Installation Manual

Rego 5200

6 720 819 556 (2016/04)

Table of Contents

1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background.
Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:
- **NOTICE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

Important information

This symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Explanation
▶	Step in an action sequence
→	Cross-reference to another part of the document
•	List entry
–	List entry (second level)

Table 1

1.2 General safety instructions

These installation instructions are intended for plumbers, heating engineers and electricians.

- ▶ Read any installation instructions (heat pump, heating controls, etc.) carefully before starting the installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Observe national and regional regulations, technical rules and guidelines.
- ▶ Record all work carried out.

Intended use

This heat pump must only be used as a heat appliance in a sealed hot water heating system for domestic purposes.

Any other use is considered inappropriate. Any damage that results from such use is excluded from liability.

Installation, commissioning and servicing

Installation, commissioning and servicing must only be carried out by an authorised contractor.

- ▶ Only use original spares.

Electrical work

Electrical work must only be carried out by qualified electricians.

- ▶ Before starting electrical work:
  - – Isolate all poles of the mains voltage and secure against reconnection.

– Using suitable means, test that the power supply is disconnected.

▶ Also see connection diagrams of other system components.

Handover to the user

When handing over the heating system, instruct the user in its operation and operating conditions.

▶ Explain the operation - with particular emphasis on all safety-related actions.

▶ Explain that conversions and repairs must only be carried out by an approved contractor.

▶ Point out the need for inspections and maintenance for safe and environmentally-compatible operation.

▶ The installation and operating instructions must be given to the user for keeping.

2 I/O connections

2.1 I/O connections control module

Temperature inputs PT 1000:		
AI1	T0	Flow temperature
AI2	TL1	Outdoor temperature
AI3	TW1	Temperature in hot water heater (HWH)
AI4	TC2	Accumulator tank temperature
UI1	TC1	Flow after serial electric boiler/boiler temp
UI2	TCO	Return temperature to heat pump
UI3	TR8	Temp. Fluid line after economizer
UI4	JR1	0-5V Condensing pressure

Table 2

Potential-free, digital inputs 24VDC:			
DI1	PC1.SSM	NC[1)]	Radiator circulation pump general alarm
DI2	I1	NO[2)]	EVU 1/External control 1
DI3	FM0	NC[1)]	Additional heat alarm electric boiler
DI4	I3	NO[2)]	EVU 2/External control 2
Di5	AC0	NC[1)]	Heat carrier pump general alarm
DI6	AB3	NC[1)]	Collector circuit pump general alarm
DI7	FE1/AR1	NC[1)]	Circuit breaker/alarm soft start compressor 1
DI8	FE2/AR2	NC[1)]	Circuit breaker/alarm soft start compressor 2

Table 3

1) Normally Closed

2) Normally Open

Analogue outputs 0-10VDC:		
AO1	WM0	Additional heat mixing valve radiator
A02	Reserve	
AO3	Reserve	
AO4	PC0	Heat carrier pump
AO5	PB3	Collector circuit pump

Table 4

Digitala outputs 230VAC:		
DO1	PC0	Power supply heat carrier pump
DO2	EE1/EM0	Start additional heat/Electric boiler stage 1/
DO3	EE2	Electric boiler stage 2/Pump/Electric element for thermal desinfection HWH
DO4	VW1	Three-way valve heating/Hot water

Table 5

Digital outputs potential-free (Inverted)		
DO5	PC1	Radiator circulation pump
DO6	PM1/PW2	Boiler circulation pump/VVC pump
DO7	SSM	General alarm (A/AB)

Table 6

Accessories	**Quantity**	**Heat pump**
Mixing valve/Pool/Room sensor (Multiregulator)	0-9	Z1

Table 7 Accessories

2.2 I/O connections HP board

Temperature inputs NTC:			
I10	TR5	R0[1)]	Suction gas temperature
I11	TR2	R0[1)]	Suction gas temperature fluid injection
I12	TR3	R40[2)]	Temperature fluid line before economizer
I13	TB0	R0[1)]	Incoming temperature collector circuit
I14	TR7	[3)]	Hot gas temperature compressor 2
I15	TC3	R40[2)]	Outgoing heat carrier
I16	TR6	[3)]	Hot gas temperature compressor 1
I17	TB1	R0[1)]	Outgoing temperature collector circuit
I19	JR0		0-5V Evaporation pressure
I18	JR2		0-5V Fluid injection pressure

Table 8

1) Sensor optimised for temperatures round 0°

2) Sensor optimised for temperatures round 40°

3) Compressor with built-in hot gas sensor

Digital inputs 230V:		
I50	ME1	Compressor 1 operating status
I51	ME2	Compressor 2 operating status
I52	MR1	High pressure switch

Table 9

Digital outputs 230VAC:		
O50	ER1	Compressor 1 start
O51	PB3	Start collector circuit pump
O52	ER2	Compressor 2 start
O53	ER3	Fluid injection solenoid valve 1
O54	ER4	Fluid injection solenoid valve 2

Table 10

Step motor controls 12V unipolar		
O17-20	VR2	Fluid injection valve
O13-16	VR1	Expansion valve

Table 11

3 Control panel

Settings for the control of the heat pump are made with the control unit's control panel, which also provides information about current status.

Each heat pump is set using its control unit.

3.1 Panel overview

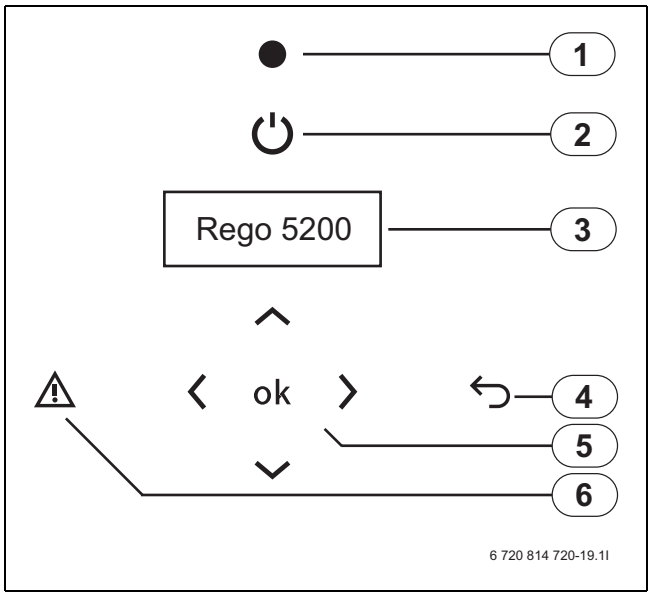

Fig. 1 Control panel

[1] Status lamp
[2] On/Off button
[3] Menu display
[4] Return button
[5] Navigation buttons
[6] Alarm button

3.2 Status lamp

The lamp lights green.	The control unit is activated.
The lamp is off.	The control unit is switched off/stand-by mode (Off).
The lamp flashes red.	An alarm is active or has not been acknowledged.
The lamp lights red.	The alarm has been acknowledged but the alarm cause remains.

Table 12 Lamp functions

The status lamp indications apply to the heat pump the lamp is placed on.

3.3 On/Off button

Use the On/Off button to switch the heating installation on and off.

When Off: The menu window shows **Standby**. The heating system circulation pump PC1 keeps running. Communication between the heat pumps is not affected.

3.4 Menu display

Use the menu display in order to:

- See information from the heat pump.
- See available menus.
- Change set values.

3.5 Return button

Use ⮌ to:

- Go back to the previous menu level.
- Leave a setting display without changing the set value.

3.6 Navigation buttons

Use the arrows to navigate between the menus. Press **ok** to initiate a value change, then use the arrows to change the value. Press **ok** to save or ⮌ to return without saving.

3.7 Alarm button

Use ⚠ to show the alarm list (status lamp lights/flashes red). To return to the previous position, press ◀ or ⮌.

Alarms activated in a certain pump are shown in the heat pump in question.

3.8 Initial menu

- To see the initial menu when the menu window is unlit, press **ok**.
- Press **ok** for 5 seconds to become logged in as a Customer (→ Chapter 3.11, page 6).

Rego 5200	Z1
2010-03-01	14:23
Outd. -2.0 °C	Menu>
Info	

Table 13 Initial menu

The Initial menu shows which heat pump it is (Z1), the date, time and outdoor temperature.

- Press ▼ to show the current operating information.
- Press ▶ to move to the top menu level (Customer).

The Initial menu looks the same in all heat pumps irrespective of the heat pump's designation.

3.9 Finding desired function and changing values

The menu overview shows the main functions that are reached using the navigation buttons and **ok**.

- Press ▶ in the Initial menu to move to the top menu level (Customer).

>1 Room temperature
2 Hot water
3 Temperatures
4 Accessories
5 Energy calculation
6 Language
7 Date/Time
8 Access level
9 Communication
10 Installer
11 Service
12 Factory reset

Table 14 Menu level 1

- Use ▼ and ▲ to scroll between the available menus at menu level.

Navigate between the menus

Button	Function
▶ **ok**	Go to next menu level for menu marked with >.
◀ ⮌	Go back to previous menu level.
▲ ▼	Scroll between menus at the same level.

Table 15 Menu navigation

Change a value, e.g. heat curve at 0 °C
The heat curve is only accessible in Z1.

▶ Go to:

>1 Room temperature
2 Hot water
3 Temperatures
4 Accessories
5 Energy calculation
6 Access level
7 Communication

Table 16 Menu level 1

▶ Press (▶) or (ok) to go to the next menu under **Room temperature**.

>1 Summer/winter op.
2 Heat curve
3 Parallel offset
4 Hysteresis
5 Attenuation TL1

Table 17 Room temperature 1

▶ Press (▼) so that **Heat curve** is marked.

1 Summer/winter op.
>2 Heat curve
3 Parallel offset
4 Hysteresis
5 Attenuation TL1

Table 18 Room temperature 2

▶ Press (▶) or (ok) to go to the next menu level for **Heat curve**.

1 Heat curve	
Outd.	Flow
20 °	20 °
15 °	24 °

Table 19 Heat curve 1

▶ Use (▼) till the below is shown:

2 Heat curve	
Outd.	Flow
0 °	35 °
-5 °	38 °

Table 20 Heat curve 2

Value 35 ° must be changed to 37 °.

▶ Press (ok) to come to the first adjustable value, which is 3 in 35 °. The digit is marked and flashes.
▶ Press (▶) so that digit 5 in 35 ° is marked.
▶ Use (▲) or (▼) to change 5 to 7.
▶ Press (ok) to save the value. The cursor is now on the next adjustable value in the window.
▶ Press (↩) one or more times to cancel an initiated change.

After change to 37 ° the window looks like this:

2 Heat curve	
Outd.	Flow
0 °	37 °
-5 °	38 °

Table 21 Heat curve 2

Table 21 Heat curve 2

Digit 3 in 38 ° is marked. Press (ok) to keep the value and continue navigating.

Other ways of changing a value
Increase the number of digits in a value:

▶ Press (▶) so that the cursor is placed to the right of the last digit in the value, and press (▲) until the desired value is shown.
▶ Press (ok) to save the value or (↩) one or more times to return without saving.

Place a decimal point in a value:

▶ Press (▶) so that the cursor is placed to the right of the last digit in the value, and press (▼). A decimal point is included. Press (▶) and use (▲) or (▼) to set the desired value for the decimal.
▶ Press (ok) to save the value or (↩) one or more times to return without saving.
When the value has been saved, it can be presented as a whole number, even though one or more decimals have been added. The value in the control unit is always the saved value.

Change to/from a negative value:

▶ Press (◀) to mark the position in front of the first digit in the value. Press (▼) to include a minus sign, press (▲) to remove a minus sign.
▶ Press (ok) to save the value or (↩) one or more times to return without saving.

Change a text value:

▶ Use (▲) or (▼) to show the available alternatives. Press (ok) when the desired value is displayed.

3.10 Operating information

Rego 5200	Z1
2010-03-01	14:23
Outd. -2.0 °C	Menu>
Info	

Table 22 Initial menu

Under **Info** there is operating information that is reached by pressing (▼) in the initial menu.

Compressor 1	
Operating mode	
Demand	
Status compr.	Time

Table 23 Info 1

Operating mode: Winter operation or **Summer operation**.

Demand: Shows one of the following for compressor 1 or 2:

No demand	No demand for heating, hot water or external start of the compressor.
Heating demand	Heating demand
Hot water demand	Hot water demand
External operation	An external unit has requested operation of the heat pump, compressor and/or additional heat.
Manual operation	Function test underway.

Table 24 Demand

Status compressor: Shows one of the following for compressor 1 or 2:

Blocked	The compressor is blocked by a tripped safety function. Information available in Alarm history available at installer level.
Blocking	The compressor is blocked via external control.
Off	The compressor is not running. PC1 is running for winter operation, or motion kick. VW1 is active for emergency operation, summer or motion kick. Additional heat is not in operation.
Press. equal.	The compressor restart timer is counting down.
Checking	After start-up the temperatures TC1, TC0, TB0, TB1 are checked for up to 2 minutes to ensure that they can manage the protection temperatures.
Start-up	Circulation pumps start to verify function.
Heating	The compressor starts. JR0 must be at least 1 K colder than TB0, and TR6 must increase to at least 10 K over TC1 within 3 minutes, otherwise the compressor stops.
Operation	The compressor runs as long as the demand remains or external start is active. No safety functions have tripped, and there is no external stop.
Stopping	The compressor has stopped in this situation. PC0 and PB3 run for 1 minute.
Alarm	An alarm is active for the compressor.
Oper.+ Add.heat	Both the compressor and additional heat are in operation.
External blocking	The compressor is blocked via external control.

