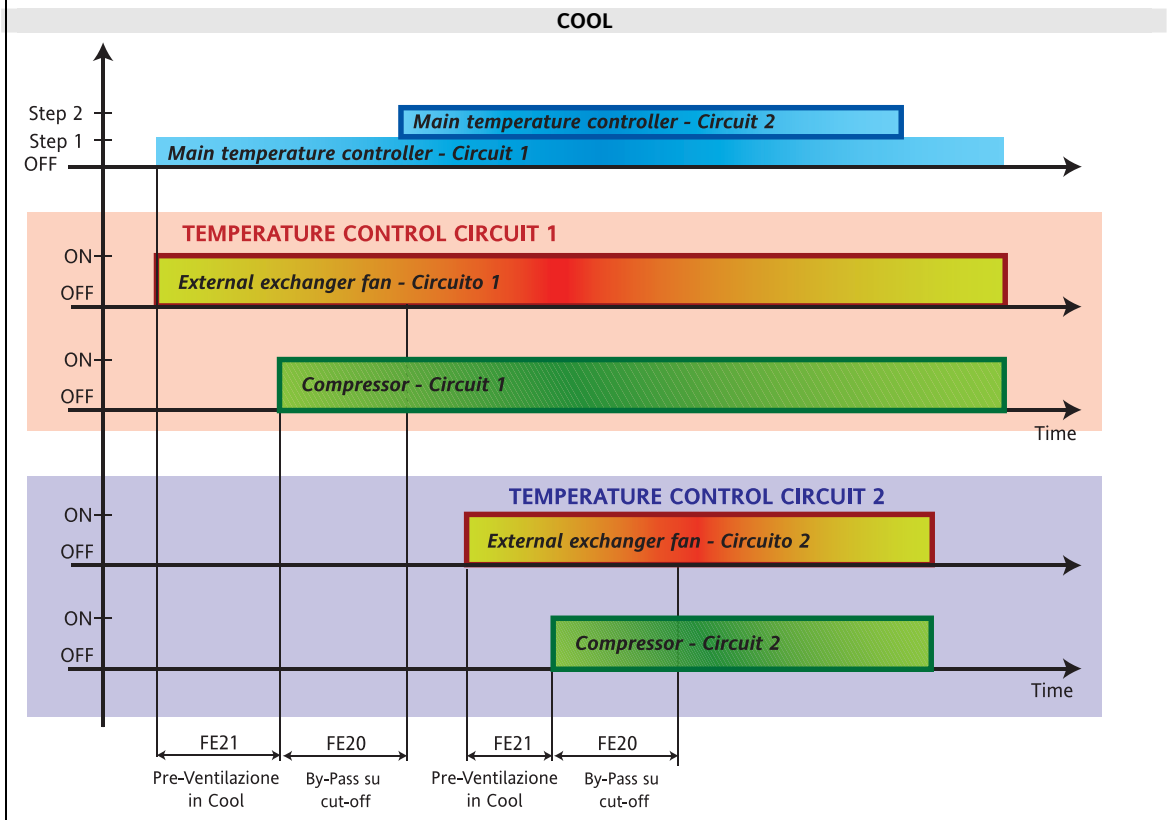
The compressor starts after the delay given in parameter ***FE21*****:** *External exchanger fan preventilation time.*
Note: compressor activation may be delayed by other *safety timings*.

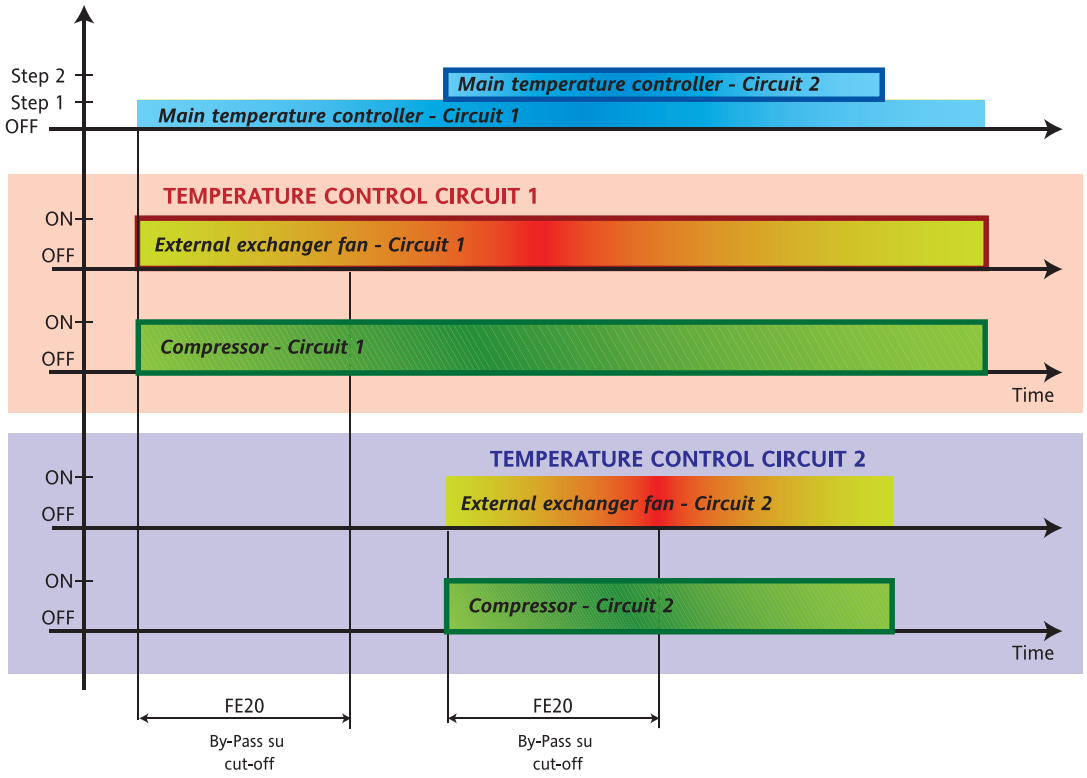
Furthermore, the *digital outputs* are controlled by parameter ***FE34*****:** *External exchanger fan minimum speed setpoint in Cool* as for *continuous operation*, with the following exception: after the compressor is activated (meaning the first compressor or power stage of the circuit in question), for the delay given in parameter ***FE20*****:** *Bypass time for external exchanger fan cut-off* the fans are forced on even if the controller is requesting cut-off.

Pre-ventilation is used in Cool to prevent high temperatures on the exchanger when the compressor is switched on.
The cut-off bypass prevents extreme temperatures on the exchanger.

Note: if there are *alarms* blocking the compressors, external exchanger fan control remains active even with the compressors off.

Note: The activation of the compressor could also be delayed by other safety timings, this means that the pre-ventilation time could be longer (never shorter).





Note: if there are *alarms* blocking the compressors, external exchanger fan control remains active even with the compressors off.

10.1.2.4 External exchanger fan analogue control in Cool

The *analogue outputs* are activated exactly as the respective *digital outputs* (with pre-ventilation and cut-off bypass) and are modulated, except for the cut-off bypass period (where the fans are activated at minimum speed if the controller requests cut-off), according to parameter ***FE34***: *External exchanger fan minimum speed setpoint in Cool* as for *continuous operation*.
If there is no request for steps the fan is normally off.

10.1.2.5 External exchanger fan analogue control in Heat

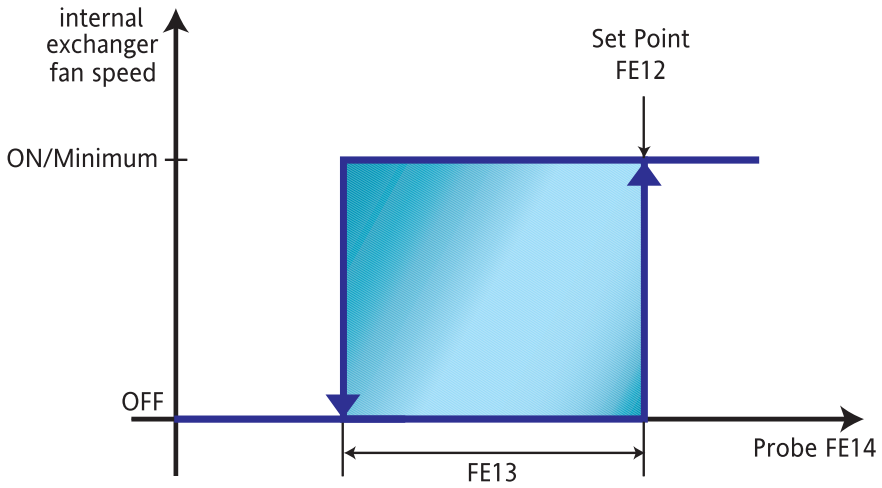
The *analogue outputs* are activated exactly as the respective *digital outputs* (with cut-off bypass) and are modulated, except for the cut-off bypass period (where the fans are activated at minimum speed if the controller requests cut-off), according to parameter ***FE54***: *External exchanger fan minimum speed setpoint in Heat* as for *continuous operation*.
If there is no request for steps the fan is normally off.

10.2 Fan control in defrost

Fan activation in *defrost* mode is useful because pressure at the external exchanger can reach alarm levels if the exchanger is not totally de-iced. To prevent a high pressure alarm in this situation, the fans are run (at minimum speed if modulating).

The behaviour of the external exchanger fan during *defrost* is determined by ***FE11*****:** *Enable special open system intercooler fan on*, in which the fans run at maximum speed.
If the machine has two temperature control circuits, the status of the fan is dependent on the *defrost* condition of its respective circuit.
On completion of defrosting the fan resumes operation as requested by its controller.

- If ***FE11*** **=** 0, the fan is forced off throughout defrosting.
- If ***FE11*** **=** 1, the fan is off or on at minimum speed (digital output active) depending on the analogue input configured for control of the fan in *defrost* and parameter ***FE12*****:** *External exchanger fan on setpoint in defrost* in the following way:



FE12**:** External exchanger fan on setpoint in *defrost*
FE13**:** External exchanger fan on hysteresis in *defrost*
FE14**:** Select probe for external exchanger fan regulation in *defrost*

Parameter table ***FE14***

Value ***FE14***	**Description**
0	No probe
1	External exchanger temperature (circuit 1 and 2)
2	High pressure input (circuit 1 and 2)
3	External exchanger pressure (circuit 1 and 2)

Note: if there are two temperature control circuits, each must have a probe configured for this purpose. If no analogue input is configured or if the configured input is in error, ventilation is always at minimum during *defrost* (maximum in coil drainage).

Note: At the end of *defrost*, the fans are switched on (at maximum speed if modulating) for the time set in parameter ***dF23*****:** *Coil drainage time*, before the reversing valve switches.

10.3 Fan control with single condensation

Parameter ***FE10*****:** *Enable single condensation* configures 2 circuit machines with single condensation.

if ***FE10*** = 0 the two fans are independent and depend on the condensation pressure/temperature and the state of the compressors on the individual circuits.
If ***FE10*** = 1 the 2 (in reality 2 digital and 2 analogue) external exchanger fan outputs operate in parallel at the maximum output value of the two controllers for the two circuits.

11 EXTERNAL CIRCUIT PUMP (FOLDER PAR/PE)

External circuit water pump parameters can be viewed and configured in *folder* **PE** (see User Interface and Parameters chapters).

At least one digital output must be configured as External Circuit Water Pump with parameters ***CL90...CL97*** **= ±16.**
See chapter System configuration (*folder* PAr/CL-Cr-CF) / *Configuration of digital outputs*

Enabling
The external circuit water pump can be enabled by parameter **(*PE00*** - **External circuit water pump mode selection**=1)

Parameter	Description	value			
		0	**1**	**2**	**3**
PE00	External circuit water pump mode selection	Pump disabled	*Continuous operation* (Always ON)	NOT USED	Operation synchronised with external exchanger fans

Based on *PE00* the external circuit pump can operate in continuous mode or synchronised with the external exchanger fans.

General conditions of operation
In **Off** the pump is always off.
In **Standby** the pump is normally off; it is activated at the same time as the external exchanger heater in antifreeze (if ***PE00***=1). If ***PE00***=3 the pump is activated only if the external exchanger fans are activated.
In **On** the pump is always on if ***PE00*** = 1. **If *PE00*=3** the External Circuit Water Pump is activated "in parallel" to the external exchanger heaters: e.g. the pump is activated if the external exchanger fan is activated (single-circuit systems), or if at least one of the two fans is activated (dual-circuit systems).

Notes:
The pump is immediately switched off in the event of boiler lock alarm (see *alarms* table).
If an *automatic reset flow switch alarm* occurs, the pump is kept on to allow it to be reset; if the alarm becomes *manual reset*, the pump is switched off.
The minimum pump off/on period is fixed at 10 seconds.

12 INTERNAL EXCHANGER ELECTRIC HEATERS (FOLDER PAR/HI)

The **SB600** controls internal exchanger heaters 1 and 2, which act both for the antifreeze function (typically in machines with water-type internal exchanger) and integration for the heat pump/heating function (air and water).

Parameters for internal circuit exchanger heaters can be viewed and configured in *folder* HI: Internal exchanger electric heater parameters (see User Interface and Parameters chapters).

Antifreeze/integrated use heaters should be connected to a relay output (°) DO1..D04, D06 (see).

- They are active only when the relative parameter enabling them *HI00*, HI02=1 (see table)

(°) The heater control outputs are all and exclusively those outputs with ON/OFF control.
The heaters can be used in a variety of ways depending on the type of system. We can have one or two internal exchangers and one or two circuits.

In the case of a single exchanger with single/double circuit: in antifreeze, *defrost* and integration the heaters are controlled in equivalent mode.

In the case of a double exchanger with double circuit: in antifreeze and *defrost* the two heaters are controlled differently, depending on the variables of the circuit in question; in integration they are controlled equivalently.

For greatest configurability:

- the number of antifreeze heaters and integration heaters can be set independently;
- the control analogue input can be determined individually.
- The heaters (1 or 2) can be used only for antifreeze, only for integration/heating, or for both functions at the same time.

heaters	Parameter	Description	value	
			0	1
Antifreeze (Standby)	***HI00***	Enable internal exchanger heater regulator in standby for antifreeze	Heaters disabled	Heaters enabled
See Heaters in *defrost* paragraph	***HI01***	Enable force heaters on during *defrost*	See parameters table ***Hi01***	
Antifreeze	***HI10***	**Select probe for antifreeze internal exchanger + heater 1**	See Parameters table ***Hi10*** and ***Hi11***	
Antifreeze	***HI11***	**Select probe for antifreeze internal exchanger + heater 2**		
integrated use	***HI20***	Enable integrated use of internal exchanger heaters	See parameters table ***Hi20***	

12.1 Internal antifreeze heater

Enabling
The internal exchanger antifreeze heaters are enabled with parameters

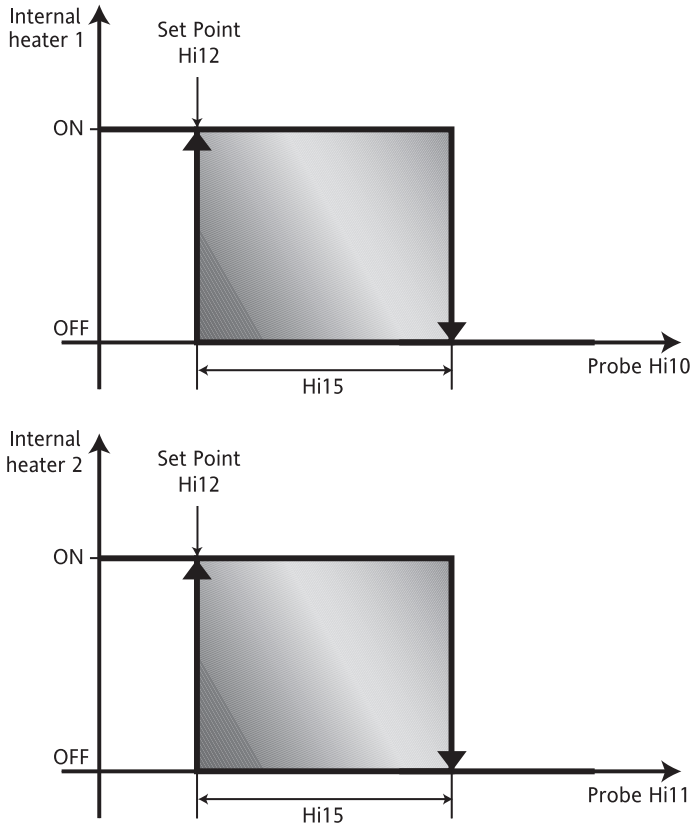
- ***HI10*** **- Select probe for antifreeze internal exchanger + heater 1**
- ***HI11*** **- Select probe for antifreeze internal exchanger + heater 2**

General conditions of operation

- In Off the internal exchanger antifreeze heaters are immediately and always off.
- In Standby the internal exchanger antifreeze heaters are active if so configured with **(** *Hi00* -Enable internal exchanger antifreeze heaters in *Stand-By*).
- In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:
  - In *Defrost* the internal circuit heaters are controlled by parameter ***Hi01*****:** *Enable force heaters on during defrost*. See dedicated paragraph
  - The internal circuit heaters are immediately turned off during heater block *alarms* (see *alarms* table).

Note: There are no safety times for heater on/off.

12.1.1 Internal circuit antifreeze heater control



Parameter	Parameter	
Control probe	***Hi10***	**Select probe for antifreeze internal exchanger + heater 1**
	Hi11	**Select probe for antifreeze internal exchanger + heater 2**
Setpoint	***Hi12***	**Internal exchanger heater regulator setpoint for antifreeze**
	Hi13	**Maximum internal exchanger heater regulator setpoint for antifreeze**
	Hi14	**Minimum internal exchanger heater regulator setpoint for antifreeze**
Hysteresis	***Hi15***	**Internal exchanger heater regulator hysteresis for antifreeze**

Parameters table ***Hi10*** and ***Hi11***

Value H110 / ***Hi11***	Probe
0	No probe (antifreeze heater disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Internal exchanger water outlet temperature circuit 1
4	Internal exchanger water outlet temperature circuit 2
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature

Note: depending on settings, the heaters can be turned on together (using the same probe) or separately (using different probes).

Note: In case of control probe error, the machine is blocked.

12.2 Configuration of integration heaters

Enabling
Use parameter ***Hi20*** *Select heater mode in integration mode* to activate the heaters in integration mode controller.
Either 1 or 2 heaters will be controlled, depending on the value of ***Hi26*****:** *Differential setpoint internal exchanger heater 2 on in integrated use*: 1 heater if ***Hi26*** = 0, 2 heaters if ***Hi26*** ≠ 0.

General conditions of operation

- InOff the compressors are switched off immediately and always.
- In *Stand-by* the integration heaters are switched off immediately and always (note that since there are two controllers on the same heaters, the same heaters may stay on in Standby if so required by the antifreeze heater controller).
- In On, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:
- In *Defrost* the internal circuit heaters are controlled by parameter ***Hi01*** *Enable force heaters on during defrost*. See dedicated paragraph
- Le resistenze del circuito primario sono spente immediatamente in caso di allarmi di blocco resistenze.
- In Sanitary Water mode regulation occurs on the *actual* ACS setpoint instead of the *actual Heat setpoint*
- In ACS for *Anti-Legionnaire's Disease* mode, regulation occurs on the Sanitary Water setpoint for *Anti-Legionnaire's Disease* instead of the *actual Heat setpoint*

The internal circuit heaters are immediately turned off during heater block *alarms*.

Operating modes
Integration heaters are turned on only in Heat mode; the regulation of the setpoint is obtained by subtracting a differential from the real Heat *setpoint*.
This differential can be calculated in a variety of ways by configuring parameter ***Hi20*****:** *Select heater mode for internal exchanger in integration mode*.

Parameter table ***Hi20***

Value ***Hi20***	Description
0	Integration heaters disabled
1	Integration heaters with setpoint differential proportional to external temperature
2	Integration heaters with setpoint differential in steps on external temperature
3	Integration heaters with setpoint differential fixed

12.2.1 Integration heater differential

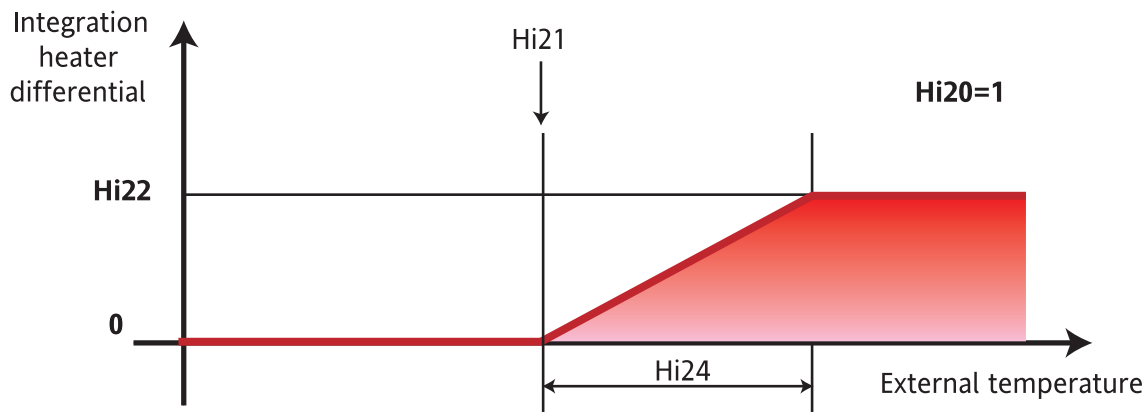
The *integration heater regulation* setpoint is calculated by subtracting a differential from the real Heat setpoint.

Integration heater setpoint = real Heat setpoint - integration heater differential

The *integration heater differential* is calculated in a variety of ways: proportional, step or fixed.

Note: When the heat pump is blocked, the differential for heaters in integrated use will be forced to a fixed value equal to ***Hi23*****:** *Heater differential in integration mode with heat pump lock*. This serves to better control the power steps of the integration heaters in special circumstances.

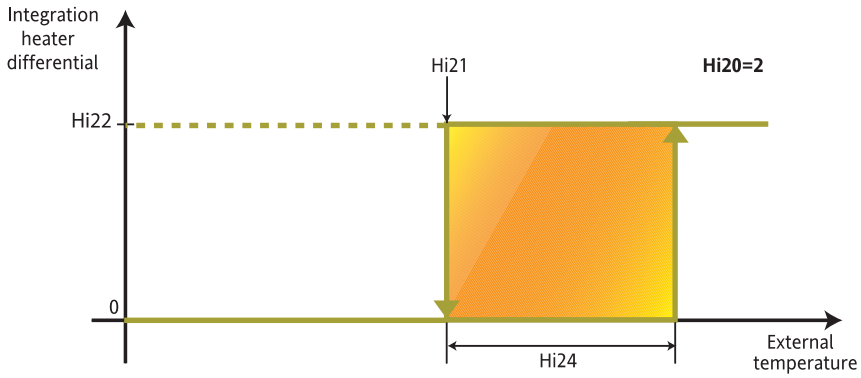
Integration heaters with differential setpoint proportional to external temperature
Case **H20**= 1.



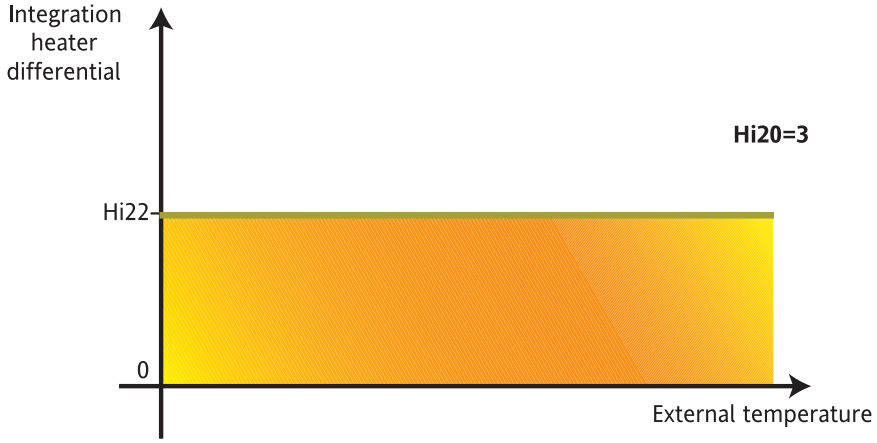
Parameter	Parameter	
Control probe	//	**External temperature**

Setpoint	***Hi21***	**Internal exchanger heater dynamic differential setpoint in integrated use**
	Hi22	**Maximum dynamic differential internal exchanger heaters in integrated use**
	Hi24	**Internal exchanger heater dynamic differential proportional band in integrated use**
Hysteresis	//	

Integration heaters with differential in steps on external temperature
Case **H20**= 2.



Integration heater differential **fixed, independent of external temperature**
Case ***Hi20***= 3.



Note: In case of error or lack of configuration of the external probe, the differential value is set to ***Hi22*** or ***Hi23*** (both fixed) depending on circumstances.

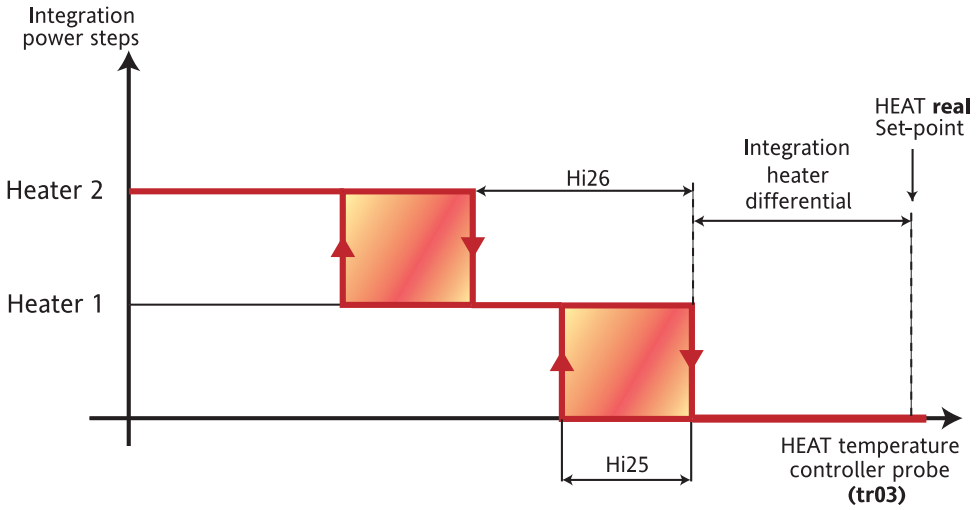
12.2.2 Integration heater regulation

Regulation uses the integration heater setpoint calculated with the *integration heater differential* as explained in the preceding paragraph. By a step is meant the activation of internal exchanger heater 1 or 2.
The analogue input used for regulation is the main *temperature controller* probe for Heat mode.

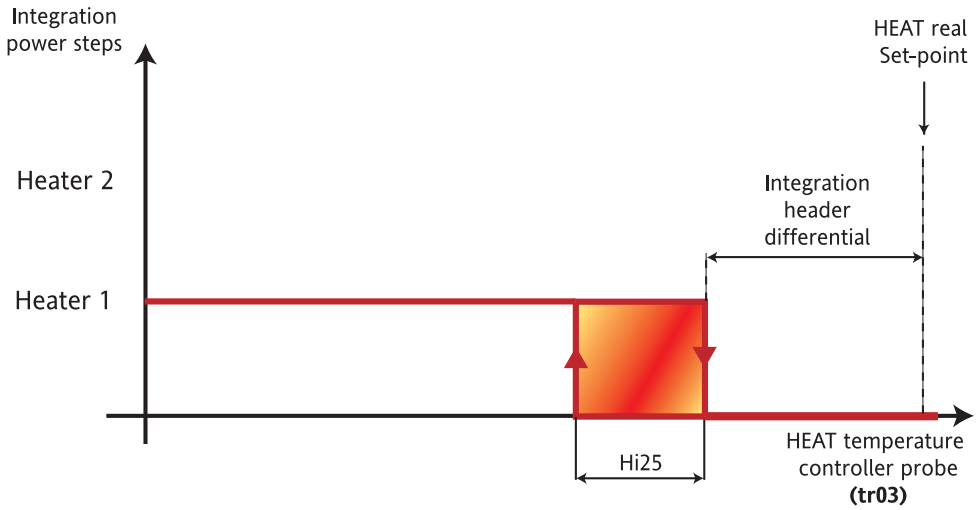
Depending on the value of ***Hi26*****:** *Setpoint differential for activation of internal exchanger heater 2 in integration mode* you can determine whether to activate heater 2 in integration or not.

Note: if you want to activate the two heating elements at the same time (using two outputs to keep the thermal switches separate), simply give *Hi26* a small value, but still non-zero and greater than the hysteresis *Hi25* (the hysteresis may not be greater than the value of the differential, otherwise value of the hysteresis used in control will coincide with that of the differential).

With ***Hi26*** not equal to 0



With ***Hi26*** = 0



Parameter	Parameter	
Control probe HEAT	***tr03***	**Select temperature control probe in Heat**
Setpoint	**//**	**Integration heater setpoint**
Hysteresis	***Hi25***	**Internal exchanger heater regulator hysteresis in integrated use**
	Hi26	**Setpoint differential for activation of internal exchanger heater 2 in integration mode**

12.3 Heaters in defrost mode

Parameter ***Hi01*****:** *Enable force heaters on during defrost* determines the operation of the internal exchanger heaters during *defrost*.
One or both of the heaters can be forced on, or heater 1 can be linked to defrosting circuit 1 and heater 2 to circuit 2.

Parameter table ***Hi01***

Value	Description
0	Free operation (no forcing)
1	Heater 1 forced on
2	Both heaters forced on
3	Heater 1 forced on for *defrost* circuit 1, heater 2 for *defrost* circuit 2 (double exchanger)

Note. For cases with value 1 and 2, the heaters are turned on if at least one of the two circuits is defrosting (typically used in case of single exchanger).

13 EXTERNAL EXCHANGER ELECTRIC HEATER PARAMETERS (FOLDER PAR/HE) – ELECTRIC HEATERS

The external exchanger heater parameters can be viewed and modified in *folder* **HE** (see User Interface and Parameters chapters).

The following must be configured:
at least one digital output as external exchanger 1 heater with parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±25.**
at least one digital output as external exchanger 2 heater with parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±26.**
See chapter System configuration (*folder* PAr/CL-Cr-CF) / *Configuration of digital outputs*

The **SB600** controls external exchanger heaters 1 and 2 with antifreeze function (as heat pumps with water external exchanger).
The heater control outputs are all and exclusively those outputs with ON/OFF control.
The heaters can be used in a variety of ways depending on the type of system. We can have one or two external exchangers (one or two circuits).

For greatest configurability:
the number of antifreeze heaters can be set;
the control analogue input can be determined individually.

Enabling
The external exchanger heater 1 antifreeze probe is enabled and selected with parameter ***HE10*** **- Select probe for antifreeze external exchanger + heater 1.**
The external exchanger heater 2 antifreeze probe is enabled and selected with parameter ***HE11*** **- Select probe for antifreeze external exchanger + heater 2.**

General conditions of operation
In **Off** the external exchanger antifreeze heaters are immediately and always off.
In **Standby** the external exchanger antifreeze heaters are active if so configured with **(*HE00* - Enable external exchanger antifreeze heaters in *Stand-By*).**
In **On**, further to the principal regulation specified in the following paragraphs, the following situations (with priority over the principal regulation itself) may occur:

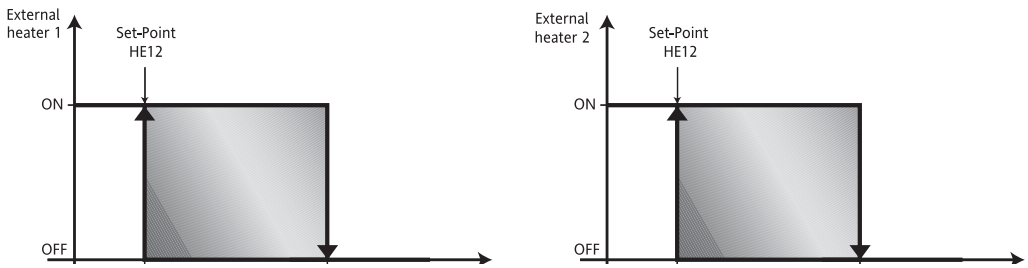
The external circuit heaters are immediately turned off during heater block *alarms*.

Note: There are no safety times for heater on/off.

Table A - external exchanger heater parameters

heaters	**Parameter**	**Description**	**Value**				
			0	**1**			
External exchanger (Standby mode)	***HE00***	Enable external exchanger heater regulator in standby for antifreeze	Heaters disabled	Heaters enabled			
Heaters	**Parameter**	**Description**	**Value**				
			0	**1**	**2**	**3**	**4**
External exchanger Enable heater 1	***HE10***	Select probe for antifreeze external exchanger + heater 1	No probe (antifreeze heater disabled)	External exchanger average temperature circuit 1 and 2	External exchanger inlet water temperature	External exchanger outlet water temperature	External temperature
External exchanger Enable heater 2	***HE11***	Select probe for antifreeze external exchanger + heater 2					
Heaters	**Parameter**	**Description**	**Value**				
External exchanger	***HE12***	External exchanger heater switch on setpoint for antifreeze	*Range* defined by parameters ***HE14***....*HE13* Hysteresis defined by parameter *HE15*				

External exchanger heaters
Regulation is performed as shown in the figure:



HE10	Analogue input - see table A
HE11	Analogue input - see table A
HE12	Setpoint - see table A
HE13	Maximum external exchanger heater regulator setpoint for antifreeze
HE14	Minimum external exchanger heater regulator setpoint for antifreeze
HE15	External exchanger heater regulator hysteresis for antifreeze

Note: depending on the settings, the heaters can be turned on together or separately.
Note: In case of control probe error, the machine is blocked.

14 AUXILIARY OUTPUT (FOLDER PAR/HA)

Auxiliary output parameters can be viewed and configured in folder**HA** (see User Interface and Parameters chapters)

The following must be configured:
at least one digital output as Auxiliary Output with parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±32.**

The auxiliary output controller can be used, for example, to control heaters in machines with air condensation to evaporate the condensation water.

Enabling
The parameter **(*HA00* - Select probe for auxiliary output regulator)** enables the auxiliary output controller.

Table A - meaning of parameter *HA00*:

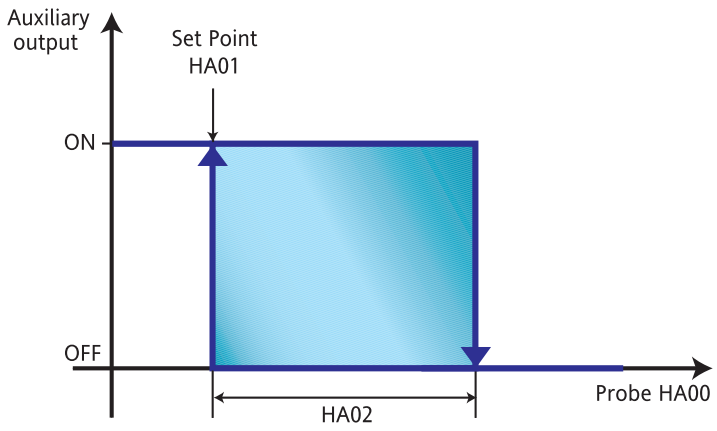
Value *HA00*	Probe
0	No probe (auxiliary output disabled)
1	External temperature
2	External exchanger temperature circuit 1
3	External exchanger temperature circuit 2
4	External exchanger inlet water temperature
5	External exchanger outlet water temperature
6	NOT USED

General conditions of operation
In **Off** the auxiliary output is immediately and always off.
In Standby the auxiliary output is immediately and always off.
In **On**, further to the principal regulation specified in the following paragraphs, the following situation (with priority over the principal regulation itself) may occur: the auxiliary output is immediately turned off in case of a block alarm for the output itself.

Note: There are no safety times for auxiliary output on/off.

Auxiliary heaters

Regulation is performed as shown in the figure:



Parameter	Description
HA00	**Control probes - see table A**
HA01	**Auxiliary output regulator setpoint**
HA02	**Auxiliary output regulator hysteresis**
Auxiliary output	**Auxiliary output**

Note: In case of probe error, the machine is blocked.

15 BOILER (FOLDER PAR/BR)

The **SB600** controls, via a digital output, the pump or the permissive signal for a hot water boiler which is used both for heating and as a supplementary heater (integration mode) for the water heat pump.
The boiler control outputs are all and exclusively those outputs with ON/OFF control.
There are many types of installation and consequently many ways of using the boiler, especially in residential installations.

15.1 Boiler configuration

The boiler is used as a heating power step both for the chiller and the heat pump.
Combined with the integration/heating heaters and the compressors (in heat pump mode) it produces hot water on the internal circuit.

For maximum configurability, you can set the boiler and other component parameters separately. You can thus determine when to use the boiler power step for heating and when to inhibit it.

In both modes, heating and integration, the boiler setpoint can be set as a differential (fixed or proportionally variable depending on the external temperature) with respect to the *real* setpoint in heat mode.

Note. Normally, when there is no heat pump (heating mode), the differential is set as fixed, and to zero (the regulation setpoint coincides with the real heat mode setpoint).

Note: if parameter *Maximum boiler dynamic differential* is set to 0, the setpoint coincides with the real Heat *setpoint*.

Enabling
Setting parameter ***br00*: ***Select boiler mode*non-zero enables *boiler regulation*.

General conditions of operation

- In **Off** the boiler is immediately and always off.
- In ***Stand-by*** the boiler is immediately and always off.
- In **On**, further to the principal regulation specified in the following paragraphs, the following situation (with priority over the principal regulation itself) may occur: The boiler is immediately off in case of boiler lock alarm (see *alarms* table).
- In Sanitary Water mode the boiler regulates on the *actual* Sanitary Water setpoint instead of the *actual Heat setpoint*
- In ACS for *Anti-Legionnaire's Disease* mode, the boiler regulates on the Sanitary Water setpoint for *Anti-Legionnaire's Disease* instead of the *actual Heat setpoint*

Note: There are no safety times for boiler on/off.

Operating modes
The boiler regulator is only active in Heat mode; the regulation of the setpoint is obtained by subtracting a differential from the real Heat *setpoint*.
The *boiler differential* can be calculated as a variety of ways which can be selected with parameter *Select boiler mode***br00**.

Parameter table ***br00***

Value *br00*	Description	
0	Boiler disabled	
1	Boiler with differential Setpoint proportional to external temperature	**Diagram A**
2	Boiler with differential Setpoint in steps dependent on external temperature	**Diagram B**
3	Boiler with differential Fixed setpoint	**Diagram C**

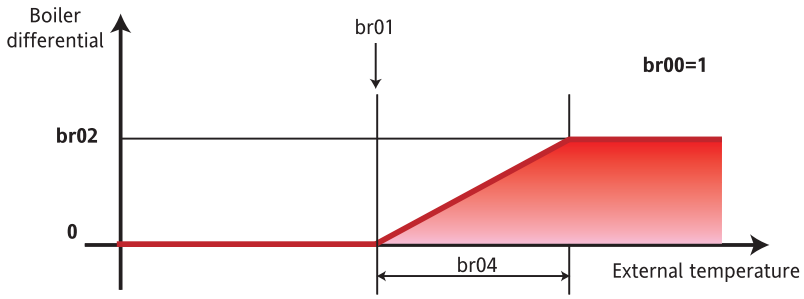
15.1.1 Boiler differential

The *boiler regulation* setpoint is calculated by *subtracting* a differential from the real Heat setpoint.

Boiler setpoint = real Heat setpoint - *Boiler differential*

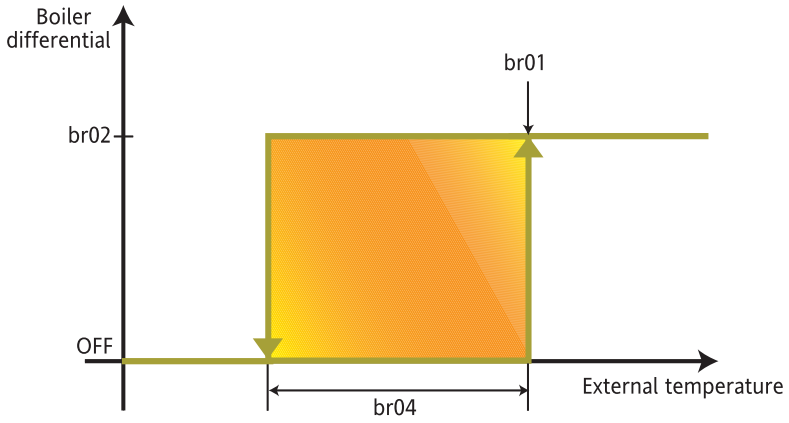
In case of heat pump block, the *Boiler differential* takes the fixed value of parameter ***br03*: *boiler differential* with *heat pump block***. This serves to improve the control of the boiler power step in special cases.

***Boiler differential* setpoint proportional to external temperature**
Example ***br00*** = 1.
Diagram A



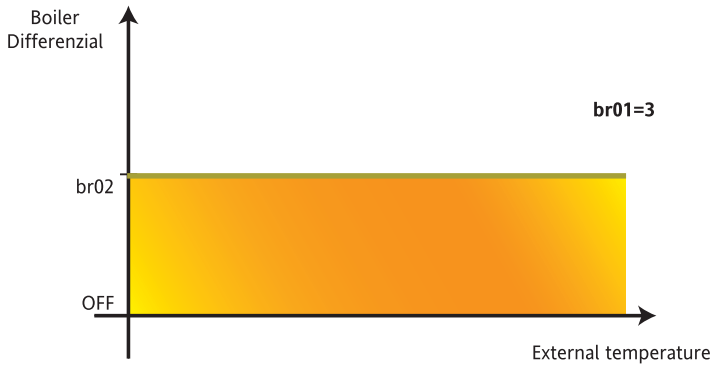
Parameter	Parameter	
Regulator probe	**//**	**External temperature**
Setpoint	***br01***	**Boiler dynamic differential setpoint**
	br02	**Maximum *boiler differential***
	br04	***Boiler differential* proportional band**

***Boiler differential* in steps as a function of external temperature**
Example ***br00***= 2.
Diagram B



	Parameter	
Regulator probe	**//**	**External temperature**
Setpoint	***br01***	**Boiler dynamic differential setpoint**
	br02	**Maximum *boiler differential br02***
	br04	***Boiler differential* proportional band**
Hysteresis	***br05***	**Boiler regulator hysteresis**

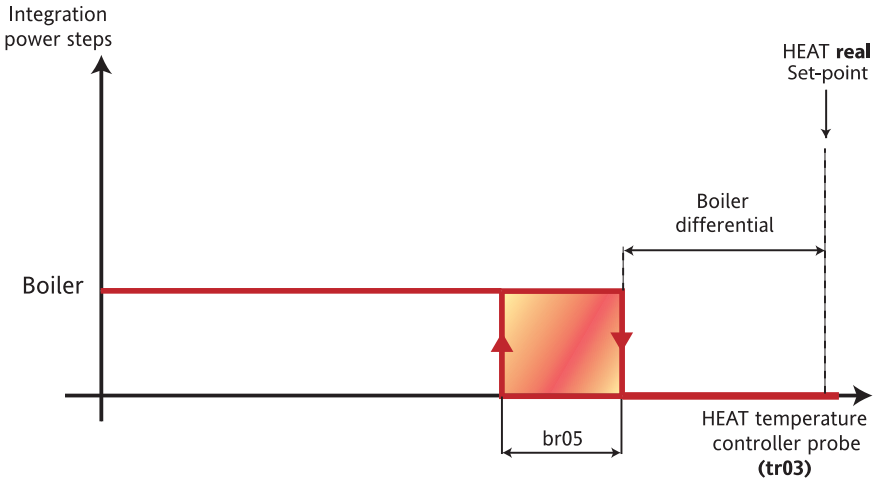
Boiler differential **fixed, independent of external temperature**
Case ***br00***= 3.
Diagram C



Note: In case of error of the external probe, the differential value is set to *br02* or *br03* (both fixed) depending on circumstances.

15.1.2 Boiler regulation

The regulation uses the Boiler setpoint calculated with the *boiler differential* as explained in the previous paragraph.



	Parameter	
Boiler differential	***br00***	**See *Boiler differential* section**
HEAT regulator probe	***tr03***	**Select temperature control probe in Heat**
Setpoint	**//**	**Boiler setpoint**
Hysteresis	***br05***	**Boiler regulator hysteresis**

16 DEFROST (FOLDER PAR/DF)

Defrost parameters can be viewed and configured in the **dF** *folder* (see User Interface and Parameters chapters)

Defrosting is only possible in HEAT mode.

It is used to prevent ice from forming on the surface of the external exchanger.
Ice builds up on the external exchanger more often as a result of cold external air containing a high degree of humidity
This considerably reduces the thermodynamic efficiency of the machine and can also result in damage to the machine itself.

Enabling
Defrosting is enabled if:

- it is enabled via parameter (***dF00*** **- Enable *defrost* function** = 1,2)

Parameter table ***dF00***

Value	Description
0	*Defrost* disabled
1	Simultaneous *defrost* (in double-circuit plants only)
2	Independent *defrost* in single or in double-circuit plants (only with separate condensation)

General conditions of operation

- In **Off** defrosting is disabled.
- In *Stand-by* defrosting is disabled.
- In **On,** further to the principal control specified in the following paragraphs, the following situation may also arise (with priority to the principal control itself): the *defrost* request is inhibited/cancelled if antifreeze with heat pump is active.

Types of defrosting
SBW600 controls bothSingle defrosting for a single or double external exchanger, and Independent defrosting for the exchangers of two cooling circuits.

In the first case, single defrosting, the two circuits *defrost* at the same time when at least of them requires it. This mode applies to machines with single condensation (parameter ***FE10*****:** *Enable single condensation* = 1). The circuit which completes defrosting first, before it resumes normal operation, waits (with compressors off) for the other circuit to complete defrosting.

Note: In case of single condensation, two start probes must be configured (on for circuit 1 and one for circuit 2) along with two 2 *defrost* end probes. The times for starting defrosting are nonetheless independent.

In the case of Independent defrosting each circuit defrosts separately.

The start and end of the *defrost* cycle depends on the values of the probes and the parameter settings described below;

defrost	Parameter	Description
start	***dF01***	**Enable maximum power for non-*defrost* circuit**
	dF10	**Select probe to enable interval count between defrosts**
	dF11	**Enable interval count between defrosts setpoint**
	dF12	**Setpoint to clear cumulative time between defrosts**
	dF13	**Cumulative interval between defrosts**
	dF14	**Minimum interval between *defrost* cycles**
output	***dF20***	**Select probe to end *defrost***
	dF21	***Defrost* deactivation setpoint**
	dF22	**Maximum *defrost* time**
	dF23	**Dripping time**
	dF30	**Maximum dynamic *defrost* differential**
Set Point	***dF31***	***Defrost* dynamic differential setpoint**
	dF32	**Dynamic *defrost* differential proportional band**

Defrosting is done in heat mode, by reversing the cooling cycle, switching the position of the reversal valve and operating the circuit in chiller mode.

During defrosting, the reversal valves switch in the same way as for change-overs (see chapter *Reversal valve management*), with the time given in parameter ***ST05*** **- Reversal valve switching delay**, and compressor on/off times which refer only to defrosting (parameter ***CP27*** **- *defrost* compressor step/delay minimum**).

In multi-circuit systems, defrosting can be run separately (*independently*) or at the same time (*single*) for the various cooling circuits, depending on the general operational requirements of the plant.

Analogue inputs for defrosting start/end
Defrosting can be started in relation to the pressure or temperature measured by the probe selected in parameter ***dF10*****: Select probe to enable interval count between defrosts.**
Defrosting can be ended in relation to the pressure or temperature measured by the probe selected in parameter ***dF20*****: Select probe to end *defrost*.**
In the double circuit case, each circuit must have an analogue input configured for the function in question.

Defrosting function analogue inputs

Description
External exchanger temperature circuit 1
External exchanger temperature circuit 2
High pressure input circuit 1
High pressure input circuit 2
Low pressure input circuit 1
Low pressure input circuit 2
External exchanger pressure circuit 1
External exchanger pressure circuit 2

Parameters table ***dF10*** and ***dF20***

Value	Description
0	No probe
1	External exchanger temperature (circuit 1 and 2)
2	High pressure input (circuit 1 and 2)
3	Low pressure input (circuit 1 and 2)
4	External exchanger pressure (circuit 1 and 2)

16.1 Defrost

16.1.1 Start defrost

Defrosting can be started in relation to the pressure or temperature measured by the probes selected in parameter *Select probe to enable interval count between defrosts* ***dF10***.
If there is a probe error or no probe is configured, start of defrosting depends solely on the effective operating time of the compressors and the parameter *Cumulative interval between defrosts* ***dF13***.
The time between defrosts must be at least equal to the value of parameter *Minimum interval between defrost cycles* ***dF14***.
Note: If ***dF00*** = 2 in systems with two circuits, the *minimum time* between two defrosts is applied to both circuits therefore *defrost* cannot occur on the two circuits simultaneously

The conditions required for starting defrosting of a circuit are as follows:

- When the pressure or temperature detected by the *start defrost* probe on the circuit drops below the value of the *start defrost setpoint* and the circuit is supplying at least one power step, the cumulative *defrost* delay counter is started, the value of which can be set with parameter ***dF13*****:** *Cumulative interval between defrosts.*
- The *start defrost setpoint* is a dynamic value calculated on the basis of parameter ***dF11*****:** *Setpoint to enable interval count between defrosts* (see relative section).

- When the pressure or temperature read by the *defrost* start probe for the circuit returns above the value of the *defrost* start setpoint ot the circuit is no longer delivering any power steps, the cumulative *defrost* delay count is stopped.

- The count is reset to zero after a *defrost* cycle or after a reset (e.g. power down).

- The cumulative *defrost* delay count is also reset when the temperature or pressure of the probe configured as *defrost* start probe rises above the value set in parameter ***dF12*****:** *Setpoint to clear cumulative time between defrosts*

- When the cumulative *defrost* delay count terminates (when the time set in the parameter elapses), the circuit runs a *defrost* cycle.

Given the above, the start time for the *defrost* cycle corresponds to the time at which the count ends (before valve reversal).

Note: In case of change-over, the count is suspended but not reset. In this way, at the next change (e.g. from OFF or *Stand-by* to Heat), the count resumes from its preceding value.

In the case of *independent* defrosting or a single circuit, defrosting starts only when the compressor safety times are reset, and the conditions for starting defrosting are satisfied (the circuit is delivering at least one power step, etc.).

In the case of *single* defrosting, defrosting starts only when the compressor safety times of both circuits are reset and the conditions for starting defrosting on the requesting circuit are satisfied. The two circuits *defrost* in a fully harmonised manner.

Defrosting starts with the reversal valve switching sequence for the circuits in question in the same way as for change-overs (see paragraph *Reversal valve management*).

16.1.2 Defrosting cycle

After cycle reversal, the compressors are *all on* (max. available power). If there is an alarm which inhibits operation of one or more compressors, defrosting proceeds anyway (as in the case of defrosting during a simple stop).
In the case of independent defrosting of two circuits, parameter ***dF01*: Enable maximum power for non-*defrost* circuit** allows you to force the other circuit to maximum power (the circuit not to be defrosted), for reasons of compensation.

16.1.3 End defrost and coil drainage

Defrost terminates:

Due to temperature/pressure:	if the temperature or pressure of the end defrosting probe of the circuit rises above the value set in parameter ***dF21*: *Defrost* deactivation setpoint.**
Due to duration:	if defrosting does not end due to temperature or pressure within the maximum time set in parameter ***dF22*: *Maximum defrost time*.**
Due to a digital input:	if the *digital inputs* End *defrost* circuit 1 and End *defrost* circuit 2 are configured and active

If the probe is in error or not configured, defrosting may end in the two other modes (duration and digital input)

The end of defrosting is always independent for each circuit, depending on the analogue or digital end *defrost* inputs for the circuit in question.

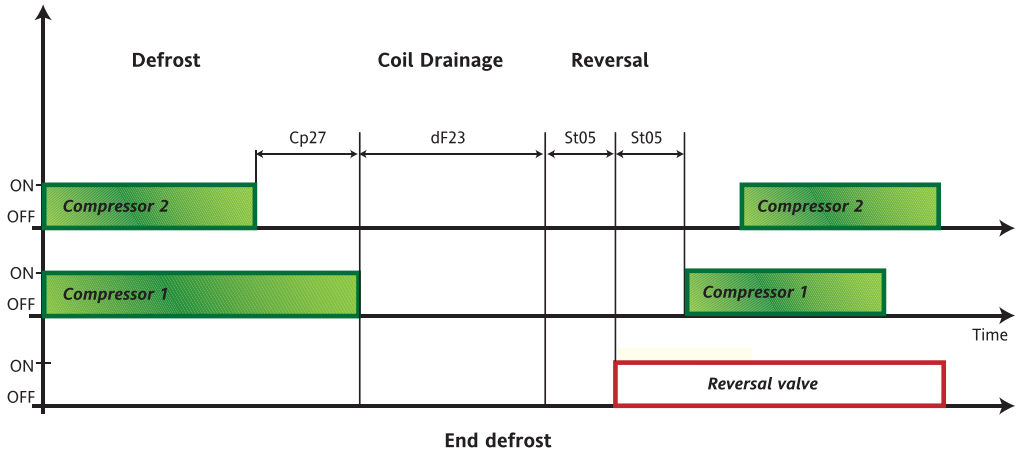
The end of defrosting starts with the circuit reversing valve switching sequence in a manner similar to that used at the start of defrosting (*St05*), apart from coil drainage.
The compressors are switched off with relation to only the time set with *parameter Defrost compressor/step delay minimum Cp27*.
Before the valve reverses, coil drainage runs for a period given in *dF23*.
In this phase the compressors stay off and the external exchanger fan of the circuit is run at maximum power.

After coil drainage, if the *Reversal valve switching delay St05* is zero, the valve switches immediately and terminates the *defrost* of the circuit.

The end of *defrosting* corresponds to the moment the valve is switched.

Note: after the end of defrosting, the compressor safety times are no longer regulated by ***CP27*** (the compressor start sequence of the circuits after defrosting observes normal timings).

