August 2010

GEOflo

Ground Source Heat Pump
Brine/Water and Water/Water
Installation operation

Working towards
a cleaner future

POTTERTON
COMMERCIAL
heating specialists

Table of contents

132-369 306.4 04.08 Fh

132-369 306.4 04.08 Fh

1. Regarding this Manual

Read this instruction thoroughly before operating the device!

1.1 Content of this manual

The content of this instruction is the installation of heat pumps of the series BSW.
The operating mode brine/water as well as the operating mode water/water is possible with the aid of an external water heat exchanger (accessory).
Here, an overview of the further documents belonging to this heating system.Keep all documents at the installation location of the heat pump!

Documentation	Contents	Intended for
Technical information	– Planning documents – Description of function – Technical data/circuit diagrams – Basic equipment and accessories – Application examples – Call-for-tender texts	Planner, customer
Installation manual – Extended information	– Usage according to purpose – Technical data/circuit diagram – Regulations, standards, CE – Notes for installation location – Application example *Standard application* – Commissioning, operation and programming – Servicing	Heating specialist
Operating Instructions	– Commissioning – Operation – User settings/programming – Disturbance table – Cleaning/maintenance – Energy saving tips	Customer
Programming and hydraulic system manual	– Setting table including all parameters and explanations – Further application examples	Heating specialist
Commissioning report	– Characteristics of the heating system	Heating specialist
Brief instruction	– Operation in brief	Customer
Servicing booklet	– Report of carried out services	Customer

132-369 306.4 04.08 Fh

1.2 Used symbols

Danger! Danger exists for body and life in case it is not observed.

Danger of electric shock! In case it is not observed, danger from electricity exists for body and life!

Attention! If warning is not observed, danger exists for environment and the device.

Note/tip: Here, you can find background information and useful tips.

Reference to additional information in other documents.

1.3 For whom is this manual intended?

This installation manual is intended for the heating specialist.

132-369 306.4 04.08 Fh

2. Safety

Danger! Absolutely, observe the following safety information! Otherwise you are endangering yourself and others

2.1 Usage according to purpose

The heat pumps of the series type are designed with electric operated compressors and buffer storage BSW (accessory) for heating systems according to EN 14511.
The heat pump is only planned for the explicitely specified usage. In case of usage not conform to the specified purpose, BRÖTJE does not accept any responsibility or liability.

2.2 General safety instructions

Danger! A danger of signifficant damages to persons, environment and property exists during installation of heating systems.Therefore, heating systems must only be installed by specialist companies and commissioned by specialists of the installing company! Setting, servicing and cleaning of heat pumps must only be carried out by a qualified heating specialist! Used accessories must correspond to the technical rules and be approved by the manufacturer in connection with this heat pump.Only original spare parts must be used. unauthorised modifications of the heat pump are not permitted, as they could endanger persons and lead to damages to the device.In case of not observing this, the approval of the device becomes void.

Danger of electric shock! All electrical work in connection with the installation must only be carried out by a trained electrician!

2.3 Regulations and standards

Beside the general technical rules, the relevant standards, regulations, ordinances and guidelines should be followed:

- DIN 4109; Noise protection in construction engineering
- DIN EN 12828; Safety technical equipment of heating plants
- EN 14511; Heat pumps with electrically driven compressors for room heating
- EnEV - Energy saving regulation
- Federal Immission Control Ordinance 3. BImSchV
- DIN 18380; Heating plants and central hot water plants (VOB)
- DIN EN 12831; Heating plants in buildings
- DIN 4753; Hot water plants for drinking and water supply
- DIN 1988; Technical Rules for drinking water installations (TRWI)
- DIN VDE 0100; EN 50165; electrical design of non-electrical devices
- DIN VDE 0116; elctrical equipment of firing plants
- VDE: EN 60335 and EN 50366
- Fuel Ordinance, State Ordinances

132-369 306.4 04.08 Fh

- Regulations of the local Electricity Board
- Obligation to register (possibly. Group Exemption Regulation)
- ATV-Code-of-practrice M251 of the waste water technology association

2.4 CE-Marking

The CE-marking means that all regulations according to the CE-standard have been met in design and manufacture of the heat pump (see conformity declaration).
Meeting the protection requirements according to the directive 89/336/EWG is only ensured for specification-conform operation of the heat pump.
The ambient conditions according EN 55014 must be met.Operation is only allowed with correct assembled covering.Correct electric earthing must be ensured by regular checks (e.g. yearly inspection) of the heat pump.
When replacing device parts, only original parts as specified by the manufacturer must be used.

