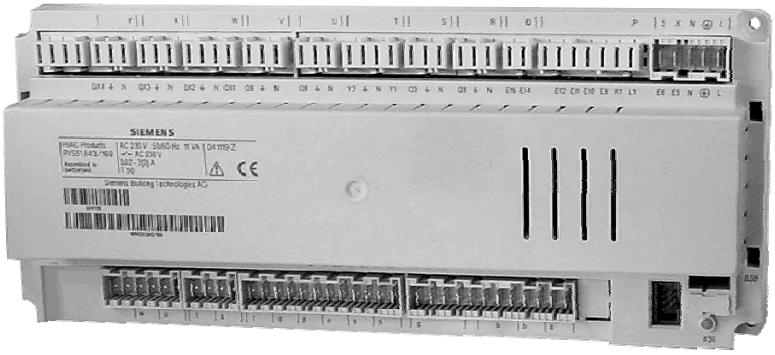
SIEMENS



Albatros^2
Heat pump controller
User manual

RVS61.843
AVS75..
AVS37..
QAA75..
QAA78..
QAA55..

Edition 1.0
Controller series A
CE1U2355en_02
23. November 2007

Siemens Schweiz AG
HVAC Products

ID A6V10084543 (doc)
ID A6V10084545 (pdf)

Table of contents

1 Summary

The present user manual describes the products listed below and covers handling and configuration of the units for readers ranging from end users to heating engineers.

Type reference (ASN)	Name
RVS61.843	Basic unit heat pump
AVS75.390	Extension module
AVS37.290	Operator unit without text display (PCB version)
AVS37.294	Operator unit with text display
QAA75.610	Room unit, for wiring
QAA75.611	Room unit, for wiring, with backlit display
QAA78.610	Room unit, wireless
QAA55.110	Room unit
AVS38.291	Dummy cover (96 x 144 mm)
AVS71.390	RF module
AVS14.390	RF repeater
AVS13.399	Outside sensor with RF module
AVS82.490	Ribbon cable for extension module
AVS82.491	Ribbon cable for operator unit

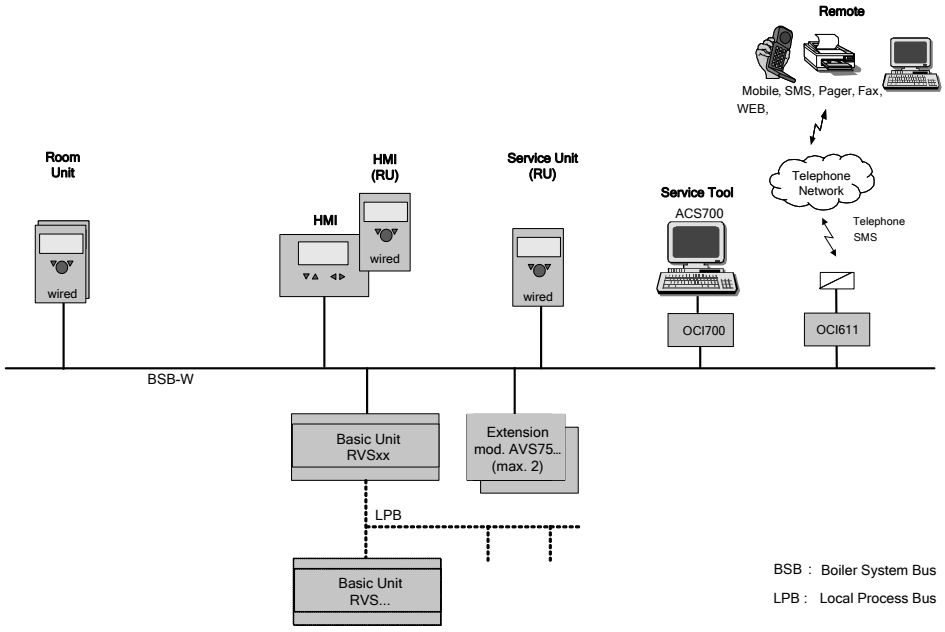
The following products are described in separate pieces of documentation:

QAC34	Outside sensor
QAD36	Strap-on temperature sensor
QAZ36	Immersion temperature sensor

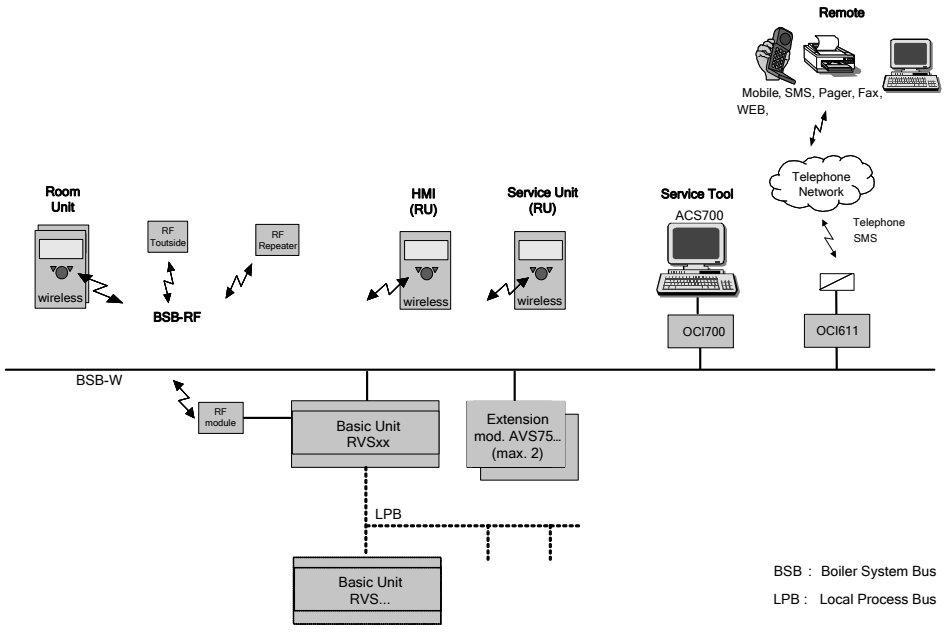
1.1 Product range overview

1.1.1 Topology

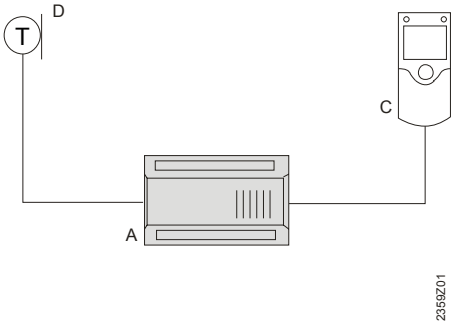
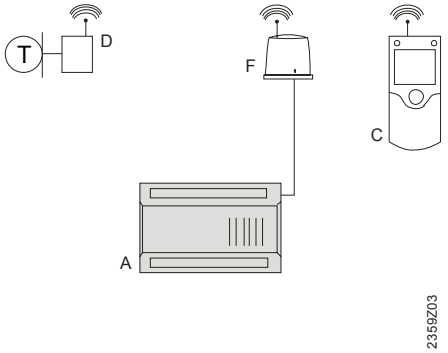
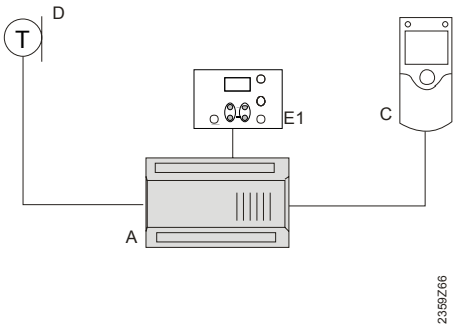
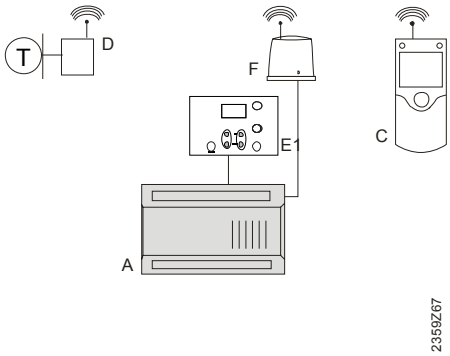
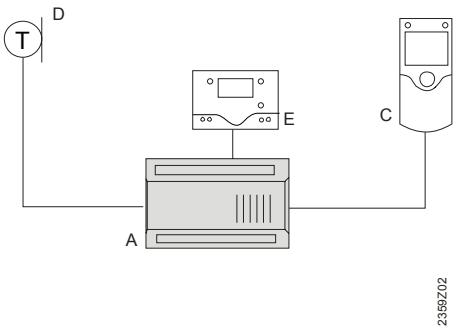
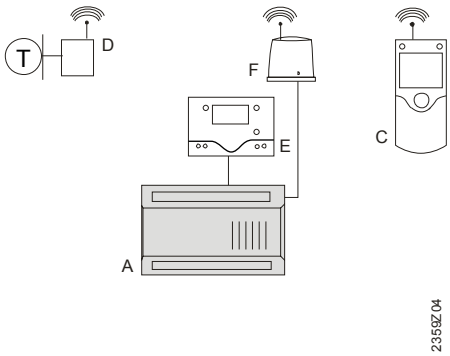
Wired



Wireless



1.1.2 Operation options

	Wired	Wireless
Operation with room unit		
Operation with “basic” operator unit (optionally with additional room unit)		
Operation with “cleartext” operator unit (optionally with additional room unit)		

A Basic unit RVS…
C Room unit QAA75… / 78… / QAA55..
D Outside sensor AVS13…
E Operator unit AVS37.294 (cleartext)
E1 Operator unit AVS37.390 (basic)
F RF module AVS71…

2 Safety notes

2.1 Notes on product liability

- The products may only be used in building services plant and on applications as described in this document
- When using the products, all requirements specified in the chapters on "Handling" and "Technical data" must be satisfied
- Local regulations (for installation, etc.) must be complied with
- Do not open the units. If not observed, warranty becomes void.

3 Mounting and installation

3.1 Regulations

Electrical installation

- Prior to installing the units, power must be turned off
- The connections for mains and low-voltage are separated
- For wiring, the requirements of safety class II must be satisfied
- One and the same sensor cannot be connected to several inputs

⚠ Sensor and power cables must not be run in the same cable duct

3.2 Heat pump controller RVS61.843

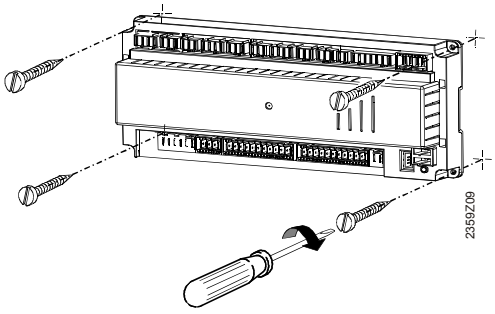
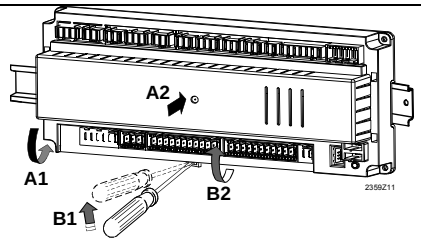
Engineering

- Air circulation around the controller must be ensured, allowing the unit to emit the heat produced by it.
  A clearance of at least 10 mm must be provided for the unit's cooling slots at the top and bottom of the housing.
  That space should not be accessible and no objects should be placed there. If the controller is enclosed in another (insulating) casing, a clearance of up to 100 mm must be observed around the cooling slots
- The controller is designed conforming to the directives for safety class II devices mounted in compliance with these regulations
- Power to the controller may only be supplied when completely fitted. If this is not observed, there is a risk of electric shock hazard near the terminals and through the cooling slots
- The controller must not be exposed to dripping water
- Permissible ambient temperature when mounted and when ready to operate: 0…50 °C
- Power cables must be clearly separated from low-voltage cables (sensors) observing a distance of at least 100 mm

Mounting location

- Heat pump
- Control panel
- Housing for wall mounting

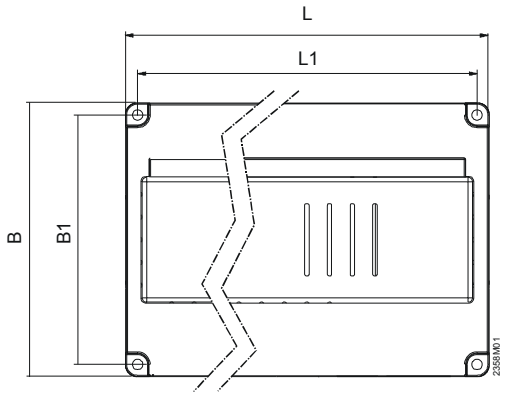
Mounting method

Screwed	On DIN rail
	

A: Mounting / B: Removal

Note:
To mount the controller on a DIN rail, a mounting clip is required!

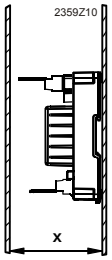
Dimensions and drilling plan



Dimensions in mm

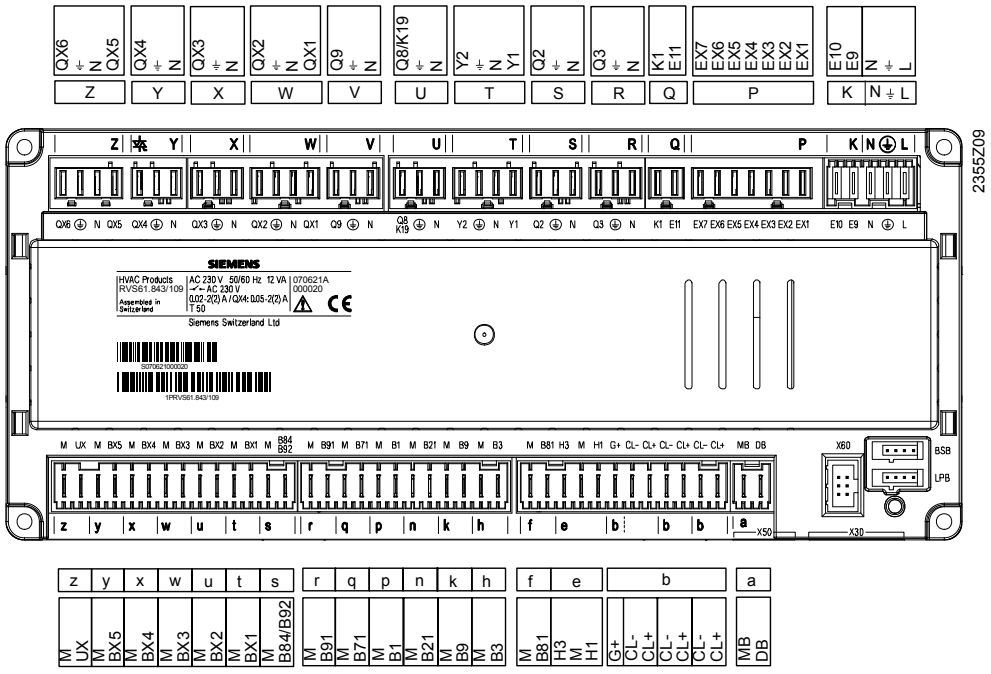
	L	*B*	*H*	*L1*	*B1*
RVS61.843	281	121	52	270	110

Total height required



Dimension X:
Connectors with tongues, minimum 70 mm
Connector without tongues, minimum 60 mm

3.2.1 Connection terminals RVS61.843



Terminal markings RVS61.843

Mains voltage

	Use	*Terminal*	*Connector type*
L	Mains connection, live AC 230 V	**L**	AGP4S.03E/109
⏚	Mains connection, protective earth	⏚	
N	Mains connection, neutral conductor	**N**	
E9 E10	Low-pressure High-pressure	**K**	AGP4S.02J/109
EX1	Multifunctional input EX1	**B**	AGP8S.07A/109
EX2	Multifunctional input EX2		
EX3	Multifunctional input EX3		
EX4	Multifunctional input EX4		
EX5	Multifunctional input EX5		
EX6	Multifunctional input EX6		
EX7	Multifunctional input EX7		
E11	Overload protection compressor 1	**Q**	AGP8S.02E/109
K1	Compressor stage 1		
N	Neutral conductor	**R**	AGP8S.03A/109
⏚	Protective earth		
Q3	DHW charging pump / diverting valve		
N	Neutral conductor	**S**	AGP8S.03B/109
⏚	Protective earth		
Q2	1st heating circuit pump		
Y1	1st heating circuit mixing valve opening	**T**	AGP8S.04B/109
N	Neutral conductor		
⏚	Protective earth		
Y2	1st heating circuit mixing valve closing		
N	Neutral conductor	**U**	AGP8S.03C/109
⏚	Protective earth		
Q8 K19	Source pump Fan		
N	Neutral conductor	**V**	AGP8S.03D/109
⏚	Protective earth		
Q9	Condenser pump		
QX1	1. Multifunctional output	**W**	AGP8S.04E/109
N	Neutral conductor		
⏚	Protective earth		
QX2	2. Multifunctional output		
N	Neutral conductor	**X**	AGP8S.03E/109
⏚	Protective earth		
QX3	3. Multifunctional output		
N	Neutral conductor	**Y**	AGP8S.03G/109
⏚	Protective earth		
QX4	4. Multifunctional output		
QX5	5. Multifunctional output	**Z**	AGP8S.04C/109
N	Neutral conductor		
⏚	Protective earth		
QX6	6. Multifunctional output		

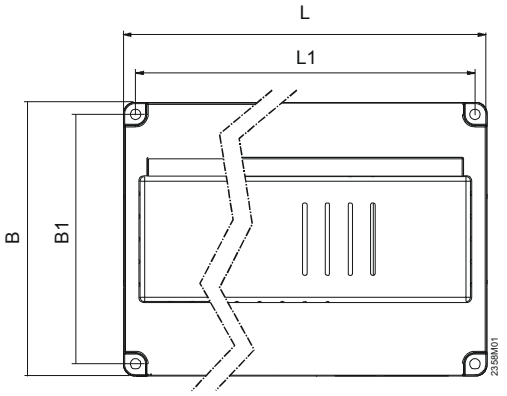
Low-voltage

	Use	*Terminal*	*Connector type*
	Service tool LPB	LPB system	-
	Service tool BSB	BSB	-
	RF module AVS71.390	X60	-
	Extension module AVS75.390	X50	AVS82.490/109
	Operator unit (HMI)	X30	AVS82.491/109
DB	LPB data bus	**a**	AGP4S.02H/109
MB	LPB ground bus		
CL+	BSB data bus	**b**	AGP4S.02A/109
CL-	BSB ground bus		
CL+	Data bus room unit 2	**b**	AGP4S.02 A /109
CL-	Ground bus room unit 2		
CL+	Data bus room unit 1	**b**	AGP4S.03D/109
CL-	Ground bus room unit 1		
G+	Power supply optional lighting		
H1	Digital / DC 0...10 V input H1	**e**	AGP4S.03G/109
M	Ground		
H3	Digital / DC 0...10 V input H3		
B81	Hot-gas temperature sensor 1	**f**	AGP4S.02B/109
M	Ground		
B3	DHW temperature sensor	**h**	AGP4S.02C/109
M	Ground		
B9	Outside sensor	**k**	AGP4S.02D/109
M	Ground		
B21	Flow temperature sensor heat pump	**n**	AGP4S.02F/109
M	Ground		
B1	Flow temperature sensor HC1	**p**	AGP4S.02G/109
M	Ground		
B71	Return temperature sensor heat pump	**q**	AGP4S.02K/109
M	Ground		
B91	Source inlet temperature sensor	**r**	AGP4S.02L/109
M	Ground		
B84	Evaporator temperature sensor	**s**	AGP4S.02S/109
B92	Source outlet temperature sensor		
M	Ground		
BX1	Multifunctional sensor input BX1	**t**	AGP4S.02M/109
M	Ground		
BX2	Multifunctional sensor input BX2	**u**	AGP4S.02N/109
M	Ground		
BX3	Multifunctional sensor input BX3	**w**	AGP4S.02P/109
M	Ground		
BX4	Multifunctional sensor input BX4	**x**	AGP4S.02R/109
M	Ground		
BX5	Multifunctional sensor input BX5	**Y**	AGP4S.02T/109
M	Ground		
UX	Multifunctional analog output UX	**z**	AGP4S.02U/109
M	Ground		

3.3 Extension module AVS75.390

For planning, mounting location and mounting method, refer to the information given for the basic modules.

Dimensions and drilling plan



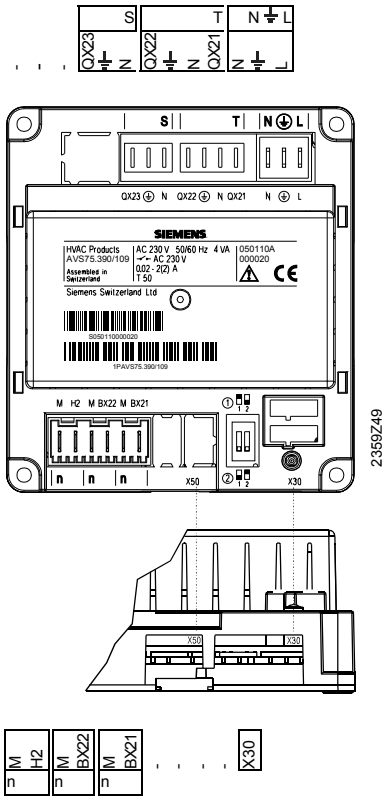
Dimensions in mm

	L	*B*	*H*	*L1*	*B1*
AVS75.390	109	121	52	98	110

Connections

The AVS75.390 extension module must be connected to terminal X50 of the basic unit using the AVS83.490/109 connecting cable. The connectors are coded.

3.3.1 Connection terminals AVS75.390



① = Module 1

② = Module 2

Terminal markings

Mains voltage

	Use	*Space*	*Connector type*
L ⏚ N	Live AC 230 V basic unit Protective earth Neutral conductor	N ⏚ L	AGP4S.03E/109
QX21 N ⏚ QX22	Assignment according to function Neutral conductor Protective earth Assignment according to function	T	AGP8S.04B/109
N ⏚ QX23	Neutral conductor Protective earth Assignment according to function	S	AGP8S.03B/109

Low-voltage

	Use	*Space*	*Connector type*
	Operator unit	X30	AVS82.491/109
BX21 M	Assignment according to function Ground	n	AGP4S.02F/109
BX22 M	Assignment according to function Ground	n	AGP4S.02F/109
H2 M	Digital / DC 0...10 V input Ground	n	AGP4S.02F/109

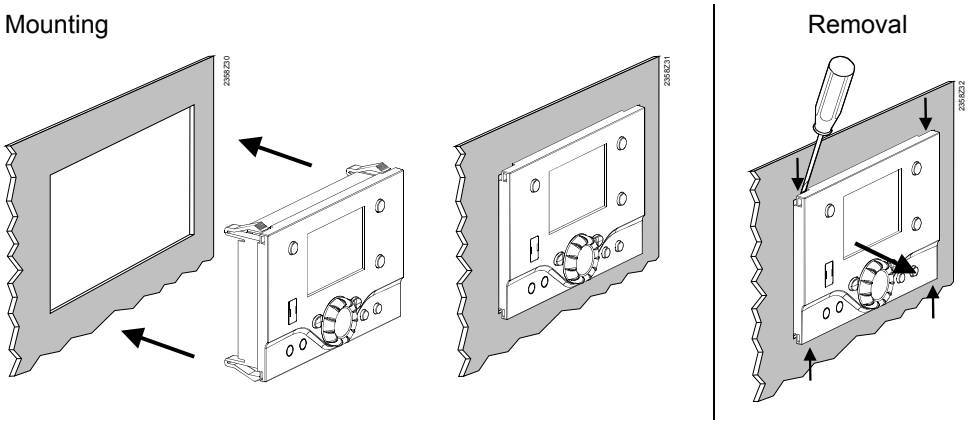
Assignment of terminals

The 2 parameters
- Function extension module 1 (6020)
- Function extension module 2 (6021)

are used to define usage of the respective module.

3.4 Operator unit AVS37.294

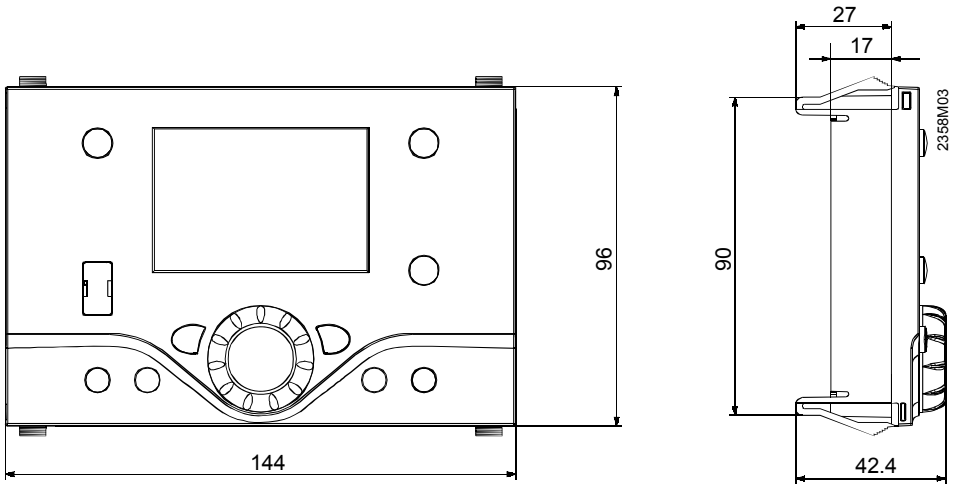
Mounting method



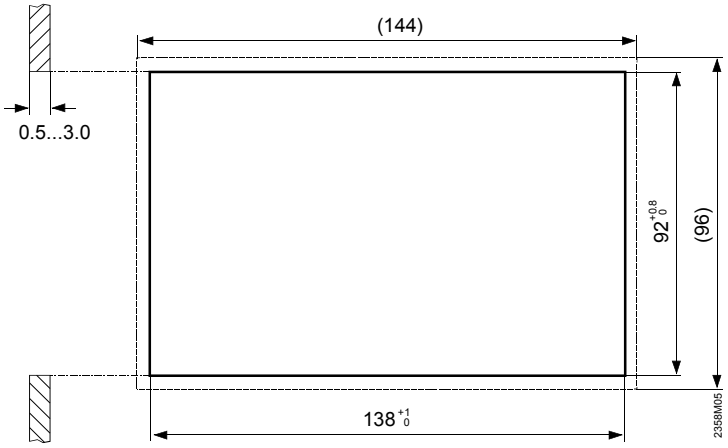
Connections

The AVS37.294 operator unit must be connected to terminal X30 of the basic unit using the AVS82.491/109 connecting cable. The connectors are coded.

Dimensions



Panel cutout

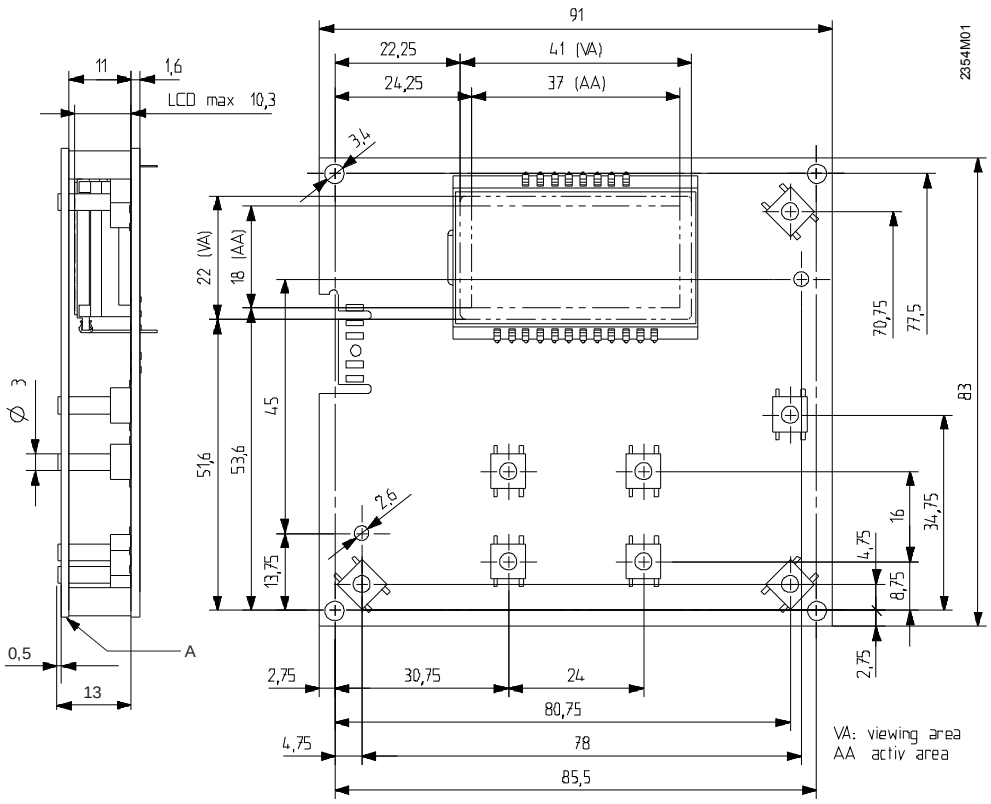


3.5 Operator unit AVS37.390

Connections

The AVS37.390 operator unit must be connected to terminal X30 of the basic unit using the AVS82.491/109 connecting cable. The connectors are coded.

Dimensions

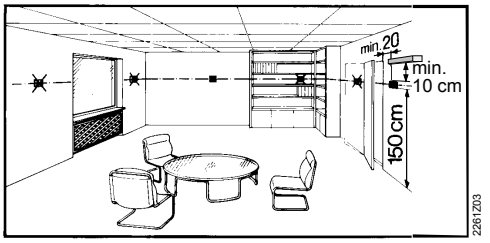


A Control panel, front

The AVS37.390 operator unit is a PCB version without casing, supplied by Siemens.

3.6 Room unit QAA55…

Engineering

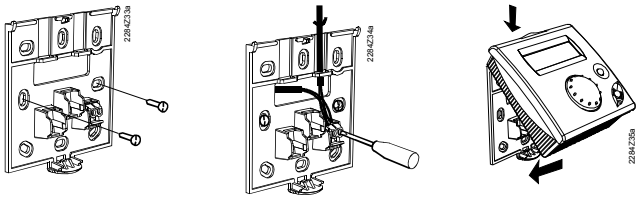


The room unit should be located in the main living room while giving consideration to the following points:

- The place of installation should be chosen so that the sensor can capture the room temperature as accurately as possible without getting adversely affected by direct solar radiation or other heat or refrigeration sources (about 1.5 meters above the floor)
- In the case of wall mounting, there must be sufficient clearance above the unit, enabling it to be fitted and removed

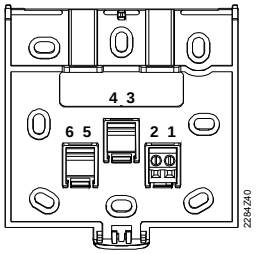
When the unit is removed from its base, power is cut off so that the unit is out of operation.

Mounting



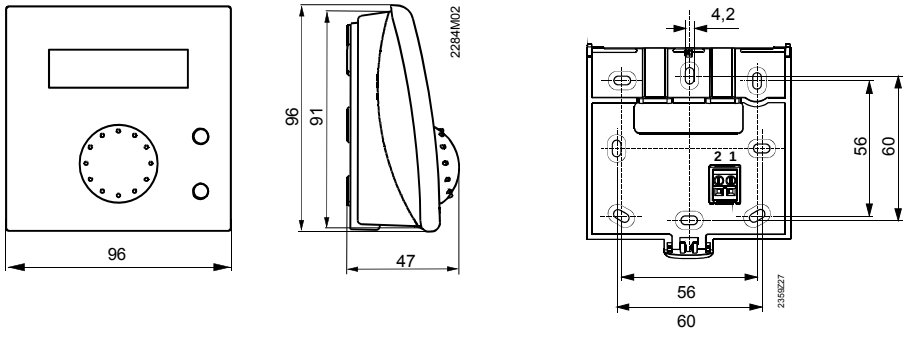
- The controller must not be exposed to dripping water

Connections



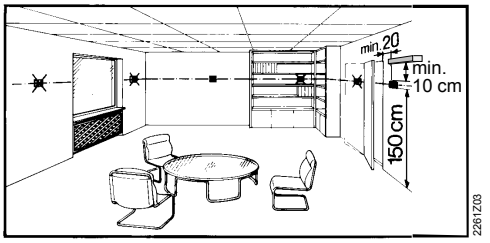
1	CL+	BSB data
2	CL-	BSB ground

Dimensions and drilling plan



3.7 Room unit QAA75…

Engineering

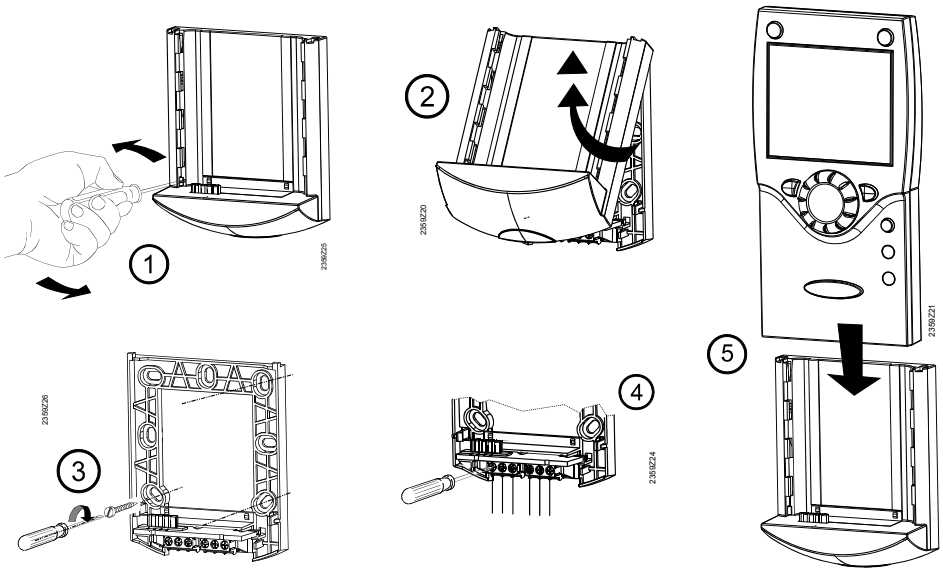


The room unit should be located in the main living room while giving consideration to the following criteria:

- The place of installation should be chosen so that the sensor can capture the room temperature as accurately as possible without getting adversely affected by direct solar radiation or other heat or refrigeration sources (about 1.5 meters above the floor)
- In the case of wall mounting, there must be sufficient clearance above the unit, enabling it to be fitted and removed

When the unit is removed from its base, power is disconnected so that the unit is out of operation.

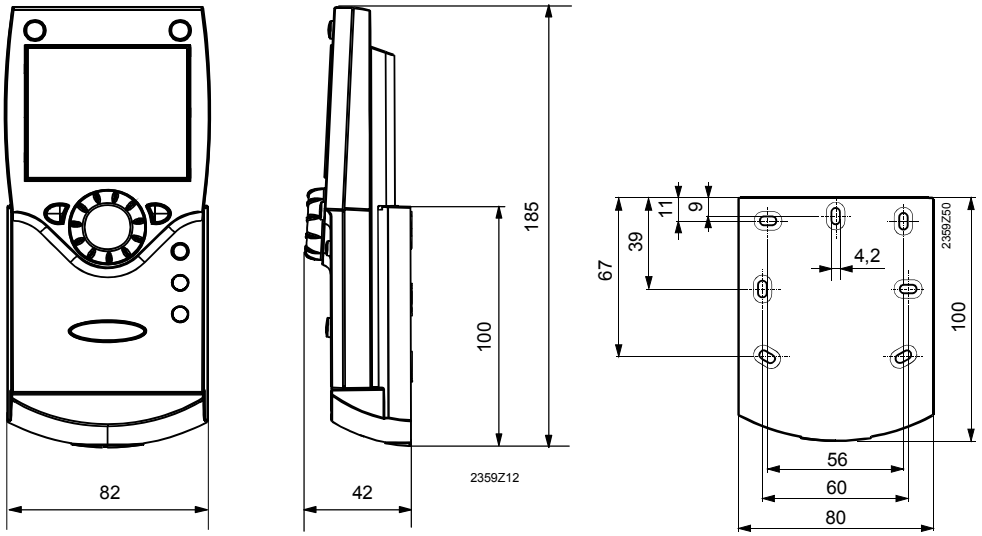
Mounting method



Connections

Terminal	Identifier	QAA75.610	QAA75.611
1	CL+	BSB data	BSB data
2	CL-	BSB ground	BSB ground
3	G+	Reserved	Power supply DC 12 V

Dimensions and drilling plan



3.8 RF components

The wireless components should be located such that transmission is as interference-free as possible. The following criteria must be observed:

- Not in the vicinity of electrical cables, strong magnetic fields or equipment, such as PCs, TV sets, microwave ovens, etc.
- Not near larger metal structures or constructional elements with fine metal meshes, such as special glass or special concrete
- The distance to the transmitter should not exceed 30 meters or 2 floors

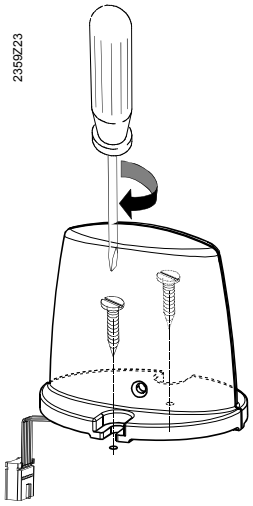
3.8.1 RF module AVS71.390

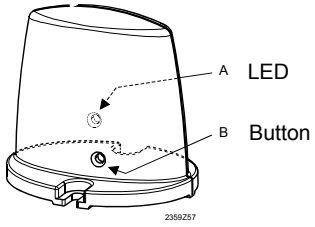
The RF module extends the product range by introducing wireless communication. With this type of device, the system components, such as room units, transmit data with no need for laying cables.

Engineering

Do not install the RF module inside metal casings (e.g. inside the heat pump).

Mounting method





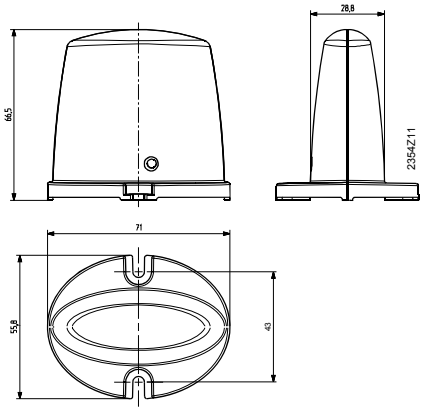
Connection

The prefabricated cable must be connected to terminal X60 of the controller.
Prior to connecting the module, the basic unit must be disconnected from power!

Radio connection

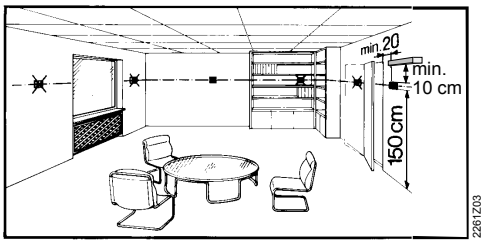
Establishment of the wireless connection is described in the following sections which cover the relevant RF components.

Dimensions and drilling plan



3.8.2 Room unit QAA78.610

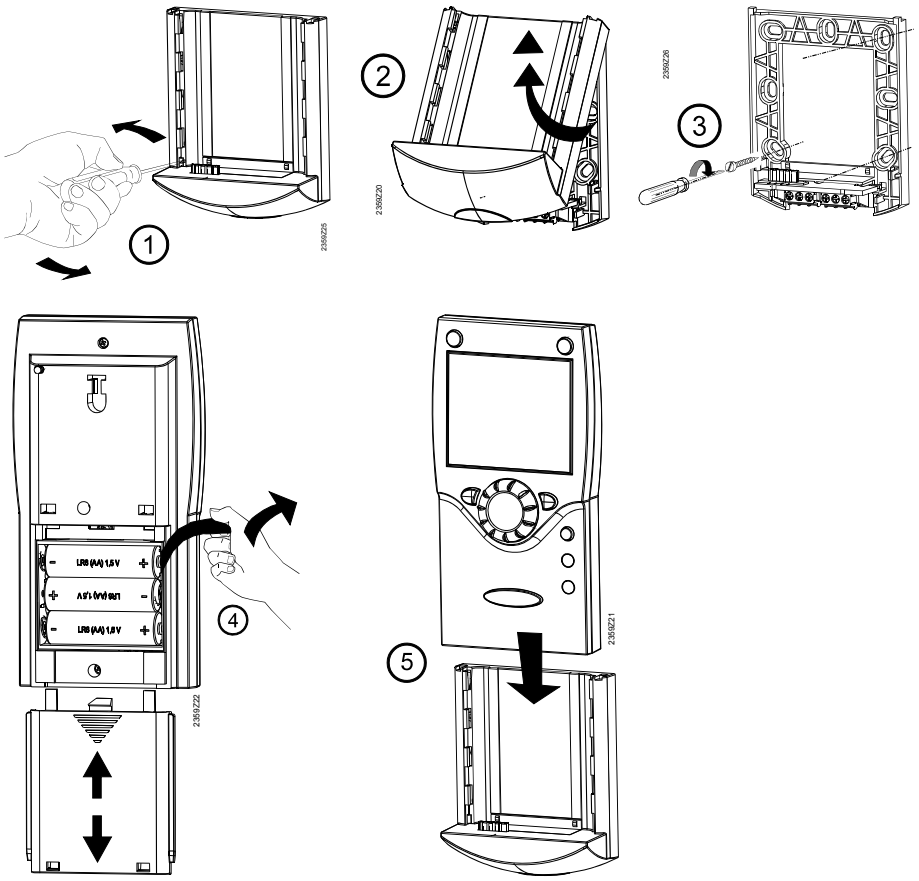
Engineering



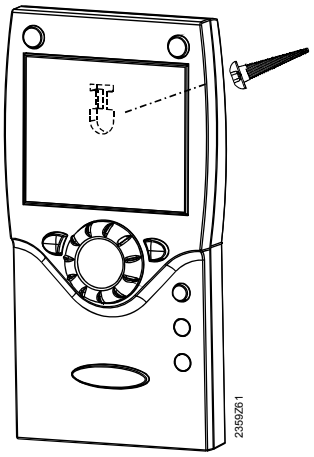
The room unit should be located in the main living room while giving consideration to the following points:

- The place of installation should be chosen so that the sensor can capture the room temperature as accurately as possible without getting adversely affected by direct solar radiation or other heat or refrigeration sources (about 1.5 meters above the floor)
- In the case of wall mounting, there must be sufficient clearance above the unit, enabling it to be fitted and removed

Mounting with the base



Mounting without the base



Connections / power supply

The room unit is powered by three 1.5 V alkaline batteries type AA (LR06).

Radio connection

Make the radio connection in the vicinity of the RF module prior to mounting so that all system components are within easy reach.

Prerequisite for the radio connection is that all components receive power, which means that the RF module must be correctly connected to the controller and the batteries must be correctly installed in the room unit.

Establishing the link

1. Press the button on the installed RF module for at least 8 seconds until the LED on the module starts **blinking at high frequency**.
2. Press the OK button on the room unit to switch to programming.
3. Press the info button for at least 3 seconds and select operating level “Commissioning“ with the setting knob. Then, press the OK button.
4. Select menu “Wireless“ and press the OK button.
5. Select operating line “Used as“ (40) and make the appropriate selection. Then, press the OK button.
6. Set the setting knob to “YES“ and press the OK button. The process of opening the connection is started.
7. The display shows the progress of opening the connection in %. This process can take 2 to 120 seconds.
8. The connection is established when “Device ready” appears and the LED on the RF module extinguishes

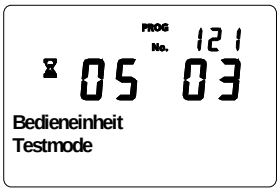
Testing

The test is made to check the quality of the radio link.

- The test can be aborted by pressing the ESC button
- While the radio link can be opened on the controller, the test should be made at the location where the room unit will be installed

On the room unit, as described above (points 2 through 4), select menu “Radio“ and activate the test mode on setting line “Test mode“ (121).

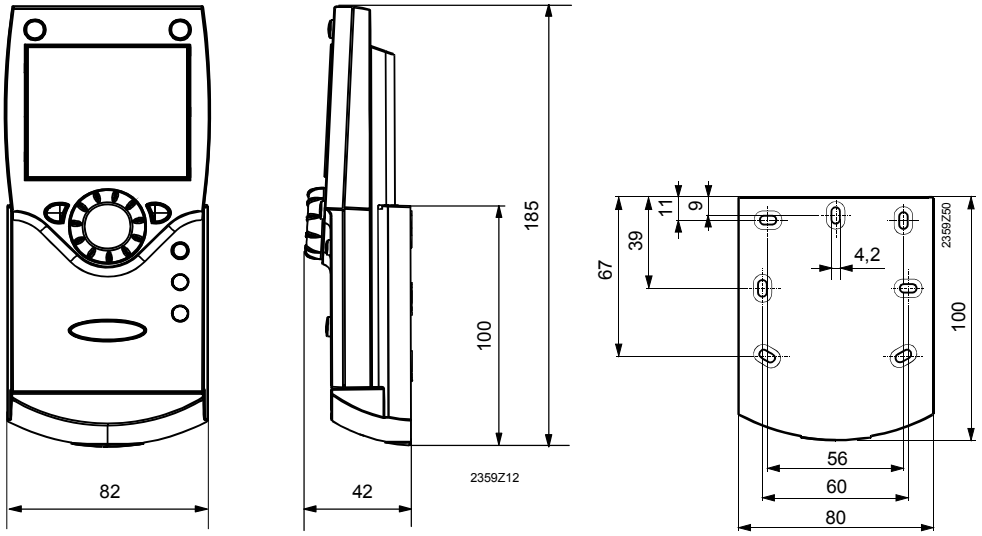
Example of a display during the test:



The digits on the left show telegrams that have been sent, the digits on the right telegrams that have been received. The test will be ended after 24 telegrams. The test is considered successful when at least 50% of the telegrams sent have been received.

If the test was not successful, some other mounting location should be chosen, or the AVS14.390 RF repeater should be used.

Dimensions and drilling plan

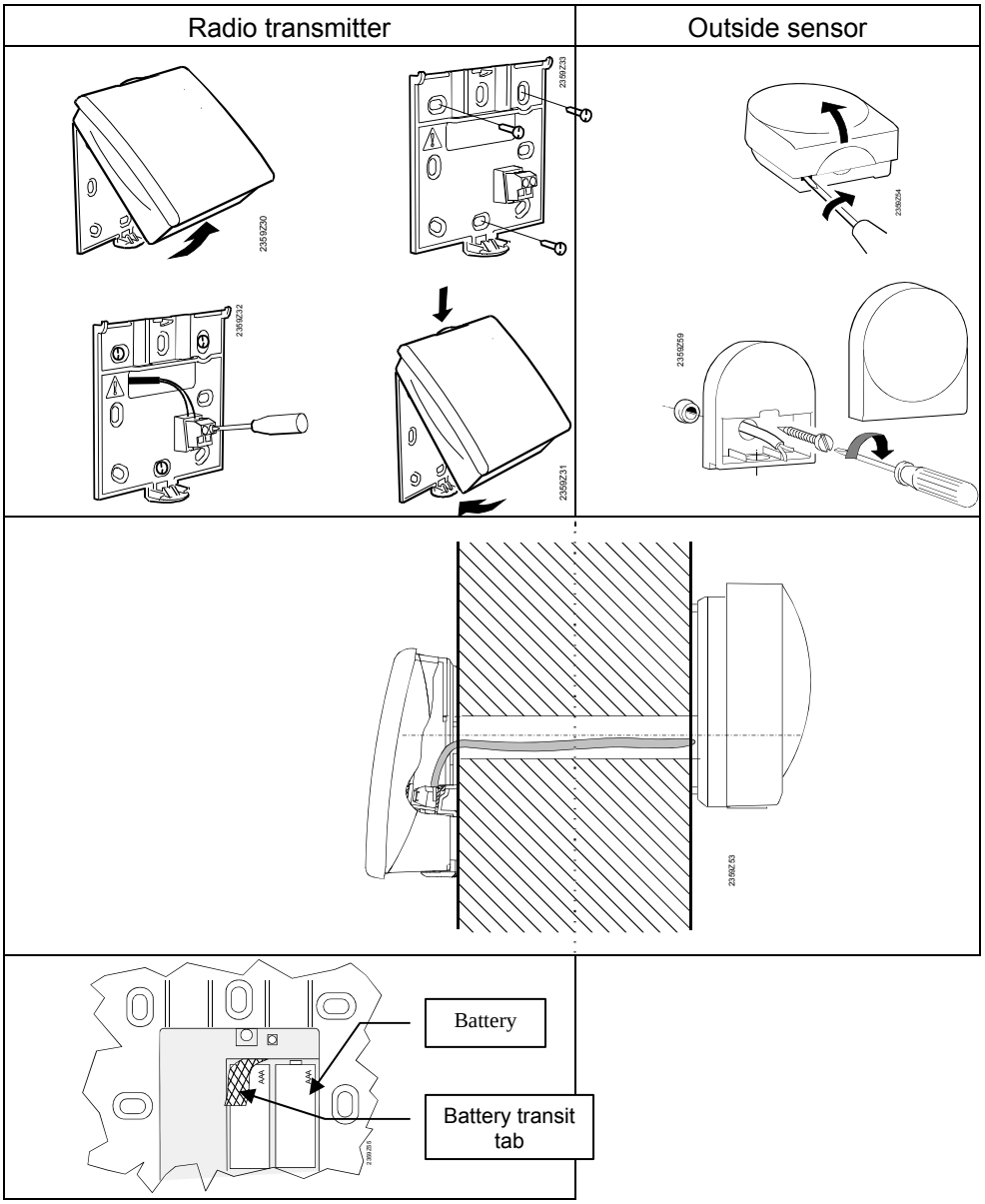


3.8.3 Wireless outside sensor AVS13.399

⚠

- The radio transmitter must be installed inside the building
- The radio transmitter's mounting location should be chosen such that batteries can be easily changed

Mounting method



Connections

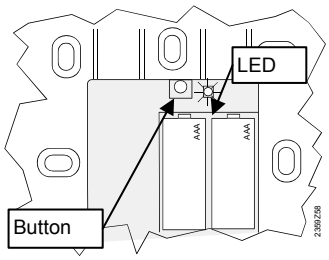
The outside sensor is to be connected to the radio transmitter via a 2-core cable, the connections are interchangeable.
The device is powered by two 1.5 V alkaline batteries type AAA (LR03).

Radio connection

Make the radio connection in the vicinity of the RF module prior to mounting so that all system components are within easy reach.

Prerequisite for the radio link is that all components receive power, which means that the RF module must be correctly connected to the basic unit and the batteries must be correctly installed in the room unit.

Establishing the link



1. Press the button on the RF module for at least 8 seconds until the LED on the RF module starts blinking at **high frequency**.
2. Press the button on the transmitter of the wireless outside sensor for at least 8 seconds until that LED also starts blinking at **high frequency**.
3. The connection is established when the LED on the RF module extinguishes.
4. Press the button on the transmitter of the wireless outside sensor briefly again until the LED extinguishes.

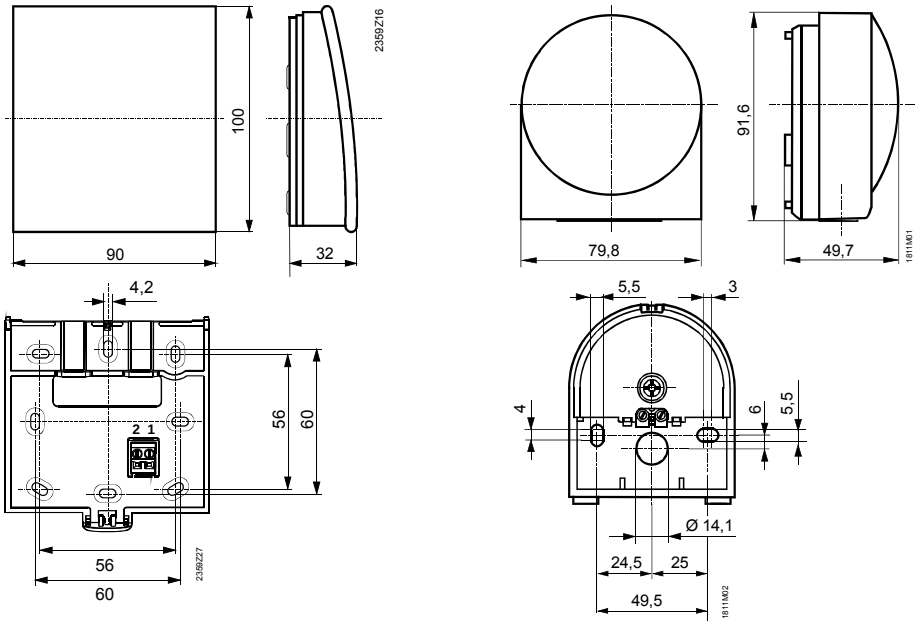
Testing

The test is made to check the quality of the radio link.

- The test can be aborted by pressing the ESC button
- While the radio link can be opened on the controller, the test should be made at the location where the room unit will be installed

1. Press button 3 on the transmitter of the wireless outside sensor for a maximum of 8 seconds until the LED starts blinking at **low frequency**.
2. When radio communication works correctly, the LED on the RF module flashes briefly at 10-second intervals.
3. After the test, press the button on the transmitter of the wireless outside sensor again briefly until the LED extinguishes.

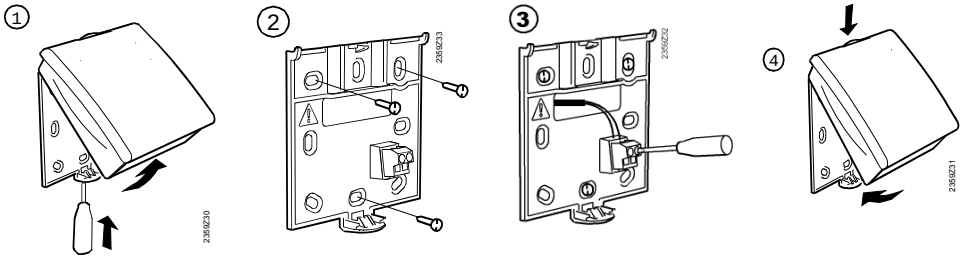
Dimensions and drilling plan



3.8.4 RF repeater AVS14.390

⚠
- To establish the radio link, the device must be temporarily connected to power prior to mounting, enabling the radio link to be opened and tested
- The RF repeater must be fitted inside the building

Mounting method



Connections

Power is supplied via the enclosed power pack. The wires are interchangeable.

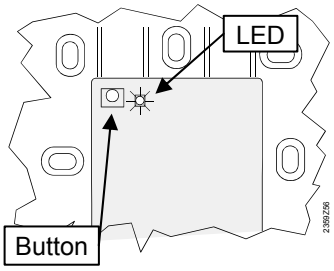
Radio link

ℹ Make the radio connection in the vicinity of the RF module prior to mounting so that all system components are within easy reach.

Prerequisite for the radio link is that all components receive power, which means that the RF module must be correctly connected to the basic unit and power must be correctly supplied to the RF repeater.

