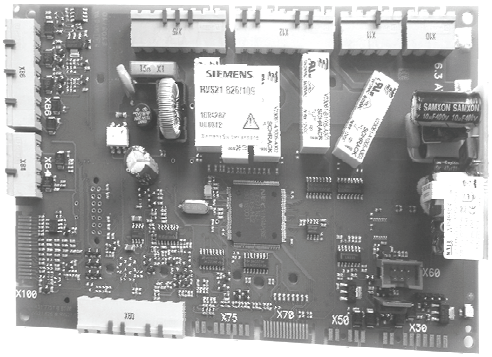
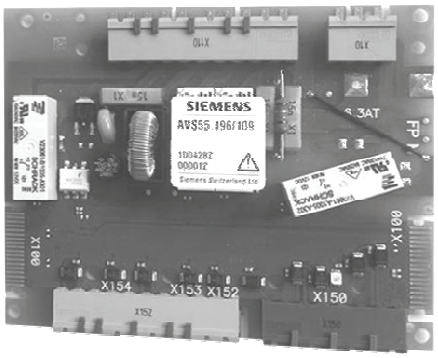
SIEMENS





Albatros^2
Heat pump controller
User Manual

RVS21.826
AVS55.196
AVS55.199
AVS75.370
AVS75.390

Edition 1.0
Controller series C
CE1U2355en_04
17.02.2012

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Contents

1 Overview

The present User Manual describes the products listed in the following table and covers handling and configuration of the controls for readers ranging from endusers to heating engineers.

Product no. (ASN)	Description
RVS21.826	Basic PCB heat pump (without housing)
AVS55.196	I/O module heat pump (without housing)
AVS55.199	I/O module heat pump (without housing)
AVS75.370	Extension module with connection facility for stepper motor
AVS75.390	Extension module
AVS82.490	Ribbon cable X50 for extension modules
AVS82.491	Ribbon cable for operator unit
AVS82.496/109	Ribbon cable X100 for I/O module (without housing)
AVS92.280	Spacer plate for mounting the I/O modules directly on the motherboard
OCI345.06/101	LPB clip-in

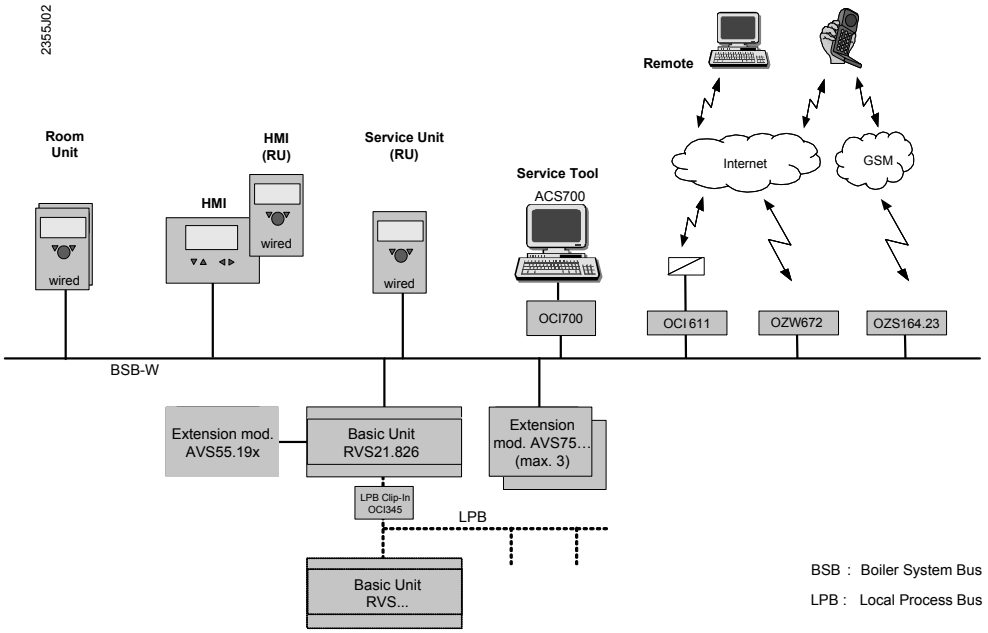
The following products are covered by separate pieces of documentation:

QAC34	Outside sensor NTC 1 kΩ
QAD36	Strap-on temperature sensor NTC 10 kΩ
QAZ36	Immersion temperature sensor NTC 10 kΩ
AVS37.390	Operator unit "Basic"
AVS37.294	Operator unit with text display
QAA75.610	Room unit, wired, with text display
QAA75.611	Room unit, wired, with backlit text display
QAA78.610	Room unit, wireless, with text display
QAA55.110	Room unit "Basic"
QAA58.110	Operator unit "Basic", wireless
AVS71.390	RF module
AVS71.393	RF module BSB
AVS14.390	RF repeater
AVS13.399	Wireless outside sensor

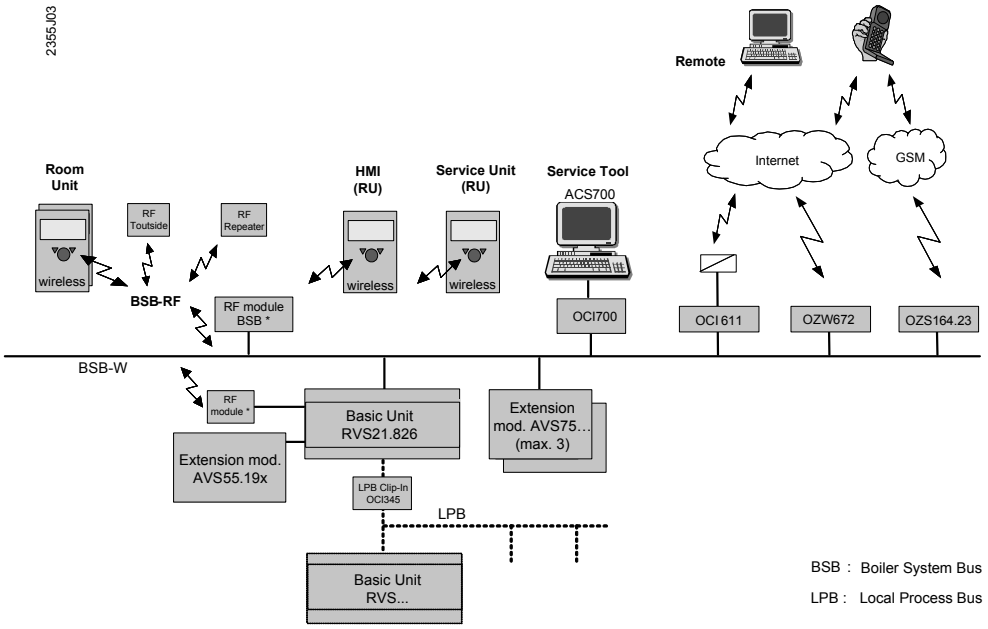
1.1 Type summary

1.1.1 Topology

Wired

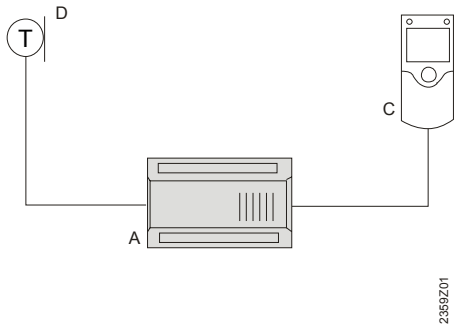
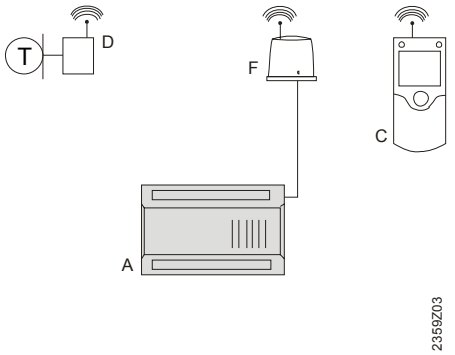
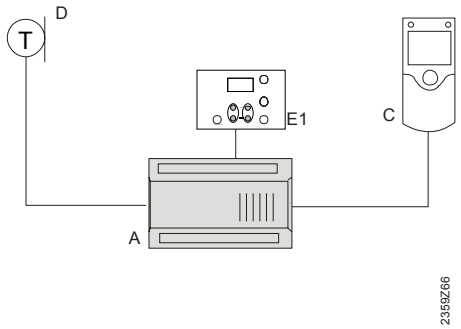
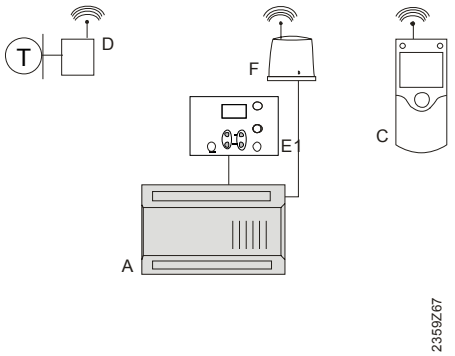
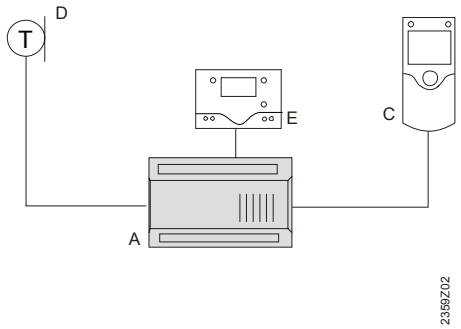
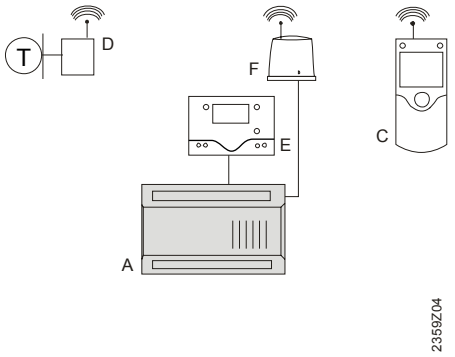


Wireless



* RF module and RF module BSB only alternatively

1.1.2 Operation options

	Wired	Wireless
Operation with room unit		
Operation with operator unit "Basic" (optionally with extra room unit)		
Operation with operator unit "Cleartext" (optionally with extra room unit)		

A Basic unit RVS21.826
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

This symbol draws your attention to special safety notes and warnings. Failing to observe these notes may result in injury and/or serious damage.

Field of use

The products may only be used in building services plant and applications as described in this document.

Intended use

Transport, storage, mounting, installation and commissioning as intended as well as careful operation are prerequisites to ensure safe and trouble-free operation of the products.

When using the products, all requirements specified in chapters "Mounting and installation" and "Technical data" must be met.

Electrical installation

Fuses, switches, wiring and earthing must comply with local safety regulations for electrical installations.

Wiring

When wiring the system, strictly segregate the AC 230 V section from the safety extra-low voltage (SELV) section to ensure protection against electric shock!

Only authorized personnel are permitted to perform diagnostics, rectify faults and restart the plant. This applies to work carried out inside the control panel also (e.g. testing or changing fuses).

All local and currently valid legislation must be observed.

3 Mounting and installation

3.1 Regulations

Electrical installation

- Prior to installation, 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
- Sensor and power cables must not be run in the same cable duct
- The same sensor cannot be connected to several inputs

3.2 Heat pump controller RVS21.826

Engineering

- The controller has been designed for integration in a heat pump or control panel and is therefore supplied without housing (PCB version)
- Air circulation around the controller must be ensured, thus making certain that the heat produced by it is emitted.
  In any case, above and below the PCB, a minimum clearance of 10 mm must be observed. This space must be inaccessible and objects must not be placed there
- The controller is designed in compliance with the directives of safety class II and must be installed according to these regulations
- Power to the controller must only be supplied when completely installed. If not observed, there is a risk of electric shock by the terminal strips
- The controller must not be exposed to dripping water
- Permissible ambient temperature when mounted and when ready to operate: -20...50 °C
- Power cables must be clearly separated from low-voltage cables (sensors) observing a distance of at least 100 mm

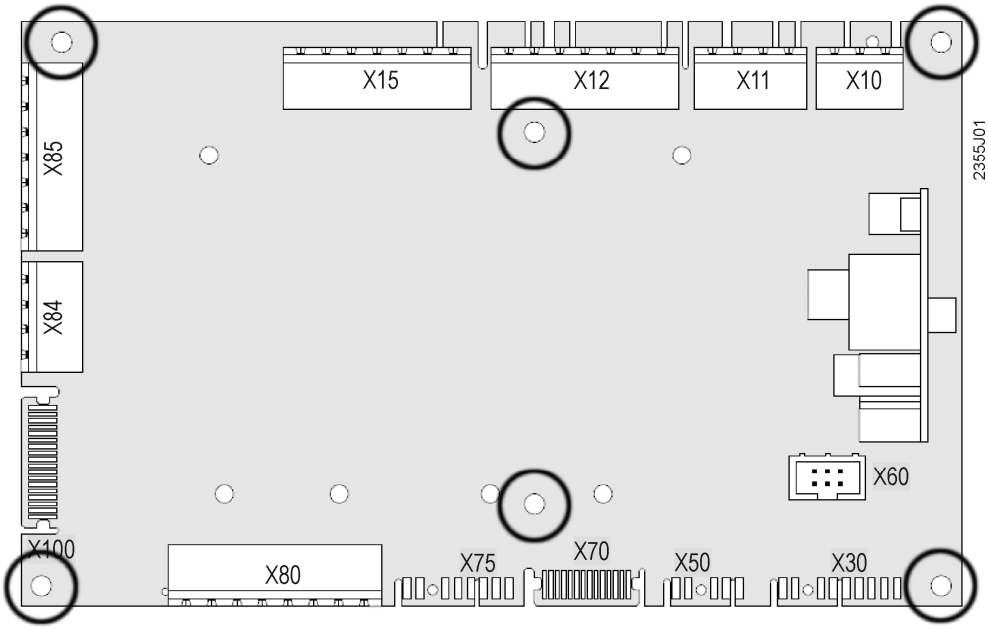
Mounting location

- Heat pump
- Control panel

Mounting method

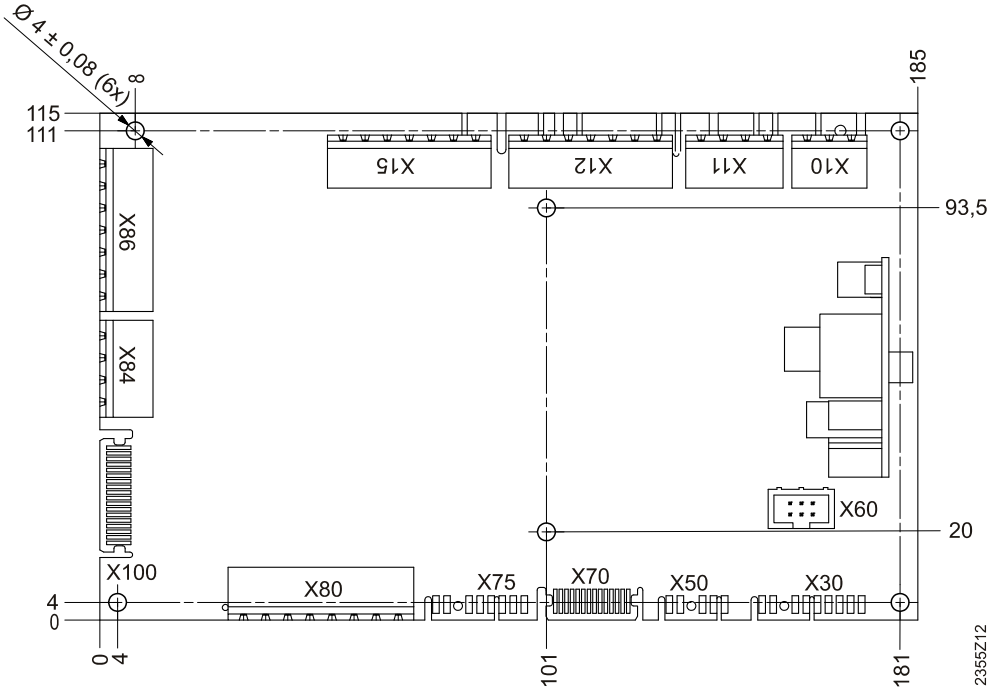
The PCB of the basic unit (RVS21.826) has 6 holes (4 mm dia.) for securing it to a solid base. It is recommended to use spacers made of plastic (e.g. Richco type LCBS-x).

To ensure adequate rigidity of the PCB, all 6 fixing points must be used.



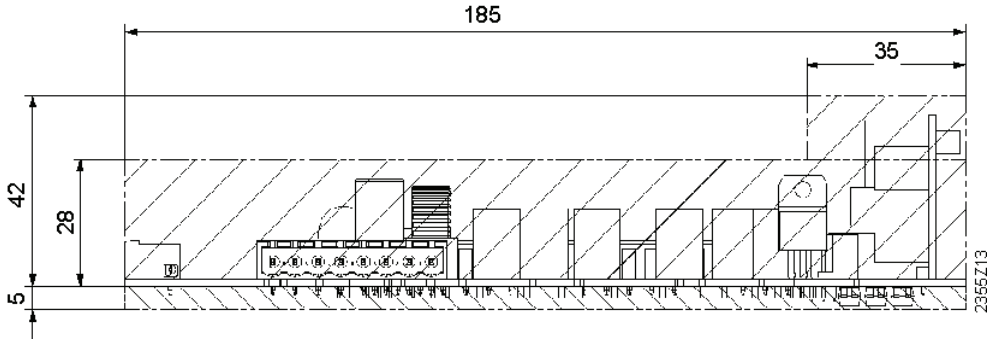
The I/O module (AVS55.196 or AVS55.199) can be fitted next to the basic unit or – using a spacer – can be plugged onto the PCB of the basic unit (refer to description of the AVS55.196 or AVS55.199).

Dimensions and drilling plan



Dimensions in mm

Height of electronic components (without extension module)

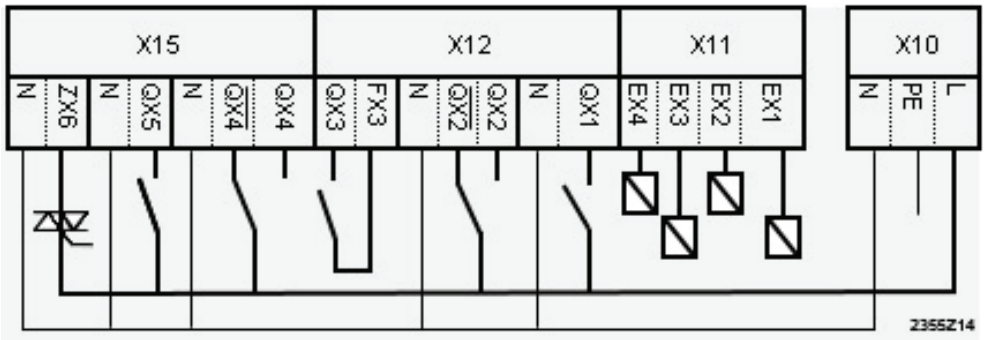


Dimensions in mm

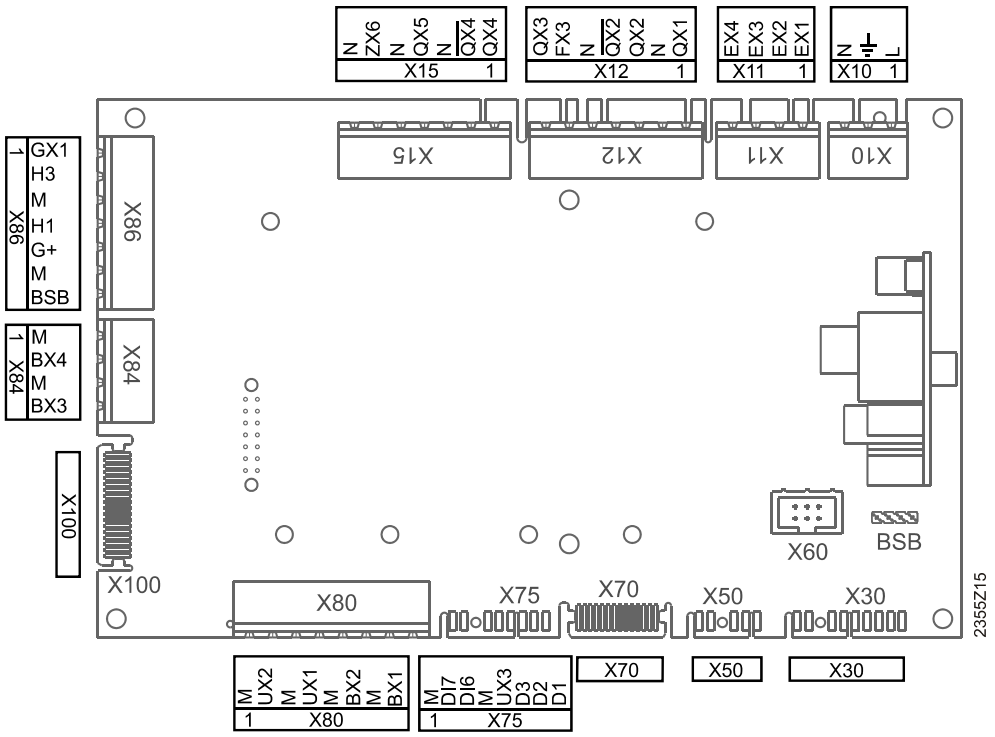
3.2.1 Connection terminals RVS21.826

Mains voltage connections

Diagram of PCB



Terminal markings RVS21.826



Mains voltage

	Use	*Socket*	*Connector type*
L	Mains connection, live conductor AC 230 V	1 X10	AGP5S.03A/109
⏚	Mains connection, protective earth		
N	Mains connection, neutral conductor		
EX1	Multifunctional input EX1	1 X11	AGP5S.04D/109
EX2	Multifunctional input EX2		
EX3	Multifunctional input EX3		
EX4	Multifunctional input EX4		
QX1	Multifunctional output QX1	1 X12	AGP5S.07H/109
N	Neutral conductor		
QX2	Multifunctional output QX2		
$\overline{QX2}$	Multifunctional output QX2 (inverse)		
N	Neutral conductor		
FX3	Live conductor to QX3		
QX3	Multifunctional output QX3		
QX4	Multifunctional output QX4	1 X15	AGP5S.07L/109
$\overline{QX4}$	Multifunctional output QX4 (inverse)		
N	Neutral conductor		
QX5	Multifunctional output QX5		
N	Neutral conductor		
ZX6	Triac output ZX6		
N	Neutral conductor		

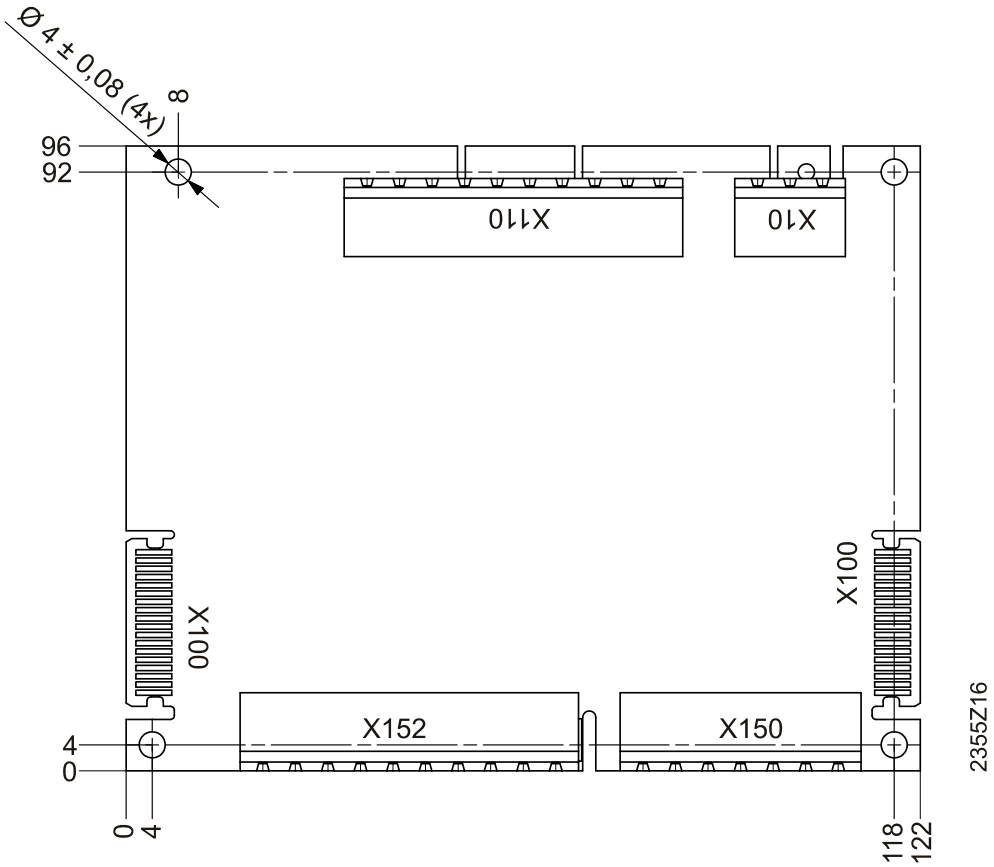
Low-voltage

	Use	*Socket*	*Connector type*
	Operator unit (HMI)	X30	AVS82.491/109 or AVS82.490/109 (ribbon cable)
	Extension modules AVS75.370/AVS75.390	X50	AVS82.490/109 (ribbon cable)
	RF module AVS71.390	X60	-
	Connection service tool (OCI700)	BSB	
	LPB clip-in	X70	Ribbon cable LPB clip-in
D1	Digital output 1, heating	X75	Lumberg 3515 08 K20
D2	Digital output 2, cooling		
D3	Digital output 3, heat pump on/off		
UX3	Output UX3 (DC 0...10 V/PWM output)		
M	Ground		
DI6	Digital input 6, defrosting		
DI7	Digital input 7, alarm		
M	Ground	1	
BX1	Sensor input BX1	X80	AGP5S.08N/109
M	Ground		
BX2	Sensor input BX2		
M	Ground		
UX1	Output UX1 (DC 0...10 V/PWM output)		
M	Ground		
UX2	Output UX2 (DC 0...10 V/PWM output)		
M	Ground	1	
BX3	Sensor input BX3	X84	AGP5S.04E/109
M	Ground		
BX4	Sensor input BX4		
M	Ground	1	
BSB	Connection BSB	X86	AGP5S.07K/109
M	Ground BSB		
G+	Power supply optional lighting		
H1	Digital/DC 0...10 V input H1		
M	Ground		
H3	Digital/DC 0...10 V input H3		
GX1	Power supply 5 V/12 V for active sensors	1	
	I/O module AVS55.196 or AVS55.199	X100	AVS82.496/109 (ribbon cable)

3.3 I/O module AVS55.196

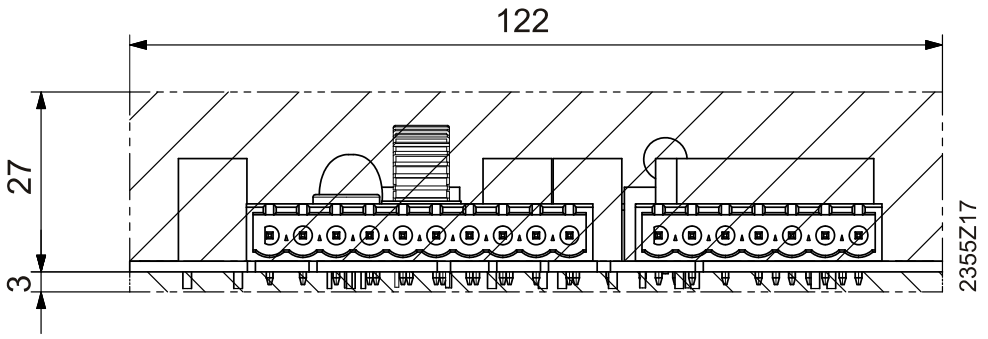
For engineering, mounting location and mounting method of the I/O module (both input and output module), the information given for the basic unit applies.

Dimensions and drilling plan



Dimensions in mm

Height of electronic components



Dimensions in mm

Fitting the I/O unit

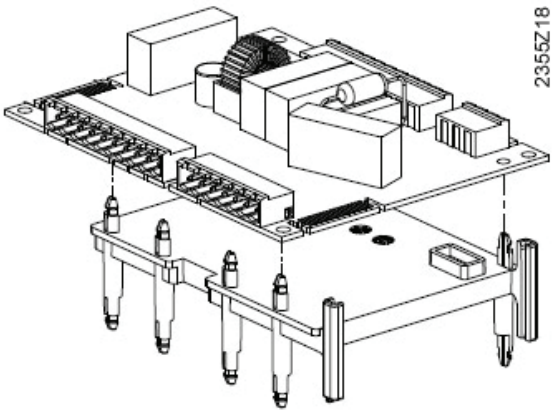
Fitting next to the basic unit

The I/O module can be fitted to the left of the basic unit.

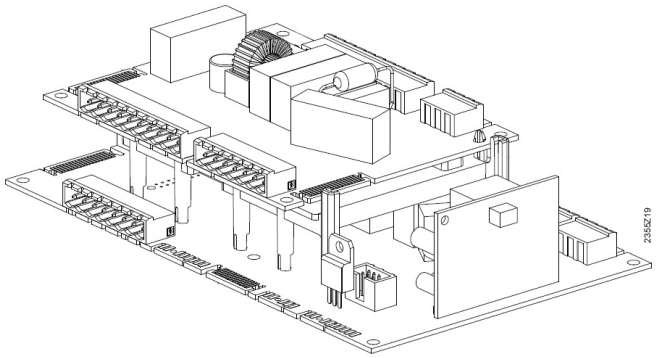
Fitting on the basic unit

Using the AVS92.280/109 placer plate, the I/O module can be plugged onto the basic unit.

First, plug the I/O module onto the spacer plate.

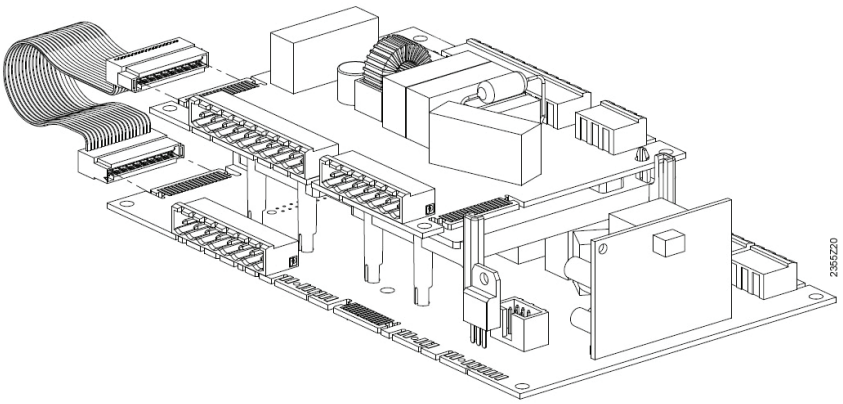


Then, plug the spacer plate together with the I/O module onto the basic unit.

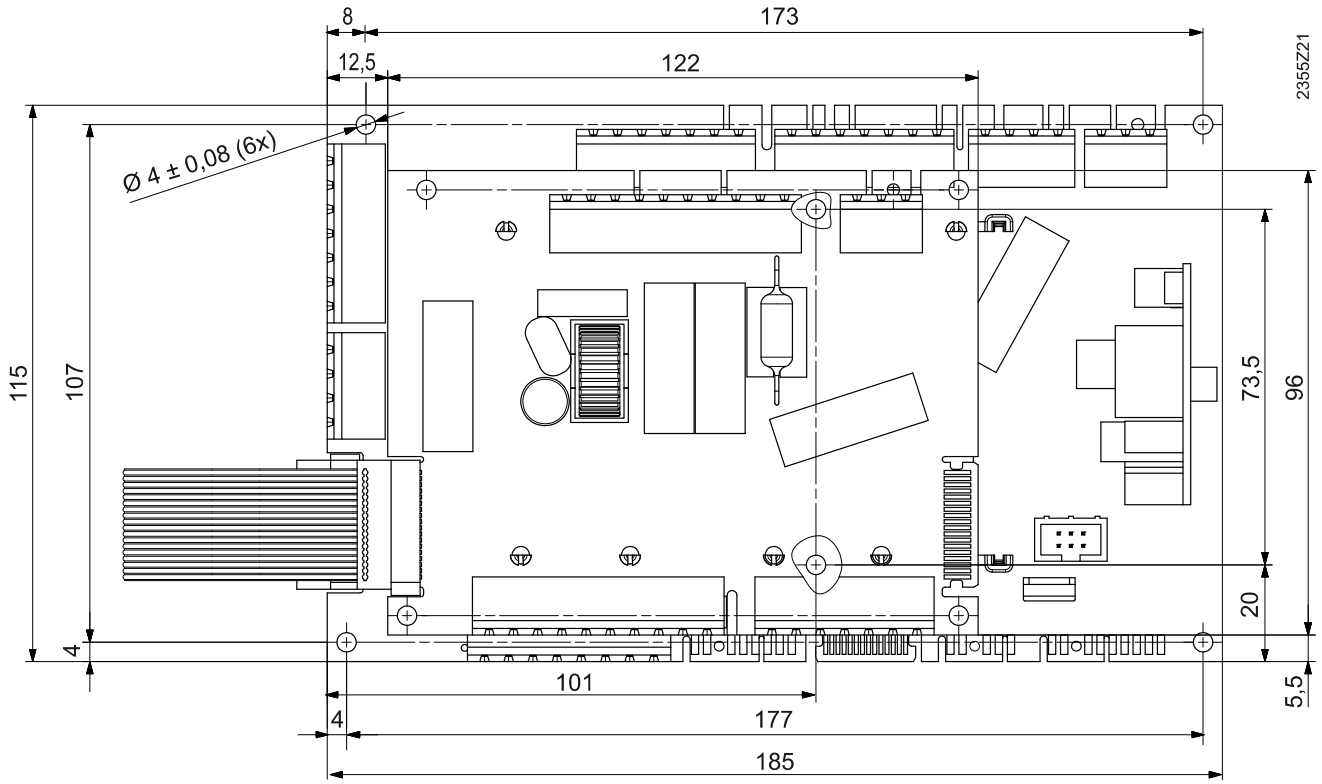


Electrical connections

Use connecting cable AVS82.496/109 to connect the AVS55.196 I/O module to socket X100 of the basic unit. The connectors are coded.

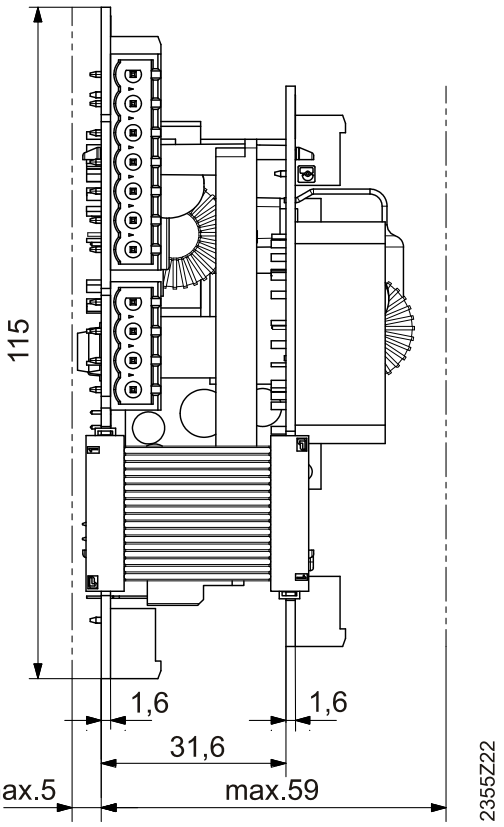


3.3.1 Dimensions of basic unit incl. I/O module



Dimensions in mm

Height of electronic components

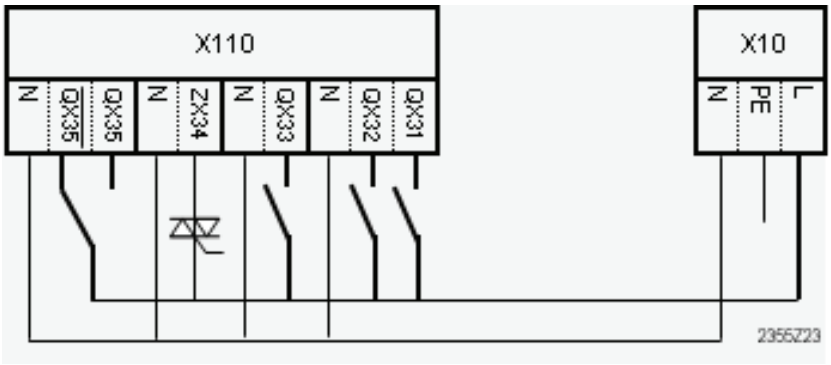


Dimensions in mm

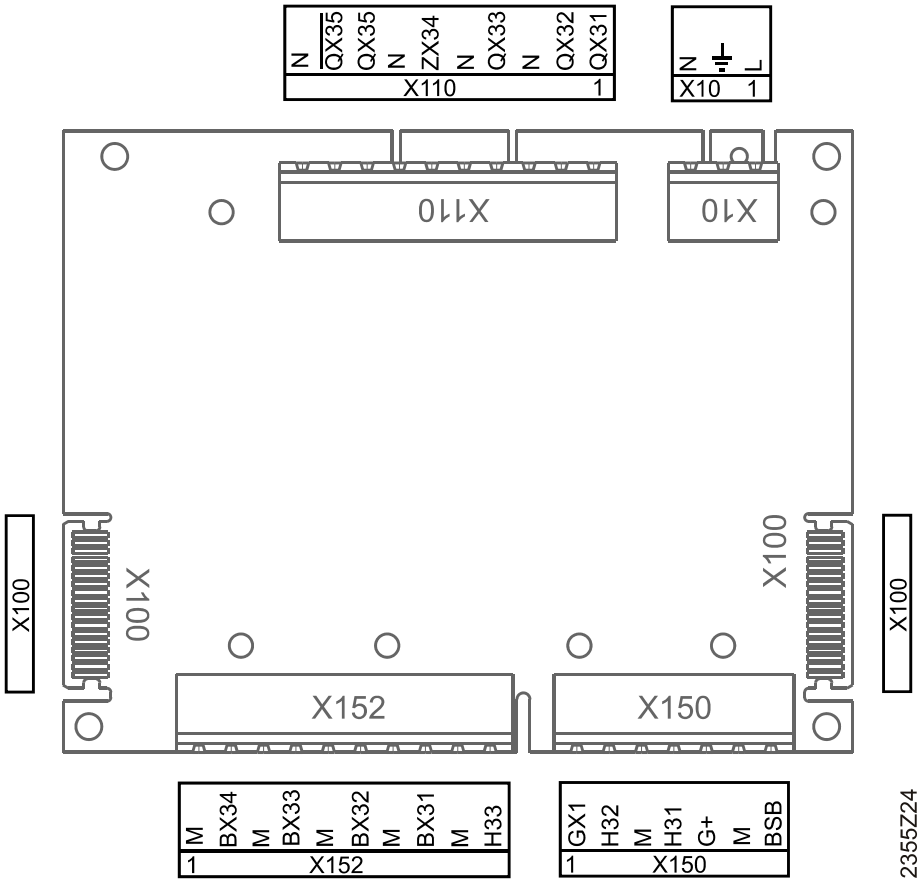
3.3.2 Connection terminals AVS55.196

Mains voltage connections

Diagram of PCB



Terminal markings AVS55.196



Terminal markings
AVS55.196

Mains voltage

	Use	*Socket*	*Connector type*
L	Live conductor AC 230 V, I/O module	1	AGP5S.03A/109
⏚	Protective earth	X10	
N	Neutral conductor		
QX31	Multifunctional output QX31	1	AGP5S.10P/109
QX32	Multifunctional output QX32		
N	Neutral conductor		
QX33	Multifunctional output QX33		
N	Neutral conductor	X110	
ZX34	Triac output ZX34		
N	Neutral conductor		
QX35	Multifunctional output QX35		
$\overline{QX35}$	Multifunctional output QX35 (inverse)		
N	Neutral conductor		

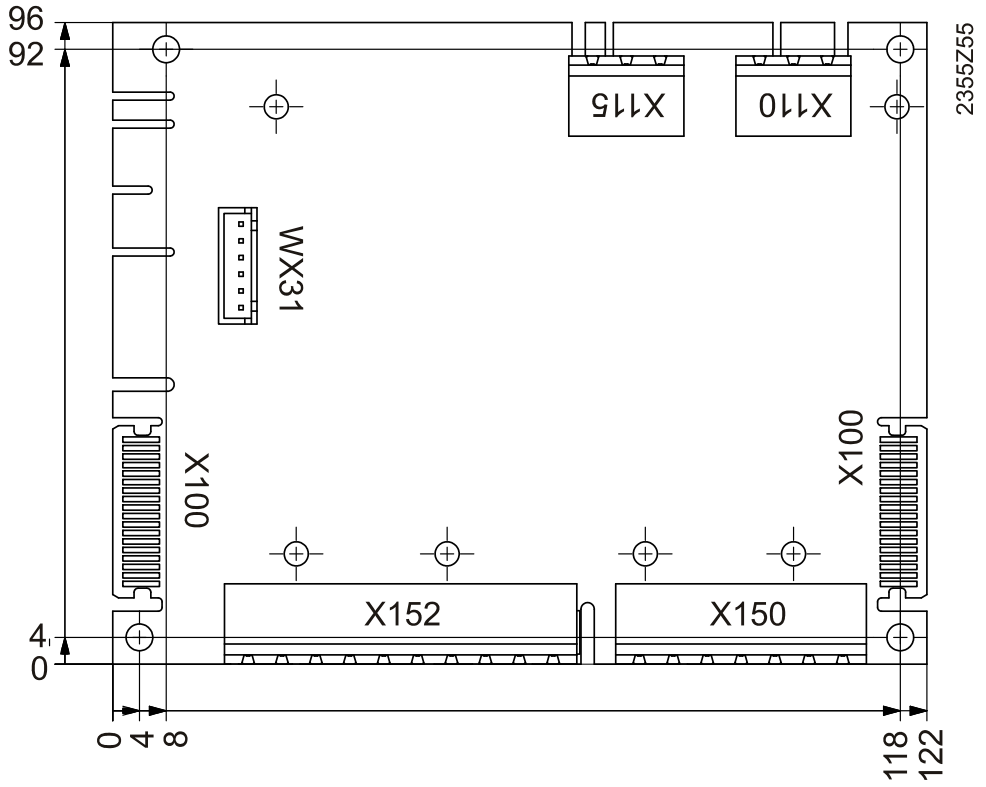
Low-voltage

	Use	*Socket*	*Connector type*
	Connection to basic unit	X100	AVS82.496/109 (ribbon cable)
BSB	Connection BSB		AGP5S.07L/109
M	Ground		
G+	12 V for room unit lighting	X150	
H31	Digital/DC 0...10 V input H31		
M	Ground		
H32	Digital/DC 0...10 V input H32		
GX1	Power supply 5 V/12 V for active sensors	1	
H33	Digital/DC 0...10 V input H33		AGP5S.10R/109
M	Ground		
BX31	Sensor input BX31		
M	Ground		
BX32	Sensor input BX32	X152	
M	Ground		
BX33	Sensor input BX33		
M	Ground		
BX34	Sensor input BX34		
M	Ground	1	

3.4 I/O module AVS55.199

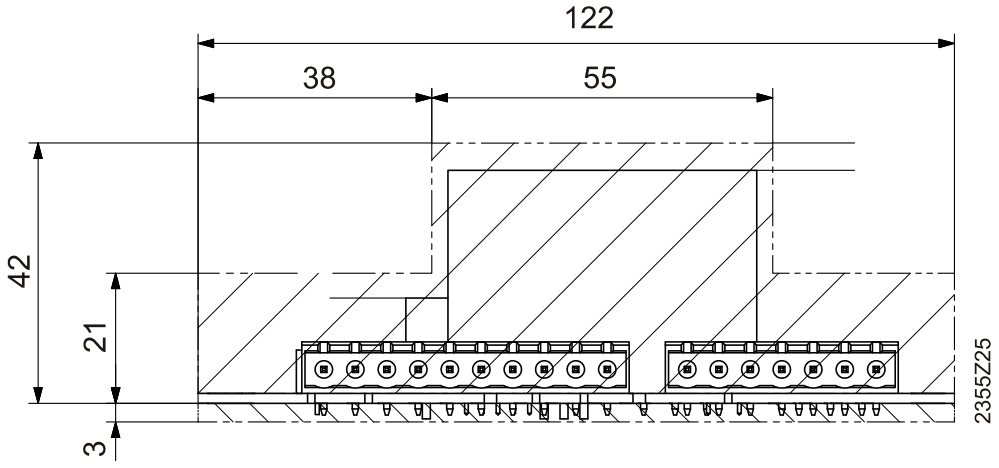
For engineering, mounting location and mounting method of the I/O module (both input and output module), the information given for the basic unit applies.

Dimensions and drilling plan



Dimensions in mm

Height of electronic components



Dimensions in mm

Fitting the I/O module

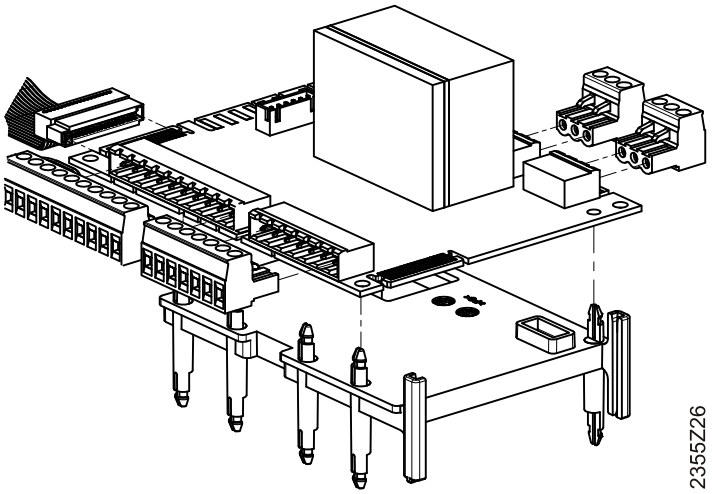
Fitting next to the basic unit

The I/O module can be fitted to the left of the basic unit.

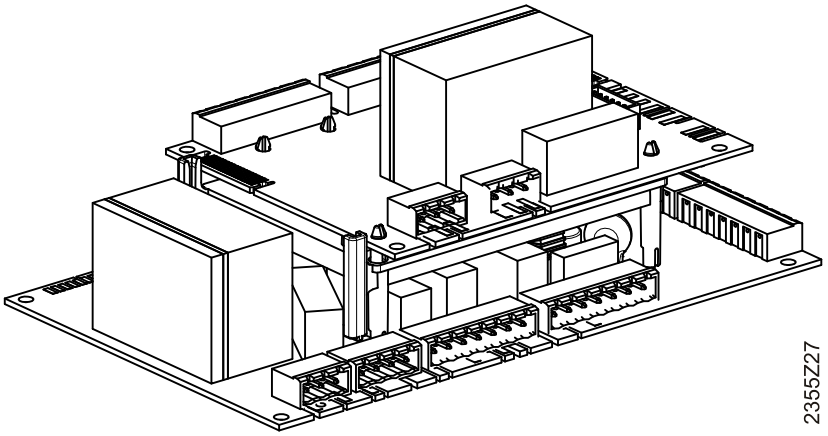
Fitting on the basic unit

Using the AVS92.280/109 spacer plate, the I/O module can be plugged onto the basic unit.

First, plug the I/O module onto the spacer plate.

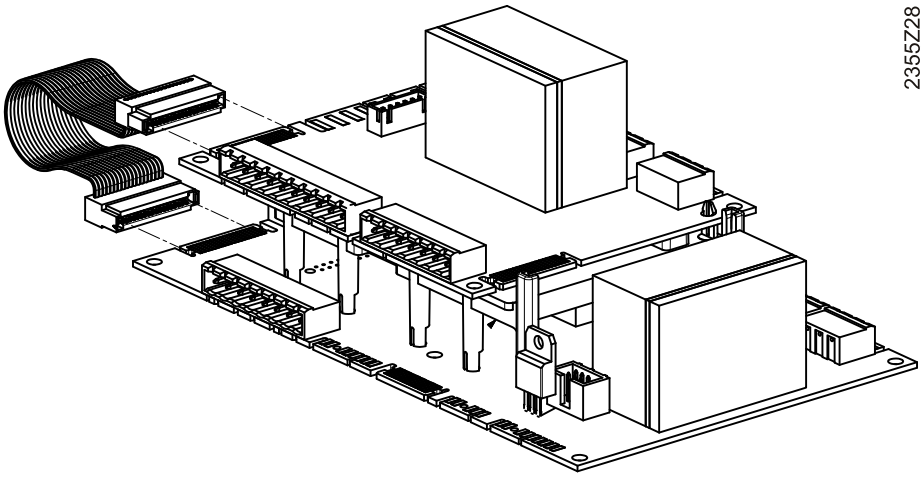


Then, plug the spacer plate together with the I/O module onto the basic unit.

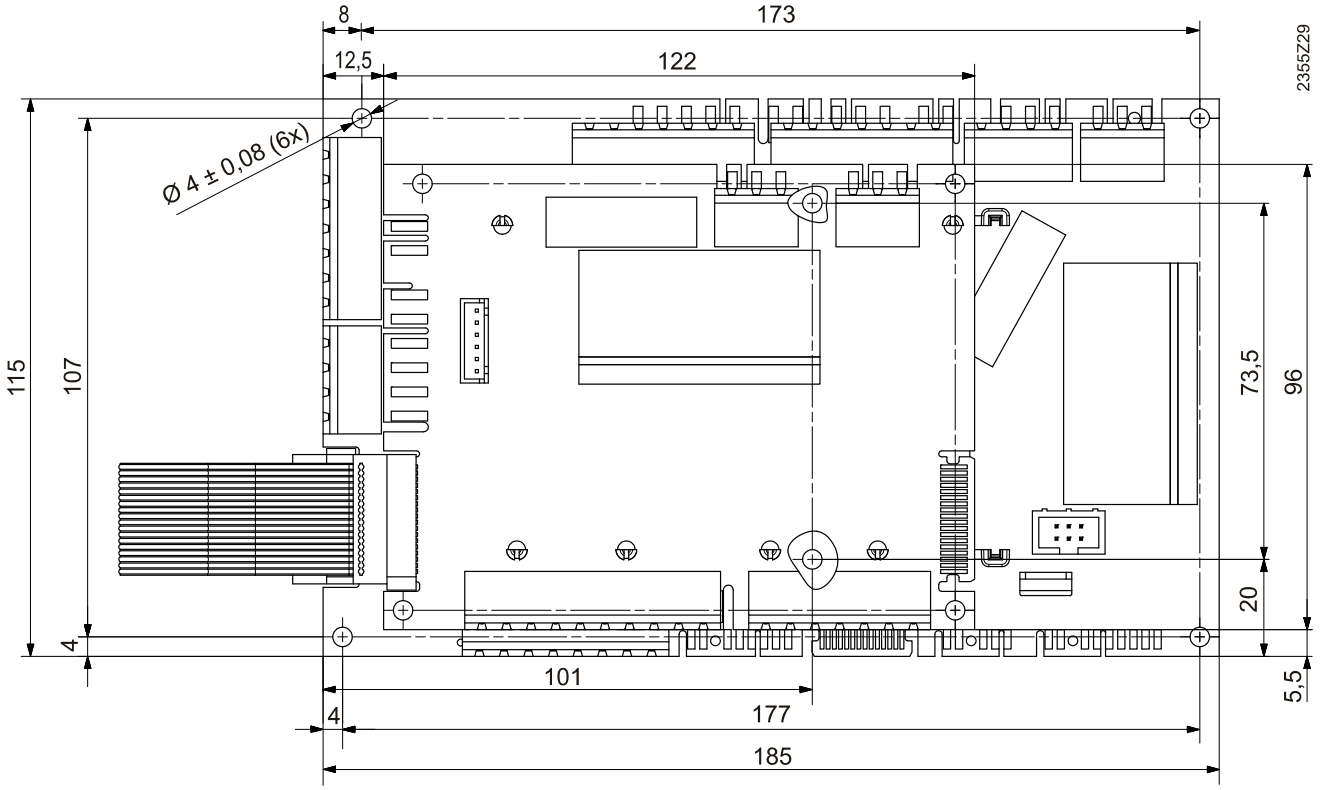


Electrical connections

Use connecting cable AVS82.496/109 to connect the AVS55.199 I/O module to socket X100 of the basic unit. The connectors are coded.

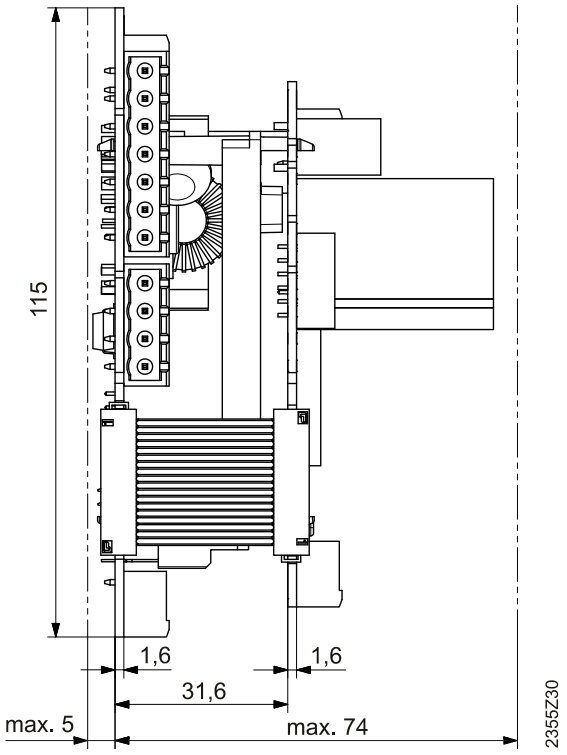


3.4.1 Dimensions of basic unit incl. I/O module



Dimensions in mm

Height of electronic components

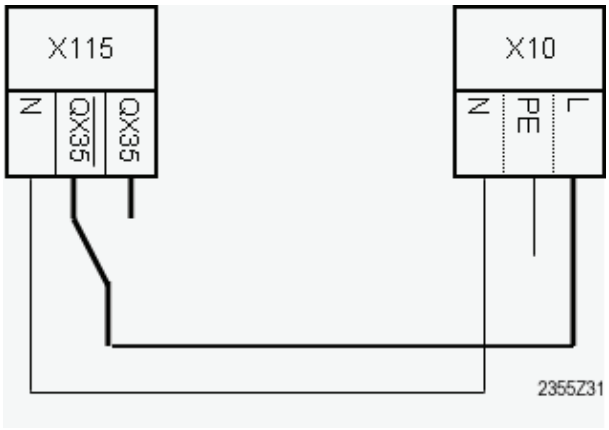


Dimensions in mm

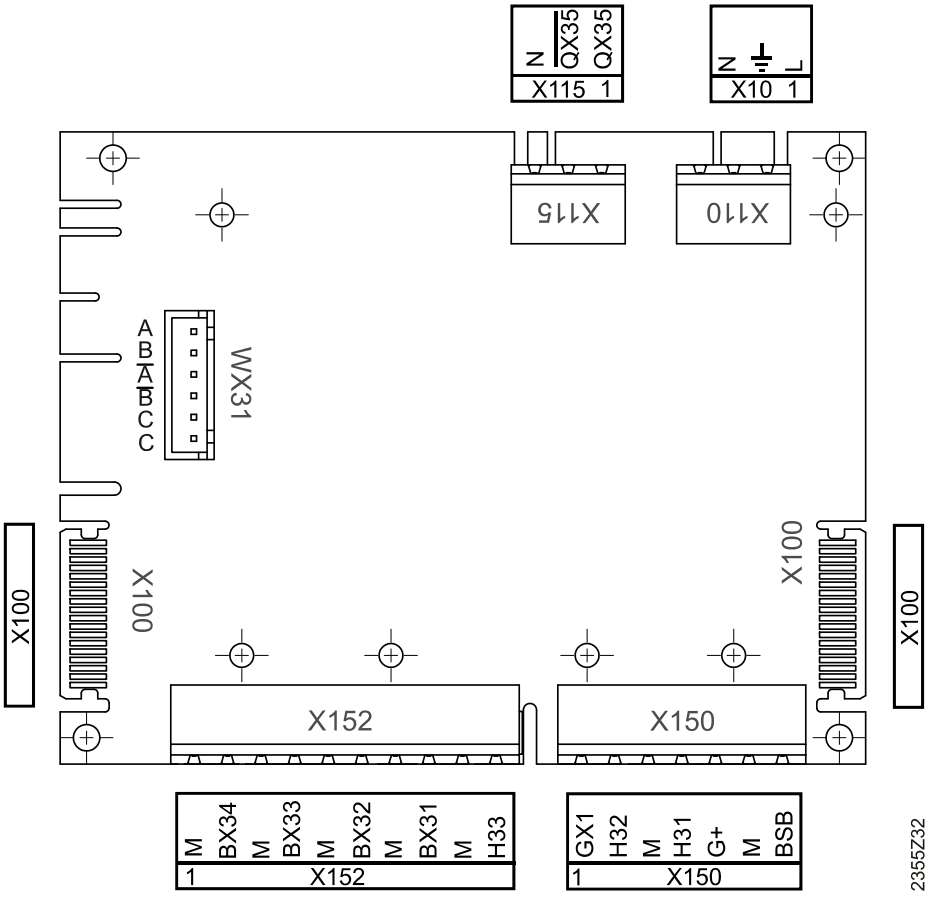
3.4.2 Connection terminals AVS55.199

Mains voltage connections

Diagram of PCB



Terminal markings AVS55.199



Terminal markings
AVS55.199

Mains voltage

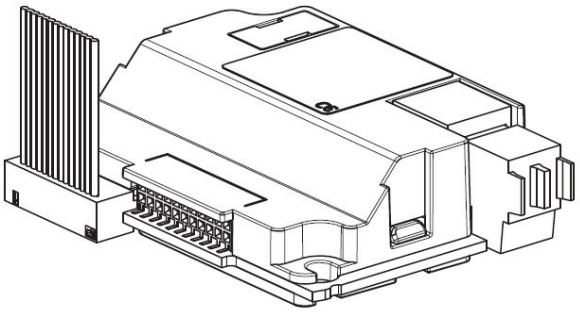
	Use	*Socket*	*Connector type*
L	Live conductor AC 230 V, I/O module	1	AGP5S.03A/109
⏚	Protective earth	X10	
N	Neutral conductor		
QX35	Multifunctional output QX35	1	AGP5S.03B/109
$\overline{QX35}$	Multifunctional output QX35 (inverse)	X115	
N	Neutral conductor		

Low-voltage

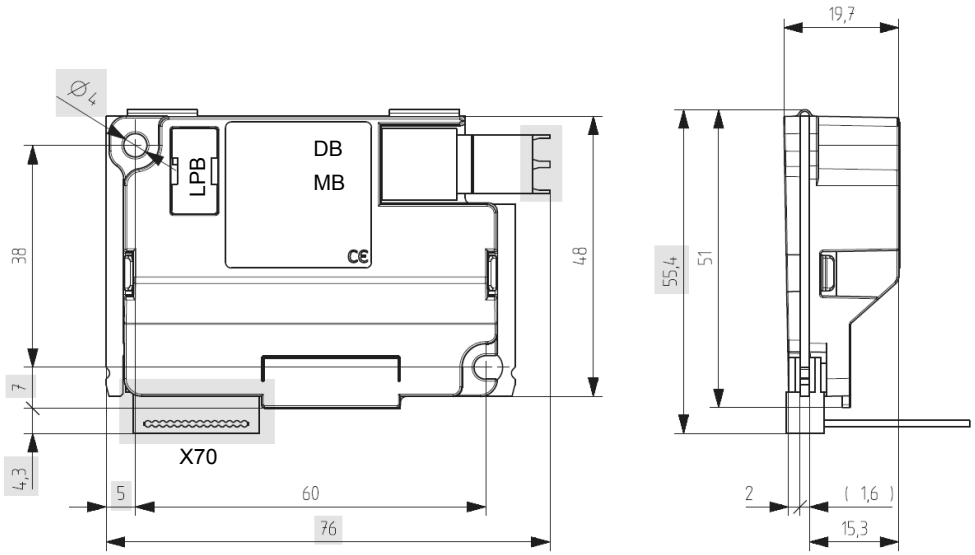
	Use	*Socket*	*Connector type*
	Connection to basic unit	X100	AVS82.496/109 (ribbon cable)
BSB	Connection BSB		AGP5S.07L/109
M	Ground		
G+	12 V for room unit lighting	X150	
H31	Digital/DC 0...10 V input H31		
M	Ground		
H32	Digital/DC 0...10 V input H32		
GX1	Power supply 5 V/12 V for active sensors	1	
H33	Digital/DC 0...10 V input H33		AGP5S.10R/109
M	Ground		
BX31	Sensor input BX31		
M	Ground		
BX32	Sensor input BX32	X152	
M	Ground		
BX33	Sensor input BX33		
M	Ground		
BX34	Sensor input BX34		
M	Ground	1	
	Connection for stepper motor (expansion valve)		XHP-6 Supplier: JST
A	Coil A		
B	Coil B	WX31	
$\overline{A}$	Coil A		
$\overline{B}$	Coil B		
C	DC 12 V		
C	DC 12 V	1	

3.5 LPB clip-in OCI345.06/101

Front view



Dimensions and drilling plan



Assignment of terminals

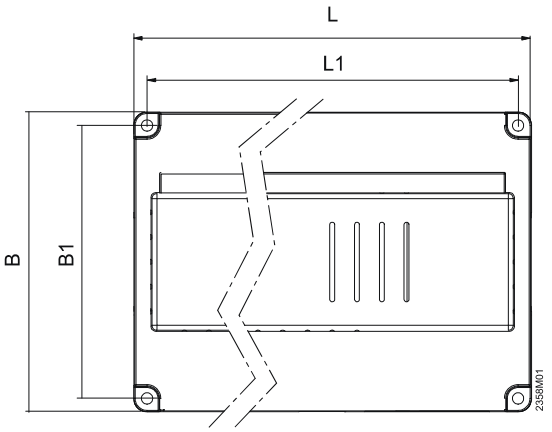
Low-voltage

	Use	*Connector type*
LPB	Connection for LPB service tool	
X70	Connector for RVS.. (ribbon cable)	Lumberg 14-pole
DB	LPB data bus	AGP4S.02H/109
MB	LPB ground	

3.6 Extension module AVS75.370

For engineering, mounting location and mounting method, the information given for the basic unit applies.