Table 25 Status compressor

▶ Use (▼) for more information under **Info**.

1 External sensors	
T0 flow	35.2 °C
T0 spv	36.2 °C
TL1 outdoors	3.9 v °C

Table 26 External sensor 1

Shows the actual value for a given sensor and the set point value for T0.

2 External sensors	
TC1 boiler	57.0 °C
TC2 buffer	57.0 °C
TW1 hot water	56.4 °C

Table 27 External sensor 2

Shows the actual value and stop temperature for the hot water sensor as well as the mixing valve position. Is only shown in heat pumps that produce hot water.

3 Heating flow, ret.	
TC3 37.0 °	TC0 27.0 °
Brine flow, return	
TB1 0.0 °	TB0 5.0 °

Table 28 Internal sensors

Shows the actual value for the given sensors.

4 Refrigerant warm
TR6 77.0 ° TR7 87.0 °
JR1 3
TR3 37.0 ° TR8 27.0 °

Table 29

5 Superheat evapor.	
TR5 37.0 °	JR0 0
Superheat injection	
TR2 0.0 °	JR2 0

Table 30

6 Status digital I/O
1 2 3 4 5 6 7 8
In: 0 0 0 1 1 1 1 1
Out: 1 0 0 0 1 0 1

Table 31 Status digital I/O

0 = Off, 1 = On (→ Chapter 2, page 3 for information on I/O connections).

7 Status analogue out	
Ao1: 0.0	(%)
Ao2: 0.0	Ao4: 64.3
Ao3: 0.0	Ao5: 52.8

Table 32 Status analogue out

Shows present utilisation in % (→ Chapter 2, page 3 for information on I/O-connections).

Program version
x.x – x – xx

Table 33 Program version

▶ Use (▲) several times to return to the Initial menu.

Information is also available at different places in the menus, e.g. under **Temperatures** at the top menu level.

3.11 Access levels

Not logged in	See a small number of settings. Limited nagivation in menus
Customer	See and change customer settings. Limited nagivation in menus Log out in 10 min.
Installer	According to the Customer and see and change more settings. Some limitation of nagivation in menus. Log out in 30 min.
Service	According to Installer and see and change more settings. No limitation of nagivation in menus. Log out in 10 min.

Table 34 Access levels

Log in must be done per heat pump.

Log in as a customer:

▶ Press (ok) for 5 seconds in the Initial menu.

Log in as installer:

▶ Enter password mmdd under **Access level**.
mm = actual month
dd = actual day
E.g: 0315 = 15th March.

Logging out:

▶ Use function **Quick log-out** at installer level or wait.

4 Settings

Settings at customer level are in the User guide for GEO.

After logging on as installer (→ Chapter 3.11, page 6) **Installer** is displayed directly under **Access level** on the top menu level. Menu line **Communication** is displayed before **Access level**.

Under **10 Installer** there are the following main functions:

- **1 Settings**
- **2 Function test**
- **3 Quick restart**
- **4 Read out**
- **5 Quick log-out**
- **6 Factory reset**
- 7 **Commissioning**

All settings are made under **1 Settings**. This includes:

- **1 Addressing**
- **2 Room temperature**
- **3 Additional heat**
- **4 Hot water**
- **5 Output/Energy cal**
- **6Accessories**
- **7 Circulation pumps**
- **8 General alarm**
- **9 Inversions**
- **10 Sensor**

Menu tables

The available functions and settings are shown in the following menu tables.

Factory: Pre-set values, most of which can be changed.

Range: Gives available setting alternatives or possible value limitations.

HP: Gives the heat pump in which the function is available.

Always set Z1 first. Most settings are made here because for example Additional heat and accessories are connected to this heat pump. The settings in Z1 also affect other heat pumps.

4.1 Settings\Addressing

Setting	Factory	Range	Heat pump
1 Addressing			
Heat pumps **Number**: **This HP**:	 1 Z1	 1- 5 Z1- Z5	 Z1 Zx
▶ Set the number of heat pumps in Z1. ▶ Enter the current designation for respective heat pump in each heat pump in accordance with the system drawing. Setting **Number** and **This HP** arranges all combined operation, addressing and port setting automatically.			

Table 35 Addressing

4.2 Settings\Room temperature

Setting			Factory	Range	Heat pump
2 Room temperature					
	1 Summer/winter op.	**1 Summer operation** **Start**: TL1 > i	 17 °C 180 min		Z1
		1 Winter operation TL1 < i	 15 °C 300 min		Z1
		1 Winter operation **Direct start**: TL1 <	 7 °C		Z1
		► Set the outdoor temperature that is required for changeover to summer operation, and the delay that applies. ► Set the outdoor temperature that is required for changeover to winter operation, and the delay that applies. ► Set the outdoor temperature at which winter operation shall start directly, without a delay. Delays prevent repeated stops and starts of the heating system circulation pump when the outdoor temperature fluctuates above and below the limit.			
	2 Basic setting	**1 Basic setting** **DOT** **Min** **Max**	 -35 °C 20 °C 60 °C		Z1
		The factory settings refer to radiator systems. For underfloor heating systems only, 35 °C is recommended as the highest flow set point. Other applications may require other values. ► Set the minimum outdoor temperature for the heat curve (**DOT**), and the lowest and highest flow temperature set points.			
	3 Heat curve				Z1
		The flow temperature set points at different outdoor temperatures are automatically calculated using the values in **Basic setting**, → Chapter 4.2.1 for example on heat curve for radiator systems and underfloor systems. Values can be changed individually, for example adjusting the heat curve at 0 °C.			
	4 Parallel offset	**1 Parallel offset**	0 K		Z1
		► Enter by how many degrees the flow temperature at the curve's outdoor temperatures shall be adjusted down or up.			
	5 Hysteresis	**1 Hysteresis Comp.1** **Actual v.** T0 **Set point**	 Display K Display °C Display°		All
		2 Hysteresis Comp.2 **Actual v.** T0 **Set point**	 Display K Display °C Display°		All
		3 Actual v. compr.1 **Actual v. compr. 2**	Display K Display K		All
		The factory settings refer to heating systems with normal flow. For low flow systems Min 3 K, Max 16 K is recommended. For high flow systems (floor heating) Min 1 K, Max 4 K is recommended. ► Set the minimum and maximum hysteresis and time factor for hysteresis reduction after start/stop. Current hysteresis, including actual value and set point value for T0 are shown.			
	6 Attenuation TL1	**1 Attenuation** TL1	2h		Z1
		The function means that the set point for the flow temperature is successively adjusted with respect to the set point at the current outdoor temperature. This reduces the effect of brief fluctuations in outdoor temperature. ► Set the time for the flow temperature set point to reach the current curve value.			
	7 Deviation T0	**1 Deviation** T0	10 K		Z1
		► Set how much lower/higher than the set point T0 must be for 30 minutes to give an alarm **Low temperature T0 flow** or **High temperature T0 flow**(→ Chapter 5.6).			

Table 36 Room temperature

4.2.1 Heat curve

The heat pump operates by holding flow temperature T0 in relation to outdoor temperature TL1 according to the set heat curve.

The appearance of the heat curve depends on settings for the minimum outdoor temperature (**DOT**, factory setting -35 °C), lowest flow set point (factory setting 20 °C) and highest flow set point (60 °C). This heat curve is appropriate for radiator systems.

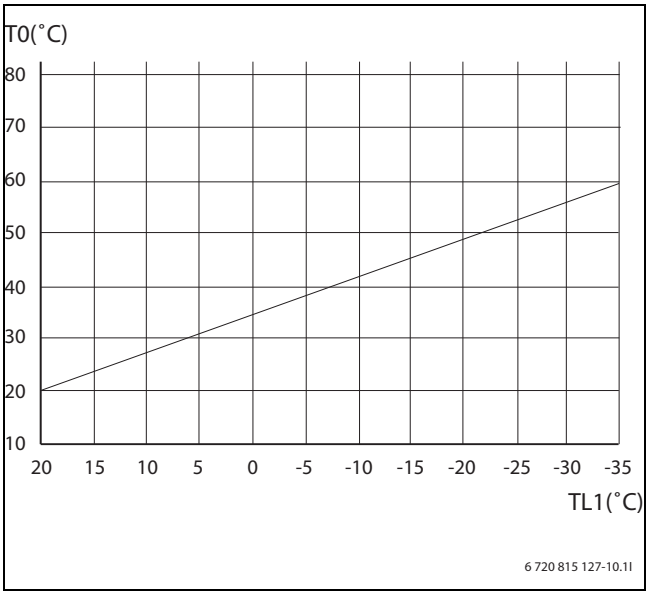

Fig. 2 Radiator system

When the factory setting is changed, the heat curve is redrawn automatically. Any adjustments to the curve disappear.

The curve is set in Z1 and applies to all heat pumps.

Example of a floor heating curve:

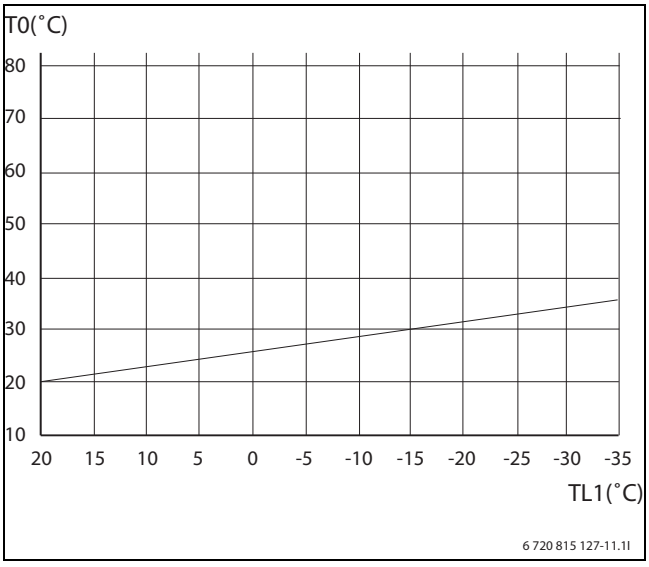

Fig. 3 Floor heating

▶ Draw in your own curve:

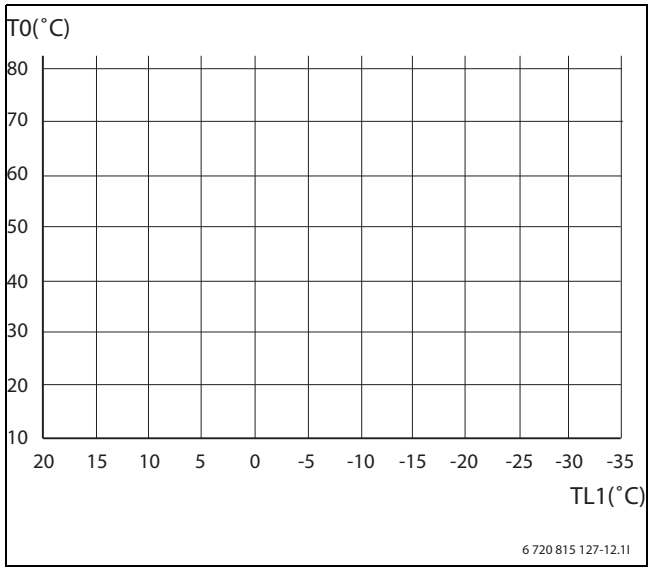

Fig. 4 Separate curve

4.2.2 Hysteresis (individually per compressor)

Hysteresis floats between a max value (8K) and a min value (2K). A time factor determines the time it takes to go from maximum to minimum value.

The values are set in respective heat pumps. The current hysteresis is calculated and displayed and T0's actual value and set point value are displayed in each heat pump. The heat pump or compressor that has been stationary the longest starts first, and the one that has been in operation longest stops first.

Stop blocking after hot water

If there is a heating demand when the hot water demand stops, the hysteresis for T0 is set to max for 1 minute.

4.2.3 Heating demand

The heat is regulated to T0, which is installed on the flow line after external mixed additional heat. The higher value of T0 and TC2 (accumulator tank sensor) is used, but not the first few minutes after the finished hot water charging when only TC2 is used.

Hot water mode and external control are superior functions.

No heat is produced in summer operation, apart from for a pool if applicable.

4.3 Settings\Additional heat

The tables display the settings for different types of additional heat:

- **3-step electrical additional heat EE**
- **District heating**
- **Modulated add. heat**
- **Mixed add. heat**

▶ Read more about additional heat (→ Chapter 4.3.1 -).