Establishing the link

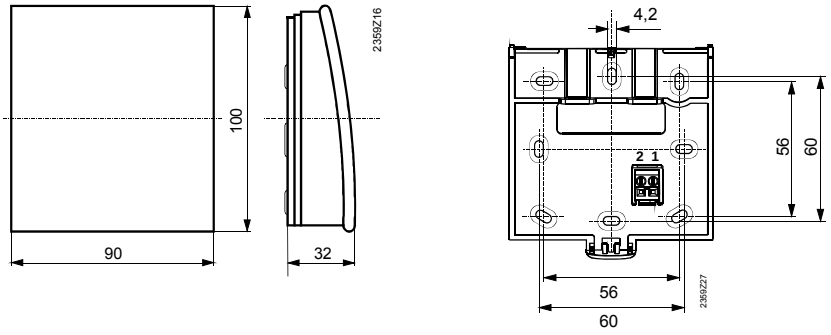
1. Press the button on the RF module for at least 8 seconds until the LED on the radio module starts blinking at **high frequency**.
2. Press the button on the installed RF repeater until the LED start blinking at **high frequency**.
3. The connection is established when the LED on the RF module extinguishes.



Testing

ℹ The test is made to check the quality of the radio link.
- The test can be aborted by pressing the ESC button
- While the radio link can be opened on the controller, the test should be made at the location where the room unit will be installed
  1. Press button 3 on the RF repeater for a maximum of 8 seconds until the LED starts blinking at **low frequency**.
  2. When radio communication works correctly, the LED on the RF module flashes briefly at 10-second intervals.
  3. After the test, press the button on the RF repeater again briefly until the LED extinguishes.

Dimensions and drilling plan



3.8.5 Checking the RF components

To check whether the connections to the required system components are operational, consult menus 130 through 135 on menu “Wireless“ (operating level “Commissioning“).

4 Commissioning

Prerequisites

To commission the units, the following working steps must be carried out:

- Prerequisite is the correct mounting and correct electrical installation and, in the case of wireless products, correctly working radio connections to all required auxiliary units
- Make all plant-specific settings. Special attention must be paid to menu ”Configuration“. For that purpose, the relevant operating level is to be selected as follows:

  Press the OK button on the room unit to switch to programming.
  Press the info button for at least 3 seconds and select operating level “Commissioning“ with the setting knob. Then, press the OK button.
- Make the function check as described below
- Reset the attenuated outside temperature
  (menu “Diagnostics of consumers“, operating line “Outside temp attenuated“ (8703))

Function check

To facilitate commissioning and fault tracing, the controller can be used to make input and output tests. With these tests, the controller’s inputs and outputs can be checked. To make the tests, switch to menu “Input / output test“ and go through all available setting lines.

If faults occurred during the tests, please refer to the descriptions “Diagnostics of heat and refrigeration sources“ and “Diagnostics of consumers” in this User Manual.

Operating state

The current operating state can be checked on menu “State“.

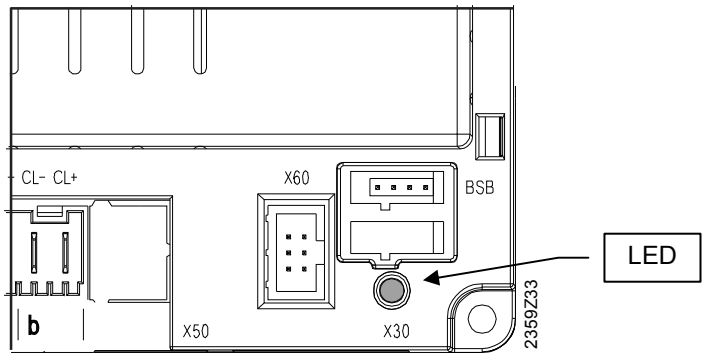
Diagnostics

For detailed diagnostics of the plant, check menus “Diagnostics heat generation“ and “Diagnostics consumers”.

4.1 Heat pump controller RVS61.843

Checking the LED

LED off:	No power supply
LED on	Ready
LED blinks	Local fault



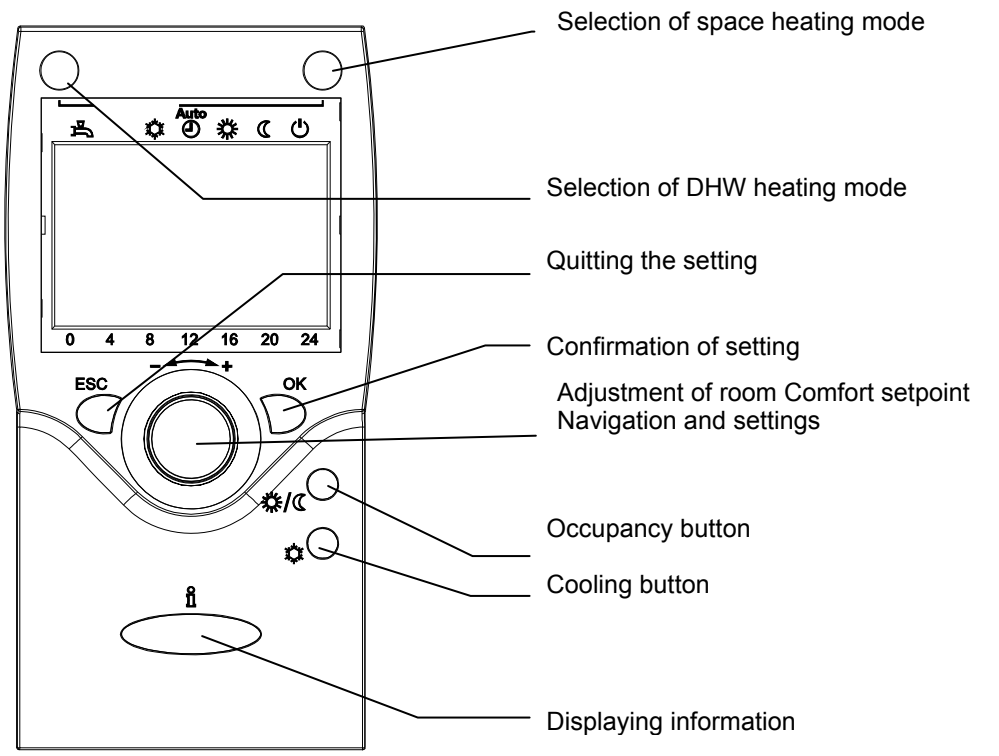
5 Handling

5.1 QAA75.. / QAA78… / AVS37..

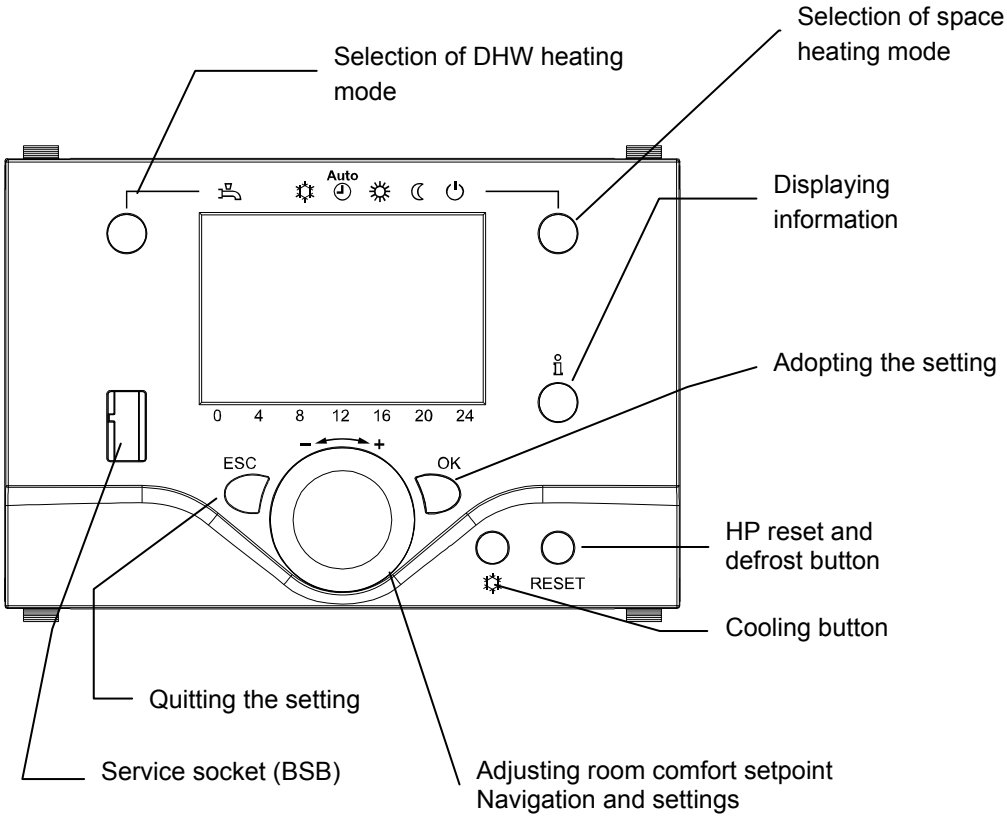
5.1.1 Operation

Operating elements

Room units
QAA75... / QAA78…



Operator unit
AVS37..

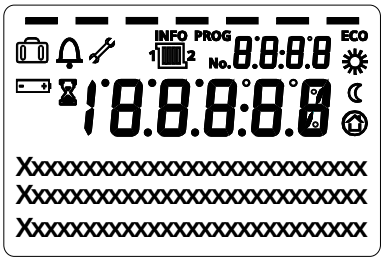


Display choices

- Heating to the Comfort setpoint
- Heating to the Reduced setpoint
- Heating to the frost protection setpoint
- Cooling
- Process running – please wait
- Change battery
- Holiday function active
- Reference to heating circuit
- Service / special functions
- Error messages
- INFO Info level activated
- PROG Programming activated
- ECO Heating temporarily switched off
  ECO function active

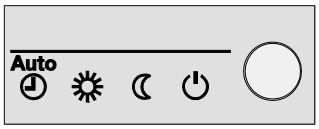
Display

Display of all segments.



Selecting space heating mode

This button is used to switch between the different operating modes. The selection made is indicated by a bar which appears below the respective symbol.



Automatic mode AUTO

Automatic operation controls the room temperature according to the time program.
Characteristics of automatic mode:

- Heating mode according to the time program
- Temperature setpoints according to the heating program "Comfort setpoint" or "Reduced setpoint"
- Protective functions active
- Automatic summer / winter changeover (ECO functions)

Continuous operation or

Continuous operation maintains the room temperature at the selected operating level.

- Heating to the Comfort setpoint
- Heating to the Reduced setpoint

Characteristics of continuous operation:

- Heating mode with no time program
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and 24-hour heating limit inactive in the case of continuous operation with the Comfort setpoint

Protection

When using Protection, the heating system is off. But it remains protected against frost (frost protection temperature), provided there is no power failure.

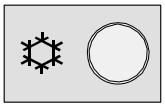
Characteristics of continuous operation:

- Heating off
- Temperature according to frost protection
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit active

Selecting cooling mode

(if available)

Cooling mode



To select cooling mode, press the Cooling button. The selection made is indicated by a bar which appears below the symbol. In cooling mode, the room temperature is controlled in accordance with the time program.

Characteristics of cooling mode:

- Cooling mode based on the time program
- Temperature setpoint according to "Comfort setpoint, cooling"
- Protective functions active
- Cooling limit according to the outside temperature

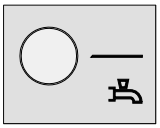
Selecting DHW heating mode

The button is used to switch DHW heating mode on and off. The selection made is indicated by a bar which appears below the respective symbol.

DHW heating mode

- On

The DHW is heated according to the selected switching program.



- Off

No DHW heating, protective function is active.

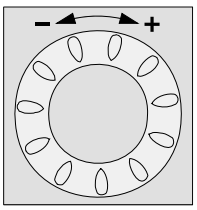
DHW push

The DHW push is triggered by keeping the DHW operating mode button on the operator or room unit depressed for at least 3 seconds.

It can also be started when:

- The operating mode is “Off“
- Operating mode changeover is effected via H1 or centrally (LPB)
- All heating circuits use the holiday function

Adjusting the room temperature setpoint

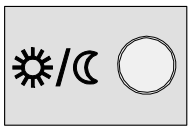


Turn the setting knob to increase or decrease the Comfort setpoint ☼ and confirm by pressing the OK button. During active heating mode, you can readjust Comfort setpoint “Heating”, and during active cooling mode, you can readjust Comfort setpoint “Cooling”.

For the **Reduced** setpoint ☾
- Press the OK button
- Select menu “Heating circuit” and
- adjust the “Reduced setpoint“

After each readjustment, wait at least 2 hours, allowing the room temperature to adapt. The Reduced setpoint can only be set in the case of heating mode. In cooling mode, there is no Reduced setpoint, only the Comfort setpoint.

Occupancy button



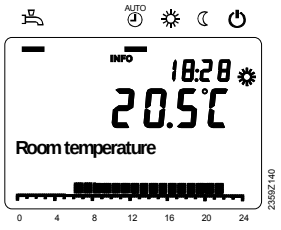
If, during the Comfort period, the rooms are not used for short periods of time, you can press the occupancy button to lower the room temperature, thus saving heating energy (changeover from Comfort to Reduced setpoint), or saving cooling energy (changeover from Comfort setpoint to OFF).
When the rooms are occupied again, press again the occupancy button to return to normal heating (changeover from Reduced to Comfort setpoint), or to cooling (changeover from OFF to Comfort setpoint).

In heating mode:	*In cooling mode:*
☼ Heating to the Comfort setpoint	☼ Cooling to the Comfort setpoint
☾ Heating to the Reduced setpoint	Cooling OFF (no symbol)

- The occupancy button is only active in automatic operation
- The current selection is active until the next switching action according to the heating program takes place

Displaying information

Various data can be displayed by pressing the info button.



Possible displays

Depending on the type of unit, configuration and operating state, some of the info lines listed below may not appear.
Display:
- Possible error messages from the “Error code list” 169
- Possible service messages from the “Maintenance code list” 173
- Possible special mode messages

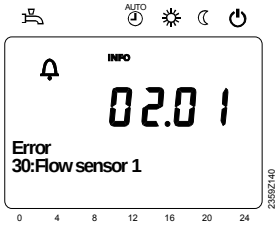
Other displays:

- Room temp
- Room temp min
- Room temp max
- Room setpoint 1
- Room setpoint 2
- Room setpoint P
- Outside temp
- Outside temp min
- Outside temp max
- DHW temp 1
- DHW temp 2
- Buffer temp 1
- Buffer temp 2
- Buffer setpoint
- Flow temp 1
- Flow temp setpoint 1
- Flow temp 2
- Flow temp setpoint 2
- Flow temp setpoint P
- Collector temp 1
- Setpoint HP
- Flow temp HP
- Return temp HP
- Source inlet temp
- Source outlet temp
- Remain stage 1 off time min
- Remain stage 2 off time min
- Remain stage 1 on time min
- Remain stage 2 on time min
- Solar flow temp
- Solar return temp
- 24-hour yield solar energy
- Total yield solar energy
- Swimming pool temp
- Swimming pool setpoint
- State heating circuit 1
- State heating circuit 2
- State heating circuit P
- State cooling circuit
- State DHW
- State heat pump
- State solar
- State buffer
- State swimming pool
- Error message
- Maintenance message
- Floor curing function
- Date and time of day
- Telephone customer service

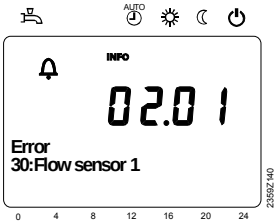
Exception

In exceptional cases, the basic display shows one of the following symbols:

Error messages
If this symbol appears, an error in the plant has occurred. Press the info button and read further information.



Service or special operation
If this symbol appears, a maintenance message is delivered or the plant has changed to special operation. Press the info button and read further information.



The LPB number on the display indicates the device in the LPB system from which the error or maintenance message, or special operation, was triggered. The first 2 digits give the segment address, the 2 digits after the dot the device address.
Hence, 02.01 denotes segment 2, device 1.

An error list is given in section “Errors“, starting on page 168.

Manual defrost of HP / reset

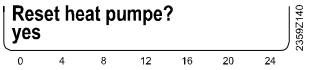
The RESET button triggers different functions, depending on the number of seconds the button is kept depressed.
When kept depressed for more than 3 seconds, the manual defrost function is activated.
Pressing the button for less than 3 seconds triggers a reset.

Manual defrost of HP

If an air-to-water heat pump is used, you can manually trigger the defrost function for the evaporator.
After successfully completing defrosting, or on completion of the maximum permissible defrost time and permitted number of defrost attempts, the heat pump is automatically released again. For more information on the defrost function, refer to page 116 ff.

HP reset

Pending error messages from the heat pump are reset with this button. The preset switch-on delay will be ignored to prevent undesirable waiting times during commissioning or fault tracing.
This function should not be used in normal operation.



When releasing the button, the reset is made after 2 seconds.

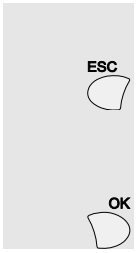
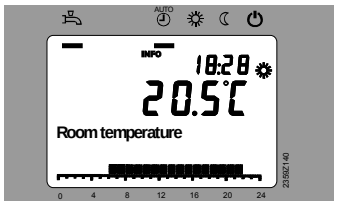
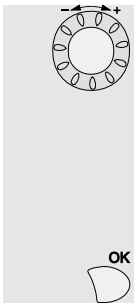
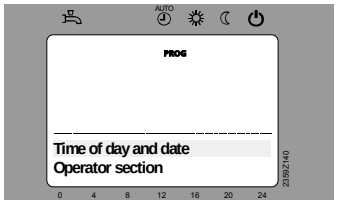
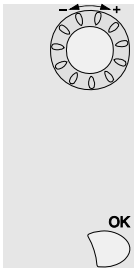
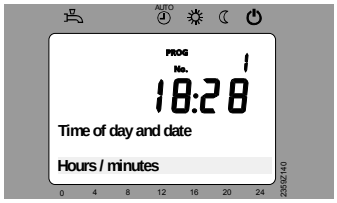
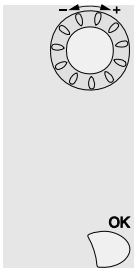
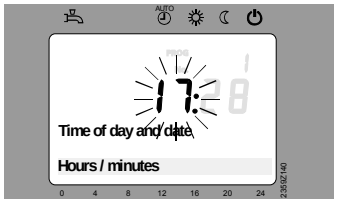
5.1.2 Programming the QAA75... / QAA78… / AVS37..

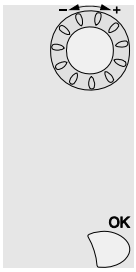
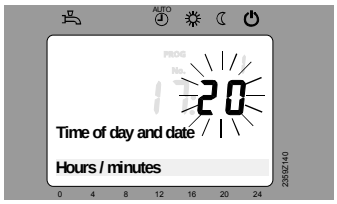
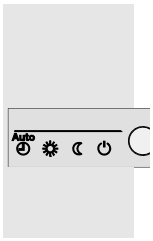
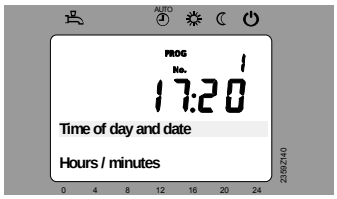
Setting principle

Settings that cannot be made directly with the operating elements are made through programming. For this purpose, the individual settings are structured in the form of menus and operating lines, thus creating practical groups of settings.
The following example shows how to set the time of day and the date.

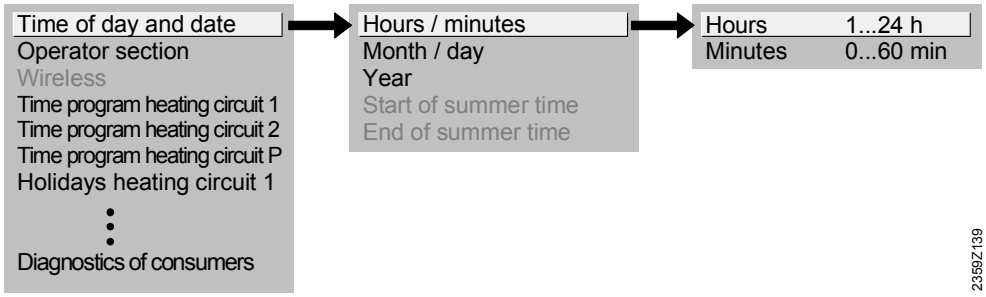
Example "Setting the time of day"

- Press the ESC button to go one step back at a time, readjusted values are not adopted
- If no setting is made for 8 minutes (2 minutes with RF devices), the unit will automatically return to the basic display
- Certain operating lines may be hidden at certain times, depending on the type of unit and the operating level

	Operation	Display example	Description
1			Basic display. If the basic display is not shown, press the ESC button to go back. Press the OK button.
2			The bottom section of the display shows various menus. Turn the setting knob until menu *Time of day and date* appears. Press the OK button to confirm.
3			In the bottom section of the display, the first operating line of menu *Time of day and date* appears. Turn the setting knob until operating line *Hours / minutes* appears. Press the OK button to confirm.
4			The display shows the hours blinking. Turn the setting knob until the hours of the time of day are correct. Press the OK button to confirm.

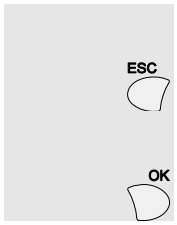
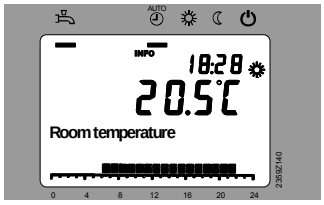
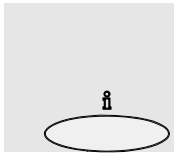
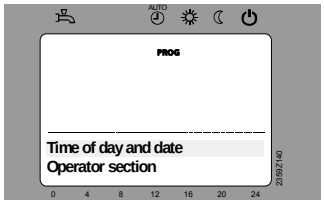
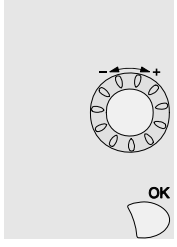
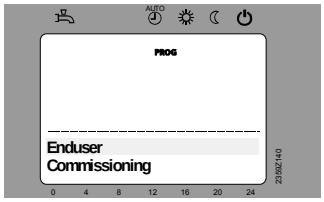
5			The display shows the minutes blinking. Turn the setting knob until the minutes of the time of day are correct. Press the OK button to confirm.
6			The settings are saved and the displays stops blinking. You can continue to make other settings, or you can press the operating mode or ESC button to go to the basic display.
7			Now, you see the basic display again.

Example of menu structure

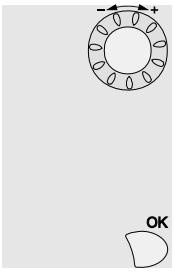


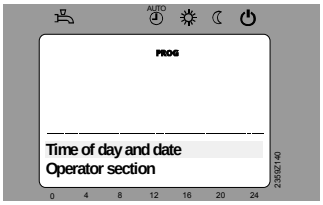
5.1.3 User levels

The user levels only allow authorized user groups to make settings. To reach the required user level, proceed as follows:

	Operation	Display example	Description
1			You see the basic display. If the basic display is not shown, press the ESC button to go back. Press the OK button.
2			You are on user level *Enduser*. Press the info button for 3 seconds.
			You are now given a choice of user levels. Turn the setting knob until the required user level is reached. Press the OK button.

3



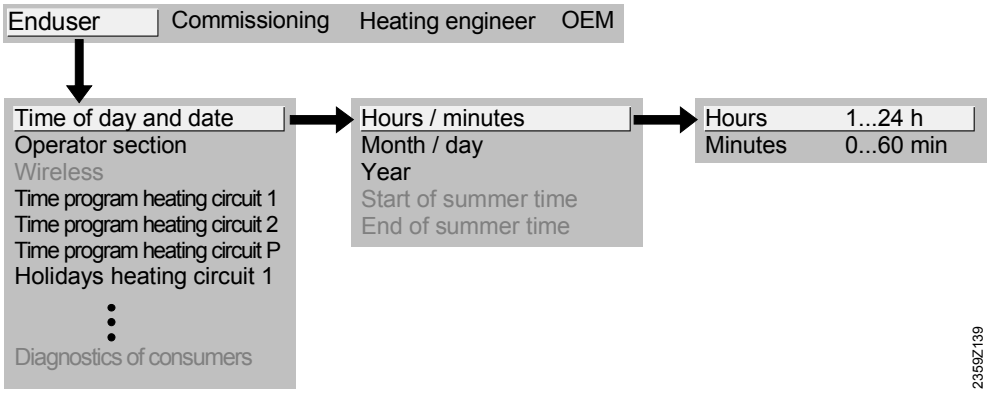


You are now on the required user level.

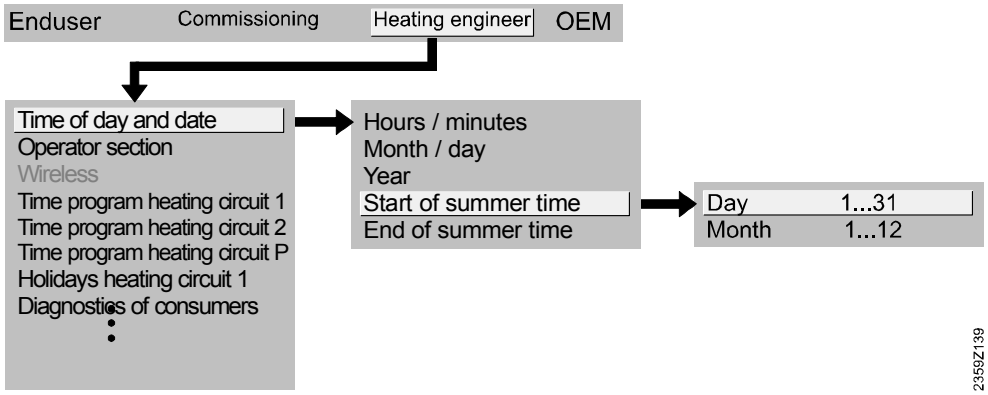
To reach the OEM level, the relevant code must be entered.

Setting structure “Enduser“

The example given here shows that certain user levels do not allow certain settings. The example shows them highlighted. On the unit, they are hidden.



Setting structure ”Heating engineer“



5.1.4 Overview of the settings

The table below shows all available settings up to the heating engineer level. Certain operating lines may be hidden, depending on the unit version in use.

Legend

E = enduser
I = commissioning
F = heating engineer
BZ = operating line

[1] Only QAA75../78..

Operating line	operating level	Function	Default value	Minimum	Max	Unit
Time of day and date						
1	E	Hours/minutes	-	00:00	23:59	hh:mm
2	E	Day/month	-	01.01	31.12	dd.MM
3	E	Year	-	2004	2099	yyyy
5	F	Start of summertime	25.03	01.01	31.12	dd.MM
6	F	End of summertime	25.10	01.01	31.12	dd.MM
Operator section						
20	E	Language German ¦ …	German			-
22	F	Info Temporarily ¦ Permanently	Temporarily			-
26	F	Operation lock Off ¦ On	Off.			-
27	F	Programming lock Off ¦ On	Off.			-
28	I	Direct adjustment Automatic storage ¦ Storage with confirmation	Storage with confirmation			
40[1]	I	Used as Room unit 1 ¦ Room unit 2 ¦ Room unit P ¦ Operator unit 1 ¦ Operator unit 2 ¦ Operator unit P ¦ Service unit	Room unit 1			-
42[1]	I	Assignment device 1 Heating circuit 1 ¦ Heating circuits 1 and 2 ¦ Heating circuits 1 and P ¦ All heating circuits	Heating circuit 1			-
44	I	Operation HC2 Commonly with HC1 ¦ Independently	Commonly with HC1			-
46	I	Operation HCP Commonly with HC1 ¦ Independently	Commonly with HC1			-
48[1]	I	Action occupancy button None ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Commonly	Heating circuit 1			-
54[1]	F	Readjustment room sensor	0.0	-3	3	°C
70	F	Software version	-	0	99.9	-
Wireless						
120	I	Binding No ¦ Yes	No			-
121	I	Test mode Off ¦ On	Off.			-
130	I	Room unit 1 Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
131	I	Room unit 2 Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
132	I	Room unit P Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
133	I	Outside sensor Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
134	I	Repeater Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
135	I	Operator unit 1 Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
136	I	Operator unit 2 Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
137	I	Operator unit P Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
138	I	Service unit Missing ¦ Ready ¦ No recept'n ¦ Change batt	-			-
140	I	Delete all devices No ¦ Yes	No			-
Time prog heating circuit 1						
500	E	Preselection Mo - Su ¦ Mo - Fr ¦ Sa - Su¦ Mo ¦ Tu ¦ We ¦ Th ¦ Fr ¦ Sa ¦Su	Mo - Su			-
501	E	1st phase on	06:00	00:00	24:00	hh:mm
502	E	1st phase off	22:00	00:00	24:00	hh:mm
503	E	2nd phase on	24:00	00:00	24:00	hh:mm
504	E	2nd phase off	24:00	00:00	24:00	hh:mm
505	E	3rd phase on	24:00	00:00	24:00	hh:mm
506	E	3rd phase off	24:00	00:00	24:00	hh:mm
516	E	Default values No ¦ Yes	No		1	-
Time prog heating circuit 2						
520	E	Preselection Mo - Su ¦ Mo - Fr ¦ Sa - Su ¦ Mo¦ Tu ¦ We ¦ Th ¦ Fr ¦ Sa ¦Su	Mo - Su			-
521	E	1st phase on	06:00	00:00	24:00	hh:mm
522	E	1st phase off	22:00	00:00	24:00	hh:mm
523	E	2nd phase on	24:00	00:00	24:00	hh:mm
524	E	2nd phase off	24:00	00:00	24:00	hh:mm
525	E	3rd phase on	24:00	00:00	24:00	hh:mm
526	E	3rd phase off	24:00	00:00	24:00	hh:mm
536	E	Default values No ¦ Yes	No		1	-
Time program 3 / HCP						
540	E	Preselection Mo - Su ¦ Mo - Fr ¦ Sa - Su ¦ Mo ¦ Tu ¦ We¦ Th ¦ Fr ¦ Sa ¦Su	Mo - Su			-
541	E	1st phase on	06:00	00:00	24:00	hh:mm
542	E	1st phase off	22:00	00:00	24:00	hh:mm
543	E	2nd phase on	24:00	00:00	24:00	hh:mm
544	E	2nd phase off	24:00	00:00	24:00	hh:mm
545	E	3rd phase on	24:00	00:00	24:00	hh:mm
546	E	3rd phase off	24:00	00:00	24:00	hh:mm
556	E	Default values No ¦ Yes	No		1	-
Time program 4 / DHW						
560	E	Preselection Mo - Su ¦ Mo - Fr ¦ Sa - Su ¦ Mo ¦ Tu¦ We ¦ Th ¦ Fr ¦ Sa ¦Su	Mo - Su			-
561	E	1st phase on	00:00	00:00	24:00	hh:mm
562	E	1st phase off	05:00	00:00	24:00	hh:mm
563	E	2nd phase on	24:00	00:00	24:00	hh:mm
564	E	2nd phase off	24:00	00:00	24:00	hh:mm
565	E	3rd phase on	24:00	00:00	24:00	hh:mm

Operating line	operating level	Function	Default value	Minimum	Max	Unit
566	E	3rd phase off	24:00	00:00	24:00	hh:mm
576	E	Default values No ¦ Yes	No		1	-
Time program 5						
600	E	Preselection Mo - Su ¦ Mo - Fr ¦ Sa - Su ¦ Mo ¦ Tu ¦ We ¦ Th¦ Fr ¦ Sa ¦Su	Mo - Su			-
601	E	1st phase on	06:00	00:00	24:00	hh:mm
602	E	1st phase off	22:00	00:00	24:00	hh:mm
603	E	2nd phase on	24:00	00:00	24:00	hh:mm
604	E	2nd phase off	24:00	00:00	24:00	hh:mm
605	E	3rd phase on	24:00	00:00	24:00	hh:mm
606	E	3rd phase off	24:00	00:00	24:00	hh:mm
616	E	Default values No ¦ Yes	No			-
Holidays heating circuit 1						
642	E	Start	--.--	01.01	31.12	dd.MM
643	E	End	--.--	01.01	31.12	dd.MM
648	E	Operating level Frost protection ¦ Reduced	frost protection			-
Holidays heating circuit 2						
652	E	Start	--.--	01.01	31.12	dd.MM
653	E	End	--.--	01.01	31.12	dd.MM
658	E	Operating level Frost protection ¦ Reduced	frost protection			-
Holidays heating circuit P						
662	E	Start	--.--	01.01	31.12	dd.MM
663	E	End	--.--	01.01	31.12	dd.MM
668	E	Operating level Frost protection ¦ Reduced	frost protection			-
Heating circuit 1						
710	E	Comfort setpoint	20.0	Operating line 712	Operating line 716	°C
712	E	Reduced setpoint	19	Operating line 714	Operating line 710	°C
714	E	Frost protection setpoint	10.0	4	Operating line 712	°C
716	F	Comfort setpoint max	35.0	Operating line 710	35	°C
720	E	Heating curve slope	0.8	0.10	4.00	-
721	F	Heating curve displacement	0.0	-4.5	4.5	°C
726	F	Heating curve adaptation Off ¦ On	Off.			-
730	E	Summer/winter heating limit	18	– – – / 8	30	°C
732	F	24-hour heating limit	-3	– – – / -10	10	°C
740	I	Flow temp setpoint min	8	8	Operating line 741	°C
741	I	Flow temp setpoint max	50	Operating line 740	95	°C
750	F	Room influence	20	– – – / 1	100	%
760	F	Room temp limitation	1	– – – / 0.5	4	°C
770	F	Boost heating	– – –	– – – / 0	20	°C
780	F	Quick setback Off ¦ Down to reduced setpoin ¦Down to frost prot setpoint	Down to reduced setpoint			-
790	F	Optimum start control max	0:00:00	00:00:00	00:06:00	h /min / s
791	F	Optimum stop control max	0:00:00	00:00:00	00:06:00	h /min / s
800	F	Reduced setp increase start	– – –	– – – / -30	10	°C
801	F	Reduced setp increase end	-15	-30	Operating line 800	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
820	F	Overtemp prot pump circuit Off ¦ On	Off.			-
830	F	Mixing valve boost	0	0	50	°C
832	F	Actuator type 2-position ¦ 3-position	3-position			-
833	F	Switching differential 2-pos	2	0	20	°C
834	F	Actuator running time	120	30	873	s
850	F	Floor curing function Off ¦ Functional heating ¦ Curing heating ¦ Functional/curing heating¦ Manually	Off.			-
851	F	Floor curing setp manually	25	0	95	°C
855	E	Floor curing setp current	0	0	95	°C
856	E	Floor curing day current	0	0	32	-
857	E	Floor curing days completed	0	0	32	-
861	F	Excess heat draw Off ¦ Heating mode ¦ Always	Always			-
870	F	With buffer No ¦ Yes	Yes			-
872	F	With primary contr / system pump No ¦ Yes	Yes			-
900	I	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			-
Cooling circuit 1						
901	E	Operating mode Off ¦ Automatic	Automatically			-
902	E	Comfort setpoint	24	15	40	°C
907	E	Release 24h/day ¦ Time progr HC ¦ Time program 5	24h/day			-
908	I	Flow setpoint at OT 25°C	20	8	35	°C
909	I	Flow setpoint at OT 35°C	16	8	35	°C
912	I	Cooling limit at OT	20	– – – / 8	35	°C
913	F	Lock time at end of heating	24	– – – / 8	100	h
918	F	Summer comp start at OT	26	20	50	°C
919	F	Summer comp end at OT	35	20	50	°C
920	F	Summer comp setp increase	4	– – – / 1	10	°C
923	F	Flow temp setp min at OT 25°C	18	6	35	°C
924	F	Flow temp setp min at OT 35°C	18	6	35	°C
928	F	Room influence	80	– – – / 1	100	°C
932	F	Room temp limitation	0.5	– – – / 0.5	4	°C
938	F	Mixing valve decrease	0	0	20	°C
939	F	Actuator type 2-position ¦ 3-position	3-position			-
940	F	Switching differential 2-pos	2	0	20	°C
941	F	Actuator running time	120	30	875	s
945	F	Mixing valve in heating mode Control ¦ Open	Open			-
946	F	Lock time dewpoint limiter	60	– – – / 10	600	min
947	F	Flow temp setp incr hygro	10	– – – / 1	20	°C
948	I	Flow setp incr start at r.h.	60	0	100	%
950	I	Flow temp diff dewpoint	2	– – – / 0	5	°C
962	F	With buffer No ¦ Yes	No			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
963	F	With prim contr/system pump No ¦ Yes	No			-
969	F	Optg mode changeover None ¦ Off ¦ Automatic	Off			-
Heating circuit 2						
1010	E	Comfort setpoint	20.0	Op line 1012	Operating line 1016	°C
1012	E	Reduced setpoint	16	Op line 1014	Operating line 1010	°C
1014	E	Frost protection setpoint	10.0	4	Operating line 1012	°C
1016	F	Comfort setpoint max	35.0	Op line 1010	35	°C
1020	E	Heating curve slope	1.50	0.10	4.00	-
1021	F	Heating curve displacement	0.0	-4.5	4.5	°C
1026	F	Heating curve adaption Off ¦ On	Off			-
1030	E	Summer/winter heating limit	18	– – – / 8	30	°C
1032	F	24-hour heating limit	-3	– – – / -10	10	°C
1040	I	Flow temp setpoint min	8	8	Operating line 1041	°C
1041	I	Flow temp setpoint max	80	Op line 1040	95	°C
1050	F	Room influence	20	– – – / 1	100	%
1060	F	Room temp limitation	1	– – – / 0.5	4	°C
1070	F	Boost heating	5	– – – / 0	20	°C
1080	F	Quick setback Off ¦ Down to reduced setpoint¦Down to frost prot setpoint	Down to reduced setpoint			-
1090	F	Optimum start control max	0:00:00	00:00:00	00:06:00	h /min / s
1091	F	Optimum stop control max	0:00:00	00:00:00	00:06:00	h /min / s
1100	F	Reduced setp increase start	– – –	– – – / -30	10	°C
1101	F	Reduced setp increase end	-15	-30	Operating line 1100	°C
1120	F	Overtemp prot pump circuit Off ¦ On	On			-
1130	F	Mixing valve boost	5	0	50	°C
1132	F	Actuator type 2-position ¦ 3-position	3-position			-
1133	F	Switching differential 2-pos	2	0	20	°C
1134	F	Actuator running time	120	30	873	s
1150	I	Floor curing function Off ¦ Functional heating ¦ Curing heating ¦ Functional/ curing heating¦ Curing/functional heating ¦ Manually	Off.			-
1151	E	Floor curing setp manually	25	0	95	°C
1155	E	Floor curing setp current	– – –	0	95	°C
1156	E	Floor curing day current	– – –	0	32	°C
1157	I	Floor curing days completed	0	0	32	-
1161	F	Excess heat draw Off ¦ Heating mode ¦ Always	Always			
1170	F	With buffer No ¦ Yes	Yes			-
1172	F	With prim contr/system pump No ¦ Yes	Yes			
1200	I	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			
Heating circuit P						
1300	E	Operating mode Protection ¦ Automatic ¦ Reduced ¦ Comfort	Automatically			-
1310	E	Comfort setpoint	20.0	Op line 1312	Operating line 1316	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
1312	E	Reduced setpoint	19	Op line 1314	Operating line 1310	°C
1314	E	Frost protection setpoint	10.0	4	Operating line 1312	°C
1316	F	Comfort setpoint max	35.0	Op line 1310	35	°C
1320	E	Heating curve slope	0.8	0.10	4.00	-
1321	F	Heating curve displacement	0.0	-4.5	4.5	°C
1326	F	Heating curve adaptation Off ¦ On	Off.			-
1330	E	Summer/winter heating limit	18	– – – / 8	30	°C
1332	F	24-hour heating limit	-3	– – – / -10	10	°C
1340	I	Flow temp setpoint min	8	8	Operating line 1341	°C
1341	I	Flow temp setpoint max	50	Op line 1340	95	°C
1350	F	Room influence	20	– – – / 1	100	%
1360	F	Room temp limitation	1	– – – / 0.5	4	°C
1370	F	Boost heating	– – –	– – – / 0	20	°C
1380	F	Quick setback Off ¦ Down to reduced setpoint¦Down to frost prot setpoint	Down to reduced setpoint			-
1390	F	Optimum start control max	0:00:00	00:00:00	00:06:00	h /min / s
1391	F	Optimum stop control max	0:00:00	00:00:00	00:06:00	h /min / s
1400	F	Reduced setp increase start	– – –	– – – / -30	10	°C
1401	F	Reduced setp increase end	-15	-30	Operating line 1400	°C
1420	F	Overtemp prot pump circuit Off ¦ On	Off.			-
1450	F	Floor curing function Off ¦ Functional heating ¦ Curing heating ¦ Functional/curing heating¦ Manually	Off.			-
1451	F	Floor curing setp manually	25	0	95	°C
1455	E	Floor curing setp current	0	0	95	°C
1456	E	Floor curing day current	0	0	32	-
1457	I	Floor curing days completed	0	0	32	-
1461	F	Excess heat draw Off ¦ Heating mode ¦ Always	Always			-
1470	F	With buffer No ¦ Yes	Yes			-
1472	F	With primary contr / system pump No ¦ Yes	Yes			-
1500	I	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			-
Domestic hot water						
1610	E	Nominal setpoint	50	Op line 1612	TempBwMax	°C
1612	E	Reduced setpoint	40	8	Operating line 1610	°C
1620	I	Release 24h/day ¦ Time programs HCs ¦ Time program 4 / DHW	Time program 4 / DHW			-
1630	I	Charging priority Absolute ¦ Shifting ¦ None ¦ MC shifting, PC absolute	Absolute			-
1640	F	Legionella function Off ¦ Periodically ¦ Fixed weekday	Off			-
1641	F	Legionella funct periodically	3	1	7	Days
1642	F	Legionella funct weekday Monday ¦ Tuesday ¦ Wednesday ¦ Thursday ¦ Friday ¦ Saturday ¦ Sunday				-
1644	F	Legionella func time	– – –	– – – / 00:00	23:50	hh:mm
1645	F	Legionella func setpoint	65	55	95	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
1646	F	Legionella funct duration	– – –	– – – / 10	360	min
1647	F	Legionella funct circ pump Off ¦ On	On.			-
1660	F	Circulating pump release Time program 3 / HCP ¦ DHW release ¦ Time program 4 / DHW ¦ Time program 5	Time program 3 / HCP			-
1661	F	Circulating pump cycling Off ¦ On	On			-
1663	F	Circulation setpoint	45	8	80	°C
Pump Hx						
2010	F	H1 Excess heat draw Off ¦ On*	On			-
2012	F	H1 with buffer No ¦ Yes*	Yes			-
2014	F	H1 prim contr/system pump No ¦ Yes*	Yes			-
2015	F	H1 Refrigeration request 2-pipe system* ¦ 4-pipe system	2-pipe system			-
2035	F	H2 Excess heat draw Off ¦ On*	On.			-
2037	F	H2 with buffer No ¦ Yes*	Yes			-
2039	F	H2 prim contr/system pump No ¦ Yes*	Yes			-
2040	F	H2 Refrigeration request 2-pipe system* ¦ 4-pipe system	2-pipe system			-
2046	F	H3 Excess heat draw Off ¦ On*	On			-
2048	F	H3 with buffer No ¦ Yes*	Yes			-
2050	F	H2 prim contr/system pump No ¦ Yes*	Yes			-
2051	F	H3 Refrigeration request 2-pipe system ¦ 4-pipe-system	2-pipe system			-
Swimming pool						
2055	E	Setpoint solar heating	26	8	80	°C
2056	E	Setpoint source heating	22	8	80	°C
2065	F	Charging priority solar No ¦ Yes	No			-
2080	F	With solar integration No ¦ Yes	Yes			-
Primary controller / system pump						
2150	I	Prim contr/system pump Before buffer st tank ¦ After buffer st tank	After buffer st tank			-
Heat pump						
2800	F	Frost protection cond pump Off ¦ On	Off.			-
2801	I	Control cond pump Automatically ¦ Temp request ¦ Parallel compr operation	Parallel compr operation			-
2802	I	Prerun time cond pump	5	0	240	s
2803	I	Overrun time cond pump	5	0	240	s
2815	F	Source temp min water	2	– – – / -20	30	°C
2816	F	Source temp min brine	-5	– – – / -30	50	°C
2817	F	Switching diff source prot	3	1	10	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
2818	F	Increase source prot temp	2	0	10	°C
2819	I	Prerun time source	15	0	240	s
2820	I	Overrun time source	5	0	240	s
2821	F	Source startup time max	5	1	10	min
2822	F	Time limit source temp min	4	1	24	h
2840	I	Switching diff return temp	4	1	20	°C
2841	F	Keep compr run time min No ¦ Yes	No			-
2842	I	Compressor run time min	20	0	120	min
2843	I	Compressor off time min	20	0	120	min
2844	F	Switch-off temp max	55	8	100	°C
2845	F	Red switch-off temp max	2	0	20	°C
2852	F	LP delay on startup	5	0	120	s
2860	F	Lock stage 2 with DHW Off ¦ On	Off			-
2861	F	Release stage 2 below OT	5	– – – / -30	30	°C
2862	F	Locking time stage 2	10	0	40	min
2863	F	Release integral stage 2	250	0	500	°C*min
2864	F	Reset integral stage 2	10	0	500	°C*min
2865	F	Compr sequence changeover	100	– – – / 10	1000	h
2880	I	Use electric flow Substitute ¦ Complement HP operation	Substitute		2	-
2881	I	Locking time electric flow	30	0	255	min
2882	I	Release integr electric flow	250	0	500	°C*min
2883	I	Reset integr electric flow	10	0	500	°C*min
2884	I	Release el flow below OT	0	-30	30	°C
2886	F	Compensation heat deficit Off ¦ On ¦ Only with floor curing fct	On			-
2893	F	Number DHW charg attempts	1	1	10	-
2894	F	Delay 3-ph current error	3	1	40	S
2895	F	Delay flow switch	0	0	10	S
2910	F	Release above OT	- - -	- - - / -30	30	°C
2911	F	For forced buffer charging Locked ¦ Released	Released			-
2912	F	Full charging buffer Off ¦ On	On			-
2951	I	Defrost release below OT	7	5	20	°C
2958	I	Numb defrost attempts max	3	0	10	-
2962	I	Duration defrost lock	30	0	100	min
2963	I	Time up to forced defrost	120	60	600	min
2964	I	Defrost time max	10	1	42	min
2965	I	Dripping time evapor	2	0	10	min
3000	I	Switch-off temp max cooling	40	20	60	°C
3002	F	Source temp min cool mode	2	-20	30	°C
3004	F	SD ch'over cooling pas/act	5	1	10	°C
3006	F	During compressor operation Passive cooling off ¦ Passive cooling on	Passive cooling on		1	-
3007	F	In passive cooling mode Condenser pump off ¦ Condenser pump on	Condenser pump off		1	-
3008	F	Temp diff cond cooling mode	5	0	20	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
Cascade						
3533	F	Switch-on delay	5	0	120	min
3540	F	Auto source seq ch'over	500	– – – / 10	990	h
3541	F	Auto source seq exclusion None ¦ First ¦ Last ¦ First and last	None			
Solar						
3810	F	Temp diff on	8	Op line 3811	40	°C
3811	F	Temp diff off	4	0	Operating line 3812	°C
3812	F	Charg temp min DHW st tank	– – –	– – – / 8	95	°C
3815	F	Charging temp min buffer	– – –	– – – / 8	95	°C
3818	F	Charging temp min swi pool	– – –	– – – / 8	95	°C
3822	F	Charging prio storage tank None ¦ DHW storage tank ¦ Buffer	DHW storage tank			-
3825	F	Charging time relative prio	– – –	– – – / 2	60	min
3826	F	Waiting time relative prio	5	1	40	min
3827	F	Waiting time parallel op	– – –	– – – / 0	40	min
3828	F	Delay secondary pump	60	0	600	s
3831	F	Min run time collector pump	20	5	120	s
3834	F	Collector start funct grad	– – –	– – – / 1	20	Min/°C
3840	F	Collector frost protection	– – –	– – – / -20	5	°C
3850	F	Collector overtemp prot	– – –	– – – / 30	350	°C
3860	F	Evaporation heat carrier	– – –	– – – / 60	350	°C
3870	F	Pump speed min	40	0	100	%
3871	F	Pump speed max	100	0	100	%
3880	F	Antifreeze None ¦ Ethylen glycol ¦ Propylene glycol ¦ Etyl and propyl glycol	None			-
3881	F	Antifreeze concentration	30	1	100	%
3884	F	Pump capacity	200	10	1500	l/h
Buffer storage tank						
4708	F	Forced charging setp cooling	– – –	6	35	°C
4709	I	Forced charg setp heat min	40	20	80	°C
4710	I	Forced charg setp heat max	50	20	80	°C
4711	I	Forced charging time	– – –	– – – / 00:00	23:50	hh:mm
4712	I	Forced charg duration max	4	1	20	h
4720	F	Auto generation lock None ¦ With B4 ¦ With B4 and B42/B41	With B4			-
4722	F	Temp diff buffer/HC	0	-20	20	°C
4739	F	Stratification protection Off ¦ Always	Off			-
4750	F	Charging temp max	80	8	95	°C
4755	F	Recooling temp	60	8	95	°C
4756	F	Recooling DHW/HCs Off ¦ On	Off			-
4757	F	Recooling collector Off ¦ Summer ¦ Always	Off			-
4760	F	Charg sensor el imm heater With B4 ¦ With B42/B41	With B4			-
4761	F	Forced charging electric No ¦ Yes	No			-
4783	F	With solar integration No ¦ Yes	No			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
DHW storage tank						
5020	F	Flow setpoint boost	0	0	30	°C
5021	F	Transfer boost	8	0	30	°C
5022	F	Type of charging With B3 ¦ With B3/B31 ¦ With B3, legio B3/B31	With B3/B31			
5024	F	Switching diff	5	0	20	°C
5030	F	Charging time limitation	240	– – – / 10	600	min
5050	F	Charging temp max	80	8	BZ 5051 OEM	°C
5055	F	Recooling temp	80	8	95	°C
5056	F	Recooling heat gen/HC Off ¦ On	Off			-
5057	F	Recooling collector Off ¦ Summer ¦ Always	Off			-
5060	F	El imm heater optg mode Substitute ¦ Summer ¦ Always	Substitute			-
5061	F	El immersion heater release 24h/day ¦ DHW release¦ Time program4/ DHW	DHW release			-
5085	F	Excess heat draw Off ¦ On	On			-
5090	F	With buffer No ¦ Yes	No			-
5092	F	With prim contr/system pump No ¦ Yes	No			-
5093	F	With solar integration No ¦ Yes	Yes			-
5101	F	Pump speed min	40	00	100	%
5102	F	Pump speed max	100	0	100	%
Instantaneous DHW heater						
5406	F	Min setp diff to tank temp	4	0	20	°C
5530	F	Pump speed min	20	0	100	%
5545	F	Mixing valve Xp	20	1	200	°C
Configuration						
5700	I	Presetting	– – –	– – – / 1	24	-
5710	I	Heating circuit 1 Off ¦ On	On			-
5711	I	Cooling circuit 1 Off ¦ 4-pipe system ¦ 2-pipe system	Off			
5712	I	Use of mixing valve 1 None ¦ Heating ¦ Cooling ¦ Heating and Cooling	Heating and cooling			
5715	I	Heating circuit 2 Off ¦ On	Off			-
5731	I	DHW control element Q3 None ¦ Charging pump ¦ Diverting valve	Charging pump			-
5736	I	Separate circuit Off ¦ On	Off			-
5800	I	Heat source Brine ¦ Water ¦ Air ¦ External	Brine			-
5807	I	Refrigeration Off ¦ 4-pipe system ¦ 2-pipe system	Off			-
5810	I	Differential HC at OT -10°C	7	0	20	°C
5840	I	Solar controlling element Charging pump ¦ Diverting valve	Charging pump			-
5841	I	External solar exchanger Jointly ¦ DHW storage tank ¦ Buffer	Jointly			-
5890	I	Relay output QX1 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦	None			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
		Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13				
5891	I	Relay output QX2 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦ Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
5892	I	Relay output QX3 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦ Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
5894	I	Relay output QX4 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦ Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
5895	I	Relay output QX5 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦ Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
5896	I	Relay output QX6 None ¦ Compressor 2 K2 ¦ Process revers valve Y22 ¦ Hot-gas temp K31 ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
5909	I	Function output QX4-Mod None ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW intern circ pump Q33 ¦ Instant DHW heater Q34 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump buffer K8 ¦ Solar pump ext exch K9 ¦ Solar pump swi pool K18 ¦ Heat circ pump HC1 Q2 ¦ Heat circ pump HC2 Q6 ¦ Heat circ pump HCP Q20	None			-
5930	I	Sensor input BX1 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31* ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70 ¦ Special temp sensor 1 ¦ Special temp sensor 2	None			-
5931	I	Sensor input BX2 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31* ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70 ¦ Special temp sensor 1 ¦ Special temp sensor 2	None			-
5932	I	Sensor input BX3 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31* ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦	None			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
		Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70 ¦ Special temp sensor 1 ¦ Special temp sensor 2				
5933	I	Sensor input BX4 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31* ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70 ¦ Special temp sensor 1 ¦ Special temp sensor 2	None			-
5934	I	Sensor input BX5 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31* ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70 ¦ Special temp sensor 1 ¦ Special temp sensor 2	None			-
5950	I	Function input H1 None ¦ Optg mode change HCs+DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HCP ¦ Error/alarm message ¦ Min flow temp setpoint ¦ Heat request 10V ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Refrigeration request ¦ Refrigeration request 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Release swimming pool ¦ Swi-on command HP stage 1 ¦ Swi-on command HP stage 2	Optg mode changeover HCs+DHW			-
5951	I	Contact type H1 NC ¦ NO*				-
5952	I	Function value, contact type H1	30	0	130	°C
5953	I	Voltage value 1 H1	0	0	10	V
5954	I	Function value 1 H1	0	-100	500	-
5955	I	Voltage value 2 H1	10	0	10	V
5956	I	Function value 2 H1	10	-100	500	-
5960	I	Function input H3 None ¦ Optg mode change HCs+DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HCP ¦ Error/alarm message ¦ Min flow temp setpoint ¦ Heat request 10V ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Refrigeration request ¦ Refrigeration request 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Release swimming pool ¦ Swi-on command HP stage 1 ¦ Swi-on command HP stage 2	Optg mode change HCs+DHW			-
5961	I	Contact type H3 NC ¦ NO	NO			-
5962	I	Function value contact H3	30	0	130	°C
5963	I	Voltage value 1 H3	0	0	10	V
5964	I	Function value 1 H3	0	-100	500	-
5965	I	Voltage value 2 H3	10	0	10	V
5966	I	Function value 2 H3	10	-100	500	-
5980	I	Function input EX1	Electrical utility lock E6			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
		None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25				
5982	I	Function input EX2 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25	Low-tariff			-
5984	I	Function input EX3 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25	Source overload E14			-
5986	I	Function input EX4 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25	Pressure switch source E26			-
5988	I	Function input EX5 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25 ¦ 3-phase current	Flow switch source E15			-
5990	I	Function input EX6 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25 ¦ 3-phase current	Flow switch consumers E24			-
5992	I	Function input EX7 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Compressor 2 overload E12 ¦ Source overload E14 ¦ Pressure switch source E26 ¦ Flow switch source E15 ¦ Flow switch consumers E24 ¦ Manual defrost E17 ¦ Common fault HP E20 ¦ Fault soft starter E25 ¦ 3-phase current	None			-
6014	I	Function mixing group 1 None ¦ Heating circ/cooling circ 1 ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Prim contr/system pump ¦ DHW primary controller ¦ Instantaneous DHW heater	Heating circuit 1			-
6020	I	Function extension module 1 None ¦ Multifunctional ¦ Cooling circuit 1 ¦ Cooling circuit 2 ¦ Solar DHW ¦ Prim contr/system pump ¦ DHW primary controller ¦ Instantaneous DHW heater	None			-
6021	I	Function extension module 2 None ¦ Multifunctional ¦ Cooling circuit 1 ¦ Cooling circuit 2 ¦ Solar DHW ¦ Prim contr/system pump ¦ DHW primary controller ¦ Instantaneous DHW heater	None			-
6030	I	Relay output QX21 None ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1	None			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
		pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13				
6031	I	Relay output QX22 None ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
6032	I	Relay output QX23 None ¦ El imm heater 1 flow K25 ¦ El imm heater 2 flow K26 ¦ Div valve cool source Y28 ¦ System pump Q14 ¦ Cascade pump Q25 ¦ Heat gen shutoff valve Y4 ¦ El imm heater DHW K6 ¦ Circulating pump Q4 ¦ St tank transfer pump Q11 ¦ DHW intern circ pump Q33 ¦ DHW mixing pump Q35 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump ext exch K9 ¦ Solar ctrl elem buffer K8 ¦ Solar ctrl elem swi pool K18 ¦ El imm heater buffer K16 ¦ H1 pump Q15 ¦ H2 pump Q18 ¦ H3 pump Q19 ¦ Heat circuit pump HCP Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HCP Q23 ¦ Diverting valve cooling Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13	None			-
6040	I	Sensor input BX21 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70¦Special temp sensor 1¦Special temp sensor 2	None			-
6041	I	Sensor input BX21 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ Hot-gas sensor B82 ¦ Refrig sensor liquid B83 ¦ DHW charging sensor B36 ¦ DHW outlet sensor B38 ¦ DHW circulation sensor B39 ¦ Swimming pool sensor B13 ¦ Collector sensor 2 B61 ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ Buffer sensor B42 ¦ Common flow sensor B10 ¦ Cascade return sensor B70¦Special temp sensor 1¦Special temp sensor 2	None			-
6046	I	Function of input H2 None ¦ Optg mode change HCs+DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HCP ¦ Error/alarm message ¦ Min flow temp setpoint ¦ Heat request 10V ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Refrigeration request ¦ Refrigeration request 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Release swimming pool ¦ Swi-on command HP stage 1 ¦ Swi-on command HP stage 2	Optg mode change HCs+DHW			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
6047	I	Contact type H2 NC ¦ NO	NO			-
6048	I	Function value, contact H2	30	0	130	°C
6049	I	Voltage value 1 H2	0	0	10	V
6050	I	Function value 1 H2	0	-100	500	-
6051	I	Voltage value 2 H2	10	0	10	V
6052	I	Function value 2 H2	10	-100	500	-
6070	I	Function output UX None ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW intern circ pump Q33 ¦ Instant DHW heater Q34 ¦ Collector pump Q5 ¦ Collector pump 2 Q16 ¦ Solar pump buffer K8 ¦ Solar pump ext exch K9 ¦ Solar pump swi pool K18 ¦ Heat circ pump HC1 Q2 ¦ Heat circ pump HC2 Q6 ¦ Heat circ pump HCP Q20 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ HP modulating	None			-
6071	I	Signal logic output UX Standard ¦ Inverted	Standard			-
6072	I	Signal output UX 0..10V ¦ PWM	0..10V			-
6075	I	Temperature value 10V UX	100	5	130	°C
6097	F	Sensor type collector NTC* ¦ Pt 1000	1	1	2	-
6098	F	Readjustm collector sensor	0	-20	20	°C
6099	F	Readjustm coll sensor 2	0	-20	20	°C
6100	F	Readjustm outside sensor	0.0	-3.0	3.0	°C
6110	F	Time constant building	20	0	50	h
6120	F	Frost protection plant Off ¦ On	On			-
6135	F	Air dehumidifier Off ¦ On	Off			-
6136	F	Release air dehumidifier 24h/day ¦ Time progr. heating circuit ¦ Time program 5	24h/day			-
6137	F	Air dehumidifier r.h. on	55	0	100	%
6138	F	Air dehumidifier r.h. SD	5	2	50	%
6200	F	Save sensors No ¦ Yes	No			-
6201	F	Reset sensors No ¦ Yes	No			-
6204	F	Save parameters No ¦ Yes	No			-
6205	F	Reset to default parameters No ¦ Yes	No			-
6212	I	Check no. heat source 1	-	0	199999	-
6213	I	Check no. heat source 2	-	0	199999	-
6215	I	Check no. storage tank	-	0	199999	-
6217	I	Check no. heating circuits	-	0	199999	-
6220	I	Software version	-	0	99.9	-
LPB system						
6600	I	Device address	1	0	16	-
6601	F	Segment address	0	0	14	-
6604	F	Bus power supply function Off ¦ Automatically	Automatic			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
6605	F	Bus power supply state Off ¦ On	On			-
6620	F	Action changeover functions Segment ¦ System	System			-
6621	F	Summer changeover Locally¦ Centrally	Locally			-
6623	F	Optg mode changeover Locally ¦ Centrally	Centrally			-
6625	F	DHW assignment Local HCs ¦ All HCs in segment ¦ All HCs in system	All HCs in system			-
6627	F	Refrigeration request Locally ¦ Centrally	Centrally			
6640	I	Clock mode Autonomously ¦ Slave without remote setting ¦ Slave with remote setting ¦ Master	Autonomously			-
6650	F	Outside temp source	0	0	239	-
Errors						
6710	I	Reset alarm relay No ¦ Yes	No			-
6711	I	Reset HP No ¦ Yes	No			-
6740	F	Flow temp 1 alarm	– – –	– – – / 10	240	min
6741	F	Flow temp 2 alarm	– – –	– – – / 10	240	min
6745	F	DHW charging alarm	– – –	– – – / 1	48	h
6746	F	Flow temp cooling 1 alarm	– – –	– – – / 10	240	min
6800	F	History 1	-			
6801	F	Error code 1	-	0	255	-
6802	F	History 2	-			
6803	F	Error code 2	-	0	255	-
6804	F	History 3	-			
6805	F	Error code 3	-	0	255	-
6806	F	History 4	-			
6807	F	Error code 4	-	0	255	-
6808	F	History 5	-			
6809	F	Error code 5	-	0	255	-
6810	F	History 6	-			
6811	F	Error code 6	-	0	255	-
6812	F	History 7	-			
6813	F	Error code 7	-	0	255	-
6814	F	History 8	-			
6815	F	Error code 8	-	0	255	-
6816	F	History 9	-			
6817	F	Error code 9	-	0	255	-
6818	F	History 10	-			
6819	F	Error code 10	-	0	255	-
Service / special operation						
7070	I	HP interval	– – –	– – – / 1	240	months
7071	I	HP time since maint	0	0	240	months
7072	I	Max starts compr1/hrs run	– – –	– – – / 0.1	12.0	-
7073	I	Cur starts compr1/hrs run	0	0	12.0	-
7074	I	Max starts compr2/hrs run	– – –	– – – / 0.1	12.0	-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
7075	I	Cur starts compr2/hrs run	0	0	12.0	-
7076	I	Diff condens max/week	– – –	– – – / 1	250	-
7077	I	Cur diff condens max/week	0	0	250	-
7078	I	Diff condens min/week	– – –	– – – / 1	250	-
7079	I	Cur diff condens min/week	0	0	250	-
7080	I	Diff evap max/week	– – –	– – – / 1	250	-
7081	I	Cur diff evap max/week	0	0	250	-
7082	I	Diff evap min/week	– – –	– – – / 1	250	-
7083	I	Cur diff evap min/week	0	0	250	-
7090	I	DHW storage tank interval	– – –	– – – / 1	240	months
7091	I	DHW stor tank since maint	0	0	240	months
7092	I	DHW charg temp HP min	40	8	80	°C
7093	I	Curr DHW charg temp HP	-	8	80	°C
7119	F	Economy function Locked ¦ Released	Locked			-
7120	E	Economy mode Off ¦ On	Off			-
7141	E	Emergency operation Off ¦ On	Off			-
7142	F	Emergency op function type Manually ¦ Automatically	Manually			-
7150	I	Simulation outside temp	– – –	– – – / -50	50	°C
7152	I	Triggering defrost No ¦ Yes	No			-
7160	F	Reset limitation No ¦ Yes	No			-
7181	I	Phone no. responsibility 1		0	16	digits
7183	I	Phone no. responsibility 2		0	16	digits
Input / output test						
7700	I	Relay test No test ¦ Everything off ¦ Source pump Q8/fan K19 ¦ Compressor 1 K1 ¦ Condenser pump Q9 ¦ DHW pump Q3 ¦ Heating circuit pump Q2¦ Heat circ mix valve op Y1¦ Heat circ mix valve cl Y2 ¦ Relay output QX23 module 1 ¦ Relay output QX21 module 1 ¦ Relay output QX22 module 1 ¦ Relay output QX1 ¦ Relay output QX2 ¦ Relay output QX3 ¦ Relay output QX4 ¦ Relay output QX5 ¦ Relay output QX6 ¦ Relay output QX23 module 2 ¦ Relay output QX21 module 2 ¦ Relay output QX22 module 2	No test			-
7710	I	Output test UX	– – –	– – – / 0	100	%
7711	I	Voltage signal UX	-	0.0	10.0	Volt
7714	I	PWM signal P1	-	0	100	%
7730	I	Outside temp B9	-	-50.0	50.0	°C
7732	I	Flow temp B1	-	0.0	140.0	°C
7750	I	DHW temp B3	-	0.0	140.0	°C
7770	I	Flow temp HP B21	-	0.0	140.0	°C
7771	I	Return temp HP B71	-	0.0	140.0	°C
7772	I	Hot-gas temp B81	-	0.0	180.0	°C
7775	I	Source inlet temp B91	-	-50.0	50.0	°C
7777	I	Sensor temp B92, B84	-	-50.0	50.0	°C
7820	I	Sensor temp BX1	-	-28	350	°C
7821	I	Sensor temp BX2	-	-28	350	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
7822	I	Sensor temp BX3	-	-28	350	°C
7823	I	Sensor temp BX4	-	-28	350	°C
7824	I	Sensor temp BX3	-	-28	350	°C
7830	I	Sensor temp BX21 module 1	-	-28	350	°C
7831	I	Sensor temp BX22 module 1	-	-28	350	°C
7832	I	Sensor temp BX21 module 2	-	-28	350	°C
7833	I	Sensor temp BX22 module 2	-	-28	350	°C
7840	I	Voltage signal H1	-	0.0	10.0	Volt
7841	I	Contact state H1 Open ¦ Closed	-	0	1	-
7845	I	Voltage signal H2	-	0.0	10.0	Volt
7846	I	Contact state H2 Open ¦ Closed	-	0	1	-
7854	I	Voltage signal H3	-	0.0	10.0	Volt
7855	I	Contact state H3 Open ¦ Closed	-	0	1	-
7889	I	Low-pressure switch E9 0V ¦ 230V	-	0	1	-
7890	I	High-pressure switch E10 0V ¦ 230V	-	0	1	-
7891	I	Compressor 1 overload E11 0V ¦ 230V	-	0	1	-
7911	I	Input EX1 0V ¦ 230V	-	0	1	-
7912	I	Input EX2 0V ¦ 230V	-	0	1	-
7913	I	Input EX3 0V ¦ 230V	-	0	1	-
7914	I	Input EX4 0V ¦ 230V	-	0	1	-
7915	I	Input EX5 0V ¦ 230V	-	0	1	-
7916	I	Input EX6 0V ¦ 230V	-	0	1	-
7917	I	Input EX7 0V ¦ 230V	-	0	1	-
State						
8000	I	State heating circuit 1	-	0	255	-
8001	I	State heating circuit 2	-	0	255	-
8002	I	State heating circuit P	-	0	255	-
8003	I	State DHW	-	0	255	-
8004	I	State cooling circuit 1	-	0	255	-
8006	I	State heat pump	-	0	255	-
8007	I	State solar	-	0	255	-
8010	I	State buffer	-	0	255	-
8011	I	State swimming pool	-	0	255	-
8050	I	History 1	-			
8051	I	State code 1	-	0	255	-
8052	I	History 2	-			
8053	I	State code 2	-	0	255	-
8054	I	History 3	-			
8055	I	State code 3	-	0	255	-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
8056	I	History 4	-			
8057	I	State code 4	-	0	255	-
8058	I	History 5	-			
8059	I	State code 5	-	0	255	-
8060	I	History 6	-			
8061	I	State code 6	-	0	255	-
8062	I	History 7	-			
8063	I	State code 7	-	0	255	-
8064	I	History 8	-			
8065	I	State code 8	-	0	255	-
8066	I	History 9	-			
8067	I	State code 9	-	0	255	-
8068	I	History 10	-			
8069	I	State code 10	-	0	255	-
Diagnostics cascade						
8100 to 8130	I	Priority source 1…16	-	0	16	
8101 to 8131	I	State source 1...16 Missing ¦ Faulty ¦ Manual control active ¦ Heat generation lock active ¦ Chimney sweep funct active ¦ Separate DHW circuit active ¦ Ouside temp limit active ¦ Not released ¦ Released	Missing			
8138	I	Cascade flow temp	-	0.0	140.0	°C
8139	I	Cascade flow temp setp	-	0.0	140.0	°C
8140	I	Cascade return temp	-	0.0	140.0	°C
8141	I	Cascade return temp setp	-	0.0	140.0	°C
8150	I	Source seq ch'over current	-	0	990	h
Diagnostics heat source						
8400	I	Compressor 1 K1 Off ¦ On	-	0	1	-
8401	I	Compressor 2 K2 Off ¦ On	-	0	1	-
8402	I	El imm heater 1 flow Off ¦ On	-	0	1	-
8403	I	El imm heater 2 flow Off ¦ On	-	0	1	-
8404	I	Source pump Q8 Off ¦ On	-	0	1	-
8405	I	Speed of source pump Off ¦ On	-	0	100	%
8406	I	Condenser pump Q9 Off ¦ On	-	0	1	-
8410	E	Return temp HP	-	0.0	140.0	°C
8411	E	Setpoint HP	-	0.0	140.0	°C
8412	E	Flow temp HP	-	0.0	140.0	°C
8413	E	Compressor modulation	-	0	100	%
8415	I	Hot-gas temp 1	-	0.0	180.0	°C
8416	F	Hot-gas temp max	-	0.0	180.0	°C
8417	I	Hot-gas temp 2	-	0.0	180.0	°C
8418	I	Hot-gas temp max	-	0.0	180.0	°C
8420	I	Refrig temp liquid	-	0.0	140.0	°C
8425	I	Temp diff condenser	-	-50.0	140.0	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
8426	I	Temp diff evaporator	-	-50.0	140.0	°C
8427	E	Source inlet temp	-	-50.0	50.0	°C
8428	I	Source inlet temp min	-	-50.0	50.0	°C
8429	E	Source outlet temp	-	-50.0	50.0	°C
8430	I	Source outlet temp min	-	-50.0	50.0	°C
8440	I	Remain stage 1 off time min	---	(0) 1	255	min
8441	I	Remain stage 2 off time min	---	(0) 1	255	min
8442	I	Remain stage 1 on time min	---	(0) 1	255	min
8443	I	Remain stage 2 on time min	---	(0) 1	255	min
8444	I	Remain limit source temp min	---	(0) 1	65535	min
8446	I	Compressor sequence 1-2 ¦ 2-1	---	0	1	-
8450	F	Hours run compressor 1	0	0	65535	h
8451	F	Start counter compressor 1	0	0	199'999	-
8452	F	Hours run compressor 2	0	0	65535	h
8453	F	Start counter compressor 2	0	0	199'999	-
8454	F	Locking time HP	0	0	65535	h
8455	F	Counter number of locks HP	0	0	65535	-
8456	F	Hours run el flow	0	0	65535	h
8457	F	Start counter el flow	0	0	65535	-
8469	F	Fan speed	*	0	100	%
8470	I	Fan K19 Off ¦ On	Off			-
8471	I	Process revers valve Off ¦ On	Off			-
8475	I	Evaporator temp	0	-50	50	°C
8477	I	Temp diff defrost act value	0	-50	50	°C
8478	I	Temp diff defrost setpoint	0	-50	50	°C
8480	I	Remain time defrost lock	0	0	255	min
8481	I	Remain time forced defrost	00:00	00:00	07:00	h/min
8485	I	Number defrost attempts	0	0	10	-
8505	F	Speed collector pump 1	0	0	100	%
8506	F	Speed solar pump ext exch	0	0	100	%
8507	F	Speed solar pump buffer	0	0	100	%
8508	F	Speed solar pump swi pool	0	0	100	%
8510	I	Collector temp 1	-	-28	350	°C
8511	I	Collector temp 1 max	200	-28	350	°C
8512	I	Collector temp 1 min	-28	-28	350	°C
8513	I	dT collector 1/DHW	0	-28	350	°C
8514	I	dT collector 1/buffer	0	-168	350	°C
8515	I	dt collector 1/swimming pool	0	-168	350	°C
8519	I	Solar flow temp	0	-28	350	°C
8520	I	Solar return temp	0	-28	350	°C
8526	I	24-hour yield solar energy	0	0	999.9	kWh
8527	I	Total yield solar energy	0	0	9999999.9	kWh
8530	F	Hours run solar yield	00:00	00:00	65535	h
8531	F	Hours run collect overtemp	00:00	00:00	65535	h
8543	F	Speed collector pump 2	0	0	100	%
8547	I	Collector temp 2	0	-28	350	°C