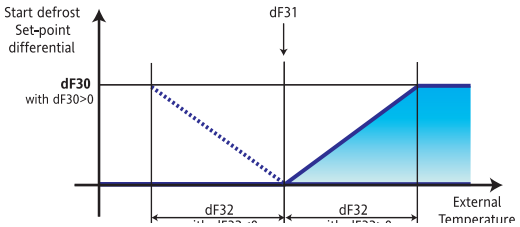
In the case of *single* defrosting on two circuits, the compressors are available for temperature control only if both circuits have stopped defrosting.
In the case of *independent* defrosting, the compressors of the circuit which has stopped defrosting are immediately available for temperature control.
The circuit for which compensation is active (if either) is controlled by the Heat *temperature controller* on termination of defrosting.

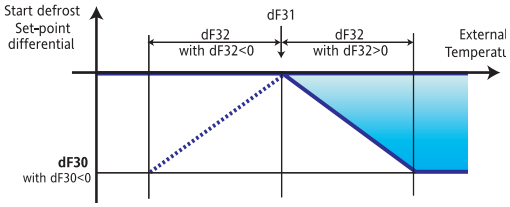


16.2 Start defrost setpoint

In very dry and cold climates, it is good to be able to vary the reference temperature for the start of defrosting as a function of the external temperature.
This regulator linearly compensates the defrosting start temperature or pressure with a positive or negative differential value according to the external temperature.
The real setpoint for the start of defrosting is calculated by adding this dynamic differential to the value of parameter ***dF11*****:** *Setpoint to enable interval count between defrosts.*

Enabling
The regulator is enabled by setting parameter ***dF30*** *Maximum dynamic defrost differential* to a value other than zero. Furthermore, an analogue input must be configured as external temperature.





defrost	**Parameter**	**Description**
External temperature		**External temperature**
Differential	***dF30***	**Maximum dynamic *defrost* differential**
Set Point	***dF31***	***Defrost* dynamic differential setpoint**
	dF32	**Dynamic *defrost* differential proportional band**

Note: In case of error of the external probe, the differential value is set to zero (compensation disabled).

16.3 Management of defrost alarms

For the actuation of loads during *alarms*, see the diagnostics chapter.

To summarise, and specifically for defrosting, if probe errors or *alarms* occur which lock the compressors, the *start defrost* and end *defrost* cycles are already defined and are typically based on parameter timings.
E.g.: If during defrosting the compressors are made unavailable by *alarms*, defrosting will terminate when the maximum time expires. It may terminate differently if the compressors become available again during the *defrosting cycle*.

16.4 Manual defrost

EnergySBW600 can force *defrost* manually by pressing and holding the [UP] key.
Manual defrost is possible when:

- ***dF00*** = 1,2
- ***UI20*** **-Enable *defrost* function from key**
- if the temperature / pressure of the external exchanger is less than the value set in parameter ***dF01*** **- Enable maximum power for non-*defrost* circuit**

Defrost starts in the sequence described in the section about "*Start Defrost*"

- the *defrost* LED is blinking.

End *defrost* takes place as described in the section about "End *Defrost*"

16.5 Power failure during defrost

If a power failure happens during defrosting, the procedure will be cancelled. All timings will be cancelled and restarted.

17 DYNAMIC SETPOINT (FOLDER PAR/DS)

Dynamic setpoint parameters can be viewed and configured in *folder* **dS** (see User Interface and Parameters sections).
The regulator is used to modify the setpoint automatically depending on external conditions.
This modification is obtained by adding a negative or positive value to the setpoint (offset or differential) depending on:

- analogue input set as dynamic setpoint input
  NOTE: the applies only for AIL3 (*CL32*=25) / AIE3 (*CE32*=25) or AIL4 (*CL33*=25) / AIE4 (*CE33*=25)

or

- External temperature

This function has two purposes: to save energy or to run the machine in extreme external temperatures.

Enabling
Dynamic setpoint
a) As a function of external temperature is enabled if:

- The dynamic setpoint activation/selection parameter ***dS00*= 1 or 2**

b) As a function of the dynamic setpoint input

- probe AI3 (analogue inputs) is configured as an dynamic setpoint input (***CL32*=25**) / (***CE32*=25**) or
- probe AI4 (analogue inputs) is configured as an dynamic setpoint input (***CL33*=25**) / (***CE33*=25**)

Note:

- these two options (a) and (b) are independent
- If the external temperature probe is in error, the associated dynamic differential is annulled (function disabled)
- The dynamic setpoint input must be a voltage (V) or current (I) input, it may not be an NTC temperature probe. The Min and Max values of the graphs are associated with the Min (start of scale value) and Max (fullscale value) values of the input itself. If the dynamic setpoint input is in error, the associated dynamic differential is annulled (function disabled)

The Economy LED flashes when this function is active (if so configured: ***UI07*=1**)

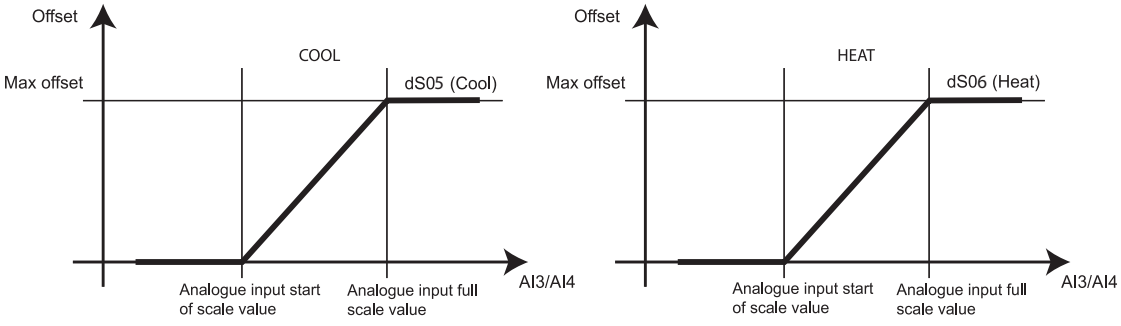
17.1 Modification (decalibration) of the setpoint as a function of the dynamic setpoint input

17.1.1 Modification (decalibration) of the setpoint as a function of the dynamic setpoint input with positive offset.

The following figure shows decalibration in both cooling and heating modes:

Modification based on the dynamic setpoint input with positive offset

Positive Offset



Note
The dynamic setpoint input must be a voltage (V) or current (I) input, it may not be an NTC temperature probe, in other words, ***CL02*/*CL03*= 3,4,5 or 6**
The Min and Max values of the graphs are associated with the Min (start of scale value) and Max (fullscale value) values of the input itself, in other words

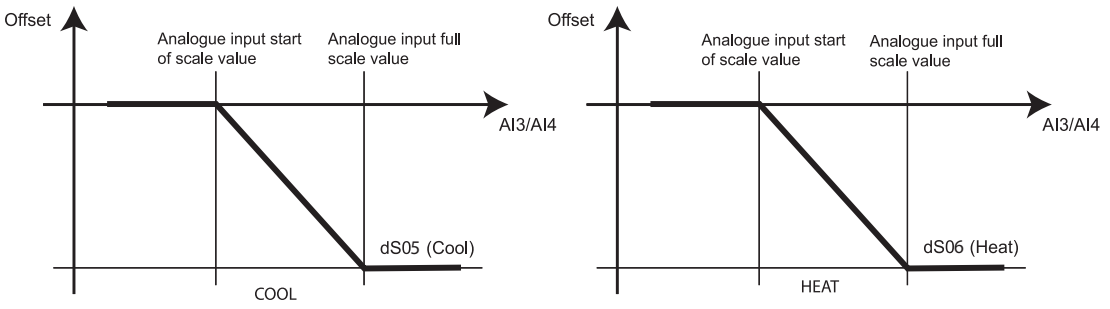
- Min = *CL11* for AI3; *CL13* for AI4
- Max = *CL10* for AI3; *CL12* for AI4

17.1.2 Modification (decalibration) of the setpoint as a function of the dynamic setpoint input with negative offset.

See above

Modification based on the dynamic setpoint input with negative offset

Negative Offset



17.2 Modification (decalibration) of the setpoint based on the external temperature

The setpoint can be decalibrated based on external temperature either proportionally or with a fixed decalibration; this is set with parameter ***dS00*** **- External *temperature controller* dynamic differential selection**
This allows enabling/selecting the *temperature controller* dynamic digital differential

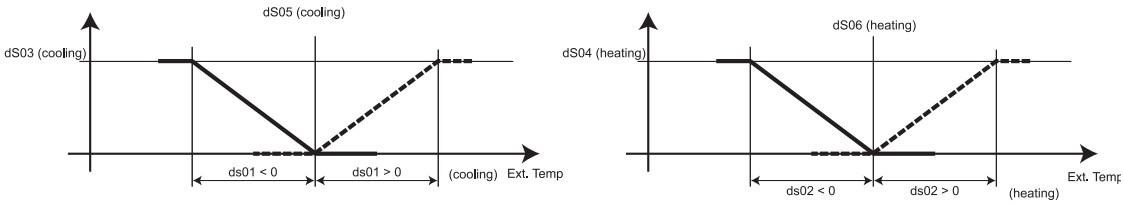
- 0 = disabled
- 1 = Proportional
- 2 = Fixed (by steps)

17.2.1 Modification (decalibration) of the setpoint based on the external temperature (dS00=1)

Proportional decalibration of the setpoint with positive differential (offset).
The figure shown above shows decalibration in both cooling and heating modes:

Modification based on the external temperature with positive offset

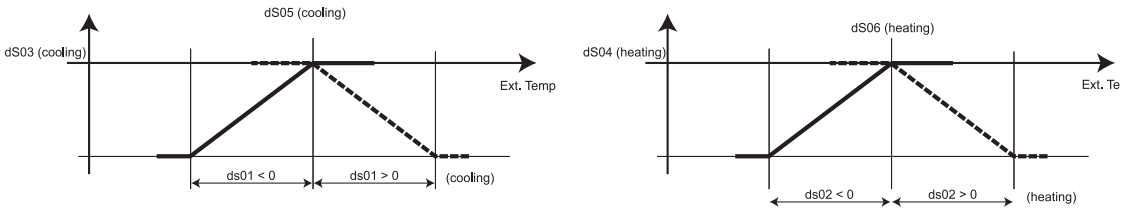
Positive Offset



Proportional decalibration of the setpoint with negative differential (offset).
See above

Modification based on the external temperature with negative offset

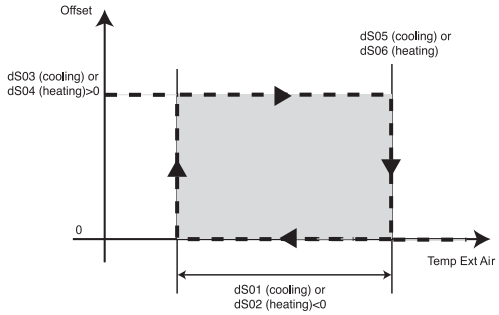
Negative Offset



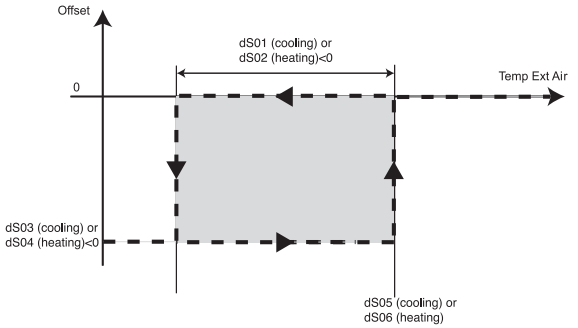
Cool	Heat	
dS01	***dS02***	***Temperature controller*** **dynamic differential proportional band in Cool / Heat**
dS03	***dS04***	**Maximum *temperature controller* dynamic differential in Cool / Heat**
dS05	***dS06***	***Temperature controller*** **dynamic differential setpoint in Cool / Heat**
		Ext. Temp: External temperature

17.2.2 Fixed modification (decalibration) of the setpoint (dS00=2)

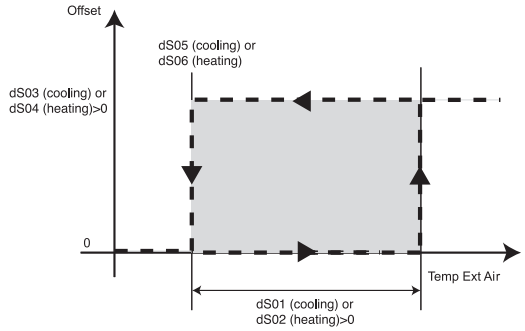
Differential > 0
Band < 0



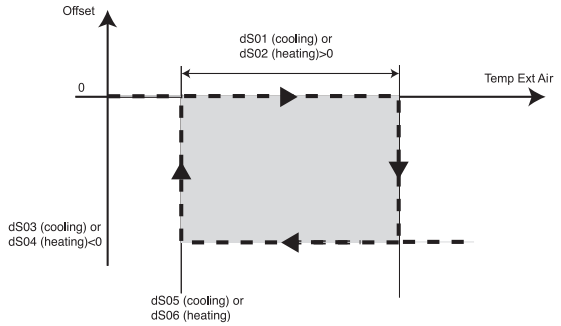
Differential < 0
Band < 0



Differential > 0
Band > 0



Differential < 0
Band > 0



Cool	Heat	
dS01	*dS02*	*Temperature controller* dynamic differential proportional band in Cool / Heat
dS03	*dS04*	Maximum *temperature controller* dynamic differential in Cool / Heat
dS05	*dS06*	*Temperature controller* dynamic differential setpoint in Cool / Heat
		Temp Ext Air: External temperature
		Offset: differential

18 ADAPTIVE (FOLDER PAR/AD)

Chillers generally contain a water accumulation tank.
The purpose of these tanks is to create sufficient thermal inertia to stop the compressor from repeatedly switching on and off in periods in which the temperature requirements in the area to be cooled are relatively few (switching repeatedly on and off will reduce the life time of compressors).
A water accumulator increases the thermal capacity and provides the inertia required to extend running time. Nevertheless, water accumulation is also a substantial cost and also adds to the minimum dimensions of the machine.

Adaptive function parameters can be viewed and configured in the **Ad** *folder* (see chapters on User Interface and Parameters).

By adjusting the setpoint and hysteresis, the *Adaptive function* simulates electronically the inertia of a water accumulator, meaning it can be used less.

Enabling
Use parameter ***Ad00*** **- Select no accumulation mode**
when set not equal to zero enables the function and enables selecting the amount to which the *adaptive function* temperature differential is to be added or subtracted.

		0	1	2	2
Ad00	**Select no accumulation mode**	Accumulation disabled	Setpoint	Hysteresis	Setpoint + hysteresis

General conditions of operation
- In Off the *adaptive function* is disabled.
- In *Stand-by* the *adaptive function* is disabled.
- In On the *adaptive function* is enabled.

MT minimum time **and ET real time**
Note that compressor on/off times must respect safety time delays:

The function analyses actual running time of the compressor (ET) comparing it with the preset minimum running time (*MT*).

Minimum time MT

The *minimum time* (*MT*) is set in parameter ***Ad06*** - **Reference compressor on time for adaptive accumulation**

Parameter	Description
MT	
Ad06	**Reference compressor on time for accumulation offset**

Real time ET

Real running time (ET) is recorded automatically by the device

Type of plant	ET
Single circuit 2 / 4 compressors / Segmented compressors	Count [first compressor on / first partialization, last resource switched off]
Double circuit 1 / 2 compressors / Segmented compressors	Count [first compressor on / first partialization, last resource switched off] Independently of the circuits
Ordinary compressor	Count [compressor on, compressor off]

18.1 Adaptive function with setpoint modification

ET<MT example

If ET<*MT*:
when the compressor switches off, the operating setpoint is changed to a value equal to the adaptive offset (AO) according to the formula below:

- **AO=((*MT* - ET)* *Ad01*)/10 + *Ad02***

Where:

Ad01	**Accumulation offset constant**
Ad02	**Accumulation offset differential**

Adaptive function Setpoint modification in cooling

COOLING MODE

- ***ET<MT example***

  If the real running time (ET) is less than the *minimum time*(*MT*), each time the compressor switches off, the adaptive offset is subtracted from the setpoint.

Cycle 0:

- Setpoint for cycle 0: SET(0) = SET (COOL)
- Hysteresis for cycle 0: HYSTERESIS (0) = HYSTERESIS (COOL)
- Compressor ON: SET (0)+HYSTERESIS (0) ---> SET (COOL) +HYSTERESIS(COOL)**
- Compressor OFF: SET (0)

Cycle 1:

- Setpoint for cycle 1: SET(1) = SET (0) - AO(1) = SET(COOL)-AO(1)
- Compressor ON: SET (0)+HYSTERESIS (0) ---> SET (COOL) +HYSTERESIS(COOL)**
- Compressor OFF: SET (0) - AO(1) = SET (COOL)** - AO(1)

Cycle 2:

- Setpoint for cycle 2: SET(2) = SET (1) - AO(2)
- Compressor ON: SET (0)+HYSTERESIS (0) ---> SET (COOL) +HYSTERESIS(COOL)**
- Compressor OFF: SET (0) - AO(2) = SET (COOL)** - AO(2)

...

- **ET>*MT* example**

  See differential regression

Adaptive function Modification of setpoint in heating

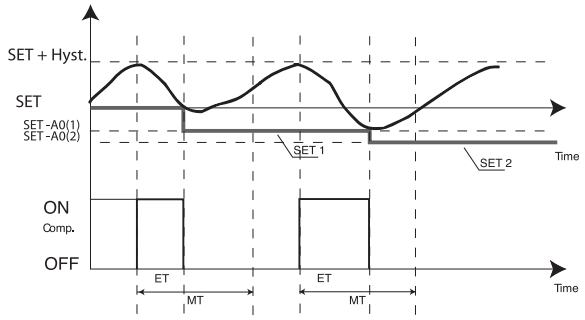
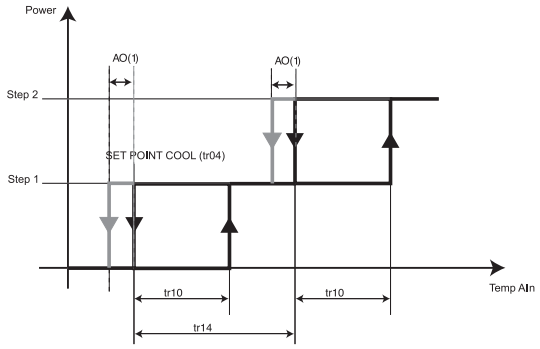
HEATING MODE

Same as heating example. The offset is ADDED to the setpoint:

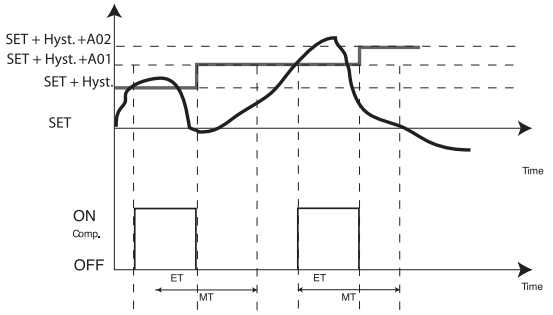
- SET(0) = SET (HEAT)
- SET(1) = SET(HEAT)+AO(1)
- SET(2) = SET(HEAT)+AO(2)

...

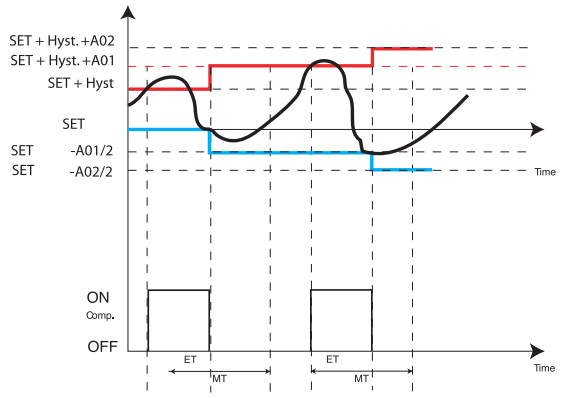
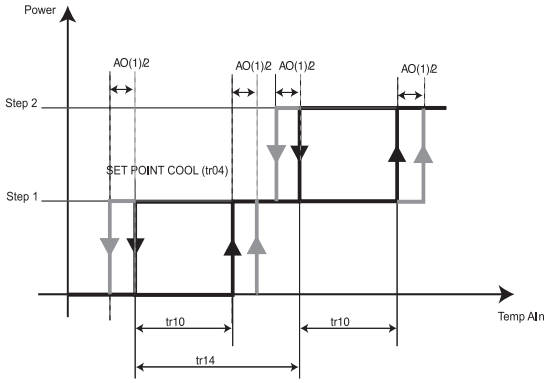
Note that in both modes, the compressor on temperature is the same for each operating cycle, even when the *adaptive function* is activated.
This extends the zone between the setpoint and on temperatures, reducing the number of times the compressor switches on and off and thereby reducing any overlap with safety times.

Cooling mode	
Adaptive function with setpoint modification **(*Ad00*=0)**	**Setpoint modification after calculation of AO1**
	
SET1 = SET(1), SET2=SET(2)	

18.2 Adaptive function with hysteresis modification

Adaptive function with hysteresis modification (*Ad00*=1)	Hysteresis modification after calculation of AO1
	

18.3 Adaptive function with setpoint and hysteresis modification

Adaptive function with setpoint and hysteresis modification (*Ad01*=2)	Setpoint and hysteresis modification after calculation of AO1
	

18.4 Setpoint regression

ET≥MT example

If ET ≥ *MT*:

If the cycle time is long enough (and greater than *MT*), regression of the real setpoint occurs: for each interval of *Ad05* (from the start of the cycle), the setpoint is modified by the value set in *Ad02*.

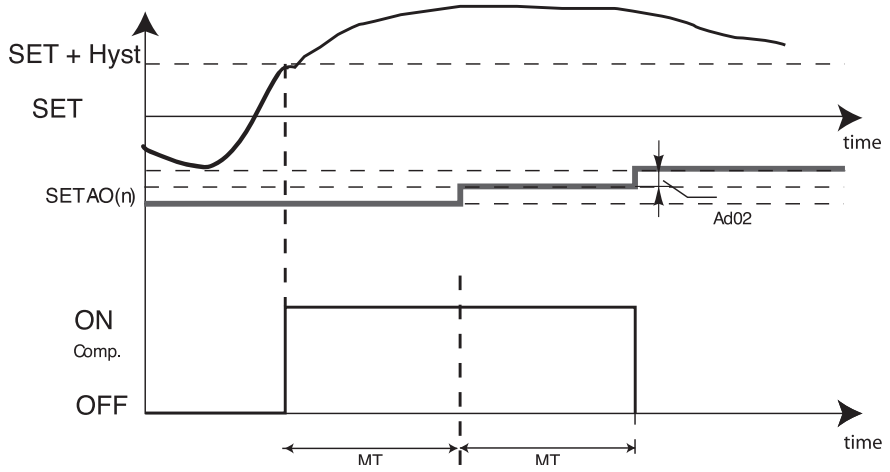
- in cooling, the setpoint (real for cycle N) is increased:
  after *Ad05*: SET(N) + *Ad02*
  after 2**Ad05*: SET(N) + 2**Ad02*
  and so on until the maximum value (setpoint / hysteresis)

- in heating, the setpoint is reduced as above, down to the minimum value (setpoint / hysteresis)

Hence for long cycle times, the "adaptive" function balances out making the cycle times compatible with *compressor timing*s.

Cooling mode

Setpoint regression



Parameter	Description	Parameter
Ad01	Accumulation offset constant	**See Modify setpoint offset calculation formula**
Ad02	Accumulation offset differential	**See Modify setpoint offset calculation formula**
		See *Setpoint regression*
Ad03	Block accumulation offset setpoint in cooling mode	**See *Protection* in cooling mode**
Ad04	Block accumulation offset setpoint in heating mode	**See *Protection* in heating mode**
Ad05	Compressor on time for accumulation offset regression	**See *setpoint regression***
Ad06	Reference compressor on time for accumulation offset	**See *MT***

18.5 Protection

COOL
If the outlet temperature < *Ad03* during general cycle n, the controller performs the following actions:
Switches off the compressor (or compressors)
Clears the adaptive offset AO(n) = 0; the next cycle recommences with the original setpoint and hysteresis

This adjustment can be considered a precursor of the antifreeze alarm (the cycle stops without generating an alarm) should the *adaptive function* lead to a very low real setpoint.
We recommend you set *Ad03* > *AL12* Internal circuit antifreeze alarm regulator setpoint

HEAT
If the outlet temperature > *Ad04* during general cycle n, the controller performs the following actions:
Switches off the compressor (or compressors)
Clears the adaptive offset AO(n) = 0; the next cycle recommences with the original setpoint and hysteresis
This adjustment can be considered a precursor of the high pressure alarm (the cycle stops without generating an alarm) should the *adaptive function* lead to a very high real setpoint.

To set *Ad06*, we recommend you refer to the high pressure safety devices in use (pressure switch configuration, type of refrigerant used, and so on)

Note: if the plant is of the two circuit type and two water temperature sensors are configured on circuit 1 and 2 primary output, consider the minimum of the two values.

19 ANTIFREEZE PARAMETERS WITH HEAT PUMP (FOLDER PAR/AF) - ANTIFREEZE

Anti-freeze parameters can be viewed and configured in *folder* **AF** (see User Interface and Parameters chapters).

The anti-freeze function with heat pump serves to prevent breakdowns due to internal heat exchanger icing (typically in machines with water-type internal heat exchangers).
SB600 enables control of machines with one or two cooling circuits and one or two internal heat exchangers.
The anti-freeze function with heat pump is controlled separately for each cooling circuit.

The function is always active in any machine operating state, i.e. cooling, heating and standby.
Anti-freeze function with heat pump is enabled
via parameter (***AF00*** **- Select antifreeze probe with circuit 1 heat pump** ≠ 0)
via parameter (***AF01*** **- Select antifreeze probe with circuit 2 heat pump** ≠ 0)

The Heating LED flashes when this function is active.

Mode change is disabled when this function is enabled.
Defrosting is disabled when this function is enabled.

Analogue inputs for anti-freeze function with heat pump
The analogue inputs used for regulation are selected distinctly for each cooling circuit, using parameters
AF00 **- Select antifreeze probe with circuit 1 heat pump**
AF01 **- Select antifreeze probe with circuit 2 heat pump**
Note: For machines with a single circuit ***AF01*** **- Select antifreeze probe with circuit 2 heat pump** must be set = 0.

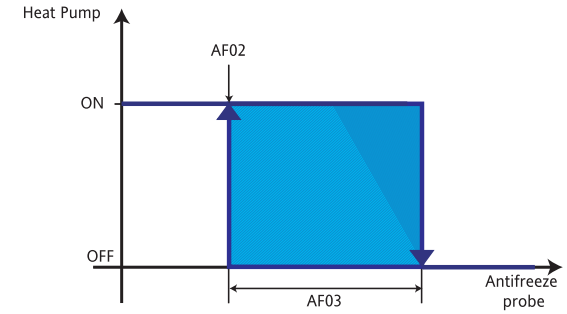
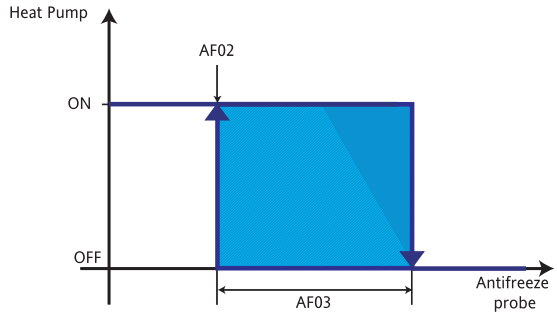
Value ***AF00*** / ***AF01***	Probe
0	No probe (anti-freeze function with heat pump disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Circuit 1 internal exchanger water outlet temperature
4	Circuit 2 internal exchanger water outlet temperature
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature

General conditions of operation
In **Off** the anti-freeze function with heat pump is disabled.
In ***Stand-by*** the anti-freeze function with heat pump is enabled, as in On.
In **On**, further to the principal regulation specified in the following paragraphs, the following situation (with priority over the principal regulation itself) may occur: anti-freeze function with heat pump inhibited during defrosts.

NOTE:
The valve reverses with a delay ***ST05*** **- Reversal valve switching delay**.
Furthermore, during the anti-freeze phase, the compressors run at maximum power and are turned off and on with reference only to the delay ***CP27*** **-** ***Defrost*** **compressor step/delay minimum**

Heat pump activation
The function is enabled (°) if the temperature measured
Circuit 1: by the anti-freeze with heat pump probe for circuit 1 < ***AF02*** **- Anti-freeze regulator setpoint with heat pump**
Circuit 2: by the anti-freeze with heat pump probe for circuit 2 < ***AF02*** **- Anti-freeze regulator setpoint with heat pump**

(°) the heat pump is activated if previously switched off; if previously activated, it remains active

Circuit 1	Circuit 2
	
Heat Pump = pompa di calore	**Heat Pump = pompa di calore**
Anti-freeze probe **anti-freeze function heat pump probe for circuit 1 (*AF00*)**	**Anti-freeze probe** **anti-freeze function heat pump probe for circuit 2 (*AF01*)**

Parameter	Description
AF02	**Anti-freeze regulator setpoint with heat pump**
AF03	**Anti-freeze regulator hysteresis with heat pump**
Regulator probe	***AF01*** **(circuit 1) /** ***AF02*** **(Circuit 2)**

20 SANITARY WATER AND ANTI-LEGIONNAIRE'S DISEASE (FOLDER PAR/AS)

Small/medium installations (typically residential installations) require “integrated” management of sanitary water (also referred to as ACS) by means of the heat pump system (for heating and cooling the interior environment).
In practice, this involves controlling the sanitary water temperature (ACS temperature) in a dedicated accumulator.

The switch between 'normal' mode (heating/cooling) and ACS mode can occur in 2 ways, depending on the type of system:

- With ACS Valve: the flow will be diverted from the heating/cooling circuit to the ACS accumulator
- With ACS Pump: the heating/cooling circuit pump will be switched off and the ACS accumulator pump switched on

Type of system
The type of system is configured using parameter ***AS00*** **- Select ACS mode**

Enabling
When parameter ***AS00*** **- Select ACS mode** is different from zero, the regulator is *enabled*.
The possible values of parameter ***AS00*** are:

- 0 = Disabled
- 1 = Enabled only heat pump for sanitary water system with sanitary water valve
- 2 = Enabled only sanitary water heater
- 3 = Enabled sanitary water heat pump and heater system with sanitary water valve
- 4 = Enabled only heat pump for sanitary water system with sanitary water pump
- 5 = Enabled only sanitary water heater
- 6 = Enabled sanitary water heat pump and heater system with sanitary water pump

Refer also to the following table where the *AS00* values are indicated in relation to the type of system used

	Par.	Description	value			
			0	**1 or 4**	**2 or 5**	**3 or 6**
Enabling	***AS00***	**Select ACS mode**	disabled	Heat pump	only sanitary water heater	Heat pump + sanitary water heater
system		**Sanitary water valve**		*AS00* = 1 system with sanitary water valve		*AS00* = 3 system with sanitary water valve
		Sanitary water pump		*AS00* = 4 system with sanitary water pump		*AS00* = 6 system with sanitary water pump

Notes.

- The term heat pump actually denotes the entire machine (e.g. *including the* integrated internal exchanger heaters, if any)
- Since the behaviour of the sanitary water heater is independent from the type of system, the values 2 and 5 determine the same device behaviour.
- When parameters *Anti-legionnaire's disease event duration, Monday – Tuesday* - etc. ***AS25*****,** ***AS26*****...** are different from zero (at least one must be) the *Anti-legionnaire's disease* function is *enabled* .Furthermore the RTC must be present and enabled for operation (it must not be faulty and/or not set, for further details refer to the specific *alarms*)

General conditions of operation

- In **Off** the regulator is *switched off* immediately and continuously.
- In **Standby** the regulator is on, with exclusive reference to activation of the ACS antifreeze heater.
- In **On**, in addition to the main control specified in subsequent paragraphs, the following situations are also possible (with priority given to the main control itself):
  - If there is an *error* in the sanitary water temperature *sensor,* the compressor associated with that sensor is disabled
  - The ACS valve / pump is immediately switched off in the event of valve / pump shutdown *alarms*
  - The ACS heater is immediately switched off in the event of heater shutdown *alarms*
  - On start-up of SBW600 (power on or reboot from OFF or Stdby), ACS mode is inhibited for 120 seconds in order to prevent multiple settings competing on start-up, with impulsive activations of the loads (e.g. internal pump).

Sanitary Water Setpoint

Regulation occurs on the **actual** ACS Setpoint.
The Actual Setpoint is determined by the following contributing factors:

- At start-up of the instrument, the Sanitary Water Setpoint = ***AS01*** **- ACS setpoint**
- If Time Bands are active (***tE00*** **- Enable time band operation** = 1) the Sanitary Water Setpoint will be determined by the **ACS Set Point** of the corresponding event / profile (see Time Bands section (*folder* PAr/tE))
- If ***AS11*** **- ACS set point dynamic constant** is different from zero then the *Dynamic ACS Setpoint* function is activated on the Sanitary Water Setpoint

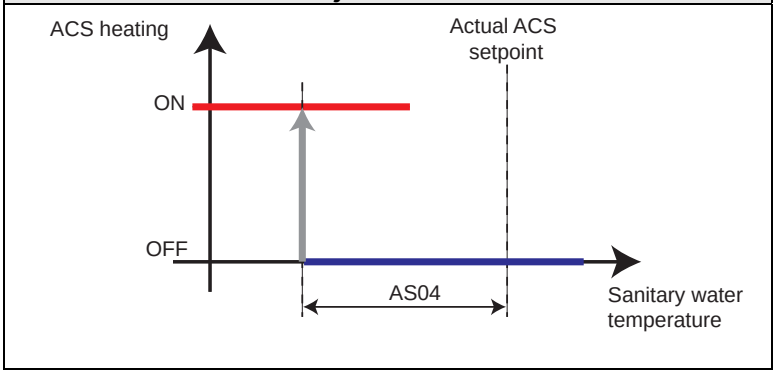
20.1 Sanitary Water in HEAT mode

Sanitary water consent
In Sanitary Water mode, the machine's operation is governed by the **request/consent** concept. Consent may be given (with resulting switchover from normal mode to the mode determined by the Sanitary Water regulator) *if and only if all* of the following conditions are satisfied:

- Sanitary Water Setpoint not reached (a function of the temperature of the ACS accumulator – **See diagram A**
- the time ***AS10*** **- ACS minimum deactivation/activation time has elapsed**
- NO *Anti-Legionnaire's Disease* period is in progress*
  *example: Saturday 21.30. *AS40* different from 0; *AS41* = 22, *AS42* = 0

This request, which was described above, takes priority over the "normal" **ACS heating request**.

Diagram A
Sanitary water CONSENT



Par.	Description
AS04	**ACS hysteresis**
AS01	**ACS setpoint**
AS02-AS03	**Note:** using the parameters: ***AS02*** **- ACS minimum setpoint** ***AS03*** **- ACS maximum setpoint** It is possible to limit the maximum and minimum configuration values of ***AS01***
Setpoint	**Actual ACS Setpoint**
Control sensor	**Sanitary water temperature**

Regulation, machine in HEAT
In the event of a sanitary water heating request:

- the machine remains in Heat Pump mode (and maintains the same control sensor that it uses in normal Heat mode) but modifies the control setpoint from actual Heat Setpoint to ***AS01*** **-**ACS Setpoint (ACS) with ***AS05*** **- ACS disengage setpoint differential**
- the ACS valve / pump is activated with the following actions:
  - machine with ACS valve: the ACS valve is activated without switching off the internal pump
  - machine with ACS pump: the ACS pump is activated at the same time as the internal pump is switched off; to prevent *flow switch alarms*, it is necessary to re-enter the time ***AL14*** **- *Flow switch alarm* bypass**

ACS heater: see corresponding paragraph

ACS disengage
Once the machine has been "disengaged" to heat the sanitary water for *Anti-Legionnaire's disease*, it will continue to do so until *at least one* of the following conditions is satisfied:

- tACS accumulator sensor reaches the actual ACS setpoint **- see figure B**
- the Heat control sensor (which typically is not the ACS accumulator sensor) reaches a certain value, equal to the ***AS01*** **-**ACS Setpoint (ACS) plus a specifiable differential, which takes account of the temperature difference that may exist between the ACS accumulator and the position of the Heat control sensor, parameter *AS05* **- see figure C**
- the time set using parameter ***AS09*** **- ACS maximum activation time has elapsed**
- an *Anti-Legionnaire's Disease* period is starting

When normal mode and the actual Heat (or Cool) setpoint are restored, except in the event of request/consent for machine operation in ACS for *Anti-Legionnaire's Disease* – see corresponding paragraph
All considerations regarding the actions adopted during switchovers apply.
If normal operating mode is restored, *the* ACS valve / pump is switched off with the following actions:

- machine with ACS valve: the ACS valve is switched off, the internal pump will continue to function if required for normal operating mode
- machine with ACS pump: the internal pump is activated at the same time as the ACS pump is deactivated; to prevent *flow switch alarms*, it is necessary to re-enter the time ***AL14*** **- *Flow switch alarm* bypass**

Diagram B
sanitary water DISENGAGE
SETPOINT REACHED

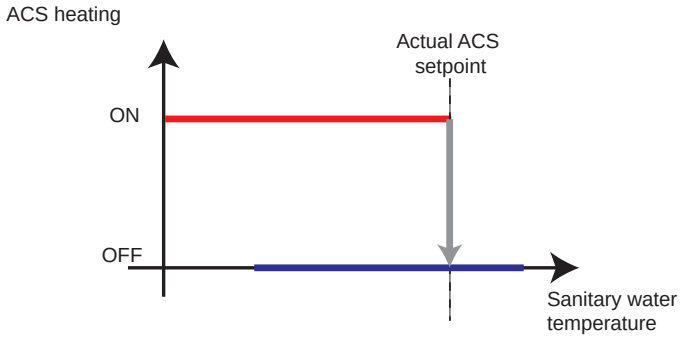


Diagram C
sanitary water DISENGAGE

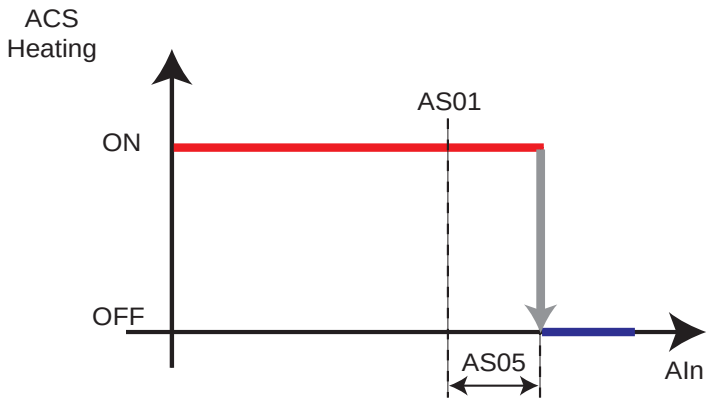


Diagram	Par.	Description
	AS02-*AS03*	**Note:** using the parameters: *AS02* **- ACS minimum setpoint** *AS03* **- ACS maximum setpoint** It is possible to limit the maximum and minimum configuration values of *AS01*
B	**Setpoint**	**Actual ACS Setpoint**
B	**Control sensor**	**Sanitary water temperature**
C	*AS01*	**ACS Setpoint**
C	*AS05*	**ACS disengage setpoint differential**
C	**Control sensor AIn**	**HEAT control sensor**

20.1.1 Sanitary water heater in Heat/Cool mode *

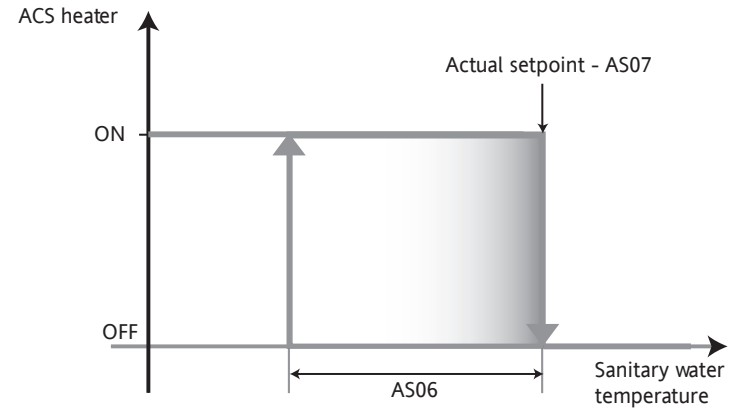
* behaviour independent from mode
Sanitary water heat regulation occurs on the actual ACS setpoint, with

- fixed differential ***AS07*** **- ACS heater differential**
- hysteresis ***AS06*** **- ACS heater hysteresis**, as shown in the figure

The analogue input used for regulation is exclusively the sanitary water temperature
Once enabled, the ACS heater is *independent* (setpoint differential aside, *it does not influence and is not influenced by the machine's other regulators, and the concepts relating to ACS consent do not apply to it*)

Differential *AS07* is cancelled if the unit is in Heat Pump Lock

ACS heater



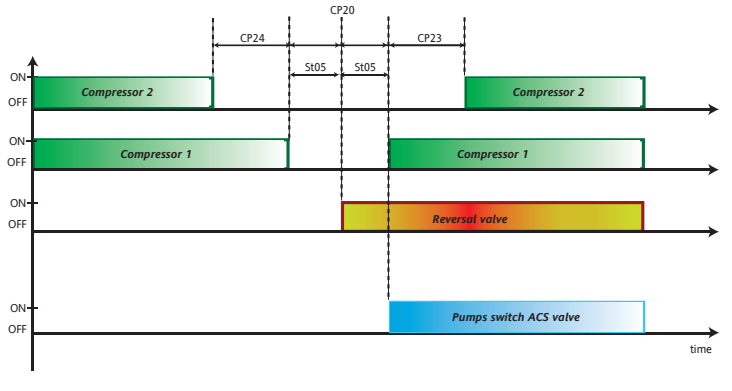
Par.	Description
AS06	**ACS heater hysteresis**
AS07	**ACS heater differential**
Setpoint	**Actual Setpoint – *AS07***
Control sensor	**Sanitary water temperature**

20.2 Sanitary Water, Cool mode

In the event of an **ACS heating** request, the machine switches temporarily from Chiller to Heat Pump (for Heat Pump operation see HEAT Mode), and remains in this mode until it is "disengaged", when normal Cool mode is restored, with actual Cool Setpoint.
In this case, special attention must be paid to the switchovers, since both the reversal valve (already discussed in the corresponding section) and the ACS valve / pump must respect the times indicated below:

Diagram	Par.	*Mode Change*
A	***St05*** **different from 0**	**COOL - ACS**
B		**ACS - COOL**
C	***St05*** **= 0**	**COOL - ACS**
D		**ACS - COOL**

Diagram A



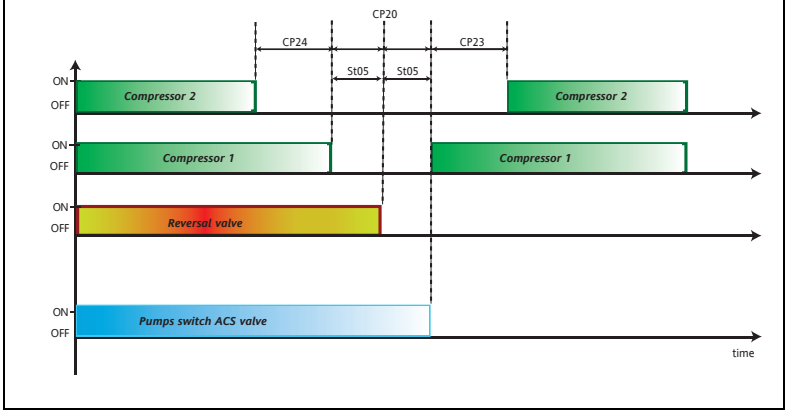
Par.	Description
St05 **different from 0**	**Reversal valve switching delay**
CP20	**Minimum off/on for same compressor**
CP23	**Minimum on/on time for same compressor**

Par.	Description
CP24	**Minimum off/off time for different compressors**

The switchover occurs with the following measures:

- **machine with ACS valve**: the ACS valve is activated after the time ***St05*** **- Reversal valve switching delay** from the valve switchover (to switch-on of the first compressor, unless other safety timings further delay said compressor), without switching off the internal pump. If in normal mode the compressors are switched off, the internal exchanger water pump can also be switched off (e.g. operation enabled on request): in this case the pump will switch on at the same time as the ACS mode is activated, resulting in the delayed switch-on of the compressors due to the need for pre-pumping.
- **machine with ACS pump:** the ACS pump is activated after the time ***St05*** **- Reversal valve switching delay** from the valve switchover (to switch-on of the first compressor, unless other safety timings further delay said compressor): the internal pump is switched off at the same time; to prevent *flow switch alarms* it is necessary to re-enter the time ***AL14*** **-** ***Flow switch alarm*** **bypass**

Diagram B



Par.	Description
St05 **different from 0**	**Reversal valve switching delay**
CP20	**Minimum off/on for same compressor**
CP23	**Minimum on/on time for same compressor**
CP24	**Minimum off/off time for different compressors**

The switchover occurs with the following actions:

- **machine with ACS valve**: the ACS valve is deactivated after the time *St05* **- Reversal valve switching delay** from the valve switchover (to switch-on of the first compressor, unless other safety timings further delay said compressor), without switching off the internal pump (this water pump may be switched off according to normal mode logic (e.g. operation enabled on request and compressors off).
- **machine with ACS pump:**: the internal exchange pump is activated after the time ***St05*** **- Reversal valve switching delay** from the valve switchover (to switch-on of the first compressor, unless other safety timings further delay said compressor), the ACS is switched off at the same time; to prevent *flow switch alarms* it is necessary to reset the time ***AL14*** **-** ***Flow switch alarm*** **bypass.**

Diagram C

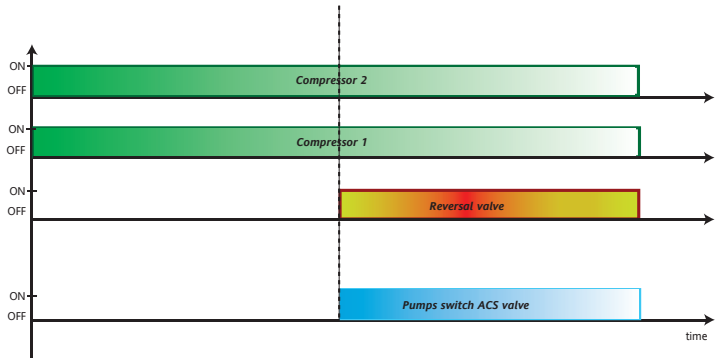
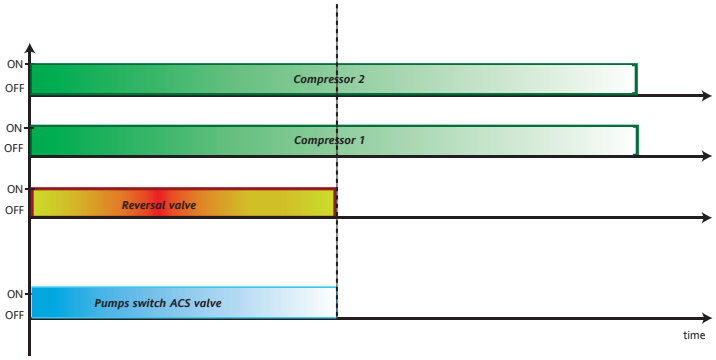


Diagram D



Par.	Description
St05 **= 0**	**Reversal valve switching delay**

20.2.1 Dynamic ACS setpoint

The *Dynamic ACS Setpoint* function consists of modifying the *actual* ACS setpoint according to the system's thermal efficiency.
In fact, it may occur that (e.g. due to incorrect dimensioning of the system) the machine never manages to reach the *actual* ACS setpoint.
Based on previous considerations, in this case the machine would exit ACS mode either due to timeout expired (***AS09*** **- ACS maximum activation time**) or due to Heat control setpoint reached (***AS01*** + ***AS05***).

The *Dynamic ACS Setpoint* function calculates and updates the maximum sanitary water temperature which the system can achieve under those particular conditions. In this way, the system is in any case "guaranteed" to exit from ACS mode due to attainment of the ACS Setpoint.

Enabling
This function is *enabled* by setting parameter ***AS11*** **- ACS setpoint dynamic constant** to a value different from zero.
You must also configure all of the following analogue inputs as:

- water delivery temperature.
- water return temperature.
- ACS temperature

The *Dynamic ACS Setpoint* function will calculate the new ACS setpoint as the minimum value between

- Actual Setpoint
- (*) ACS maximum water temperature achievable as a function of the system

Where (*) is a function of the parameters
AS11 **- ACS setpoint dynamic constant**
AS12 **- ACS system maximum temperature**

20.3 Sanitary water regulation, AS mode

During operation in Heat or Cool mode, the controller/machine (heat pump) meet ACS (or ACS for AL) heating needs if there is a request and provided the necessary conditions are met, otherwise they meet system needs (Heat or Cool).

AS mode is useful in the event that (e.g. due to the current season or the type of system) it is not necessary to meet system needs. In other words in AS mode, the controller/machine (heat pump) are only activated if there is a need for ACS (or ACS for AL) heating, according to the same process as that described previously, otherwise there is no actuation.

The above indications also apply to *defrost* (must be managed as normal!).

20.4 Anti-Legionnaire's Disease

The *Anti-Legionnaire's Disease* function eliminates Legionnaire's disease bacteria, which reside in water sources; these bacteria are typically destroyed if the water temperature rises above 60°C for a certain period of time.

Anti-Legionnaire's Disease **period**
An *anti-legionnaire's disease* period can be activated on each day of the week with a configurable start time and duration:

Description	Duration of event (0= disabled) Par.	Event (start) hour Par.	Event (start) minutes Par.
day 1 (Monday)	***AS25***	***AS26***	***AS27***
day 2 (Tuesday)	***AS28***	***AS29***	***AS30***
day 3 (Wednesday)	***AS31***	***AS32***	***AS33***
day 4 (Thursday)	***AS34***	***AS35***	***AS36***
day 5 (Friday)	***AS37***	***AS38***	***AS39***
day 6 (Saturday)	***AS40***	***AS41***	***AS42***
day 7 (Sunday)	***AS43***	***AS44***	***AS45***

Note.
The *Anti-Legionnaire's disease* period (duration of event) must be of suitable length, otherwise there is the risk that ***AS20*** **- ACS setpoint for** ***anti-legionnaire's disease*** is never reached. If so an Er48 Anti-legionnaires alarm will raise up. The automatic alarm reset when the setpoint will be reached.

ACS setpoint for ***anti-legionnaire's disease***

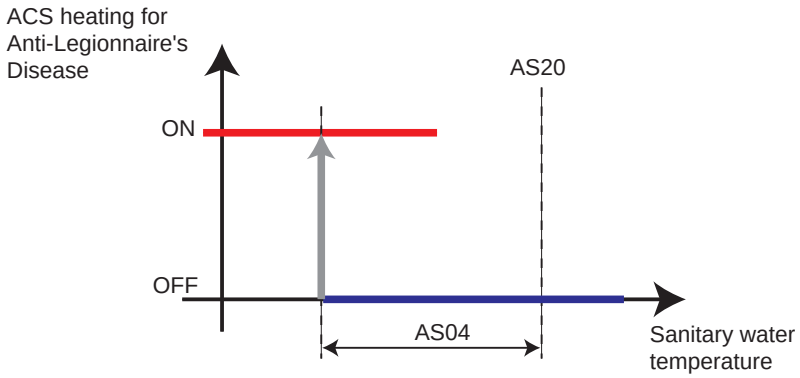
Regulation always occurs on the ACS setpoint **for** ***anti-legionnaire's disease*** ***AS20***

ACS consent for ***anti-legionnaire's disease***
In the same way as for the "normal" ACS regulator, the **request/consent** concept applies to **machine operation in ACS for** ***Anti-Legionnaire's Disease***. Consent may be given (with resulting switchover from normal mode, or from ACS mode, to the mode determined by the ACS regulator for *Anti-Legionnaire's disease*) *if and only if all* of the follow conditions are satisfied:

- *Anti-Legionnaire's disease* period in progress*
  *example: Saturday 22.30. *AS40* different from 0; *AS41* = 22, *AS42* = 0
- ACS setpoint for *Anti-Legionnaire's Disease* not reached (a function of the temperature of the ACS accumulator – **See diagram A**
- the time ***AS23*** **- ACS minimum deactivation/activation time for** ***anti-legionnaire's disease*** **has elapsed**

This request, which was described above, takes priority over the "normal" **ACS heating request**.

Diagram A
Anti- Legionnaire's disease CONSENT



Par.	Description
AS04	**ACS hysteresis**
AS20	**ACS setpoint for** ***anti-legionnaire's disease***
AS21-AS22	**Note: with** the parameters :

	AS21* - Minimum ACS setpoint for *anti-legionnaire's disease ***AS22* - Maximum ACS setpoint for *anti-legionnaire's disease*** It is possible to limit the maximum and minimum configuration values of ***AS20***
Control sensor	**ACS water temperature**

Notes
Consent is not subject to compliance with safety times*, since the aim is to bring the ACS to the temperature specified for *Anti-Legionnaire's Disease*, with priority over everything else.
*times controlled by defining *Anti-Legionnaire's disease* periods using parameters *AS25*...*AS45*
Typically ***AS20* - ACS setpoint for *anti-legionnaire's disease*** > ***AS01* - ACS setpoint** which means that the machine will switch to managing ACS heating for *Anti-Legionnaire's Disease* as soon as the *Anti-Legionnaire's Disease* period starts (all the more so if the machine was in Cool mode).

Regulation
HEAT
the machine operates in much the same way as for the ACS case, except that a different setpoint is adopted: in the event of a request for ACS heating for *Anti-Legionnaire's disease*:

- the machine remains in Heat Pump mode (and maintains the same control sensor that it uses in normal Heat mode) but modifies the control setpoint from Actual Heat Setpoint to ***AS20* - ACS setpoint for *anti-legionnaire's disease*** with the same ***AS05* - ACS disengage setpoint differential**
- the ACS valve / pump is activated (or remains active) with the same actions as those indicated in the ACS case.

COOL
the machine operates in a similar way, it must switch from chiller to PdC and vice versa.
All considerations made with regard to actions adopted during switchovers apply.