Dimensions and drilling plan



Masse in mm

	L	*B*	*H*	*L1*	*B1*
AVS75.370	108.7	120.9	51.7	98	110

Electrical connections

Use connecting cable AVS83.490/109 to connect the AVS75.370 extension module via socket X50 to socket X50 of the basic unit. The connectors are coded.

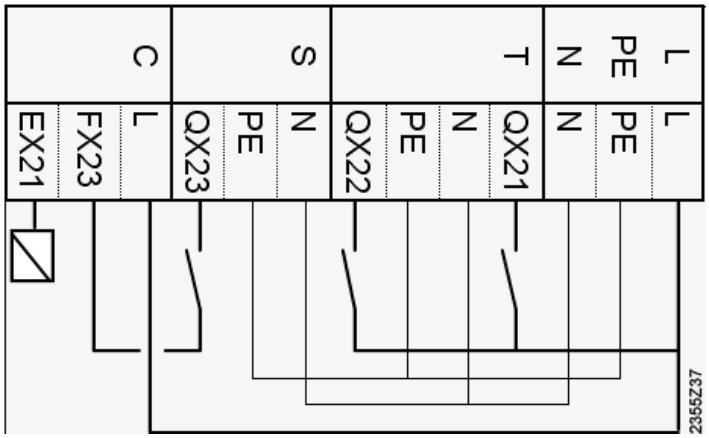
Additional modules are connected from socket X50 of the first module to socket X50 of the next module.

A maximum of 3 extension modules can be connected to a basic unit.

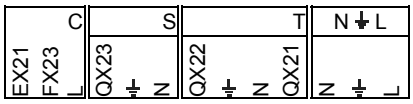
3.6.1 Connection terminals AVS75.370

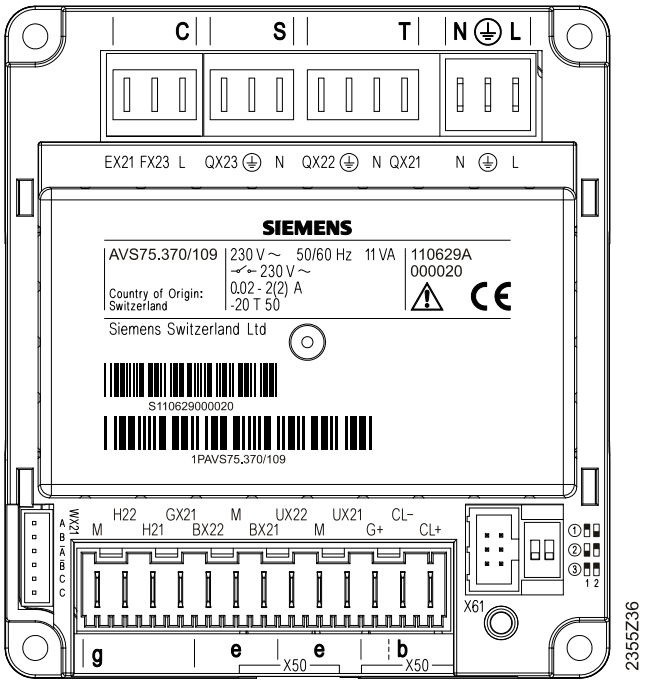
Mains voltage connections

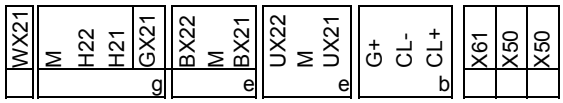
Diagram of AVS75.370



Terminal markings AVS75.370







① = module 1

② = module 2

③ = module 3

Terminal markings
AVS75.370

Mains voltage

	Use	*Socket*	*Connector type*
L	Mains connection, live conductor AC 230 V	N ⏚ L	AGP4S.03E/109
⏚	Mains connection, protective earth		
N	Mains connection, neutral conductor		
QX21	Multifunctional output QX21	T	AGP8S.04B/109
N	Neutral conductor		
⏚	Protective earth		
QX22	Multifunctional output QX22		
N	Neutral conductor	S	AGP8S.03B/109
⏚	Protective earth		
QX23	Multifunctional output QX23		
L	Live conductor AC 230 V	C	AGP8S.03K/109
FX23	Power supply QX23		
EX21	Multifunctional input EX21		

Low-voltage

	Use	*Socket*	*Connector type*
	Connection to basic unit or extension module	X50	AVS82.490/109
	Connection to basic unit or extension module	X50	AVS82.490/109
CL+	Room unit 1, data	b	AGP4S.02A/109
CL-	Room unit 1, ground		AGP4S.03D/109
G+	Room unit 1, power supply 12 V		
UX21	Output UX21 (DC 0...10 V/PWM output)	e	AGP4S.03G/109
M	Ground		
UX22	Output UX22 (DC 0...10 V/PWM output)		
BX21	Sensor input BX21	e	AGP4S.03G/109
M	Ground		
BX22	Sensor input BX22		
GX21	Power supply 5 V/12 V for active sensors	g	AGP4S.04D/109
H21	Digital/DC 0...10 V input H21		
H22	Digital/DC 0...10 V input H22		
M	Ground		
	Connection for stepper motor (expansion valve)	WX21	XHP-6 Supplier: JST
A	Coil A		
B	Coil B		
$\overline{A}$	Coil A		
$\overline{B}$	Coil B		
C	DC 12 V		
C	DC 12 V		

Assignment of terminals

Parameters ...

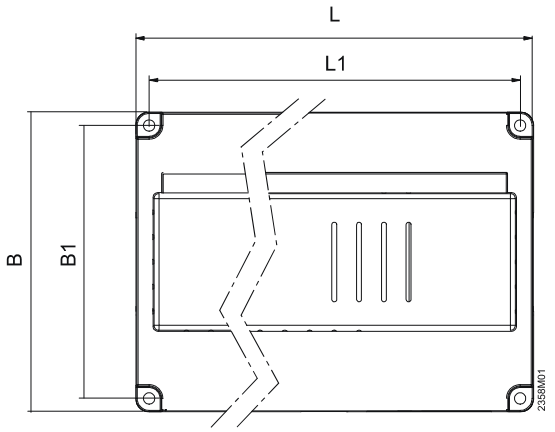
- "Function extension module 1" (line 7300)
- "Function extension module 2" (line 7375)
- "Function extension module 3" (line 7450)

are used to define usage of the respective module.

3.7 Extension module AVS75.390

For engineering, mounting location and mounting method, the information given for the basic unit applies.

Dimensions and drilling plan



Dimensions

	L	*B*	*H*	*L1*	*B1*
AVS75.390	108.7	120.9	51.7	98	110

Electrical connections

Use connecting cable AVS83.490/109 to connect the AVS75.390 extension module via socket X50 to socket X50 of the basic unit. The connectors are coded.

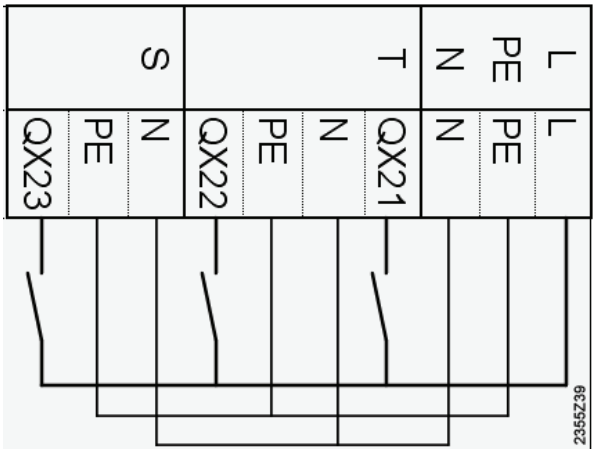
Additional modules are connected from socket X50 of the first module to socket X50 of the next module.

A maximum of 3 extension modules can be connected to a basic unit.

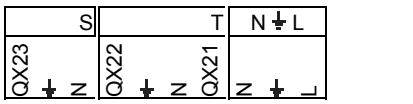
3.7.1 Connection terminals AVS75.390

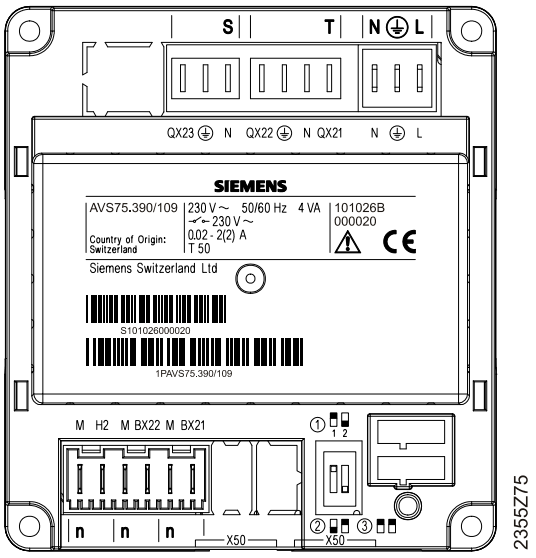
Mains voltage connections

Diagram of AVS75.390



Terminal markings AVS75.390

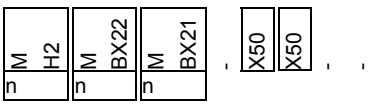




① = Modul 1

② = Modul 2

③ = Modul 3



Terminal markings
AVS75.390

Mains voltage

	Use	*Socket*	*Connector type*
L ⏚ N	Mains connection, live conductor AC 230 V Mains connection, protective earth Mains connection, neutral conductor	N ⏚ L	AGP4S.03E/109
QX21 N ⏚ QX22	Multifunctional output QX21 Neutral conductor Protective earth Multifunctional output QX22	T	AGP8S.04B/109
N ⏚ QX23	Neutral conductor Protective earth Multifunctional output QX23	S	AGP8S.03B/109

Low-voltage

	Use	*Socket*	*Connector type*
	Connection to basic unit or extension module	X50	AVS82.490/109
	Connection to basic unit or extension module	X50	AVS82.490/109
BX21 M	Sensor input BX21 Ground	n	AGP4S.02F/109
BX22 M	Sensor input BX22 Ground	n	AGP4S.02F/109
H2 M	Digital/DC 0...10 V input Ground	n	AGP4S.02F/109

Assignment of terminals

Parameters ...

- "Function extension module 1" (line 7300)
- "Function extension module 2" (line 7375)
- "Function extension module 3" (line 7450)

are used to define usage of the respective module.

4 Commissioning

Prerequisites

To commission the plant, follow these working steps:

- Prerequisite is the correct mounting and correct electrical installation and, in the case of wireless products, correctly working RF connections to all required auxiliary units
- Make all plant-specific settings. Pay special attention to operating page "Configuration". For that, select the relevant operating level as follows:
  – Press the OK button on the room unit to switch to programming
  – Keep the info button depressed 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
  (operating page "Diagnostics consumers", operating line 8703, "Outside temp attenuated")

Function check

To facilitate commissioning and fault tracing, the controller offers input/output tests. These tests can be made to check the controller's inputs and outputs. To perform the tests, select operating page "Input/output test" and go through all available operating lines.

If the tests reveal errors, refer to descriptions "Diagnostics sources (producers)" and "Diagnostics consumers" in this User Manual.

Operating state

The current operating state can be checked on operating page "State".

Diagnostics

For detailed plant diagnostics, check operating pages "Diagnostics heat generation" and "Diagnostics consumers".

4.1 Heat pump controller and I/O module

Checking the LEDs

Both the heat pump controller and the I/O module have an LED to indicate their operating states:

LED off	No power
LED on	Ready to operate
LED flashes	Local error

5 Overview of settings

The table below shows all available settings up to the heating engineer level.
Certain operating lines may be hidden, depending on the type of controller used.

Key

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

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
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/HC3						
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

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
565	E	3rd phase on	24:00	00:00	24:00	hh:mm
566	E	3rd phase off	24:00	00:00	24:00	hh:mm
576	E	Default values No ¦ Yes	No			
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						
641	E	Preselection Period 1...8		1	8	
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						
651	E	Preselection Period 1...8		1	8	
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 3						
661	E	Preselection Period 1...8		1	8	
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	Line 712	Line 716	°C
712	E	Reduced setpoint	19	Line 714	Line 710	°C
714	E	Frost protection setpoint	10.0	4	Line 712	°C
716	F	Comfort setpoint max	35.0	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 adaption 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	Line 741	°C
741	I	Flow temp setpoint max	50	Line 740	95	°C
742	E	Flow temp setpoint room stat	- - -	- - - / 40	95	°C
750	F	Room influence	20	- - - / 1	100	%
760	F	Room temp limitation	1	- - - / 0	4	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
770	F	Boost heating	- - -	- - - / 0	20	°C
780	F	Quick setback Off ¦ Down to reduced setpoint ¦ Down to frost prot setpoint	Down to reduced setpoint			
790	F	Optimum start control max	0:00:00	00:00:00	00:06:00	hh:mm:ss
791	F	Optimum stop control max	0:00:00	00:00:00	00:06:00	hh:mm:ss
794	F	Heat up gradient	60	0	600	min/K
800	F	Reduced setp increase start	- - -	- - - / -30	10	°C
801	F	Reduced setp increase end	-15	-30	Line 800	°C
810	F	Frost prot plant HC pump Off ¦ On	On			
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	650	s
850	I	Floor curing function Off ¦ Functional heating ¦ Curing heating ¦ Functional/curing heating ¦ Manually	Aus			
851	I	Floor curing setp manually	25	0	95	°C
856	I	Floor curing day current	0	0	32	-
857	I	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 prim contr/system pump No ¦ Yes	Yes			
882	F	Pump speed min	40	0	Line 883	%
883	F	Pump speed max	100	Line 882	100	%
900	F	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			
Cooling circuit 1						
901	E	Operating mode Off ¦ Automatic	Automatic			
902	E	Comfort setpoint	24	15	40	°C
907	E	Release 24h/day ¦ Time program HC ¦ Time program 5	24h/day			
908	I	Flow temp setp at OT 25°C	20	6	35	°C
909	I	Flow temp setp at OT 35°C	16	6	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 OT 25°C	18	6	35	°C
924	F	Flow temp setp min OT 35°C	18	6	35	°C
928	F	Room influence	80	- - - / 1	100	%
932	F	Room temp limitation	0.5	- - - / 0	4	°C
937	F	Frost prot plant CC pump Off ¦ On	Off			
938	F	Mixing valve decrease	0	0	20	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
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	650	s
945	F	Mixing valve in heating mode Control ¦ Open	Open			
946	F	Lock time dewpoint monitor	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
953	I	Acquisition room r.h. None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33	None			
954	I	Acquisition room temp Ditto 953	None			
962	F	With buffer No ¦ Yes	No			
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	Line 1012	Line 1016	°C
1012	E	Reduced setpoint	19	Line 1014	Line 1010	°C
1014	E	Frost protection setpoint	10.0	4	Line 1012	°C
1016	F	Comfort setpoint max	35.0	Line 1010	35	°C
1020	E	Heating curve slope	0.8	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	Line 1041	°C
1041	I	Flow temp setpoint max	- - -	Line 1040	95	°C
1042	E	Flow temp setpoint room stat	- - -	- - - / 8	95	°C
1050	F	Room influence	20	- - - / 1	100	%
1060	F	Room temp limitation	1	- - - / 0	4	°C
1070	F	Boost heating	- - -	- - - / 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	00:00:00	00:00:00	00:06:00	hh:mm:ss
1091	F	Optimum stop control max	00:00:00	00:00:00	00:06:00	hh:mm:ss
1094	F	Heat up gradient	60	0	600	min/K
1100	F	Reduced setp increase start	- - -	- - - / -30	10	°C
1101	F	Reduced setp increase end	-15	-30	Line 1100	°C
1110	F	Frost prot plant HC pump Off ¦ On	On			
1120	F	Overtemp prot pump circuit Off ¦ On	Off			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
1130	F	Mixing valve boost	0	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	650	s
1150	I	Floor curing function Off ¦ Functional heating ¦ ¦ Curing heating ¦ Functional/curing heating ¦ Manually	Off			
1151	E	Floor curing setp manually	25	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			
1182	F	Pump speed min	40	0	Line 1183	%
1183	F	Pump speed max	100	Line 1182	100	%
1200	I	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			
Heating circuit 3						
1300	E	Operating mode Protection ¦ Automatic ¦ Reduced ¦ Comfort	Automatic			
1310	E	Comfort setpoint	20.0	Line 1312	Line 1316	°C
1312	E	Reduced setpoint	19	Line 1314	Line 1310	°C
1314	E	Frost protection setpoint	10.0	4	Line 1312	°C
1316	F	Comfort setpoint max	35.0	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 adaption 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	Line 1341	°C
1341	I	Flow temp setpoint max	50	Line 1340	95	°C
1342	E	Flow temp setpoint room stat	- - -	- - - / 8	95	°C
1350	F	Room influence	20	- - - / 1	100	%
1360	F	Room temp limitation	1	- - - / 0	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	00:00:00	00:00:00	00:06:00	hh:mm:ss
1391	F	Optimum stop control max	00:00:00	00:00:00	00:06:00	hh:mm:ss
1394	F	Heat up gradient	60	0	600	min/K
1400	F	Reduced setp increase start	- - -	- - - / -30	10	°C
1401	F	Reduced setp increase end	-15	-30	Line 1400	°C
1410	F	Frost prot plant HC pump Off ¦ On	On			
1420	F	Overtemp prot pump circuit Off ¦ On	Off			
1430	F	Mixing valve boost	0	0	50	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
1432	F	Actuator type 2-position ¦ 3-position	3-position			
1433	F	Switching differential 2-pos	2	0	20	°C
1434	F	Actuator running time	120	30	650	s
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
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 prim contr/system pump No ¦ Yes	Yes			
1482	F	Pump speed min	40	0	Line 1483	%
1483	F	Pump speed max	100	Line 1482	100	%
1500	I	Optg mode changeover None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic	Protection			
Domestic hot water						
1610	E	Nominal setpoint	50	Line 1612	Line 1614	°C
1612	F	Reduced setpoint	40	8	Line 1610	°C
1620	I	Release 24h/day ¦ Time programs HCs ¦ Time program 4/DHW ¦ Low-tariff ¦ T'prog 4/DHW or low-tariff	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	d
1642	F	Legionella funct weekday Monday ¦ Tuesday ¦ Wednesday ¦ Thursday ¦ Friday ¦ Saturday ¦ Sunday	Monday			
1644	F	Legionella funct time	- - -	- - - / 00:00	23:50	hh:mm
1645	F	Legionella funct setpoint	65	55	95	°C
1646	F	Legionella funct duration	30	- - - / 10	360	min
1647	F	Legionella funct circ pump Off ¦ On	On			
1648	F	Legio funct circ temp diff	- - -	- - - / 0	20	°C
1660	F	Circulating pump release Time program 3/HC3 ¦ DHW release ¦ Time program 4/DHW ¦ Time program 5	Time program 3/HC3			
1661	F	Circulating pump cycling Off ¦ On	On			
1663	F	Circulation setpoint	45	8	80	°C
1680	F	Optg mode changeover None ¦ Off ¦ On	Off			
Consumer circuit 1						
1854	F	Request opt energy Off ¦ On	Off			
1859	I	Flow temp setp cons request	30	8	120	°C
1860	F	Frost prot plant VK pump Off ¦ On	On			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
1875	F	Excess heat draw Off ¦ On	On			
1878	F	With buffer No ¦ Yes	Yes			
1880	F	With prim contr/system pump No ¦ Yes	Yes			
Consumer circuit 2						
1904	F	Request opt energy Off ¦ On	Off			
1909	I	Flow temp setp cons request	30	8	120	°C
1910	F	Frost prot plant VK pump Off ¦ On	On			
1925	F	Excess heat draw Off ¦ On	On			
1928	F	With buffer No ¦ Yes	Yes			
1930	F	With prim contr/system pump No ¦ Yes	Yes			
Swimming pool circuit						
1952	F	Release source heating None ¦ 24h/day ¦ Time program 5	None			
1954	F	Request opt energy Off ¦ On	Off			
1959	I	Flow temp setpoint	30	8	120	°C
1960	F	Frost prot plant pool pump Off ¦ On	Off			
1973	F	Last priority to charge No ¦ Yes	No			
1975	F	Excess heat draw Off ¦ On	On			
1978	F	With buffer No ¦ Yes	Yes			
1980	F	With prim contr/system pump No ¦ Yes	Yes			
Swimming pool						
2055	E	Setpoint solar heating	26	8	80	°C
2056	E	Setpoint source heating	22	8	35	°C
2057	F	SD source heating	0.5	0.5	3	°C
2065	F	Charging priority solar Priority 1 ¦ Priority 2 ¦ Priority 3	Priority 3			
2080	F	With solar integration No ¦ Yes	Yes			
Primary contr/system pump						
2120	F	Frost prot plant syst pump Off ¦ On	On			
2150	I	Primary contr/system pump Before buffer ¦ After buffer	After buffer			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
Heat pump						
		Condenser pump Q9				
2789	I	Condenser pump with DHW Off ¦ On	On			
2790	F	Condenser pump modulation None ¦ HP setpoint ¦ Compressor output ¦ Temp diff condenser ¦ Demand	HP setpoint			
2792	F	Pump speed min	40	0	100	%
2793	F	Pump speed max	100	0	100	%
2800	F	Frost prot plant cond pump Off ¦ On	Off			
2801	I	Control cond pump Automatically ¦ Temp request ¦ Parallel compr operation	Automatically			
2802	I	Prerun time cond pump	5	0	240	s
2803	I	Overrun time cond pump	5	0	240	s
		Condenser				
2805	F	Req temp diff condenser	10	- - - / 1	20	°C
		Evaporator				
2815	F	Source temp min water	3	- - - / -20	30	°C
2816	F	Source temp min brine	-5	- - - / -30	50	°C
2817	F	Switching diff source prot	3	1	10	°C
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	T'limit source temp min brine	4	1	24	h
2827	F	Time limit source temp	15	1	360	min
		Compressor				
2839	F	Set' time ch'over DHW/HC	120	- - - / 15	600	s
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	-20	20	°C
2852	F	LP delay on startup	5	0	120	s
		Electric immersion heaters flow				
2880	I	Use electric flow Substitute ¦ Complem operation HC ¦ Complem operation DHW ¦ Complem operation HC+DHW ¦ End DHW charging ¦ Emergency operation ¦ Legionella function	Complem operation HC			
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
		General parameters				
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 mains fault	3	1	40	s
2895	F	Delay flow switch	0	0	10	s

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
2908	F	OT limit with DHW charging Ignore ¦ Note	Note			
2909	F	Release below outside temp	- - -	- - - / -50	50	°C
2910	F	Release above outside temp	- - -	- - - / -30	30	°C
2911	F	For forced buffer charging Locked ¦ Released	Released			
2912	F	Full charging buffer Off ¦ On	On			
		Defrosting				
2951	I	Defrost release below OT	7	5	20	°C
2958	I	Max num defrost repetitions	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
2969	F	Defrost with DHW charging Automatically ¦ DHW ¦ Heating circuit ¦ Heating circ, delay defrost	Automatically			
		Cooling				
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			
3007	F	In passive cooling mode Condenser pump off ¦ Condenser pump on	Condenser pump off			
3008	F	Temp diff cond cooling mode	5	0	20	°C
		Output control source				
3025	I	Silent mode speed max	- - -	- - - / 0	100	%
3026	I	Silent mode on	22:00	00:00	23:50	hh:mm
3027	I	Silent mode off	06:00	00:00	23:50	hh:mm
3028	F	Silent mode speed incr start	- - -	- - - / -50	50	°C
3029	F	Silent mode speed incr end	-10	-50	50	°C
		Sensor calibration				
3030	I	Auto readj HP cond sensor Off ¦ Now ¦ After pump prerun	Off			
3031	I	Readj HP flow sensor	0	-20	20	°C
3032	I	Readj HP return sensor	0	-20	20	°C
3033	I	Readj status Not readjusted ¦ Manually readjusted ¦ Automatically readjusted ¦ Readjustment running	Not readjusted			
Energy meter						
3090	F	Pulse count heat None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33	None			
3092	F	Pulse unit heat None ¦ kWh ¦ Liter	None			
3093	F	Pulse value heat numer	1	1	1000	
3094	F	Pulse value heat denom	1	1	1000	

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
3095	F	Flow measurement heat None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33	None			
3097	F	Flow heating	- - -	- - - / 10	60000	l/h
3098	F	Flow DHW	- - -	- - - / 10	60000	l/h
3100	F	Pulse count energy None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33	None			
3102	I	Pulse unit energy None ¦ kWh ¦ m3	None			
3103	I	Pulse value energy numer	1	1	1000	
3104	I	Pulse value energy denom	1	1	1000	
3106	F	Mean gas energy content	11.5	1	100	kWh/m3
3108	I	Electrical source output	- - -	- - - / 0.01	10	kW
3109	I	Int count el imm heater flow None ¦ Heat delivered ¦ Energy brought in ¦ Both	None			
3110	F	Heat delivered	0	0	9999999	kWh
3113	F	Energy brought in	0	0	3500000	kWh
3116	F	Performance factor	- - -	- - - / 0	10	
3119	I	Fixed day yearly perf fact	30.6.	1.01	31.12	DD.MM
3120	E	Yearly perf factor 1	- - -	- - - / 0	10	
3120	E	Fixed day 1		1.9.2004	31.12.2099	DD.MM.YYYY
3121	E	Heat delivered heating 1	0	0	9999999	kWh
3122	E	Heat delivered DHW 1	0	0	9999999	kWh
3124	E	Energy brought in heating 1	0	0	3500000	kWh
3125	E	Energy brought in DHW 1	0	0	3500000	kWh
3127	E	Yearly perf factor 2	- - -	- - - / 0	10	
3127	E	Fixed day 2		1.9.2004	31.12.2099	DD.MM.YYYY
3128	E	Heat delivered heating 2	0	0	9999999	kWh
3129	E	Heat delivered DHW 2	0	0	9999999	kWh
3131	E	Energy brought in heating 2	0	0	3500000	kWh
3132	E	Energy brought in DHW 2	0	0	3500000	kWh
3134	E	Yearly perf factor 3	- - -	- - - / 0	10	
3134	E	Fixed day 3		1.9.2004	31.12.2099	DD.MM.YYYY
3135	E	Heat delivered heating 3	0	0	9999999	kWh
3136	E	Heat delivered DHW 3	0	0	9999999	kWh
3138	E	Energy brought in heating 3	0	0	3500000	kWh
3139	E	Energy brought in DHW 3	0	0	3500000	kWh
3141	E	Yearly perf factor 4	- - -	- - - / 0	10	
3141	E	Fixed day 4		1.9.2004	31.12.2099	DD.MM.YYYY
3142	E	Heat delivered heating 4	0	0	9999999	kWh
3143	E	Heat delivered DHW 4	0	0	9999999	kWh

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
3145	E	Energy brought in heating 4	0	0	3500000	kWh
3146	E	Energy brought in DHW 4	0	0	3500000	kWh
3148	E	Yearly perf factor 5	- - -	- - - / 0	10	
3148	E	Fixed day 5		1.9.2004	31.12.2099	DD.MM. YYYY
3149	E	Heat delivered heating 5	0	0	9999999	kWh
3150	E	Heat delivered DHW 5	0	0	9999999	kWh
3152	E	Energy brought in heating 5	0	0	3500000	kWh
3153	E	Energy brought in DHW 5	0	0	3500000	kWh
3155	E	Yearly perf factor 6	- - -	- - - / 0	10	
3155	E	Fixed day 6		1.9.2004	31.12.2099	DD.MM. YYYY
3156	E	Heat delivered heating 6	0	0	9999999	kWh
3157	E	Heat delivered DHW 6	0	0	9999999	kWh
3159	E	Energy brought in heating 6	0	0	3500000	kWh
3160	E	Energy brought in DHW 6	0	0	3500000	kWh
3162	E	Yearly perf factor 7	- - -	- - - / 0	10	
3162	E	Fixed day 7		1.9.2004	31.12.2099	DD.MM. YYYY
3163	E	Heat delivered heating 7	0	0	9999999	kWh
3164	E	Heat delivered DHW 7	0	0	9999999	kWh
3166	E	Energy brought in heating 7	0	0	3500000	kWh
3167	E	Energy brought in DHW 7	0	0	3500000	kWh
3169	E	Yearly perf factor 8	- - -	- - - / 0	10	
3169	E	Fixed day 8		1.9.2004	31.12.2099	DD.MM. YYYY
3170	E	Heat delivered heating 8	0	0	9999999	kWh
3171	E	Heat delivered DHW 8	0	0	9999999	kWh
3173	E	Energy brought in heating 8	0	0	3500000	kWh
3174	E	Energy brought in DHW 8	0	0	3500000	kWh
3176	E	Yearly perf factor 9	- - -	- - - / 0	10	
3176	E	Fixed day 9		1.9.2004	31.12.2099	DD.MM. YYYY
3177	E	Heat delivered heating 9	0	0	9999999	kWh
3178	E	Heat delivered DHW 9	0	0	9999999	kWh
3180	E	Energy brought in heating 9	0	0	3500000	kWh
3181	E	Energy brought in DHW 9	0	0	3500000	kWh
3183	E	Yearly perf factor 10	- - -	- - - / 0	10	
3183	E	Fixed day 10		1.9.2004	31.12.2099	DD.MM. YYYY
3184	E	Heat delivered heating 10	0	0	9999999	kWh
3185	E	Heat delivered DHW 10	0	0	9999999	kWh
3187	E	Energy brought in heat 10	0	0	3500000	kWh
3188	E	Energy brought in DHW 10	0	0	3500000	kWh
3190	I	Reset fixed day storage No ¦ Yes	No			
3192	I	Int count el imm heater DHW	None			
3193	I	Int count el imm heat buffer None ¦ Heat delivered ¦ Energy brought in ¦ Both	None			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
3195	I	Electric pump power heating	- - -	- - - / 0.01	10	kW
3196	I	Electric pump power DHW	- - -	- - - / 0.01	10	kW
Cascade						
3514	F	Stage sequence Serial, release all 2nd stage ¦ Serial, release last stage ¦ Parallel, release last stage	Serial, release last stage			
3530	F	Release integral source seq	50	0	500	°C*min
3531	F	Reset integral source seq	20	0	500	°C*min
3533	F	Switch on delay	5	0	120	min
3538	F	Substitute common flow temp None ¦ Highest source value ¦ Internal source value ¦ Median source value	Highest source value			
3540	F	Auto source seq ch'over	500	- - - / 10	990	h
3541	F	Auto source seq exclusion None ¦ First ¦ Last ¦ First and last	None			
3544	F	Leading source	1	1	16	
Supplementary source						
3690	F	Setpoint incr main source	5	0	10	°C
3691	F	Ouput limit main source	- - -	- - - / 1	100	%
3692	F	With DHW charging Locked ¦ Substitute ¦ Complement ¦ Instantly	Complement		-	
3694	F	OT limit with DHW charging Ignore ¦ Note	Note			
3700	F	Release below outside temp	- - -	- - - / -50	50	°C
3701	F	Release above outside temp	- - -	- - - / -50	50	°C
3705	F	Overrun time	5	0	120	min
3710	F	Setpoint min	- - -	- - - / 0	80	°C
3720	F	Switching integral	- - -	- - - / 0	500	°C*min
3722	F	Switching diff off	15	0	20	°C
3723	F	Locking time	30	- - - / 0	120	min
3725	F	Control sensor Common flow temp ¦ Buffer sensor B4	Common flow temp			
3750	F	Source type Other ¦ Solid fuel boiler ¦ Heat pump ¦ Oil/gas boiler	Oil/gas boiler			
3755	F	Delay lockout position	- - -	- - - / 1	40	min
Solar						
3810	F	Temp diff on	8	Line 3811	40	°C
3811	F	Temp diff off	4	0	Line 3810	°C
3812	F	Charg temp min DHW st tank	20	- - - / 8	95	°C
3815	F	Charging temp min buffer	20	- - - / 8	95	°C
3818	F	Charging temp min swi pool	20	- - - / 8	95	°C
3822	F	Charging prio storage tank None ¦ DHW storage tank ¦ Buffer storage tank	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
3830	F	Collector start function	- - -	- - - / 5	60	min
3831	F	Min run time collector pump	20	5	120	s
3834	F	Collector start funct grad	- - -	- - - / 1	20	min/°C
3835	F	Min collector temp start fct	5	0	30	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
3840	F	Collector frost protection	- - -	- - - / -20	5	°C
3850	F	Collector overtemp prot	- - -	- - - / 30	350	°C
3860	F	Evaporation heat carrier	- - -	- - - / 60	350	°C
3862	F	Impact evaporation superv On own collector pump ¦ On both collector pumps	On own collector pump			
3870	F	Pump speed min	40	0	Line 3871	%
3871	F	Pump speed max	100	Line 3870	100	%
3880	F	Antifreeze None ¦ Ethylene glycol ¦ Propylene glycol ¦ Ethyl and propyl glycol	None			
3881	F	Antifreeze concentration	30	1	100	%
3884	F	Pump capacity	- - -	10	1500	l/h
3886	F	Pulse count yield None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33	None			
3887	F	Pulse unit yield None ¦ kWh ¦ Liters	None			-
3888	F	Pulse value yield numer	10	1	1000	-
3889	F	Pulse value yield denom	10	1	1000	-
3891	F	Flow measurement yield None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 With input H31 ¦ With input H32 ¦ With input H33	None			-
3896	F	Readj solar flow sensor	0	-20	20	°C
3897	F	Readj solar return sensor	0	-20	20	°C
Solid fuel boiler						
4102	F	Locks other heat sources Off ¦ On	On			
4103	F	Charg prio DHW stor tank Off ¦ On	Off			
4110	F	Setpoint min	40	8	120	°C
4114	F	Temp differential min	4	0	40	°C
4130	F	Temp diff on	4	1	40	°C
4134	F	Connection DHW stor tank None ¦ With B3 ¦ With B31 ¦ With B3 and B31	None			
4135	F	Boiler temp setp DHW charg Storage tank temp ¦ Storage tank setpoint ¦ Boiler temp setpoint min	Storage tank temp			
4136	F	DHW charging with Q3 No ¦ Yes	Yes			
4137	F	Connection buffer With B4 ¦ With B42/B41 ¦ With B4 and B42/B41	With B4			
4138	F	Boil temp setp buffer charg Storage tank temp ¦ Storage tank setpoint ¦ Boiler temp setpoint min	Storage tank temp			
4140	F	Pump overrun time	20	0	120	min
4153	F	Return setpoint min	8	8	95	°C
4158	F	Flow influence return ctrl Off ¦ On	Off			
4190	F	Residual heat fct dur max	- - -	- - - / 5	60	min

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
4192	F	Residual heat fct trigg Once ¦ Several times	Once			
4201	F	Pump speed min	40	0	100	%
4202	F	Pump speed max	100	0	100	%
Buffer storage tank						
		Forced charging				
4708	F	Forced charging setp cooling	12	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	02:00	- - - / 00:00	23:50	hh:mm
4712	I	Forced charg duration max	4	1	20	h
		Automatic generation locks				
4720	F	Auto generation lock None ¦ With B4 ¦ With B4 and B42/B41 ¦ With B42 ¦ With B42 and B41 ¦ With B4 and B71	With B4			
4722	F	Temp diff buffer/HC	0	-20	20	°C
4728	F	Rel temp diff buffer/HC	0	-50	50	%
4735	F	Setpoint reduction B42/B41	0	0	20	°C
		Stratification protection				
4739	F	Stratification protection Off ¦ Always	Off			
		Solar charging/solid fuel boiler				
4749	F	Min charging setpoint solar	8	8	95	°C
4750	F	Charging temp max	80	8	95	°C
		Recooling				
4755	F	Recooling temp	70	8	95	°C
4756	F	Recooling DHW/HCs Off ¦ On	Off			
4757	F	Recooling collector Off ¦ Summer ¦ Always	Off			
		Electric immersion heater				
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			
DHW storage tank						
		Charging control				
5020	F	Flow setpoint boost	8	0	30	°C
5021	F	Transfer boost	8	0	30	°C
5022	F	Type of charging Recharging ¦ Full charging ¦ Full charging legio ¦ Full charg 1st time day ¦ Full charg 1st time legio	Full charging			
5024	F	Switching diff	5	0	20	°C
		Charging limitation				
5030	F	Charging time limitation	240	- - - / 10	600	min
5032	F	Max temp charging abort	- - -	- - - / 8	100	°C
		Overtemperature protection				
5050	F	Charging temp max	80	8	Line 5051	°C
		Recooling				
5055	F	Recooling temp	70	8	95	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
5056	F	Recooling heat gen/HCs Off ¦ On	Off			
5057	F	Recooling collector Off ¦ Summer ¦ Always	Off			
		Electric immersion heater				
5060	F	El imm heater optg mode Substitute ¦ Summer ¦ Always ¦ Cooling mode ¦ Emergency operation ¦ Legionella function	Substitute			
5061	F	El immersion heater release 24h/day ¦ DHW release ¦ Time program 4/DHW	DHW release			
5062	F	El immersion heater control External thermostat ¦ DHW sensor	DHW sensor			
		Configuration				
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			
		Speed-controlled pumps				
5101	F	Pump speed min	40	0	100	%
5102	F	Pump speed max	100	0	100	%
		Transfer				
5130	F	Transfer strategy Off ¦ Always ¦ DHW release	Always			
5131	F	Comparison temp transfer With B3 ¦ With B31 ¦ With B3 and B31	With B3			
		Stratification storage tank/intermediate circuit				
5140	F	Intermediate circuit boost	2	0	10	°C
5146	F	Full charging with B36 No ¦ Yes	No			
5148	F	Min start temp diff Q33	0	-20	20	°C
		Mixing pump				
5160	F	Legionella funct mixing pump Off ¦ With charging ¦ With charging and duration	With charging and duration			
5165	F	Restratification Off ¦ On	Off			
5166	F	Restrat temp min	8	8	95	°C
5167	F	Restrat temp diff min	8	0	40	°C
Instantaneous water heater						
5406	F	Min setp diff to tank temp	4	0	20	°C
5407	F	Storage tank setpoint incr	6	0	20	°C
5530	F	Pump speed min	0	0	Line 5531	%
5544	F	Actuator running time	15	7.5	480	s
Configuration						
		Presetting				
5700	I	Presetting	- - -	- - - / 1	17	
		Heating circuits/cooling circuit				
5710	I	Heating circuit 1 Off ¦ On	On			
5711	I	Cooling circuit 1 Off ¦ 4-pipe system cooling ¦ 2-pipe system cooling	Off			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
5712	I	Use of mixing valve 1 None ¦ Heating ¦ Cooling ¦ Heating and cooling	Heating and cooling			
5715	I	Heating circuit 2 Off ¦ On	Off			
5721	I	Heating circuit 3 Off ¦ On	Off			
		DHW				
5731	I	DHW ctrl elem Q3 No charging request ¦ Charging pump ¦ Diverting valve	Charging pump			
5734	F	Basic position DHW div valve Last request ¦ Heating circuit ¦ DHW	Heating circuit			
5736	I	DHW separate circuit Off ¦ On	Off			
5740	I	Output el imm heater K6	10	0.1	99	kW
		Consumer circuits				
5750	I	Consumer circuit 1 Heating ¦ 4-pipe system cooling ¦ 2-pipe system cooling	Heating			
5751	I	Consumer circuit 2 Heating ¦ 4-pipe system cooling ¦ 2-pipe system cooling	Heating			
		Heat pump.				
5800	I	Heat source Brine ¦ Water ¦ Air ¦ Externally	Brine			
5807	I	Refrigeration Off ¦ 4-pipe system cooling ¦ 2-pipe system cooling	Off			
5810	I	Differential HC at OT -10°C	7	0	20	°C
5811	I	Output el imm heater K25	10	0.1	99	kW
5813	I	Output el imm heater K26	10	0.1	99	kW
		Solar				
5840	I	Solar controlling element Charging pump ¦ Diverting valve	Charging pump			
5841	I	External solar exchanger Jointly ¦ DHW storage tank ¦ Buffer storage tank	Jointly			
		Buffer storage tank				
5870	I	Combi storage tank No ¦ Yes	No			
5872	I	Output el imm heater K16	10	0.1	99	kW
		QX/ZX basic unit				
5890	I	Relay output QX1 **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦ Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83				
5891	I	Relay output QX2 Ditto 5890	None			
5892	I	Relay output QX3 Ditto 5890	Compressor stage 1 K1			
5894	I	Relay output QX4 Ditto 5890	None			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
5895	I	Relay output QX5 Ditto 5890	Condenser pump Q9			
5896	I	Triac output ZX6 Ditto 5890	Source pump Q8/fan K19			
5911	I	Function output ZX6-Mod None ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ Compressor modulation				
		BX basic unit				
5930	I	Sensor input BX1 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ **Source inlet sensor B91** ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87				
5931	I	Sensor input BX2 Ditto 5930	HP flow sensor B21			
5932	I	Sensor input BX3 None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ **HP return sensor B71** ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72				
5933	I	Sensor input BX4 Ditto 5932	Outside sensor B9			
		H1 basic unit				
5950	I	Function input H1 **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
5951	I	Contact type H1 NC ¦ NO	NO			
5953	I	Input value 1 H1	0	0	1000	-
5954	I	Function value 1 H1	0	-100	500	-
5955	I	Input value 2 H1	10	0	1000	-
5956	I	Function value 2 H1	100	-100	500	-
5957		Temperature sensor H1 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
		H3 basic unit				
5960	I	Function input H3 Ditto 5950				
5961	I	Contact type H3 NC ¦ NO	NO			
5963	I	Input value 1 H3	0	0	1000	-
5964	I	Function value 1 H3	0	-100	500	-
5965	I	Input value 2 H3	10	0	1000	-
5966	I	Function value 2 H3	100	-100	500	-

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
5967	I	Temperature sensor H3 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
		EX basic unit				
5980	I	Function input EX1 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Overload source 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-pressure switch E9** ¦ High-pressure switch E10 ¦ Overload compressor 1 E11 ¦ Error/alarm message ¦ Mains supervision E21				
5982	I	Function input EX2 Ditto 5980	High-pressure switch E10			
5984	I	Function input EX3 Ditto 5980	None			
5986	I	Function input EX4 Ditto 5980	None			
		Mixing groups 1 basic unit				
6014	I	Function mixing group 1 **Multifunctional** ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Ret temp contr sol fuel boil				
		UX1 (10V/PWM) basic unit				
6070	I	Function output UX1 **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82				
6071	I	Signal logic output UX1 Standard ¦ Inverted	Standard			
6072	I	Signal output UX1 0..10V ¦ PWM	0..10V			
6075	I	Temp value 10V UX1	100	5	130	°C
		UX2 (10V/PWM) basic unit				
6078	I	Function output UX2 Ditto 6070	None			
6079	I	Signal logic output UX2 Standard ¦ Inverted	Standard			
6080	I	Signal output UX2 0..10V ¦ PWM	0..10V			
6084	I	Temp value 10V UX2	100	5	130	°C
		Sensor types/readjustments				
6097	F	Sensor type collector NTC ¦ Pt 1000	NTC			
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
6104	F	Sensor type solar flow/ret NTC ¦ Pt 1000	NTC			
		Building and room model				
6110	F	Time constant building	10	0	50	h
		Frost protection for the plant				
6120	F	Frost protection plant Off ¦ On	On			
		Dehumidifier/humidifier				
6135	F	Air dehumidifier Off ¦ On	Off			
6136	F	Release air dehumidifier 24h/day ¦ Time program HC ¦ Time program 5	24h/day			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
6137	F	Air dehumidifier r.h. on	55	0	100	%
6138	F	Air dehumidifier r.h. SD	5	2	50	%
6139	F	Acquisition room r.h. **None** ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33				
		Static pressure supervision				
6148	F	Static press supervision 1 **None** ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33				
6154	F	Static press supervision 2 Ditto 6148	None			
6184	F	Static press supervision 3 Ditto 6148	None			
		Parameter reset				
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			
		Plant diagrams				
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	-
		Device data				
6220	I	Software version	-	0	99.9	-
		Hardware configuration				
6358	F	Voltage output GX1 5 Volt ¦ 12 Volt	5 Volt			
		QX/ZX I/O module				
6371	I	Relay output QX31 **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦ Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83				
6372	I	Relay output QX32 Ditto 6371				
6373	I	Relay output QX33 Ditto 6371				
6374	I	Triac output ZX34 Ditto 6371				

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
6375	I	Relay output QX35 Ditto 6371				
6384	I	Function output ZX34-Mod **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ Compressor modulation				
		BX I/O module				
6391	I	Sensor input BX31 **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72				
6392	I	Sensor input BX32 **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87				
6393	I	Sensor input BX33 Ditto 6392				
6394	I	Sensor input BX34 Ditto 6391				
		HX I/O module				
6400	I	Function input H31 **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
6401	I	Contact type H31 NC ¦ NO	NO			
6403	I	Input value 1 H31	10	0	1000	-
6404	I	Function value 1 H31	0	-100	500	-
6405	I	Input value 2 H31	10	0	1000	-
6406	I	Function value 2 H31	100	-100	500	-
6407	I	Temperature sensor H31 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
6410	I	Function input H32 Ditto 6400				
6411	I	Contact type H32 NC ¦ NO	NO			
6413	I	Input value 1 H32	10	0	1000	-
6414	I	Function value 1 H32	0	-100	500	-
6415	I	Input value 2 H32	10	0	1000	-
6416	I	Function value 2 H32	100	-100	500	-
6417	I	Temperature sensor H32 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
6420	I	Function input H33 Optg mode change HCs+DHW ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ **Dewpoint monitor** ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V				
6421	I	Contact type H33 NC ¦ NO	NO			
6423	I	Input value 1 H33	10	0	1000	-
6424	I	Function value 1 H33	0	-100	500	-
6425	I	Input value 2 H33	10	0	1000	-
6426	I	Function value 2 H33	0	-100	500	-
		Mixing group I/O module				
6455	I	Function mixing group 31 **Multifunctional** ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Ret temp contr sol fuel boil				
LPB system						
6600	I	Device address	1	0	16	-
6601	F	Segment address	0	0	14	-
6604	F	Bus power supply function Off ¦ Automatically	Automatically			
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			
6630	F	Cascade master Always ¦ Automatically	Automatically			
6632	F	Note OT limit ext source No ¦ Yes	Yes			
6640	I	Clock mode Autonomously ¦ Slave without remote setting ¦ Slave with remote setting ¦ Master	Autonomously			
6650	F	Outside temp source	-	S0/G1	S14/G16	-
Fault						
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
6742	F	Flow temp 3 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	-

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
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	Month
7071	I	HP time since maint	0	0	240	Month
7072	I	Max starts compr1/hrs run	- - -	- - - / 0.1	12.0	-
7073	I	Cur starts compr1/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	Month
7091	I	DHW stor tank since maint	0	0	240	Month
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			
7153	I	Pumping off refrigerant Off ¦ On	Off			
7181	I	Phone no. responsibility 1		0	16	Digits
7183	I	Phone no. responsibility 2		0	16	Digits

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
Config extension module						
		Module 1				
7300	I	Function extension module 1 **None** ¦ Multifunctional ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Solar DHW ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Solid fuel boiler				
7301	I	Relay output QX21 module 1 **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83				
7302	I	Relay output QX22 module 1 Ditto 7301				
7303	I	Relay output QX23 module 1 Ditto 7301				
7307	I	Sensor input BX21 module 1 **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Source inlet sensor B91 ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87				
7308	I	Sensor input BX22 module 1 Ditto 7307				
7311	I	Function input H2 module 1 None ¦ **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7312	I	Contact type H2 module 1 NC ¦ NO	NO			
7314	I	Voltage value 1 H2 module 1	0	0	10	V
7315	I	Funct value 1 H2 module 1	0	-100	500	
7316	I	Voltage value 2 H2 module 1	10	0	10	V
7317	I	Funct value 2 H2 module 1	100	-100	500	
7318	I	Temp sensor H2 module 1 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7321	I	Function input H21 module 1 **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7322	I	Contact type H21 module 1 NC ¦ NO	NO			
7324	I	Input value 1 H21 module 1	0	0	1000	

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
7325	I	Funct value 1 H21 module 1	0	-100	500	
7326	I	Input value 2 H21 module 1	10	0	1000	
7327	I	Funct value 2 H21 module 1	100	-100	500	
7328	I	Temp sensor H21 module 1 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			-
7331	I	Function input H22 module 1 Ditto 7321				
7332	I	Contact type H22 module 1 NC ¦ NO	NO			
7334	I	Input value 1 H22 module 1	0	0	1000	
7335	I	Funct value 1 H22 module 1	0	-100	500	
7336	I	Input value 2 H22 module 1	10	0	1000	
7337	I	Funct value 2 H22 module 1	100	-100	500	
7338	I	Temp sensor H22 module 1 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7341	I	Voltage out GX21 module 1 5 Volt ¦ 12 Volt	5 Volt			
7342	I	Funct input EX21 module 1 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Overload source 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-pressure switch E9 ¦ High-pressure switch E10 ¦ Overload compressor 1 E11 ¦ Error/alarm message ¦ Mains supervision E21				
7348	I	Funct output UX21 module 1 **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82				
7349	I	Sign logic out UX21 module1 Standard ¦ Inverted	Standard			
7350	I	Signal output UX21 module 1 0..10V ¦ PWM	0..10V			
7354	I	Temp val 10V UX21 module1	100	5	130	°C
7355	I	Funct output UX22 module 1 Ditto 7348				
7356	I	Sign logic out UX22 module1 Standard ¦ Inverted	Standard			
7357	I	Signal output UX22 module 1 0..10V ¦ PWM	0..10V			
7361	I	Temp val 10V UX22 module1	100	5	130	°C
		Module 2				
7375	I	Function extension module 2 **None** ¦ Multifunctional ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Solar DHW ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Solid fuel boiler				
7376	I	Relay output QX21 module 2 **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83				

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
7377	I	Relay output QX22 module 2 Ditto 7376				
7378	I	Relay output QX23 module 2 Ditto 7376				
7382	I	Sensor input BX21 module 2 **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Source inlet sensor B91 ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87				
7383	I	Sensor input BX22 module 2 Ditto 7382				
7386	I	Function input H2 module 2 None ¦ **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7387	I	Contact type H2 module 2 NC ¦ NO	NO			
7389	I	Voltage value 1 H2 module 2	0	0	10	V
7390	I	Funct value 1 H2 module 2	0	-100	500	
7391	I	Voltage value 2 H2 module 2	10	0	10	V
7392	I	Funct value 2 H2 module 2	100	-100	500	
7393	I	Temp sensor H2 module 2 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7396	I	Function input H21 module 2 **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7397	I	Contact type H21 module 2 NC ¦ NO	NO			
7399	I	Input value 1 H21 module 2	0	0	1000	
7400	I	Funct value 1 H21 module 2	0	-100	500	
7401	I	Input value 2 H21 module 2	10	0	1000	
7402	I	Funct value 2 H21 module 2	100	-100	500	
7403	I	Temp sensor H21 module 2 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7406	I	Function input H22 module 2 Ditto 7396				
7407	I	Contact type H22 module 2 NC ¦ NO	NO			
7409	I	Input value 1 H22 module 2	0	0	1000	
7410	I	Funct value 1 H22 module 2	0	-100	500	
7411	I	Input value 2 H22 module 2	10	0	1000	
7412	I	Funct value 2 H22 module 2	100	-100	500	
7413	I	Temp sensor H22 module 2	None			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
		None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71				
7416	I	Voltage out GX21 module 2 5 Volt ¦ 12 Volt	5 Volt			
7417	I	Funct input EX21 module 2 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Overload source 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-pressure switch E9 ¦ High-pressure switch E10 ¦ Overload compressor 1 E11 ¦ Error/alarm message ¦ Mains supervision E21				
7423	I	Funct output UX21 module 2 **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82				
7424	I	Sign logic out UX21 module2 Standard ¦ Inverted	Standard			
7425	I	Signal output UX21 module 2 0..10V ¦ PWM	0..10V			
7429	I	Temp val 10V UX21 module2	100	5	130	°C
7430	I	Funct output UX22 module 2 Ditto 7423				
7431	I	Sign logic out UX22 module2 Standard ¦ Inverted	Standard			
7432	I	Signal output UX22 module 2 0..10V ¦ PWM	0..10V			
7436	I	Temp val 10V UX22 module2	100	5	130	°C
		Module 3				
7450	I	Function extension module 3 **None** ¦ Multifunctional ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Solar DHW ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Solid fuel boiler				
7451	I	Relay output QX21 module 3 **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦ Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83				
7452	I	Relay output QX22 module 3 Ditto 7451				
7453	I	Relay output QX23 module 3 Ditto 7451				
7457	I	Sensor input BX21 module 3 **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Source inlet sensor B91 ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87				
7458	I	Sensor input BX22 module 3 Ditto 7457				

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
7461	I	Function input H2 module 3 None ¦ **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7462	I	Contact type H2 module 3 NC ¦ NO	NO			
7464	I	Voltage value 1 H2 module 3	0	0	10	V
7465	I	Funct value 1 H2 module 3	0	-100	500	
7466	I	Voltage value 2 H2 module 3	10	0	10	V
7467	I	Funct value 2 H2 module 3	100	-100	500	
7468	I	Temp sensor H2 module 3 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7471	I	Function input H21 module 3 **Optg mode change HCs+DHW** ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V				
7472	I	Contact type H21 module 3 NC ¦ NO	NO			
7474	I	Input value 1 H21 module 3	0	0	1000	
7475	I	Funct value 1 H21 module 3	0	-100	500	
7476	I	Input value 2 H21 module 3	10	0	1000	
7477	I	Funct value 2 H21 module 3	100	-100	500	
7478	I	Temp sensor H21 module 3 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7481	I	Function input H22 module 3 Ditto 7471				
7482	I	Contact type H22 module 3 NC ¦ NO	NO			
7484	I	Input value 1 H22 module 3	0	0	1000	
7485	I	Funct value 1 H22 module 3	0	-100	500	
7486	I	Input value 2 H22 module 3	10	0	1000	
7487	I	Funct value 2 H22 module 3	100	-100	500	
7488	I	Temp sensor H22 module 3 None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71	None			
7492	I	Funct input EX21 module 3 None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Overload source 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-pressure switch E9 ¦ High-pressure switch E10 ¦ Overload compressor 1 E11 ¦ Error/alarm message ¦ Mains supervision E21				
7491	I	Voltage out GX21 module 3 5 Volt ¦ 12 Volt	5 Volt			
7498	I	Funct output UX21 module 3 **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82				

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
7499	I	Sign logic out UX21 module3 Standard ¦ Inverted	Standard			
7500	I	Signal output UX21 module 3 0..10V ¦ PWM	0..10V			
7504	I	Temp val 10V UX21 module3	100	5	130	°C
7505	I	Funct output UX22 module 3 Ditto 7498				
7506	I	Sign logic out UX22 module3 Standard ¦ Inverted	Standard			
7507	I	Signal output UX22 module 3 0..10V ¦ PWM	0..10V			
7511	I	Temp val 10V UX22 module3	100	5	130	°C
Input/output test						
7700	I	Relay test No test ¦ Everything off ¦ Relay output QX1 ¦ Relay output QX2 ¦ Relay output QX3 ¦ Relay output QX4 ¦ Relay output QX5 ¦ Output QX6/ZX6 ¦ Relay output QX31 ¦ Relay output QX32 ¦ Relay output QX33 ¦ Output QX34/ZX34 ¦ Relay output QX35 ¦ Relay output QX21 module 1 ¦ Relay output QX22 module 1 ¦ Relay output QX23 module 1 ¦ Relay output QX21 module 2 ¦ Relay output QX22 module 2 ¦ Relay output QX23 module 2 ¦ Relay output QX21 module 3 ¦ Relay output QX22 module 3 ¦ Relay output QX23 module 3				
7705	I	Mod setpoint ZX6 relay test	100	0	100	%
7708	I	Modulation signal ZX6	0	0	100	%
7710	I	Output test UX1	- - -	0	100	%
7711	I	Output signal UX1	0	0	100	
7711	I	[Output signal UX1] Voltage V ¦ PWM %	None			
7716	I	Output test UX2	- - -	- - - / 0	100	%
7717	I	Output signal UX2	0	0	100	
7717	I	[Output signal UX2] Voltage V ¦ PWM %	None			
7721	I	Heating mode D1 Off ¦ On	Off			
7722	I	Cooling mode D2 Off ¦ On	Off			
7723	I	Heat pump D3 Off ¦ On	Off			
7724	I	Output test UX3	- - -	0	100	%
7725	I	Output signal UX3	0	0	100	
7725	I	[Output signal UX3] Voltage V ¦ PWM %	None			
7728	I	Defrosting DI6 Off ¦ On	Off			
7729	I	Error/alarm message DI7 Off ¦ On	Off			
7780	I	Output test UX21 module 1	- - -	- - - / 0	100	%
7781	I	Output signal UX21 module 1	0	0	100	
7781	I	[Output signal UX21 module 1] Voltage V ¦ PWM %	None			
7782	I	Output test UX22 module 1	- - -	- - - / 0	100	%
7783	I	Output signal UX22 module 1	0	0	100	
7783	I	[Output signal UX22 module 1] Voltage V ¦ PWM %	None			
7784	I	Output test UX21 module 2	- - -	- - - / 0	100	%
7785	I	Output signal UX21 module 2	0	0	100	
7785	I	[Output signal UX21 module 2] Voltage V ¦ PWM %	None			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
7786	I	Output test UX22 module 2	- - -	- - - / 0	100	%
7787	I	Output signal UX22 module 2	0	0	100	
7787	I	[Output signal UX22 module 2] Voltage V ¦ PWM %	None			
7788	I	Output test UX21 module 3	- - -	- - - / 0	100	%
7789	I	Output signal UX21 module 3	0	0	100	
7789	I	[Output signal UX21 module 3] Voltage V ¦ PWM %	None			
7790	I	Output test UX22 module 3	- - -	- - - / 0	100	%
7791	I	Output signal UX22 module 3	0	0	100	
7791	I	[Output signal UX22 module 3] Voltage V ¦ PWM %	None			
7796	I	Output test WX21 module 1	- - -	- - - / 0	100	%
7797	I	Pos step motor WX21 mod 1	0	0	65535	
7798	I	Output test WX21 module 2	- - -	- - - / 0	100	%
7799	I	Pos step motor WX21 mod 2	0	0	65535	
7800	I	Output test WX21 module 3	- - -	- - - / 0	100	%
7801	I	Pos step motor WX21 mod 3	0	0	65535	
7804	I	Sensor temp BX1	-	-28	350	°C
7805	I	Sensor temp BX2	-	-28	350	°C
7806	I	Sensor temp BX3	-	-28	350	°C
7807	I	Sensor temp BX4	-	-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
7834	I	Sensor temp BX21 module 3	-	-28	350	°C
7835	I	Sensor temp BX22 module 3	-	-28	350	°C
7844	I	Input signal H1	0	0	65535	
7844	I	[Output signal H1] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7845	I	Input signal H2 module 1	0	0	65535	
7845	I	[Output signal H2 module 1] None ¦ Closed (ooo), Open (---) ¦ Frequency Hz ¦ Voltage V	None			
7845	I	Input signal H21 module 1	0	0	65535	
7845	I	[Output signal H21 module 1] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7846	I	Input signal H22 module 1	0	0	65535	
7846	I	[Output signal H22 module 1] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7847	I	Input signal H2 module 2	0	0	65535	
7847	I	[Output signal H2 module 2] None ¦ Closed (ooo), Open (---) ¦ Frequency Hz ¦ Voltage V	None			
7847	I	Input signal H21 module 2	0	0	65535	
7847	I	[Output signal H21 module 2] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7848	I	Input signal H22 module 2	0	0	65535	
7848	I	[Output signal H22 module 2] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦				