Setting			Factory	Range	Heat pump
3 Additional heat					
	1 Additional heat type		**No additional heat**	**No additional heat** **3-step electrical additional heat** **District heating** **Modulated add. heat** **Mixed add. heat**	Z1
			Comp. + add. heat	**Only additional heat** **Comp. + add. heat** **Only compressor**	
		► Set relevant **Additional heat type** and required additional heat mode. **Internal add. heat** shows:			
	2 3-step electrical additional heat	**1 Start** EE1 **Hysteresis** **Delay** **Actual v.**:	 3 K 180 °min Display, can be changed		Z1
		2 Start EE2 **Delay** **Actual v.**:	 60 °min Display, can be changed		
		3 Start EE1+EE2 **Delay** **Actual v.**:	 60 °min Display, can be changed		
		4 Stop EE1 **Delay** **Actual v.**:	 10 °min Display, can be changed		
		5 Stop EE2 **Delay** **Actual v.**:	 5 °min Display, can be changed		
		6 Stop EE1+EE2 **Delay** **Actual v.**:	 5 °min Display, can be changed		
		7 Settings **Max no. of steps in**: **Heating**: **Hot water**:	 2 2	 0, 1, 2, 3 0, 1, 2, 3	
		8 Output	Step 1 Step 2 Step 3		
		► Set conditions for when respective steps must activated/disconnected. ► Set maximum number of steps that can be used for heating mode and hot water mode.			

Table 37 Internal electrical additional heat

Setting			Factory	Range	Heat pump
	3 District heating	**Start** heat **Hysteresis** **Delay** **Actual v.**:	 3 K 180 °min Display, can be changed		Z1
		Stop heat **Delay** **Actual v.**:	 10 °min Display, can be changed		
		PID VM0 P: I: D: T1, **Sp**, **Out**	 1 100 0 Display		
		▶ Set conditions for connecting/disconnecting the additional heat. ▶ Set values for mixing valve control. Actual and set point value for T1 is shown. In addition the output signal is shown in %.			
	4 Mixed add. heat	**Start** heat **Hysteresis** **Delay** **Actual v.**:	 3 K 180 °min Display, can be changed		Z1
		Stop heat **Delay** **Actual v.**:	 10 °min Display, can be changed		
		PID VM0 P: I: D: T1, **Sp**, **Out**	 1 100 0 Display		
	5 Alarm delay	**1 Alarm delay**	30 min		Z1
		The function is only shown for **Mixed add. heat**. ▶ Set the time the alarm **External add. heat out of order** is delayed (→ Chapter 5.6).			
	6 ECO-drive	**1 ECO-drive** **Start** **Stop after**	**No** 22:00 6 hr	**No**, **Yes** 00:00 - 23:59	Z1
		▶ Enter **Yes** if activation of additional heat is to be delayed dudring the selected period. The delay increases by 25%.			

Table 37 Internal electrical additional heat

4.3.1 3-step electrical additional heat

Electrical additional heat has three steps, EE1, EE2 and EE3. When all the steps are connected there is a total of 15 kW for internal electrical additional heat and 42 kW for external. A degree minute calculation is used to activate each step.

EE1: The compressor is running and T10 does not reach its set point value. Calculation of the difference between T0 set point − set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (180 °min) step 1 is activated. Step 1 with (3K), (180°minutes) is used for external additional heat.

EE2: Step 1 is connected and T0 does not reach its set point value. Calculation of the difference between T0 set point − set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (60 °min) step 2 is activated.

EE1 + EE2: Step 2 is connected and T0 does not reach its set point value. Calculation of the difference between T0 set point − set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (60 °min) both step 1 and 2 are activated.

Disconnection: Step 1+2 is disconnected when the degree minute calculation for the difference between T0 actual value and T0 set point value reaches the set **Delay** (5 °min). The same applies for step 2. Step 1 is disconnected when the degree minute calculation reaches the set **Delay** (10 °min).

The additional heat demand ceases when all stages are disconnected.

Power guard for 3-step additional electric heat

When there is a signal from the power guard for more than 60 seconds, disconnection is done step by step. The counter resets on each disconnection of a step.

The additional heat demand remains if T0 is less than the set point value by more that the set limit (3K), even if all the steps are disconnected because of the signal from the power guard.

When the signal from the power guard is no longer active, reconnection is done step by step after 60 seconds.

4.3.2 Modulated add. heat VM0

The external additional heat is controlled with 0-10V and regulated using a PID regulator to maintain the T0 set point value.

A degree minute calculation is used for connection/disconnection.

Connection: T0 does not reach its set point value. Calculation of the difference between T0 set point − set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (180 °min) the additional heat is activated.

The output signal from the PID regulator controls how much additional heat shall be produced.

Disconnection: The additional heat is disconnected when the degree minute calculation for the difference between T0 actual value and T0 set point value reaches the set **Delay** (10 °min). The calculation starts when the output signal from the PID regulator is less than 1% (<0.1V).

4.3.3 Mixed add. heat VM0

The external additional heat mixing valve VM0 is controlled with 0-10V and regulated with a PID regulator to maintain the T0 set point value.

A degree minute calculation is used for connection/disconnection.

Connection: T0 does not reach its set point value. Calculation of the difference between T0 set point – set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (180 °min) the additional heat is activated.

The additional heat and any internal circulation starts. The mixing valve starts when the boiler temperature sensor TC1 exceeds the start value.

Disconnection: The additional heat is disconnected when the degree minute calculation for the difference between T0 actual value and T0 set point value reaches the set **Delay** (10 °min). The calculation starts when the output signal from the PID regulator is less than 1% (<0.1V).

4.3.4 District heating VM0

VM0 is controlled with 0-10V and regulated with a PID regulator to maintain the T0 set point value.

A degree minute calculation is used for connection/disconnection.

Connection: T0 does not reach its set point value. Calculation of the difference between T0 set point – set **Hysteresis** (3 K) and T0 actual value is added continuously. When the total amounts to the value set in **Delay** (180 °min) the additional heat is activated.

Disconnection: The additional heat is disconnected when the degree minute calculation for the difference between T0 actual value and T0 set point value reaches the set **Delay** (10 °min). The calculation starts when the output signal from the PID regulator is less than 1% (<0.1V).

4.3.5 Jointly for additional heat

ECOdrive

If this function is activated it delays the connection of the additional heat from start (22.00) and (6) hours ahead. The degree minute limiting value is increaed from the set value by 25%. The compressor continues to work to the normal set point value. Additional heat mode: Normal/ ECOdrive (Normal).

Additional heat mode.

Normally **Comp. + add. heat** applies. When **Only additional heat** is set the additional heat is activated instead of the compressor during a heat demand.

For **3-step electrical additional heat**the additional heat is also activated during a hot water demand.

The additional heat is also activated if both compressors have interlocked alarms or if the alarm **Communication error with HP board** occurs.

Additional heat alarm

On alarm from the additional heat all degree minute calculations are reset.

Hysteresis T0

When there is a demand for additional heat the hysteresis for T0 is held at maximum. Normal calculation starts when the demand for additional heat stops.

All compressors in all heat pumps have activated heating demand during additional heat mode.

PID regulator

P factor control is used.

4.4 Settings\Hot water

Setting			Factory	Range	Heat pump
4 Hot water					
	1 Hot water type	**1 Hot water type**	**No hot water**	**No hot water** **Fresh water station** **Local sensor** **Communicated**	Zx Not Z1
		When the heat pump is to produce hot water: ▶ Enter how the heat pump is to control hot water production. ▶ Select **Local sensor** when there is a locally connected hot water heater with local sensor to measure the hot water temperature. ▶ Select **Communicated** when the heat pump has all the information on the hot water temperature and start/stop limits via communication control.			
		2 Temperatures	**Actual v.** **Start**: 53 °C **Stop**: 57 °C **Max temperature**		Zx
		▶ Set start and stop values for hot water production. The factory settings refer to heat pumps with **Local sensor**. For **Previous HP** 2 K lower temperatures are recommended. For **Communicated** the values are of no importance. **Max temperature** shows the estimated highest possible hot water temperature.			
		3 Compressors	**Compressors for VV** **Automatic**		Zx
		▶ Select if 1 or 2 compressors are to be used for hot water mode. ▶ If **Automatic** is selected the second compressor starts if the temperature on TW1 is below **Low temperature TW1 hot water**.			
		4 Fresh water station	**Set point**		Zx
		▶ For **Fresh water station** a set point value is set for JR1.			
	2 Therm. disinfection (**Hot water type** = **Local sensor**)	**1 Therm. disinfection** **Day**: **Start**: **Number of steps**:	**No** 02:00 1	**No**, **Yes** **None**, **Day**, **All** 00:00 - 23.59 1, 2, 3	Z1
		▶ Select **Yes** if thermal disinfection is to take place. Enter also the frequency and start time. ▶ Select number of steps for the 3-stage additional electric heat that is to be used by this function. The function starts according to the settings and is active until TW1 exceeds 70 °C or has run for three hours. If 70 °C is not reached in this time alarm **Therm. disinfection unsuccessful** (à Chapter 5.6) is given, and a new attempt is made next time.			

Table 38 Hot water

Setting			Factory	Range	Heat pump
	3 Settings (**Hot water type** = **Local sensor**)	**1 Settings** **Alarm setting** **Alarm limit**: **Delay**	 45 °C 30 min		Zx
		Settings for monitoring of too low temperature in hot water heater. ▶ Set the lowest temperature at which the system sets off an alarm. ▶ Set how long the alarm **Low temperature TW1 hot water** is to be delayed (à Chapter 5.6).			
		2 Settings **Valve**: **Emergency operation**:	 **External** **No**	 **External**, **Internal** **No**, **Yes**	Zx
		▶ Enter type of three-way valve to get the correct designation in the control unit. **External** = VW1, **Internal** = VW1 ▶ Enter **Yes** if **Emergency operation** for hot water should take place if there is a problem, → Chapter 4.4.4 for description of the function.			
		3 Settings **Monitor T0**: **Set point** - T0 > **Delay**	 **No** 10 K 10 min	 **No**, **Yes**	Zx
		▶ Select **Yes** when the heat pump must monitor T0 during hot water production. ▶ Enter the maximum number of degrees (K) the flow temperature T0 can be below its set point value. ▶ Enter how long the flow temperature must be below the set limit before the heat pump changes to heating mode. For more than one heat pump all heat pumps except Z1 switch to heating mode 2 degrees (K) before Z1's limit (10 K-2 K = 8 K at 10 K factory value).			
		Settings **Heat protection**: T0 - **Set point** > **T0 increase** >	 **No** 10 K 15 K	 **No**, **Yes**	Zx
		▶ Select **Yes** when the heat pump must monitor T0 during hot water production. ▶ Enter the maximum number of degrees (K) the flow temperature T0 can exceed its set point value and how many degrees (K) T0 can increase during hot water production. When both conditions are fulfilled the heat pump gives an alarm **Problem with three-way valve VW1** (→ Chapter 5.6).			

Table 38 Hot water

Setting			Factory	Range	Heat pump
	4 FWS	**1 Temperature flow** Reading. **TW2 Heat in** **TW3 Heat ret** **TW4 VV flow** **TW5 Water in** **TW6 VV circ** **TW7 Cold water** **GW0 Water flow**			Z1
		2Settings **TW4 flow** Reading **Set point** Set VV temp **PC4 speed** Reading **GW0 Water flow** Reading **PID** **Feedforward** **Learn factor** **TW3 heat retur**Reading **Start limit** **Max limit** **Cold limit** **Heat limit** **VW3 pos** Reading			
		3 Time **VV circulation** **Day** Set on and off times **Weekend** Set on and off times **Operating hours** Reading **PC4 heat** **PW2 circul.**			
		4 Energy flow Reading			
		5 Alarm limits **TW2 hot water in** **Max temp** **Min temp** **Alarm delay** **TW3 heat retur** **Max temp** **Alarm delay** **TW4 VV temp** **Max temp** **Min temp** **Alarm delay** **TW6 VV circulation** **Max temp** **Min temp** **Alarm delay**			
		6 Man/Auto **PW2 VV circul. pump** **Off** **On** **Auto** **PC4 heat pump** **Manual value** **Off** **On** **Auto** **VW3 heat ret. valve** **Off** **On** **Auto**			

Table 39 Hot water

Setting			Factory	Range	Heat pump
	5 Energy calculation	**1 Settings** **Fuse size** El meter Energy calculation heat transfer fluid Energy calculation collector circuit Energy calculation nominal heat flow Energy calculation nominal brine flow Energy calculation nominal heat effect Energy calculation nominal Brine effect			Z1
		2 Reading			

Table 39 Hot water

4.4.1 Hot water type

Set the type of hot water, depending on the system.

The setting **Automatic** in the menu **Compressors** is mainly used when the hot water heater has a volume of from 10 to 20 litres per kW heat pump output, in order to improve the HW comfort (higher capacity).

High DHW temp mode: starts when the hot water stop temperature is set to ≥ 60 °C.

Fresh water station or **high DHW temp mode** in combination with selected hot water type:

- When there is a hot water requirement the regulation of PC0 is changed first to regulate the condensing temperature JR1
- When TC3 is higher than TW1 *or* TC3 is over the HW start limit, then HW1 switches over to hot water mode to maintain the stratification in the hot water tank.
- Both compressors are allowed to run in the heating phase, even if only one is selected for hot water.
- The maximum time for the heating phase is 10 minutes, after which the system switches to normal hot water charging even if TC3 < TW1.