Operating line	operating level	Function	Default value	Minimum	Max	Unit
8548	I	Collector temp 2 max	-28	-28	350	°C
8549	I	Collector temp 2 min	350	-28	350	°C
8550	I	dT collector 2/DHW	0	-168	350	°C
8551	I	dT collector 2/buffer	0	-168	350	°C
8552	I	dt collector 2/swimming pool	0	-168	350	°C
Diagnostics consumers						
8700	E	Outside temp	-	-50.0	50.0	°C
8701	E	Outside temp min	-	-50.0	50.0	°C
8702	E	Outside temp max	-	-50.0	50.0	°C
8703	I	Outside temp attenuated	-	-50.0	50.0	°C
8704	I	Outside temp composite	-	-50.0	50.0	°C
8720	I	Rel room humidity	-	0	100	%
8721	I	Room temp	-	0	50	°C
8722	I	Dewpoint temp 1	-	0	50	°C
8730	I	Heating circuit pump Q2 Off ¦ On	Off			-
8731	I	Heat circ mix valve op Y1 Off ¦ On	Off			-
8732	I	Heat circ mix valve cl Y2 Off ¦ On	Off			-
8735	F	Speed heating circuit pump 1	-	0	100	%
8740	E	Room temp 1	-	0.0	50.0	°C
8741	E	Room setpoint 1	20	4.0	35.0	°C
8743	E	Flow temp 1	-	0.0	140.0	°C
8744	E	Flow temp setpoint 1	-	0.0	140.0	°C
8751	I	Cooling circuit pump 1	-	0	1	-
8752	I	Cool circ mix valve 1 open	-	0	1	-
8753	I	Cool circ mix valve 1 closed	-	0	1	-
8754	I	Diverting valve cooling 1	-	0	1	-
8756	E	Flow temp cooling 1	-	0	140	°C
8757	E	Flow temp setp cooling 1	-	0	140	°C
8760	I	Heating circuit pump Q6 Off ¦ On	Off.			-
8761	I	Heat circ mix valve op Y5 Off ¦ On	Off.			-
8762	I	Heat circ mix valve cl Y6 Off ¦ On	Off.			-
8765	F	Speed heating circuit pump 2	-	0	100	%
8770	E	Room temp 2	-	0.0	50.0	°C
8771	E	Room setpoint 2	20	4.0	35.0	°C
8773	E	Flow temp 2	-	0.0	140.0	°C
8774	E	Flow temp setpoint 2	-	0.0	140.0	°C
8795	F	Speed heating circuit pump B	-	0	100	%
8800	E	Room temp P	-	0.0	50.0	°C
8801	E	Room setpoint P	20	4.0	35.0	°C
8803	E	Flow temp setpoint P	-	0.0	140.0	°C
8820	I	DHW pump Q3 Off ¦ On	Off			-
8821	I	El imm heater DHW K6 Off ¦ On	Off			-
8825	F	Speed DHW pump	-	0	100	%

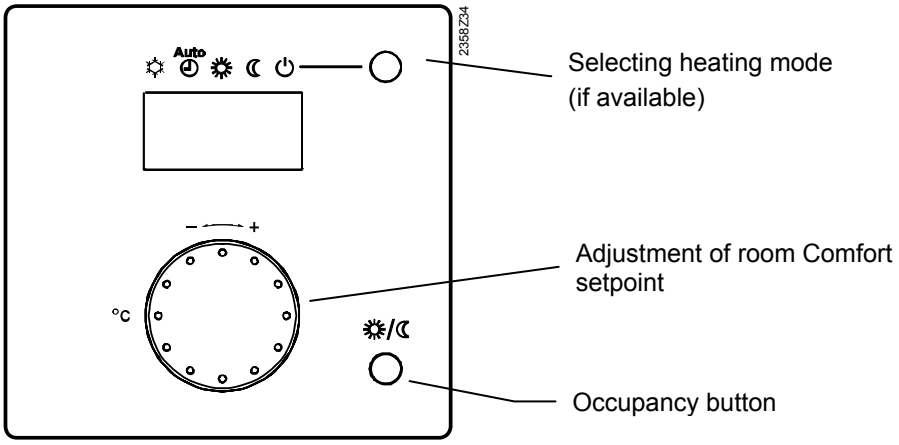
Operating line	operating level	Function	Default value	Minimum	Max	Unit
8826	F	Speed DHW interm circ pump	-	0	100	%
8827	F	Speed inst DHW heater pump	-	0	100	%
8830	E	DHW temp 1	-	0.0	140.0	°C
8831	E	DHW temp setpoint	55	8.0	80.0	°C
8832	I	DHW temp 2	-	0.0	140.0	°C
8835	I	DHW circulation temp	-	0.0	140.0	°C
8836	I	DHW charging temp	-	0.0	140.0	°C
8840	F	Hours run DHW pump	0:00:00	00:00:00	2730:15:00	h/Min/s
8841	F	Start counter DHW pump	0	0	65535	-
8842	F	Hours run el DHW	0:00:00	00:00:00	2730:15:00	h/Min/s
8843	F	Start counter el DHW	0	0	65535	-
8850	I	DHW primary controller temp	0	0	140.0	°C
8851	I	DHW primary controller setp	0	0	140.0	°C
8852	I	Instant DHW heater temp	0	0	140.0	°C
8853	I	Instant DHW heater setpoint	0	0	140.0	°C
8900	I	Swimming pool temp	0	0	140.0	°C
8901	I	Swimming pool setpoint	24	8	80.0	°C
8930	I	Primary controller temp	0	0	140.0	°C
8931	I	Primary controller setpoint	0	0	140.0	°C
8950	I	Common flow temp	0	0	140.0	°C
8951	I	Common flow temp setpoint	0	0	140.0	°C
8957	I	Common flow setp refrig	0	0	140.0	°C
8970	I	El imm heater buffer Off ¦ On	Off			-
8980	E	Buffer temp 1	-	0.0	140.0	°C
8981	E	Buffer setpoint	-	0.0	140.0	°C
8982	E	Buffer temp 2	-	0.0	140.0	°C
8983	I	Buffer temp 3	-	0.0	140.0	°C
8990	F	Hours run el buffer	0:00:00	00:00:00	2730:15:00	h/Min/s
8991	F	Start counter el buffer	0	0	65535	-
9000	I	Flow temp setpoint H1	5	0.0	140.0	°C
9001	I	Flow temp setpoint H2	5	0.0	140.0	°C
9004	I	Flow temp setpoint H3	5	0.0	140.0	°C
9005	I	Water pressure H1	0	-100	500	mbar
9006	I	Water pressure H2	0	-100	500	mbar
9009	I	Water pressure H3	0	-100	500	mbar
9031	E	Relay output QX1 Off ¦ On	Off			-
9032	E	Relay output QX2 Off ¦ On	Off			-
9033	E	Relay output QX3 Off ¦ On	Off			-
9034	E	Relay output QX4 Off ¦ On	Off			-
9035	E	Relay output QX5 Off ¦ On	Off			-
9036	E	Relay output QX6 Off ¦ On	Off			-
9050	I	Relay output QX21 module 1 Off ¦ On	Off			-
9051	I	Relay output QX22 module 1	Off			-

Operating line	operating level	Function	Default value	Minimum	Max	Unit
		Off ¦ On				
9052	I	Relay output QX23 module 1 Off ¦ On	Off			-
9053	I	Relay output QX21 module 2 Off ¦ On	Off			-
9054	I	Relay output QX22 module 2 Off ¦ On	Off			-
9055	I	Relay output QX23 module 2 Off ¦ On	Off			-

5.2 QAA55..

5.2.1 Operation

Operating elements



Display choices

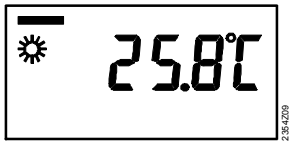
- Heating / cooling to the Comfort setpoint
- Heating to the Reduced setpoint
- Error messages

Display

Display of all segments.

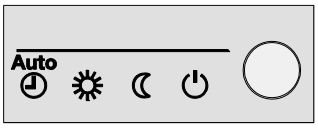
Display of all segments.

Example of basic display:



Selecting pace heating mode

This button is used to switch between the different operating modes. The selection made is indicated by a bar which appears below the respective symbol.



Automatic mode AUTO

In automatic mode, the room temperature is controlled in accordance with the time program.

Characteristics of automatic mode:

- Heating mode according to the time program
- Temperature setpoints according to the heating program "Comfort setpoint" ☼ or "Reduced setpoint" ☾
- Protective functions active
- Automatic summer / winter changeover and automatic 24-hour heating limit active (ECO functions)

Continuous operation ☼ or ☾

Continuous operation maintains the room temperature at the selected operating level.

☼ Heating to the Comfort setpoint

☾ Heating to the Reduced setpoint

Characteristics of continuous operation:

- Heating with no time program
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit inactive in the case of continuous operation with Comfort setpoint

Protection ⏻

When using Protection, the heating system is off. But it remains protected against frost (frost protection temperature) provided there is no power failure.

Characteristics of Protection:

- Heating off
- Temperature according to frost protection
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit active

Indication of cooling mode

(If available)

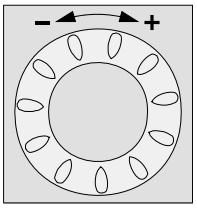
Cooling mode ☼

Release of cooling mode is indicated by a bar which appears below the symbol. Cooling mode is active when the bar for heating mode is hidden. .

Characteristics of cooling mode:

- Cooling mode in accordance with the time program
- Temperature setpoint in accordance with "Comfort setpoint cooling"
- Protective functions active
- Cooling limit depending on the outside temperature

Adjusting the room temperature setpoint

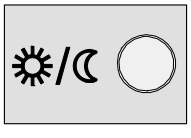


The heating or cooling setpoint is set depending on the active operating state.

Turn the setting knob to increase or decrease the **Comfort setpoint ☼** .

i After each readjustment, wait at least 2 hours, allowing the room temperature to adapt.

Occupancy button



If you do not use the rooms for short periods of time, you can press the presence button to temporarily reduce heating / cooling.

When the rooms are occupied again, press again the occupancy button.

i
- The occupancy button is only active in automatic operation
- The current selection is active until the next switching action according to the heating program takes place

5.2.2 Programming

Configuration

A long press on the occupancy button (> 3 seconds) enables the service level to be accessed. When the parameter is selected, the current value blinks. The setting knob is used to adjust the value. The next setting can be selected by a short press on the occupancy button.

Settings

	Indication	*Function*
Used as	ru = 1	The room unit is addressed as room unit 1 (default setting)
	ru = 2	The room unit is addressed as room unit 2
	ru = 3	The room unit is addressed as room unit 3
Direct adjustment	P1 = 1	Automatic storage: (default setting) A setpoint readjustment made with the knob is adopted either by pressing the operating mode button or without any further confirmation (timeout).
	P1 = 2	**Storage with confirmation**: A setpoint readjustment made with the knob is adopted only after pressing the operating mode button.
Operation lock	P2 = 0	**OFF**: All operating elements are enabled (default setting)
	P2 = 1	**ON**: The following operating elements are locked: • Operating mode changeover heating circuit • Readjustment of Comfort setpoint • Changeover of operating level (occupancy button)

If operation lock is active and one of the locked buttons is pressed, OFF is displayed for 3 seconds.
The operation lock does not prevent the service level from being accessed.

6 The settings in detail

6.1 Time of day and date

The controller has a yearly clock with time of day, weekday and date. To ensure that the heating program works correctly, both time of day and date must be correctly set.

Line no.	*Operating line*
1	**Hours/minutes**
2	**Day/month**
3	**Year**
5	**Start of summertime**
6	**End of summertime**

Daylight saving time/standard time changeover

The dates set for the changeover from wintertime to summertime, and vice versa, ensure that on the first Sunday after the set date the time of day will change from 02:00 (wintertime) to 03:00 (summertime), and from 03:00 (summertime) to 02:00 (wintertime).

6.2 Operator section

Operation and display

Line no.	*Operating line*
20	**Language** German English French Dutch
22	**Info** Temporarily Permanently
26	**Operation lock** Off On
27	**Programming lock** Off On
28	**Direct adjustment** Automatic storage Storage with confirmation

Info

Temporarily: After pressing the info button, a change to the “predefined“ basic display is made after a maximum of 8 minutes, or by pressing the operating mode button (with the QAA78… only after 2 minutes) .

Continuously: After pressing the info button, a change back to the “new“ basic display is made after a maximum of 8 minutes. The info value selected last will be adopted by the new basic display.
This setting cannot be made with the QAA78…

Operation lock

When the operation lock is activated, the following operating elements can no longer be adjusted:
Heating circuit operating mode, DHW operating mode, room Comfort setpoint (setting knob), and occupancy button.

Programming lock

When the programming lock is activated, parameter values can still be displayed, but can no longer be changed.

- Temporary deactivation of programming.
  Within the programming level, the programming lock can temporarily be overridden.

To do this, press the OK and ESC buttons simultaneously for 3 seconds. Temporary deactivation of the programming lock is maintained until programming is quit.

- Constant deactivation of programming.
  First, make the temporary deactivation, then go to operating line “Programming lock“ (27) and deactivate the programming lock

Direct adjustment

Automatic storage:
A setpoint readjustment made with the knob is adopted either by pressing the OK button or without any further confirmation (timeout).
Storage with confirmation:
A setpoint readjustment made with the knob is adopted only after pressing the OK button.

Used as

Line no.	*Operating line*
40	**Used as** Room unit 1 Room unit 2 Room unit P Operator unit 1 Operator unit 2 Operator unit P Service unit

This operating line is used to select the use of the operator section. Depending on use, additional settings will then be required under “Heating circuit assignment“. When using several operator sections, it is thus possible to match individual units to specific requirements.

- If several operator units are used, each device address may only be used once
- The AVS37.294 operator unit is supplied as operator unit 1 (40) acting on all heating circuits (42) and can only be readjusted on operating lines 44, 46 and 48

Depending on the selected use of the unit (40), the following settings (marked with X) can be made when assigning the heating circuit.

Operating line					
40	42	44	46	48	54
Room unit 1	Heating circuit 1				X
	Heating circuits 1 and 2	X		X	X
	Heating circuits 1 and P		X	X	X
	All heating circuits	X	X	X	X
Room unit 2					X
Room unit P					X
Operator unit 1	Heating circuit 1				
	Heating circuits 1 and 2	X		X	
	Heating circuits 1 and P		X	X	
	All heating circuits	X	X	X	
Operator unit 2					
Operator unit P					
Service unit					

Room unit 1
The operator unit supports the heating circuits released on operating line 42 (Assignment room unit 1) and activated in the basic unit.

Room unit 2
The operator unit only supports heating circuit 2.

Operator unit / service unit
The operator unit supports the heating circuits activated in the basic unit.

When using this setting, the operator unit does not acquire and deliver the room temperature.

Heating circuit assignment

Line no.	*Operating line*
42	**Assignment device 1** Heating circuit 1 Heating circuits 1 and 2 Heating circuits 1 and P All heating circuits
44	**Operation HC2** Commonly with HC1 Independently
46	**Operation HCP** Commonly with HC1 Independently
48	**Action occupancy button** None. Heating circuit 1 Heating circuit 2 Commonly

Assignment device 1

As device 1 (setting 40), the action of the relevant operator section on heating circuit 1 or on both heating circuits can be assigned. The latter is required especially when using 2 heating circuits and only 1 room unit.

Operation HC2

Depending on operating line 40, the action of operation (operating mode button or setting knob) on room unit 1, on the operator unit or service unit can be defined for heating circuit 2.
Commonly with HC1
Operation acts jointly on heating circuits 1 and 2.
Independently
The action of operation is queried on the display as soon as the operating mode button is pressed or the setting knob is operated.

Operation HCP

Depending on operating line 40, the action of operation (operating mode button or setting knob) on room unit 1, on the operator unit or service unit can be defined for heating circuit P.
Commonly with HC1
Operation acts jointly on heating circuits 1 and 2.
Independently
Operating mode changes or readjustments of the Comfort setpoints are to be made in programming mode.

Action occupancy button

The action of the occupancy button on the operator unit can be assigned to the relevant heating circuits.
If only one heating circuit is assigned, the occupancy button always acts on that heating circuit.

Room sensor

Line no.	*Operating line*
54	**Readjustment room sensor**

The temperature display can be readjusted.

Device data

Line no.	*Operating line*
70	**Software version**

The display shows the current version of the room unit.

6.3 Radio links

Binding

Line no.	*Operating line*
120	**Binding** No Yes
121	**Test mode** Off On

For more detailed information, refer to the descriptions of the wireless components in section 3.8.

Binding

When commissioning the system, the wireless peripheral devices (room unit) are assigned to the basic unit.

Test mode

The test mode is used for checking the radio link. The test should be made when the installation is entirely completed.

List of RF devices

Line no.	*Operating line*
130	**Room unit 1** Missing Ready No recept'n Change batt
131	**Room unit 2** Same as on operating line 130
132	**Room unit 3** Same as on operating line 130
133	**Outside sensor** Same as on operating line 130
134	**Repeater** Same as on operating line 130
135	**Operator unit 1** Same as on operating line 130
136	**Operator unit 2** Same as on operating line 130
137	**Operator unit P** Same as on operating line 130
138	**Service unit** Same as on operating line 130
140	**Delete all devices**

Delete all devices

The radio link to all devices will be cancelled. If radio communication is required again, a new binding must be made.

6.4 Time programs

For the heating circuits and DHW heating, a number of switching programs are available. They are activated in Automatic mode and control the change of the temperature levels (and the associated setpoints) via the selected switching times.

Entering the switching times

The switching times can be set in a combined way, either commonly for several days, or separately for individual days. The preselection of groups of days like for instance Mo...Fr and Sa...Su that use the same switching times simplifies setting of the switching programs.

Switching points

Line no.					*Operating line*
HC1	*HC2*	*3/HCP*	*4/DHW*	*5*	
500	**520**	**540**	**560**	**600**	**Preselection** Mo - Su Mo - Fr Sa - Su Mo - Su
501	**521**	**541**	**561**	**601**	**1. 1st phase on**
502	**522**	**542**	**562**	**602**	**1. 1st phase off**
503	**523**	**543**	**563**	**603**	**2. 2nd phase on**
504	**524**	**544**	**564**	**604**	**2. 2nd phase off**
505	**525**	**545**	**565**	**605**	**3. 3rd phase on**
506	**526**	**546**	**566**	**606**	**3. 3rd phase off**

Standard program

Line no.	*Operating line*
516, 536, 556, 576, 616	**Default values** No Yes

All time programs can be reset to their default settings. Each time program has its own operating line to make the reset.

In that case, individual settings will be lost!

6.5 Holidays

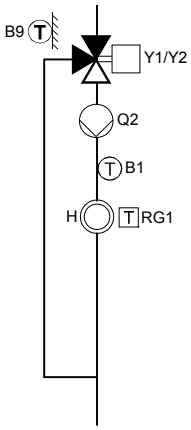
Line no.				*Operating line*
HC1	*HC2*	*HC3P*		
642	**652**	**662**		**Start**
643	**653**	**663**		**End**
648	**658**	**668**		**Operating level** Frost protection Reduced

The holiday program is used to switch the heating circuits to a selectable operating level according to calendar dates.

Important

- The holiday program can only be used in "Automatic" mode

6.6 Heating circuits



For the heating circuits, various functions are available which can be individually set for each heating circuit.

The operating lines of the second heating circuit appear only when an AVS75.390 extension module is connected to the controller.
The operating lines of the pump heating circuit appear only when a multifunctional output is defined as the pump heating circuit.

Operating mode

Line no.	*Operating line*
1300	**Operating mode** Protection Automatic Reduced Comfort

The operating mode of heating circuits 1 and 2 is selected directly with the operating mode button while the operating mode of heating circuit P must be selected in programming mode (1300).

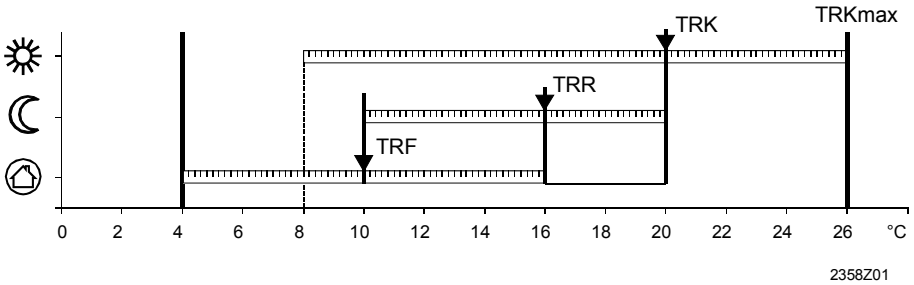
This setting is used to switch between the different operating modes. The functionality corresponds to operating mode selection with the operating mode button. For details, refer to section ”Operation“.

Setpoints

Line no.			*Operating line*
HC1	*HC2*	*HC3P*	
710	**1010**	**1310**	**Comfort setpoint**
712	**1012**	**1312**	**Reduced setpoint**
714	**1014**	**1314**	**Frost protection setpoint**
716	**1016**	**1316**	**Comfort setpoint max**

Room temperature

The room temperature can be shifted according to different setpoints. These setpoints become active depending on the selected operating mode, thus producing different temperature levels in the rooms.
The setpoint setting ranges are obtained as a result of the interdependency of setpoints. This is shown in the following graph:



TRKmax Comfort setpoint max
TRK Comfort setpoint
TRR Reduced setpoint
TRF Frost protection setpoint

Frost protection

In Protection mode, the room temperature is prevented from falling below a certain level. This means that the frost protection setpoint of the room temperature will be maintained.

Heating curve

Line no.				*Operating line*
HC1	*HC2*	*HC3P*		
720	**1020**	**1320**		**Heating curve slope**
721	**1021**	**1321**		**Heating curve displacement**
726	**1026**	**1326**		**Heating curve adaption**

The heating curve generates the flow temperature setpoint, which is used to maintain a certain flow temperature depending on the prevailing weather conditions. The heating curve can be adjusted via a number of settings, thus matching heat output and room temperature to individual needs.

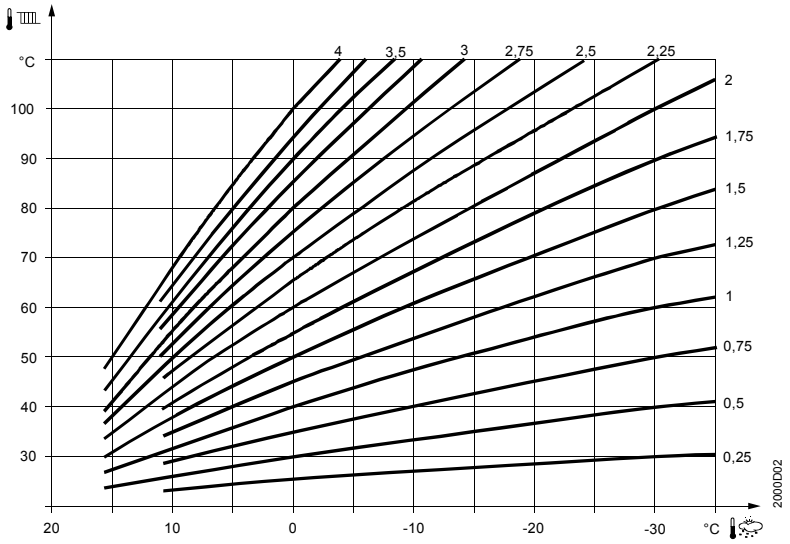
Heating curve slope

The steeper the heating curve slope, the greater the change of flow temperature at low outside temperatures. In other words, if the room temperature is not correct at low outside temperatures, but at higher outside temperatures, the heating curve slope needs readjusting.

Increasing the setting: Raises the flow temperature, especially when outside temperatures are low.

Decreasing the setting: Lowers the flow temperature, especially when outside temperatures are low.

The set heating curve is based on a room temperature setpoint of 20 °C. If the room temperature setpoint is adjusted, the heating curve adapts automatically to the new value.



Heating curve displacement

Parallel displacement of the heating curve is used to change the flow temperature evenly across the entire outside temperature range or, in other words, if the room temperature is always too high or too low, a readjustment must be made via parallel displacement.

Adaption

Adaption of the heating curve is used by the controller to automatically adapt the heating curve to the prevailing weather conditions. It can only be switched on or off. In that case, a readjustment of heating curve slope and parallel displacement is not required.

To assure this function, following must be observed:

- A room sensor must be connected
- The ”Room influence“ setting must be between 1 and 99
- There should be no thermostatic radiator valves in the reference room (mounting location of room sensor) (If such valves are present, they must be set to their fully open position).

ECO functions

Line no.				*Operating line*
HC1	*HC2*	*HC3P*		
730	**1030**	**1330**		**Summer/winter heating limit**
732	**1032**	**1332**		**24-hour heating limit**

Summer/winter heating limit

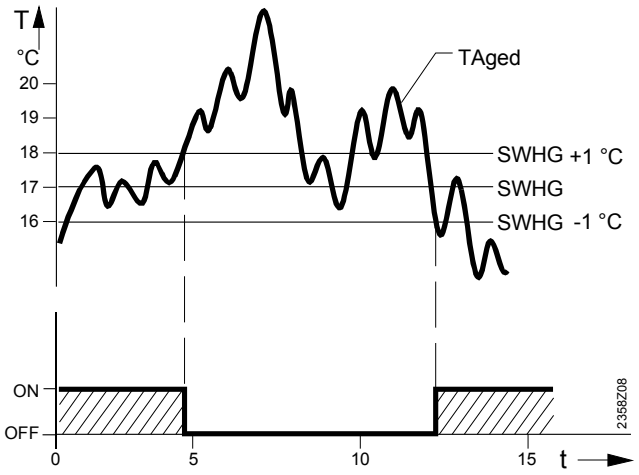
The summer / winter heating limit is used to switch the heating on and off in the course of the year, depending on temperature conditions. In Automatic mode, switching on / off takes place automatically, so there is no need for the user to do this manually. By changing the setting, the respective periods of time will be shortened or extended.

Increase: Winter operation will start *earlier*
Summer operation will start *later*

Decrease: Winter operation will start *later*
Summer operation will start *earlier*

- The function is not active in operating mode ”Continuously nominal temperature“ ☼
- The display will show ECO
- To give consideration to the building’s thermal dynamics, the outside temperature is attenuated

Example:



SWHG Summer/winter heating limit
TAged Attenuated outside temperature
T Temperature
t Days

24-hour heating limit

The 24-hour heating limit is used to switch the heating on and off in the course of the day, depending on the outside temperature. This function is used primarily during intermediate seasons (spring and autumn), enabling the system to respond to short-time temperature variations.

Example:

Setting line	*e.g.*
Comfort setpoint (TRw)	22°C
24-hour heating limit (THG)	-3°C
Changeover temperature (TRw-THG) heating off	= 19°C

Switching differential (fixed)	-1°C
Changeover temperature heating on	= 18 °C

By changing the value entered, the respective heating periods will be shortened or extended.

Increase: Heating mode will start *earlier,* changeover to ECO *later.*

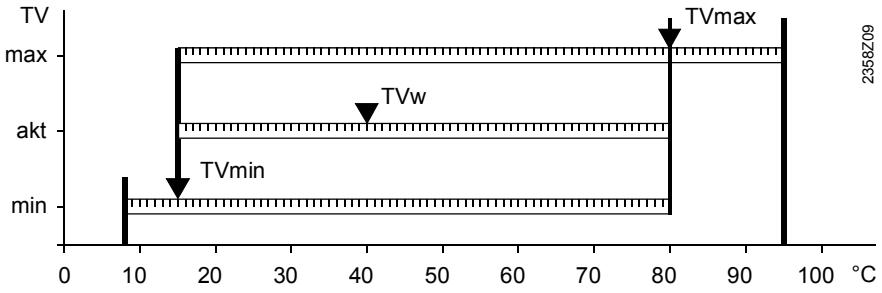
Decrease: Heating mode will start *later,* changeover to ECO *earlier.*

- The function is not active in operating mode ”Continuously nominal temperature“
- The display will show ECO
- To give consideration to the building’s thermal dynamics, the outside temperature will be attenuated

Flow temperature setpoint limitations

Line no.				*Operating line*
HC1	*HC2*	*HC3P*		
740	**1040**	**1340**		**Flow temp setpoint min**
741	**1041**	**1341**		**Flow temp setpoint max**

Using this limitation, a temperature range for the flow temperature setpoint can be defined. If the flow temperature setpoint demanded by the heating circuit reaches the relevant limit and the heat request increases or decreases, the flow temperature setpoint will be maintained at the maximum or minimum limit.



TVw Current flow temperature setpoint
TVmax Flow temperature setpoint maximum
Tvmin Flow temp setpoint minimum

Room influence

Line no.				Operating line
HC1	*HC2*	*HC3P*		
750	**1050**	**1350**		**Room influence**

Compensation variants

When a room temperature sensor is used, there is a choice of 3 different types of compensation.

Setting	*Type of compensation*
– – – %	Pure weather compensation *
1…99 %	Weather compensation with room influence
100 %	Pure room compensation

* Outside sensor required.

Pure weather compensation

The flow temperature is calculated via the heating curve, depending on the composite outside temperature.
This type of compensation calls for correct adjustment of the heating curve since in that case the control gives no consideration to the room temperature.

Weather compensation with room influence

The deviation of the actual room temperature from the setpoint is measured and taken into account when controlling the temperature. Heat gains can thus be considered, ensuring more accurate room temperature control. The effect of the deviation is set as a percentage figure. The better the reference room (correct room temperature, correct mounting location, etc.) the higher the value can be set.

- Example:

Approx. 60% Good reference room conditions
Approx. 20% Unfavorable reference room

To activate the function, following must be considered:

- A room temperature sensor must be connected
- The ”Room influence“ setting must be between 1 and 99
- There should be no thermostatic radiator valves in the reference room (mounting location of room sensor) (If such valves are present, they must be set to their fully open position)

Pure room compensation

The flow temperature is controlled depending on the room temperature setpoint, the current room temperature and the progression of the room temperature. For example, a slight room temperature increase leads to an immediate drop of the flow temperature.

To activate the function, following must be considered:

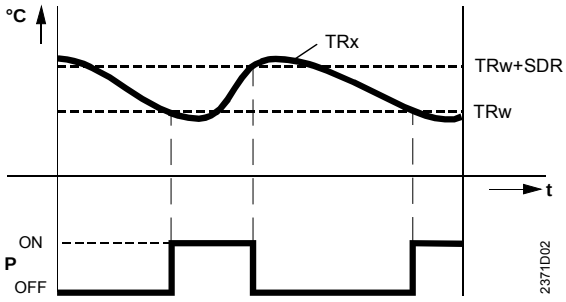
- A room temperature sensor must be connected
- “Room influence“ must be set to 100%
- There should be no thermostatic radiator valves in the reference room (mounting location of the room sensor). (If such valves are present, they must be set to their fully open position)

Room temperature limitation

Line no.				Operating line
HC1	*HC2*	*HC3P*		
760	**1060**	**1360**		**Room temp limitation**

The "Room temperature limitation" function enables the heating circuit pump to be deactivated should the room temperature exceed the current room temperature setpoint by more than the adjusted differential.
The heating circuit pump will be activated again as soon as the room temperature returns to a level below the current room temperature setpoint.
During the time the "Room temperature limitation" function is active, no heat request is sent to the heat source.

Room temperature limitation does not work in the case of pure weather compensation.



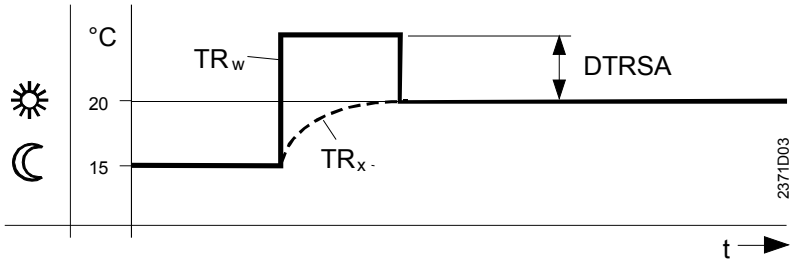
TRx Actual value of the room temperature
TRw Room temperature setpoint
SDR Room's switching differential
P Pump
t Time

Boost heating

Line no.				Operating line
HC1	*HC2*	*HC3P*		
770	**1070**	**1370**		**Boost heating**

Boost heating is used to reach the new setpoint more quickly when switching from the Reduced setpoint to the Comfort setpoint, thus shortening the heating up time . During boost heating, the room temperature setpoint is raised by the value set here.
A higher setting leads to shorter heating up times, a lower setting to longer heating up times.

- Boost heating is possible with or without room temperature sensor.



TRw Room temperature setpoint
TRx Actual value of the room temperature
DTRSA Increase of the room temperature setpoint

Quick setback

Line no.				Operating line
HC1	*HC2*	*HC3P*		
780	**1080**	**1380**		**Quick setback** Off Down to reduced setpoint Down to frost prot setpoint

During quick setback, the heating circuit pump is deactivated and, in the case of mixing valve circuits, the mixing valve fully closed.

- Function with room temperature sensor:

When using a room temperature sensor, the function keeps the heating switched off until the room temperature has dropped to the level of the Reduced setpoint or the frost level.
When the room temperature has fallen to the Reduced level or frost level, the heating circuit pump will be activated and the mixing valve will be released.

- Function without room temperature sensor:

Quick setback switches the heating off for a certain period of time, depending on the outside temperature and the building time constant.

Duration of quick setback when Comfort setpoint minus Reduced setpoint = 2 °C
(e.g. Comfort setpoint = 20 °C and Reduced setpoint =18 °C)

Outside temperature (OT) composite:	Building time constant: 0	2	5	10	15	20	50
15 °C	0	3.1	7.7	15.3	23	30.6	76.6
10 °C	0	1.3	3.3	6.7	10	13.4	33.5
5 °C	0	0.9	2.1	4.3	6.4	8.6	21.5
0 °C	0	0.6	1.6	3.2	4.7	6.3	15.8
-5 °C	0	0.5	1.3	2.5	3.8	5.0	12.5
-10 °C	0	0.4	1.0	2.1	3.1	4.1	10.3
-15 °C	0	0.4	0.9	1.8	2.6	3.5	8.8
-20 °C	0	0.3	0.8	1.5	2.3	3.1	7.7
	Duration of quick setback in hours						

- Quick setback is possible with or without room temperature sensor

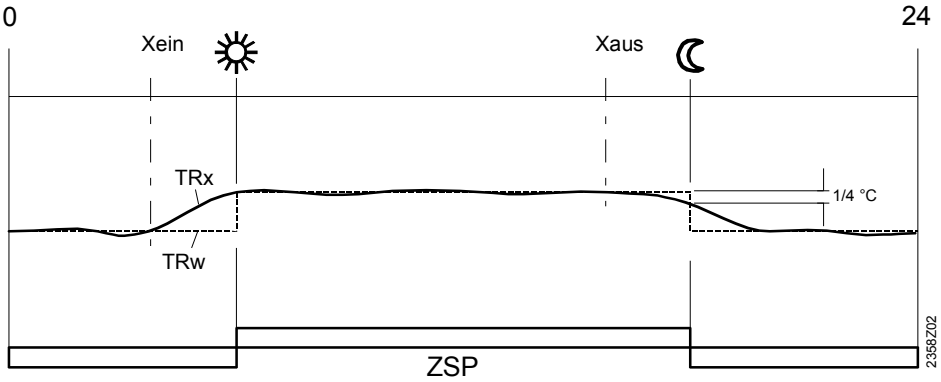
Optimum start / stop control

Line no.			Operating line
HC1	*HC2*	*HCP*	
790	**1090**	**1390**	**Optimum start control max**
791	**1091**	**1391**	**Optimum stop control max**

Optimum start control max — The change from one temperature level to the other is optimized in a way that the Comfort setpoint is reached at the respective switching times.

Optimum stop control max — The change from one temperature level to the other is optimized in a way that the Comfort setpoint minus 1/4 °C is reached at the respective switching times.

ℹ Optimum start / stop control is possible with or without room temperature sensor.

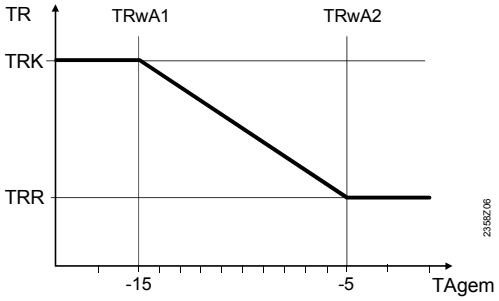


Xein Switch-on time shifted forward in time
Xaus Switch-off time shifted forward in time
ZSP Time program
TRx Actual value of the room temperature
TRw Room temperature setpoint

Raising the Reduced setpoint

Line no.			Operating line
HC1	*HC2*	*HCP*	
800	**1100**	**1400**	**Reduced setp increase start**
801	**1101**	**1401**	**Reduced setp increase end**

The function is used primarily in connection with heating systems with **only** little spare capacity (e.g. low-energy houses). In such cases, the heating up time at low outside temperatures would be too long. When the Reduced setpoint is raised, the rooms are prevented from cooling down excessively, thus shortening the heating up time when changing to the nominal setpoint.