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
		Voltage V				
7849	I	Input signal H2 module 3	0	0	65535	
7849	I	[Output signal H2 module 3] None ¦ Closed (ooo), Open (---) ¦ Frequency Hz ¦ Voltage V	None			
7849	I	Input signal H21 module 3	0	0	65535	
7849	I	[Output signal H21 module 3] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7850	I	Input signal H22 module 3	0	0	65535	
7850	I	[Output signal H22 module 3] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7858	I	Input signal H3	0	0	65535	
7858	I	[Output signal H3] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7911	I	Input EX1 0V ¦ 230V	0V			-
7912	I	Input EX2 0V ¦ 230V	0V			-
7913	I	Input EX3 0V ¦ 230V	0V			-
7914	I	Input EX4 0V ¦ 230V	0V			-
7950	I	Input EX21 module 1 0V ¦ 230V	0V			
7951	I	Input EX21 module 2 0V ¦ 230V	0V			
7952	I	Input EX21 module 3 0V ¦ 230V	0V			
7965	I	Output test WX31	- - -	- - - / 0	100	%
7966	I	Pos stepper motor WX31	0	0	65535	
7969	I	Mod setp ZX34 relay test	100	0	100	%
7970	I	Modulation signal ZX34	0	0	100	%
7973	I	Sensor temp BX31	-	-28	350	°C
7974	I	Sensor temp BX32	-	-28	350	°C
7975	I	Sensor temp BX33	-	-28	350	°C
7976	I	Sensor temp BX34	-	-28	350	°C
7989	I	Input signal H31	0	0	65535	
7989	I	[Output signal H31] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7994	I	Input signal H32	0	0	65535	
7994	I	[Output signal H32] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
7999	I	Input signal H33	0	0	65535	
7999	I	[Output signal H33] None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V	None			
State						
8000	I	State heating circuit 1	-	0	255	-
8001	I	State heating circuit 2	-	0	255	-
8002	I	State heating circuit 3	-	0	255	-
8003	I	State DHW	-	0	255	-

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
8004	I	State cooling circuit 1	-	0	255	-
8006	I	State heat pump	-	0	255	-
8007	I	State solar	-	0	255	-
8008	I	State solid fuel boiler	-	0	255	-
8010	I	State buffer	-	0	255	-
8011	I	State swimming pool	-	0	255	-
8022	I	State supplementary source	-	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	-
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, 8102, 8130	I	Priority/state source 1...16	-	0	16	
8101, 8103, 8131	I	[State "Sources" (producers) 1...16] **Missing** ¦ Faulty ¦ Manual control active ¦ Heat generation lock active ¦ Chimney sweep funct active ¦ Temporarily unavailable ¦ Outside temp limit active ¦ Not released ¦ Released				
8138	I	Cascade flow temp	-	0	140	°C
8139	I	Cascade flow temp setp	-	0	140	°C
8140	I	Cascade return temp	-	0	140	°C
8141	I	Cascade return temp setp	-	0	140	°C
8150	I	Source seq ch'over current	-	0	990	h
Diagnostics heat generation						
		Heat pump brine/water/air				
8400	I	Compressor 1	-			
8402	I	El imm heater 1 flow	-			
8403	I	El imm heater 2 flow	-			
8404	I	Source pump	-			
8405	F	Speed of source pump	-	0	100	%
8406	I	Condenser pump	-			
8407	F	Speed condenser pump	-	0	100	%
8408	I	Diverting valve cool source	-			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
8410	E	Return temp HP	-	0	140	°C
8411	E	Setpoint HP	-	0	140	°C
8412	E	Flow temp HP	-	0	140	°C
8413	F	Compressor modulation	-	0	100	%
8415	I	Hot-gas temp 1	-	0	180	°C
8416	F	Hot-gas temp max	-	0	180	°C
8420	I	Refrig temp liquid	-	0	140	°C
8423	F	Condenser temp	-	-50	180	°C
8423	F	Condenser pressure	-	-1	50	bar
8425	I	Temp diff condenser	-	-50	140	°C
8426	I	Temp diff evaporator	-	-50	140	°C
8427	I	Source inlet temp	-	-50	50	°C
8427	I	Switch-off threshold	-	-50	50	°C
8428	I	Source inlet temp min	-	-50	350	°C
8429	I	Source outlet temp	-	-50	50	°C
8429	I	Switch-off threshold	-	-50	50	°C
8430	I	Source outlet temp min	-	-50	350	°C
8434	I	Suction gas temp	-	-50	180	°C
8435	F	Evaporation temp	-	-50	180	°C
8435	F	Evaporation pressure	-	-1	50	bar
8436	F	Superheat	-	-10	180	°C
8436	F	Superheat setpoint	-	0	140	°C
8437	F	Expansion valve	-	0	100	%
8438	F	Magnetic valve	-			
8440	I	Remain stage 1 off time min	-	(0) 1	255	min
8442	I	Remain stage 1 on time min	-	(0) 1	255	min
8444	I	Remain limit source temp	-	(0) 00:01	24:00	hh:mm
8450	F	Hours run compressor 1	-	0	199'999	h
8451	F	Start counter compressor 1	-	0	199'999	-
8454	F	Locking time HP	-	0	199'999	h
8455	F	Counter number of locks HP	-	0	199'999	-
8456	F	Hours run el flow	-	0	199'999	h
8457	F	Start counter el flow	-	0	199'999	-
8460	F	Heat pump throughput	-	0	65535	l/min
8462	F	Suction gas temp EVI	-	-50	180	°C
8463	F	Evaporation temp EVI	-	-50	180	°C
8463	F	Evaporation pressure EVI	-	-1	50	bar
8464	F	Superheat EVI	-	-10	180	°C
8464	F	Superheat setpoint EVI	-	0	140	°C
8465	F	Expansion valve EVI	-	0	100	%
8466	F	Magnetic valve EVI	-			
8467	F	Magn valve injection cap	-			
		Air-to-water heat pump				
8469	F	Fan speed	-	0	100	%
8470	I	Fan	-			
8471	I	Process revers valve	-			
8475	I	Evaporator temp	-	-50	50	°C
8477	I	Temp diff defrost act value	-	-50	50	°C
8478	I	Temp diff defrost setpoint	-	-50	50	°C

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
8480	I	Remain time defrost lock	-	0	255	min
8481	I	Remain time forced defrost	-	00:00	07:00	hh:mm
8485	I	Number defrost attempts	-	0	10	-
		Solar collector field				
8499	F	Collector pump 1	-			
8505	F	Speed collector pump 1	-	0	100	%
8506	F	Speed solar pump ext exch	-	0	100	%
8507	F	Speed solar pump buffer	-	0	100	%
8508	F	Speed solar pump swi pool	-	0	100	%
8510	I	Collector temp 1	-	-28	350	°C
8511	I	Collector temp 1 max	-	-28	350	°C
8512	I	Collector temp 1 min	-	-28	350	°C
8513	I	dt collector 1/DHW	-	-28	350	°C
8514	I	dt collector 1/buffer	-	-168	350	°C
8515	I	dt collector 1/swimming pool	-	-168	350	°C
8519	I	Solar flow temp	-	-28	350	°C
8520	I	Solar return temp	-	-28	350	°C
8521	I	Solar throughput	-	0	65535	l/min
8526	I	24-hour yield solar energy	-	0	999.9	kWh
8527	I	Total yield solar energy	-	0	9999999.9	kWh
8530	F	Hours run solar yield	-	0	199'999	h
8531	F	Hours run collect overtemp	-	0	199'999	h
8542	F	Collector pump 2	-			
8543	F	Speed collector pump 2	-	0	100	%
8547	F	Collector temp 2	-	-28	350	°C
8548	F	Collector temp 2 max	-	-28	350	°C
8549	F	Collector temp 2 min	-	-28	350	°C
8550	F	dt collector 2/DHW	-	-168	350	°C
8551	F	dt collector 2/buffer	-	-168	350	°C
8552	F	dt collector 2/swimming pool	-	-168	350	°C
		Solid fuel boiler				
8560	I	Solid fuel boiler temp	-	0	140	°C
8561	I	Solid fuel boiler setpoint	-	0	140	°C
8563	I	Solid fuel boiler return temp	-	0	140	°C
8564	I	Solid fuel boiler return setp	-	0	140	°C
8568	F	Speed solid fuel boiler pump	-	0	100	%
8570	E	Hours run solid fuel boiler	-	0	199'999	h
		Supplementary source (producer)				
8585	F	Control temperature	-	0	140	°C
8586	F	Suppl source setpoint	-	0	140	°C
Diagnostics consumers						
		Meteo				
8700	E	Outside temp	-	-50	50	°C
8701	E	Outside temp min	-	-50	50	°C
8702	E	Outside temp max	-	-50	50	°C
8703	I	Outside temp attenuated	-	-50	50	°C
8704	I	Outside temp composite	-	-50	50	°C
		Dehumidifier				
8723	I	Rel room humidity	-	0	100	%

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
		Heating circuits/cooling circuit				
8730	I	Heating circuit pump 1	-			
8731	I	Heat circ mix valve 1 open	-			
8732	I	Heat circ mix valve 1 close	-			
8735	F	Speed heating circuit pump 1	-	0	100	%
8739	I	Relative room humidity 1	-	0	100	%
8740	E	Room temp 1	-	0	50	°C
8741	E	Room setpoint 1	-	4	35	°C
8743	E	Flow temp 1	-	0	140	°C
8744	E	Flow temp setpoint 1	-	0	140	°C
8747	E	Dewpoint temp 1	-	0	50	°C
8749	E	Room thermostat 1	-			
8751	I	Cooling circuit pump 1	-			
8752	I	Cool circ mix valve 1 open	-			
8753	I	Cool circ mix valve 1 close	-			
8754	I	Diverting valve cooling 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 2	-			
8761	I	Heat circ mix valve 2 open	-			
8762	I	Heat circ mix valve 2 close	-			
8765	F	Speed heating circuit pump 2	-	0	100	%
8770	E	Room temp 2	-	0	50	°C
8771	E	Room setpoint 2	-	4	35	°C
8773	E	Flow temp 2	-	0	140	°C
8774	E	Flow temp setpoint 2	-	0	140	°C
8779	E	Room thermostat 2	-			
8790	I	Heating circuit pump 3	-			
8791	I	HC mixing valve 3 open	-			
8792	I	HC mixing valve 3 closed	-			
8795	F	Speed heating circuit pump 3	-	0	100	%
8800	E	Room temp 3	-	0	50	°C
8801	E	Room setpoint 3	-	4	35	°C
8803	E	Flow temp setpoint 3	-	0	140	°C
8804	E	Flow temp 3	-	0	140	°C
8809	E	Room thermostat 3	-			
		DHW				
8820	I	DHW pump	-			
8821	I	El imm heater DHW	-			
8825	F	Speed DHW pump	-	0	100	%
8826	F	Speed DHW interm circ pump	-	0	100	%
8827	F	Speed inst DHW heater pump	-	0	100	%
8830	E	DHW temp 1	-	0	140	°C
8831	E	DHW temp setpoint	-	8	80	°C
8832	I	DHW temp 2	-	0	140	°C
8835	I	DHW circulation temp	-	0	140	°C
8836	I	DHW charging temp	-	0	140	°C
8840	F	Hours run DHW pump	-	0	199'999	h
8841	F	Start counter DHW pump	-	0	199'999	-

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
8842	F	Hours run el DHW	-	0	199'999	h
8843	F	Start counter el DHW	-	0	199'999	-
8850	I	DHW primary controller temp	-	0	140	°C
8851	I	DHW primary controller setp	-	0	140	°C
8852	I	DHW consumption temp	-	0	140	°C
8853	I	Instant WH setpoint	-	0	140	°C
		Consumer circuits				
8875	I	Flow temp setp VK1	-	0	130	°C
8885	I	Flow temp setp VK2	-	0	130	°C
		Swimming pool				
8895	I	Flow temp setp swimming pool	-	0	130	°C
8900	I	Swimming pool temp	-	0	140	°C
8901	I	Swimming pool setpoint	-	8	80	°C
		Primary controller/system pump				
8930	I	Primary controller temp	-	0	140	°C
8931	I	Primary controller setpoint	-	0	140	°C
		Common flow values				
8950	I	Common flow temp	-	0	140	°C
8951	I	Common flow temp setpoint	-	0	140	°C
8957	I	Common flow setp refrig	-	0	140	°C
		Buffer storage tank				
8970	I	El imm heater buffer	-			
8980	E	Buffer temp 1	-	0	140	°C
8981	E	Buffer setpoint	-	0	140	°C
8982	E	Buffer temp 2	-	0	140	°C
8983	I	Buffer temp 3	-	0	140	°C
8990	F	Hours run el buffer	-	0	199'999	h
8991	F	Start counter el buffer	-	0	199'999	-
		Inputs H				
9005	I	Water pressure 1	-	-1	50	bar
9006	I	Water pressure 2	-	-1	50	bar
9009	I	Water pressure 3	-	-1	50	bar
9010	I	Measurement room temp 1	-	0	50	°C
9011	I	Measurement room temp 2	-	0	50	°C
9012	I	Measurement room temp 3	-	0	50	°C
		States of relays/triac QX/ZX				
9031	E	Relay output QX1	-			
9032	E	Relay output QX2	-			
9033	E	Relay output QX3	-			
9034	E	Relay output QX4	-			
9035	E	Relay output QX5	-			
9036	E	Triac output ZX6	-			
9050	I	Relay output QX21 module 1	-			
9051	I	Relay output QX22 module 1	-			
9052	I	Relay output QX23 module 1	-			
9053	I	Relay output QX21 module 2	-			
9054	I	Relay output QX22 module 2	-			
9055	I	Relay output QX23 module 2	-			
9056	I	Relay output QX21 module 3	-			

Operating line	Operating level	Function	Default value	Min.	Max.	Unit
9057	I	Relay output QX22 module 3	-			
9058	I	Relay output QX23 module 3	-			
9071	E	Relay output QX31	-			
9072	E	Relay output QX32	-			
9073	E	Relay output QX33	-			
9074	E	Triac output ZX34	-			
9075	E	Relay output QX35	-			

6 The settings in detail

6.1 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 temperature levels (and the associated setpoints) via the set switching times.

Entering the switching times

The switching times can be set in a combined way, either jointly for several days, or separately for individual days. When preselecting groups of days like for instance Mo...Fr and Sa...Su that shall use the same switching times, the setting of switching programs is simplified.

Switching points

Line no.					*Operating line*
HC1	*HC2*	*HC3*	*4/DHW*	*5*	
500	**520**	**540**	**560**	**600**	**Preselection** Mo...Su ¦ Mo...Fr ¦ Sa...Su ¦ Mo...Su
501	**521**	**541**	**561**	**601**	**1st phase on**
502	**522**	**542**	**562**	**602**	**1st phase off**
503	**523**	**543**	**563**	**603**	**2nd phase on**
504	**524**	**544**	**564**	**604**	**2nd phase off**
505	**525**	**545**	**565**	**605**	**3rd phase on**
506	**526**	**546**	**566**	**606**	**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 factory settings. Each time program has a specific operating line to make the reset.

Individual settings will be lost in that case!

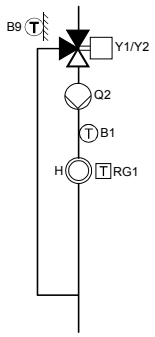
6.2 Holidays

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
641	**651**	**661**	**Preselection** Period 1...8
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. A total of 8 independent holiday periods can be set.

Important!
The holiday program can only be used in "Automatic" mode.

6.3 Heating circuits



Various functions are available for the heating circuits; they can be individually set.

Operating mode

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
700	**1000**	**1300**	**Operating mode** Protection ¦ Automatic ¦ Reduced ¦ Comfort

The heating circuits' operating mode can be selected directly via the operating mode button on the operator units.

Protection ⏻

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

Characteristics of "Protection" mode:
- Heating mode off
- Temperature according to frost protection
- "Protection" functions are active
- Automatic summer/winter changeover and automatic 24-hour heating limit are active

"Automatic" operation AUTO

In "Automatic" operation, the room temperature is controlled according to the selected time program.

Characteristics of "Automatic" operation:
- Heating mode according to the time program
- Temperature setpoints according to heating program "Comfort setpoint" ☼ or "Reduced setpoint" ☾
- "Protection" functions active
- Automatic summer/winter changeover and automatic 24-hour heating limit are active

"Reduced" operation ☾

"Reduced" operation maintains the room temperature at the adjusted "Reduced" setpoint.

Characteristics of "Reduced" operation:
- Heating mode without time program
- "Protection" functions are active
- Automatic summer/winter changeover and automatic 24-hour heating limit are active

"Comfort" mode ☼

"Comfort" mode maintains the room temperature at the adjusted "Comfort" setpoint.

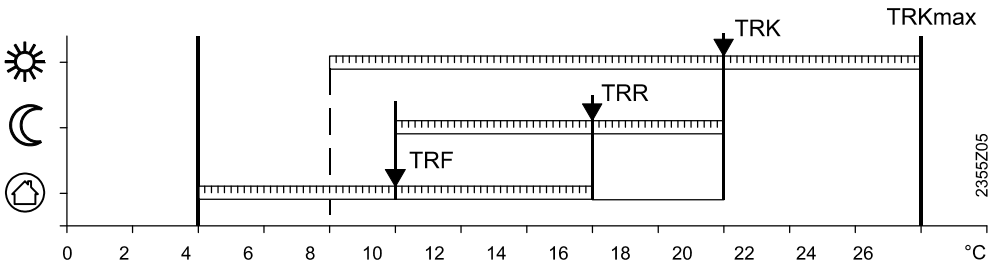
Characteristics of "Comfort" mode:
- Heating mode without time program
- "Protection" functions are active
- Automatic summer/winter changeover and automatic 24-hour heating limit in "Comfort" mode are inactive

Setpoints

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
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 setpoint setting ranges are obtained as a result of the interdependency of setpoints. This is shown in the following diagram. The setpoints required for each heating circuit can be individually adjusted.



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

Comfort setpoint

The "Comfort" setpoint is the room temperature setpoint for normal room usage (e.g. during the day). This is the setpoint used by "Automatic" operation (during the "Comfort" phase) and by "Comfort" mode.

Reduced setpoint

The "Reduced" setpoint is the room temperature setpoint for reduced room usage (e.g. during the night or when absent for several hours). This is the setpoint used by "Automatic" operation (during the "Reduced" phase) and by "Reduced" operation.

Frost protection setpoint

The frost protection setpoint is the room temperature setpoint for the periods of time when the room is not occupied (e.g. during holidays), but protection from extremely low temperatures shall be provided for the hydraulic system or animals and plants, antiquities, etc.
It is used as the setpoint when the plant operates in "Protection" mode.

Comfort setpoint max

"Comfort setpoint max" ensures maximum limitation of the adjustable "Comfort" setpoint. The "Comfort" setpoint at the respective room unit or on the relevant operating line cannot be set to a level higher than the temperature defined here.

Heating curve

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
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 used to maintain a certain flow temperature depending on the prevailing weather conditions.

The heating curve can be adjusted via a number of settings, matching heat output and thus the room temperature to individual needs.

Heating curve slope

The steeper the heating curve slope, the greater the change in 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.

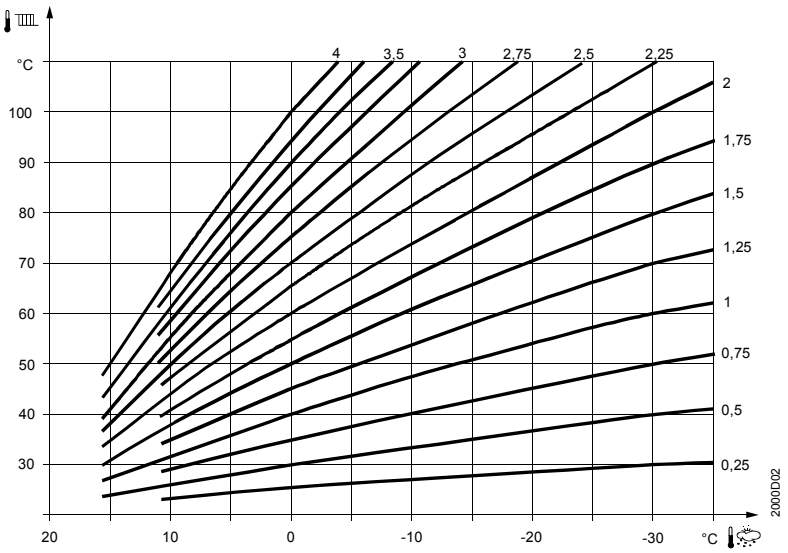
Increase adjustment

Raises the flow temperature, especially at low outside temperatures.

Decrease adjustment

Lowers the flow temperature, especially at low outside temperatures.

The set heating curve applies to a room temperature setpoint of 20 °C. If the room temperature setpoint is changed, the heating curve is automatically adapted.



Heating curve displacement

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

Heating curve adaption

This function is used by the controller to automatically adapt the heating curve to the prevailing weather conditions.

To make certain the function is performed as required, following must be observed:

- A room sensor must be connected
- "Room influence" must be set to a value between 1 and 99
- There should be no thermostatic radiator valves in the reference room (mounting location of room sensor); if such valves are installed, they must be fully opened

"ECO" functions

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
730	**1030**	**1330**	**Summer/winter heating limit**
732	**1032**	**1332**	**24-hour heating limit**

Summer/winter heating limit

The summer/winter heating limit switches the heating on and off in the course of the year, depending on the outside temperature. In "Automatic" operation, 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

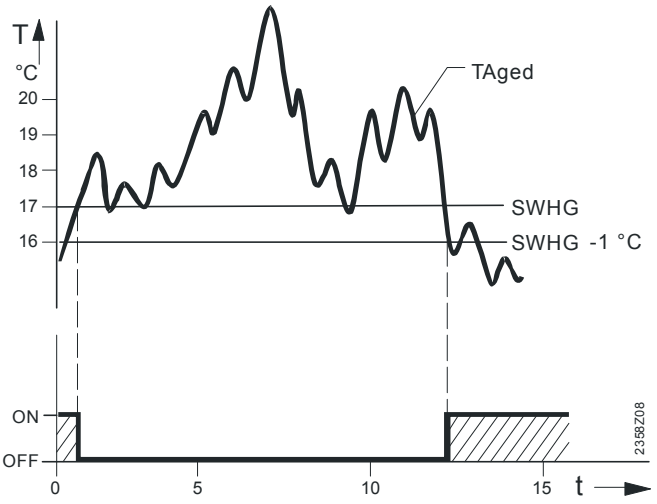
- Change from summer to winter operation will be earlier
- Change from winter to summer operation will be later

Decrease

- Change from summer to winter operation will be later
- Change from winter to summer operation will be earlier

- The function is not active in operating mode "Continuously nominal temperature" ☼
- The display shows 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 switches 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

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

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

By changing the value, the respective heating phases are shortened or extended.

Increase

- Changeover to heating mode will occur earlier
- Changeover to ECO will occur later

Decrease

- Changeover to heating mode will occur later
- Changeover to ECO will occur earlier

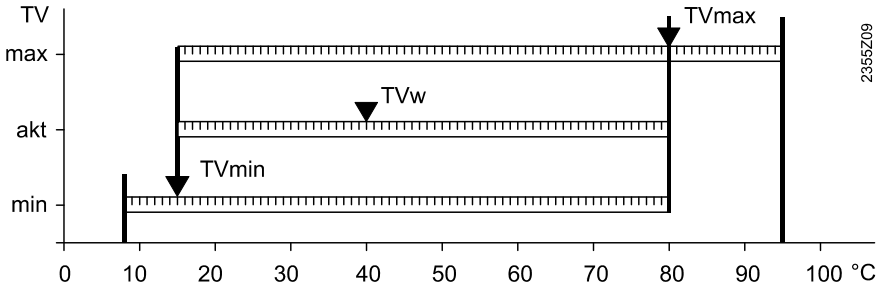
- The function is not active in operating mode "Continuously nominal temperature" ☼
- The display shows ECO
- To give consideration to the building's thermal dynamics, the outside temperature is attenuated

Limitations of flow temperature setpoint

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
740	**1040**	**1340**	**Flow temp setpoint min**
741	**1041**	**1341**	**Flow temp setpoint max**
742	**1042**	**1342**	**Flow temp setpoint room stat**

Flow temp setpoint min/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 request for heat increases or decreases, the flow temperature setpoint is maintained at the maximum or minimum limit respectively.



TVw Current flow temperature setpoint
TVmax Flow temp setpoint max
TVmin Flow temp setpoint min

Flow temp setpoint room stat

On applications with room thermostat, the heating circuit is switched on only when the room thermostat calls for heat.

A fixed or weather-compensated temperature value is called for, depending on the selected setting:

Setting	*Compensation variant*
– – –	Temperature request according to the heating curve
8...95 °C	Temperature request according to the set value*

* In "Comfort" mode only; there is no temperature request in other operating modes and the heating circuit remains off

Using one of the Hx inputs, the room thermostat can be connected to the controller, the extension module, or the I/O module.

Room influence

Line no.			Operating line
HC1	HC2	HC3	
750	**1050**	**1350**	**Room influence**

Compensation variants

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

Setting	Compensation variant
– – – %	Weather compensation alone*
1...99 %	Weather compensation with room influence*
100 %	Room compensation alone

* Outside sensor mandatory

Weather compensation alone

The flow temperature is calculated via the heating curve, depending on the composite outside temperature.

This compensation variant calls for a correct adjustment of the heating curve because with this setting the control system gives no consideration to the room temperature.

Weather compensation with room influence

The deviation of the current room temperature from the setpoint is acquired and taken into account when controlling the temperature. Heat gains can thus be considered, facilitating more accurate room temperature control.

The authority of deviation is set as a percentage value. 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
Approx. 20 % Unfavorable reference room

To activate the function, following must be considered:
- A room sensor must be connected
- "Room influence" must be set to a value between 1 and 99
- There should be no thermostatic radiator valves in the reference room (mounting location of room sensor); if such valves are installed, they must be fully opened

Room compensation alone

The flow temperature is controlled depending on the room temperature setpoint, the current room temperature and its progression.
For example, a slight increase in room temperature leads to an immediate reduction in 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 thermostatic radiator valves in the reference room (mounting location of room sensor); if such valves are installed, they must be fully opened

Room temperature limitation

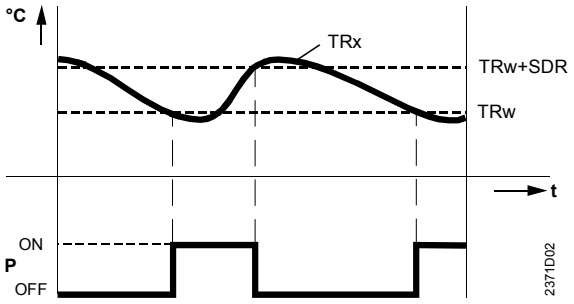
Line no.			Operating line
HC1	HC2	HC3	
760	**1060**	**1360**	**Room temp limitation**

Function "Room temp limitation" enables the heating circuit pump to be deactivated should the room temperature exceed the current room temperature setpoint by more than the set differential.

The heating circuit pump is activated again as soon as the room temperature falls 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 producer.

Room temperature limitation does not work in connection with weather compensation alone.



TRx Actual value of room temperature
TRw Room temperature setpoint
SDR Room switching differential
P Pump
t Time

Boost heating

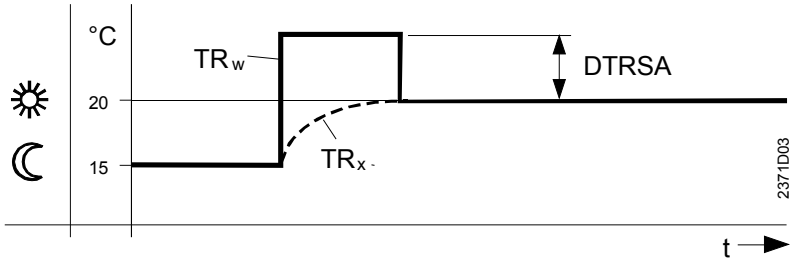
Line no.			Operating line
HC1	HC2	HC3	
770	**1070**	**1370**	**Boost heating**

Boost heating ensures that the new setpoint is reached more quickly when switching from the "Reduced" to the "Comfort" setpoint, thus shortening the heat up time.

During boost heating, the room temperature setpoint is raised by the value set here.

Higher settings lead to shorter heat up times, lower settings to longer heat up times.

Boost heating can be provided with or without room sensor.



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

Quick setback

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
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 circuits, the mixing valve is fully closed.

Function with room sensor

When using a room sensor, the function keeps the heating off until the room temperature drops to the level of the "Reduced" or "Frost protection" setpoint.

If the room temperature falls to the reduced or frost level, the heating circuit pump is activated and the mixing valve released.

Function without room sensor

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

Example

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

	Building time constant [h]						
Composite outside	0	2	5	10	15	20	50
temperature	*Duration of quick setback [h]*						
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

Quick setback can be provided with or without room sensor.

Optimum start/stop control

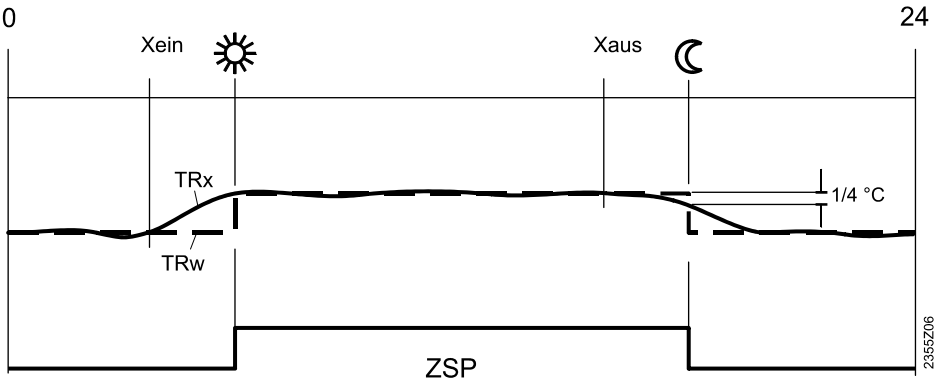
Line no.			*Operating line*
HC1	*HC2*	*HC3*	
790	**1090**	**1390**	**Optimum start control max**
791	**1091**	**1391**	**Optimum stop control max**
794	**1094**	**1394**	**Heat up gradient**

Optimum start control max

With "Optimum start control", the change from one temperature level to the other is shifted forward such that the "Comfort" setpoint will be reached at the respective switching times.
"Optimum start control max" limits the forward shift.

Optimum stop control max

With "Optimum stop control", the change from one temperature level to the other is shifted forward such that the "Comfort" setpoint -1/4 K will be reached at the respective switching times.
"Optimum stop control max" limits the forward shift.



Xein Forward shift of switch-on time
Xaus Forward shift of switch-off time
ZSP Time program
TRx Actual value of room temperature
TRw Room temperature setpoint

Optimum start/stop control can also be provided without room sensor. In that case, optimum start/stop control is calculated with the help of the room model.

Heat up gradient

The heat up gradient defines the period of time the heating system requires to raise the room temperature by 1 K.

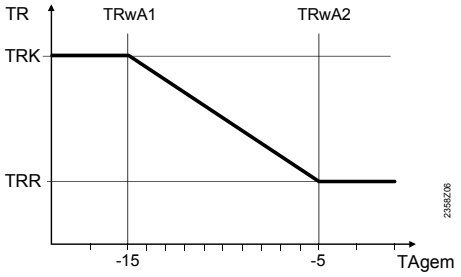
If the room temperature does not reach the "Comfort" setpoint at the respective switching times, the setting must be increased.

The heat up gradient is only active when optimum start control is switched on.

Increase of "Reduced" setpoint

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
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 heat up time at low outside temperatures would be too long. When the "Reduced" setpoint is increased, the rooms are prevented from cooling down excessively, thus shortening the heat up time when changing to the nominal setpoint.



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

Frost protection for the plant HC pump

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
810	**1110**	**1410**	**Frost prot plant HC pump** Off ¦ On

When selecting "On", the respective heating circuit pump is put into operation when frost protection for the plant is active (refer to description "Frost protection for the plant").

Overtemperature protection pump heating circuit

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
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 producer temperature.

As a result of the excessive flow temperature, this pump heating circuit would assume too high temperatures.

By switching the pump on/off, function "Overtemp prot pump circuit" ensures that the heat supply to the pump heating circuit meets the request from the heating curve.

⚠ 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.

Control of mixing valve

Line no.			Operating line
HC1	HC2	HC3	
830	**1130**	**1430**	**Mixing valve boost**
832	**1132**	**1432**	**Actuator type** 2-position ¦ 3-position
833	**1133**	**1433**	**Switching differential 2-pos**
834	**1134**	**1434**	**Actuator running time**

Mixing valve boost

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

Actuator type

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

3-position
The controller uses 2 relay outputs to drive the actuator. One output is used for opening the connected valve, the other for closing it.

Switching differential 2-pos

When using a 2-position actuator, "Switching differential 2-pos" might have to be adapted. With 3-position actuators, the switching differential has no impact.

Actuator running time

In the case of 3-position control, the running time of the mixing valve actuator used can be adapted. With 2-position control, the actuator running time has no impact.

"Floor curing" function

Line no.			Operating line
HC1	HC2	HC3	
850	**1150**	**1450**	**Floor curing function** Off ¦ Functional heating Curing heating ¦ Functional/curing heating ¦ Manually
851	**1151**	**1451**	**Floor curing setp manually**
856	**1156**	**1456**	**Floor curing day current**
857	**1157**	**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.

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

Floor curing function

Off
The function is deactivated.

Functional heating
The first section of the temperature profile (Fh) is completed automatically.

Curing heating
The second section of the temperature profile (Bh) is completed automatically.

Functional/curing heating
The entire temperature profile (first and second section) is completed automatically.

Manually
In manual mode, no temperature profile is used. The required flow temperature is set individually for every heating circuit using parameter "Floor curing setp manually".
The function is automatically ended after 25 days.

Floor curing setp manually

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

⚠ First, start the "Floor curing" function, then adjust the setpoint manually. The start value is 25 °C and can be manually readjusted at any time. "Floor curing setp manually" can only be adjusted within the 2 limit values "Flow temp setpoint max" (TVMax) and "Flow temp setpoint min" (TVmin).

The function is ended when the functional days (Fh+Bh = 25 days) have elapsed or when the function is deactivated via the respective parameter. The start day (day 0) does not count as a functional day.

Floor curing day current
Floor setpoint current

Displays the current day and the current setpoint of the "Floor curing" function in progress.

Floor curing days completed

The completed number of days are continuously stored and retained until the function is started the next time.

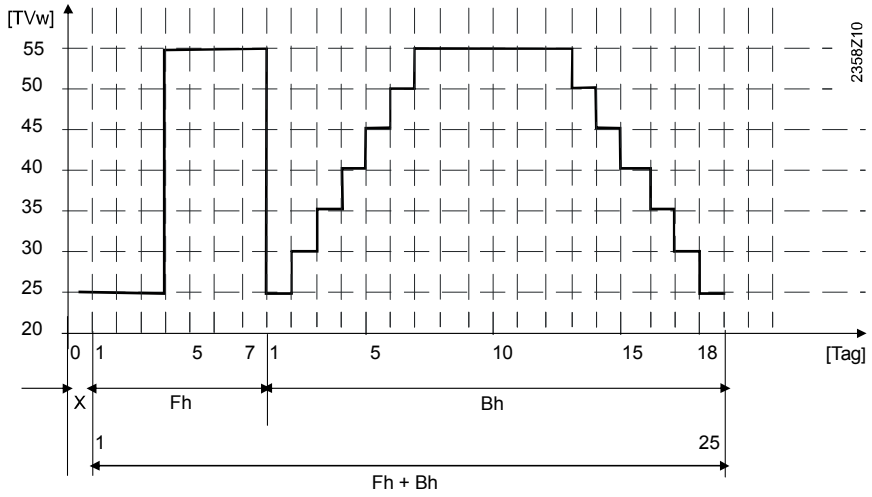
The temperature is considered maintained when the deviation from the setpoint is less than 2 K. The periods of time the flow temperature is correct are added up by a meter.

If the required temperature is not reached for more than 1 hour, the meter is stopped until the deviation drops again below 2 K.

⚠ In the event of a power failure, the plant resumes the "Floor curing" function at the point in time the power failure occurred.

Temperature profile

In "Automatic" modes, the controller ensures automatic completion of the selected temperature profile.



X Start day
Fh Functional heating
Bh Curing heating

The temperature change is always made at midnight. The start day (day 0), that is, the period of time from activation to midnight, does not count as a functional day. The setpoint used for the start day is the value of the first functional day.

During "Floor curing" mode, the profile temperature is limited within the 2 limit values "Flow temp setpoint max" (TVMax) and "Flow temp setpoint min" (TVmin).

The function is ended when the functional days have elapsed or when the function is deactivated via the respective parameter.

⚠ **Start in the summer**

In the case of heat pumps controlled according to the return temperature, the switch-on point for the heat pump might not be reached in the summer.

The return temperature needed for switching on the heat pump is calculated based on the flow temperature setpoint minus the required temperature differential ("Differential HC at OT -10°C", parameter 5810).

If the temperature acquired by the return sensor lies above that temperature, the heat pump is not put into operation so that the "Floor curing" function is started too late (only when the temperature increase according to the "Floor curing" function necessitates switching on).

Excess heat draw

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
861	**1161**	**1461**	**Excess heat draw** Off ¦ Heating mode ¦ Always

Excess heat draw can be initiated via bus from some other device or storage tank recooling.

If excess heat draw is activated, excess heat can be supplied to 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*	*HC3*	
870	**1170**	**1470**	**With buffer**
872	**1172**	**1472**	**With prim contr/system pump**

With buffer

If a buffer storage tank is installed, enter whether the heating circuit can draw heat from it.

With prim contr/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).

Speed control

Speed-controlled pumps can be connected to outputs Zx and Ux.

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
882	**1182**	**1482**	**Pump speed min**
883	**1183**	**1483**	**Pump speed max**

Pump speed min/max

Using these settings, minimum and maximum limitation of the pump speed is provided.

Remote control

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
900	**1200**	**1500**	**Optg mode changeover** None ¦ Protection ¦ Reduced ¦ Comfort ¦ Automatic

Optg mode changeover

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

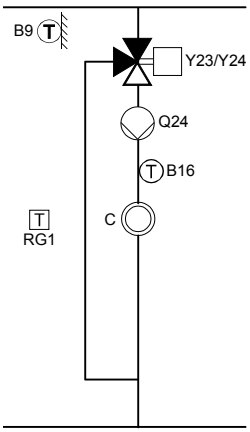
Frost protection for the heating circuit

Frost protection for the heating circuit is always active.

If the flow temperature falls below 5 °C, the controller switches on the heating circuit pumps (regardless of the heating system's current operating mode).

When the flow temperature returns to a level above 7 °C, the controller will switch the pumps off again after 5 minutes.

6.4 Cooling circuit



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

Cooling mode is automatically started when the room temperature rises above the "Comfort setpoint" for cooling (line 902). The "Cooling" function must be activated (line 901, "Operating mode", selection "Automatic") and enabled according to the time program (line 907, "Release").

In addition, criteria "Cooling limit at OT" (line 912) and "Lock time at end of heating" (line 913) must be satisfied.

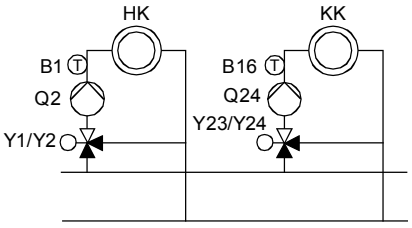
- With a 2-pipe system (with active cooling), cooling mode is interrupted if one of the consumers calls for heat.
- In the case of a 4-pipe system, both DHW charging and space heating (via some other heating circuit) are possible in cooling mode.

Cooling via common heating/cooling flow

In plants 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 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 the buffer storage tank. 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

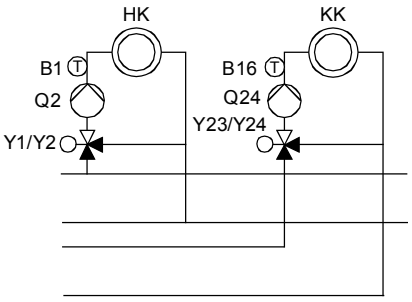


Cooling and heating circuit draw their cooling energy/heat from the same common flow.

Cooling via separate common cooling flow

In plants using a 4-pipe system, the controller acquires the current room temperature and compares it with the room temperature setpoint to calculate the required flow temperature setpoint. If the required cooling energy is available directly from the heat pump source, both the source pump and cooling circuit pump are put into operation. If the temperature level of the source is too high, the pumps remain deactivated.

4-pipe system



Cooling and heating circuit draw their cooling energy/heat from separate common flows.

Operating mode

Line no.			*Operating line*
HC1	*HC2*	*HC3*	
901	**1201**		**Operating mode** Off ¦ Automatic

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

The selection of cooling mode via the cooling mode button on a room unit is the same as this selection.

Off
The "Cooling" function is deactivated.

Automatic
The "Cooling" function is automatically enabled based on the selected time program (line 907, "Release "), the holiday program, and the presence button – and then activated, if required.

Manual control

If the release for cooling mode (line 907) is set to "24h/day", the cooling mode button can be used as an on/off button (manual control).

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.

In the summer, the "Comfort" setpoint is shifted upward as a function of the outside temperature (see lines 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 according to which cooling will be enabled.

24 h/day

Cooling is continuously released (24 hours a day).

Time program heating circuit

Cooling is released according to the heating circuit's time program.

Time program 5

Cooling is released according to time program 5.

Cooling curve

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

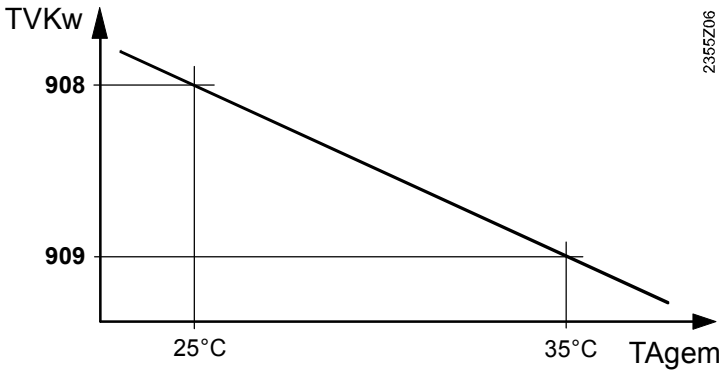
Based on the cooling curve, the controller determines the required flow temperature at a certain composite outside temperature. The cooling curve is determined by defining 2 fixed points (flow temperature setpoint at 25 °C and 35 °C).

Flow temp setp at OT 25°C

Determines the flow temperature required for cooling at a composite outside temperature of 25 °C, without giving consideration to summer compensation.

Flow temp setp at OT 35°C

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 is automatically adapted.

ECO

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

Cooling limit at OT

Cooling is released when the composite outside temperature lies above the cooling limit. Cooling is locked when the composite outside temperature drops at least 0.5 K below the cooling limit.

Lock time at end of heating

To avoid too rapid a change to cooling at the end of heating, the "Cooling" function is locked for the period of time set here. The locking time starts when there is no valid heat request from heating circuit 1. Heat requests from heating circuit 2 or 3 are not taken into consideration.

The locking lime is not taken into consideration when the "Cooling" function is activated via the operating mode button.

Summer compensation

Line no.	*Operating line*
918	**Summer comp start at OT**
919	**Summer comp end at OT**
920	**Summer comp setp increase**

In the summer, the "Comfort setpoint" for cooling (line 902) is shifted upward as the outside temperature rises. This saves cooling energy and prevents too great differences between room and outside temperature.

The resulting "Room temperature setpoint" for cooling can be displayed on the info level.

Summer comp start at OT

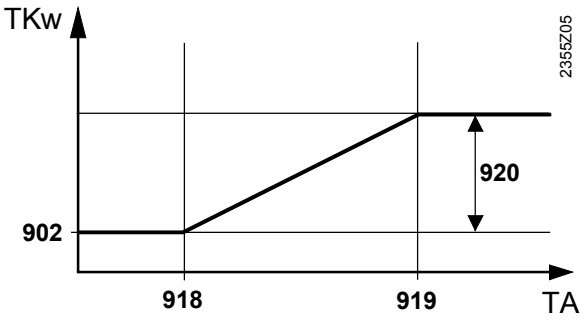
Summer compensation starts to take effect at the outside temperature level set here. If the outside temperature continues to rise, the "Comfort" setpoint is raised continuously.

Summer comp end at OT

At this outside temperature, summer compensation is fully active (line 920). Any further increase of the outside temperature will have no more impact on the "Comfort" setpoint.

Summer comp setp increase

This setting defines the maximum by which the "Comfort" setpoint is raised.



TKw Comfort setpoint
TA Outside temperature

Limitations of flow temperature setpoint

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

The flow temperature required for cooling can be limited to a minimum. The limit curve is determined by defining 2 fixed points.

In addition, there is a minimum limit for the resulting flow temperature setpoint, which must not fall below 5 °C.

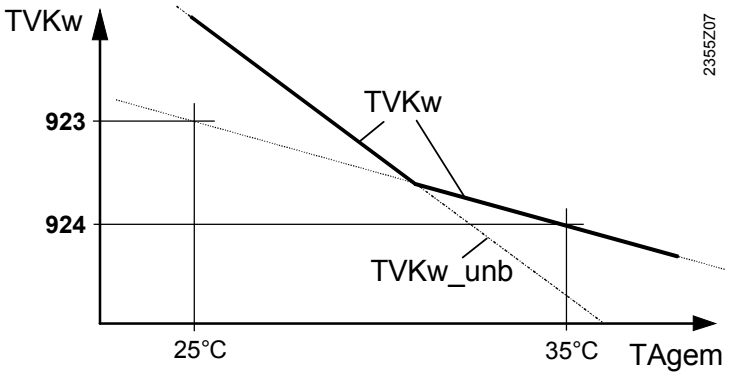
Flow temp setp min OT 25°C

Defines the lowest permissible flow temperature at a composite outside temperature of 25 °C.

Flow temp setp min OT 35°C

Defines the lowest permissible flow temperature at a composite outside temperature of 35 °C.

⚠ If a valid outside temperature is not available, the controller uses the value of "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	*Compensation variant*
- - - %	Weather compensation alone*
1...99 %	Weather compensation with room influence*
100 %	Room compensation alone

* Outside sensor is mandatory

Weather compensation alone

The flow temperature is calculated based on the cooling curve, depending on the composite outside temperature.

This compensation variant demands a correct adjustment of the cooling curve since in that case the control gives no consideration to the room temperature.

Weather compensation with room influence

The deviation of the current room temperature from the setpoint is acquired and taken into account when controlling the room temperature. This way, consideration is given to room temperature deviations, ensuring more accurate room temperature control. The authority of the deviation is set as a percentage value.

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
Approx. 20% Unfavorable reference room

i To activate the function, following must be considered:
- A room sensor must be connected
- "Room influence" must be set to a value between 1 and 99
- There should be no thermostatic radiator valves in the reference room (mounting location of room sensor); if such valves are installed, they must be fully opened

Room compensation alone

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

i 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 thermostatic radiator valves in the reference room (mounting location of room sensor); if such valves are installed, they must be fully opened

Room temperature limitation

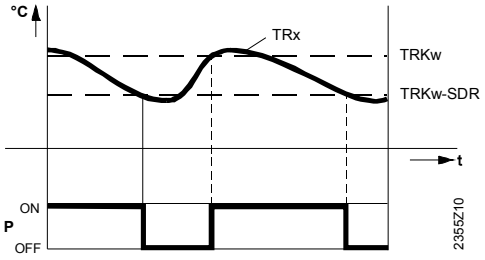
Line no.	*Operating line*
932	**Room temp limitation**

The "Room temp limitation" function allows the cooling circuit pump to be deactivated if the room temperature falls by more than the preset difference below the effective room temperature setpoint (with summer compensation, line 920).

The cooling circuit pump will be activated again whenever the room temperature returns to a level above the current room temperature setpoint.

During the time the "Room temperature limitation" function is active, no refrigeration request is forwarded to the producer.

The function is deactivated in the following cases:
- No room temperature sensor installed
- "Room temp limitation" = "---"
- "Room influence" (line 928) = "---" (weather compensation alone)



TRx Actual value of room temperature
TRKw Room temperature setpoint cooling (incl. summer compensation)
SDR Room switching differential
P Pump
t Time

Frost protection for the plant CC pump

Line no.	*Operating line*
937	**Frost prot plant CC pump** Off ¦ On

When selecting "On", the cooling circuit pump is put into operation when frost protection for the plant is active.

Control of mixing valve

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

Actuator type

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

3-position
The controller uses 2 relay outputs to drive the actuator. One output is used for opening the valve, the other for closing it.

Switching differential 2-pos

When using a 2-position actuator, "Switching differential 2-pos" might have to be adapted. With 3-position actuators, the switching differential has no impact.

Actuator running time

In the case of 3-position control, the running time of the mixing valve actuator used can be adjusted. With 2-position control, the actuator running time has no impact.

Mixing valve in heating mode

Defines the position of mixing valve 1 (Y1/Y2) in heating mode. In the case of plants with hydraulically separated heating and cooling circuit, this parameter is inactive.

Control
The valve ensures control in heating and cooling mode.

Open
The valve ensures control in cooling mode, it is open in heating mode.

Dewpoint monitoring

Line no.	*Operating line*
946	**Lock time dewpoint monitor**
947	**Flow temp setp incr hygro**
948	**Flow setp incr start at r.h.**
950	**Flow temp diff dewpoint**
953	**Acquisition room r.h.**
954	**Acquisition room temp**

Lock time dewpoint monitor

Whenever the connected dewpoint monitor detects the formation of condensation, it closes its contact, thus deactivating cooling.

The "Lock time dewpoint monitor" set here starts when the contact opens again. Cooling can be resumed only when the locking time has elapsed.

⚠ The dewpoint monitor must be assigned to one of the Hx inputs as "Dewpoint monitor".

Flow temp setp incr hygro

To prevent condensation due to high indoor air humidity, a hygrostat can be installed to produce a fixed increase in flow temperature. As soon as the room humidity exceeds the value set on the hygrostat, its contact closes and the flow temperature setpoint is increased by the set amount.

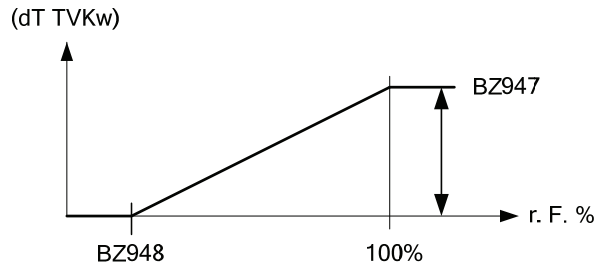
⚠ The hygrostat must be assigned to one of the Hx inputs as "Flow temp setp incr hygro".

Flow setp incr start at r.h.

To prevent the formation of condensation due to extremely high indoor air humidity, humidity measurements (DC 0...10 V) can be made to continuously raise the flow temperature setpoint**.**

If the relative room humidity exceeds the level of "Flow setp incr start at r.h.", the flow temperature setpoint is continuously increased. The start of increase (line 948) and the maximum increase (line 947) can be set.

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



dT TVKw Increase of flow temperature setpoint
r.F. Relative humidity
BZ Operating line

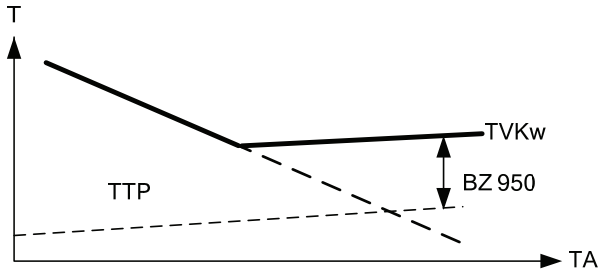
Flow temp diff dewpoint

The dewpoint temperature is determined based on the relative room humidity and the room temperature.

To prevent condensation on surfaces, a minimum limit can be applied to the flow temperature, meaning that it always remains above the dewpoint temperature by the value set here (line 950).

Setting "- - -" deactivates the function.

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



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

Acquisition room r.h.

A humidity sensor delivering a DC 0...10 V signal can be connected to one of the Hx inputs. In that case, the following configuration is required:

- Function "Rel room humidity 10V" must be assigned to the respective Hx input
- With the cooling circuit, parameter "Acquisition room r.h." must be used to refer to the respective Hx input

The measured relative humidity is used for calculating the dewpoint and for the cooling circuit's "Condensation protection" functions. It is also used to control the dehumidifier.

Acquisition room temp

In place of, or in addition to the room unit's temperature sensor (BSB or B5/B52/B53), a room temperature sensor delivering a DC 0...10 V signal can be connected to an Hx input. In that case, the following configuration is required:

- Function "Room temp 10V" must be assigned to the respective Hx input
- With the cooling circuit, parameter "Acquisition room temp" must be used to refer to this Hx input

The value at the Hx input and the value of the room unit's sensor are used for the various functions according to the following priorities:

Room temperature ...		*Use of room temperature ...*	
from Hx	from room unit	for dewpoint	for cooling circuit
No	No	-	-
No	Yes	Value room unit	Value room unit
Yes	**Yes**	**Value Hx**	**Value room unit**
Yes	No	Value Hx	Value Hx

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 a buffer storage tank is installed, it must be selected whether the cooling circuit may draw cooling energy from it.

No
Hydraulically speaking, the cooling circuit is connected **upstream** of the buffer storage tank and cannot draw any cooling energy from it. The refrigeration request is forwarded to the producer upstream of the buffer storage tank.

Yes
The cooling circuit is connected **downstream** from the buffer storage tank. It draws 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 cooling circuit.

No
Hydraulically speaking, the cooling circuit is connected **upstream** of the primary controller/system pump and cannot draw any "precontrolled" cooling energy. The refrigeration request is always forwarded to the producer located upstream of the primary controller.

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

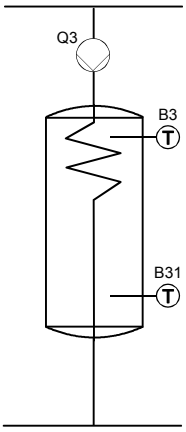
Remote control

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

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

6.5 DHW

Summary



The unit controls the DHW temperature according to the time program, or continuously, to the required setpoint. Priority of DHW charging over space heating can be selected.

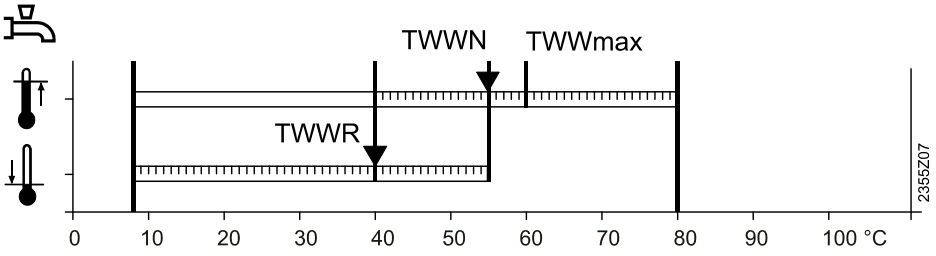
The controller features a "Legionella" function with a number of setting choices, which fights legionella viruses in the DHW storage tank and in the circulation pipe. The circulating pump is controlled to the setpoint according to the selectable time program and the selectable operating mode.

Setpoints

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

{>

The DHW is heated up according to different setpoints. These setpoints become active 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 Maximum nominal DHW setpoint

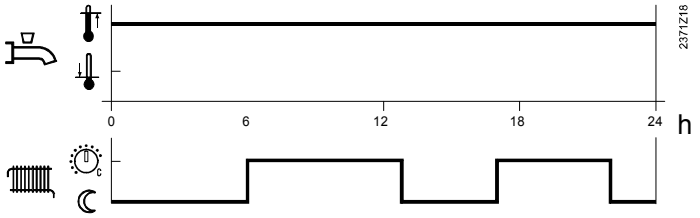
Release

Line no.	*Operating line*
1620	**Release** 24h/day ¦ Time programs HCs ¦ Time program 4/DHW ¦ Low-tariff ¦ T'prog 4/DHW or low-tariff

24h/day

The DHW temperature is always maintained at the nominal DHW setpoint (regardless of time programs).

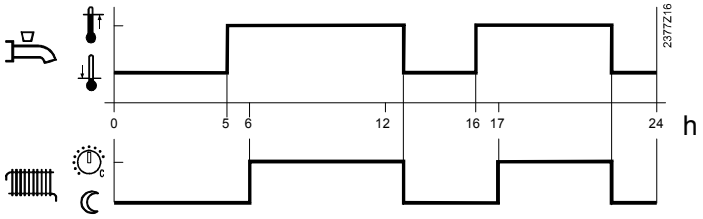
Example



Time programs HCs

The DHW setpoint changes between the nominal and the reduced DHW setpoint according to the heating circuit's time program. The first switch-on point of each phase is shifted forward in time by 1 hour.

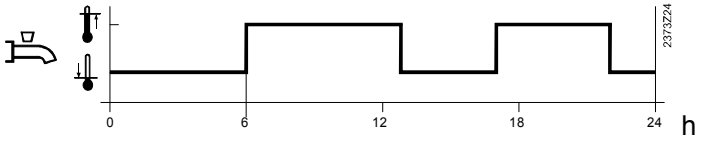
Example



Time program 4/DHW

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

Example



Low-tariff

DHW heating is released when the low-tariff input (E5) is active.

T'prog 4/DHW or low-tariff

DHW heating is released when the nominal setpoint of DHW program 4 or the low-tariff input (E5) is active.

Charging priority

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

If the heating circuits and DHW call for heat at the same time, the "DHW priority" function ensures that, during DHW charging, the heat produced by the heat source is used primarily for DHW.

Absolute priority
Mixing and pump heating circuits are locked until the DHW reaches the required temperature level.

Shifting priority
If the heat source is no longer able to meet the demand, the mixing and pump heating circuits are restricted until the DHW reaches the required temperature level. To ensure the temperature available for DHW charging is high enough and to be able to end DHW charging, the request to heat pump fix is raised by 6 K (DHW target + 6 K) ➔ Does not apply to separate DHW circuit.

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 remain locked until the DHW storage tank is heated up. If the heat source is no longer able to meet the demand, the mixing heating circuits will be restricted as well.

- Plants without buffer or combi storage tanks: Parameter "Charging priority" should be set to "Absolute" to ensure that the consumers are 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 funct time**
1645	**Legionella funct setpoint**
1646	**Legionella funct duration**
1647	**Legionella funct circ pump**
1648	**Legio funct circ temp diff**

"Legionella function"

Off
The "Legionella" function is deactivated.

Periodically
The "Legionella" function is repeated according to the selected interval (line 1641). If the legionella setpoint is attained via a solar plant, independent of the set time, the interval is started again.

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

Legionella funct time

Defines the time of day the "Legionella" function is started. The setpoint is increased at this point in time, starting DHW charging.

If no time (--.--) is parameterized, the "Legionella" function is started on the respective day at the same time normal DHW heating is released for the first time. If no release is scheduled for that day, (continuously reduced), the "Legionella" function is performed at 24:00 o'clock.

If DHW heating is off (operating mode = off or "Holiday" function of the heating circuits active), the "Legionella" function is made up for as soon as DHW heating is switched on again (operating mode = on or end of holiday period).

Legionella funct setpoint

The DHW storage tank is heated up to the adjusted setpoint (55...95 °C).
For the "Legionella" function to be regarded as fulfilled, the sensor at the top of the storage tank (B3) or both sensors (B3 and B31) must reach the legionella setpoint, depending on the type of charging (line 5022); that setpoint must then be maintained for the set duration of the function.

The higher the setpoint, the shorter the duration that need be set to reliably kill the legionella viruses in the DHW.

Legionella funct duration

Defines the period of time during which the legionella setpoint in the storage tank/circulation pipes must be maintained.

Legionella funct circ pump

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

⚠ There is a risk of scalding when opening the taps during the time the "Legionella" function is performed.

Legio funct circ temp diff

The circulating pump remains in operation until the temperature acquired by the circulation sensor (B39) reaches the setpoint (line 1645) minus the circulation difference (line 1648),
and the set duration of the function (line 1646) has elapsed.

If, for 48 hours, the circulation pipe does not reach the required temperature, an error message (127:Legionella temp) is delivered.
If the temperature differential is not set, the temperature at sensor B39 is not monitored during the period of time the "Legionella" function is performed.

Circulating pump

Line no.	*Operating line*
1660	**Circulating pump release** Time program 3/HC3 ¦ DHW release ¦ Time program 4/DHW ¦ Time program 5
1661	**Circulating pump cycling**
1663	**Circulation setpoint**

Circulating pump release

With setting "DHW release", the circulating pump runs whenever DHW heating is released. With the other settings, it operates according to the respective time program.

Circulating pump cycling

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

Circulation setpoint

If sensor B39 is located in the DHW distribution pipe, circulating pump Q4 is activated as soon as the water temperature drops below the set value. The pump then operates for 10 minutes or longer until the setpoint is reached again. Between the setpoint for the DHW storage tank and the setpoint for sensor B39 (parameter 1663), there is always a fixed temperature differential of 8 K. This is to ensure that the circulation setpoint will be reached, preventing the circulating pump from running continuously.

Example 1

- DHW setpoint: 55 °C (nominal setpoint)
- Circulation setpoint: 45 °C

➔ The circulating pump is activated when the temperature at the sensor drops below 45 °C and then runs for at least 10 minutes.

Example 2

- DHW setpoint: 50 °C
- Circulation setpoint: 45 °C

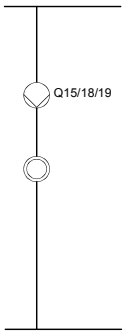
➔ The circulating pump is activated when the temperature at the sensor drops below 42 °C (50 °C – 8 K) and then runs for at least 10 minutes.