4.4.2 Hot water temperatures

A start temperature and stop temperature are set for TW1. TC0 is set in the same heat pump automatically to the same stop temperature.

The settings for selection of sensor and start / stop limits are made in each heat pump.

4.4.3 Hot water demand

Hot water requirement starts when TW1 falls below its start temperature and stops when TW1 exceeds its stop temperature; TCO must also exceed the stop limit.

When TC0 exceeds the stop limit by -2K (max 59 °C) the compressor with the longest run time is stopped, if both compressors are running.

When the hot water charging is finished the dynamic hysteresis is set to half the maximum value of the stopped compressor.

4.4.4 Emergency operation, hot water

If this function is enabled and local sensor TW1 is not working, the production of hot water switches over to an emergency mode. 120 minutes after the last hot water production, the 3-way valve switches over to hot water and PC0 is given a start signal. This happens whether the compressor is running or not. If TC0 is below TW1's start temperature a hot water demand is activated, otherwise the 3-way valve switches back to its previous mode. The hot water demand stops when TC0 exceeds its and TW1's joint stop temperature.

4.4.5 Fresh water station (FWS)

For an explanation of the system's component parts, see system solution with fresh water station.

Function

The fresh water station is heated from a buffer tank CW1, which in turn is heated by the heat pump or from the additional heat. The return from the fresh water station goes either into CW1, or to the heating system's buffer tank depending on how high the return temperature to the fresh water station is. The heating system's buffer tank must be heated to approx. 40°C, even in the summer. This means that the heating system circuits must have mixing valves.

Buffer tank CW1 for hot water production

The heat pump must be set for local hot water sensors. Hot water production is activated when the temperature measured by sensor TW1 falls below the start temperature. The hot water production stops when TW1 and TC0 go over the stop temperature. In hot water production, the compressor starts and the three-way valves VW1 and VW2 are set in hot water mode.

Hot water temperature

The fresh water station maintains the hot water temperature measured by sensor TW4 to a constant temperature by transfering heat from the hot water buffer tank CW1. The transfer of heat is controlled by the speed of circulation pump PC4. In the event of sudden changes in the flow of hot water, which are measured by the flow sensor GW0, the speed of PC4 is influenced before the temperature is changed on TW4. This is done to maintain a uniform temperature.

The high hot water return from the fresh water station involves in principle only the circulation of hot water. The three-way valve VW3 is then set so that the return goes to CW1. When the consumption of hot water increases and the return temperature falls, VW3 changes mode and the return goes to the heating system's buffer tank for preheating.

Flow in hot water circulation

To maintain the dimensioned capacity of the fresh water station and buffer tank CW1 it is important that the hot water circulation flow is not so large that maximum return temperature for the heat pump is exceeded. The temperature difference between TW4 and TW6/GW41 should be approx. 5K.

4.5 Settings\Accessories

The accessory Multiregulator is used as a room sensor, or a mixing valve regulator. How the regulator is used in the system is determined by selecting the function for each accessory unit in the control unit. Accessory 1 must have physical address 21, which is set in the unit during installation. Accessory 2 must have physical address 22 etc.

▶ Set the physical address of the respective accessories and connect the accessories before settings are made in the control unit.

Setting				Factory	Range	Heat pump
6 Accessories						
	1 Accessories **Number**: **Set unit**			 0 x	 0-9	Z1
	▶ Set each accessory.					
		1 Accessories x **Select function**:			**Room sensor** **Active room sensor** **Fixed sp heating** **Own heat curve** **E11 heat curve** **Fixed sp cooling** **Pool**	Z1
		▶ Select the correct function for each accessory installed. ▶ Use ▼ and ▲ to scroll through the settings.				
		2 Room sensor **Actual v.**:		 Display		Z1
		2 Active room sensor **Actual v.**: **Set point**: **Average**:		 Display 22 °C Display		Z1
		▶ Set the set point value for the room temperature. With several active room sensors their average value is calculated and shown. This value together with the factor set in **Room temp. influence** is used to influence T0's heat curve.				
		2 Fixed sp heating **Actual v.**: **Set point**: **Settings**>	 **1 Fixed sp heating** P: I: Y: **2 Fixed sp heating** **Deviation**: **Pump**:	 Display 0 °C % 0 % 0 K **Off**	 **Winter**, **Summer**, **Off**, **On**	Z1
		▶ Set the fixed set point value to be applied. ▶ Set appropriate values for P and I. ▶ Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ▶ Enter pump function. **Winter** means that the accessory circulation pump is in operation during winter operation. The unit uses a connected external sensor to control a 0-10V connected mixing valve to maintain the given fixed set point value. This does not affect the heat pump's flow set point value.				
		2 Own heat curve **Actual v.**: **Set point**: **Settings**>	 **1 Own heat curve** P: I: Y: **2 Own heat curve** **Deviation**: **Pump**: **3 Own heat curve** Factor **3 Own heat curve** **Offset**	 Display 0 °C % 0 % 0 K **Off**	 **Winter**, **Summer**, **Off**, **On**	Z1
		▶ Set the heat curve that is to apply for the unit in **Set point curve**. ▶ Set appropriate values for P and I. ▶ Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ▶ Enter pump function. **Winter** means that the accessory circulation pump is in operation during winter operation. The unit uses an externally connected sensor to control a 0-10V connected mixing valve to maintain the set point value according to settings in **Set point curve**.				

Table 40 Accessories

Setting				Factory	Range	Heat pump
		2 T0 heat curve **Actual v.**: **Offset**: **Settings**>	 **1 T0 heat curve** P: I: Y: **2 T0 heat curve** **Deviation**: **Pump**:	 Display 0 K % 0 % 0 K **Off**	 **Winter**, **Summer**, **Off**, **On**	Z1
		▶ Set appropriate values for P and I. ▶ Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ▶ Enter pump function. **Winter** means that the accessory circulation pump is in operation during winter operation. The unit uses an externally connected sensor to control a 0-10V connected mixing valve to maintain the set point value according to T0's heat curve, adjusted with given deviation. Used for some sun solutions, or when Pool is used.				
		2 Fixed sp cooling **Actual v.**: **Set point**: **Settings**>	 **1 Fixed sp cooling** P: I: Y: **2 Fixed sp cooling** **Deviation**: **Pump**:	 Display 0 °C % 0 % 0 K **Off**	 **Winter**, **Summer**, **Off**, **On**	Z1
		▶ Set the fixed set point value to be applied. ▶ Set appropriate values for P and I. ▶ Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ▶ Enter pump function. **Summer** means that the accessory circulation pump is in operation during summer operation. The unit uses an externally connected sensor to control a 0-10V connected mixing valve to maintain the stated fixed set point value.				

Table 40 Accessories

Setting				Factory	Range	Heat pump
		2 Cooling curve				Z1
		Actual v.:		Display		
		Set point:		0 °C		
		Settings>	**1 Cooling curve**			
			P:	%		
			I:	0		
			Y:	%		
			2 Cooling curve	0 K	**Winter**, **Summer**, **Off**, **On**	
			Deviation:	**Off**		
			Pump:			
		► Set the fixed set point value to be applied. ► Set appropriate values for P and I. ► Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ► Enter pump function. **Summer** means that the accessory circulation pump is in operation during summer operation. The unit uses an externally connected sensor to control a 0-10V connected mixing valve to maintain the stated fixed set point value.				
		2 Pool				Z1
		Actual v.:		Display		
		Set point:		0 °C		
		Settings>	**1 Pool**			
			P:	%		
			I:	0		
			Y:	%		
			2 Pool	0 K	**Winter**, **Summer**, **Off**, **On**	
			Deviation:	**Off**		
			Pump:			
		► Set the fixed set point value to be applied. ► Set appropriate values for P and I. ► Set the temperature deviation that will give an alarm **Accessory x temp. deviation** (→ Chapter 5.6). ► Enter pump function. **Summer** means that the accessory circulation pump is in operation during summer operation. The unit uses a connected external sensor to control a 0-10V connected mixing valve to maintain the given fixed set point value. This affects the heat pump's flow set point value. An extra mixing valve is required.				
		2 Coolingpower lim.				Z1
		Actual v.:		Display		
		Set point:		0 °C		
		Settings>	**1 Coolingpower lim.**			
			P:	%		
			I:	0		
			Y:	%		
			2 Coolingpower lim.			
			Min limit:	0 K		
			Di1 function:			
		The multiregulator uses an external sensor to reduce the number of connected compressors in the connected heat pumps, when the temperature is lower than the set point value. The output in the multiregulator is active when a PB3 pump is running and can be used to start, for example, a groundwater pump. ► Set the fixed set point value to be applied. ► Set appropriate values for P and I. Y shows degree of reduction. ► Set the minimum temperature to set off an alarm (à Chapter 5.6). ► Enter function for Di1. Select either general alarm (B-alarm) for open contact (e.g. groundwater pump or pressure switch) or start mode.				
		3 Set point curve				Z1
		► Set the set point value for the circuit flow at different outdoor temperatures. For the curve's lowest outdoor temperature **DOT** the same value applies as for T0's heat curve.				
		3 Room temp. influence		0	0-10	Z1
		The settings are shown if one or more active room sensors are installed. If there are several active room sensors, a comparison is made with the average of the sensors' actual values. ► Set how much a one degree difference in room temperature (actual/average value compared to set point) wll influence the set point value for flow temperature T0. Example: A deviation of 2 K from the set room temperature will change the set point value for the flow temperature by 6 K when the effect is set with a factor of 3. At 0 there will be no effect.				

Table 40 Accessories

4.5.1 PI regulator

For accessories without **Room sensor** or **Active room sensor** the PI regulator for the mixing valve must be set.

P-band control is used.

Recommended settings:

	P-band	I	Deviation
Fixed sp heating	30	30	10
Own heat curve	30	30	10
T0 heat curve	30	30	10
Fixed sp cooling	30	30	10
Pool	5	2000	10
Coolingpower lim.	40	100	10

Table 41 Recommended settings

4.6 Settings\Circulation pumps

Setting			Factory	Range	Heat pump
7 Circulation pumps					
	1 Settings PC1	**1 Settings** PC1 **Alarm**: **Operating mode**:	 **SSM** **Automatic**	 **None**, **Oper. reply**, **SSM** **Continuous**, **Automatic**	Z1
		▶ Set if/how G1 should give an alarm in event of a problem. Alarm **Operating fault heating circuit pump PC1** can be given at **SSM** or **Oper. reply** (→ Chapter 5.6). ▶ Select if G1 should run in continuous or automatic mode. With **Automatic** PC1 runs in winter mode and is stationary in summer mode, apart from motion kick. With an operating fault on PC1 and all accessory pumps, all heat production stops and the alarm **Operating fault all PC1** (catagory A, → Chapter 5.6) is shown. This alarm is also shown in the event there is only PC1, because all heat production stops.			
	2 SettingsPC0	**1 Settings PC0** **Precirc. speed**: **Afterrun speed:** **Afterrun time**:			Zx
		2 SettingsPC0 **Regulating** **Delta set point value:**	 8 K		Zx
		▶ Set the temperature difference TC1-TC0 that the heat carrier pump should maintain in heating mode.			
	3 SettingsPB3	**1 Settings PB3** **Precirc. speed**: **Afterrun time**			Zx
		2 Settings PB3 **Regulating** **Delta set point value:**	 3 K		Zx
		▶ Set the temperature difference TB0-TB1 that the collector circuit pump should maintain.			
	4 SettingsPM1/PW2	**1 SettingsPM1/PW2** **Pump function**:	 **None**	 **None**, **Additional heat**,**VV circulation**	Zx
		With PM1: The additional heat pump starts at the same time as the additional heat and continues for 2 minutes after the additional heat has stopped. This function can be replaced with a delayed time relay on the same signal that goes to the boiler if you have to use the output signal to control PW2. With PW2: The HWC pump runs according to the timer channel (Chapter à 4.6.1)			
		2 Time channel	**1 VV circulation**	Activate / deactivate timer control	
			2 VV circulation	**Day**	
			3 VV circulation	**Weekend**	

Table 42 Circulation pumps

4.6.1 Timer channel hot water (DHW) circulation

In those countries were it is permitted to stop the circulation of hot water a timer channel DHW is used with one switching on and one switching off per weekday, Saturday and Sunday. Setting for how many degrees the temperature is reduced (-) or increased (+) between the set time intervals. Default setting 0 degree change.

This menu is not shown in countries where it is not permitted to stop the circulation of hot water.

4.7 Settings\General alarm

Setting			Factory	Range	Heat pump
8 General alarm					
	1 General alarm		**A/B alarm**	**A/B alarm**, **A alarm**	Zx
		▶ Select whether the general alarm output Do7 must be activated for both A and B alarms or only for A alarms.			

Table 43 General alarm

4.8 Settings\Inversions

Setting			Factory	Range	Heat pump
9 Inversions					
	1 Digital inputs				Zx
	Di1		**Normal**	**Normal**, **Inverted**	
	Di2		**Normal**	**Normal**, **Inverted**	
	Di3		**Normal**	**Normal**, **Inverted**	
	Di4		**Normal**	**Normal, Inverted**	
		▶ Select **Inverted** if the unit connected to the input requires this.			
	2 Digital outputs				Zx
	Do1		**Normal**	**Normal**, **Inverted**	
	Do2		**Normal**	**Normal**, **Inverted**	
	Do3		**Normal**	**Normal**, **Inverted**	
	Do4		**Normal**	**Normal, Inverted**	
	Do5		**Normal**	**Normal**, **Inverted**	
	Do6		**Normal**	**Normal**, **Inverted**	
	Do7		**Normal**	**Normal, Inverted**	
		▶ Select **Inverted** if the unit connected to the input requires this.			