TRwA1 Reduced setpoint increase start
TRwA2 Reduced setpoint increase end
TRK Comfort setpoint
TRR Reduced room temperature setpoint
TAgem Composite outside temperature

Overtemp prot pump circuit

Line no.			Operating line
HC1	HC2	HCP	
820	**1120**	**1420**	**Overtemp prot pump circuit**

In the case of heating plants with pump heating circuits, the flow temperature of the heating circuit can be higher than the flow temperature called for by the heating curve, the reason being higher requests from other heat consumers (mixing heating circuit, DHW charging, external heat demand), or a parameterized minimum heat source temperature. As a result of this too high flow temperature, the pump heating circuit would assume excessive temperatures.
Function "Overtemperature protection for pump circuits" ensures that the energy supply for pump heating circuits corresponds to the demand from the heating curve by activating / deactivating the pump.

Important:
The function may only be activated in plants with buffer or combi storage tanks. In the case of plants without storage tank, there is a risk of a compressor being in operation without having a consumer pump running.

Mixing valve control

Line no.		Operating line
HC1	HC2	
830	**1130**	**Mixing valve boost**
832	**1132**	**Actuator type** 2-position ¦ 3-position
833	**1133**	**Switching differential 2-pos**
834	**1134**	**Actuator running time**

Mixing valve boost

The controller adds the mixing valve boost set here to the current flow temperature setpoint and uses the value as the temperature setpoint for heat generation.

Actuator type

2-position
The controller drives the actuator with only one relay output. When the output delivers a signal, the valve opens. When there is no signal, the valve closes automatically.

3-position
The controller drives the actuator with 2 relay outputs. One of the outputs is used for opening the valve and one for closing the valve.

Switching differential 2-pos

For the 2-position actuator, the "2-position switching differential" must also be adapted. The switching differential has no impact on 3-position operation.

Actuator running time

For 3-position operation, the running time of the mixing valve actuator can be adjusted. The actuator running time has no impact on 2-position operation.

Floor curing function

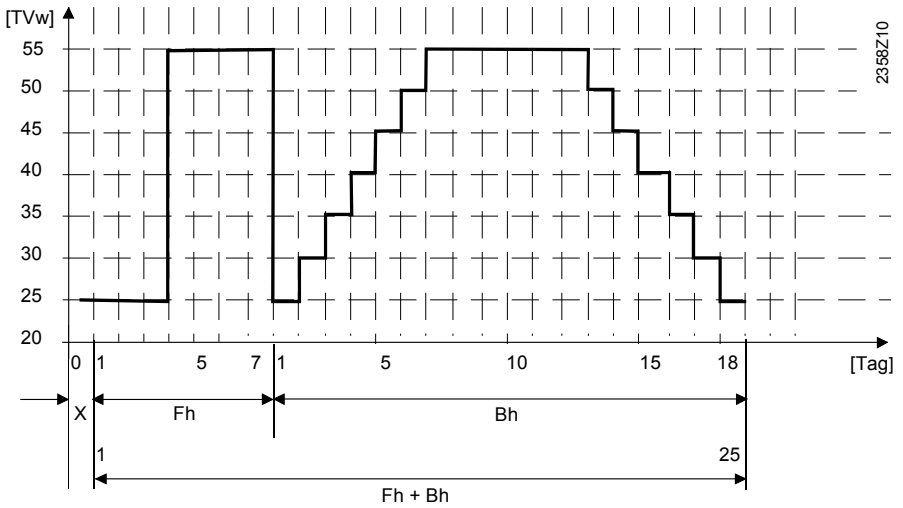
Line no.			Operating line
HC1	*HC2*	*HCP*	
850	**1150**	**1450**	**Floor curing function** **Off** **Functional heating (Fh)** **Curing heating (Bh)** Functional/curing heating **Curing heating/functional heating** Manually
851	**1151**	**1451**	**Floor curing setp manually**
		1455	**Floor curing setp current**
		1456	**Floor curing day current**
		1457	**Floor curing days completed**

The floor curing function ensures controlled drying of the floor. It controls the flow temperature according to a certain temperature profile. Drying of the floor is ensured by the floor heating system and the mixing or pump heating circuit.

Floor curing function

Off:
Function is deactivated.
Functional heating (Fh) :
The first part of the temperature profile is handled automatically.
Floor curing heating (Bh)
The second part of the temperature profile is handled automatically.
Floor curing heating and functional heating
The entire temperature profile (first and second part) is handled automatically.
Manually
It is not a temperature profile that is handled, but the floor setpoint is controlled manually. The function is automatically ended after 25 days.

⚠
- Observe the relevant standards and regulations of the company making and laying the floor!
- Proper functioning is ensured only when the plant is correctly installed (hydraulic system, electrical installation, settings)!
  If not observed, the floor might get damaged!
- The function can be aborted by selecting **Off**
- Maximum limitation of the flow temperature remains active



X Start day
Fh Functional heating
Bh Floor curing heating

Floor curing setp manually

The flow temperature setpoint for the "manual" floor curing function can be set separately for each heating circuit.

Floor curing setp current

Shows the current flow temperature setpoint of the floor curing process in progress

Floor curing day current

Shows the current day of the floor curing process in progress.

⚠ After a power failure, the plant resumes the floor curing function at the point in time the power failure occurred.

⚠ **Start in the summer**
In the case of heat pumps controlled according to the return temperature, the switch-on point for the heat pump may not be reached during the summer.
For this reason, the return temperature needed for switching on the heat pump is calculated based on the flow temperature setpoint minus the required temperature differential (5801). If the temperature acquired by the return temperature sensor lies above that temperature, the heat pump will not be put into operation and, therefore, the floor curing function be started too late (only when the temperature increase resulting from the floor curing function requires the heat pump to be switched on).

Excess heat draw

Line no.				*Operating line*
HC1	*HC2*	*HCP*		
861	**1161**	**1461**		**Excess heat draw** Off Heating mode Always

Excess heat draw can be triggered by some other device via bus or by storage tank recooling.
When dissipation of excess heat is activated, it can be drawn by space heating. This can be selected separately for each heating circuit.

Off
Excess heat draw is deactivated.

Heating mode
Excess heat is drawn only when the controller operates in heating mode.

Always
Excess heat is drawn in all operating modes.

Buffer storage tank / primary controller

Line no.			*Operating line*
HC1	*HC2*	*HCP*	
870	**1170**	**1470**	**With buffer storage tank**
872	**1172**	**1472**	**With prim contr/system pump**

With buffer

If there is a buffer storage tank, state whether the heating circuit can draw heat from it. When using alternative heat sources, the buffer storage tank temperature is used as a control criterion for the release of additional heat sources.

With primary controller / system pump

Select whether the heating circuit shall receive its heat via the primary controller or with the help of the system pump (depending on the type of plant).

Remote control

Line no.			Operating line
HC1	*HC2*	*HCP*	
900	**1200**	**1500**	**Optg mode changeover** None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic

In the case of external changeover via the Hx inputs, the operating mode to be used can be selected.

Frost protection for the heating circuit

Frost protection for the heating circuit is always active and cannot be deactivated.

Frost protection for the heating circuit in heating mode

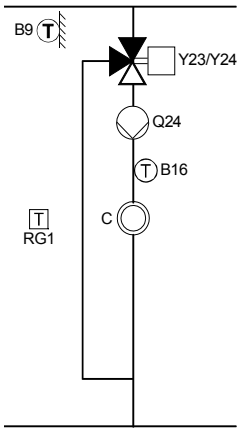
If the flow temperature falls below 5 °C, the controller switches on the heat source and activates the heating circuit pumps – independent of the heating system's current operating mode.

When the flow temperature returns to a level above 7 °C, the controller switches off the heat source and deactivates the heating circuit pumps after a waiting time of 5 minutes.

Frost protection for the heating circuit in cooling mode

For a more detailed description, refer to page 95.

6.7 Cooling circuit 1



To be able to operate the cooling circuit, an appropriate partial diagram "Heating / cooling" must be used.

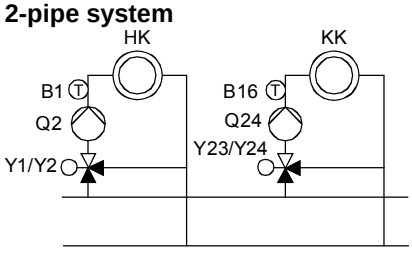
The system starts to operate in cooling mode when the room temperature rises above the Comfort cooling setpoint (902). The cooling function must be activated (901 = Auto) and enabled in accordance with the time program (907).

Cooling mode is aborted when heating circuit 1 calls for heat, or when there is a heat request from DHW or some other heating circuit (only with active cooling).
In the case of passive cooling, DHW charging and heating with some other heating circuit during cooling mode are possible.

Cooling via common heating / cooling pipe

When using a 2- or 4-pipe system with heat pump and process reversing valve, the controller acquires the current room temperature and compares it with the room temperature setpoint in order to calculate the required flow temperature setpoint. If the buffer storage tank temperature is sufficiently low, the cooling circuit draws the required cooling energy from that buffer. If the temperature is not low enough, or if there is no buffer storage tank, the heat pump is put into operation to be used as a refrigeration machine (process reversal Y22).

2-pipe system



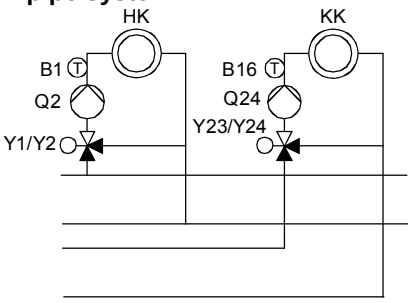
The cooling and heating circuits draw their cooling / heating energy from the same common flow.

Cooling via separate cooling pipe

When using a 4-pipe system, the controller acquires the current room temperature, compares it with the room temperature setpoint and then calculates the required flow

temperature setpoint. If the required cooling energy is available directly from the heat pump, the source pump and the cooling circuit pump are put into operation. If the temperature level of the source is too high, the pumps remain deactivated.

4-pipe system



The cooling and heating circuits draw their cooling / heating energy from separate circuits.

Operating mode

Line no.	*Operating line*
901	**Operating mode** Off ¦ Automatic*

The operating mode can be selected either via the operating mode button on the room or operator unit or via the above operating line.

Off — The cooling function is deactivated.

Automatic — The cooling function is automatically enabled on the basis of the selected time program (907), the holiday program and the occupancy button, and then activated if required.

Setpoints

Line no.	*Operating line*
902	**Comfort setpoint**

Comfort setpoint — In cooling mode, room temperature control maintains the Comfort setpoint adjusted here. The Comfort setpoint for cooling can also be adjusted with the setting knob on the room unit.

i In the summer, the Comfort setpoint is shifted as a function of the outside temperature (918 - 920).

Release

Line no.	*Operating line*
907	**Release** 24 h/day ¦ Time program heating circuit¦ Time program 5

Parameter "Release" determines the time program in accordance with which cooling is enabled.

24 h/day — Cooling is permanently enabled (24 hours a day)

Time programs heating circuit — Cooling is enabled in accordance with the heating circuit's time program

Time program 5 — Cooling is enabled in accordance with time program 5.

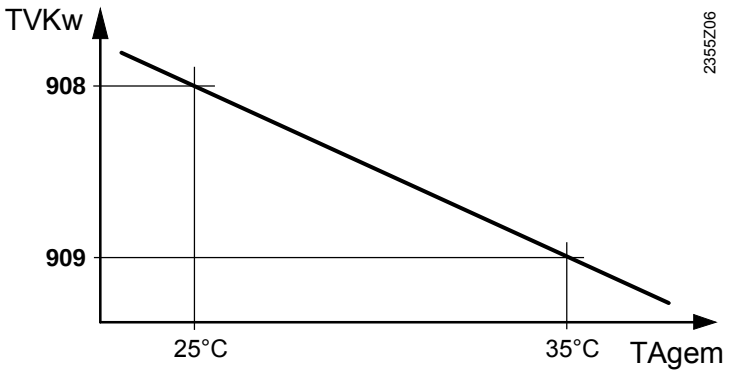
Cooling curve

Line no.	*Operating line*
908	**Flow setp at OT 25°C**
909	**Flow setp at OT 35°C**

The controller determines the required flow temperature at a certain composite outside temperature. The cooling curve is determined by defining 2 fixed points (flow temperature setpoint at 25 °C and 35 °C).

Flow setp at OT 25°C — This determines the flow temperature required for cooling at a composite outside temperature of 25 °C without giving consideration to summer compensation.

Flow setp at OT 35 °C — This determines the flow temperature required for cooling at a composite outside temperature of 35 °C without giving consideration to summer compensation.



TVKw Flow temperature setpoint for cooling
TAgem Composite outside temperature

The set cooling curve is based on a room temperature setpoint of 25 °C. If the room temperature setpoint is changed, the cooling curve automatically adapts to the new value.

ECO

Line no.	*Operating line*
912	**Cooling limit at OT**
913	**Lock time at end of heating**

Cooling limit at OT — If the composite outside temperature lies above the cooling limit, cooling is released; cooling is locked when the outside temperature drops to at least 0.5 °C below the cooling limit.

Lock time at end of heating — To avoid too rapid a change to cooling at the end of the heating phase, the cooling function is disabled for the period of time which can be set here. This locking period begins when there is no heating request from heating circuit 1. Heating requests from heating circuit 2 or heating circuit P are not taken into consideration.

The locking time is aborted by switching the operating mode button off and on again.

Summer compensation

Line no.	*Operating line*

918	**Summer comp start at OT**
919	**Summer comp end at OT**
920	**Summer comp setp increase**

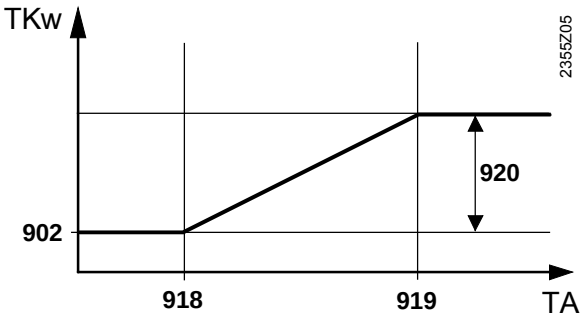
In summer, the cooling Comfort setpoint (902) is shifted upwards as the outside temperature increases. This saves cooling energy, and prevents too great a differential between the room and the outside temperature.

The resulting room temperature setpoint (cooling) can be displayed on the info level.

Summer comp start at OT — Summer compensation starts to take effect at the outside temperature set here. If the outside temperature continues to rise, the Comfort setpoint is raised continuously.

Summer comp end at OT — Summer compensation takes full effect at this outside temperature (920). The Comfort setpoint is not affected by any further increase in the outside temperature.

Summer comp setp increase — This setting determines the maximum permissible increase in the Comfort setpoint.



TKw Comfort setpoint
TA Outside temperature

Flow temperature setpoint limitations

Line no.	*Operating line*
923	**Flow temp setp min OT 25°C**
924	**Flow temp setp min OT 35°C**

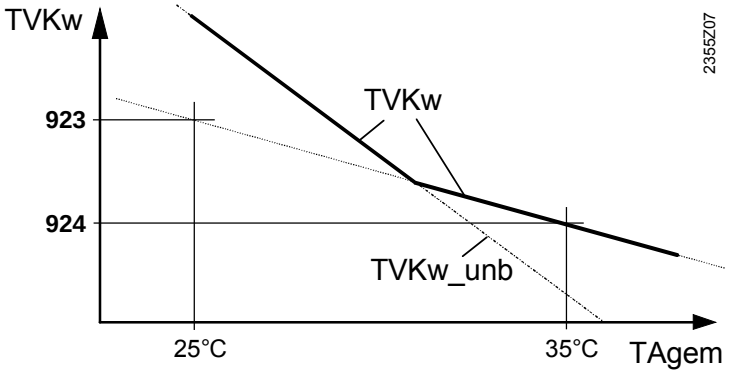
A low limit can be defined for the flow temperature required for cooling.
The limit curve is determined by defining 2 fixed points.

There is also a low limit for the resulting flow temperature setpoint, which must not fall below 5 °C.

Flow temp setp min at OT 25 °C — This determines the lowest permissible flow temperature at a composite outside temperature of 25 °C.

Flow temp setp min at OT 35 °C — This determines the lowest permissible flow temperature at a composite outside temperature of 35 °C.

If there is no valid outside temperature available, the controller uses the value "Flow temp setp min OT = 35 °C".



TVKw Flow temperature setpoint for cooling (with minimum limitation)
TVKw_unb Flow temperature setpoint for cooling (without minimum limitation)
TAgem Composite outside temperature

Room influence

Line no.	*Operating line*
928	**Room influence**

Compensation variants

When using a room temperature sensor, there is a choice of 3 different types of compensation.

Setting	*Type of compensation*
– – – %	Pure weather compensation *
1…99 %	Weather compensation with room influence *
100 %	Pure room compensation

* Outside sensor required.

Pure weather compensation

The flow temperature is calculated with the help of the cooling curve as a function of the composite outside temperature.
This type of compensation requires correct adjustment of the cooling curve, since in this case, the control does not take account of the room temperature.

Weather compensation with room influence

The deviation of the actual room temperature from the setpoint is measured and taken into account when controlling the temperature. In this way, account is taken of room temperature deviations to facilitate more accurate room temperature control. The effect of the deviation is set as a percentage figure. The better the reference room conditions (correct room temperature, correct mounting location, etc.) the higher the value can be set.

- Example:

Approx. 60% Good reference room conditions
Approx. 20% Unfavorable reference room

To activate the function, following must be considered:

- A room sensor must be connected
- The ”Room influence“ setting must be selected between 1 and 99
- There should be no controlled valves in the reference room (mounting location of the room sensor) (If such valves are installed, they must be set to their fully open position)

Pure room compensation

The flow temperature is controlled depending on the room temperature setpoint, the current room temperature and the progression of the room temperature. For example, a

slight increase of the room temperature causes an immediate drop of the flow temperature.

To activate the function, following must be considered:

- A room sensor must be connected
- “Room influence“ must be set to 100%
- There should be no controlled valves in the reference room (mounting location of the room sensor) (If such valves are installed, they must be set to their fully open position)

Room temperature limitation

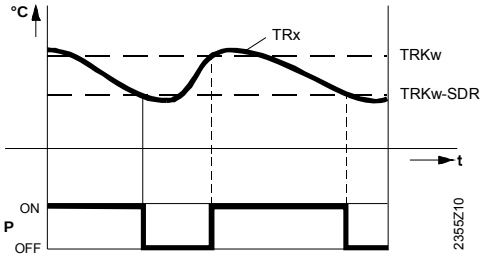
Line no.	*Operating line*
932	**Room temp limitation**

The “Room temperature limitation” function makes it possible to deactivate the cooling circuit pump if the room temperature falls by more than the preset difference below the effective room temperature setpoint (with summer compensation, 920).

The cooling circuit pump is activated again as soon as the room temperature returns to a level above the current room temperature setpoint.
During the time the “Room temperature limitation“ function is active, no cooling request is sent to the source.

The function is deactivated in the following situations:

- No room temperature sensor
- "Room temp limitation" = ---
- "Room influence“ (928) = --- (pure weather compensation)



TRx	Actual room temperature
TRKw	Room temperature setpoint cooling (incl. summer compensation)
SDR	Room’s switching differential
P	Pump
t	Time

Mixing valve control

Line no.	*Operating line*
938	**Mixing valve decrease**
939	**Actuator type** 2-position ¦ 3-position
940	**Switching differential 2-pos**
941	**Actuator running time**
945	**Mixing valve in heating mode** Control ¦ Open

Mixing valve decrease

The refrigeration request from the mixing valve circuit to the source is reduced by the preset value. The purpose of this reduction is to enable the mixing valve controller to compensate for the variation in temperature caused by the source (2-position control).

Actuator type

2-position
The controller drives the actuator with only one relay output. When the output delivers a signal, the valve opens. When there is no signal, the valve closes automatically.

3-position
The controller drives the actuator with 2 relay outputs. One of the outputs is used for opening the valve, the other for closing the valve.

Switching differential 2-pos

For the 2-position actuator, the "2-position switching differential" must also be adapted. The switching differential has no impact on 3-position actuators.

Actuator running time

For the 3-position actuator, the running time of the mixing valve actuator can be adjusted. The actuator running time has no impact on 2-position actuators.

Mixing valve in heating mode

This defines the position of mixing valve 1 (Y1 / Y2) when heating mode is active. This parameter has no impact on systems with hydraulically separate heating and cooling circuits.

Controls	The valve is used for control in heating and cooling mode.
Open	The valve is used for control in cooling mode, it is open in heating mode.

Dewpoint monitoring

Line no.	*Operating line*
946	**Lock time dewpoint limiter**
947	**Flow temp setp incr hygro**
948	**Flow setp incr start at r.h.**
950	**Flow temp diff dewpoint**

Lock time dewpoint limiter

When the connected dewpoint limiter detects the **formation of condensation,** it closes its contact, thereby **deactivating cooling**.
The "Lock time dewpoint limiter" set here starts running as soon as the contact reopens. Cooling can only start after expiry of this locking time.

⚠ The dewpoint limiter must be assigned to one of the Hx inputs as a “Dewpoint limiter”.

Flow temp setp incr hygro

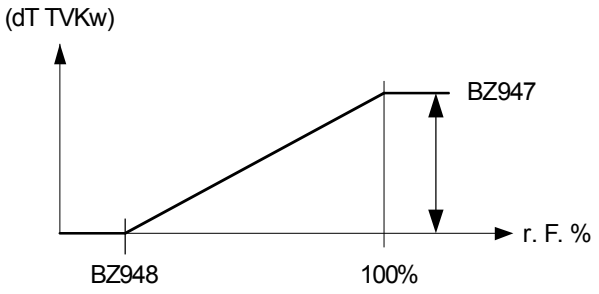
To prevent the formation of condensation due to excess indoor air humidity, a hygrostat can be used to implement a **fixed increase in the flow temperature**. As soon as the air humidity exceeds the value set on the hygrostat, the contact closes and the flow temperature setpoint is increased by the amount set here.

⚠ The hygrostat must be assigned to one of the Hx inputs as "Flow setp increase hygro".

Flow setp incr start at r.h.

To prevent the formation of condensation due to excess indoor air humidity, a DC 0…10 V humidity measurement can be used to implement a **continuous increase in the flow temperature**.
If the relative humidity in the room exceeds the value defined by "Flow setp incr start at r.h." the flow temperature setpoint is increased continuously. The start of increase (949) and the maximum increase (947) can be set.

⚠ The humidity sensor must be assigned to one of the Hx inputs as "Rel room humidity 10V".

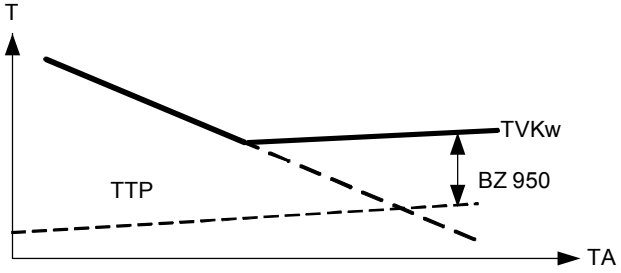


dT TVKw Flow setpoint increase
r.h. relative humidity
BZ Operating line

Flow temp diff dewpoint

The dewpoint temperature is determined on the basis of the relative humidity of the indoor air and the associated room temperature.
To prevent the formation of condensation on surfaces, a minimum limit is applied to the flow temperature so that it remains above the dewpoint temperature by the value set here (950).
The function can be deactivated with setting – – –.

⚠ The humidity sensor must be assigned to one of the Hx inputs as "Rel room humidity 10V", and a room temperature sensor must also be available (assigned to the Hx input as "Room temp 10V" or room unit).



TVKw Flow temperature setpoint cooling
TTP Dewpoint temperature
TA Outside temperature
BZ Operating line

Buffer storage tank / primary controller

Line no.	*Operating line*
962	**With buffer** No ¦ Yes
963	**With prim contr/system pump** No ¦ Yes

With buffer

If there is a buffer storage tank, this setting must be made to define whether the cooling circuit can draw cooling energy from it.

With prim contr/system pump

This determines whether the cooling circuit is supplied via the primary controller or with the help of the system pump (depending on the type of plant).

Remote control

Line no.	*Operating line*
969	**Optg mode changeover** None ¦ Off ¦ Automatic

In the case of external changeover via inputs H1 / H2 / H3, the operating mode to be used can be selected.

Frost protection for the heating circuit

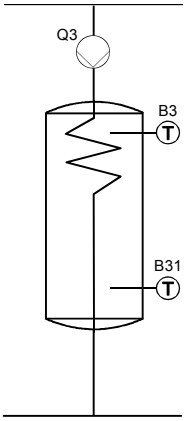
Frost protection for the heating circuit is always enabled and cannot be deactivated.

Frost protection for the heating circuit in cooling mode

If, during a valid cooling request, the flow temperature falls below 5 °C, the heating circuits are switched off. The pumps are activated again when the flow temperature exceeds 7 °C and a fixed locking time of 5 minutes has elapsed.
During the period of time frost protection in cooling mode is active, neither a cooling nor a heating request is delivered to the source.

6.8 DHW

Summary

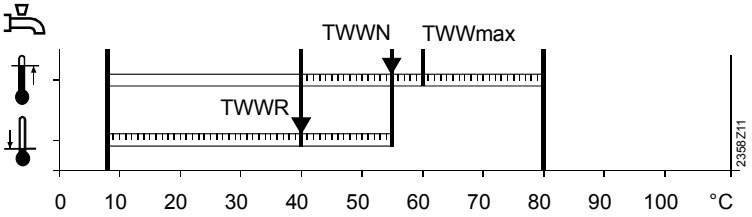


The RVS61.843 controls the DHW temperature according to the time program, or constantly to the relevant setpoint. Priority of DHW charging over space heating can be selected.
The controller features a legionella function with a number of setting choices, fighting legionella viruses both in the storage tank and in the circulation pipe. The circulating pump is controlled according to the selectable time program and the operating mode.

Setpoints

Line no.	*Operating line*
1610	**Nominal setpoint**
1612	**Reduced setpoint**

The DHW is controlled according to different setpoints. These setpoints are activated depending on the selected operating mode, thus leading to the required temperature level in the DHW storage tank.



TWWR Reduced DHW setpoint
TWWN Nominal DHW setpoint
TWWmax Nominal DHW setpoint maximum

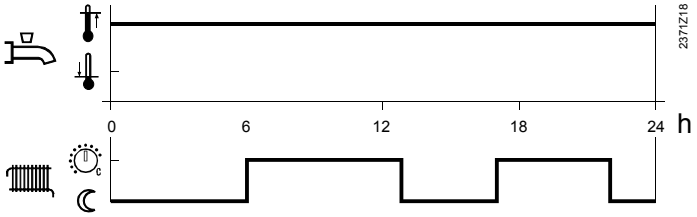
Release

Line no.	*Operating line*
1620	**Release** 24h/day Time programs HCs Time program 4/DHW

24h/day

The DHW temperature is maintained at the nominal DHW setpoint, independent of any time programs.

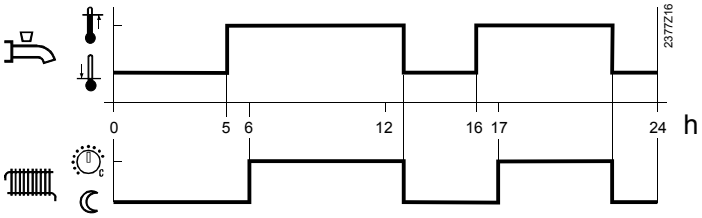
Example:



Time programs HCs

The DHW setpoint changes between the nominal DHW setpoint and the reduced DHW setpoint according to the heating circuits' time program. The first switch-on point of each phase is shifted forward in time by one hour.

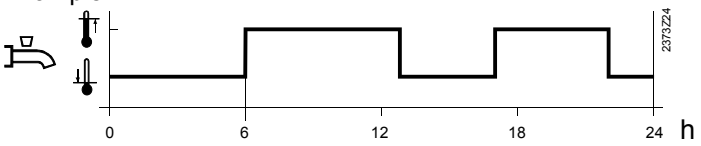
Example:



Time program 4/DHW

For DHW heating, time program 4 of the local controller is taken into consideration. The set switching times of that program are used to switch between the nominal DHW setpoint and the reduced DHW setpoint. This way, the DHW storage tank is charged independently of the heating circuits.

Example:



Charging priority

Line no.	*Operating line*
1630	**Charging priority** Absolute Shifting None MC shifting, PC absolute

When both space and DHW demand heat, the “DHW priority“ function ensures that during DHW charging the heat source’s capacity is used primarily for DHW heating.

Absolute priority

The mixing and pump heating circuits are locked until the DHW has reached the required temperature level.

Shifting priority

If the capacity of the heat source is no longer sufficient, the mixing and pump heating circuits are restricted until the DHW has reached the required temperature level.

No priority

DHW charging and space heating take place at the same time.

In the case of tightly sized heat sources and mixing heating circuits, the DHW setpoint might not be reached if space heating calls for considerable amounts of heat.

Mixing heating circuit shifting, pump heating circuit absolute

The pump heating circuits stay locked until the DHW storage tank is heated up. If the capacity of the heat source is not sufficient, the mixing heating circuits will also be restricted.

Plants without buffer or combi storage tanks: Parameter “Charging priority“ should be set to “Absolute“, ensuring that the consumers will be switched off. If this is not observed, the required DHW temperature might not be reached.

Plants with buffer or combi storage tanks: Parameter “Charging priority“ should be set to “None“. If this is not observed, the heating circuits of plants using storage tanks will be unnecessarily restricted.

Parameter “Charging priority“ has no impact on condenser pump Q9.

Legionella function

Line no.	*Operating line*
1640	**Legionella function** Off Periodically Fixed weekday
1641	**Legionella funct periodically**
1642	**Legionella funct weekday** Monday…Sunday
1644	**Legionella func time**
1645	**Legionella func setpoint**
1646	**Legionella funct duration**
1647	**Legionella funct circ pump**

Legionella function

- Periodically

The legionella function is repeated according to the interval set (1641). If the legionella setpoint is attained via solar plant, independent of the time set, the period of time will be started again.

- Fixed weekday

The legionella function can be activated on a fixed weekday (1642). When using this setting, heating up to the legionella setpoint takes place on the selected weekday, independent of previous storage tank temperatures.

Legionella funct circ pump

During the period of time the legionella function is performed, the DHW circulating pump can be activated.

⚠ During the period of time the legionella function is carried out, there is a risk of scalding when opening the taps.

Circulating pump

Line no.	*Operating line*
1660	**Circulating pump release** Time program 3 / HCP DHW release Time program 4 / DHW
1661	**Circulating pump cycling**
1663	**Circulation setpoint**

Circulating pump release

When using setting “Release DHW“, the circulating pump runs when DHW heating is released.

Circulating pump cycling

When the function is activated, the circulating pump is switched on for a fixed time of 10 minutes within the release time and then switched off again for 20 minutes.

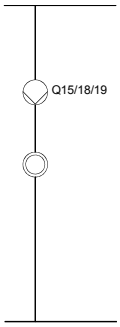
The circulating pump is defined via the relevant setting of a relay output 1 - 4 (5891 - 5894).

Circulation setpoint

If a sensor is installed in the DHW distribution pipe, the controller monitors its actual value during the period of time the legionella function is performed. The adjusted setpoint must be maintained at the sensor during the adjusted “Dwelling time“.

6.9 Hx pumps

Summary



Prerequisite for using the Hx pumps is an appropriately defined Hx input (5950, 5960 or 6046). The input must be defined as heat request, heat request 10 V, release swimming pool, refrigeration request, or refrigeration request 10 V.
The Hx pumps (Q15 / Q18 / Q19) are put into operation when there is a heat or refrigeration request at the respective input, or when excess heat draw is called for.
The pumps are to be connected to the appropriately defined multifunctional relay outputs Qx.. (6030 - 6032).

Hx pumps

Line no.	*Operating line*
2010, 2035, 2046	**H1, H2, H3 Excess heat draw** Off On
2012, 2037, 2048	**H1, H2, H3 with buffer** No Yes
2014, 2039, 2050	**H1, H2, H3 prim contr/system pump** No Yes
2015, 2040, 2051	**H1, H2, H3 Refrigeration request** 2-pipe system 4-pipe system

Excess heat draw

Excess heat draw can be triggered from some other device via bus or by storage tank recooling.
When dissipation of excess heat is activated, it can be drawn by space heating. This can be selected separately for each heating circuit (H1, H2, H3).

Off
Excess heat draw is deactivated.

On
Excess heat draw is activated.

Excess heat draw is active only if the respective Hx input is defined as a heat request or heat request 10 V input.

With buffer

If there is a buffer storage tank, it must be stated whether the Hx circuit can draw heat from it.
When making use of alternative heat sources, the buffer storage tank temperature is used as a control criterion for the release of additional heat sources.

No
Hydraulically speaking, the consumer group is connected **upstream** of the buffer storage tank and cannot draw any heating or cooling energy from it. The heat or refrigeration request is forwarded to the heat / refrigeration source upstream of the buffer storage tank.

Yes
The consumer group is connected **downstream** from the buffer storage tank. It draws heating or cooling energy from the buffer storage tank and its temperature request is taken into account by buffer management.

With prim contr/system pump

The setting defines whether the primary controller / system pump has an impact on the consumer group.

No
Hydraulically speaking, the consumer group is connected **upstream** of the primary controller / system pump and cannot draw any “precontrolled” heating or cooling energy. The heat or refrigeration request is always forwarded to the heat / refrigeration source upstream of the primary controller.

Yes
The consumer group is connected **downstream** from the primary controller / system pump. The primary controller ensures control of a valid heat or refrigeration request, or the system pump is activated.

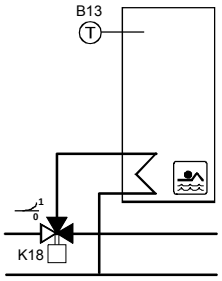
Refrigeration request

2-pipe system
The Hx cooling circuit and the heating circuit obtain their cooling or heating energy from the same circuit.

4-pipe system
The Hx cooling circuit and the heating circuit obtain their cooling or heating energy from separate circuits.

6.10 Swimming pool

Summary



The controller facilitates swimming pool heating with solar energy or a heat pump on the basis of separately adjustable setpoints. In the case of solar heating, it is possible to select priority of swimming pool heating over storage tank charging.

Setpoints

Line no.	*Operating line*
2055	**Setpoint solar heating**
2056	**Setpoint source heating**

Setpoint solar heating

When using solar energy, the swimming pool is heated up until this setpoint is reached. The “Protective collector overtemperature” function can reactivate the collector pump until the maximum swimming pool temperature is reached.

Setpoint source heating

When using the heat source, the swimming pool is heated up until this setpoint is reached.

Priority

Line no.	*Operating line*
2065	**Charging priority solar**

No
Swimming pool heating through solar charging does not give consideration to any priorities. If storage tank charging priority (3822) is deactivated also, the swimming pool is heated alternately with the storage tanks, the temperature increase being 5 °C.

Yes
Swimming pool heating through solar charging is given priority. This also applies if storage tank charging priority (3822) would have to give preference to other heat exchangers.

If **none** of the Hx inputs is used to release the swimming pool, the swimming pool priority is determined by the parameter setting. The swimming pool is always enabled for solar heating.

If the swimming pool is enabled via **one** of the Hx inputs, swimming pool priority is equivalent to the parameter setting. Solar heating must now be enabled via the Hx input.

If **2** Hx inputs are used to enable the swimming pool, the swimming pool is given priority when both Hx inputs are enabled. If only one of the Hx inputs is enabled, the swimming pool priority is determined by the parameter setting. If none of the Hx inputs is enabled, solar heating of the swimming pool is disabled.

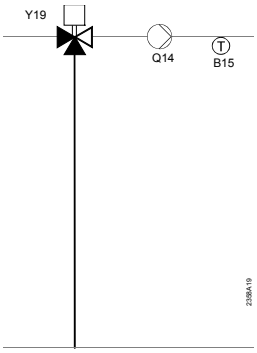
Plant hydraulics

Line no.	*Operating line*
2080	**With solar integration**

This setting is made to indicate whether the swimming pool can be charged by solar energy.

6.11 Primary controller / system pump

Summary



The primary controller makes it possible to mix the flow, aimed at obtaining flow temperatures for heating / cooling groups with setpoints higher or lower than those of the common flow.

The system pump can be used to overcome the pressure drop to remote heating / cooling groups.

Primary controller / system pump

Line no.	*Operating line*
2150	**Prim contr/system pump** Before buffer After buffer

Prim contr/system pump

If the plant uses a buffer storage tank, it is to be set here whether – hydraulically speaking – the primary controller or the system pump is installed upstream of or downstream from the buffer storage tank.

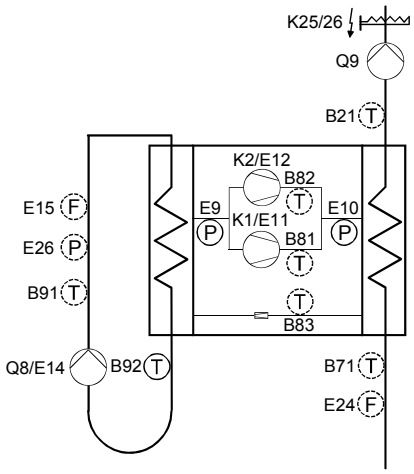
6.12 Heat pump

The heat pump draws energy from the environment (brine, water or air) and delivers it to the heating system at a higher temperature level. If the heat pump is equipped with a process reversing valve, it can also be used for active cooling. Also, brine-to-water and water-to-water heat pumps can be employed for passive cooling.

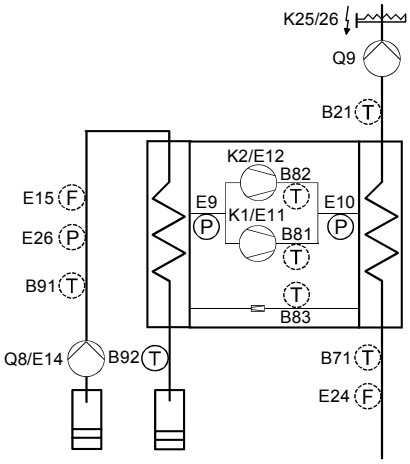
Function diagrams

The following function diagrams show the components and designations used in the description:

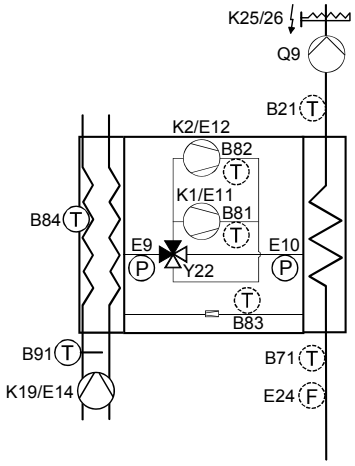
Brine-to-water heat pump



Water-to-water heat pump



Air-to-water heat pump



Mains voltage

E5	Low-tariff
E6	Heat pump lock
E9	Low-pressure switch
E10	High-pressure switch
E11	Compressor 1 overload
E12	Compressor 2 overload
E14	Overload source / fan
E15	Flow switch source
E17	Manual defrost
E24	Flow switch consumers
E26	Pressure switch source
K1	Compressor 1
K2	Compressor 2
K19	Fan air-to-water heat pump
K25	Electric immersion heater 1
K26	Electric immersion heater 2
Q8	Source pump
Q9	Condenser pump
Y22	Process reversing valve air-to-water heat pump

Low-voltage

B21	Flow temperature heat pump
B71	Return temperature heat pump
B81	Hot-gas temperature compressor 1
B82	Hot-gas temperature compressor 2
B83	Refrigerant temperature liquid
B84	Evaporator temperature air-to-water heat pump
B91	Source inlet temperature
B92	Source outlet temperature

Condenser pump

Line no.	*Operating line*
2800	**Frost protection cond pump** **Off** **On**
2801	**Control cond pump**
2802	**Prerun time cond pump**
2803	**Overrun time cond pump**

Frost protection cond pump

It can be defined whether or not the condenser pump shall be put into operation when frost protection for the plant is activated.

Off
The condenser pump does not run when frost protection for the plant is activated.

On
The condenser pump runs when frost protection for the plant is activated.

Control cond pump

This defines whether the pump shall run when there is a valid request or only when the compressor is in operation.

Temperature request
The condenser pump starts running as soon as there is a valid temperature request.

Parallel compressor operation
The condenser pump runs when at least one compressor is in operation.

The condenser pump also runs when the electric immersion heater installed in the flow is in operation.
In the case of an active separate DHW circuit and DHW controlling element Q3 = charging pump (5731), the condenser pump does not operate.

The condenser pump can also be activated by the following functions:

- Frost protection for the plant
- Frost protection for the heat pump
- Storage tank recooling
- Passive cooling

Prerun time cond pump

Prior to starting the compressor, the condenser pump must be activated, enabling the sensors to acquire the correct temperature.

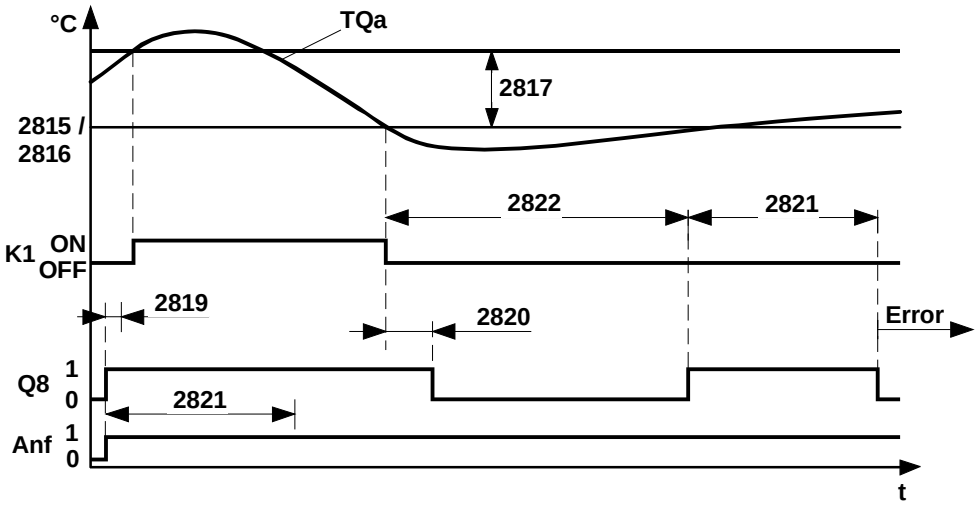
Overrun time cond pump

When the compressor is switched off, the condenser pump continues to run for the set overrun time.

In the event of a heat pump fault, the condenser pump is deactivated until the fault is corrected.
However, if activated, frost protection for the plant, the heat pump or the electric immersion heater K25/K26 can still put the condenser pump into operation.

Source pump

Functional interrelationships



2815 Source temp min water
2817 Switching diff source prot
2821 Source startup time max
2822 Time limit source temp min
TQa Source outlet temperature
K1 Compressor 1
Q8 Source pump
Anf Heat request

Line no.	*Operating line*
2815	**Source temp min water**
2816	**Source temp min brine**
2817	**Switching diff source prot**
2818	**Increase source prot temp**
2819	**Prerun time source**
2820	**Overrun time source**
2821	**Source startup time max**
2822	**Time limit source temp min**

Source temp min water

This function prevents the heat pump from operating at too low source outlet temperatures. It is intended for plants that use water as the heat source.
If, during operation, the source outlet temperature drops below the “Source temp min water”, the pumps and the compressor are switched off for the “Time limit source temp min” (2822).

Source temp min brine

This function is intended for plants that use the ground as a heat source and is aimed at preventing the source temperature from dropping excessively. With the exception of the following 2 points, this function is identical with function “Source temp min water”:

- Function 5804 is used to select whether the temperature at the source inlet or source outlet shall be considered
- During the time the floor curing function is carried out, the controller raises automatically the minimum source temperature by the value set on operating line 2818

The source protection function for brine-to-water heat pumps also applies to setting “Heat source = external” on operating line 5800.

Switching diff source prot

After the set maximum source startup time (2821), the source temperature must exceed the source protection temperature (2815 or 2816) by at least the “Switching diff source prot” (2817) , enabling the compressor to be switched on when there is a valid heat request.

Increase source prot temp

In the case of brine-to-water heat pumps, the controller raises automatically the minimum source temperature (2816) by the adjustable value “Increase source prot temp” during the time the floor curing function is performed.

Prerun time source

Before putting the compressor into operation, the source pump (or the fan in the case of an air-to-water heat pump) must be activated, ensuring that the refrigerant passes through the evaporator, enabling the sensors to acquire the correct temperature.

Overrun time source

When the compressor is switched off, the source pump (or the fan in the case of an air-to-water heat pump) continues to operate for the set overrun time.

Source startup time max

If, during the adjustable “Source startup time max“, the source temperature does not reach the required level (2815 or 2816 plus 2817), the heat pump goes to lockout. The fault must be reset, either manually or automatically.

Time limit source temp min

Refer to the description of ”Source temp min water“ (2815) or “Source temp min brine” (2816).

In the event of a heat pump fault, the source pump will be deactivated until the fault is corrected.

The parameters described above – with the exception of prerun and overrun time source – have no impact on air-to-water heat pumps.

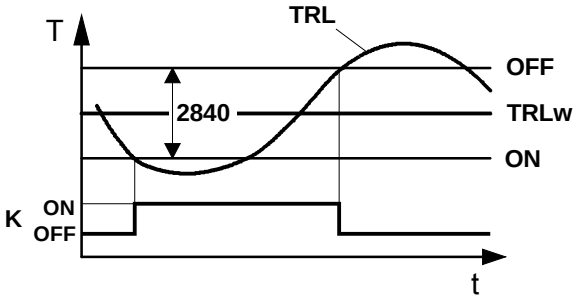
During “Time limit source temp min“ (2822), the electric immersion heaters installed in the flow are activated.

Compressor control in plants without buffer or combi storage tank

The settings apply to compressor 1 and – if present – to compressor 2 also.

Control

If there is no buffer or combi storage tank installed, the compressor is switched according to the return temperature (B71) and the “Switching diff return temp” (2840). The return temperature setpoint is used for calculating the switch-on or switch-off point. The return temperature setpoint is calculated based on the required flow temperature setpoint and the “Differential HC at OT –10 °C“ (5801). The adjustable “Switching diff return temp“ (2840) lies symmetrically about the calculated return temperature setpoint.



2840 Switching diff return temp
OFF Switch-off point
ON Switch-on point
TRLw Return temperature setpoint
K Compressor

The switch-on / off points are impacted by a number of other functions (maximum switch-off temperature, compensation of heat deficits, compressor running time minimum, compressor off time minimum, pump prerun time, and pump overrun time).

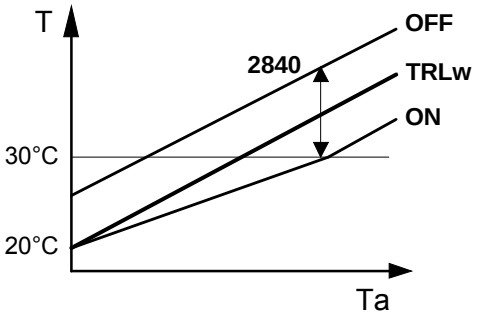
Required sensors:
To enable the controller to put the heat pump into operation without control of a buffer or combi storage tank, at least the return temperature sensor (B71) and the relevant source temperature sensor must be installed. In the case of air-to-water heat pumps, the evaporator sensor (B84) is required also.

Line no.	*Operating line*
2840	**Switching diff return temp**

Switching diff return temp

If the return temperature exceeds the setpoint by half the switching differential, the heat pump will be switched off; if it falls below the setpoint by half the switching differential, the controller will put the heat pump into operation.

If the return temperature setpoint drops below 30 °C, the switching differential is reduced in a way that the switch-on point approaches the setpoint. With a return temperature setpoint of 20 °C, the switch-on point is identical with the return temperature setpoint.



OFF	Switch-off point
ON	Switch-on point
2840	Switching diff return temp
Ta	Outside temperature
T	Temperature of heat pump return
TRLw	Return temperature setpoint

The calculation of the return temperature setpoint is explained on operating line 5810 (“Differential HC at OT –10 °C”).

The function is not active when heat compensation is switched on.

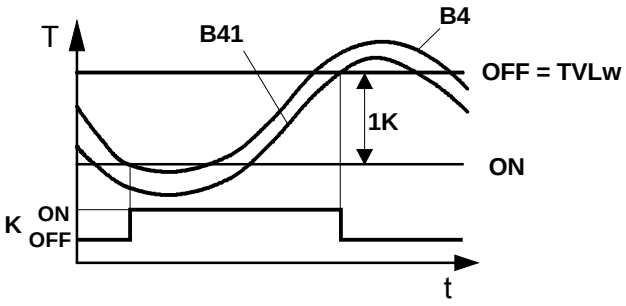
Compressor control in plants with buffer or combi storage tank

The settings apply to compressor 1 and – if present – to compressor 2 also.

Control

If a buffer or storage tank is connected to the same controller as the heat pump, the controller uses sensors B4 and B41 for control of the compressor. The switching differential (2840) has no impact.
If there is no sensor B41, heat pump return temperature sensor B71 is used.
The setting on operating line 2841 defines whether the minimum compressor running time (2842) is observed.

As soon as the temperature at both sensors (B4 + B41) drops 1 Kelvin below the flow temperature setpoint, a heat request is forwarded to the heat pump. This heat request is maintained until the temperature at both sensors reaches the flow temperature setpoint.



B4 Upper buffer or combi storage tank sensor
B41 Lower buffer or combi storage tank sensor
TVLw Flow temperature setpoint
K Compressor
ON Switch-on point
OFF Switch-off point

The switch-on / off points are impacted by a number of other functions (maximum switch-off temperature, compensation of heat deficits, compressor running time minimum, compressor off time minimum, pump prerun time, and pump overrun time).

The heat pump is switched off as soon as the buffer or combi storage tank temperature has reached the setpoint. The minimum off time is always observed, however, even if the temperature at the upper buffer storage tank sensor drops below the switch-on point.

Required sensors:
In the case of control with buffer or combi storage tank, the upper buffer storage tank sensor (B4), the lower buffer storage tank sensor (B41) and the relevant source sensor must be installed.
If the lower buffer storage tank sensor (B41) is missing, the controller uses the return temperature sensor (B71) for switching the heat pump off.

Compressor settings

The settings apply to compressor 1 and – if present – to compressor 2 also.

Line no.	*Operating line*
2841	**Keep compr run time min**
2842	**Compressor run time min**
2843	**Compressor off time min**
2844	**Switch-off temp max**
2845	**Red switch-off temp max**
2852	**LP delay on startup**

Keep compr run time min

This determines if the minimum compressor running time set on operating line 2842 shall be observed if the heat request is stopped prematurely:

No
No consideration is given to the minimum compressor running time. When there is no more heat request, the compressor is switched off.

Yes
The minimum compressor running time is also observed when there is no more heat request.

Compressor run time min

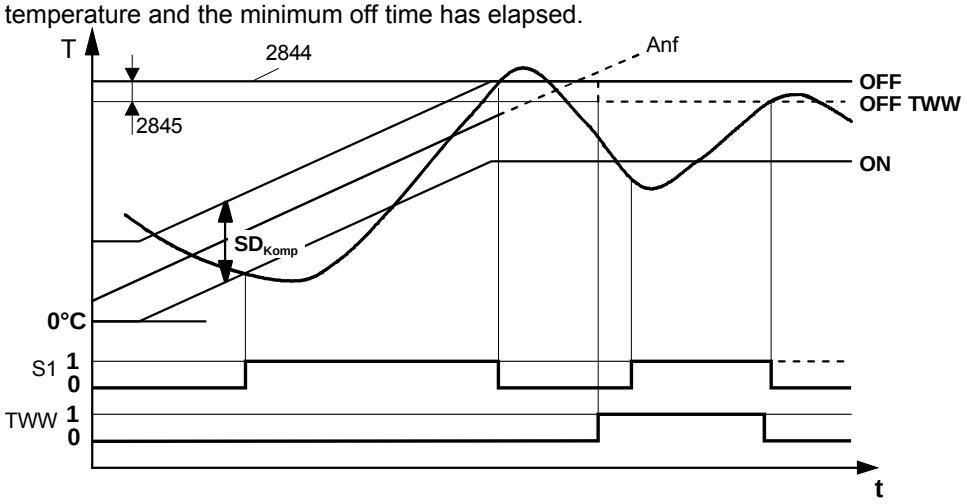
To prevent damage to the compressor due to too frequent switching cycles, the compressor always operates for at least the period of time set here, each time it is switched on. During storage tank charging and in the case of active limitations, the minimum compressor running time is inactive.

Compressor off time min

For the same reason, the compressor remains switched off for the minimum period of time set here.

Switch-off temp max

If the flow or the return temperature exceeds the maximum switch-off temperature, the compressor will be switched off.
The heat pump is switched on again when the temperature at both sensors has dropped by the “Switching diff return temp” (2840) below the maximum switch-off temperature and the minimum off time has elapsed.



2844 Switch-off temp max
2845 Red switch-off temp max
Anf Temperature request from the consumers
SD_{Komp} Compressor switching differential
ON Switch-on point
OFF Switch-off point
OFF TWW Switch-off point DHW
S1 Speed 1.
TWW DHW charging

Red switch-off temp max

In the case of DHW charging, forced buffer storage tank charging and when operating the second compressor stage, "Switch-off temp max” (2844) is reduced by this value.

If the flow or the return temperature (B21 / B71) exceeds this level, DHW charging or forced buffer storage tank charging is prematurely aborted and a change to space heating takes place, provided space heating calls for heat.
In this case, the heat pump continues to operate with no interruption.

If there is no demand for heat from space heating, the heat pump is switched off.
It can resume operation only when the minimum off time (2843) has elapsed, provided the flow or return temperature (B21 / B71) has dropped below the reduced maximum switch-off temperature by the amount of the adjustable switching differential (2840).

If an electric immersion heater is installed, DHW charging can be completed. Otherwise, for DHW charging to be resumed, the DHW storage tank temperature (B3) must drop by the amount of the DHW switching differential (5024).

If a second compressor is in operation, it is always switched off when the reduced switch-off temperature is reached, and no status message is displayed. During DHW charging, or in the case of forced buffer storage tank charging, compressors 1 and 2 are switched off at the same time.

LP delay on startup

When starting the compressor, no consideration is given to the low-pressure switch (E9) during the period of time set here.

Compressor 2

Line no.	*Operating line*
2860	**Lock stage 2 with DHW** **Off** **On**
2861	**Release stage 2 below OT**
2862	**Locking time stage 2**
2863	**Release integral stage 2**
2864	**Reset integral stage 2**
2865	**Compr sequence changeover**

Lock stage 2 with DHW

It can be selected whether the second compressor stage shall be locked during DHW charging.

Off
Compressor stage 2 is released during the period of time the DHW storage tank is charged.
On
Compressor stage 2 is locked during the period of time the DHW storage tank is charged.

Release stage 2 below OT

If the attenuated outside temperature lies below the set release temperature, the second compressor stage is locked.