Remote control

Line no.	*Operating line*
1680	**Optg mode changeover** None ¦ Off ¦ On

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

6.6 Consumer circuits and swimming pool circuit



In addition to heating circuits HC1...HC3 and the cooling circuit, other consumers can be connected or controlled (e.g. warm air curtain, swimming pool, etc.).

The controller can receive their temperature requests via one of the Hx inputs to control the respective pumps via a Qx relay output.

For the consumer circuits, the following settings are available:

Prerequisite for the use of consumer circuits/swimming pool circuit is an appropriately defined Hx input on the controller itself or on an extension module. The input can be defined as follows:

- Consumer request VK1, 2
- Consumer request VK1 10V, Consumer request VK2 10V
- Release swi pool source heat

- Operating lines 5750 and 5751 are available to select whether the consumer circuits are used for heating or cooling
- The pumps are connected to the appropriately defined multifunctional relay outputs Qx

The consumer circuit pumps (Q15/Q18) are put into operation when there is a heat or refrigeration request at the respective Hx input, or when excess heat draw is called for.

The swimming pool circuit (Q19) is put into operation when there is a release at the respective Hx input and when the swimming pool temperature lies below "Setpoint source heating" (line 2056).

Line no.			*Operating line*
VK1	*VK2*	*SC*	
1854	**1904**	**1954**	**Request opt energy** Off ¦ On

On
When used in connection with producers operating with optimum efficiency (condensing boilers, heat pumps, etc.), the consumer circuit makes non-mandatory heat requests.

Only heat sources supporting the function
"Producers with optimum efficiency" (parameter 2867, OEM) handle such requests.

Off
The consumer circuit makes no requests that demand optimum efficiency.

Consumer circuits 1 and 2/swimming pool circuit

Line no.			*Operating line*
VK1	*VK2*	*SC*	
1859	**1909**	**1959**	**Flow temp setp cons request, Flow temp setpoint**
1860	**1910**	**1960**	**Frost prot plant VK pump, Frost prot plant pool pump**
1875	**1925**	**1975**	**Excess heat draw** Off ¦ On
1878	**1928**	**1978**	**With buffer** No ¦ Yes
1880	**1930**	**1980**	**With prim contr/system pump** No ¦ Yes

The current flow temperature setpoints of the consumer circuits appear on operating lines 8875 and 8885 and that of the swimming pool circuit on operating line 8895.

Flow temperature setpoint

When a heat or refrigeration request is pending at an appropriately defined Hx input, the flow temperature of the respective consumer circuit is increased/decreased until the value set here is reached.

For the swimming pool circuit, a request from swimming pool sensor B13 is required, in addition to the release at the Hx input.

Frost protection for the plant

Defines whether the consumer circuit pumps and the swimming pool pump shall be put into operation when frost protection for the plant responds.

Excess heat draw

Excess heat draw can be initiated via bus by some other device or via storage tank recooling.

When dissipation of surplus heat is activated, it can be drawn by the consumer circuits/swimming pool circuit. This can be selected separately for each consumer circuit/the swimming pool circuit.

Off
Excess heat draw is deactivated.

On
Excess heat draw is activated.

With buffer

No
Hydraulically speaking, the consumer circuit/swimming pool circuit is connected **upstream** of the buffer storage tank and cannot draw any heat 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 circuit/swimming pool circuit is connected **downstream** from the buffer storage tank. It draws heat or cooling energy from the buffer storage tank and its temperature request is taken into account by buffer management.

With prim contr/system pump

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

Yes
The consumer circuit/swimming pool circuit 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.

Line no.	*Operating line*
1952	**Release source heating** None ¦ 24h/day ¦ Time program 5

The release for heating by the heat source can take place either via the assigned Hx input or parameter "Release source heating".

If only 1 of the 2 types of release is configured, swimming pool heating is released when the configured release is active.

If both types of release are configured, swimming pool heating is released only if both types of release are active.

Input Hx configured	*Contact state Hx*	*Release source* heating *(line 1952)*	*State switching program 5*	*Release producer heating for swimming pool*
No		None	-	No
		24h/day	-	Yes
		Time program 5	Off	No
			On	Yes
Yes	Inactive	None	-	No
		24h/day	-	
		Time program 5	Off	
			On	
	Active	None	-	Yes
		24h/day		Yes
		Time program 5	Off	No
			On	Yes

Line no.	*Operating line*
1973	**Last priority to charge** No ¦ Yes

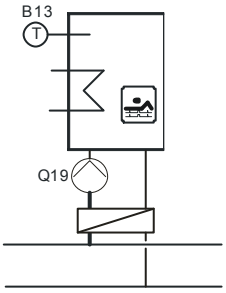
Parameter "Last priority to charge" is used to select the charging priority for the swimming pool.

No
Swimming pool heating is handled with the same priority as other heat requests. When, at the same time, the DHW is heated with charging priority, swimming pool heating is interrupted if demanded by the DHW priority.

Yes
Swimming pool heating is handled with the last priority. When using this parameter setting, the swimming pool is heated only if no other heat request is active.

6.7 Swimming pool

Summary



The controller facilitates swimming pool heating with solar energy or via a heat pump using 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**
2057	**SD source heating**

Setpoint solar heating

When using solar energy, the swimming pool is heated up until this setpoint is reached.

Function "Overtemperature protection for the collector" can reactivate the collector pump until the maximum swimming pool temperature is reached.

Solar swimming pool heating can be made dependent on the release of 1 or 2 Hx inputs.

Setpoint source heating

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

SD source heating

When released (see parameter 1952), the charging controller switches the swimming pool pump on or off based on "SD source heating". Also, when switching on, a heat request is forwarded to the producer.

Priority

Line no.	*Operating line*
2065	**Charging priority solar** Priority 1 ¦ Priority 2 ¦ Priority 3

Priority 1
Swimming pool heating is assigned the first priority.

Priority 2
Swimming pool heating is assigned the second priority (after the buffer storage tank, before the DHW storage tank, or after the DHW storage tank, before the buffer storage tank).

Priority 3
Swimming pool heating is assigned the last priority (after the buffer and the DHW storage tank).

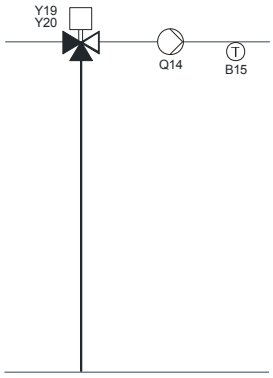
Plant hydraulics

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

This setting defines whether the swimming pool can be heated by solar energy.

6.8 Primary controller/system pump

Summary



The primary controller allows lower or higher flow temperatures by mixing to obtain flow temperatures for heating/cooling zones 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 zones.

Primary controller/ system pump

Line no.	*Operating line*
2120	**Frost prot plant syst pump** Off ¦ On
2150	**Primary contr/system pump** Before buffer ¦ After buffer

Frost prot plant syst pump

Defines whether the system pump is put into operation when frost protection for the plant responds.

Primary contr/system pump

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

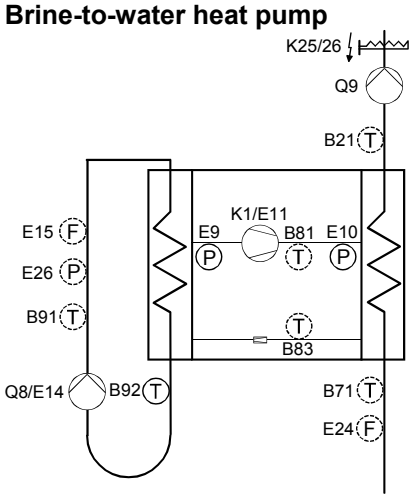
6.9 Heat pump

Heat pumps draw energy from the environment (brine, water or air) and deliver it to the heating system, raised to 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.

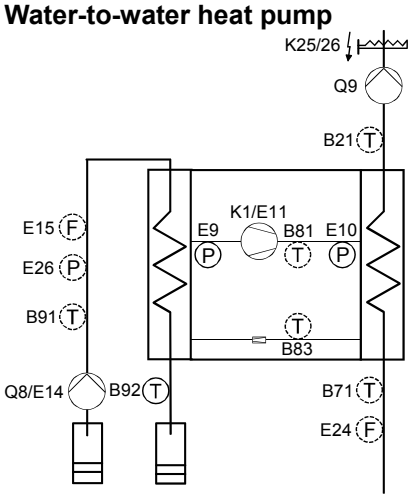
Function diagrams

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

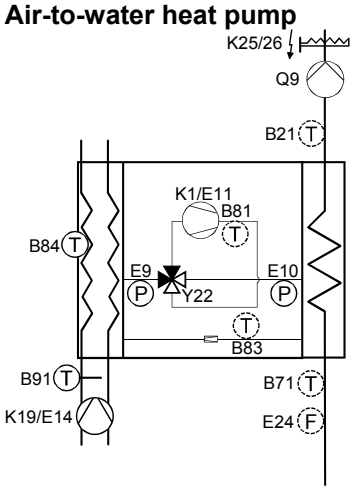
Brine-to-water heat pump



Water-to-water heat pump



Air-to-water heat pump



Mains voltage

E5	Low-tariff E5
E6	Electrical utility lock E6
E9	Low-pressure switch E9
E10	High-pressure switch E10
E11	Overload compressor 1 E11
E14	Overload source E14
E15	Flow switch source E15
E17	Manual defrost E17
E24	Flow switch consumers
E26	Pressure switch source
K1	Compressor stage 1 K1
K19	Source pump Q8/fan K19
K25	El imm heater 1 flow K25
K26	El imm heater 2 flow K26
Q8	Source pump Q8/fan K19
Q9	Condenser pump Q9
Y22	Process revers valve Y22

Low-voltage

B21	HP flow sensor B21
B71	HP return sensor B71
B81	Hot-gas sensor B81
B83	Refrig sensor liquid B83
B84	Source outl sens B92/B84
B91	Source inlet B91
B92	Source outl sens B92/B84

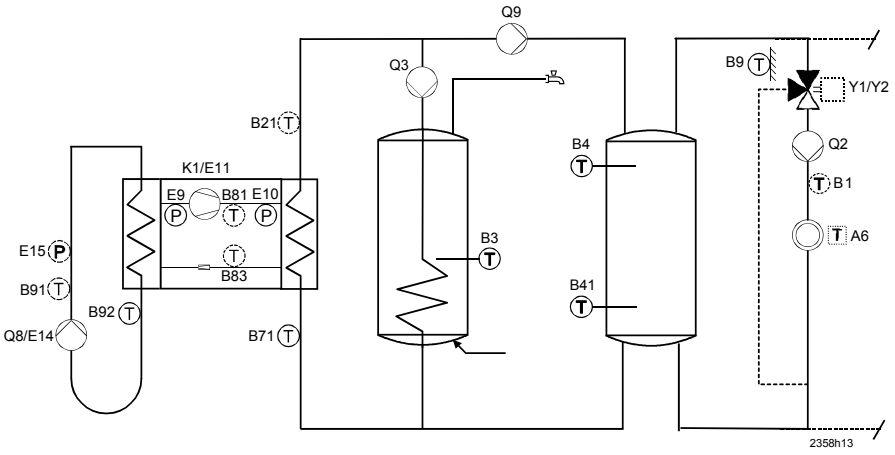
Line no.	Operating line
2789	**Condenser pump with DHW**

Condenser pump with DHW

Parameter "Condenser pump with DHW" is used to select whether the condenser pump shall operate during DHW charging.

Application example

"Condenser pump with DHW" = off



Speed-controlled condenser pump

Line no.	Operating line
2790	**Condenser pump modulation** None ¦ HP setpoint ¦ Compressor output ¦ Temp diff condenser
2792	**Pump speed min**
2793	**Pump speed max**

The speed of the condenser pump can be controlled via triac output or Ux output. For that, an appropriate output must be parameterized as "Condenser pump Q9".

If, in addition, a relay output for the condenser pump is available, that relay is controlled also, according to the normal condenser pump logic.

Condenser pump modulation

The speed of the condenser pump can be controlled according to different criteria.

None

The speed of the condenser pump is not controlled. Speed output corresponds to the parameterized maximum speed (line 2793).

HP setpoint

The function lowers the pump speed to such a level that the required heat pump setpoint at flow temperature sensor B21 is reached.

The speed of the condenser pump is calculated such that it can be reduced to the permissible minimum (line 2792) only when the compressor reaches its full capacity.

Compressor output
The speed of the condenser pump is controlled according to the compressor output currently released. The action depends on the type of heat pump.

- 1-stage compressor

When the compressor is in operation, the condenser pump runs at maximum speed.

When the compressor is off, the condenser pump runs at minimum speed.

- 2-stage compressor

When both compressors are in operation, the condenser pump runs at maximum speed.

When 1 compressor is in operation, the condenser pump runs at maximum speed minus the minimum speed, divided by 2 .

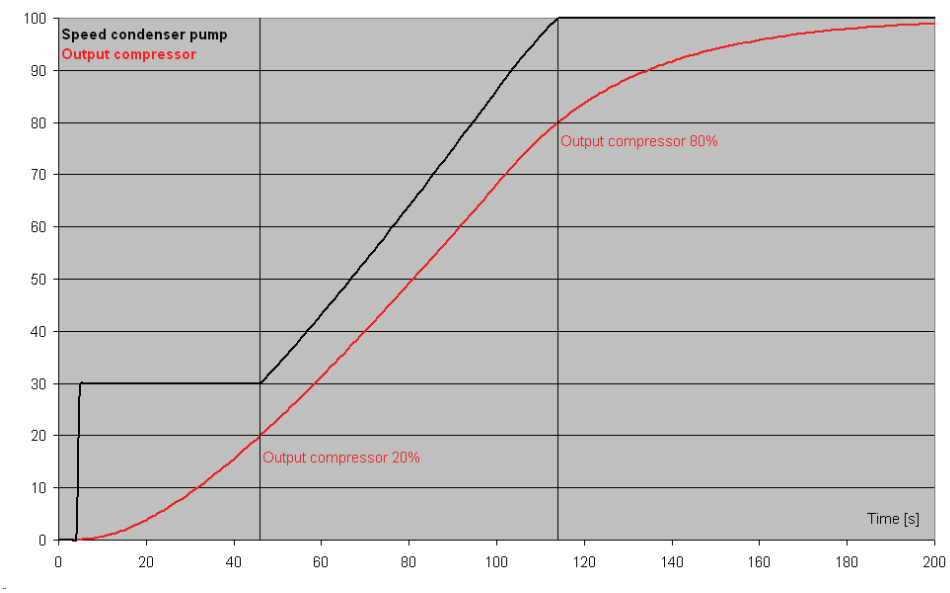
When both compressors are off, the condenser pump runs at minimum speed.

- Modulating compressor

With this function, the speed of the condenser pump depends directly on the compressor's current output.

If the compressor's output is ≤20%, the speed of the condenser pump is maintained at the minimum.

If the compressor's output is ≥80%, the speed of the condenser pump is maintained at the maximum.



2355Z42

Temp diff condenser
The function controls the pump speed such that the parameterized temperature differential ("Req temp diff condenser", line 2805) of heat pump flow and heat pump return is maintained.

Pump speed min/max

These settings ensure minimum and maximum limitation of the condenser pump speed.

Line no.	*Operating line*
2800	**Frost prot plant cond pump**
2801	**Control cond pump**
2802	**Prerun time cond pump**
2803	**Overrun time cond pump**

Frost prot plant 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 operate when frost protection for the plant is active.

On
The condenser pump operates when frost protection for the plant is active.

Control cond pump

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

Automatically
The controller decides when the condenser pump must be switched on, based on the origin of the requests.

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

Parallel compr operation
The condenser pump runs when the compressor is in operation.
The condenser pump also runs when the electric immersion heater installed in the flow is in operation.

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

In the event of a heat pump failure, the condenser pump is deactivated until the fault is corrected.

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.

Line no.	*Operating line*
2805	**Req temp diff condenser**

Temperature differential condenser

This is the temperature differential of the medium on the consumer side between condenser inlet (B71) and condenser outlet (B21).

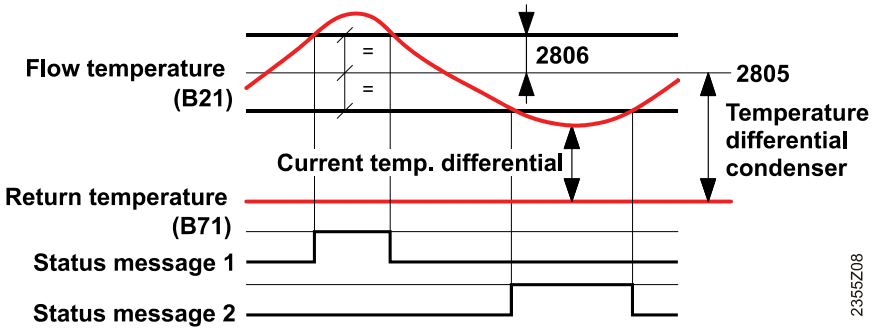
The function described below is only active when both sensors are installed.

Req temp diff condenser

"Req temp diff condenser" is the temperature differential anticipated across the condenser with maximum compressor output in heating mode.
The setting is used for different functions (e.g. speed control of condenser pump).

The settings required are "Req temp diff condenser" and a maximum permissible deviation ("Max dev temp diff cond", line 2806, OEM).

If the permitted deviation is not observed, a status message is displayed.



2805 Req temp diff condenser
2806, OEM Max dev temp diff cond
Status message 1 Limit diff condens max
Status message 2 Limit diff condens min

- For a too great or too small temperature differential to be displayed in the form of a status message, the compressor must have run for a minimum of 3 minutes and DHW charging must not be active
- When changing from DHW charging to space heating, the controller waits another 3 minutes before displaying a deviation that is too great
- With 2-stage heat pumps, the messages appear only when the second stage is in operation

- The function can be deactivated
- In cooling mode, the function is automatically deactivated

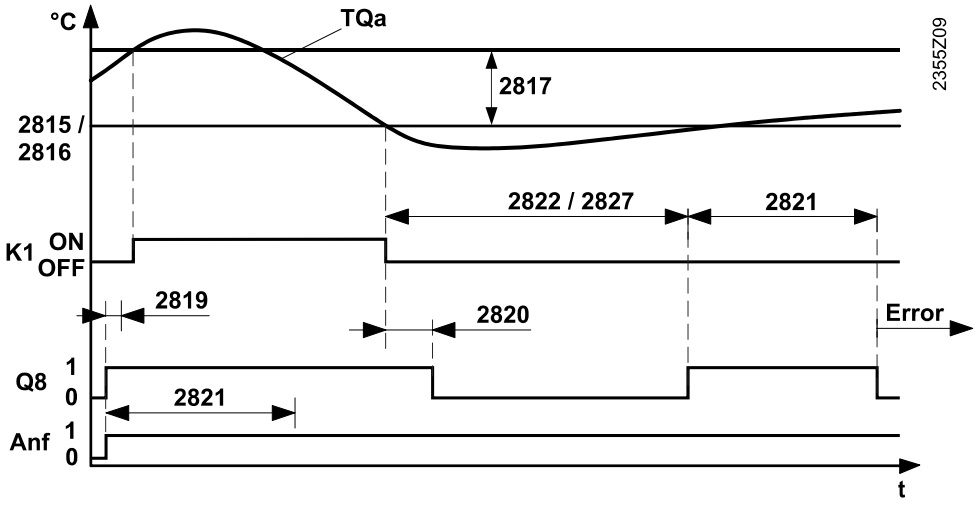
Condenser frost protection

"Condenser frost protection" leads to a release of the heat pump whenever the flow or return temperature falls below the set frost protection temperature (line 2810, OEM). As a result of the release, the heat pump is switched on with a fixed setpoint of 10 °C.

When the temperatures at both sensors (flow and return) return to a level 1 K above the set frost protection temperature, the release is maintained for another 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 parameterized), both relays are energized.

Source pump
Functional interrelationships



2815 Source temp min water
2817 Switching diff source prot
2821 Source startup time max
2822 T'limit source temp min brine
2827 Time limit source temp
TQa Source outlet temperature
K1 Compressor
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	**T'limit source temp min brine**
2827	**Time limit source temp**

Source temp min water

This function prevents the heat pump from operating when the source outlet temperature is too low. The function is intended for plants that use water as a heat source.

If, during operation, the source outlet temperature drops below "Source temp min water", both the pumps and the compressor are switched off for an adjustable period of time ("Time limit source temp", parameter 2827).

Source temp min brine

The function shall prevent the source from cooling down excessively.
It is intended for plants that use geothermal energy as the source of heat.

If, during operation, the source outlet temperature drops below "Source temp min brine", both the pumps and the compressor are switched off for an adjustable period of time ("T'limit source temp min brine", parameter 2822).

Compared to function "Source temp min water" (line 2815), the following additional differences exist, which must be observed:

- "Source prot sens brine HP" (parameter 5804, OEM) can be used to select whether the temperature at the source inlet or source outlet shall be considered
- During the time the "Floor curing" function is performed, the controller automatically raises 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.

During "T'limit source temp min brine" (line 2822), the electric immersion heaters installed in the flow are activated.

Switching diff source prot

After the set maximum source startup time (line 2821), the source temperature must exceed the source protection temperature (line 2815 or 2816) by at least "Switching diff source prot" (line 2817).

Increase source prot temp

With brine-to-water heat pumps, the controller automatically raises the minimum source temperature (line 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 "Prerun time source" (line 2819), the source temperature does not reach the required level (line 2815 or line 2816 plus 2817), the heat pump continues to operate until "Source startup time max" is reached (line 2821).

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

T'limit source temp min brine

Refer to description of "Source temp min brine" (line 2816).

Time limit source temp

See use of "Time limit source temp" with function "Source temp min water". Also note: This setting is used in connection with all problems associated with the source.

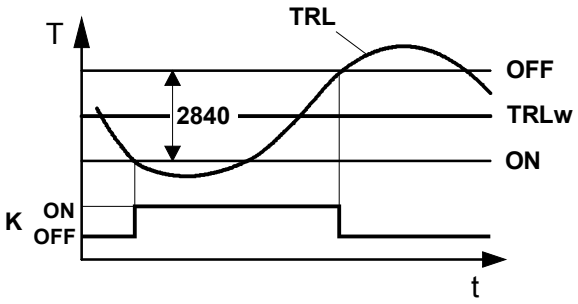
ⓘ In the event of a heat pump failure, the source pump will be deactivated until the fault is corrected.

Compressor

Compressor control without buffer or combi storage tank

If there is **no** buffer or combi storage tank in the plant, the compressor is switched on and off according to the return temperature (B71) and the "Switching diff return temp" (line 2840).

The return temperature setpoint is used to calculate the switch-on or switch-off point. It is calculated based on the required flow temperature setpoint and the “Differential HC at OT -10°C“ (line 5810). The adjustable "Switching diff return temp" (line 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 influenced 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 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 temperature sensor (B84) is required also.

Compressor control with buffer or combi storage tank

If a buffer or combi storage tank is installed, the controller uses sensors B4 and B41 to control the compressor. "Switching diff return temp" (line 2840) has no impact.

If there is no sensor B41, heat pump return temperature sensor B71 is used. The heat pump is switched on as soon as there is a heat request from the buffer storage tank. Control is effected via the buffer storage tank's automatic generation lock (see parameter 4720).

Required sensors

- In the case of control with buffer or combi storage tank, the buffer storage tank sensor at the top (B4), the buffer storage tank sensor at the bottom (B41) and the relevant source sensor must be installed
- If the buffer storage tank sensor at the bottom (B41) is missing, the controller uses the return temperature sensor (B71) to switch the heat pump off

If a solar application is configured, sensor B41 is not considered for full charging of the buffer storage tank. It is always switched off with B71. Sensor B41 is reserved for the "Solar" function.

Overview of setpoint and control sensor selection

A number of factors determine which sensor is used to control to which setpoint. The following table provides an overview of the plant configurations and sensors used to maintain the various setpoints. Prerequisite is always a valid heat request forwarded to the heat pump.

Behavior in case of faults is not considered here and not all cases listed may represent practical plant configurations.

Request from storage tank[1)]	*B21*	*B71*	*B10*	*5810[3)]*	*Compressor K1 (message)*			*Electric imm. heaters K25/K26*		
					Sensor	*Setpoint*	*SD[2)]*	*Sensor*	*Setpoint*	*SD[2)]*
No	-	-	-		Off (138:No control sensor HP)			Off		
	-	-	ok		Off (138:No control sensor HP)			B10	Tvw	±1 K
	-	ok	-		B71	T_{RW}	±2840/2	B71	T_{RW}	±2840/2
	-	ok	ok	=0	B71	T_{RW}	±2840/2	B71	T_{RW}	±2840/2
				>0				B10	Tvw	±1 K
	ok	-	-		Off (138:No control sensor HP)			B21	Tvw	±1 K
	ok	-	ok		Off (138:No control sensor HP)			B21	Tvw	±1 K
	ok	ok	-	=0	B71	T_{RW}	±2840/2	B71	T_{RW}	±2840/2
				>0				B21	Tvw	±1 K
	ok	ok	ok	=0	B71	T_{RW}	±2840/2	B71	T_{RW}	±2840/2
				>0				B21	T_{VW}	±1 K
Yes	-	-	-		On[4)]			ein		
	-	-	ok		On[4)]			B10	T_{VW}	±1 K
	-	ok	-		On[4)]			B71	T_{RW}	±1 K
	-	ok	ok		On[4)]			B10	Tvw	±1 K
	ok	-	-		On[4)]			B21	Tvw	±1 K
	ok	-	ok		On[4)]			B21	Tvw	±1 K
	ok	ok	-		On[4)]			B21	Tvw	±1 K
	ok	ok	ok		On[4)]			B21	Tvw	±1 K

[1)] Heat request comes from a storage tank (DHW, heating circuit via buffer, forced charging)
[2)] Switching differential ("Switching diff return temp", line 2840)
[3)] Parameter 5810, "Differential HC at OT -10°C"
[4)] Safety functions switch compressors off (high-pressure, hot-gas, max. switch-off temperature)
Tvw: Flow temperature setpoint
T_{RW}: Return temperature setpoint

Line no.	Operating line
2839	**Set' time ch'over DHW/HC**

Set' time ch'over DHW/HC

DHW- or heating circuit-specific monitoring functions give consideration to the settling time and ensure smooth changeover.

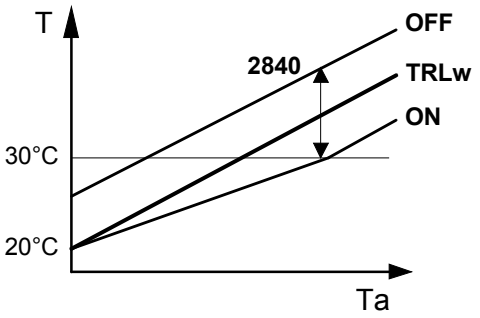
When a change is made from DHW to heating mode (or vice versa) while the compressor is running, the heat pump continues to operate during the settling time while the compressor delivers its current output.

Nevertheless, safety functions are allowed to reduce the compressor's output.

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 is switched off; if it falls below the setpoint by half the switching differential, the controller demands operation of the heat pump.
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. At 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	Heat pump return temperature
TRLw	Return temperature setpoint

Calculation of the return temperature setpoint is explained on operating line 5810 ("Differential HC at OT -10°C").

The function is not active when "Compensation heat deficit" is switched on (line 2886).

Compressor settings

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

Determines whether the minimum compressor running time set on operating line 2842 shall be observed if the heat request becomes invalid prematurely:

No
The minimum compressor running time is **not** taken into consideration. When there are no more requests for heat, the compressor is switched off.

Yes
The minimum compressor running time is also observed when there are no more requests for heat.

When using this setting, the plant must de designed such that the heat produced can also be dissipated when the consumer is not in operation (e.g. buffer storage tank).

Compressor run time min

To prevent the compressor from getting damaged due to too frequent cycling, it always operates for at least the period of time set here, each time it is switched on.

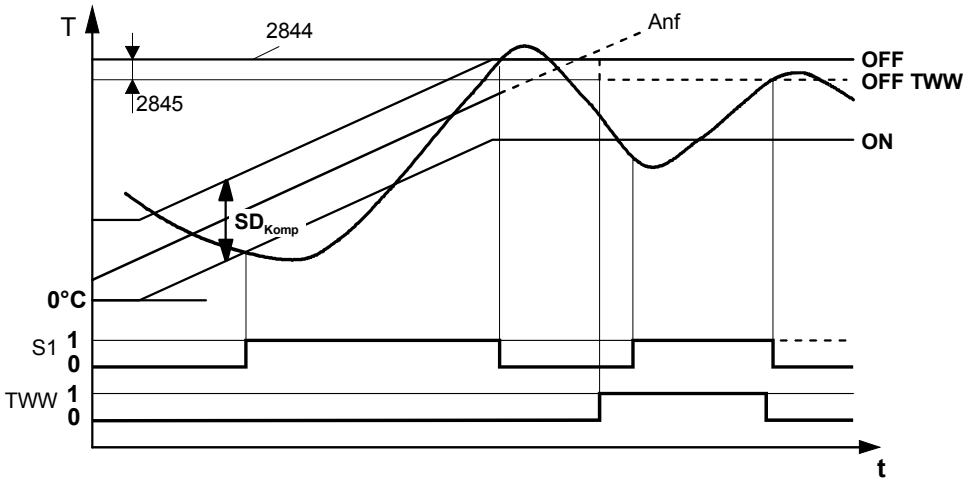
Compressor off time min

For the same reason, the compressor remains 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 is switched off.

The heat pump is switched on again when the temperature at both sensors (B21 and B71) drops by the "Switching diff return temp" (line 2840) below the maximum switch-off temperature while the minimum off time has elapsed.



2844	Switch-off temp max
2845	Red switch-off temp max
Anf	Temperature request from consumers
SD_{Komp}	Switching differential compressor
ON	Switch-on point
OFF	Switch-off point
OFF DHW	Switch-off point DHW
S1	Stage 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" (line 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 the heating circuits call for heat.

In this case, the heat pump continues to operate with no interruption. During a settling time of 2.5 minutes and after abortion of DHW charging, the heating circuit's setpoint is not taken into consideration. This means that the compressor remains in operation, regardless of the return temperature, enabling the heat pump to settle at the new temperature level.

If an electric immersion heater is installed in the DHW storage tank, it ends DHW charging and the heat pump is immediately made available for space heating. If an electric immersion heater is only installed in the flow and parameter "Use electric flow" (line 2880) is **not** set to "Substitute", DHW charging is ended.
The compressor remains locked during this time.

If an electric immersion heater is not available, DHW charging is aborted.

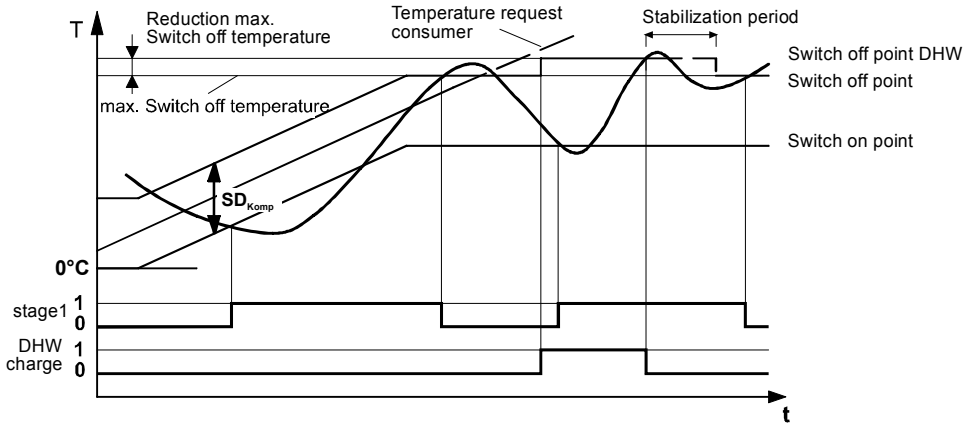
Parameter "Number DHW charg attempts" (line 2893) can be used to set the number of attempts the heat pump shall make until storage tank charging is aborted or ended by an electric immersion heater.

If there is no request for heat from space heating, the heat pump is shut down.
It can only be put back into operation when the minimum off time ("Compressor off time min", line 2843) has elapsed, provided the flow or return temperature (B21/B71) dropped by the amount of the adjustable switching differential ("Switching diff return temp", line 2840) below the reduced maximum switch-off temperature.

If a negative value is set for the reduction, the maximum switch-off temperature is increased by the parameterized negative reduction during the time DHW is charged. If the flow reaches the increased switch-off temperature, DHW charging is aborted.

The compressor continues to operate if space heating calls for heat. The flow temperature is not monitored during the settling time. On completion of the settling time, the compressor is switched off when the maximum switch-off temperature is reached.

Maximum switch-off temperature with negative reduction



Behavior of Q9 with buffer storage tank at the maximum switch-off temperature

If, due to "Switch-off temp max" (line 2844), the heat pump had to shut down and a new start is made, condenser pump Q9 is put into operation first and then the compressor, whenever the following criteria are satisfied:

- The minimum off time ("Compressor off time min", line 2843) has elapsed
- The temperature at sensor B21 or B4 dropped by the switching differential (line 2840)
- A request for heat is pending
- The buffer storage tank has not yet reached the setpoint

The heat pump remains in operation until the buffer storage tank is charged or "Switch-off temp max" has again been reached.

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.

Electric immersion heater in the flow

Relays K25 and K26 are used for an electric immersion heater installed in the flow. They are controlled via 2 appropriately configured multifunctional relay outputs QX1...QX6.

If both relays are available, 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 K.

If the flow temperature sensor is missing, but a common flow temperature sensor (B10) is available, that sensor is used for the control.

If no flow temperature sensor is available, 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" (line 2840).

During an electrical utility lock, the electric immersion heaters installed in the flow are locked also.

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

Use and control of the electric immersion heater can be parameterized:

Substitute

The electric immersion heater is only used in emergency situations (parameters 7141 and 7142) when the temperature drops below the minimum source temperature (parameters 2815 and 2816), or when outside the operating limits of air-to-water heat pumps (parameters 2812 and 2813).

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" (line 2881) and "Release el flow below OT" (line 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. When using 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 be provided by an external thermostat.

Complem operation HC, DHW, HC+DHW

If the electric immersion heater installed in the flow is released for support of the heat pump (complementing the compressor), the time entered via "Locking time electric flow" (parameter 2881) starts to run as soon as the compressor is switched on. When the locking time has elapsed, calculation of the release integral is started (parameter 2882). When the release integral has elapsed, the electric immersion heater is released **in addition** to the compressor, for heating only, for DHW charge only, or for both, depending on the selection made. In this case, the electric immersion heaters act like additional stages.

End DHW charging

During heating mode and DHW charging, the electric immersion heater is locked.

Exception: If, during DHW charging, the compressor must be switched off due to the maximum switch-off temperature, high-pressure or hot-gas problems, the electric immersion heater ensures DHW charging as soon as the number of charging attempts exceeds the set "Number DHW charg attempts".

- Parameters "Locking time electric flow" and "Release el flow below OT" have no impact
- In the case of a 3-stage electric immersion heater (K25 and K26 parameterized), both relays are energized simultaneously
- If the electric immersion heater is parameterized as "End DHW charging", it is also released in the cases described under "Substitute"

Emergency operation
The electric immersion heater is only used in emergency situations. The electric immersion heater is released immediately and controls to the current setpoint.

- Parameters "Locking time electric flow" and "Release el flow below OT" have no impact
- For activation of emergency operation, refer to "Emergency operation" (parameter 7141)

Legionella function
Behavior like "End DHW charging", but only when the "Legionella" function is active.

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 temperatures (see "T'limit source temp min brine", line 2822)

If the flow switch on the consumer side trips, or if the water pressure is too low, the electric immersion heater is 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.

The locking time is considered only if the electric immersion heater is used for "Complementary operation" (parameter 2880). It is not taken into consideration when using the "Substitute" setting.

Release integr electric flow

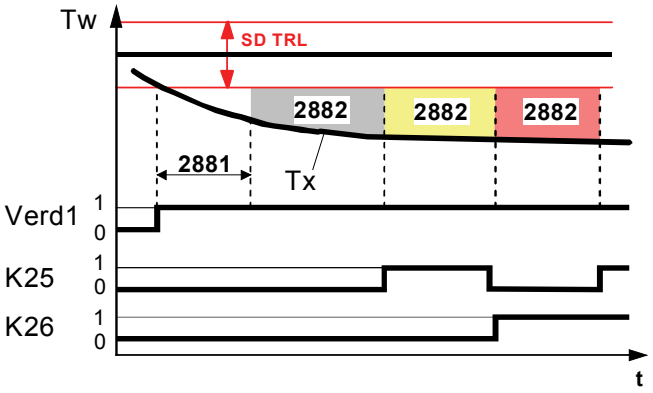
When using a 2- or 3-stage electric immersion heater, the stages are released in accordance with the release and the reset integral (lines 2882 and 2883).

Release integral with setting 2880: "Substitute"
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. When the value of the integral reaches the set maximum ("Release integr electric flow", line 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 (line 2882), the third stage of the electric immersion heater is released (K25 fixed on, and K26 controls).

Release integral with setting 2880: "Complem operation HC, DHW, HC+DHW"
When "Locking time electric flow" has elapsed, 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 value 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
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 surplus heat, if available – starts to compute the reset integral.

The next lower stage is switched off when surplus heat reaches the set reset integral (line 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 a "complement" to heat pump operation" (line 2880). When using the "Substitute" setting, the electric immersion heater is always released.

Line no.	*Operating line*
2886	**Compensation heat deficit** Off ¦ On ¦ Only with floor curing fct
2893	**Number DHW charg attempts**
2894	**Delay mains fault**
2895	**Delay flow switch**
2908	**OT limit with DHW charging**
2909	**Release below outside temp**
2910	**Release above outside temp**
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 the surplus 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 surplus heat/heat deficits, the controller displays an appropriate status message.

This function is not active during the time the DHW storage tank is charged.
The function is not active either in the case of plants with buffer/(combi) storage tanks.

"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 are cleared.

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 (factory setting). If the current temperature lies at least 2 K below the required setpoint, the heat pump is immediately switched on.

If compensation of surplus heat/heat deficits shall act "Only with floor curing fct", the respective setting must be selected. This means that the parameter is deactivated in normal heating mode.

Calculation of integral

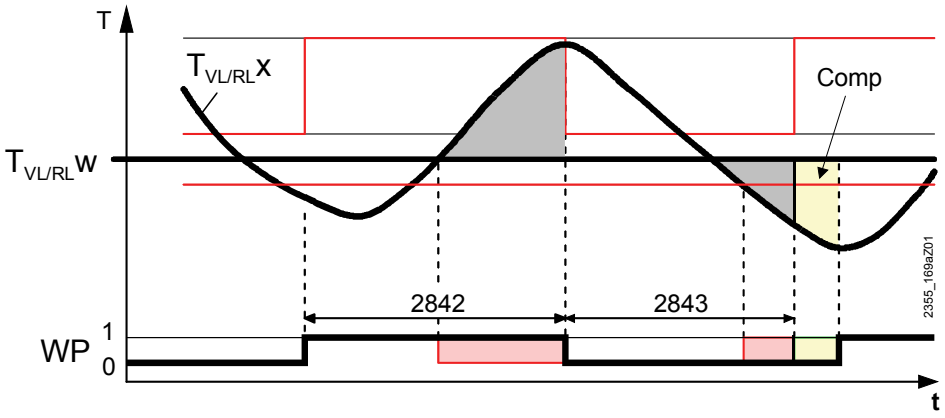
- If a flow temperature sensor (B21) is connected and the heating curve is set to the flow temperature setpoint, the controller uses the flow temperature and the flow temperature setpoint for computing the integrals
- If sensor B21 is not installed and the compressor does not operate, the temperature at the return sensor (B71) is used and, when the compressor runs, the temperature at sensor B71 plus parameter "Req temp diff condenser" (line 2805)
- If the heating curves are set to the return (line 5810), the return temperature sensor (B71) and the return temperature setpoint are used for computing 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 heat pump 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
- The function is deactivated

With active DHW charging, the integral value is frozen.

In the following example of compensation, surplus heat occurs during the minimum compressor on time. This surplus 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 surplus heat resulting from running time

Number DHW charg attempts

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

Heat pump protection during DHW charging

The heat pump is switched off, when the high-pressure switch trips during DHW charging or because the hot-gas or flow temperature approaches its maximum value.

Parameter "Number DHW charg attempts" (parameter 2893) is used to select whether charging is aborted immediately 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 ("Compressor off time min", Parameter 2843) 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 is aborted, the controller stores the current DHW temperature and readjusts the switch-on point to the DHW temperature minus the DHW switching differential. With diagnostics, the stored temperature appears on the display as "Curr DHW charg temp HP" (parameter 7093). The value is maintained until – due to a limitation – the heat pump is again forced to abort DHW charging.

If "Curr DHW charg temp HP" lies below the adjustable value "DHW charg temp HP min" (parameter 7092), a maintenance message appears.
If the "Reduced" setpoint lies below "DHW charg temp HP min" and the heat pump can end DHW charging, the controller does not deliver a maintenance message.

Delay mains fault

The compressor is switched off if the mains fault is constantly present for the period of time set here. When "Min off time" has elapsed, 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 initiates lockout, provided 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. When "Min off time" has elapsed, 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 is exceeded.

OT limit with DHW charging

Ignore / Note of parameters 2909 and 2910 (see description below) with DHW charging.

Release below outside temp/above outside temperatureWhen the composite outside temperature lies below or above the set temperature, the heat pump may be put into operation. This setting makes possible alternative operation with other heat sources.
The release also applies to active cooling mode.

With DHW charging, the effect of locking can be canceled.

For forced buffer charging

Using function "For forced buffer charging", forced charging of the storage tank can be demanded, independent of the request (e.g. during low-tariff periods).

If the heat pump is released via parameter "For forced buffer charging", it is switched on while forced storage tank charging is pending. In that case, the minimum off time ("Compressor off time min", line 2843) and any active "Minimum running time" of the heat pump are adhered to.

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

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

Full charging buffer

"Full charging buffer" only applies to heating mode. It takes effect when, due to the "Automatic generation lock", the resulting request from the storage tank is dropped. Full charging can extend the heat pump's running time.

The heat pump contributes to full charging only if it is in operation and the function is activated via parameter "Full charging buffer". In that case, the heat pump's "Minimum running time" is adhered to.

Off
The heat pump remains locked until the buffer storage tank is fully charged by some other heat source. It is released only when the current demand for heat cannot be satisfied ("Auto generation lock", line 4720).

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

Defrosting

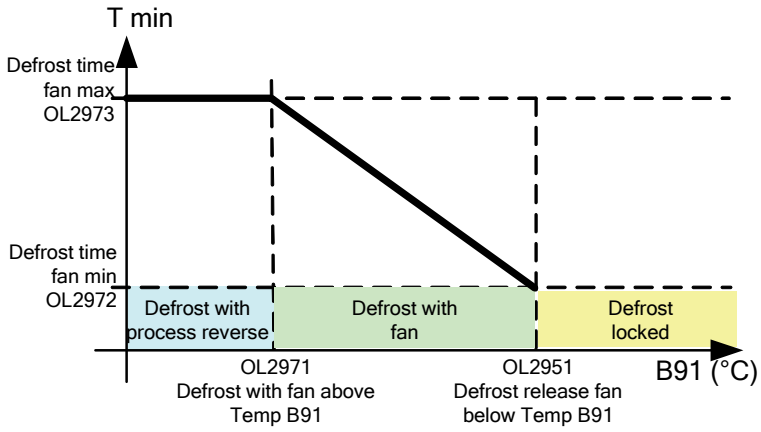
"Defrost" function for air-to-water heat pumpsDefrosting of an evaporator is effected either with the fan or the compressor by reversing the process – depending on the outside temperature:

- Above the set outside air temperature (parameter 2971, OEM) via the **fan (passive defrosting)**
- Below the set outside air temperature (parameter 2971, OEM) by **process reversal (active defrosting)**

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

Explanation

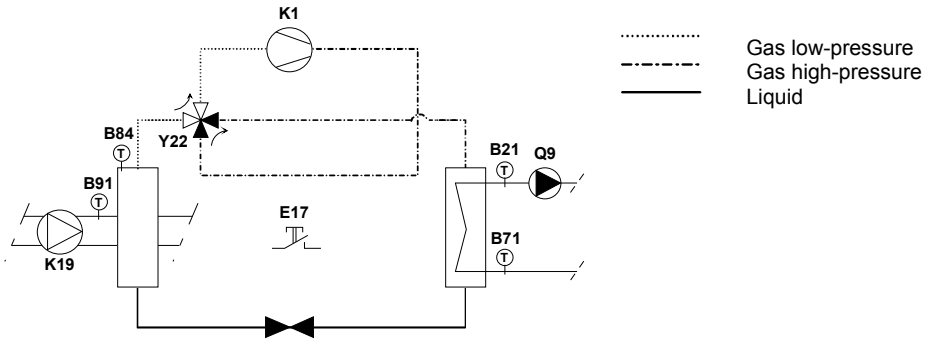
Up to the set outside temperature at B91, "Defrost fan above" (parameter 2971, OEM), defrosting takes place via the fan. If the outside temperature falls below this level, defrosting is effected by reversing the process with the help of the compressor. If the 2 parameters 2971, "Defrost fan above", and 2951, "Defrost release below OT", are set to the same value, defrosting is started directly with active defrosting "Defrost with process revers".



2951	Defrost release below OT
2971, OEM	Defrost fan above
2972, OEM	Defrost time fan min
2973, OEM	Defrost time fan max

Plant in heating mode

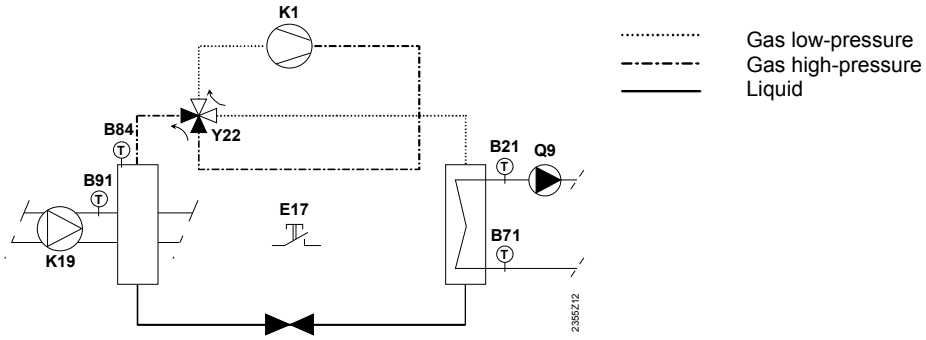
In normal heating mode of an air-to-water heat pump, condensation can occur at low temperatures, causing the evaporator to ice up. This reduces the heat pump's output and can lead to malfunction on the low-pressure side or even damage to the evaporator.



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 is kept at a minimum. During the defrost process with process reversal, the fan remains deactivated.

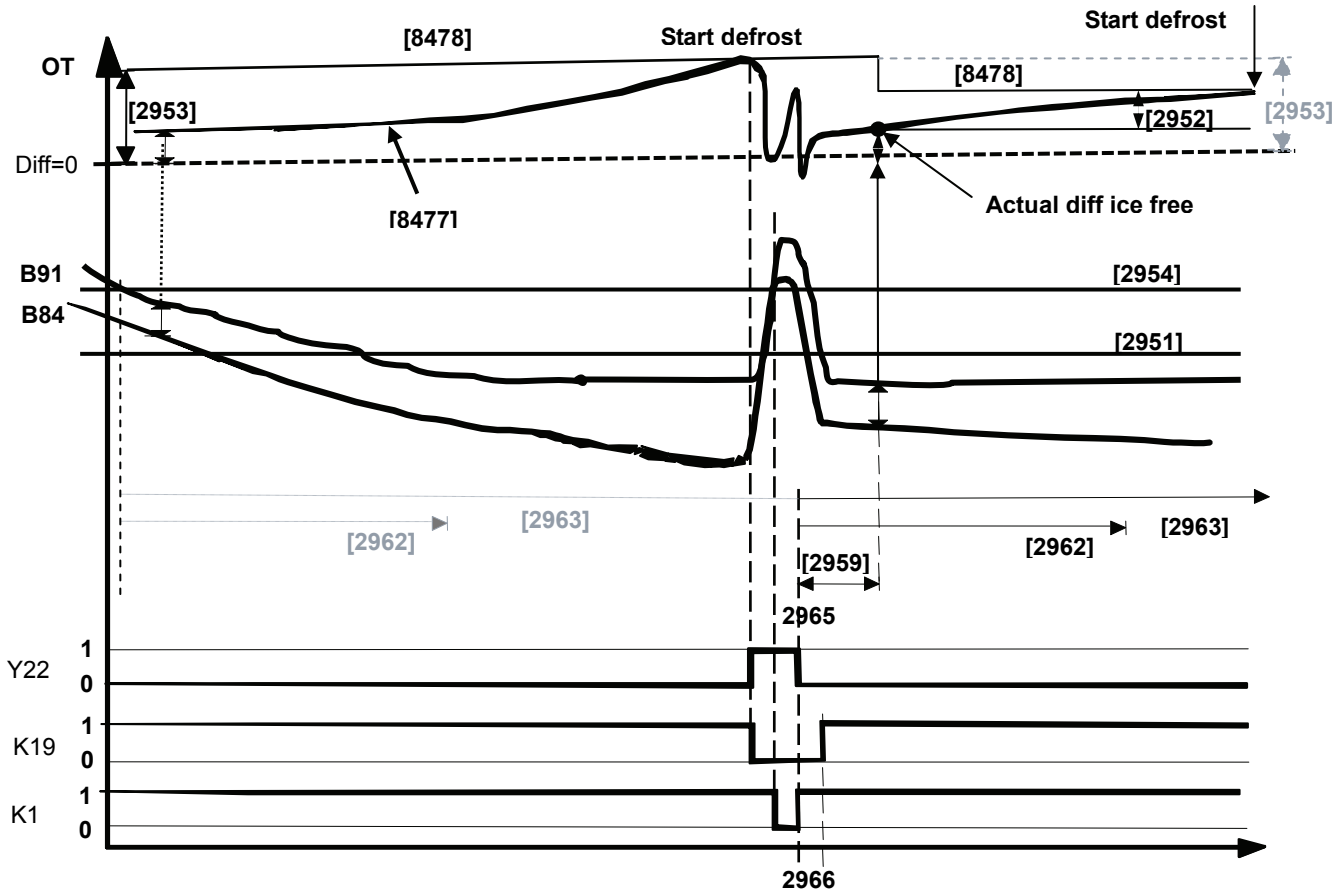


Automatic "Defrost" function

When the compressor is in operation, "Duration defrost lock" (line 2962) and "Time up to forced defrost" (line 2963) elapse. If the source temperature (B91) drops below the defrost release temperature ("Defrost release below OT", line 2951), the "Defrost" function is released.

The heat pump can switch to "Defrost" mode after "Duration defrost lock" at the earliest, and on completion of "Time up to forced defrost" (line 2963) at the latest.

If, due to icing during this period of time, "Temp diff defrost act value" (line 8477) between the incoming outside air (B91) and the evaporator (B84) exceeds the setpoint ("Temp diff defrost setpoint", line 8478), the "Defrost" function is activated.



B91	Source inlet temperature	2951	Defrost release below OT
B84	Evaporator temperature	2952 OEM	Swi diff defrost
Y22	Process reversing valve	2953 OEM	Temp diff defrost max
K19	Fan source inlet	2954 OEM	Evapor temp defrost end
K1	Compressor	2959 OEM	Defrost settling time
		2962	Duration defrost lock
		2963	Time up to forced defrost
		2965	Dripping time evapor
		2966 OEM	Cooling down time evapor
		8477	Temp diff defrost act value
		8478	Temp diff defrost setpoint

End of defrosting when defrosting through process reversal

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

End of defrosting when defrosting with the fan

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

- The temperature differential ("Temp diff defrost act value", line 8477) between incoming outside air (B91) and evaporator (B84) is smaller than that set by the supplier
- When defrosting with the fan, the defrost time is reached

The defrost process at low outside temperatures takes longer than at higher outside temperatures.

Starting heating mode and preparing for the next defrost process

Heating mode is resumed after successful completion of the defrost process through process reversal or with the fan. "Duration defrost lock", "Time up to forced defrost", and "Defrost settling time" (line 2959, OEM) are restarted.

When "Defrost settling time" (line 2959, OEM) has elapsed, "Temp diff defrost icefree" is acquired and used to generate the new setpoint ("Temp diff defrost setpoint", line 8478).

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

Manual defrost

Defrosting by reversing the process can also be effected manually, either via input EX1...EX7 or "Triggering defrost" (parameter 7152). When defrosting manually, no consideration is given to "Defrost release below OT" (line 2951) and "Duration defrost lock" (line 2962).

Manual defrosting is also possible during "Duration defrost lock" and above "Defrost release below OT" (line 2951). A "Defrost" function in progress is completed independently of "Defrost release below OT".

Line no.	*Operating line*
2951	**Defrost release below OT**
2958	**Max num defrost repetitions**
2962	**Duration defrost lock**
2963	**Time up to forced defrost**
2964	**Defrost time max**
2965	**Dripping time evapor**
2969	**Defrost with DHW charging**

Defrost release below OT

The "Defrost" function can be released only when the current source inlet temperature (B91) lies below the release temperature set here. Above this outside temperature, the automatic "Defrost" function is not active (locked when B91 > line 2952 + 1 K).

Max num defrost repetitions

If the defrost process could not be successfully completed, another attempt is made after a preheating phase (see "Duration defrost lock"). If it is still not possible to normally end the defrost process after the number of attempts set here, the heat pump is switched off and an error message is delivered (error 247:Defrost fault).

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" is started. 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 (line 2951).

After a prematurely aborted defrost 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 – with no defrosting – forced defrosting is activated.

The same prerequisite applies here: The source temperature (B91) must lie below the set release temperature (line 2951).

Defrost time max

If, in the case of defrosting via process reversal, it was not possible to successfully defrost the evaporator during "Defrost time max", or based on the minimum temperature in the condenser circuit (line 2970, OEM), 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 "Max num defrost repetitions" (line 958).

Dripping time evapor

Before the heat pump is allowed to resume heating mode after successfully defrosting via 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 when the delay time preset by the supplier has elapsed.

Defrost with DHW charging

If defrosting during DHW charging is required, the following choices are available:

Automatically
Based on the return temperature, the decision is made whether defrosting can be effected during DHW heating or whether changeover to the heating circuit is required.

DHW
DHW charging will not be interrupted.

Heating circuit
DHW charging will be interrupted during the defrost process. If required, the heating circuit pumps are put into operation for defrosting.

Heating circ, delay defrost
DHW charging is interrupted during the defrost process. First, the change to heating mode is made, then, "Defrost settling time" (line 2959, OEM) must elapse, only then is the defrost process started. On completion of the defrost process, the "Defrost settling time" must elapse, then, DHW charging is resumed.

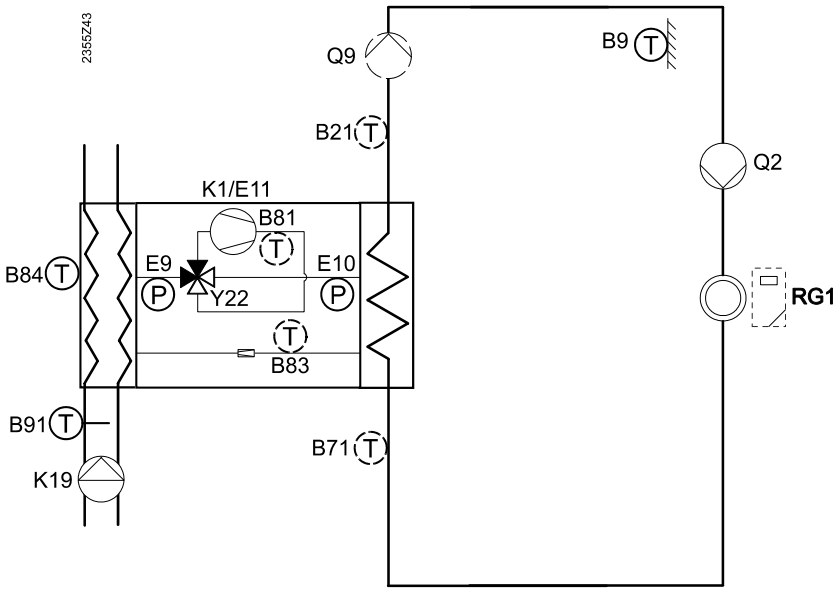
If a DHW request is received while the defrost process is already in progress, the change to DHW charging is only made when the defrost process is ended.

Active cooling

With 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 1" (line 5711) and "Refrigeration" (line 5807) can be in the form of a 2- or 4-pipe system.

Plant example

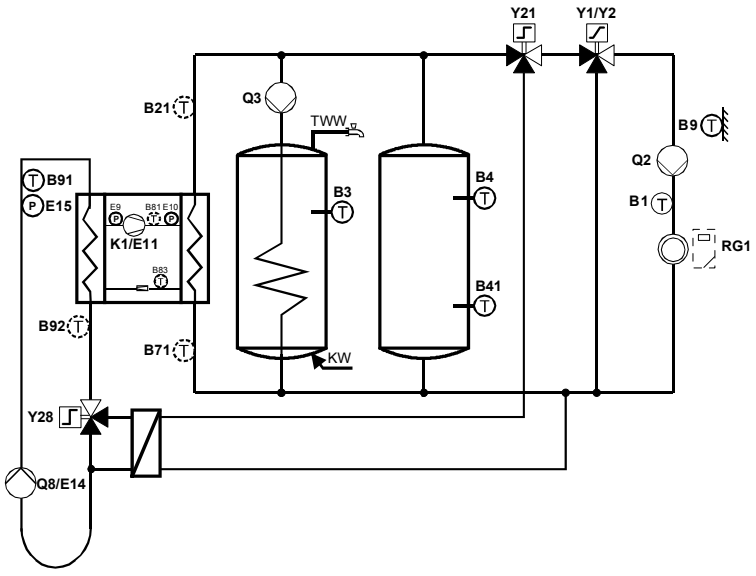


Passive cooling
with brine-to-water or water-to-water heat pump

In the case of passive cooling, cooling is effected 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" (line 5711) and "Refrigeration" (line 5807) must 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.

Plant 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 request for cooling, 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 parameter setting examples show heat pump plant diagrams that make possible automatic changeover between active and passive cooling.

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

For the passively produced cooling energy, parameter "During compressor operation" (line 3006) can be used to select indirectly the common flow to be used for delivering the cooling energy to the consumers:

"Passive cooling off" during compressor operation
Passive cooling is effected via the common heating/cooling flow.
If a DHW request is pending, it is satisfied by the heat pump via the common heating/cooling flow. If there is a refrigeration request pending at the same time, it cannot be satisfied.

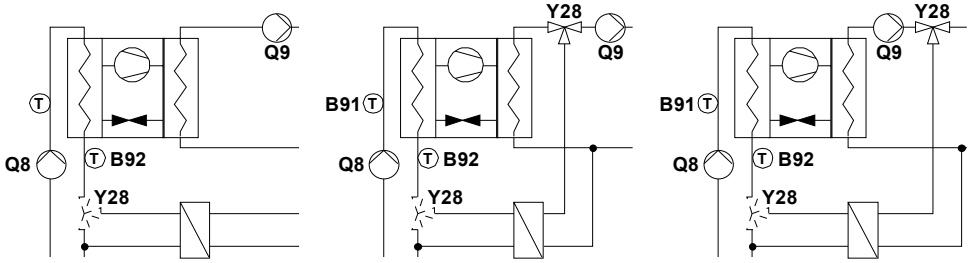
"Passive cooling on" during compressor operation
Passive cooling is effected via the common cooling flow. If there is a DHW request, it is satisfied by the heat pump via the heating / cooling pipe. If there is a refrigeration request pending at the same time, it can simultaneously be satisfied via the common cooling flow.

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

Prerequisites for the 3 examples:

- Setting "Heat source" (line 5800) must read "Brine" or "Water"
- Setting "Refrigeration" (line 5807) must read "4-pipe system cooling"

Passive cooling via the ...

	common cooling flow	*common heating/cooling flow*	*common heating/cooling flow*
			
"During compressor operation*" (line 3006):*	Passive cooling on	Passive cooling off	Passive cooling off
"In passive cooling mode*" (line 3007:)*	Condenser pump off	Condenser pump on	Condenser pump off
"Cooling circuit 1" (line 5711):	4-pipe system cooling	2-pipe system cooling	2-pipe system cooling

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 already 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 ("Compressor off time min", line 2843).

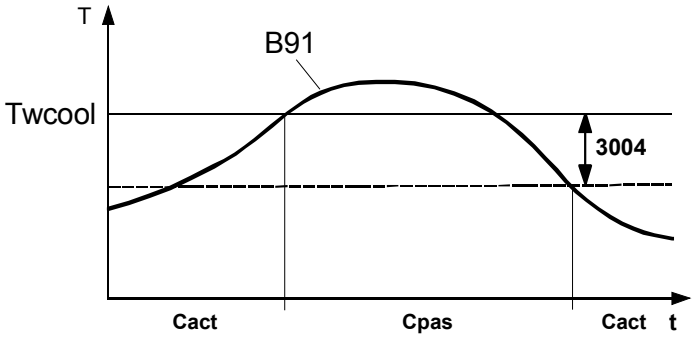
This function is only active in the case of active cooling. It has no impact with passive cooling. For more information about active/passive cooling, refer to chapter "Cooling circuit" .