Table 44 Inversions

4.9 Settings\Sensor calibration

Setting			Factory	Range	Heat pump
10 Sensor					
	1 Sensor calibration				
	T0		0.000 K		Z1
	TL1		0.000 K		Z1
	TW1		0.000 K		Zx VV
		▶ Check the sensors and adjust the reading if necessary.			

Table 45 Sensor calibration

4.10 Settings\Collector circuit

Setting			Factory	Range	HP
11Collector circuit					
	1Collector circuit	**TB0:Low**	– 5 °C	– 8 °C – +30 °C	Zx
		TB0:High	30 °C	– 8 °C – +30 °C	
		TB1:Low	– 8 °C	– 8 °C – +30 °C	
		TB1:High	15 °C	– 8 °C – +30 °C	
		▶ Set alarm limits for collector circuit in (TB0) and out (TB1). ▶ The factory settings are recommended for rock/soil. ▶ For exhaust air TB0 **Low** 0, TB1 **Low** – 3, TB0 **High** 30, TB1 **High** 15 °C are recommended. ▶ For groundwater TB0 **Low** 2, TB1 **Low** – 2, TB0 **High** 30, TB1 **High** 15 °C are recommended.			

Table 46 Collecter circuit

4.11 Settings\External control

Setting		Factory	Range	Heat pump
12External control				
1 External input I1 **Select function**:		**No effect**	**No effect** **Block all** (EVU1) **Block add. heat** **Block compressor**(EVU2) **Block hot water** **Start comp+add.heat** **Start compressor** (1+2) **Start brine pump** **Start fixed temperature** (Compressor and additional heat)[1)] **Start fixed temperature not additional heat** (Compressor only)[1)] **Powerguard 3step** (On signal from load monitor) **Start compressor**1	Zx
1 External input I1 **Offset main circuit** **Offset main circuit** **Speed brine pump**				Zx
2 External input I3 **Select function**:		**No effect**	**No effect** **Block all** (EVU1) **Block add. heat** **Block compressor**(EVU2) **Block hot water** **Start comp+add.heat** **Start compressor** (1+2) **Start brine pump** **Start fixed temperature** (Compressor and additional heat)[1)] **Start fixed temperature not additional heat** (Compressor only)[1)] **Powerguard 3step** (On signal from load monitor) **Start compressor**2	Zx
2 External input I3 **Offset main circuit** **Offset mixed circuit** **Speed brine pump**				Zx
	▶ Select function according to how the external input should affect the heat pump when the input is connected.			
	External control **Heating only**			Zx
13Hybrid				
Hybrid control	**Heat** **DHW**			Zx
Hybrid control	**Energy price** **Electricity** **Additional heat**			
	▶ Set price for respective type of energy			

Table 47 External controls

1) Safety functions are superordinate

External input I1 and I3

The heat pump can be controlled via the external inputs and with a closed contact one of these selections is made:

- **No effect**, no effect on the system.
- **Block all**, compressor, additional heat and hot water blocked.
- **Block add. heat**, additional heat mode blocked (e.g. on signal from current relay.
- **Block compressor**
- **Block hot water**
- **Start comp+add.heat**

- **Start compressor** starts both
- **Start brine pump**, PB3 starts even if the compressor is not running, e.g. for passive cooling.
- **Offset main circuit**
  - Set temperature deviation in submenu
- **Offset mixed circuit**
  - Set temperature deviation in submenu
  - Set speed for circulation pump in submenu **Speed brine pump**
- **Powerguard 3step**, on signal from load monitor
- **Start compressor 1** External input I1 controls compressor 1
- **Start compressor 2** External input I3 controls compressor 2

External control --> Heating only
The heat pump's own heat regulation is disconnected, with start of the compressors only via external input (fixed temperature) or via modbus. Sensor failure on T0, TL1 and TC2 blocked.

The hot water function can be activated as usual.

The function is deactivated if additional heat is selected.

Hybrid control heating
The heat pumpen starts again if the set point value for T0 falls below the temperature where heat pump produced energy is cheaper than additional heat energy, and the additional heat is then stopped in normal conditions.

Hybrid control hot water
If energy prices have been set then only the hot water will start if TW1 is lower than the temperature where heat pump produced energy is cheaper than additional energy, and will stop in advance if TW1 exceeds this temperature, and also the price for heat pump produced energy will be higher than the price of the additional heating energy.

4.12 Function test

Setting		Factory	Range	Heat pump
2 Function test				
1 Digital outputs	Do1 – Do15 **Function**:	**Auto**	**Off**, **On**, **Auto**	Zx
2 Analogue outputs	Ao1 – Ao5 **Function**: **Manual value**:	**Auto** %	**Manual**, **Auto**	Zx
	▶ Function test all inputs and outputs in conjunction with commissioning. ▶ Adjust **Auto** on completion of test. Otherwise an alarm will be given **Output in wrong pos after function test** (→ Chapter 5.6). The control unit gives the selected setting for each output in brackets on the fourth line in the menu window. The outputs are not controlled during the function test of the compressor; the heat pump carries out a complete check of the cooling circuit and the input and output temperatures before starting the compressor.			
2 Ref. Control	1 **Ref. Control** **Refrigerant vacation**			Zx
	2 **A05 PB3** **Function**: **Manual value**:	Manual operation of refrigerant pump %		Zx
	3 **A04 PC0** **Function**: **Manual value**:	Manual operation of heat carrier pump %		Zx
	4 Additional heat only	Activation of only additional heat mode		Zx
	When **Refrigerant vacation** ia activated the expansion valves VR1 and VR2 100% open; the solenoid values ER3 and ER4 also open. The C-alarm for refrigerant emptying is activated, the compressors are blocked and the speeds for PC0 and PB3 are set to 20%.			

Table 48 Function test

4.13 Quick restart

Setting		Factory	Range	Heat pump
3 Quick restart				
1 Quick restart **Actual v.**:		**No** Display	**No**, **Yes**	Zx
	▶ Select **Yes**if the restart timer for the compressor is to be changed from 6 minutes to 20 seconds. The time remaining is shown in seconds. **Yes** can only be selected when the restart timer counts down 6 minutes. After changing, the value automatically resets to **No**.			

Table 49 Quick restart

4.14 Read out

Read out/Setting				Heat pump
4 Read out				
	1 I/O-status	**1 Digital inputs**		Zx
		▶ Read off the status of the inputs. Shown as 0 (**Off**) or 1 (**On**).		
		2 Digital outputs		Zx
		▶ Read the status of the outputs. Shown as 0 (**Off**) or 1 (**On**).		
		3 Analogue inputs		Zx
		▶ Read off the temperatures of the inputs.		
		4 Analogue outputs		Zx
		▶ Read the opening degree/speed in per cent for the outputs.		
	2 Temperatures	**1 Internal sensors**		Zx
		▶ Read the temperatures for sensors TR6, TR7, TC3, TC0, TB0, TB1, JR1, TR3, TR8, TR5, JR0, TR2, JR2.		
		2 External sensors		Zx
		▶ Read the temperatures for sensors T0, TL1, TW1, TC1, TC2. The set point value is also shown for T0, and for TW1 the stop temperature, valve and its mode.		
	3 Operating times	**1 Total**		Zx
		▶ Read off the total number of starts and hours for **Compressor**, **Hot water**, **Winter operation**, **Additional heat**. Additional heat is shown in Z1.		
		2 Short time		Zx
		▶ Read off the number of starts and hours for **Compressor**, **Hot water**, **Winter operation**, **Additional heat** for the time after resetting. Additional heat is shown in Z1.		
		3 Alarm settings		Zx
		▶ Enter **Yes** if a short run time is to be monitored for **Heating** and/or **Hot water**. Information alarm **Short oper. time in heating mode** and/or **Short oper. time in hot water mode** can now trip (→ Chapter 5.6).		
	4 Alarm history	**1 Alarm history**		Zx
		▶ Read all alarms and information messages, the last are shown first. ▶ Use (▼) and (▲) to browse to the relevant alarm. The alarm history contains the most recent 20 messages.		
	5 Serial number	**1 Serial number**		Zx
	6 Program version	**1 Program version** **2 Program version**		Zx
		▶ Read the current program version for the control unit and HP board.		
	7 Output/Energy cal	**1 Output/Energy cal**		Zx

Table 50 Reading

4.15 Quick log-out

Setting		Factory	Range	Heat pump
5 Quick log-out				
1 Quick log-out **Current level**:		**No** Display	**No**, **Yes**	Zx
	▶ Enter **Yes** to log out and return to the initial menu.			

Table 51 Quick log out

4.16 Factory reset

Setting		Factory	Range	Heat pump
6 Factory reset				
1 Factory reset **Reset**: **Confirm**:		 **No** **No**	 **No**, **Yes** **No**, **Yes**	Zx
	▶ Enter **Yes** to reset all values to the factory settings. Customer settings can be affected if the heat curve is changed by the reset (Z1). After **Yes** on **Confirm** the reset, **Completed** is shown.			

Table 52 Factory reset

4.17 Commissioning

Setting			Factory	Range	Heat pump
7 Commissioning					
	1 Save variables				Zx
	2 Load variables				Zx

Table 53 Commissioning

The operating times and energy metering are stored in the HP card once every day and are reloaded automatically to the control centre after replacing or upgrading the software.

4.18 Service

Menus for service engineer. Separate login is required.

5 Information/Alarms

5.1 General

The heat pump has several safety functions to prevent problems or damage to the equipment, for example the temperatures and functions of vital parts are checked. In addition, motion kick of all circulation pumps and 3-way valve VW1 takes place for one minute if they have not been used for more than 7 days.

The heat pump reacts to operational disturbances by providing information or giving an alarm.

A disturbance is indicated/stored/remedied/ acknowledged in the heat pump where it occurred.

5.2 Alarm categories

Some disturbances are more serious than others. Alarms are therefore categorised.

C: Information that is acknowledged automatically when the cause disappears. Disturbances are often temporary and disappear of their own accord.
B: Action must be taken but can wait until normal working hours. With some alarms, the operation of the heat pump is restricted until the fault is rectified and the alarm is acknowledged.
A: Must be rectified immediately to prevent damage to the system/ equipment.

5.3 Status lamp

The status lamp on the control unit is used to show ON/OFF status for the heat pump but also to show possible alarms.

The lamp goes green.	Control unit is enabled.
Lamp is off.	Control unit is switched off/standby mode (Off).
Lamp flashes red.	An alarm is active, or has not been acknowledged.
Lamp goes red.	Alarm has been acknowledged, but the alarm cause remains.

Table 54 Lamp functions

5.4 Alarm list and Alarm history

When a disturbance occurs, a fault message is stored in the alarm list and alarm history.

The alarm list is shown by pressing (⚠).

The alarm history is shown at installer level under **Read out**.

The alarm history contains the last 20 or so alarms and information messages; the most recent is shown first.

5.5 Acknowledgement of alarms

NOTICE: Acknowledgement of pressure switch alarms (Sensor failure JRx) without rectifying the failure results in repeated attempts to start the compressor. Repetitive start attempts, when there is no circulation in the refrigerant circuit, can cause the evaporator to freeze. It takes at least 24 hours for it to thaw out. The evaporator could also breakdown, and need to be replaced.
- ▶ Remedy cause of fault before acknowledging.

Use (⚠) to show the alarm list (status lamp lights/flashes red). To return to the previous position, press (◀) or (⮌).

To acknowledge an alarm:
- ▶ Log in.
- ▶ Use (⚠) to show the alarm list.
- ▶ Use (▼) and (▲) to browse to the required alarm.
- ▶ Press (**ok**) twice.
  Acknowledged is shown in the alarm window and the alarm is taken from the list when the cause is remedied/disappears.

If the cause of the alarm disappears but the alarm is not acknowledged **Returned** is shown in the alarm window. Acknowledge the alarm and it is removed from the list.

NOTICE: Watch out for ESD damage to the electronics.
- ▶ Ensure that ESD damage is avoided when replacing the battery.

5.6 Alarm functions

A and B alarms must always be acknowledged after the cause is rectified in order to restart the heat pump. C alarms are automatically acknowledged.

- ▶ Contact service immediately in the case of A or B alarms.
- ▶ Contact service in the event of a repeated C alarm.

5.6.1 A - alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Error all PC1	Z1	X	X	X		A	Rectify immediately! Risk of freeze damage. ► Check the function for each pump. ► Check connections.
Oper. error compr. and add. heat	Z1	X	X	X	X	A	Rectify immediately! Risk of freeze damage. ► check which others (B alarms) exist and rectify these. ► Check additional heat and overheat protection/thermostat.
Sensor failure on T0 and TC2[1)]	Z1	X	X			A	Rectify immediately! Risk of freeze damage. ► Check installation of sensors. ► Check connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Failure on sensor TW1 HW flow					X	A, B	Failure on flow line sensor in fresh water station (FWS). PC4 stops. ► Check the installation of the sensor. ► Check the connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Run failure PC4 hot water pump					X	A	Alarm from circulation pump in fresh water station. ► Vent the pipes between fresh water station and buffer tank. ► If the circulation pump is overheated, check that taps / valves are open.