ACS Disengage for *Anti-Legionnaire's Disease*
Once the machine has been "engaged" to heat sanitary water for *Anti-Legionnaire's disease*, it will continue to do so until *at least one* of the following conditions is satisfied:

- the ACS accumulator sensor reaches the ACS setpoint for *Anti-Legionnaire's disease*, parameter *AS20* **- see figure B**
- the Heat control sensor (which typically is not the ACS accumulator sensor) will reach a certain value, equal to the ACS Setpoint for *Anti-Legionnaire's Disease* plus a specifiable differential, which takes account of the temperature difference that may exist between the ACS accumulator and the position of the Heat control sensor, parameter *AS05* **- see figure C**
- the *Anti-Legionnaire's Disease* period is finished

when normal mode and the actual Heat (or Cool) setpoint are restored, except in the event of request/consent for machine operation in ACS mode, for which the machine's behaviour has already been described in detail.
All considerations made with regard to actions adopted during switchovers apply.

Note. Once the request for ACS heating for *Anti-Legionnaire's Disease* is exhausted, typically the conditions for having an ACS heating request are not satisfied, but this may occur if the *Anti-Legionnaire's Disease* period has a limited duration. In which case, normal mode will not be restored but the machine will operate in ACS mode, for which the machine's behaviour has already been described in detail.

Diagram B
Anti-Legionnaire's Disease
DISENGAGE
SETPOINT REACHED

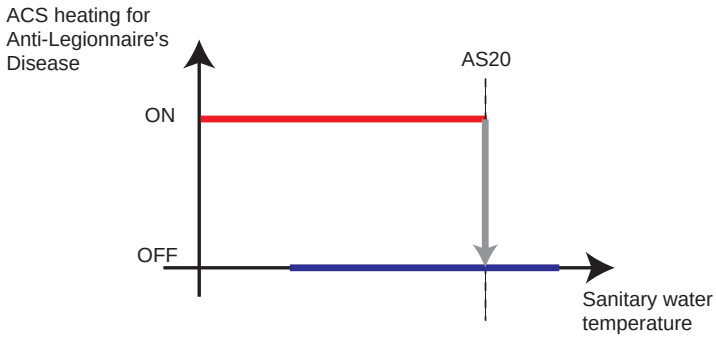


Diagram C
Anti-Legionnaire's Disease
DISENGAGE

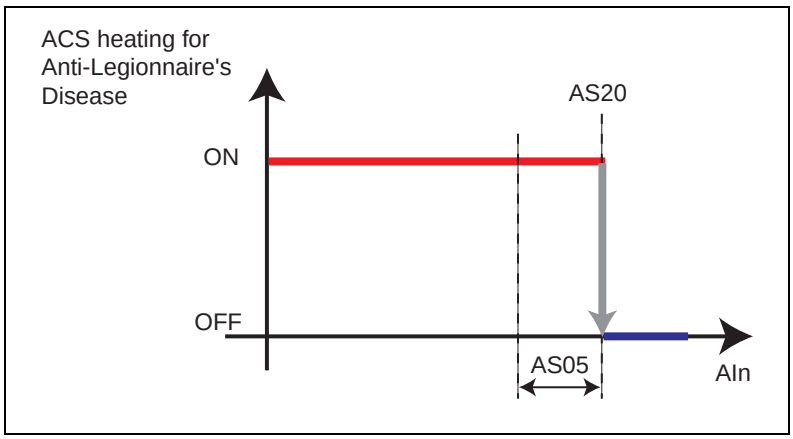


Diagram	Par.	Description
C	*AS05*	ACS disengage setpoint differential
B-C	*AS20*	ACS setpoint for *anti-legionnaire's disease*
B-C	*AS21*-*AS22*	Note: with the parameters : *AS21* - Minimum ACS setpoint for *anti-legionnaire's disease* *AS22* - Maximum ACS setpoint for *anti-legionnaire's disease* it is possible to limit the maximum and minimum configuration values of *AS20*
B	Control sensor	Sanitary water temperature
C	AIn Control sensor	HEAT control sensor

Note
Diagram C Case:: if the Heat control sensor is disengaged (e.g. the sanitary water did not achieve the *Anti-Legionnaire's Disease* setpoint), the conditions for a new ACS consent for *Anti-Legionnaire's Disease* may immediately exist.
In order to prevent the machine fluctuating between normal mode and ACS for *Anti-Legionnaire's Disease* mode, there must be a minimum ACS OFF-ON safety time for *Anti-legionnaire's disease* defined by parameter ***AS23*** **- ACS minimum deactivation/activation time for *anti-legionnaire's disease***

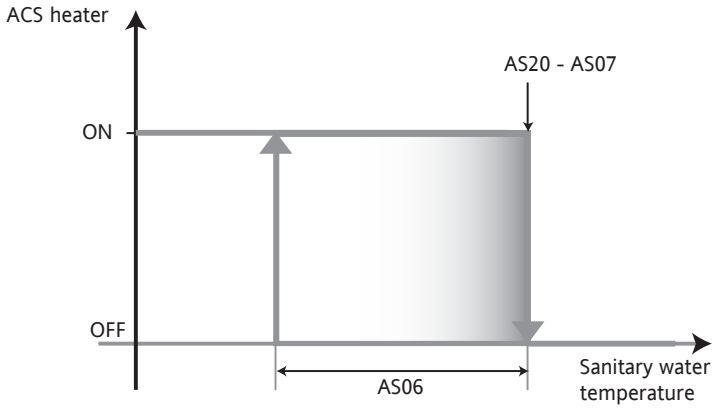
20.4.1 ACS Heater for Anti-Legionnaire's Disease

The ACS heater is regulated in the same way as described for ACS heating, except that:

- the setpoint adopted is ***AS20*** **- ACS setpoint for *anti-legionnaire's disease***
-

Differential *AS07* is cancelled if the unit is in Heat Pump Lock

ACS Heater for Anti-Legionnaire's Disease



Par.	Description
AS06	ACS heater hysteresis (for *anti-legionnaire's disease*)
AS07	ACS heater differential
AS20	ACS setpoint for *anti-legionnaire's disease*
Control sensor	ACS water temperature

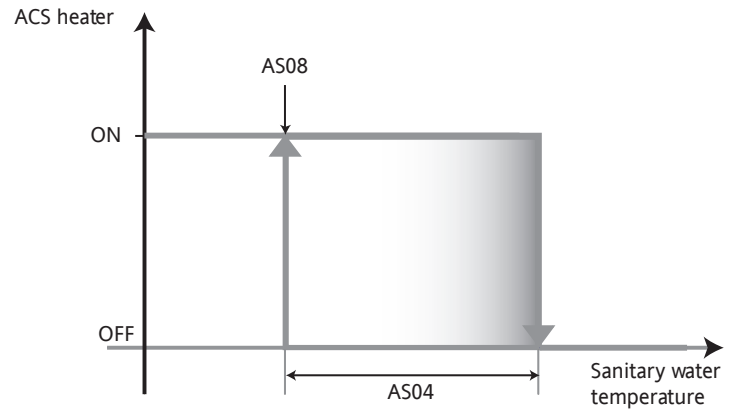
20.5 Sanitary Water Antifreeze

In specific situations (e.g. machine in standby) it is necessary to guard against the risk of the ACS water freezing.
For this purpose, only the ACS heater (which must be present*) is used and the machine's operation mode is not modified (e.g. if in Cool, it remains in Cool).

* at least one digital input must be configured as ACS Electrical Heater by means of parameters ***CL90...CL97*** **/** ***CL80-CL81*** **if digital /** ***CL61...CL63*** **if digital = ±28.**

The heater is regulated on parameter ***AS08*** **- ACS antifreeze setpoint**, as shown in the figure below. The analogue input used for regulation is exclusively the sanitary water temperature

Antifreeze for ACS water



Par.	Description
AS04	**ACS hysteresis**
AS08	**ACS antifreeze setpoint**
Control sensor	**Sanitary water temperature**

21 BLOCK HEAT PUMP (FOLDER PAR/HP)

The block heat pump function allows **energy savings** by disabling the heat pump in specific operating conditions, such as:

- when the installation is not working efficiently due to the external temperature **(Block heat pump by external temperature)**
- when on account of the particular electricity supply agreement it would be useful to disable the heat pump at peak charge times **(Block heat pump with digital input)**

Block heat pump 1 and 2 parameters table

Parameter	Description	External temperature	Differential Setpoint External Temperature	Parameter (analogue input)
Block 1				
HP00	Select heat pump 1 lock probe	**X (=1)**		**x**
HP01	Block heat pump 1 setpoint	**x**		**x**
HP02	Block heat pump 1 hysteresis	**x**		**x**
HP03	Heat pump 1 lock maximum dynamic differential		**x**	
HP04	Block heat pump 1 dynamic differential setpoint		**x**	
HP05	Block heat pump 1 dynamic differential proportional band		**x**	
Block 2				
HP10	Select probe for block heat pump 2	**X (=1)**		**x**
HP11	Block heat pump 2 setpoint	**x**		**x**
HP12	Block heat pump 2 hysteresis	**x**		**x**

If the external temperature is too low, heat pump performance will not be acceptable; the following are thus available:

Block heat pump based on external temperature

Block heat pump based on external temperature

- set a set point (***HP01*** **/** ***HP11***) below which the heat pump will be disabled.
- Set the parameters ***HP00*** **/** ***HP10*** **Select probe for block heat pump 1 / 2** = 1

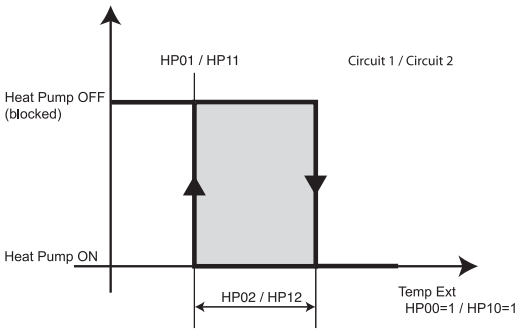
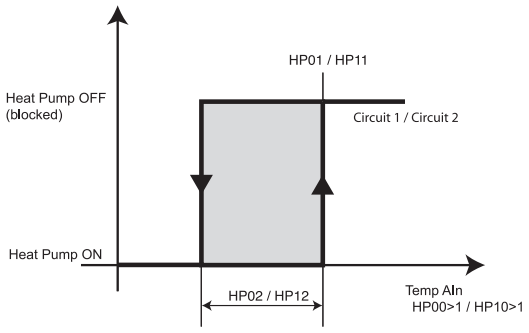
Block heat pump based on regulation temperature

Block heat pump based on regulation temperature

- set a set point (***HP01*** / ***HP11***) above which the heat pump will be disabled.
- Set the parameters ***HP00*** / ***HP10*** **Select probe for block heat pump 1 / 2** > 1

Value	Probe	Mode
0	No probe (block pump disabled)	-
1	**External temperature**	**Heating**
2	Internal exchanger water/air inlet temperature	Cooling
3	Internal exchanger water/air outlet temperature	Cooling
4	Circuit 1 and 2 internal exchanger water outlet average temperature	Cooling
5	Recovery exchanger inlet water temperature (or external exchanger)	Cooling
6	Recovery exchanger water outlet temperature (or external exchanger)	Cooling
7	Circuit 1 and 2 external exchanger average temperature	Cooling

Note: The Economy LED illuminates with a steady light on the *display* to indicate heat pump lock (set ***UI07*** - **Configuration of Economy LED** = 2)

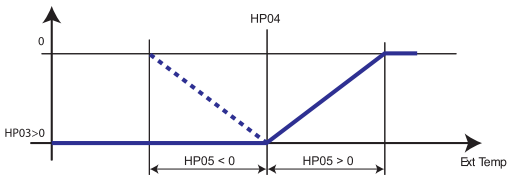
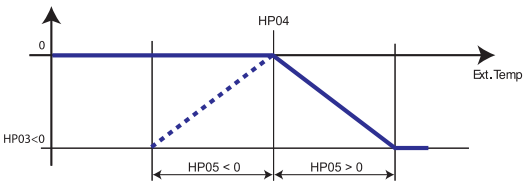
Block heat pump based on external temperature **Circuit 1 / Circuit 2**	*Block heat pump based on regulation temperature* **Circuit 1 / Circuit 2**
	
Heat Pump = pompa di calore	**Heat Pump = pompa di calore**

Heat Pump	Heat pump state
T ext	External temperature
AIn	Probe selected by parameter

21.1.1 Block heat pump 1 - setpoint

It is useful to be able to vary the block heat pump temperature according to the external temperature.
This regulator linearly compensates the setpoint for the block heat pump function with a positive or negative differential value according to the external temperature.
The real setpoint for the block function is calculated by *adding* this dynamic differential to the value of parameter ***HP01*** **- Block heat pump 1 setpoint**

Enabling
The regulator is enabled by setting parameter ***HP03*** **- Heat pump 1 lock maximum dynamic differential** ≠ 0.
Furthermore, an analogue input must be configured as external temperature.

Positive offset *HP03*>0	**Negative offset *HP03*<0**
	
Heat Pump = pompa di calore	**Heat Pump = pompa di calore**

21.1.2 Block heat pump from digital input

If a digital input is configured as “Block heat pump” or ***CL40***..***CL45*** **/** ***CL50***..***CL54*****=±20 ,** then when it is activated, the heat pump will be deactivated.

22 POWER LIMITATION (FOLDER PAR/PL)

Power limitation parameters can be viewed and set in *folder* **PL** (see User Interface and Parameters chapters)

22.1 Operating modes

The power limitation function:

- protects the machine from high and low temperature situations when used with the temperature control probe;
- protects the machine from high pressure situations, when used with the high pressure probe;
- protects the machine from low pressure situations, when used with the low pressure probe;
- prevents the machine from running at a low efficiency level, when used with the external temperature.

Enabling

- Power limitation on **external temperature *** is enabled by parameter (***PL00*** **-** Proportional band for power limitation on external temperature ≠ **0**)
- Power limitation on **temperature *** is enabled by parameter (***PL10*** **-** Proportional band for power limitation on water/air temperature ≠ **0**)
- Power limitation on **pressure **** is enabled by parameter (***PL20*** **-** Proportional band for power limitation on pressure ≠ **0**)

* The external temperature and temperature power limitation act on the power steps independently of the circuits.
** In the case of machines with two circuits, power limitation is controlled on each circuit separately, as a function of their parameters.

General conditions of operation
Function active in Cool/Heat mode.

1. In **Off** the power limitation function is disabled.
2. In **Standby** the power limitation function is disabled.
3. In **On** power limitation acts by switching off the power steps in observance of the set safety timings. The same applies to their turning back on when returning from limitation.
   Note: when limitation is active, no special message indicates this on the *display*
   Note: if the control input is not configured or in error, the individual power limitation controllers are disabled. Apart from probe errors, in this situation there is no special indication on the *display*

Parameter	Parameter	Description	See diagram	
COOL	HEAT		COOL	HEAT
PL00		**Power limitation on external temperature proportional band External SETPOINT. COOL temperature**		
PL01	***PL02***	**External temperature setpoint for power limitation in Cool/Heat. External SETPOINT. HEAT temperature**	**A A'**	**B B'**
PL11		**Select probe for power limitation on water/air temperature**	**See table, parameter *PL11***	
PL12		**High water temperature setpoint for power limitation *PL12* High temperature SETPOINT**	**C**	
PL13		**Low water temperature setpoint for power limitation Low temperature SETPOINT**	**D**	
PL20		**Power limitation on pressure proportional band**		
PL21		**High pressure setpoint for power limitation High Pressure SETPOINT**	**E E' E''**	
PL22		**Low pressure setpoint for power limitation Low Pressure SETPOINT**	**F F' F''**	

Table, parameter *PL11*

Value	Probe
0	No probe (regulator disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Circuit 1 and 2 internal exchanger water outlet average temperature
4	Recovery (or external) exchanger inlet water temperature
5	Recovery (or external) exchanger water outlet temperature
6	Circuit 1 and 2 external exchanger average temperature

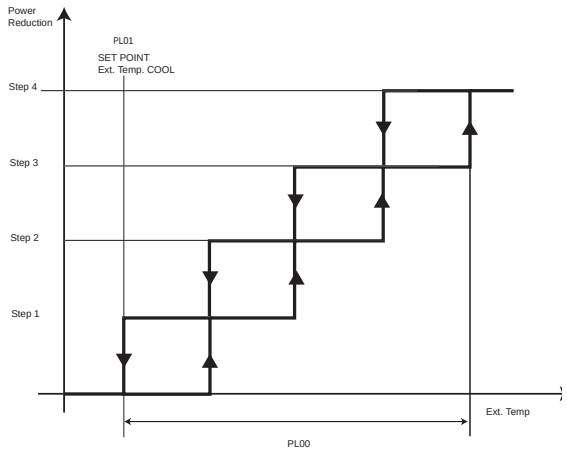
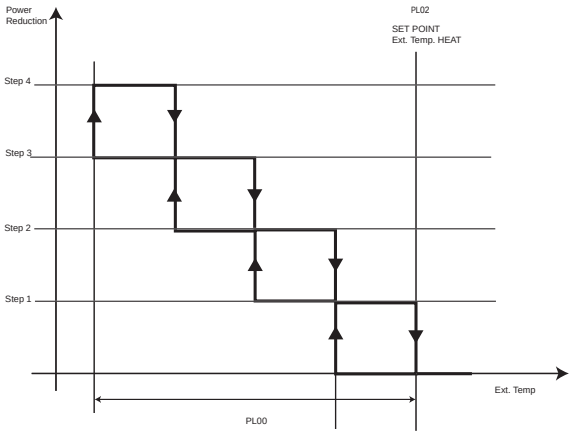
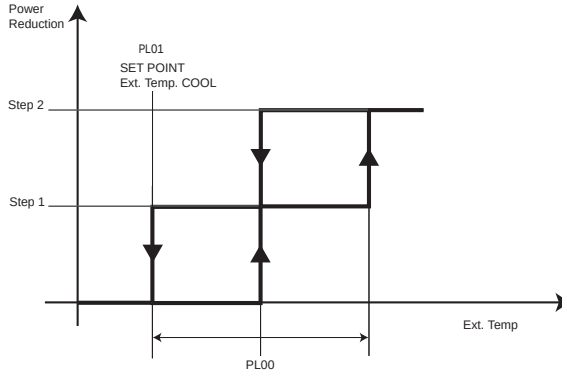
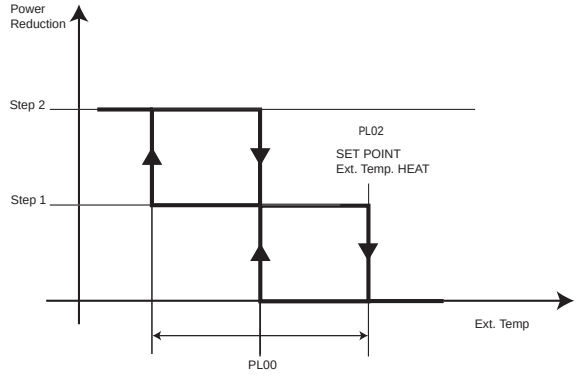
Power limitation - 2 compressors

Diagrams **A' B' E'' F' F''** represent the inhibition/enabling of two power steps (two compressor machine or power stage compressor);
The pressure or temperature interval between inhibition/enabling of one step and the next depends on the proportional band and the number of resources present in the circuit.
The switching on/off of steps respects the operating logic set

Power limitation - 4 compressors

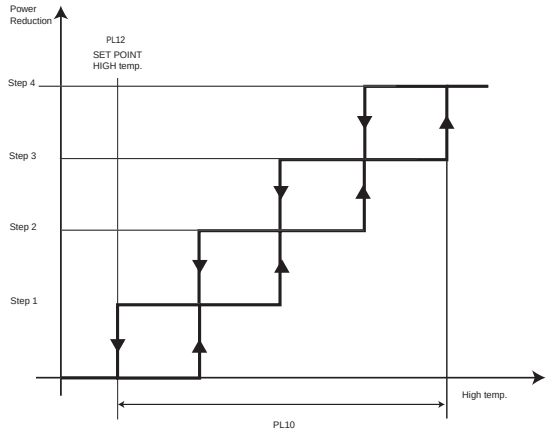
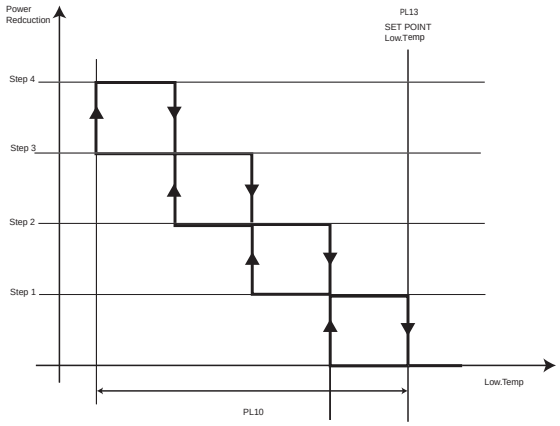
The external temperature and temperature power limitation act on the power steps independently of the circuits.

22.2 Power limitation - by external temperature (Cool and Heat)

COOL	HEAT
Diagram A **for high external temperature** ***PL01*** **= External SET POINT COOL temperature**	**Diagram B** **for low external temperature *PL02* = External SET POINT HEAT temperature**
Total of 4 steps	
	
NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT	
Diagram A	**Diagram B**
Total of 2 steps	
	
NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT	

22.3 Power limitation - by temperature (Cool and Heat)

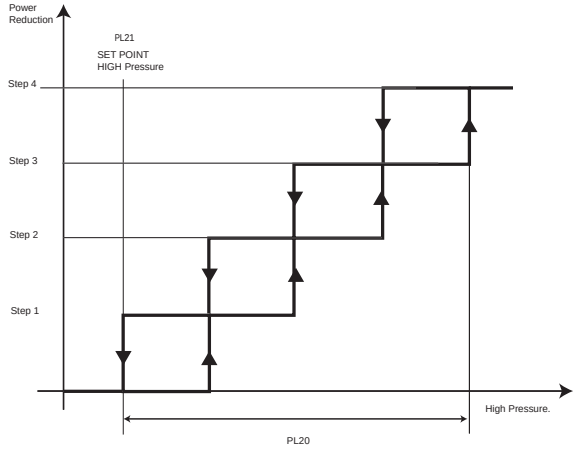
Example of power limitation on temperature in a 4 step machine,

Diagram C **for high temperature on the control probe** **(Cool and Heat)** ***PL12*** **High temperature SETPOINT**	**Diagram D** **for low temperature on the control probe** **(Cool and Heat)** ***PL13*** **Low temperature SETPOINT**
	
NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT	

22.4 Power limitation - by high pressure probe (Cool and Heat)

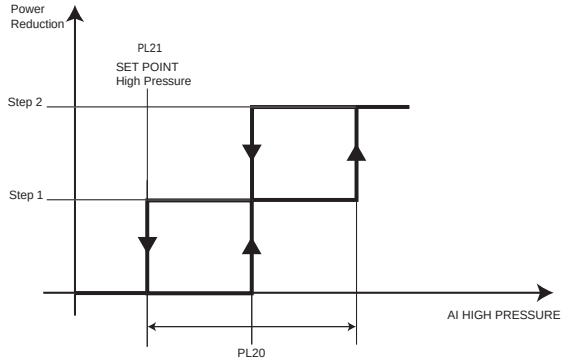
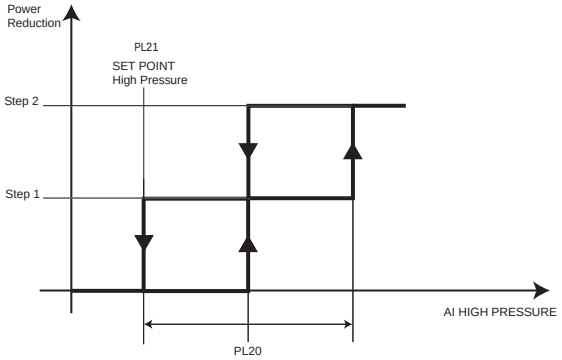
Example of power limitation on high pressure in a 4 step/1 circuit machine

Diagram E
on high pressure probe (Cool and Heat)
PL21 **= High Pressure SETPOINT**



NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT

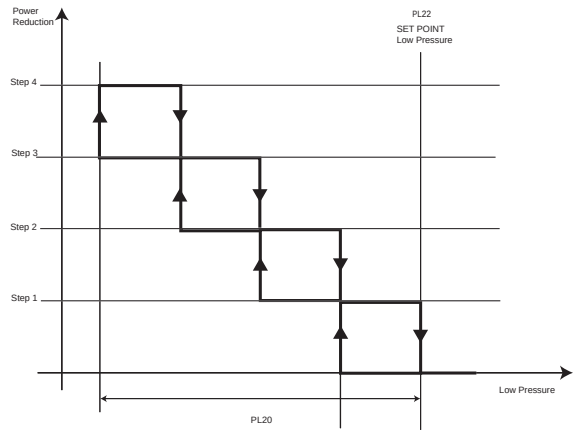
Example of power limitation on high pressure in a 2 step/2 circuit machine

Diagram E' **on high pressure probe (Cool and Heat)** ***PL21*** **= High Pressure SETPOINT**	**Diagram E''** **on high pressure probe (Cool and Heat)** ***PL21*** **= High Pressure SETPOINT**
Steps to cut out on circuit 1	**Steps to cut out on circuit 2**
	
NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT ON CIRCUIT 1	**NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT ON CIRCUIT 2**
HIGH PRESSURE = high pressure input circuit 1	**HIGH PRESSURE = high pressure input circuit 2**

22.5 Power limitation - by low pressure probe (Cool and Heat)

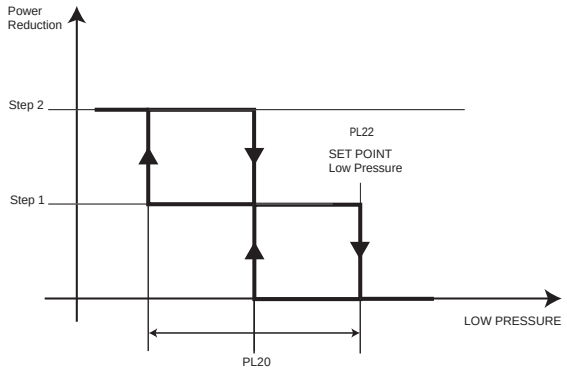
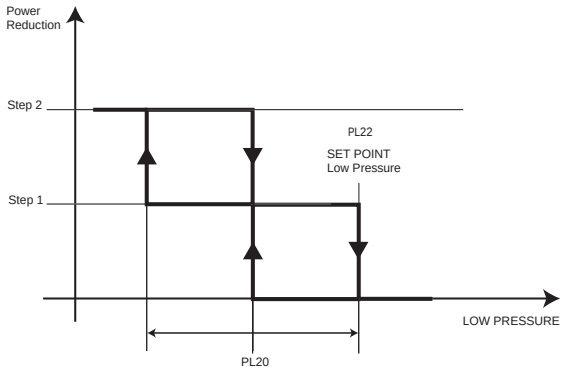
Example of power limitation on low pressure in a 4 step/1 circuit machine

Diagram F
on low pressure probe (Cool and Heat)
PL22 **Low Pressure SETPOINT**



NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT

Example of power limitation on low pressure in a 2 step/2 circuit machine

Diagram F' **on low pressure probe (Cool and Heat)** ***PL22*** **Low Pressure SETPOINT**	**Diagram F''** **on low pressure probe (Cool and Heat)** ***PL22*** **Low Pressure SETPOINT**
Steps to cut out on circuit 1	**Steps to cut out on circuit 2**
	
NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT ON CIRCUIT 1	**NOTE: "POWER REDUCTION" INDICATES THE POWER STEPS TO BE CUT OUT ON CIRCUIT 2**
LOW PRESSURE = low pressure input circuit 1	**LOW PRESSURE = low pressure input circuit 2**

22.6 Power limitation to 50%

Function enabled by configuring:
a digital input as 50% power limitation or by setting one of parameters *CL40*...*CL45* = ±21
or an analogue input when configured as digital input CL46...*CL54* = ±21;

Activating the digital input halves the availability of power steps, thus reducing energy consumption.

Power limitation to 50% is independent of the forced power stages described above.
The limitations act in parallel, and the number of steps limited is the maximum of the two limitation functions.

With the SB600 this results in a large number of possible situations: the first column shows the power steps *normally* available (without *alarms* or blocks, a value which depends exclusively on how the SB600 is *configured*, not on the particular situation at any given time), while the second column shows the residual power steps with 50% power limitation active.

Number of power steps *configured*	Number of power steps available with *limitation to 50%* active	Notes
1	**1**	No effect
2	**1**	
3	**2**	
4	**2**	

By step we mean the power equivalent of a compressor power stage; the selection of the step is subordinate to the compressor controller mechanism (e.g. limitation to 50% makes no distinction between the power stages of different circuits).
In other words, the selection of which power step to turn off is made by the power stage on/off logic described in the chapter Compressors.

Example 1
SB device configured with two power steps, one per circuit (= one compressor per circuit): the activation of the input has no effect if only one compressor is running at the time; if the input stays active, it will affect any request for activation of the compressor of the other circuit (it will impede it).

Example 2
SB device configured with four power steps (one power stage compressor per circuit): activation of the input has no effect if only 1 or 2 power stages are active at the time (whether both or only one compressor is running), as for the previous example. It will have an effect if 3 or 4 power stages are active and 1 or 2 steps are turned off according to the compressor controller logic (either both compressors or only one remains active).

As fro other forms of limitation, the step off/on sequence is subordinate to the *safety timings*.

The function has no effect on other resources, and is not indicated on the *display* in any way.

23 TIME BANDS (FOLDER PAR/TE)

SBW600 allows for differentiated operation based on the time and the days of the week.
In fact, you can "define" time bands (e.g. in order to save energy at night, when less energy is requested by the system), by programming specific "profiles" and "events" throughout the course of the week.
You can define the hour and minute of each event, at which point a new "time band" triggers the activation of a specific mode (ON or STANDBY) and specific Cool / Heat setpoints.

The Time Band control parameters can be viewed and configured in the **tE** *folder* (see User interface section and Parameters section).

Enabling
The function may be enabled using parameter ***tE00*** **- Enable time band operation**

		Parameter	**Description**	
			0	**1**
Enable	***tE00***	**Enable time band operation**	Time bands disabled	Time bands enabled

General conditions of operation
tE00 **- Enable time band operation = 1**
The RTC must be present **(*models* /C)**
The time must first be checked and if necessary adjusted (see paragraph on How to adjust the clock (CL), in the User Interface section (*folder* PAr/UI)

NOTE: This DOES NOT affect the Heat/Cool *mode change* or even the system / ACS *mode change* but only the Cool and Heat setpoint values defined by the indicated parameters, as well as the *mode change* from ON to STANDBY and vice versa.
The *mode change* procedure always occurs in accordance with the basic regulation times and rules.

Time Band Operation
Up to 3 profiles are available for each day of the week. They may be selected from the following parameters:

Parameter	**Description**	**1**	**2**	**3**
tE01	Select profile, day 1 (Monday)	Profile 1	Profile 2	Profile 3
tE02	Select profile, day 2 (Tuesday)	Profile 1	Profile 2	Profile 3
tE03	Select profile, day 3 (Wednesday)	Profile 1	Profile 2	Profile 3
tE04	Select profile, day 4 (Thursday)	Profile 1	Profile 2	Profile 3
tE05	Select profile, day 5 (Friday)	Profile 1	Profile 2	Profile 3
tE06	Select profile, day 6 (Saturday)	Profile 1	Profile 2	Profile 3
tE07	Select profile, day 7 (Sunday)	Profile 1	Profile 2	Profile 3

Up to 4 events can be associated with each profile – see the following table:

Description	Description	Profile 1	Profile 2	Profile 3
EVENT 1		***tE10..tE15***	***tE38..tE50***	***tE66..tE71***
	Hour / Minutes	*tE10..tE11*	*tE38..tE39*	*tE66..tE67*
	ON/Standby operating mode	*tE12*	*tE40*	*tE68*
	Cool setpoint	*tE13*	*tE41*	*tE69*
	Heat setpoint	*tE14*	*tE42*	*tE70*
	ACS setpoint	*tE15*	*tE43*	*tE71*
EVENT 2		***tE17..tE22***	***tE45..tE50***	***tE73..tE78***
	Hour / Minutes	*tE17...tE18*	*tE45..tE46*	*tE73..tE74*
	ON/Standby operating mode	*tE19*	*tE47*	*tE75*
	Cool setpoint	*tE20*	*tE48*	*tE76*
	Heat setpoint	*tE21*	*tE49*	*tE77*
	ACS setpoint	*tE22*	*tE50*	*tE78*
EVENT 3		***tE24..tE29***	***tE52..tE57***	***tE80..tE85***
	Hour / Minutes	*tE24...tE25*	*tE52..tE53*	*tE80..tE81*
	ON/Standby operating mode	*tE26*	*tE54*	*tE82*
	Cool setpoint	*tE27*	*tE55*	*tE83*
	Heat setpoint	*tE28*	*tE56*	*tE84*
	ACS setpoint	*tE29*	*tE57*	*tE85*
EVENT 4		***tE31..tE36***	***tE59..tE64***	***tE87..tE92***
	Hour / Minutes	*tE31...tE32*	*tE59..tE60*	*tE87..tE88*
	ON/Standby operating mode	*tE33*	*tE61*	*tE89*
	Cool setpoint	*tE34*	*tE62*	*tE90*
	ACS setpoint	*tE36*	*tE64*	*tE92*

ACS = Domestic hot water
Each event will have
a start time defined by 2 parameters
event start hour
event start minute
operating mode
ON
Standby
SBW600 will enter ON or standby when the time coincides with the start of the time band
Cool mode *temperature controller* setpoint
Heat mode *temperature controller* setpoint
Sanitary Water setpoint
The Cool mode setpoint will be active with SBW600 in Cool mode when the time coincides with the predefined event (start of the time band).
Similarly, the Heat mode setpoint will be active with SBW600 in Heat mode when the time coincides with the start of the time band
NOTE: the SBW600 device does NOT change mode but will use the setpoints indicated if in Cool/Heat mode

24 ALARMS AND DIAGNOSTICS (FOLDER PAR/AL)

Alarms

The "Energy SBW600 " performs full installation diagnostics and reports a variety of *alarms*.

Parameters for alarm activation and acknowledgment can be viewed and configured in *folder*
AL (parameters *AL00*...*AL82*) (see User Interface and Parameters chapters)

Automatic reset

Automatic reset
For *automatic reset alarms*, normal operation is restored as soon as the cause of the alarm has been removed.

Manual reset

Manual reset
Alarms can be manually reset by pressing and releasing the [UP + DOWN] *keys*
Normal operation can only be reset

- by pressing a key on the instrument keyboard and
- only if the cause of the alarm has been removed.

Alarm acknowledgement
Alarms can be acknowledged by pressing any key.
NOTE: acknowledging an alarm has no effect on the alarm other than on the alarm LED that goes from fixed to flashing.

An alarm has two effects:

- It blocks the utilities concerned
- Message on keyboard *display* alternates with a message on the main *display*

The next two sections summarize *alarms* grouped by type (digital or analogue).
Alarm code and alarm parameters are in bold (PAr/AL *folder*)

For some *alarms*, the signal can be excluded for a preset interval, set in the relative parameter.

No. interventions
The number of interventions per sampling period is defined in parameter ***AL00*** **- Time interval for alarm event count**

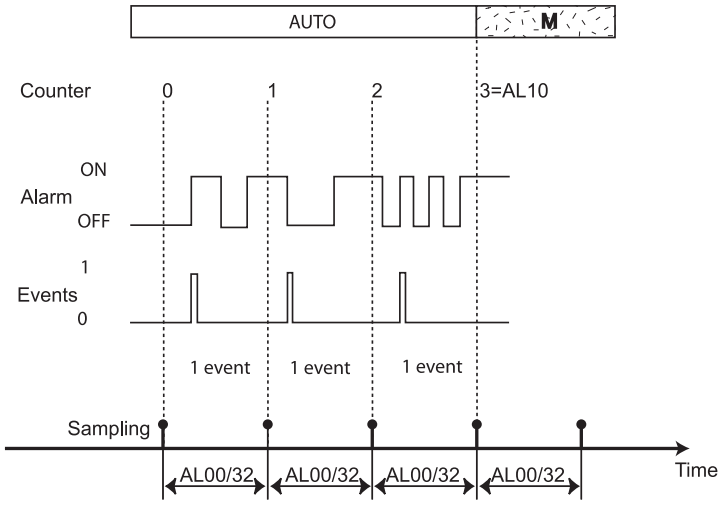
No. interventions

For some *alarms*, the number of interventions can be counted: if, in a period of time defined in ***AL00*** a threshold set in a parameter is exceeded, the alarm changes from automatic to *manual reset*.

Alarms are counted every ***AL00***/32 (minutes) = sample time.
AL00 and hence also ***AL00*****/32** is expressed in minutes.

Example: ***AL10*****-High pressure alarm circuit 1:** if the number of events per hour is set to ***AL10***, for the alarm to change from automatic to *manual reset*, the count must reach the number set in ***AL10*****.**

Example *AL10*=3



			Event =Nr. Events
A: *Automatic reset*	Sampling: sampling	***AL00***/32 sampling time	**1**
M: *Manual reset*	Time: time		**2**
	Alarm: alarm		**3 (=*AL10*)**

NOTE:

- if, during the sample time ***AL10***/32 several alarm events of the same type occur (e.g. **High pressure alarm circuit 1)** only 1 event is counted
- if the alarm conditions is active for several sample times, only 1 event is counted.
- if the alarm event is active for a period greater than ***AL00*** **the counter resets to zero**

Digital alarms

24.1.1 Digital alarms

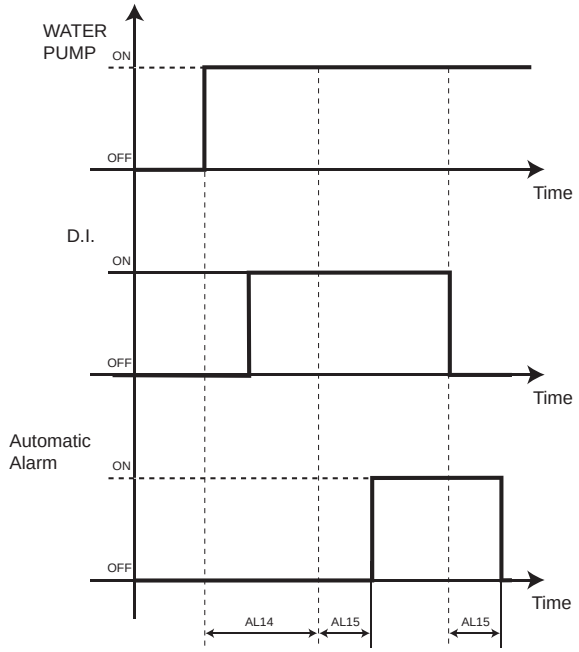
Alarm code	Name of alarm	Bypass activation event	Bypass time	Automatic alarm activation time	Manual alarm activation time	Exit alarm deactivation time	Number of interventions per sample time
Er01	High pressure alarm circuit 1	None	not present	not present	not present	not present	***AL10***
Er02	High pressure alarm circuit 2	None	not present	not present	not present	not present	***AL10***
Er05	Low pressure alarm circuit 1	Circuit compressor activated or reversal of 4-way valve **(NOTE 1)**	***AL11***	not present	not present	not present	***AL12***
Er06	Low pressure alarm circuit 2	Circuit compressor activated or reversal of 4-way valve **(NOTE 1)**	***AL11***	not present	not present	not present	***AL12***
Er20 (NOTE 2)	Internal circuit flow meter alarm	Internal circuit pump activation (One of the two pumps)	***AL14***	***AL15***	***AL16***	***AL15***	not present
Er25 (NOTE 3)	External *flow switch alarm*	External circuit pump activation	***AL17***	***AL18***	***AL19***	***AL18***	not present
Er10	Compressor 1 thermal switch	Compressor 1 switched on	***AL20***	not present	not present	not present	***AL21***
Er11	Compressor 2 thermal switch	Compressor 2 switched on	***AL20***	not present	not present	not present	***AL21***
Er12	Compressor 3 thermal switch	Compressor 3 switched on	***AL20***	not present	not present	not present	***AL21***
Er13	Compressor 4 thermal switch	Compressor 4 switched on	***AL20***	not present	not present	not present	***AL21***
Er15 (NOTE 2)	Compressor 1 oil pressure switch	Compressor 1 switched on	***AL22***	Not present	not present	Not present	***AL23***
Er16 (NOTE 2)	Compressor 2 oil pressure switch	Compressor 2 switched on	***AL22***	Not present	not present	Not present	***AL23***
Er17 (NOTE 2)	Compressor 3 oil pressure switch	Compressor 3 switched on	***AL22***	Not present	not present	Not present	***AL23***
Er18 (NOTE 2)	Compressor 4 oil pressure switch	Compressor 4 switched on	***AL22***	Not present	not present	Not present	***AL23***
Er40	Internal exchanger fan thermal switch	None	Not present	Not present	not present	Not present	***AL24***
Er41	External exchanger fan thermal switch circuit 1	None	Not present	Not present	not present	Not present	***AL25***
Er42	External exchanger fan thermal switch circuit 2	None	Not present	Not present	not present	Not present	***AL25***
Er21	Internal circuit pump 1 thermal switch	None	Not present	Not present	not present	Not present	***AL26***
Er22	Internal circuit pump 2 thermal switch	None	Not present	Not present	not present	Not present	***AL26***
Er26	External circuit pump thermal switch	None	Not present	Not present	not present	Not present	***AL27***
Er50	Internal exchanger electric heater thermal switch	None	Not present	Not present	not present	Not present	not present
Er51	Internal exchanger electric heaters 2 thermal switch	None	Not present	Not present	not present	Not present	not present
Er56	Auxiliary output alarm	None	Not present	Not present	not present	Not present	not present

(NOTE 1) The bypass is activated by the reversal of the 4-way valve only if at least one compressor is on
(NOTE 2) The alarm is active only if the associated resource (e.g. a given compressor or pump) is active
(NOTE 3) The alarm is active only if the associated resource (e.g. a given compressor or pump) is active and in heating mode only

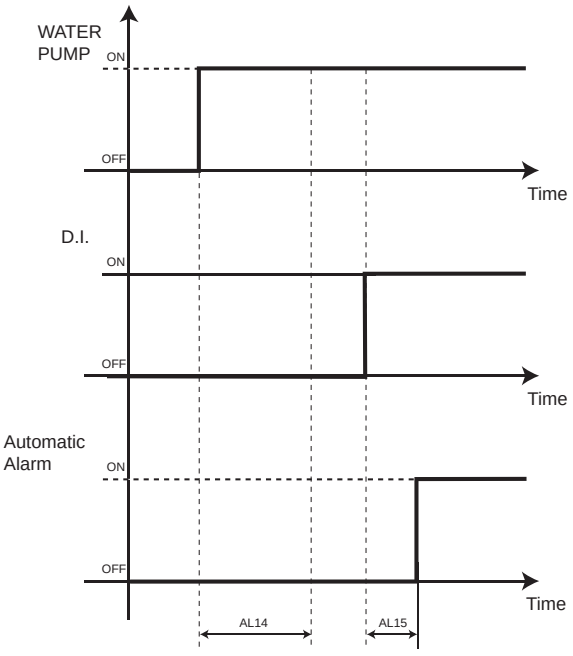
24.1.1.1 Flow switch alarm

Management of digital *flow switch alarms* Er20 & Er25 differs from that of other *digital alarms*: alarm events are not considered, only the activation time of the digital input is taken into account. See the following examples
NOTE: The external circuit *flow switch alarm* is not active in Cool.

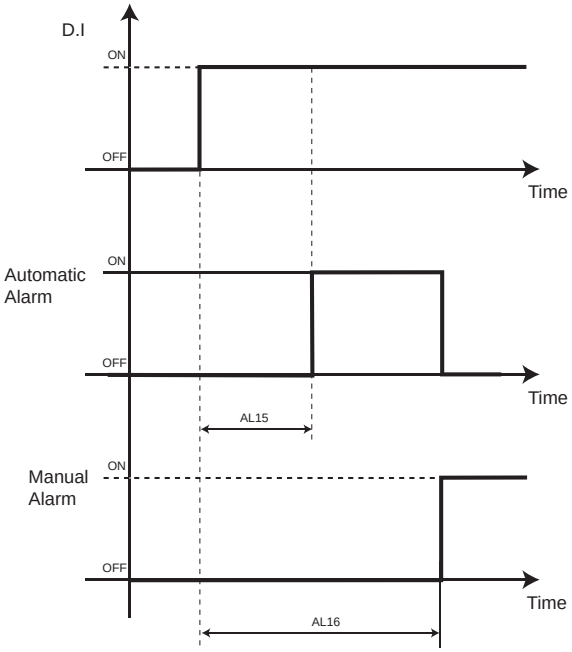
Example of external circuit pump *automatic reset flow switch alarm*
Alarm generated with activation of digital input D.I. during bypass;
count ***AL15*** **- Enable flow switch time for primary circuit automatic alarm**
starts only when ***AL14*** **- Flow switch bypass time after primary circuit water pump enabled** is decremented to 0.



Example 2 of external circuit pump *automatic reset flow switch alarm*
Alarm generated with start of next alarm event after the bypass has elapsed



Example of external circuit pump *manual reset flow switch alarm*
***AL15* - Enable flow switch time for primary circuit automatic alarm**
***AL16* - Enable flow switch time for primary circuit manual alarm**



24.1.2 Analogue alarms

NOTES

(NOTE 1) if N° interventions per hour = 1, the alarm is always of the *manual reset* type.
(NOTE 2) Alarm bypass is active in heating mode only.

Alarm code	Name of alarm	Bypass activation event	Bypass time	SET activation	Hysteresis	Automatic alarm time (NOTE 1)	*No. interventions*	Control sensor
Er03	High pressure (analogue) circuit 1	None	None	***AL40***	***AL41***	Not present	***AL42***	High pressure probe circuit 1
Er04	High pressure (analogue) circuit 2	None	None	***AL40***	***AL41***	Not present	***AL42***	High pressure probe circuit 2
Er07	Low pressure (analogue) circuit 1	A circuit 1 compressor switched on or reversal of the 4-way valve	***AL43***	***Al44***	***AL45***	Not present	***AL46***	Low pressure probe circuit 1
Er08	Low pressure (analogue) circuit 2	A circuit 2 compressor Switched on or reversal of the 4-way valve	***AL43***	***Al44***	***AL45***	Not present	***AL46***	Low pressure probe circuit 2
Er30	Internal circuit antifreeze	On/Off (local or remote), input in heat mode *(NOTE 2)*	***AL50***	***AL51***	***AL52***	Not present	**A53**	Internal exchanger water/air outlet temperature
Er31	External circuit antifreeze	On/Off (local or remote), input in heat mode *(NOTE 2)*	***AL54***	***AL55***	***AL56***	Not present	**A57**	External exchanger outlet water temperature
Er35	High temperature	None	None	***AL47***	***AL48***	***AL49***	*Automatic reset*	Internal exchanger water/air outlet temperature

24.1.3 Table of Alarms

- The alarm signal consists of a code, the format being "Er**nn**" (nn is a 2-figure number identifying the type of alarm, e.g. Er00, Er25, Er39….).
- When more than one alarm occurs at the same time, the one with the lowest number will be shown first; e.g. simultaneous *alarms* Er00 and Er01. Er00 will be shown alternating between the *display* and the main screen
- If the measurement on the main *display* is incorrect, in the event of an alarm, the alarm code will alternate with "----".

All possible *alarms* are listed in the table below with their respective codes and the relative utilities blocked:

Alarm table key

column		
Alarm code	**NOTE: codes are listed in increasing order (Er00, Er01) and some numbers are "skipped" (Er06 does not exist)**	
Name of alarm		
notes	**CMP 1/2**	Compressor 1/power step 2
	PUMP 1/2	Pump 1/2
alarm	**D**	digital
	A	analogue
		See *digital alarms* table
Reset	**AUTO**	automatic
UTILITY	**OFF COMP1**	OFF compressor 1
	OFF COMP2	OFF compressor 2
	OFF COMP3	OFF compressor 3
	OFF COMP4	OFF compressor 4
	OFF (1)	When used for temperature control
	OFF (2)	When used for temperature control and/or antifreeze
	OFF RES1	OFF heater 1
	OFF RES2	OFF heater 2

Table of Alarms

Table of Alarms

Alarm code	Name of alarm	Notes	Digital/Analogue	Alarm type	SANITARY WATER VALVE	SANITARY WATER HEATER	COMPRESSORS	EXTERNAL EXCHANGER FAN	RECIRCULATION FAN	INTERNAL CIRCUIT PUMP	EXTERNAL CIRCUIT PUMP	INTERNAL EXCHANGER HEATERS	EXTERNAL EXCHANGER HEATERS	OUTPUT AUXILIARY	BOILER
Er00	General alarm		**D**	AUTO	OFF0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Er01	High pressure (digital) circuit 1		**D**	Events			OFF (1)								
Er02	High pressure (digital) circuit 2		**D**	Events			OFF (1)								
Er03	High pressure (analogue) circuit 1		**A**	Events			OFF (1)								

Alarm code	Name of alarm	Notes	Digital/Analogue	Alarm type	SANITARY WATER VALVE	SANITARY WATER HEATER	COMPRESSORS	EXTERNAL EXCHANGER FAN	RECIRCULATION FAN	INTERNAL CIRCUIT PUMP	EXTERNAL CIRCUIT PUMP	INTERNAL EXCHANGER HEATERS	EXTERNAL EXCHANGER HEATERS	OUTPUT AUXILIARY	BOILER
Er04	High pressure (analogue) circuit 2		**A**	Events			OFF (1)								
Er05	Low pressure (digital)		**D**	Events			OFF (1)	OFF (2)	OFF						
Er07	Low pressure (analogue) circuit 1		**A**	Events			OFF (1)	OFF (2)	OFF						
Er08	Low pressure (analogue) circuit 2		**A**	Events			OFF (1)	OFF (2)	OFF						
Er09	No refrigerant		**A**	Events			OFF	OFF (2)	OFF						
Er10	Compressor 1 thermal switch	CMP 1	**D**	Events			OFF COMP1								
Er11	Compressor 2 thermal switch	CMP 2	**D**	Events			OFF COMP2								
Er12	Compressor 3 thermal switch	CMP 3	**D**	Events			OFF COMP3								
Er13	Compressor 4 thermal switch	CMP 4	**D**	Events			OFF COMP4								
Er15	Compressor 1 oil pressure switch	CMP 1	**D**	Events			OFF COMP1								
Er16	Compressor 2 oil pressure switch	CMP 2	**D**	Events			OFF COMP2								
Er17	Compressor 3 oil pressure switch	CMP 3	**D**	Events			OFF COMP3								
Er18	Compressor 4 oil pressure switch	CMP 4	**D**	Events			OFF COMP4								
Er20	Primary circuit flow switch		**D**	Time	OFF for *manual reset* alarm		OFF	OFF		OFF for *manual reset* alarm		OFF			OFF
Er21	Internal circuit pump 1 thermal switch	Pump 1	**D**	Events			OFF (3)	OFF (3)		OFF Pump 1		OFF (3)			OFF (3)
Er22	Internal circuit pump 2 thermal switch	Pump 2	**D**	Events			OFF (3)	OFF (3)		OFF Pump 2		OFF (3)			OFF (3)
Er25	External circuit flow switch		**D**	Time			OFF	OFF for *manual reset* alarm			OFF for *manual reset* alarm		OFF		
Er26	External circuit pump thermal switch		**D**	Events			OFF				OFF		OFF		
Er30	Internal circuit antifreeze		**A**	AUTO			OFF	OFF							
Er31	External circuit antifreeze		**A**	AUTO			OFF	OFF							
Er35	High temperature		**A**	AUTO			OFF								

Alarm code	Name of alarm	Notes	Digital/Analogue	Alarm type	SANITARY WATER VALVE	SANITARY WATER HEATER	COMPRESSORS	EXTERNAL EXCHANGER FAN	RECIRCULATION FAN	INTERNAL CIRCUIT PUMP	EXTERNAL CIRCUIT PUMP	INTERNAL EXCHANGER HEATERS	EXTERNAL EXCHANGER HEATERS	OUTPUT AUXILIARY	BOILER
Er40	Internal exchanger fan thermal switch		**D**	Events			OFF		OFF			OFF			
Er41	External exchanger fan thermal switch circuit 1		**D**	Events			OFF (2)	OFF (1)					OFF (2)		
Er42	External exchanger fan thermal switch circuit 2		**D**	Events			OFF (2)	OFF (1)					OFF (2)		
Er45	Error clock faulty			AUTO											
Er46	Error set clock			AUTO											
Er47	LAN communication error			AUTO											
Er48	Anti-Legionnaire			AUTO											
Er50	Internal exchanger electric heater 1 thermal switch		**D**	AUTO								OFF RES.1			
Er51	Internal exchanger electric heater 2 thermal switch		**D**	AUTO								OFF RES.1			
Er56	Auxiliary output thermal switch		**D**	AUTO										OFF	
Er60	Internal exchanger water/air inlet temperature probe faulty			AUTO	See probe error table										
Er61	Internal exchanger water/air outlet temperature probe faulty, or Circuit 1 internal exchanger water outlet temperature probe faulty, or Circuit 2 internal exchanger water outlet temperature probe faulty			AUTO	See probe error table										
Er62	Circuit 1 external exchanger temperature probe faulty, or Circuit 2 external exchanger temperature probe faulty			AUTO	See probe error table										
Er63	External exchanger inlet water temperature probe faulty			AUTO	See probe error table										
Er64	External exchanger outlet water temperature probe faulty			AUTO	See probe error table										
Er66	Sanitary water temperature probe faulty			AUTO	See *Probe Errors Table*										
Er67	*Display* probe (temperature / pressure) faulty			AUTO	See probe error table										
Er68	External temperature probe faulty			AUTO											

Alarm code	Name of alarm	Notes	Digital/Analogue	Alarm type	SANITARY WATER VALVE	SANITARY WATER HEATER	COMPRESSORS	EXTERNAL EXCHANGER FAN	RECIRCULATION FAN	INTERNAL CIRCUIT PUMP	EXTERNAL CIRCUIT PUMP	INTERNAL EXCHANGER HEATERS	EXTERNAL EXCHANGER HEATERS	OUTPUT AUXILIARY	BOILER
Er69	High pressure input circuit 1 faulty, or High pressure input circuit 2 faulty			AUTO	See probe error table										
Er70	Low pressure input circuit 1 faulty, or Low pressure input circuit 2 faulty			AUTO											
Er73	Dynamic setpoint input faulty			AUTO											
Er74	Internal exchanger pressure circuit 1 faulty, or Internal exchanger pressure circuit 2 faulty			AUTO	See probe error table										
Er75	External exchanger pressure circuit 1 faulty, or External exchanger pressure circuit 2 faulty			AUTO	See probe error table										
Er80	Configuration error			AUTO	OFF	OFF									
Er81	Compressor exceeded running hours message	CMP		Manual											
Er85	Primary circuit pump operating hours exceeded signal	PUMP		Manual											
Er86	External circuit pump operating hours exceeded signal	PUMP		Manual											
Er90	Alarm history records exceeded message			Manual											

(1) the resources of the associated circuit are switched off
(2) the resources of the associated circuit are switched off if separate condensation, all resources if single condensation. In digital and analogue low pressure *alarms*, the external exchanger fans are switched off only if the alarm is of the *manual reset* type.
(3) if the device is configured for two internal water pumps, the resources are witched off only if both thermal switch *alarms* (pump 1 and pump 2) are active

Probe errors table *Probe errors table*

Temperature probe error	Use	Lock machine	Notes
Internal exchanger water/air inlet temperature	Cool / Heat *temperature controller*s (proportional and differential)	YES	
	Change over	YES	
	Recirculation fan	NO	The fan switches ON/OFF depending on the compressor state
	Internal circuit water pump, antifreeze or Internal circuit heater, antifreeze	YES	
	Antifreeze with heat pump	YES	
	Block heat pump	YES	
	Power limitation	NO	
	Low refrigerant alarm	NO	The alarm is disabled
Internal exchanger water/air outlet temperature		YES	
Circuit 1 internal exchanger water outlet temperature probe		YES	
Circuit 2 internal exchanger water outlet temperature probe		YES	
External exchanger temperature circuit 1 or External exchanger temperature circuit 2	Cool / Heat *temperature controller*s (proportional and differential)	YES	
	External exchanger fans	NO	
	Antifreeze with external circuit heater	YES	
	Auxiliary output	NO	
	Defrost, input and output	NO	
	Block heat pump function or power limitation	YES	
External exchanger inlet water temperature	Cool / Heat *temperature controller*s (proportional and differential)	YES	
	Antifreeze with external circuit heater	YES	
	Auxiliary output	NO	
	Block heat pump	YES	
	Power limitation	NO	
External exchanger outlet water temperature		YES	
External temperature	Cool / Heat *temperature controller*s (differential)	YES	
	Change over	NO	
	Dynamic setpoint	NO	
	Internal circuit water pump, antifreeze	YES	
	Internal integrated heater, differential	NO	
	Auxiliary output	NO	
	External antifreeze heater	YES	
	Boiler, differential	NO	
	Block heat pump	YES	
	Power limitation	NO	
	Defrost, compensation	NO	
Dynamic setpoint input	Dynamic setpoint	NO	

Temperature probe error	Use	Lock machine	Notes
Temperature *display*	*Display*	NO	
Sanitary water temperature	Sanitary water	NO	
Pressure probe error	**Use**	**Lock machine**	**Notes**
High pressure input circuit 1 or High pressure input circuit 2	External exchanger fans	YES	
	Defrost, input and output		
	Power limitation		
Low pressure input circuit 1 or Low pressure input circuit 2	External exchanger fans	YES	
	Defrost, input and output		
	Power limitation		
Dynamic setpoint input	Dynamic setpoint	NO	
Internal exchanger pressure circuit 1, or Internal exchanger pressure circuit 2	External exchanger fans	YES	
External exchanger pressure circuit 1, or External exchanger pressure circuit 2	External exchanger fans	YES	
	Defrost, input and output		
Pressure *display*	*Display*	NO	

25 PARAMETERS (PAR)

The Energy SBW600 is fully configurable via parameter settings;

They can be modified with:
- The *Multi Function key* (MFK)
- *Keys* on the SBW600 front panel / SKW22(L) remote panel
- PC and *DeviceManager* software

The following sections analyse each parameter, divided into categories (folders), in detail.