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 are locked until the source outlet temperature exceeds the minimum temperature by 1 K.

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.



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

During compressor operation

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

Defines the behavior 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.

Temp diff cond 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 set here.

If the setting is "0", the cooling curve in plants with return temperature control must be based on the return (plants with pump heating circuits and without buffer or combi storage tanks).

Output control fan

Line no.	*Operating line*
3025	**Silent mode speed max**
3026	**Silent mode on**
3027	**Silent mode off**
3028	**Silent mode speed incr start**
3029	**Silent mode speed incr end**

"Silent mode" serves for reducing noise by limiting the fan's speed during certain daylight or night hours. The limitation acts in all fan speed control modes and all heat pump operating modes.

What can be parameterized is a switch-on and a switch-off point and the possibility to appropriately adjust the "Silent mode" at low outside temperatures.

Silent mode speed max

During a set time window (typically at night), the maximum fan speed is limited to the set value. If no maximum speed for "Silent mode" is parameterized, the function is deactivated.

Silent mode on/off

A start and end time defines the time window for "Silent mode". Within this period of time, the fan's speed will not exceed the set maximum level.

Silent mode speed incr start/end

At low outside temperatures, the limitation can be canceled. If the outside temperature drops below the level set for the start of the increase, the maximum speed is raised in a linear manner to reach the initial value at the end of the increase (without "Silent mode").

The increase can be deactivated.

If the outside temperature (B9) is not available, the source inlet temperature (B91) is used to calculate the increase.

Sensor calibration

The "Sensor calibration" function can be used to readjust the 2 heat pump sensors B21 (flow) and B71 (return) with the following parameters and to calibrate them against one another.

If the temperature differential of flow and return sensor is used to determine the energy delivered, the sensors must be calibrated against one another due to the relative large sensor tolerances. The calibration must be made on the sensors currently used in the plant.

If possible, the sensors should be calibrated at a temperature level of between 20 °C and 40 °C. The deviation of both sensors and the required readjustment should normally be <1 K and should not exceed 2 K.

Line no.	*Operating line*
3030	**Auto readj HP cond sensor**
3031	**Readj HP flow sensor**
3032	**Readj HP return sensor**
3033	**Readj status**

Automatic readjustment

Automatic readjustment ensures that with the same temperatures at the flow and return sensor, the values used for the control and the calculation of the yearly performance factor are the same. A calibration using absolute temperatures is not done.

Both sensor elements must be brought to the same temperature before making the automatic readjustment.

Auto readj HP cond sensor

Now
Setting "Now" triggers automatic sensor readjustment instantly. During the calibration, "Readj HP flow sensor" is set based on the temperature differential acquired between flow and return sensor.

$$T_{readjB21} = T_{readjB71} + (T_{B71} - T_{B21})$$

For the calibration to be made, the temperature at both sensor values must lie between 5 °C and 50 °C, the difference being a maximum of 3 K.

After pump prerun
If "After pump prerun" is selected, condensor pump Q9 is first switched on for 8 minutes, followed by the calibration.

The controller automatically activates function "Relay test Q9" to switch on the condensor pump. For this reason, the key symbol and special operating mode "Output test" are displayed during this time. The prerun time cannot be adjusted.

The readjustment can be immediately enforced at any time during pump prerun by selecting "Now". "Off″ aborts the prerun without readjustment.

If a calibration at absolute temperatures is required, return temperature sensor B71 must be calibrated manually before making the automatic readjustment. The readjusted value of the return temperature sensor is not changed for automatic readjustment.

Readj HP flow sensor/ return sensor

Using 2 separate parameters (3031 for the flow and 3032 for the return), the temperatures acquired by sensors B21 and B71 can be manually readjusted by a maximum of ±20 K.

Menu "Input/output test" is used to show the acquired sensor values without readjustment. The readjusted temperature values used for the control are displayed by menu "Diagnostics heat generation".

Readj status (status display)

The readjustment state is displayed on the room unit/HMI directly by the readjustment parameters for the flow and the return sensor (double display). The ACS service tool displays the state on a separate operating line. The readjustment state is maintained even after power down.

Not readjusted
The values were not readjusted, neither manually nor automatically, or automatic readjustment was aborted or did not work.

Manually readjusted
At least one of the readjustment values was changed via operation.

Automatically readjusted
The sensors were calibrated using automatic sensor readjustment. The readjustment values were not changed anymore afterwards.

Readjustment running
Pump prerun was started for automatic sensor readjustment. The readjustment has not yet been made.

6.10 Energy meters

The controller can meter and display both the (electrical) energy input and the energy delivered (produced).

This way, information on the plant's efficiency (performance factor) can be provided.

The Hx inputs offer the following choice of functions:

- Pulse count; connection of externally installed electricity, gas, heat or flow meters
- Flow measurement; connection of flow sensors delivering voltage (10 V) or frequency signals (Hz)
- Temperature measurement; connection of temperature sensors delivering voltage signals (10 V)

The availability of the functions at the respective inputs is as follows:

Inputs	*H1/H3*		*H31/H32*		*H2*	*H33*	*H21*	*H22*
Pulse count	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Flow measurement 10 V	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flow measurement Hz	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Temperature measurement 10 V	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

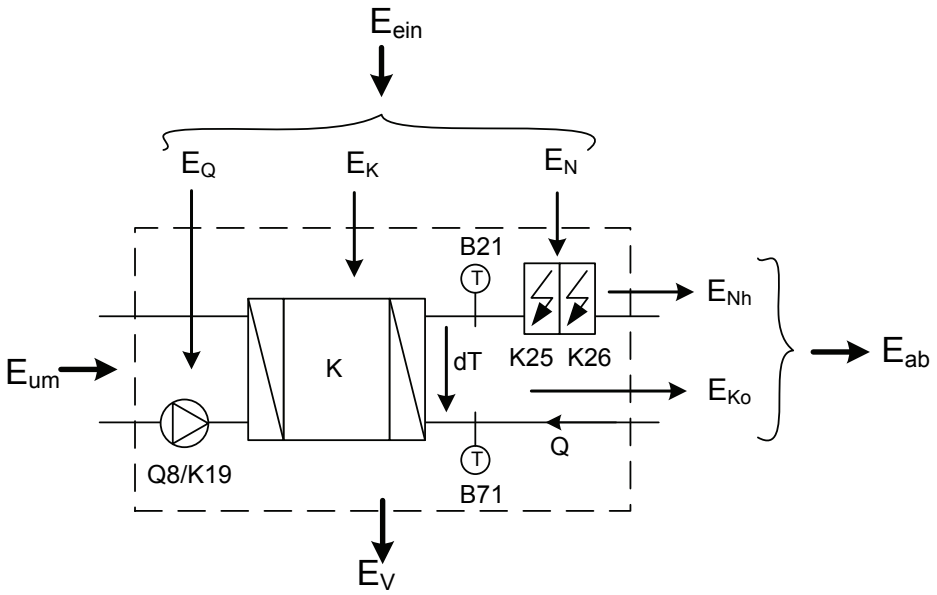
The double inputs H1/H3 and H31/H32 were conceived such that they are especially suited for use with electronic sensors for combined flow/temperature measurement and 2 voltage outputs.

In addition, 2 outputs (GX1) are available for powering the sensor (5 V or 12 V selectable, refer to line 6358).

H1	M	H3	GX1		H31	M	H32	GX1

The heat pump's flow and return temperatures are acquired either via temperature measurement at one of the Hx inputs or via the resistance temperature sensors connected to Bx.

The functionality implemented in the controller, employed for acquiring the energy input/energy delivered and for calculating the yearly performance factor is shown by the following model:



Eein	Energy input (E_Q + E_K + E_N)
Eab	Energy/heat delivered for space and DHW heating (ENh + EKo)
E_{um}	Energy captured from the environment (geothermal heat, ground water, air)
E_v	Technical losses
E_Q	Energy used to operate the source (pump/fan)
E_K	Energy used to operate the compressor (electricity or gas)
E_N	Electrical energy used to operate the electric immersion heaters K25/K26
E_{Nh}	Energy/heat delivered by the electric immersion heaters K25/K26
E_{Ko}	Energy/heat delivered by the condenser (dT x Q)
Q8	Brine-to-water heat pump
K19	Fan (air-to-water heat pumps)
K25	Electric immersion heater 1 – flow
K26	Electric immersion heater 2 – flow
B21	Flow sensor
B71	Return sensor
Q	Flow through the condensor
dT	Temperature differential across the condenser (B21 - B71)

To acquire the energy flows depicted above, the controller provides the following functions:

E_Q Calculation of the electrical energy to operate the source pump or fan via adjustable output parameter [kW] and the effective running time.

E_K Metering the electrical energy [kWh] to operate the compressor with an **external electricity meter** and connection to the pulse count input,

or

Metering the gas volume flow [m3] with an **external gas meter** and connection to the pulse count input. Calculation of the gas energy required to operate the compressor, based on the adjustable mean gas energy content [kWh/m3].

E_N Decision whether the thermal energy delivered (ENh) by the electric immersion heater shall also be regarded and metered as electrical energy input (EN = ENh).

Eein Metering the total amount of electrical energy [kWh] required to operate the system (compressor, source and electric immersion heater) with an **external electricity meter** and connection to the pulse count input,

or

Adding the calculated energy required to operate the source and the electric immersion heater to the metered energy required to operate the compressor ($E_Q + E_N + E_K$).

E_{Nh} Calculation of the thermal energy delivered by the electric immersion heaters via adjustable output parameters [kW] and the effective operating time.

E_{Ko} Metering the flow through the condenser [l] with an **external flow meter** and connection to the pulse count input, or metering the volume flow [l/min] with an **external flow meter** and connection to the metering input.
Measuring the temperature differential of heat pump flow (B21) and return (B71) and calculation of the amount of heat delivered,

or

Calculation of the flow through the condenser via adjustable pump flow rate [l/h] and effective running time/speed.
Measuring the temperature differential of heat pump flow (B21) and return (B71) and calculation of the amount of heat delivered.

E_{ab} With external heat meter:
Metering the thermal energy [kWh] via the pulse count input,

or

Adding the calculated/metered amounts of thermal energy of the electric immersion heater and the condenser ($E_{Nh} + E_{Ko}$).

E_{um} Not acquired.

E_v Not acquired.

Pulse count

Line no.	*Operating line*
3090	**Pulse count heat** None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

Pulse count heat

Parameter "Pulse count heat" is used to select the Hx input for metering the amount of heat or the flow of water:

None
No metering via input Hx. This setting is important if the inputs are used for other pulse counts.

With input Hx
The pulse counter is read via the selected input and the energy determined from it is added to the reading of the meter used for metering the heat delivered.

It is important that the count input selected here is set in the configuration for the pulse count as well.

Line no.	Operating line
3092	**Pulse unit heat** None ¦ kWh ¦ Liter
3093	**Pulse value heat numer**
3094	**Pulse value heat denom**

Pulse unit and value

The value of a pulse is entered with 3 setting parameters as a quotient (nominator and denominator) and the physical unit:

Pulse unit heat = kWh
The pulses or their energy values are added directly to the reading of the meter used for metering the heat delivered.

Pulse unit heat = liter
Using the pulses or their volume value, the acquired temperature differential of flow and return plus the specific heat capacity of water, the thermal energy is calculated and then added to the reading of the meter used for metering the heat delivered.

Pulse valency = (numerator/denominator) * unit

Example 1

Pulse value heat numerator = 10
Pulse value heat denominator = 1
Pulse unit heat = liter

➔ Pulse valency = 10 liters/pulse

Example 2

Pulse value heat numerator = 1
Pulse value heat denominator = 1
Pulse unit heat = kWh

➔ Pulse valency = 1 pulse/kWh

Flow measurement 10 V/Hz

Line no.	Operating line
3095	**Flow measurement heat** None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

In place of using the pulse count, the flow can also be measured with a flow sensor (10 V or Hz) connected to an Hx input.

Flow measurement heat

Parameter "Flow measurement heat" is used to select the Hx input for making the flow measurements:

None
No metering at input Hx. This setting is important if the inputs are used for making other flow measurements (e.g. solar yield).

With input Hx
The flow via the selected input is acquired and used for calculating the volume. The determined volume is multiplied by the acquired temperature differential and the specific heat capacity of water, and then added as thermal energy to the reading of the meter used for metering the heat delivered.

The Hx input selected here must be set in the configuration for flow measurement (10 V or Hz).

Calculation of flow

Line no.	Operating line
3097	**Flow heating**
3098	**Flow DHW**

Flow heating
Flow DHW

In place of flow measurement or the pulse count, volume calculation can be used. Based on the adjustable volume flow, running time and speed, this function calculates the theoretical flow through the condenser.

Volume [l] = running time [min]/60 * speed [%] * volume flow [l/h]

The volume flow can be set separately for heating mode and DHW heating.

The running time is acquired with an accuracy of 1 minute. In heating mode, the state of condenser pump Q9 is acquired, in DHW heating mode, the state of charging pump/diverting valve Q3.

The calculated volume is multiplied by the acquired temperature differential and the specific heat capacity of water, and then added as thermal energy to the reading of the meter used for metering the heat delivered.

Using this function and the acquired temperature differential, the amount of thermal energy delivered can be acquired without having to install a heat meter.

The temperature differential is only acquired for heat flow (dT>0). In the case of negative differential values (cooling flow), dT is limited to "0". This means that the calculated amount of thermal energy delivered is zero as well, meaning that cooling flow is never metered.
To ensure sufficient accuracy for the temperature differential, we recommend to calibrate sensors B21 and B71 relative to one another.

If the thermal energy shall not be metered through volume calculation, the function must be deactivated via both parameters ("---").

Energy meters electricity/gas

Line no.	Operating line
3100	**Pulse count energy** None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

Pulse count energy

Parameter "Pulse count energy" is used to select the Hx input for metering the electrical energy or the flow of gas:

None
No metering at input Hx. This setting is important if the inputs are used for other pulse counts.

With input Hx
The pulse counter is read by the selected input and the energy determined from it (electricity or natural gas) is added to the reading of the meter used for metering the energy input.

The Hx input selected here must be set in the configuration for the pulse count.

Pulse unit and value

Line no.	*Operating line*
3102	**Pulse unit energy**
3103	**Pulse value energy numer**
3104	**Pulse value energy denom**

The value of a pulse is entered with 3 setting parameters as a quotient (nominator and denominator) and the physical unit:

Pulse valency = (numerator/denominator) * unit

Example 1

Pulse value energy numerator = 1
Pulse value energy denominator = 100
Pulse unit energy = m3

➔ Pulse valency = 0.01 m3/pulse (or 100 pulses/m3)

Example 2

Pulse value energy numerator = 1
Pulse value energy denominator = 100
Pulse unit energy = kWh

➔ Pulse valency = 100 pulses/kWh (or 0.01 kWh/pulse)

Pulse unit energy = kWh
The pulses or their energy values are added directly to the reading of the meter used for metering the energy input.

Pulse unit energy = m3
Using the pulses or their volume value and the mean gas energy content, the gas energy is calculated and then added to the meter used for metering the energy input.

Line no.	*Operating line*
3106	**Mean gas energy content**

Gas energy contentIf the pulse count is parameterized for volume (pulse unit energy = m3), the gas energy input is calculated based on the metered volume and the adjustable mean gas energy content:

Gas energy [kWh] = volume [m3] * Mean gas energy content [kWh/m3]

The value of the gas energy is then added to the reading of the meter used for metering the energy input.

Line no.	*Operating line*
3108	**Electrical source output**

Electrical source output

Based on the adjustable electrical source output, the running time and speed, this function calculates the electrical energy theoretically required to operate the source (pump/fan):

Source operation [kWh] = running time [min]/60 * speed [%] * Electrical source output [kW]

The running time is acquired with an accuracy of 1 minute. Acquired is the state of source pump Q8 or fan K19.

The energy determined for source operation is added to the reading of the meter used for metering the energy input.

If source energy metering is not desired, the function must be deactivated via the output parameter ("---").

Line no.	Operating line
3109	**Int count el imm heater flow** None ¦ Heat delivered ¦ Energy brought in ¦ Both

Int count el imm heater flow

The energy input via the electric immersion heater installed in the flow can be added to one of the meter readings.

None
The energy input is not metered.

Heat delivered
The energy input is added to the reading of meter "Heat delivered".

Energy brought in
The energy input is added to the reading of meter "Energy brought in".

Both
The energy input is added to the reading of the meters "Heat delivered" and "Energy brought in".

The energy input is calculated based on the number of operating hours and the output of the electric immersion heaters (lines 5811 and 5813).

Meters/performance factor

The following parameters are displayed values of the metered or calculated values.

Line no.	Operating line
3110	**Heat delivered**

Heat delivered

The metered and calculated amounts of heat are added to the reading of meter "Heat delivered" at an interval of 1 minute.

Heat delivered = dT * volume (calculated) + dT * volume (metered) + heat (metered)

Inside the controller, the heat delivered for heating mode and DHW charging is acquired separately, but displayed is only the total. The fixed day storage shows the values separately, however (parameters 3120...3188).

The display shows "---" if no "Metering" function (pulse or calculation) is selected.

Using the ACS service tool and having the respective access right, the meter can be set to zero via operation or to any value.

This leads to a fixed day entry.

Line no.	Operating line
3113	**Energy brought in**

Energy brought in

The energy increase (electricity or gas) determined via the pulse count and the calculated energy increase for operation of the source are added to the reading of meter "Energy brought in" at an interval of 1 minute.

Energy brought in =
Energy source operation (calculated) + electrical energy or gas (metered) + energy electric immersion heater (calculated)

Inside the controller, the energy required for heating mode and DHW heating is acquired separately, but displayed is only the total. But the fixed day storage shows the values separately (parameters 3120...3188).

The display shows "---" if no "Metering" function (pulse or calculation) is selected.

Using the ACS service tool and having the respective access right, the meter can be set to any value.

This leads to a fixed day entry.

Line no.	*Operating line*
3116	**Performance factor**

Performance factor

The performance factor is calculated from the 2 meters used for metering the energy delivered (parameter 3110) and the energy input (parameter 3113):

Performance factor = heat delivered/energy input

The performance factor displays "---" if one of the 2 energy meters is not used (no "Metering" function set) and also displays "---".

Fixed day storage (yearly performance factor)

The fixed day storage retains the total of meter values on the fixed day to calculate the yearly performance factor for the previous period.

For consumption or plant analyses, the underlying yearly energy values (separately for space and DHW heating) are stored as well.

The following values are displayed per entry:

- Fixed date (storage date)
- Yearly performance factor
- Amount of heat delivered for space heating
- Amount of heat delivered for DHW heating
- Energy input for space heating
- Energy input for DHW heating

Displayed are the energy values representing delivery and input over the course of one year (or between 2 fixed day entries).

Line no.	*Operating line*
3119	**Fixed day yearly perf fact**

Fixed day yearly performance factor

Parameter "Fixed day yearly perf fact" is used to set the date of the fixed day (day/month).

An entry is generated in the storage at mid-night of the set fixed day. The process is repeated annually. Entry of the fixed day cannot be deactivated.

Meter values

The meter values shown in the fixed day storage are the energy values acquired over the time period between the 2 fixed day entries, which are used to calculate the associated yearly performance factor.

The energy delivered and energy input for space and DHW heating are shown separately.

The fixed day storage makes it possible to store up to 10 entries (10 years). The first entry (index 1) is always the latest and moves the older entries in the index back 1 place. If the storage entry is empty, "---" is displayed as the counter value.

Overview of the respective operating lines:

Fixed day storage	*Yearly perf* factor 1*...10, fixed day 1...10*	*Heat delivered heating 1...10*	*Heat delivered DHW 1...10*	*Energy brought in, heating 1...10*	*Energy brought in, DHW 1...10*
1st year	3120	3121	3122	3124	3125
2nd year	3127	3128	3129	3130	3131
3rd year	3134	3135	3136	3137	3138
4th year	3141	3142	3143	3144	3145
5th year	3148	3149	3150	3151	3152
6th year	3155	3156	3157	3158	3159
7th year	3162	3163	3164	3165	3166
8th year	3169	3170	3171	3172	3173
9th year	3176	3177	3178	3179	3180
10th year	3183	3184	3185	3186	3187

Yearly performance factor

Calculation of the yearly performance factor is based on the following definition:

The yearly performance factor is the quotient of energy delivered (E_{ab}) and energy input (E_{ein}) over a period of one year.

Yearly performance factor = Energy delivered/energy input over a period of one year

Delivered energy

Thermal energy for space and DHW heating.

Energy input

Energy required for operation of the heat pump (compressor, source pump and fan) and for the electric immersion heaters.

With air-to-water heat pumps, the electrical energy required for defrosting is added to the energy input.

Active or passive cooling for room cooling is not considered, neither in term of energy delivered nor energy input.

Assignment of the acquired flows of energy to space or DHW heating is based on the following operating state definitions:

Heating mode

Heating mode is defined as follows:

- All operating states which, in the following, are not specifically defined to as DHW heating, cooling or "Defrost" mode

In heating mode, ...

- the acquired energy input is metered as energy used for space heating,
- the acquired amount of energy delivered is metered as heat used for space heating.

DHW heating

DHW heating is defined as follows:

- When a charging request with absolute priority is active
- When a charging request is active and a diverting valve or separate circuit is configured

In DHW heating mode, ...

- the energy input is metered as energy used for DHW heating,
- the energy delivered is metered as heat used for DHW heating.

All other types of DHW heating are regarded as heating mode, especially if no or shifting charging priority is selected, or the DHW storage tank is not connected to the same controller.

Cooling mode (room cooling)

Cooling mode is defined as follows:

- Active cooling mode with process reversal is active
- Passive cooling mode ex brine circuit is active

In cooling mode, ...
- the energy input is not metered,
- the energy delivered is not metered.

"Defrost" mode (air-to-water heat pumps)

"Defrost" mode is defined as follows:
- The internal "Defrost" function is active

In "Defrost" mode ...
- the energy input is metered as energy used for space heating,
- the energy delivered is not metered.

Line no.	*Operating line*
3190	**Reset fixed day storage**

Reset fixed day storage

Parameter "Reset fixed day storage" clears the entire storage with all entries.

All entries or their values are displayed as "---".

Extended energy acquisition

Line no.	*Operating line*
3192	**Int count el imm heater DHW** None ¦ Heat delivered ¦ Energy brought in ¦ Both
3193	**Int count el imm heat buffer** None ¦ Heat delivered ¦ Energy brought in ¦ Both

Int count el imm heater DHW / Int count el imm heat buffer

The energy fed to the DHW storage tank and buffer storage tank via the electric immersion heater can be added to the reading of one of the meters.

None
The energy of the electric immersion heater is not metered.

Heat delivered
The energy of the electric immersion heater is added to the reading of meter "Heat delivered".

Energy brought in
The energy of the electric immersion heater is added to the reading of meter "Energy brought in".

Both
The energy of the electric immersion heater is added to the reading of the meters "Heat delivered" and "Energy brought in".

The energy input is calculated based on the number of hours run and the output of the electric immersion heaters (lines 5740 and 5872).

Line no.	*Operating line*
3195	**Electric pump power heating**
3196	**Electric pump power DHW**

Electric pump power heating/Electric pump power DHW

The electric pumping power set here is used by the controller to calculate the energy required for operating these pumps.

This energy is calculated based on the running time and, if required, and the degree of modulation to be added to the energy input according to operating line 3113.

This means that the performance factor also gives consideration to the pumps' power consumption (line 3116).

6.11 Cascade

Control

Line no.	*Operating line*
3514	**Stage sequence** Serial, release all 2nd stage ¦ Serial, release last stage ¦ Parallel, release last stage
3530	**Release integral source seq**
3531	**Reset integral source seq**
3533	**Switch on delay**
3538	**Substitute common flow temp**

Stage sequence

Parameter "Stage sequence" is used to select the required sequence of stages.

The sequence of stages determines the order in which the cascade master releases and locks the available producer stages. The recommended sequence of stages depends on the types of producers used in the cascade (oil/gas boilers, heat pumps, mCHP, etc.).

Menu "Diagnostics cascade", parameter "Source seq ch'over current" (line 8150), shows the current sequence of stages.

Serial, release all 2nd stage
With this sequence of stages, every producer is released with its basic stage first and then with its second stage/modulation stage, in accordance with priorities. The second stages/modulation stages of all released producers are given release for control.

This means:
- Using their second stage, multistage producers may switch on/off in accordance with their setpoints and temperatures
- Modulating producers may provide control with their modulation stage
- Single-stage producers are not allowed to use their stage for cycling

This sequence of stages is used primarily in connection with oil or gas boilers.

Serial, release last stage
With this sequence of stages, every producer is released with its basic stage first and then with its second stage/modulation stage, in accordance with priorities. The stage/modulation stage released last is the only stage that is given release of control.

This means:
- Only the output stage switched on last may switch on/off according to the setpoint and the producer’s temperature
- Modulating producers may provide control with their modulation stage

This sequence of stages is used primarily in connection with heat pump cascades.

Producers with "optimum efficiency"

If producers are employed that use function "Output optimum", parameter 2867, OEM, setting "Serial, release last stage" the following strategy is pursued:
- The stages are released in a way that the producers first put into operation within their optimum output are those operating with "optimum efficiency" (line 2867, OEM)
- Full capacity of these producers is released only when the initial output is no longer sufficient
- When all producers with "optimum efficiency" deliver their full output, the heat sources without "optimum efficiency" are switched on as well
- In the case of requests forwarded to the producers with "optimum efficiency" only, outputs above this permitted limit will not be released

Parallel, release last stage
With this sequence of stages, all producers are released with their basic stage first, in accordance with the priorities. Only when all sources with their basic stages are released will the second stages/modulation stages be switched on as well, if required.
The stage/modulation stage released last is the only stage given release of control.
This means:
- Only the output stage switched on last may provide control according to the setpoint and the producer's temperature

This sequence of stages is used primarily in connection with condensing boilers.

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, the heat sources are switched on at a faster rate.

Reset integral 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 surplus heat).

When the value is decreased, the heat sources are switched off at a faster rate.

Switch on delay

Delayed switching on ensures that the lag producer is switched on only when the producer switched on last has reached its operating temperature. This prevents frequent cycling of the heat sources.

With DHW requests, the delay time is a maximum of 1 minute.

Substitute common flow temp

- With common flow sensor B10

Whenever a common flow sensor B10 is connected, it is used for acquiring the cascade flow temperature.

- Without common flow sensor B10

If a common flow sensor B10 is not connected, the cascade flow temperature is calculated depending on the setting of parameter "Substitute common flow temp".

Highest source value

The currently highest heat source temperature determines the common flow temperature.

- When a heat request to the cascade is made, the producers considered are only those that currently deliver heat to it
- When there is no request for heat, all existing producers are considered

Internal source value

The cascade master's own heat source determines the common flow temperature. If this producer is not available or if its temperature sensor is faulty, the common flow temperature is not valid.

Median source value

The temperature values of the producers currently released are averaged.

The parameterized rated output of the individual producers is considered when averaging the common flow temperature: Producers with great capacity have a greater impact on common flow temperature averaging than heat sources with small capacity.

When no request to the cascade is made, a common flow temperature backup value is not calculated.

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** - - - / 1..16

Absolute priority

If there are several heat sources that use function "Output optimum" (parameter 2867, OEM), they are always the first to change over (regardless of the settings made on operating lines 3540, 3541 and 3544).

Auto source seq ch'over

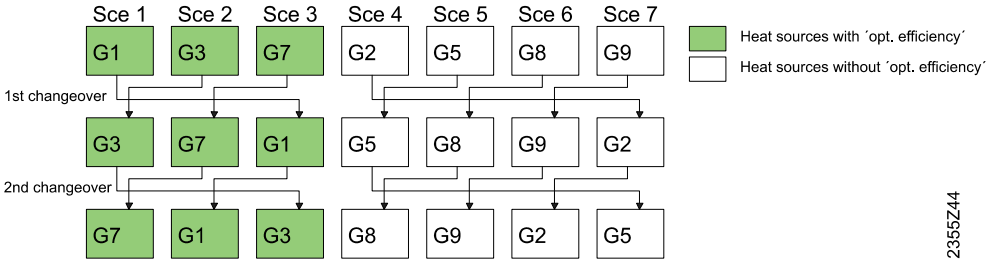
Function "Auto source seq ch'over" can be used to influence capacity utilization of the heat sources operating in a cascade. This is accomplished by defining the order of lead and lag producers.

"- - -"

Setting "- - -" defines a **firm** order. The heat sources are switched on/off in the order of their LPB device addresses.

'According to the number of hours run'

On completion of the number of hours set, the heat source sequence within the cascade changes. When changing over, the heat source with the next higher device address assumes the function of the lead producer and the previous lead producer is moved to the end of the producers (or producer group).



Sce: Heat source
Gx: Device address

Auto source seq exclusion

Setting the heat source sequence exclusion is only used in connection with the activated heat source sequence (line 3540).

With producer exclusion, the first and/or last heat source can be exempted from automatic changeover.

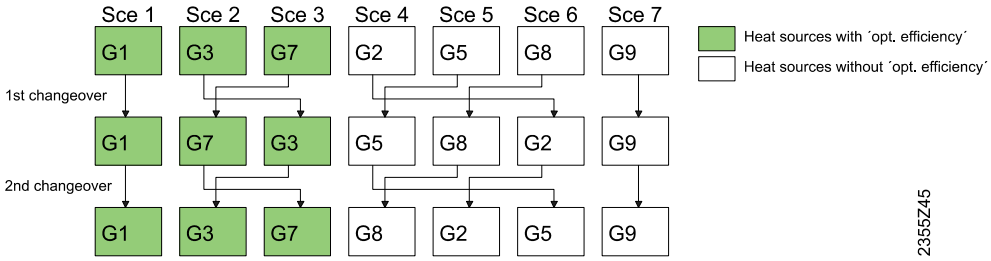
When there are 2 groups of producers (heat sources with and without "optimum efficiency"), only the first and last producer operating in both groups can be exempted.

None
The order of switching on the heat sources changes when the number of hours set is reached (line 3540).

First
The first heat source in the addressing scheme always remains the lead producer. With the other heat sources, the order of switching on changes when the set number of hours are reached (line 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 are reached (line 3540).

First and last
The first heat source in the addressing scheme always remains the lead producer. The last heat source in the addressing scheme always remains the last. The heat sources in between change when the set number of hours are reached (line 3540).



Sce: Heat source
Gx: Device address

Leading source

Setting of the leading heat source is only used in connection with the fixed order of the heat source sequence (line 3540).

The heat source defined as the lead producer 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.

If heat sources with "optimum efficiency" are installed, the lead producer must also be able to ensure "optimum efficiency".

Electric immersion heaters in the cascade

Many heat pumps are equipped with electric immersion heaters (K25) installed 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).

6.12 Supplementary source (producer)

A supplementary producer can be operated in addition to the main producer (heat pump).

Release of the supplementary producer depends on a number of parameters a detailed description of which is given on the following pages.

- Release is effected via release relay K27
- 2-position control is effected via control relay K32
- Ux can be used to transmit the supplementary source a DC 0...10 V signal for the required temperature/output setpoint

Control to the flow temperature control sensor

Control of the released supplementary source is effected based on the temperature deviation at the selected control sensor (common flow sensor B10 or buffer storage tank sensor B4 (see line 3725).

If the temperature at the control sensor drops by "Switching diff on" (preset) below the setpoint, both release relay K27 and the control relay (QX1...QX5, lines 5890...5895) are energized. If a switching integral (line 3720) is set, it must be filled first after dropping below "Switching diff on".

If the temperature at the control sensor exceeds the setpoint by "Switching diff off" (line 3722), control relay K32 is immediately deenergized and the release relay drops out when the overrun time has elapsed.

Line no.	*Operating line*
3690	**Setpoint incr main source**
3691	**Ouput limit main source**
3692	**With DHW charging** Locked ¦ Substitute ¦ Complement ¦ Instantly
3694	**OT limit with DHW charging**

Setpoint incr main source

For the period of time the supplementary source is released, the setpoint of the main source is increased by the value set here, ensuring that it is not switched off or that the degree of modulation is not reduced.

This prevents the main source from reducing its output when the supplementary source is in operation.

When locking the supplementary source, the setpoint of the main source is continuously shifted again to its own setpoint.

Ouput limit main source

The supplementary source is released only when the main source exceeds the output [%] set here. This prevents the supplementary source from being switched on while the main source modulates at low output.

The locking time starts only when the main source exceeds the set output [%].

With DHW charging

Defines the release of the supplementary source for DHW charging:

Locked
The supplementary source will not be released.

Substitute
The supplementary source is released only if the main source cannot be put into operation (e.g. in the event of fault).

Complement
The supplementary producer is released if the output of the main producer is not sufficient.

Instantly
The supplementary source will always be released.

OT limit with DHW charging

Parameter "OT limit with DHW charging" can be used to cancel the operating limit for DHW charging according to the outside temperature.

If "Ignore" is selected, the supplementary source is put into operation for DHW charging according to the setting of parameter 3692, although it would be locked due to the outside temperature.

Line no.	*Operating line*
3700	**Release below outside temp**
3701	**Release above outside temp**

Release below outside temp/above outside temp

Operation of the supplementary source is released only when the composite outside temperature lies above or below the set temperature limit.

This enables the supplementary source to lock in a selected outside temperature range to ensure bivalent operation of supplementary source and heat pump. Also refer to operating lines 2909 and 2910.

To ensure continuous release of the supplementary source, setting "---" must be selected on the respective operating lines.

If both release values are enabled, the outside temperature must satisfy both criteria, thus ensuring release of the supplementary source .

Overtemperature protection

Line no.	*Operating line*
3705	**Overrun time**

Overrun time of release for the external source:If the integral indicates another heat deficit before the overrun time has elapsed, the release remains activated.

If the set overrun time elapses before the common flow temperature drops below the common flow temperature setpoint, the release is deactivated also.

Operating mode

Line no.	*Operating line*
3710	**Setpoint min***

* Only active if a control sensor is available

Setpoint min

When the supplementary source is released (relay K27 energized), the setpoint of the supplementary source is raised to the "Setpoint min" adjusted here.

During night operation, "Setpoint min" acts as the minimum switch-on temperature.

Flow control

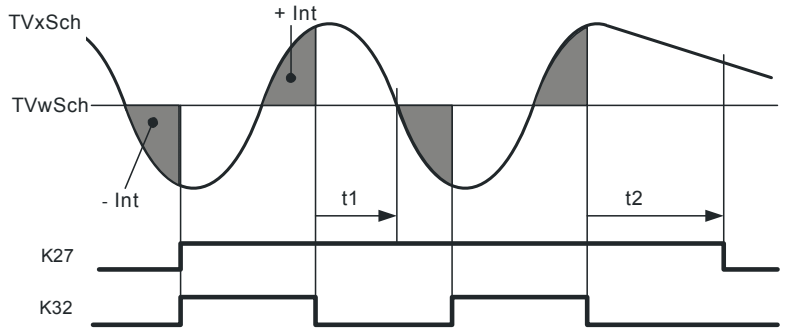
Line no.	*Operating line*
3720	**Switching integral***
3722	**Switching diff off***
3723	**Locking time**
3725	**Control sensor** Common flow temp ¦ Buffer sensor B4

* Only active if a control sensor is available

Switching integral

The temperature-time integral is a continuous summation of the temperature differential over time. In this case, the decisive criterion is the difference by which the temperature lies above or below the common flow temperature setpoint.

The temperature-time integral gives consideration not only to the period of time, but also to the extent of over-/undershoot. This means that when the crossing is significant, the supplementary source is released earlier, or locked earlier, than with minor crossings.



TVx Actual value of flow temperature
TVw Flow temperature setpoint
+ Int Surplus integral
- Int Deficit integral
t1 Overrun time (not completed)
t2 Overrun time (fully completed)
K27 Release output K27
K32 Control K32

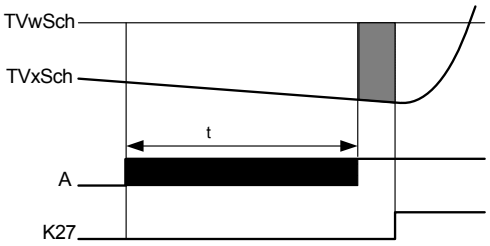
Switching diff off

If the common flow temperature exceeds the flow temperature setpoint by the amount of the switch-off differential, switching off takes place immediately, independent of the switching integral of the supplementary source (K32), and the request for heat (K27) is aborted on completion of the overrun time.

Locking time

The locking time enables the heat pump to reach a stable operating state before the supplementary source is allowed to switch on.

The supplementary source is released only when the locking time has elapsed. The locking time starts as soon as a valid flow temperature setpoint is available. Calculation of the release integral starts only when the locking time has elapsed.



TVxSch	Actual value of common flow temperature
TVwSch	Setpoint of common flow temperature
A	Request
K27	Release output K27
t	Locking time

No consideration is given to the locking time, if the heat pump malfunctions or is locked, or if the supplementary source must end DHW charging.
Setting "- - -" can be used to deactivate the function.

Control sensor

Control of the supplementary source is effected based on the temperature acquired by the sensor defined here (common flow temperature or buffer storage tank sensor B4).

Source type

Line no.	*Operating line*
3750	**Source type** Other ¦ Solid fuel boiler ¦ Heat pump ¦ Oil/gas boiler

Defines the type of producer of the supplementary source.
Hence, operating units supporting this function can display the type of supplementary source currently in operation.

Delay lockout position

Line no.	*Operating line*
3755	**Delay lockout position**

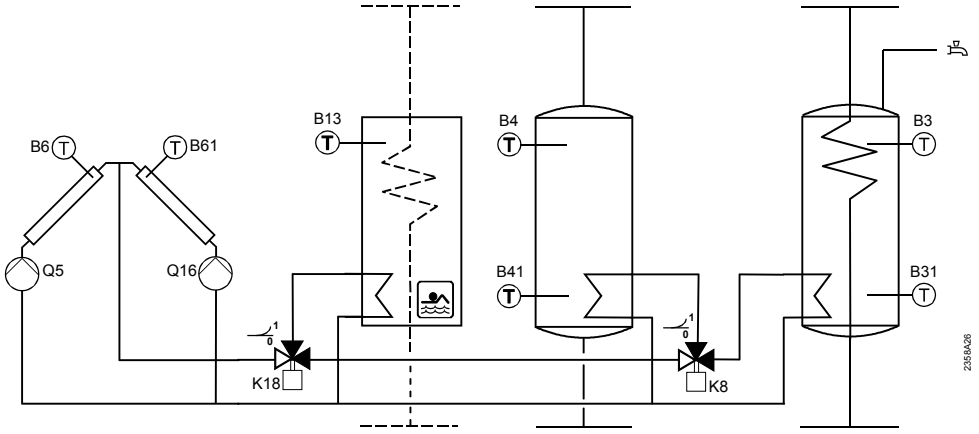
If an Hx input is configured as "Status info suppl source" and a delay time is set via parameter "Delay lockout position", following applies:

- After switching on, output "Supplementary source" (K32) must send status information to the respective Hx input within the delay time set here
- If missing, the controller signals "Fault"

- If no output (relay) "Supplementary source" (K32) is configured, "Delay lockout position" starts from the release (K27)
- Should a fault occur, the controller deactivates the release (K27), but keeps output (relay) "Supplementary source" (K32) activated
- If no supplementary source (K32) is configured, the controller also maintains the release (K27)
- The "Lockout position" function can be deactivated by switching off the delay time

6.13 Solar

Summary

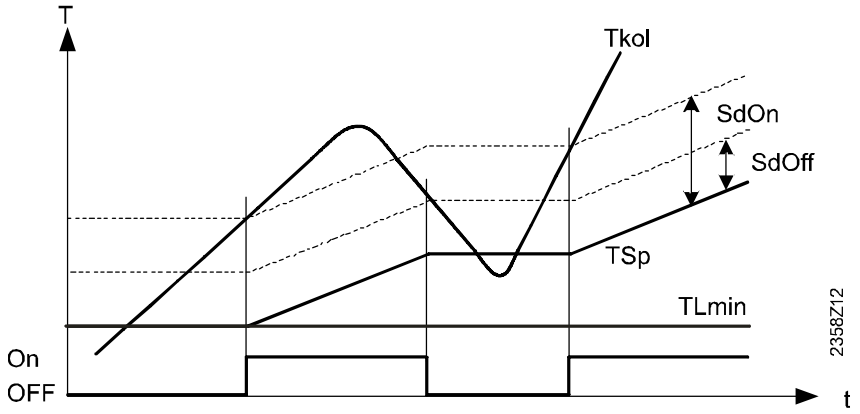


If sufficient solar energy is available, the solar plant can heat the swimming pool, the DHW storage tank and the buffer storage tank. Priorities for heating or charging the different storage tanks can be selected. The pumps can be speed-controlled. Protection of the plant is ensured by a "Frost protection" and an "Overtemperature protection" function.

Charging controller (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 of collector and storage tank or swimming pool is required. Also, the collector temperature must lie above the minimum charging temperature for the storage tank/swimming pool.



Tkol Collector temperature
On/Off Collector pump
SdOn Temp diff on
SdOff Temp diff 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 storage tank
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 ("Charging priority solar", line 2065) can impact the storage tank priority of solar charging and possibly charge the swimming pool before charging 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
The storage tanks are charged alternately for a temperature increase of 5 K at a time, until every setpoint reaches the level of A, B or C (see below). The setpoints of the next higher level are approached only after 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 table), charging is effected with priority . Only then will the other consumers of the same level be charged.

When all setpoints of a level are reached, those of the next level are approached and here too, the DHW storage tank has priority.

Buffer storage tank
During solar charging, preference is given to the buffer storage tank. At every level A, B or C (see table), charging is effected with priority . Only then will the other consumers of the same level be charged (see table).

When all setpoints of a level are reached, those of the next level are approached and here too, the buffer storage tank has priority.

Storage tank setpoints

Level	*DHW storage tank*	*Buffer storage tank*	*Swimming pool*
A	Line 1610	Buffer setpoint (slave pointer)	Line 2055
B	Line 5050	Line 4750	Line 2055
C	Line 5051	Line 4751	Line 2070

* When priority for the swimming pool is activated ("Charging priority solar", line 2065), the swimming pool is heated before the storage tanks are charged

1610 Nominal setpoint
5050 Charging temp max
5051, OEM Storage tank temp max
4750 Charging temp max
4751, OEM Storage tank temp max
2055 Setpoint solar heating
2070, OEM Swimming pool temp max

Charging time relative prio

If, for some reason, 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. because the temperature differential of collector and storage tank is 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 is immediately canceled.

If the parameter is deactivated ("- - -"), priority always follows the settings of "Charging prio storage tank".

Waiting time relative prio

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

Waiting time parallel op

If solar output is sufficient and solar charging pumps are used, simultaneous 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. Simultaneous operation can be delayed by a waiting time. This way, in the case of simultaneous operation, switching on of the storage tanks can be effected in steps.
Setting "- - -" deactivates simultaneous operation.

Delay secondary pump

To remove 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*
3830	**Collector start function**
3831	**Min run time collector pump**
3834	**Collector start funct grad**
3835	**Min collector temp start fct**

Collector start function

If the collector temperature cannot be accurately acquired during the time the pump is deactivated (especially in the case of vacuum tubes), the pump can be switched on from time to time. This setting defines the interval at which the collector pump is put into operation. It then runs for the period of time set, "Min run time collector pump" (line 3831).

Min run time collector pump

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

Collector start funct grad

If the temperature increase at the collector sensor exceeds the set "Collector start funct grad", the collector pump is activated.

Min collector temp start fct

The collector pump may be activated only if the temperature acquired by the collector sensor reaches at least the level set here.

Collector frost protection

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

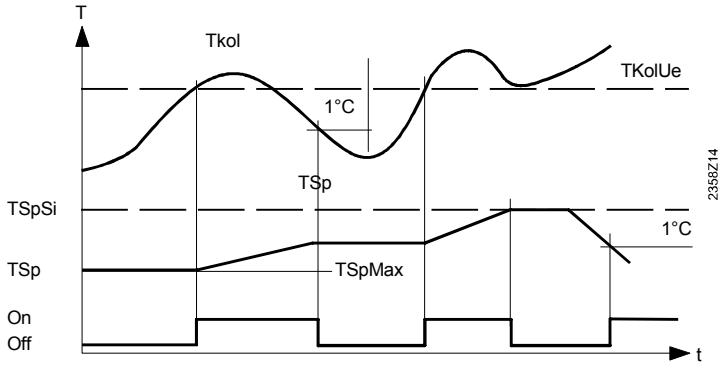
If there is risk of frost at the collector, the collector pump is put into operation to prevent the heat transfer medium from freezing.

- If the collector temperature falls below the frost protection level, the collector pump is activated
- When the collector temperature returns to a level 1 K above frost protection, the collector pump is deactivated again

Collector overtemperature protection

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

If there is a risk of overtemperature at the collector, storage tank charging is continued to reduce the amount of surplus heat. Charging is aborted when the storage tank reaches its safety temperature.



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

Supervision of evaporation

Line no.	*Operating line*
3860	**Evaporation heat carrier**
3862	**Impact evaporation superv** On own collector pump ¦ On both collector pumps

Evaporation heat carrier

If there is a risk of evaporation of the heat transfer medium due to high collector temperatures, the collector pump is deactivated to prevent it from overheating. This is a 'Pump protection' function.

Impact evaporation superv

In the case of collector fields equipped with 2 collector pumps, it can be selected if only the pump of the collector circuit with risk of evaporation or if both pumps shall be deactivated.

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 a permissible minimum and maximum speed.

Yield measurement

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

To ensure accurate solar yield measurement, both additional sensors (B63 in the solar flow and B64 in the solar return) should be connected. If one or both sensors is/are missing, the controller uses collector sensor B6 or B61 and the respective storage tank sensor B31 or B41 to make the calculation.

More accurate measurements are made with B63/B64. The 24-hour and total solar energy yield (lines 8526 and 8527) are calculated based on these data.

Antifreeze

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

Pump capacity

When establishing the yield without external pulse count or flow measurement, the flow (in liters per hour) must be determined according to the pump used und serves for calculating the volume input.

If the flow is metered via an Hx input, this setting must be deactivated.

Yield measurement pulse

Line no.	*Operating line*
3886	**Pulse count yield** None ¦ With input H1 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

Pulse count yield

Parameter "Pulse count yield" is used to select the Hx input for metering the amount of heat or the flow of water:

None
No metering via input Hx. This setting is important if the inputs are used for other pulse counts (e.g. acquisition of energy input).

With input Hx
The pulse counter is read by the selected input and the energy determined from it is added to the reading of the meter used for metering the heat delivered.

It is important that the count input selected here is set in the configuration for the pulse count as well.

Pulse measurement

Line no.	*Operating line*
3887	**Pulse unit yield** None ¦ kWh ¦ Liter
3888	**Pulse value yield numer**
3889	**Pulse value yield denom**

Every pulse received can be interpreted as a value (kWh or liters).
The pulse value is defined on operating lines 3887...3889 (unit, numerator and denominator).

Examples

1 pulse value corresponds to $\frac{\text{Numerator}}{\text{Denominator}} * \text{Unit} = \frac{\text{Line } 3888}{\text{Line } 3889} * \text{Line } 3887$

In other words, for example $\frac{1}{10} * kWh$ or $\frac{11}{2} * liters$

- The pulses are counted by the Hx input selected via operating line 3886
- The sum of the counted pulses is displayed by the respective pulse counter (lines 7842, 7856, 7987, 7992 and 7997)

Pulse unit yield

None
The pulse value will not be counted.

kWh
The pulse value is interpreted as kWh and added to "24-hour yield solar energy" (line 8526).

Liter
The pulse value is counted as liters. The yield in kWh is determined based on the flow and the temperature differential of collector flow and return and then added to "24-hour yield solar energy" (line 8526).

Flow measurement yield

Line no.	*Operating line*
3891	**Flow measurement yield** None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

In place of using the pulse count, the flow can also be measured with a flow sensor (10 V or Hz) connected to one of the Hx inputs.

Flow measurement yield

Parameter "Flow measurement yield" is used to select the Hx input for making the flow measurements:

None
No measurement via input Hx. This setting is important if the inputs are used for making other flow measurements (e.g. heat pump).

With input Hx
The flow via the selected input is acquired and used for calculating the volume. The determined volume is multiplied by the measured temperature differential and added to "24-hour yield solar energy" (line 8526).

The Hx input selected here must be set in the configuration for the flow measurement.

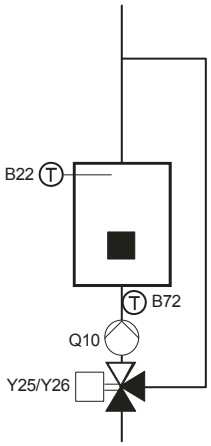
Sensor calibration

Line no.	*Operating line*
3896	**Readj solar flow sensor**
3897	**Readj solar return sensor**

By making sensor readjustments, inaccuracies of the sensor's measured values can be compensated for.

6.14 Solid fuel boiler

Summary



When the temperature of the solid fuel boiler is high enough, the boiler pump is activated and the DHW storage tank and/or the buffer storage tank are charged.

The solid fuel boiler operates as follows:

- Only with boiler sensor B22, or
- With boiler sensor B22 and return sensor B72.

Operating mode

Line no.	*Operating line*
4102	**Locks other heat sources**
4103	**Charg prio DHW stor tank** Off ¦ On

Locks other heat sources

When the solid fuel boiler is heated up, other heat sources, such as oil/gas boilers, are locked.

Locking takes place as soon as an increase of the boiler temperature is detected.

This predictive function allows locked heat sources to end any overrun of pumps before the solid fuel boiler pump is activated.

Also, in the case of a common flueway, it can be made certain that only one boiler is in operation at a time.

Charg prio DHW stor tank

When the solid fuel boiler is in operation, the DHW storage tank can be charged with priority (on) against the other consumers.

When selecting "Off", normal DHW charging priority applies (line 1630).

Setpoints

Line no.	*Operating line*
4110	**Setpoint min**
4114	**Temp differential min**
4130	**Temp diff on**

Setpoint min

The boiler pump is put into operation when the boiler temperature reaches its minimum level plus "Temp diff on".

If the boiler temperature falls below its minimum level, the boiler pump is deactivated again when pump overrun is ended.

Temp differential min

If the temperature increase (differential of boiler flow and boiler return temperature) is too small, the boiler pump is deactivated when pump overrun is ended.

If a return sensor is not installed, the boiler temperature increase is calculated from the boiler temperature and the minimum return temperature setpoint (e.g. when using a thermal return temperature controller).

Temp diff on

Refer to description of "Setpoint min".

DHW charging

Line no.	*Operating line*
4134	**Connection DHW stor tank** None ¦ With B3 ¦ With B31 ¦ With B3 and B31
4135	**Boiler temp setp DHW charg** Storage tank temp ¦ Storage tank setpoint ¦ Boiler temp setpoint min
4136	**DHW charging with Q3** No ¦ Yes

Connection DHW stor tank

When integrating a solid fuel boiler, the sensors must be selected.

Boiler temp setp DHW charg

This setting is used to select the required calculation of the boiler temperature setpoint during DHW charging.

Storage tank temp
The boiler temperature setpoint is calculated based on the DHW flow setpoint boost (line 5020) and the current DHW storage tank temperature (according to line 4134).

Storage tank setpoint
The boiler temperature setpoint is calculated based on the DHW flow setpoint boost (line 5020) and the setpoint of the DHW storage tank (nominal or legionella setpoint).

Boiler temp setpoint min
The boiler temperature setpoint corresponds to the minimum setpoint.

DHW charging with Q3

Determines whether charging pump Q3 is used by the solid fuel boiler for DHW heating.

No
The solid fuel boiler charges the DHW storage tank directly via boiler pump Q10. Charging pump Q3 is not controlled by the solid fuel boiler.

Yes
For DHW charging with the solid fuel boiler, charging pump Q3 must run.

Charging of buffer storage tank

Line no.	*Operating line*
4137	**Connection buffer** With B4 ¦ With B42/B41 ¦ With B4 and B42/B41
4138	**Boil temp setp buffer charg** Storage tank temp ¦ Storage tank setpoint ¦ Boiler temp setpoint min

Connection buffer

When integrating a solid fuel boiler, the required sensors must be selected.

Boil temp setp buffer charg

This setting is used to select the required calculation of the boiler temperature setpoint during buffer storage tank charging.

Storage tank temp
The boiler temperature setpoint corresponds to the current storage tank temperature (according to line 4137).

Storage tank setpoint
The boiler temperature setpoint corresponds to the setpoint of the buffer storage tank (slave pointer).

Boiler temp setpoint min
The boiler pump remains in operation as long as the boiler temperature lies above the minimum setpoint.

Pump overrun/ limitation of return temperature

Line no.	*Operating line*
4140	**Pump overrun time**
4153	**Return setpoint min**
4158	**Flow influence return ctrl** Off ¦ On

Pump overrun time

If the temperature of the solid fuel boiler drops below the minimum temperature differential or the minimum setpoint, the boiler pump keeps running for the parameterized overrun time.

Return setpoint min

The controller prevents the return temperature from falling below the level set here by adding hot flow water.

Flow influence return ctrl

If desired, the return temperature controller can help reach the flow temperature setpoint. Influence of the flow on the control of the return temperature can be switched on or off.

For both functions, return temperature sensor B72 is required.

"Residual heat" function

Line no.	*Operating line*
4190	**Residual heat fct dur max**
4192	**Residual heat fct trigg** Once ¦ Several times

Overrun of the boiler pump ensures that the boiler circuit's residual heat is dissipated. This makes certain that overtemperatures will not occur, preventing the safety limit thermostat from tripping.

Residual heat fct dur max

The "Residual heat" function is aborted after the set maximum time at the latest.

Residual heat fct trigg

The "Residual heat" function can be performed once or, if required, several times.

Once
When completed, the "Residual heat" function remains deactivated.

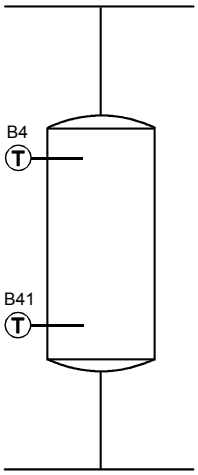
Several times
The "Residual heat" function is resumed when the switch-on criteria are fulfilled.

Line no.	*Operating line*
4201	**Pump speed min**
4203	**Pump speed max**

Using these settings, minimum and maximum limitation of the pump speed can be provided.

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 forced charging is no longer released, or the heat pump must be switched off.

When the plant operates in cooling mode, "Forced charging setp cooling" is used. In heating mode, the slave pointer is used as the setpoint. It can be limited via operating lines "Forced charg setp heat min" and "Forced charg setp heat max".

Forced charging can be triggered either via low-tariff input E5 (one of the Ex inputs) or "Forced charging time" (line 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 drops by 5 K (heating) or rises by 5 K (cooling). At this point in time, forced charging must still be released, and the number of permissible charging abortions must not be exceeded (line 2893). Otherwise, the controller waits until forced charging is regularly triggered the next time.

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

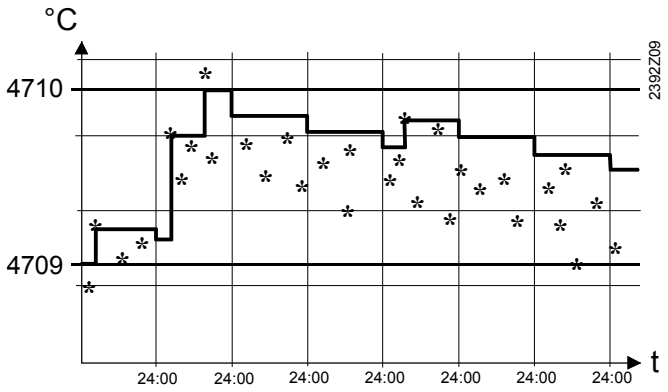
Forced charging setp cooling

Forced charging of the buffer storage tank is completed when "Forced charging setp cooling" (4708) is reached. When using setting "---", forced charging for 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 at a minimum and a maximum.

The slave pointer collects the maximum values of the temperature requests from the heating circuit and stores them. Every midnight, the slave pointer setpoint is reduced by 10%.



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

Forced charging time

Forced charging starts every day at the time of day set here (00:00...24:00). Setting "- - -", deactivates forced charging.

Forced charg duration max

Forced charging is aborted when the required setpoint has not been reached on completion of the period of time set here.

Automatic locks

If the buffer storage tank is able to satisfy the heat request it receives, the request is **not** passed on to the producer.

Line no.	*Operating line*
4720	**Auto generation lock** None ¦ With B4 ¦ With B4 and B42/B41 ¦ With B42 ¦ With B42 and B41 ¦ With B4 and B71
4722	**Temp diff buffer/HC**
4728	**Rel temp diff buffer/HC**
4735	**Setpoint reduction B42/B41**

If the temperature level of the buffer storage tank is high enough, the consumers draw the heat they require from the buffer storage tank. The heat sources are locked via the "automatic generation lock".

Auto generation lock

None
There will be no generation lock due to the buffer storage tank temperature. A heat request from the consumers is passed on directly to the heat sources.

With B4
If the temperature at sensor B4 is high enough, the heat source is locked. The consumers draw the heat they require from the buffer storage tank.

If the temperature at sensor B4 is too low, a heat request is passed on to the heat sources.

With B4 and B42/B41
If the temperature at both sensors B4 and B42 (or B41) is high enough, the heat source is locked. The consumers draw the heat they require from the buffer storage tank.

If the temperature at both sensors B4 and B42 (or B41) is too low, a heat request is passed on to the producers.

With B42
If the temperature at sensor B42 is high enough, the heat source is locked. The consumers draw the heat they require from the buffer storage tank.

If the temperature at sensor B42 is too low, a heat request is passed on to the producers.

With B42 and B41
If the temperature at both sensors (B42 and B41) is high enough, the heat source is locked. The consumers draw the heat they require from the buffer storage tank.

If the temperature at both sensors (B42 and B41) is too low, a heat request is passed on to the producers.

With B4 and B71
If the temperature at both sensors (B4 and B71) is high enough, the heat source is locked. The consumers draw the heat they require from the buffer storage tank.

Exception: If the temperature at sensor B4 is too low, a heat request is passed on to the producers.

For release of the producer with this setting, only the sensor in the buffer storage tank is considered (the return temperature sensor delivers a valid temperature only when the pump is in operation).

When there are no sensors, the following backup order applies:

Selection	*Sensor*	*Backup 1*	*Backup 2*	*Backup 3*
With B4 and B42/B41				Only B4
	B42	B41*	B71	
With B42	B42	B4		
With B42 and B41	B42	B4		
	B41*	B71		
With B4 and B71		Only B4		
	B71			

* With solar integration, B41cannot be used or cannot replace a missing sensor

Temp diff buffer/HC

In plants with great switching differentials, a mixing valve boost is usually set to switch producers on and off. This mixing valve boost is not required when drawing heat from a storage tank and can be readjusted via parameter "Temp diff buffer/HC".

Rel temp diff buffer/HC

"Rel temp diff buffer/HC" (parameter 4728) can be used to parameterize an undersupply in relation to the setpoint (as a percentage). This means that higher temperature requests allow greater deviations than lower requests.

The reduction is calculated as follows, based on the entered percentage value (-50...50%):

Reduction = (TVLw - Ts) * [Rel temp diff buffer/HC %] / 100

TVLw	Flow temperature setpoint
Ts	Basic request 20 °C
%	Percentage value (-50...50%)

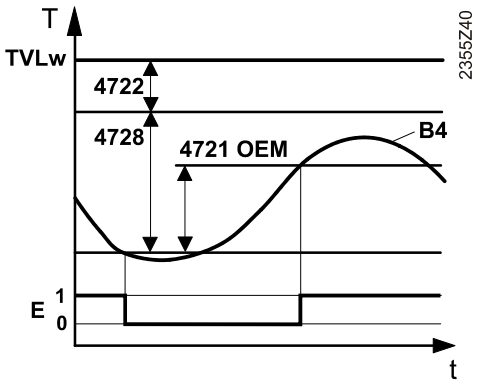
ExampleTVLw = 60 °C or 40 °C and a tolerance of -10% each:

Reduction$^{60^\circ}$ = (60-20) * (-10) / 100 = -4 K

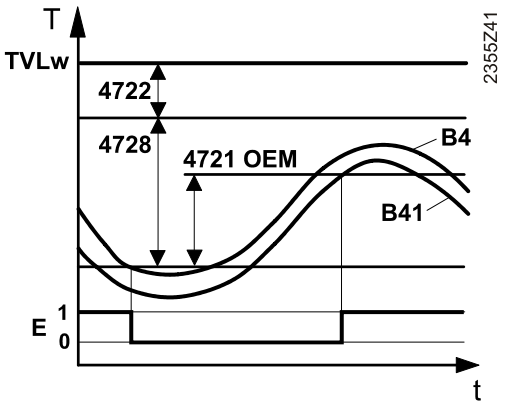
Reduction$^{40^\circ}$ = (40-20) * (-10) / 100 = -2 K

Generation lock active/inactive

With B4



With B4 and B42/B41



TVLw	Flow temperature setpoint (Buffer setpoint, line 8981)
B4	Buffer or combi storage tank sensor at the top
B41	Buffer or combi storage tank sensor at the bottom
4721, OEM	Auto heat gen lock SD
4722	Temp diff buffer/HC
4728	Rel temp diff buffer/HC
E	Generation lock (1 = active, 0 = inactive)

Generation lock inactive

As soon as the temperature at the selected buffer storage tank sensor(s) lies by "Temp diff buffer/HC" (line 4722) **plus** "Rel temp diff buffer/HC" (line 4728) below the required flow temperature setpoint, the generation lock is deactivated. The heat sources are released.