Table 55 Information/Alarms

1) Depending on system

5.6.2 B - alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Failure on sensor TW1 hot tap water	TW1				X	B	Emergency operation hot water starts possibly (→ Chapter 4.4.4, page 16). Temperature given with NaN in the display. ► Check that Hot tap water type is correctly set in the control unit. ► Check the installation of the sensor. ► Check the connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Failure on sensors TC0, TB0, TB1.	All	(X)	(X)			B	Both compressors stop if there is a failure on TC0. TB1 + set point value delta PB3 control is used for failure on TB0. TB0 - set point value delta PB3 control is used for failure on TB1. The temperature is given with NaN in the display.
Failure on sensor TC3 heat transfer fluid out	All	X	X			B	Both compressors are stopped. Temperature given with NaN in the display. ► Check the installation of the sensor. ► Check connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Failure on sensors TB0 and TB1 at the same time.	All	X	X			B	Compressors stopped. Temperatures given with NaN in the display.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Failure on sensor TR3 Fluid line	All					B	TC0 used instead. Temperature given with NaN in the display. Check the installation of the sensor. ► Check connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Failure on sensor TR5 suction line compr.	All	X	X			B	Temperature given with NaN in the display. Both compressors are stopped. Check the installation of the sensor. ► Check connection, measure the resistance and compare with the resistance table. ► Replace sensor if necessary.
Failure on sensor JR0 evaporation pressure	All	X	X			B	Both compressors are stopped. Pressure given with NaN in the display. ► Check the connections. Remove connector and check that 5 V voltage supply is available. ► Connect a spare pressure sensor to see if the alarm returns. If the failure returns, the pressure sensor is defective.
Failure on sensor JR1 condensing pressure	All					B	TC3 used instead. Pressure given with NaN in the display. Check the installation. ► Check the connections. Remove connector and check that 5 V voltage supply is available. ► Connect a spare pressure sensor to see if the alarm returns. If the failure returns, the pressure sensor is defective.
Failure on sensor JR2 fluid injection pressure	All					B	Fluid injection is turned off. Pressure given with NaN in the display. Check the installation. ► Check the connections. Remove connector and check that 5 V voltage supply is available. ► Connect a spare pressure sensor to see if the alarm returns. If the failure returns, the pressure sensor is defective.
Compressor 1 does not start	All	X				B	Corresponding C alarm given more than 2 times in 2 hours. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components. ► Check if the contactor really pulls after start command, and if it does, why the operating response does not come into the input on the HP board.
Compressor 2 does not start	All		X			B	Corresponding C alarm given more than 2 times in 2 hours. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components. ► Check if the contactor really pulls after start command, and if it does, why the operating response does not come into the input on the HP board.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Operating failure compressor 1	All	X				B	Corresponding C alarm given more than 2 times in 2 hours. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components. ► Identify where the signal is interrupted incorrectly.
Operating failure compressor 2	All		X			B	Corresponding C alarm given more than 2 times in 2 hours. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components. ► Identify where the signal is interrupted incorrectly.
General alarm heat carrier pump PC0	All	X	X	X		B	Alarm signal from circulation pump has tripped for more than 2 minutes. ► Reset circulation pump via heat pump display. ► Check system for air. ► Check the connection for the 0-10V/PWM signal.
General alarm collector circuit pump PB3	All	X	X			B	Alarm signal from circulation pump has tripped for more than 2 minutes. Additional heat permitted to start. ► Reset circulation pump via heat pump display. ► Check system for air. ► Check the connection for the 0-10V/PWM signal.
High temperature TR6 hot gas[1)]	All	X				B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. ► Check that the injection is working normally. ► Check that the suction gas overheating is normal. ► Check that the sensor shows a feasible value. ► Check connection, measure the resistance and compare with the resistance table. ► With the correct sensor, check that the refrigerant circuit can dispose of the heat.
High temperature TR7 hot gas[1)]	All		X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. ► Check that the injection is working normally. ► Check that the suction gas overheating is normal. ► Check that the sensor shows a feasible value. Check connection, measure the resistance and compare with the resistance table. ► With the correct sensor, check that the refrigerant circuit can dispose of the heat.
JR1 higher than permitted for compressor[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time.
JR1 lower than permitted for compressor[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Tripped high pressure switch[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. ▶ Check the particle filter and clean if necessary. Check the valves. ▶ Check the heating system pressure, vent if necessary. ▶ Check the flow over the condenser. ▶ Check the pressure switch and its connections. ▶ Check the heat carrier pump PC0. ▶ Make sure there is no risk of large sudden temperature increases over the heat pump.
Low pressure cooling circuit JR0[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. ▶ Check the collector circuit screen and clean if required. Check the valves. ▶ Check the collector circuit pressure, vent if necessary. Check the flow over the evaporator. ▶ Check the pressure switch and its connections. ▶ Check that collector circuit pump PB3 starts and that the speed increases when the control signal from the heat pump increases.
High temperature TC1 Additional heat[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging.
Low temperature TB0 collector circuit in[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. ▶ Check the energy source and its temperature. ▶ Check the collector circuit. ▶ Check the particle filter and clean if necessary. ▶ Check the valves and any distributors. ▶ Check that the sensor shows the correct temperature, compare with resistance table.
Low temperature TB1 collector circuit out[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. Remedy cause of fault before acknowledging. Z1: Additional heat permitted to start.
Low overheating TR5[1)]	All	X	X			B	Corresponding C alarm has tripped more than 1 time.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Communication error with Zxx	Z1					B	Z1 has lost contact with other connected heat pump. ► Check communication cable, it must not be near power cables. Minimum gap is 100 mm. ► Check the setting for the number of heat pumps. ► Check the addressing in the given heat pump and the connections between Z1 and the given heat pump. ► Terminate communication cable at each end as necessary (use a resistor of 120 Ω, 0.5 W).
Communication error with Z1	All except Z1	X	X			B	Other connected heat pump has lost contact with Z1. ► Check communication cable, it must not be near power cables. Minimum gap is 100 mm. ► Check the addressing in the given heat pump and the connections between Z1 and the given heat pump. ► Terminate communication cable at each end as necessary (use a resistor of 120 Ω, 0.5 W).
Communication error with accessory x	Z1					B	Z1 has lost contact with connected accessory. ► Check voltage supply and communication cable, it must not be near power cables. Minimum gap is 100 mm. ► Check the physical address of the accessory. ► Check the settings for accessories in Z1. ► Check the connections between Z1 and accessories. ► Terminate communication cable at each end as necessary (use a resistor of 120 Ω, 0.5 W).
Communication error with accessory	Z1					B	► Check communication cable and power supply.
Problem with hot water production	TW1				X	B	The temperature of Zx.TW1 is under its start limit when the heat pump goes outside its temperature range. ► Check the hot water system. ► Check that the hot water can circulate between the heat pump and the hot water heater. ► Check that TW1, TC0 and JR1 show the correct temperatures. Compare with resistance table at end of handbook. ► Check that the installation is correctly dimensioned. ► Acknowledge the alarm to reactivate the function. Automatic resetting at midnight.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Problem with three-way valve VW1	TW1				X	B	T0 shows 10 K higher than the set point and has increased by 15 K during hot water production. The alarm is interlocked with the sun function. ▶ Check that the valve is working and is correctly connected. ▶ Check that the system is correctly connected. ▶ Check that the valve does not leak. Hot water loading is interlocked until the alarm is acknowledged. ▶ Check T0.
Problem with three-way valve Zx.VWx	TW1				X	B	T0 shows 10 K higher than the set point and has increased by 15 K during hot water production. Hot water production is therefore stopped.
Interrupted start attempt[1)] Stops either compressor 1 or 2.	All	(X)	(X)			B	Corresponding C alarm has tripped more than 2 times in the last 120 minutes. Automatic restart. Find out the reason with the help of the temperature log.
Wrong phase order to compressor 1	All	X	X			B	Corresponding C alarm has tripped more than 2 times in the last 120 minutes. ▶ Check direction of rotation on compressor 1. ▶ Check incoming phase sequence. ▶ Check that the sensors show the correct temperature, compare with resistance table at the end of the handbook. ▶ Check the connections.
Wrong phase order to compressor 2	All	X	X			B	Corresponding C alarm has tripped more than 2 times in the last 120 minutes. ▶ Check direction of rotation on compressor 1. ▶ Check incoming phase sequence. ▶ Check that the sensors show the correct temperature, compare with resistance table at the end of the handbook. ▶ Check the connections.
Overheated compressor 1	All	X				B	Corresponding C alarm has tripped more than 2 times in the last 120 minutes. ▶ Check input voltage. Check the TR6 sensor with the resistance table. ▶ Check the connections.
Overheated compressor 2	All		X			B	Corresponding C alarm has tripped more than 2 times in the last 120 minutes. ▶ Check input voltage. Check the TR7 sensor with the resistance table. ▶ Check the connections.
Electric additional heat overheated	Z1			X		B	Overheat protection on the additional heat has tripped. ▶ Reset protection ▶ Acknowledge the alarm. ▶ Check function PCO and clean screen if necessary. ▶ Check that the flow is not obstructed in the system. ▶ Check the valves.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Mixed additional heat does not get hot	Z1			X		B	The temperature of the additional heat temperature TC1 does not rise over the required boiler temp. ► Check that the boiler is hot. ► Check TC1 and its connections.
Access. x pump out of order (x = 1-9)	Z1					B	The accessory's circulation pump sets off alarm as per setting. ► Check connections.
General alarm heating circuit pump PC1	All					B	General alarm (normally closed) from the unmixed circuit's circulation pump. ► Check connections.
High temperature TB0 collector circuit in	All	X	X			B	TB0 shows > 30 °C, restart at < 29 °C. Z1: Additional heat permitted to start. ► Check that it is feasible that the energy source delivers over 30 °C. ► Check the sensor, compare with resistance table at end of handbook. ► Cool down the collector circuit.
Communication error with HP board	All	X	X			B	3 corresponding C alarms in 120 minutes. ► Check cabling and contactors. ► Check the voltage supply to the HP board (12V).
Wrong software in HP-card – The software in the HP-card is too old	Alla	X	X			B	The software in the HP-card is too old. ► Upgrade the software.
Wrong software in Regin – The software in the Regin box is too old	Alla	X	X			B	The software in the Regin box is too old. ► Upgrade the software.
The software in the FWS is too old	Alla					B	The software in the control box of the FWS is too old. ► Upgrade the software.
The Regin SW is too old for the FWS	Alla					B	The software in the Regin box is too old. ► Upgrade the software.
Communication error with FWS	Alla					B	► Check cables and connections. ► Check the voltage supply to the control box.
Low temperature TW2						B	The flow line temperature from the buffer tank to the fresh water station is too low. ► Check that the heat pump is working normally. ► Vent the pipes between fresh water station and buffer tank. ► Check that the start and stop temperaturers for hot water charging are sufficiently high. ► Check that the FWS function is activated. ► Check that the TW2 sensor is in good contact with the tank outlet. ► Check that the speed control of the circulation pump PC0 is working properly.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Low temperature TW4						B	the hot tap water temperature from the fresh water station is too low. ▶ Vent the pipes between fresh water station and buffer tank. ▶ Check that the pipe between buffer tank and hot water station is insulated. ▶ Check that the resistance on the non-return valve at VW3 is not set too high. ▶ Check that the flow line temperature from the buffer tank (TW2) is sufficiently high. ▶ Check that the circulation pump PC4 and the flow meter TW4 are working normally. ▶ Check if the heat exchanger in the fresh water station is blocked.
High temperature TW4						B	the hot tap water temperature from the fresh water station is too high. ▶ Check that the non-return valve at VW3 has a sufficiently high resistance. ▶ Check that the circulation pump PC4 and the flow meter TW4 are working normally.
Low temperature TW6						B	The return temperature from the HW circulation is too low. ▶ Check that the hot water circulation pump PW2 is working normally. ▶ Check that the hot water circulation flow is sufficiently high. ▶ Check that the hot tap water temperature TW4 is sufficiently high.
Fuse tripped for compressor 1	All	X				B	Fuse to compressor 1 has tripped, alarm input from the fuse has been broken. The alarm is generated via the soft start alarm output if soft start is installed.
Fuse tripped for compressor 2	All		X			B	Fuse to compressor 2 has tripped, alarm input from the fuse has been broken. The alarm is generated via the soft start alarm output if soft start is installed.
Low temperature cooling system[1)]	Z1					B	Corresponding C alarm has tripped more than 1 time in the last 120 minutes. ▶ Check energy source temperature. ▶ Check the collector circuit system. ▶ Check valves and distributors, where appropriate. ▶ Check the particle filter. ▶ Check that the sensor shows the correct temperature, compare with resistance table.
Cooling system SSM alarm	Z1	X	X			B	The general alarm signal from the circulation pump or pressure switch in the cooling system has been activated. ▶ Check that the circulation pump works. ▶ Check that the pressure in the cooling system is correct. ▶ Check that the pressure switch has reset. ▶ Check the cooling system for air.
Compressor 1 overcurrent	All	X				B	Current to compressor 1 is too high. Automatic reset when the current is within the permitted limit. ▶ Check supply to compressor 1.