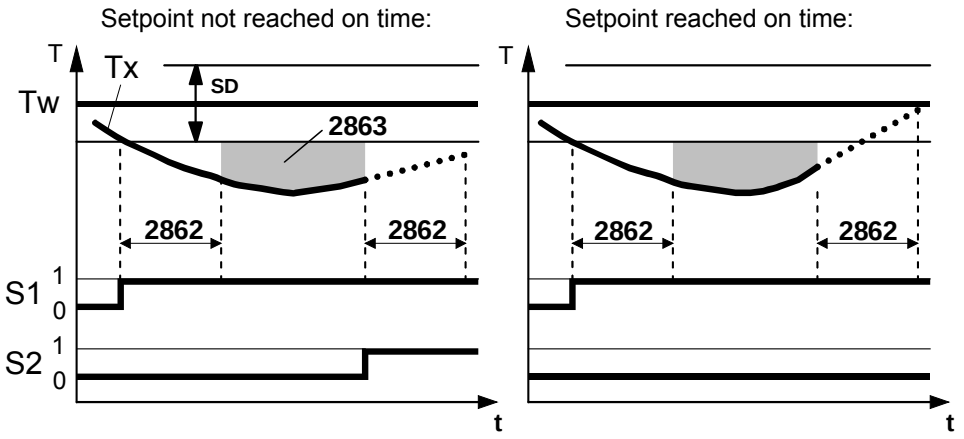
Locking time stage 2

The second stage can be released only when the locking time has elapsed and when the release integral has been filled. The locking time starts to run on release of the first compressor. Calculation of the release integral begins only on completion of the locking time.

The locking time enables compressor 1 to reach a stable operating state before compressor 2 is switched on. It was preset by the compressor supplier.
When compressor 2 is released, compressor 1 is always in operation. Compressor 2 cycles if the output of both compressors together exceeds the demand.

Release integral stage 2

As soon as the locking time for the second compressor stage has elapsed, the controller starts calculating the heat deficit, if there is any.
If the release integral is filled, the anticipated actual value is calculated on completion of a further locking time, based on the current temperature gradient.
The second stage is released only if, on completion of the second locking time, the actual value to be anticipated lies below the required setpoint.



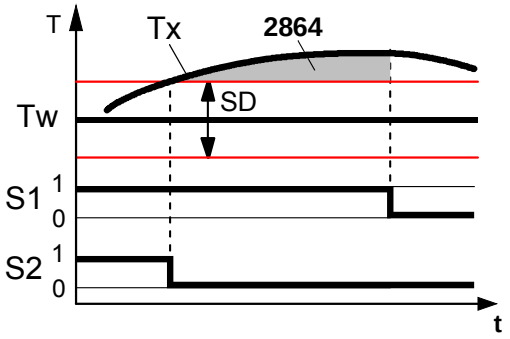
TW	Flow or return temperature setpoint
Tx	Actual value of flow or return temperature
SD	Switching differential
S1	Compressor stage 1
S2	Compressor stage 2
2862	Locking time stage 2
2863	Release integral stage 2
T	Temperature
t	Time

In the case of flow temperature control, the controller uses the flow temperature for calculating the release and the reset integral. When control is based on the return, the return temperature is used for making the calculation.

To ensure correct switching on of the second stage with storage tank charging (buffer or DHW storage tank), a flow temperature sensor must be connected. If that sensor is missing, the controller makes the calculation with a backup value of 0 °C.

Reset integral stage 2

If there is excess heat, the controller generates an integral. As soon as the set value for the integral is reached, release of the second stage is withdrawn and the first stage switched off. If the temperature returns to a level below the switch-on point, the first compressor is switched on again.



TW	Flow or return temperature setpoint
Tx	Actual value of flow or return temperature
SD	Switching differential
S1	Heat pump stage 1
S2	Heat pump stage 2
2864	Reset integral stage 2
T	Temperature
t	Time

If both stages together deliver too much heat, the second stage is immediately switched off when the switch-off point or, latest, the reduced maximum switch-off temperature is reached (2844 and 2845).

Compr sequence changeover

Automatic changeover of the compressors ensures that both compressors operate pretty much the same number of hours.
If the difference of operating hours between the first and the second compressor exceeds the limit (h) set here, the order of startup changes as soon as both compressors are switched off. This means that compressor 1 becomes compressor 2, and vice versa. The current compressor sequence appears on operating line 8446.

Electric immersion heater in the flow

Relays K25 and K26 are intended for using an electric immersion heater in the flow. They are controlled by 2 appropriately configured multifunctional relay outputs QX1 – QX6.
If both relays are present, the electric immersion heater is controlled in 3 stages (1st stage K25, 2nd stage K26, and 3rd stage K25 and K26).

If a flow temperature sensor (B21) is connected, it is used for control to the flow temperature setpoint. The switching differential is 1 °C.
If the flow temperature sensor is missing, but a common flow temperature sensor (B10) is available, that sensor is used for conrol.

If no flow temperature sensor is present, the electric immersion heater is controlled based on the return temperature (B71) and the return temperature setpoint. The switching differential is set with parameter “Switching diff return temp” (2840).

Line no.	*Operating line*
2880	**Use electric flow**
2881	**Locking time electric flow**
2882	**Release integr electric flow**
2883	**Reset integr electric flow**
2884	**Release el flow below OT**

Use electric flow

Control of the electric immersion heater is dependent on the selected kind of use.

Substitute
The electric immersion heater is only used in emergency operation (7141 and 7142). When activating emergency operation (manually or automatically), the electric immersion heater is immediately released to ensure control to the current setpoint. No consideration is given to “Locking time electric flow” (2881) and to “Release electric flow below OT” (2884).

If there is no control sensor (B21, B10, B71), the electric immersion heater is switched on in emergency operation when there is a valid temperature request. In the case of a 3-stage electric immersion heater, both stages (K25 and K26) are switched on at the same time.
Control of the electric immersion heater must take place by an external thermostat.

With DHW charging: If the heat pump is not capable of completing DHW charging, the electric immersion heater is not switched on and DHW charging will be aborted.

Complement to heat pump operation
With this setting, the electric immersion heater is used as described under "Substitute", and in cases where the heat pump is not capable of satisfying the demand for heat.

In the case of DHW charging, the electric immersion heater is locked, however, except when the compressor had to be switched off due to the maximum switch-off temperature, high-pressure or hot-gas problems. In these cases, the electric immersion heater is released for DHW charging when the maximum permissible number of charging attempts (2893) has been reached.

With DHW charging: If the heat pump is not capable of completing DHW charging, it will be completed by the electric immersion heater. In that case, the current DHW charging temperature is saved when switching to the electric immersion heater occurs.
When making the diagnostics, the saved temperature appears as “Curr DHW charg temp HP” (7093).

If there is no control sensor (B21, B10, B71), the electric immersion heater is locked when controlling to the return temperature sensor and can only be activated via emergency operation.

Substitute and complement to heat pump operation

In the following cases, setting “Use electric flow” has no impact on the use of the electric immersion heater:

- With frost protection
- With air-to-water heat pumps during the defrost process
- During active limitation due to too low source temperature (see “Time limit source temp min” for water-to-water heat pumps (2822))

If the flow switch on the consumer side responds, or if the water pressure is too low, the electric immersion heater will be switched off.

Locking time electric flow

The electric immersion heater may be switched on only when the locking time after the compressor start set here has elapsed. If there are 2 compressors, the locking time starts to run after startup of the second compressor.

The locking time is considered only if the electric immersion heater is used as a “Complement to HP operation” (2880). It is not taken into consideration when using the “Substitute” setting.

Release integral electric flow

When using a 2- or 3-stage electric immersion heater, the stages are released in accordance with the release and the reset integral (2882 and 2883).

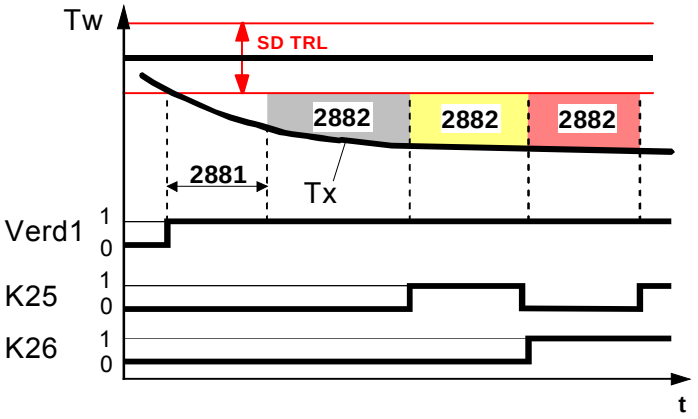
Release integral with “Substitute” setting (2880)

After release of the electric immersion heater’s first stage (K25), the controller compares the actual temperature value with the switch-on point and generates an integral based on the heat deficit, if there is any. As soon as the value of the integral reaches the set maximum value (2882), the second stage is released (K25 off, K26 controls).
The controller continues to compare the actual value of the temperature with the switch-on point and calculates again the heat deficit in the release integral.
When the release integral reaches the set value (2882), the third stage of the electric immersion heater is released (K25 fixed on, and K26 controls).

Release integral with setting “Complement HP operation“ (2880)

On completion of “Locking time electric flow“, the controller starts calculating the heat deficit, if there is any. The first stage of the electric immersion heater (K25) is released only when the heat deficit has reached the level set here.

For the second and third stage of the electric immersion heater, the locking time is not taken into consideration, but the release integral must again reach the set value.



SD TRL Switching differential return temperature
Verd1 Compressor 1
K25 Electric immersion heater relay K25
K26 Electric immersion heater relay K26
T_W Temperature setpoint (switch-on point)
Tx Actual value of temperature
2881 Locking time electric flow
2882 Release integr electric flow
t Time

Reset integr electric flow

If the actual value lies above the switch-off point, the controller switches off the (controlling) stage switched on last and – based on excess heat, if available – starts to compute the reset integral.
The next lower stage is switched off when excess heat reaches the set reset integral (2883).
For a new release, the release integral must be filled again.

Release el flow below OT

The electric immersion heater is released only when the attenuated outside temperature lies below the temperature set here.

This setting is considered only if the electric immersion heater is used as “Complement to HP operation” (2880). With the “Substitute” setting, the electric immersion heater is always released.

Heat pump protection during DHW charging

The heat pump is switched off if the high-pressure switch trips during DHW charging, or because the hot-gas or flow temperature approached its maximum.
Parameter "Number DHW charg attempts" (2893) is used to select whether charging shall immediately be aborted or whether the heat pump shall make a certain number of charging attempts. In the case of several attempts, the heat pump starts the next charging attempt each time the minimum off time has elapsed.
If the heat pump shall make only one charging attempt or if, after the selected number of attempts, the DHW has still not reached the required temperature, DHW charging will be aborted, the controller will save the current DHW temperature and readjust the switch-on point to DHW temperature minus the switching differential DHW. With diagnostics, the saved temperature appears as “Curr DHW charg temp HP” (7093). The value is maintained until – due to limitation – the heat pump must again abort DHW charging.
If the “Curr DHW charg temp HP“ lies below the adjustable value of “DHW charg temp HP min” (7092) a maintenance message appears.
If the reduced setpoint lies below “DHW charg temp HP min“ and the heat pump is able to complete DHW charging, the controller will not deliver a maintenance message.
In the case of sudden setpoint changes, the switch-on point changes to setpoint minus the switching differential.

General parameters

Line no.	*Operating line*
2886	**Compensation heat deficit** Off ¦ On ¦ Only with floor curing fct
2893	**Number DHW charg attempts**
2894	**Delay 3-ph current error**
2895	**Delay flow switch**
2910	**Release above OT**
2911	**For forced buffer charging**
2912	**Full charging buffer**

Compensation heat deficit

This function compensates for excess heat and heat deficits.
These can occur in the following situations:

- Minimum compressor on and off times
- In the case of low temperature requests, the flow temperature can lie below the required setpoint, but the return temperature may not drop below the switch-on point for a longer period of time. In this situation, the heat pump must be switched on to prevent heat deficits

The controller compares continuously the flow temperature setpoint with the actual value and integrates excess heat and heat deficits. Differences are compensated for by extending the compressor on and off times.
If the compressor is not switched on or off due to excess heat / heat deficits, the controller displays an appropriate status message.

The function can only be used when control is based on the return temperature. In the case of plants with buffer or combi storage tanks, the setting (on / off) has no impact.

"Compensation heat deficit" only acts in heating mode. The parameter is inactive in cooling mode.

The maximum switch-off temperature is given priority over the compensation function. In the case of sudden setpoint changes, both integrals will be deleted.

Behavior in connection with the floor curing function

When activating the floor curing function, the integral is set to a level representing 1.5 times the predefined value (default setting). If the actual temperature lies at least 2 K below the required setpoint, the heat pump will immediately be switched on.
If compensation of excess heat / heat deficits shall act only when the floor curing function is active, the respective setting is to be selected. This means that the parameter is deactivated in normal heating mode.

Calculation of integral

If a flow sensor (B21) is connected and the heating curve is set to the flow temperature setpoint, the controller uses the actual flow temperature and the flow temperature setpoint for computing the integrals.

If sensor B21 is not present and the compressor does not operate, the temperature at the return sensor (B71) is used and, when the compressor runs, the temperature at B71 plus parameter "Req temp diff condenser" (2805).

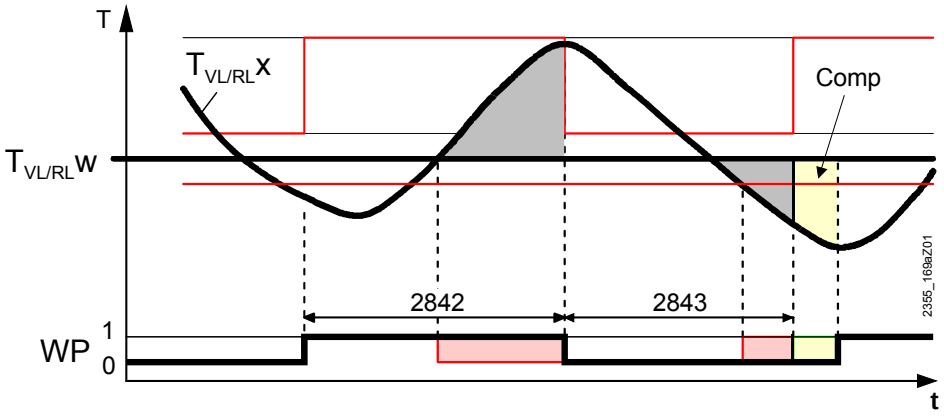
If the heating curves are based on the return (5810), the return sensor (B71) and the return temperature setpoint are used for calculating the integral.
If that is not the case, the return sensor (B71) and the return temperature setpoint are used.

In the following situations, the integral is set to 0:

- No valid temperature request delivered
- Setpoint change > 2 K
- Frost protection for the HP is active
- The heat pump has gone to lockout or cannot deliver any heat for a longer period of time
- The heat pump is in active cooling mode
- A buffer storage tank is being charged
- Function is deactivated

With active DHW charging, the integral value is frozen in.

In the following example of compensation, excess heat occurs during the minimum compressor on time. Excess heat is reduced again on completion of the set minimum compressor off time in that the compressor will not yet be released:



$T_{VL/RL}x$	Actual value of flow or return temperature
$T_{VL/RL}w$	Flow or return temperature setpoint
2842	Compressor run time min
2843	Compressor off time min
WP	Heat pump switching state: 0 = off, 1 = on
Comp	Compensation of excess heat resulting from on time

Number of DHW charging attempts

This number determines how many times DHW charging or forced buffer storage tank charging may be aborted until either the electric immersion heater in the flow or that in the DHW storage tank completes the charging process.

Delay 3-ph current error

The compressor is switched off if the 3-phase current error is constantly present for the period of time set here. On completion of the “Minimum off time“, the heat pump is switched on again. If, within “Duration error repetition”, the 3-phase current error occurs again for at least the delay time, the heat pump will initiate lockout, if the permitted preset number of faults has been exceeded.

Delay flow switch source / consumers

The compressor is switched off if the flow switch signal is constantly present during the period of time set here. On completion of the “Minimum off time“, the heat pump is switched on again. If, within “Duration error repetition”, the flow switch trips again, the heat pump initiates lockout, if the permitted preset number of faults has been exceeded.

If the relevant input EX1 – EX7 is configured for use with a pressure switch, a fixed delay of 3 seconds applies.

Release above OT

The heat pump is released only when the composite outside temperature lies above the value set here. Below this outside temperature level, the amount of heat required must be delivered by some other heat source (bivalent operation). This prevents poor efficiency and thus uneconomical operation of the heat pump.

For forced buffer storage tank charging

This defines the behavior of the heat pump in the case of forced buffer storage tank charging.

Locked
The heat pump is not put into operation for forced buffer storage tank charging.

Released
The heat pump can be put into operation for forced buffer storage tank charging.

Full charging of buffer storage tank

This defines the behavior of the heat pump in the case of full buffer storage tank charging.

Off
The heat pump remains locked until the buffer storage tank is fully charged by some other heat source. It is released only when there is not enough heat for satisfying the current demand (4720).

On
The heat pump is released when the buffer storage tank is fully charged.

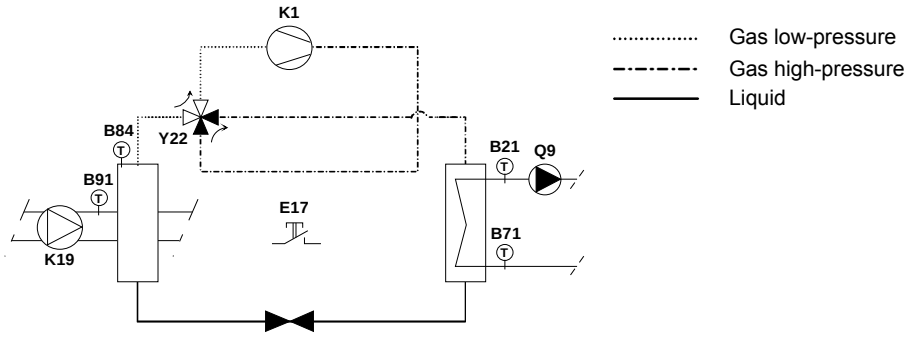
Defrost function for air-to-water HP

Defrosting of an iced-up evaporator is effected either with the fan or the compressor by reversing the process – independent of the outside temperature:

- Above the set outside temperature with the fan
- Below the set outside temperature by reversing the process

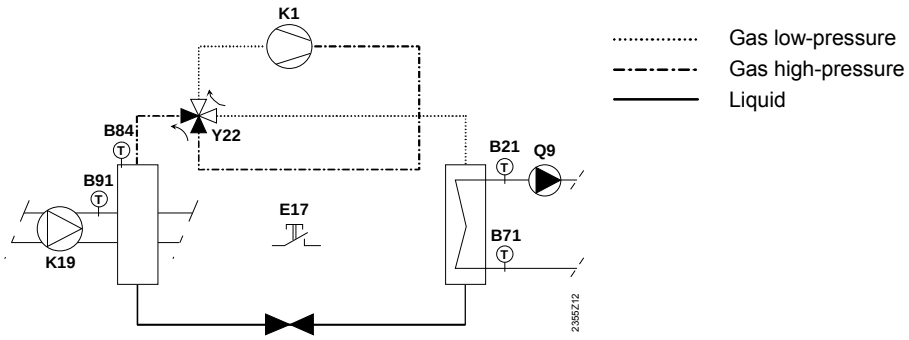
The example below shows a heat pump in heating mode and in defrosting mode with process reversal.

Plant in heating mode
In normal heating mode of an air-to-water heat pump, condensation can occur at low temperatures, causing the evaporator to ice up. This reduces the heat pump's output and can lead to low-pressure malfunctions or damage to the evaporator.



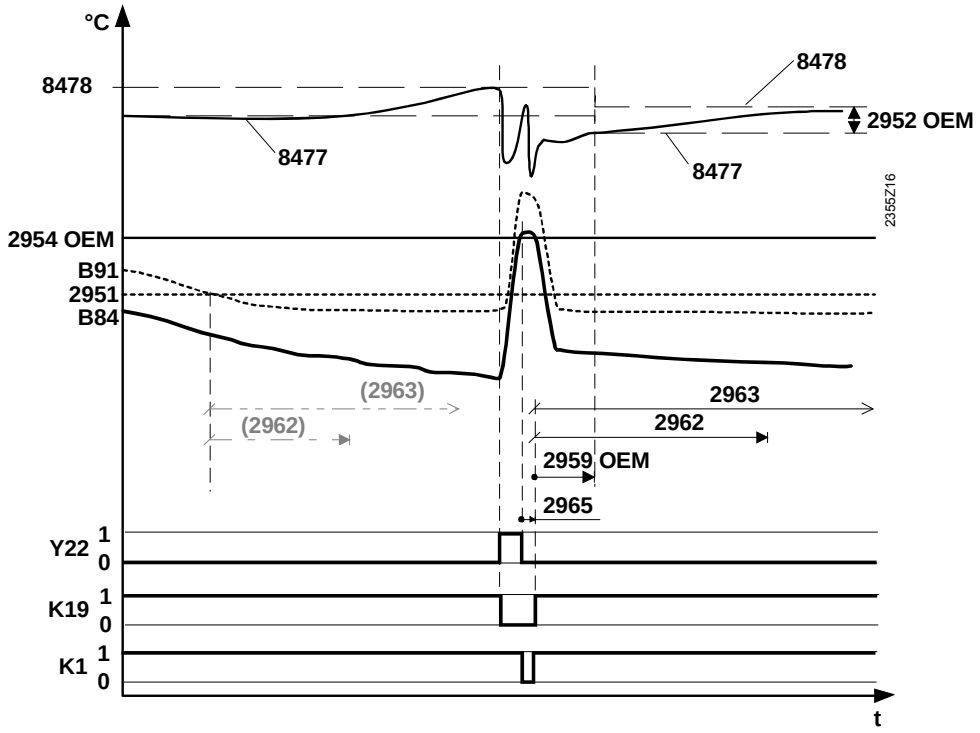
Plant in defrost mode (process reversal)
The evaporator is defrosted either with the fan or – as shown in the example below – with process reversing valve Y22. For process reversal, a HP partial diagram with process reversing valve (Y22) must be used.

Demand-dependent defrost control ensures that the defrost energy drawn from the heating circuit in the case of process reversal will be kept at a minimum. During the defrost process with process reversal, the fan remains deactivated.



Automatic defrost function

When the compressor is in operation, “Duration defrost lock“ (2962) and “Time up to forced defrost“ (2963) elapse. If the source temperature (B91) drops below the defrost release temperature (2951), the defrost release function will be released. The heat pump can change to defrost operation mode after ”Duration defrost lock” at the earliest, and on completion of “Time up to forced defrost” (2963) at the latest.
When, due to icing up during this period of time, the temperature difference (8477) between incoming outside air (B91) and evaporator (B84) exceeds the setpoint (8478), the defrost function is triggered.



B91	Source inlet temperature	2951	Defrost release below OT
B84	Evaporator temperature	2952 OEM	Swi diff defrost
Y22	Process reversing valve	2954 OEM	Evapor temp defrost end
K19	Fan source inlet	2959	Defrost settling time
K1	Compressor 1	2962	Duration defrost lock
		2963	Time up to forced defrost
		2965	Dripping time evapor
		8477	Temp diff defrost act value
		8478	Temp diff defrost setpoint

Defrost end when defrosting through process reversal

When defrosting is successful, the evaporator temperature (B84) rises. If the evaporator temperature exceeds “Evapor temp defrost end“ (2954 OEM), the defrost process can be successfully completed and the compressor is switched off during the dripping time (2965). Then, heating mode is resumed.

Defrost end when defrosting with the fan

Defrosting with the fan is considered completed when one of the 2 following conditions is satisfied:

- The temperature difference (8477) between incoming outside air (B91) and evaporator (B84) is smaller than that set by your supplier
- When defrosting with the fan, the defrost time is reached

The defrost process at low outside temperatures takes more time than at higher outside temperatures.

Resuming heating mode and preparing the next defrost process

Heating mode is resumed after successful completion of the defrost process either through process reversal or with the fan. “Duration defrost lock“, “Time up to forced defrost“ and “Defrost settling time“ (2959 OEM) start to run again.
On completion of “Defrost settling time“ (2959 OEM), “Temp diff defrost icefree“ is acquired and used to generate the new setpoint (8478).

When there is a heat pump lock pending, any active defrost process is completed.

Manual defrosting

Defrosting through process reversal can also be effected manually. Either via one of the inputs EX1 – EX7 or via the operating line (7152). With manual defrosting, no consideration is given to the release temperature (2951) and to “Duration defrost lock“ (2962).

Manual defrosting is also possible during ”Duration defrost lock” and above “Defrost release below OT” (2951). A defrost process in progress is completed, independent of “Defrost release below OT“.

Line no.	*Operating line*
2951	**Defrost release below OT**
2958	**Numb defrost attempts max**
2962	**Duration defrost lock**
2963	**Time up to forced defrost**
2964	**Defrost time max**
2965	**Dripping time evapor**

Defrost release below OT

The defrost function can be released only when the source inlet temperature (B91) lies below the release temperature set here. Above this outside temperature, the automatic defrost function is not active.

Numb defrost attempts max

If the defrost process could not be successfully completed, another attempt is made after a preheating phase (see “Duration defrost lock”). If, during the number of attempts set here, it was still not possible to successfully complete the defrost process, the heat pump is switched off and generates an error message.

For the heat pump to resume operation, the fault must be manually reset.

Duration defrost lock

When the heat pump is switched on in heating mode, “Duration defrost lock” begins to run. It is at the end of this period of time at the earliest the controller is allowed to start the next evaporator defrost attempt.
Prerequisite for defrosting is that the source temperature (B91) lies below the set release temperature (2951).

After a prematurely aborted defrosting attempt (see “Defrost time max“), the heating water is preheated during the period of time “Duration defrost lock”. If an electric immersion heater is installed in the flow or in the buffer / combi storage tank, it is switched on to support preheating. Then, a direct change to defrost mode is made.

Time up to forced defrost

If the heat pump was in operation during the period of time set here, without defrosting in the meantime, forced defrosting will take place.
The same prerequisite applies here: the source temperature (B91) must lie below the set release temperature (2951).

Defrost time max

If, in the case of defrost through process reversal, it was not possible to successfully defrost during “Defrost time max“, the controller aborts the defrost process and tries again after the preheating phase (see “Duration defrost lock”).
The permitted number of defrost attempts is limited by “Numb defrost attempts max“ (2958).

Dripping time evapor

Before the heat pump is allowed to resume heating mode after successfully defrosting through process reversal, the “Dripping time evapor“ set here must elapse. The heat pump resumes operation only on completion of this period of time and the fan is switched on after a delay time preset by the supplier.

Frost protection for the heat pump

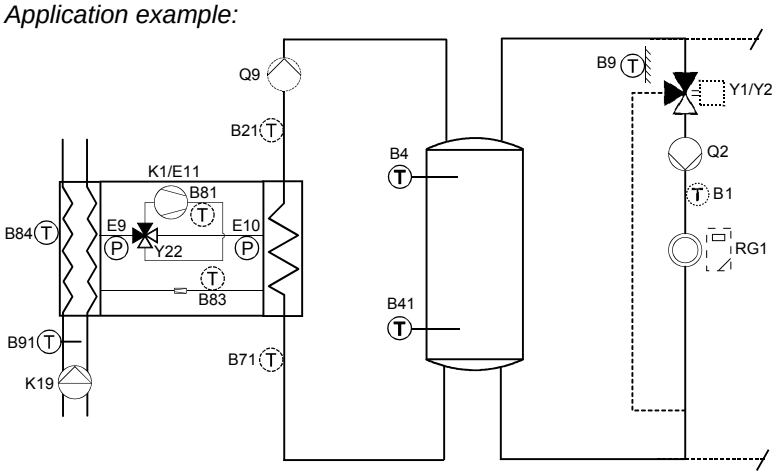
Frost protection for the heat pump leads to release of the heat pump as soon as the flow or the return temperature falls below 5 °C. After both sensors have reached the level of 6 °C, the heat pump’s release is maintained for 5 minutes.
If an electric immersion heater is installed in the flow, it is switched on for this period of time.
In the case of a 3-stage electric immersion heater (K25 and K26), both relays are energized.

Cooling

Active cooling

In the case of active cooling, the heat pump operates as a refrigeration machine by reversing the process in the summer. Process reversal requires a heat pump equipped with a 4-port valve (Y22) and a HP partial plant diagram which supports this function (HP18, 19, 38, 39, 50, 51).
Cooling circuit (5711) and refrigeration (5807) can be in the form of a 2- or 4-pipe system

Application example:

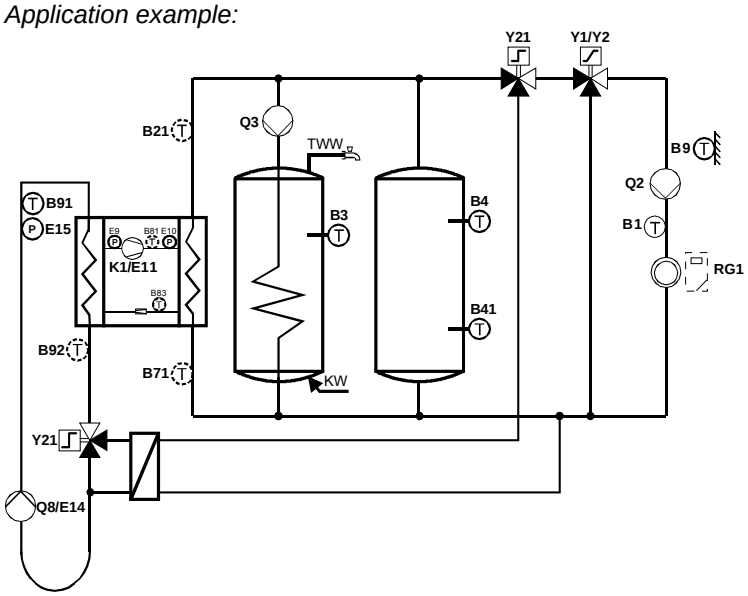


Passive cooling
with brine-to-water or water-to-water heat pump

In the case of passive cooling, cooling is accomplished by letting the cold water circulate through the system without putting a refrigeration source into operation. For that purpose, the heat pump’s source pump and the cooling circuit are switched on.
Cooling circuit 1 (5711) and refrigeration (5807) can be in the form of a 4-pipe system.
The HP partial plant diagram must support passive cooling (HP 14, 15, 22, 23, 34, 35, 42, 43).

Passive cooling is not possible with air-to-water heat pumps.

Application example:



Active and passive cooling

In the case of plants that support both passive and active cooling, the controller switches automatically from passive to active cooling, and vice versa. Simultaneous active and passive cooling is not possible.
As long as the temperature acquired by the source inlet sensor (B91) lies below the cooling request, cooling is passive.
If the source temperature exceeds the cooling request, the controller switches to active cooling.
The HP partial diagram used must support this function (HP 22, 23, 42, 43).

If a source inlet sensor (B91) is used, the temperature acquired by the source outlet sensor (B92) is used as the changeover criterion.

Parameter setting examples with active and passive cooling

The 3 following parameter setting examples show heat pump plant diagrams that make possible automatic changeover between active and passive cooling mode.

The actively produced cooling energy is delivered to the consumers via the heating / cooling pipes.

For the passively produced cooling energy, parameter “During compressor operation” can be used to select indirectly the pipes via which cooling energy shall be delivered to the consumers:

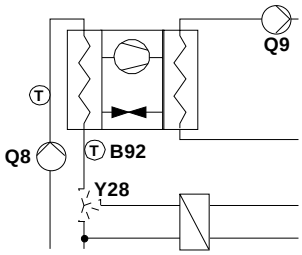
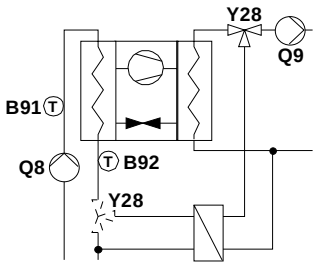
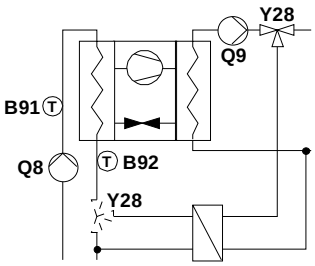
Passive cooling while the compressor is off
The passive cooling enery is diverted to the heating / cooling pipe.
If there is a DHW request, it is satisfied by the heat pump via the common heating / cooling pipe. If there is a cooling request at the same time, it cannot be satisfied.

Passive cooling while the compressor is on
Passive cooling is effected via the cooling pipe. If there is a DHW request, it is satisfied by the heat pump via the heating / cooling pipe. If there is a cooling request at the same time, it can simultaneously be satisfied via the cooling pipe.

If passive cooling is effected via the heating / cooling pipe, parameter “In passive cooling mode” (3007) can be used to define whether the condenser pump shall be switched on or off.

Prerequisites for the 3 examples
- Setting “Heat source” (5800) must read "Brine" or "Water"
- Setting “Refrigeration” (5807) must read “4-pipe system”

- A process reversing valve must be configured

Passive cooling via:	... cooling pipes	… heating / cooling pipes	... heating / cooling pipes
			
"During compressor operation" (3006)	Passive cooling ON	Passive cooling OFF	Passive cooling OFF
"In passive cooling mode" (3007)	Condenser pump OFF	Condenser pump ON	Condenser pump OFF
"Cooling circuit 1" (5711)	4-pipe system	2-pipe system	2-pipe system

Line no.	*Operating line*
3000	**Switch-off temp max cooling**
3002	**Source temp min cool mode**
3004	**SD ch'over cooling pas/act**
3006	**During compressor operation**
3007	**In passive cooling mode**
3008	**Temp diff cond cooling mode**

Switch-off temp max cooling

If the return temperature (B71) lies above "Switch-off temp max cooling", the compressor must not be put into operation. If it is running, it will be switched off.
On completion of the set pump prerun times – but not before 2 minutes have elapsed – the pumps are deactivated if the temperatures are still too high.
Another compressor startup attempt is made on completion of the minimum compressor off time (2843).

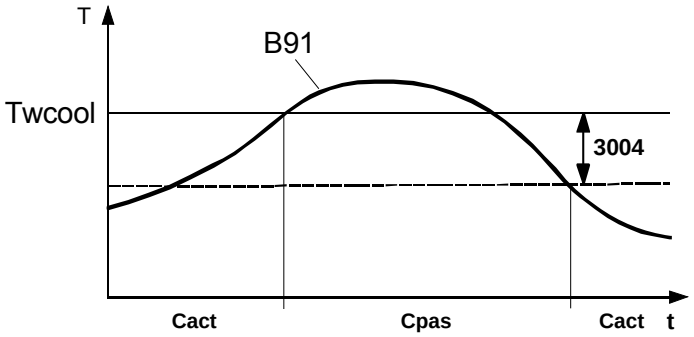
This function is only active in the case of active cooling. It has no impact with passive cooling. For more detailed information about active / passive cooling, refer to page 87.

Source temp min cool mode (frost protection)

To prevent the formation of ice in the heat exchanger for separating the media in passive cooling mode, a minimum source temperature can be entered. If the temperature at the source outlet sensor (B92) falls below the value set with parameter "Source temp min cool mode", the consumers will be locked until the source outlet temperature exceeds the minimum temperature by 1 °C.

SD ch'over cooling pas/act

If the source temperature drops below the cooling setpoint minus the switching differential set here and the minimum compressor on time has elapsed, the controller switches to passive cooling.
SD ch'over cooling pas/act



B91	Source inlet sensor
Twcool	Cooling setpoint
3004	SD ch'over cooling pas/act
Cact	Active cooling mode
Cpas	Passive cooling mode
T	Temperature
t	Time

During compressor operation

This determines whether passive cooling is permitted when the compressor is in operation (e.g. for DHW charging).

Passive cooling off
Passive cooling is locked during the time the compressor operates.

Passive cooling on
Passive cooling is released during the time the compressor operates.

In passive cooling mode

This defines the behaviour of the condenser pump in passive cooling mode.

Condenser pump off
The condenser pump remains deactivated during passive cooling mode.

Condenser pump on
The condenser pump remains activated during passive cooling mode.

Setp red cooling mode

To obtain the return temperature setpoint for active cooling mode, the current flow temperature setpoint (according to the cooling curve) is increased by the value of "Setp red cooling mode" set here.
If the setting = 0 in the case of plants with return temperature control, the cooling curve must be based on the return (plants with pump heating circuits and without buffer or combi storage tanks).

6.13 Cascade

Control

Line no.	*Operating line*
3530	**Release integral source seq**
3531	**Reset integral source seq**
3533	**Switch-on delay**
3534	**Forced time basic stage**

Release integral source seq

When, with the heat source currently in operation, the demand for heat cannot be met - the difference being the release integral set here - another heat source is switched on.
When the value is increased, additional heat sources are switched on at a slower rate.
When the value is decreased, additional heat sources are switched on at a faster rate.

Reset integral heat source seq

When, with the heat source currently in operation, the demand for heat is exceeded by the reset integral set here, the heat source with the highest priority is shut down.
When the value is increased, the heat sources operate for longer periods of time (in the case of excess heat).
When the value is decreased, the heat sources are switched off at a faster rate.

Switch-on delay

Correct setting of the switch-on delay ensures that the plant maintains stable operating states. This prevents frequent cycling of the heat sources.
With DHW requests, the delay time is fixed at one minute.

Forced time basic stage

When switched on, every heat source operates with its basic stage for the period of time set here. The next stage is released only when this period of time has elapsed.

Heat source sequence

Line no.	*Operating line*
3540	**Auto source seq ch'over**
3541	**Auto source seq exclusion** None First Last First and last
3544	**Leading source** Device 1…device 16

Auto source seq ch'over

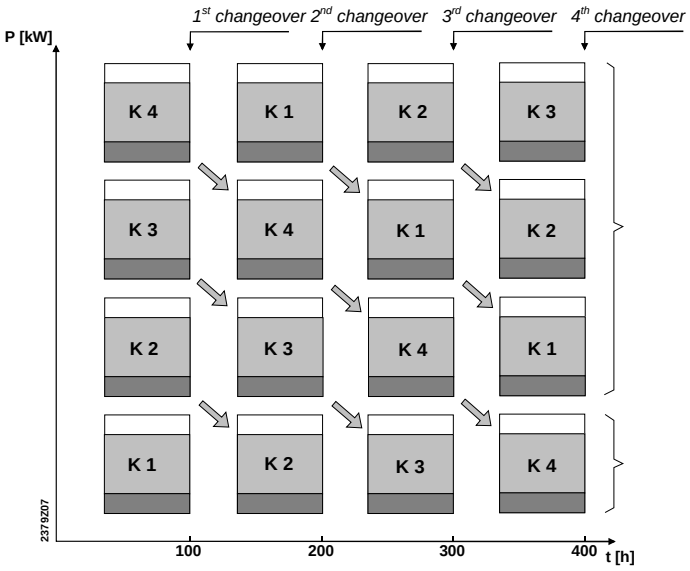
With automatic source sequence changeover, the heat source loads in a cascade can be influenced by defining the order of lead and lag heat source.

Fixed order

Setting - - - defines a fixed order. In that case, the lead heat source can be selected on operating line 3544; the other heat sources are then switched on and off in the same order as the LPB device addresses.

Order according to the number of operating hours

On completion of the number of hours set, the heat source sequence in the cascade changes. It is always the heat source with the next higher device address that takes on the role of lead heat source.



t = total number of operating hours of all lead heat sources = total output of cascade [kW]

Auto source seq exclusion

Setting of the source sequence exclusion is only used in connection with the activated source sequence (3540).
With source sequence exclusion, the first and / or the last heat source can be exempted from automatic changeover.

None
The order of switching on the heat sources changes when the number of hours set is reached (3540).
First
The first heat source in the addressing scheme always remains the lead heat source. With the other heat sources, the order of switching on changes when the set number of hours is reached (3540).
Last
The last heat source in the addressing scheme always remains the last. The other heat sources change when the set number of hours is reached (3540).
First and last
The first heat source in the addressing scheme always remains the lead heat source. The last heat source in the addressing scheme always remains the last. The heat sources in between change when the set number of hours is reached (3540).

Leading source

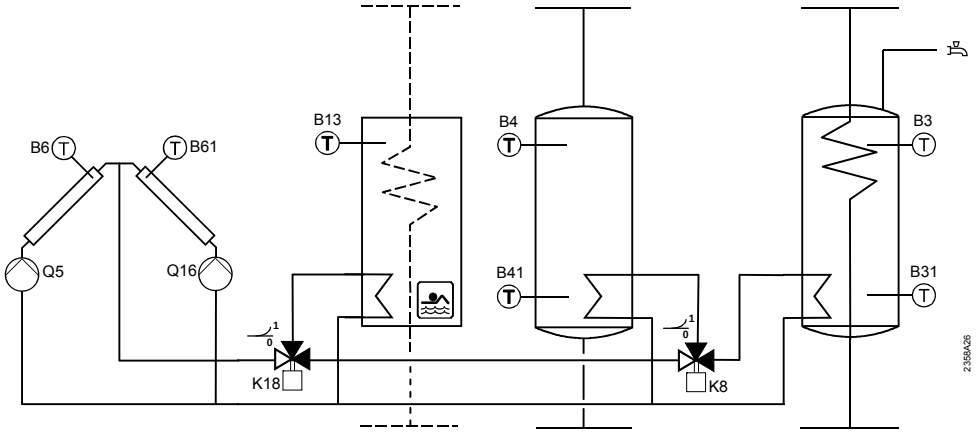
The leading source is only selected in connection with the fixed order of the heat source sequence (3540).
The heat source defined as the lead heat source is always the first to be switched on and the last to be switched off. The other heat sources are switched on and off in the order of their device addresses.

Electric immersion heaters in the cascade

Many heat pumps are equipped with an electric immersion heater (K25) in the flow (directly after the condenser). The electric immersion heaters can be of the 2- or 3-stage type (K25 and K26).
If all compressor stages of the cascade are released, the electric immersion heater of the heat pump with first priority is released. Electric immersion heaters are released according to the same criteria as heat pumps (release and reset integral). The heat pump reports to the source master when all stages of the electric immersion heater are released, or when no electric immersion heater is available.

6.14 Solar

Summary

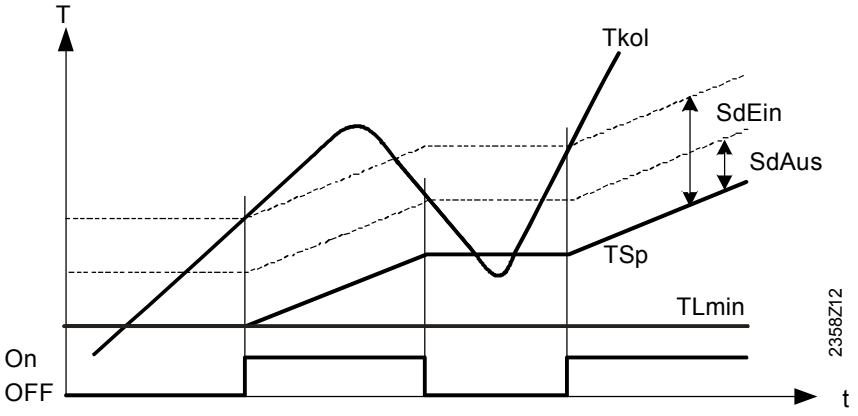


When sufficient solar energy is available, it can be used to heat the swimming pool and to charge the DHW and buffer storage tank. Priorities for heating or charging can be selected. The pumps can be speed-controlled. The plant is protected against frost and overtemperatures.

Charging controller solar (dT)

Line no.	*Operating line*
3810	**Temp diff on**
3811	**Temp diff off**
3812	**Charg temp min DHW st tank**
3815	**Charging temp min buffer**
3818	**Charging temp min swi pool**

To charge the storage tank / heat the swimming pool via the heat exchanger, an adequate temperature differential between collector and buffer storage tank or swimming pool, is required. In addition, the collector temperature must lie above the minimum charging temperature for the storage tank / swimming pool.



Tkol Collector temp
On / Off Collector pump
SdOn Temperature differential on
SdOff Temperature differential off
TSp Storage tank temperature
TLmin Charging temp min DHW storage tank / buffer / swimming pool

Priority

Line no.	*Operating line*
3822	**Charging prio storage tank** None DHW storage tank Buffer
3825	**Charging time relative prio**
3826	**Waiting time relative prio**
3827	**Waiting time parallel op**
3828	**Delay secondary pump**

⚠ The priority circuit for the swimming pool (2065) can impact the storage tank priority for solar charging and may charge the swimming pool before prior to the storage tanks.

Charging prio storage tank

If a plant uses several heat exchangers, it is possible to set a priority for the integrated storage tanks, which defines the charging sequence.

None
Every storage tank is charged alternately for a temperature increase of 5 °C at a time, until every setpoint of level A, B or C (see below) is reached. The setpoints of the next higher level are approached only when all setpoints of the previous level have been reached.

DHW storage tank
During solar charging, preference is given to the DHW storage tank. At every level A, B or C (see below), it is charged with priority. Only then will the other consumers of the same level be charged. As soon as all setpoints of a level are attained, those of the next level are approached, whereby priority is again given to the DHW storage tank.

Buffer storage tank
During solar charging, preference is given to the buffer storage tank. At every level A, B or C (see below), it is charged with priority. Only then will the other consumers of the same level be charged. As soon as all setpoints of a level are attained, those of the next level are approached, whereby priority is again given to the buffer storage tank.
Storage tank setpoints:

Level	DHW storage tank	Buffer storage tank	Swimming pool (1)
A	1610 Nominal setpoint	Buffer setpoint (slave pointer)	2055 Setpoint solar heating
B	5050 Charging temp max	4750 Charging temp max	2055 Setpoint solar heating
C	5051 Storage tank temp max	4751 Storage tank temp max	2070 Swimming pool temp max

(1) When priority for the swimming pool is activated (2065), the swimming pool is charged before the storage tanks.

Charging time relative prio

If the preferred storage tank cannot be charged in accordance with charging control, priority is transferred to the next storage tank or the swimming pool for the period of time set (e.g. temperature differential between collector and storage tank too great). As soon as the preferred storage tank (according to setting "Charging prio storage tank") is again ready to be charged, the transfer of priority will immediately be stopped.

If this parameter is disabled (---) charging proceeds in accordance with the "Charging prio storage tank" settings.

Waiting time relative prio

During the period of time set, the transfer of priority is delayed. This prevents relative priority from intervening too often.

Waiting time parallel op

If solar output is sufficient and solar charging pumps are used, parallel operation is possible. In that case, the storage tank of the priority model can be the next to be charged at the same time, in addition to the storage tank to be charged next. Parallel operation can be delayed by introducing a waiting time. This way, in the case of parallel operation, switching on of the storage tanks can be effected in steps.
Setting (---) disables parallel operation.

Delay secondary pump

To remove any existing cold water from the primary circuit, operation of the secondary pump of the external heat exchanger can be delayed.

Start function

Line no.	*Operating line*
3831	**Min run time collector pump**
3834	**Gradient collector start funct**

Min run time collector pump

The function activates periodically the collector pump for at least the selected minimum running time.

Collector start funct gradient

When the temperature at the collector sensor rises, the collector pump is activated.

Frost protection for the collector

Line no.	*Operating line*
3840	**Collector frost protection**

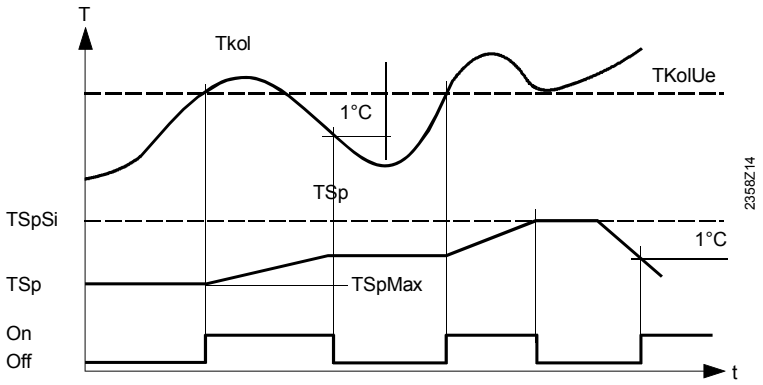
When there is risk of frost at the collector, the collector pump is activated to prevent the heat-carrying medium from freezing.

- If the collector temperature falls below the frost protection temperature, the collector pump is activated: TKol < TKolFrost.
- When the collector temperature returns to a level of 1 K above the frost protection temperature, the collector pump is deactivated again: TKol > TKolFrost + 1.

Overtemperature protection for the collector

Line no.	*Operating line*
3850	**Collector overtemp protection**

If there is a risk of overtemperature at the collector, storage tank charging is continued to reduce the amount of excess heat. When the storage tank's safety temperature is reached, charging is stopped.



TSpSi	Storage tank safety temperature
TSp	Storage tank temperature
TKolUe	Collector temperature for overtemperature protection
TSpmax	Maximum charging temperature
Tkol	Collector temp
On / Off	Collector pump
T	Temperature
t	Time

Medium's evaporation temperature

Line no.	*Operating line*
3860	**Evaporation heat carrier**

If there is a risk of the heat-carrying medium evaporating due to high collector temperatures, the collector pump is deactivated to prevent overtemperatures. This is a protective pump function.

Speed control

Line no.	*Operating line*
3870	**Pump speed min**
3871	**Pump speed max**

Pump speed min / max

The speed range of the solar pump is limited by the minimum and maximum permissible speed.

Yield measurement

Line no.	*Operating line*
3880	**Antifreeze**
3881	**Antifreeze concentration**
3884	**Pump capacity**

The 24-hour and total solar energy yield (8526 and 8527) is calculated, based on these data.

Antifreeze

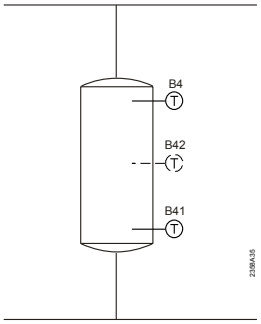
Since the mixing ratio of the collector medium has an impact on heat transmission, the type of antifreeze used and its concentration must be entered in order to be able to determine the energy yield.

Pump capacity

The flow rate in l/h of the pump used must be determined and serves for calculating the volume delivered.

6.15 Buffer storage tank

Summary



A buffer storage tank can be integrated in the plant. It can be charged via the heat pump, by solar energy or by an electric immersion heater. In the case of active cooling, it can also be used for storing cooling energy.
The controller controls heating / cooling and forced charging of the buffer storage tank, protects it against overtemperatures and maintains stratification whenever possible.

Forced charging

Line no.	*Operating line*
4708	**Forced charging setp cooling**
4709	**Forced charg setp heat min**
4710	**Forced charg setp heat max**
4711	**Forced charging time**
4712	**Forced charg duration max**

To save electricity costs or to fully charge the storage tank before the heat pump is locked, forced charging of the buffer storage tank can be triggered. This way, operation of the heat pump is maintained until the required temperature setpoint for forced charging (heating / cooling) in the buffer storage tank is reached, or until forced charging is no longer released, or until the heat pump must be switched off.

When the plant is operating in cooling mode, “Forced charging setp cooling” is used. In heating mode, the slave point is used for the setpoint. It can be limited with ”Forced charg setp heat min” (4709) and “Forced charg setp heat max” (4710).

Forced charging can be triggered either via low-tariff input E5 or operating line “Forced charging time” (4711).
If forced charging is stopped because the heat pump had to be switched off, it will be resumed as soon as the buffer storage tank temperature has dropped by 5 °C (heating) or risen by 5 °C (cooling). At this point in time, forced charging must still be released, and the number of permissible charging abortions must not be exceeded (2893). Otherwise, the controller waits until forced charging is regularly triggered the next time.

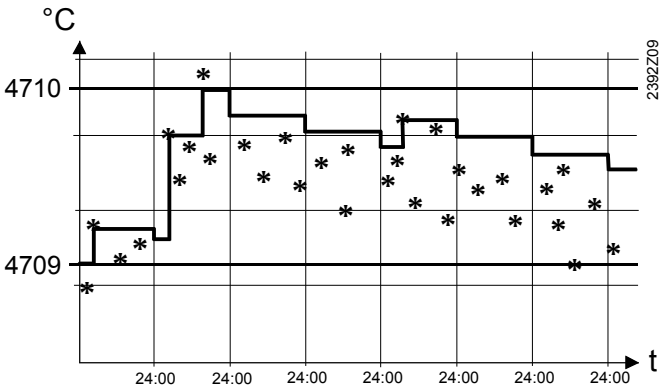
In summer operation, or when all heating circuits are in protective mode, forced charging is locked.

Forced charging setp cooling

Forced charging of the buffer storage tank is completed when the “Forced charging setp cooling“ (4708) is reached. When using setting “---“, forced charging cooling is deactivated. For forced charging to start, the storage tank temperature at the bottom must lie at least 2 K above the adjusted setpoint. If there is no sensor at the bottom, the storage tank sensor at the top is used.

Forced charg setp heat min / Forced charg setp heat max

The slave pointer used as setpoint with forced charging heating can be limited upwards and downwards.
The slave pointer collects the maximum values of the temperature requests from the heating circuit and saves them. Every midnight, the slave pointer setpoint is reduced by 5%.



* = individual temperature requests
4709 Forced charg setp heat min
4710 Forced charg setp heat max

Forced charging time

Forced charging is started every day at the point in time set here (00:00 – 24:00). With "- - -", forced charging is deactivated.

Forced charg duration max

Forced charging is aborted when the required setpoint has not beeen reached on completion of the period of time set here.
Forced charging can also be triggered via input Ex using the "Low-tariff" setting.

Automatic locks

Line no.	*Operating line*
4720	**Auto generation lock** None With B4 With B4 and B41 / B42
4722	**Temp diff buffer/HC**

Auto generation lock

None
The function is deactivated.

With B4:
Sensor B4 is used releasing and locking the heat source.

With B4 and B41 / B42:
Sensor B4 is used for releasing the heat source. For the generation lock, sensor B42 is used, and if this is not available, then B41.

Temp diff buffer/HC

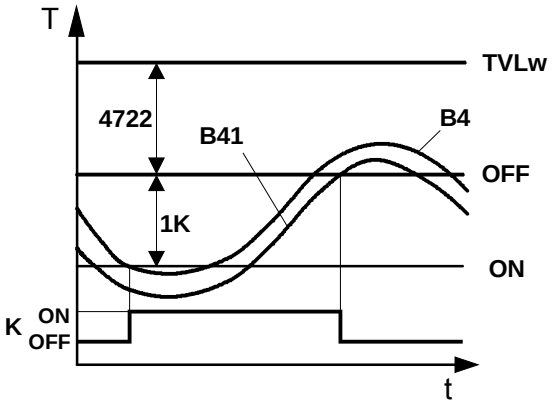
If the temperature differential ∆T between buffer storage tank and temperature request from the heating circuit is sufficiently large, the heat required by the heating circuit is drawn from the buffer storage tank. The heat source is locked.

Released

The heat source is released as soon as the temperature at both buffer storage tank sensors drops by "Temp diff buffer/HC" plus 1 K below the required flow temperature.

Locked

The heat source is locked as soon as the temperature at both buffer storage tank sensors drops by less than “Temp diff buffer/HC” below the required flow temperature.



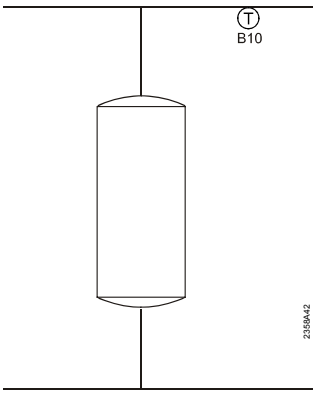
4722	Temp diff buffer/HC
B4	Upper buffer or combi storage tank sensor
B41	Lower buffer or combi storage tank sensor
TVLw	Flow temperature setpoint
K	Compressor

Using “Temp diff buffer/HC“, the mixing valve boost resulting from the heating circuit’s temperature request can be compensated.