Generation lock active

When the temperature at the selected buffer storage tank sensor(s) lies less than "Temp diff buffer/HC" (line 4722) **plus** "Rel temp diff buffer/HC" (line 4728) **minus** "Auto heat gen lock SD" (line 4721, OEM)below the required flow temperature setpoint, the generation lock is active. The heat sources are locked.

Setpoint reduction B42/B41

When using a storage tank sensor at the bottom (B41, B42) or B71 (heat pump return), a setpoint reduction can be parameterized for it via "Setpoint reduction B42/B41".

The permissible differential of setpoint and sensor at the bottom is increased by the set value.

Stratification protection

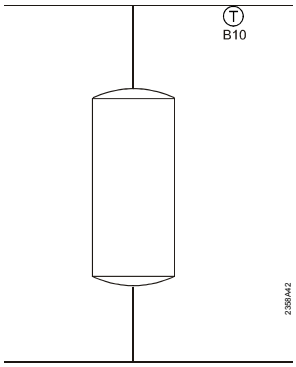
Line no.	Operating line
4739	**Stratification protection** Off ¦ Always

The buffer storage tank's "Stratification protection" function provides for hydraulic balancing between consumers and producer 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 the addition of colder water from the buffer storage tank is avoided whenever possible.

Off
The "Stratification protection" function is deactivated.

Always
The "Stratification protection" function is active when the heat source is in operation.



ℹ The function requires a common flow sensor B10.

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

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

ℹ Function "Overtemperature protection for the collector" 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 was charged via "Recooling temp" (e.g. with solid fuel boiler or solar), recooling to the recooling temperature set here is effected as soon as possible.

To recool the buffer storage tank, the 2 following functions are available:

Recooling DHW/HCs

The heat can be drawn either by space heating or the DHW storage tank. The function is activated or deactivated via this operating line. The drawing of heat can be selected separately for each heating circuit (operating page "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
- When frost protection for the buffer storage tank is active

Charg sensor el imm heater

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 1 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 do 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

Charging control

Line no.	*Operating line*
5020	**Flow setpoint boost**
5021	**Transfer boost**
5022	**Type of charging** Recharging ¦ Full charging ¦ Full charging legio ¦ Full charg 1st time day ¦ Full charg 1st time legio
5024	**Switching diff**

Boost of flow temperature setpoint

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. For that, the current buffer storage tank temperature must exceed the current DHW storage tank temperature by the amount of the transfer boost.
The respective temperature differential can be set here.

Type of charging

DHW charging can be effected with 1 or 2 sensors.
If only 1 sensor is configured (installed), selection "Recharging" applies.

Recharging
The DHW storage tank is charged until the sensor at the top (B3) reaches its setpoint. The sensor at the bottom (B31) is not taken into consideration.

Full charging
The DHW storage tank is fully charged. Storage tank sensors B3 and B31 must reach their setpoint.

Full charging legio
The storage tank is charged with sensor B3 only.
For the "Legionella" function, both sensors (B3 and B31) must reach their setpoint.

Full charg 1st time day
The first DHW storage tank charging in the morning means full charging with sensors B3 and B31. Further chargings and the "Legionella" function are performed with B3 only.

Full charg 1st time legio
The first DHW storage tank charging in the morning and the "Legionella" function mean full charging with sensors B3 and B31. Further chargings are effected with B3.

Switching differential

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.

The first DHW storage tank charging in the morning is also started when the DHW temperature lies within the switching differential, provided it does not lie less than 1 K below the setpoint.

Charging time limitation

Line no.	*Operating line*
5030	**Charging time limitation**
5032	**Max temp charging abort**

Charging time limitation

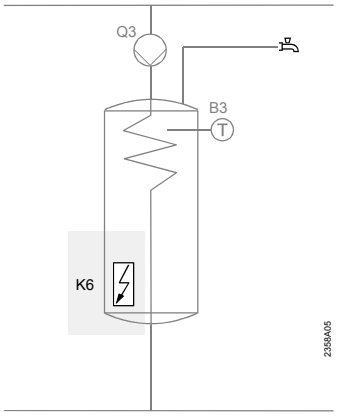
During DHW charging, space heating may receive no or too little heat (depending on the selected charging priority (line 1630) and the type of hydraulic circuit). For this reason, it is often practical to set a time limit for DHW charging.

- - -
Charging time limitation is deactivated. The DHW is heated up until the current DHW temperature setpoint is reached.

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 time period, the heat produced is made available for space heating. This cycle repeats itself until the nominal DHW setpoint is reached.

When space heating is off (summer operation, "ECO" function, etc.), DHW charging is not interrupted, irrespective of the setting made.

Abortion of DHW charging by the heat pump



If DHW charging is interrupted because the heat pump exceeded the permissible number of charging attempts (line 2893), the electric immersion heater (K6) – if installed – completes the charging process.

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

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

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

Max temp charging abort

When the DHW storage tank reaches "Max temp charging abort", DHW charging is aborted, but then ended by the electric immersion heater or the supplementary source. If, when DHW charging is started, the temperature at sensor B3 lies less than 1 K below "Max temp charging abort", charging is directly provided by the electric immersion heater or the supplementary producer.

Function "Max temp charging abort" is only available when both the DHW storage tank and the heat pump are controlled by the same controller.

Overtemperature protection

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

The DHW storage tank is charged by the solar collector until the set "Charging temp max" is reached.

The "Overtemperature protection" function for the collector 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/HCs** Off ¦ On
5057	**Recooling collector** Off ¦ Summer ¦ Always

Recooling temp

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

Recooling heat gen/HCs/ consumer circuit

Surplus energy can be drawn off either by the heating circuits/consumer circuits or the heat source. This can be selected separately for each heating circuit/consumer circuit (operating page "Heating circuit/Consumer 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 ¦ Cooling mode ¦ Emergency operation ¦ Legionella function
5061	**El immersion heater release** 24h/day ¦ DHW release ¦ Time program 4/DHW
5062	**El immersion heater control** External thermostat ¦ DHW sensor

El imm heater optg mode

Substitute

The electric immersion heater provides 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 provide DHW charging because the heat pump was not able to end the charging process, the controller stores the DHW temperature at which the electric immersion heater took over via "Curr DHW charg temp HP" (line 7093).

Also, at the changeover point, the switch-on temperature is adapted. 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 current DHW setpoint minus 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 under setting "Substitute".

Always
DHW charging is always effected by the electric immersion heater.
When using this setting, an electric immersion heater **must** be available. There will be no DHW charging by the heat pump!

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.

Cooling mode
DHW charging is effected by the electric immersion heater when the producers operate in cooling mode.

Also, when using this setting, the electric immersion heater is released under the conditions mentioned under "Substitute".

Emergency operation
The electric immersion heater is only used when the controller is set to "Emergency operation".

If DHW heating is active with one of the zone controllers, the electric immersion heater is also used when the producers have gone to lockout.

Legionella function
The electric immersion heater is only used when the DHW storage tank must be heated up to the legionella setpoint and the heat sources are not able to end the charging process ("Heat pump" function).

The electric immersion heater is also released if the producers signal a fault or if it they have been shut down by the generation lock.

For all settings, following applies:
- If the electrical utility lock for the electric immersion heater is active, the heater remains locked for all applications
- If a manual DHW push is triggered and the producers have gone to lockout, the electric immersion heater is switched on, irrespective of the parameter settings made
- The electric immersion heater is used for the "Storage tank frost protection" function, irrespective of the parameterized operating mode (for information about the function, refer to chapter "Frost protection")

The table below shows the changeover to the electric immersion heater:

Event	*El imm heater optg mode*					
	Substitute	*Summer*	*Always*	*Cooling mode*	*Legionella function*	*Emergency operation*
Electrical utility lock active	No release					
High-tariff active	With DHW push					No release
Wood-fired boiler, ECO function or transfer active	With frost protection					
Source, end of charging	Every request				With legionella	No release
Cooling mode active	With frost protection			Every request	No release	
Source locked, fault	With every request					No release
Summer operation	No release	Every request		No release		
Emergency operation	No release					Every request

El immersion heater release

24h/day
The electric immersion heater is always released, independent of time programs.

DHW release
The electric immersion heater is switched on/off according to setting "Release" (line 1620).

Time program 4/DHW
The electric immersion heater is released according to the setting made on operating page "Time program 4/DHW" of the local controller.

The actual release is effected only if the electric immersion heater may be operated according to setting "El imm heater optg mode" (line 5060).

El immersion heater control

In the case of DHW heating with electric immersion heater, the storage tank temperature can be monitored either with an external thermostat in the heater or the controller's inbuilt sensors.

Control with external thermostat
The controller releases constantly DHW heating with the electric immersion heater within the release period, **regardless** of the storage tank temperature. The controller's current DHW setpoint has no impact.

The required storage tank temperature must be adjusted on the external thermostat. The manual push cannot be activated. The "Legionella" function is deactivated.

Control with DHW sensor
The controller releases constantly DHW heating with the electric immersion heater within the release period, **regardless** of the storage tank temperature. The controller's current DHW setpoint is maintained.

The manual push can be activated. When the "Legionella" function is activated, charging to the legionella setpoint takes place.

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

Configuration

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

Excess heat draw

Excess heat draw can be triggered by the following functions:
- Inputs Hx
- Storage tank recooling
- Excess heat draw by the solid fuel boiler

When dissipation of excess heat is activated, it can be discharged to the DHW storage tank.

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 a buffer storage tank is installed, enter whether the DHW storage tank can draw heat from it.

With prim contr/system pump

It must be selected whether the DHW storage tank shall be charged via the primary controller or the system pump.

With solar integration

It must be selected whether the DHW storage tank can be charged by solar energy.

Speed-controlled pump

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

Pump speed min/max

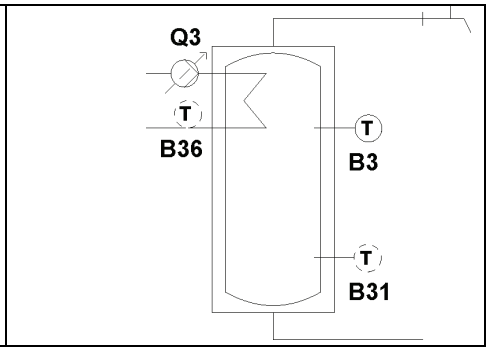
The speed range of the DHW pump is limited by the minimum and maximum permissible speed.

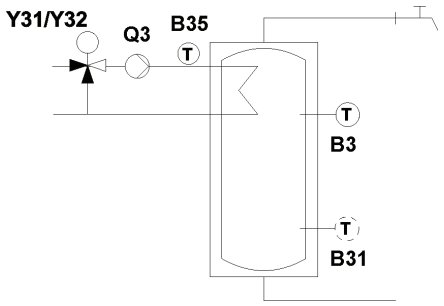
To ensure that the pump operates reliably on startup, it is operated at maximum speed for the first 10 seconds.

Speed control of charging pump Q3

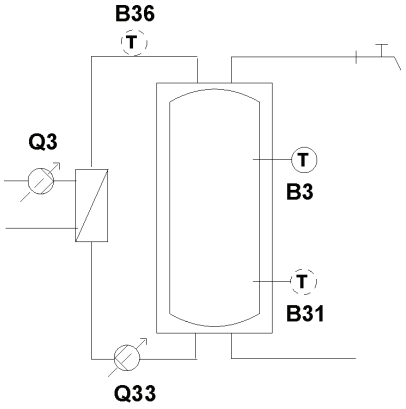
Heat exchanger in the storage tank and sensor B36 in the return.

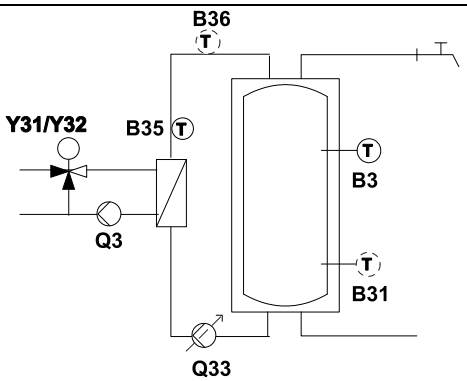
The controller calculates the charging pump speed required to ensure that the return temperature acquired by sensor B36 is 2 K above the storage tank temperature (B3).



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

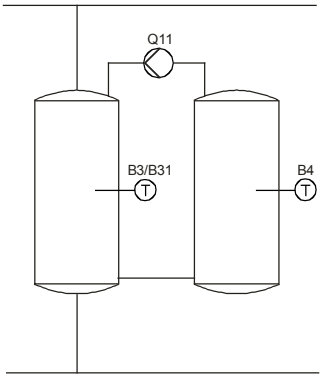
Speed control charging pump Q3/intermediate circuit pump Q33

Heat exchanger outside the DHW storage tank and sensor B36 in the flow. The controller calculates the speed of the speed-controlled pump such that the charging temperature at sensor B36 lies 2 K above the DHW setpoint (partial diagrams 22 and 23).	

Heat exchanger outside the storage tank, with primary controller. **Without B36** The controller calculates the speed of the speed-controlled pump such that the charging temperature at sensor B35 lies 2 K above the DHW setpoint. In this case, primary controller sensor B35 must be located in the intermediate circuit. **With B36** If B36 is connected as well, B35 must be positioned as the primary controller sensor. The controller calculates the speed of charging pump Q3 such that the temperature acquired by sensor B35 represents the DHW setpoint plus the charging boost. The controller calculates the speed of intermediate circuit pump Q33 such that the charging temperature at sensor B36 lies 2 K above the DHW setpoint.	

Line no.	Operating line
5130	**Transfer strategy** Off ¦ Always ¦ DHW release
5131	**Comparison temp transfer** With B3 ¦ With B31 ¦ With B3 and B31

Transfer strategy



If the temperature level of the buffer storage tank is high enough, the DHW storage tank can be charged by the buffer storage tank.

Depending on the hydraulic circuit, the transfer of heat can be effected either with charging pump Q3 or transfer pump Q11, which is specifically parameterized for this function.

When DHW heating is deactivated, the transfer of heat is switched off as well.

The following transfer strategies are available:

Off
The transfer of heat is deactivated.

Always
When DHW heating is switched on, the heat is transferred from the buffer to the DHW storage tank until the latter's nominal setpoint is reached. If the "Legionella" function is activated and due, the heat is transferred until the legionella setpoint is reached.

DHW release
When DHW heating is switched on, the heat is transferred from the buffer to the DHW storage tank until the latter's setpoint is reached (line 1620). If the "Legionella" function is activated and due, the heat is transferred until the legionella setpoint is reached.

For charging with Q3 from the buffer storage tank, function "With buffer" (line 5090) must be activated (setting "Yes").
If Q3 was parameterized as a diverting valve (line 5731), or a specific transfer pump Q11 is installed, Q3 is not used for the transfer of heat.

In the case of a manual DHW push during heat transfer, normal DHW charging to the nominal DHW setpoint is triggered.
If the buffer storage tank satisfies this temperature request as well (buffer storage tank temperature > nominal setpoint + charging boost), the transfer of heat remains active and the heat source will not be put into operation.

Heat transfer with combi storage tankIf a specific transfer pump Q11 is installed, the transfer of heat is also effected when using a combi storage tank.

If only Q3 is used and heat transfer is in progress, the controller waits until the DHW section is heated up again by the surrounding storage tank; during this period of time, neither the heat source nor Q3 are put into operation.

If this waiting time is not desired, the "Transfer" function must be deactivated.

Comparison temp transfer

For the transfer of heat, the desired DHW sensor can be selected to get a comparative temperature.

With B3

Heat transfer is effected when the temperature at sensor B3 lies at least 1 K below the current transfer setpoint and the temperature at buffer storage tank sensor B4 exceeds the temperature at sensor B3 by at least the amount of the transfer boost.

If sensor B3 is not installed, there will be no transfer of heat.

Charging by the heat source and simultaneous heat transfer are not possible.

With B31

Heat transfer is effected when the temperature at sensor B31 lies at least 1 K below the current transfer setpoint and the temperature at buffer storage tank sensor B4 exceeds the temperature at sensor B31 by at least the amount of the transfer boost.

If B31 is not installed, sensor B3 is used for the transfer of heat.

Charging by the heat source and the simultaneous transfer of heat are possible, provided the transfer is effected via the separate transfer pump Q11.

With B3 and B31

Both sensors B3 and B31 are considered for the transfer of heat.

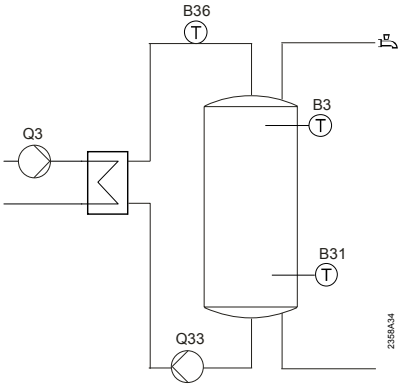
Heat transfer is effected when the temperature at sensor B3 lies at least 1 K below the current transfer setpoint and the temperature at buffer storage tank sensor B4 exceeds the temperature at sensor B3 by at least the amount of the transfer boost.

The transfer of heat is ended when the temperature at sensor B31 reaches the current transfer setpoint.

If B31 is not installed, sensor B3 is used for the transfer of heat.

Charging by the heat source and simultaneous heat transfer are not possible.

Line no.	*Operating line*
5140	**Intermediate circuit boost**
5146	**Full charging with B36** No ¦ Yes
5148	**Min start temp diff Q33**



Intermediate circuit boost

For charging, the flow temperature in the intermediate circuit (B36) must exceed the required DHW setpoint by the value set here because the heat exchanger is not able to transfer all energy.

The set value is added to the request.

Full charging with B36

To fully charge the DHW storage tank, DHW charging sensor B36 can be used in place of sensor B31.
The charging process is completed when sensor B36 reaches the required temperature (DHW setpoint **plus** line 5140 **plus** 3 K) and, at the same time, sensor B3 reaches the required setpoint.

When starting DHW storage tank charging, the intermediate circuit sensor is considered only if the intermediate circuit pump has been in operation for at least 30 seconds.

Min start temp diff Q33

Intermediate circuit pump Q33 is activated only when the temperature of the primary circuit (B21, B10, B4, B35, B15) exceeds the upper DHW storage tank temperature (B3) by at least the temperature differential set here. This ensures that stratification in the DHW storage tank is maintained.

Mixing pump Q35/restratification

The mixing pump can be used either as a mixing pump in connection with the "Legionella" function or as a restratification pump.

Line no.	*Operating line*
5160	**Legionella funct mixing pump** Off ¦ With charging ¦ With charging and duration
5165	**Restratification** No ¦ Yes
5166	**Restrat temp min**
5167	**Restrat temp diff min**

Legionella funct mixing pump

Off
With setting "Off", the mixing pump is not used when the "Legionella" function is active.

With charging
Mixing pump Q35 is put into operation while the "Legionella" function is active.

With charging and duration
Mixing pump Q35 is put into operation while the "Legionella" function is active and during the time that follows (line 1646).

Restratification

The "Restratification" function can be activated/deactivated.

No
There will be no restratification with the mixing pump.
Nevertheless, restratification can be activated during the time the "Legionella" function is active.

Yes
The "Restratification" function compares the 2 DHW storage tank sensors B3 and B31.

Restrat temp min

For the "Restratification" function to be performed, storage tank sensor B31 at the bottom must have reached the set level.

Restrat temp diff min

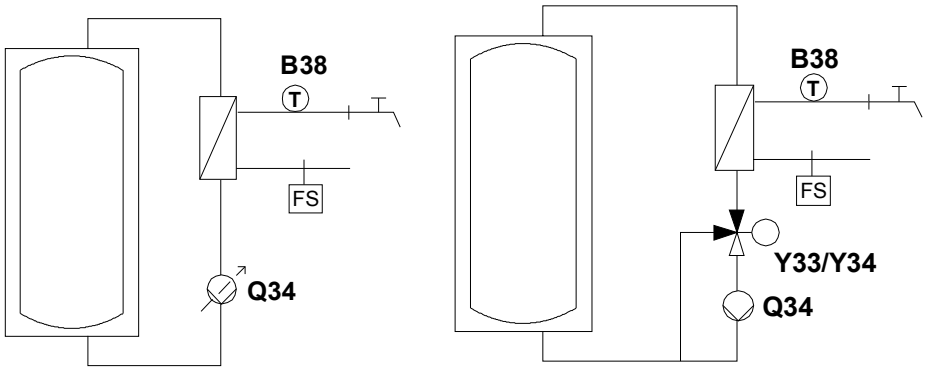
When the temperature at sensor B31 at the bottom of the storage tank exceeds the temperature at sensor B3 at the top by more than the adjustable restratification temperature differential (line 5167), mixing pump Q35 is put into operation. The switching differential is 2 K.

6.17 Instantaneous water heater

Summary

The controller supports DHW heating via an external heat exchanger. In that case, the heat is delivered by the buffer, DHW or combi storage tank.

A speed-controlled pump (left) or pump with mixing valve (right) are used to supply heat to the instantaneous water heater, depending on demand:



When the DHW flow switch (FS) detects flow, sensor B38 provides control to the nominal setpoint (line 1610).

When the flow switch detects no more flow, pump Q34 is deactivated.

Configuration

Speed-controlled (left)

When using a speed-controlled pump without mixing valve (left), the outputs and inputs must be individually configured:

- Pump Q34 is configured to a multifunctional Zx or Ux output
- Water outlet sensor B38 is configured to a multifunctional input Bx
- The DHW flow switch (FS) is configured to a multifunctional Hx input

Mixing valve (right)

When using a mixing valve and a pump with a fixed speed (right), 2 configuration choices are available:

- "Function mixing group 1" (line 6014) or "Function mixing group 31" (line 6455) is configured as "Instantaneous water heater"
- Function extension module 1...3 (line 7300, 7375 or 7450) is configured as "Instantaneous water heater"

In that case, pump Q34, mixing valve Y33/Y34, water outlet sensor B38 and the DHW flow switch (FS) are assigned to fixed inputs and outputs.

For assignment tables, refer to parameters 6014, 6455 and 7300, 7375 and 7450.

Line no.	Operating line
5406	**Min setp diff to tank temp**
5407	**Storage tank setpoint incr**
5530	**Pump speed min**

Min setp diff to tank temp

The maximum DHW tap temperature setpoint controlled is the current storage tank temperature minus the adjustable setpoint differential.

Storage tank setpoint incr

Charging of the storage tank is effected such that the nominal setpoint is exceeded by an adjustable differential ("Storage tank setpoint incr"), thus ensuring that the DHW temperature will not drop below the parameterized setpoint.

"Storage tank setpoint incr" should be parameterized **above** the setpoint differential (line 5406).

Pump speed min

The minimum permissible speed limits the permissible speed range of the instantaneous heater pump at the bottom.

Control of mixing valve

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

Setting the running time of the actuator used with the mixing valve for the instantaneous water heater.

6.18 Configuration

Procedure

First, make use of the preselection and enter the plant diagram that comes closest to the plant in question. Then, modify manually the individual partial diagrams to match them to your requirements.

Select the extra functions only then and make the fine-tuning via the operating lines of the individual parameters.

Presetting

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

Presetting

The diagrams shown in chapter "Plant diagrams" can be preselected by entering a diagram number. The plant diagram is the result of presetting plus the connected sensors.

Fore more information about the selection of plant diagrams, refer to chapter "Plant diagrams".

Manual setting/ adaption of partial diagrams

A plant diagram is made up of several partial diagrams.

The partial diagrams needed can be used to manually produce the required final plant diagram.

But it is also possible to adapt partial diagrams of a plant diagram generated via "Presetting" (line 5700).

A separate catalog with partial diagrams 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.

On operating lines 6212...6217, it can be checked whether the adjustments led to the right partial diagram. The check number shown there must accord with the relevant components group.

Heating circuits/cooling circuit

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

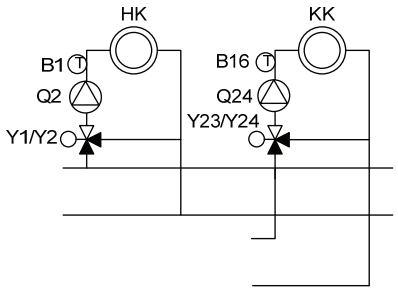
Heating circuit 1

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

Cooling circuit 1

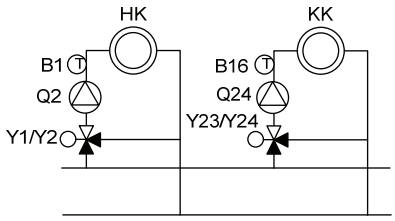
Off
The cooling circuit is switched off.

4-pipe system cooling



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

2-pipe system cooling



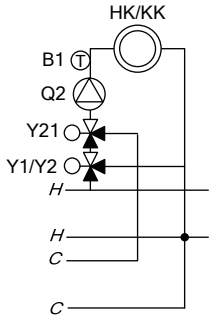
The cooling and heating circuits draw their cooling energy/heat from the same common flow.

Use of mixing valve 1

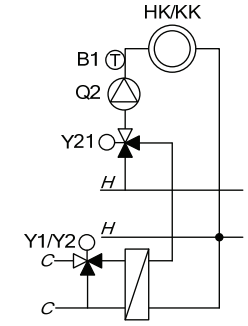
The parameter is active under 2 conditions:

- Only with a 4-pipe system
- If a relay output Qx is used for a diverting valve

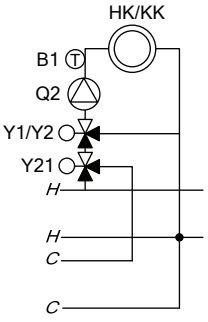
Heating



Cooling



Heating and cooling



HC Heating circuit
KK Cooling circuit
H Common heating flow
C Common cooling flow

The setting is required when one of the Qx relay outputs (configuration) is used for 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.

Heating circuit 3

Line no.	*Operating line*
5721	**Heating circuit 3** Off ¦ On

Heating circuit 3

Using this setting, heating circuit 3 can be switched on and off.

DHW

Selection	*Operating line*
5731	**DHW ctrl elem Q3** No charging request ¦ Charging pump ¦ Diverting valve
5734	**Basic position DHW div valve** Last request ¦ Heating circuit ¦ DHW

DHW ctrl elem Q3

No charging request
No DHW charging via Q3.

Charging pump
DHW charging is effected with a pump connected to terminal Q3.

Diverting valve
DHW charging is effected with a diverting valve connected to terminal Q3.

Basic position DHW div valve

Defines the basic position of the diverting valve (Q3) in the waiting state:

Last request
The diverting valve maintains the position assumed last.

Heating circuit
When there is no request for heat, the diverting valve assumes the "Heating circuit" position.

DHW
When there is no request for heat, the diverting valve assumes the "DHW" position.

The function acts only if "DHW ctrl elem Q3" is configured as "Diverting valve".

Separate DHW circuit

Line no.	*Operating line*
5736	**DHW separate 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.

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

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

Electric immersion heater

Selection	*Operating line*
5740	**Output el imm heater K6**

Defines the output of the electric immersion heater installed in the DHW storage tank.
The output entered is used for calculating the yearly performance factor.

Consumer circuits

Consumer circuits 1 and 2 can be used to operate as heating or cooling circuits (e.g. for a warm air curtain or cooling chamber).

The consumer circuit is activated when the demand signal (contact or DC 0...10 V) is parameterized at one of the Hx inputs **and** usage of the consumer circuit is selected. Usage of a pump is optional.

Line no.		*Operating line*
VK1	*VK2*	
5750	**5751**	**Consumer circuit 1, 2** Off ¦ Heating ¦ 4-pipe system cooling ¦ 2-pipe system cooling

Off
The consumer circuit is off.

Heating
The respective consumer circuit is used for heating purposes only.

4-pipe system cooling
The respective consumer circuit draws its cooling energy from the common cooling flow.

2-pipe system cooling
The respective consumer circuit draws its cooling energy from the common heating flow.

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

Heat source

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

Brine
When using geothermal energy, for example.

Water
When using ground, lake or river water, for example.

Air
When using air.

Externally
When using a heat source with external control. The external heat pump can be controlled via the X75 outputs.

The connection of heat pump sensors to the RVS... 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

Defines the way the heat pump produces cooling energy.

Off
No generation of refrigeration.

4-pipe system cooling
Refrigeration is produced actively or passively.

2-pipe system cooling
Refrigeration is always produced actively.

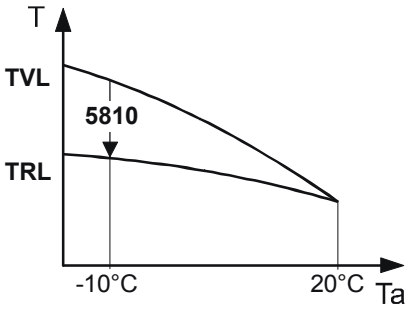
Differential HC at OT -10°C

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

For that, 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

⚠ 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. This choice only exists for plants without mixing heating circuit.

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

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

Electric immersion heater heat pump

Selection	*Operating line*
5811	**Output el imm heater K25**
5813	**Output el imm heater K26**

Defines the output of the electric immersion heaters installed in the heat pump's flow.

The output entered is used for calculating the yearly performance factor.

Solar

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

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, the flow can only pass through one heat exchanger at a time. Only alternative operation is possible.

When using a charging pump, the flow can pass through all heat exchangers at the same time. 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 for one of the two only.

Buffer storage tank

Line no.	*Operating line*
5870	**Combi storage tank** No ¦ Yes

No
If, hydraulically speaking, a combi storage tank is used, a partial diagram "Buffer storage tank" and partial diagram "DHW" become active in the device software. This means that with the combi storage tank, the functions are performed the same way as if buffer storage tank and DHW storage tank were separate.

Yes
The DHW request is always forwarded to the buffer storage tank, regardless of the setting for DHW storage tank with buffer storage tank. DHW pump Q3 is activated only when the temperature at buffer storage tank sensor B4 also lies under the DHW setpoint minus the switching differential.

During heat transfer, the DHW controlling element (Q3) is not switched on. The system allows a certain waiting time for the temperatures to level out.

Electric immersion heater buffer storage tank

Selection	*Operating line*
5872	**Output el imm heater K16**

Defines the output of electric immersion heater K16 installed in the buffer or combi storage tank. The output entered is used for calculating the yearly performance factor.

QX/ZX basic unit

The use of relay outputs 1...5 and triac output ZX6 can be individually defined.

Line no.	*Operating line*
5890 **5891** **5892** **5894** **5895** **5896**	**Relay output QX1, QX2, QX3, QX4, QX5,** **Triac output ZX6** **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦ Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83

Relay outputs QX...

None
The relay output is not assigned any function. The relay is deenergized.

Process revers 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" (line 2849, OEM), and deenergized, when the temperature drops by one switching differential (line 2850, OEM) below the setpoint. The type of contact (line 2851, OEM) can be selected.

El imm heater 1 flow K25
The relay is used to control an electric immersion heater installed in the flow (K25) or, in the case of a 2-stage electric immersion heater, to control the first stage.

⚠ The electric immersion heater must be equipped with a safety limit thermostat!

El imm heater 2 flow K26
The relay is used to control the second stage of an electric immersion heater installed in the flow (K26).

⚠ The electric immersion heater must be equipped with a safety limit thermostat!

Div valve cool source Y28
Control of optional diverting valve Y28 in the source circuit.
For changeover to passive cooling.

System pump Q14
The connected pump serves as a system pump which can be used to supply heat to other consumers.

The system pump is put into operation when one of consumers calls for heat. If there is no request for heat, the pump is deactivated followed by overrun.

Cascade pump Q25
Common pump for all heat sources in a cascade.

Heat gen shutoff valve Y4
If the buffer storage tank holds a sufficient amount of heat, the consumers can draw their heat from it (no need to put the heat sources into operation).

Automatic generation lock locks the heat sources and hydraulically disconnects them from the rest of the plant with the help of a diverting valve Y4.

This means that the heat consumers draw the energy they require 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 "El imm heater optg mode" (line 5660) and "El immersion heater release" (line 5061).

⚠ The electric immersion heater must be equipped with a safety limit thermostat!

ⓘ "El imm heater optg mode" must be appropriately set.

(DHW) Circulating pump Q4
The connected pump serves as a DHW circulating pump. The time schedule for the circulating pump can be set and adjusted via "Circulating pump release" (line 1660). "Circulating pump cycling" (line 1661) and "Circulation setpoint" (line 1663) can be set.

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 storage tank.

Depending on the hydraulic circuit, the transfer of heat can be effected either with charging pump Q3 or transfer pump Q11, which is specifically parameterized for this function.

The parameter settings for "Transfer strategy" (line 5130), "Comparison temp transfer" (line 5131) and "Transfer boost" (line 5021) apply to both plant configurations.

If a transfer pump Q11 is installed, charging pump Q3 is only used for recharging by the heat source.

ⓘ Heat transfer with Q11 is effected independently of function "With buffer" (line 5090).

ⓘ If a combi storage tank is used (see line 5870) and a transfer pump Q11 is defined, the "Transfer" function is active as well.

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 of the solar collector circuit.

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 exch K9" must be set at the multifunctional relay output (Qx).

If both a DHW and a buffer storage tank are installed, "External solar exchanger" (line 5841) must be set as well.

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 ("Solar controlling element", 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 ("Solar controlling element", line 5840).

El imm heater buffer K16
The relay is used for control of an electric immersion heater installed in the buffer storage tank.

⚠ **Important!**
Electric immersion heaters must be equipped with a safety limit thermostat.

Cons circuit pump VK1 Q15
Consumer circuit pump 1 can be used for an additional consumer.

Together with the respective external request for heat/cooling energy at input Hx, the application is suited for an air heating coil/air cooling coil, for instance.

Cons circuit pump VK2 Q18
Consumer circuit pump 2 can be used for an additional consumer.

Together with the respective external request for heat/cooling energy at input Hx, the application is suited for an air heating coil/air cooling coil, for instance.

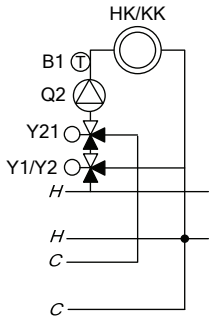
Swimming pool pump Q19
The connected pump is used for the swimming pool circuit. The respective heat request is made via one of the Hx inputs.

Heat circuit pump HC3 Q20
The relay is used for the control of heating circuit pump 3.

2nd pump speed HC1 Q21 /HC2 Q22/HC3 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:

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

Div valve HC/CC1 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 jointly used heating and cooling flow for changeover from heating to cooling when the heat pump is used not only for heating but also and **simultaneously** for cooling.



Example:
4-pipe system

Air dehumidifier K29
When room humidity rises, an external dehumidifier can be switched on. In this case, a humidity sensor must be connected to input Hx.
The functionality of the dehumidifier is independent of the functionality of cooling mode.

Operation of the dehumidifier is not affected by operating modes, holiday programs, presence button, etc.

Heat request K27
Release relay K27 is used together with control relay K32 for flow temperature control of the supplementary source (see lines 3690...3755).

Refrigeration request K28
Output K28 is activated whenever there is a request for refrigeration. This can be used to switch on an external refrigeration machine.

In the case of the device with address 1, a request for refrigeration from the system can also activate output K28. For that, the "Refrigeration request" (line 6627) on operating page "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 (line 6612).

When the fault is corrected, that is, when the error message is no longer present, the contact opens with no delay.

If the fault cannot immediately be rectified, it is still possible to reset the alarm relay. This is made via operating line 6710.

Time program 5 K13
The relay switches any connected plant component at the points in time set in time program 5 (lines 601...616).

Heat circuit pump HC1 Q2
The connected pump serves as circulating pump for heating circuit 1.

DHW ctrl elem Q3
Depending on the hydraulic system in use, output Q3 serves for control of a connected DHW charging pump or diverting valve.

Source pump Q8/fan K19
Source pump for brine-to-water or water-to-water heat pumps.
Fan for air-to-water heat pumps.

Condenser pump Q9
The relay is used for control of the condenser pump.

Compressor stage 1 K1
The relay is used for control of the first compressor stage.

Suppl source control K32
Control relay K32 is used together with release relay K32 for control of the supplementary source (see lines 3690...3755).

The control relay provides 2-position control of the supplementary source to the setpoint of the selected control sensor.

Heat circuit pump HC2 Q6
The connected pump serves as circulating pump for heating circuit 2.

Instant WH ctrl elem Q34
The connected pump serves as circulating pump for the instantaneous water heater.

Cooling circ pump CC1 Q24
The connected pump serves as circulating pump for heating circuit 1.

Solid fuel boiler pump Q10
Connection of a solid fuel boiler requires a circulating pump for the boiler circuit.

Crankcase heater K40
The relay is used for the crankcase heater of the compressor.

Drip tray heater K41
The relay is used for the drip tray heater of the evaporator.

Valve evaporator K81
The relay is used for the magnetic valve of the superheat controller.

Valve EVI K82
The relay is used for the magnetic valve of vapor injection.

Valve injection capillary K83
The relay is used for the magnetic valve of saturated vapor injection.

Invalid settings

The following settings are invalid and do not provide any functions:

Div valve HC/CC2 Y45, Div valve HC/CC3 Y46, Cooling circ pump CC2 Q28, Cooling circ pump CC3 Q29, Flue gas relay K17, Assisted firing fan K30

Function output ZX6-Mod

Line no.	*Operating line*
5911	**Function output ZX6-Mod** **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ Compressor modulation

This setting determines the pump to be modulated.
Modulation is effected via a triac (full-wave control).

⚠ Observance of the minimum and maximum loads according to the technical data is mandatory.

BX basic unit

Line no.	*Operating line*
5930, 5931	**Sensor input BX1, BX2** None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Source inlet sensor B91 ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87

The settings for the sensor inputs determine the basic plant diagrams and extra functions. For more information, refer to chapter "Plant diagrams".

Sensor input BX3, BX4

Line no.	*Operating line*
5932, 5933	**Sensor input BX3, BX4** None ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72

The settings for the sensor inputs determine the basic plant diagrams and the extra functions. For more information, refer to chapter "Plant diagrams".

The operating lines determine the function of input H1 or H3.

Line no.	*Operating line*
5950 **5960**	**Function input H1, H3** Optg mode change HCs+DHW ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V

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Changeover of operating mode (digital)

Heating circuits/ cooling circuit

The current operating mode of the respective heating circuit(s)/cooling circuit is changed to the setting made under "Operating mode changeover" (Protection, Reduced, Comfort, Automatic) when contact Hx closes.

The settings are made on the following operating lines:

- Line 900 "Optg mode changeover" for heating circuit 1
- Line 969 "Optg mode changeover" for cooling circuit 1
- Line 1200 "Optg mode changeover" for heating circuit 2
- Line 1500 "Optg mode changeover" for heating circuit 3
- Line 1680 "Optg mode changeover" for DHW heating

When the contact opens, the various consumers resume the operating mode initially selected.

The contact serves for remote control of the operating mode (e.g. via a remote telephone switch). When the contact is closed, local operation of the operating mode is locked.

Settings referring to heating circuit 1 always denote "Heating circuit 1/cooling circuit 1".

DHW

The current operating mode of DHW charging changes to the setting made under "Optg mode changeover" (off, on) when contact Hx is closed. DHW charging is only changed when using setting "HCs+DHW" or "DHW". When DHW charging is switched off, frost protection is still ensured.

Error/alarm message (digital)

By closing input Hx, an external error message can be forwarded and displayed.

Consumer request VK1 and VK2 (digital)
When input Hx closes, a consumer request (heating or cooling) is forwarded to the controller. The value of the request is set on operating line 1859 or 1909.

A voltage-proportional temperature request is made with settings "Consumer request VK1 10V" and "VK2 10V".

Release swi pool source heat (digital)
When input Hx closes (e.g. via a manual switch), swimming pool heating is released. Heating is provided by the heat sources.

Release swi pool solar (digital)
When using **1** Hx input, solar swimming pool heating can be released from a remote location (e.g. via a manual switch).

When using **2** Hx inputs, the charging priority of swimming pool heating against the storage tanks can be defined (for function description, refer to "Charging priority solar", line 2065).

Operating level DHW
When the contact closes, the operating level changes to "Reduced".

Operating level HC1, HC2, HC3 (digital)
If the selected heating circuit operates in "Automatic" mode and the respective contact is closed, a change to the "Reduced" level is made.

When the contact closes, cooling circuit 1 changes from "Automatic" mode to "Off".

The setting can be used to control the heating circuits/cooling circuit via an external time switch, for instance.

Room thermostat HC1, HC2, HC3
A connected room thermostat sends the Hx input a signal "Demand" or "No demand".

If there is demand for heat in "Comfort" mode, the room thermostat forwards a heat request for the respective heating circuit to ensure control to the flow temperature setpoint selected under "Flow temp setpoint room stat" (line 742 for HC1, 1042 for HC2, and 1342 for HC3).

DHW flow switch (digital)
A DHW flow switch is connected to the respective input; it detects flow to the point of consumption.
This enables the controller to detect the start and end of DHW consumption.

Pulse count (pulse input)
Pulse count input for the connection of electricity, gas, heat or flow meters.

Parameter "Contact type Hx" has no meaning in terms of pulse counting.

Dewpoint monitor (digital)
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 circuit is released when the dewpoint monitor becomes inactive and an adjustable locking time (line 946) has elapsed.

Flow temp setp incr hygro (digital)
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" (line 947).

Swi-on command HP stage 1 (digital) (heating only)
By closing a contact connected to this input (e.g. by an external controller or a superposed building automation and control system), 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 and requests forwarded via bus are suppressed. Minimum off times are observed. The prerun and overrun times of the condenser pump and source pump are taken into account. Defrosting is normally possible.

Status info suppl source (digital)
The contact's closing informs the controller that the supplementary source has been successfully started. Also refer to setting "Delay lockout position" (line 3755).

Charg prio DHW sol fuel boil
When the contact closes, the DHW storage tank is charged by the solid fuel boiler.

Flow measurement Hz (frequency input)
The controller receives a signal for the flow measured.
The respective flow is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/function value 2).

Consumer request VK1 10V and Consumer request VK2 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the heat/refrigeration demand (flow temperature) of consumer circuit 1 or 2.

The required flow temperature is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/function value 2).

A constant temperature request via contact is made with settings "Consumer request VK1" and "VK2".

Pressure measurement 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the pressure.
The respective pressure value is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/ function value 2).

Rel room humidity 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the relative room humidity.

The respective room humidity value is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/ function value 2).

Room temp 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the room temperature. The room temperature (together with the relative room humidity) is used primarily to calculate the dewpoint in the cooling circuit.

If there is no room unit with a room sensor connected for heating/cooling circuit 1 (via BSB), the room temperature acquired via Hx is also used for space heating/space cooling 1 (compensation variant and room influence).

The respective room temperature is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/function value 2).

Flow measurement 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the flow measured.

The respective flow is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/function value 2).

Temp measurement 10V (analog input)
The controller receives a voltage signal (DC 0...10 V) for the acquired temperature.

The respective temperature is calculated via the linear characteristic which is defined by 2 fixed points (input value 1/function value 1 and input value 2/function value 2).

Usage of the acquired temperature is defined via parameter "Temperature sensor H1 or H3" (lines 5957 and 5967) of the controller.

Contact type H1 and H3

Line no.	*Operating line*
5951 **5961**	**Contact type H1, H3** NC ¦ NO

Contact type H1, H3

NC
The contact is normally closed and must be opened to activate the selected function.

NO
The contact is normally open and must be closed to activate the selected Hx function.

Input/function value H1 and H3

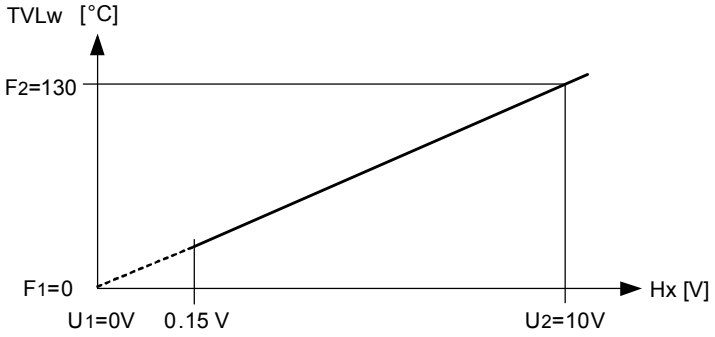
Line no.	*Operating line*
5953, 5963	**Input value 1 H1, H3**
5954, 5964	**Function value 1 H1, H3**
5955, 5965	**Input value 2 H1, H3**
5956, 5966	**Function value 2 H1, H3**

Input value 1
Function value 1
Input value 2
Function value 2

These settings are available for each Hx input.

The linear characteristic is defined via 2 fixed points. The setting is made with 2 pairs of parameters for input value and function value.

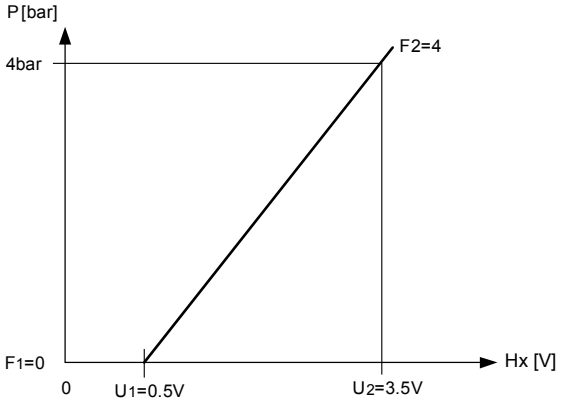
Example of consumer circuit request VK1 10V



TVLw Flow temperature setpoint
Hx Input value at Hx
U1 Input value 1
F1 Function value 1
U2 Input 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.

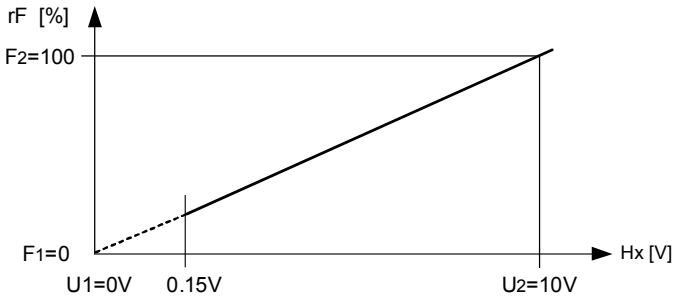
Example of pressure measurement 10 V



P Pressure value
Hx Input value at Hx
U1 Input value 1
F1 Function value 1
U2 Input value 2
F2 Function value 2

If the measured value lies below 0.15 V, it is regarded invalid.

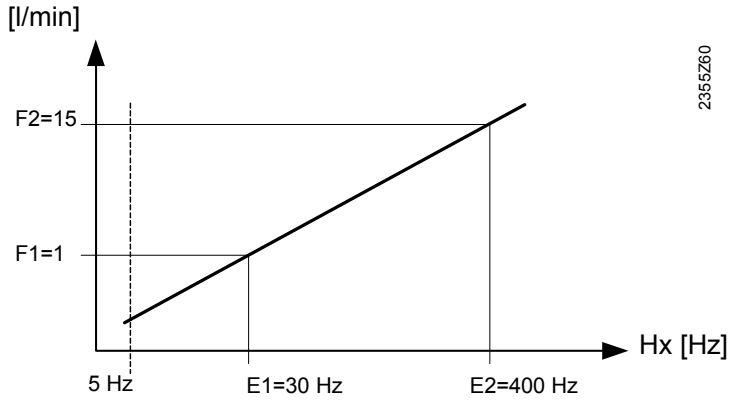
Example of relative room humidity 10 V



r.h. Relative humidity
Hx Input value at Hx
U1 Input value 1
F1 Function value 1
U2 Input value 2
F2 Function value 2

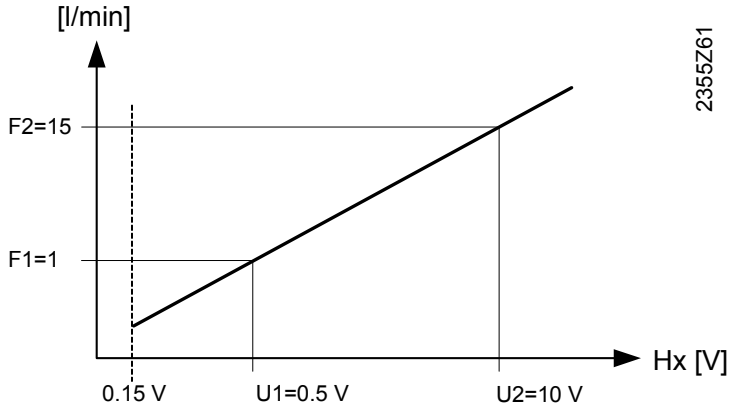
If the measured value lies below 0.15 V, it is regarded invalid.

Example of flow measurement Hz



l/min	Flow rate in liters/minute
Hx	Input value at Hx
E1	Input value 1 [Hz]
F1	Function value 1
E2	Input value 2 [Hz]
F2	Function value 2

Example of flow measurement 10 V



l/min	Flow rate in liters/minute
Hx	Input value at Hx
E1	Input value 1
F1	Function value 1
E2	Input value 2
F2	Function value 2

If the measured value lies below 0.15 V (or 5 Hz), it is seen as "No flow".

Temperature sensors at H1 and H3

Line no.	*Operating line*
5957 **5967**	**Temperature sensor H1, H3** None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71

Defines the temperature acquired by the sensor connected to input H1 or H3. The controller uses the acquired temperature to control the respective plant component.

If, for temperature acquisition, the same sensor is defined at Bx and Hx, the sensor at Bx is given priority.

This operating line is used to define the function of inputs Ex (230 V).

Line no.	*Operating line*
5980 **5982** **5984** **5986**	**Function input EX1, EX2, EX3, EX4** None ¦ Electrical utility lock E6 ¦ Low-tariff E5 ¦ Overload source 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-pressure switch E9 ¦ High-pressure switch E10 ¦ Overload compressor 1 E11 ¦ Error/alarm message ¦ Mains supervision E21

Function input EX1, EX2, EX3, EX4

None
Activation of input Ex has no impact.

Electrical utility lock E6
Takes an external locking signal (e.g. from the electrical utility) for the heat pump and locks the heat pump. 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. Electric immersion heaters are locked during the electrical utility lock.

Low-tariff E5
The low-tariff signal delivered by the electrical utility can be routed via an Ex input. When the input is activated, forced charging of the buffer storage tank 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 source E14
Takes the overload message delivered by the source pump/fan. When the contact closes, the controller switches the heat pump off. For the heat pump to resume operation, the minimum off time must have elapsed.

If "Overload source" responds several times within the preset "Duration error repetition", the controller locks the heat pump. Operation can only be resumed by making a reset.

Pressure switch source E26
Takes the signal delivered by pressure switch source. If, during source pump operation, the contact closes for at least 3 seconds, preselected monitoring (always or in heating mode only) is active and the prerun time has elapsed, the heat pump is shut down.

When "Min off time" has elapsed, 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 E15
Takes the signal delivered by flow switch source. If, during source pump operation, the contact closes for at least the preset delay time (line 2895), 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.

When "Min off time" has elapsed, the heat pump is switched on again. If the flow switch trips again within "Duration error repetition", the heat pump goes to lockout.

Flow switch consumers E24
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 (line 2895), the flow switch signal is pending.

When "Min off time" has elapsed, the heat pump is switched on again. If the flow switch trips again within "Duration error repetition", the heat pump goes to lockout. Operation can only be resumed by making a reset.

Manual defrost E17
Manual defrost is triggered by activating the appropriately defined Ex input.

Common fault HP E20
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" (line 2843) must have elapsed.

Fault soft starter E25
Takes the fault status signal delivered by an external compressor soft starter.
In the event of an active fault, the controller switches the compressor off.

When the fault status message is no longer present, the heat pump is released again.

Low-pressure switch E9
Input of a low-pressure switch (AC 230 V) upstream of the compressor.

High-pressure switch E10
Input of a high-pressure switch (AC 230 V) downstream from the compressor.

Overload compressor 1 E11
Input of an overload protection signal (AC 230 V) at compressor 1.

Error/alarm message
Input of an external error/alarm signal (AC 230 V).

Mains supervision E21
For mains supervision, the phase must be connected to the appropriately defined Ex input. Mains supervision monitors power supply to the compressor.

If a mains fault is continuously present during the period of time set under "Delay mains fault" (line 2894), the compressor is shut down for the minimum off time. The controller delivers error message "Mains fault".

If the mains fault occurs again within "Duration error repetition" (line 2889, OEM) for at least the delay time, the heat pump initiates lockout, if the preselected number of faults have been exceeded.

The controller delivers error message 385:Mains undervoltage.

The heat pump must be manually reset.

Mixing group 1 basic unit

Line no.	*Operating line*
6014	**Function mixing group 1** **Multifunctional** ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Ret temp contr sol fuel boil

Terminals BX4, QX1, QX2 and QX5 are assigned as follows, depending on the setting of parameter 6014:

Function mixing group 1	*Terminal BX4*	*Terminal QX1*	*Terminal QX2*	*Terminal QX5*
None	Without function	Without function	Without function	Without function
Multifunctional	BX4	QX1	QX2	QX5
Heating circuit 1	B1	Y1	Y2	Q2
Heating circuit 2	B12	Y5	Y6	Q6
Heating circuit 3	B14	Y11	Y12	Q20
Primary contr/system pump	B15	Y19	Y20	Q14
DHW primary controller	B35	Y31	Y32	Q3
Instantaneous water heater *	B38	Y33	Y34	Q34
Cooling circuit 1	B16	Y23	Y24	Q24
Heating circ/cooling circ 1	B1	Y1	Y2	Q2
Ret temp contr sol fuel boil	B72	Y9	Y10	Q10

* DHW flow switch (FS) ready connected to H1

Multifunctional
With setting "Multifunctional", the terminals intended for use with the mixing group (BX4, QX1, QX2 and QX5) can be used for other applications.
Potential functions that can be assigned to these multifunctional inputs/outputs are shown on operating lines 6371...6384 and 6391...6394.

Heating circuit 1...3
For settings, refer to chapter "Heating circuits".

Primary contr/system pump
For settings, refer to chapter "Primary controller/system pump".

DHW primary controller
For settings, refer to chapter "DHW".

Instantaneous water heater
For settings, refer to chapter "Instantaneous water heater".

Cooling circuit 1
For settings, refer to chapter "Cooling circuit".

Heating circ/cooling circ 1
For settings, refer to chapters "Heating circuits" and "Cooling circuit".

Ret temp contr sol fuel boil
For settings, refer to chapter "Solid fuel boiler".

Line no.		*Operating line*
UX1	*UX2*	
6070	**6078**	**Function output UX1 and UX2** **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82
6071	**6079**	**Signal logic output UX1 and UX2** Standard ¦ Inverted
6072	**6080**	**Signal output UX1 and UX2** 0..10V ¦ PWM
6075	**6084**	**Temp value 10V UX1 and UX2**

Function output UX1/2

Voltage- or PWM-modulated output for speed control of pumps or for temperature and/or output requests.

Speed-controlled pumps
The output signal at Ux corresponds to the speed required for the selected pump.

⚠ If the pump is controlled in a way that voltage output Ux modulates while a triac output (ZX6, ZX34) switches power on and off, it must be made certain that modulation of the triac output is switched off ("None", see lines 5911 and 6384).

HP setpoint
The output signal at Ux corresponds to the heat pump setpoint for heating or cooling.

Output request
The output signal at Ux is proportional to the demand via the common flow.

Heat request and Refrigeration request
The output signal at Ux corresponds to the common flow temperature setpoint.

Compressor modulation
The output signal at Ux corresponds to the required compressor output.

Expansion valve evapor V81
The output signal at Ux corresponds to the required position of the electronic expansion valve for superheat control.

Expansion valve EVI V82
The output signal at Ux corresponds to the required position of the electronic expansion valve for vapor injection.

Signal logic output UX1/2

The voltage signal can be inverted. This means that inverted signal logic can also be used to control variable speed pumps or equipment receiving the temperature request.

Signal output UX1/2

Determines whether the signal shall be delivered as a DC 0...10 V signal or pulse width-modulated signal (PWM).

Temp value 10V UX1/2

This operating line is used to define the maximum temperature request (corresponding to 10 V).

Sensor types/readjustments

Line no.	*Operating line*
6097	**Sensor type collector**
6098	**Readjustm collector sensor**
6099	**Readjustm coll sensor 2**
6100	**Readjustm outside sensor**
6104	**Sensor type solar flow/ret**

Sensor type collector

Selection of the type of sensor for B6 and B61. The controller uses the respective temperature characteristic.

For tables showing the temperatures and corresponding resistances, refer to chapter "Sensor characteristics" at the end of the document.

Sensor readjustmentsThe measured value of the temperature sensors can be readjusted by +/- 3 K.

Sensor type solar flow/ret

Selection of the type of sensor for B63 and B64. The controller uses the respective temperature characteristic.

For tables showing the temperatures and corresponding resistances, refer to chapter "Sensor characteristics" at the end of the document.

Building and room model

Line no.	*Operating line*
6110	**Time constant building**

As the outside temperature varies, the room temperature changes at different rates, depending on the type of building construction .

The above setting is used to adjust the rate of response of the flow temperature setpoint when the outside temperature varies.

Example

> 20	Room temperature responds more slowly to outside temperature variations
10...20	This setting is suited for most types of buildings
< 10	Room temperature responds more quickly to outside temperature variations

Setting "0"

The function is deactivated. The attenuated as well as the mixed temperature are the same as the current outside air temperature.

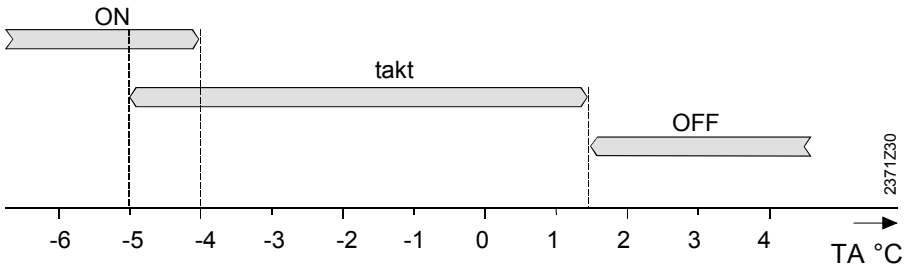
Line no.	*Operating line*
6120	**Frost protection plant** Off ¦ On

The following pumps can be activated depending on the current outside temperature, even if there is no request for heat.

The pumps‘ behavior can be individually selected.

Heating circuit pumps	Q2,Q6,Q20
Cooling circuit	Q24
Consumer circuits	Q15, Q18
Swimming pool circuit	Q19
System pump	Q14
Condenser pump	Q9
Solid fuel boiler pump	Q10

Outside temperature	*Pump*	*Diagram*
... -4 °C	Continuously on	ON
-5...1.5 °C	10 minutes on at intervals of about 6 hours	takt (cycle)
1.5 °C...	Continuously off	OFF



Line no.	*Operating line*
6135	**Air dehumidifier** Off ¦ On
6136	**Release air dehumidifier** 24h/day ¦ Time program HC ¦ Time program 5
6137	**Air dehumidifier r.h. on**
6138	**Air dehumidifier r.h. SD**
6139	**Acquisition room r.h.** None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

Air dehumidifier

Activates and deactivates the "Air dehumidification" function.

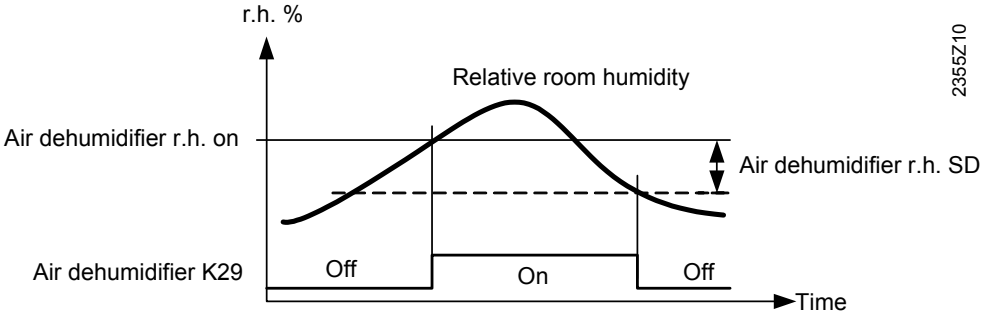
Release air dehumidifier

24h/day
The dehumidifier is released 24 hours a day.

Time program HC
The dehumidifier is released according to the time program of heating circuit 1.

Time program 5
The 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 dehumidifier is switched on.

Air dehumidifier r.h. SD

If the relative humidity falls below "Air dehumidifier r.h. on" by the switching differential set here, the dehumidifier is switched off again.

Acquisition room r.h.

The relative room humidity is acquired via one of the Hx inputs using setting "Rel room humidity 10V".

To configure the measurement of relative room humidity, operating line 6139 must then refer to such an Hx input.