Table 56 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Compressor 2 overcurrent	All		X			B	Current to compressor 2 is too high. Automatic reset when the current is within the permitted limit. ► Check supply to compressor 2.
Phase sequence fault in power supply	All	X	X			B	Phase sequence fault in input supply. ► Check and correct phase sequence.
Compressor 1 stopped	All	X				B	Locked rotor. ► If soft start available, check if it sets off alarm (àChapter 5.7).
Compressor 2 stopped	All		X			B	Locked rotor ► If soft start available, check if it sets off alarm (àChapter 5.7).
Fault in bypass relay 1	All	X				B	Internal fault in soft start 1. ► Disconnect voltage to reset. ► (àChapter 5.7)
Fault in bypass relay 2	All		X			B	Internal fault in soft start 2. ► Disconnect voltage to reset. ► (àChapter 5.7)
Fault on soft start 1	All	X	X			B	Internal fault in soft start 1. ► Disconnect voltage to reset. ► (àChapter 5.7)
Fault on soft start 2	All	X	X			B	Internal fault in soft start 2. ► Disconnect voltage to reset. ► (àChapter 5.7)

Table 56 Information/Alarms

1) If the corresponding alarm in category C trips more than the set number of times during the set time, a B alarm trips.

5.6.3 C - alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Failure on sensor T0 flow	Z1			X (external)		C	Control will temporarily be based on TC2. The temperature is given with NaN in the display. External additional heat disconnected, but not 3-stage additional electrical heat. ▶ Check the installation of the sensor. ▶ Check the connection, measure the resistance and compare with the resistance table. ▶ Replace sensor if necessary.
Failure on sensor TC1 additional heat temp	Z1					C	Temperature given with NaN in the display. Check the installation of the sensor. ▶ Check the connection, measure the resistance and compare with the resistance table. ▶ Replace sensor if necessary.
Failure on sensor TC2 acc tank	Z1					C	Temperature given with NaN in the display. Control only based on T0. ▶ Check the installation of the sensor. ▶ Check connection, measure the resistance and compare with the resistance table. ▶ Replace sensor if necessary.
High temperature TB1 collector circuit out	All					C	TB1 shows > 30 °C, restart at < 29 °C. Z1: Additional heat permitted to start. ▶ Check that it is feasible that the energy source delivers over 30 °C. ▶ Check the sensor, compare with resistance table at end of handbook. ▶ Cool down the collector circuit.
Warmwater stopped by TC3	Alla				X	C	TC3 is above the safety limit (63 °C). ▶ Check flows and valves. ▶ Check the sensor TC3.
Output in wrong mode after function test.	All					C	An output is not in AUTO mode. ▶ Reset the manual output to AUTO mode.
Hot water production in emergency mode	TW1					C	Zx.Tw1 is not functioning. Emergency mode running (→ Chapter 4.4.4, page 16). Emergency mode continues until TW1 is rectified, or the function is disabled.
High temperature T0 flow	Z1					C	T0 shows > 10 K higher the set point value for more than 30 minutes. ▶ Check that T0 shows correct temperature and is correctly installed in the right place. ▶ Check that the compressor and additional heat are disconnected. ▶ Check that no other energy sources are active.
Low temperature T0 flow	Z1					C	T0 shows > 10 K below the set point for more than 30 min. ▶ Check that T0 shows correct temperature, compare with resistance table at the end of the handbook, and that it is correctly installed in the right place. ▶ Check that connected energy sources have capacity to deliver heat to the system. ▶ Check the valves and piping.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Low temperature TW1 hot water	TW1					C	TW1 shows a value lower than 45 °C for more than 30 minutes. ► Check that TW1 shows correct temperature, compare with resistance table at the end of the handbook, and that it is correctly installed in the right place. ► Check that connected energy sources have capacity to deliver heat to the tank. ► Check the valves and piping.
High temperature TR6 hot gas[1)]	All	X				C	TR6 shows > 135 °C, restart at < 100 °C. Z1: Additional heat permitted to start. ► Check that the sensor shows a feasible value. Check the connections, compare with resistance table at end of handbook. ► Check the heating and cooling circuit, if the sensor is OK.
High temperature TR7 hot gas[1)]	All		X			C	TR7 shows > 135 °C, restart at < 100 °C. Z1: Additional heat permitted to start. ► Check that the sensor shows a feasible value. ► Check the connections, compare with resistance table at end of handbook. ► Check the heating and cooling circuit, if the sensor is OK.
JR1 higher than permitted for compressor[1)]	All	X	X			C	Pressure sensor JR1 is higher than permitted for the compressors at the actual evaporation pressure. The alarm can also be caused by an error in the system configuration. ► Check the filter valves and clean if necessary. ► Check that all the valves that should be open are open. ► Check the heating system pressure and venting. ► Check the heat carrier pump PC0. ► Check the flow over the condenser. ► Check the high pressure sensor JR1 and its connections. ► Check there is no risk of large sudden temperature increases over the heat pump.
JR1 lower than permitted for compressor[1)]	All	X	X			C	Pressure sensor JR1 is lower than the permitted working range for the compressors at the actual evaporation pressure. ► Check that the 0-10V output for speed controlling of the heat carried pump PC0 is on auto , and that the pump actually changes the speed when the 0-10V signal is changed.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Tripped high pressure switch[1)]	All	X	X			C	Remedy cause of fault before acknowledging. Z1: Additional heat permitted to start. The alarm can also be caused by an error in the system configuration. ▶ Check the filter valves and clean if necessary. ▶ Check that all the valves that should be open are open. ▶ Check the heating system pressure and venting. ▶ Check the heat carrier pump PC0. ▶ Check there is no risk of large sudden temperature increases over the heat pump.
Low pressure cooling circuit JR0[1)] NOTE: Acknowledgement of pressure switch alarms without rectifying the failure results in repeated attempts to start the compressor. Repeated start attempts when there is no circulation lead to the evaporator freezing, which requires at least one day in stationary mode to thaw. Repeated start attempts can lead to the evaporator cracking and having to be replaced.	All	X	X			C	Rectify the reason for the fault before acknowledging. The evaporation temperature has fallen below than the set minimum limit for 30 s. ▶ Check the filter valves and clean if necessary. ▶ Check that all the valves that should be open are open. ▶ Check the collector circuit pressure and venting. ▶ Check the flow over the evaporator. Check the low pressure sensor and its connections. ▶ Check collector circuit pump PB3, that it starts and follows 0-10V control signal.
High temperature TC1 Additional heat[1)]	All	X	X			C	The additional heat is hotter than its safety limit. The compressors are stopped to protect the cooling circuit. ▶ Check the valves and piping. ▶ Check the dirt filter. ▶ Check that the sensor shows the correct temperature, compare with resistance table at the end of the handbook.
High temperature TC0 heat transfer fluid in[1)]	All	X	X			C	Incoming heat (from radiator/HH) is hotter than its safety limit. Stop of compressor with highest hot gas temperature when TC0 > 60 °C, stop of other compressor when TC0 > 63 °C. ▶ Check the valves and piping. ▶ Check the dirt filter.
Low temperature TB0 collector circuit in[1)]	All	X	X			C	Incoming Brine (from bore hole) is colder than its safety limit. The compressors are stopped to protect the cooling and brine circuits. ▶ Check the energy source and its temperature. ▶ Check the collector circuit system. ▶ Check valves and distributors, where appropriate. ▶ Check the dirt filter.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Low temperature TB1 collector circuit out[1)]	All	X	X			C	Outgoing Brine is colder than its safety limit. The compressors are stopped to protect the cooling and brine circuits. ► Check the energy source and its temperature. ► Check the collector circuit system. ► Check valves and distributors, where appropriate. ► Check the particle filter. ► Check that collector circuit pump PB3 follows 0-10V control signal.
Low overheating TR5[1)] Suction gas overheating	All	X	X			C	The difference in TR5-JR0 temp is less than 2 K for 10 minutes when the compressor is running. ► Check that the valves are open and that the filters are cleaned. ► Check that the expansion valve is working. ► Check that the temperature sensor TR5 and pressure sensor JR0 show the correct values, compare with resistance table at the end of the handbook. ► Check that the heat and collector circuit pumps function and run automatically, and that the pumps follow the 0-10V control signal.
High overheating TR5	All	X	X			C	The difference in TR5-JR0 temp is more than 10 K for 10 minutes when the compressor is running. Check that the valves are open and that the filters are cleaned. ► Check that the expansion valve is working. ► Check that the temperature sensor TR5 and pressure sensor JR0 show the correct values, compare with resistance table at the end of the handbook. ► Check that the heat and collector circuit pumps function and run automatically, and that the pumps follow the 0-10V control signal.
Low overheating TR2[1)]	All	X	X			C	The difference in TR2-JR2 temp is less than 2 K for 10 minutes when the compressor is running, and the hot gas temperature is at least 20 degrees over the condensing temperature. ► Check that the injection valve and solenoid valves are working. ► Check that the temperature sensor TR2 and pressure sensor JR2 show the correct values, compare with resistance table at the end of the handbook.
Low temp. diff. heat transfer fluid	All					C	The difference in TC3-TC0 is less than 3 K after 15 minutes with the compressor running. ► Check that the valves are open. ► Check that heat carrier pump PC0 runs automatically and follows the 0-10V control signal. ► Check that the sensors show the correct temperatures, compare with resistance table.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
High temp. diff. heat transfer fluid	All					C	The difference in TC3-TC0 is more than 15 K after 15 minutes with the compressor running. ▶ Check that the valves are open and that the filter is cleaned. ▶ Check that heat carrier pump PC0 runs automatically and follows the 0-10V control signal. ▶ Check that the sensors show the correct temperatures, compare with resistance table.
High temp. diff. collector circuit	All					C	The difference in TB0-TB1 is more than 10 K after 15 minutes with the compressor running. ▶ Check that the valves are open and that the filter is cleaned. ▶ Check that heat carrier pump PB3 runs automatically and follows the 0-10V control signal. ▶ Check that the sensors show the correct temperatures, compare with resistance table.
Therm. disinfection unsuccessful	TW1					C	TW1 has not reached 70 °C in 3 hours after starting. New attempt at the next occasion. The warnings can be caused by a prolonged simultaneous blockage. ▶ Check that the valve is moving properly. ▶ Check that adequate output is permitted, with additional heat. ▶ Check that the additional heat is working.
Short oper. time in hot water mode There must be 20 l of water per KW heat pump to run both compressors for hot water. If there is at least 10 l of water per kW heat pump, it is possible to select hot water charging with 1 compressor.	TW1					C	Compressor operation for hot water is on average shorter than 10 minutes per start, based on at least 5 starts during 24 hours. Automatic return at midnight. ▶ Check that the system is correctly installed. ▶ Check that the system is correctly dimensioned. ▶ Check that all the requisite flow adjustments are correctly implemented.
Short oper. time in heating mode	All					C	Compressor operation for heating is on average shorter than 10 minutes per start, based on at least 5 starts within 24 hours. Automatic return at midnight. ▶ Check that the system is correctly installed. ▶ Check that the system is correctly dimensioned, at least 10 l of water in accumulator tank per kW heat pump. ▶ Check that all the requisite flow adjustments are correctly implemented.
Temporary failure on heat carrier pump PC0[1)]	All	X	X			C	Supply voltage deviation to circulation pump. This can be a result of temporary voltage dips in the grid, contact electricity supplier if it happens often. ▶ Check the connections between control unit and circulation pump. ▶ Check supply voltage connection to circulation pump. ▶ Check supply voltage to heat pump.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Temporary failure on collector circuit pump PB3[1)]	All	X	X			C	Supply voltage deviation to circulation pump. This can be a result of temporary voltage dips in the grid, contact electricity supplier if it happens often. ► Check the connections between control unit and circulation pump. ► Check supply voltage connection to circulation pump. ► Check supply voltage to heat pump.
Control unit restarted	All					C	The control unit restarted due to insufficient voltage. The alarm stops after about 10 seconds. This can be a result of temporary voltage dips in the grid, contact electricity supplier if it happens often. ► Check if necessary the voltage supply to the heat pump and 24 VAC.
Replace memory battery	All					C	The memory battery must be replaced. Replacement battery CR2032: in the event of a discharged battery and power failure all the software is deleted in the control unit, which means that all settings and a new commissioning must be carried out by the installer or service engineer, after the battery has been replaced by the service enginner.
Interrupted start attempt[1)]	All					C	During temperature check in start-up the start attempt was interrupted. A new start attempt is made automatically after 9 minutes, assuming that the requirement still exists. Reasons for interrupted start attempts. ► Heat return too high (TC0 > 58 °C). ► Incoming collector circuit too high (TB0>29 °C). ► Incoming collector circuit too low TB0 (< – 4 °C).
Compressor 1 does not start	All	X				C	The operating response from the compressor did not come within 10 seconds of the start command. Additional 50 seconds delay with soft start. ► Consult the wiring diagram for the heat pump and follow the signal from the HP board via connected componetns, if the contactor really pulls after start command, and if it does, why the operating response does not come into the input on the HP board.
Compressor 2 does not start	All		X			C	The operating response from the compressor did not come within 10 seconds of the start command. Additional 50 seconds delay with soft start. ► Consult the wiring diagram for the heat pump and follow the signal from the HP board via connected componetns, if the contactor really pulls after start command, and if it does, why the operating response does not come into the input on the HP board.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Operating failure compressor 1	All	X				C	The operating response from the compressor has stopped during operation. Additional 50 seconds delay with soft start. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components, and identify where the signal is interrupted incorrectly.
Operating failure compressor 2	All		X			C	The operating response from the compressor has stopped during operation. Additional 50 seconds delay with soft start. ► Consult the relevant wiring diagram for the heat pump and follow the signal from the HP board via connected components, and identify where the signal is interrupted incorrectly.
Wrong phase order to compressor 1	All	X				C	TR6 does not exceed JR1 by 18 K within 3 minutes after the compressor starts, when both compressors are running or the temperature difference TB0-JR0 is less than 1K with only 1 compressor running. ► Check incoming phase sequence. ► Check direction of rotation on compressor 1 (heavy rattling with wrong direction). ► Check that the sensors show the correct temperature, compare with resistance table at the end of the handbook. ► Check the connections.
Wrong phase order to compressor 2	All		X			C	TR7 does not exceed JR1 by 18 K within 3 minutes after the compressor starts, when both compressors are running or the temperature difference TB0-JR0 is less than 1K with only 1 compressor running. ► Check incoming phase sequence. ► Check direction of rotation on compressor 2 (heavy rattling with wrong direction). ► Check that the sensors show the correct temperature, compare with resistance table at the end of the handbook. ► Check the connections.
Hot water mode stopped TC3[1)]	All				X	C	TC3 increases over its safety limit during hot water demand. ► Check the flows and valves. ► Check TC3. ► Check that PC0 runs automatically and that the pump speed follows the 0-10V control signal.
Too much refrigerant in the heat pump.	All	X	X			C	If the heat pump has recently been refilled, or topped up, this means that it was filled with too much refrigerant.
Not enough refrigerant in the heat pump	All	X	X			C	If the heat pump has recently been refilled, or topped up, this means that it was filled with too little refrigerant. Alternatively the refrigerant has leaked out.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Overheated compressor 1	All	X				C	Internal protection has tripped while the compressor was running. Restart when the compressor temperature has dropped below the set limit. ► Check input voltage. ► Check the TR6 sensor with the resistance table. ► Check the connections.
Overheated compressor 2	All		X			C	Internal protection has tripped while the compressor was running. Restart when the compressor temperature has dropped below the set limit. ► Check input voltage. ► Check the TR7 sensor with the resistance table. ► Check the connections.
Accessory x temp. deviation	Z1					C	Measured temperature differs from the set point value by more than the set limit for more than 30 minutes. ► Check the settings. ► Check that the set point value is not too high/low. ► Check the installation. ► Check the connections, compare with the resistance table.
Failure on sensor TB0 collector circuit in	All					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TB1 collector circuit out	All					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TR8 Fluid line economizer	All					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TR3 Fluid line	All					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TR2 Fluid injection	All					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TR6 hot gas compr 1	All	X				C	Z1: Additional heat permitted to start. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.
Failure on sensor TR7 hot gas compr 2	All		X			C	Z1: Additional heat permitted to start. Temperature given with NaN in the display. ► Check the installation. ► Check the connections.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Failure on sensor JR1 condensing pressure	All					C	The failure returns when the sensor is rectified. ▶ Check the installation. ▶ Check the connections. ▶ Remove connector and check that 5 V voltage supply is available.
Failure on sensor JR2 fluid injection pressure	All					C	The failure returns when the sensor is rectified. ▶ Check the connections. ▶ Remove connector and check that 5 V voltage supply is available.
Failure on sensor T0 flow	Z1					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display.
Failure on sensor TL1 outdoor temperature	Z1					C	Outdoor temperature set to 0 °C to give some heat. Temperature given with NaN in the display. ▶ Check the installation. ▶ Check the connections.
Failure on sensor TC1 additional heat temp	Z1					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ▶ Check the installation. ▶ Check the connections.
Failure on sensor TC2 acc tank	Z1					C	The failure returns when the sensor is rectified. Temperature given with NaN in the display. ▶ Check the installation. ▶ Check the connections.
Too long depressurize time	All	X	X			C	Pressure equalisation has taken more than 3 minutes. ▶ Check voltage feed to both JR0 and JR1. ▶ Check that the condensing pressure sensor JR1 shows correct reading, and that the cabling is OK. ▶ Check that Evaporator pressure sensor JR0 shows correct reading, and that the cabling is OK. ▶ Check that the expansion valve VR1 is working.
High temperature TW2						C	The flow line temperature from the buffer tank to the fresh water station is too high. ▶ Check if external additional heat or solar panel are charging the tank with too high a temperature.
High temperature TW3						C	The return temperature from the fresh water station to the buffer tank is too high. ▶ Check that the circulation pump PC4 follows the controlled speed. ▶ Check that the non-return valve at VW3 has a sufficient resistance.
High temperature TW6						C	The return temperature from the HW circulation is too high. ▶ Check that the hot water circulation flow is not too high. ▶ Check that the outgoing hot tap water temperature TW4 is not too high.