132-369 306.4 04.08 Fh

2.5 Conformity declaration

CE

BRÖTJE HEIZUNG
Ein Unternehmen der BAXI GROUP

Konformitätserklärung des Herstellers
Declaration of Conformity

Produkt *Product*	Wasser/Wasser- und Sole/Wasser-Wärmepumpe
Handelsbezeichnung *Trade Mark*	SensoTherm
Typ, Ausführung *Type, Model*	BSW 6 A, BSW 7 A, BSW 8 A, BSW 10 A, BSW 13 A, BSW 15 A, BSW 18 A, BSW 21 A
EU-Richtlinien *EU Directives*	89/392/EWG oder 98/37/EG 89/366/EWG, 73/23/EWG
Normen *Standards*	DIN EN 378 -1/-2/-3/-4, DIN EN 60529, DIN EN 294, DIN EN 60335 -1/A2 -2-40, DIN EN 292/T1 T2, DIN EN 349, DIN EN 55014-/T1 T2, DIN EN 61000-3-2/-3-3

Wir erklären hiermit als Hersteller:

Die entsprechend gekennzeichneten Produkte erfüllen die Anforderungen der aufgeführten Richtlinien und Normen. Sie stimmen mit dem geprüften Baumuster überein, beinhalten jedoch keine Zusicherung von Eigenschaften. Die Herstellung unterliegt dem genannten Überwachungsverfahren.
Das bezeichnete Produkt ist ausschließlich zum Einbau in Warmwasserheizanlagen bestimmt. Der Anlagenhersteller hat sicherzustellen, dass die geltenden Vorschriften für den Einbau und Betrieb des Kessels eingehalten werden.

AUGUST BRÖTJE GmbH

.....
Leiter Entwicklung

.....
Leiter Versuch

Rastede, 29.11.07

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132-369 306.4 04.08 Fh

3. Technical Data

3.1 Dimensions and connections BSW

Fig. 1: Dimensions and connections

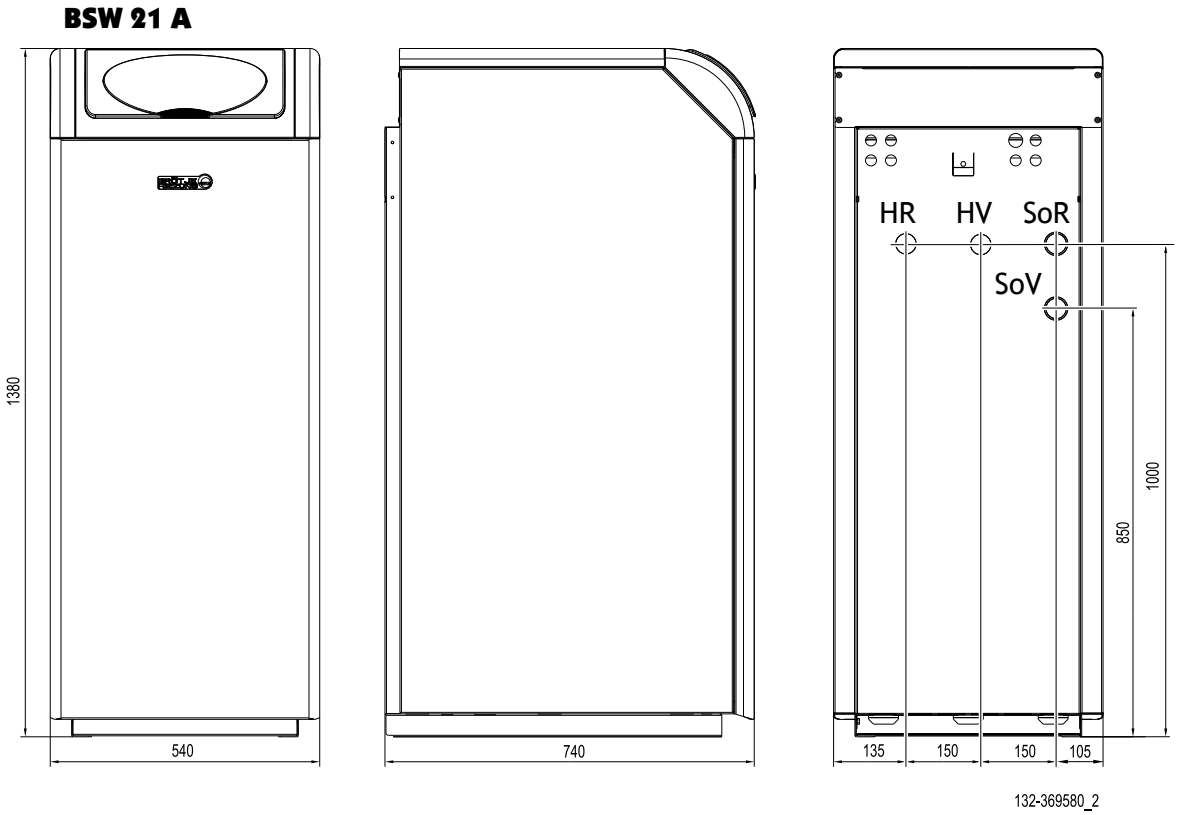
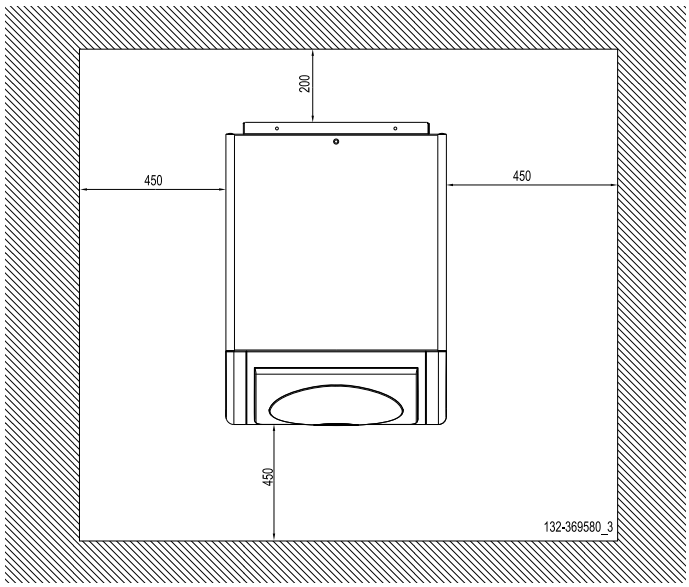