Static pressure supervision

Line no.			Operating line
1	2	3	
6148	**6154**	**6184**	**Static press supervision 1, 2, 3** None ¦ With input H1 ¦ With input H2 module 1 ¦ With input H2 module 2 ¦ With input H2 module 3 ¦ With input H21 module 1 ¦ With input H21 module 2 ¦ With input H21 module 3 ¦ With input H22 module 1 ¦ With input H22 module 2 ¦ With input H22 module 3 ¦ With input H3 ¦ With input H31 ¦ With input H32 ¦ With input H33

Static press supervision 1, 2, 3

Defines the Hx input to be used for the respective static pressure supervision.

The Hx input must be appropriately defined and a pressure sensor must be connected.

Parameter reset

Line no.	Operating line
6200	**Save sensors**

Using this setting, the sensors can immediately be stored. This is necessary when, for instance, a sensor is removed because it is no longer needed.

At midnight, the controller stores the states at the sensor terminals, provided the controller has previously been in operation for at least 2 hours.
If, after storage, a sensor fails, the controller delivers an error message.

Line no.	Operating line
6201	**Reset sensors**

This setting is used to clear the stored state of the sensors.

The sensors are read in again using function "Save sensors" (line 6200), or automatically at midnight, provided the controller has previously been in operation for at least 2 hours.

Parameter reset

Line no.	Operating line
6204	**Save parameters**

The current parameter settings can be stored as new default settings. Exempted from this are the settings made on the OEM level, the time of day and date, the operator section, wireless and all time programs, plus the number of hours run and the various meters.

Caution!
With this process, the factory settings are overwritten and can no longer 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 operating pages: "Time of day and date", "Operator section", "Wireless", and all time programs, plus the number of hours run and the various meters.

Plant diagram

Line no.	*Operating line*
6212	**Check no. heat source 1**
6213	**Check no. heat source 2**
6215	**Check no. storage tank**
6217	**Check no. heating circuits**

Check numbers

To identify the current plant diagram, the controller generates a check number.

The check number is made up of the lined up partial diagram numbers (without the preceding zeros).

Structure of check numberEvery check number consists of 3 columns, each representing the application of a plant section. Every column is shown with 2 digits. All preceding zeros before the first numeral deviating from zero are hidden.

	1st column 2 digits	*2nd column 2 digits*	*3rd column 2 digits*
Line 6212	Blank	Solar	00
Line 6213	Blank	Solid fuel boiler	Heat pump
Line 6215		Buffer storage tank	DHW storage tank
Line 6217	Heating circuit 3	Heating circuit 2	Heating circuit 1/cooling circuit 1

The following tables show the meaning of the numbers on the lines:

Check no. heat source 1

Solar						
1 collector field with sensor B6 and collector pump Q5	2 collector fields with sensors B6 and B61 and collector pumps Q5 and Q16	Storage tank charging pump buffer K8	Solar diverting valve buffer K8	Solar charging pump swimming pool K18	Solar diverting valve swimming pool K18	External solar heat exchanger pump K9 DHW = domestic hot water B = buffer
0		No solar plant				
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

* The DHW storage tank is charged via collector pump Q5

Check no. heat source 2: Solid fuel boiler

	Solid fuel boiler
0	No solid fuel boiler
1	Solid fuel boiler, boiler pump
2	Solid fuel boiler, boiler pump, integration DHW storage tank

Check no. heat source 2: Heat pump

Heat pump	
0	No heat pump
10	Brine-to-water heat pump, 1-stage
14	Brine-to-water heat pump, 1-stage, with passive cooling
18	Brine-to-water heat pump, 1-stage, with process reversing valve
22	Brine-to-water heat pump, 1-stage, with process reversing valve and passive cooling
30	Water-to-water heat pump, 1-stage
34	Water-to-water heat pump, 1-stage, with passive cooling
38	Water-to-water heat pump, 1-stage, with process reversing valve
42	Water-to-water heat pump, 1-stage, with process reversing valve and passive cooling
50	Air-to-water heat pump, 1-stage, with process reversing valve
60	Heat pump, 1-stage, for external monitoring

Check no. storage tank

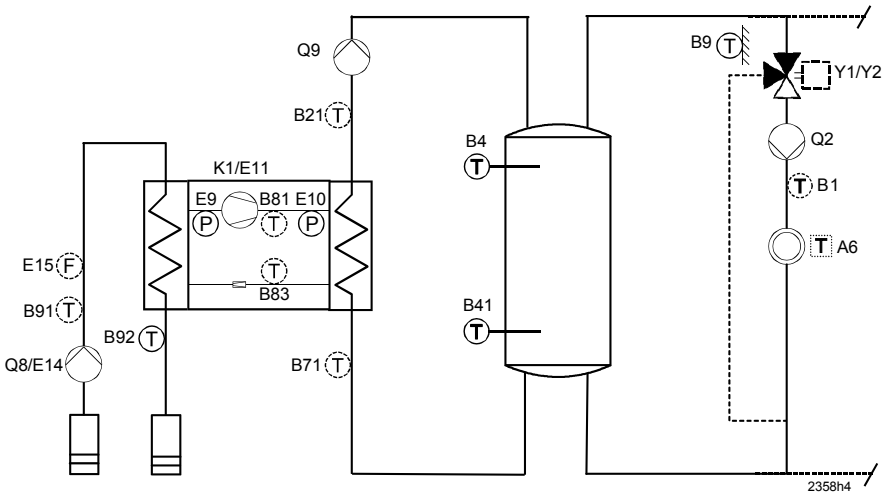
Buffer storage tank		DHW storage tank	
0	No buffer storage tank	00	No DHW storage tank
1	Buffer storage tank	01	Electric immersion heater
2	Buffer storage tank, solar connection	02	Solar connection
4	Buffer storage tank, heat source shutoff valve	04	charging pump
5	Buffer storage tank, solar connection, heat source shutoff valve	05	Charging pump, solar connection
		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 3		Heating circuit 2		Heating circuit 1	
0	No heating circuit	00	No heating circuit	00	No heating circuit
2	Heating circuit pump	02	Heating circuit pump	01	Circulation via boiler pump
3	Heating circuit pump, mixing valve	03	Heating circuit pump, mixing valve	02	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:

Line 6213	Check no heat source 2	**30**
Line 6215	check no. storage tank	**100**
Line 6217	Check no. heating circuits	**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 unit was produced.
The first 2 digits denote the software version, the third digit indicates the software upgrade (e.g. 01.0).

Hardware configuration

Line no.	*Operating line*
6358	**Voltage output GX1** 5 Volt ¦ 12 Volt

Defines the voltage used by the controller for powering the external sensor.

Defines usage of the Qx relay outputs on the I/O module .

Line no.	*Operating line*
6371 **6372** **6373** **6374** **6375**	**Relay output QX31, QX32, QX33, QX34, QX35,** **Triac output ZX34** **None** ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦ Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83

See function descriptions, operating line "Relay output QX1".

Function output ZX34-Mod

This setting determines the pump to be modulated.
Modulation is effected via triac control (full-wave control).

Line no.	*Operating line*
6384	**Function output ZX34-Mod** **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ Compressor modulation

⚠ Observance of the minimum and maximum loads according to the technical data is mandatory.

Defines usage of the Bx sensor inputs on the I/O module .

Line no.	*Operating line*
6391 **6394**	**Sensor input BX31, BX34** **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72

See function descriptions, operating line "Sensor input BX1".

Line no.	*Operating line*
6392 **6393**	**Sensor input BX32, BX33** **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87

See function descriptions, operating line "Sensor input BX1".

HX on I/O module

Line no.			*Operating line*
H31	*H32*	*H33*	
6400	**6410**	**6420**	**Function input H31...H33 on I/O module** Optg mode change HCs+DHW ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V
6401	**6411**	**6421**	**Contact type H31...H33 on I/O module** NC ¦ NO
6403	**6413**	**6423**	**Input value 1 H31...H33 on I/O module**
6404	**6414**	**6424**	**Function value 1 H31...H33 on I/O module**
6405	**6415**	**6425**	**Input value 2 H31...H33 on I/O module**
6406	**6416**	**6426**	**Function value 2 H31...H33 on I/O module**
6407	**6417**		**Temperature sensor H31...H32 on I/O module** None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71

The settings for inputs H31, H32 and H33 on the I/O module correspond to a large extent those for inputs H1 and H3 on the controller. For descriptions, refer to operating line "Function input H1, H3" and following.

Mixing group on I/O module

I/O module AVS55 features a mixing group consisting of flow sensor, mixing valve open/close and pump. This mixing group 31 can be used for different applications.

Line no.	*Operating line*
6455	**Function mixing group 31** **Multifunctional** ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Ret temp contr sol fuel boil

Terminals BX4, QX31, QX32 and QX33 are assigned as follows, depending on the setting of parameter 6455:

Function mixing group 31	*Terminal BX31*	*Terminal QX31*	*Terminal QX32*	*Terminal QX33*
None	Without function	Without function	Without function	Without function
Multifunctional	BX31	QX31	QX32	QX33
Heating circuit 1	B1	Y1	Y2	Q2
Heating circuit 2	B12	Y5	Y6	Q6
Heating circuit 3	B14	Y11	Y12	Q20
Primary contr/system pump	B15	Y19	Y20	Q14
DHW primary controller	B35	Y31	Y32	Q3
Instantaneous water heater *	B38	Y33	Y34	Q34
Cooling circuit 1	B16	Y23	Y24	Q24
Heating circ/cooling circ 1	B1	Y1	Y2	Q2
Ret temp contr sol fuel boil	B72	Y9	Y10	Q10

* DHW flow switch (FS) ready connected to H1

Multifunctional
With setting "Multifunctional", the terminals intended for use with the mixing group (QX31, QX32, QX33 and BX31) can be used for other applications.
Potential functions that can be assigned to these multifunctional inputs/outputs are shown on operating lines 6371...6384 and 6391...6394.

Heating circuit 1...3
For the respective settings, see chapter "Heating circuits".

Primary contr/system pump
For the respective settings, see chapter "Primary controller/system pump".

DHW primary controller
For the respective settings, see chapter "DHW".

Instantaneous water heater
For the respective settings, see chapter "Instantaneous water heater".

Cooling circuit 1
For the respective settings, see chapter "Cooling circuit".

Heating circ/cooling circ 1
For the respective settings, see chapters "Heating circuits" and "Cooling circuit".

Ret temp contr sol fuel boil
For the respective settings, see chapter "Solid fuel boiler".

6.19 LPB

Address/power supply

Line no.	*Operating line*
6600	**Device address**
6601	**Segment address**
6604	**Bus power supply function** Off ¦ Automatic
6605	**Bus power supply state** Off ¦ On

Device address and segment address

The controller's LPB address consists of two 2-digit numerals.

Example

14	16
Segment address	Device address

Bus power supply function

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 controller.

Automatic
Bus power supply (LPB) via controller is automatically switched on and off depending on the power 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 controller is currently inactive.

On
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 HCs in segment ¦ All HCs in system
6627	**Refrigeration request** Locally¦ Centrally
6630	**Cascade master** Always ¦ Automatically
6632	**Note OT limit ext source** No ¦ Yes

These settings only apply to device address 1.

Action changeover functions

The range of action for the central changeover functions can be defined.
This applies to the following changeover actions:

- Operating mode changeover via input Hx (with setting "Centrally" on line 6623)
- Summer changeover (when selecting "Centrally" on line 6621)

Choice of settings:

Segment
Changeover takes place with all controllers in the same segment.

System
Changeover is effected with all controllers in the entire system (that is, 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:

Locally
Local action; the local heating circuit is switched on and off according to operating lines 730, 1030, and 1330.

Centrally
Central action: Depending on the setting made on operating line "Action changeover functions", either the heating circuits in the segment or those of the entire system are switched on and off according to operating line 730.

Optg mode changeover

The range of action of operating mode changeover via input Hx is as follows:

Locally
Local action; the local heating circuit is switched on and off

Centrally
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 and off.

DHW assignment

DHW assignment defines the heating circuits of which the operating state for the control of DHW heating (forward shift for charging, operation of circulating pump, "Holiday" function) shall be considered.

Local HCs
DHW heating only considers own, controller-internal heating circuits.

All HCs in segment
DHW heating considers the heating circuits of the controllers in the same segment.

All HCs in system
DHW heating considers the heating circuits of all controllers in the system.

Refrigeration request

A Qx output parameterized as "Refrigeration request K28" delivers a refrigeration request. Depending on setting "Refrigeration request", 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.

Locally
Only cooling circuit 1 is considered.

Centrally
Consideration is given to the refrigeration requests from the entire system.

Cascade master

The "Cascade" menu (lines 3510...3590) can always be shown, or only under certain conditions.

Always
The "Cascade" menu is always shown, irrespective of the number of producers installed.

Automatically
The "Cascade" menu is only shown when several producers are installed.

Note OT limit ext source

Additional producers connected via LPB can be locked or released according to their own parameters based on the outside temperature (e.g. air-to-water heat pump). This state is distributed via LPB. In a cascaded system, the master therefore knows whether or not an additional producer (slave) according to own operating limits (outside temperature) is available so that it can be switched on, if required.

No
The Ecobit of the external source is not considered.

⚠ Caution: If another heat source with an LMU boiler management unit (slave) is connected as an additional producer, this parameter must be set to "No"!

Yes
The Ecobit of the external producer is considered and the cascade is controlled according to the available producers.

Clock

6640	**Clock mode** Autonomously ¦ Slave without remote setting ¦ Slave with remote setting ¦ Master
6650	**Outside temp source**

Clock mode

This setting defines the action of the system time on the controller's time settings. The effects are as follows:

Autonomously
The time of day can be readjusted on the controller.
The controller's time of day is not matched to the system time.

Slave without remote setting
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 setting
The time of day can be readjusted on the controller; at the same time, the system time is adapted since the change is adopted from the master.
Nevertheless, the controller's time of day is automatically and continuously matched to the system time.

Master
The time of day can be readjusted on the controller.
The time of day on the controller is used for the system: The system time is adapted.

Outside temp source

The LPB plant requires only 1 outside sensor. This sensor is connected to any controller and delivers via LPB the signal to the controllers with no sensor.
The first numeral that appears on the display is the segment number followed by the device number.

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 HP

Pending error messages from the heat pump are reset via 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

This function can be used for monitoring adherence to the required flow temperature.

If the flow temperature deviates constantly from the required level for more than the period of time set, an error message is delivered. If, during an active alarm, the setpoint is maintained again, the error message is cleared.

An alarm message can be delivered if, within a parameterized time, the DHW storage tank cannot be charged to a temperature level at least within the switching differential.

Line no.	*Operating line*
6740	**Flow temp 1 alarm**
6741	**Flow temp 2 alarm**
6742	**Flow temp 3 alarm**
6745	**DHW charging alarm**
6746	**Flow temp cooling 1 alarm**

The temperatures are constantly monitored. If an actual value deviates from the setpoint for a period of time exceeding the time set here, an alarm is delivered, including display of the associated error message.

Error code 121: Flow temperature heating circuit 1 too low (line 6740)
Error code 122: Flow temperature heating circuit 2 too low (line 6741)
Error code 371: Flow temperature heating circuit 3 too low (line 6742)
Error code 126: Monitoring DHW charging (line 6745)
Error code 357: Flow temperature cooling circuit not reached (line 6746)

The flow temperature is considered maintained if the deviation from the setpoint is less than 1 K. If the flow temperature setpoint is reduced by more than 4 K, the monitoring function will be deactivated until the flow temperature has dropped to the new setpoint.
The function is also passive if the heating circuit pump is off due to an "ECO" function or quick setback.

Error history

Line no.	Operating line
6800...6819	**[Time stamp and error history 1...10]**

The controller stores the last 10 errors in a nonvolative error memory. Any additional entry clears the oldest entry in the memory.
For each error entry, error code and time of occurrence are stored.

The ACS 700 PC tool can be used to display the relevant actual values, setpoints and relay outputs for each error.

Error list

The following error messages can occur:

No.:Error text	*Place*	*Error*	*Acknow-ledgement*	*Function error repetition*		*Heat pump operation*	*Responsibility*
		prio	*manually*	*active*	*1st status message*		*No.*
10:Outside sensor	B9	6	No	No	---	Yes	1 (installer)
25:Boiler sensor solid fuel	B22	6	No	No	---	Yes	1 (installer)
26:Common flow sensor	B10	6	No	No	---	Yes	1 (installer)
28:Flue gas temp sensor	B8	6	No	No	---	Yes	1 (installer)
30:Flow sensor 1	B1	6	No	No	---	Yes	1 (installer)
31:Flow sensor cooling 1	B16	6	No	No	---	Yes	1 (installer)
32:Flow sensor 2	B12	6	No	No	---	Yes	1 (installer)
33:Flow sensor HP	B21	6	No	No	---	Yes	1 (installer)
35:Source inlet sensor	B91	9	No	No	---	No (param.)	1 (installer)
36:Hot-gas sensor 1	B81	6	No	No	---	Yes	1 (installer)
37:Hot-gas sensor 2	B82	6	No	No	---	Yes	1 (installer)
38:Flow sensor prim contr	B15	6	No	No	---	Yes	1 (installer)
39:Evaporator sensor	B84	9	No	No	---	No (air-HP)	1 (installer)
43:Return sensor solid fuel	B72	6	No	No	---	Yes	1 (installer)
44:Return sensor HP	B71	6	No	No	---	Yes	1 (installer)
45:Source outlet sensor	B92	9	No	No	---	No (param.)	1 (installer)
46:Return sensor cascade	B70	6	No	No	---	Yes	1 (installer)
48:Refrigerant sensor liquid	B83	6	No	No	---	Yes	1 (installer)
50:DHW sensor 1	B3	6	No	No	---	Yes	1 (installer)
52:DHW sensor 2	B31	6	No	No	---	Yes	1 (installer)
54:DHW flow sensor	B35	6	No	No	---	Yes	1 (installer)
57:DHW circulation sensor	B39	6	No	No	---	Yes	1 (installer)
60:Room sensor 1		6	No	No	---	Yes	1 (installer)
65:Room sensor 2		6	No	No	---	Yes	1 (installer)
68:Room sensor 3		6	No	No	---	Yes	1 (installer)
70:Storage tank sensor 1	B4	6	No	No	---	Yes	1 (installer)
71:Storage tank sensor 2	B41	6	No	No	---	Yes	1 (installer)
72:Storage tank sensor 3	B42	6	No	No	---	Yes	1 (installer)
73:Collector sensor 1	B6	6	No	No	---	Yes	1 (installer)
74:Collector sensor 2	B61	6	No	No	---	Yes	1 (installer)
76:Special sensor 1	Bx	3	No	No	---	Yes	1 (installer)
81:LPB short-circuit/comm		6	No	No	---	Yes	5 (none)
82:LPB address collision		3	No	No	---	Yes	5 (none)
83:BSB short-circuit		8	No	No	---	Yes	5 (none)
84:BSB address collision		3	No	No	---	Yes	5 (none)
85:BSB Radio communication		8	No	No	---	Yes	5 (none)
98:Extension module 1		8	No	No	---	Yes	5 (none)
99:Extension module 2		8	No	No	---	Yes	5 (none)
100:2 clock time masters		3	No	No	---	Yes	5 (none)
102:Clock without backup		3	No	No	---	Yes	5 (none)
103:Communication failure		3	No	No	---	Yes	5 (none)
105:Maintenance message		5	No	No	---	Yes	1 (installer)
106:Source temp too low		6	Yes	No	---	No	1 (installer)
107:Hot-gas compressor 1		9	Yes	Num*	Limit hot-gas compr1	No	2 (customer service)
108:Hot-gas compressor 2		9	Yes	Num*	Limit hot-gas compr2	No	2 (customer service)
117:Water pressure too high	Hx	6	No	No	---	Yes	1 (installer)
118:Water pressure too low	Hx	6	No	No	---	No	1 (installer)
121:Flow temp HC1 (too low)		3	No	No	---	Yes	1 (installer)
122:Flow temp HC2 (too low)		3	No	No	---	Yes	1 (installer)
126:DHW charg temp		6	No	No	---	Yes	1 (installer)
127:Legionella temp		6	No	No	---	Yes	1 (installer)

No.:Error text	Place	Error	Acknow-ledgement	Function error repetition		Heat pump operation	Responsibility
		prio	manually	active	1st status message		No.
134:Common fault HP	E20	9	Yes	Num*	Fault	No	1 (installer)
138:No control sensor HP		1	No	No	---	No	1 (installer)
146:Configuration error		3	No	No	---	Yes	5 (none)
171:Alarm contact 1 active	H1/H31	6	No	No	---	Yes	1 (installer)
172:Alarm contact 2 active	H2/H21/H22/H32	6	No	No	---	Yes	1 (installer)
173:Alarm contact 3 active	Ex	6	No	No	---	Yes	1 (installer)
174:Alarm contact 4 active	H3/H33	6	No	No	---	Yes	1 (installer)
176:Water press 2 too high	Hx	6	No	No	---	Yes	1 (installer)
177:Water press 2 too low	Hx	6	No	No	---	No	1 (installer)
178:Limit thermostat HC1		3	No	No	---	Yes	1 (installer)
179:Limit thermostat HC2		3	No	No	---	Yes	1 (installer)
201:Frost alarm	B21	9	Yes	No	---	No	1 (installer)
204:Fan overload	E14	9	Yes	Num*	Fan overload	No	1 (installer)
222:Hi-press on HP op	E10	9	Yes	Num*	High-press in HP mode	No	1 (installer)
223:Hi-press on start HC	E10	9	Yes	No	---	No	1 (installer)
224:Hi-press on start DHW	E10	9	Yes	No	---	No	1 (installer)
225:Low-pressure	E9	9	Yes	Num*	Low-pressure	No	2 (customer service)
226:Compressor 1 overlaod	E11	9	Yes	Num*	Compressor 1 overload	No	2 (customer service)
227:Compressor 2 overlaod	E12	9	Yes	Num*	Compressor 2 overload	No	2 (customer service)
228:Flow swi heat source	E15	9	Yes	Num*	Flow switch heat source	No	1 (installer)
229:Press swi heat source	E15	9	Yes	Num*	Press switch heat source	No	1 (installer)
230:Source pump overload	E14	9	Yes	Num*	Source pump overload	No	1 (installer)
241:Flow sensor yield	B63	6	No	No	---	Yes	1 (installer)
242:Return sensor yield	B64	6	No	No	---	Yes	1 (installer)
243:Swimming pool sensor	B13	6	No	No	---	Yes	1 (installer)
247:Defrost fault		9	Yes	Num*	Preheating for defrost	No	1 (installer)
260:Flow sensor 3	B14	6	No	No	---	Yes	---
320:DHW charging sensor	B36	6	No	No	---	Yes	---
321:DHW outlet sensor	B38	6	No	No	---	Yes	---
322:Water press 3 too high	Hx	6	No	No	---	Yes	---
323:Water press 3 too low	Hx	6	No	No	---	No	---
324:BX same sensors		3	No	No	---	Yes	---
325:BX/e'module same sens		3	No	No	---	Yes	---
326:BX/m'grp same sens		3	No	No	---	Yes	---
327:E'module same funct		3	No	No	---	Yes	---
328:Mix group same funct		3	No	No	---	Yes	---
329:E'mod/m'grp same funct		3	No	No	---	Yes	---
330:BX1 no function		3	No	No	---	Yes	---
331:BX2 no function		3	No	No	---	Yes	---
332:BX3 no function		3	No	No	---	Yes	---
333:BX4 no function		3	No	No	---	Yes	---
334:BX5 no function		3	No	No	---	Yes	---
335:BX21 no function		3	No	No	---	Yes	---
336:BX22 no function		3	No	No	---	Yes	---
337:B1 no function		3	No	No	---	Yes	---
338:B12 no function		3	No	No	---	Yes	---
339:Coll pump Q5 missing		3	No	No	---	Yes	---
340:Coll pump Q16 missing		3	No	No	---	Yes	---
341:Coll sensor B6 missing		3	No	No	---	Yes	---
342:Solar DHW B31missing		3	No	No	---	Yes	---
343:Solar integration missing		3	No	No	---	Yes	---
344:Solar buffer K8 missing		3	No	No	---	Yes	---
345:Sol swi pool K18 missing		3	No	No	---	Yes	---
346:Boiler pump Q10 missing		3	No	No	---	Yes	---
350:Buffer address error		3	No	No	---	Yes	---
351:Prim/sys pump addr err		3	No	No	---	Yes	---
352:Pr'less header addr err		3	No	No	---	Yes	---
353:Casc sens B10 missing		3	No	No	---	Yes	---
354:Special sensor 2	Bx	3	No	No	---	Yes	---
355:3-ph curr asymmetric	E21/E22/E23	9	Yes	Num*	3-ph current asymmetric	No	---
356:Flow switch consumers	E24	9	Yes	Num*	Flow switch consumers	No	---
357:Flow temp cooling 1 (not reached)		6	No	No	---	Yes	---
358:Soft starter	E25	9	Yes	Num*	---	No	---
359:Div valve cool Y21 miss		3	No	No	---	Yes	---
360:Proc rev va Y22 miss		3	No	No	---	Yes	---

No.:Error text	Place	Error	Acknow-ledgement	Function error repetition		Heat pump operation	Responsibility
		prio	manually	active	1st status message		No.
361:Source sens B91 miss		3	No	No	---	Yes	---
362:Source sens B92 miss		3	No	No	---	Yes	---
363:Compr sens B84 miss		3	No	No	---	Yes	---
364:Cool system HP wrong		3	No	No	---	No	---
365:Inst heater Q34 miss		3	No	No	---	Yes	---
366:Room temp sensor Hx		6	No	No	---	Yes	---
367:Room humidity sens Hx		6	No	No	---	Yes	---
368:Flow temp setp readjHx		6	No	No	---	Yes	---
370:Thermodynamic source		9	No	No	---	No	---
369:External		9	No	No	---	No	---
371:Flow temp HC3 (too low)		3	No	No	---	Yes	---
372:Limit thermostat HC3		3	No	No	---	Yes	---
373:Extension module 3		3	No	No	---	Yes	---
385:Mains undervoltage	E21	9	Yes	Num*	Mains undervoltage	Yes	---
388:DHW sensor no function		3	No	No	---	Yes	---
441:BX31 no function		3	No	No	---	Yes	---
442:BX32 no function		3	No	No	---	Yes	---
443:BX33 no function		3	No	No	---	Yes	---
444:BX34 no function		3	No	No	---	Yes	---
445:BX35 no function		3	No	No	---	Yes	---
446:BX36 no function		3	No	No	---	Yes	---
447:BX6 no function		3	No	No	---	Yes	---
452:HX1 no function		3	No	No	---	Yes	---
453:HX3 no function		3	No	No	---	Yes	---
454:HX31 no function		3	No	No	---	Yes	---
455:HX32 no function		3	No	No	---	Yes	---
456:HX33 no function		3	No	No	---	Yes	---
457:BX7 no function		3	No	No	---	Yes	---
462:BX8 no function		3	No	No	---	Yes	---
463:BX9 no function		3	No	No	---	Yes	---
464:BX10 no function		3	No	No	---	Yes	---
465:BX11 no function		3	No	No	---	Yes	---
466:BX12 no function		3	No	No	---	Yes	---
467:BX13 no function		3	No	No	---	Yes	---
468:BX14 no function		3	No	No	---	Yes	---
469:HX21 no function		3	No	No	---	Yes	---
470:HX22 no function		3	No	No	---	Yes	---
472:Flow sensor cooling 2	B17	6	No	No	---	Yes	---
473:Flow sensor cooling 3	B18	6	No	No	---	Yes	---
476:Suction gas temp	B85	6	No	No	---	No	---
477: Evaporation pressure	H82	6	No	No	---	No	---
479:No refrigerant selected		3	No	No	---	No	---
480:Suction temp EVI	B86	6	No	No	---	No	---
481:Evaporation press EVI	H86	6	No	No	---	No	---
482:Evaporation temp EVI	B87	6	No	No	---	No	---
483:Soft starter 2		9	Yes	Num*	---	No	---
488:Condensation pressure	H83	8	No	No	---	No	---

* Num: 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 error recurs the number of times set for an adjustable period of time

The LPB system displays the following error messages only as collective errors:

No.:Error text	Place	Error	Acknow-ledgement	Function error repetition		Heat pump operation	Responsibility
		prio	manually	active	1st status message		No.
207:Fault cooling circuit	LPB	---	---	---	---	---	1 (installer)
208:Flow supervision	LPB	---	---	---	---	---	1 (installer)
209:Fault heating circuit	LPB	---	---	---	---	---	1 (installer)
217:Sensor fault	LPB	---	---	---	---	---	1 (installer)
218:Pressure supervision	LPB	---	---	---	---	---	1 (installer)

Notes relating to the tables

Error text

The error text in the tables corresponds to the clear-text on the display of the operator unit.

Place

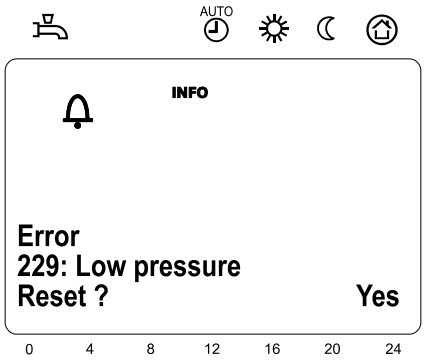
Sensor or contact or bus in connection with the error message.

Reset

The errors are reset either manually or automatically, depending on the type of error.

Manual reset

With error displays on the info level where "Reset?" appears, the error can be reset manually.



After pressing the OK button once, "Yes" is displayed flashing. Pressing the OK button a second time confirms the "Yes" and resets the error.

Automatic reset

Automatic acknowledgement takes place when the minimum compressor off time has elapsed (line 2843). On completion of this period of time, the controller tries to reset the error.
If the table indicates "Number", it can be selected how many times the error shall be reset before the heat pump goes to lockout.

Heat pump operation

This indicates whether or not the heat pump can continue to operate should a fault occur.

Yes

Heat pump operation is continued although an error message was delivered.

No

Error causes the heat pump to shut down.

Error messages, alarm messages

The errors are assigned priorities. From priority 5 (priorities 5...9), alarm messages are delivered, which are used for remote monitoring (OCI). In addition, the alarm relay is set.

6.21 Maintenance/special operation

"Maintenance" functions

"Maintenance" functions can be used as a preventive measure to ensure periodic monitoring of plant. All "Maintenance" functions can be switched individually. The controller generates maintenance messages automatically should maintenance function settings be violated.

Line no.	*Operating line*
7070	**HP interval**
7071	**HP time since maint**
7072	**Max starts compr1/hrs run**
7073	**Cur starts compr1/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**

HP interval

Setting the interval (in months) at which the heat pump requires service.

HP time since maint

Display of the period of time (in months) since the last service visit. If the value lies above setting "HP interval", ...

- symbol appears on the display, and
- 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", ...

- symbol appears on the display, and
- a maintenance message on the info level: 8:Too many starts compr1 (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 exceeded the maximum

Diff condens max/week

Setting the number of times within a 7-day period the temperature differential across the condenser may exceed the maximum.

Cur diff condens max/week	Number of times within a 7-day period the temperature differential across the condenser exceeded the maximum. If the value lies above setting "Diff condens max/week", ... • symbol appears on the display, and • and a maintenance message on the info level: 13:Diff condenser 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 dropped 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 within a 7-day period the temperature differential across the condenser dropped below the minimum. If the value lies above setting "Diff condens min/week", ... • symbol appears on the display, and • and a maintenance message on the info level: 14:Diff condenser 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 condenser exceeded 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 within a 7-day period the temperature differential across the condenser exceeded the maximum. If the value lies above setting "Diff evap max/week", ... • symbol appears on the display, and • and a maintenance message on the info level: 15:Diff evaporator 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 dropped 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 within a 7-day period the temperature differential across the evaporator dropped below the minimum. If the value lies above setting "Diff evap min/week", ... • symbol appears on the display, and • and a maintenance message on the info level: 16:Diff evaporator 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 the interval (in months) at which the DHW storage tank must be serviced.
DHW stor tank since maint	Period of time (in months) since the last service visit. If the value lies above setting "DHW storage tank interval", ... • symbol appears on the display, and • and a maintenance message on the info level: 11:DHW stor 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 without aborting charging.
Curr DHW charg temp HP	The controller stores the DHW temperature at which charging by the heat pump was aborted last because the heat pump reached the limitation for high-pressure, hot-gas, or the maximum switch-off temperature. If the value lies below setting "DHW charg temp HP min", ... • symbol appears on the display, and • and a maintenance message on the info level: 12:DHW charg tempHP low (priority6).
No reset	This parameter **cannot** be reset. If the minimum DHW charging temperature is exceeded again next time the DHW storage tank is charged, the "Maintenance" function is canceled. 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

During intermediate seasons, the demand for heat can possibly be met by ecological heat sources, such as solar or wood-fired boilers. In that case, conventional producers such as heat pumps or electrical immersion heaters are locked. This option can be released or locked via "Economy function" (line 7119). Using operating line "Economy mode", the enduser can switch off the heat pump or electrical immersion heaters for any desired period of time.

Line no.	*Operating line*
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

Off
"Economy" mode is deactivated.

On
"Economy" mode is activated; all electric immersion heaters are locked and the heat pump is put into operation only if DHW charging is required.

Manual interventions/simulations

Emergency operation

If the heat pump does not operate properly, 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).
In that case, the compressor remains off.

Line no.	*Operating line*
7141	**Emergency operation** Off ¦ On
7142	**Emergency op function type** Manually ¦ Automatically

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" (line 7141).

Automatically
Emergency operation switches itself on whenever the heat pump becomes faulty. It switches itself off again when the fault is rectified and – if required – a reset is made.

Emergency operation can also be switched on and off manually via parameter "Emergency operation" (line 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...50 °C can be simulated. During simulation, the current, the composite and the attenuated outside temperature are overridden by the set simulated temperature.

During simulation of the outside temperature, calculation of the 3 mentioned outside temperatures continues and the temperatures are available again when simulation is completed.

The function is deactivated by setting "- - -" or automatically after a timeout of 5 hours.

Defrosting, refrigerant

Line no.	*Operating line*
7152	**Triggering defrost** No ¦ Yes
7153	**Pumping off refrigerant** Off ¦ On

Triggering defrost

The heat pump's "Defrost" function can be manually triggered via this operating line.

Pumping off refrigerant

Pumping off the refrigerant can be manually triggered via this operating line.

Definition of responsibilities

Line no.	*Operating line*
7181	**Phone no. responsibility 1**
7183	**Phone no. responsibility 2**

These operating lines are used to enter the phone numbers required for the relevant error and maintenance messages.

6.22 Configuring the extension modules

Function of extension modules

Line no.	*Operating line*
7300 **7375** **7450**	**Function extension module 1, 2 and 3** None ¦ Multifunctional ¦ Heating circuit 1 ¦ Heating circuit 2 ¦ Heating circuit 3 ¦ Solar DHW ¦ Primary contr/system pump ¦ DHW primary controller ¦ Instantaneous water heater ¦ Cooling circuit 1 ¦ Heating circ/cooling circ 1 ¦ Solid fuel boiler

When selecting a function, the extension module's inputs and outputs are assigned functions according to the following table:

Electrical connections

Connection terminal on the module	*QX21*	*QX22*	*QX23*	*BX21*	*BX22*	*H2/H21*	*H22*
Multifunctional	*	*	*	*	*	*	*
Heating circuit 1	Y1	Y2	Q2	B1	*	*	*
Heating circuit 2	Y5	Y6	Q6	B12	*	*	*
Heating circuit 3	Y11	Y12	Q20	B14	*	*	*
Solar DHW	*	*	Q5	B6	B31	*	*
Primary contr/system pump	Y19	Y20	Q14	B15	*	*	*
DHW primary controller	Y31	Y32	Q3	B35	*	*	*
Instantaneous water heater	Y33	Y34	Q34	B38	B39	FS	*
Cooling circuit 1	Y23	Y24	Q24	B16	*	*	*
Heating circ/cooling circ 1	Y1	Y2	Q2	B1	*	*	*
Solid fuel boiler	Y9	Y10	Q10	B72	B22		

* Freely selectable in QX.../BX...
FS = DHW flow switch; AVS75.390 = H2; AVS75.370 = H21

QX extension module

Defines usage of the Qx relay outputs.

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7301	**7376**	**7451**	**Relay output QX21 module 1, 2, 3**
7302	**7377**	**7452**	**Relay output QX22 module 1, 2, 3**
7303	**7378**	**7453**	**Relay output QX23 module 1, 2, 3** None ¦ 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 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 ¦ Cons circuit pump VK1 Q15 ¦ Cons circuit pump VK2 Q18 ¦ Swimming pool pump Q19 ¦ Heat circuit pump HC3 Q20 ¦ 2nd pump speed HC1 Q21 ¦ 2nd pump speed HC2 Q22 ¦ 2nd pump speed HC3 Q23 ¦ Div valve HC/CC1 Y21 ¦ Air dehumidifier K29 ¦ Heat request K27 ¦ Refrigeration request K28 ¦ Alarm output K10 ¦ Time program 5 K13 ¦ Heat circuit pump HC1 Q2 ¦ DHW ctrl elem Q3 ¦ Source pump Q8/fan K19 ¦ Condenser pump Q9 ¦ Compressor stage 1 K1 ¦ Suppl source control K32 ¦ Heat circuit pump HC2 Q6 ¦ Instant WH ctrl elem Q34 ¦Div valve HC/CC2 Y45 ¦ Div valve HC/CC3 Y46 ¦ Cooling circ pump CC1 Q24 ¦ Cooling circ pump CC2 Q28 ¦ Cooling circ pump CC3 Q29 ¦ Solid fuel boiler pump Q10 ¦ Flue gas relay K17 ¦ Assisted firing fan K30 ¦ Crankcase heater K40 ¦ Drip tray heater K41 ¦ Valve evaporator K81 ¦ Valve EVI K82 ¦ Valve injection capillary K83

Refer to the function descriptions, operating line "Relay output QX1".

BX extension module

Defines usage of the Bx sensor inputs.

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7307	**7382**	**7457**	**Sensor input BX21 module 1, 2, 3**
7308	**7383**	**7458**	**Sensor input BX22 module 1, 2, 3** **None** ¦ Buffer sensor B4 ¦ Buffer sensor B41 ¦ Collector sensor B6 ¦ DHW sensor B31 ¦ 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 ¦ DHW sensor B3 ¦ HP flow sensor B21 ¦ HP return sensor B71 ¦ Hot-gas sensor B81 ¦ Outside sensor B9 ¦ Source inlet sensor B91 ¦ Source outl sens B92/B84 ¦ Room sensor B5 ¦ Room setp readjustment 1 ¦ Room sensor B52 ¦ Room setp readjustment 2 ¦ Room sensor B53 ¦ Room setp readjustment 3 ¦ Flue gas temp sensor B8 ¦ Solid fuel boiler sensor B22 ¦ Solid fuel boil ret sens B72 ¦ Suction gas sensor B85 ¦ Suction gas sensor EVI B86 ¦ Evaporation sensor EVI B87

See function descriptions, operating line "Sensor input BX1".

H2 on extension modules 1, 2 and 3

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7311	**7386**	**7461**	**Function input H2 module 1, 2, 3** None ¦ Optg mode change HCs+DHW ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V
7312	**7387**	**7462**	**Contact type H2 module 1, 2, 3** NC ¦ NO
7314	**7389**	**7464**	**Voltage value 1 H2 module 1, 2, 3**
7315	**7390**	**7465**	**Funct value 1 H2 module 1, 2, 3**
7316	**7391**	**7466**	**Voltage value 2 H2 module 1, 2, 3**
7317	**7392**	**7467**	**Funct value 2 H2 module 1, 2, 3**

The settings for input H2 on the extension module correspond to a large extent to those for the Hx inputs on the basic unit (without pulse count, flow measurement Hz). For descriptions, refer to operating line "Function input H1, H3" and following.

Temperature sensor H2

Line no.			Operating line
Mod. 1	Mod. 2	Mod. 3	
7318	**7393**	**7468**	**Temp sensor H2 module 1, 2, 3** None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71

Defines the temperature acquired by the sensor connected to "Input H2 module 1...3" (solar flow/return or heat pump flow/return). The controller uses the acquired temperature to control the respective plant component.

If, for temperature acquisition, the same sensor is defined at Bx and Hx, the sensor connected to Bx is given priority.

Function input H21

Line no.			Operating line
Mod. 1	Mod. 2	Mod. 3	
7321	**7396**	**7471**	**Function input H21 module 1, 2, 3** Optg mode change HCs+DHW ¦ Optg mode changeover DHW ¦ Optg mode changeover HCs ¦ Optg mode changeover HC1 ¦ Optg mode changeover HC2 ¦ Optg mode changeover HC3 ¦ Error/alarm message ¦ Consumer request VK1 ¦ Consumer request VK2 ¦ Release swi pool source heat ¦ Release swi pool solar ¦ Operating level DHW ¦ Operating level HC1 ¦ Operating level HC2 ¦ Operating level HC3 ¦ Room thermostat HC1 ¦ Room thermostat HC2 ¦ Room thermostat HC3 ¦ DHW flow switch ¦ Pulse count ¦ Dewpoint monitor ¦ Flow temp setp incr hygro ¦ Swi-on command HP stage 1 ¦ Status info suppl source ¦ Charg prio DHW sol fuel boil ¦ Flow measurement Hz ¦ Consumer request VK1 10V ¦ Consumer request VK2 10V ¦ Pressure measurement 10V ¦ Rel room humidity 10V ¦ Room temp 10V ¦ Flow measurement 10V ¦ Temp measurement 10V
7322	**7397**	**7472**	**Contact type H21 module 1, 2, 3** NC ¦ NO
7324	**7399**	**7474**	**Input value 1 H21 module 1**
7325	**7400**	**7475**	**Funct value 1 H21 module 1**
7326	**7401**	**7476**	**Input value 2 H21 module 1**
7327	**7402**	**7477**	**Funct value 2 H21 module 1**
7328	**7403**	**7478**	**Temp sensor H21 module 1** None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71

The settings for input H21 on the extension module correspond to those for the Hx inputs on the controller. For descriptions, refer to operating line "Function input H1, H3" and following.

Function input H22

Line no.			Operating line
Mod. 1	Mod. 2	Mod. 3	
7331	**7406**	**7481**	**Function input H22 module 1, 2, 3** Ditto 7321
7332	**7407**	**7482**	**Contact type H22 module 1, 2, 3**
7334	**7409**	**7484**	**Input value 1 H22 module 1, 2, 3**
7335	**7410**	**7485**	**Funct value 1 H22 module 1, 2, 3**
7336	**7411**	**7486**	**Input value 2 H22 module 1, 2, 3**
7337	**7412**	**7487**	**Funct value 2 H22 module 1, 2, 3**
7338	**7413**	**7488**	**Temp sensor H22 module 1, 2, 3** None ¦ Solar flow sensor B63 ¦ Solar return sensor B64 ¦ HP flow sensor B21 ¦ HP return sensor B71

The settings for input H22 on the extension module correspond to those for the Hx inputs on the controller. For descriptions, refer to operating line "Function input H1, H3" and following.

Voltage output GX21

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7341	**7416**	**7491**	**Voltage out GX21 module 1, 2, 3** 5 Volt ¦ 12 Volt

Defines the voltage used by the extension module for powering the external sensor.

Function output UX21

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7348	**7423**	**7498**	**Funct output UX21 module 1, 2, 3** **None** ¦ Source pump Q8/fan K19 ¦ DHW pump Q3 ¦ DHW interm circ pump Q33 ¦ Heat circuit pump HC1 Q2 ¦ Heat circuit pump HC2 Q6 ¦ Heat circuit pump HC3 Q20 ¦ Collector pump Q5 ¦ Solar pump ext exch K9 ¦ Solar pump buffer K8 ¦ Solar pump swi pool K18 ¦ Collector pump 2 Q16 ¦ Instant WH pump Q34 ¦ Solid fuel boiler pump Q10 ¦ Condenser pump Q9 ¦ HP setpoint ¦ Output request ¦ Heat request ¦ Refrigeration request ¦ Compressor modulation ¦ Expansion valve evapor V81 ¦ Expansion valve EVI V82
7349	**7424**	**7499**	**Sign logic out UX21 module1, 2, 3** Standard ¦ Inverted
7350	**7425**	**7500**	**Signal output UX21 module 1, 2, 3** 0..10V ¦ PWM
7354	**7429**	**7504**	**Temp val 10V UX21 module1, 2, 3**

The settings for output UX21 on the extension module correspond to those for the Ux outputs on the controller. For descriptions, refer to operating line "Function output UX1 and UX2" and following.

Function output UX22

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7355	**7430**	**7505**	**Funct output UX22 module 1, 2, 3** Ditto 7348
7356	**7431**	**7506**	**Sign logic out UX22 module1, 2, 3** Standard ¦ Inverted
7357	**7432**	**7507**	**Signal output UX22 module 1, 2, 3** 0..10V ¦ PWM
7361	**7436**	**7511**	**Temp val 10V UX22 module1, 2, 3**

The settings for output UX22 on the extension module correspond to those for the Ux outputs on the controller. For descriptions, refer to operating line "Function output UX1 and UX2" and following.

6.23 Input/output test

The input/output test is used to check the correct functioning of the connected plant 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 checked.

Line no.	*Operating line*
7700	**Relay test** No test ¦ Everything off ¦ Relay output QX1 ¦ Relay output QX2 ¦ Relay output QX3 ¦ Relay output QX4 ¦ Relay output QX5 ¦ Output QX6/ZX6 ¦ Relay output QX31 ¦ Relay output QX32 ¦ Relay output QX33 ¦ Output QX34/ZX34 ¦ Relay output QX35 ¦ Relay output QX21 module 1 ¦ Relay output QX22 module 1 ¦ Relay output QX23 module 1 ¦ Relay output QX21 module 2 ¦ Relay output QX22 module 2 ¦ Relay output QX23 module 2 ¦ Relay output QX21 module 3 ¦ Relay output QX22 module 3 ¦ Relay output QX23 module 3

⚠ Important: When making the relay test, limitations are not active.

ℹ
- When using a multifunctional output for compressor K1, the output will be deactivated for about 1 to 2 seconds
- After 8 minutes, the relay test switches itself automatically off (timeout)

Triac output test (ZX6 modulated)

By selecting a setting from output test ZX6, an appropriate signal is delivered, allowing checking.

Line no.	*Operating line*
7705	**Mod setpoint ZX6 relay test**
7708	**Modulation signal ZX6**

Mod setpoint ZX6 relay test

When the relay test is active ("Relay test" = "Output QX6/ZX6"), the modulation value set here is delivered via triac output ZX6.

Modulation signal ZX6

Shows the modulation value currently delivered via triac output ZX6.

Output test UX1/UX2

By selecting a setting from output test UX1 or UX2, an appropriate signal is delivered or displayed, allowing checking.

Line no.	*Operating line*
7710	**Output test UX1**
7711	**Output signal UX1**
7711	**[Output signal UX1]** Voltage V ¦ PWM %
7716	**Output test UX2**
7717	**Output signal UX2**
7717	**[Output signal UX2]** Voltage V ¦ PWM %

Output test UX1/UX2

The value entered here is delivered via output Ux.

Output signal UX1/UX2, Output signal UX1/UX2

Shows the value currently delivered and its type of signal.

Input/output test X75

By selecting a setting from input/output test X75, the respective signal is delivered, allowing checking.

Line no.	*Operating line*
7721	**Heating mode D1** Off ¦ On
7722	**Cooling mode D2** Off ¦ On
7723	**Heat pump D3** Off ¦ On
7724	**Output test UX3**
7725	**Output signal UX3**
7725	**[Output signal UX3]** Voltage V ¦ PWM %
7728	**Defrosting DI6** Off ¦ On
7729	**Error/alarm message DI7** Off ¦ On

For operating lines 7724 and 7725, see explanations relating to 7710 and following.

Output test UX21/UX22

By selecting a setting from output test UX21 or UX22, an appropriate signal is delivered or displayed, allowing checking.

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7780	**7784**	**7788**	**Output test UX21 module 1, 2, 3**
7781	**7785**	**7789**	**Output signal UX21 module 1, 2, 3**
7781	**7785**	**7789**	**[Output signal UX21 module 1, 2, 3]** Voltage V ¦ PWM %
7782	**7786**	**7790**	**Output test UX22 module 1, 2, 3**
7783	**7787**	**7791**	**Output signal UX22 module 1, 2, 3**
7783	**7787**	**7791**	**[Output signal UX22 module 1, 2, 3]** Voltage V ¦ PWM %

See operating line 7710 and following.

Stepper motor output test

By selecting a setting from the stepper motor output test, an appropriate signal is delivered or displayed.

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7796	**7798**	**7800**	**Output test WX21 module 1, 2, 3**
7797	**7799**	**7801**	**Pos step motor WX21 mod 1, 2, 3**

Output test WX21 — The stepper motor is driven to the position set here.

Pos step motor WX21 — Shows the current position of the stepper motor.

Sensor input test

By selecting a setting from the sensor input test, the relevant input is displayed, allowing checking.

Line no.	*Operating line*
7804	**Sensor temp BX1**
7805	**Sensor temp BX2**
7806	**Sensor temp BX3**
7807	**Sensor temp BX4**
7830	**Sensor temp BX21 module 1**
7831	**Sensor temp BX22 module 1**
7832	**Sensor temp BX21 module 2**
7833	**Sensor temp BX22 module 2**
7834	**Sensor temp BX21 module 3**
7835	**Sensor temp BX22 module 3**

Sensor temperature Bx

Shows the temperature acquired by the sensor. The selected sensor values are updated within a maximum of 5 seconds. The display is made with no measured value correction.

Input test Hx

By selecting a setting from the Hx input test, the respective input is displayed.

Line no.	*Operating line*
7844	**Input signal H1**
7844	**[Output signal H1]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V
7858	**Input signal H3**
7858	**[Output signal H3]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V

Input signal H1/H3 [output signal H1/H3]

Shows the current input value and its type of signal.

By selecting a setting from the Hx input test, the respective input is displayed.

Line no.			*Operating line*
Mod. 1	*Mod. 2*	*Mod. 3*	
7845	**7847**	**7849**	**Input signal H2 module 1, 2, 3**
7845	**7847**	**7849**	**[Output signal H2 module 1, 2, 3]** None ¦ Closed (ooo), Open (---) ¦ Frequency Hz ¦ Voltage V
7845	**7847**	**7849**	**Input signal H21 module 1, 2, 3**
7845	**7847**	**7849**	**[Output signal H21 module 1, 2, 3]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V
7846	**7848**	**7850**	**Input signal H22 module 1, 2, 3**
7846	**7848**	**7850**	**[Output signal H22 module 1, 2, 3]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V

H2 and H21 never occur at the same time.

Input signal H2/H21/H22, [signal type H2/H21/H22]

Shows the current input value and its type of signal.

Input test EX1...EX4

By selecting a setting from input test EX1...EX4, the relevant input is displayed, allowing checking.

Line no.	*Operating line*
7911	**Input EX1**
7912	**Input EX2**
7913	**Input EX3**
7914	**Input EX4**

The display of "0 V" means that voltage is not present. "230 V" means that AC 230 V is available at the respective input.

Input/output test I/O module

The following settings serve for testing the I/O module.

Line no.	*Operating line*
7965	**Output test WX31**
7966	**Pos stepper motor WX31**
7969	**Mod setp ZX34 relay test**
7970	**Modulation signal ZX34**
7973	**Sensor temp BX31**
7974	**Sensor temp BX32**
7975	**Sensor temp BX33**
7976	**Sensor temp BX34**
7989	**Input signal H31**
7989	**[Output signal H31]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V
7994	**Input signal H32**
7994	**[Output signal H32]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V
7999	**Input signal H33**
7999	**[Output signal H33]** None ¦ Closed (ooo), Open (---) ¦ Pulse ¦ Frequency Hz ¦ Voltage V

Output test WX31

The stepper motor is driven to the position set here.

Pos stepper motor WX31

Shows the current position of the stepper motor.

Mod setp ZX34 relay test

When the relay test is active ("Relay test" = "Output QX34/ZX34"), the modulation value set here is delivered via triac output ZX34.

Modulation signal ZX34

Shows the modulation value currently delivered via triac output ZX34.

Sensor temp BX31...34

Shows the temperature acquired by the sensor. The selected sensor values are updated within a maximum of 5 seconds. The display is made with no measured value correction.

Input signal H31/H32/ H33, [output signal H31/H32/H33]

Shows the current input value and its type of signal.

6.24 State

The current operating state of the plant is visualized in the form of state displays.

Messages

Line no.	*Operating line*
8000	**State heating circuit 1**
8001	**State heating circuit 2**
8002	**State heating circuit 3**
8003	**State DHW**
8004	**State cooling circuit 1**
8006	**State heat pump**
8007	**State solar**
8008	**State solid fuel boiler**
8010	**State buffer**
8011	**State swimming pool**
8022	**State supplementary source**

State heating circuit 1...3

Enduser (info level)	Commissioning, heating engineer
Limitter has tripped	Limitter has tripped
Manual control active	Manual control active
Floor curing function active	Floor curing function active
Heating mode restricted	Overtemp prot active Restricted, boiler protection Restricted, DHW priority Restricted, buffer
Forced draw	Forced draw buffer Forced draw DHW Forced draw source Forced draw Overrun active
Comfort heating mode	Opt start ctrl+boost heating Optimum start control Boost heating Comfort heating mode
Reduced heating mode	Optimum stop control Reduced heating mode
Frost protection active	Frost prot room active Frost protection flow active Frost prot plant active
Summer operation	Summer operation
Off	24-hour Eco active Setback reduced Setback frost protection Room temp limitation Off

State DHW

Enduser (info level)	Commissioning, heating engineer
Limitter has tripped	Limitter has tripped
Manual control active	Manual control active
Consumption	Consumption
Keep hot mode on	Keep hot mode active Keep hot mode on
Recooling active	Recooling via collector Recooling via heat gen/HCs
Charging lock active	Discharging prot active Charg time limitation active Charging locked
	Forced, max st tank temp Forced, max charging temp Forced, legionella setp Forced, nominal setp

Forced charging active	
Charging opt energy, nominal Charging opt energy, legio Charging opt energy utility, nominal Charging opt energy utility, legio	Charging opt energy, nominal Charging opt energy, legio Charging opt energy utility, nominal Charging opt energy utility, legio
Charg el imm heater	El charging, legionella setp El charging, nominal setp El charging, reduced setp El charging, frost prot setp El imm heater released
Push active	Push, legionella setp Push, nominal setp
Charging active	Charging, legionella setp Charging, nominal setp Charging, reduced setp
Frost protection active	Frost protection active
Overrun active	Overrun active
Standby charging	Standby charging
Charged	Charged, max st tank temp Charged, max charging temp Charged, legionella temp Charged, nominal temp Charged, reduced temp
Off	Off
Ready	Ready

State cooling circuit 1

Enduser (info level)	Commissioning, heating engineer
Dewpoint monitor active	Dewpoint monitor active
Manual control active	Manual control active
Fault	Fault
Frost protection active	Frost protection flow active
Cooling mode locked	Locked, heating mode Locking time after heating Locked, source Locked, buffer
Cooling mode restricted	Temp drop protection active Flow temp setp incr hygro Limit flow min dewpoint Limit flow min OT
Cooling mode restricted	Flow temp setp incr hygro Limit flow min dewpoint Limit flow min OT
Cooling mode Comfort	Cooling mode Comfort Overrun active
Protection mode cooling	Protection mode cooling
Frost protection active	Frost prot plant active
Cooling limit OT active	Cooling limit OT active
Off	Off Room temp limitation Flow limit reached
Cooling mode off	Cooling mode off

State heat pump

Enduser (info level)	Commissioning, heating engineer
Emergency operation	Emergency operation
Fault	Fault
Water pressure too low	Water pressure too low
Locked	Locked, outside temp Locked, externally Locked, Economy mode
Limitation time active	3-ph current asymmetric Low-pressure Fan overload Compressor 1 overload Source pump overload Flow switch consumers Operation limit OT min Operation limit OT max Limit source temp min water Limit source temp min brine Limit source temp max High-press in HP mode Flow switch heat source Press switch heat source Limit hot-gas compr1 Limit switch-off temp max Limit swi-off temp max cool Limit switch-off temp min Compr off time min active Compens surplus heat
Frost protection active	Frost protection HP
Defrost active	Forced defrost compressor Forced defrost fan Forced defrost active Dripping Defrost with compressor Defrost with fan Defrost active
Active cooling mode	Compr run time min active Compressor 1 on
Heating mode	Cooling down evaporator Compr run time min active Compensation heat deficit Preheating for defrost Limit diff condens max Limit diff condens min Limit diff evap max Limit diff evap min Compr and electric on Compressor 1 on Electric on
Passive cooling mode	Limit source temp min cooling Passive cooling mode
Frost protection active	Frost prot plant active
Off	Flow active Overrun active Released, evap ready No request

State solar

Enduser (info level)	Commissioning, heating engineer
Manual control active	Manual control active
Fault	Fault
Frost prot collector active	Frost prot collector active
Recooling active	Recooling active
Max st tank temp reached	Max st tank temp reached
Evaporation prot active	Evaporation prot active

Overtemp prot active	Overtemp prot active
Max charging temp reached	Max charging temp reached
Charg DHW+buffer+swi pool	Charg DHW+buffer+swi pool
Charging DHW+buffer	Charging DHW+buffer
Charging DHW+swi pool	Charging DHW+swi pool
Charging buffer+swi pool	Charging buffer+swi pool
Charging DHW	Charging DHW
Charging buffer	Charging buffer
Charging swimming pool	Charging swimming pool
Radiation insufficient	Min charg temp not reached Temp diff insufficient Radiation insufficient

State solid fuel boiler

Enduser (info level)	Commissioning, heating engineer
Manual control active	Manual control active
Fault	Fault
Overtemp prot active	Overtemp prot active
Locked	Locked, manual Locked, automatic
Min limitation active	Min limitation Min limitation, low-fire Min limitation active
In operation for HC In part load op for HC In operation for DHW In part load op for DHW In op for HC, DHW In part load op for HC, DHW Overrun active In operation	Protective start Protective start, low-fire Return limitation Return limitation, low-fire In operation for HC In part load op for HC In operation for DHW In part load op for DHW In op for HC, DHW In part load op for HC, DHW Overrun active In operation
Assisted firing active	Assisted firing active
Released	Released
Frost protection active	Frost prot plant active Boiler frost prot active
Off	Off

State buffer

Enduser (info level)	Commissioning, heating engineer
Frost prot cooling active	Frost prot cooling active
Charging restricted	Locking time after heating Charging locked
Charging active	Forced charging active Full charging active
Charged	Charged, forced temp Charged, required temp Charged, min charging temp
Hot	Hot
No request	No request
Frost protection active	Frost protection active
Charg el imm heater	El charg, emergency mode El charg, source protection Electric charging defrost Electric charging, forced Electric charging, substitute
Charging restricted	Charging locked Restricted, DHW priority
Charging active	Forced charging active Full charging active

Source released	Source released
Recooling active	Recooling via collector Recooling via DHW/HCs
Charged	Charged, max st tank temp Charged, max charging temp Charged, forced temp Charged, required temp Part charged, required temp Charged, min charging temp
Cold	Cold
No request	No request

State swimming pool

Enduser (info level)	Commissioning, heating engineer
Manual control active	Manual control active
Fault	Fault
Heating mode restricted	Heating mode restricted
Forced draw	Forced draw
Heating mode	Heating mode source
Heated, max swi pool temp Heated	Heated, max swi pool temp Heated, setpoint solar Heated, setpoint source
Heating mode off	Heating mode solar off Heating mode source off
Cold	Cold

State supplementary source

Enduser (info level)	Commissioning, heating engineer
Fault	Fault
Locked	Locked, solid fuel boiler Locked, outside temp Locked, Economy mode Locked
Charging buffer	Charging buffer
In op for HC, DHW	In op for HC, DHW
Released for HC, DHW	Released for HC, DHW
In operation for DHW	In operation for DHW
Released for DHW	Released for DHW
In operation for HC	In operation for HC
Released for HC	Released for HC
Overrun active	Overrun active
Off	Off

History

Line no.	*Operating line*
8050...8069	**History 1...10, State code 1...10**

The last 10 status messages are stored or displayed together with their state codes.

History 1 keeps the latest message, history 10 the oldest.

The status displays currently valid for the enduser can be retrieved 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.

6.25 Diagnostics cascade

For diagnostics purposes, state and priority of the sources, various temperature values and the current sequence of sources and stages can be displayed.

State/priority

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 setp**
8140	**Cascade return temp**
8141	**Cascade return temp setp**
8150	**Source seq ch'over current**

6.26 Diagnostics sources (producers)

Heat pump brine/water/air

For diagnostic purposes, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Line no.	*Operating line*
8400	**Compressor 1** On ¦ Off
8402	**El imm heater 1 flow** On ¦ Off
8403	**El imm heater 2 flow** On ¦ Off
8404	**Source pump** On ¦ Off
8405	**Speed of source pump**
8406	**Condenser pump** On ¦ Off
8407	**Speed condenser pump**
8408	**Diverting valve cool source**

These operating lines can be used to check the operating states of the plant components controlled via the heat pump relays.

- The display of "0" means that the relevant plant component is currently off
- The display of "1" means that the relevant plant component is currently on

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**
8420	**Refrig temp liquid**
8423	**Condenser temp**
8423	**Condenser pressure**
8425	**Temp diff condenser**
8426	**Temp diff evaporator**
8427	**Source inlet temp**
8427	**Switch-off threshold**
8428	**Source inlet temp min**
8429	**Source outlet temp**
8429	**Switch-off threshold**
8430	**Source outlet temp min**

These operating lines can be used to query the different setpoints and actual values of the heat pump.