Table 57 Information/Alarms

Alarm/information text	Heat pump	Stops comp. 1	Stops comp. 2	Stops add. heat	Stops hot water	Cat.	Cause/Comments
Run failure PW2 HWC pump						C	Alarm from hot water circulation pump in the fresh water station. ► Vent the hot water circulation pipe. ► If the circulation pump is overheated, check that taps / valves are open. ► Check that the alarm signal cable is properly connected.
Upper limit for current to heat pump (requires metering accessory, only affects the HP it is connected to)	Zx	X	X			C	The measured current exceeds the set limit on one of the phases. ► Check that the set limit corresponds to the fusing of the heat pump. ► Check communication with power meter; the current values in heat pump display should agree with the power meter display.
Low temperature cooling system	All	X	X			C	Inadequate energy source for cooling effect of heat pumps; cooling system temperature is too low. ► Check energy source temperature. ► Check the collector circuit system. ► Check valves and distributors, where appropriate. ► Check the particle filter. ► Check that the sensor shows the correct temperature, compare with resistance table.
Start mode failure from cooling system	All	X	X			C	Cooling system is not working. ► Check cooling system circulation pump, pressure switches and fans.
Oil compensation compressor 1	Zx	X				C	Stop to achieve oil compensation. Compressor 1 has been running continuously for more than 4 hours, without compressor 2 running. The alarm resets when compressor 2 has started, or cannot start from some other reason. The alarm also resets if it is acknowledged.
Oil compensation compressor 2	Zx		X			C	Stop to achieve oil compensation. Compressor 2 has been running continuously for more than 4 hours, without compressor 1 running. The alarm resets when compressor 1 has started, or cannot start from some other reason. The alarm also resets if it is acknowledged.
Too high or low voltage	Zx	X	X			C	Automatic reset when the voltage level is within the permitted range. ► Check the voltage level on the input supply.
Too high temp soft start 1	Zx	X				C	Automatic reset when the temperature is within the limit values. ► (àChapter 5.7).
Too high temp soft start 2	Zx		X			C	Automatic reset when the temperature is within the limit values. ► (àChapter 5.7).

Table 57 Information/Alarms

1) This alarm is not shown in the display, but is saved in the history.

5.7 Soft start alarm

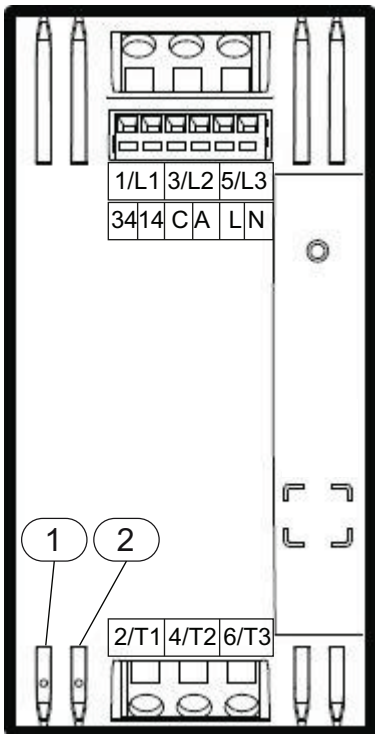

Fig. 5 Soft start

[1] Yellow LED
[2] Red LED

Yellow LED	Red LED	Status
Flashes slowly	Off	Ready mode
On	Off	Run mode
Flashes quickly	Off	Pause
Flashes with 10x sequence	Flashes with error code sequence (see table below)	Error status
Off	Flashes with error code sequence (see table below)	Hardware fault

Table 58 LED status

Number of flashes red LED	Name	Description
2	Voltage too high / Voltage too low	If only 1 soft start alarm is given, the alarm “Fuse tripped for compressor ...” is given instead. Automatic reset.
3	Current too high / Current too low	Automatic reset. If the current exceeds the upper permitted limit the soft start will go into the service mode to protect the soft start and the compressor. If the current is too low the soft start will go into the service mode and stay there until the failure is rectified.
3	Current not symmetrical	Automatic reset.
3	Motor cut-out tripped	Automatic reset. The motor cut-out monitors continuously and trips as per class 10.
4	Locked rotor	Automatic reset. If the rotor is locked the current will increase until the motor cut-out trips and the compressor stops.
5	Failure on by-pass relay	Voltage must be disconnected for reset.
6	High temperature / Low temperature	Automatic reset. If the temperature in the soft start is over or under the permitted limit the soft start will go into service mode and will be able to start until the temperature is the permitted temperature.
7	Phase sequence error	Check phase sequence. Automatic reset.
8	Frequency error	Automatic reset. If the network frequency is outside 45-65 Hz the soft start will not start. The soft start will stay in service mode until the error is rectified and reset.
9	Error in soft start	Voltage must be disconnected for reset.
	Hardware fault	If a hardware fault occurs in the soft start, the soft start will stop and go into pause mode. The fault can be reset manually, but the soft start remains in pause mode until the time has run out (5 min).
	The soft start is enabled, but the compressor does not run	If the voltage drops below the lower limit the soft start will go into service mode and set off an alarm. This mode persists until the voltage has reached over the lower limit. The same applies if the voltage is over the upper limit. and lasts until the voltage is below the upper limit.

Table 59 Alarm list soft start

5.8 Resistance table PT1000 temperature sensor

°C	Ω	°C	Ω	°C	Ω	°C	Ω	°C	Ω
-20	921.6	9	1035.1	38	1147.7	67	1259.2	96	1369.8
-19	925.5	10	1039.0	39	1151.5	68	1263.1	97	1373.6
-18	929.5	11	1042.9	40	1155.4	69	1266.9	98	1377.4
-17	933.4	12	1046.8	41	1159.3	70	1270.7	99	1381.2
-16	937.3	13	1050.7	42	1163.1	71	1274.5	100	1385.0
-15	941.2	14	1054.6	43	1167.0	72	1278.4	101	1388.8
-14	945.2	15	1058.5	44	1170.8	73	1282.2	102	1392.6
-13	949.1	16	1062.4	45	1174.7	74	1286.0	103	1396.4
-12	953.0	17	1066.3	46	1178.5	75	1289.8	104	1400.2
-11	956.9	18	1070.2	47	1182.4	76	1293.7	105	1403.9
-10	960.9	19	1074.0	48	1186.2	77	1297.5	106	1407.7
-9	964.8	20	1077.9	49	1190.1	78	1301.3	107	1411.5
-8	968.7	21	1081.8	50	1194.0	79	1305.1	108	1415.3
-7	972.6	22	1085.7	51	1197.8	80	1308.9	109	1419.1
-6	976.5	23	1089.6	52	1201.6	81	1312.7	110	1422.9
-5	980.4	24	1093.5	53	1205.5	82	1316.6	111	1426.6
-4	984.4	25	1097.3	54	1209.3	83	1320.4	112	1430.4
-3	988.3	26	1101.2	55	1213.2	84	1324.2	113	1434.2
-2	992.2	27	1105.1	56	1217.0	85	1328.0	114	1438.0
-1	996.1	28	1109.0	57	1220.9	86	1331.8	115	1441.7
0	1000.0	29	1112.8	58	1224.7	87	1335.6	116	1445.5
1	1003.9	30	1116.7	59	1228.6	88	1339.4	117	1449.3
2	1007.8	31	1120.6	60	1232.4	89	1343.2	118	1453.1
3	1011.7	32	1124.5	61	1236.2	90	1347.0	119	1456.8
4	1015.6	33	1128.3	62	1240.1	91	1350.8	120	1460.6
5	1019.5	34	1132.2	63	1243.9	92	1354.6	121	1464.4
6	1023.4	35	1136.1	64	1247.7	93	1358.4	122	1468.1
7	1027.3	36	1139.9	65	1251.6	94	1362.2	123	1471.9
8	1031.2	37	1143.8	66	1255.4	95	1366.0	124	1475.7

Table 60 Measurement values for temperature sensor

Notes

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