Fig. 2: Space requirement



Minimum distances in mm

Table 1: Dimensions and connections BSW

Model		**BSW 21 A**
HV	– Heating flow	R 5/4“
HR	– Heating return	R 5/4“
SoV	– Flow brine circuit	R 5/4“
SoR	– Return brine circuit	R 5/4“
SV	– Drain safety valves	Plastic hose, ∅ 19 mm inner

132-369 306.4 04.08 Fh

3.2 Technical Data BSW

Heat pump Brine / Water			**BSW 21 A**	
Type			Standard	
Rated capacity data			W 35	W 50
Heating capacity	at B0	kW	21.3	19.6
COP[1)]	at B0	(-)	4.7	3.0
Electric power consumption[1]	at B0	kW	4.6	6.6
Refrigerating capacity	at B0	kW	16.7	13.

Probe length (according to AWP with 59W/m)	m	334

Application range			
Heat sources temperature	min/max	°C	-6 / +20
Flow temperature heating	min/max	°C	20 / 60

Evaporator**, brine side**		
Volume flow (3 K ΔT bei B0/W35)	m^3/h	5.2
Pressure drop	kPa	24
Medium Water/Ethylene glycol	%	70 / 30

Liquefyer, heating side		
Volume flow (10 K ΔT at B0/W35)	m^3/h	1.8
Pressure drop	kPa	4.5
Medium Water	%	100

Dimensions / connections / miscellaneous			
Dimensions	DxWxH	mm	740 x 540 x 1380
Operating weight		kg	230
Heating circuit connection	IG	inch	1 1/4"
Heat source connection	IG	inch	1 1/4"
Noise emission level[2]	Lwa	dB(A)	appr. 56
Sound pressure level in 1m [2) 3]	Lpa	dB(A)	appr. 48
Refrigerant			R410A
Filling quantity		kg	3.4

Electric Data		
Operating voltage, input		3/N/PE/400V/50Hz
External fusing	AT	25C
Max. machine current	A	23
Starting current direct	A	95
Starting current with soft starter	A	52
max. Power consumption compressor	kW	9,1
Max. power consumption circulating pumps	kW	
Max power consumption total	kW	10.7
Heating pump outlets		P/N/PE
Heat source pump outlet		3P/PE

1. Without circhlating pumps
2. Provisional values
3. Measured values averaged around the heat pump (free field)

132-369 306.4 04.08 Fh

Heat pumps Water / Water			BSW 21 A	
Type			Standard	
Rated capacity data			W 35	W 50
Heating capacity	W10	kW	28.1	25.7
COP [1]	W10	(-)	6.1	3.9
El. power consumption [1)]	W10	kW	4.6	6.6
Cold temperature capacity	W10	kW	23.5	19.1
Application range				
Heat sources temperature	min/max	°C	+6 / +20	
Flow temperature heating	min/max	°C	20 / 63	
Liquefyer, heating side				
Volume flow (10 K ΔT ati W10/W35)		m^3/h	2.4	
Pressure drop		kPa	7	
Medium Water		%	100	
Evaporator, groundwater side				
Volume flow (3.5 K ΔT at W10/W35)		m^3/h	6.7	
Pressure drop		kPa	37	
Medium Water		%	100	
Dimensions / connections / miscellaneous				
Dimensions	DxWxH	mm	740 x 540 x 1380	
Operating weight		kg	230	
Heating circuit connection	IG	inch	1 1/4“	
Heat source connection	IG	inch	1 1/4"	
Noise emission level[2]	Lwa	dB(A)	appr. 56	
Sound pressure leve in 1m [2) 3]	Lpa	dB(A)	appr. 48	
Refrigerant			R410A	
Filling quantity		kg	3.4	
Electric Data				
Operating voltage, input			3/N/PE/400V/50Hz	
External fusing without electric heater insert		AT	25C	
Max. machine current		A	25	
starting current direct		A	95	
Starting current with soft starter		A	52	
max. Power consumption compressor		kW	9.1	
max. power consumption circulating pumps		kW	2.4	
Max power consumption total		kW	11.5	
Heating pump outlets			P/N/PE	
Heat source pump outlet			3P/PE	