Each *folder* is designated with a 2 character *label* (example: CF, UI, etc).

	Folder label	**Acronym meaning (*label*)**	**Parameters of:**
	CL	**C**onfiguration **L**ocal	Local I/O configuration
	Cr	**C**onfiguration **R**emote terminal	Remote terminal I/O configuration
	CF	**C**on**F**iguration	Configuration
	Ui	**U**ser **i**nterface	User interface
	tr	**t**hermoregulation	Heat regulation
	St	**St**atuses (*Operating modes*)	*Operating states*
	CP	**C**om**P**ressors	Compressor
Pump	**PI**	**P**ump (**I**nternal)	Internal circuit water pump
Fan	**FI**	**F**an (**I**nternal)	Recirculation fans (internal)
	FE	**F**an (**E**xternal)	External exchanger fans (external)
Pump	**PE**	**P**ump (**E**xternal)	External exchanger pump
Electric heaters	**HI**	Electric **H**eaters (**I**nternal)	Internal exchanger electric heaters
	HE	Electric **H**eaters (**E**xternal)	External exchanger electric heaters
	HA	**A**uxiliary Output	Auxiliary output
	br	**b**oile**r**	Boiler
	dF	***deF**rost*	*Defrost*
	dS	**d**ynamic **S**etpoint	Dynamic setpoint
	Ad	**Ad**aptive	Adaptive (*adaptive function*)
	AF	**A**nti**F**reeze	Antifreeze
	AS		Sanitary Water *Anti-Legionnaire's Disease*
	HP	Heat Pump	Block heat pump
	PL	**P**ower **L**imitation	Power limitation
	tE	**T**ime **E**vents	Time Band
	AL	**AL**arm	*Alarms*

Visibility and value of Parameters
The Energy SBW600 is a family of controllers.
There are 4+1 hardware *models* (see Appendix, *Models* section) with varying numbers of inputs and outputs.
The 4+1 hardware *models* are divided into 3 *DeviceManager models* (version with 1 or 2 *TRIAC* and version with 5 relays).
Depending on the model, some configuration parameters may not (usually) be visible or significant given that the associated resource is not present.
See the table below:

			TCL1 **TCE1**	**TCL2** **TCE2**	**DOL6** **DOE6**
	Device Manager	**hardware**			
model	**636**	**636**	***CL73-CL76-CL79*** ***CE73-CE76-CE79***	***CL75-CL78-CL81*** **(AOL2)** ***CE75-CE78-CE81*** **(AOE2)**	
	646	**646/C** **646/C/S**	***CL73-CL76-CL79*** ***CE73-CE76-CE79***		//
	655	**655/C** **655/C/S**	//	//	***CL95*** ***CE95***

When not indicated otherwise, the parameter is always visible and modifiable, unless customised settings have been configured via *serial*

NB: parameters and *folder* visibility can both be controlled (See *Folder* table).
If *folder* visibility is modified, the new setting will apply to all parameters in the *folder*.

25.1.1 Local I/O configuration parameters (CL) - Configuration Local

CL00 **AiL1 analogue input type**
Configures the analogue input AiL1 - see table

0	Probe not configured
1	DI
2	NTC

CL01 **AiL2 analogue input type**
Configures the analogue input AiL2 - as for *CL00*

CL02 **AiL3 analogue input type**
Configures the analogue input AiL3 - see table

0	Probe not configured	**3**	4..20mA
1	DI	**4**	0-10V
2	NTC	**5**	0-5V
		6	0-1V

CL03 **AiL4 analogue input type**
Configures the analogue input AiL4 - as for *CL02*

CL04 **AiL5 analogue input type**
Configures the analogue input AiL5 - as for *CL00*

CL10 **AiL3 analogue input fullscale value**
Configures the full scale value with analogue input AiL3

CL11 **AiL3 analogue input start of scale value**
Configures the start of scale value with analogue input AiL3

CL12 **AiL4 analogue input fullscale value**
Configures the full scale value with analogue input AiL4

CL13 **AiL4 analogue input start of scale value**
Configure the start of scale value with analogue input AiL4

CL20 **AiL1 analogue input differential**
Configures the differential in analogue input AiL1
M.U. : °C

CL21 **AiL2 analogue input differential**
Configures the differential in analogue input AiL2
M.U. : °C

CL22 **AiL3 analogue input differential**
Configures the differential in analogue input AiL3
M.U. : °C / bar

CL23 **AiL4 analogue input differential**
Configures the differential in analogue input AiL4
M.U. : °C / bar

CL24 **AiL5 analogue input differential**
Configures the differential in analogue input AiL5
U.M. : °C

CL30 **Configuration of analogue input AiL1**
Configures the analogue input AiL1 - see table

0	input disabled
1	Air/water inlet temperature internal exchanger
2	Water/air outlet temperature internal exchanger
3	Outlet water temperature internal exchanger circuit 1
4	Outlet water temperature internal exchanger circuit 2
5	External exchanger temperature circuit 1
6	External exchanger temperature circuit 2
7	Inlet water temperature recovery (or external) exchanger
8	Outlet water temperature recovery (or external) exchanger
9	External temperature
10	NOT USED
11	Sanitary water temperature
12	NOT USED
13	NOT USED
14	NOT USED
15	NOT USED
16	Temperature *display*

CL31 **Configuration of analogue input AiL2**
Configures the analogue input AiL2 - as for *CL30*

CL32 **Configuration of analogue input AiL3**
Configures the analogue input AiL3 - see table

0	input disabled	16	Temperature *display*
1	Air/water inlet temperature internal exchanger	17	NOT USED
2	Water/air outlet temperature internal exchanger	18	NOT USED
3	Outlet water temperature internal exchanger circuit 1	19	NOT USED
4	Outlet water temperature internal exchanger circuit 2	20	NOT USED
5	External exchanger temperature circuit 1	21	High pressure input circuit 1
6	External exchanger temperature circuit 2	22	High pressure input circuit 2
7	Inlet water temperature recovery (or external) exchanger	23	Low pressure input circuit 1
8	Outlet water temperature recovery (or external) exchanger	24	Low pressure input circuit 2
9	External temperature	25	Dynamic setpoint input
10	NOT USED	26	Internal exchanger pressure circuit 1
11	Sanitary water temperature	27	Internal exchanger pressure circuit 2
12	NOT USED	28	External exchanger pressure circuit 1
13	NOT USED	29	External exchanger pressure circuit 2
14	NOT USED	30	Pressure *display*
15	NOT USED		

CL33 **Configuration of analogue input AiL4** - as for *CL32*
CL34 **Configuration of analogue input AiL5** - as for *CL32*

CL40 **Configuration of digital input DI1**
Configures the digital input DI1 - see table

0	Input disabled	±31	High pressure switch C2
±1	Remote STD-BY	±32	Low pressure switch C1
±2	Remote OFF	±33	Low pressure switch C2
±3	Remote Summer/Winter	±34	Compressor 1 oil pressure switch
±4	Power step 1 request	±35	Compressor 2 oil pressure switch
±5	Power step 2 request	±36	Compressor 3 oil pressure switch
±6	Power step 3 request	±37	Compressor 4 oil pressure switch
±7	Power step 4 request	±38	NOT USED
±8	Heat power step 1 request digital input	±39	External exchanger fan thermal switch C1
±9	Heat power step 2 request digital input	±40	External exchanger fan thermal switch C2
±10	Heat power step 3 request digital input	±41	Internal exchanger fan thermal switch
±11	Heat power step 4 request digital input	±42	External Free-Cooling fan thermal switch
±12	Cool power step 1 request digital input	±43	Compressor 1 thermal switch
±13	Cool power step 2 request digital input	±44	Compressor 2 thermal switch
±14	Cool power step 3 request digital input	±45	Compressor 3 thermal switch
±15	Cool power step 4 request digital input	±46	Compressor 4 thermal switch
±16	Block compressor 1	±47	Internal circuit pump 1 thermal switch
±17	Block compressor 2	±48	Internal circuit pump 2 thermal switch
±18	Block compressor 3	±49	External circuit pump thermal switch
±19	Block compressor 4	±50	Internal exchanger electric heater 1 thermal switch
±20	Block heat pump	±51	Internal exchanger electric heater 2 thermal switch
±21	Power limited to 50%	±52	Auxiliary output alarm
±22	Economy input	±53	NOT USED
±23	NOT USED	±54	NOT USED
±24	General alarm	±55	Primary circuit flow switch
±25	End of *defrost* C1	±56	External (recovery) circuit flow switch
±26	End of *defrost* C2	±57	NOT USED
±27	NOT USED	±58	*Display*
±28	Remote AS		
±29	NOT USED		
±30	High pressure switch C1		

CL41 **Configuration of digital input DI2**
Configures the digital input DI2 - as for *CL40*

CL42 **Configuration of digital input DI3**
Configures the digital input DI3 - as for *CL40*

CL43 **Configuration of digital input DI4**
Configures the digital input DI4 - as for *CL40*

CL44 **Configuration of digital input DI5**
Configures the digital input DI5 - as for *CL40*

CL45 **Configuration of digital input DI6**
Configures the digital input DI6 - as for *CL40*

CL50 **Configuration of analogue input AiL1 when configured as digital input**
Configures analogue input AiL1 when configured as digital input - as for *CL40*
NOTE: Set to 0 if AiL1 is NOT configured as a DI

CL51 **Configuration of analogue input AiL2 when configured as digital input**
Configures analogue input AiL2 when configured as digital input - as for *CL40*
NOTE: Set to 0 if AiL2 is NOT configured as a DI

CL52 **Configuration of analogue input AiL3 when configured as digital input**
Configures analogue input AiL3 when configured as digital input - as for *CL40*
NOTE: Set to 0 if AiL3 is NOT configured as a DI

CL53 **Configuration of analogue input AiL4 when configured as digital input**
Configures analogue input AiL4 when configured as digital input - as for *CL40*
NOTE: Set to 0 if AiL5 is NOT configured as a DI

CL54 **Configuration of analogue input AiL5 when configured as digital input**
Configures analogue input AiL5 when configured as digital input - as for *CL40*
NOTE: Set to 0 if AiL5 is NOT configured as a DI

CL60 **Type of analogue output AO5**
- 0 = 4-20mA
- 1 = 0-20mA

CL61 **Configuration of analogue output AO3**
Configures analogue output AO3 - see table

CL62 **Configuration of analogue output AO4**
Configures analogue output AO3 - as for *CL61* - see table

CL63 **Configuration of analogue output AO5**
Configures analogue output AO3 - as for *CL61* - see table

Outputs: Configuration table

Value	Description	Type
0	Output disabled	Digital
±1	Compressor 1	Digital
±2	Compressor 2	Digital
±3	Compressor 3	Digital
±4	Compressor 4	Digital
±5	Reversal valve circuit 1	Digital
±6	Reversal valve circuit 2	Digital
±7	NOT USED	Digital
±8	NOT USED	Digital
±9	Sanitary water valve	Digital
±10	NOT USED	Digital
±11	NOT USED	Digital
±12	NOT USED	Digital
±13	NOT USED	Digital
±14	Internal circuit water pump 1	Digital
±15	Internal circuit water pump 2	Digital
±16	External circuit water pump	Digital
±17	NOT USED	Digital
±18	Recirculation fan	Digital
±19	Fan External exchanger circuit 1	Digital
±20	Fan External exchanger circuit 2	Digital
±21	NOT USED	Digital
±22	NOT USED	Digital
±23	Electrical heating element 1 internal exchanger	Digital
±24	Electrical heating element 2 internal exchanger	Digital
±25	Electrical heating element External exchanger 1	Digital
±26	Electrical heating element External exchanger 2	Digital
±27	Auxiliary output	Digital
±28	Sanitary Water Electric Heater	Digital
±29	NOT USED	Digital
±30	Boiler	Digital
±31	Alarm	Digital

Value	Description	Type
±32	NOT USED	Digital
±33	NOT USED	Digital
±34	NOT USED	Digital
±35	NOT USED	Digital
±36	NOT USED	Digital
±37	NOT USED	Digital
±38	NOT USED	Digital
±39	NOT USED	Digital
±40	NOT USED	Digital
±41	NOT USED	Digital
±42	NOT USED	Digital
±43	NOT USED	Digital
±44	NOT USED	Digital
±45	NOT USED	Digital
±46	NOT USED	Digital
±47	NOT USED	Digital
±48	NOT USED	Digital
±49	NOT USED	Digital
±50	NOT USED	Digital
±51	NOT USED	Digital
±52	NOT USED	Digital
±53	NOT USED	Digital
±54	NOT USED	Digital
±55	NOT USED	Digital
±56	Fan External exchanger circuit 1	Analogue
±57	Fan External exchanger circuit 2	Analogue
±58	NOT USED	//
±59	Internal circuit modulating water pump 1	Analogue
±60	Internal circuit modulating water pump 2	Analogue
±61	NOT USED	Analogue
±62	Analogue stage 1 for compressor	Analogue
±63	Analogue stage 2 for Compressor	Analogue

For the visibility of parameters *CL71* - *CL81* see the table at the head of this chapter

CL71 **Enabling analogue output AO1**
Enables analogue output AO1
- 0 = Output configured as digital - see *CL96*
- 1 = Output configured as *triac* - see *CL74* - *CL77* - *CL80*

CL72 **Enabling analogue output AO2**
Enables analogue output AO2
- 0 = Output configured as digital - see *CL97*
- 1 = Output configured as *triac* - see *CL75* - *CL78* - *CL81*

CL73 **Phase shift analogue output TC1**
Enables phase shift of analogue output TC1

CL74 **Phase shift analogue output AO1**
Enables phase shift of analogue output AO1

CL75 **Phase shift analogue output AO2**
Enables phase shift of analogue output AO2

CL76 **Analogue output TC1 pulse length**
Configures analogue output pulse

CL77 **Analogue output AO1 pulse length**
Configures analogue output AO1 pulse

CL78 **Analogue output AO2 pulse length**
Configures analogue output AO2 pulse

CL79 **Configuration of analogue output TC1**
Configures analogue output TC1 - as for *CL63*

CL80 **Configuration of analogue output AO1**
Configures analogue output AO1 - as for *CL63*

CL81 **Configuration of analogue output AO2**
Configures analogue output AO2 - as for *CL63*

CL90 **Configuration of digital output DO1**
Configures digital output DO1 - see table

CL91 **Configuration of digital output DO2**
Configures digital output DO2 - as for *CL90* - see **Outputs: Configuration table**

CL92 **Configuration of digital output DO3**
Configures digital output DO3 - as for *CL90* - see **Outputs: Configuration table**

CL93 **Configuration of digital output DO4**
Configures digital output DO4 - as for *CL90* - see **Outputs: Configuration table**

CL94 **Configuration of digital output DO5 (Open collector)**
Configures digital output DO5 - as for *CL90* - see **Outputs: Configuration table**

CL95 **Configuration of digital output DO6 - visible in *models* SBW655/C/S only**
Configures digital output DO6 - as for *CL90* - see **Outputs: Configuration table**

CL96 **Configures digital output AO1 - as for *CL90* - see Outputs: Configuration table**

CL97 **Configures digital output AO2 - as for *CL90* - see Outputs: Configuration table**

25.1.2 I/O configuration parameters expanded on expansion (CE) - Configuration Expansion

CE00 **AiE1 analogue input type**
Configures AiE1 analogue input - see table

0	Probe not configured
1	DI
2	NTC

CE01 **AiE2 analogue input type**
Configures AiE2 analogue input - Same as *CE00*

CE02 **AiE3 analogue input type**
Configures AiE3 analogue input - see table

0	Probe not configured	**3**	4..20mA
1	DI	**4**	0-10V
2	NTC	**5**	0-5V
		6	0-1V

CE03 **AiE4 analogue input type**
Configures AiE4 analogue input - Same as *CE02*

CE04 **AiE5 analogue input type**
Configures AiE5 analogue input - Same as *CE00*

CE10 **AiE3 analogue input fullscale value**
Configures the full scale value with AiE3 analogue input

CE11 **AiE3 analogue input start of scale value**
Configures the start of scale value with AiE3 analogue input

CE12 **AiE4 analogue input fullscale value**
Configures the full scale value with AiE4 analogue input

CE13 **AiE4 analogue input start of scale value**
Configures the start of scale value with AiE4 analogue input

CE20 **AiE1 analogue input differential**
Configures the differential in AiE1 analogue input
M.U. : °C

CE21 **AiE2 analogue input differential**
Configures the differential in AiE2 analogue input

M.U. : °C

CE22 **AiE3 analogue input differential**
Configures the differential in AiE3 analogue input
M.U. : °C/bar

CE23 **AiE4 analogue input differential**
Configures the differential in AiE4 analogue input
M.U. : °C/bar

CE24 **AiE5 analogue input differential**
Configures the differential in AiE5 analogue input
M.U. : °C

CE30 **AiE1 analogue input configuration**
Configures AiE1 analogue input - see table

0	input disabled
1	Water/air inlet temperature internal exchanger
2	Water/air outlet temperature internal exchanger
3	Water outlet temperature internal exchanger circuit 1
4	Water outlet temperature internal exchanger circuit 2
5	External exchanger temperature circuit 1
6	External exchanger temperature circuit 2
7	Water inlet temperature recovery (or external) exchanger
8	Water outlet temperature recovery (or external) exchanger
9	External temperature
10	Water recovery temperature
11	Sanitary water temperature
12	NOT USED
13	NOT USED
14	NOT USED
15	NOT USED
16	Temperature *display*

CE31 **AiE2 analogue input configuration**
Configures AiE2 analogue input - Same as *CE30*

CE32 **AiE3 analogue input configuration**
Configures AiE3 analogue input - see table

0	input disabled	16	Temperature *display*
1	Water/air inlet temperature internal exchanger	17	NOT USED
2	Water/air outlet temperature internal exchanger	18	NOT USED
3	Water outlet temperature internal exchanger circuit 1	19	NOT USED
4	Water outlet temperature internal exchanger circuit 2	20	NOT USED
5	External exchanger temperature circuit 1	21	High pressure input circuit 1
6	External exchanger temperature circuit 2	22	High pressure input circuit 2
7	Water inlet temperature recovery (or external) exchanger	23	Low pressure input circuit 1
8	Water outlet temperature recovery (or external) exchanger	24	Low pressure input circuit 2
9	External temperature	25	Input for dynamic set point
10	NOT USED	26	Internal exchanger pressure circuit 1
11	Sanitary water temperature	27	Internal exchanger pressure circuit 2
12	NOT USED	28	External exchanger pressure circuit 1
13	NOT USED	29	External exchanger pressure circuit 2
14	NOT USED	30	Pressure *display*
15	NOT USED		

CE33 **AiE4 analogue input configuration** – Same as *CE32*
CE34 **AiE5 analogue input configuration** – Same as *CE32*

CE40 **DI1 digital input configuration**
Configures the DI1 digital input – see table

0	Input disabled	±31	High pressure pressure switch C2
±1	Remote STD-BY	±32	Low pressure pressure switch C1
±2	remote OFF	±33	Low pressure pressure switch C2
±3	Remote Summe*r/W*inter	±34	Compressor 1 oil pressure switch
±4	Power step 1 request	±35	Compressor 2 oil pressure switch
±5	Power step 2 request	±36	Compressor 3 oil pressure switch
±6	Power step 3 request	±37	Compressor 4 oil pressure switch
±7	Power step 4 request	±38	NOT USED
±8	Digital input heat step 1 request	±39	External exchanger fan thermal switch C1
±9	Digital input heat step 2 request	±40	External exchanger fan thermal switch C2
±10	Digital input heat step 3 request	±41	Internal exchanger fan thermoswitch
±11	Digital input heat step 4 request	±42	NOT USED
±12	Digital input cool step 1 request	±43	Compressor 1 thermoswitch
±13	Digital input cool step 2 request	±44	Compressor 2 thermoswitch
±14	Digital input cool step 3 request	±45	Compressor 3 thermal switch
±15	Digital input cool step 4 request	±46	Compressor 4 thermal switch
±16	Block compressor 1	±47	Internal circuit pump 1 thermal *protection*
±17	Block compressor 2	±48	Internal circuit pump 2 thermal *protection*
±18	Block compressor 3	±49	External circuit pump thermal *protection*
±19	Block compressor 4	±50	Internal exchanger electric heater 1 thermoswitch
±20	Heat pump lock	±51	Internal exchanger electric heater 2 thermoswitch
±21	Power limited to 50%	±52	Auxiliary output alarm
±22	Economy input	±53	NOT USED
±23	NOT USED	±54	NOT USED
±24	General alarm	±55	Primary circuit flow switch
±25	End of *defrost* C1	±56	External circuit flow switch (Recovery)
±26	End of *defrost* C2	±57	NOT USED
±27	NOT USED	±58	*Display*
±28	NOT USED		
±29	NOT USED		
±30	High pressure pressure switch C1		

CE41 **DI2 digital input configuration**
Configures DI2 digital input – Same as *CE40*

CE42 **DI3 digital input configuration**
Configures DI3 digital input – Same as *CE40*

CE43 **DI4 digital input configuration**
Configures DI4 digital input – Same as *CL40*

CL44 **DI5 digital input configuration**
Configures DI5 digital input – Same as *CL40*

CL45 **DI6 digital input configuration**
Configures DI6 digital input – Same as *CL40*

CE50 **AiE1 analogue input configuration when configured as digital input**
Configures AiE1 analogue input when configured as digital input – Same as *CE40*
NOTE: Set = 0 if AiE1 is NOT configured as DI

CE51 **AiE2 analogue input configuration when configured as digital input**
Configures AiE2 analogue input when configured as digital input - Same as *CE40*
NOTE: Set = 0 if AiE2 is NOT configured as DI

CE52 **AiE3 analogue input configuration when configured as digital input**
Configures AiE3 analogue input when configured as digital input - Same as *CE40*
NOTE: Set = 0 if AiE3 is NOT configured as DI

CE53 **AiE4 analogue input configuration when configured as digital input**
Configures AiE4 analogue input when configured as digital input - Same as *CE40*
NOTE: Set = 0 if AiE5 is NOT configured as DI

CE54 **AiE5 analogue input configuration when configured as digital input**
Configures AiE5 analogue input when configured as digital input - Same as *CE40*
NOTE: Set = 0 if AiE5 is NOT configured as DI

CE60 **AOE5 analogue output type**
- 0 = 4-20mA
- 1 = 0-20mA

CE61 **AOE3 analogue output configuration**
Configures AOE3 analogue output - see table

CE62 **AOE4 analogue output configuration**
Configures AOE3 analogue output - same as *CE61* - see table

CE63 **AOE5 analogue output configuration**
Configures AOE3 analogue output - same as *CL61* - see table

Outputs: configuration table

Value	Description	Type
0	Output disabled	Digital
±1	Compressor 1	Digital
±2	Compressor 2	Digital
±3	Compressor 3	Digital
±4	Compressor 4	Digital
±5	Reversal valve circuit 1	Digital
±6	Reversal valve circuit 2	Digital
±7	NOT USED	Digital
±8	NOT USED	Digital
±9	Sanitary water valve	Digital
±10	NOT USED	Digital
±11	NOT USED	Digital
±12	NOT USED	Digital
±13	NOT USED	Digital
±14	Internal circuit water pump 1	Digital
±15	Internal circuit water pump 2	Digital
±16	External circuit water pump	Digital
±17	NOT USED	Digital
±18	Recirculation fan	Digital
±19	Fan External exchanger circuit 1	Digital
±20	Fan External exchanger circuit 2	Digital
±21	NOT USED	Digital
±22	NOT USED	Digital
±23	Electrical heating element 1 internal exchanger	Digital
±24	Electrical heating element 2 internal exchanger	Digital
±25	Electrical heating element External exchanger 1	Digital
±26	Electrical heating element External exchanger 2	Digital
±27	Auxiliary output	Digital
±28	Sanitary Water Electric Heater	Digital
±29	NOT USED	Digital
±30	Boiler	Digital
±31	Alarm	Digital

Value	Description	Type
±32	NOT USED	Digital
±33	NOT USED	Digital
±34	NOT USED	Digital
±35	NOT USED	Digital
±36	NOT USED	Digital
±37	NOT USED	Digital
±38	NOT USED	Digital
±39	NOT USED	Digital
±40	NOT USED	Digital
±41	NOT USED	Digital
±42	NOT USED	Digital
±43	NOT USED	Digital
±44	NOT USED	Digital
±45	NOT USED	Digital
±46	NOT USED	Digital
±47	NOT USED	Digital
±48	NOT USED	Digital
±49	NOT USED	Digital
±50	NOT USED	Digital
±51	NOT USED	Digital
±52	NOT USED	Digital
±53	NOT USED	Digital
±54	NOT USED	Digital
±55	NOT USED	Digital
±56	Fan External exchanger circuit 1	Analogue
±57	Fan External exchanger circuit 2	Analogue
±58	NOT USED	//
±59	Internal circuit modulating water pump 1	Analogue
±60	Internal circuit modulating water pump 2	Analogue
±61	NOT USED	Analogue
±62	Analogue stage 1 for compressor	Analogue
±63	Analogue stage 2 for Compressor	Analogue

If multiple outputs are configured to run the same resource, the outputs will be activated in parallel.

For visibility of parameters CE70 – *CE81* See table at the beginning of this section

CE71 **Enable AOE1 analogue output**
Enables AO1 analogue output
- 0 = Output configured as digital – see *CE96*
- 1 = Output configured as *triac* – see *CE74* – *CE77* – *CE80*

CE72 **Enable AOE2 analogue output**
Enables AO2 analogue output
- 0 = Output configured as digital – see *CE97*
- 1 = Output configured as *triac* – see *CE75* – *CE78* – *CE81*

CE73 **Phase shift TCE1 analogue output**
Enables phase shift of TC1 analogue output

CE74 **Phase shift AOE1 analogue output**
Enables phase shift of AO1 analogue output

CE75 **Phase shift AOE2 analogue output**
Enables phase shift of AO2 analogue output

CE76 **TCE1 analogue output pulse length**
Configures analogue output pulse

CE77 **AOE1 analogue output pulse length**
Configures AO1 analogue output pulse

CE78 **AOE2 analogue output pulse length**
Configures AO2 analogue output pulse

CE79 **TCE1 analogue output configuration**
Configures TC1 analogue output - Same as *CE63*

CE80 **AOE1 analogue output configuration**
Configures AOE1 analogue output - Same as *CE63*

CE81 **AOE2 analogue output configuration**
Configures AOE2 analogue output - Same as *CE63*

CE90 **DOE1 digital output configuration**
Configures DOE1 digital output - see table

CE91 **DOE2 digital output configuration**
Configures DOE2 digital output - Same as *CE90* - see **Outputs: configuration table**

CE92 **DOE3 digital output configuration**
Configures DOE3 digital output - Same as *CE90* - see **Outputs: configuration table**

CE93 **DOE4 digital output configuration**
Configures DOE4 digital output - Same as *CE90* - see **Outputs: configuration table**

CE94 **DOE5 digital output configuration (Open Collector)**
Configures DO5 digital output - Same as *CE90* - see **Outputs: configuration table**

CE95 **DOE6 digital output configuration - Visible only in *models* SE655/C/S**
Configures DOE6 digital output - Same as *CE90* - see **Outputs: configuration table**

CE96 **AOE1 digital output configuration** – Same as *CE90* - see **Outputs: configuration table**

CE97 **AOE2 digital output configuration** – Same as *CE90* - see **Outputs: configuration table**

25.1.3 Remote I/O configuration parameters (Cr) - Configuration remote

Cr00 **Air1 analogue input type**
Configures remote terminal analogue input Air1 - see table

0	Probe not configured
1	//
2	NTC

Cr01 **Air2 analogue input type**
Configures remote terminal analogue input Air2 - see table

0	Probe not configured
1	DI
2	NTC
3	4..20mA

Cr10 **Air2 local analogue input fullscale value**
Configures the full scale value with local analogue input Air2

Cr11 **Air2 local analogue input start of scale value**
Configures the start of scale value with local analogue input Air2

Cr20 **Air1 local analogue input differential**
Configures the differential in local analogue input Air1
°C

Cr21 **Air2 local analogue input differential**
Configures the differential in local analogue input Air2
°C / bar

Cr30 **Air1 local analogue input configuration**
Configures local analogue input AiL1 - see table

0	input disabled	8	Outlet water temperature recovery (or external) exchanger
1	Air/water inlet temperature internal exchanger	9	External temperature
2	Water/air outlet temperature internal exchanger	10	NOT USED
3	Outlet water temperature internal exchanger circuit 1	11	Sanitary water temperature
4	Outlet water temperature internal exchanger circuit 2	12	NOT USED
5	External exchanger temperature circuit 1	13	NOT USED
6	External exchanger temperature circuit 2	14	NOT USED
7	Inlet water temperature recovery (or external) exchanger	15	NOT USED

Cr31 **Air2 local analogue input configuration**
Configures local analogue input Air2 - see table

0	input disabled	16	Temperature *display*
1	Air/water inlet temperature internal exchanger	17	NOT USED
2	Water/air outlet temperature internal exchanger	18	NOT USED
3	Outlet water temperature internal exchanger circuit 1	19	NOT USED
4	Outlet water temperature internal exchanger circuit 2	20	NOT USED
5	External exchanger temperature circuit 1	21	High pressure input circuit 1
6	External exchanger temperature circuit 2	22	High pressure input circuit 2
7	Inlet water temperature recovery (or external) exchanger	23	Low pressure input circuit 1
8	Outlet water temperature recovery (or external) exchanger	24	Low pressure input circuit 2
9	External temperature	25	Dynamic setpoint input
10	NOT USED	26	Internal exchanger pressure circuit 1
11	Sanitary water temperature	27	Internal exchanger pressure circuit 2
12	NOT USED	28	External exchanger pressure circuit 1
13	NOT USED	29	External exchanger pressure circuit 2
14	NOT USED	30	Pressure *display*
15	NOT USED		

Cr50 **Configuration of local analogue input Air2 when configured as digital input**
Configures local analogue input Air2 if configured as digital input - as for *CL40*
NOTE: Set to 0 if Air2 is NOT configured as a DI

25.1.4 Configuration parameters (CF) - Configuration

CF01 **Select COM1 (TTL) protocol**
Configures the selection of COM1 (TTL) communication channel protocol
- 0 = Eliwell
- 1 = Modbus

If *CF01*=0, the following parameters should be configured: *CF20*/*CF21*

CF20 **Eliwell protocol controller address**
Allows you to modify the Eliwell protocol controller address

CF21 **Eliwell protocol controller family**
Allows you to modify the Eliwell protocol controller family
CF21= index of device inside family (values run from 0 to 14)
CF22 = device family (values run from 0 to 14)
The pair of values *CF20* and *CF21* represent the device's network address and is indicated as "FF.DD" (where FF=*CF21* and DD=*CF20*).

If *CF01*=1, the following parameters should be configured: *CF30*/*CF31*/*CF32*

CF30 **Modbus protocol controller address**
Modifies the Modbus protocol controller address
Values from 1 to 255. NOTE: 0 (zero) is not included

CF31 **Modbus protocol Baudrate**
Modifies the Modbus protocol baud rate
- 0=1200 baud
- 1=2400 baud
- 2=4800 baud
- 3=9600 baud
- 4=19200 baud
- 5=38400 baud (maximum speed when using VarManager software)
- 6=58600 baud
- 7=115200 baud

CF32 **Modbus protocol parity**
Modbus parity
- 0= STX
- 1= EVEN
- 2= NONE
- 3= ODD

CF43 **firmware screen**
Indicates the revision number of the firmware screen. Read-only parameter.

CF44 **Firmware release**
Indicates the release number of the firmware screen. Read-only parameter.

CF60 **Client code 1**

CF61 **Client code 2**
Parameters for use by client/user only. The client can assign these parameters values that e.g. identify the type and/or model of the system, and its configuration etc. Values from 0 to 999

25.1.5 User interface parameters (UI) - User Interface

SBW600 utility led configuration

UI00 **Configuration of LED 1**
UI01 **Configuration of LED 2**
UI02 **Configuration of LED 3**
UI03 **Configuration of LED 4**
UI04 **Configuration of LED 5**
UI05 **Configuration of LED 6**
UI06 **Configuration of LED 7**
Configures LED 1...7

LED utilities table

LED symbol on *display*	**LED SBW600 / LED SKW22 22L**	**Parameter SBW600 / SKW22 22L**	***Default* SBW600 / SKW22 22L**	***Default* SBW600**	***Default* icon on front panel SBW600**
	LED 1 / 11 (first from left)	*UI00* / *UI30*	50 / 50	Output step 1	
	LED 2 /12	*UI01* / *UI31*	51 / 51	Output step 2	
	LED 3 /13	*UI02* / *UI32*	14 / 0	Internal circuit water pump 1	
	LED 4 /14	*UI03* / *UI33*	16 / 0	External circuit water pump	
	LED 5 /15	*UI04* /*UI34*	23 / 23	Internal exchanger electric heater	
	LED 6 /16	*UI05* /*UI35*	9* / 0	Sanitary water valve	
	LED 7 /17	*UI06* /*UI36*	30 / 14	Boiler	
LED symbol on *display*	**LED SBW600**	**Parameter SBW600**			
	Economy LED	*UI07*=0 *dS00*=0	*UI07*=0 *dS00*=1	*UI07*=1 *dS00*=0	NOT enabled (LED off)
	Economy LED			*UI07*=1 *dS00*=1	Enabled (dynamic setpoint)

* the LED is permanently on when in AS mode and with heating in progress, blinking when in AS mode and heating not in progress

See **Outputs: configuration table with the following exceptions:**

Value	**Description**	**Notes**
±50	Power step 1 output	values used only for configuring the user interface LEDs, and associated with the power steps requested by the main temperature regulator
±51	Power step 2 output	
±52	Power step 3 output	
±53	Power step 4 output	
...		
±70	internal pump 1 output or internal pump 2 output or both	Digital values used only for configuring the user interface LEDs
±71	external exchanger fan circuit 1 output Or external exchanger fan circuit 2 output or both	
±72	internal exchanger electric heater 1 output Or internal exchanger electric heater 2 output or both	
±73	external exchanger heater 1 output or external exchanger heater 2 output or both	
±74	circuit 1 heat pump lock status or	

Value	Description	Notes
	circuit 2 heat pump lock status or both	

UI07 **Configuration of Economy LED**
To configure the Economy LED (if=1,2 the economy LED on the *display* will be permanently on)
- 0 = LED disabled
- 1 = dynamic setpoint
- 2 = heat pump lock

UI10 **Select main *display***
Selects the main *display*

0	AiL1 analogue input	**8**	NOT USED
1	AiL2 analogue input	**9**	NOT USED
2	AiL3 analogue input	**10**	NOT USED
3	AiL4 analogue input	**11**	NOT USED
4	AiL5 analogue input	**12**	Clock
5	Remote terminal AIR1 analogue input 1	**13**	Setpoint set
6	Remote terminal AIR2 analogue input 2	**14**	Real setpoint
7	NOT USED		

Which we will refer to as:

Display	***Display* A**	***Display* B***
	4-digit clock *display*	2 and a half digit *display* + sign, see parameter *UI11*

UI11 **Select main *display* (remote terminal) SKW1**
Selects the main *display** remote terminal
*Note: 2 and a half digit *display* + sign
See *Ui10*

UI20 **Enable ACS in standby / *Manual defrost* function from [UP] key**
To enable or disable the Sanitary water in standby function from **[UP]** key or *manual defrost* depending on model
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

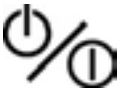
UI21 **Enable mode function from key**
Enables/disables mode selection ([esc] key) (mode function) from a key
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

UI22 **Enable disp function from key**
Enables/disables configuration of the main *display* from a key [set] (disp function)
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

UI23 **Enable standby function from [DOWN] key**
To enable or disable standby function from **DOWN** key
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

UI24 **Enable “set” function from key**
Enables/disables access via the "set" to machine state menu and relative subfolders
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

UI25 **Setpoint edit function enable from main screen**
Parameter allows you to enable Setpoint modification on the main *display* with the UP and DOWN *keys*.
- 0 = Key not enabled for the function
- 1 = Key enabled for the function

parameter	Key [prolonged press]	*Default* icon on front panel
UI20=1	[UP] = Sanitary Water / *Manual defrost* depending on model	
UI21=1	[esc] = change-over	**mode**
UI22=1	[set] = *display*	**disp**
UI23=1	[DOWN] = Standby / Local ON/OFF depending on model	
UI24=1	[Set] = modify SetPoint	**None (set key)**
parameter	**Key (press and release)**	***Default* icon on front panel**
UI25=1	UP / DOWN	**None (UP and DOWN *keys*)**

UI27 **Installation password**
Installation password.
When enabled (value other than zero), constitutes the password for access to parameters
Values from 0 to 255

UI28 **Manufacturer password**
Manufacturer password
When enabled (value other than zero), constitutes the password for access to parameters
Values from 0 to 255

SKW utility led configuration

UI30 **Configuration of LED 11**
UI31 **Configuration of LED 12**
UI32 **Configuration of LED 13**
UI33 **Configuration of LED 14**
UI34 **Configuration of LED 15**
UI35 **Configuration of LED 16**
UI36 **Configuration of LED 17**
See LED table (parameters ***UI00..UI06***)

25.1.6 Temperature control parameters (tr) - temperature controller

Main *temperature controller*

tr00 **Type of *temperature controller***

Sets the type of *temperature controller*

- 0 = Proportional
- 1 = Differential
- 2 = Digital
- **3 = INVERTER Proportional**
- **4 = INVERTER Differential**

tr01 **Enable heat pump**

Enables/disables the heat pump

- 0 = Heat pump absent
- 1 = Heat pump present

tr02 **Select temperature control probe in Cool**

tr03 **Select temperature control probe in Heat**

Selects the temperature control probe in Cool/Heat modes

value	
0	Internal exchanger water/air inlet temperature **(*CL30*...*CL34*=0)**
1	Internal exchanger water/air outlet temperature **(*CL30*...*CL34*=1)**
2	Circuit 1 and 2 internal exchanger water outlet average temperature **Average ((*CL30*...*CL34*=2), (*CL30*...*CL34*=3))**
3	External exchanger inlet water temperature **(*CL30*...*CL34*=6)**
4	External exchanger outlet water temperature **(*CL30*...*CL34*=7)**
5	Circuit 1 and 2 external exchanger average temperature **Average ((*CL30*...*CL34*=4), (*CL30*...*CL34*=5))**

tr04 **Select probe for temperature control differential in Cool**

tr05 **Select probe for temperature control differential in Heat**

Selects the probe for temperature control differential in Cool/Heat modes

value	Probe 1	Probe 2
0	Internal exchanger water/air inlet temperature **(*CL30*...*CL34*=0)**	External temperature NTC input **(*CL30*...*CL34*=8)**
1	Internal exchanger water/air outlet temperature **(*CL30*...*CL34*=1)**	
2	Circuit 1 and 2 internal exchanger water outlet average temperature **Average ((*CL30*...*CL34*=2), (*CL30*...*CL34*=3))**	
3	External exchanger inlet water temperature **(*CL30*...*CL34*=6)**	
4	External exchanger outlet water temperature **(*CL30*...*CL34*=7)**	
5	Circuit 1 and 2 external exchanger average temperature **Average ((*CL30*...*CL34*=4), (*CL30*...*CL34*=5))**	

Cool mode setpoint, hysteresis, differentials

tr10 **Temperature control setpoint in Cool**

Modifies the temperature control setpoint in Cool mode

tr11 **Minimum temperature control setpoint in Cool**

Modifies the minimum temperature control setpoint in Cool mode

tr12 **Maximum temperature control setpoint in Cool**

Modifies the maximum temperature control setpoint in Cool mode

tr13 **Temperature control hysteresis in Cool**

tr14 **Steps/compressors insertion differential in Cool**

tr15 **Setpoint differential in Cool from economy input**

Modifies the setpoint differential in Cool mode from economy input

Heat mode setpoint, hysteresis, differentials

tr20 **Temperature control setpoint in Heat**

Modifies the temperature control setpoint in Heat mode

tr21 **Minimum temperature control setpoint in Heat**

Modifies the minimum temperature control setpoint in Heat mode

tr22 **Maximum temperature control setpoint in Heat**

Modifies the maximum temperature control setpoint in Heat mode

tr23 **Temperature control hysteresis in Heat**

Modifies the temperature control hysteresis in Cool/Heat modes

tr24 **Steps/compressors insertion differential in Heat**

Modifies the steps/compressors insertion differential in Cool/Heat modes

tr25 **Setpoint differential in Heat from economy input**

Modifies the setpoint differential in Heat mode from economy input

tr30 ***Temperature controller*** **hysteresis with inverter in Cool**
To modify temperature control hysteresis with INVERTER in Cool mode

tr31 ***Temperature controller*** **band with inverter in Cool**
To modify the proportional band of the *temperature controller* with INVERTER in Cool mode

tr32 **Minimum speed with inverter in Cool**
To modify the minimum speed of the compressor with INVERTER in Cool mode

tr33 **Maximum speed with inverter in Cool**
To modify the maximum speed of the compressor with INVERTER in Cool mode

tr34 **Inverter/compressors insertion differential in Cool**
To modify the compressor / INVERTER insertion differential in Cool mode

tr40 ***Temperature controller*** **hysteresis with inverter in Heat**
To modify temperature control hysteresis with INVERTER in Heat mode

tr41 ***Temperature controller*** **band with inverter in Heat**
To modify the proportional band of the *temperature controller* with INVERTER in Heat mode

tr42 **Minimum speed with inverter in Heat**
To modify the minimum speed of the compressor with INVERTER in Heat mode

tr43 **Maximum speed with inverter in Heat**
To modify the maximum speed of the compressor with INVERTER in Heat mode

tr44 **Inverter/compressors insertion differential in Heat**
To modify the compressor / INVERTER insertion differential in Heat

25.1.7 Mode selection parameters (St) - Operating modes

Operating mode

St00 **Select *operating modes***
Selects the operating mode
- 0 = cool only
- 1 = heat only
- 2 = Heat pump heat/cool

Value	Mode	Description
0	Cool only	Only OFF, *STAND-BY* and COOL allowed (local and remote).
1	Heat only	Only OFF, *STAND-BY* and HEAT allowed (local and remote).
2	Heat pump heat/cool	All modes allowed.

Change-over

St01 **Enable changeover from analogue input**
Enables operating *mode change*over from analogue input
- 0 = not enabled
- 1 = enabled

St02 **Select probe for *automatic changeover* of operating mode**
Selects the probe for *automatic changeover* of the operating mode
- 0 = external temperature
- 1 = internal exchanger inlet water temperature
- 2 = internal exchanger water outlet temperature

St03 **Differential for automatic *mode change* in Heat**
Modifies the differential for the automatic *mode change* in Heat mode

St04 **Differential for automatic *mode change* in Cool**
Modifies the differential for the automatic *mode change* in Cool mode

Reversal valve

St05 **Reversal valve switching delay**
In seconds.