Stratification protection

Line no.	*Operating line*
4739	**Stratification protection** Aus ¦ Immer

The buffer storage tank’s stratification protection function provides for hydraulic balancing between the consumers and the heat source without the need for additional shutoff valves for the buffer storage tank.
When the function is active, the volume of water on the consumer side is adjusted so that, where possible, the addition of colder water from the buffer storage tank is avoided.



Off:
Stratification protection is switched off.
Always:
Stratification protection is active when the heat source is on.

A common flow sensor B10 must be connected for this function.

Overtemperature protection

Line no.	*Operating line*
4750	**Charging temp max**

Solar energy charges the buffer storage tank until the set maximum charging temperature is reached.

The protective collector overtemperature function can reactivate the collector pump until the maximum storage tank temperature is reached.

Recooling

Line no.	*Operating line*
4755	**Recooling temp**
4756	**Recooling DHW/HCs**
4757	**Recooling collector** Off Summer Always

Recooling temp

If the buffer storage tank had to be charged via “Charging temp max”, recooling to the recooling temperature set here takes place as soon as possible.
For recooling the buffer storage tank, the 2 following functions are available:

Recooling DHW/HCs

The heat energy can be drawn off either by space heating or the DHW storage tank.
Die Funktion wird auf dieser Bedienzeile ein- oder ausgeschaltet. This can be selected separately for each heating circuit (menu ”Heating circuit 1…”).

Recooling collector

When the collector is cold, the energy can be emitted to the environment via the collector’s surfaces.

Off
Recooling via the collector is deactivated.

Summer
Recooling via the collector is permitted in summer only.

Always
Recooling via the collector is activated throughout the year.

Electric immersion heater

Line no.	*Operating line*
4760	**Charg sensor el imm heater**
4761	**Forced charging electric**

The electric immersion heater **in the buffer storage tank** is released for forced charging when none of the heat sources is able to deliver heat, and in the case of active frost protection for the buffer storage tank.

The electric immersion heater **in the flow** is switched on for forced charging if the heat pump does not reach the setpoint and if, on operating line 2880, “Use electric flow”, setting “Complement HP operation” is used, or when the heat pump works in emergency operation and on operating line 2880, “Use electric flow”, setting “Substitute” is used.

Charg sensor el imm heater

This defines the sensor to be used for charging with an electric immersion heater.

B4
The electric immersion heater is switched on and off via sensor B4.

B42/B41
The electric immersion heater is switched on via sensor B41 and off via sensor B42.

Forced charging electric

If, within one minute after triggering forced charging, none of the heat sources in the system is put into operation for forced charging of the buffer storage tank, the electric immersion heater can ensure it.

No
Electric immersion heater K16 is not used for forced charging.

Yes
If no other heat source provides forced charging, electric immersion heater K16 is used.

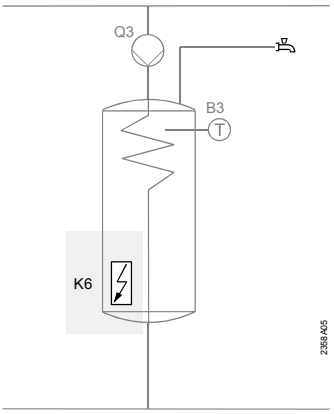
Solar integration

Line no.	*Operating line*
4783	**With solar integration**

Select here whether the buffer storage tank can be charged by solar energy.

6.16 DHW storage tank

Abortion of DHW charging



If DHW charging is stopped because the heat pump has exceeded the number of permitted charging attempts (2893), the electric immersion heater (K6) – if present – continues the charging process.

If no electric immersion heater is used, DHW charging is resumed as soon as the DHW storage tank temperature has dropped by the preset DHW switching differential.

The following criteria can lead to abortion of DHW charging by the heat pump:

- The heat pump cannot complete DHW charging due to a high-pressure fault
- The heat pump must stop DHW charging because the hot-gas or the flow temperature approaches its maximum value. The permitted approach to the maximum value is preset

Charging control

Line no.	*Operating line*
5020	**Flow setpoint boost**
5021	**Transfer boost**
5022	**Type of charging** With B3 ¦ With B3 / B31 ¦ With B3, legio B3/B31
5024	**Switching diff**

Flow setpoint boost

The DHW request to the heat source is made up of the current DHW setpoint plus the adjustable setpoint boost.

Transfer boost

Heat transfer makes it possible to transport energy from the buffer storage tank to the DHW storage tank. In that case, the actual buffer storage tank temperature must be higher than the actual temperature of the DHW storage tank.
The respective temperature differential can be set here.

Type of charging

Storage tank charging can be effected with one or 2 sensors.
It is also possible to implement charging with one sensor and the legionella function with 2 sensors (setting 3).

Switching diff

If the DHW temperature is lower than the current setpoint minus the switching differential set here, DHW charging is started.
DHW charging is completed when the temperature reaches the current setpoint.

When DHW heating is released for the first time in a 24-hour period, forced charging is initiated. DHW charging is also started when the DHW temperature lies within the switching differential, provided it does not lie less than K below the setpoint.

Charging time limitation

Line no.	*Operating line*
5030	**Charging time limitation**

Charging time limitation

During DHW charging, space heating may obtain no or too little energy, depending on the selected charging priority (1630) and the type of hydraulic circuit. For this reason, it is often practical to set a time limit to DHW charging.

- - -
Charging time limitation is deactivated. The DHW is heated up to the nominal setpoint, even if space heating cannot draw sufficient heat for a certain period of time.

10 – 600
DHW charging is stopped after the set period of time in minutes and then locked for the same time before it is resumed. During this period of time, the heat produced is made available for space heating. This cycle is repeated until the nominal DHW setpoint is reached.

When space heating is off (summer operation, Eco function, etc.), DHW charging is not stopped, independent of the selected setting.

Overtemperature protection

Line no.	*Operating line*
5050	**Charging temp max**

The solar collector charges the DHW storage tank until the set “Charging temp max“ is reached.

The protective collector overtemperature function can reactivate the collector pump until the maximum storage tank temperature is reached.

Recooling

Line no.	*Operating line*
5055	**Recooling temp**
5056	**Recooling heat gen/HC** Off ¦ On
5057	**Recooling collector** Off ¦ Summer ¦ Always

Recooling temp

An activated recooling function remains in operation until the set recooling temperature in the DHW storage tank is reached.

Recooling heat gen/HC

Excess heat can be drawn off either by space heating or the DHW storage tank. Heat consumption via a heating circuit can be set separately for every heating circuit (menu "Heating circuit X…”).

Recooling collector

When the collector is cold, surplus energy can be emitted to the environment via the collector’s surfaces

Electric immersion heater

Line no.	*Operating line*
5060	**El imm heater optg mode** Substitute* ¦ Summer ¦ Always
5061	**El immersion heater release** 24h / day ¦ DHW release* ¦ Time program 4

El imm heater optg mode

Substitute

The electric immersion heater ensures DHW charging should the heat pump go to lockout, should it be off, or should DHW charging be aborted by the heat pump.
If the electric immersion heater must ensure DHW charging because the heat pump was not able to complete the charging process, the controller saves the DHW temperature at which the electric immersion heater took over on operating line “Curr DHW charg temp HP”(7093).
Also, at the changeover point, the switch-on temperature is readjusted. If the DHW temperature increases due to the electric immersion heater or some other heat source (e.g. solar), the switch-on point also increases according to the slave pointer principle. The switch-on point increases to a maximum of the current DHW setpoint minus the switching differential. If the DHW temperature falls below the switch-on point, the heat pump is put into operation.

Summer

When all heating circuits have switched to summer operation, the electric immersion heater ensures DHW charging from the next day. This means that the heat pump remains deactivated during summer operation.
DHW heating via the heat pump is resumed only when at least one of the heating circuits has switched to heating mode.

In heating mode, the electric immersion heater is operated as described above under “Substitute“.

Always

DHW charging is always provided by the electric immersion heater.

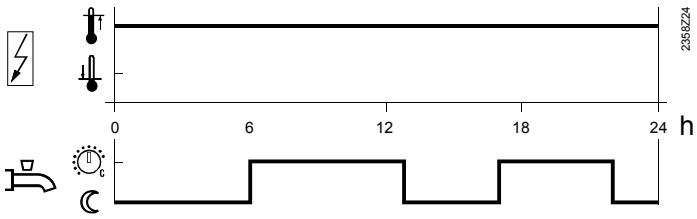
The DHW operating mode button also acts on the electric immersion heater. For the DHW to be heated, the DHW operating mode button must be pressed.

El imm heater release

24h/day

The electric immersion heater is always released, independent of time programs.

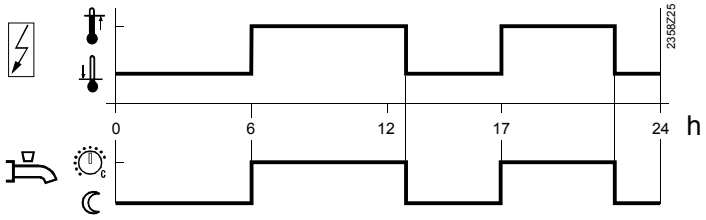
Example:



DHW release

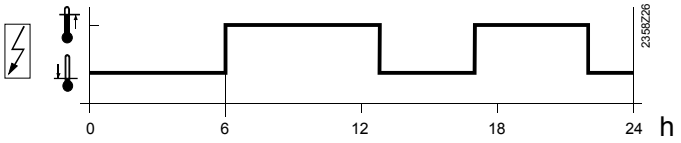
The electric immersion heater is switched according to DHW release.

Example:



Time program 4 / DHW
For the electric immersion heater, time program 4 / DHW of the local controller is taken into account.

Example:



Actual release takes place only if the electric immersion heater can operate according to setting “El imm heater optg mode“ (5060).

El immersion heater control

External thermostat
The storage tank is charged with an external thermostat without setpoint compensation by the controller.

DHW sensor
The storage tank is charged with an electric immersion heater, with setpoint compensation by the controller.

To ensure that setpoint compensation operates as required, the external thermostat must be set to the minimum storage temperature.

Excess heat draw

Line no.	*Operating line*
5085	**Excess heat draw** **Off ¦ On**

Excess heat draw

Excess heat draw can be triggered from some other device via bus or through storage tank recooling.
When dissipation of excess heat is activated, it can be drawn by space heating. This can be adjusted separately for each heating circuit.

Plant hydraulics

Line no.	*Operating line*
5090	**With buffer** **No ¦ Yes**
5092	**With prim contr/system pump** **No ¦ Yes**
5093	**With solar integration** **No ¦ Yes**

With buffer

If there is a buffer storage tank, enter whether the DHW storage tank can draw heat from it.
When using alternative heat sources, the buffer storage tank temperature is used as a control criterion for the release of additional heat sources.

With prim contr/system pump

It is to be set whether the DHW storage tank receives its heat via the primary controller or with the help of the system pump (depending on the type of plant).

With solar integration

It must be selected whether the DHW storage tank shall receive its heat from the solar collectors.

Speed-controlled pump

Line no.	*Operating line*
5101	**Pump speed min**
5102	**Pump speed max**

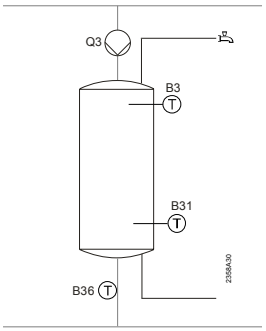
Speed control of charging pump

The speed of the charging pump is limited by a minimum and maximum speed.

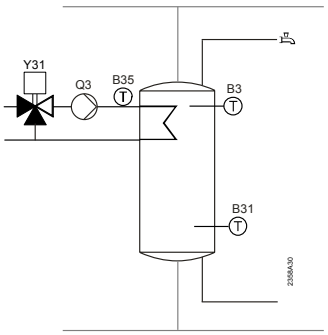
To ensure that the pump operates reliably on startup, it is operated at maximum speed for the first 10 seconds.

Speed control of charging pump Q3

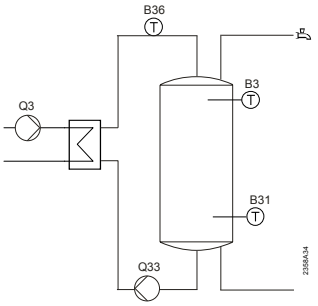
Heat exchanger in the storage tank and sensor B36 in the return.
The controller calculates the charging pump speed required to ensure that the return temperature acquired by sensor B36 is 2 K above the storage tank temperature (B3).



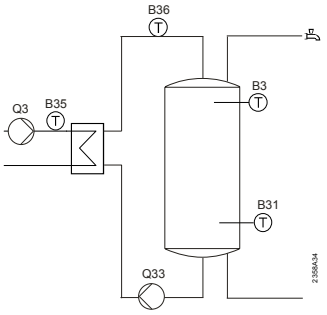
Heat exchanger in storage tank, with primary controller.
The controller calculates the positioning signal required to ensure that the DHW setpoint + charging increase acquired by sensor B35 is achieved.



Heat exchanger outside the storage tank and sensor B36 in the flow (partial plant diagrams 22, 23)
The controller calculates the charging pump speed required to ensure that the charging temperature acquired by sensor B36 is 2 K above the DHW setpoint.



Heat exchanger outside the storage tank, with primary controller.
The controller calculates the charging pump's speed required to ensure that the charging temperature acquired by sensor B35 is 2 K above the DHW setpoint. In this case, primary controller sensor B35 must be located in the intermediate circuit.
If B36 is connected as well, B35 must be positioned as the primary controller sensor. In this case, the controller calculates the speed required to ensure that the DHW setpoint + charging increase acquired by sensor B35 is achieved.

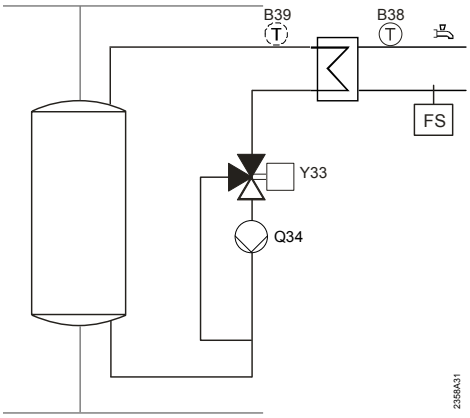


Speed control of intermediate circuit pump Q33

The controller calculates the speed of the intermediate circuit pump required to ensure that the return temperature acquired by sensor B36 is 2 K above the DHW setpoint.
If no B36 is connected, sensor B35 is used to make the calculation.
If no valid sensor is connected, the pump speed is not controlled.

6.17 Instantaneous DHW heater

Summary



The controller supports DHW heating via an external heat exchanger. The heating energy required is delivered by the buffer storage tank.

A speed-controlled or single-speed pump plus mixing valve are used to supply heat to the DHW circuit, depending on demand.

Setpoints

Line no.	*Operating line*
5406	**Min setp diff to tank temp**

The maximum DHW temperature setpoint controlled is the current storage tank temperature minus the setpoint differential that can be adjusted here.

Speed-controlled pump

Line no.	*Operating line*
5530	**Pump speed min**

Pump speed min

The minimum speed of the pump for instantaneous DHW heater can be defined. It is thus possible to negate the lowest pump speeds, which cannot be properly controlled.

Mixing valve control

Line no.	*Operating line*
5544	**Actuator running time**

Actuator running time — Setting the running time of the actuator used with the mixing valve.

6.18 Configuration

Procedure

First, make use of the presetting choices and enter the plant diagram that comes closest to the plant in question. Then, modify manually the individual partial diagrams to match them to the actual requirements.
After that, select the extra functions and make the fine-tuning via the operating lines of the individual parameters.

Preselection of plant diagram

Line no.	*Operating line*
5700	**Presetting**

Presetting — The plant diagrams shown in chapter “Applications“ can be preselected by entering a diagram number. The plant diagram is the result of presetting plus the connected sensors.

The sensors contained in the required plant diagram must be connected to ensure that automatic sensor identification will not detect some other plant diagram.

Manual setting / adjustment of partial diagrams

The plant diagrams consist of several partial diagrams.
The required partial diagrams can be used to manually produce the required final plant diagram.
But it is also possible to modify and adjust partial diagrams of a plant diagram generated via “Presetting” (5700).

A catalog with partial diagrams, which is separately available, contains the partial diagrams implemented in the controller – classified according to groups. Also listed in the catalog are the required operating lines which must be set to produce the respective partial diagrams, plus the sensors required for the relevant partial diagram.

You can use operating lines 6212 - 6217 (see page 162) to check if your adjustments led to the right partial diagram. The check no. shown there must accord with the relevant components group.

Heating / cooling circuit 1

Line no.	*Operating line*
5710	**Heating circuit 1** Off ¦ On
5711	**Cooling circuit 1** Off ¦ 4-pipe system ¦ 2-pipe system¦
5712	**Use of mixing valve 1** None ¦ Heating ¦ Cooling ¦ Heating and Cooling

Heating circuit 1

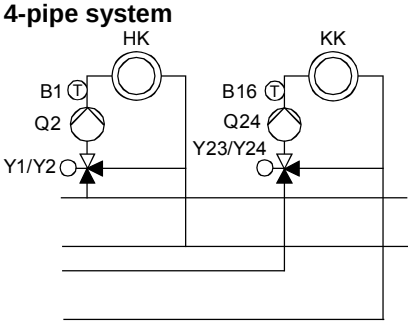
Using this setting, heating circuit 1 can be switched on and off.

Cooling circuit 1

Off

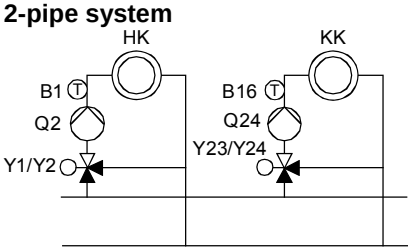
The cooling circuit is deactivated.

4-pipe system



The cooling and heating circuits draw their cooling / heating energy from separate primary circuits.

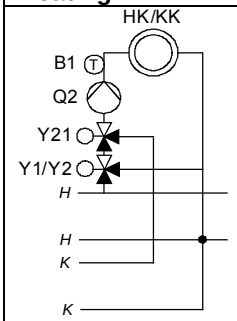
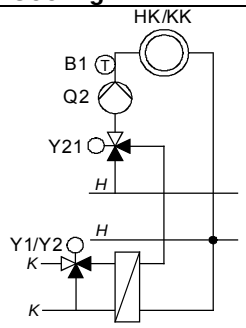
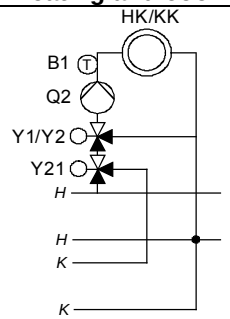
2-pipe system



The cooling and heating circuits draw their cooling / heating energy from the same primary circuit.

Use of mixing valve 1

The parameter is only active in a 4-pipe system.

Heating	**Cooling**	**Heating and cooling**
		

HK Heating circuit
KK Cooling circuit
H Primary heating circuit
K Primary cooling circuit

The setting is required when one of the QX… relay outputs (configuration) is used as a diverting cooling valve Y21.

Heating circuit 2

Line no.	*Operating line*
5715	**Heating circuit 2** Off ¦ On

Heating circuit 2 Using this setting, heating circuit 2 can be switched on and off.

DHW controlling element Q3

Setting	*Operating line*
5731	**DHW control element Q3** None ¦ Charging pump ¦ Diverting valve

None
No DHW charging via Q3.

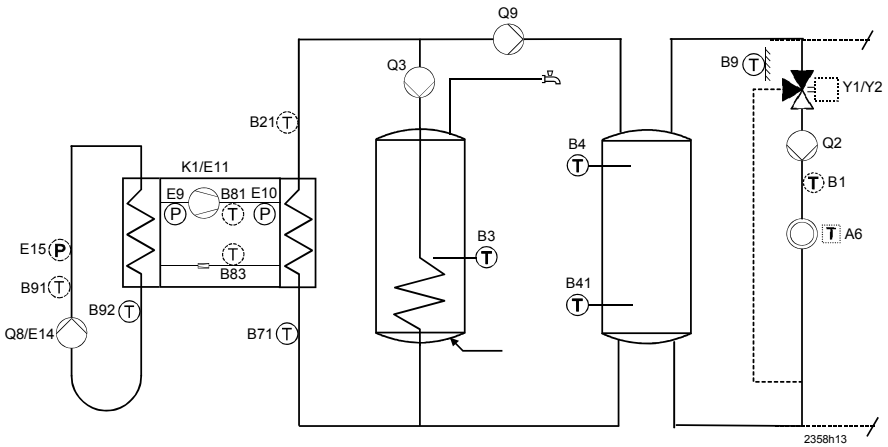
Charging pump
The DHW is heated up with a pump connected to terminals Q3/Y3.

Diverting valve
The DHW is heated up with a diverting valve connected to terminals Q3/Y3.

Separate DHW circuit

In the case of multiboiler plants (cascades), one of the heat sources can temporarily be used for DHW charging only. When DHW charging is activated, the respective heat source hydraulically decouples itself from the system by means of the so-called separate circuit and is not available for space heating during that period of time. On completion of DHW charging, the heat source is again available for space heating, which means that it informs the cascade about it.

When the separate circuit is activated with the RVS61.843, condenser pump Q9 is deactivated when parameter “DHW control element” (5731) is set to "Charging pump”. The plant diagram below shows a possible application of this function.
This type of plant can also be implemented without using system pump Q14.



Line no.	*Operating line*
5736	**Separate circuit**

OFF
The separate circuit is switched off. Every available heat source can charge the DHW storage tank

ON
The separate circuit is switched on. DHW charging takes place solely via the heat source selected for it.

For the separate circuit, DHW controlling element Q3 must be set to “Diverting valve”!

Heat pump

Line no.	*Operating line*
5800	**Heat source** Brine ¦ Water ¦ Air ¦ External
5807	**Refrigeration** Off ¦ 4-pipe system ¦ 2-pipe system
5810	**Differential HC at OT -10°C**

Heat source

The heat source used by the heat pump is to be selected on this operating line. This defines the number and types of sensors required and matches functionality to the relevant type of heat pump.

Brine
E.g. when using geothermal heat.
Water
E.g. when using ground water, lake water or river water.
Air
When using air
Externally
When using a heat source with external control.
The external heat pump can be controlled via the Hx outputs (on / off).
Connection of heat pump sensors to the Siemens controller is optional.
Sensors connected to the controller are used and the associated functions are enabled.
When B71 is connected, use can be made of the controller’s internal compressor stage control. In that case, the compressor stages must also be connected directly to the controller.

Refrigeration

This defines whether and for which system refrigeration is generated.

Off
No generation of refrigeration.

4-pipe system
Refrigeration is generated for a 4-pipe system and supplied either via separate pipes or the same pipes as for heating / cooling.

2-pipe system
Refrigeration is generated for a 2-pipe system and supplied via the same pipes as for heating and cooling.

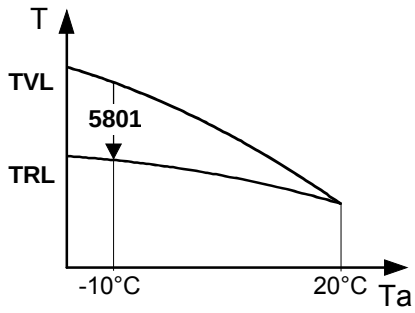
Differential HC at OT -10 °C

For the heat pump to be controlled according to the return temperature setpoint, the latter must be determined first.

For that purpose, the flow temperature setpoint (according to the heating curve) is reduced by the expected temperature differential across the condenser and used as the return temperature setpoint.

The temperature differential at an outside temperature of -10 °C that is entered on this operating line is transformed to the current composite outside temperature.

At an outside temperature of -10 °C, the flow temperature setpoint is reduced by the set value, and there is no more reduction at an outside temperature of 20 °C.



TVL Flow temperature
tRL Return temperature
Ta Outside temperature (OT)

⚠ Important!
Instead of entering the correct temperature differential at -10 °C, it is also possible to enter 0 as the temperature differential. In that case, the heating curve must be set for the return temperature setpoint. But this choice only exists for plants without mixing heating circuit.

⚠ Parameter 5810 is active only if there is no buffer storage tank.

⚠ In cooling mode, the parameter has no impact. In the case of return temperature control, the cooling curve must be based on the return temperature setpoint.

Solar

Line no.	*Operating line*
5840	**Solar controlling element** Charging pump Diverting valve
5841	**External solar exchanger** Jointly DHW storage tank Buffer

Solar controlling element

In place of a collector pump and diverting valves for integrating the storage tanks, the solar plant can also be operated with charging pumps.
When using a diverting valve, it is always only one heat exchanger that can be used at a time. Only alternative operation is possible.
When using a charging pump, all heat exchangers can be used at the same time. Either parallel or alternative operation is possible.

External solar exchanger

In the case of solar plants with 2 storage tanks, it must be selected whether the external heat exchanger shall be used for DHW and as a buffer storage tank, or exclusively for one of the two.

Output relay QX

The use of relay outputs 1 to 6 can be individually defined.

Line no.	*Operating line*
5890	**Relay output QX1, QX2, QX3, QX4, QX5, QX6**
5891	None
5892	Compressor stage 2 K2
5894	Process reversing valve Y22
5895	Hot-gas temp K31
5896	El imm heater 1 flow K25
	El imm heater 2 flow K26
	Diverting valve cool strat2 Y28
	System pump Q14
	Cascade pump Q25
	Heat gen shutoff valve Y4
	El imm heater DHW K6
	Circulating pump Q4
	St tank transfer pump Q11
	DHW interm circ pump Q33
	DHW mixing pump Q35
	Collector pump Q5
	Collector pump 2 Q16
	Solar pump ext exch K9
	Solar ctrl elem buffer K8
	Solar ctrl elem swi pool K18
	El imm heater buffer K16
	H1 pump Q15
	H2 pump Q18
	H3 pump Q19
	Heizkreispumpe HkP Q20
	2. 2nd pump speed HC1 Q21
	2. 2nd pump speed HC2 Q22
	2. 2nd pump speed HCP Q23
	Diverting valve, cooling Y21
	Dehumidifier K29
	Heat request K27
	Refrig demand K28
	Alarm output K10
	Time program 5 K13

Depending on the selection made, setting of the relay outputs assigns appropriate extra functions to the basic diagrams. For detailed information, refer to section “Application diagrams“.

Relay outputs QX1 – QX6

None

The relay output cannot be assigned any function. The relay is inactive.

Compressor stage 2 K2

Relay is used for the control of a second compressor (refer to compressor 2)

Process reversing valve Y22

Control of process reversing valve Y22. The process reversing valve is required for changeover from heating to cooling mode and for the heat pump’s defrost function.

Hot-gas temp K31

The relay is energized when a connected hot-gas temperature sensor B81 or B82 exceeds “Setpoint hot-gas temp” (2849), and deenergized, when the temperature drops by the switching differential (2850) below the setpoint. The type of contact (2851) can be selected.

El imm heater flow K25

The relay is used for the control of an electric immersion heater in the flow (K25) or, in the case of a 2-stage electric immersion heater, for control of the first stage.

El imm heater flow K26
The relay is used for the control of the second stage of an electric immersion heater in the flow (K26).

Diverting valve cool strat2 Y28
Control of optional diverting valve cooling Y28 for changeover to passive cooling. In the case of simultaneous heating mode, this ensures hydraulic disconnection of the heating circuit from the cooling circuit.

System pump Q14
The connected pump serves as a system pump for supplying heat to other consumers. The system pump is put into operation as soon as one of consumers calls for heat. If there is no heat request, the pump will be deactivated followed by overrun.

Cascade pump Q25
Gemeinsame Pumpe für alle Wärmeerzeuger einer Kaskade.

Heat gen shutoff valve Y4
If the buffer storage tank holds a sufficient amount of heat, the consumers can draw their heat from it, and the heat sources need not be put into operation.
Automatic heat generation lock locks the heat sources and hydraulically disconnects them from the rest of the plant with the help of shutoff valve Y4.
This means that the heat consumers draw energy from the buffer storage tank and wrong circulation through the heat sources is prevented.

El imm heater DHW K6
Using the connected electric immersion heater, the DHW can be charged according to operating lines “El imm heater optg mode” (5660) and “El immersion heater release” (5061).

⚠ The electric immersion heater must be fitted with a safety limit thermostat!

ℹ “El imm heater optg mode” must be appropriately set.

Circulating pump Q4
The connected pump serves as a DHW circulating pump.
The time schedule for the circulating pump can be set on operating line “Circulating pump release” (1660). “Circulating pump cycling” can be set on operating line 1661, “Circulation setpoint” on operating line 1663.
.

St tank transfer pump Q11
If the temperature level of the buffer storage tank is high enough, the DHW storage tank can be charged by the buffer. This transfer can be made by means of transfer pump Q11.

DHW interm circ pump Q33
Charging pump with DHW storage tank using an external heat exchanger.

DHW mixing pump Q35
Separate pump for storage tank circulation during the time the legionella function is active.

Collector pump Q5
For control of the collector pump.

Collector pump 2 Q16
For control of the circulating pump of a second solar collector circuit.

Solar pump ext exch K9
For the external heat exchanger, solar pump “Ext heat exchanger K9“ must be set at the multifunctional relay output (QX).
If both a DHW and a buffer storage tank are available, operating line 5841 “External solar exchanger“ must also be set.

Solar ctrl elem buffer K8
If several heat exchangers are used, the buffer storage tank must be set at the respective relay output and, in addition, the type of solar controlling element must be defined on operating line 5840).

Solar ctrl elem swi pool K18
If several heat exchangers are used, the swimming pool must be set at the respective relay output and, in addition, the type of solar controlling element must be defined on operating line 5840).

El imm heater buffer K16
The relay is used for the control of an electric immersion heater in the buffer storage tank.

⚠ Important!
Electric immersion heaters must be fitted with a safety limit thermostat.

H1 pump Q15
Pump H1 can be used for an additional consumer. Together with an external request for heating / cooling at input H1, the application is suited for an air heating coil / air cooling coil, for instance. The pump’s overrun time is always 1 minute.

H2 pump Q18
Pump H1 can be used for an additional consumer. Together with an external request for heating / cooling at input H2, the application is suited for an air heating coil / air cooling coil, for instance. The pump’s overrun time is always 1 minute.

H3 pump Q19
Pump H1 can be used for an additional consumer. Together with an external request for heating / cooling at input H3, the application is suited for an air heating coil / air cooling coil, for instance. The pump’s overrun time is always 1 minute.

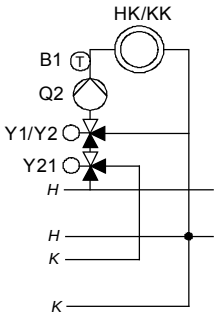
Heat circ pump HCP Q20
The relay is used for the control of heating circuit pump Q20.

2. Pump speed HC1 Q21 / HC2 Q22 / HCP Q23
This function facilitates the control of a 2-speed heating circuit pump, allowing the pump’s capacity to be lowered in Reduced mode (e.g. during night setback). In that case, after pump speed 1, pump speed 2 is switched on as follows via “Multifunctional relay RX“:

1st speed output Q2/Q6/Q20	2nd speed Output Q21/Q22/Q23	Pump state
Off	Off	Off
On	Off	Part load
On	On	Full load

Diverting valve, cooling Y21

Control of the diverting valve for cooling. This necessitates a 4-pipe system. The diverting valve for cooling is required in the case of a commonly used heating and cooling circuit for changeover from heating to cooling when the heat pump is used not only for heating but also and **simultaneously** for cooling.



Example:
Draw off via 4-pipe system

Dehumidifier K29

An external dehumidifier can be enabled if the indoor air humidity rises. In this case, a humidity sensor must be connected to input Hx.
The function of the dehumidifier depends on the cooling functions.
Operation of the dehumidifier is not affected by operating modes, holiday programs, presence button, etc.

Heat request K27

Indicates to an external heat source when there is a request for heat by closing its contact.

Refrig demand K28

As soon as there is refrigeration demand in cooling circuit 1, output K28 is activated. This can be used to switch on an external refrigeration machine.
In the case of device with address 1, a refrigeration demand from the system also can activate output K28. For this purpose, operating line 6627 "Refrig demand K28" on menu "LPB system" must be set to "Centrally".

Alarm output K10

If a fault occurs in the controller or the system, one of the alarm relays delivers a signal. The relevant contact makes with a delay of 10 minutes.
When the fault is corrected, that is, when the error message is no longer present, the contact opens with no delay.

Time program 5 K13

The relay switches any connected component at the points in time set in time program 5 (601 – 616).

Function output QX4-Mod

This setting determines the pump to be modulated.
Modulation is effected via a triac (full-wave control).

Line no.	*Operating line*
5909	**Function output QX4-Mod** None Source pump Q8 / fan K19 DHW pump Q3 DHW interm circ pump Q33 Instant DHW heater Q34 Collector pump Q5 Collector pump 2 Q16 Solar pump buffer K8 Solar pump ext exch K9 Solar pump swi pool K18 Heat circ pump HC1 Q2 Heat circ pump HC2 Q6 Heat circ pump HCP Q20

Observance of the minimum and maximum loads according to the technical data is mandatory.

Sensor input BX1, BX2, BX3, BX4, BX5

Line no.	*Operating line*
5930, **5931,** **5932,** **5933,** **5934**	**Sensor input BX1, BX2, BX3, BX4, BX5** None Buffer sensor B4 Buffer sensor B41 Collector sensor B6 DHW sensor B31 Hot-gas sensor B82 Refrig sensor liquid B83 DHW charging sensor B36 TWW Zapffühler B38 DHW circulation sensor B39 Swimming pool sensor B13 Collector sensor 2 B61 Solar flow sensor B63 Solar return sensor B64 Buffer sensor B42 Common flow sensor B10 Cascade return sensor B70 Solar temp sensor 1 Solar temp sensor 2

Depending on the selection made, setting of the sensor inputs assigns appropriate extra functions to the basic diagrams. For more detailed information, refer to section “Plant diagrams“.

Input H1, H3

These operating lines are used to determine the function of input H1/H3 (Hx).
The selected function is activated by closing a potentialfree contact or by feeding an analog DC 0…10 V signal to terminal Hx.

Line no.	*Operating line*
5950 **5960**	**Function input H1, H3** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Error/alarm message Minimum flow temp setpoint Heat request 10V Dew point monitor Flow temp setp incr hygro Refrigeration request Refrigeration request 10V Pressure measurement 10V Rel room humidity 10V Room temp 10V Release swimming pool Switch-on command HP stage 1 Switch-on command HP stage 2
5951 **5961**	**Contact type H1, H3** NC NO
5952, **5962**	**Function value, contact H1, H3**
5953, **5963**	**Voltage value 1 H1, H3**
5954, **5964**	**Function value 1 H1, H3**
5955, **5965**	**Voltage value 2 H1, H3**
5956, **5966**	**Function value 2 H1, H3**

The settings for input H2 are made on operating lines 6046 – 6052.

Function input Hx

Changeover of operating mode

- Heating circuits
  The operating mode of the respective heating circuit(s) is switched to Protection via terminal Hx (e.g. by means of a remote telephone switch).
- DHW
  DHW heating is locked only when using setting 1 (HCs+DHW) All temperature requests made by the heating circuits and by DHW are ignored. Frost protection is maintained.

Error / alarm message

When input H1 closes, a controller-internal error message is triggered.
If the alarm output (relay outputs QX1 – QX6, 5890 – 5896) is appropriately configured, the error is forwarded or indicated by closing an additional contact (by an external lamp or horn).

Minimum flow temp setpoint
Consumers requiring a minimum flow temperature can request it via contact Hx (e.g. air heating coil for air curtain).
When the contact closes, the temperature setpoint adjusted on operating line 5952 / 5962 is demanded.

Heat request 10V
Heat generation receives heat requests in the form of voltage signals (DC 0...10 V).
The associated setpoint is calculated on the basis of the straight line defined with operating lines 5952 – 5956 (for H1), or 5962 – 5966 (for H3).

Dewpoint monitor
To detect the formation of condensation in the cooling circuit, a dewpoint monitor can be connected to input Hx.
If the dewpoint monitor trips, the cooling circuit is immediately switched off.
The cooling is enabled again when the dewpoint monitor reverts to normal and an adjustable locking time (946) has elapsed.

Flow temp setp inc hygro
To prevent the formation of condensation due to high indoor air humidity, a hygrostat can be connected to input Hx.
If the hygrostat trips, the flow temperature setpoint is increased by the fixed value of "Flow temp setp incr hygro" (947). As soon as the hygrostat reverts to normal, the flow temperature setpoint returns to the "normal value".

Refrigeration request
If the connected contact closes, the controller drives the heat pump to the fixed temperature setpoint adjusted on operating line 5952 (for H1), 6048 (for H2), or 5962 (for H3). If the refrigeration request made is lower, consideration is given to it.

Refrig request 10V
Refrigeration generation receives the refrigeration request in the form of voltage signals (DC 0...10 V).
The respective setpoint in °C is determined via the linear characteristic which is defined by 2 fixed points (voltage value 1 / function value 1, and voltage value 2 / function value 2).

Pressure measurement 10V
The controller receives the pressure signal in the form of voltage signals (DC 0...10 V).
The respective pressure value is calculated via the linear characteristic which is defined by 2 fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).
If the pressure value crosses one of the set limit values, an error or maintenance message is delivered. If the value falls below the critical pressure limit, the heat pump is shut down.

The values of the maximum, minimum and critical water pressure for H1 can be set under 6140 OEM...6142 OEM, foür H2 under 6150 OEM…6152 OEM, and for H3 under 6180 OEM…6182 OEM

Rel room humidity 10V
The controller receives the relative humidity signal in the form of voltage signals (DC 0...10 V).
The respective room humidity is calculated via the linear characteristic which is defined by 2 fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

The controller compares room humidity with the limit values set on operating lines 6137 and 6138 and switches external air dehumidifier K29 connected to an appropriately defined output QX1 – QX6 (5890 – 5896).

Room temp 10V
The controller receives the room temperature signal in the form of voltage signals (DC 0...10 V). The room temperature in connection with relative room humidity is used to calculate the dewpoint temperature in the cooling circuit.
If there is no room unit with a room sensor (BSB) connected for heating / cooling circuit 1, the room temperature measured at Hx is also used for room heating / cooling 1 (variant with compensation and room influence).
The respective room temperature is calculated via the linear characteristic which is defined by 2 fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Release swimming pool
This function is to be used to enable **direct heating of the swimming pool** from externally via the heat pump and Hx pumps (e.g. with a manual switch).
For direct charging, a release signal is always required at input Hx.
Configuration: Set the function of input Hx to "Release swimming pool" **and** select the associated Hx pump at one of the OX outputs.

This function can be used to enable **solar heating of the swimming pool** from externally (e.g. with a manual switch) or to define solar charging priority over storage.
Configuration: Set the function of input Hx to "Release swimming pool". For a description of the function, refer to operating line 2065 "Charging priority solar".

Function of input Hx (5950, 6046, 5960)	Function of output QX..	Status Hx	Release status of sourced
-	x	x	No heating
Sw. pool	"Not" H.. pump	x	No direct heating (Hx acts on solar function)
Sw. pool	Pump Hx	Inactive	Locked
Sw. pool	Pump Hx	Active	Released

- = Release of swimming pool not set
x = not relevant

Switch-on command HP stage 1 (heating only)
By closing a contact connected to this input (e.g. by an external controller or a superposed building automation and control system), stage 1 of the heat pump is put into operation. It remains in operation until contact Hx opens again or until the heat pump is shut down by a safety function (e.g. due to high-pressure, low-pressure, or hot-gas temperature).

Internal requests, DHW requests and requests via bus are suppressed. No consideration is given to minimum off time and minimum running time. The prerun and overrun times of the condenser pump and source pump are taken into account. Normal defrost is possible.

Switch-on command HP stage 2 (heating only)
By closing a contact connected to this input (e.g. by an external controller or a superposed building automation and control system), stage 2 of the heat pump is put into operation. It remains in operation until contact Hx opens again or until the heat

pump is shut down by a safety function (e.g. due to high-pressure, low-pressure, or hot-gas temperature).

Internal requests, DHW requests and requests via bus are suppressed. No consideration is given to minimum off time and minimum running time. The prerun and overrun times of the condenser pump and source pump are taken into account. Normal defrost is possible.

Type of contact Hx

NC contact
The contact is normally closed and must be opened to activate the selected Hx function.

NO contact
The contact is normally open and must be closed to activate the selected function Hx.

The descriptions given on the functions of contact Hx refer to the setting as NO contact.

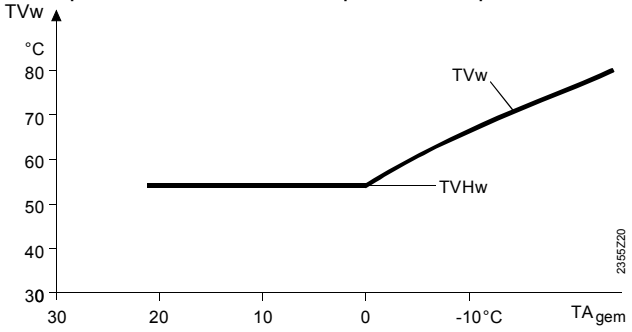
Function value contact Hx

If input H1, H2, H3 (5950, 6046, 5960) is used as a contact input (”Min flow temp setp” or “Refrigeration request”), the controller uses the value set here as the setpoint.

The heat pump is controlled constantly at the temperature level set here, either until contact Hx opens again or until a higher heating / cooling request is delivered.

If several requests for heating or cooling are received at the same time (contact Hx, DHW or from the controller itself), the highest or lowest of them is automatically selected.

Example of minimum flow temperature setpoint:

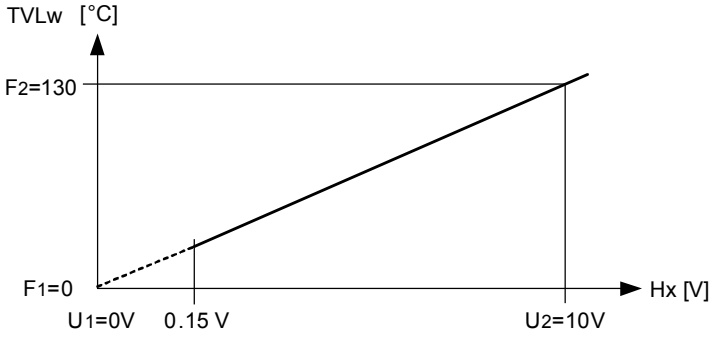


TVHw Minimum flow temperature setpoint
TVw Flow temperature setpoint

Voltage value 1
Function value 1
Voltage value 2
Function value 2

These settings can be made for each input Hx.
The linear characteristic is defined via 2 fixed points. The setting is made with 2 parameter pairs for *Function value* and *Voltage value* (F1/U1 and F2/U2).

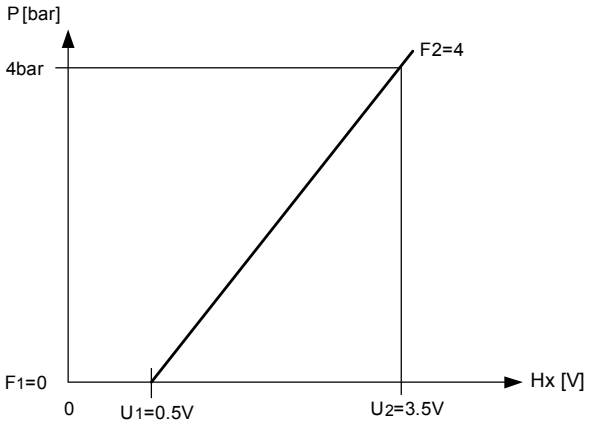
- Example for heat or refrigeration request 10 V



TVLw Flow temperature setpoint
Hx Voltage value at Hx
U1 Voltage value 1
F1 Function value 1
U2 Voltage value 2
F2 Function value 2

If the input signal drops below the limit value of 0.15 V, the heat request is invalid and therefore inactive.

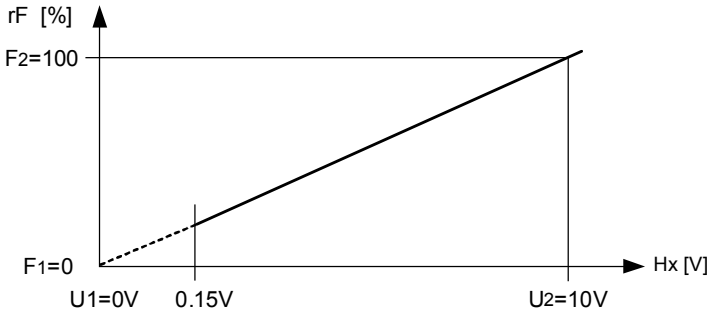
- Example of pressure measurement 10V



B Pressure value
Hx Voltage value at Hx
U1 Voltage value 1
F1 Function value 1
U2 Voltage value 2
F2 Function value 2

If the measured value lies below 0.15 V, it is regarded invalid.

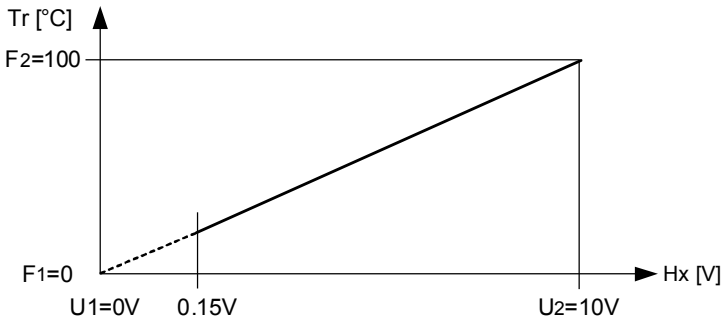
- Example of relative room humidity 10V



rF Relative humidity
Hx Voltage value at Hx
U1 Voltage value 1
F1 Function value 1
U2 Voltage value 2
F2 Function value 2

If the measured value lies below 0.15 V, it is regarded invalid.

- Example of room temperature 10V



Tr	Room temperature
Hx	Voltage value at Hx
U1	Voltage value 1
F1	Function value 1
U2	Voltage value 2
F2	Function value 2

If the measured value is below 0.15 V, it is regarded invalid and an error message is delivered.

Input EX1, EX2, EX3, EX4, EX5, EX6, EX7

This operating line is used to define the function of inputs Ex (230 V).

Line no.	*Operating line*
5980 **5982** **5984** **5986** **5988** **5990** **5992**	**Function input EX1, EX2, EX3, EX4, EX5, EX6, EX7** None Electrical utility lock E6 Low tariff E5 Compressor 2 overload E11 Source overload E14 Pressure switch source E26 Flow switch source E15 Flow switch consumer E24 Manual defrost E17 Common fault HP Fault soft starter 3-phase current (only with Ex 5 ... Ex7)

Function input EX1, EX2, EX3, EX4, EX5, EX6, EX7

None
Activation of input Ex has no impact.

Electrical utility lock
Accepts an external locking signal (e.g. from the electrical utiliy) for the heat pump and locks it. If, in the case of air-to-water heat pumps, locking occurs during defrost, the controller completes the defrost process before locking the heat pump.

Low tariff
The low tariff signal delivered by the electrical utility can be routed via an Ex input. As soon as the input is activated, forced charging of the storage tanks is triggered.

The point in time for forced storage tank charging can also be set as a fixed time on operating lines 4711 and 4712.

Overload compressor 2
Takes the overload message from compressor 2 and shuts it down.
If overload protection responds several times within the preset “Duration error repetition”, the heat pump initiates lockout and must be manually reset to resume operation.

When the compressor is started, no consideration is given to overload protection for 3 seconds.

Overload source
Takes the overload message delivered by the source pump / fan. As soon as the contact is closed, the controller switches the heat pump off. For the heat pump to resume operation, the minimum off time must have elapsed.
If, within the preset ”Duration error repetition“, “Overload source” responds several times, the controller locks the heat pump. Heat pump operation can only be resumed by making a reset.

Pressure switch source
Takes the signal delivered by pressure switch source. If, during source pump operation, the contact closes for at least 3 seconds, and preselected monitoring (always or in heating mode only) is active, and the prerun time has elapsed, the heat pump is shut down.

On completion of “Min off time“, the heat pump is switched on again. If the pressure switch trips again within “Duration error repetition”, the heat pump initiates lockout and operation can only be resumed by making a reset.

Flow switch source
Takes the signal delivered by flow switch source. If, during source pump operation, the contact closes for at least the preset delay time (2895), and preselected monitoring (always or in heating mode only) is active, and the prerun time has elapsed, the heat pump is shut down and operation can only be resumed by making a reset.

On completion of “Min off time“, the heat pump is switched on again. If the flow switch trips again within “Duration error repetition”, the heat pump initiates lockout.

Flow switch consumers
Takes the signal delivered by flow switch consumers.
The flow switch is active only when the condenser pump runs and the prerun time has elapsed. The compressor is not switched on when, on completion of the prerun time and the preset delay time (2895), the flow switch signal is present.
On completion of “Min off time“, the heat pump is switched on again. If the flow switch trips again within “Duration error repetition”, the heat pump initiates lockout. Operation can only be resumed by making a reset.

Defrost manual
Manual defrost is triggered by activating the appropriately defined Ex input.

Common fault HP
Takes a common fault and sets the heat pump to the fault state.
For the heat pump to be switched on again, the common fault must disappear and “Min off time” (2843) must have elapsed.

Fault soft starter
Takes the fault status signal delivered by an external compressor soft starter.
In the event of an active fault, the controller switches off both compressors.
When the fault status message is no longer present, the heat pump is released again.

3-phase current

For monitoring the 3-phase current, the 3 phases must be connected to inputs Ex5, Ex6 and Ex7 in the correct order (L1, L2, and L3). The controller monitors the correct temporal order of the 3 phases. Any phase asymmetry, phase interruption or too low rated voltage of one or several phases is regarded as a 3-phase error.

If a 3-phase error is continuously present during the period of time set under “Delay 3-phase error” (2894), the compressor is switched off for the minimum off time. The controller delivers status message **180: 3-phase current asymmetrical**.

If the 3-phase error occurs again within “Duration error repetition” (2889) for at least the delay time, the heat pump initiates lockout, if the preselected number of errors has been exceeded. The controller delivers error message **355: 3-phase current asymmetrical**. The heat pump must be manually reset.

Mixing group

Line no.	*Operating line*
6014	**Function mixing group 1** Heating circuit 1 Cooling circuit 1 Heating circuit/cooling circuit 1 Prim contr/system pump DHW primary controller Instantaneous DHW heater

Function mixing group 1

Defines use of mixing group 1 and of its inputs and outputs.
The settings are made on the respective menu (heating circuit 1, cooling circuit 1, etc.).
The table below shows the logical assignment of the sensors / relays of the mixing group function to the physical terminals of the mixing group:

Physical terminal on the mixing group	Designation of connections	Logical assignment of sensors and relays per mixing group function					
		Heating circuit 1	Cooling circuit 1	Heating circuit/cooling		DHW primary controller	Instantaneous DHW heater
B1	p	B1	B16	B1	B15	B35	B38
Y1	t	Y1	Y23	Y1	Y19	Y31	Y33
Y2		Y2	Y24	Y2	Y20	Y32	Y34
Q2	s	Q2	Q24	Q2	Q14	Q3	Q34

Extension module

Line no.	*Operating line*
6020 **6021**	**Function extension module 1, 2** None Multifunctional Cooling circuit 1 Heating circuit 2 Solar DHW Primary contr/system pump DHW primary controller Instantaneous DHW heater

Connection terminal on module	QX21	QX22	QX23	BX21	BX22	H2
Multifunctional	*	*	*	*	*	*
Cooling circuit 1	Y23	Y24	Q24	B16	*	*
Heating circuit 2	Y5	Y6	Q6	B12	*	*
Solar DHW	*	*	Q5	B6	B31	*
Primary controller / system pump	Y19	Y20	Q14	B15	*	*
DHW primary controller	Y31	Y32	Q3	B35	*	*
Instantaneous DHW heater	Y33	Y34	Q34	B38	B39	F_S

* Freely selectable in Q…/ BX...
FS = Flow Switch

Multifunctional
Functions that can be assigned to the multifunctional inputs / outputs appear on operating lines 6030, 6031, 6032 and 6040, 6041.

Cooling circuit 1
For this application, the respective settings of menu “Cooling circuit 1” can be adapted.

Heating circuit 2
For this application, the respective settings of menu “Heating circuit 2” can be adapted.

Solar DHW
For this application, the respective settings of menu “Solar” can be adapted.

Primary controller / system pump
For this application, the respective settings of menu “Primary controller / system pump” can be adapted.

DHW primary controller
For this application, the respective settings of menu “DHW storage tank” can be adapted.

Instantaneous DHW heater
For this application, the respective settings of menu “Instantaneous DHW heater” can be adapted.

Frost protection on the extension module

Heating circuit

Frost protection for the heating circuit on the extension module operates the same way as frost protection for the heating circuit connected to the controller (see page 87).

Frost protection for the plant (see page 161) also acts on the heating circuit of the extension module.

Cooling circuit

If the frost protection function on the extension module responds, its pump (Q24) is activated and the mixing valve (Y23 / Y24) maintains the frost protection setpoint (10 °C). But the cooling circuit does not send a request to the heat source.
For monitoring frost protection on the extension module, sensor B16 is used. When there is no flow temperature sensor installed, the frost protection function for the heating circuit is performed with the common flow temperature (B21).

Frost protection for the plant (see page 161) also acts on the cooling circuit of the extension module. The function can be activated / deactivated.

QX extension module

This extension module defines use of the QX… relay outputs.

Line no.	*Operating line*
6030 **6031** **6032**	**Relay output QX21, QX22, QX23** None El imm heater 1 flow K25 El imm heater 2 flow K26 Diverting valve cool strat2 Y28 System pump Q14 Cascade pump Q25 Heat gen shutoff valve Y4 El imm heater DHW K6 Circulating pump Q4 St tank transfer pump Q11 DHW interm circ pump Q33 DHW mixing pump Q35 Collector pump Q5 Collector pump 2 Q16 Solar pump ext exch K9 Solar ctrl elem buffer K8 Solar ctrl elem swi pool K18 El imm heater buffer K16 H1 pump Q15 H2 pump Q18 H3 pump Q19 Heat circ pump HCP Q20 2. 2nd pump speed HC1 Q21 2. 2nd pump speed HC2 Q22 2. 2nd pump speed HCP Q23 Diverting valve cooling Y21 Air dehumidifier K29 Heat request K27 Refrigeration request K28 Alarm output K10 Time program 5 K13

Refer to the function descriptions on operating line "Relay output QX1".

BX extension module

This extension module defines use of the BX… sensor inputs.

Line no.	*Operating line*
6040 **6041**	**Sensor input BX21, BX22** None Buffer sensor B4 Buffer sensor B41 Collector sensor B6 DHW sensor B31 Hot-gas sensor B82 Refrig sensor liquid B83 DHW charging sensor B36 TWW Zapffühler B38 DHW circulation sensor B39 Swimming pool sensor B13 Collector sensor 2 B61 Solar flow sensor B63 Solar return sensor B64 Buffer sensor B42 Common flow sensor B10 Cascade return sensor B70

Refer to the function descriptions on operating line "Sensor input BX1".

H2 extension module

Line no.	*Operating line*
6046	**Function input H2** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Error/alarm message Minimum flow temp setpoint Heat request 10V Dewpoint monitor Flow temp setp incr hygro Refrigeration request Refrigeration request 10V Pressure measurement 10V Rel room humidity 10V Room temp 10V Release swimming pool Switch-on command HP stage 1 Switch-on command HP stage 2
6047	**Contact type H2** NC NO
6048	**Function value, contact H2**
6049	**Voltage value 1 H2**
6050	**Function value 1 H2**
6051	**Voltage value 2 H2**
6052	**Function value 2 H2**

The settings for input H2 on the extension module are the same as those for the Hx inputs on the basic unit. They are described under operating line "Function input Hx".