1. Without circulating pumps
2. Provisional values
3. Measured values averaged around the heat pump (free field)

132-369 306.4 04.08 Fh

3.3 Residual pressure heads and hydraulic resistance

Fig. 3: Hydraulic resistance BSW 21 A (condenser side)

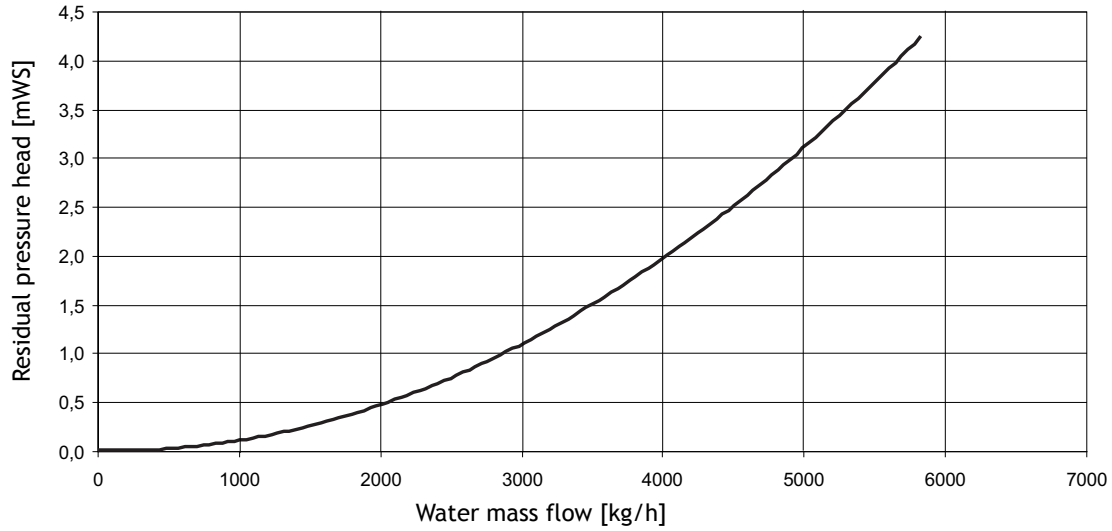
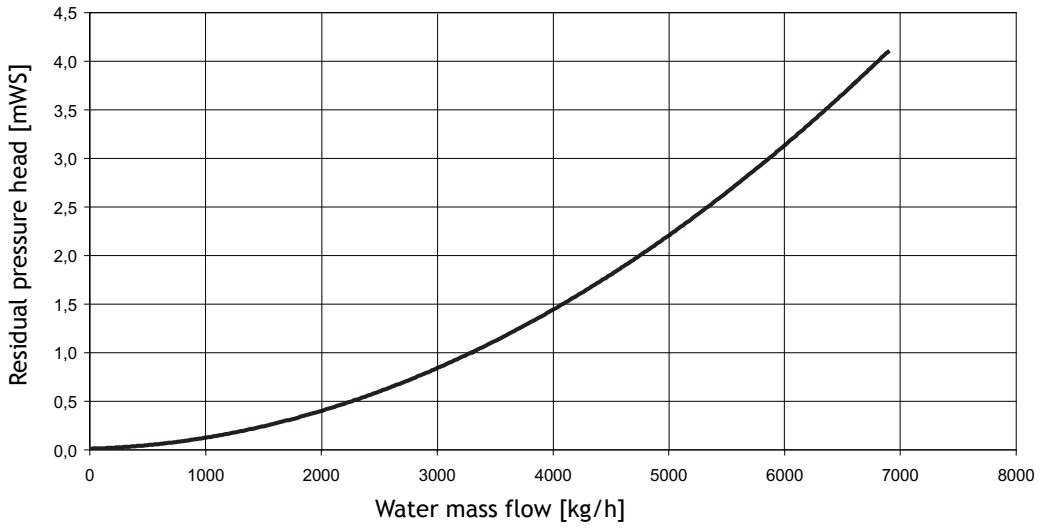
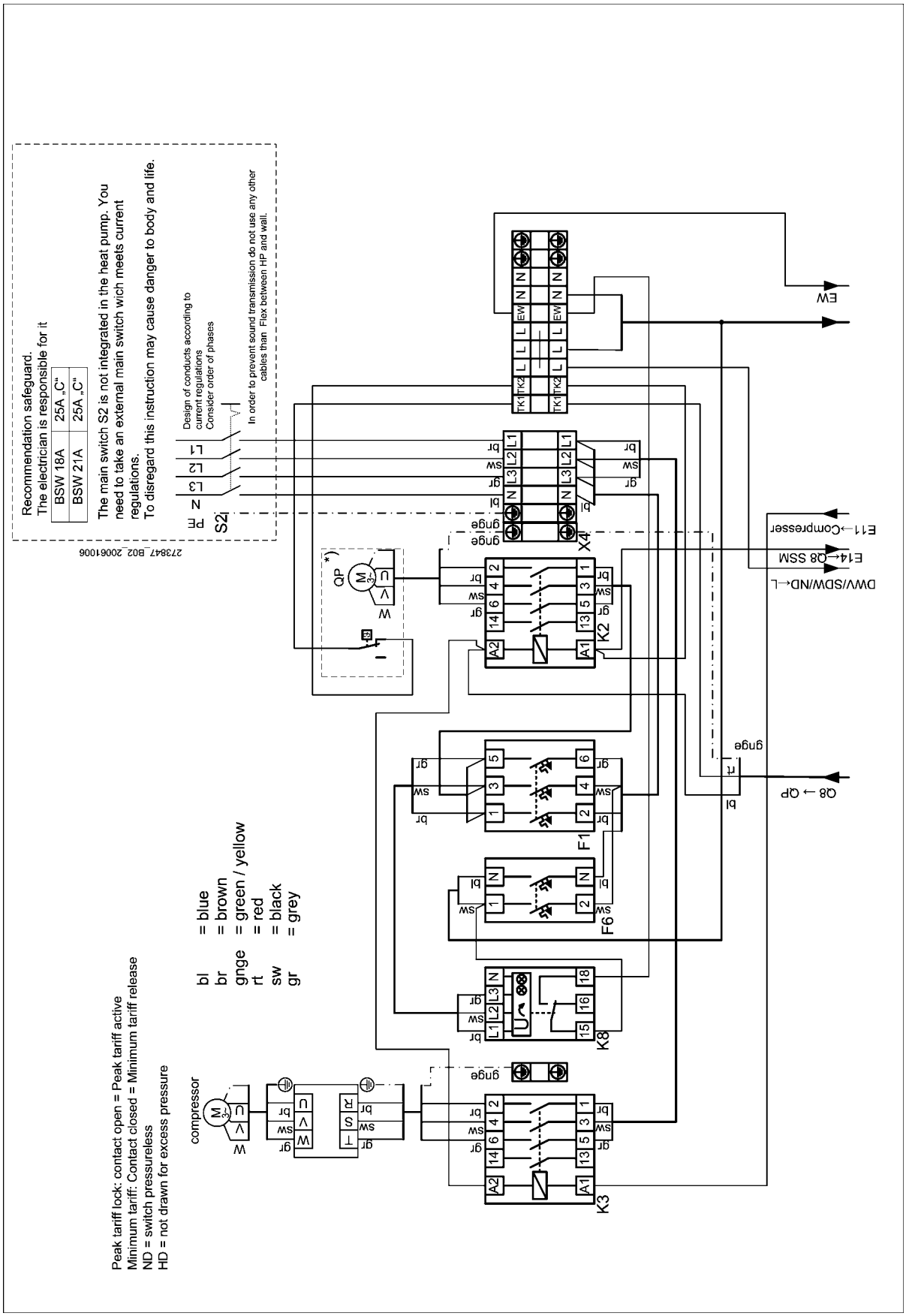