25.1.8 Compressor Parameters (CP) - Compressor

Type of plant

CP00 **Compressor type**
Selects the type of compressor
- 0 = simple (non-power stage)
- 1 = alternate power stage
- 2 = screw power stage

CP01 **Number of circuits**
Selects the number of circuits
- 1 = 1 circuit
- 2 = 2 circuits

CP02 **Number of compressors per circuit**
Selects the number of compressors per circuit
- 1 = 1 compressor
- 2 = 2 compressors
- 3 = 3 compressors
- 4 = 4 compressors

CP03 **Number of power stages per compressor**
Selects the number of compressors per circuit
- 1 = 1 power stage
- 2 = 2 power stages
- 3 = 3 power stages

Plant resource management

CP10 **Enable circuit balancing**
Establishes circuit management
- 0 = saturation (circuits)
- 1 = balancing (circuits)

CP11 **Enable compressor balancing**
Establishes circuit management
- 0 = saturation (compressors)
- 1 = balancing (compressors)
- 2 = NOT USED

CP12 **Circuit selection criterion**
Establishes circuit selection
- 0 = hours balancing
- 1 = on sequence 1-->2; off sequence 2-->1

CP13 **Compressor selection criterion**
Establishes the selection of compressors on each circuit
- 0 = hours balancing
- 1 = on sequence 1-->2-->3-->4; off sequence 4-->3-->2-->1
- 2 = operating time

CP14 **Compressor running time for switch on sequence**
Modifies the compressor running time for the switch on sequence

Compressor *Protection*

CP20 ***Minimum time* between the switching off and on of the same compressor**
Modifies the *minimum time* between the switching off and on of the same compressor

CP21 ***Minimum time* between the switching on of the same compressor**
Modifies the *minimum time* between the switching on of the same compressor

CP22 ***Minimum compressor on time***
Modifies the minimum compressor switch on time

CP23 ***Minimum time between the switching on of more than one compressor***
Modifies the *minimum time between the switching on of more than one compressor*

CP24 ***Minimum time between the switching off of more than one compressor***
Modifies the *minimum time between the switching off of more than one compressor*

CP25 **Minimum compressor switch on time for increase in power stages**
Modifies the minimum compressor switch on time for an increase in power stages

CP26 ***Minimum compressor switch on time for decrease in power stages***
Modifies the minimum compressor switch on time for a decrease in power stages

CP27 ***Defrost* compressor/step delay minimum**
Modifies the *minimum time* between the switching off and on in *defrost*

25.1.9 Internal circuit pump parameters (PI) - Internal pump

PI00 **Select internal circuit water pump operating mode**
To select operating mode of the internal circuit water pump

0	Pump disabled
1	Continuous (always on)
2	on request (pump on when compressor on)

PI01 **Internal circuit water pump idle time due to antilock**
Modifies the internal circuit water pump idle time due to antilock

PI02 **Internal circuit water pump pick-up time**
Modifies the internal circuit water pump pick-up time

PI03 **Minimum internal circuit water pump start time**
Modifies the minimum compressor switch on time

PI05 **Maximum internal circuit water pump changeover start time**
Pump operation time, after which the active pump is switched off and replaced by the second pump if available. If = 0 the second pump is not called

PI10 **Enable internal circuit water pump on when antifreeze heaters active**
Enables the switching on of the internal circuit water pump when the antifreeze heaters are active

- 0 = Pump disabled
- 1 = Pump enabled

PI11 **Enable internal circuit special water pump**

- 0 = No enabling
- 1 = Enable pump when the boiler is on
- 2 = Enable modulating pump on the basis of the difference between Internal exchanger water/air inlet temperature and Internal exchanger water/air outlet temperature. See *configuration of analogue inputs*

Operation on call

PI20 **Delay internal circuit water pump on and compressor on**
Modifies the delay between switching on the internal circuit water pump and switching on the compressor

PI21 **Delay compressor off - internal circuit water pump off**
Modifies the delay between switching off the compressor and switching off the internal circuit water pump

PI22 **Internal circuit pump periodic activation interval**
Modifies the maximum pump off time after which the pump is forced on
If modulating, it will be switched on a maximum speed

Modulating function in Cool mode

PI30 **Minimum internal circuit water pump speed in Cool**
Modifies the minimum internal circuit water pump speed in Cool mode

PI31 **Maximum internal circuit water pump speed in Cool**
Modifies the maximum internal circuit water pump speed in Cool mode

PI32 **Minimum internal circuit water pump speed setpoint in Cool**
Modifies the minimum internal circuit water pump speed setpoint in Cool mode

PI33 **Internal circuit water pump proportional band in Cool**
Modifies the internal circuit water pump proportional band in Cool mode

PI34 **Fan speed setpoint to modulate internal circuit water pump in Cool**
Modifies the fan speed setpoint to modulate the internal circuit water pump in Cool mode

PI35 **Fan speed hysteresis to modulate internal circuit water pump in Cool**
Modifies fan speed hysteresis for modulation of the internal circuit water pump in Cool mode

Modulating function in Heat mode

PI40 **Minimum internal circuit water pump speed in Heat**
Modifies the minimum internal circuit water pump speed in Heat mode

PI41 **Maximum internal circuit water pump speed in Heat**
Modifies the maximum internal circuit water pump speed in Heat mode

PI42 **Minimum internal circuit water pump speed setpoint in Heat**
Modifies the minimum internal circuit water pump speed setpoint in Heat mode

PI43 **Internal circuit water pump proportional band in Heat**
Modifies the internal circuit water pump proportional band in Heat mode

PI44 **Fan speed setpoint to modulate internal circuit water pump in Heat**
Modifies the fan speed setpoint to modulate the internal circuit water pump in Heat mode

PI45 **Fan speed hysteresis to modulate internal circuit water pump in Heat**
Modifies fan speed hysteresis for modulation of the internal circuit water pump in Heat mode

Antifreeze with pump

PI50 **Select antifreeze function probe with internal circuit water pump**
To enable or disable the antifreeze function with internal circuit water pump

Value	Probe
0	No probe (pump in antifreeze disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Internal exchanger water outlet temperature circuit 1
4	Internal exchanger water outlet temperature circuit 2
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature
6	External temperature

PI51 **Internal circuit water pump regulator setpoint for antifreeze**
Modifies the internal circuit water pump regulator setpoint for antifreeze

PI52 **Internal circuit water pump regulator hysteresis for antifreeze**
Modifies the internal circuit water pump regulator hysteresis for antifreeze

25.1.10 Recirculation fan parameters (FI) - Internal Fan

FI00 **Select recirculation fan operation**
To select the operating mode of the recirculation fan
- 0 = recirculation fan disabled
- 1 = Always on
- 2 = On request

FI01 **Recirculation fan regulator hysteresis in Cool mode**
Modifies the recirculation fan regulator hysteresis in Cool mode

FI02 **Recirculation fan regulator hysteresis in Heat mode**
Modifies the recirculation fan regulator hysteresis in Heat mode

FI03 **Postventilation time in Heat mode**
Modifies postventilation time in Heat mode

25.1.11 Secondary (external) exchanger fan parameters (FE) - External Fan

FE00 **Select external exchanger fan operating mode**
To select the operating mode of the external exchanger fan
- 0 = fan disabled
- 1 = *Continuous operation* (Always ON)
- 2 = *Operation on call* (ON with compressor ON)

FE01 **External exchanger fan pick-up time**
To vary the pick up time of the external exchanger fan

FAN CONTROL IN DEFROST

FE10 ***Fan control with single condensation***
Configures 2 circuit machines with a single condenser
- 0 = separate condensation / independent fans
- 1 = single condensation / in parallel

FE11 **Enable special open system intercooler fan on**
To enable special activation of the external exchanger fan
- 0 = Function disabled
- 1 = Fan enabled in *defrost* mode
- 2 = Fan enabled in relation to external exchanger heaters

FE12 **External exchanger fan on setpoint in *defrost***
Modifies the external exchanger fan on setpoint in *defrost*

FE13 **External exchanger fan on hysteresis in *defrost***
Modifies the external exchanger fan on hysteresis in *defrost*

FE14 **Select probe for external exchanger fan regulation in *defrost***
To select the probe to control the external exchanger fan in *defrost*
- 0 = Probe absent
- 1 = External exchanger temperature probe (circuit 1 e 2)
- 2 = High pressure probe (circuit 1 e 2)
- 3 = External exchanger pressure probe (circuit 1 e 2)

FE20 **Bypass time for external exchanger fan cut-off**
Modifies the bypass time of the external exchanger fan cut-off

FE21 **External exchanger fan preventilation time**
To modify the preventilation time of the external exchanger fan

FAN CONTROL IN COOLING

FE30 **Minimum speed external exchanger fan in Cool**
Modifies the minimum speed of the external exchanger fan in Cool mode

FE31 **Average speed external exchanger fan in Cool**
Modifies the average speed of the external exchanger fan in Cool mode

FE32 **Maximum speed external exchanger fan in Cool**
Modifies the maximum speed of the external exchanger fan in Cool mode

FE33 **Select probe for external exchanger fan regulation in Cool**
To select the probe to control the external exchanger fan in Cool mode

Value	Description	Regulation
0	No probe	On or On/Off
1	External exchanger temperature (circuit 1 and 2)	Direct
2	High pressure input (circuit 1 and 2)	Direct
3	Low pressure input (circuit 1 and 2)	Reversal
4	External exchanger pressure (circuit 1 and 2)	Direct
5	Internal exchanger pressure (circuit 1 and 2)	Reversal
6	Internal exchanger water/air inlet temperature	Direct
7	Internal exchanger water/air outlet temperature	Direct

FE34 **External exchanger fan minimum speed setpoint in Cool**
Modifies the minimum speed setpoint of the external exchanger fan in Cool mode

FE35 **External exchanger maximum speed differential in Cool**
Modifies the maximum speed differential of the external exchanger fan in Cool mode

FE36 **External exchanger fan speed proportional band in Cool**
Modifies the proportional band of the external exchanger fan speed in Cool mode

FE37 **Maximum external exchanger fan hysteresis in Cool mode**
Modifies the maximum hysteresis of the external exchanger fan speed in Cool mode

FE38 **External exchanger fan cut-off hysteresis in Cool**
Modifies the cut-off hysteresis of the external exchanger fan in Cool mode

FE39 **External exchanger fan cut-off differential in Cool**
Modifies the cut-off differential for the external exchanger fan in Cool mode

FAN CONTROL IN HEATING

FE50 **Minimum speed external exchanger fan in Heat**
Modifies the minimum speed of the external exchanger fan in Heat mode

FE51 **Average speed external exchanger fan in Heat**
Modifies the average speed of the external exchanger fan in Heat mode

FE52 **Maximum speed external exchanger fan in Heat**
Modifies the maximum speed of the external exchanger fan in Heat mode

FE53 **Select probe for external exchanger fan regulation in Heat**
To select the probe to control the external exchanger fan in Heat mode

Value	Description	Regulation
0	No probe	On or On/Off
1	External exchanger temperature (circuit 1 and 2)	Direct
2	High pressure input (circuit 1 and 2)	Direct
3	Low pressure input (circuit 1 and 2)	Reversal
4	External exchanger pressure (circuit 1 and 2)	Direct
5	Internal exchanger pressure (circuit 1 and 2)	Reversal
6	Internal exchanger water/air inlet temperature	Direct
7	Internal exchanger water/air outlet temperature	Direct

FE54 **Minimum external exchanger fan speed setpoint in Heat**
Modifies the minimum speed setpoint of the external exchanger fan in Heat mode

FE55 **Maximum external exchanger speed differential in Heat**
Modifies the maximum speed differential of the external exchanger fan in Heat mode

FE56 **External exchanger fan speed proportional band in Heat**
Modifies the proportional band of the external exchanger fan speed in Heat mode

FE57 **Maximum external exchanger fan speed hysteresis in Heat**
Modifies the maximum hysteresis of the external exchanger fan speed in Heat mode

FE58 **External exchanger fan cut-off hysteresis in Heat**
Modifies the cut-off hysteresis of the external exchanger fan in Heat mode

FE59 **External exchanger fan cut-off differential in Heat**
Modifies the cut-off differential for the external exchanger fan in Heat mode

25.1.12 External circuit pump parameters (PE) - External Pump

PE00 **External circuit water pump mode selection**
Defines the operation of the external circuit water pump

- 0 = Pump disabled
- 1 = *Continuous operation* (Always ON)
- 2 = NOT USED
- 3 = Operation synchronised with external exchanger fans

25.1.13 Electric heater parameters (HI) - Electric Heaters

HI00 **Enable internal exchanger heaters in Standby**
To enable or disable external exchanger heaters in standby
- 0 = Heaters disabled
- 1 = Heaters enabled

HI01 **Enable force heaters on during *defrost***
To enable or disable force heaters on during *defrost*
- 0 = Heaters enabled (ON) when requested by *temperature controller* (antifreeze or integrated use)
- 1 = Heaters always enabled ON during *defrost*

ANTIFREEZE

HI10 **Select probe to regulate internal exchanger heater 1 during antifreeze**
To select the probe for regulation of internal exchanger heaters during antifreeze
- 0 = Internal exchanger water/air inlet temperature
- 1 = Internal exchanger water/air outlet temperature

HI11 **Select probe to regulate internal exchanger heater 2 during antifreeze**
To select the probe for regulation of internal exchanger heaters during antifreeze

Value *Hi10* / *Hi11*	Probe
0	No probe (antifreeze heater disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Circuit 1 internal exchanger water outlet temperature
4	Circuit 2 internal exchanger water outlet temperature
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature

HI12 **Internal exchanger heater regulator setpoint for antifreeze**
Modifies the internal exchanger heater regulator setpoint for antifreeze

HI13 **Maximum internal exchanger heater regulator setpoint for antifreeze**
Modifies the maximum setpoint of the internal exchanger heater regulator for antifreeze

HI14 **Minimum internal exchanger heater regulator setpoint for antifreeze**
Modifies the minimum setpoint of the internal exchanger heater regulator for antifreeze

HI15 **Internal exchanger heater regulator hysteresis for antifreeze**
Modifies the hysteresis of the internal exchanger heater regulator for antifreeze

INTEGRATION

HI20 **Selects internal exchanger heater operation for integration**
To enable or disable integrated use of internal exchanger heaters

Value	Description
0	Integration heaters disabled
1	Integration heaters with differential setpoint proportional to external temperature
2	Integration heaters with differential setpoint in steps to external temperature
3	Integration heaters with differential setpoint fixed

HI21 **Internal exchanger heater dynamic differential setpoint in integrated use**
Modifies the dynamic differential setpoint of the internal exchanger heaters in integrated use

HI22 **Maximum dynamic differential internal exchanger heaters in integrated use**
Modifies the maximum dynamic differential of the internal exchanger heaters in integrated use

HI23 **Heater differential in integration mode with heat pump lock**
Modifies the start differential of the internal exchanger heaters in integrated use in case of heat pump lock

HI24 **Internal exchanger heater dynamic differential proportional band in integrated use**
Modifies the proportional band of the dynamic differential of the internal exchanger heaters in integrated use

HI25 **Internal exchanger heater regulator hysteresis in integrated use**
Modifies the hysteresis of the internal exchanger heaters in integrated use

HI26 **Differential setpoint internal exchanger heater 2 on in integrated use**
Modifies the differential setpoint to switch on internal exchanger heater 2 in integrated use

25.1.14 External exchanger electric heater parameters (HE) - Electric Heaters

HE00 **Enable external exchanger heaters in Standby**
To enable or disable external exchanger heaters for antifreeze
- 0 = Heaters disabled
- 1 = Heaters enabled

HE10 **Select probe to regulate external exchanger heater1 during antifreeze**
To select the probe to control the external exchanger heaters during antifreeze

Value	Probe
0	No probe (antifreeze heater disabled)
1	External exchanger average temperature circuit 1 and 2
2	Recovery (or external) exchanger inlet water temperature
3	Recovery (or external) exchanger water outlet temperature
4	External temperature

HE11 **Select probe to regulate external exchanger heater 2 during antifreeze**
To select the probe to control the external exchanger heaters during antifreeze
As for *HE10*

HE12 **External exchanger heater switch on setpoint for antifreeze**
Modifies the external exchanger switch on setpoint for antifreeze

HE13 **Maximum external exchanger heater regulator setpoint for antifreeze**
Modifies the maximum setpoint of the external exchanger heater regulator for antifreeze

HE14 **Minimum external exchanger heater regulator setpoint for antifreeze**
Modifies the minimum setpoint of the external exchanger heater regulator for antifreeze

HE15 **External exchanger heater regulator hysteresis for antifreeze**
Modifies the regulator hysteresis of external exchanger heaters for antifreeze

25.1.15 Auxiliary output parameters (HA) - Auxiliary Output

HA00 **Select probe for auxiliary output**
Selects the probe for regulation of the auxiliary output

Value	Probe
0	No probe (auxiliary output disabled)
1	External temperature
2	External exchanger temperature circuit 1
3	External exchanger temperature circuit 2
4	Recovery (or external) exchanger inlet water temperature
5	Recovery (or external) exchanger water outlet temperature
6	NOT USED

HA01 **Auxiliary heater regulator setpoint**
Sets the auxiliary output regulator setpoint

HA02 **Auxiliary heater regulator hysteresis**
Sets the auxiliary output regulator hysteresis

25.1.16 Boiler parameters (br) -boiler

br00 **Select boiler mode**
Selects the boiler mode

Value	Description
0	Boiler disabled
1	Boiler with differential setpoint proportional to external temperature
2	Boiler with differential setpoint in steps as a function of external temperature
3	Boiler with differential setpoint fixed

br01 **Boiler dynamic differential setpoint**
Modifies the setpoint of the boiler dynamic differential

br02 **Maximum boiler dynamic differential**
Modifies the maximum dynamic differential of the boiler

br03 **Boiler dynamic differential with heat pump lock**
In case of heat pump block, the *Boiler differential* takes the fixed value of this parameter

br04 **Boiler dynamic differential proportional band**
Modifies the proportional band of the dynamic differential of the boiler

br05 **Boiler regulator hysteresis**
Modifies the hysteresis of the boiler regulator

25.1.17 Defrost parameters (dF) - deFrost

dF00 **Select *defrost* function**
Selects the *defrost* function

Value	Description
0	*Defrost* disabled
1	Simultaneous *defrost* (in double-circuit plants only)
2	Independent *defrost* in single or in double-circuit plants (only with separate condensation)

dF01 **Enable maximum power for non-*defrost* circuit**
Allows you to force the other circuit to maximum power (the circuit not to be defrosted), for reasons of compensation
0 = forcing the other circuit to maximum power disabled
1 = forcing the other circuit to maximum power enabled

Select probe to enable interval count between defrosts

dF10 To select the probe to enable the *defrost* interval count

Value	Description
0	No probe
1	External exchanger temperature (circuit 1 and 2)
2	High pressure input (circuit 1 and 2)
3	Low pressure input (circuit 1 and 2)
4	External exchanger pressure (circuit 1 and 2)

dF11 **Enable interval count between defrosts setpoint**
Modifies the setpoint enabling the interval count between defrosts

dF12 **Setpoint to clear cumulative time between defrosts**
Modifies the setpoint clearing the cumulative time between defrosts

dF13 **Cumulative interval between defrosts**
Modifies the overall time between defrosts

dF14 **Minimum interval between *defrost* cycles**
Modifies the minimum interval between defrosts

dF20 **Select probe to end *defrost***
To select the probe to end *defrost*

Value	Description
0	No probe
1	External exchanger temperature (circuit 1 and 2)
2	High pressure input (circuit 1 and 2)
3	Low pressure input (circuit 1 and 2)
4	External exchanger pressure (circuit 1 and 2)

dF21 ***Defrost* deactivation setpoint**
Modifies the *defrost* deactivation setpoint

dF22 **Maximum *defrost* time**
Modifies the maximum *defrost* time

dF23 **Coil drainage time**
Modifies the coil drainage time

dF30 **Maximum dynamic *defrost* differential**
Modifies the maximum *defrost* dynamic differential

dF31 ***Defrost* dynamic differential setpoint**
Modifies the dynamic differential setpoint for *defrost*

dF32 **Dynamic *defrost* differential proportional band**
Modifies the proportional band of the dynamic *defrost* differential

25.1.18 Dynamic setpoint parameters (dS) - dynamic Setpoint

dS00 **External *temperature controller* dynamic differential selection**
Selects the external *temperature controller* dynamic differential

- 0 = disabled
- 1 = proportional
- 2 = by steps

dS01 ***Temperature controller* dynamic differential proportional band in Cool**
dS02 ***Temperature controller* dynamic differential proportional band in Heat**
Modifies the proportional band of the *temperature controller* dynamic differential in Cool/Heat mode

dS03 **Maximum *temperature controller* dynamic differential in Cool**
dS04 **Maximum *temperature controller* dynamic differential in Heat**
Modifies the maximum dynamic differential of the *temperature controller* in Cool/Heat mode

dS05 ***Temperature controller* dynamic differential setpoint in Cool**
dS06 ***Temperature controller* dynamic differential setpoint in Heat**
Modifies the dynamic differential setpoint of the *temperature controller* in Cool/Heat mode

25.1.19 Adaptive parameters (Ad) - Adaptive

Ad00 **Select no accumulation mode**
To select the type of accumulation compensation
- 0 = accumulation disabled
- 1 = Setpoint
- 2 = Hysteresis
- 3 = Setpoint and hysteresis

Ad01 **Accumulation offset constant**
Modifies the accumulator offset constant

Ad02 **Accumulator offset differential**
Modifies the accumulator offset differential

Ad03 **Block accumulation offset setpoint in Cool mode**
Modifies the block accumulation offset setpoint in Cool mode

Ad04 **Block accumulation offset setpoint in heating mode**
Modifies the block accumulation offset setpoint in Heat mode

Ad05 **Compressor on time for accumulation offset/regression**
Modifies the compressor on time for accumulation offset and regression

Ad06 **Reference compressor on time for accumulation offset**
Modifies the reference compressor on time for accumulation offset

25.1.20 Antifreeze parameters with heat pump (AF) - AntiFreeze

AF00 **Select antifreeze function heat pump probe for circuit 1**
To select the probe to control the heat pump in circuit 1 antifreeze

Value *AF00* / *AF01*	Probe
0	No probe (anti-freeze function with heat pump disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Circuit 1 internal exchanger water outlet temperature
4	Circuit 2 internal exchanger water outlet temperature
5	Circuit 1 and 2 internal exchanger water outlet minimum temperature

AF01 **Select antifreeze function heat pump probe for circuit 2**
To select the probe to control the heat pump in circuit 2 antifreeze
As for *AF00*

AF02 **Heat pump regulator setpoint for antifreeze**
Modifies heat pump regulator setpoint for antifreeze

AF03 **Block heat pump hysteresis in antifreeze**
Modifies the hysteresis to block heat pump during antifreeze

25.1.21 Sanitary Water Parameters (AS)

AS00 **Select ACS mode**
To select the Sanitary Water operating mode
0 = Sanitary water disabled
1 = Enabled only heat pump for sanitary water (system with sanitary water valve)
2 = Enabled only sanitary water heater
3 = Enabled sanitary water heat pump and heater (system with sanitary water valve)
4 = Enabled only heat pump for sanitary water (system with sanitary water pump)
5 = Enabled only sanitary water heater
6 = Enabled sanitary water heat pump and heater (system with sanitary water pump)

AS01 **ACS setpoint**
To modify the sanitary water setpoint

AS02 **ACS minimum setpoint**
To limit the minimum configurable value of the sanitary water setpoint

AS03 **ACS maximum setpoint**
To limit the maximum configurable value of the sanitary water setpoint

AS04 **ACS hysteresis**
To modify the sanitary water hysteresis

AS05 **ACS disengage setpoint differential**
To modify the sanitary water disengage setpoint differential

AS06 **ACS heater hysteresis**
To modify the sanitary water heater hysteresis

AS07 **ACS heater differential**
To modify the sanitary water heater differential for *anti-legionnaire's disease*

AS08 **ACS antifreeze setpoint**
To modify the antifreeze setpoint value for sanitary water

AS09 **ACS maximum activation time**
To modify the maximum activation time of Sanitary Water mode

AS10 **ACS minimum deactivation/activation time**
To modify the *minimum time* between deactivation and activation of Sanitary Water mode

AS11 **ACS setpoint dynamic constant**
If different from 0 the dynamic setpoint is enabled

AS12 **ACS system maximum temperature**
To modify the maximum temperature value of the system for sanitary water

AS20 **ACS setpoint for *anti-legionnaire's disease***
To limit the value of the sanitary water setpoint for *anti-legionnaire's disease*

AS21 **Minimum ACS setpoint for *anti-legionnaire's disease***
To limit the minimum configurable value of setpoint *AS20* - Sanitary water for *anti-legionnaire's disease*

AS22 **Maximum ACS setpoint for *anti-legionnaire's disease***
To limit the maximum configurable value of setpoint *AS20* - Sanitary water for *anti-legionnaire's disease*

AS23 **ACS minimum deactivation/activation time for *anti-legionnaire's disease***
To modify the *minimum time* between deactivation and activation of Sanitary Water mode for *anti-legionnaire's disease*

AS25 ***Anti-legionnaire's disease*** **period, day 1 (Monday)**
In hours. 0=event disabled

AS26 **Event hour, day 1 (Monday)**
Determines the start time hour of the event [0...23]

AS27 **Event minutes, day 1 (Monday)**
Determines the start time minute of the event at a set hour [0...59]

AS28 ***Anti-legionnaire's disease*** **period, day 2 (Tuesday)**
In hours. 0=event disabled

AS29 **Event hour, day 2 (Tuesday)**
Determines the start time hour of the event [0...23]

AS30 **Event minutes, day 2 (Tuesday)**
Determines the start time minute of the event at a set hour [0...59]

AS31 ***Anti-legionnaire's disease*** **period, day 3 (Wednesday)**
In hours. 0=event disabled

AS32 **Event hour, day 3 (Wednesday)**
Determines the start time hour of the event [0...23]

AS33 **Event minutes, day 3 (Wednesday)**
Determines the start time minute of the event at a set hour [0...59]

AS34 ***Anti-legionnaire's disease*** **period, day 4 (Thursday)**
In hours. 0=event disabled

AS35 **Event hour, day 4 (Thursday)**
Determines the start time hour of the event [0...23]

AS36 **Event minutes, day 4 (Thursday)**
Determines the start time minute of the event at a set hour [0...59]

AS37 ***Anti-legionnaire's disease*** **period, day 5 (Friday)**
In hours. 0=event disabled

AS38 **Event hour, day 5 (Friday)**
Determines the start time hour of the event [0...23]

AS39 **Event minutes, day 5 (Friday)**
Determines the start time minute of the event at a set hour [0...59]

AS40 ***Anti-legionnaire's disease*** **period, day 6 (Saturday)**
In hours. 0=event disabled

AS41 **Event hour, day 6 (Saturday)**
Determines the start time hour of the event [0...23]

AS42 **Event minutes, day 6 (Saturday)**
Determines the start time minute of the event at a set hour [0...59]

AS43 ***Anti-legionnaire's disease*** **period, day 7 (Sunday)**
In hours. 0=event disabled

AS44 **Event hour, day 7 (Sunday)**
Determines the start time hour of the event [0...23]

AS45 **Event minutes, day 7 (Sunday)**
Determines the start time minute of the event at a set hour [0...59]

25.1.22 Heat pump block parameters (HP) - Heat Pump

HP00 **Select heat pump lock probe circuit 1**
To select the probe to block the heat pump in circuit 1 antifreeze

Value	Probe	Mode
0	No probe (block pump disabled)	-
1	External temperature	Heating
2	Internal exchanger water/air inlet temperature	Cooling
3	Internal exchanger water/air outlet temperature	Cooling
4	Circuit 1 and 2 internal exchanger water outlet average temperature	Cooling
5	Recovery (or external) exchanger inlet water temperature	Cooling
6	Recovery (or external) exchanger water outlet temperature	Cooling
7	Circuit 1 and 2 external exchanger average temperature	Cooling

HP01 **Heat pump lock setpoint**
Sets the heat pump 1 regulator setpoint

HP02 **Boiler regulator hysteresis**
Modifies heat pump 1 regulator hysteresis

HP03 **Block heat pump 1 maximum differential**
Modifies the block heat pump differential circuit 1

HP04 **Block heat pump circuit 1 differential setpoint**
Modifies the block heat pump differential setpoint circuit 1

HP05 **Block heat pump proportional band circuit 1**
Modifies the block heat pump proportional band circuit 1

HP10 **Select heat pump lock probe circuit 2**
To select the probe to block the heat pump in circuit 2 antifreeze
As for *HP00*

HP11 **Heat pump 2 lock setpoint**
Sets the heat pump 2 regulator setpoint

HP12 **Hysteresis Heat pump 2 lock**
Modifies heat pump 2 regulator hysteresis

25.1.23 Power limitation parameters (PL) - Power Limitation

Power limitation on external temperature

PL00 **Power limitation on external temperature proportional band**
Modifies the proportional band for power limitation on external temperature

PL01 **External temperature setpoint for power limitation in Cool**
Modifies the external temperature setpoint for power limitation in Cool mode

PL02 **External temperature setpoint for power limitation in Heat**
Modifies the external temperature setpoint for power limitation in Heat mode

Power limitation on temperature

PL10 **Power limitation on water/air temperature proportional band**
Modifies the proportional band for power limitation on temperature

PL11 **Select probe for power limitation on water/air temperature**
To select the probe for power limitation

Value	Probe
0	No probe (regulator disabled)
1	Internal exchanger water/air inlet temperature
2	Internal exchanger water/air outlet temperature
3	Circuit 1 and 2 internal exchanger water outlet average temperature
4	Recovery (or external) exchanger inlet water temperature
5	Recovery (or external) exchanger water outlet temperature
6	Circuit 1 and 2 external exchanger average temperature

PL12 **High temperature setpoint for power limitation**
Modifies the high temperature setpoint for power limitation

PL13 **Low temperature setpoint for power limitation**
Modifies the low temperature setpoint for power limitation

Power limitation on pressure

PL20 **Power limitation on pressure proportional band**
Modifies the proportional band for power limitation on pressure

PL21 **High pressure setpoint for power limitation**
Modifies the high pressure setpoint for power limitation

PL22 **Low pressure setpoint for power limitation**
Modifies the low pressure setpoint for power limitation

25.1.24 Time Band Parameters (tE)

tE00 **Enable time band operation**
To enable or disable time band operation
0= time bands disabled
1= time bands enabled

tE01 **Select profile, day 1 (Monday)**
To select the profile of the first day of the week
- 1= Profile 1
- 2= Profile 2
- 3= Profile 3

tE02 **Select profile, day 2 (Tuesday)**
To select the profile of the second day of the week - See *tE01*

tE03 **Select profile, day 3 (Wednesday)**
To select the profile of the third day of the week - See *tE01*

tE04 **Select profile, day 4 (Thursday)**
To select the profile of the fourth day of the week - See *tE01*

tE05 **Select profile, day 5 (Friday)**
To select the profile of the fifth day of the week - See *tE01*

tE06 **Select profile, day 6 (Saturday)**
To select the profile of the sixth day of the week - See *tE01*

tE07 **Select profile, day 7 (Sunday)**
To select the profile of the seventh day of the week - See *tE01*

PROFILE 1
EVENT 1 / PROFILE 1

tE10 **Event start time hour 1, profile 1**
Determines the start time hour of the event [0...23]

tE11 **Event start time minutes 1, profile 1**
Determines the start time minute of the event at a set hour [0...59]

tE12 **Operating mode from event 1, profile 1**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE13 **Cool mode temperature regulator setpoint, from event 1, profile 1**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE14 **Heat mode temperature regulator setpoint, from event 1, profile 1**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE15 **ACS setpoint, from event 1, profile 1**
Determines the Sanitary Water setpoint to use during the event

EVENT 2 / PROFILE 1

tE17 **Event start time hour 2, profile 1**
Determines the start time hour of the event [0...23]

tE18 **Event start time minutes 2 profile 1**
Determines the start time minute of the event at a set hour [0...59]

tE19 **Operating mode from event 2, profile 1**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE20 **Cool mode temperature regulator setpoint, from event 2, profile 1**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE21 **Heat mode temperature regulator setpoint, from event 2, profile 1**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE22 **ACS setpoint, from event 2, profile 1**
Determines the sanitary water setpoint to use during the event

EVENT 3 / PROFILE 1

tE24 **Event start time hour 3, profile 1**
Determines the start time hour of the event [0...23]

tE25 **Event start time minutes 3, profile 1**
Determines the start time minute of the event at a set hour [0...59]

tE26 **Operating mode from event 3, profile 1**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE27 **Cool mode temperature regulator setpoint, from event 3, profile 1**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE28 **Heat mode temperature regulator setpoint, from event 3, profile 1**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE29 **ACS setpoint, from event 3, profile 1**
Determines the sanitary water setpoint to use during the event

EVENT 4 / PROFILE 1

tE31 **Event start time hour 4, profile 1**
Determines the start time hour of the event [0...23]

tE32 **Event start time minutes 4, profile 1**
Determines the start time minute of the event at a set hour [0...59]

tE33 **Operating mode from event 4, profile 1**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE34 **Cool mode temperature regulator setpoint, from event 4, profile 1**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE35 **Heat mode temperature regulator setpoint, from event 4, profile 1**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE36 **ACS setpoint, from event 4, profile 1**
Determines the sanitary water setpoint to use during the event

PROFILE 2

EVENT 1 / PROFILE 2

tE38 **Event start time hour 1, profile 2**
Determines the start time hour of the event [0...23]

tE39 **Event start time minutes 1, profile 2**
Determines the start time minute of the event at a set hour [0...59]

tE40 **Operating mode from event 1, profile 2**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE41 **Cool mode temperature regulator setpoint, from event 1, profile 2**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE42 **Heat mode temperature regulator setpoint, from event 1, profile 2**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE43 **ACS setpoint, from event 1, profile 2**
Determines the sanitary water setpoint to use during the event

EVENT 2 / PROFILE 2

tE45 **Event start time hour 2, profile 2**
Determines the start time hour of the event [0...23]

tE46 **Event start time minutes 2 profile 2**
Determines the start time minute of the event at a set hour [0...59]

tE47 **Operating mode from event 2, profile 2**
Determines the operating mode of Energy Flex during the event
- 0= ON

- 1 = Standby

tE48 **Cool mode temperature regulator setpoint, from event 2, profile 2**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE49 **Heat mode temperature regulator setpoint, from event 2, profile 2**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE50 **ACS setpoint, from event 2, profile 2**
Determines the sanitary water setpoint to use during the event

EVENT 3 / PROFILE 2

tE52 **Event start time hour 3, profile 2**
Determines the start time hour of the event [0...23]

tE53 **Event start time minutes 3, profile 2**
Determines the start time minute of the event at a set hour [0...59]

tE54 **Operating mode from event 3, profile 2**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE55 **Cool mode temperature regulator setpoint, from event 3, profile 2**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE56 **Heat mode temperature regulator setpoint, from event 3, profile 2**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE57 **ACS setpoint, from event 3, profile 2**
Determines the sanitary water setpoint to use during the event

EVENT 4 / PROFILE 2

tE59 **Event start time hour 4, profile 2**
Determines the start time hour of the event [0...23]

tE60 **Event start time minutes 4, profile 2**
Determines the start time minute of the event at a set hour [0...59]

tE61 **Operating mode from event 4, profile 2**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE62 **Cool mode temperature regulator setpoint, from event 4, profile 2**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE63 **Heat mode temperature regulator setpoint, from event 4, profile 2**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE64 **ACS setpoint, from event 4, profile 2**
Determines the sanitary water setpoint to use during the event

PROFILE 3

EVENT 1 / PROFILE 3

tE66 **Event start time hour 1, profile 3**
Determines the start time hour of the event [0...23]

tE67 **Event start time minutes 1, profile 3**
Determines the start time minute of the event at a set hour [0...59]

tE68 **Operating mode from event 1, profile 3**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE69 **Cool mode temperature regulator setpoint, from event 1, profile 3**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE70 **Heat mode temperature regulator setpoint, from event 1, profile 3**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE71 **ACS setpoint, from event 1, profile 3**
Determines the sanitary water setpoint to use during the event

EVENT 2 / PROFILE 3

tE73 **Event start time hour 2, profile 3**
Determines the start time hour of the event [0...23]

tE74 **Event start time minutes 2 profile 3**
Determines the start time minute of the event at a set hour [0...59]

tE75 **Operating mode from event 2, profile 3**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE76 **Cool mode temperature regulator setpoint, from event 2, profile 3**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE77 **Heat mode temperature regulator setpoint, from event 2, profile 3**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE78 **ACS setpoint, from event 2, profile 3**
Determines the sanitary water setpoint to use during the event

EVENT 3 / PROFILE 3

tE80 **Event start time hour 3, profile 3**
Determines the start time hour of the event [0...23]

tE81 **Event start time minutes 3, profile 3**
Determines the start time minute of the event at a set hour [0...59]

tE82 **Operating mode from event 3, profile 3**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE83 **Cool mode temperature regulator setpoint, from event 3, profile 3**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE84 **Heat mode temperature regulator setpoint, from event 3, profile 3**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE85 **ACS setpoint, from event 3, profile 3**
Determines the sanitary water setpoint to use during the event

EVENT 4 / PROFILE 3

tE87 **Event start time hour 4, profile 3**
Determines the start time hour of the event [0...23]

tE88 **Event start time minutes 4, profile 3**
Determines the start time minute of the event at a set hour [0...59]

tE89 **Operating mode from event 4, profile 3**
Determines the operating mode of Energy Flex during the event
- 0= ON
- 1 = Standby

tE90 **Cool mode temperature regulator setpoint, from event 4, profile 3**
Determines the Cool setpoint to use during the event (with Energy Flex in Cool mode)

tE91 **Heat mode temperature regulator setpoint, from event 4, profile 3**
Determines the Heat setpoint to use during the event (with Energy Flex in Heat mode)

tE92 **ACS setpoint, from event 4, profile 3**
Determines the sanitary water setpoint to use during the event

25.1.25 Alarm parameters (AL) - ALarm

AL00 **Time interval for alarm event count**
Modifies the interval in which alarm events are counted
AL00 is expressed in minutes.
Alarms are counted every ***AL00***/32 (minutes) = sample time.

AL01 **Maximum number of events in alarm log**
Modifies the maximum number of events stored in the alarm log

DIGITAL ALARMS

AL10 **Number of high pressure *alarms***
Modifies the number of high pressure *alarms*

AL11 **Low pressure alarm bypass time**
Modifies the low pressure alarm bypass time

AL12 **Number of low pressure *alarms***
Modifies the number of low pressure *alarms*

AL13 **Enable low pressure alarm during *defrost***
To enable or disable the low pressure alarm during *defrost*
- 0 = Alarm disabled
- 1 = Alarm enabled

AL14 **Bypass flow switch time from activation of the internal circuit water pump**
Modifies the bypass flow switch time from activation of the internal circuit water pump

AL15 **Flow switch activation time for internal circuit automatic *alarms***
Modifies the activation time of the flow switch for internal circuit automatic *alarms*

AL16 **Flow switch activation time for internal circuit manual alarm**
Modifies the activation time of the flow switch for internal circuit manual *alarms*

AL17 **Bypass flow switch time from activation of the external circuit water pump**
Modifies the flow switch bypass time from activation of the external circuit water pump

AL18 **Flow switch activation time for external circuit automatic *alarms***
Modifies the activation time of the flow switch for external circuit automatic *alarms*

AL19 **Flow switch activation time for external circuit manual alarm**
Modifies the activation time of the flow switch for external circuit manual *alarms*

AL20 **Compressor thermal switch alarm bypass time**
Modifies the bypass time of the compressor thermal switch alarm

AL21 **Number of compressor thermal switch *alarms***
Modifies the number of compressor thermal switch *alarms*

AL22 **Compressor oil pressure switch alarm bypass time**
Modifies the compressor oil pressure switch alarm bypass time

AL23 **Number of compressor oil pressure switch *alarms***
Modifies the number of compressor oil pressure switch *alarms*

AL24 **Number of internal exchanger fan thermal switch *alarms***
Modifies the number of internal exchanger fan thermal switch *alarms*

AL25 **Number of external exchanger fan thermal switch *alarms***
Modifies the number of external exchanger fan thermal switch *alarms*

AL26 **Number of internal circuit pump thermoswitch *alarms***
To modify the number of internal circuit pump thermoswitch *alarms*

AL27 **Number of external circuit pump thermoswitch *alarms***
To modify the number of external circuit pump thermoswitch *alarms*

ANALOGUE ALARMS

AL40 **High pressure alarm regulator setpoint from analogue input**
Modifies the setpoint of the high pressure alarm regulator from analogue input

AL41 **High pressure alarm regulator hysteresis from analogue input**
Modifies the hysteresis of the high pressure alarm regulator from analogue input

AL42 **Number of high pressure *alarms* from analogue input**
Modifies the number of high pressure *alarms* from analogue input

AL43 **Low pressure alarm bypass time from analogue input**
Modifies the low pressure alarm bypass time from analogue input

AL44 **Low pressure alarm regulator setpoint from analogue input**
Modifies the setpoint of the low pressure alarm regulator from analogue input

AL45 **Low pressure alarm regulator hysteresis from analogue input**
Modifies the setpoint of the low pressure alarm regulator hysteresis from analogue input

AL46 **Number of low pressure *alarms* from analogue input**
Modifies the number of low pressure *alarms* from analogue input

AL47 **High temperature alarm regulator setpoint from analogue input**
Modifies the setpoint of the high temperature alarm regulator from analogue input

AL48 **High temperature alarm regulator hysteresis from analogue input**
Modifies the hysteresis of the high temperature alarm regulator from analogue input

AL49 **High temperature delay before alarm**
Modifies the time temperature is high before alarm generated

AL50 **Internal circuit antifreeze alarm bypass time**
Modifies the internal circuit antifreeze alarm bypass time

AL51 **Internal circuit antifreeze alarm regulator setpoint**
Modifies the internal circuit antifreeze alarm regulator setpoint

AL52 **Internal circuit antifreeze alarm regulator hysteresis**
Modifies the internal circuit antifreeze alarm regulator hysteresis

AL53 **Number of internal circuit antifreeze *alarms***
Modifies the number of internal circuit antifreeze *alarms*

AL54 **External circuit antifreeze alarm bypass time**
Modifies the external circuit antifreeze alarm bypass time

AL55 **External circuit antifreeze alarm regulator setpoint**
Modifies the external circuit antifreeze alarm regulator setpoint

AL56 **External circuit antifreeze alarm regulator hysteresis**
Modifies the external circuit antifreeze alarm regulator hysteresis

AL57 **Number of external circuit antifreeze *alarms***
Modifies the number of external circuit antifreeze *alarms*

NO REFRIGERANT

AL70 **Enable low refrigerant alarm**
To enable or disable the low refrigerant alarm
- 0 = Low refrigerant alarm disabled
- 1 = Low refrigerant alarm enabled

AL71 **Low refrigerant alarm bypass time**
Modifies the low refrigerant alarm bypass time

AL72 **Low refrigerant alarm differential**
Modifies the low refrigerant alarm differential

AL73 **Low refrigerant delay before alarm**
Modifies the time refrigerant is low before alarm generated

MAINTENANCE

AL80 **Compressor start time for maintenance signal**
Modifies the on time of compressor for the service message

AL81 **Internal pump start time on maintenance signal**
Modifies the on time of pump for the service message

AL82 **External pump start time on maintenance signal**
Modifies the on time of pump for the service message

25.2 Parameters / visibility table, folder visibility table and client table

the **following tables** contain the read/write/decoding information for each resource to which the device has access.
There are three tables:

- The **parameters** table contains all the device configuration parameters stored in its non-volatile memory, including visibilities
- The **folders** table contains all the parameter *folder* visibilities
- The ***client*** *table* contains all the I/O state and alarm resources available in the device's volatile memory.

Description of columns:

FOLDER This indicates the *label* of the *folder* containing the parameter in question

LABEL Indicates the *label* with which the **parameters** are displayed in the device's menus.

VALUE PAR ADDRESS The whole part represents the address of the MODBUS register containing the value of the resource to be read or written in the
instrument. The value after the point indicates the position of the most significant data bit in the register; if not indicated it is taken to be zero. This information is always provided when the register contains more than one information item, and it is necessary to distinguish which bits actually represent the data (the working size of the data indicated in the column *DATA SIZE* is also taken into consideration). Given that the modbus registers have the size of one WORD (16 bit), the index number after the point can vary from 0 (least significant bit -LSb-) to 15 (most significant bit -MSb-).

Examples (in binary form the least significant bit is the first on the right):

VAL PAR ADDRESS	*DATA SIZE*	Value	Content of register	
8806	WORD	1350	1350	(0000010101000110)
8806	Byte	70	1350	(0000010101000110)
8806,8	Byte	5	1350	(0000010101000110)
8806,14	1 bit	0	1350	(0000010101000110)
8806,7	4 bit	10	1350	(0000010101000110)

Important: when the register contains more than one data item, during the write operation proceed as follows:

- read current register value
- modify the bits that represent the resource concerned
- write the register

VAL PAR ADDRESS Same as above. In this case, the parameter visibility value is in the MODBUS register address. By *default*, all parameters have:

- *Data size* bits
- *Range* 0...3
- **Visibility 3
- *U.M.* number

****Value Significance**

- Value 3 = parameter or *folder* always visible
- Value 2 = **manufacturer level;** these parameters can only be seen by entering the manufacturer's password (see parameter UI18) (all parameters specified as always visible, parameters that are visible at the installation level, and manufacturer level parameters will be visible)
- Value 1 = **installation level**; these parameters can only be viewed by entering the installation password (see parameter UI17) (all parameters specified as always visible and parameters that are visible at the installation level will be visible)
- Value 0 = parameter or *folder* NOT visible

1. Parameters and/or folders with visibility level <>3 (i.e. password protected) will only be visible if the correct password is entered (installer or manufacturer) following the procedure outlined below:
2. Parameters and/or folders with visibility level =3 are always visible and no password is required; in this case, the procedure below is not required.

Examples (in binary form the least significant bit is the first on the right):
Default **visibility:**

VAL PAR ADDRESS	*DATA SIZE*	Value	Content of register	
49481,6	2 bit	3	65535	----------(1111111111111111)
49482	2 bit	3	65535	(1111111111111111)
49482,2	2 bit	3	65535	(1111111111111111)
49482,4	2 bit	3	65535	(1111111111111111)
49482,6	2 bit	3	65535	(1111111111111111)

Modifies the visibility value of parameter *CL04* (address 49482.6) from 3 to 0

Visibility modified

VAL PAR ADDRESS	*DATA SIZE*	Value	Content of register	
49481,6	2 bit	0	16383	(0011111111111111)

RESET (Y/N)

Indicates whether the device **MUST** be rebooted after the modification.

- Y=YES the device **MUST** be rebooted after the modification:
- N=NO the device DOESN'T need to be rebooted to modify the parameter

Example: ALL configuration parameters (*folder* **CF**) have a value of Y so that the device **MUST ALWAYS BE REBOOTED AFTER MODIFICATION**

R/W

Indicates if resources are read/write, read-only or write-only:

R Read-only resource
W Write-only resource
RW Read / write resource

DATA SIZE

Indicates the size of the data in bits.

WORD = 16 bit
Bytes = 8 bit
"n" bits = 0...15 bits depending on the value of "n"

CPL

When the field indicates "Y", the value read by the register requires conversion, because the value represents a number with a sign. In the other cases the value is always positive or null.
To carry out conversion, proceed as follows:

- if the value in the register is between 0 and 32767, the result is the value itself (zero and positive values)
- if the value in the register is between 32768 and 65535, the result is the value of the register - 65536 (negative values)

RANGE

Describes the interval of values that can be assigned to the parameter. It can be correlated with other parameters in the controller (indicated with the parameter *label*).
NOTE: If the actual value is outside the limits specified for the parameter itself (for example, because other parameters defining the limits in question have been varied), teh actual value is not displayed but rather the value of the limit in violation

DEFAULT

Indicates the factory setting for the standard model of the instrument. Then table considers the hardware model **SBW646/C** with 4 relays + *TRIAC* + 2 *analogue outputs* A01 AO2 PWM + 1 low voltage analogue output A03

EXP

If set to -1 the value read from the register must be divided by 10 (value/10) to convert to the values given in the column *RANGE* and *DEFAULT* with the unit of measure given in the column ***U.M.***,
Example: parameter *CL04* = 50.0. Column *EXP* = -1:

- The value read by the device /*DeviceManager* is 50.0
- The value read from the register is 500 --> 500/10 = 50.0

U.M.

Measurement unit for values converted according to the rules indicated in the *CPL* and *EXP* columns.

25.2.1 Parameters / visibility table

(see following page)

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
CL	CL00	49208	BYTE			49435,4	Y	RW	AIL1 analogue input type	0 ... 2	0	num
CL	CL01	49209	BYTE			49435,6	Y	RW	AIL2 analogue input type	0 ... 2	0	num
CL	CL02	49210	BYTE			49436	Y	RW	AIL3 analogue input type	0 ... 6	0	num
CL	CL03	49211	BYTE			49436,2	Y	RW	AIL4 analogue input type	0 ... 6	0	num
CL	CL04	49212	BYTE			49436,4	Y	RW	AIL5 analogue input type	0 ... 2	0	num
CL	CL10	16450	WORD	Y	-1	49436,6	Y	RW	AIL3 analogue input fullscale value	CL11 ... 999	500	°C/Bar
CL	CL11	16462	WORD	Y	-1	49437	Y	RW	AIL3 analogue input start of scale value	-500 ... CL10	0.0	°C/Bar
CL	CL12	16452	WORD	Y	-1	49437,2	Y	RW	AIL4 analogue input fullscale value	CL13 ... 999	500	°C/Bar
CL	CL13	16464	WORD	Y	-1	49437,4	Y	RW	AIL4 analogue input start of scale value	-500 ... CL12	0	°C/Bar
CL	CL20	49238	BYTE	Y	-1	49437,6	Y	RW	AIL1 analogue input differential	-120 ... 120	0	°C
CL	CL21	49239	BYTE	Y	-1	49438	Y	RW	AIL2 analogue input differential	-120 ... 120	0	°C
CL	CL22	49240	BYTE	Y	-1	49438,2	Y	RW	AIL3 analogue input differential	-120 ... 120	0	°C/Bar
CL	CL23	49241	BYTE	Y	-1	49438,4	Y	RW	AIL4 analogue input differential	-120 ... 120	0	°C/Bar
CL	CL24	49242	BYTE	Y	-1	49438,6	Y	RW	AIL5 analogue input differential	-120 ... 120	0	°C
CL	CL30	49286	BYTE			49439	Y	RW	AIL1 analogue input configuration	0 ... 16	0	num
CL	CL31	49287	BYTE			49439,2	Y	RW	AIL2 analogue input configuration	0 ... 16	0	num
CL	CL32	49288	BYTE			49439,4	Y	RW	AIL3 analogue input configuration	0 ... 30	0	num
CL	CL33	49289	BYTE			49439,6	Y	RW	AIL4 analogue input configuration	0 ... 30	0	num
CL	CL34	49290	BYTE			49440	Y	RW	AIL5 analogue input configuration	0 ... 16	0	num
CL	CL40	49292	BYTE	Y		49440,2	Y	RW	DIL1 digital input configuration	-58 ... 58	0	num
CL	CL41	49293	BYTE	Y		49440,4	Y	RW	DIL2 digital input configuration	-58 ... 58	0	num
CL	CL42	49294	BYTE	Y		49440,6	Y	RW	DIL3 digital input configuration	-58 ... 58	0	num
CL	CL43	49295	BYTE	Y		49441	Y	RW	DIL4 digital input configuration	-58 ... 58	0	num
CL	CL44	49296	BYTE	Y		49441,2	Y	RW	DIL5 digital input configuration	-58 ... 58	0	num
CL	CL45	49297	BYTE	Y		49441,4	Y	RW	DIL6 digital input configuration	-58 ... 58	0	num
CL	CL50	49302	BYTE	Y		49442	Y	RW	AIL1 analogue input configuration 1 when configured as digital input	-58 ... 58	0	num
CL	CL51	49303	BYTE	Y		49442,2	Y	RW	AIL2 analogue input configuration 2 when configured as digital input	-58 ... 58	0	num
CL	CL52	49304	BYTE	Y		49442,4	Y	RW	AIL3 analogue input configuration 3 when configured as digital input	-58 ... 58	0	num

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
CL	*CL53*	49305	BYTE	Y		49442,6	Y	RW	AIL4 analogue input configuration 4 when configured as digital input	-58 ... 58	0	num
CL	*CL54*	49306	BYTE	Y		49443	Y	RW	AIL5 analogue input configuration 5 when configured as digital input	-58 ... 58	0	num
CL	*CL60*	49248	BYTE			49443,2	Y	RW	AOL5 analogue output type	0 ... 1	0	num
CL	*CL61*	49310	BYTE	Y		49443,4	Y	RW	AOL3 analogue output configuration	-53 ... 63	59	num
CL	*CL62*	49311	BYTE	Y		49443,6	Y	RW	AOL4 analogue output configuration	-53 ... 63	0	num
CL	*CL63*	49312	BYTE	Y		49444	Y	RW	AOL5 analogue output configuration	-53 ... 63	0	num
CL	*CL71*	49251	BYTE			49444,4	Y	RW	Enable AOL2 analogue output	0 ... 1	0	num
CL	*CL72*	49252	BYTE			49444,6	Y	RW	Enable AOL2 analogue output	0 ... 1	0	num
CL	*CL73*	49253	BYTE			49445	Y	RW	Phase shift TCL1 analogue output	0 ... 90	27	num
CL	*CL74*	49254	BYTE			49445,2	Y	RW	Phase shift AO1 analogue output	0 ... 90	27	num
CL	*CL75*	49255	BYTE			49445,4	Y	RW	Phase shift AOL2 analogue output	0 ... 90	27	num
CL	*CL76*	49256	BYTE			49445,6	Y	RW	TCL1 analogue output pulse length	5 ... 40	10	Num (1 unità = 69.4 µsec)
CL	*CL77*	49257	BYTE			49446	Y	RW	AOL1 analogue output pulse length	5 ... 40	10	Num (1 unità = 69.4 µsec)
CL	*CL78*	49258	BYTE			49446,2	Y	RW	AOL2 analogue output pulse length	5 ... 40	10	Num (1 unità = 69.4 µsec)
CL	*CL79*	49314	BYTE	Y		49446,4	Y	RW	TCL1 analogue output configuration	-53 ... 63	56	num
CL	*CL80*	49315	BYTE	Y		49446,6	Y	RW	AOL1 analogue output configuration	-53 ... 63	0	num
CL	*CL81*	49316	BYTE	Y		49447	Y	RW	AOL2 analogue output configuration	-53 ... 63	0	num
CL	*CL90*	49322	BYTE	Y		49447,2	Y	RW	DOL1 digital output configuration	-53 ... 53	1	num
CL	*CL91*	49323	BYTE	Y		49447,4	Y	RW	DOL2 digital output configuration	-53 ... 53	14	num
CL	*CL92*	49324	BYTE	Y		49447,6	Y	RW	DOL3 digital output configuration	-53 ... 53	5	num
CL	*CL93*	49325	BYTE	Y		49448	Y	RW	DOL4 digital output configuration	-53 ... 53	23	num
CL	*CL94*	49326	BYTE	Y		49448,2	Y	RW	DOL5 digital output configuration	-53 ... 53	2	num
CL	*CL95*	49327	BYTE	Y		49448,4	Y	RW	DOL6 digital output configuration (655 *models*)	-53 ... 53	0	num
CL	*CL96*	49328	BYTE	Y		49448,6	Y	RW	AOL1 digital output configuration	-53 ... 53	30	num
CL	*CL97*	49329	BYTE	Y		49449	Y	RW	AOL2 digital output configuration	-53 ... 53	31	num
CE	*CE00*	49696	BYTE			49451,6	Y	RW	AIE1 analogue input type	0 ... 2	0	num

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
CE	*CE01*	49697	BYTE			49452	Y	RW	AIE2 analogue input type	0 ... 2	0	num
CE	*CE02*	49698	BYTE			49452,2	Y	RW	AIE3 analogue input type	0 ... 6	0	num
CE	*CE03*	49699	BYTE			49452,4	Y	RW	AIE4 analogue input type	0 ... 6	0	num
CE	*CE04*	49700	BYTE			49452,6	Y	RW	AIE5 analogue input type	0 ... 2	0	num
CE	*CE10*	16938	WORD	Y	-1	49453	Y	RW	AIE3 analogue input fullscale value	*CE11* ... 999	500	°C/Bar
CE	*CE11*	16950	WORD	Y	-1	49453,2	Y	RW	AIE3 analogue input start of scale value	-500 ... *CE10*	0	°C/Bar
CE	*CE12*	16940	WORD	Y	-1	49453,4	Y	RW	AIE4 analogue input fullscale value	*CE13* ... 999	500	°C/Bar
CE	*CE13*	16952	WORD	Y	-1	49453,6	Y	RW	AIE4 analogue input start of scale value	-500 ... *CE12*	0	°C/Bar
CE	*CE20*	49726	BYTE	Y	-1	49454	Y	RW	AIE1 analogue input differential	-120 ... 120	0	°C
CE	*CE21*	49727	BYTE	Y	-1	49454,2	Y	RW	AIE2 analogue input differential	-120 ... 120	0	°C
CE	*CE22*	49728	BYTE	Y	-1	49454,4	Y	RW	AIE3 analogue input differential	-120 ... 120	0	°C/Bar
CE	*CE23*	49729	BYTE	Y	-1	49454,6	Y	RW	AIE4 analogue input differential	-120 ... 120	0	°C/Bar
CE	*CE24*	49730	BYTE	Y	-1	49455	Y	RW	AIE5 analogue input differential	-120 ... 120	0	°C
CE	*CE30*	49748	BYTE			49455,2	Y	RW	AIE1 analogue input configuration	0 ... 16	0	num
CE	*CE31*	49749	BYTE			49455,4	Y	RW	AIE2 analogue input configuration	0 ... 16	0	num
CE	*CE32*	49750	BYTE			49455,6	Y	RW	AIE3 analogue input configuration	0 ... 30	0	num
CE	*CE33*	49751	BYTE			49456	Y	RW	AIE4 analogue input configuration	0 ... 30	0	num
CE	*CE34*	49752	BYTE			49456,2	Y	RW	AIE5 analogue input configuration	0 ... 16	0	num
CE	*CE40*	49754	BYTE	Y		49456,4	Y	RW	DIE1 digital input configuration	-58 ... 58	0	num
CE	*CE41*	49755	BYTE	Y		49456,6	Y	RW	DIE2 digital input configuration	-58 ... 58	0	num
CE	*CE42*	49756	BYTE	Y		49457	Y	RW	DIE3 digital input configuration	-58 ... 58	0	num
CE	*CE43*	49757	BYTE	Y		49457,2	Y	RW	DIE4 digital input configuration	-58 ... 58	0	num
CE	CE44	49758	BYTE	Y		49457,4	Y	RW	DIE5 digital input configuration	-58 ... 58	0	num
CE	CE45	49759	BYTE	Y		49457,6	Y	RW	DIE6 digital input configuration	-58 ... 58	0	num
CE	*CE50*	49762	BYTE	Y		49458	Y	RW	AIE1 analogue input configuration when configured as digital input	-58 ... 58	0	num
CE	*CE51*	49763	BYTE	Y		49458,2	Y	RW	AIE2 analogue input configuration when configured as digital input	-58 ... 58	0	num
CE	*CE52*	49764	BYTE	Y		49458,4	Y	RW	AIE3 analogue input configuration when configured as digital input	-58 ... 58	0	num
CE	*CE53*	49765	BYTE	Y		49458,6	Y	RW	AIE4 analogue input configuration when configured as digital input	-58 ... 58	0	num
CE	*CE54*	49766	BYTE	Y		49459	Y	RW	AIE5 analogue input configuration when configured as digital input	-58 ... 58	0	num