Superheat controller

8434	**Suction gas temp**
8435	**Evaporation temp**
8435	**Evaporation pressure**
8436	**Superheat**
8436	**Superheat setpoint**
8437	**Expansion valve**
8438	**Magnetic valve**

Shows the current values of superheat control.

Remaining times

Line no.	*Operating line*
8440	**Remain stage 1 off time min**
8442	**Remain stage 1 on time min**

If the "Minimum off time" (line 2843) or the "Minimum running time" (line 2842) is active, the operating lines show the remaining off time/running time.

The display of "- - -" appears only when the minimum off times have elapsed, enabling another release of the heat pump.

Line no.	*Operating line*
8444	**Remain limit source temp**

If the source temperature (B91) is too low, the pumps and the compressor are locked for the period of time "T'limit source temp min brine" (line 2822). This operating line shows the remaining time for pumps and compressor to be released again.

Hours run/start counter

Line no.	*Operating line*
8450	**Hours run compressor 1**
8451	**Start counter compressor 1**

These operating lines show the total number of hours run and the number of starts of the compressor since the plant was 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 electrical utility (via E6) since the plant 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 electrical utility (via E6) since the plant was first commissioned.

Line no.	*Operating line*
8456	**Hours run el flow**
8457	**Start counter el flow**

The hours run and the number of starts of the electric immersion heater installed in the flow can be read out here.

Line no.	*Operating line*
8460	**Heat pump throughput**

This operating line shows the current volume flow through the heat pump in [l/min].

Vapor injection

Line no.	*Operating line*
8462	**Suction gas temp EVI**
8463	**Evaporation temp EVI**
8463	**Evaporation pressure EVI**
8464	**Superheat EVI**
8464	**Superheat setpoint EVI**
8465	**Expansion valve EVI**
8466	**Magnetic valve EVI** Off ¦ On
8467	**Magn valve injection cap** Off ¦ On

Shows the current values of vapor injection.

Air-to-water heat pumps

Line no.	*Operating line*
8469	**Fan speed**
8470	**Fan** On ¦ Off
8471	**Process revers valve** On ¦ Off
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

Shows the current operating state of fan K19 for the air-to-water heat pump (off/on).

Process revers valve Y22

Shows the current state of the process reversing valve (on: process reversed, off: process runs normally).

Evaporator temp

Shows the current evaporator temperature at sensor B84.

Temp diff defrost act value

Shows the current temperature differential of source inlet (B91) and evaporator temperature (B84).

Temp diff defrost setpoint

Shows the setpoint of the temperature differential of source inlet (B91) and evaporator temperature (B84) required for the evaporator to become completely defrosted (ΔT defrosted).

Remain time defrost lock

Shows after successful or unsuccessful defrosting, for what period of time the "Defrost" function is locked until a new defrost attempt may be started/new defrost process may be performed.

Remain time forced defrost

Shows the period of time to elapse until the next forced defrost process is due if automatic or manual defrosting is not triggered before.

Number defrost attempts

Shows the maximum number of defrost attempts required until defrosting was successful or the heat pump was locked.

Solar collector field

Line no.	*Operating line*
8499	**Collector pump 1**
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**
8521	**Solar throughput**
8526	**24-hour yield solar energy**
8527	**Total yield solar energy**
8530	**Hours run solar yield**
8531	**Hours run collect overtemp**
8542	**Collector pump 2**
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**

Collector pump 1 and 2

Shows the current state of the collector pumps.

Speed collector pump 1 and 2

Shows the current speed of collector pumps 1 and 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 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 temp 1 and 2

Current collector temperature at sensor B6/B61

Collector temp 1 max and 2 max

Display of the maximum temperature acquired by sensor B6/B61.

Collector temp 1 min and 2 min	Display of the minimum temperature acquired by sensor B6/B61.
dt collector 1/DHW and 2/DHW	Display of the temperature differential of collector sensor B6/B61 and DHW sensors B3 and B31.
dt collector 1/buffer and 2/buffer	Display of the temperature differential of collector sensor B6/B61 and buffer storage tank sensors B4 and B41.
dt collector 1/swimming pool and 2/swimming pool	Display of the temperature differential of 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.
Solar throughput	Display of the current flow through the solar circuit in [l/min].
24-hour yield solar energy	Display of the energy input to the plant by 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 (hours run).
Hours run collect overtemp	Display of the number of hours during which overtemperature protection for the collector was active.

Solid fuel boiler

Line no.	*Operating line*
8560	**Solid fuel boiler temp**
8561	**Solid fuel boiler setpoint**
8563	**Solid fuel boiler return temp**
8564	**Solid fuel boiler return setp**
8568	**Speed solid fuel boiler pump**
8570	**Hours run solid fuel boiler**
8585	**Control temperature**
8586	**Suppl source setpoint**

Displays the current values of the solid fuel boiler. Parameters 8585 and 8586 show the current values of the supplementary source.

6.27 Diagnostics consumers

For diagnostic purposes, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Meteo

Line no.	*Operating line*
8700	**Outside temp**
8701	**Outside temp min**
8702	**Outside temp max**
8703	**Outside temp attenuated**
8704	**Outside temp composite**

Display of the actual, minimum, maximum, attenuated and composite outside temperature.

The minimum, the maximum and the attenuated outside temperature can be reset directly on the operating lines.

Air dehumidifier

Line no.	*Operating line*
8723	**Rel room humidity**

Heating circuits/cooling circuit

Heating circuit 1, 2, 3

Line no.	*Operating line*
8730, 8760, 8790	**Heating circuit pump 1, 2, 3** On ¦ Off
8731, 8761, 8791	**Heat circ mix valve 1 open** **Heat circ mix valve 2 open** **HC mixing valve 3 open** On ¦ Off
8732, 8762, 8792	**Heat circ mix valve 1 close** **Heat circ mix valve 2 close** **HC mixing valve 3 closed** On ¦ Off
8735, 8765, 8795	**Speed heating circuit pump 1, 2, 3** On ¦ Off
8739	**Relative room humidity 1**
8740, 8770, 8800	**Room temp 1, 2, 3**
8741, 8771, 8801	**Room setpoint 1, 2, 3**
8743, 8773, 8803	**Flow temp 1, 2, 3**
8744, 8774, 8804	**Flow temp setpoint 1, 2, 3**
8747	**Dewpoint temp 1**
8749, 8779, 8809	**Room thermostat 1, 2, 3** No demand ¦ Demand

The display of "Off" means that the relevant plant component is currently off
The display of "On" means that the relevant plant component is currently on

Room setpoint 1

"Room setpoint 1" (line 8741) is used for the display of both setpoints, for heating and cooling mode.

In heating mode, the setpoint for heating is displayed, in cooling mode, the setpoint for cooling. If neither heating nor cooling takes place, the setpoint used last is displayed.

Speed heating circuit pump 1...3

Display of the speed of the relevant heating circuit pump as a percentage of maximum speed.

Room thermostat 1, 2, 3

Shows whether or not there is currently a demand from the respective room thermostat.

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 1**
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 mode is displayed on operating line 8741.

DHW

Line no.	*Operating line*
8820	**DHW pump** 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	**DHW consumption temp**
8853	**Instant WH 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 and start counters and temperatures and setpoints of the primary controller and instantaneous water heater.

Consumer circuits

Line no.	*Operating line*
8875	**Flow temp setp VK1**
8885	**Flow temp setp VK2**
8895	**Flow temp setp swimming pool**

Display of the flow temperature setpoints for consumer circuits 1 and 2 and the swimming pool circuit.

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 values

Line no.	*Operating line*
8950	**Common flow temp**
8951	**Common flow temp setpoint**
8957	**Common flow setp refrig**

Display of the current common flow temperature and of the setpoints for heating and cooling mode.

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 buffer storage tank's actual values and setpoints. Also displayed are the operating state, the number of hours run and the start counter of the electric immersion heater.

Inputs H

Line no.	*Operating line*
9005	**Water pressure 1**
9006	**Water pressure 2**
9009	**Water pressure 3**

Display of the water pressure of static pressure monitoring, measured via the assigned Hx input with setting "Pressure measurement 10V".

Room temperature

Line no.	*Operating line*
9010	**Measurement room temp 1**
9011	**Measurement room temp 2**
9012	**Measurement room temp 3**

Display of the room temperature, measured via the assigned Hx input with setting "Room temperature 10V".

States of relays/triac QX/ZX

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	**Triac output ZX6**

The switching states of each of the multifunctional relays 1...13 can be queried via these operating lines.

- The display of "Off" means that the plant component assigned to the output is currently off
- The display of "On" means that the relevant plant component is currently on

Extension modules 1, 2 and 3

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**
9056	**Relay output QX21 module 3**
9057	**Relay output QX22 module 3**
9058	**Relay output QX23 module 3**

The switching states of each of the relays on extension modules 1 and 2 can be queried via these operating lines.

- The display of "Off" means that the plant component assigned to the output is currently off
- The display of "On" means that the relevant plant component is currently on

I/O module

Line no.	*Operating line*
9071	**Relay output QX31**
9072	**Relay output QX32**
9073	**Relay output QX33**
9074	**Triac output ZX34**
9075	**Relay output QX35**

The switching states of each relay on the I/O module can be queried via these operating lines.

- The display of "Off" means that the plant component assigned to the output is currently off
- The display of "On" means that the relevant plant component is currently on

6.28 Pump kick

To ensure that pumps and valves do not get damaged during off times, they are operated for short periods of time at regular intervals.

- The "Kick" function is performed every Friday morning at 10:00 (non-adjustable)
- The relay outputs for pumps and mixing valves are activated one by one for 30 seconds at 1-minute intervals
- With the multifunctional relay outputs Qx, the setting decides whether or not the "Kick" function acts on the relay
- If the pump is speed-controlled, modulation output Zx or Ux used is set to the maximum pump speed

Description		Relay	Kick
Heat pump	Source pump	Q8	Yes
	Fan	K19	Yes
	Condenser pump	Q9	Yes
	Process reversing valve	Y22	Yes, when compressor is off
	Diverting valve cooling, common flow 2	Y28	Yes, when compressor is off
Cascade	Cascade pump	Q25	Yes
	Return mixing valve open	Y25	Yes, if there is no valid setpoint
	Return mixing valve closed	Y26	No
Solar	Collector pump	Q5	Yes
	Collector pump 2	Q16	Yes
	Ext. heat exchanger pump	K9	Yes
	Controlling element buffer storage tank	K8	Yes
	Controlling element swimming pool	K18	Yes
DHW	Charging pump/diverting valve	Q3	Yes
	Primary controller mixing valve open	Y31	Yes, if there is no heat request from DHW
	Primary controller mixing valve closed	Y32	No
	Mixing pump	Q35	Yes
	Intermediate circuit pump	Q33	Yes
	Storage tank transfer pump	Q11	Yes
	Instantaneous water heater pump	Q34	Yes
	Instantaneous water heater mixing valve open	Y33	Yes, if there is no heat request
	Instantaneous water heater mixing valve closed	Y34	No
	Circulating pump	Q4	Yes
Buffer storage tank	Source shutoff valve	Y4	Yes
	Return valve	Y15	Yes
Heating circuit 1...3	Heating circuit pump	Q2,Q6,Q20	Yes
	Heating circuit mixing valve open	Y1,Y5,Y11	Yes, if there is no heat request from DHW
	Heating circuit mixing valve closed	Y2,Y6,Y12	No
	HC pump 2nd speed	Q21,Q22,Q23	No
Cooling circuit 1	Cooling circuit pump	Q24	Yes
	Cooling circuit mixing valve open	Y23	Yes, if there is no refrigeration request from the CC
	Cooling circuit mixing valve closed	Y24	No
	Diverting valve cooling	Y21	Yes
Consumer circuit group	Pump consumer circuit 1	Q15	Yes
	Pump consumer circuit 2	Q18	Yes
	Swimming pool pump	Q19	Yes

7 Plant diagrams

The basic plant diagrams depicted here represent a choice of possible solutions. The selection is not conclusive.

The basic plant diagrams shall serve as a starting point and can be adapted depending on the type of application.

Using the "Configuration" menu, customized applications can be created, independent of these plant diagrams.

7.1 Basic plant diagrams

The plant diagrams shown below can be preset by entering a diagram number (plant diagram 1...17) (line 5700).

The plant diagram is the result of presetting and connected sensors.

Connection of the sensors contained in the required plant diagram and shown with solid lines is mandatory. Plant components shown with broken lines are optional.

The plant diagrams shown are basic diagrams. From the hydraulics point of view, they do not claim to be correct. The basic diagrams do not contain plant components, such as shutoff valves, throttling valves or check valves, which are important from the hydraulics point of view, because these are not controlled by the controller.

Brine-to-water
Water-to-water

Variants of producers can be selected by making appropriate parameter settings. Plant diagrams 1...9 show brine-to-water applications.

When replacing sensor B91 (source inlet) by sensor B92 (source outlet) and changing parameter "Heat source" (line 5800), the same plant diagrams can also be used for water-to-water applications.

Air-to-water

The same way, plant diagrams 1...9 can also be used for compact air-to-water heat pumps, installed indoors or outdoors.

For that, after selecting the plant diagram, parameter "Heat source" (line 5800) must be changed to "Air" and process reversing valve Y22 must be connected to a free relay output (e.g. QX4). In addition, evaporator sensor B84 must be connected to a free sensor input Bx.

Split air-to-water applications

Plant diagrams 10...16 are examples of air-to-water heat pumps installed outdoors where the applications are split.

Control of the heat pump is integrated in the heat pump itself (RVS21.826/xxx and may be I/O module AVS55.195/xxx); control of the consumers is locally separated from the heat pump.

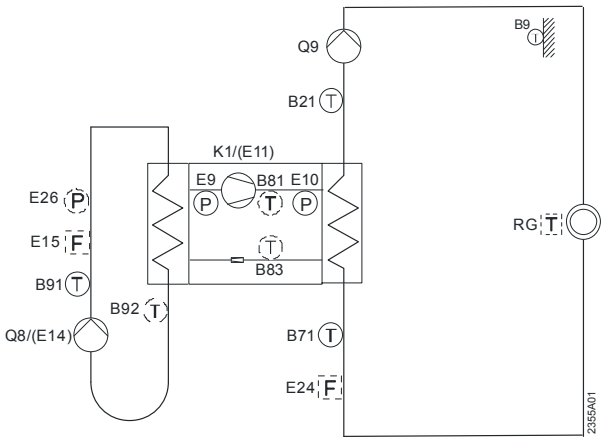
Typical applications are heat pumps installed outdoors, which have their hydraulic connections inside the building.

Solar integration

All plant diagrams containing a DHW storage tank show simple solar DHW heating support as an option. The connection of solar sensor B6 and solar pump Q5 activates all solar functions. If pump Q5 is connected to output ZX6 or ZX34, control of the pump can be modulating. Recommended for this purpose is output ZX34. Naturally, any other free relay output can be used as well.

Plant diagram 1

Brine-to-water heat pump with pump heating circuit.



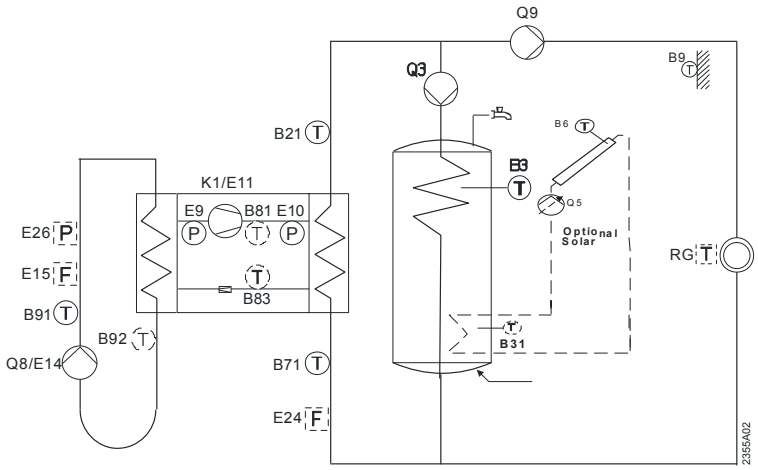
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

Plant diagram 2

Brine-to-water heat pump with pump heating circuit and DHW storage tank with DHW charging pump Q3.



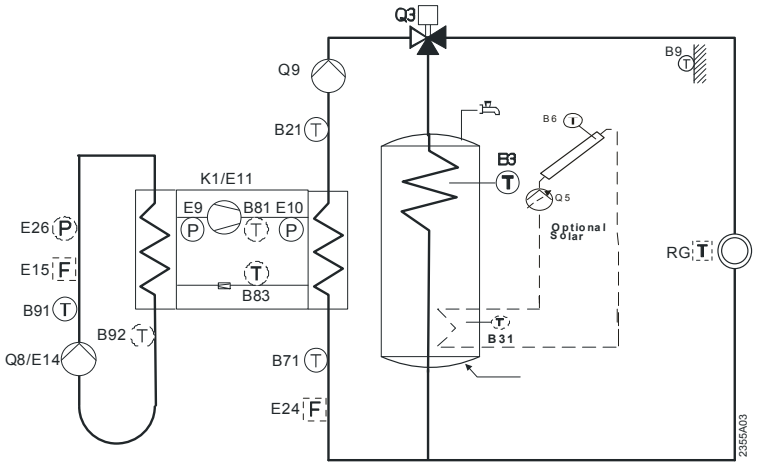
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	Collector pump Q5
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	DHW sensor B31
BX33	Collector sensor B6
BX34	

Plant diagram 3

Brine-to-water heat pump with pump heating circuit and DHW storage tank with DHW charging pump Q3.

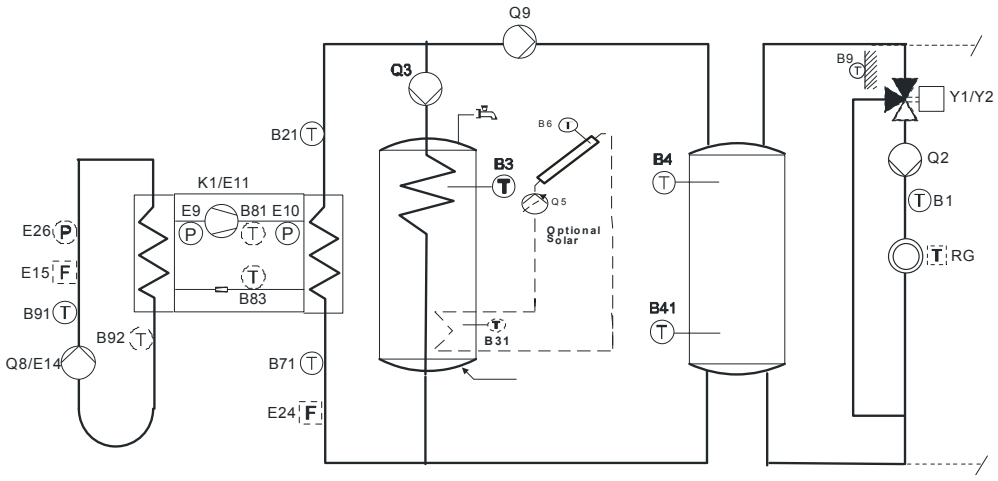


Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	Collector pump Q5
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	DHW sensor B31
BX33	Collector sensor B6
BX34	

Plant diagram 4



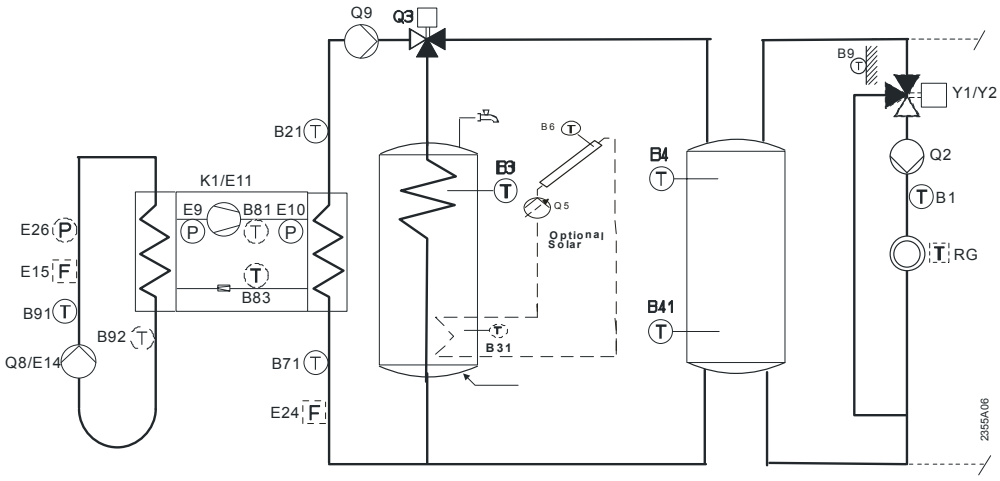
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	Heat circuit pump HC1 Q2
ZX34	
QX35	DHW ctrl elem Q3
BX31	B1
BX32	DHW sensor B3
BX33	Buffer sensor B4
BX34	Buffer sensor B41
Extension module AVS75.390 addr1	
QX21	Collector pump Q5 on/off
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 5

Brine-to-water heat pump with buffer storage tank, DHW storage tank with diverting valve Q3 and mixing or pump heating circuit.



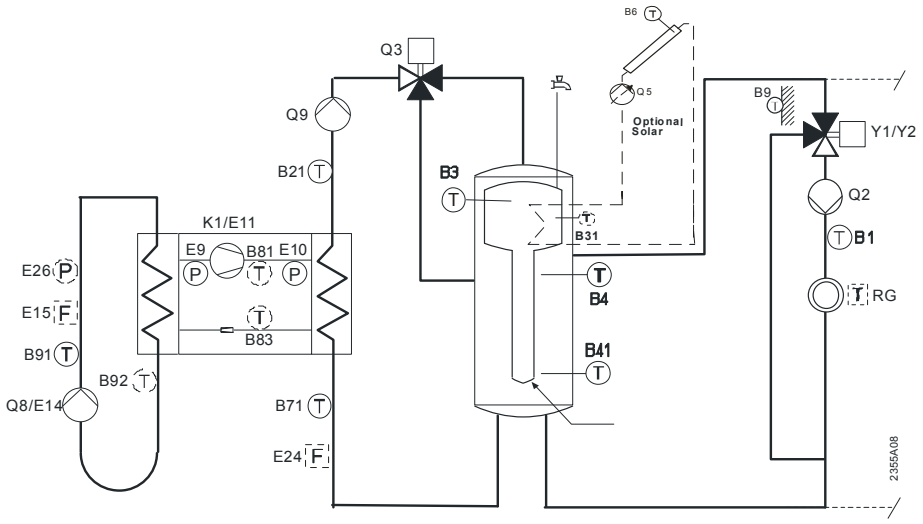
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	Heat circuit pump HC1 Q2
ZX34	
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	B1
BX33	Buffer sensor B4
BX34	Buffer sensor B41
Extension module AVS75.390 addr1	
QX21	Collector pump Q5 on/off
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 6

Brine-to-water heat pump with combi storage tank and DHW diverting valve Q3, mixing or pump heating circuit.



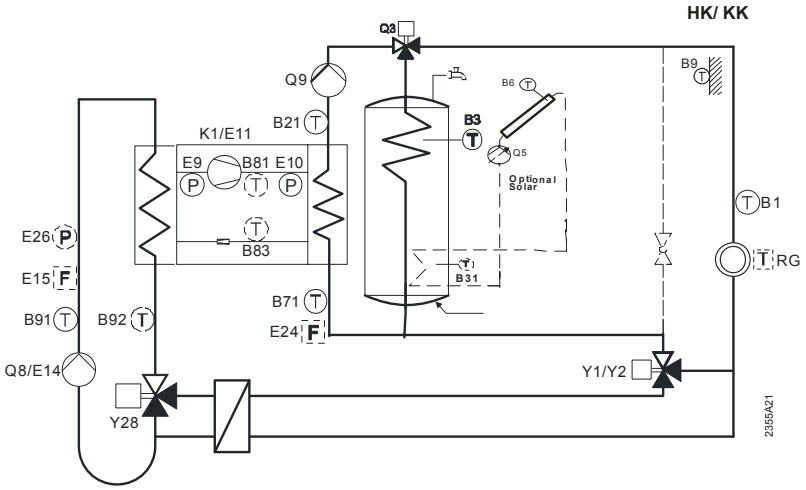
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	Heat circuit pump HC1 Q2
ZX34	
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	B1
BX33	Buffer sensor B4
BX34	Buffer sensor B41
Extension module AVS75.390 addr1	
QX21	Collector pump Q5 on/off
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 7

Brine-to-water heat pump, DHW storage tank with DHW charging pump Q3, pump heating circuit and mixing cooling circuit for passive cooling.



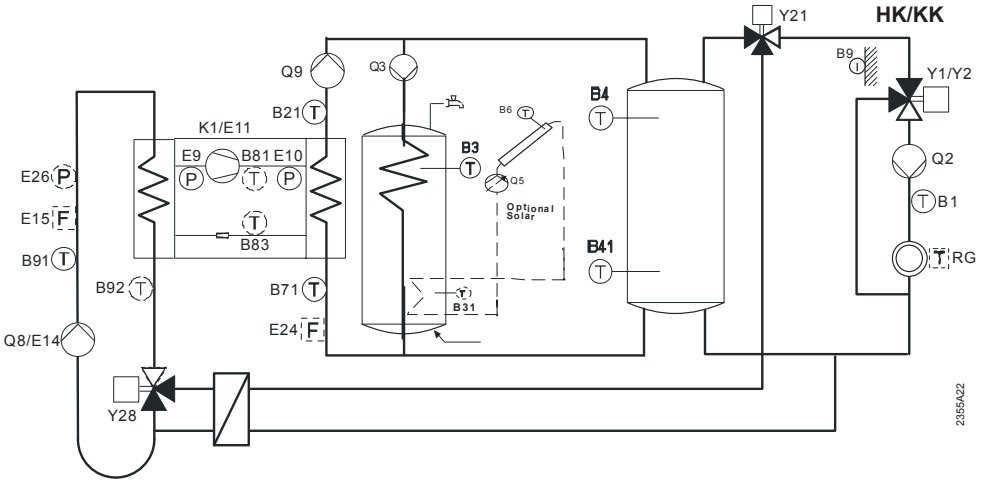
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	Div valve cool source Y28
QX2	
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	
ZX34	Collector pump Q5
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	B1
BX33	Collector sensor B6
BX34	DHW sensor B31
Extension module AVS75.390 addr1	
QX21	
QX22	
QX23	
BX21	
BX22	

Plant diagram 8

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.



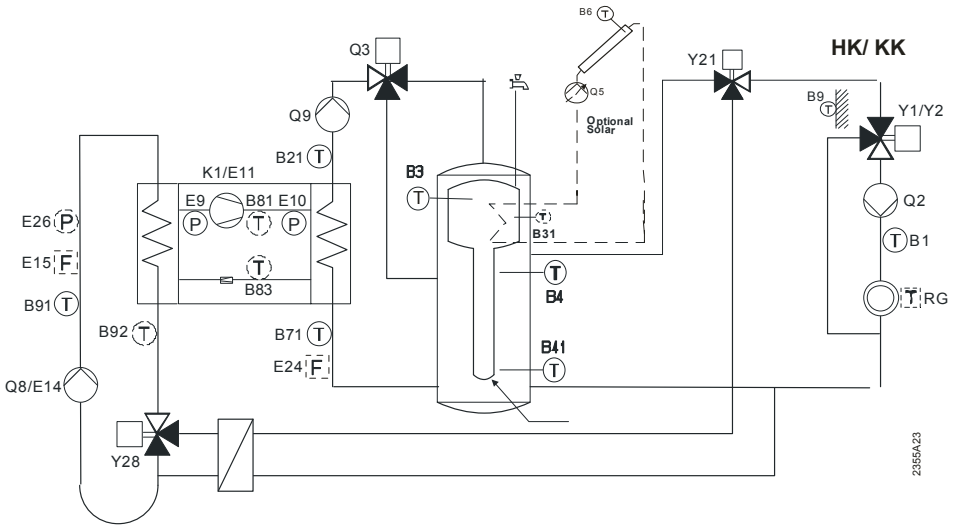
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	Div valve cool source Y28
QX2	Y21
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	Heat circuit pump HC1 Q2
ZX34	
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	B1
BX33	Buffer sensor B4
BX34	Buffer sensor B41
Extension module AVS75.390 addr1	
QX21	Collector pump Q5 on/off
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Schema 9

Brine-to-water heat pump, combi storage tank with DHW diverting valve Q3, mixing or pump heating circuit and mixing cooling circuit for passive cooling.



Multifunctional terminals

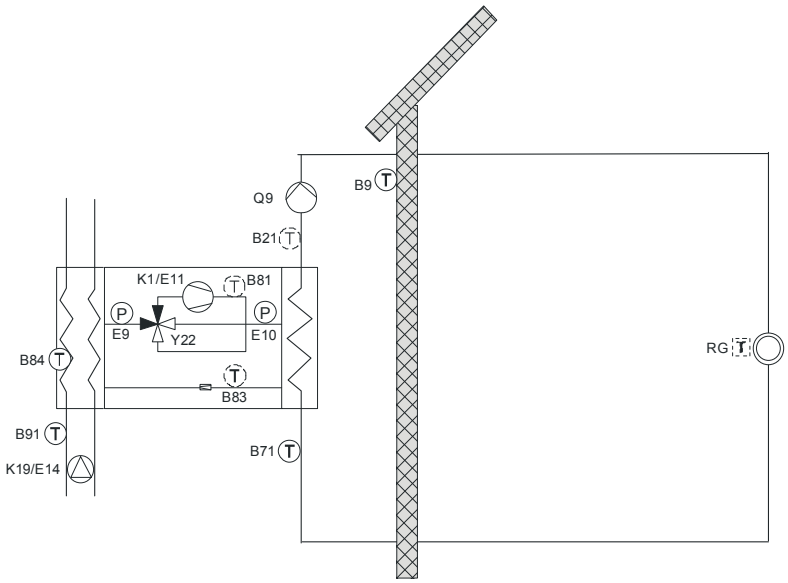
Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	Div valve cool source Y28
QX2	Y21
QX3	Compressor stage 1 K1
QX4	
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	HP flow sensor B21
BX3	HP return sensor B71
BX4	Outside sensor B9

I/O module AVS55.190/109	
QX31	Y1
QX32	Y2
QX33	Heat circuit pump HC1 Q2
ZX34	
QX35	DHW ctrl elem Q3
BX31	DHW sensor B3
BX32	B1
BX33	Buffer sensor B4
BX34	Buffer sensor B41
Extension module AVS75.390 addr1	
QX21	Collector pump Q5 on/off
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

7.2 Solutions for air-to-water heat pumps installed outdoors

Plant diagram 10

Air-to-water heat pump with pump heating circuit.



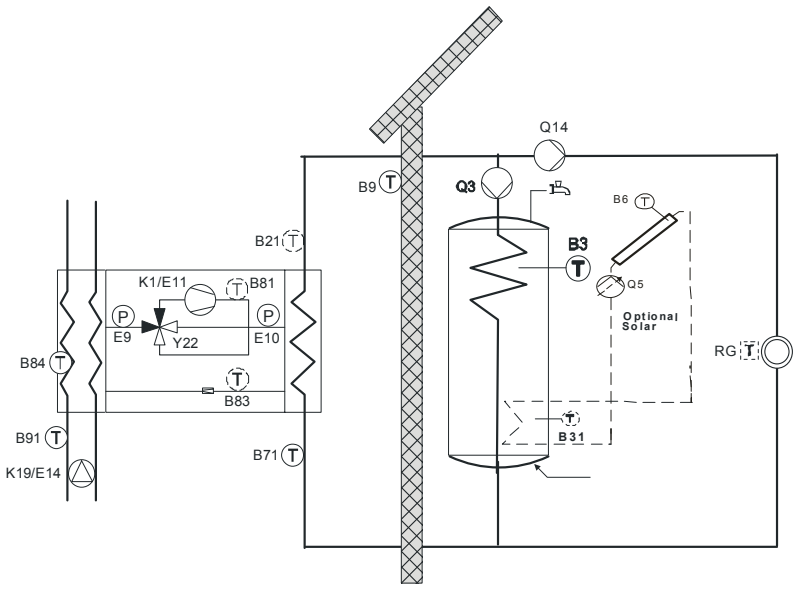
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

Extension module AVS75.390 addr1	
QX21	
QX22	
QX23	
BX21	
BX22	

Plant diagram 11

Air-to-water heat pump with pump heating circuit and DHW storage tank with DHW charging pump Q3.



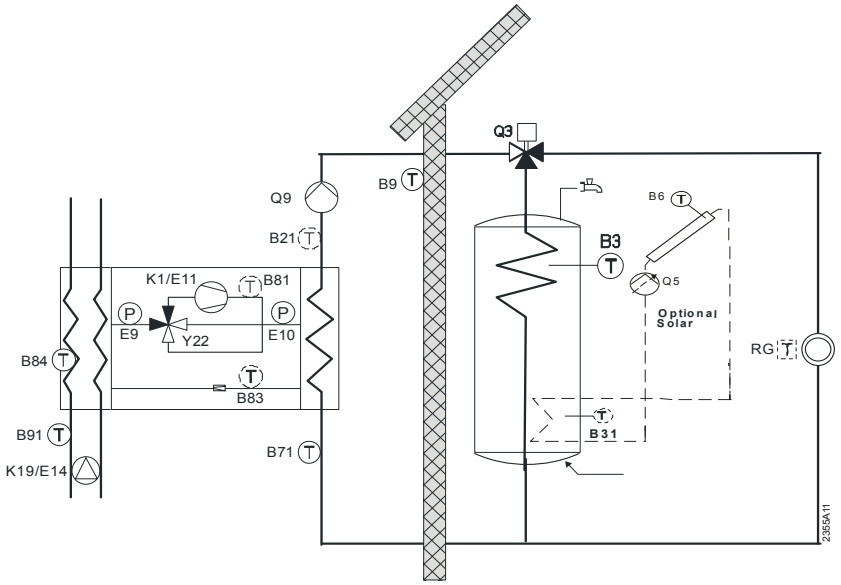
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	
QX22	
QX23	
BX21	
BX22	
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	System pump Q14
QX23	
BX21	DHW sensor B3
BX22	
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 12

Air-to-water heat pump with pump heating circuit and DHW storage tank with DHW diverting valve Q3.



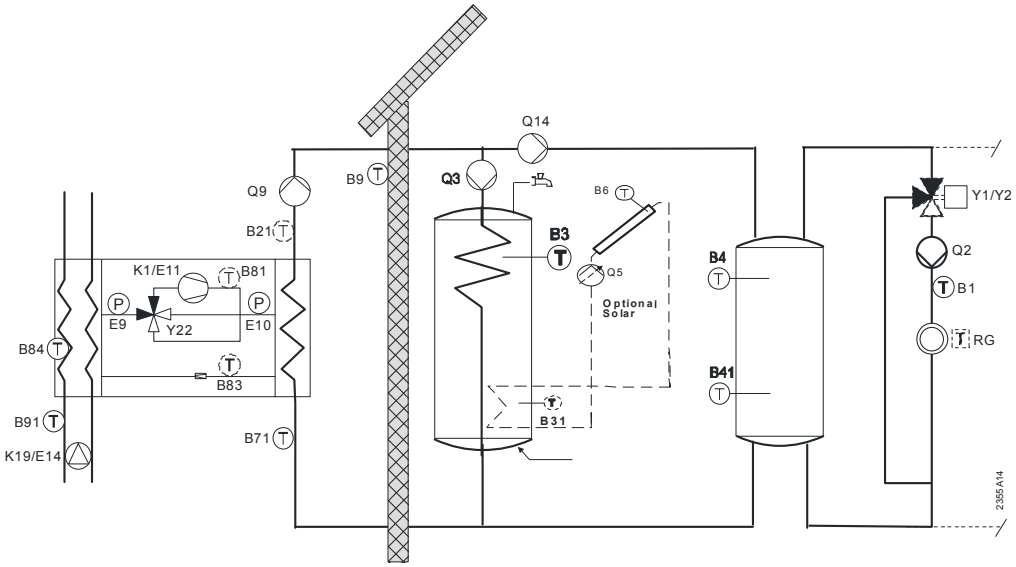
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	
QX22	
QX23	
BX21	
BX22	
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	
QX23	
BX21	DHW sensor B3
BX22	
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

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.



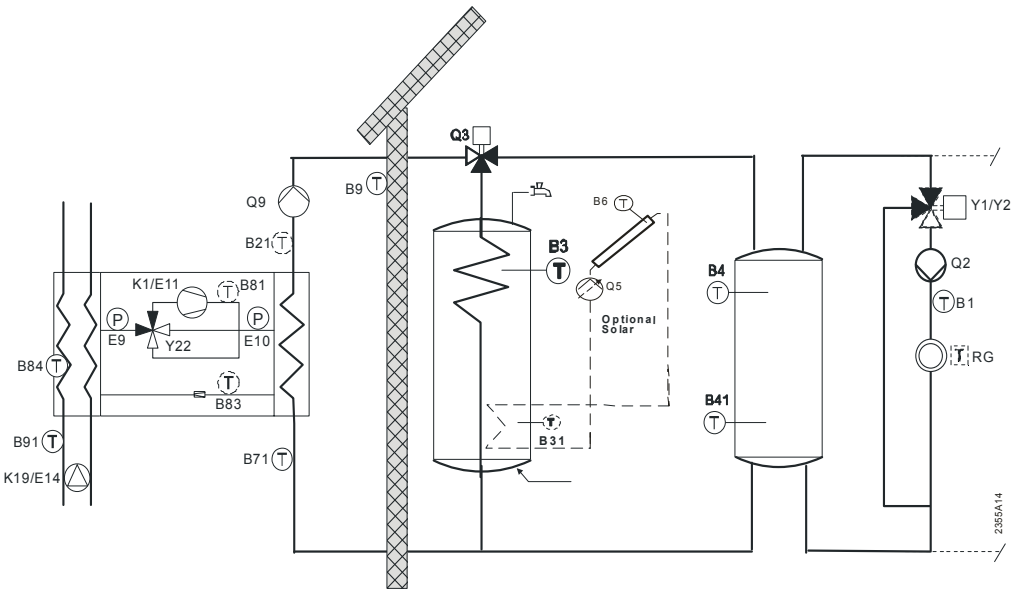
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	Y1
QX22	Y2
QX23	Heat circuit pump HC1 Q2
BX21	B1
BX22	Buffer sensor B4
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	System pump Q14
QX23	
BX21	DHW sensor B3
BX22	Buffer sensor B41
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 14

Air-to-water heat pump (installed outdoors) with buffer storage tank, DHW storage tank with diverting valve Q3 and mixing or pump heating circuit.



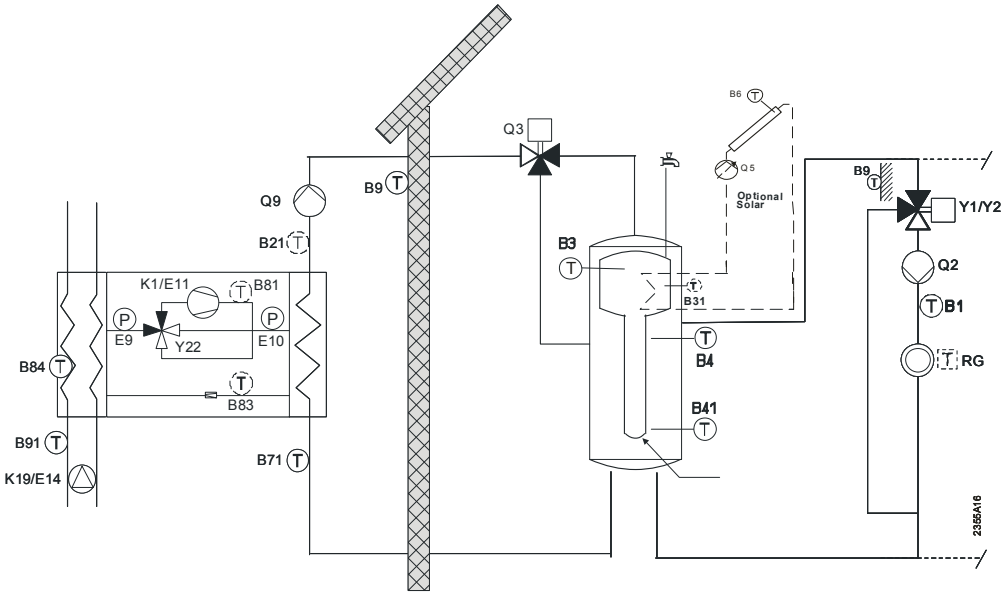
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	Y1
QX22	Y2
QX23	Heat circuit pump HC1 Q2
BX21	B1
BX22	Buffer sensor B4
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	
QX23	
BX21	DHW sensor B3
BX22	Buffer sensor B41
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 15

Air-to-water heat pump with combi storage tank and DHW diverting valve Q3 and mixing or pump heating circuit.



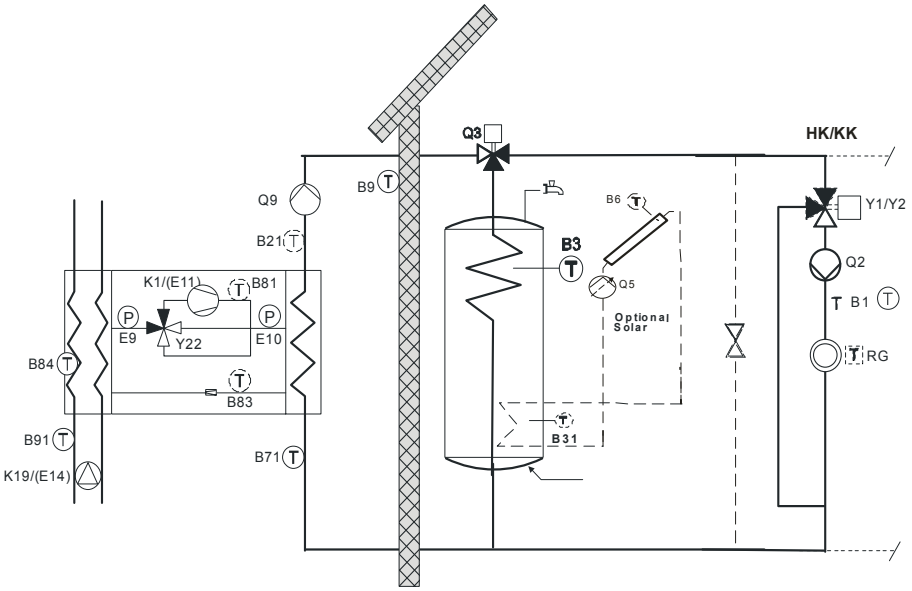
Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	Y1
QX22	Y2
QX23	Heat circuit pump HC1 Q2
BX21	B1
BX22	Buffer sensor B4
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	
QX23	
BX21	DHW sensor B3
BX22	Buffer sensor B41
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 16

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.

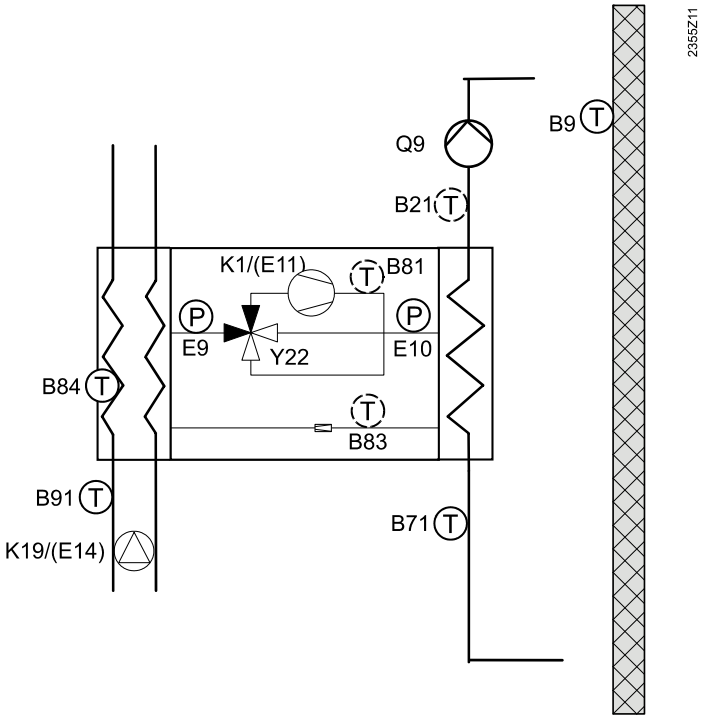


Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

AVS75.390/109 (address1) mixing HC	
QX21	Y1
QX22	Y2
QX23	Heat circuit pump HC1 Q2
BX21	B1
BX22	
AVS75.390/109 (address2) storage tank	
QX21	DHW ctrl elem Q3
QX22	
QX23	
BX21	DHW sensor B3
BX22	
AVS75.390/109 (address3) solar	
QX21	Collector pump Q5
QX22	
QX23	
BX21	Collector sensor B6
BX22	DHW sensor B31

Plant diagram 17 Air-to-water heat pump, cascade slave.



Multifunctional terminals

Basic PCB RVS21.827/109	
EX1	Low-pressure switch E9
EX2	High-pressure switch E10
EX3	
EX4	
QX1	
QX2	
QX3	Compressor stage 1 K1
QX4	Process revers valve Y22
QX5	Condenser pump Q9
ZX6	Source pump Q8/fan K19
BX1	Source inlet sensor B91
BX2	Evaporator sensor, setting: Source outl sens B92/B84
BX3	HP return sensor B71
BX4	Outside sensor B9
I/O module AVS55.190/109	
QX31	
QX32	
QX33	
ZX34	
QX35	
BX31	
BX32	
BX33	
BX34	

8 Technical data

8.1 Basic unit RVS21.826

Power supply	Rated voltage	AC 230 V (+10%/-15%)
	Rated frequency	50/60 Hz
	Power consumption	Max. 9.5 VA
	Fusing of supply lines	Automatic cutout: max. 13 A to EN 60898-1 or Fuse: max. 10 AT
Wiring of terminals	Power supply and AC 230 V outputs	Solid or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5...1.5 mm^2 3 cores: not allowed
Function data	Software class	A
	Mode of operation to EN 60730	1.B (automatic operation)
Inputs	Mains inputs EX1...EX4	Max. AC 230 V
	Operating range	AC 0...253 V
	Low	< AC 170 V
	High	> AC 190 V
	Internal resistance	>100 kΩ
	Digital inputs H1, H3	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:
	Voltage with contact open	DC 12 V
	Current with contact closed	DC 3 mA
	Analog inputs H1, H3	Safety extra low-voltage
	Operating range	DC 0...10 V
	Internal resistance	>100 kΩ
	Pulse inputs H1, H3	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:
	Voltage with contact open	DC 12 V
	Current with contact closed	DC 3 mA
	Pulse duration	Min. 20 ms
	Frequency inputs H1, H3	Safety extra low-voltage
	Operating range	DC 0...12 V
	Low	<1.7 V
	High	2.7..0.12 V
	Internal resistance	>100 kΩ
	Frequency	Max. 500 Hz
	Digital inputs DI6, DI7 (both at X75)	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:
	Voltage with contact open	DC 12 V
	Current with contact closed	DC 3 mA
	Sensor inputs BX1...BX5	NTC 1k (QAC34, outside sensor) NTC 10k (QAZ36, QAD36) Pt1000 (optionally for collector and flue gas sensor)
	Perm. sensor cables (copper)	
	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 QX1...QX5	
	Rated current range	AC 0.02...2 (2) A
	Switch-on current	Max.1 A for ≤1 s
	Total current	Max. AC 10 A (all AC 230 V outputs)
	Rated voltage range	AC 24...230 V (for potentialfree outputs)
	Triac output ZX6	
	Rated current range	AC 0.02...2(2) A (on/off operation) AC 0.02...1.2 (1.2) A (speed control)
	Switch-on current	Max.4 A for ≤1 s
	Total current	Max. AC 10 A (all AC 230 V outputs)
	Analog outputs UX1, UX2, UX3 (X75)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	U_{out} = 0... 10.0 V
	Current load	±2 mA RMS; ±2.7 mA peak
	Ripple	≤50 mVpp
	Accuracy of zero point	<± 80 mV
	Error remaining range	≤130 mV
	PWM outputs UX1, UX2, UX3 (X75)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	High 10 V, Low 0 V
	Current load	Ux = min. 6 V @ 5 mA
	Frequency	3 kHz
	Digital outputs D1, D2, D3 (all at X75)	Internal pullup
	Output voltage	High 12 V, Low 0 V
	Current load	2.5 mA
	G+ power supply	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	11.3...13.2 V
	Current load	Max. 88 mA (RVS21 and AVS55 together)
	GX1 power supply (switchable)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage 5 V	4.75...5.25 V
	Output voltage 12 V	11.3...13.2 V
	Current load	Max. 20 mA (RVS21 and AVS55 together)
Interfaces	BSB	2-wire connection (non-interchangeable)
	Cable length	
	Basic unit – peripheral device	Max. 200 m
	Total cable length	Max. 400 m (max. cable capacitance: 60 nF)
	Cross-sectional area	Min. 0.5 mm^2
	LPB (optionally with LPB clip-in OCI345.06/101 at X70)	Copper cable 1.5 mm^2, 2-wire connection (non-interchangeable)
	With controller bus power supply (per controller)	250 m
	With central bus power supply	460 m
	Bus loading number	E = 3
	Connecting cable X100 to AVS55.19x	Ribbon cable (18 poles)
	Cable length	Max. 1,000 mm
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00 (without housing)
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class II
	Degree of pollution to EN 60730	Normal pollution

Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EG
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	2006/95/EG
	- Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C
	Operation to EN 60721-3-3	Class 3K5, -20...50 °C (non-condensing)
Weight	Excl. packaging	193 g

8.2 I/O module AVS55.196

Power supply	Rated voltage	AC 230 V (+10%/-15%)
	Rated frequency	50/60 Hz
	Power consumption	Max. 2.5 VA
	Fusing of supply lines	Automatic cutout: max. 13 A (as per EN 60898-1) or fuse: max. 10 AT
Wiring of terminals	Power supply and AC 230 V outputs	Solid or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5...1.5 mm^2 3 cores: not allowed
Inputs	Digital inputs H31, H32, H33	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:
	Voltage with contact open	DC 12 V
	Current with contact closed	DC 3 mA
	Analog inputs H31, H32, H33	Safety extra low-voltage
	Operating range	DC 0...10 V
	Internal resistance	>100 kΩ
	Pulse inputs H31, H32, H33	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:
	Voltage with contact open	DC 12 V
	Current with contact closed	DC 3 mA
	Pulse duration	Min. 20 ms
	Frequency inputs H31, H32, H33	Safety extra low-voltage
	Operating range	DC 0...12 V
	Low	<1.7 V
	High	2.7...12 V
	Internal resistance	>100 kΩ
	Frequency	Max. 500 Hz
	Sensor inputs BX31...BX34	NTC 1k (QAC34, outside sensor), NTC 10k (QAZ36, QAD36) Pt1000 (optional for collector sensor)

Perm. sensor cables (copper)						
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 QX31...QX33, QX35	
	Rated current range	AC 0.02...2 (2) A
	Switch-on current	Max.1 A for ≤1 s
	Total current	Max. AC 10 A (all AC 230 V outputs)
	Triac output ZX34	
	Rated current range	AC 0.02...2(2) A (on/off operation) AC 0.02...1.2 (1.2) A (speed control)
	Leakage current	Max. 2 mA
	Switch-on current	Max.4 A for ≤1 s
	Total current	Max. AC 10 A (all AC 230 V outputs)
	G+ power supply	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	11.3...13.2 V
	Current load	Max. 88 mA (RVS21 and AVS55 together)
	GX1 power supply (switchable)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage 5 V	4.75...5.25 V
	Output voltage 12 V	11.3...13.2 V
	Current load	Max. 20 mA (RVS21 and AVS55 together)
Interfaces	BSB	2-wire connection (not interchangeable)
	Cable length	
	Basic unit – peripheral device	Max. 200 m
	Total cable length	Max. 400 m (max. cable capacitance: 60 nF)
	Cross-sectional area	Min. 0.5 mm^2
	Connecting cable X100 for RVS21	Ribbon cable (18 poles)
	Length	Max. 1,000 mm
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00 (without housing)
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class II
	Degree of pollution to EN 60730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EG
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	2006/95/EG
	- Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C
	Operation to EN 60721-3-3	Class 3K5, -20...50 °C (non-condensing)
Weight	Excl. packaging	112 g

8.3 I/O module AVS55.199

Power supply	Rated voltage	AC 230 V (+10%/-15%)					
	Rated frequency	50/60 Hz					
	Power consumption	Max. 4 VA (excl. EEV)					
	Fusing of supply lines	Automatic cutout: max. 13 A (to EN 60898-1) or fuse: max. 10 AT					
Wiring of terminals	Power supply and AC 230 V outputs	Solid or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5...1.5 mm^2 3 cores: not allowed					
Inputs	Digital inputs H31, H32, H33	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:					
	Voltage with contact open	DC 12 V					
	Current with contact closed	DC 3 mA					
	Analog inputs H31, H32, H33	Safety extra low-voltage					
	Operating range	DC 0...10 V					
	Internal resistance	>100 kΩ					
	Pulse inputs H31, H32, H33	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:					
	Voltage with contact open	DC 12 V					
	Current with contact closed	DC 3 mA					
	Pulse duration	Min. 20 ms					
	Frequency inputs H31, H32, H33	Safety extra low-voltage					
	Operating range	DC 0...12 V					
	Low	<1.7 V					
	High	2.7...12 V					
	Internal resistance	>100 kΩ					
	Frequency	Max. 500 Hz					
	Sensor inputs BX31...BX34	NTC 1k (QAC34, outside sensor), NTC 10k (QAZ36, QAD36) Pt1000 (optional for collector sensor)					
	Perm. sensor cables (copper)						
	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 output QX35	
	Rated current range	AC 0.02...2 (2) A
	Switch-on current	Max.1 A for ≤1 s
	Total current	Max. AC 10 A
	G+ power supply	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	11.3...13.2 V
	Current load	Max. 88 mA (RVS21 and AVS55 together)
	GX1 power supply (switchable)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage 5 V	4.75...5.25 V
	Output voltage 12 V	11.3...13.2 V
	Current load	Max. 20 mA (RVS21 and AVS55 together)
	WX31 electronic expansion valve	
	Type of stepper motor	Unipolar
	Control	Half-step Full step (1 phase)
	Step rate	30...300 steps/s
	Output voltage COM	11.3...13.2 V
	Current load COM	260 mA per phase, max. 2 phases
Interfaces	BSB	2-wire connection (non-interchangeable)
	Cable length	
	Basic unit – peripheral device	Max. 200 m
	Total cable length	Max. 400 m (max. cable capacitance: 60 nF)
	Cross-sectional area	Min. 0.5 mm^2
	Connecting cable X100 for RVS21	Ribbon cable (18 poles)
	Length	Max. 1,000 mm
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00 (without housing)
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class II
	Degree of pollution to EN 60730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EG
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	2006/95/EG
	- Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C
	Operation to EN 60721-3-3	Class 3K5, -20...50 °C (non-condensing)
Weight	Excl. packaging	93 g

8.4 LPB clip-in OCI345.06/101

Power supply	Via RVS... basic unit	DC 24 V
Interfaces	Connection to RVS... basic unit (power supply, communication)	Prefabricated ribbon cable (0.2 m, 14 poles)
	LPB	2-wire copper cable 1.5 mm^2 (non-interchangeable)
	With bus power supply via controller (per controller)	250 m
	With central bus power supply	460 m
	Bus loading number	E = 3
	Connection of service tool	LPB service plug (4 poles)
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class III
	Degree of pollution to EN 60730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EG
	- Immunity	- EN 61000-6-1, EN 61000-6-2
	- Emissions	- EN 61000-6-3, EN 61000-6-4
	Low-voltage directive	2006/95/EG
	- Electrical safety	- EN 60730, EN 50090-2-2
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C
	Operation to EN 60721-3-3	Class 3K5, 0...60 °C (non-condensing) In connection with RVS21.82x: Class 3K5, -20...60 °C (non-condensing)
Weight	Excl. packaging	54 g

8.5 Extension module AVS75.370

Power supply	Rated voltage	AC 230 V (+10%/-15%)					
	Rated frequency	50/60 Hz					
	Power consumption	Max. 6.5 VA					
	Fusing of supply lines	Automatic cutout: max. 13 A (as per EN 60898-1) or fuse: max. 10 AT					
Wiring of terminals	Power supply and outputs	Solid or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5...1.5 mm^2 3 cores: not allowed					
Function data	Software class	A					
Inputs	Digital inputs H21, H22	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:					
	Voltage with contact open	DC 12 V					
	Current with contact closed	DC 3 mA					
	Analog inputs H21, H22	Safety extra low-voltage					
	Operating range	DC 0...10 V					
	Internal resistance	>100 kΩ					
	Pulse inputs H21, H22	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:					
	Voltage with contact open	DC 12 V					
	Current with contact closed	DC 3 mA					
	Pulse duration	Min. 20 ms					
	Frequency inputs H21, H22	Safety extra low-voltage					
	Operating range	DC 0...12 V					
	Low	<1.7 V					
	High	2.7 V..0.12 V					
	Internal resistance	>100 kΩ					
	Frequency	Max. 500 Hz					
	Mains input EX21	Max. AC 230 V					
	Operating range	AC 0...253 V					
	Low	<95 V					
	High	>115 V					
	Internal resistance	>100 kΩ					
	Sensor inputs BX21, BX22	NTC 10k (QAZ36, QAD36) Pt1000 (for collector)					
	Perm. sensor cables (copper)						
	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
	Switch-on current	Max.1 A for ≤1 s
	Total current	Max. AC 6 A (all relays)
	Rated voltage range	AC 24...230 V (for potentialfree outputs)
	Analog outputs UX21, UX22	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	U_{out} = 0...10 V
	Current load	±2 mA RMS; ±2.7 mA peak
	Ripple	≤50 mVpp
	Accuracy of zero point	<± 80 mV
	Error remaining range	≤130 mV
	PWM outputs UX21, UX22	Safety extra low-voltage, output is short-circuit-proof
	Output voltage	High 10 V, Low 0 V
	Current load	Ux = min. 6 V @ 5 mA
	Frequency	3 kHz
	Power supply GX21 (switchable)	Safety extra low-voltage, output is short-circuit-proof
	Output voltage 5 V	4.75...5.25 V
	Output voltage 12 V	11.4...12.6 V
	Current load	Max. 20 mA
	WX21 electronic expansion valve	
	Type of stepper motor	Unipolar
	Control	Half-step Full step (1 phase)
	Step rate	30...300 steps/s
	Output voltage COM	11.3...13.2 V
	Current load COM	260 mA per phase, max. 2 phases
Interfaces	BSB	2-wire connection (not interchangeable)
	Cable length	
	Basic unit – peripheral device	Max. 200 m
	Total cable length	Max. 400 m (max. cable capac. 60 nF)
	Cross-sectional area	Min. 0.5 mm^2
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class II
	Degree of pollution to EN 60730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	2004/108/EG
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	2006/95/EG
	- Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C
	Operation to EN 60721-3-3	Class 3K5, -20...50 °C (non-condensing)
Weight	Excl. packaging	248 g

8.6 Extension module AVS75.390

Power supply	Rated voltage	AC 230 V (+10%/-15%)					
	Rated frequency	50/60 Hz					
	Power consumption	Max. 4 VA					
	Fusing of supply lines	Automatic cutout: max. 13 A (to EN 60898-1) or fuse: max. 10 AT					
Wiring of terminals	Power supply and outputs	Solid or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5...1.5 mm^2 3 cores: not allowed					
Function data	Software class	A					
Inputs	Digital input H2	Safety extra low-voltage for potentialfree contacts suitable for low-voltage:					
	Voltage with contact open	DC 12 V					
	Current with contact closed	DC 3 mA					
	Analog input H2	Safety extra low-voltage					
	Operating range	DC 0...10 V					
	Internal resistance	>100 kΩ					
	Sensor inputs BX21, BX22	NTC 10k (QAZ36, QAD36) Pt1000 (for collector)					
	Perm. sensor cables (copper)						
	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					
	Switch-on current	Max.1 A for ≤1 s					
	Total current	Max. AC 6 A (all relays)					
Interfaces	BSB	2-wire connection (non-interchangeable)					
	Cable length						
	Basic unit – peripheral device	Max. 200 m					
	Total cable length	Max. 400 m (max. cable capacitance: 60 nF)					
	Cross-sectional area	Min. 0.5 mm^2					
Degree of protection and safety class	Degree of protection of housing to EN 60529	IP00					
	Safety class to EN 60730	If correctly installed, low-voltage live parts meet the requirements of safety class II					
	Degree of pollution to EN 60730	Normal pollution					
Standards, safety, EMC, etc.	CE conformity to						
	EMC directive	2004/108/EG					
	- Immunity	- EN 61000-6-2					
	- Emissions	- EN 61000-6-3					
	Low-voltage directive	2006/95/EG					
	- Electrical safety	- EN 60730-1, EN 60730-2-9					
Climatic conditions	Storage to EN 60721-3-1	Class 1K3, -20...65 °C					
	Transport to EN 60721-3-2	Class 2K3, -25...70 °C					
	Operation to EN 60721-3-3	Class 3K5, -20...50 °C (non-condensing)					
Weight	Excl. packaging	293 g					

8.7 Sensor characteristics

8.7.1 NTC 1k

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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