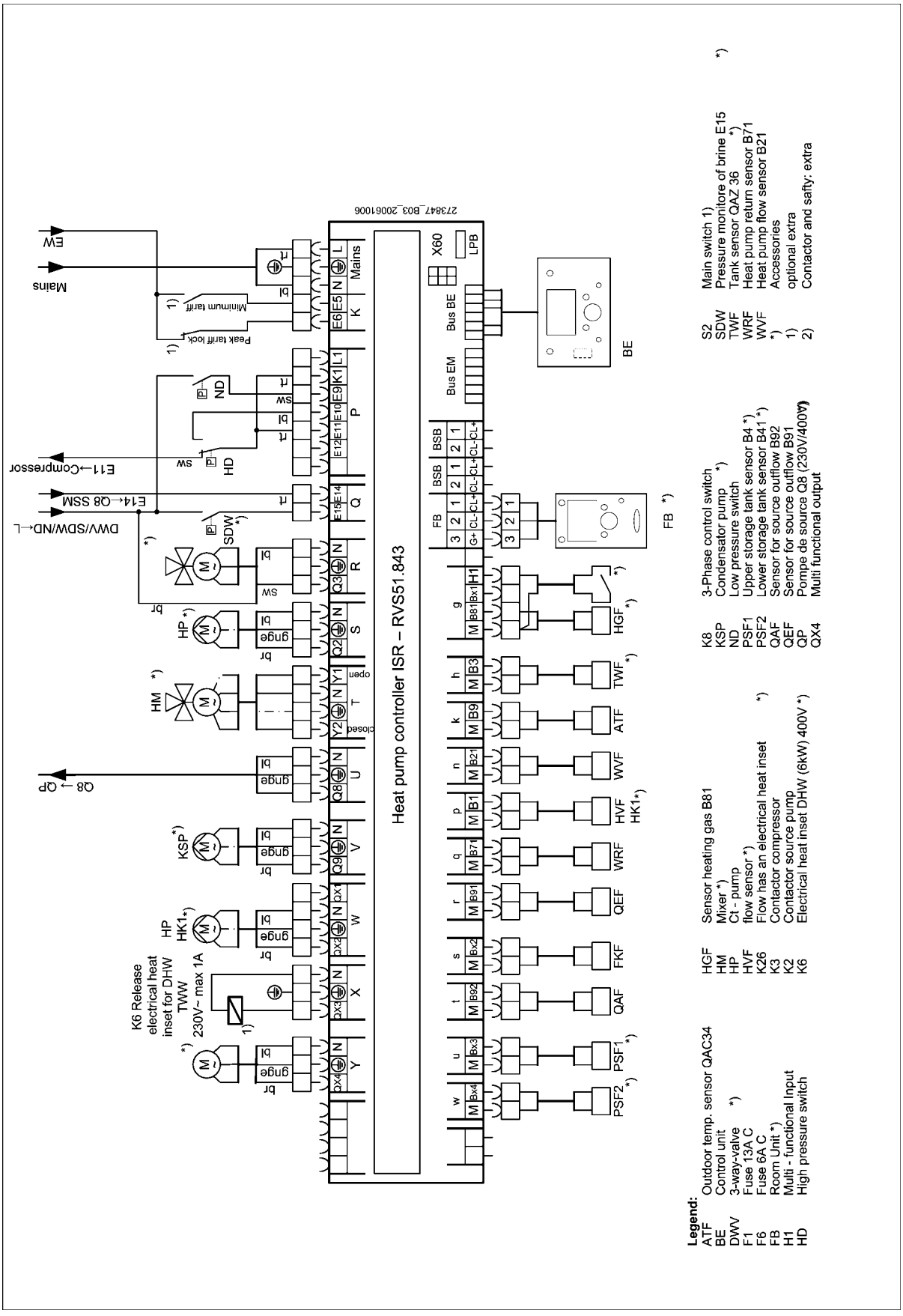
Fig. 4: Hydraulic resistance BSW 21 A (condenser side)