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
CE	*CE60*	49736	BYTE			49459,2	Y	RW	AOE5 analogue output type 5	0 ... 1	0	num
CE	*CE61*	49768	BYTE	Y		49459,4	Y	RW	AOE3 analogue output configuration	-53 ... 63	0	num
CE	*CE62*	49769	BYTE	Y		49459,6	Y	RW	AOE4 analogue output configuration	-53 ... 63	0	num
CE	*CE63*	49770	BYTE	Y		49460	Y	RW	AOE5 analogue output configuration	-53 ... 63	0	num
CE	CE70	49738	BYTE			49460,2	Y	RW	Enable TCE1 analogue output	0 ... 1	1	num
CE	*CE71*	49739	BYTE			49460,4	Y	RW	Enable AOE1 analogue output	0 ... 1	0	num
CE	*CE72*	49740	BYTE			49460,6	Y	RW	Enable AOE2 analogue output	0 ... 1	0	num
CE	*CE73*	49741	BYTE			49461	Y	RW	Phase shift TCE1 analogue output	0 ... 90	27	Deg
CE	*CE74*	49742	BYTE			49461,2	Y	RW	Phase shift AOE1 analogue output	0 ... 90	27	Deg
CE	*CE75*	49743	BYTE			49461,4	Y	RW	Phase shift AOE2 analogue output	0 ... 90	27	Deg
CE	*CE76*	49744	BYTE			49461,6	Y	RW	TCE1 analogue output pulse length	5 ... 40	10	69 µsec
CE	*CE77*	49745	BYTE			49462	Y	RW	AOE1 analogue output pulse length	5 ... 40	10	69 µsec
CE	*CE78*	49746	BYTE			49462,2	Y	RW	AOE2 analogue output pulse length	5 ... 40	10	69 µsec
CE	*CE79*	49772	BYTE	Y		49462,4	Y	RW	TCE1 analogue output configuration	-53 ... 63	0	num
CE	*CE80*	49773	BYTE	Y		49462,6	Y	RW	AOE1 analogue output configuration	-53 ... 63	0	num
CE	*CE81*	49774	BYTE	Y		49463	Y	RW	AOE2 analogue output configuration	-53 ... 63	0	num
CE	*CE90*	49776	BYTE	Y		49463,2	Y	RW	DOE1 digital output configuration	-53 ... 53	0	num
CE	*CE91*	49777	BYTE	Y		49463,4	Y	RW	DOE2 digital output configuration	-53 ... 53	0	num
CE	*CE92*	49778	BYTE	Y		49463,6	Y	RW	DOE3 digital output configuration	-53 ... 53	0	num
CE	*CE93*	49779	BYTE	Y		49464	Y	RW	DOE4 digital output configuration	-53 ... 53	0	num
CE	*CE94*	49780	BYTE	Y		49464,2	Y	RW	DOE5 digital output configuration	-53 ... 53	0	num
CE	*CE95*	49781	BYTE	Y		49464,4	Y	RW	DOE6 digital output configuration	-53 ... 53	0	num
CE	*CE96*	49782	BYTE	Y		49464,6	Y	RW	AOE1 digital output configuration	-53 ... 53	0	num
CE	*CE97*	49783	BYTE	Y		49465	Y	RW	AOE2 digital output configuration	-53 ... 53	0	num
Cr	*Cr00*	49664	BYTE			49449,2	Y	RW	AIR1 analogue input type	0 ... 2	0	num
Cr	*Cr01*	49665	BYTE			49449,4	Y	RW	AIR2 analogue input type	0 ... 3	0	num
Cr	*Cr10*	16900	WORD	Y	-1	49449,6	Y	RW	AIR2 analogue input fullscale value	*Cr11* ... 999	0	num
Cr	*Cr11*	16904	WORD	Y	-1	49450	Y	RW	AIR2 analogue input start of scale value	-999 ... *Cr10*	0	num
Cr	*Cr20*	49674	BYTE	Y	-1	49450,2	Y	RW	AIR1 analogue input differential	-12.0 ... 12.0	0.0	°C

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
Cr	*Cr21*	49675	BYTE	Y	-1	49450,4	Y	RW	AIR2 analogue input differential	-12.0 ... 12.0	0.0	°C/Bar
Cr	*Cr30*	49676	BYTE			49450,6	Y	RW	AIR1 analogue input configuration	0...16	0	num
Cr	*Cr31*	49677	BYTE			49451	Y	RW	AIR2 analogue input configuration	0...30	0	num
Cr	*Cr50*	49683	BYTE	Y		49451,2	Y	RW	AIR2 input configuration when configured as digital input	0 ... 6	0	num
CF	*CF01*	49169	BYTE			49465,4	Y	RW	Select COM1 protocol	0 ... 1	0	num
CF	*CF20*	16426	BYTE			49467,2	Y	RW	Eliwell protocol controller address	0 ... 14	0	num
CF	*CF21*	16428	BYTE			49467,4	Y	RW	Eliwell protocol controller family	0 ... 14	0	num
CF	*CF30*	49600	BYTE			49467,6	Y	RW	Modbus protocol controller address	1 ... 255	1	num
CF	*CF31*	49600	BYTE			49468	Y	RW	Modbus baud rate protocol	0 ... 7	3	num
CF	*CF32*	16426	BYTE			49468,2	Y	RW	Modbus parity protocol	1 ... 3	1	num
CF	*CF43*	49600	BYTE			49470,4	Y	RW	Firmware screen	0 ... 999	0	num
CF	*CF44*	49600	BYTE			49465,4	Y	RW	Firmware version	0 ... 999	0	num
CF	*CF60*	16430	BYTE			49467,2	Y	RW	Customer code 1	0 ... 999	0	num
CF	*CF61*	16432	BYTE			49467,4	Y	RW	Customer code 2	0 ... 999	0	num
UI	*UI00*	49388	BYTE			49470,6	Y	RW	LED1 configuration	0 ... 74	50	num
UI	*UI01*	49389	BYTE			49471	Y	RW	LED2 configuration	0 ... 74	51	num
UI	*UI02*	49390	BYTE			49471,2	Y	RW	LED3 configuration	0 ... 74	14	num
UI	*UI03*	49391	BYTE			49471,4	Y	RW	LED4 configuration	0 ... 74	16	num
UI	*UI04*	49392	BYTE			49471,6	Y	RW	LED5 configuration	0 ... 74	23	num
UI	*UI05*	49393	BYTE			49472	Y	RW	LED6 configuration	0 ... 74	9	num
UI	*UI06*	49394	BYTE			49472,2	Y	RW	LED7 configuration	0 ... 74	30	num
UI	*UI07*	49402	BYTE			49472,4	Y	RW	Standby LED configuration	0 ... 2	1	num
UI	*UI10*	49366	BYTE			49473	Y	RW	Fundamental state *display* selection	0 ... 14	0	num
UI	*UI11*	49367	BYTE			49473,2	Y	RW	SKW basic state *display* 1	0 ... 14	5	num
UI	*UI20*	49382	BYTE			49473,6	Y	RW	Enable ACS/*Defrost* function from key	0 ... 1	1	num
UI	*UI21*	49383	BYTE			49474	Y	RW	Enable MODE function from key	0 ... 1	1	num
UI	*UI22*	49384	BYTE			49474,2	Y	RW	Enable DISP function from key	0 ... 1	1	num
UI	*UI23*	49385	BYTE			49474,4	Y	RW	Enable Standby/ON/OFF function from key	0 ... 1	1	num
UI	*UI24*	49386	BYTE			49474,6	Y	RW	Enable SET function from key	0 ... 1	1	num

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
UI	*UI25*	49387	BYTE			49475	Y	RW	Setpoint edit function enable from main screen	0 ... 1	0	num
UI	*UI27*	16640	WORD			49475,4	Y	RW	Installation engineer password	0 ... 255	1	num
UI	*UI28*	16642	WORD			49475,6	Y	RW	Manufacturer password	0 ... 255	2	num
UI	*UI30*	49395	BYTE			49476	Y	RW	LED11 configuration	0 ... 74	50	num
UI	*UI31*	49396	BYTE			49476,2	Y	RW	LED12 configuration	0 ... 74	51	num
UI	*UI32*	49397	BYTE			49476,4	Y	RW	LED13 configuration	0 ... 74	0	num
UI	*UI33*	49398	BYTE			49476,6	Y	RW	LED14 configuration	0 ... 74	0	num
UI	*UI34*	49399	BYTE			49477	Y	RW	LED15 configuration	0 ... 74	23	num
UI	*UI35*	49400	BYTE			49477,2	Y	RW	LED16 configuration	0 ... 74	0	num
UI	*UI36*	49401	BYTE			49477,4	Y	RW	LED17 configuration	0 ... 74	14	num
tr	*tr00*	49824	BYTE			49477,6	Y	RW	Temperature control type	0 ... 4	0	Num
tr	*tr01*	49825	BYTE			49478	Y	RW	Enable heating pump	0 ... 1	1	Num
tr	*tr02*	49826	BYTE			49478,2	Y	RW	Select temperature control probe in Cool	0 ... 5	0	Num
tr	*tr03*	49827	BYTE			49478,4	Y	RW	Select temperature control probe in Heat	0 ... 5	1	Num
tr	*tr04*	49828	BYTE			49478,6	Y	RW	Select probes for temperature control differential in Cool	0 ... 5	0	Num
tr	*tr05*	49829	BYTE			49479	Y	RW	Select probes for temperature control differential in Heat	0 ... 5	0	Num
tr	*tr10*	17062	WORD	Y	-1	49479,2	N	RW	Temperature control setpoint in Cool	*tr11* ... *tr12*	120	°C
tr	*tr11*	17064	WORD	Y	-1	49479,4	Y	RW	Minimum temperature control setpoint in Cool	-500 ... *tr12*	110	°C
tr	*tr12*	17066	WORD	Y	-1	49479,6	Y	RW	Maximum temperature control setpoint in Cool	*tr11* ... 999	200	°C
tr	*tr13*	17068	WORD		-1	49480	N	RW	Temperature control hysteresis in Cool	1 ... 255	30	°C
tr	*tr14*	17070	WORD		-1	49480,2	N	RW	Insert steps/compressors differential in Cool	1 ... 255	30	°C
tr	*tr15*	17072	WORD	Y	-1	49480,4	N	RW	Setpoint differential in Cool from Economy input	-255 ... 255	50	°C
tr	*tr20*	17074	WORD	Y	-1	49480,6	N	RW	Temperature control setpoint in Heat	*tr21* ...*tr22*	400	°C
tr	*tr21*	17076	WORD	Y	-1	49481	Y	RW	Minimum temperature control setpoint in Heat	-500 ... *tr22*	300	°C
tr	*tr22*	17078	WORD	Y	-1	49481,2	Y	RW	Maximum temperature control setpoint in Heat	*tr21* ... 999	450	°C
tr	*tr23*	17080	WORD		-1	49481,4	N	RW	Temperature control hysteresis in Heat	1 ... 255	30	°C
tr	*tr24*	17082	WORD		-1	49481,6	N	RW	Insert steps/compressors differential in Heat	1 ... 255	30	°C

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
tr	*tr25*	17084	WORD	Y	-1	49482	N	RW	Setpoint differential in Heat from Economy Input	-255 ... 255	-50	°C
tr	*tr30*	17712	WORD		-1	49482,4	Y	RW	*Temperature controller* hysteresis with inverter in Cool	0 ... 255	20	°C
tr	*tr31*	17714	WORD		-1	49482,6	Y	RW	*Temperature controller* band with inverter in Cool	0 ... 255	30	°C
tr	*tr32*	50484	BYTE			49483	Y	RW	Minimum speed with inverter in Cool	0 ... *tr33*	20	num
tr	*tr33*	50485	BYTE			49483,2	Y	RW	Maximum speed with inverter in Cool	*tr32* ... 100	100	num
tr	*tr34*	17718	WORD		-1	49483,4	Y	RW	Insert Inverters/compressors differential in Cool	0 ... 255	60	°C
tr	*tr40*	17726	WORD		-1	49483,6	Y	RW	*Temperature controller* hysteresis with inverter in Heat	0 ... 255	20	°C
tr	*tr41*	17728	WORD		-1	49484	Y	RW	*Temperature controller* band with inverter in Heat	0 ... 255	30	°C
tr	*tr42*	50498	BYTE			49484,2	Y	RW	Minimum speed with inverter in Heat	0 ... *tr43*	20	num
tr	*tr43*	50499	BYTE			49484,4	Y	RW	Maximum speed with inverter in Heat	*tr42* ... 100	100	num
tr	*tr44*	17732	WORD		-1	49484,6	Y	RW	Insert Inverters/compressors differential in Heat	0 ... 255	0	°C
St	*St00*	49808	BYTE			49482,2	Y	RW	Select operating mode	0 ... 2	2	num
St	*St01*	49809	BYTE			49482,4	Y	RW	Enable change mode from analogue input	0 ... 1	0	num
St	*St02*	49810	BYTE			49482,6	Y	RW	Select probe to change automatic mode	0 ... 2	0	num
St	*St03*	17044	WORD	Y	-1	49483	N	RW	Differential for change automatic mode in Heat	-25.5 ... 25.5	-10.0	°C
St	*St04*	17046	WORD	Y	-1	49483,2	N	RW	Differential for change automatic mode in Cool	-25.5 ... 25.5	10.0	°C
St	*St05*	49816	BYTE			49483,4	Y	RW	Reversal valve switching delay	0 ... 255	3	Sec
CP	*CP00*	49886	BYTE			49483,6	Y	RW	Type of compressor	0 ... 2	0	num
CP	*CP01*	49887	BYTE			49484	Y	RW	Number of circuits	1 ... 2	1	num
CP	*CP02*	49888	BYTE			49484,2	Y	RW	Number of compressors per circuit	1 ... 4	2	num
CP	*CP03*	49889	BYTE			49484,4	Y	RW	Number of capacity steps of compressor	0 ... 3	0	num
CP	*CP10*	49896	BYTE			49485,2	Y	RW	Enable circuit balancing	0 ... 1	0	Num
CP	*CP11*	49897	BYTE			49485,4	Y	RW	Enable compressor balancing	0 ... 1	0	Num
CP	*CP12*	49898	BYTE			49485,6	Y	RW	Circuit selection criterion	0 ... 1	0	Num
CP	*CP13*	49899	BYTE			49486	Y	RW	Compressor selection criterion	0 ... 2	0	Num
CP	*CP14*	17132	WORD			49486,2	Y	RW	Compressor operating time for each on sequence	0 ... 255	18	Sec*10
CP	*CP20*	17136	WORD			49486,4	Y	RW	Minimum off/on for same compressor	0 ... 255	18	Sec*10
CP	*CP21*	17138	WORD			49486,6	Y	RW	Minimum on/on time for same compressor	0 ... 255	30	Sec*10
CP	*CP22*	17140	WORD			49487	Y	RW	*Minimum compressor on time*	0 ... 255	2	Sec*10

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
CP	CP23	17142	WORD			49487,2	Y	RW	Minimum on/on time for different compressors	1 ... 255	10	Sec
CP	CP24	17144	WORD			49487,4	Y	RW	Minimum off/off time for different compressors	1 ... 255	10	Sec
CP	CP25	17146	WORD			49487,6	Y	RW	*Minimum compressor on time* per splitting increment	1 ... 255	10	Sec
CP	CP26	17148	WORD			49488	Y	RW	*Minimum compressor on time* per splitting decrease	1 ... 255	5	Sec
CP	CP27	17150	WORD			49488,2	Y	RW	*Defrost* compressor/step delay minimum	1 ... 255	3	Sec
PI	PI00	49984	BYTE			49491,4	Y	RW	Select primary circuit water pump function	0 ... 2	2	Num
PI	PI01	49985	BYTE			49491,6	Y	RW	Time primary circuit water pump not active for anti-lock	0 ... 255	50	h
PI	PI02	49986	BYTE			49492	Y	RW	Internal circuit water pump pick-up time	0 ... 255	2	Sec
PI	PI03	49987	BYTE			49492,2	Y	RW	Minimum internal circuit water pump start time	0 ... 255	10	Sec*10
PI	PI05	49989	BYTE			49492,6	Y	RW	Maximum internal circuit water pump changeover start time	0 ... 255	0	h
PI	PI10	49992	BYTE			49493	Y	RW	Enable primary circuit water pump on when anti-freeze heaters on	0 ... 1	0	Num
PI	PI11	49993	BYTE			49493,2	Y	RW	Enable internal circuit special water pump	0 ... 2	1	Num
PI	PI20	49996	BYTE	Y	-1	49493,4	Y	RW	Delay primary circuit water pump on - compressor on	0 ... 255	60	Sec
PI	PI21	49997	BYTE	Y	-1	49493,6	Y	RW	Delay compressor off - primary circuit water pump off	0 ... 255	60	Sec
PI	PI22	49998	BYTE			49494	Y	RW	Internal circuit pump periodic activation interval	0 ... 255	30	Min
PI	PI30	50002	BYTE			49494,2	Y	RW	Minimum primary circuit water pump speed in Cool	0 ... 100	30	%
PI	PI31	50003	BYTE			49494,4	Y	RW	Maximum primary circuit water pump speed in Cool	0 ... 100	100	%
PI	PI32	17236	WORD			49494,6	N	RW	Minimum primary circuit water pump setpoint speed in Cool	-500 ... 999	200	°C
PI	PI33	17238	WORD			49495	N	RW	Proportional band primary circuit water pump in Cool	-255 ... 255	80	°C
PI	PI34	50008	BYTE			49495,2	N	RW	Fan speed setpoint for primary circuit water pump modulation in cool	0 ... 100	80	%
PI	PI35	50009	BYTE			49495,4	N	RW	Fan speed hysteresis for primary circuit water pump modulation in Cool	1 ... 100	10	%
PI	PI40	50012	BYTE			49495,6	Y	RW	Minimum primary circuit water pump speed in Heat	0 ... 100	30	%
PI	PI41	50013	WORD			49496	Y	RW	Maximum primary circuit water pump speed in Heat	0 ... 100	100	%
PI	PI42	17246	WORD			49496,2	N	RW	Minimum primary circuit water pump setpoint speed in Heat	-500 ... 999	200	°C
PI	PI43	17248	BYTE			49496,4	N	RW	Proportional band primary circuit water pump in Heat	-255 ... 255	180	°C
PI	PI44	50018	BYTE			49496,6	N	RW	Fan speed setpoint for primary circuit water pump modulation in Heat	0 ... 100	80	%

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
PI	*PI45*	50019	BYTE			49497	N	RW	Fan speed hysteresis for primary circuit water pump modulation in Heat	1 ... 100	10	%
PI	*PI50*	50022	BYTE			49497,2	Y	RW	Select probe for internal circuit + water pump antifreeze	0 ... 7	0	Num
PI	*PI51*	17256	WORD			49497,4	N	RW	Primary circuit water pump regulator setpoint for anti-freeze	-500 ... 999	80	°C
PI	*PI52*	17258	WORD			49497,6	N	RW	Primary circuit water pump regulator hysteresis for anti-freeze	1 ... 255	20	°C
FI	*FI00*	17150	BYTE			49498	Y	RW	Select recirculating fan function	0 ... 2	0	Num
FI	*FI01*	49956	WORD		-1	49498,2	N	RW	Recirculating fan regulator hysteresis in Cool	1 ... 255	20	°C
FI	*FI02*	17190	WORD		-1	49498,4	N	RW	Recirculating fan regulator hysteresis in Heat	1 ... 255	20	°C
FI	*FI03*	17192	WORD			49498,6	Y	RW	*Post-ventilation* time in Heat	0 ... 255	10	Sec
FE	*FE00*	50038	BYTE			49500	Y	RW	External exchanger fan mode selection	0 ... 2	2	Num
FE	*FE01*	50039	BYTE			49500,2	Y	RW	Surge current time open system intercooler fan	0 ... 60	2	Sec
FE	*FE10*	50046	BYTE			49500,4	Y	RW	Enable single condensation	0 ... 1	0	num
FE	*FE11*	50047	BYTE			49500,6	Y	RW	Enable open system intercooler fan on during *defrost*	0 ... 2	0	num
FE	*FE12*	17280	WORD	Y	-1	49501	N	RW	Open system intercooler fan switch on setpoint during *defrost*	-500 ... 999	190	°C/Bar
FE	*FE13*	17282	WORD		-1	49501,2	N	RW	Open system intercooler fan switch-on hysteresis during *defrost*	1 ... 255	10	°C/Bar
FE	*FE14*	50052	BYTE			49501,4	Y	RW	Select probe to regulate open system intercooler fan during *defrost*	0 ... 3	1	num
FE	*FE20*	17290	WORD			49501,6	Y	RW	Cut-off open system intercooler fan bypass time	0 ... 255	2	Sec
FE	*FE21*	17292	WORD			49502	Y	RW	External exchanger fan preventilation time	0 ... 255	15	Sec
FE	*FE30*	50062	BYTE			49502,2	Y	RW	Open system intercooler fan minimum speed in Cool	0 ... 100	50	%
FE	*FE31*	50063	BYTE			49502,4	Y	RW	Open system intercooler fan average speed in Cool	0 ... 100	95	%
FE	*FE32*	50064	BYTE			49502,6	Y	RW	Open system intercooler fan maximum speed in Cool	0 ... 100	100	%
FE	*FE33*	50065	BYTE			49503	Y	RW	Select probe to regulate open system intercooler fan in Cool	0 ... 7	1	Num
FE	*FE34*	17298	WORD	Y	-1	49503,2	N	RW	Open system intercooler fan minimum setpoint speed in Cool	-500 ... 999	140	°C/Bar
FE	*FE35*	17300	WORD	Y	-1	49503,4	N	RW	Open system intercooler fan maximum speed differential in Cool	1 ... 999	55	°C/Bar
FE	*FE36*	17302	WORD		-1	49503,6	N	RW	Open system intercooler fan proportional band speed in Cool	0 ... 999	35	°C/Bar
FE	*FE37*	17304	WORD		-1	49504	N	RW	Open system intercooler fan maximum speed hysteresis in Cool	1 ... 255	10	°C/Bar
FE	*FE38*	17306	WORD		-1	49504,2	N	RW	Open system intercooler fan hysteresis cut-off in Cool	1 ... 255	10	°C/Bar

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
FE	*FE39*	17308	WORD		-1	49504,4	N	RW	Open system intercooler fan differential cut-off in Cool	0 ... 255	20	°C/Bar
FE	*FE50*	50082	BYTE			49504,6	Y	RW	Open system intercooler fan minimum speed in Heat	0 ... 100	50	%
FE	*FE51*	50083	BYTE			49505	Y	RW	Open system intercooler fan average speed in Heat	0 ... 100	95	%
FE	*FE52*	50084	BYTE			49505,2	Y	RW	Open system intercooler fan maximum speed in Heat	0 ... 100	100	%
FE	*FE53*	50085	BYTE			49505,4	Y	RW	Select probe to regulate open system intercooler fan in Heat	0 ... 7	1	Num
FE	*FE54*	17318	WORD	Y	-1	49505,6	N	RW	Open system intercooler fan minimum setpoint speed in Heat	-500 ... 999	55	°C/Bar
FE	*FE55*	17320	WORD	Y	-1	49506	N	RW	Open system intercooler fan maximum speed differential in Heat	1 ... 999	17	°C/Bar
FE	*FE56*	17322	WORD		-1	49506,2	N	RW	Open system intercooler fan proportional band speed in Heat	0 ... 999	10	°C/Bar
FE	*FE57*	17324	WORD		-1	49506,4	N	RW	Open system intercooler fan maximum speed hysteresis in Heat	1 ... 255	5	°C/Bar
FE	*FE58*	17326	WORD		-1	49506,6	N	RW	Open system intercooler fan hysteresis cut-off in Heat	1 ... 255	5	°C/Bar
FE	*FE59*	17328	WORD		-1	49507	N	RW	Open system intercooler fan differential cut-off in Heat	0 ... 255	10	°C/Bar
PE	*PE00*	50110	BYTE			49507,2	Y	RW	External circuit water pump mode selection	0 ... 3	0	num
HI	*HI00*	50126	BYTE			49507,4	Y	RW	Enable internal exchanger antifreeze heaters in standby	0 ... 1	0	Num
HI	*HI01*	50127	BYTE			49507,6	Y	RW	Enable force heaters on during *defrost*	0 ... 3	0	Num
HI	*HI10*	50130	BYTE			49508	Y	RW	Select probe for antifreeze internal exchanger + heater 1	0 ... 3	2	Num
HI	*HI11*	50131	BYTE			49508,2	Y	RW	Select probe for antifreeze internal exchanger + heater 2	0 ... 3	2	num
HI	*HI12*	17364	WORD	Y	-1	49508,4	N	RW	Primary intercooler heaters regulator setpoint for anti-freeze	*Hi14* ... *Hi13*	40	°C
HI	*HI13*	17366	WORD	Y	-1	49508,6	Y	RW	Primary intercooler heaters regulator maximum setpoint for anti-freeze	*Hi14* ... 999	70	°C
HI	*HI14*	17368	WORD	Y	-1	49509	Y	RW	Primary intercooler heaters regulator minimum setpoint for anti-freeze	-500 ... *Hi13*	-100	°C
HI	*HI15*	17370	WORD		-1	49509,2	N	RW	Primary intercooler heaters regulator hysteresis for anti-freeze	1 ... 255	5	°C
HI	*HI20*	50146	BYTE			49509,4	Y	RW	Select heater mode for internal exchanger in integration mode	0 ... 3	0	Num
HI	*HI21*	17380	WORD	Y	-1	49509,6	N	RW	Primary intercooler heaters dynamic differential setpoint in integration	-500 ... 999	100	°C
HI	*HI22*	17382	WORD		-1	49510	Y	RW	Primary intercooler heaters maximum dynamic differential in integration	0 ... 999	255	°C
HI	*HI23*	17384	WORD		-1	49510,2	N	RW	Heater differential in integration mode with heat pump lock	0 ... 999	0	°C

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
HI	*HI24*	17386	WORD		-1	49510,4	N	RW	Primary intercooler heaters dynamic differential proportional band in integration	0 ... 999	50	°C
HI	*HI25*	17388	WORD		-1	49510,6	N	RW	Primary intercooler heaters regulator hysteresis in integration	1 ... 255	10	°C
HI	*HI26*	17390	WORD		-1	49511	N	RW	Primary intercooler heater 2 switch-on setpoint differential in integration	0 ... 999	30	°C
HE	*HE00*	50166	BYTE			49511,2	Y	RW	Enable external exchanger antifreeze heaters in standby	0 ... 1	0	Num
HE	*HE10*	50168	BYTE			49511,4	Y	RW	Select probe for antifreeze external exchanger + heater 1	0 ... 4	0	Num
HE	*HE11*	50169	BYTE			49511,6	Y	RW	Select probe for antifreeze external exchanger + heater 2	0 ... 4	0	num
HE	*HE12*	17402	WORD	Y	-1	49512	N	RW	Open-system intercooler heaters switch-on setpoint for anti-freeze	*HE14* ...*HE13*	40	°C
HE	*HE13*	17404	WORD	Y	-1	49512,2	Y	RW	Primary open-system intercooler heaters regulator maximum setpoint for anti-freeze	*HE14* ... 999	70	°C
HE	*HE14*	17406	WORD	Y	-1	49512,4	Y	RW	Primary open-system intercooler heaters regulator minimum setpoint for anti-freeze	-500 ... *HE13*	-100	°C
HE	*HE15*	17408	WORD	Y	-1	49512,6	N	RW	Open-system intercooler heaters regulator hysteresis for anti-freeze	1 ... 255	10	°C
HA	*HA00*	50186	BYTE			49513	Y	RW	Select probe for auxiliary output regulator	0 ... 6	0	Num
HA	*HA01*	17420	WORD	Y	-1	49513,2	N	RW	Auxiliary output regulator setpoint	-500 ... 999	20	°C
HA	*HA02*	17422	WORD	Y	-1	49513,4	N	RW	Auxiliary output regulator hysteresis	-500 ... 999	10	°C
br	*br00*	50200	BYTE			49513,6	Y	RW	Select boiler mode	0 ... 3	0	Num
br	*br01*	17434	WORD	Y	-1	49514	N	RW	Boiler dynamic differential setpoint	-500 ... 999	100	°C
br	*br02*	17436	WORD		-1	49514,2	Y	RW	Maximum boiler dynamic differential	0 ... 999	255	°C
br	*br03*	17438	WORD		-1	49514,4	Y	RW	Boiler dynamic differential with heat pump lock	0 ... 999	0	°C
br	*br04*	17440	WORD		-1	49514,6	N	RW	Boiler proportional band dynamic differential	0 ... 999	50	°C
br	*br05*	17442	WORD		-1	49515	N	RW	Boiler regulator hysteresis	1 ... 255	20	°C
dF	*dF00*	50262	BYTE			49519	Y	RW	Select *defrost* mode	0 ... 2	2	num
dF	*dF01*	50263	BYTE			49519,2	Y	RW	Enable maximum power for non-*defrost* circuit	0 ... 1	0	num
dF	*dF10*	50266	BYTE			49519,4	Y	RW	Select probe to enable interval count between *defrost* cycles	0 ... 4	1	Num
dF	*dF11*	17500	WORD	Y	-1	49519,6	N	RW	Setpoint for enable interval count between *defrost* cycles	-500 ... 999	25	°C / Bar
dF	*dF12*	17502	WORD	Y	-1	49520	N	RW	Setpoint to clear cumulative time between *defrost* cycles	-500 ... 999	130	°C / Bar
dF	*dF13*	17504	WORD			49520,2	Y	RW	Cumulative time between *defrost* cycles	1 ... 255	20	Min
dF	*dF14*	17506	WORD			49520,4	Y	RW	Minimum interval between *defrost* cycles	1 ... 255	60	Min

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
dF	*dF20*	50280	BYTE			49520,6	Y	RW	Select probe to disable *defrost*	0 ... 4	1	Num
dF	*dF21*	17514	WORD	Y	-1	49521	N	RW	Disable *defrost* setpoint	-500 ... 999	130	°C / Bar
dF	*dF22*	17516	WORD			49521,2	Y	RW	Maximum *defrost* time	1 ... 255	5	Min
dF	*dF23*	17518	WORD			49521,4	Y	RW	Drip time	0 ... 255	40	sec
dF	*dF30*	17524	WORD	Y	-1	49521,6	Y	RW	Maximum dynamic *defrost* differential	-500 ... 999	0	°C / Bar
dF	*dF31*	17526	WORD	Y	-1	49522	N	RW	Dynamic *defrost* differential setpoint	-500 ... 999	100	°C
dF	*dF32*	17528	WORD	Y	-1	49522,2	N	RW	*Defrost* proportional band dynamic differential	-500 ... 999	-50	°C
dS	*dS00*	49876	BYTE			49522,4	Y	RW	External *temperature controller* dynamic differential selection	0 ... 2	0	Num
dS	*dS01*	17096	WORD	Y	-1	49522,6	N	RW	Temperature control proportional band dynamic differential in Cool	-500 ... 999	50	°C
dS	*dS02*	17098	WORD	Y	-1	49523	N	RW	Temperature control proportional band dynamic differential in Heat	-500 ... 999	50	°C
dS	*dS03*	17100	WORD	Y	-1	49523,2	Y	RW	Maximum temperature control dynamic differential in Cool	-500 ... 999	50	°C
dS	*dS04*	17102	WORD	Y	-1	49523,4	Y	RW	Maximum temperature control dynamic differential in Heat	-500 ... 999	50	°C
dS	*dS05*	17104	WORD	Y	-1	49523,6	N	RW	Temperature control dynamic setpoint differential in Cool	-500 ... 999	150	°C
dS	*dS06*	17106	WORD	Y	-1	49524	N	RW	Temperature control dynamic setpoint differential in Heat	-500 ... 999	220	°C
Ad	*Ad00*	50308	BYTE			49524,2	Y	RW	Select no accumulation mode	0 ... 3	0	Num
Ad	*Ad01*	17542	WORD		-1	49524,4	Y	RW	Constant accumulation compensation	0 ... 255	20	Num
Ad	*Ad02*	17544	WORD		-1	49524,6	N	RW	Accumulation compensation differential	0 ... 255	5	°C
Ad	*Ad03*	17546	WORD	Y	-1	49525	N	RW	Accumulation compensation block setpoint in Cool	-500 ... 999	40	°C
Ad	*Ad04*	17548	WORD	Y	-1	49525,2	N	RW	Accumulation compensation block setpoint in Heat	-500 ... 999	500	°C
Ad	*Ad05*	17550	WORD			49525,4	Y	RW	Time compressor on for accumulation compensation regression	0 ... 255	24	sec*10
Ad	*Ad06*	17552	WORD			49525,6	Y	RW	Compressor on reference time for accumulation compensation	0 ... 255	18	sec*10
AF	*AF00*	50332	BYTE			49526	Y	RW	Select antifreeze function heat pump probe for circuit 1	0 ... 5	0	num
AF	*AF01*	50333	BYTE			49526,2	Y	RW	Select antifreeze function heat pump probe for circuit 2	0 ... 5	0	num
AF	*AF02*	17566	WORD	Y	-1	49526,4	Y	RW	Setpoint for antifreeze regulator with heat pump	-500 ... 999	50	°C
AF	*AF03*	17568	WORD		-1	49526,6	Y	RW	Antifreeze regulator hysteresis with heat pump	1 ... 125	30	°C

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
AS	AS00	50344	BYTE			49530,4	Y	RW	Select ACS mode	0 ... 6	0	num
AS	AS01	17578	WORD	Y	-1	49530,6	Y	RW	ACS setpoint	AS02 ... AS03	500	°C
AS	AS02	17580	WORD	Y	-1	49531	Y	RW	ACS minimum setpoint	-500 ... AS03	400	°C
AS	AS03	17582	WORD	Y	-1	49531,2	Y	RW	ACS maximum setpoint	AS02 ... 999	600	°C
AS	AS04	17584	WORD		-1	49531,4	Y	RW	ACS hysteresis	1 ... 255	30	°C
AS	AS05	17586	WORD	Y	-1	49531,6	Y	RW	ACS disengage setpoint differential	-500 ... 999	30	°C
AS	AS06	17588	WORD		-1	49532	Y	RW	ACS heater hysteresis	1 ... 255	20	°C
AS	AS07	17590	WORD		-1	49532,2	Y	RW	ACS heater differential	0 ... 999	0	°C
AS	AS08	17592	WORD	Y	-1	49532,4	Y	RW	ACS antifreeze setpoint	-500 ... AS03	30	°C
AS	AS09	17594	WORD			49532,6	Y	RW	ACS maximum activation time	1 ... 999	60	min
AS	AS10	17596	WORD			49533	Y	RW	ACS minimum deactivation/activation time	1 ... 999	60	min
AS	AS11	17598	WORD		-1	49533,2	Y	RW	Sanitary water set point dynamic constant	0 ... 255	0	°C
AS	AS12	17600	WORD	Y	-1	49533,4	Y	RW	Sanitary water system maximum temperature	-500 ... 999	650	°C
AS	AS20	17602	WORD	Y	-1	49533,6	Y	RW	ACS setpoint for *anti-legionnaire's disease*	AS21 ... AS22	650	°C
AS	AS21	17604	WORD	Y	-1	49534	Y	RW	Minimum ACS setpoint for *anti-legionnaire's disease*	-500 ... AS22	600	°C
AS	AS22	17606	WORD	Y	-1	49534,2	Y	RW	Maximum ACS setpoint for *anti-legionnaire's disease*	AS22 ... 999	700	°C
AS	AS23	17608	WORD			49534,4	Y	RW	ACS minimum deactivation/activation time for *anti-legionnaire's disease*	1 ... 999	15	min
AS	AS25	50382	BYTE			49534,6	Y	RW	*Anti-legionnaire's disease* period duration, day 1	0 ... 24	0	Ore
AS	AS26	50383	BYTE			49535	Y	RW	Event hour, day 1	0 ... 23	0	Ore
AS	AS27	50384	BYTE			49535,2	Y	RW	Event minutes, day 1	0 ... 59	0	Minuti
AS	AS28	50385	BYTE			49535,4	Y	RW	*Anti-legionnaire's disease* period duration, day 2	0 ... 24	0	Ore
AS	AS29	50386	BYTE			49535,6	Y	RW	Event hour, day 2	0 ... 23	0	Ore
AS	AS30	50387	BYTE			49536	Y	RW	Event minutes, day 2	0 ... 59	0	Minuti
AS	AS31	50388	BYTE			49536,2	Y	RW	*Anti-legionnaire's disease* period duration, day 3	0 ... 24	0	Ore
AS	AS32	50389	BYTE			49536,4	Y	RW	Event hour, day 3	0 ... 23	0	Ore
AS	AS33	50390	BYTE			49536,6	Y	RW	Event minutes, day 3	0 ... 59	0	Minuti
AS	AS34	50391	BYTE			49537	Y	RW	*Anti-legionnaire's disease* period duration, day 4	0 ... 24	0	Ore
AS	AS35	50392	BYTE			49537,2	Y	RW	Event hour, day 4	0 ... 23	0	Ore
AS	AS36	50393	BYTE			49537,4	Y	RW	Event minutes, day 4	0 ... 59	0	Minuti

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
AS	AS37	50394	BYTE			49537,6	Y	RW	Anti-legionnaire's disease period duration, day 5	0 ... 24	0	Ore
AS	AS38	50395	BYTE			49538	Y	RW	Event hour, day 5	0 ... 23	0	Ore
AS	AS39	50396	BYTE			49538,2	Y	RW	Event minutes, day 5	0 ... 59	0	Minuti
AS	AS40	50397	BYTE			49538,4	Y	RW	Anti-legionnaire's disease period duration, day 6	0 ... 24	0	Ore
AS	AS41	50398	BYTE			49538,6	Y	RW	Event hour, day 6	0 ... 23	0	Ore
AS	AS42	50399	BYTE			49539	Y	RW	Event minutes, day 6	0 ... 59	0	Minuti
AS	AS43	50400	BYTE			49539,2	Y	RW	Anti-legionnaire's disease period duration, day 7	0 ... 24	0	Ore
AS	AS44	50401	BYTE			49539,4	Y	RW	Event hour, day 7	0 ... 23	0	Ore
AS	AS45	50402	BYTE			49539,6	Y	RW	Event minutes, day 7	0 ... 59	0	Minuti
HP	HP00	50408	BYTE			49534,6	Y	RW	Select heat pump 1 lock probe	0 ... 7	0	num
HP	HP01	17642	WORD	Y	-1	49535	N	RW	Heat pump 1 lock setpoint	-500 ... 999	0	°C
HP	HP02	17644	WORD		-1	49535,2	N	RW	Heat pump 1 lock hysteresis	1 ... 255	20	°C
HP	HP03	17646	WORD	Y	-1	49535,4	Y	RW	Heat pump 1 lock maximum dynamic differential	-500 ... 999	0	°C
HP	HP04	17648	WORD	Y	-1	49535,6	Y	RW	Heat pump 1 lock dynamic differential setpoint	-500 ... 999	0	°C
HP	HP05	17650	WORD	Y	-1	49536	Y	RW	Heat pump 1 lock dynamic differential proportional band	-500 ... 999	0	°C
HP	HP10	50424	BYTE			49536,2	Y	RW	Select heat 2 pump lock probe	0 ... 7	0	num
HP	HP11	17658	WORD	Y	-1	49536,4	N	RW	Heat pump 2 lock setpoint	-500 ... 999	450	°C
HP	HP12	17660	WORD	Y	-1	49536,6	N	RW	Heat pump 2 lock hysteresis	1 ... 255	20	°C
PL	PL00	17676	WORD		-1	49537	Y	RW	Power limitation proportional band on external temperature	0 ... 255	0	°C
PL	PL01	17678	WORD	Y	-1	49537,2	N	RW	External temperature setpoint for power limitation in Cool	-500 ... 999	500	°C
PL	PL02	17680	WORD	Y	-1	49537,4	N	RW	External temperature setpoint for power limitation in Heat	-500 ... 999	-50	°C
PL	PL10	17686	WORD		-1	49537,6	Y	RW	Power limitation proportional band on water/air temperature	0 ... 255	0	°C
PL	PL11	50456	BYTE			49538	Y	RW	Power limitation probe selection on water/air temperature	0 ... 6	2	Num
PL	PL12	17690	WORD	Y	-1	49538,2	N	RW	High temperature setpoint for power limitation	-500 ... 999	500	°C
PL	PL13	17692	WORD	Y	-1	49538,4	N	RW	Low temperature setpoint for power limitation	-500 ... 999	50	°C
PL	PL20	17694	WORD		-1	49538,6	Y	RW	Power limitation proportional band on pressure	0 ... 255	0	Bar
PL	PL21	17696	WORD	Y	-1	49539	N	RW	High pressure setpoint for power limitation	-500 ... 999	400	Bar
PL	PL22	17698	WORD	Y	-1	49539,2	N	RW	Low pressure setpoint for power limitation	-500 ... 999	30	Bar

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
tE	tE00	50688	BYTE			49544,6	Y	RW	Enable time band operation	0 ... 1	0	Num
tE	tE01	50689	BYTE			49545	Y	RW	Select profile, day 1	1 ... 3	1	Num
tE	tE02	50690	BYTE			49545,2	Y	RW	Select profile, day 2	1 ... 3	1	Num
tE	tE03	50691	BYTE			49545,4	Y	RW	Select profile, day 3	1 ... 3	1	Num
tE	tE04	50692	BYTE			49545,6	Y	RW	Select profile, day 4	1 ... 3	1	Num
tE	tE05	50693	BYTE			49546	Y	RW	Select profile, day 5	1 ... 3	1	Num
tE	tE06	50694	BYTE			49546,2	Y	RW	Select profile, day 6	1 ... 3	2	Num
tE	tE07	50695	BYTE			49546,4	Y	RW	Select profile, day 7	1 ... 3	3	Num
tE	tE10	50700	BYTE			49546,6	Y	RW	Event start time hour 1, profile 1	0 ... 23	7	Ore
tE	tE11	50701	BYTE			49547	Y	RW	Event start time minutes 1, profile 1	0 ... 59	0	Minuti
tE	tE12	50702	BYTE			49547,2	Y	RW	Operating mode from event 1, profile 1	0 ... 1	0	Num
tE	tE13	17936	WORD	Y	-1	49547,4	N	RW	Cool mode temperature regulator setpoint, from event 1, profile 1	tr11 ... tr12	120	°C
tE	tE14	17938	WORD	Y	-1	49547,6	N	RW	Heat mode temperature regulator setpoint, from event 1, profile 1	tr21 ... tr22	400	°C
tE	tE15	17940	WORD	Y	-1	49548	N	RW	Sanitary water set point from event 1, profile 1	AS02 ... AS03	450	°C
tE	tE17	50712	BYTE			49548,2	Y	RW	Event start time hour 2, profile 1	0 ... 23	12	Ore
tE	tE18	50713	BYTE			49548,4	Y	RW	Event start time minutes 2, profile 1	0 ... 59	0	Minuti
tE	tE19	50714	BYTE			49548,6	Y	RW	Operating mode from event 2, profile 1	0 ... 1	0	Num
tE	tE20	17948	WORD	Y	-1	49549	N	RW	Cool mode temperature regulator setpoint, from event 2, profile 1	tr11 ... tr12	120	°C
tE	tE21	17950	WORD	Y	-1	49549,2	N	RW	Heat mode temperature regulator setpoint, from event 2, profile 1	tr21 ... tr22	400	°C
tE	tE22	17952	WORD	Y	-1	49549,4	N	RW	Sanitary water set point from event 2, profile 1	AS02 ... AS03	450	°C
tE	tE24	50724	BYTE			49549,6	Y	RW	Event start time hour 3, profile 1	0 ... 23	15	Ore

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
tE	tE25	50725	BYTE			49550	Y	RW	Event start time minutes 3, profile 1	0 ... 59	0	Minuti
tE	tE26	50726	BYTE			49550,2	Y	RW	Operating mode from event 3, profile 1	0 ... 1	0	Num
tE	tE27	17960	WORD	Y	-1	49550,4	N	RW	Cool mode temperature regulator setpoint, from event 3, profile 1	tr11 ... tr12	120	°C
tE	tE28	17962	WORD	Y	-1	49550,6	N	RW	Heat mode temperature regulator setpoint, from event 3, profile 1	tr21 ... tr22	400	°C
tE	tE29	17964	WORD	Y	-1	49551	N	RW	Sanitary water set point from event 3, profile 1	AS02 ... AS03	450	°C
tE	tE31	50736	BYTE			49551,2	Y	RW	Event start time hour 4, profile 1	0 ... 23	22	Ore
tE	tE32	50737	BYTE			49551,4	Y	RW	Event start time minutes 4, profile 1	0 ... 59	0	Minuti
tE	tE33	50738	BYTE			49551,6	Y	RW	Operating mode from event 4, profile 1	0 ... 1	0	Num
tE	tE34	17972	WORD	Y	-1	49552	N	RW	Cool mode temperature regulator setpoint, from event 4, profile 1	tr11 ... tr12	120	°C
tE	tE35	17974	WORD	Y	-1	49552,2	N	RW	Heat mode temperature regulator setpoint, from event 4, profile 1	tr21 ... tr22	400	°C
tE	tE36	17976	WORD	Y	-1	49552,4	N	RW	Sanitary water set point from event 4, profile 1	AS02 ... AS03	450	°C
tE	tE38	50748	BYTE			49552,6	Y	RW	Event start time hour 1, profile 2	0 ... 23	7	Ore
tE	tE39	50749	BYTE			49553	Y	RW	Event start time minutes 1, profile 2	0 ... 59	0	Minuti
tE	tE40	50750	BYTE			49553,2	Y	RW	Operating mode from event 1, profile 2	0 ... 1	0	Num
tE	tE41	17984	WORD	Y	-1	49553,4	N	RW	Cool mode temperature regulator setpoint, from event 1, profile 2	tr11 ... tr12	120	°C
tE	tE42	17986	WORD	Y	-1	49553,6	N	RW	Heat mode temperature regulator setpoint, from event 1, profile 2	tr21 ... tr22	400	°C
tE	tE43	17988	WORD	Y	-1	49554	N	RW	Sanitary water set point from event 1, profile 2	AS02 ... AS03	450	°C
tE	tE45	50760	BYTE			49554,2	Y	RW	Event start time hour 2, profile 2	0 ... 23	12	Ore
tE	tE46	50761	BYTE			49554,4	Y	RW	Event start time minutes 2, profile 2	0 ... 59	0	Minuti
tE	tE47	50762	BYTE			49554,6	Y	RW	Operating mode from event 2, profile 2	0 ... 1	0	Num
tE	tE48	17996	WORD	Y	-1	49555	N	RW	Cool mode temperature regulator setpoint, from event 2, profile 2	tr11 ... tr12	120	°C

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
tE	tE49	17998	WORD	Y	-1	49555,2	N	RW	Heat mode temperature regulator setpoint, from event 2, profile 2	tr21 ... tr22	400	°C
tE	tE50	18000	WORD	Y	-1	49555,4	N	RW	Sanitary water set point from event 2, profile 2	AS02 ... AS03	450	°C
tE	tE52	50772	BYTE			49555,6	Y	RW	Event start time hour 3, profile 2	0 ... 23	15	Ore
tE	tE53	50773	BYTE			49556	Y	RW	Event start time minutes 3, profile 2	0 ... 59	0	Minuti
tE	tE54	50774	BYTE			49556,2	Y	RW	Operating mode from event 3, profile 2	0 ... 1	0	Num
tE	tE55	18008	WORD	Y	-1	49556,4	N	RW	Cool mode temperature regulator setpoint, from event 3, profile 2	tr11 ... tr12	120	°C
tE	tE56	18010	WORD	Y	-1	49556,6	N	RW	Heat mode temperature regulator setpoint, from event 3, profile 2	tr21 ... tr22	400	°C
tE	tE57	18012	WORD	Y	-1	49557	N	RW	Sanitary water set point from event 3, profile 2	AS02 ... AS03	450	°C
tE	tE59	50784	BYTE			49557,2	Y	RW	Event start time hour 4, profile 2	0 ... 23	22	Ore
tE	tE60	50785	BYTE			49557,4	Y	RW	Event start time minutes 4, profile 2	0 ... 59	0	Minuti
tE	tE61	50786	BYTE			49557,6	Y	RW	Operating mode from event 4, profile 2	0 ... 1	0	Num
tE	tE62	18020	WORD	Y	-1	49558	N	RW	Cool mode temperature regulator setpoint, from event 4, profile 2	tr11 ... tr12	120	°C
tE	tE63	18022	WORD	Y	-1	49558,2	N	RW	Heat mode temperature regulator setpoint, from event 4, profile 2	tr21 ... tr22	400	°C
tE	tE64	18024	WORD	Y	-1	49558,4	N	RW	Sanitary water set point from event 4, profile 2	AS02 ... AS03	450	°C
tE	tE66	50796	BYTE			49558,6	Y	RW	Event start time hour 1, profile 3	0 ... 23	7	Ore
tE	tE67	50797	BYTE			49559	Y	RW	Event start time minutes 1, profile 3	0 ... 59	0	Minuti
tE	tE68	50798	BYTE			49559,2	Y	RW	Operating mode from event 1, profile 3	0 ... 1	0	Num
tE	tE69	18032	WORD	Y	-1	49559,4	N	RW	Cool mode temperature regulator setpoint, from event 1, profile 3	tr11 ... tr12	120	°C
tE	tE70	18034	WORD	Y	-1	49559,6	N	RW	Heat mode temperature regulator setpoint, from event 1, profile 3	tr21 ... tr22	400	°C
tE	tE71	18036	WORD	Y	-1	49560	N	RW	Sanitary water set point from event 1, profile 3	AS02 ... AS03	450	°C
tE	tE73	50808	BYTE			49560,2	Y	RW	Event start time hour 2, profile 3	0 ... 23	12	Ore

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
tE	*tE74*	50809	BYTE			49560,4	Y	RW	Event start time minutes 2, profile 3	0 ... 59	0	Minuti
tE	*tE75*	50810	BYTE			49560,6	Y	RW	Operating mode from event 2, profile 3	0 ... 1	0	Num
tE	*tE76*	18044	WORD	Y	-1	49561	N	RW	Cool mode temperature regulator setpoint, from event 2, profile 3	*tr11* ... *tr12*	120	°C
tE	*tE77*	18046	WORD	Y	-1	49561,2	N	RW	Heat mode temperature regulator setpoint, from event 2, profile 3	*tr21* ... *tr22*	400	°C
tE	*tE78*	18048	WORD	Y	-1	49561,4	N	RW	Sanitary water set point from event 2, profile 3	*AS02* ... *AS03*	450	°C
tE	*tE80*	50820	BYTE			49561,6	Y	RW	Event start time hour 3, profile 3	0 ... 23	15	Ore
tE	*tE81*	50821	BYTE			49562	Y	RW	Event start time minutes 3, profile 3	0 ... 59	0	Minuti
tE	*tE82*	50822	BYTE			49562,2	Y	RW	Operating mode from event 3, profile 3	0 ... 1	0	Num
tE	*tE83*	18056	WORD	Y	-1	49562,4	N	RW	Cool mode temperature regulator setpoint, from event 3, profile 3	*tr11* ... *tr12*	120	°C
tE	*tE84*	18058	WORD	Y	-1	49562,6	N	RW	Heat mode temperature regulator setpoint, from event 3, profile 3	*tr21* ... *tr22*	400	°C
tE	*tE85*	18060	WORD	Y	-1	49563	N	RW	Sanitary water set point from event 3, profile 3	*AS02* ... *AS03*	450	°C
tE	*tE87*	50832	BYTE			49563,2	Y	RW	Event start time hour 4, profile 3	0 ... 23	22	Ore
tE	*tE88*	50833	BYTE			49563,4	Y	RW	Event start time minutes 4, profile 3	0 ... 59	0	Minuti
tE	*tE89*	50834	BYTE			49563,6	Y	RW	Operating mode from event 4, profile 3	0 ... 1	0	Num
tE	*tE90*	18068	WORD	Y	-1	49564	N	RW	Cool mode temperature regulator setpoint, from event 4, profile 3	*tr11* ... *tr12*	120	°C
tE	*tE91*	18070	WORD	Y	-1	49564,2	N	RW	Heat mode temperature regulator setpoint, from event 4, profile 3	*tr21* ... *tr22*	400	°C
tE	*tE92*	18072	WORD	Y	-1	49564,4	N	RW	Sanitary water set point from event 4, profile 3	*AS02* ... *AS03*	450	°C
AL	*AL00*	50572	BYTE			49564,6	Y	RW	Time interval in which alarm events are counted	1 ... 99	60	Min
AL	*AL01*	50573	BYTE			49565	Y	RW	Maximum number of historical events per alarm message	0 ... 99	99	num
AL	*AL10*	50580	BYTE			49565,2	Y	RW	Number of high pressure *alarms*	1 ... 255	1	num
AL	*AL11*	50581	BYTE			49565,4	Y	RW	Low pressure alarm bypass time	0 ... 255	120	sec
AL	*AL12*	50582	BYTE			49565,6	Y	RW	Number of low pressure *alarms*	1 ... 255	3	num

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
AL	*AL13*	50583	BYTE			49566	Y	RW	Enable low pressure alarm during *defrost*	0 ... 1	0	num
AL	*AL14*	50584	BYTE			49566,2	Y	RW	Flow switch bypass time after primary circuit water pump enabled	0 ... 255	15	sec
AL	*AL15*	50585	BYTE			49566,4	Y	RW	Flow switch activation/deactivation time on internal circuit automatic alarm	0 ... 255	2	sec
AL	*AL16*	50586	BYTE			49566,6	Y	RW	Enable flow switch time for primary circuit manual alarm	0 ... 255	2	Sec x 10
AL	*AL17*	50587	BYTE			49567	Y	RW	Flow switch bypass time after open-circuit pump activated	0 ... 255	15	sec
AL	*AL18*	50588	BYTE			49567,2	Y	RW	Flow switch activation/deactivation time on external circuit automatic alarm	0 ... 255	2	sec
AL	*AL19*	50589	BYTE			49567,4	Y	RW	Time flow switch on before open-circuit manual alarm	0 ... 255	2	sec x 10
AL	*AL20*	50590	BYTE			49567,6	Y	RW	Bypass compressor thermal switch alarm time	0 ... 255	1	sec
AL	*AL21*	50591	BYTE			49568	Y	RW	Number of compressor thermal switch *alarms*	1 ... 255	1	num
AL	*AL22*	50592	BYTE			49568,2	Y	RW	Compressor oil pressure switch alarm bypass time	0 ... 255	1	sec
AL	*AL23*	50593	BYTE			49568,4	Y	RW	Number of compressor oil pressure switch *alarms*	1 ... 255	1	num
AL	*AL24*	50594	BYTE			49568,6	Y	RW	Number of primary intercooler fan thermal switch *alarms*	1 ... 255	1	num
AL	*AL25*	50595	BYTE			49569	Y	RW	Number of open-system intercooler fan thermal switch *alarms*	1 ... 255	1	num
AL	*AL26*	50596	BYTE			49569,2	Y	RW	Number of primary circuit pump thermal switch *alarms*	1 ... 255	2	num
AL	*AL27*	50597	BYTE			49569,4	Y	RW	Number of open-system pump thermal switch *alarms*	1 ... 255	2	num
AL	*AL40*	17840	WORD	Y	-1	49569,6	N	RW	High pressure alarm regulator setpoint from analogue input	-500 ... 999	420	Bar
AL	*AL41*	17842	WORD		-1	49570	N	RW	High pressure alarm regulator hysteresis from analogue input	1 ... 255	20	Bar
AL	*AL42*	50612	BYTE			49570,2	Y	RW	Number of high pressure *alarms* from analogue input	1 ... 255	1	num
AL	*AL43*	50613	BYTE			49570,4	Y	RW	Low pressure alarm bypass time from analogue input	0 ... 255	10	sec
AL	*AL44*	17846	WORD	Y	-1	49570,6	N		Low pressure alarm regulator setpoint from analogue input	-500 ... 999	20	Bar
AL	*AL45*	17848	WORD		-1	49571	N	RW	Low pressure alarm regulator hysteresis from analogue input	1 ... 255	20	Bar