10V output UX

Line no.	*Operating line*
6070	**Function output UX** None Source pump Q8 / fan K19 DHW pump Q3 DHW interm circ pump Q33 Instant DHW heater Q34 Collector pump Q5 Collector pump 2 Q16 Solar pump buffer K8 Solar pump ext exch K9 Solar pump swi pool K18 Heat circ pump HC1 Q2 Heat circ pump HC2 Q6 Heat circ pump HCP Q20 HP setpoint Output setpoint Heat request Refrigeration request
6071	**Signal logic output UX** Standard Inverted
6072	**Signal output UX** 0...10V PWM
6075	**Temp value 10V UX**

Function output UX

The voltage-modulated output can be used either for speed-controlled pumps or as an output for a voltage-proportional temperature request.

Speed-controlled pumps:
The output signal at UX corresponds to the speed required for the selected pump.

Heat pump setpoint:
The output signal at UX corresponds to the heat pump setpoint.

Output setpoint:
The output signal at UX is proportional to the demand for output on the common flow.

Heating and cooling request:
The output signal at UX corresponds to the common flow temperature setpoint.

Signal logic output UX

The voltage signal can be inverted. It can thus also be used to control pumps with variable speeds, or temperature request receivers that use inverted signal logic.

Signal output UX

Determines whether the signal shall be delivered as a DC 0...10 V signal or pulse width-modulated signal (PWM).

Temperature value 10V UX

This operating line is used to define the maximum temperature request (corresponding to 10 V).

Types of sensor / readjustment

Line no.	*Operating line*
6097	**Sensor type collector** NTC Pt 1000
6098	**Readjustm collector sensor**
6099	**Readjustm coll sensor 2**
6100	**Readjustm outside sensor**

Sensor type collector

Selection of type of sensor used. The controller uses the respective temperature characteristic.

Sensor readjustments

The measured value of the respective sensors can be readjusted by +/- 3 K.

Building and room model

Line no.	*Operating line*
6110	**Time constant building**

When the outside temperature varies, the room temperature changes at different rates, depending on the building's thermal storage capacity (type of building construction). The above setting is used to adjust the rate of response of the flow temperature setpoint to varying outside temperatures.

- Example:

> 20

The room temperature will respond more slowly to outside temperature variations.

10 - 20

This setting can be used for most types of buildings.

< 10

The room temperature will respond more quickly to outside temperature variations.

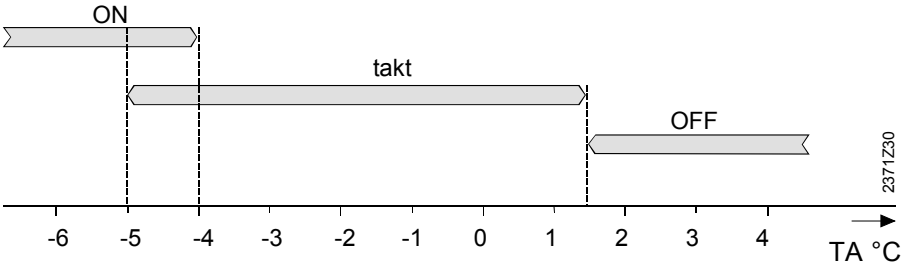
Frost protection for the plant

Line no.	*Operating line*
6120	**Frost protection plant** On Off

The heating circuit pump and condenser pump are activated as a function of the **current** outside temperature, although there is no heat request.

The action on the condenser pump (see page 102) can be switched off.

Outside temperature	Pump	Graph
…-4 °C	Continuously on	ON
-5…1.5 °C	On for 10 minutes at 6-hour intervals	Cycle (takt)
1.5 °C…	Continuously off	OFF



Air dehumidifier

Line no.	*Operating line*
6135	**Air dehumidifier** Off On
6136	**Release air dehumidifier** 24h/day Time programs HC Time program 5
6137	**Air dehumidifier r.h. on**
6138	**Air dehumidifier r.h. SD**

Air dehumidifier

Activates and deactivates the air dehumidification function.

Release air dehumidifier

24h / day
The air dehumidifier is released 24 hours a day.

Time program HC
The air dehumidifier is released according to the time program of heating circuit 1.

Time program 5
The air dehumidifier is released according to time program 5.

Air dehumidifier r.h. on

If the relative humidity acquired via one of the Hx inputs exceeds the setpoint adjusted here, the air dehumidifier is switched on. For that, the air dehumidification function must be activated and the dehumidifier must be released (refer to the 2 functions above).

Air dehumidifier r.h. SD

If the relative humidity falls by the switching differential set here below “Air dehumidifier r.h. on”, the dehumidifier is switched off again.

Sensors

Line no.	*Operating line*
6200	**Save sensors**

At midnight, the basic unit saves the states at the sensor terminals, provided the controller has previously been in operation for at least 2 hours.
If, after saving, a sensor fails, the basic unit generates an error message.
This setting is used to ensure immediate saving of the sensors. This is necessary when, for instance, a sensor is removed because it is no longer needed.

Line no.	*Operating line*
6201	**Reset sensors**

This setting is used to reset all connected sensors. The sensors are read in again using function “Save sensors“ (6200), or automatically at midnight, provided the controller has previously been in operation for at least 2 hours.

Parameters

Line no.	*Operating line*
6204	**Save parameters**

The current parameter settings can be saved as new default settings. Exempted from this are the following menus: “ ”Time of day and date”, “Operator section”, “RF”, and all time programs, as well as the number of operating hours and the different counters..

⚠ Caution!
With this process, the factory settings will be overwritten and cannot be retrieved!

Line no.	*Operating line*
6205	**Reset to default parameters**

The parameters can be reset to their default values. Exempted from this are the following menus: “”Time of day and date”, Operator section”, “RF”, and all time programs, as well as the number of operating hours and the different counters.

Plant diagram

Line no.	*Operating line*		
6212	**Check no. heat source 1** Solar XX		
6213	**Check no. heat source 2** Heat pump XX		
6215	**Check no. storage tank** Combi storage tank XX	Buffer storage tank XX	DHW storage tank XX
6217	**Check no. heating circuits** Heating circuit P XX	Heating circuit 2 XX	Heating circuit 1 XX

Check numbers

To identify the current plant diagram, the basic unit generates a check number. The check number is made up of the lined up part diagram numbers (without the preceding zeros).

For meaning of the numbers for the relevant operating lines, refer to the following tables:

Check no. heat source 1

Solar

One collector field with sensor B6 and collector pump Q5	2 collector fields with sensors B6 and B61 and collector pumps Q5 and Q16	Buffer tank c harging pump K8	Solar diverting valve, buffer K8	Solar charging puimp, swimming pool K18	Solar diverting valve, swimming pool K18	External solar heat exchanger, solar pump K9 DHW = dom. hot water, B = Buffer
0		No solar				
1						*
3						DHW/B
5		x				
6			x			
8		x				DHW+B
9			x			DHW/B
10		x				DHW
11			x			DHW
12		x				B
13			x			B
14				x		
15					x	
17				x		DHW/B
18					x	DHW/B
19		x		x		
20			x		x	
22		x				DHW+B
23			x		x	DHW/B
24		x		x		DHW
25			x		x	DHW
26		x		x		B
27			x		x	B
	31					*
	33					DHW/B
	35		x			
	37	x				DHW+B
	38		x			DHW/B
	39	x				DHW
	40		x			DHW
	41		x			B
	42				x	
	44			x		DHW/B
	45				x	DHW/B
	46		x		x	
	48	x		x		DHW+B
	49		x		x	DHW/B
	50	x		x		DHW
	51		x		x	DHW
	52		x		x	B

Check no. heat source 2

Heat pump	
0	No heat pump
10	Brine-to-water heat pump, 1-stage
11	Brine-to-water heat pump, 2-stage
14	Brine-to-water heat pump, 1-stge, with passive cooling
15	Brine-to-water heat pump, 2-stage, with passive cooling
18	Brine-to-water heat pump, 1-stage, with process reversing valve
19	Brine-to-water heat pump, 2-stage, with process reversing valve
22	Brine-to-water heat pump, 1-stage, with process reversing valve and passive cooling
23	Brine-to-water heat pump, 2-stage, with process reversing valve and passive cooling
30	Water-to-water heat pump, 1-stage
31	Water-to-water heat pump, 2-stage
34	Water-to-water heat pump, 1-stage, with passive cooling
35	Water-to-water heat pump, 2-stage, with passive cooling
38	Water-to-water heat pump, 1-stage, with process reversing valve
39	Water-to-water heat pump, 2-stage, with process reversing valve
42	Water-to-water heat pump, 1-stage, with process reversing valve and passive cooling
43	Water-to-water heat pump, 2-stage, with process reversing valve and passive cooling
50	Air-to-water heat pump, 1-stage, with process reversing valve
51	Air-to-water heat pump, 2-stage, with process reversing valve
60	Heat pump, 1-stage, for external monitoring
61	Heat pump, 2-stage, for external monitoring

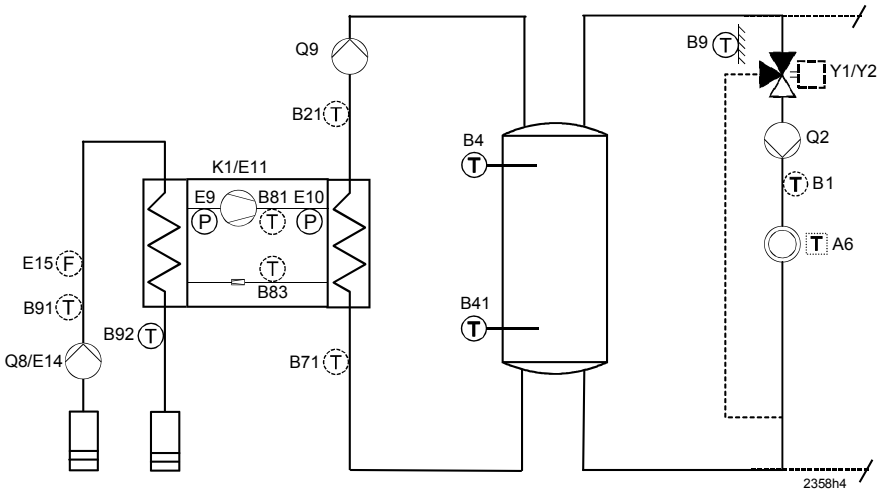
Check no. storage tank

Buffer storage tank		DHW storage tank	
0	No buffer storage tank	00	No DHW storage tank
1	Buffer storage tank	01	Electric immersion heater
2	Buffer storage tank, solar connection	02	Solar connection
4	Buffer storage tank, heat source shutoff valve	04	Charging pump
		05	Charging pump, solar connection
5	Buffer storage tank, solar connection, heat source shutoff valve	13	Diverting valve
		14	Diverting valve, solar connection
		16	Primary controller, without heat exchanger
		17	Primary controller, 1 heat exchanger
		19	Intermediate circuit, without heat exchanger
		20	Intermediate circuit, 1 heat exchanger
		22	Charging pump / intermediate circuit, without heat exchanger
		23	Charging pump / intermediate circuit, 1 heat exchanger
		25	Diverting valve / intermediate circuit, without heat exchanger
		26	Diverting valve / intermediate circuit, 1 heat exchanger
		28	Primary controller / intermediate circuit, without heat exchanger
		29	Primary controller / intermediate circuit, 1 heat exchanger

Check no. heating circuits

Heating circuit P		Heating circuit 2		Heating circuit 1	
0	No heating circuit	00	No heating circuit	00	No heating circuit
2	1st heating circuit pump	02	1st heating circuit pump	01	Circulation via boiler pump
		03	Heating circuit pump, mixing valve	02	1st heating circuit pump
				03	Heating circuit pump, mixing valve
				05..07	Heating/cooling, 2-pipe, common distribution
				08..10	Cooling only, 2-pipe
				12	Heating/cooling, 4-pipe, common distribution
				14..16	Heating/cooling, 4-pipe, common distribution
				20..27	Heating/cooling, 2-pipe, separate distribution
				30..38	Heating/cooling, 4-pipe, separate distribution
				40..42	Cooling only, 4-pipe

Example:
Source 2: Water-to-water heat pump, 1-stage
Storage tank: Buffer storage tank
Heating circuit 1: Heating circuit pump and mixing valve



Displays on the operator unit:

Check no. heat source 2	30
Check no. storage tank	100
Check no. heating circuit	3

Device data

Line no.	*Operating line*
6220	**Software version**

The software version installed represents the state of the software available at the time the controller was produced.
The first 2 digits denote the software version, the third digit gives the software upgrade (e.g. 01.0).

6.19 LPB system

Address / power supply

Line no.	*Operating line*
6600	**Device address**
6601	**Segment address**
6604	**Bus power supply function** Off Automatically
6605	**Bus power supply state** Off On

Device address and segment address

Both the device address and the segment address consist of 2-digit numbers. Together, they form the device's unambiguous LPB address (e.g. 14.16 stands for segment 14, device 16).

Bus power supply function

The bus power supply enables the bus system to be powered directly by the individual controllers (no central bus power supply). The type of bus power supply can be selected.

- Off: No bus power supply via the controller
- Automatically: The bus power supply (LPB) via the controller is automatically switched on and off depending on the requirements of the LPB

Bus power supply state

The display shows whether the controller currently supplies power to the bus:

- Off: Bus power supply via the controller is currently inactive
- On: The bus power supply via controller is currently active. At the moment, the controller supplies some of the power required by the bus

Central functions

Line no.	*Operating line*
6620	**Action changeover functions** Segment System
6621	**Summer changeover** Locally Centrally
6623	**Optg mode changeover** Locally Centrally
6625	**DHW assignment** Local HCs All heating circuits in the segment: All HCs in system
6627	**Refrigeration request** Locally Centrally
6630	**Cascade master** Always Automatic

These settings are only relevant for device address 1.

Action changeover functions

The range of action of central changeover can be defined.
This concerns:

- Changeover of operating mode via input H (when selecting “Centrally“ on operating line 6623)
- Summer changeover (when selecting ”Central“ on operating line 6621)

The possible settings are the following:

- Segment: Changeover takes place with all controllers in the same segment
- System: With all controllers, changeover takes place in the entire system (in all segments). For that, the controller must be located in segment 0!

Summer changeover

The range of action of summer changeover is as follows:

- Local entry:
  Local action; the local heating circuit is switched on the basis of operating lines 730, 1030 and 1330
- Central entry: Central action; depending on the setting made on operating line “Action changeover functions“, either the heating circuits in the segment or those in the entire system are switched on the basis of operating line 730

Optg mode changeover

The range of action of operating mode changeover via input H is as follows:

- Local entry:
  Local action; the local heating circuit is switched on and off
- Central entry:
  Central action; depending on the setting made on operating line “Action changeover functions“, either the heating circuits in the segment or those in the entire system are switched

DHW assignment

Assignment of DHW heating is required only if it is controlled by a heating circuit time program (refer to operating lines 1620 and 5061).

Settings:

- Local heating circuits:
  DHW is only heated for the local heating circuit
- All heating circuits in the segment:
  DHW is heated for all heating circuits in the segment
- All heating circuits in the system:
  DHW is heated for all heating circuits in the system.

With all settings, controllers in holiday mode are also considered for DHW heating.

Refrigeration request

"Refrigeration request K28" sets the relay parameter at the QX.. for the output of the refrigeration request.
Depending on the setting (locally / centrally) the request is delivered by the local cooling circuit or all cooling circuits in the system. This option only applies to the device with device address 1.

- Local entry:
  Consideration is only given to local refrigeration requests
- Central entry:
  Consideration is given to all refrigeration requests from the system

Cascade master

When creating a cascade, the controller having address 1 is assigned the role of the cascade master. That controller then activates the required functionality and displays the additional operating menus including the cascade-related parameters.
Identification as the cascade master is made either automatically, depending on the selection made, or can be ready assigned by selecting “Always”.

In the case of a cascaded plant, it is recommended to select “Always” on the cascade master. This selection ensures that the cascade operating menus and common functions (e.g. common return temperature control) will not be lost should a power failure occur.

Clock

6640	**Clock mode** Autonomously Slave without remote Slave with remote setting Master
6650	**Outside temp source**

Clock mode

This setting defines the impact of the system time on the controller’s time setting. The impact is as follows:

- Autonomously: The time of day on the controller can be readjusted
  The controller's time of day is not matched to the system time
- Slave without remote adjustment: The time of day on the controller cannot be readjusted
  The controller's time of day is constantly and automatically matched to the system time

- Slave with remote adjustment: The time of day on the controller can be readjusted; at the same time, the system time is readjusted since the change is adopted from the master.
  Nevertheless, the controller's time of day is automatically and constantly matched to the system time
- Master: The time of day on the controller can be readjusted
  The time of day on the controller is used for the system. The system time is readjusted

Outside temp source

Only one outside sensor is required in the LPB plant. This sensor is connected to a freely selectable controller and delivers via LPB the signal to the controllers with no sensor.
The first numeral that appears on the display is the segment no. followed by the device no.

6.20 Errors

When an error is pending, an error message can be displayed on the info level by pressing the info button. The display describes the cause of the error.

Reset

Line no.	*Operating line*
6710	**Reset alarm relay** No Yes
6711	**Reset HP** No Yes

Reset alarm relay

When an error is pending, an alarm can be triggered via relay QX... The QX... relay must be appropriately configured.
This setting is used to reset the relay, but the alarm is maintained.

Reset heat pump

Pending error messages from the heat pump are reset on this operating line. The preset switch-on delay is bridged, thus avoiding undesirable waiting times during commissioning or fault tracing.
This function should not be used in normal operation.

Error message functions

Line no.	*Operating line*
6740	**Flow temp 1 alarm**
6741	**Flow temp 2 alarm**
6745	**DHW charging alarm**
6746	**Flow temp cooling 1 alarm**

The difference of setpoint and current temperature is monitored. A control offset beyond the set period of time triggers an error message.

Error history

Line no.	*Operating line*
6800…6819	**History and error code 1 - 10**

The controller saves the last 10 errors in nonvolative memory. Any additional entry deletes the oldest entry in the memory.
For each error entry, error code and time of occurrence are saved.

The ACS 700 PC tool can be used to display the relevant actual values, setpoints and relay outputs for each error.

Error list

Error text

The error text in the following table corresponds to the clear-text on the display of the operator unit.

Lo-cation

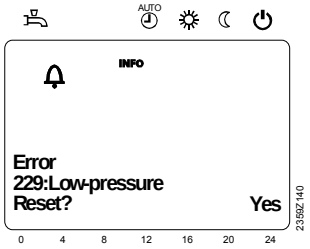
Sensors or contacts in connection with error messages.

Reset

The errors are reset either manually or automatically, depending on the type of error (refer to the following table with the error messages).

Manual reset

In the case of error displays on the info level where “Reset?“ appears, the error can be manually reset.



After pressing the OK button once, “Yes” appears blinking on the display. Pressing the OK button a second time confirms the “Yes“ and resets the error.

Automatic reset

Automatic acknowledgement takes place on completion of the preset period of time (OEM parameter). When this time has elapsed (default setting 6 hours), the controller tries to reset the error.

If the table shows “Number“, it can be selected how many times the error shall be reset before the heat pump triggers lockout.

HP operation

This indicates whether or not the heat pump can continue to operate should a fault occur.

Yes
The heat pump continues to operate although an error message was delivered.

No
Error causes the heat pump to shut down.

No with brine
In the case of brine heat pumps, the error causes the heat pump to shut down; in the case of water or air heat pumps, the heat pump will continue to operate.

No with water
In the case of water heat pumps, the error causes the heat pump to shut down; in the case of brine or air heat pumps, the heat pump will continue to operate.

No with air
In the case of air heat pumps, the error causes the heat pump to shut down; in the case of brine or water heat pumps, the heat pump will continue to operate.

Plant diagram-dependent
Heat pump shutdown depends on the plant diagram currently used.

Alarm messages

The errors are assigned priorities. From priority 5 (that is, priorities 5 - 9), alarm messages are delivered, which are used for remote monitoring (OCI). In addition, the alarm relay is set.

The following error messages can occur:

No.: Error text	Loc.	Reset		HP operation	Prio
		Manual	Auto		
0: No error					
10: Outside sensor	B9	No	No	Yes	6
26: Common flow sensor	B10	No	No	Yes	6
30: Flow sensor 1	B1	No	No	Yes	6
31: Flow sensor cooling 1	B16	No	No	Yes	6
32: Flow sensor 2	B12	No	No	Yes	6
33: Flow sensor HP	B21	No	No	Yes	6
35: Source inlet sensor	B91	No	No	No with brine	9
36: Hot-gas sensor 1	B81	No	No	Yes	6
37: Hot-gas sensor 2	B82	No	No	Yes	6
38: Flow sensor prim controller	B15	No	No	Yes	6
39: Evaporator sensor	B84	No	No	No with air	9
44: Return sensor HP	B71	No	No	As per plant diag	6
45: Source outlet sensor	B92	No	No	No with water	9
46: Return sensor cascade	B70	No	No	Yes	6
48: Refrigerant sensor, liquid	B83	No	No	Yes	6
50: DHW sensor 1	B3	No	No	Yes	6
52: DHW sensor 2	B31	No	No	Yes	6
54: DHW flow sensor	B35	No	No	Yes	6
57: DHW circulation sensor	B39	No	No	Yes	6
60: Room sensor 1		No	No	Yes	6
65: Room sensor 2		No	No	Yes	6
68: Room sensor 3		No	No	Yes	6
70: Storage tank sensor 1	B4	No	No	As per plant diag	6
71: Storage tank sensor 2	B41	No	No	As per plant diag	6
72: Storage tank sensor 3	B42	No	No	Yes	6
73: Collector sensor 1	B6	No	No	Yes	6
74: Collector sensor 2	B61	No	No	Yes	6
76: Special sensor 1	B_X	No	No	Yes	3
81: LPB short-circuit/comm		No	No	Yes	6
82: LPB address collision		No	No	Yes	3
83: BSB short-circuit		No	No	Yes	8
84: BSB address collision		No	No	Yes	3
85: BSB Radio communication		No	No	Yes	8
98: Extension module 1		No	No	Yes	8
99: Extension module 2		No	No	Yes	8
100: 2 clock time masters		No	No	Yes	3
102: Clock without backup		No	No	Yes	3
105: Maintenance message		No	No	Yes	5
106: Source temp too low		Yes	Yes	No	6
107: Hot-gas compressor 1		Yes	Num.*	No	9
108: Hot-gas compressor 2		Yes	Num.*	No	9
117: Water pressure too high	H1	No	No	Yes	6

No.: Error text	Loc.	Reset		HP operation	Prio
		Manual	Auto		
118: Water pressure too low	H1	No	No	No	6
121: Flow temp HC1 too low		No	No	Yes	6
122: Flow temp HC2 too low		No	No	Yes	6
126: DHW charging supervision		No	No	Yes	6
127: Legionella temperature		No	No	Yes	6
134: Common fault HP	E20	Yes	Num.*	No	9
138: Control sensor HP missing		No	Yes	No	1
146: Sensor/controlling element config		No	No	Yes	3
171: Alarm contact 1 active		No	No	Yes	6
172: Alarm contact 2 active	H2	No	No	Yes	6
174: Alarm contact 4 active	H3	No	No	Yes	6
176: Water pressure 2 too high	H2	No	No	Yes	6
177: Water pressure 2 too low	H2	No	No	No	6
178: Limit thermostat HC1		No	No	Yes	3
179: Limit thermostat HC2		No	No	Yes	3
201: Frost alarm	B21/71	Yes	No	No	9
204: Fan overloaded	E16	Yes	Num.*	No	9
222: Hi-press on HP op	E10	Yes	Num.*	No	9
223: Hi-press on start HC	E10	Yes	No	No	9
224: Hi-press on start DHW	E10	Yes	No	No	9
225: Low-pressure	E9	Yes	Num.*	No	9
226: Compressor 1 overloaded	E11	Yes	Num.*	No	9
227: Compressor 2 overloaded	E12	Yes	Num.*	No	9
228: Flow swi heat source	E15	Yes	Num.*	No	9
229: Press swi heat source	E15	Yes	Num.*	No	9
230: Source pump overload	E14	Yes	Num.*	No	9
241: Flow sensor yield	B63	No	No	Yes	6
242: Return sensor yield	B64	No	No	Yes	6
243: Swimming pool sensor	B13	No	No	Yes	6
247: Defrost fault		Yes	Num.*	No	9
320: DHW charging sensor	B36	No	No	Yes	6
321: DHW outlet sensor	B38	No	No	Yes	6
322: Water press 3 too high	H3	No	No	Yes	6
323: Water press 3 too low	H3	No	No	No	6
324: BX same sensors		No	No	Yes	3
325: BX/e'module same sens		No	No	Yes	3
327: E’module same funct		No	No	Yes	3
329: E’mod/m’grp same funct		No	No	Yes	3
330: BX1 no function		No	No	Yes	3
331: BX2 no function		No	No	Yes	3
332: BX3 no function		No	No	Yes	3
333: BX4 no function		No	No	Yes	3
334: BX5 no function		No	No	Yes	3

No.: Error text	Loc.	Reset		HP operation	Prio
		Manual	Auto		
335: BX21 no function		No	No	Yes	3
336: BX22 no function		No	No	Yes	3
339: Coll pump Q5 missing		No	No	Yes	3
340: Coll pump Q16 missing		No	No	Yes	3
341: Coll sensor B6 missing		No	No	Yes	3
343: Solar integration missing		No	No	Yes	3
344: Solar buffer K8 missing		No	No	Yes	3
345: Sol swi pool K18 missing		No	No	Yes	3
350: Buffer address error		No	No	Yes	3
351: Prim/sys pump addr err		No	No	Yes	3
352: Pr'less header addr err		No	No	Yes	3
353: Casc sens B10 missing		No	No	Yes	3
354: Special sensor 2	B_X	No	No	Yes	3
355: 3-ph curr asymmetrical	E21-23	Yes	Num.*	No	9
356: Flow switch consumers	E24	Yes	Num.*	No	9
357: Flow temp cooling 1		No	No	Yes	6
358: Soft starter	E25	No	No	No	9
359: Div valve cool Y21 missing		No	No	Yes	3
360: Proc rev va Y22 missing		No	No	Yes	3
361: Source sens B92 missing		No	No	Yes	3
362: Source sens B92 missing		No	No	Yes	3
363: Compr sens B84 missing		No	No	Yes	3
364: Cool system HP wrong		No	No	Yes	3
365: Inst h'pump Q34 missing		No	No	Yes	3

Number* These plant states do not directly lead to an error message, but first deliver a status message upon initial startup.
An error message is delivered only if the same fault occurs the number of times set for an adjustable period of time.

The LPB system displays the following error messages only as common faults:

No.: Error text	Loc.	Reset		HP operation	Prio
		Manual	Auto		
207:Fault cooling circuit	LPB	- - -	- - -	- - -	- - -
208:Flow supervision	LPB	- - -	- - -	- - -	- - -
217:Sensor fault	LPB	- - -	- - -	- - -	- - -
218:Pressure supervision	LPB	- - -	- - -	- - -	- - -

6.21 Maintenance / special operation

Maintenance functions

Maintenance functions can be used as a preventive measure for periodic monitoring of plant. All maintenance functions can be individually activatd and deactivated.
The controller delivers maintenance messages automatically if the settings made for the maintenance functions are violated, either upward or downward.

Line no.	*Operating line*
7070	**HP interval**
7071	**HP time since maint**
7072	**Max starts compr1/hrs run**
7073	**Cur starts compr1/hrs run**
7074	**Max starts compr2/hrs run**
7075	**Curr starts comp2/hrs run**
7076	**Diff condens max/week**
7077	**Cur diff condens max/week**
7078	**Diff condens min/week**
7079	**Cur diff condens min/week**
7080	**Diff evap max/week**
7081	**Cur diff evap max/week**
7082	**Diff evap min/week**
7083	**Cur diff evap min/week**
7090	**DHW storage tank interval**
7091	**DHW stor tank since maint**
7092	**DHW charg temp HP min**
7093	**Curr DHW charg temp HP**

Interval for heat pump maintenance

HP interval — Setting of interval (in months) at which the heat pump requires service.

HP time since maint — Display of period of time (in months) elapsed since last service visit.
If the value is above setting “HP interval“ (7070), symbol appears on the display and a maintenance message on the info level:
17: HP interval (priority 6)

Reset — This parameter can be reset, provided the respective access right is granted.

Maximum number of starts of compressor 1 per hour run

Max starts compr1/hrs run — Setting the maximum permissible number of starts of compressor 1 per hour run.

Cur starts compr1/hrs run — Average number of starts of compressor 1 per hour run, reached over the last 6 weeks.
If the value lies above setting “Max starts compr1/hrs run“ (7072), symbol appears on the display and a maintenance message on the info level:
8: Too many starts compr 1 (priority 9)

Reset — This parameter can be reset, provided the respective access right is granted.

Maximum number of starts of compressor 2 per hour run

Max starts compr2/hrs run	Setting the maximum permissible number of starts of compressor 2 per hour run.
Curr starts comp2/hrs run	Average number of starts of compressor 2 per hour run, reached over the last 6 weeks. If the value is above setting “Max starts compr2/hrs run“ (7074), symbol appears on the display and a maintenance message on the info level: **9: Too many starts compr 2** (priority 9)
Reset	This parameter can be reset, provided the respective access right is granted.

Number of times per week the temperature differential across the condenser exceeds the maximum

Diff condens max/week	Setting the number of times within a 7-day period the maximum temperature differential across the condenser may be exceeded.
Cur diff condens max/week	Number of times the maximum temperature differential across the condenser was exceeded within a 7-day period. If the value is above setting “Diff condens max/week“ (7076), symbol appears on the display and a maintenance message on the info level: **13: Diff condens max** (priority 3)
Reset	This parameter can be reset, provided the respective access right is granted.

Number of times per week the temperature differential across the condenser falls below the minimum

Diff condens min/week	Indicates how many times within a 7-day period the temperature differential across the condenser may drop below the minimum.
Cur diff condens min/week	Number of times the temperature differential across the condenser dropped below the minimum level within a 7-day period. If the value is above setting “Diff condens min/week“ (7078), symbol appears on the display and a maintenance message on the info level: **14: Diff condens min** (priority 3)
Reset	This parameter can be reset, provided the respective access right is granted.

Number of times per week the temperature differential across the evaporator exceeds the maximum

Diff evap max/week	Indicates how many times within a 7-day period, the maximum temperature differential across the evaporator may be exceeded.
Cur diff evap max/week	Number of times the maximum temperature differential across the evaporator was exceeded within a 7-day period. If the value is above setting “Diff evap max/week“ (7080), symbol appears on the display and a maintenance message on the info level: **15: Diff evap max** (priority 3)
Reset	This parameter can be reset, provided the respective access right is granted.

Number of times per week the temperature differential across the evaporator drops below the minimum

Diff evap min/week — Indicates how many times within a 7-day period the temperature differential across the evaporator may drop below the minimum.

Cur diff evap min/week — Number of times the temperature differential across the evaporator dropped below the minimum level within a 7-day period. If the value is above setting “Diff evap min/week“ (7082), symbol appears on the display and a maintenance message on the info level:
16: Diff evap min (priority 3)

Reset — This parameter can be reset, provided the respective access right is granted.

Interval for maintenance of DHW storage tank

DHW storage tank interval — Setting of interval (in months) at which the DHW storage tank must be serviced.

DHW stor tank since maint — Period of time (in months) elapsed since last service visit.
If the value is above setting “DHW storage tank interval“ (7090), symbol appears on the display and a maintenance message on the info level:
11: DHW storage tank interval (priority 6)

Reset — This parameter can be reset, provided the respective access right is granted.

Minimum DHW charging temperature

DHW charg temp HP min — Minimum temperature level to which the DHW storage tank must be charged by the heat pump with no abortion of charging.

Curr DHW charg temp HP — The controller saves the DHW temperature at which charging by the heat pump was last aborted since the heat pump has reached the limitation for high-pressure, hot-gas, or the maximum switch-off temperature.
If the value is below setting “DHW charg temp HP min“ (7092), symbol appears on the display and a maintenance message on the info level:
12: DHW charg temp HP too low (priority 6)

No reset — This parameter cannot be reset.

When, next time the DHW storage tank is charged, the minimum DHW charging temperature is exceeded again, the maintenance function is cancelled. But if not reached again, the maintenance message is maintained.

Other maintenance messages

5: Water pressure too low (priority 9)
18: Water pressure 2 too low (priority 9)
22: Water pressure 3 too low (priority 9)

Economy mode

7119	**Economy function** Locked ¦ released
7120	**Economy mode** Off ¦ On

Economy function — **Locked**
Economy mode is not possible.

Released

Economy mode can be activated.

Economy mode

Switches economy mode on or off

Emergency operation

If the heat pump does not operate correctly, emergency operation can be started. Emergency operation allows the plant to be operated with the available electric immersion heaters (flow, buffer storage tank, DHW storage tank).
The compressor remains off.

Line no.	*Operating line*
7141	**Emergency operation** **Off** **On**
7142	**Emergency op function type** **Manually** **Automatic**

Emergency operation

Emergency operation can be manually switched on and off.

Off
Emergency operation is off.
On
Emergency operation is on.

Emergency op function type

Manually:
Emergency operation can only be switched on and off on the programming level using parameter “Emergency operation“ (7141).

Automatically:
Emergency operation switches itself on whenever a heat pump fault occurs. It switches itself off again after the fault is rectified and – if required – a reset is made.
Emergency operation can also be switched manually via parameter “Emergency operation“ (7141).

Simulation

Line no.	*Operating line*
7150	**Simulation outside temp**

Simulation outside temp

To facilitate commissioning and fault tracing, outside temperatures in the range from –50 to +50 °C can be simulated. During simulation, the actual, the composite and the attenuated outside temperature are overridden by the set simulated temperature. During simulation, calculation of the 3 mentioned outside temperatures continues and the temperatures are available again when simulation is completed.

The function is deactivated by setting - - on this operating line, or automatically after a timeout of 5 hours.

Manual defrost

Line no.	*Operating line*
7152	**Triggering defrost** No ¦ Yes

Triggering defrost

The heat pump's defrost function can be manually triggered via this operating line.

Resetting limitations

Line no.	*Operating line*
7160	**Reset limitation** **No** **Yes**

If, due to the "Min off time" or the "Limitation source temp min", the heat pump is switched off, it can be put back into operation via parameter "Reset limitation".

Definition of responsibilities

Line no.	*Operating line*
7181	**Phone no. responsibility 1**
7183	**Phone no. responsibility 2**

These operating lines are used to set the phone numbers for the relevant error and maintenance messages.

6.22 Input / output test

The input / output test is used to check correct functioning of the connected components.

Output test relays

When selecting a setting from the relay test, the relevant relay is energized, thus putting the connected component into operation. The correct functioning of the relays and correct wiring can thus be tested.

Line no.	*Operating line*
7700	**Relay test** No test Everything off Source pump Q8/Ventilat K19 Compressor K1 (for approx. 1 - 2 s) Condenser pump Q9 DHW pump Q3 Heating circuit pump Q2 Heating circ mix valve op Y1 Heat circ mix valve cl Y2 Relay output QX23 module 1 Relay output QX21 module 1 Relay output QX22 module 1 Relay output QX1 (for approx. 1- 2 s) Relay output QX2 Relay output QX3 Relay output QX4 Relay output QX5 Relay output QX6 Relay output QX23 module 2 Relay output QX21 module 2 Relay output QX22 module 2

⚠ Important:
During the relay test, limitations are not active.

Output test UX / P1

By selecting a setting from output test UX / P1, an appropriate signal is delivered, enabling it to be checked.

Line no.	*Operating line*
7710	**Output test UX**
7711	**Voltage signal UX**
7714	**PWM signal P1**

Input test sensors

By selecting a setting from input test sensors, the relevant input is displayed, enabling it to be checked.

Line no.	*Operating line*
7730	**Outside temp B9**
7732	**Flow temp B1**
7750	**DHW temp B3**
7770	**Flow temp HP B21**
7771	**Return temp HP B71**
7772	**Hot-gas temp B81**
7775	**Source inlet temp B91**
7777	**Sensor temp B92, B84**
7820	**Sensor temp BX1**
7821	**Sensor temp BX2**
7822	**Sensor temp BX3**
7823	**Sensor temp BX4**
7824	**Sensor temp BX3**
7830	**Sensor temp BX21 module 1**
7831	**Sensor temp BX22 module 1**
7832	**Sensor temp BX21 module 2**
7833	**Sensor temp BX22 module 2**

The selected sensor values are updated within a maximum of 5 seconds.
The display is made with no measured value correction.

Input test H1, H2, H3

Line no.	*Operating line*
7840	**Voltage signal H1**
7841	**Contact state H1** Open. Closed).
7845	**Voltage signal H2**
7846	**Contact state H2** Open. Closed).
7854	**Voltage signal H3**
7855	**Contact state H3** Open. Closed).

Voltage signal H1, H2, H3

Shows the value of the pending voltage signal (DC 0…10 V).

Contact state H1, H2, H3

Shows the current state of contact H1.

Input test E

Line no.	*Operating line*
7889	**Low-pressure switch E9** 0 V 230 V
7890	**High-pressure switch E10** 0 V 230 V
7891	**Compressor 1 overload E11**
7911	**Input EX 1**
7912	**Input EX 2**
7913	**Input EX 3**
7914	**Input EX 4**
7915	**Input EX 5**
7916	**Input EX 6**
7917	**Input EX 7**

By selecting a setting from input test E, the relevant input will be displayed, enabling it to be checked.

Display of 0 V means that there is no voltage and the respective input is currently inactive. Display of 230 V means that voltage is present at the respective input so that it is activated.

6.23 State of plant

The current operating state of the plant is visualized by means of status displays.

Messages

Line no.	*Operating line*
8000	**State heating circuit 1**
8001	**State heating circuit 2**
8002	**State heating circuit P**
8003	**State DHW**
8004	**State cooling circuit 1**
8006	**State heat pump**
8007	**State solar**
8010	**State buffer**
8011	**State swimming pool**

State heating circuit

Enduser (info level)	Commissioning, heating engineer	
Limit thermostat has cut out	Limit thermostat has cut out	3
Manual control active	Manual control active	4
Floor curing function active	Floor curing function active	102
Heating mode restricted	Overtemp protection active Restricted, boiler protection Restricted, DHW priority Restricted, buffer priority	56 103 104 105 106
Forced discharging	Forced discharging buffer storage tank Forced discharging DHW Forced discharging heat source Forced discharging Overrun active	107 108 109 110 17 110
Heating mode Comfort	Opt start control + boost heating Optimum start control Boost heating Heating mode Comfort	111 112 113 114
Heating mode Reduced	Optimum stop control Heating mode Reduced	115 116
Frost protection active	Frost protection room active Frost protection flow active Frost protection plant active	101 117 23 24
Summer operation	Summer operation	118
	24-hour Eco active	119

	Setback Reduced	120
	Setback frost protection	121
	Room temp lim	122
Off	Off	25

State DHW

Enduser (info level)	Commissioning, heating engineer	
Limit thermostat has cut out	Limit thermostat has cut out	3
Manual control active	Manual control active	4
Draw-off mode	Draw-off mode	199
	Recooling via collector	77
	Recooling via DHW/HCs	78
Recooling active		53
	Discharging protection active	79
	Charging time limitation active	80
	DHW charging locked	81
Charging lock active		82
	Forced, max stor tank temp	83
	Forced, max charging temp	84
	Forced, legionella setpoint	85
	Forced, nominal setpoint	86
Forced charging active		67
	Charging electric, leg setpoint	87
	Charging electric, nominal setpoint	88
	Charging electric, Red setpoint	89
	Charging electric, frost setpoint	90
	El imm heater released	91
Charging el im heater		66
	Push, leg setpoint	92
	Push, nominal setpoint	93
Push active		94
	Charging, leg setpoint	95
	Charging, nominal setpoint	96
	Charging, reduced setpoint	97
Charging active		69
Frost protection active	Frost protection active	24
Overrun active	Overrun active	17
Stand-by charging	Stand-by charging	201
	Charged, max stor temp	70
	Charged, max charg temp	71
	Forced, legio temp	98
	Charged, nominal temp	99
	Forced, Reduced temp	100
Charged		75
Off	Off	25
Ready	Ready	200

State cooling circuit

Enduser (info level)	Commissioning, heating engineer	
Dewpoint monitor active	Dewpoint monitor active	133
Manual control active	Manual control active	4
Fault.	Fault.	2
	Frost protection flow active	117
Frost protection active		24
	Locked, heating mode	204
	Locking period at end of heating	135
	Locked, energy source	205
	Locked, buffer	206
Cooling mode locked		146
	Flow setpt increase hygro	136
	Min. flow limit, dewpoint	177
	Min. flow limit, outside temp	178
Cooling mode, restricted		144
	Cooling mode, Comfort	150
	Overrun active	17
Cooling mode, Comfort		150
Protection mode, cooling	Protection mode, cooling	149
	Frost protection plant active	23
Frost protection active		24
Cooling limit OT active	Cooling limit OT active	134
	Off.	25
	Room temp lim	122
	Flow limit reached	179
Off		25
Cooling mode off	Cooling mode off	138

State heat pump

Enduser (info level)	Commissioning, heating engineer	
Emergency operation	Emergency operation	26
Fault	Fault	2
	Locked, outside temperature	176
	Locked, externally	27
	Locked, economy mode	198
Locked		10
	3-phase current asymmetric	180
	Low-pressure	181
	Fan overload	182
	Compressor 1 overload	183
	Compressor 2 overload	184
	Source pump overload	185
	Flow switch consumers	186
	Limit OT min	187
	Limit OT max	188
	Lim source temp min water	189
	Lim source temp min brine	190
	Lim source temp max	191
	High-pressure in HP operation	29
	Flow switch heat source	30
	Pressure switch heat source	31
	Lim hot-gas compressor 1	32
	Lim hot-gas compressor 2	33
	Lim switch-off temp max	34
	Lim switch-off temp max cooling	145
	Lim switch-off temp Minimum	139
	Compressor off time min active	35
	Compens surplus heat	36
Limitation time active		37
	Frost protection heat pump	48
Frost protection active		24
	Forced defrost compressor	192
	Forced defrost fan	193
	Forced defrost active	132
	Dripping	126
	Defrost with compressor	194
	Defrost with fan	195
Defrost active	Defrost active	125
	Compr run time min active	38
	Compressors 1 and 2 on	45
	Compressor 1 on	46
	Compressor 2 on	47
Active cooling mode		127
	Cooling down evaporator	129
	Compr run time min active	38
	Compensation heat deficit	39
	Vorwärmen für Abtauen	130
	Lim temp diff condens max	40
	Lim temp diff condens min	41
	Lim temp diff evap max	42
	Lim temp diff evap min	43
	Compressor 1 and el on	44
	Compressors 1 and 2 on	45
	Compressor 1 on	46
	Compressor 2 on	47
	Elektro ein	197
Heating mode		137
	Limit source temp min cooling	196
Passive cooling mode	Passive cooling mode	128
	Frost protection plant active	23
Frost protection active		24
	Flow active	49
	Overrun active	17
	Released, evap ready	50
	No demand	51
Off		25

State solar

Enduser (info level)	Commissioning, heating engineer	
Manual control active	Manual control active	4
Fault.	Fault.	2
Frost protection collector active	Frost protection collector active	52
Recooling active	Recooling active	53
Max stor tank temp reached	Max stor tank temp reached	54

Evaporation protection active	Evaporation protection active	55
Overtemp protection active	Overtemp protection active	56
Max charg temp reached	Max charg temp reached	57
Charging DHW+buffer+swi pool	Charging DHW+buffer+swi pool	151
Charging DHW+buffer	Charging DHW+buffer	152
Charging DHW+swi pool	Charging DHW+swi pool	153
Charging buffer+swimming pool	Charging buffer+swimming pool	154
Charging DHW	Charging DHW	58
Ladung Pufferspeicher	Ladung Pufferspeicher	59
Charg swimm pool	Charg swimm pool	60
	Min charg temp not reached	61
	Temp diff insufficient	62
Radiation insufficient	Radiation insufficient	63

State buffer

Enduser (info level)	Commissioning, heating engineer	
Frost protection cooling active	Frost protection cooling active	202
	Locking period at end of heating	135
	DHW charging locked	81
Charging restricted		124
	Forced charging active	67
	Full charging active	203
Charging active		69
	Charged, forced charg required temp	72
	Charged, required temp	73
	Charged, min charg temp	143
Charged		75
Hot	Hot	147
No demand	No demand	51
Frost protection active	Frost protection active	24
	Charging electric, em operation	64
	Charging electric, source prot	65
	Charging electric, defrost	131
	Charging electric, forced	164
	Charging electric, substitute	165
Charging el im heater		66
	DHW charging locked	81
	Restricted, DHW priority	104
Charging restricted		124
	Forced charging active	67
	Partial charging active	68
Charging active	Charging active	69
	Recooling via collector	77
	Recooling via DHW/HCs	142
Recooling active		53
	Charged, max stor temp	70
	Charged, max charg temp	71
	Charged, forced charg required temp	72
	Charged, required temp	73
	Partially charged, temp setpoint	74
	Charged, min charg temp	143
Charged		75
Cold	Cold	76
No demand	No demand	51

State swimming pool

Enduser (info level)	Commissioning, heating engineer	
Manual control active	Manual control active	4
Fault.	Fault.	2
Heating mode restricted	Heating mode restricted	106
Forced heat release	Forced heat release	110
	Heating mode, generation	155
Heating mode		137
Heated, max. sw. pool temp	Heated, max. sw. pool temp	156
	Heated, solar setpoint	158
	Heated, source setpoint	157
Heated		159
	Heating mode solar off	160
	Heating mode, generation off	161
Heating off		162
Cold	Cold	76

History

Line no.	*Operating line*
8050 – 8069	**History and state code state history 1 - 10**

The last 10 status messages are saved or displayed together with the associated state codes.
History 1 contains the latest message, history 10 the oldest.

The status displays currently valid for the enduser can be queried directly via the room unit's info level.

Using the ACS 700 PC tool, the relevant actual values, setpoints and relay outputs can be displayed for each status message.

6.24 Diagnostics cascade

For making diagnostics, priority and state of the sources, various temperature values, and the current order of sources and stages can be displayed.

Priority/state

Line no.	*Operating line*
8100 **8102** **...** **8130**	**Priority/state source 1** **…** **priority/state source 16**
8101 **8103** **...** **8131**	**State source 1** **…** **state source 16**
8138	**Cascade flow temp**
8139	**Cascade flow temp setpoint**
8140	**Cascade return temp**
8141	**Cascade return temp setp**
8150	**Source seq ch'over current**
8151	**Current sequence**

6.25 Diagnostics heat source

For making diagnostics, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Brine-to-water heat pump

Line no.	*Operating line*
8400	**Compressor 1 K1**
8401	**Compressor 2**
8402	**El imm heater 1 flow**
8403	**El imm heater 2 flow**
8404	**Source pump Q8**
8405	**Speed of source pump**
8406	**Condenser pump Q9**

These operating lines are used to check the operating states of the components controlled via the heat pump relays. The display of 0 indicates that the relevant component is currently off. The display of 1 indicates that the relevant compoennt is currently in operation.

This rule applies to relays defined as NO contacts. When defined as NC contacts, the action is reversed.

Setpoints and actual values

Line no.	*Operating line*
8410	**Return temp HP**
8411	**Setpoint HP**
8412	**Flow temp HP**
8413	**Compressor modulation**
8415	**Hot-gas temp 1**
8416	**Hot-gas temp max**
8417	**Hot-gas temp 2**
8420	**Refrig temp liquid**
8425	**Temp diff condenser**
8426	**Temp diff evaporator**
8427	**Source inlet temp**
8428	**Source inlet temp min**
8429	**Source outlet temp**
8430	**Source outlet temp min**

These operating lines are used to query the different setpoints and actual values of the heat pump.

Remaining times

Line no.	*Operating line*
8440	**Remain stage 1 off time min**
8441	**Remain stage 2 off time min**
8442	**Remain stage 1 on time min**
8443	**Remain stage 2 on time min**

If the “Min off time“ or “Min on time“ of stage 1 or 2 is active, these operating lines show the remaining off time / on time.
Only on completion of the off time is - - - displayed, and the heat pump can be released again.

Line no.	*Operating line*
8444	**Remain limit source temp min**

Remain limit source temp min

If the source temperature (B91) is too low, pumps and compressor are locked for the period of time “Time limit source temp min“ (2822). This operating line shows the remaining period of time for pumps and compressor to be released again.

Compressor

Line no.	*Operating line*
8446	**Compressor sequence** **1 – 2** **2 – 1**

Compressor sequence

Shows the current compressor sequence, that is, the order in which the compressors are put into operation:

1 – 2
First, compressor 1 is put into operation, then compressor 2.

2 – 1
First, compressor 2 is put into operation, then compressor 1.

Time / start counter

Line no.	*Operating line*
8450	**Hours run compressor 1**
8451	**Start counter compressor 1**
8452	**Hours run compressor 2**
8453	**Start counter compressor 2**

These operating lines show the total number of operating hours and the number of starts of compressors 1 and 2 since the time they were first commissioned.

Line no.	*Operating line*
8454	**Locking time HP**

This operating line shows the total number of heat pump locking hours enforced by the electric utility (via E6) since the time the heat pump was first commissioned.

Line no.	*Operating line*
8455	**Counter number of locks HP**

This operating line shows the total number of heat pump locking actions enforced by the electric utility (via E6) since the time the heat pump was first commissioned.

Line no.	*Operating line*
8456	**Hours run el flow**
8457	**Start counter el flow**

The total number of operating hours and the number of starts of the electric immersion heater in the flow can be read off here.

Heat pump air

Line no.	*Operating line*
8469	**Fan speed**
8470	**Fan K19**
8471	**Process revers valve**
8475	**Evaporator temp**
8477	**Temp diff defrost act value**
8478	**Temp diff defrost setpoint**
8480	**Remain time defrost lock**
8481	**Remain time forced defrost**
8485	**Number defrost attempts**

Fan K19

This shows the current operating state of the fan for the air-to-water heat pump K19 (off / on).

Process revers valve Y22

This shows the current state of the process reversing valve (on = process reversed, off = process runs normally).

Evaporator temp

This shows the current evaporator temperature at sensor B84.

Temp diff defrost act value

This shows the temperature difference between source inlet (B91) and evaporator temperature (B84).

Temp diff defrost setpoint

This shows the setpoint of the temperature difference between source inlet (B91) and evaporator temperature (B84) to be reached to enable the evaporator to become completely defrosted (ΔT defrosted).

Remain time defrost lock

This shows – after a successful or unsuccessful defrost process – how long the defrost function is locked until a new defrost attempt may be made / new defrost process may be carried out.

Remain time forced defrost

Shows the time to elapse until the next forced defrost process takes place if, prior to that, automatic or manual defrost is not triggered.

Number defrost attempts

Shows the maximum number of defrost attempts that were needed until the defrost process could be successfully carried out, or until the heat pump was locked.

Solar

Line no.	*Operating line*
8505	**Speed collector pump 1**
8506	**Speed solar pump ext exch**
8507	**Speed solar pump buffer**
8508	**Speed solar pump swi pool**
8510	**Collector temp 1**
8511	**Collector temp 1 max**
8512	**Collector temp 1 min**
8513	**dT collector 1/DHW**
8514	**dT collector 1/buffer**
8515	**dt collector 1/swimming pool**
8519	**Solar flow temp**
8520	**Solar return temp**
8526	**24-hour yield solar energy**
8527	**Total yield solar energy**
8530	**Hours run solar yield**
8531	**Hours run collect overtemp**
8543	**Speed collector pump 2**
8547	**Collector temp 2**
8548	**Collector temp 2 max**
8549	**Collector temp 2 min**
8550	**dT collector 2/DHW**
8551	**dT collector 2/buffer**
8552	**dt collector 2/swimming pool**

Speed collector pump 1 / 2

Shows the current speed of collector pump 1 / 2.

Speed solar pump ext exch

Shows the current speed of the solar pump of an external heat exchanger 1.

Speed solar pump buffer

Shows the current speed of the solar pump used for buffer storage tank charging.

Speed solar pump swi pool

Shows the current speed of the solar pump used for heating the swimming pool.

Collector temperature 1 / 2

Current collector temperature acquired by sensor B6 / B61

Collector temperature 1, 2 max

Display of the maximum temperature acquired by sensor B6 / B61.

Collector temperature 1, 2 min

Display of the minimum temperature acquired by sensor B6 / B61.

dT collector 1, 2 / DHW

Display of the temperature difference between collector sensor B6 / B61 and DHW sensors B3 and B31.

dT collector 1, 2 / buffer	Display of the temperature difference between collector sensor B6 / B61 and buffer storage tank sensors B4 and B41.
dT collector 1, 2/ swimming pool	Display of the temperature difference between collector sensor B6 / B61 and swimming pool sensor B13.
Solar flow temp	Display of the solar flow temperature acquired by sensor B63.
Solar return temp	Display of the solar return temperature acquired by sensor B64.
24-hour yield solar energy	Display of the amount of energy supplied to the plant via the solar collector in the course of the day.
Total yield solar energy	Display of the total of all 24-hour solar yields since the controller was reset last.
Hours run solar yield	Display of the number of hours the solar plant produced energy (operating hours).
Hours run collect overtemp	Shows the number of hours during which collector overtemperature protection was active.

6.26 Diagnostics consumers

For diagnostic purposes, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Outside temperature

Line no.	*Operating line*
8700	**Outside temperature**
8701	**Outside temp min**
8702	**Outside temp max**
8703	**Outside temp attenuated**
8704	**Outside temp composite**

Display of the current, minimum, maximum, attenuated and composite outside temperature.

Room

Line no.	*Operating line*
8720	**Relative room humidity**
8721	**Room temperature**
8722	**Dewpoint temperature 1**

Heating circuits 1, 2, P

Line no.	*Operating line*
8730, 8760	**Heating circuit pump Q2, Q6**
8731, 8761	**Heat circ mix valve open Y1, Y5**
8732, 8762	**Heat circ mix valve close Y2, Y6**
8735, 8765, 8795	**Speed heating circuit pump 1, 2, P**
8740, 8770, 8800	**Room temp 1, 2, P**
8741, 8771, 8801	**Room temp model 1, 2, P**
8743, 8773	**Flow temp 1, 2**
8744, 8774, 8803	**Flow temp 1, 2, P**

Display of “Off“ means that the relevant plant component is currently off. “On“ means that the relevant plant component is presently in operation.

Room setpoint 1

Operating line “Room setpoint 1“ (8741) is used for display of the setpoint for heating and the setpoint for cooling.
In heating mode, the setpoint for heating is displayed, in cooling mode, that for cooling.
If neither heating nor cooling takes place, the setpoint used last is displayed.

Speed heating circuit pump

Display of the speed of the relevant heating circuit pump as a percentage of maximum speed.

Cooling circuit 1

Line no.	*Operating line*
8751	**Cooling circuit pump 1**
8752	**Cool circ mix valve 1 open**
8753	**Cool circ mix valve 1 close**
8754	**Diverting valve cooling**
8756	**Flow temp cooling 1**
8757	**Flow temp setp cooling 1**

Show the states of the cooling circuit pump, the cooling circuit mixing valve and the diverting valve, plus the actual value and the setpoint of the flow temperature for cooling.
The room temperature setpoint for cooling is displayed on operating line 8741.