132-369 306.4 04.08 Fh

3.4 Wiring diagram BSW 21 A (general)

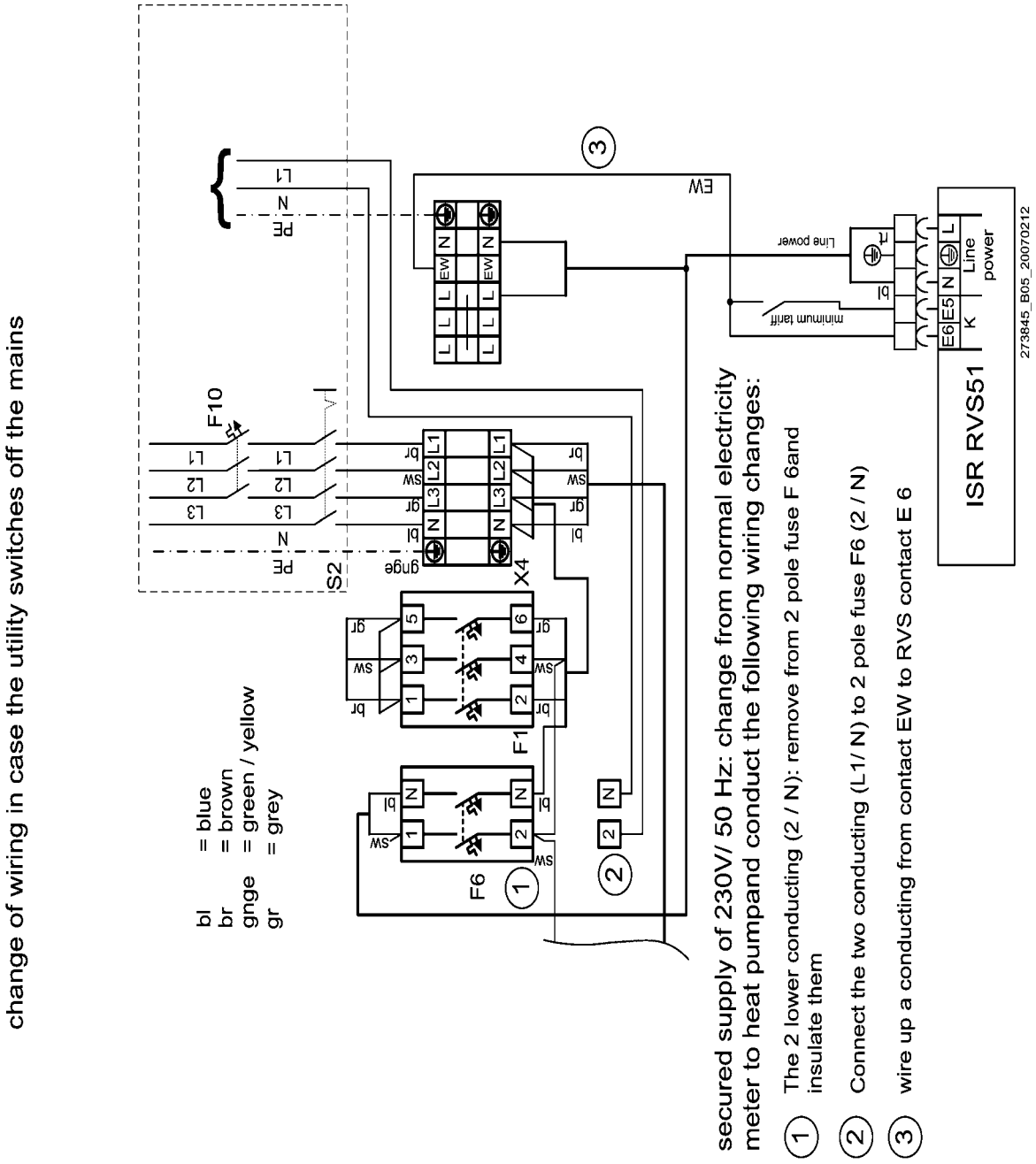



Heat pump controller ISR – RVS51.843
27384 7_B03_2006 1006
Mains
EW
E11→Compressor
E14→Q8 SSM
DWV/SDW/ND→L
Q8 ← QP
K6 Release electrical heat inset for DHW TWW 230V~ max 1A
HP HK1*)
KSP*)
HM *)
HP *)
SDW*)
HD
ND
Peak tariff lock
Minimum tariff
BE
FB *)
Bus EM
Bus BE
LPB
X60
Legend:
ATF Outdoor temp. sensor QAC34
BE Control unit
DWV 3-way-valve *)
F1 Fuse 13A C
F6 Fuse 6A C
FB Room Unit *)
H1 Multi - functional Input
HD High pressure switch
HGF Sensor heating gas B81
HM Mixer *)
HP Ct - pump
HVF flow sensor *)
K26 Flow has an electrical heat inset *)
K3 Contactor compressor
K2 Contactor source pump
K6 Electrical heat inset DHW (6kW) 400V *)
K8 3-Phase control switch
KSP Condensator pump *)
ND Low pressure switch
PSF1 Upper storage tank sensor B4 *)
PSF2 Lower storage tank sensor B41 *)
QAF Sensor for source outflow B92
QEF Sensor for source outflow B91
QP Pompe de source Q8 (230V/400V*)
QX4 Multi functional output
S2 Main switch 1)
SDW Pressure monitore of brine E15 *)
TWF Tank sensor QAZ 36 *)
WRF Heat pump return sensor B71
WVF Heat pump flow sensor B21
*) Accessories
1) optional extra
2) Contactor and safty: extra

3.5 Wiring diagram BSW (EW-Sperre)

EW-Locking

The locking of the heat pump by the energy supply company (EVU) must be carried out via a floating switching contact.Switching off the complet working line hinders the operation of the heat pump. If this is not available, use the lower circuit diagram.



132-369 306.4 04.08 Fh

4. Before installation

4.1 Planning tips

In order to guarantee an optimum operation of the heat pump BSW, the following points must be taken into consideration:

- The heating capacity of the heat pump should, if possible, be exactly dimensioned, to avoid increased on and off switching freqyencies.
- If the heating capacity is too large or the heat is given off by means of radiators, a buffer storage must, absolutely, be used.
- The volume flow through the heat pump must be constant (no pressure-controlled pumps).