FOLDER	LABEL	VALUE PAR ADDRESS	DATA SIZE	CPL	EXP	VIS PAR ADDRESS	RESET (Y/N)	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
AL	*AL46*	50618	BYTE			49571,2	Y	RW	Number of low pressure *alarms* from analogue input	1 ... 255	2	num
AL	*AL47*	17852	WORD	Y	-1	49571,4	N	RW	High temperature alarm regulator setpoint from analogue input	-500 ... 999	800	°C
AL	*AL48*	17854	WORD		-1	49571,6	N	RW	High temperature alarm regulator hysteresis from analogue input	1 ... 255	20	°C
AL	*AL49*	50624	BYTE			49572	Y	RW	High temperature time per alarm	0 ... 255	30	sec x 10
AL	*AL50*	50625	BYTE			49572,2	Y	RW	Primary circuit anti-freeze alarm bypass time	0 ... 255	1	min
AL	*AL51*	17858	WORD	Y	-1	49572,4	N	RW	Primary circuit anti-freeze regulator setpoint alarm	-500 ... 999	40	°C
AL	*AL52*	17860	WORD		-1	49572,6	N	RW	Primary circuit anti-freeze regulator hysteresis alarm	1 ... 255	20	°C
AL	*AL53*	50630	BYTE			49573	Y	RW	Number of primary circuit anti-freeze *alarms*	1 ... 255	1	num
AL	*AL54*	50631	BYTE			49573,2	Y	RW	Open-system circuit anti-freeze alarm bypass time	0 ... 255	1	min
AL	*AL55*	17864	WORD	Y	-1	49573,4	N	RW	Open-system circuit anti-freeze regulator setpoint alarm	-500 ... 999	40	°C
AL	*AL56*	17866	WORD		-1	49573,6	N	RW	Open-system circuit anti-freeze regulator hysteresis alarm	1 ... 255	20	°C
AL	*AL57*	50636	BYTE			49574	Y	RW	Number of open-system anti-freeze *alarms*	1 ... 255	1	num
AL	*AL70*	50640	BYTE			49574,2	Y	RW	Enable gas low in plant alarm	0 ... 1	0	num
AL	*AL71*	50641	BYTE			49574,4	Y	RW	Gas low in plant alarm bypass time	0 ... 255	5	min
AL	*AL72*	17874	WORD		-1	49574,6	N	RW	Gas low in plant alarm differential	0 ... 255	20	°C
AL	*AL73*	50644	BYTE			49575	Y	RW	Time gas low in plant before alarm	0 ... 255	30	min
AL	*AL80*	50652	BYTE			49575,2	Y	RW	Compressor start time on maintenance signal	0 ... 255	0	orex100
AL	*AL81*	50653	BYTE			49575,4	Y	RW	Internal pump start time on maintenance signal	0 ... 255	0	orex100
AL	*AL82*	50654	BYTE			49575,6	Y	RW	Internal pump start time on maintenance signal	0 ... 255	0	orex100

25.2.2 Folder visibility table

LABEL	ADDRESS	*R/W*	DESCRIPTION	*DATA SIZE*	*RANGE*	*DEFAULT*	*U.M.*
_VisSt0	**49424**	RW	*Folder* Ai visibility	2 bit	0 ... 3	3	num
_VisSt1	**49424,2**	RW	*Folder* di visibility	2 bit	0 ... 3	3	num
_VisSt2	**49424,4**	RW	*Folder* AO visibility	2 bit	0 ... 3	3	num
_VisSt3	**49424,6**	RW	*Folder* dO visibility	2 bit	0 ... 3	3	num
_VisSt4	**49425**	RW	*Folder* SP visibility	2 bit	0 ... 3	3	num
_VisSt5	**49425,2**	RW	*Folder* Sr visibility	2 bit	0 ... 3	3	num
_VisSt6	**49425,4**	RW	*Folder* Hr visibility	2 bit	0 ... 3	3	num
_VisPa0	**49425,6**	RW	*Folder* Par visibility	2 bit	0 ... 3	3	num
_VisPa1	**49426**	RW	*Folder* FnC visibility	2 bit	0 ... 3	3	num
_VisPa2	**49426,2**	RW	*Folder* PASS visibility	2 bit	0 ... 3	3	num
_VisPa3	**49426,4**	RW	*Folder* EU visibility	2 bit	0 ... 3	3	num
_VisSSp0	**49426,6**	RW	*Folder* SP\COOL visibility	2 bit	0 ... 3	3	num
_VisSSp1	**49427**	RW	*Folder* SP\HEAT visibility	2 bit	0 ... 3	3	num
_VisSSr0	**49427,2**	RW	*Folder* Sr\COOL visibility	2 bit	0 ... 3	3	num
_VisSSr1	**49427,4**	RW	*Folder* Sr\HEAT visibility	2 bit	0 ... 3	3	num
_VisPP0	**49427,6**	RW	*Folder* Par\CL visibility	2 bit	0 ... 3	3	num
_VisPP1	**49428**	RW	*Folder* Par\Cr visibility	2 bit	0 ... 3	3	num
_VisPP3	**49428,4**	RW	*Folder* Par\CF visibility	2 bit	0 ... 3	3	num
_VisPP4	**49428,6**	RW	*Folder* Par\Ui visibility	2 bit	0 ... 3	3	num
_VisPP5	**49429**	RW	*Folder* Par\tr visibility	2 bit	0 ... 3	3	num
_VisPP6	**49429,2**	RW	*Folder* Par\St visibility	2 bit	0 ... 3	3	num
_VisPP7	**49429,4**	RW	*Folder* Par\CP visibility	2 bit	0 ... 3	3	num
_VisPP8	**49429,6**	RW	*Folder* Par\Pi visibility	2 bit	0 ... 3	3	num
_VisPP9	**49430**	RW	*Folder* Par\Fi visibility	2 bit	0 ... 3	3	num
_VisPP10	**49430,2**	RW	*Folder* Par\FE visibility	2 bit	0 ... 3	3	num
_VisPP11	**49430,4**	RW	*Folder* Par\PE visibility	2 bit	0 ... 3	3	num
_VisPP12	**49430,6**	RW	*Folder* Par\Hi visibility	2 bit	0 ... 3	3	num
_VisPP13	**49431**	RW	*Folder* Par\HE visibility	2 bit	0 ... 3	3	num
_VisPP14	**49431,2**	RW	*Folder* Par\HA visibility	2 bit	0 ... 3	3	num

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	DEFAULT	U.M.
_VisPP15	**49431,4**	RW	*Folder* Par\br visibility	2 bit	0 ... 3	3	num
_VisPP17	**49432**	RW	*Folder* Par\dF visibility	2 bit	0 ... 3	3	num
_VisPP18	**49432,2**	RW	*Folder* Par\dS visibility	2 bit	0 ... 3	3	num
_VisPP19	**49432,4**	RW	*Folder* Par\Ad visibility	2 bit	0 ... 3	3	num
_VisPP20	**49432,6**	RW	*Folder* Par\AF visibility	2 bit	0 ... 3	3	num
_VisPP21	**49433**	RW	*Folder* Par\AS visibility	2 bit	0 ... 3	3	num
_VisPP22	**49433,2**	RW	*Folder* Par\HP visibility	2 bit	0 ... 3	3	num
_VisPP23	**49433,4**	RW	*Folder* Par\PL visibility	2 bit	0 ... 3	3	num
_VisPP24	**49433,6**	RW	*Folder* Par\tE visibility	2 bit	0 ... 3	3	num
_VisPP25	**49434**	RW	*Folder* Par\AL visibility	2 bit	0 ... 3	3	num
_VisPF0	**49434,4**	RW	*Folder* FnC\dEF visibility	2 bit	0 ... 3	3	num
_VisPF1	**49434,6**	RW	*Folder* FnC\tA visibility	2 bit	0 ... 3	3	num
_VisPF2	**49435**	RW	*Folder* FnC\St visibility	2 bit	0 ... 3	3	num
_VisPF3	**49435,2**	RW	*Folder* FnC\CC visibility	2 bit	0 ... 3	3	num
_VisPF4	**49435,4**	RW	*Folder* FnC\Eur visibility	2 bit	0 ... 3	3	num
_VisPFCC0	**49576**	RW	*Folder* FnC\CC\UL visibility	2 bit	0 ... 3	3	num
_VisPFCC1	**49576,2**	RW	*Folder* FnC\CC\dL visibility	2 bit	0 ... 3	3	num
_VisPFCC2	**49576,4**	RW	*Folder* FnC\CC\Fr visibility	2 bit	0 ... 3	3	num

25.2.3 Client Table

RESOURCE	*LABEL*	ADDRESS	*DATA SIZE*	*CPL*	*EXP*	*R/W*	DESCRIPTION	*RANGE*	*DEFAULT*	M.U.
AI	LocalAInput[0]	412	WORD	Y	-1	R	Analogue input AIL1	-500 ... 999	0	°C
AI	LocalAInput[1]	414	WORD	Y	-1	R	Analogue input AIL2	-500 ... 999	0	°C
AI	LocalAInput[2]	416	WORD	Y	-1	R	Analogue input AIL3	-500 ... 999	0	°C/Bar
AI	LocalAInput[3]	418	WORD	Y	-1	R	Analogue input AIL4	-500 ... 999	0	°C/Bar
AI	LocalAInput[4]	420	WORD	Y	-1	R	Analogue input AIL5	-500 ... 999	0	°C
DI	LocalDigInput DIL1	33158	1 bit			R	Digital input DIL1	0 ... 1	0	num
DI	LocalDigInput DIL2	33158,1	1 bit			R	Digital input DIL2	0 ... 1	0	num
DI	LocalDigInput DIL3	33158,2	1 bit			R	Digital input DIL3	0 ... 1	0	num
DI	LocalDigInput DIL4	33158,3	1 bit			R	Digital input DIL4	0 ... 1	0	num
DI	LocalDigInput DIL5	33158,4	1 bit			R	Digital input DIL5	0 ... 1	0	num
DI	LocalDigInput DIL6	33158,5	1 bit			R	Digital input DIL6	0 ... 1	0	num
DI	LocalDigInput DIL7	33158,6	1 bit			R	Digital input DIL7	0 ... 1	0	num
DO	LocalDigOutput DOL1	33159,2	1 bit			R	Digital output DOL1	0 ... 1	0	num
DO	LocalDigOutput DOL2	33159,3	1 bit			R	Digital output DOL2	0 ... 1	0	num
DO	LocalDigOutput DOL3	33159,4	1 bit			R	Digital output DOL3	0 ... 1	0	num
DO	LocalDigOutput DOL4	33159	1 bit			R	Digital output DOL4	0 ... 1	0	num
DO	LocalDigOutput DOL5	33159,1	1 bit			R	Digital output DOL5	0 ... 1	0	num
DO	LocalDigOutput DOL6	33159,5	1 bit			R	Digital output DOL6	0 ... 1	0	num
AO	LocalDigOutput AOL1	33159,6	1 bit			R	Digital output AOL1	0 ... 1	0	num
AO	LocalDigOutput AOL2	33159,7	1 bit			R	Digital output AOL2	0 ... 1	0	num
AO	Analog.Out TC1	33224	BYTE	Y		R	Analogue output TCL1	0 ... 100	0	num
AO	Analog.Out AOL1	33225	BYTE	Y		R	Analogue output AOL1	0 ... 100	0	num
AO	Analog.Out AOL2	33226	BYTE	Y		R	Analogue output AOL2	0 ... 100	0	num
AO	Analog.Out ALO3	466	WORD	Y	-1	R	Analogue output AOL3	0 ... 999	0	num
AO	Analog.Out AOL4	468	WORD	Y	-1	R	Analogue output AOL4	0 ... 999	0	num
AO	Analog.Out AOL5	470	WORD	Y	-1	R	Analogue output AOL5	0 ... 999	0	num
AI	RemAInput[0]	854	WORD	Y	-1	R	Analogue input AIr1	-500 ... 999	0	°C

RESOURCE	*LABEL*	ADDRESS	*DATA SIZE*	*CPL*	*EXP*	*R/W*	DESCRIPTION	*RANGE*	*DEFAULT*	M.U.
AI	RemAInput[1]	856	WORD	Y	-1	R	Analogue input AIr2	-500 ... 999	0	°C/Bar
setpoint	Setpoint Cool reale	975	WORD	Y	-1	R	Cooling mode set point	-500 ... 999	0	°C
setpoint	Setpoint Heat reale	977	WORD	Y	-1	R	Heating mode set point	-500 ... 999	0	°C
setpoint	SBSetACSReale	1042	WORD	Y	-1	R	ACS or *anti-legionnaire's disease* setpoint	-500 ... 999	0	°C
hysteresis	Isteresi Cool reale	979	WORD	Y	-1	R	Cooling mode hysteresis	-500 ... 999	0	°C
hysteresis	Isteresi Heat reale	981	WORD	Y	-1	R	Heating mode hysteresis	-500 ... 999	0	°C
time	_TimMinOnOnCps	542	WORD			R	Compressors minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOfOfCps	544	WORD			R	Compressors minimum off/off time timer	0 ... 32768	0	s
time	_TimMinOnOnPrz	546	WORD			R	Capacity steps minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOfOfPrz	548	WORD			R	Capacity steps minimum off/off time timer	0 ... 32768	0	s
time	_TimMinOfOnCp0	550	WORD			R	Compressor 1 minimum off/on time timer	0 ... 32768	0	s
time	_TimMinOfOnCp1	552	WORD			R	Compressor 2 minimum off/on time timer	0 ... 32768	0	s
time	_TimMinOfOnCp2	554	WORD			R	Compressor 3 minimum off/on time timer	0 ... 32768	0	s
time	_TimMinOfOnCp3	556	WORD			R	Compressor 4 minimum off/on time timer	0 ... 32768	0	s
time	_TimMinOnOnCp0	558	WORD			R	Compressor 1 minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOnOnCp1	560	WORD			R	Compressor 2 minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOnOnCp2	562	WORD			R	Compressor 3 minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOnOnCp3	564	WORD			R	Compressor 4 minimum on/on time timer	0 ... 32768	0	s
time	_TimMinOnCp0	566	WORD			R	Compressor 1 minimum on time timer	0 ... 32768	0	s
time	_TimMinOnCp1	568	WORD			R	Compressor 2 minimum on time timer	0 ... 32768	0	s
time	_TimMinOnCp2	570	WORD			R	Compressor 3 minimum on time timer	0 ... 32768	0	s
time	_TimMinOnCp3	572	WORD			R	Compressor 4 minimum on time timer	0 ... 32768	0	s
time	_TimEntraSbriC1	582	WORD			R	Circuit 1 *defrost* interval/duration time timer	0 ... 32768	0	s
time	_TimEntraSbriC2	584	WORD			R	Circuit 2 *defrost* interval/duration time timer	0 ... 32768	0	s
time	_TimSgoccioC1	586	WORD			R	Circuit 1 dripping time timer	0 ... 32768	0	s
time	_TimSgoccioC2	588	WORD			R	Circuit 2 dripping time timer	0 ... 32768	0	s
time	_TimRitOnCpPomPri	592	WORD			R	Switch-on delay timer for compressors after primary pump	0 ... 32768	0	s
time	_TimRitOfPomPriCp	594	WORD			R	Switch-off delay timer for primary pump after compressors	0 ... 32768	0	s
time	_TimASPMaxAtt	676	WORD			R	Timer maximum ACS on time	0 ... 32768	0	s
time	_TimASPDisAtt	678	WORD			R	Timer minimum ACS off/on time	0 ... 32768	0	s

RESOURCE	*LABEL*	ADDRESS	*DATA SIZE*	*CPL*	*EXP*	*R/W*	DESCRIPTION	*RANGE*	*DEFAULT*	M.U.
time	_TimALPDisAtt	680	WORD			R	Timer minimum ACS off/on time for *anti-legionnaire's disease*	0 ... 32768	0	s
state	_SbrinOnC1	33812,2	1 bit			R	Defrosting status	0 ... 1	0	num
state	_SbrinOnC2	33812,3	1 bit			R	Defrosting status	0 ... 1	0	num
mode	_MemoOff	33028	1 bit			R	Device in OFF	0 ... 1	0	num
mode	_MemoRemotOff	33028,1	1 bit			R	Device in OFF	0 ... 1	0	num
mode	_MemoLocalStBy	33028,2	1 bit			R	Device in STAND BY	0 ... 1	0	num
mode	_MemoRemotStBy	33028,3	1 bit			R	Device in STAND BY	0 ... 1	0	num
mode	_MemoLocalCool	33028,4	1 bit			R	Device in COOL	0 ... 1	0	num
mode	_MemoRemotCool	33028,5	1 bit			R	Device in COOL	0 ... 1	0	num
mode	_MemoLocalHeat	33028,6	1 bit			R	Device in HEAT	0 ... 1	0	num
mode	_MemoRemotHeat	33028,7	1 bit			R	Device in HEAT	0 ... 1	0	num
counter	STCPOreFunz[0]	939	WORD			R	Operation hours compressor 1	0 ... 65535	0	h
counter	STCPOreFunz[1]	941	WORD			R	Operation hours compressor 2	0 ... 65535	0	h
counter	STCPOreFunz[2]	943	WORD			R	Operation hours compressor 3	0 ... 65535	0	h
counter	STCPOreFunz[3]	945	WORD			R	Operation hours compressor 4	0 ... 65535	0	h
counter	STPMOreFunz[0]	947	WORD			R	Operation hours pump 1	0 ... 65535	0	h
counter	STPMOreFunz[1]	949	WORD			R	Operation hours pump 2	0 ... 65535	0	h
counter	STPMOreFunz[2]	951	WORD			R	Operation hours pump 3	0 ... 65535	0	h
differential	SBDiffSetPoint	995	WORD	Y	-1	R	Temperature control set point dynamic differential	-500 ... 999	0	°C
offset	SBDiffAdaptive	997	WORD	Y	-1	R	*Adaptive function* offset	-500 ... 999	0	°C
differential	STDiffResPri	999	WORD	Y	-1	R	Integrated electric heater set point dynamic differential	-500 ... 999	0	°C
differential	STDiffBoiler	1001	WORD	Y	-1	R	Boiler set point dynamic differential	-500 ... 999	0	°C
setpoint	SBSetStartSbri	1009	WORD	Y	-1	R	*Defrost* start set point	-500 ... 999	0	°C
state	SBCircuiti[0].OutAttive	33791	BYTE			R	Temperature control steps supplied circuit 1	0 ... 4	0	num
state	SBCircuiti[0].OutAttive	33797	BYTE			R	Temperature control steps supplied circuit 2	0 ... 4	0	num
alarm	Er00	33104	1 bit			R	General alarm	0 ... 1	0	flag
alarm	Er01	33104,1	1 bit			R	Circuit 1 digital high pressure alarm	0 ... 1	0	flag
alarm	Er02	33104,2	1 bit			R	Circuit 2 digital high pressure alarm	0 ... 1	0	flag
alarm	Er03	33104,3	1 bit			R	Circuit 1 analogue high pressure alarm	0 ... 1	0	flag
alarm	Er04	33104,4	1 bit			R	Circuit 2 analogue high pressure alarm	0 ... 1	0	flag

RESOURCE	LABEL	ADDRESS	DATA SIZE	CPL	EXP	R/W	DESCRIPTION	RANGE	DEFAULT	M.U.
alarm	Er05	33104,5	1 bit			R	Circuit 1 digital low pressure alarm	0 ... 1	0	flag
alarm	Er06	33104,6	1 bit			R	Circuit 2 digital low pressure alarm	0 ... 1	0	flag
alarm	Er07	33104,7	1 bit			R	Circuit 1 analogue low pressure alarm	0 ... 1	0	flag
alarm	Er08	33105	1 bit			R	Circuit 2 analogue low pressure alarm	0 ... 1	0	flag
alarm	Er09	33105,1	1 bit			R	Machine low charge alarm	0 ... 1	0	flag
alarm	Er10	33105,2	1 bit			R	Compressor 1 thermal switch alarm	0 ... 1	0	flag
alarm	Er11	33105,3	1 bit			R	Compressor 2 thermal switch alarm	0 ... 1	0	flag
alarm	Er12	33105,4	1 bit			R	Compressor 3 thermal switch alarm	0 ... 1	0	flag
alarm	Er13	33105,5	1 bit			R	Compressor 4 thermal switch alarm	0 ... 1	0	flag
alarm	Er15	33105,7	1 bit			R	Compressor 1 oil pressure switch alarm	0 ... 1	0	flag
alarm	Er16	33106	1 bit			R	Compressor 2 oil pressure switch alarm	0 ... 1	0	flag
alarm	Er17	33106,1	1 bit			R	Compressor 3 oil pressure switch alarm	0 ... 1	0	flag
alarm	Er18	33106,2	1 bit			R	Compressor 4 oil pressure switch alarm	0 ... 1	0	flag
alarm	Er20	33106,4	1 bit			R	Primary circuit *flow switch alarm*	0 ... 1	0	flag
alarm	Er21	33106,5	1 bit			R	Primary circuit pump1 thermal switch alarm	0 ... 1	0	flag
alarm	Er22	33106,6	1 bit			R	Primary circuit pump2 thermal switch alarm	0 ... 1	0	flag
alarm	Er25	33107,1	1 bit			R	Primary circuit pump thermal switch alarm	0 ... 1	0	flag
alarm	Er26	33107,2	1 bit			R	Disposable circuit pump thermal switch alarm	0 ... 1	0	flag
alarm	Er30	33107,6	1 bit			R	Primary circuit antifreeze alarm	0 ... 1	0	flag
alarm	Er31	33107,7	1 bit			R	Disposable circuit antifreeze alarm	0 ... 1	0	flag
alarm	Er35	33108,3	1 bit			R	High temperature alarm	0 ... 1	0	flag
alarm	Er40	33109	1 bit			R	Primary exchanger fan thermal switch alarm	0 ... 1	0	flag
alarm	Er41	33109,1	1 bit			R	Circuit 1 external heat exchanger fan thermal switch alarm	0 ... 1	0	flag
alarm	Er42	33109,2	1 bit			R	Circuit 2 external heat exchanger fan thermal switch alarm	0 ... 1	0	flag
alarm	Er45	33109,5	1 bit			R	Faulty clock alarm	0 ... 1	0	flag
alarm	Er46	33109,6	1 bit			R	Time lost alarm	0 ... 1	0	flag
alarm	Er47	33109,7	1 bit			R	No communication with keyboard alarm	0 ... 1	0	flag
alarm	Er50	33110,2	1 bit			R	Primary exchanger electric heater 1 thermal switch alarm	0 ... 1	0	flag
alarm	Er51	33110,3	1 bit			R	Primary exchanger electric heater 2 thermal switch alarm	0 ... 1	0	flag
alarm	Er56	33111	1 bit			R	Auxiliary output alarm	0 ... 1	0	flag

RESOURCE	*LABEL*	ADDRESS	*DATA SIZE*	*CPL*	*EXP*	*R/W*	DESCRIPTION	*RANGE*	*DEFAULT*	M.U.
alarm	Er60	33111,4	1 bit			R	Primary exchanger water or air output temperature probe faulty alarm	0 ... 1	0	flag
alarm	Er61	33111,5	1 bit			R	Primary exchanger water or air input temperature probe faulty alarm	0 ... 1	0	flag
alarm	Er62	33111,6	1 bit			R	Faulty disposable exchanger temperature probe alarm	0 ... 1	0	flag
alarm	Er63	33111,7	1 bit			R	Faulty disposable exchanger water or air input temperature probe alarm	0 ... 1	0	flag
alarm	Er64	33112	1 bit			R	Faulty disposable exchanger water or air output temperature probe alarm	0 ... 1	0	flag
alarm	Er67	33112,3	1 bit			R	Faulty *display* probe alarm	0 ... 1	0	flag
alarm	Er68	33112,4	1 bit			R	Faulty external temperature probe alarm	0 ... 1	0	flag
alarm	Er69	33112,5	1 bit			R	Faulty circuit 1 o 2 high pressure transducer alarm	0 ... 1	0	flag
alarm	Er70	33112,6	1 bit			R	Faulty circuit 1 o 2 low pressure transducer alarm	0 ... 1	0	flag
alarm	Er73	33113,1	1 bit			R	Faulty dynamic set point input alarm	0 ... 1	0	flag
alarm	Er74	33113,2	1 bit			R	Faulty primary heat exchanger transducer alarm	0 ... 1	0	flag
alarm	Er75	33113,3	1 bit			R	Faulty disposable exchanger transducer 1 o 2 alarm	0 ... 1	0	flag
alarm	Er80	33114	1 bit			R	Configuration error alarm	0 ... 1	0	flag
alarm	Er81	33114,1	1 bit			R	Compressor operating hours exceeded warning	0 ... 1	0	flag
alarm	Er85	33114,5	1 bit			R	Primary circuit pump operating hours exceeded signal	0 ... 1	0	flag
alarm	Er86	33114,6	1 bit			R	External circuit pump operating hours exceeded signal	0 ... 1	0	flag
alarm	Er90	33115,2	1 bit			R	Alarm log full warning	0 ... 1	0	flag
net command	Reset allarmi	33532,2	1 bit			W	Alarm *manual reset*	0 ... 1	0	num
net command	COOL	33532,3	1 bit			W	Select mode COOL	0 ... 1	0	num
net command	HEAT	33532,4	1 bit			W	Select mode HEAT	0 ... 1	0	num
net command	STAND BY	33532,5	1 bit			W	Select mode STAND BY	0 ... 1	0	num
net command	DEF	33532,6	1 bit			W	*Manual defrost* activation	0 ... 1	0	num
net command	ON/OFF	33532,7	1 bit			W	Select mode ON/OFF	0 ... 1	0	num
net command	RemoteFormatStorAll	33533	1 bit			W	Reset alarm history	0 ... 1	0	num
net command	Remote_AS	33533,1	1 bit			W	Select mode AS	0 ... 1	0	num
net command	Remote_TogFascieOra	33533,2	1 bit			W	Enable/Disable band operation	0 ... 1	0	num

26 FUNCTIONS (FOLDER FNC)

The Functions menu is used to perform a number of manual functions such as switching the device on/off, acknowledging *alarms*, deleting the alarm history, running a *manual defrost* and using the *Multi Function key* (MFK).
A number of these operations can be done from the keyboard and main *display* using the *keys* - see User Interface chapter.
Functions associated to *keys* can be disabled and password-only access allowed to these functions at a "Service" level only via parameters (see Parameters chapter).
For more details, see the table below:

	folder	operation	Function activated by [key] if configured	Notes
FnC	dEF	*Manual defrost*	YES [UP]	
	tA	Reset *Alarms*	YES [UP+DOWN]	
	St	Switch device on/off	YES [DOWN]	
	CC	Copy Card Use (multi-function key)	NO	
	EUr	Reset alarm log	NO	

To open the Functions menu (*folder* Fnc) perform steps 1-4 as indicated below:

1		To view *folder* FnC in the main *display*, press the Esc and Set *keys* at the same time. [esc+set]
2		Pressing both *keys* will open the *Programming menu*: --- The first *folder* you will see is the PAr *folder*.
3		Scroll with the "Up" and "DOWN" *keys* until you find the FnC *folder*. --- Press the set key to open the Functions menu.
4		The first *label* you will see is dEF. --- Scroll using the "up" and "down" *keys* to find other labels/folders. In this order: • (dEF) • tA • St • CC • EUr

26.1 Manual defrost activation (dEF folder)

See 1-4	Press [esc + set] in the main screen. The *label* 'PAr' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' *label*. Press 'set'. The *label* 'dEF' will appear. Scroll with 'UP' and 'DOWN' to find the 'dEF' *label*
	Press the "set" key to activate *defrost* manually from the keyboard
	The *DEFROST* LED will start to blink.

26.2 Manual Reset (tA folder)

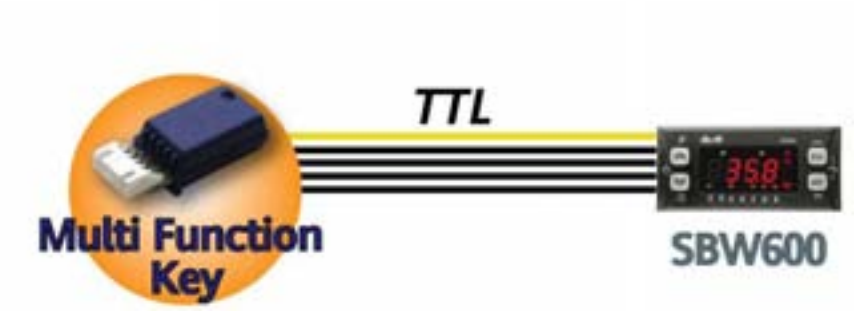
See 1-4	Press [esc + set] in the main screen. The *label* 'PAr' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' *label*. Press 'set'. The *label* 'dEF' will appear. Scroll with 'UP' and 'DOWN' to find the 'TA' *label*.
	Press the 'set' key for *manual reset* - - - - - - - - - NOTE: resetting an active alarm will save the alarm in the *alarms* log.

26.3 Change On/OFF state (folder St)

See 1-4	Press [esc + set] in the main screen. The *label* 'PAr' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' *label*. Press 'set'. The *label* 'dEF' will appear. Scroll with 'UP' and 'DOWN' to find the 'St' *label*.
	The *label* "OFF" will appear in the "St" *folder* if the device is ON, or "OFF", if the device is switched OFF locally or by remote
	Press the set key to change state from OFF to On --- or from On to OFF
	

26.4 Multi Function key

When connected to the Energy TTL *serial* port, the *Multi Function Key* (MFK) allows you to rapidly program device parameters (up/download parameter map to or from one or more devices of the same type) and also program the device's firmware.



Connecting the Multi Function Key

NOTE: The MFK and SBW600 connect with the **YELLOW cable.**

For fast parameter programming, the upload (*label* UL), download (*label* dL) and copy card formatting (*label* Fr) operations are as explained below:

UPLOAD (copy from DEVICE to *MULTI FUNCTION KEY*)
By doing this, the programming parameters and *alarms* log will be downloaded from Energy SBW600 to the *Multi Function Key*.

DOWNLOAD (copy from *MULTI FUNCTION KEY* to DEVICE)
By doing this, the programming parameters will be uploaded from the *Multi Function Key* to the device.

FORMAT*
Formatting the *Multi Function Key* consists of deleting the contents of the *Multi Function Key*
* This should be done prior to the Upload when used for the first time

See 1-4	**Upload / Download / Formatting** **The download procedure is illustrated in the figure.** Press [esc + set] in the main screen. The *label* 'PAr' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' *label*. Press 'set'. The *label* 'dEF' will appear. Scroll with 'UP' and 'DOWN' to find the 'CC' *label*
	The commands you need to use the *Multi Function Key* are in the "CC" *folder*. Press the 'set' key to access the functions.
	Scroll with the UP and DOWN *keys* to find the desired function: • UL for upload • dL for download • Fr for format Press the 'set' key and the upload (or download) will be performed. (in this example, dL- download) Wait for a few seconds...
 	Wait for a few seconds... If this completes successfully, 'yes' is displayed; otherwise 'Err' is displayed (°). On completion, remove the MFK.

26.4.1 Download from reset

Connect the key with the device OFF.

Download firmware

At start up, if a compatible firmware is loaded into the MFK (the MFK can be prepared fro this with the Device Manager software), the new firmware is downloaded into the device.
This happens as follows:

- firmware verification/update (MFK led flashes)
- termination with successful programming (MFK on fixed)
- switch off the device

If a compatible firmware is not loaded into the MFK, no download takes place.
If, on termination, the MFK led does not stay on fixed, the operation must be repeated as this means it failed.

Download parameters

On start up, if there is a compatible parameter map in the MFK, the programming parameters are loaded into the device;

	lamp test completed...
	**Example A** ...dLY... appears on the *display* If the procedure terminates successfully.
	**Example B** ...dLn... appears on the *display*. If the procedure does not complete successfully (°)
	In both cases, the device will be switched OFF locally (OFF appears on the *display*). When you press [DOWN] (°°), the device will operate: With the new map **Example A** With the previous map **Example B** Remove the Copy Card on completion (°°) see User Interface chapter, (*folder* Par/UI) local ON/OFF section *Change On/OFF state (folder St)* section

NOTES:

- If the MFK is loaded with both a compatible firmware and a compatible parameter map, the firmware is downloaded first and then (after the device has been switched off and back on again manually) the parameter map.
- The formatting function is ONLY REQUIRED FOR UPLOADING (**):
  - to use the *Multi Function Key* the first time (*Multi Function Key* that has never been used) and
  - to use the *Multi Function Key* with *models* that are not mutually compatible.
  - (**) a pre-programmed key supplied by Eliwell to DOWNLOAD parameters does not need to be formatted. **NOTE. Formatting can NOT be cancelled.**
- after the download operation, the instrument will work with the newly loaded parameters map/firmware.

- Remove the key on completion of the operation

(°) If the string Err / dLn (*download from reset*) appears:

- Check that the key is connected to the device
- Check the *Multi Function Key* - Energy SBW600 connection (check the TTL cable)
- Check that the key is compatible with the device
- Contact Eliwell technical support

26.5 Reset alarm log (folder EUr)

See 1-4	Press [esc + set] in the main screen. The *label* 'PAr' will appear. Scroll with 'UP' and 'DOWN' to find the 'FnC' *label*. Press 'set'. The *label* 'dEF' will appear. Scroll with 'UP' and 'DOWN' to find the 'EUr' *label*.
	Press the "set" key for 3 seconds [set]
	The 'YES' *label* appears to indicate that the alarm log has been deleted

27 ELECTRICAL CONNECTIONS

27.1 General warnings

IMPORTANT!
Make sure the machine is switched off before working on the *electrical connections*. The work must be done by qualified personnel. To ensure proper connections, comply with the following:
Power supplies other than those specified can seriously damage the system.
Use cables of suitable section for the terminals used.
Separate the cables of probes and *digital inputs* from inductive loads and high voltage connections to prevent any electromagnetic interference. Do not place the probe cables near other electrical equipment (switches, meters, etc.)
Make connections as short as possible and do not wind them around electrically connected parts.
To avoid causing static discharges, do not touch the electronic components on the boards.
Eliwell supplies the high voltage cables to connect the device to loads - see *Accessories* chapter
Eliwell supplies the signal cables to connect the power supply, probes, *digital inputs*, etc. - See the *Accessories* chapter
The device must be connected to a suitable *transformer* that complies with the specifications provided in the Specifications chapter.

27.1.1 Power supply - High voltage inputs (relay)

Do not exceed the maximum permitted current; for higher loads, use a contactor with sufficient power capacity.

Important!
Make sure that power supply is of the correct voltage for the device.

27.1.2 TRIAC

The *TRIAC* (TC1, TC2 for 63x *models*) output, when partialized, suppresses the half-wave at the zero-crossing.

27.1.3 Analogue inputs-Probes

Temperature probes

The *temperature probes* have no characteristic insertion polarity and can be extended using standard bipolar cable (note that extending cables can affect the performance of the device in terms of electromagnetic compatibility: take great care with the wiring).

Important!

Pressure probes

Pressure probes have a specific insertion polarity which must be observed.
Signal cables (temperature/*pressure probes*, *digital inputs*, TTL *serial*) must be cabled separately from high voltage cables.
Eliwell supplied cables are recommended. Contact the Eliwell sales department for item availability.

27.1.4 Serial connections TTL connection

TTL (COM 1)

Use a 5-wire TTL cable up to 30cm in length.
An Eliwell-supplied TTL cable is recommended. Contact the Eliwell sales department for item availability.

27.2 Wiring diagrams

Circuit diagram key

- SUPPLY — **SBW ● SDW ● SCW 63x 64x** Power supply 12-24V~;
- SUPPLY — **SBW ● SDW ● SCW 65x** Power supply 12-24V~ / 24V⎓
- 5 ⎓ — Auxiliary 5V ⎓ 20mA max supply
- 12 ⎓ — Auxiliary 12V ⎓ supply
- DO1...DO4, DO6 — 2A - 230Vac high voltage relay outputs
- DO1...DO3 — **SDW ● SCW 63x** 2A - 230Vac high voltage relay outputs
- N — Neutral
- TC1 — *TRIAC* 2A 230Vac high voltage output
- TC1, TC2 — **SDW ● SCW 63x** *TRIAC* 3A 230Vac high voltage output
- AO1 AO2 — Low voltage (SELV (§)) PWM *analogue outputs*
- AO3 AO4 — Low voltage (SELV (§)) 0...10V *analogue outputs*
- AO5 — Low voltage (SELV (§)) 0...20mA / 4...20mA *analogue outputs*
- DO5 — Open Collector low voltage output (SELV (§))
- DO4, DO5 — **SDW ● SCW 63x** Open Collector low voltage output (SELV (§))
- DI1...DI6 — No voltage *digital inputs* (°)
- AI1...AI2, AI5 — NTC* / Digital Input configurable analogue inputs***
- AI3...AI4 — NTC / voltage, current** / Digital Input configurable analogue inputs***
- GND — Ground
- LAN — Remote keyboard (KEYBoard) / SE600 (max 100m)
- TTL — TTL *serial* for connection to *Multi Function Key* / Device Manager
- RS-485 — RS-485 *Serial* for connection to *supervision* system

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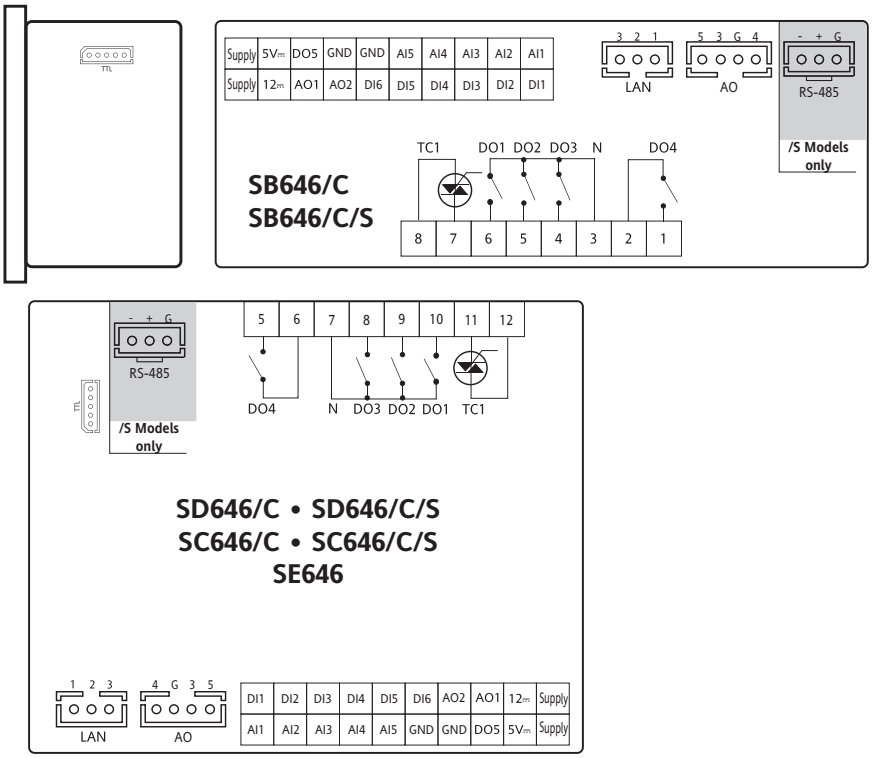
*SEMITEC 103AT type (10KΩ / 25°C)
**4...20mA current or 0...5V / 0...10V / 0...1V voltage input or no-voltage digital input
***no voltage digital input
(°) closing current for 0.5mA ground
(§) **SELV**: (SAFETY EXTRA LOW VOLTAGE)

27.2.1 Wiring Diagrams

646/C/S *models*

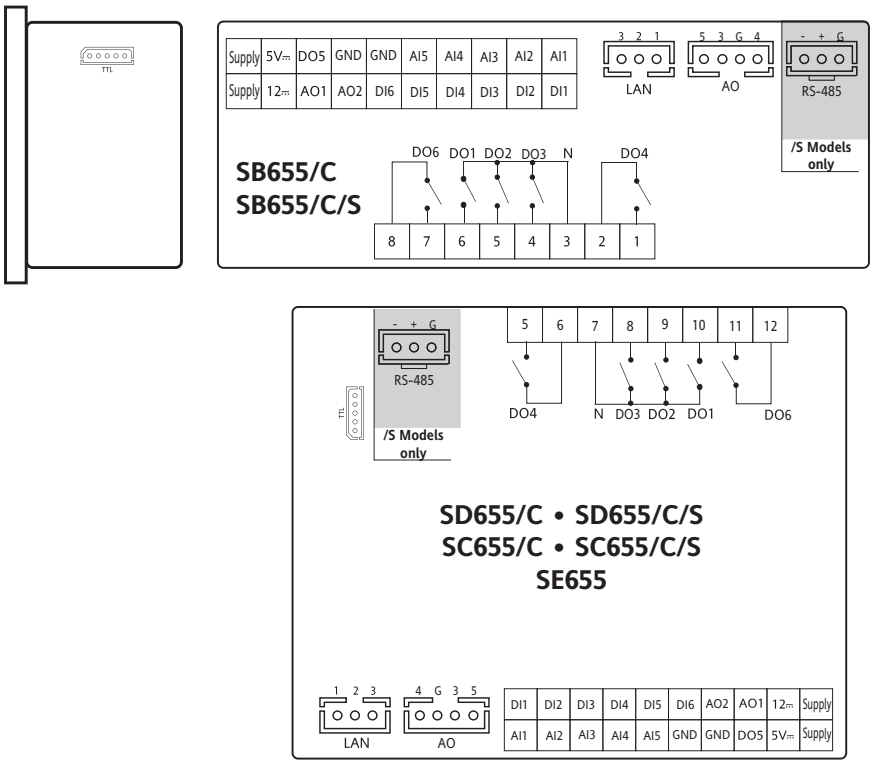


- **6** *digital inputs* [DI1...DI6] ● DI
- **4** high voltage *digital outputs* 2A 230Vac ● DO
- **6** *analogue outputs* ● AO:
  - o 1 high voltage [TC1] 2A 230Vac analogue output
  - o 2 PWM *analogue outputs* [AO1, AO2]
  - o 3 low voltage (SELV (§)) *analogue outputs*
    - 2 outputs [AO3-4] 0-10V
    - 1 output [AO5] 4...20mA/0...20mA
- **5** analogue inputs [AI1...AI5]
- 1 low voltage digital output (SELV (§)) [DO5]
  - o Open Collector

Model /S RS-485 on board

- /C RTC supplied as standard
- *TTL (COM 1)* supplied as standard
- LAN connection to remote keyboard KEYB / SE600
- (§) SELV: (SAFETY EXTRA LOW VOLTAGE)

655/C/S *models*



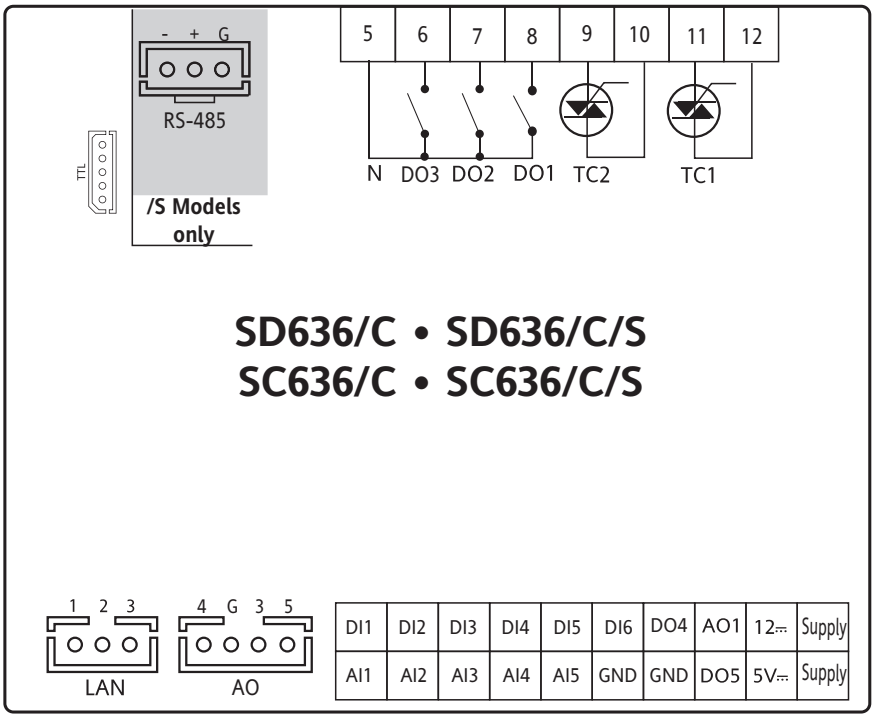
- **6** *digital inputs* [DI1...DI6] ● DI
- **5** high voltage *digital outputs* 2A 230Vac ● DO
- **5** *analogue outputs* ● AO:
  - 2 PWM *analogue outputs* [AO1, AO2]
  - 3 low voltage (SELV (§)) *analogue outputs*
    - 2 outputs [AO3-4] 0-10V
    - 1 output [AO5] 4...20mA/0...20mA

- **5** analogue inputs [AI1...AI5]
- 1 low voltage digital output (SELV (§)) [DO5]
  - Open Collector

Model /S RS-485 on board

- /C RTC supplied as standard
- *TTL (COM 1)* supplied as standard
- LAN connection to remote keyboard KEYB / SE600
- (§) SELV: (SAFETY EXTRA LOW VOLTAGE)

636/C/S *models*



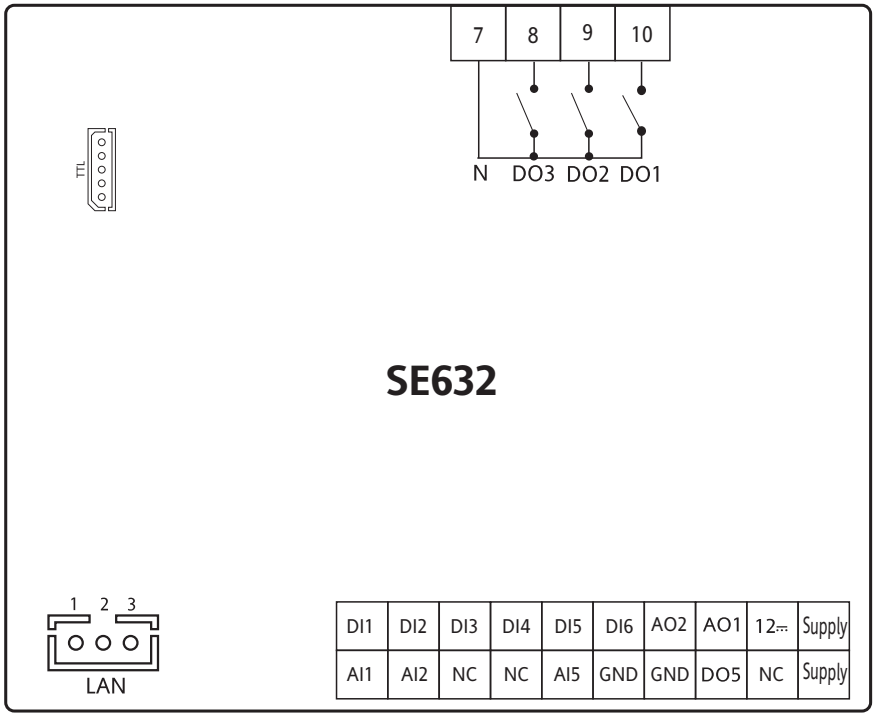
- **6** *digital inputs* [DI1...DI6] ● DI
- **3** high voltage *digital outputs* 2A 230Vac ● DO
- **6** *analogue outputs* ● AO:
  - 2 high voltage [TC1, TC2] 3A 230Vac analogue output
  - 1 PWM *analogue outputs* [AO1]
  - 3 low voltage (SELV (§)) *analogue outputs*
    - 2 outputs [AO3-4] 0-10V
    - 1 output [AO5] 4...20mA/0...20mA

- **5** analogue inputs [AI1...AI5]
- 2 low voltage digital output (SELV (§)) [DO4, DO5]
  - Open Collector

Model /S RS-485 on board

- /C RTC supplied as standard
- *TTL (COM 1)* supplied as standard
- LAN connection to remote keyboard KEYB / SE600
- (§) SELV: (SAFETY EXTRA LOW VOLTAGE)

632 model

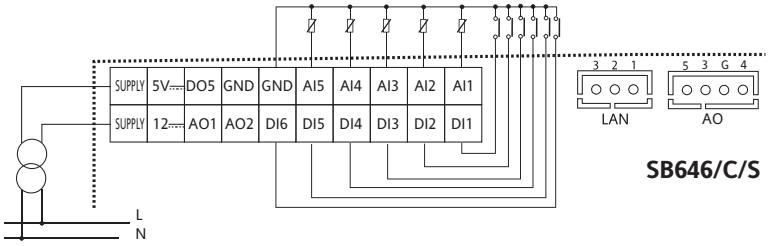


- **6** *digital inputs* [DI1...DI6] ● DI
- **3** high voltage *digital outputs* 2A 230Vac ● DO
- **2** *analogue outputs* ● AO:
  - 2 PWM *analogue outputs* [AO1, AO2]

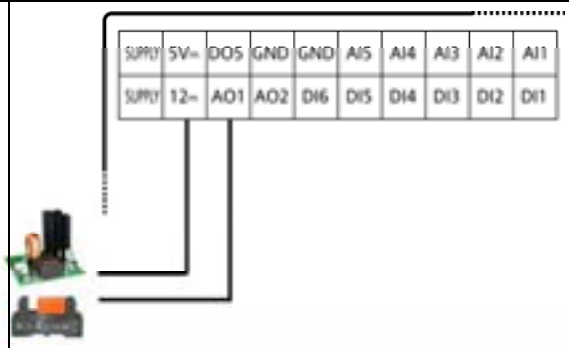
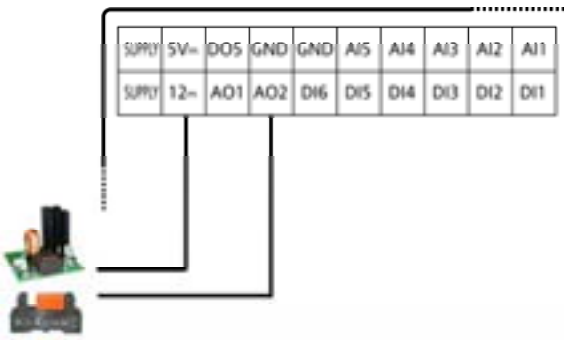
- **3** analogue inputs [AI1...AI5]
- 1 low voltage digital output (SELV (§)) [DO5]
  - Open Collector

- *TTL (COM 1)* supplied as standard
- LAN connection to remote keyboard KEYB or SB/SC/SD600
- (§) SELV: (SAFETY EXTRA LOW VOLTAGE)

27.2.2 Example of low voltage input/output connection

SBW600 - *Example of low voltage input/output connection*
SDW SCW SE 600 Example identical

Analogue outputs **AO see chapter** ***System configuration (folder Par/CF)*** **paragraph** ***Configuration of analogue outputs***
Digital output D05 see Digital Output Configuration
LAN : see connecting remote keyboard /SE600

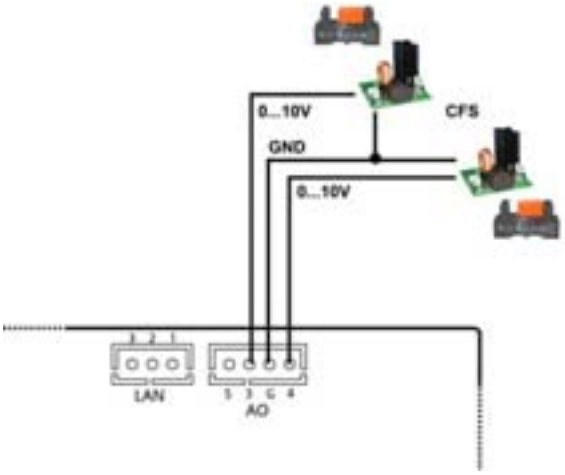
27.2.2.1 Example of AO1 / AO2 connection

Example of SBW600 (AO1) connection with 1 fan module CFS PWM or EXP211	Example of SBW600 (AO2) connection with 1 fan module CFS PWM or EXP211
SDW SCW SE 600 Example identical	SDW SCW SE 600 Example identical
	

27.2.2.2 Example of AO3 - AO4 connection

Example of SBW600 (AO3-AO4) connection with 1 fan module CFS 0-10V

SDW SCW SE 600 Example identical

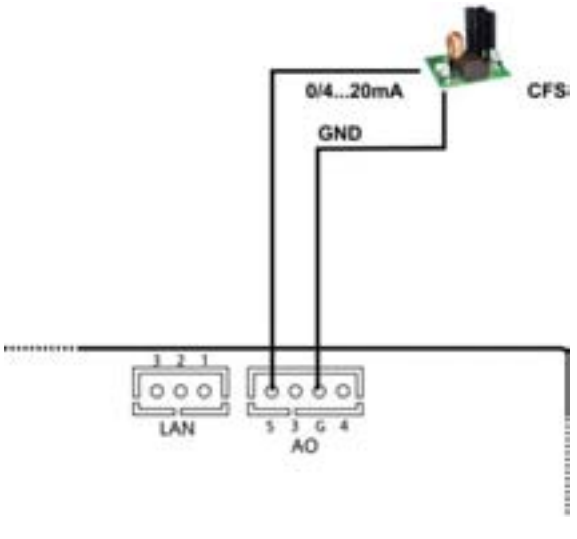


Analogue output	Terminal no.	description
AO3	3	0-10V
AO3	G	GND
AO4	4	0-10V
AO4	G	GND