DHW

Line no.	*Operating line*
8820	**DHW pump Q3** **Off** **On**
8821	**El imm heater DHW** **Off** **On**
8825	**Speed DHW pump**
8826	**Speed DHW interm circ pump**
8827	**Speed inst DHW heater pump**
8830	**DHW temp 1**
8831	**DHW temp setpoint**
8832	**DHW temp 2**
8835	**DHW circulation temp**
8836	**DHW charging temp**
8840	**Hours run DHW pump**
8841	**Start counter DHW pump**
8842	**Hours run el DHW**
8843	**Start counter el DHW**
8850	**DHW primary controller temp**
8851	**DHW primary controller setp**
8852	**Instant DHW heater temp**
8853	**Instant DHW heater setpoint**

Display of the actual values and setpoints of DHW, the current speed of the DHW pumps as percentages, the DHW circulation and charging temperature, plus the hours run meters and start counters and temperatures and setpoints of the primary controller and instantaneous DHW heater.

Swimming pool

Line no.	*Operating line*
8900	**Swimming pool temp**
8901	**Swimming pool setpoint**

Display of the current swimming pool temperature and setpoint.

Primary controller

Line no.	*Operating line*
8930	**Primary controller temp**
8931	**Primary controller setpoint**

Display of the current primary controller temperature and setpoint.

Common flow

Line no.	*Operating line*
8950	**Common flow temp**
8951	**Common flow temperature setpoint**
8957	**Common flow setp refrig**

Buffer storage tank

Line no.	*Operating line*
8970	**El imm heater buffer** **Off** **On**
8980	**Buffer temp 1**
8981	**Buffer setpoint**
8982	**Buffer temp 2**
8983	**Buffer temp 3**
8990	**Hours run el buffer**
8991	**Start counter el buffer**

Display of the setpoints and actual values of the buffer storage tank and of the number of operating hours and starts.

Input H1

Line no.	*Operating line*
9000	**Flow temp setpoint H1**
9001	**Flow temp setpoint H2**
9004	**Flow temp setpoint H3**

Display of the temperature setpoint when contact Hx is activated and setting ”Heat request” is used.

Water pressure

Line no.	*Operating line*
9005	**Water pressure H1**
9006	**Water pressure H2**
9009	**Water pressure H3**

Display of the water pressure when contact Hx is activated and setting ”Pressure measurement 10 V” is used.

States of multifunctional relays

Line no.	*Operating line*
9031	**Relay output QX1**
9032	**Relay output QX2**
9033	**Relay output QX3**
9034	**Relay output QX4**
9035	**Relay output QX5**
9036	**Relay output QX6**

The switching states of each of the multifunctional relays 1 to 6 can be queried via these operating lines. Display of “Off“ means that the plant component assigned to the output is currently off. “On“ means that the relevant plant component is presently in operation.

States of relays extension modules 1 and 2

Line no.	*Operating line*
9050	**Relay output QX21 module 1**
9051	**Relay output QX22 module 1**
9052	**Relay output QX23 module 1**
9053	**Relay output QX21 module 2**
9054	**Relay output QX22 module 2**
9055	**Relay output QX23 module 2**

The switching states of each of the relays on extension modules 1 and 2 can be queried via these operating lines. Display of “Off“ means that the plant component assigned to the output is currently off. “On“ means that the relevant plant component is presently in operation.

6.26.1 Special operating codes

Special operating code	Description
307	Emergency operation
308	Output test
314	Economy operation

7 Plant diagrams

The various applications are shown in the form of basic diagrams including heat source / refrigeration source variants and extra functions.

Basic diagrams can be implemented with standard outputs (excluding multifunctional outputs).

Heat source / refrigeration source variants can be selected via appropriate parameter settings.

To include extra functions, the multifunctional inputs and outputs must be appropriately set.

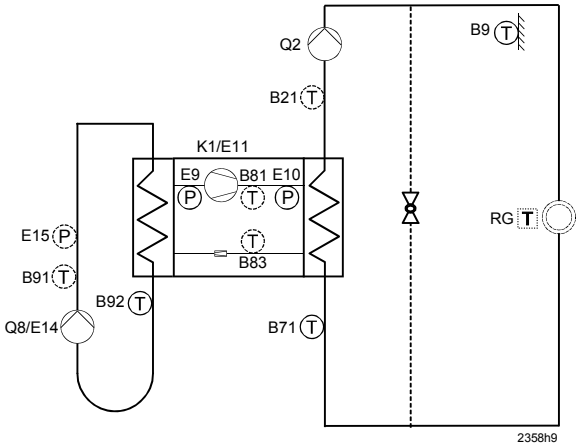
7.1 Basic diagrams

The following plant diagrams can be preselected by entering a number (5700). The plant diagram is the result of preselection plus the connected sensors.

The sensors contained in the selected plant diagram must be connected to ensure that automatic sensor identification will not detect some other plant diagram. Components shown with broken lines are optional.

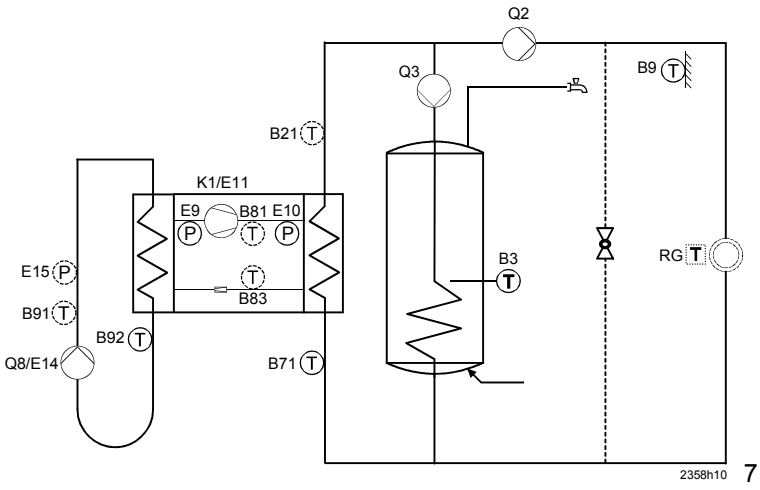
7.1.1 Plant diagram 1

Brine-to-water heat pump with pump heating circuit.



7.1.2 Plant diagram 2

Brine-to-water heat pump with pump heating circuit and DHW storage tank with DHW charging pump Q3.



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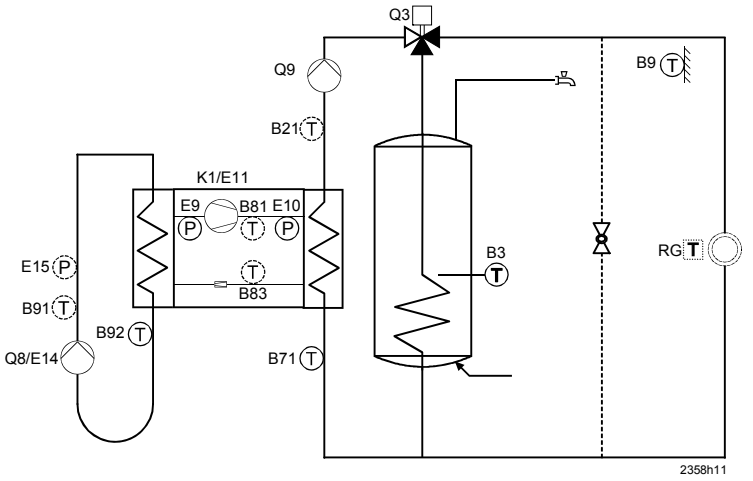
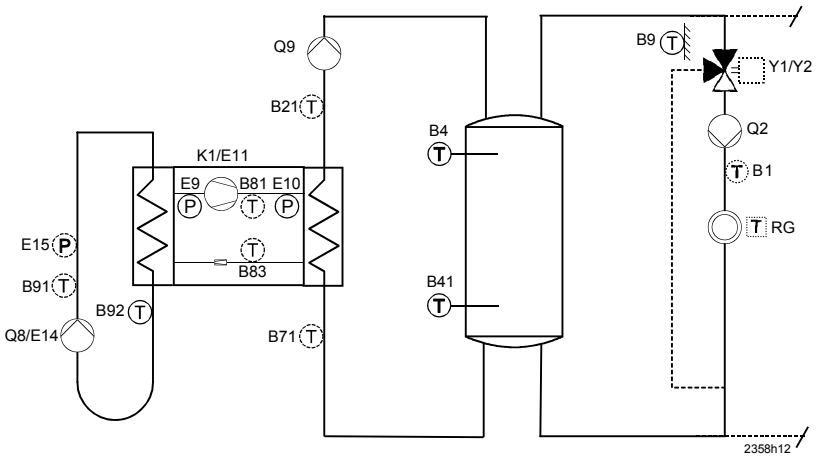
7.1.3 Plant diagram 3

Brine-to-water heat pump with pump heating circuit and DHW storage tank with DHW diverting valve Q3.



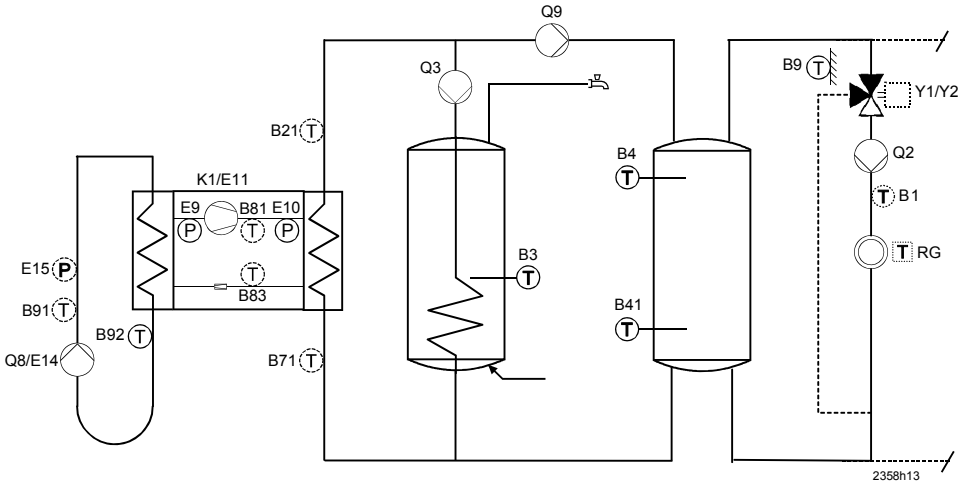
7.1.4 Plant diagram 4

Brine-to-water heat pump with buffer storage tank and mixing or pump heating circuit.



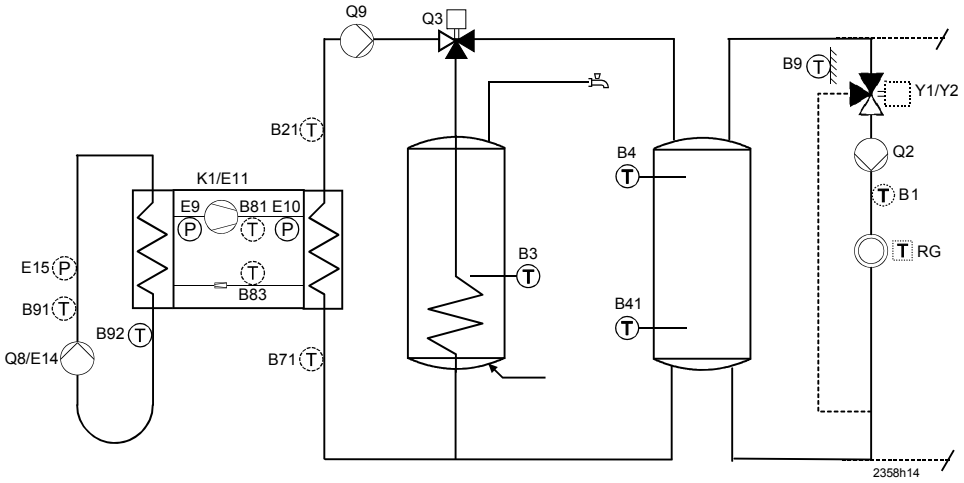
7.1.5 Plant diagram 5

Brine-to-water heat pump with buffer storage tank, DHW storage tank with charging pump Q3, and mixing or pump heating circuit.



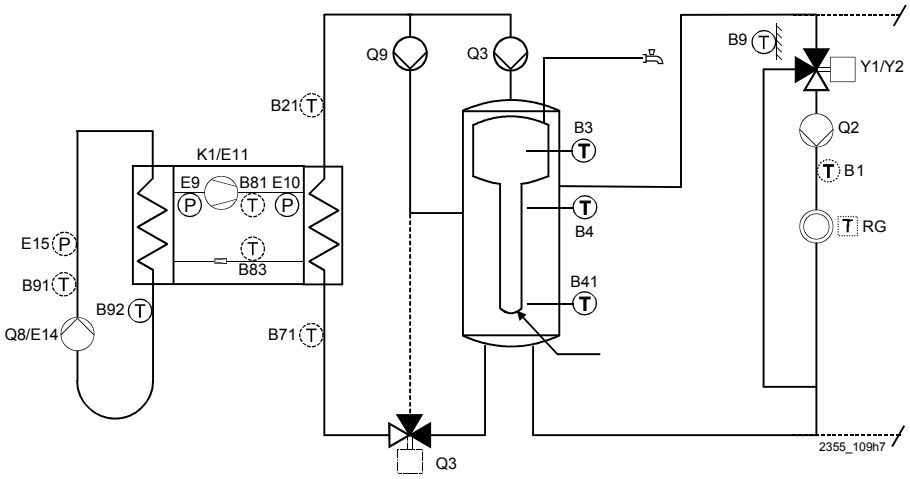
7.1.6 Plant diagram 6

Brine-to-water heat pump with buffer storage tank, DHW storage tank with diverting valve Q3, and mixing or pump heating circuit.



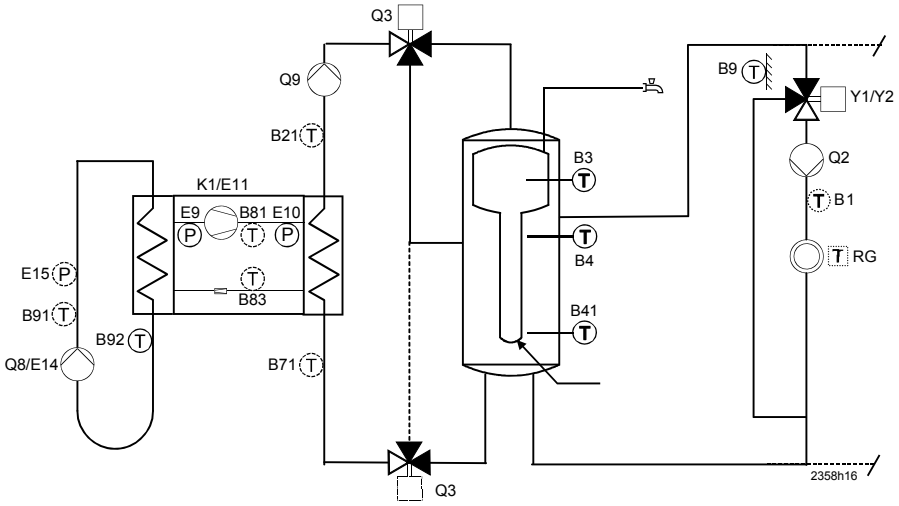
7.1.7 Plant diagram 7

Brine-to-water heat pump with combi storage tank and DHW charging pump Q3, and mixing or pump heating circuit.



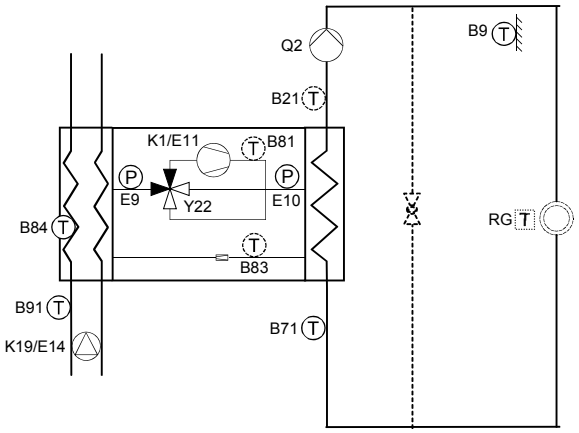
7.1.8 Plant diagram 8

Brine-to-water heat pump with combi storage tank and DHW diverting valve Q3, and mixing or pump heating circuit.



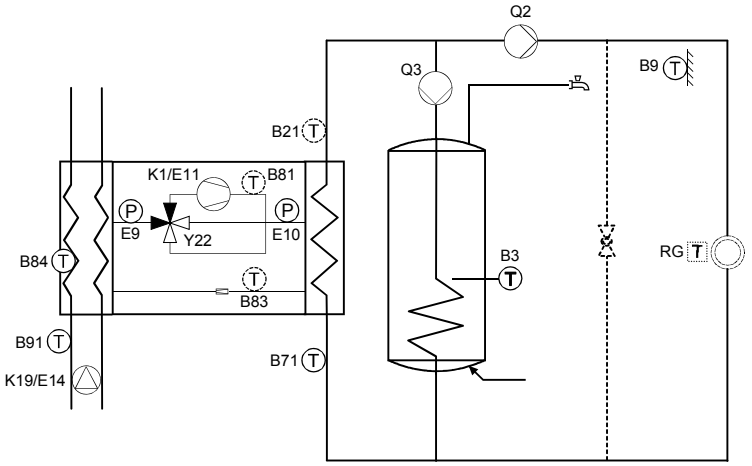
7.1.9 Plant diagram 9

Air-to-water heat pump with pump heating circuit.



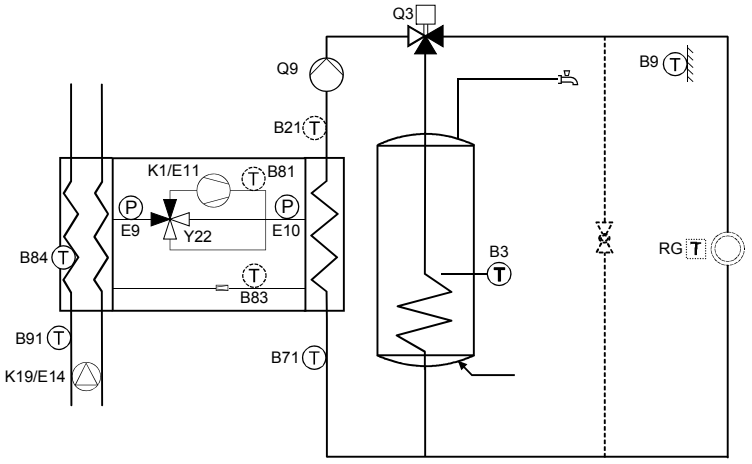
7.1.10 Plant diagram 10

Air-to-water heat pump with pump heating circuit and DHW storage tank with DHW charging pump Q3.



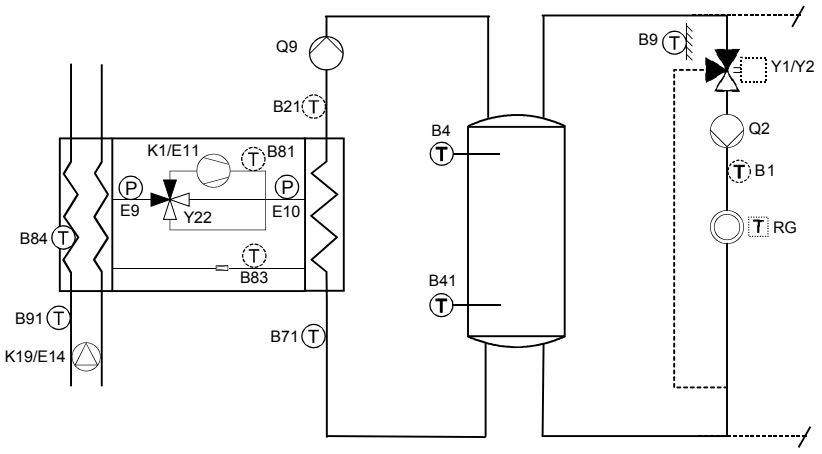
7.1.11 Plant diagram 11

Air-to-water heat pump with pump heating circuit and DHW storage tank with DHW diverting valve Q3.



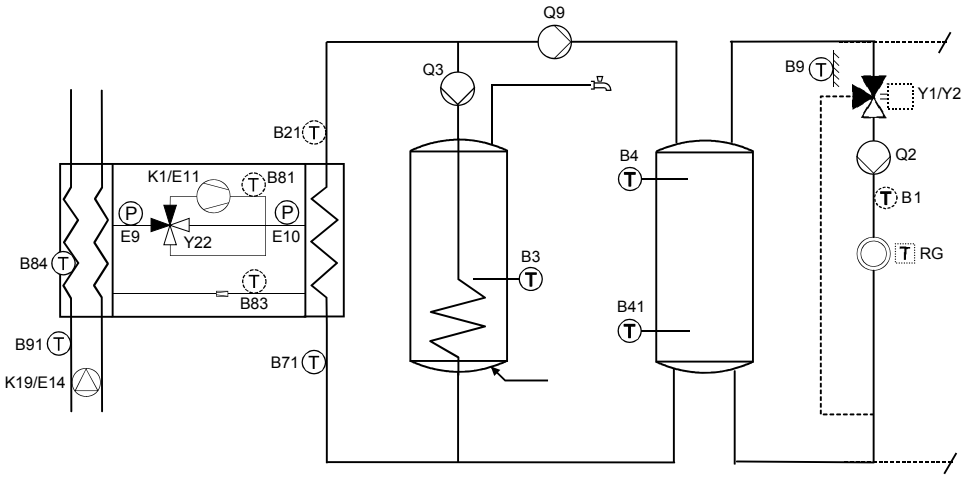
7.1.12 Plant diagram 12

Air-to-water heat pump with buffer storage tank and mixing or pump heating circuit.



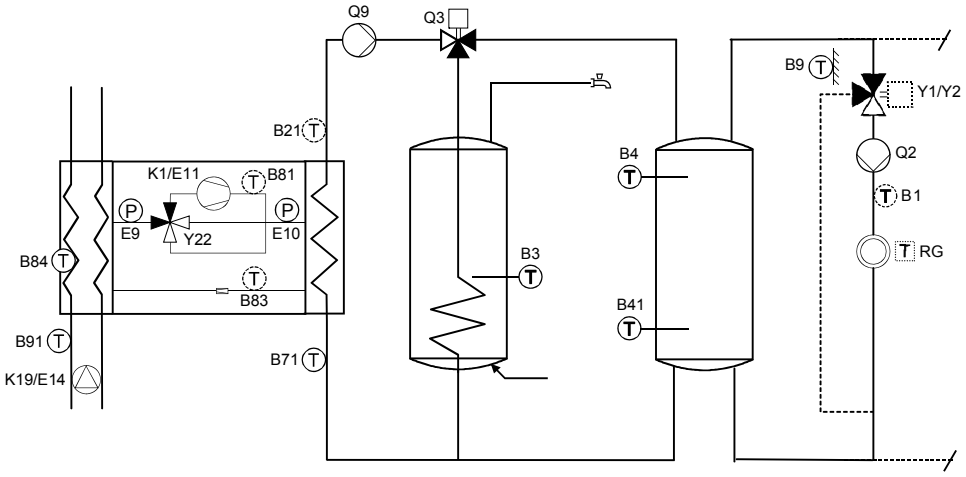
7.1.13 Plant diagram 13

Air-to-water heat pump with buffer storage tank, DHW storage tank with charging pump Q3, and mixing or pump heating circuit.



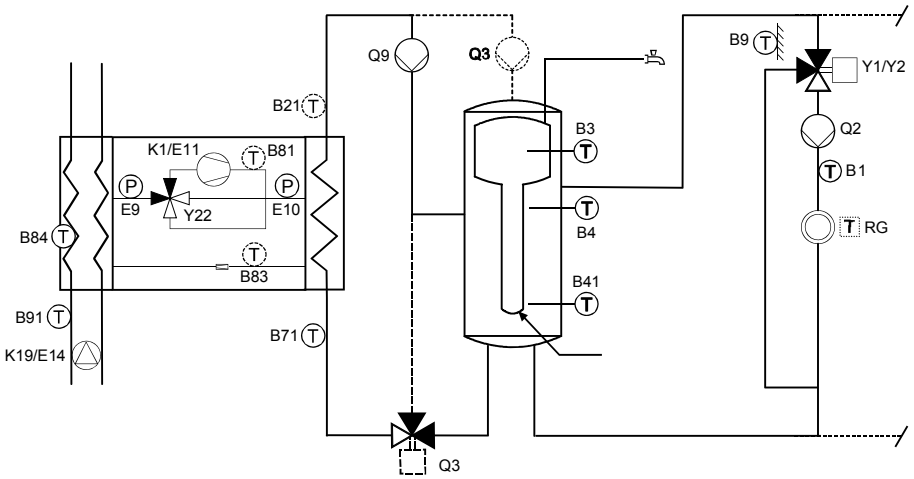
7.1.14 Plant diagram 14

Air-to-water heat pump with buffer storage tank, DHW storage tank with diverting valve Q3, and mixing or pump heating circuit.



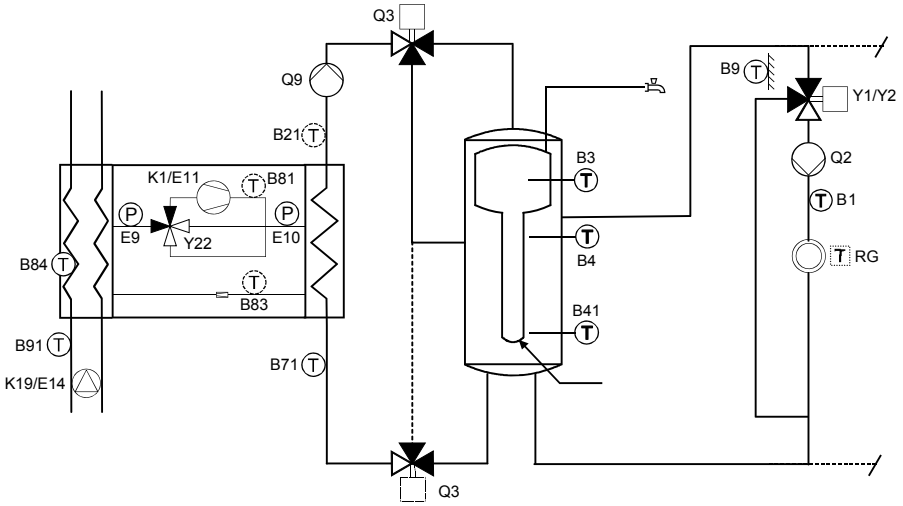
7.1.15 Plant diagram 15

Air-to-water heat pump with combi storage tank and DHW charging pump Q3, and mixing or pump heating circuit.



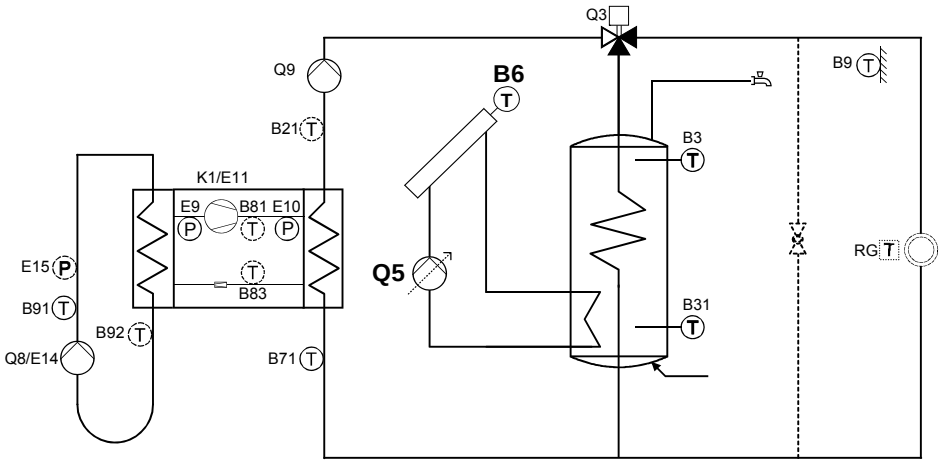
7.1.16 Plant diagram 16

Air-to-water heat pump with combi storage tank and DHW diverting valve Q3, and mixing or pump heating circuit.



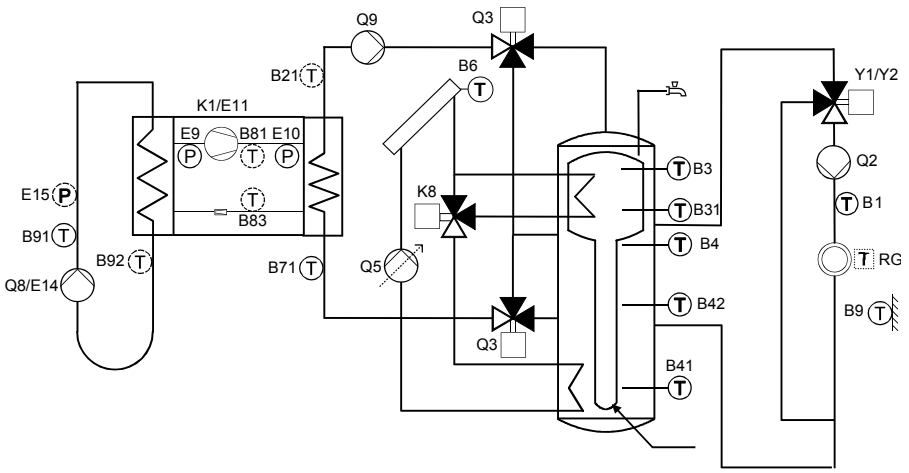
7.1.17 Plant diagram 17

Brine-to-water heat pump, DHW storage tank with DHW diverting valve Q3 and solar collector, and pump heating circuit.



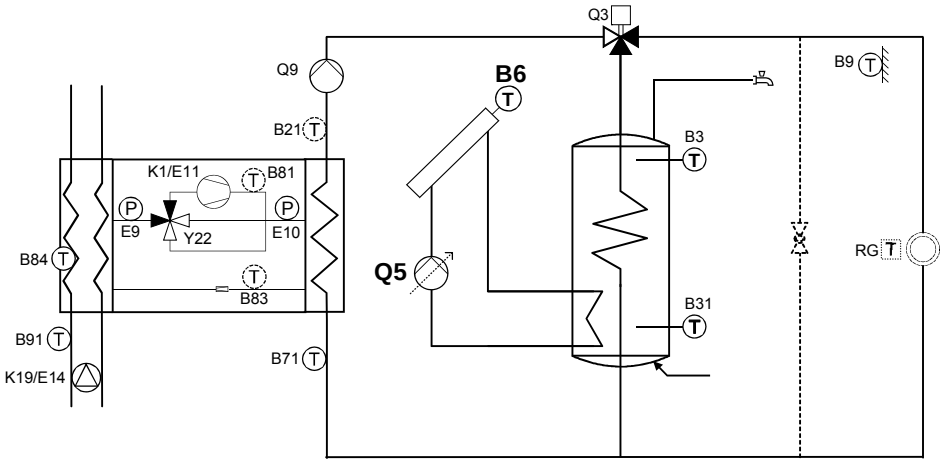
7.1.18 Plant diagram 18

Brine-to-water heat pump, combi storage tank and DHW diverting valve Q3 and solar collector, and mixing or pump heating circuit.



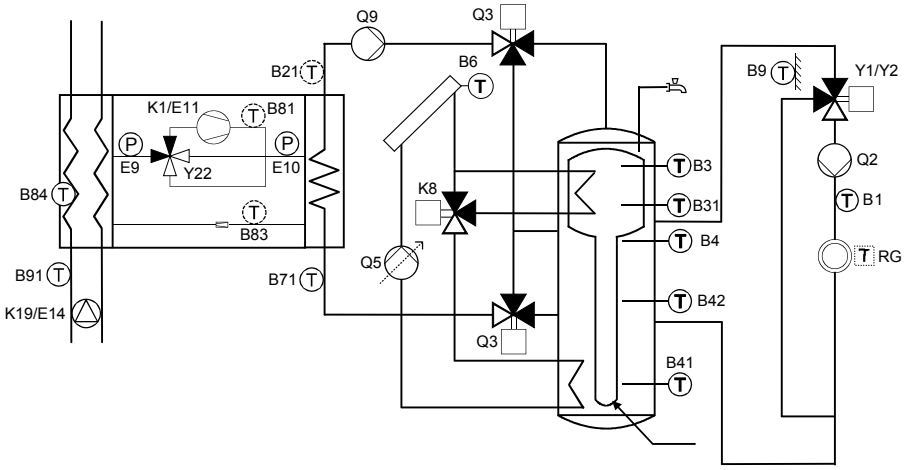
7.1.19 Plant diagram 19

Air-to-water heat pump, DHW storage tank with DHW diverting valve Q3 and solar collector, and pump heating circuit.



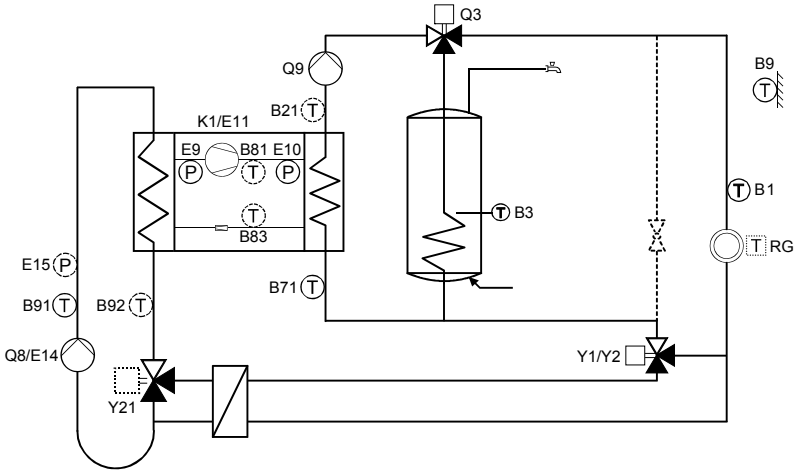
7.1.20 Plant diagram 20

Air-to-water heat pump, combi storage tank with DHW diverting valve Q3 and solar collector, and mixing or pump heating circuit.



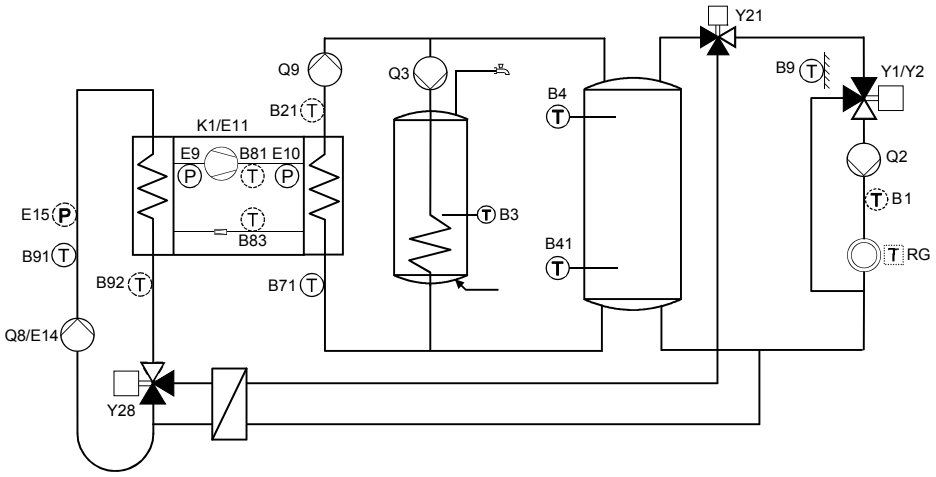
7.1.21 Plant diagram 21

Brine-to-water heat pump, DHW storage tank with DHW charging pump Q3, pump heating circuit, and mixing cooling circuit for passive cooling.



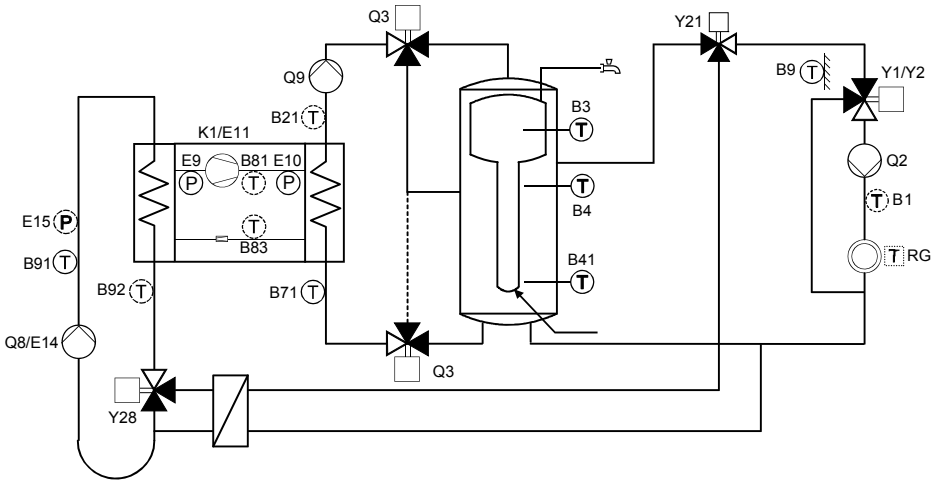
7.1.22 Plant diagram 22

Brine-to-water heat pump, DHW storage tank with DHW charging pump Q3, buffer storage tank, mixing or pump heating circuit, and mixing cooling circuit for passive cooling.



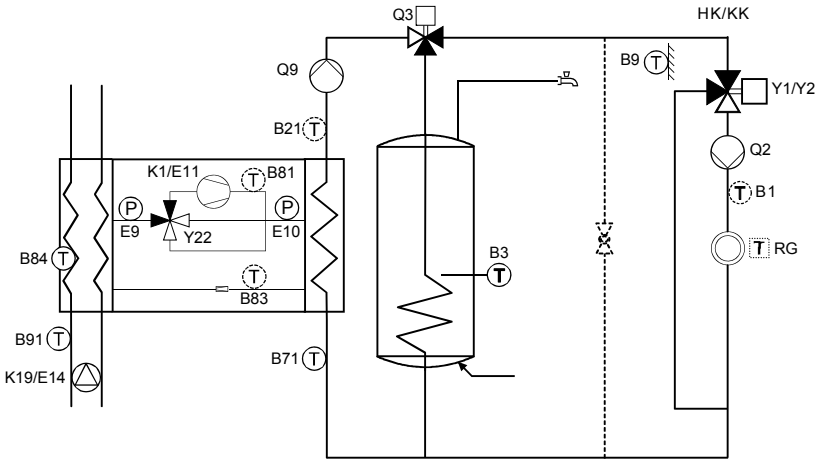
7.1.23 Plant diagram 23

Brine-to-water heat pump, combi storage tank with DHW diverting valve Q3, and mixing or pump heating circuit.



7.1.24 Plant diagram 24

Air-to-water heat pump, DHW storage tank with DHW diverting valve Q3, mixing or pump heating circuit, and mixing cooling circuit for active cooling.



Legend (catalog of plant diagrams and extra functions)

K1	Compressor 1
K2	Compressor 2
K8	Solar controlling element buffer
K9	Solar pump ext. heat exchanger
K10	Alarm output
K6	Electric immersion heater DHW or combi storage tank
K16	Electric immersion heater, buffer or combi storage tank
K18	Solar controlling element swimming pool
K19	Fan air-to-water heat pump
K26	Electric immersion heater flow
E5	Low-tariff
E6	Heat pump lock
E9	Low-pressure switch
E10	High-pressure switch
E11	Compressor 1 overload
E12	Compressor 2 overload
E14	Overload source
E15	Pressure and / or flow switch source
E17	Manual defrost
Ex	Flow switch consumers
Q2	1. 1st heating circuit pump
Q3	DHW diverting valve / charging pump
Q5	Collector pump
Q6	2. 2nd heating circuit pump (extension module)
Q8	Source pump
Q9	Condenser pump
Q11	Storage tank charging pump
Q14	System pump
Q15	Pump H1
Q18	Pump H2
Q19	Pump H3
Q20	Heating circuit pump HCP
Q21	2. 2nd pump speed HC1
Q22	2. 2nd pump speed HC2
Q23	2. 2nd pump speed HCP
Q24	Cooling circuit pump
Q25	Cascade pump
Q33	Intermediate heating circuit pump
Q34	Instantaneous DHW heater pump
RG	Room temperature sensor
B1	Flow temperature sensor HC1
B9	Outside sensor
B10	Common flow sensor
B12	Flow temperature sensor HC2
B13	Swimming pool sensor
B15	Flow sensor primary controller
B16	Flow sensor cooling 1
B3	DHW temperature sensor
B31	Second DHW temperature sensor
B35	DHW primary controller sensor
B36	DHW charging sensor
B38	DHW consumption sensor
B39	DHW circulation sensor
B4	Buffer storage tank temperature sensor, top
B41	Buffer storage tank temperature sensor, bottom
B42	Buffer storage tank temperature sensor, center
B6	Collector sensor
B61	Collector sensor 2
B63	Solar flow sensor
B64	Solar return sensor
B9	Outside sensor
B21	Flow temperature heat pump
B70	Cascade return sensor
B71	Return temperature heat pump
B81	Hot-gas temperature compressor 1
B82	Hot-gas temperature compressor 2
B83	Refrigerant temperature liquid
B84	Evaporator temperature air-to-water HP
B91	Source inlet temperature
B92	Source outlet temperature
Y1 / Y2	1. Heating circuit mixing valve opening / closing
Y4	Heat source shutoff valve
Y5 / Y6	2. Heating circuit mixing valve opening / closing
Y19/Y20	Primary controller
Y21	Diverting valve cooling
Y23/24	Actuator cooling circuit (e'module)
Y21	Diverting valve for cooling
Y22	Process reversing valve
Y31/Y32	DHW primary controller mixing valve
Y33/Y34	Instantaneous DHW heater valve

7.2 Heat / refrigeration source variants / extra functions

For source variants and extra functions, refer to separately available Partial Plant Diagram Catalog.

8 Technical data

8.1 Basic unit RVS61.843

Power supply	Rated voltage	AC 230 V (±10%)
	Rated frequency	50/60 Hz
	Power consumption	RVS61.843: max. 11 VA
	Fusing of supply lines	Max. 10 AT
Wiring of terminals	(Power supply and outputs)	Solid wire or stranded wire (twisted or with ferrule): 1 core: 0.5 mm^2…2.5 mm^2 2 cores 0.5...1.5 mm^2
Functional data	Software class	A
	Mode of operation to EN 60 730	1b (automatic operation)
Inputs	Digital inputs H1, H3	Safety extra low-voltage for potentialfree low-voltage contacts: Voltage with contact open: DC 12 V Current with contact closed: DC 3 mA
	Analog input H1, H3	Protective extra low-voltage operating range: DC (0…10) V Internal resistance: > 100 kΩ
	Mains inputs EX1 – EX7, E9 – E11	AC 230 V (±10%) Internal resistance: > 100 kΩ
	Sensor input B9	NTC1k (QAC34)
	Sensor inuts B1, B3, B4, B21, B41, B71, B81, B91 and B92	NTC10k (QAZ36, QAD36)
	Sensor input BX1 – BX5	NTC 10k (QAZ36, QAD36), Pt1000
	Perm. sensor cables (copper)	
	– Cross-sectional area:	0.25 0.5 0.75 1.0 1.5 (mm2)
	– Max. length:	20 40 60 80 120 (m)
Outputs	Relay outputs Q2, 3, 8, 9, QX1 – QX6, Y1, Y2	
	Rated current range	AC 0.02…2 (2) A
	Max. switch-on current	15 A for ≤1 s
	Max. total current (of all relays)	AC 6 A
	Rated voltage range	AC (24..230) V (for potentialfree outputs)
	Output Q4-Mod	
	Rated current range	
	On / off mode	AC 0.05…2 (2) A
	Speed control	AC 0.05…0.4 (1) A
	Max. switch-on current	4 A for ≤1 s
	Analog output U1	Output is shortcircuit-proof
	Output voltage	U_{out} = 0 ... 10.0 V
	Current rating	±2 mA RMS; ±2.7 mA peak
	Ripple	≦ 50 mVpp
	Accuracy at zero point	< ± 80 mV
	Error remaining range	≦ 130 mV

Interfaces	BSB	2-wire connection, not interchangeable
	Max. cable length basic unit – peripheral device	200 m
	Max. total length	400 m (max. cable capacitance) 60 nF)
	Min. cross-sectional area	0.5 mm^2
	LPB	Copper cable 1.5 mm^2, 2-wire **not** interchangeable
	With bus power supply via controller (per controller)	250 m 460 m
	With central bus power supply	E = 3
	Bus loading number	
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP 00
	Safety class to EN 60 730	Low-voltage-carrying parts meet the requirements of safety class II, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	2006/95/EEC
	– Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, temp. -20…65 °C
	Transport to EN 60721-3-2	Class 2K3, temp. -25…70°C
	Operation to EN 60721-3-3	Class 3K5, temp. -20...50°C (non-condensing)
Weight	Without packaging	RVS61.843: 607 g

8.2 Extension module AVS75.390

Power supply	Rated voltage	AC 230 V (±10%)
	Rated frequency	50/60 Hz
	Power consumption	Max. 4 VA
	Fusing of supply lines	Max. 10 AT
Wiring of terminals	(Power supply and outputs)	Solid wire or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores 0.5...1.5 mm^2
Functional data	Software class	A
	Mode of operation to EN 60 730	1b (automatic operation)
inputs	Digital inputs H2	Safety extra low-voltage for potential free low-voltage contacts: voltage with contact open: DC 12 V current with contact closed: DC 3 mA
	Analog input H2	Protective extra low-voltage operating range: DC (0...10) V internal resistance: > 100 kΩ
	Mains input L	AC 230 V (±10%) Internal resistance: > 100 kΩ
	Sensor inputs BX6, BX7	NTC 10k (QAZ36, QAD36)
	Perm. sensor cables (copper) with cross-sectional area:	0.25 0.5 0.75 1.0 1.5 mm^2
	Max. length:	20 40 60 80 120 m
Outputs	Relay outputs	
	Rated current range	AC 0.02…2 (2) A
	Max. switch-on current	15 A for ≤1 s
	Max. total current (all relays)	AC 6 A
	Rated voltage range	AC (24...230) V (for potentialfree outputs)
Interfaces	BSB	2-wire connection, not interchangeable
	Max. cable length basic unit – peripheral device	200 m
	Max. total length	400 m (max. cable capacitance) 60 nF)
	Min. cross-sectional area	0.5 mm^2
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP 00
	Safety class to EN 60 730	Llow-voltage-carrying parts meet the requirements of safety class II, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	class 1K3, temp. -20…65 °C
	Transport to EN 60721-3-2	class 2K3, temp. -25…70°C
	Operation to EN 60721-3-3	class 3K5, temp. 0...50°C (noncondensing)
Weight	Without packaging	293 g

8.3 Operator and room unit AVS37... / QAA7x… / QAA55..

Power supply	For devices without batteries:	
	Bus power supply	BSB
	For battery-powered devices:	
	Batteries	3 pcs
	Type of batteries	1.5 V alkaline size AA (LR06)
	Battery life	Approx. 1.5 years
Room temperature measurement (only with QAA7x...) / QAA55...)	Measuring range	0...50 °C
	According to EN 12098:	
	Range 15...25 °C	Within tolerance of 0.8 K
	Range 0..15 °C or 25...50 °C	Within tolerance of 1.0 K
	Resolution	1/10 K
Interfaces	AVS37.. / QAA75.. / QAA55..	BSB-W, 2-wire connection, not interchangeable
	Max. cable length basic unit – peripheral device	QAA75.. / QAA55.. 200 m AVS37.. 3 m
	QAA78...	BSB-RF Frequency band 868 MHz
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP20 for QAA7… IP40 for AVS37… IP20 (when mounted) Normal pollution
	Safety class to EN 60 730	Low-voltage-carrying parts meet the requirements of safety class III, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 50090-2-2
	RF	EN 300 220-1 (25-1000MHz)
Climatic conditions	For devices without batteries:	
	Storage to EN 60721-3-1	Class 1K3, temperature -20…65 °C
	Transport to EN 60721-3-2	Class 2K3, temperature -25…70 °C
	Operation to EN 60721-3-3	Class 3K5, temperature 0...50 °C (non-condensing)
	For battery-powered devices:	
	Storage to EN 60721-3-1	Class 1K3, temperature -20…30 °C
	Transport to EN 60721-3-2	Class 2K3, temperature -25…70 °C
	Operation to EN 60721-3-3	Class 3K5, temperature 0...50 °C (non-condensing)
Weight	Without packaging	AVS37.294: 160 g QAA75.61x: 170 g QAA78.610: 312 g QAA55.110: 115 g

8.4 RF module AVS71.390

Power supply	Via RVS… basic unit	DC 5.5 V
	Power consumption	Max. 0.11 VA
Interfaces	Connection to RVS… basic units (power supply, communication)	6-pole prefabricated ribbon cable, ready fitted, 1.5 m 1.5m
	RF transmitter	BSB-RF Frequency band 868 MHz
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP40
	Safety class to EN 60 730	Low-voltage-carrying parts meet the requirements of safety class III, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-1, EN 61000-6-2
	- Emissions	- EN 61000-6-3, EN 61000-6-4
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730, EN 50090-2-2
	RF	EN 300 220-1 , -3 (25-1000MHz) EN 301 489-1 , -3
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, temperature -20…65 °C
	Transport to EN 60721-3-2	Class 2K3, temperature -25…70°C
	Operation to EN 60721-3-3	Class 3K5, temperature 0...50°C (non-condensing)
Weight	Without packaging	54 g

8.5 Wireless outside sensor AVS13.399

Power supply	Batteries	2 pcs
	Type of batteries	1.5 V alkaline size AAA (LR03)
	Battery life	Approx. 2 years
Interfaces	RF transmitter	BSB-RF Frequency band 868 MHz
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP20
	Safety class to EN 60 730	Low-voltage-carrying parts meet the requirements of safety class III, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 50090-2-2
	RF	EN 300 220-1 (25-1000 MHz)
Climatic conditions	For devices without batteries:	
	Storage to EN 60721-3-1	Class 1K3, temperature -20…65 °C
	Transport to EN 60721-3-2	Class 2K3, temperature -25…70 °C
	Operation to EN 60721-3-3	Class 3K5, temperature 0...50 °C (non-condensing)
	For battery-powered devices:	
	Storage to EN 60721-3-1	class 1K3, temperature -20…30 °C
	Transport to EN 60721-3-2	class 2K3, temperature -25…70 °C
	Operation to EN 60721-3-3	class 3K5, temperature 0...50 °C (non-condensing)
Outside temperature acquisition	Outside sensor	QAC34/101
	Measuring range	-50…70 °C
	Cable length	Max. 5 m
Weight	Without packaging	Radio transmitter: 160 g Outside sensor QAC34: 73 g Cable: 70 g

8.6 RF repeater AVS14.390

Power supply	Nominal voltage	AC 230 V ±10% (primary side AC/AC adapter)
	Nominal frequency	50 Hz ±6%
	Power consumption	max. 0.5 VA
Interfaces	RF transmitter	BSB-RF Frequency band 868 MHz
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP20
	Safety class to EN 60 730	Low-voltage-carrying parts meet the requirements of safety class III, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 50090-2-2
	RF	EN 300 220-1 (25-1000 MHz)
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, temperature -20…65 °C
	Transport to EN 60721-3-2	Class 2K3, temperature -25…70 °C
	Operation to EN 60721-3-3	Class 3K5, temperature 0...50 °C (non-condensing)
Weight	Without packaging	RF repeater: 112 g ower supply: 195 g

8.7 Sensor characteristics

8.7.1 NTC 1 k

T [°C]	R[Ohm]	T [°C]	R[Ohm]	T [°C]	R[Ohm]
-30.0	13,034	0.0	2'857	30.0	827
-29.0	12,324	1.0	2'730	31.0	796
-28.0	11,657	2.0	2'610	32.0	767
-27.0	11,031	3.0	2'496	33.0	740
-26.0	10,442	4.0	2'387	34.0	713
-25.0	9,889	5.0	2'284	35.0	687
-24.0	9,369	6.0	2'186	36.0	663
-23.0	8,880	7.0	2'093	37.0	640
-22.0	8,420	8.0	2'004	38.0	617
-21.0	7,986	9.0	1'920	39.0	595
-20.0	7,578	10.0	1'840	40.0	575
-19.0	7,193	11.0	1'763	41.0	555
-18.0	6,831	12.0	1'690	42.0	536
-17.0	6,489	13.0	1'621	43.0	517
-16.0	6,166	14.0	1'555	44.0	500
-15.0	5,861	15.0	1'492	45.0	483
-14.0	5,574	16.0	1'433	46.0	466
-13.0	5,303	17.0	1'375	47.0	451
-12.0	5,046	18.0	1'320	48.0	436
-11.0	4,804	19.0	1'268	49.0	421
-10.0	4,574	20.0	1'218	50.0	407
-9.0	4,358	21.0	1'170		
-8.0	4,152	22.0	1'125		
-7.0	3,958	23.0	1'081		
-6.0	3,774	24.0	1'040		
-5.0	3,600	25.0	1'000		
-4.0	3,435	26.0	962		
-3.0	3,279	27.0	926		
-2.0	3,131	28.0	892		
-1.0	2,990	29.0	859		

8.7.2 NTC 10k

T [°C]	R[ohm]	T [°C]	R[ohm]	T [°C]	R[ohm]
-30.0	175203	50.0	3605	130.0	298
-25.0	129289	55.0	2989	135.0	262
-20.0	96360	60.0	2490	140.0	232
-15.0	72502	65.0	2084	145.0	206
-10.0	55047	70.0	1753	150.0	183
-5.0	42158	75.0	1481	155.0	163
0.0	32555	80.0	1256	160.0	145
5.0	25339	85.0	1070	165.0	130
10.0	19873	90.0	915	170.0	117
15.0	15699	95.0	786	175.0	105
20.0	12488	100.0	677	180.0	95
25.0	10000	105.0	586	185.0	85
30.0	8059	110.0	508	190.0	77
35.0	6535	115.0	443	195.0	70
40.0	5330	120.0	387	200.0	64
45.0	4372	125.0	339		

8.7.3 Pt1000

T [°C]	R[ohm]	T [°C]	R[ohm]	T [°C]	R[ohm]
–30	882.2	50	1194.0	130	1498.3
–25	901.9	55	1213.2	135	1517.1
–20	921.6	60	1232.4	140	1535.8
–15	941.2	65	1251.6	145	1554.6
–10	960.9	70	1270.8	150	1573.3
–5	980.4	75	1289.9	155	1591.9
0	1000.0	80	1309.0	160	1610.5
5	1019.5	85	1328.0	165	1629.1
10	1039.0	90	1347.1	170	1647.7
15	1058.5	95	1366.1	175	1666.3
20	1077.9	100	1385.1	180	1684.8
25	1097.3	105	1404.0	185	1703.3
30	1116.7	110	1422.9	190	1721.7
35	1136.1	115	1441.8	195	1740.2
40	1155.4	120	1460.7	200	1758.6
45	1174.7	125	1479.5		

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