- When designing the geothermal probes, running time changes must be taken into account, caused by TWW or swimming pool water preparation**It must be taken into account especially that not more than 80 kWh/m* of thermal energy is taken from the ground.**
- **Building drying** with a heat pump, operated with geothermal probes, can only be carried out, if this is **only operated with the activated additional heating capacity** (e.g. electric heater insert in the heating flow)!
- A heat pump cannot be operated capacity-controlledHeat pumps will be operated with constant volume flow and, due to this, with a constant temperature gradient between heating flow and return. Attention must be paid to these circumstances and to avoid excessive cycling operation, especially in case of consumers with variable capacities.Example:The energy transfer of the heat exchangers changes with increasing temperatures.By increasing the return temperature, the maximum flow temperature will be exceeded in case of too high set set-point.*Consequence*: High pressure fault of the heat pump.

4.2 Assembly tips

To guarantee an optimum and maintenance-free operation of the heat pump, the following points must be taken into consideration for the assembly:

- A heat pump must have no rigid connections to the building (no channels for electricity cables, no connectiong line directly to the heat pump).
- The supplied armoured hoses must be installed in any case.

- For securing the heat pump (load), it is absolutely necessary to use a 3-pole LS-block (three single fuses are not allowed). The fusing values given on the type plate must be observed.

- In case of geothermal probe operation,antifreeze must be added into the geothermal probe pipeline (mixture according to type plate). It must be observed in this case that no ice can form up to a temperature of -15°C.
- In no case must the geothermal probe connecting pipeline be made from galvanised steel pipes.
- All pipelines must be insulated vapour diffusion-tight.