27.2.2.3 Example of AO5 connection

Example of SB600 (AO5) connection with 1 fan module CFS 0...20mA / 4...20mA

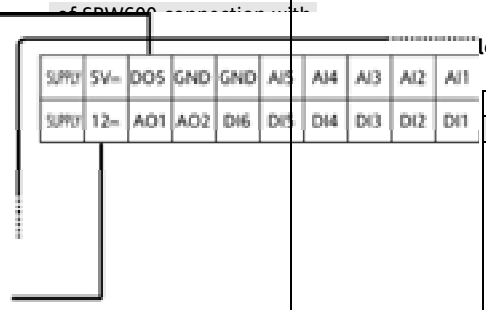
SDW SCW SE 600 Example identical



Analogue output	Terminal no.	description
AO5	5	0...20mA / 4...20mA
AO5	G	GND

27.2.2.4 Example of DO5 connection

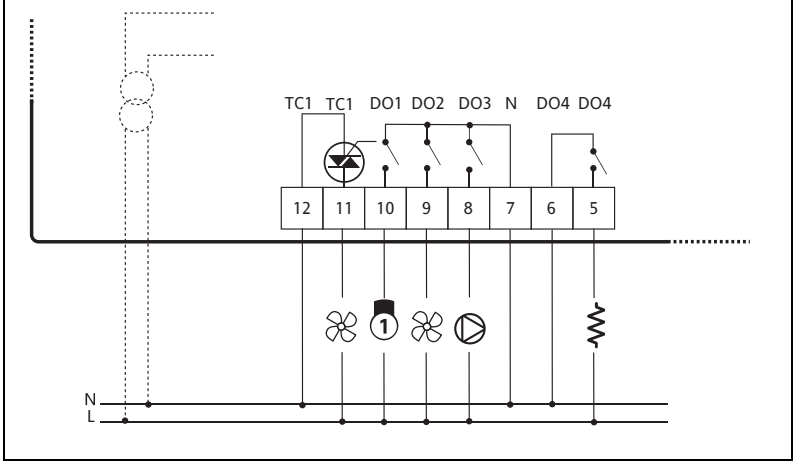
of SBW600 connection with:



le of connection of high voltage outputs

Example of model with *TRIAC*

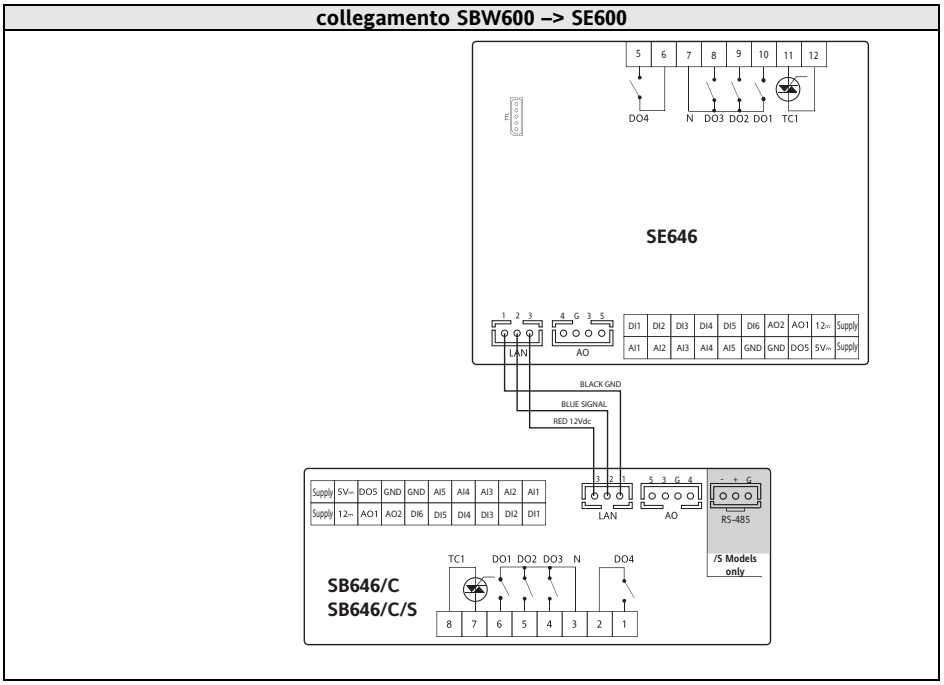
646 *models* - *Example of connection of high voltage outputs*



27.3 Examples of network connections

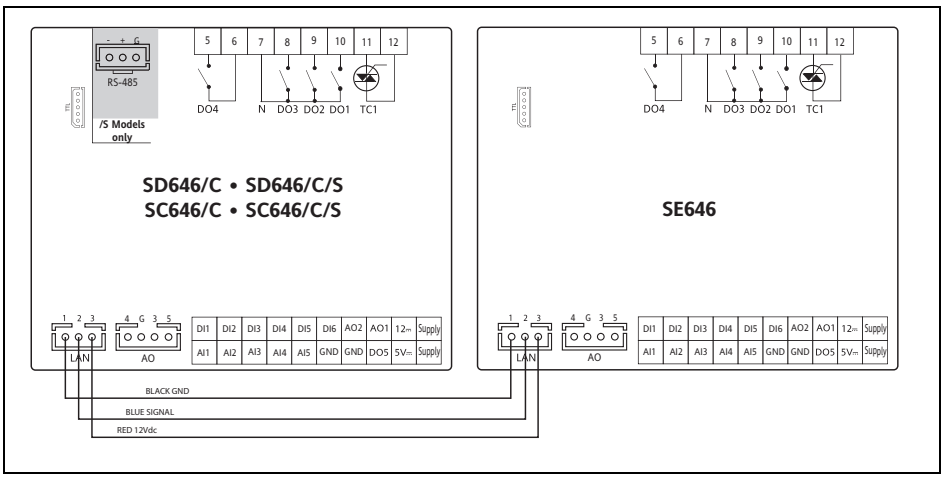
27.3.1 Example of connection SBW600 – SE600

collegamento SBW600 –> SE600

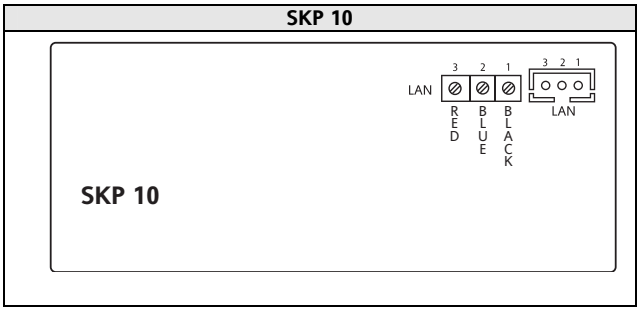


27.3.2 Esempio collegamento SDW600/SCW600 – SE600

collegamento SDW600 / SCW600 –> SE600

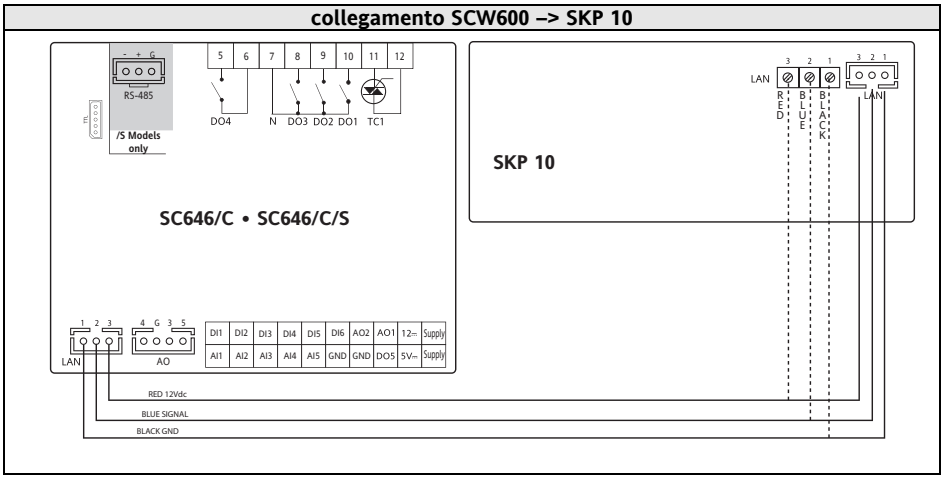


27.4 SKP 10 Remote Terminal 32x74

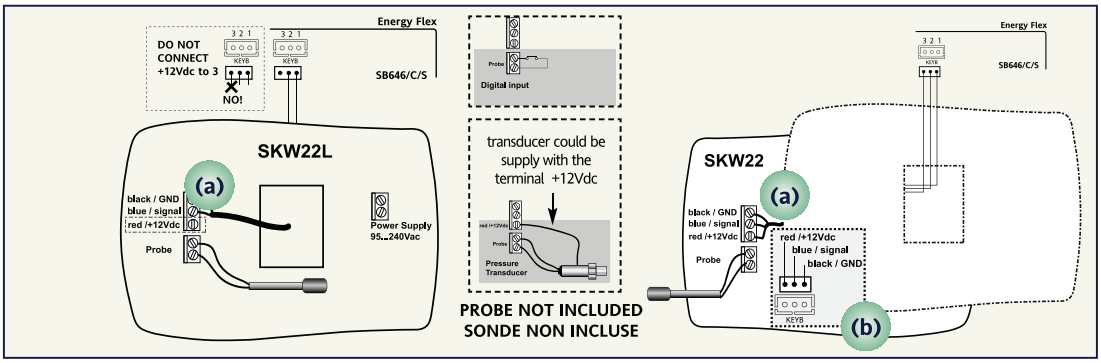


	Terminal SBW600 SDW600 SCW600	Terminal SKP 10	description
LAN	1	1	GND / black
	2	2	Signal / blue
	3	3	12V~ power supply from base module

27.4.1 Example of connection SCW600 – SKP 10



27.5 SKW22 - SKW22L remote LCD terminal



Terminal SBW600	Terminal SKW22	Terminal SKW22L	description	Notes
	AIR1	AIR1	NTC on-board analogue input	
1	GND / black	GND / black	GND / black	
2	Signal / Blue	Signal / Blue	Signal / blue	
3	+12Vdc /red**	DO NOT CONNECT!	12V~ power from SBW600	SKW22
3	-	Power Supply	Power supply SKW22L 95-240V~	SKW22L
LAN	-	-	Remote KEYBoard	

To connect the device, use:

SKW22L
- (a) screw connector for connection to SB600

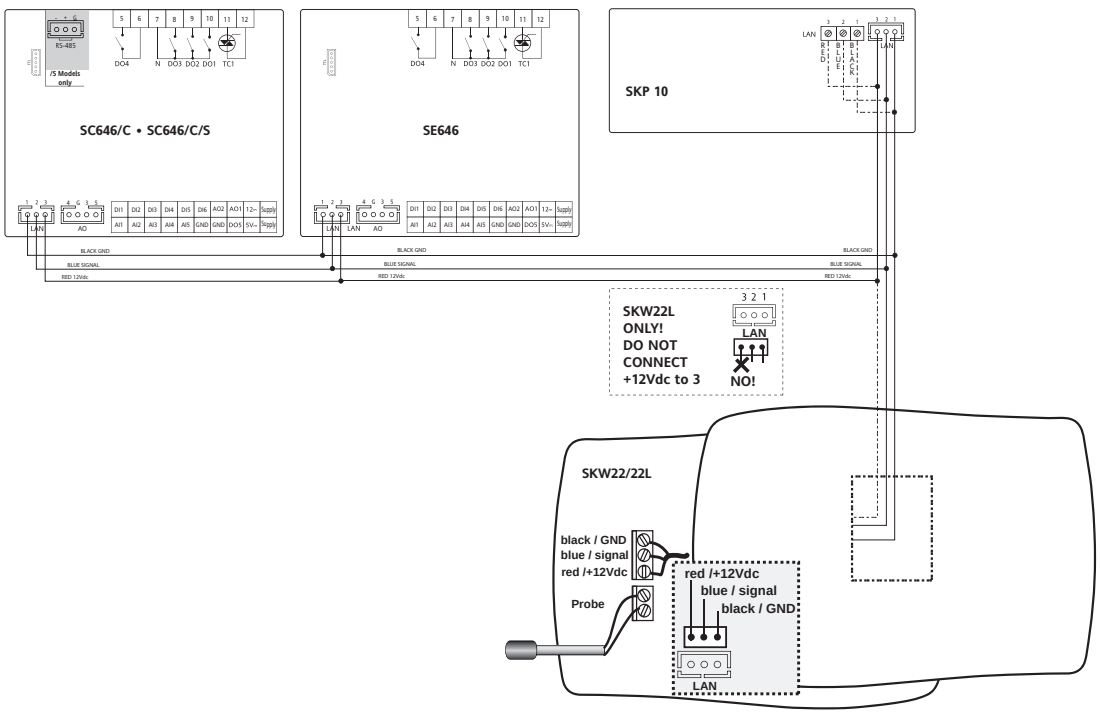
NOTE: ONLY connect terminals 1 and 2 to LAN

SKW22 only
- (a) screw connector for connection to SB600
- (b) JST 3-way connector for connection with SB600

The connector is inside the front keypad which is accessed by removing the cover (use a screwdriver or similar)
Cables must pass through the hole in the middle of the back plate
Make sure that the power supply is of the correct voltage for the device.
When mounted on a metal panel, the latter must be grounded.

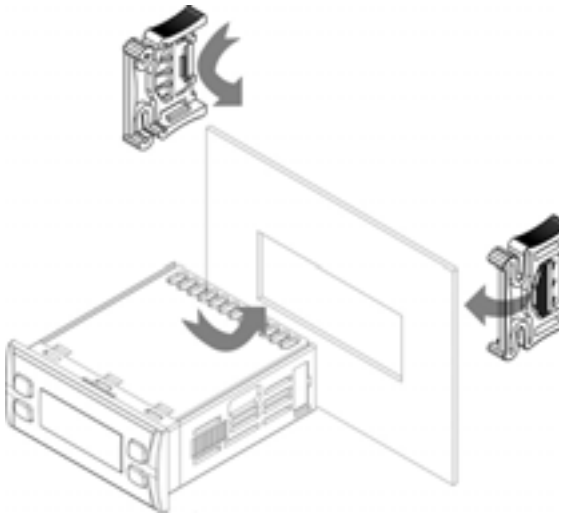
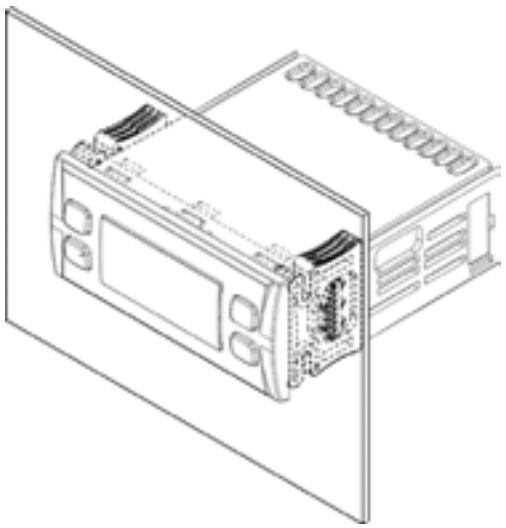
27.5.1 Example of connection SCW600 – SE600 – SKP10 – SK22/22L

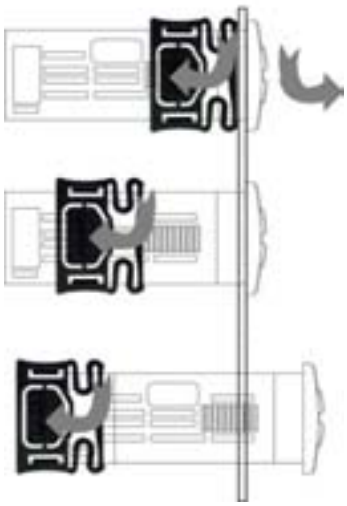
Example of connection **SCW600 - SE600 - SKP10 – SKW22/22L**



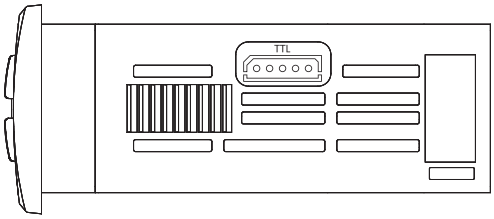
28 MECHANICAL ASSEMBLY

SBW600 – SKP 10
The instrument is intended for panel mounting (see diagram).
Make a 29x71 mm hole and insert the instrument; secure it with the special brackets provided.
Do not mount the device in damp and/or dirt-laden areas; it is suitable for use in places with ordinary or normal levels of pollution.
Keep the area around the device cooling slots adequately ventilated.
The TTL *serial* is on the left side of the device.

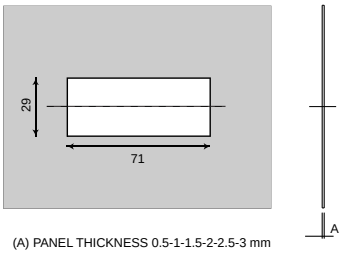
Example of panel-mounted SBW600 – SKP 10	Panel-mounted SBW600 – SKP 10
	
The images refer to SBW600	

SBW600 – SKP 10 Example of panel mounting - side view	SBW600 – SKP 10 Removing the device from the panel - side view
	
The images refer to SBW600	

TTL socket SBW600



Panel cut-out



SDW600 – SCW600 – SE600
The instrument is intended for 4DIN rail mounting

29 TECHNICAL DATA

29.1 General specifications

29.1.1 SB600 General specifications

	Standard	Min.	Max.
Power supply voltage ***Models*** **63x 64x**	12-24V~		
Power supply voltage ***Models*** **65x**	12-24V~ /24V⎓		
Power supply frequency	50Hz/60Hz	---	---
Consumption **SBW600 SDW600 SCW600**	6VA / 4W	---	---
Consumption **SE600**	5VA /3.5W	---	---
Insulation class	2	---	---
Working temperature	25°C	-10°C	55°C
Ambient operating humidity (non-condensing)	30%	10%	90%
Storage temperature	25°C	-20°C	85°C
Ambient storage humidity (non-condensing)	30%	10%	90%

Classification	
The product complies with the following European Community Directives	Directive 2006/95/EC Directive 89/108/EC
and complies with the following harmonised regulations:	EN 60730-2-6 EN 60730-2-9
Use	operating (not safety) device for incorporation
Mounting	panel or on DIN Omega bar support
Type of action	1.B 1.Y
Pollution class	2
Overvoltage category	II
Nominal pulse voltage	2500V
Digital outputs	refer to the *label* on the device.
Fire resistance category	D
Software class	A

29.2 I/O features

Type	*Folder*	Description	Model
Digital inputs	**DI1 DI2 DI3 DI4 DI5 DI6**	6 no-voltage *digital inputs* Closing current for ground: 0.5mA	**All *models***
Digital outputs High voltage	**DO1 DO2 DO3 DO4***	4 relays 2A 250V~; *For 636 *models* D04 is available as Open Collector output	**All *models***
	DO6	1 relay 2A 250V~;	**65x *Models***
Open Collector low voltage (SELV) digital output	**DO4***	1 output **Open Collector** **Max. current **35mA** @12Vcc	**63x *models***
	DO5	1 output **Open Collector** **Max. current **35mA** @12Vcc	**All *models***
Analogue output High voltage	**TC1**	1 - 2A *TRIAC*, max 250V~ Resolution 1% **Contactors may NOT be installed downstream from the *Triac***	**64x *Models***
	TC1 TC2 = AO2	2 - 3A *TRIAC*, max 250V~ Resolution 1% **Contactors may NOT be installed downstream from the *Triac***	**63x *Models***
Analogue outputs PWM/Open Collector low voltage (SELV)	**AO1 AO2**	2 outputs **PWM / Open Collector** **PWM** resolution: 1% **PWM / Open Collector** Nominal *range* 0...16.9V⎓ (12V~ rectified) Closing at 12V⎓ **Max. current **35mA** (min. load 340Ohm @12Vcc)	**All *models* Except *Models* 63x Where AO2 = TC2 (*TRIAC*)**
Analogue outputs low voltage (SELV)	**AO3 AO4**	2 outputs 0-10V • 2% full scale accuracy • Resolution 1% • output 0...10Vcc, max **28mA*** ** @10V (min. load resistance **360**Ohm).	**All *models***
	AO5	1 output 4..20mA / 0...20mA • 2% full scale accuracy • Resolution 1% • output 0/4...20mA max. load (max load resistance **350Ohm**)***	**All *models***
Analogue inputs	**AI1 AI2 AI3 AI4 AI5**	3 configurable inputs: a) temperature NTC 103AT 10kΩ, measurement *range* -50°C ÷ 99.9°C; b) no voltage digital input 2 configurable inputs: a) temperature NTC 103AT 10kO, measurement *range* -50°C ÷ 99.9°C; b) current input 4...20 mA /voltage input 0-10V/0-5V/0-1V measurement *range* -50.0 ÷ +99.9; accuracy: 1% full scale (2% full scale for 0-1V voltage input) Resolution: (a) 0.1°C (b) 0.1°C/bar Input impedance (b): • 0-10V and 0-5V: 21KOhm • 0-1V: 10KOhm • 4...20mA: 100Ohm c) no voltage digital input	**All *models***

* For 63x *models* DO4 is an Open collector, **TC2 equals to AO2 (TC2=AO2) – see** System configuration **(*folder* PAr/CL-Cr-CF) chapter**

** Outputs AO1, AO2 and DO5 (typically connected to the device's auxiliary 12V output) cannot deliver more than 70mA total). Any other loads connected to the same 12V⎓ auxiliary output must also be taken into account

If the **SKP 10** keypad is connected to the device, the current becomes **55mA**

*** outputs AO3, AO4 and AO5 cannot deliver more than 40mA total.

29.3 Mechanical specifications

Terminals and connectors	1 8-way high voltage male connector For use in combination with the supplied female connector	**All *models***
	1 20-way snap-on low voltage connector To be used with COLV0000E0100	**All *models***
	1 JST 3-way remote keyboard connector To be used with COLV000033200	**All *models***
	1 JST 4 -way connector To be used with COLV000042100	**All *models***
	1 JST 3-way connector To be used with COLV000035100	***Models* /S**
Housing	Housing: PC+ABS plastic resin with V0 flammability rating	

29.4 Display and LEDS

Display and LEDS		• 4 digits or 3 digits + sign; • 18 LEDs	**All *models* except SCW600 SE600**
Keys	**UP DOWN set esc**	• 4 *keys*	**All *models* except SCW600 SE600**

29.5 Serial

Serial	**TTL**	• 1 TTL *serial* for connection to CopyCard (MFK) or Personal Computer via interface module	**All *models***
	RS-485	• RS-485 opto-isolated *serial*	***Models* /S**

29.6 Transformer

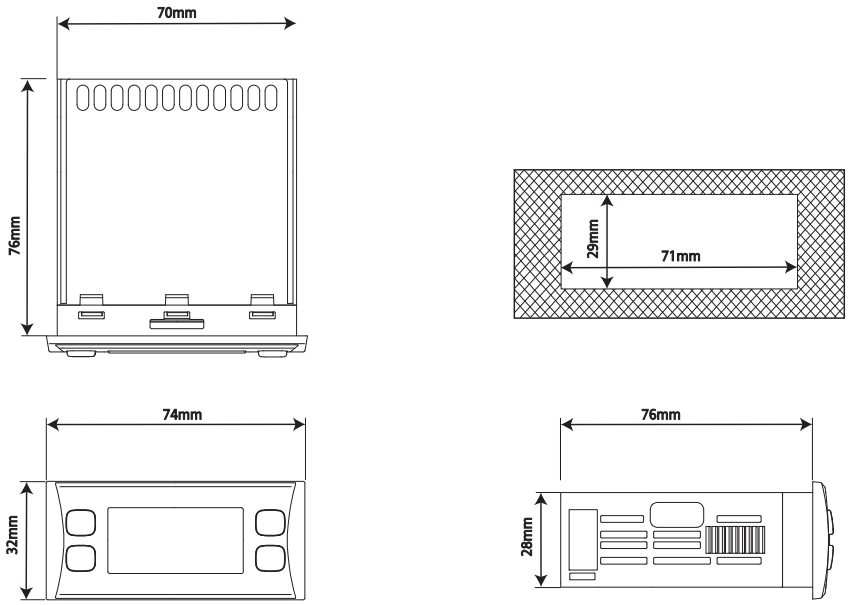
The instrument must be connected to a suitable current *transformer* with the following features:

- Primary voltage: depending on requirements of individual device and/or country of installation
- Secondary voltage: 12V~
- Power supply frequency: 50/60Hz
- Rating: 6VA min. (/S *models*), 5VA (all other *models*)

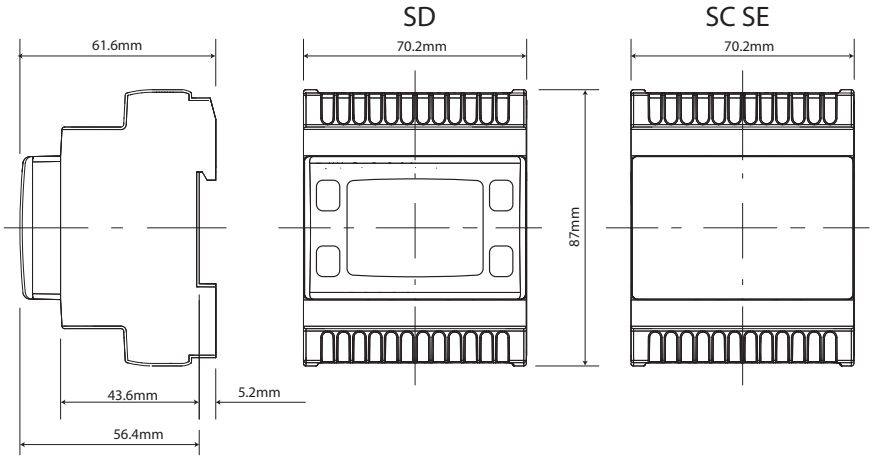
29.7 Mechanical dimensions

	Length (L) mm	Depth (d) mm	Height (H) mm	Notes
Front keypad	76.4	//	35	(+0.2mm)
Front (cover) SDW600 SC600 SE600	70	//	45	(+0.2mm)
Dimensions SB600	86	76 connectors excluded	26	
Dimensions SDW600 SCW600 SE600	70.2	61.6 56.4 from Din bar to cover	87	4DIN
Hole for panel mounting	71	//	29	(+0.2mm/ -0.1mm)

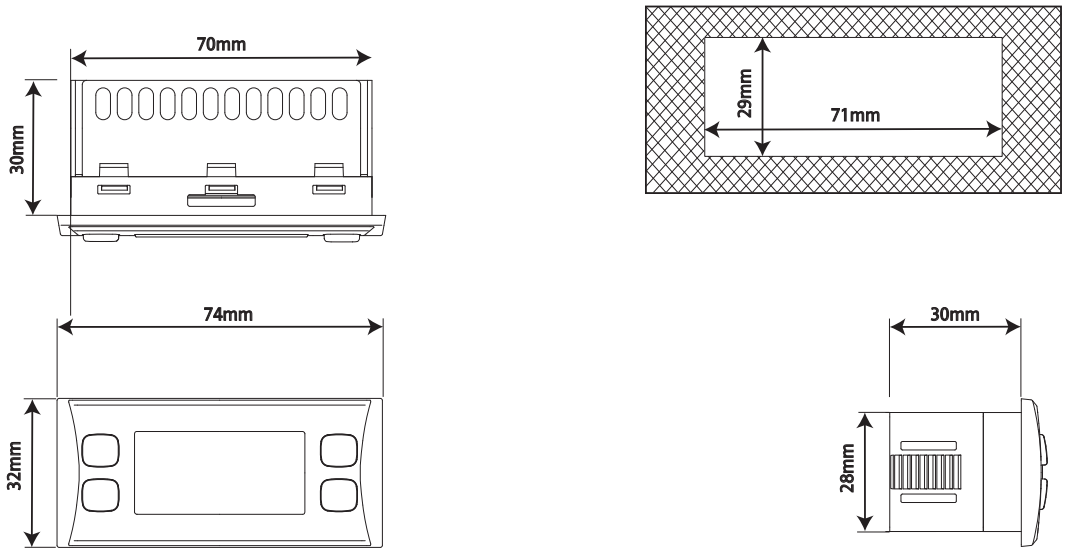
SBW600



SDW600 / SCW600 – SE600



SKP 10



29.8 Permitted use

This product is used to control centralised air-conditioning units

For safety reasons the instrument must be installed and used in accordance with the instructions supplied. Users must not be able to access parts with dangerous voltage levels under normal operating conditions. The device must be suitably protected from water and dust according to the specific application and only be accessible using special tools (except for the front keypad). The device can be fitted to refrigeration equipment for household and/or similar use. It has been tested and in safety terms, conforms to applicable harmonized European standards.

29.8.1 Unintended Use

The use of the unit for applications other than those described above is
forbidden. It should be noted that the relay contacts supplied with the device are functional and therefore may be subject to fault.
Any *protection* devices required to comply with product requirements or dictated by common sense due for obvious safety reasons should be installed externally.

29.9 Responsibility and Residual Risks

Eliwell shall not be held liable for any damage incurred as a result of:

- installation/use other than those intended, and, in particular, failure to comply with the safety instructions specified by applicable regulations and/or provided in this document;
- use with equipment which does not provide adequate *protection* against electric shocks, water and dust under the effective conditions of installation;
- use with equipment which permits access to hazardous parts without the use of tools;
- installation/use with equipment which does not comply with current regulations and legislation.

29.10 Disclaimer

30 DEVICEMANAGER

The Device Manager software uses the TTL *serial* connection of the SB600 to simplify and aid in installing and managing the SB600

Main features

- Device parameters management.
- Real-time monitoring and recording of system variables.
- Device *alarms* records management.
- Firmware updating.

All basic components required for the use of *DeviceManager* are described below.

30.1.1 Device Manager software component

The software has a graphic user interface, which is described in the *DeviceManager* manual.
The Device Manager software supports both Eliwell and Modbus protocols.
The functionalities available to the customer depend on which Device Manager hardware interface he/she has purchased.

30.1.2 Device Manager interface component

The USB/TTL hardware interface, used in association with the software package, enables:

- use of the software itself.
- connection to devices for controlling them.
- connection to the *Multi Function Key component*.

There are three different types of interface, corresponding to three user levels:

- DMI 100-1 END USER.
- DMI 100-2 SERVICE.
- DMI 100-3 MANUFACTURER.

Depending on the type purchased, the client has access to the functions described above.

30.1.3 Multi Function Key Component

This is a memory device, which enables:

- updating the device's parameter values.
- updating the device's firmware.
- downloading parameter values from the device.
- downloading the *alarms* records from the device.

For more details
--> See manual

- **8MA00219 Device Manager ITA**
- **8MA10219 Device Manager ENG**

See the following tables:

Parameter	Description	Value	
		0	**1**
CF01	**Select COM1 (TTL) protocol**	**Eliwell**	Modbus

If *CF01*=0, the following parameters should be configured:

Parameter	Description	***range***
CF20	**Eliwell protocol controller address**	**0...14**
CF21	**Eliwell protocol controller family**	

Parameter	Description	***range***
CF30	**Modbus protocol controller address**	**1...255**
Parameter	**Description**	**values**

Parameter	Description	*range*
CF31	**Modbus protocol baudrate**	• 0=1200 baud • 1=2400 baud • 2=4800 baud • 3=9600 baud • 4=19200 baud • 5=38400 baud (maximum speed when using *DeviceManager*) • 6=58600 baud • 7=115200 baud
CF32	**Modbus protocol parity**	• 0= STX • 1= EVEN • 2= NONE • 3= ODD

31 SUPERVISION

The TTL *serial* - referred to also as COM1 - can be used to configure the device, parameters, states, and variables using the Modbus protocol.

Study the following tables:

Parameter	Description	value	
		0	1
CF01	Select COM1 (TTL) protocol	Eliwell	Modbus

If *CF01*=0, the following parameters should be configured:

Parameter	Description	*range*
CF20	Eliwell protocol controller address	0...14
CF21	Eliwell protocol controller family	

Parameter	Description	*range*
CF30	Modbus protocol controller address	1...255
Parameter	**Description**	**values**
CF31	Modbus protocol Baudrate	• 0=1200 baud • 1=2400 baud • 2=4800 baud • 3=9600 baud • 4=19200 baud • 5=38400 baud (maximum speed when using *DeviceManager*) • 6=58600 baud • 7=115200 baud

31.1 Configuration with Modbus RTU

Modbus is a client/server protocol for communication between network linked devices.
Modbus devices communicate using a master-slave technique in which a single device (the master) can send messages. All other devices in the network (slaves) respond by returning the data required to the master or executing the action indicated in the message received. A slave is defined as a device connected to a network that processes information and sends the results to a master using the Modbus protocol.
The master can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only reply to messages received individually from the master.
The Modbus standard used by Eliwell uses RTU coding for data transmission.

31.1.1 Data format (RTU)

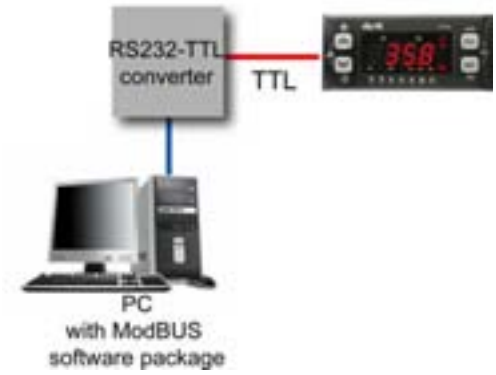
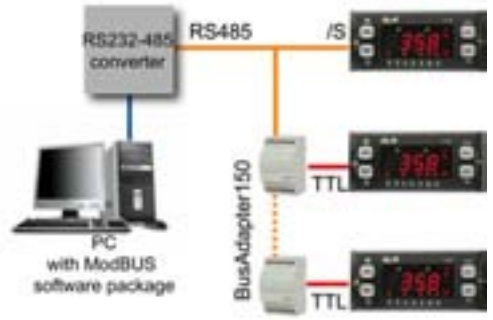
The data coding model used defines the structure of messages sent to the network and the way in which the information is decoded. The type of coding selected is generally based on specific parameters (baud rate, parity, etc)*** and some devices only support specific code *models*. However, the same model must be used for all devices connected to a Modbus network.
The protocol used the RTU binary method with the following bytes:
8 bits for data, even parity bit (not configurable), 1 stop bit.

***configured with parameters *CF30*, *CF31* - see table at start of paragraph

NOTE: transmission speed must be set at 9600 baud.
The device is fully configurable via parameter settings
They can be modified with:

- the instrument's keyboard
- *Multi Function key*
- by sending data via the Modbus protocol straight to individual instruments, or via broadcast, using the address 0 (broadcast)

The connection diagram when using Modbus is shown below

ModBus - device connection diagram Single via TTL	ModBus - multiple devices connection diagram Via RS485
	

PC / Interface connection	RS232 cable
Device / Bus Adapter connection	TTL cable with 5 way connector (30cm) (available with other sizes/lengths)
Bus adapter	BA150
Bus Adapter / Interface connection	RS485 cable shielded and twisted (example: Belden model 8762 cable)

31.1.2 Modbus commands available and data areas

The commands implemented are:

Modbus command	Description of command
3	Read multiple registers on Client side
16	Write multiple registers on Client side
43	Read device ID
	DESCRIPTION Manufacturer ID Model ID Version ID

Length restrictions

maximum length in bytes of messages sent to device	30 BYTES
maximum length in bytes of messages received by device	30 BYTES

Multiple read of 2 real setpoints

Field	Decimal	Hex	Dimension
Device address (slave):	1	0x01	byte
Read command code:	3	0x03	byte
Start address:	975	0x03CF	Word
Number of registers (words) to read:	3	0x0003	Word

Configuration of COOL operating mode
Write value 8 to word for remote commands at address h2FC

Field	Decimal	Hex	Dimension
Device address (slave):	1	0x01	byte
Write command code:	10	0x0A	byte
Write address:	764	0x02FC	Word
Number of words to write:	1	0x0001	Word
Number of bytes (No. words x 2):	2	0x02	Word
Value (word) to write:	8	0x0008	Word

At the end of this operation, the device will switch to COOL mode (if enabled).

Configuration of ON/OFF operating mode
Write value 128 to word for remote commands at address h2FC

At the end of this operation, the device will toggle the On/Off state (if enabled).

The Ram variables that can be monitored and commands available are listed below.

Commands available:

- Manual alarm reset
- Change operating mode (Heat, Cool and St-By)
- Switch device on/off
- Enable *defrost*

Additional operations can be performed by following specific procedures:

- read alarm log
- change/set time
- reset running time of compressor and pump outputs

Details for read alarm log

The alarm log is saved in the EEPROM in a circular buffer composed of 7-byte records formatted as follows

Byte	bit	index	Data	Values
0	0	Bit 0	Alarm record flag free	Must always be 0
	1	Bit 1	Alarm state	0 = alarm reset; 1 = alarm current
	2	Bit 2	*Automatic reset* alarm	0 = *automatic reset*; 1 = *manual reset*
	3	-	Not used	
	4	-		
	5	-		
	6	-		
	7	-		
1	0	Bit 0	Start of alarm minute	0÷59 = minutes >59 = undetermined value
	1	Bit 1		
	2	Bit 2		
	3	Bit 3		
	4	Bit 4		
	5	Bit 5		
	6	Bit 0	End of alarm minute	0÷59 = minutes >59 = undetermined value
	7	Bit 1		
2	0	Bit 2		
	1	Bit 3		
	2	Bit 4		
	3	Bit 5		
	4	Bit 0	Start of alarm hour	0÷23 = hours >23 = undetermined value
	5	Bit 1		
	6	Bit 2		
	7	Bit 3		
3	0	Bit 4		
	1	Bit 0	End of alarm hour	0÷23 = hours >23 = undetermined value
	2	Bit 1		
	3	Bit 2		
	4	Bit 3		
	5	Bit 4		
	6	Bit 0	Start of alarm day	1÷31 = day 0 or >31 = undefined value
	7	Bit 1		
4	0	Bit 2		
	1	Bit 3		
	2	Bit 4		
	3	Bit 0	End of alarm day	1÷31 = day 0 or >31 = undefined value
	4	Bit 1		
	5	Bit 2		
	6	Bit 3		
	7	Bit 4		
5	0	Bit 0	Start of alarm month	0÷23 = hours >23 = undetermined value
	1	Bit 1		
	2	Bit 2		
	3	Bit 3		
	4	Bit 0	End of alarm month	0÷23 = hours >23 = undetermined value
	5	Bit 1		
	6	Bit 2		
	7	Bit 3		
6	0	Bit 0	Alarm code	0÷99 = alarm code >99 Not allowed
	1	Bit 1		
	2	Bit 2		
	3	Bit 3		
	4	Bit 4		
	5	Bit 5		
	6	Bit 6		
	7	Bit 7		

To identify the index of the first record, read variable ***PntStorAll*** at address h83A8

To identify the number of records present, read variable ***NumStorAll*** at address h83A9

Address 0x83A8 => data: 0x0027 = Index of first record (most recent);
Address 0x83A9 => data: 0x0027 = number of records (39);

To calculate the address of the most recent record:
Address EU00 = 51712 + (N-1)x7 = 51712 + 17x7 = 51832 (0xCA77)

Read EU00
TX: 01, 03, CA, 77, 00, 07, 8B, CA.
RX: 01, 03, 0E, 00, 82, 00, DD, 00, CF, 00, FE, 00, 04, 00, 06, 00, 3C, 9B, 13.

Address 0xCA77 => data: 0x0082 = Byte 0 of *alarms* log;
Address 0xCA78 => data: 0x00DD = Byte 1 of *alarms* log;
Address 0xCA79 => data: 0x00CF = Byte 2 of *alarms* log;
Address 0xCA7A => data: 0x00FE = Byte 3 of *alarms* log;
Address 0xCA7B => data: 0x0004 = Byte 4 of *alarms* log;
Address 0xCA7C => data: 0x0006 = Byte 5 of *alarms* log;
Address 0xCA7D => data: 0x003C = Byte 6 of *alarms* log;

Alarm record flag free = b 0 = 0
Alarm state = b 1 = 1
Automatic reset alarm = b 0 = 0
Not used = b 10000 = free
Start of alarm minute = b 011101 = 29
End of alarm minute= b 111111 = 63 (undefined)
Start of alarm hour = b 01100 = 12
End of alarm hour = b 11111 = 31 (undefined)
Start of alarm day = b 10011 = 19
End of alarm day = b 00000 = 0 (undefined)
Start of alarm month = b 0110 = 6
End of alarm month = b 0000 = 0 (undefined)
Alarm code = b 00111100 = 60

The result shows that on EU00 there is an **Er60** that started on **19/06** at **12.19** and which is still active.

To read EU01, the address is determined as follows
Address EU01 = Address EU00 - 7 = 51832 - 7 = 51825

To read EU02 continue by subtracting 7 fromaddress EU01 and so on...

NOTE: The minimum limit is address 51712 (hCA00) after which, if there are still *alarms* to be read, you must start again from address 52404 (hCCB5) (the buffer is circular and after the 99th record it writes over the old ones).

Details for reading, modifying, setting the time

To write the hour, address the structure ***DataWrite*** at address h82F4
Write the seconds byte last!

Example: Set time **h11:33** on **28/03/2007**

Field	Address	Decimal	Hex	Dimension
0: seconds	H82F4	0	0x0000	bytes
1: minutes	H82F5	33	0x0021	bytes
2: hours	H82F6	11	0x000B	bytes
3: dayweek	H82F7	-	-	bytes
4: daymonth	H82F8	28	0x001C	bytes
5: month	H82F9	3	0x0003	bytes
6: year	H82FA	7	0x0007	bytes

NOTE: Write the seconds byte last!

Write sequence:
Write 6 words of 46, 12, 0, 19, 6, 8 at the address H82AF5.

Write a word of 00 at the address H82AF4

Details for resetting the running time
To read and/or clear running time, address the counters in the device's EEPROM and RAM

STCPOreFunz[0] to the address h3AB Running time CP1 (in Ram)
STCPOreFunz[1] to the address h3AC Running time CP2 (in Ram)
STPMOreFunz[0] to the address h3B3 Running time P1 (in Ram)
STPMOreFunz[1] to the address h3B4 Running time P2 (in Ram)

EE_OreFunzCP0 to the address h4F20 Running time CP1 (in EEPROM)
EE_OreFunzCP1 to the address h4F22 Running time CP2 (in EEPROM)
EE_OreFunzP0 to the address h4F38 Running time P1 (in EEPROM)
EE_OreFunzP1 to the address h4F38 Running time P2 (in EEPROM)

Multiple reading of running time CP to the RAM address h3AB
The full command to be sent to the device will therefore be:

Address 0x03AB => data: 0x0065 = 101 hours running time CP1;
Address 0x03AC => data: 0x0000 = not used
Address 0x03AD => data: 0x0001 = 1 hours running time CP2;

Clear time CP1 (in RAM and EEPROM)
Write 0 for running time CP at RAM address h3AB

Write 0 for running time CP at EEPROM address h4F20

Variables:
See Parameters chapter (PAr), *Client table*

31.2 Configuration of device address

The Device Number in a ModBus message is defined by the parameter **CF63 - see table at beginning of this section**
The address 0 is used for broadcast messages that all slaves recognize. Slaves do not reply to broadcast messages.

31.2.1 Configuration of parameter addresses

The list of addresses is given in the Parameters chapter under the section headed "Parameters Table / visibility, ADDRESS column (parameter addresses) and VIS PAR ADDRESS (parameter visibility addresses)

31.2.2 Configuration of variable / state addresses

The list of addresses is given in the Parameters chapter, under the section headed *Client Table* ADDRESS column

32 ANNEXE A – MODELS AND ACCESSORIES

32.1 Models

32.1.1 Models SBW SDW SCW600 SE600

model	item number	Voltage-free *digital inputs*	*Digital outputs* High voltage	Analogue output High voltage	*Analogue outputs* PWM Safe voltage (SELV)	*Analogue outputs* Safe voltage (SELV)	Analogue inputs Safe voltage (SELV)	Digital output Open Collector	RS-485 *serial*
		(DI1...DI6)	(DO1...DO4) (+ DO6)	(TC1)	(AO1-AO2)	(AO3-AO5)	(AI)	(DO5)	/S
SBW646/C/S	**SB641235W2400**	**6**	**4**	**1**	**2**	**3**	5	1	YES
SBW646/C	**SB641235W1400**	**6**	**4**	**1**	**2**	**3**	5	1	NO
SDW646/C/S	**SD641235W2400**	**6**	**4**	**1**	**2**	**3**	5	1	YES
SDW646/C	**SD641235W1400**	**6**	**4**	**1**	**2**	**3**	5	1	NO
SCW646/C/S	**SC641235W2400**	**6**	**4**	**1**	**2**	**3**	5	1	YES
SCW646/C	**SC641235W1400**	**6**	**4**	**1**	**2**	**3**	5	1	NO
SDW655/C/S	**SD650235W2400**	**6**	**5**	**//**	**2**	**3**	5	1	YES
SDW655/C	**SD650235W1400**	**6**	**5**	**//**	**2**	**3**	5	1	NO
SCW655/C/S	**SC650235W2400**	**6**	**5**	**//**	**2**	**3**	5	1	YES
SCW655/C	**SC650235W1400**	**6**	**5**	**//**	**2**	**3**	5	1	NO
SE632	SE64123510400	**6**	**3**	//	**2**	//	3	1	NO
SE646	**SE64123510400**	**6**	**4**	**1**	**2**	**3**	5	1	NO
SE655	**SE65023510400**	**6**	**5**	**//**	**2**	**3**	5	1	NO

NOTE:

- **SBW646 Power supply 12...24V~**
- **SBW655 Power supply 12...24V~ / 24V~**

TTL supplied as standard
/C indicates the presence of real-time clock (RTC)
/S indicates the presence of on-board RS485
SELV: SAFETY EXTRA LOW VOLTAGE

32.1.2 SBW ● SDW636 models 2 TRIAC

model	item number	Voltage-free *digital inputs*	*Digital outputs* High voltage	Analogue output High voltage	*Analogue outputs* PWM Safe voltage (SELV)	*Analogue outputs* Safe voltage (SELV)	Analogue inputs Safe voltage (SELV)	Digital output Open Collector	RS-485 *serial*
		(DI1...DI6)	(DO1 DO2 DO3)	(TC1, TC2)	(A01)	(AO3-AO5)	(AI)	(DO4, DO5)	/S
SDW636/C/S	SD632135W2400	**6**	**3**	**2**	**1**	**3**	5	2	YES
SDW636/C	SD632135W1400	**6**	**3**	**2**	**1**	**3**	5	2	NO
SCW36/C/S	SC632135W2400	**6**	**3**	**2**	**1**	**3**	5	2	YES
SCW636/C	SC632135W1400	**6**	**3**	**2**	**1**	**3**	5	2	NO

NOTE:
TC2 equals to AO2 (TC2=AO2) – see System configuration **(*folder* PAr/CL-Cr-CF) chapter**
TTL supplied as standard
/C indicates the presence of the RTC - Real Time Clock
/S indicates the presence of on-board RS485
SELV: SAFETY EXTRA LOW VOLTAGE

32.1.3 Remote terminals

Model	Code	Mounting	Dimensions	*Display*	Analogue Inputs Safe voltage (SELV)	Power supply
SKP10	**SKP1000000000**	**panel**	**74x32x30mm**	**LED / 4 digit**	-	From base
SKW22	**SKW2200000000**	**wall**	**137x96.5x31.3mm**	**LCD**	1 onboard NTC 1 V/I configurable input	12V~ from base
SKW22L	**SKW22L0000H00**	**wall**	**137x96.5x31.3mm**	**LCD backlit**	1 onboard NTC 1 configurable V/I input	95-240V~ from base

32.2 Accessories

Note: The photos are intended to show the *accessories* and are for indication purposes only. The dimensions of the figures are not to scale

Remote LCD terminals				
	Name	**Code**	**Description**	**Documentation**
	**SKP10**	SKP1000000000	32x74 terminal	**Instruction sheet** **8FI20016** Energy Flex GB-I
	**SKW 22** **SKW22L**	SKW2000000000 SKW22L0000H00	Remote LCD terminal (SKW22L: backlit) with internal ambient temperature control - - - Compatible with all *models*	**Instruction sheet** **9IS24102** remote terminal / terminale remoto LCD GB-I **manual** **8MA10218** remote terminal LCD GB **8MA00218** terminale remoto LCD IT **8MA20218** terminal à distance LCD FR **8MA30218** terminal remoto LCD ES **8MA50218** LCD ferbedienung DE **8MAA0218** remote terminal LCD RUS
	WIRING	C0LV000033200	3-way wiring for remote LCD / 32x74 remote terminal - - - Supplied in package (SKW22 only)	NA
Transformer				
	*TRANSFORMER*	TF411215	*Transformer* 230V~/12V 6VA (protected)	NA
		TF411210	*Transformer* 230V~/12V 11VA (protected)	NA

Multi Function key				
	Multi-Function key	MFK100T000000	Smart key to up/download parameters *Alarms* and applications log	NA

Expansion			
	Name	**Code**	**Description**
	EXP211	MW320100	230V 10A expansion module with base fitted to DIN rail

Cables			
	Name	**Code**	**Description**
	WIRING	COLV0000E0100	Wiring (connector + 1m cables) to connect safe voltage inputs and outputs (SELV).
	RS-485 *serial* port wiring	COLV0000035100	
	WIRING SB600 - AO3-4-5	COLV000042100	WIRING SB600 - A03 AO4 (connector + 1m cables).
EMC filter			
	FILTER	FT111201	LC filter, network filter, recommended for applications with fan speed modulation.

Temperature probes				
	Name	**Code**	**Description**	**Documentation**
	*TEMPERATURE PROBES* (1) (2)	SN691150	Probe NTC 103AT, 1.5m (plastic cap, 2-wire cable);	**Instruction sheet** SN691150 GB-I
		SN8T6H1502	NTC temperature probe 5X20 1.5m TPE IP68	**Instruction sheet** SN8T6H1502 GB-I
		SN8T6A1502	NTC temperature probe 6X40 TPE STEEL IP68	**Instruction sheet** SN8T6A1502 GB-I
		SN8T6N1502	NTC temperature probe 6X50 TPE STEEL IP68	**Instruction sheet** SN8T6N1502 GB-I
Ratiometric transducers				
	RATIOMETRIC TRANSDUCERS (1)	TD400030	Ratiometric transducer EWPA 030 R 0/5V 0/30BAR Female connector	
		TD400050	Ratiometric transducer EWPA 050 R 0/5V 0/50BAR Female connector	
Pressure transducers				
	PRESSURE TRANSDUCERS (1)	TD200130	Pressure transducer EWPA 030 4...20mA 0/30bar Male connector	**Instruction sheet 9IS41070** EWPA 007-030 GB-I-E-D-F-RUS - - - Power EWPA 007-30 GB-I-E-D-F
		TD200030	Pressure transducer EWPA 030 4...20mA 0/30bar Female connector	
		TD200107	Pressure transducer EWPA 007 4...20mA -5/8bar Male connector	
		TD300008	Pressure transducer EWPA 007 4...20mA -5/8bar Female connector	

Pressure switches			
	Name	**Code**	**Description**
	PRESSURE SWITCHES (1)	(1)	HR *range* (*automatic reset*) - minimum 100,000 ON/OFF cycles available
		(1)	HL *range* (*manual reset*) - minimum 6,000 ON/OFF cycles
		(1)	HC *range* (*automatic reset*) - minimum 250,000 ON/OFF cycles

Fan modules				
	Name	**Code**	**Description**	**Documentation**
	CFS FAN MODULES (1)	For item numbers **See instruction sheet**	Single-phase speed regulators for currents from 2A to 9A	**Instruction sheet 8FI40014** CFS -Fan Speed Modules GB-I-E-D-F
	CF-REL FAN MODULE	MW991300	6A 230V relay	**Instruction sheet 8FI40014** CFS -Fan Speed Modules GB-I-E-D-F
	CFS05 TANDEM FAN MODULE	MW991012	5+5A 230V *TRIAC*	**Instruction sheet 8FI40016** CFS05 - TANDEM - Fan Speed Module GB-I-E-D-F
	THREE-PHASE FAN REGULATOR (DRV 300) (1) 3 phases 12...20A/420V~ (IP22 or IP55)	LD312420T1S00	Specifications: • power supply 20A, 420V~; • box: IP22.	Contact Eliwell Sales Department
		LD320420T1S00	Specifications: • power supply 20A, 420V~; • box: IP55.	Contact Eliwell Sales Department
		LD312420T1G00	Specifications: • power supply 12A, 420V~; • box: IP22.	Contact Eliwell Sales Department
		LD320420T1G00	Specifications: • power supply 20A, 420V~; • box: IP22.	Contact Eliwell Sales Department

Interface modules				
	Name	**Code**	**Description**	**Documentation**
	Device Manager interface	DM1001002000	DM100-1 End User	**Instruction sheet 9IS44014** Device Manager Interface GB-I
		DM1002002000	DM100-2 Service	
		DM1003002000	DM100-3 Manufacturer	

Connections				
	130 TTL RS485 bus adapter	BA11250N3700	TTL/RS-485 communication interface 12V aux. output for power supply to device. TTL cable, L = 1 m (2)	**Instruction sheet 9IS43084** BusAdapter 130-150-350 GB-I-E-D-F
	150 TTL RS485 bus adapter	BA10000R3700	TTL/RS-485 communication interface TTL cable, L = 1 m (2)	
	RadioAdapter TTL/WIRELESS 802.15.4	BARF0TS00NH00 (1)		**Instruction sheet 8FI40023** RadioAdapter GB-I-E-D-F **manual 9MAX0010** RadioAdapter GB-I-E-D-F

Software Tools				
	Name	**Code**	**Description**	**Documentation**
	Device Manager	Contact Eliwell Sales Department		**Manual** **8MA00219** *DeviceManager* ITA **8MA00219** *DeviceManager* GB **8MA30219** *DeviceManager* SPA **8MA50219** *DeviceManager* GER **8MA20219** *DeviceManager* FRE **8MAA0219** *DeviceManager* RUS

	Name	Code	Description	Documentation
	WebAdapter	WA0ET00X700		**Instruction sheet** **9IS44065** WebAdapter GB-I-E-D-F-RUS **manual** • **8MA00202** WebAdapter ITA • **8MA10202** WebAdapter GB • **8MA20202** WebAdapter FRE • **8MA30202** WebAdapter SPA • **8MA50202** WebAdapter GER • **8MAA0202** WebAdapter RUS
	WebAdapter Wi-Fi	WA0WF00X700		

Demo Case			
	Name	**Code**	**Description**
	Demo Case SB600/ST700	VAL00031K	Demo case for SB600/ST700

(1) various item numbers available. Contact Eliwell Sales Department
(2) Various lengths can be requested

GENERAL NOTES:
COLV cabling are not required if they are made by the manufacturer.
Connection of remote keyboard via 3-way cables with no optional modules.
Eliwell can also supply a variety of different NTC probes depending on the cable type (PVC or silicon) and length.

33 ANALITIC INDEX

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