132-369 306.4 04.08 Fh

4.3 Arrival check

The devices are delivered on a wood pallet with a respective protective packaging.On arrival of the delivery, the device must be checked for transportation damages and completeness.

Caution! If damages are detected, the respective damage must be recorded immediately on the transportation document with the following note:
"Acceptance under reservation because of obvious damage.

4.4 Transportation

It must be ensured berore every transportation that the used auxiliary means have a lifting capacity appropriate for the respective device weight.The work described here must be carried out according to the valid safety standards with respect to the equipment as well as also the procedure.

Transportation with fork lift, hand lift or similar means:
Place the forks lengthways under the wood pallet.When lifting, pay attention to equal distribution of the device weight.

Caution! When transported, the heat pump may only be tilted up to maximum 45° (in any direction).
It must be avoided that the heat pump is exposed to any kind of wetness or moisture(Valid also for assembly!)
The heat pump must be protected from damages especially during transportation or during the building phase.
Under no circumstances stack items on the heat pump or hang wet washing over the heat pump.

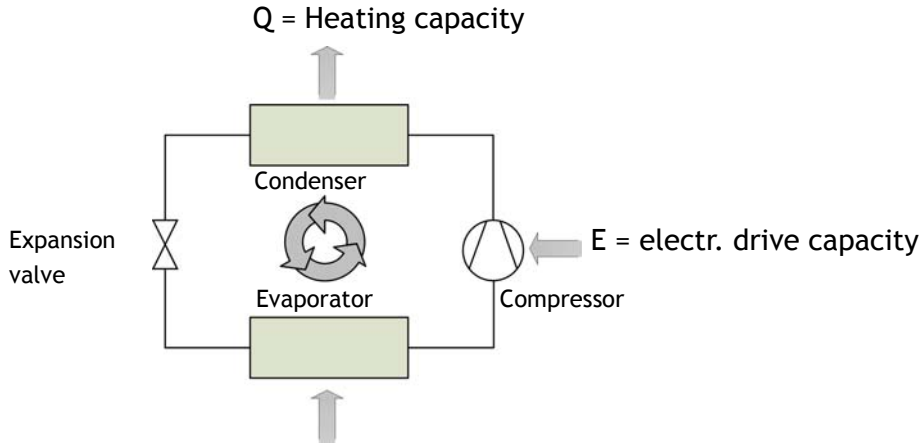
4.5 Function and design of a heat pump

In principle, the heat pump has been designed for DHW and/or hot water for domestic use.The function "'Free-Cooling' will also be supported (with accessories RGTK).
Under observation of the application limits (see Technical Data), the heat pump can be installed in new erected of existing heating plants.

132-369 306.4 04.08 Fh

Working principle of the heat pump

Fig. 5:



Description:

The energy reserves available in the environment cannot be directly used for heating purposes.
This renewable energy source can be used by raising this energy to a usable temperature level by operating a heat pump circuit process. This energy in the form of heat will be transferred to a heating circuit via a condenser.
Taking up the environment energy is carried out via an evaporator either direct from the ground (geothermal probe or geothermal collector), or by an intermediate circuit from the groundwater.
Driving energy is necessary for the operation of the heat pump circuit process.This driving energy is in most cases electric current, which drives the compressor via a motor.
The ratio between transmitted heating capacity and the necessary driving capacity is given as **COP** (Coefficient of Performance) in the Technical Data Sheets. This value depends strongly on the operating conditions and is higher at low heating circuit temperatures.The higher the COP-value is, the lesser driving capacity will be needed for the same heating capacity.

➜ Example:
BSW 10 A (Brine entry 0°C / Heating flow 35°C)
Heating capacity 10.06 kW
Elektric power consumption 2.16 kW
COP = 10,06 / 2.16 = 4.7

Design and components of the heat pump

A heat pump consits mainly of:

- Housing part
- Device switchboard including heat pump controller (GSF)
- Hydraulic components on the extraction side (brine or groundwater circuit) and heat disposal side.
- Cooling part including fully hermetic compressor

132-369 306.4 04.08 Fh

In the BRÖTJE-heat pumps BSW 6-15 A, the refrigerating part, the device switchboard and the main hydraulic components (circulating pumps, expansion containers as well as safety valves) are integrated into the heat pump housing and adjusted to the capacity stages of the cooling part.

The size of the integrated expansion containers as well as pump capacities must be checked by the heating installer due to the object-specific conditions.

4.6 Installation

The heat pump BSW is designed for installation inside.The installation room must be dry (IXPO) and save from frost.The base frame of the heat pump must sit on an even, smooth and horizontal surface.The heat pump must be installed in such a way that service work can be carried out without a problem.The minimum distances must be be kept for all devices (see Abb. 2 on Seite 10).

It must be checked after definite installation, if visible damages exist.The packaging material must be disposed correct and environment-friendly.

132-369 306.4 04.08 Fh

132-369 306.4 04.08 Fh

4.7 Application example

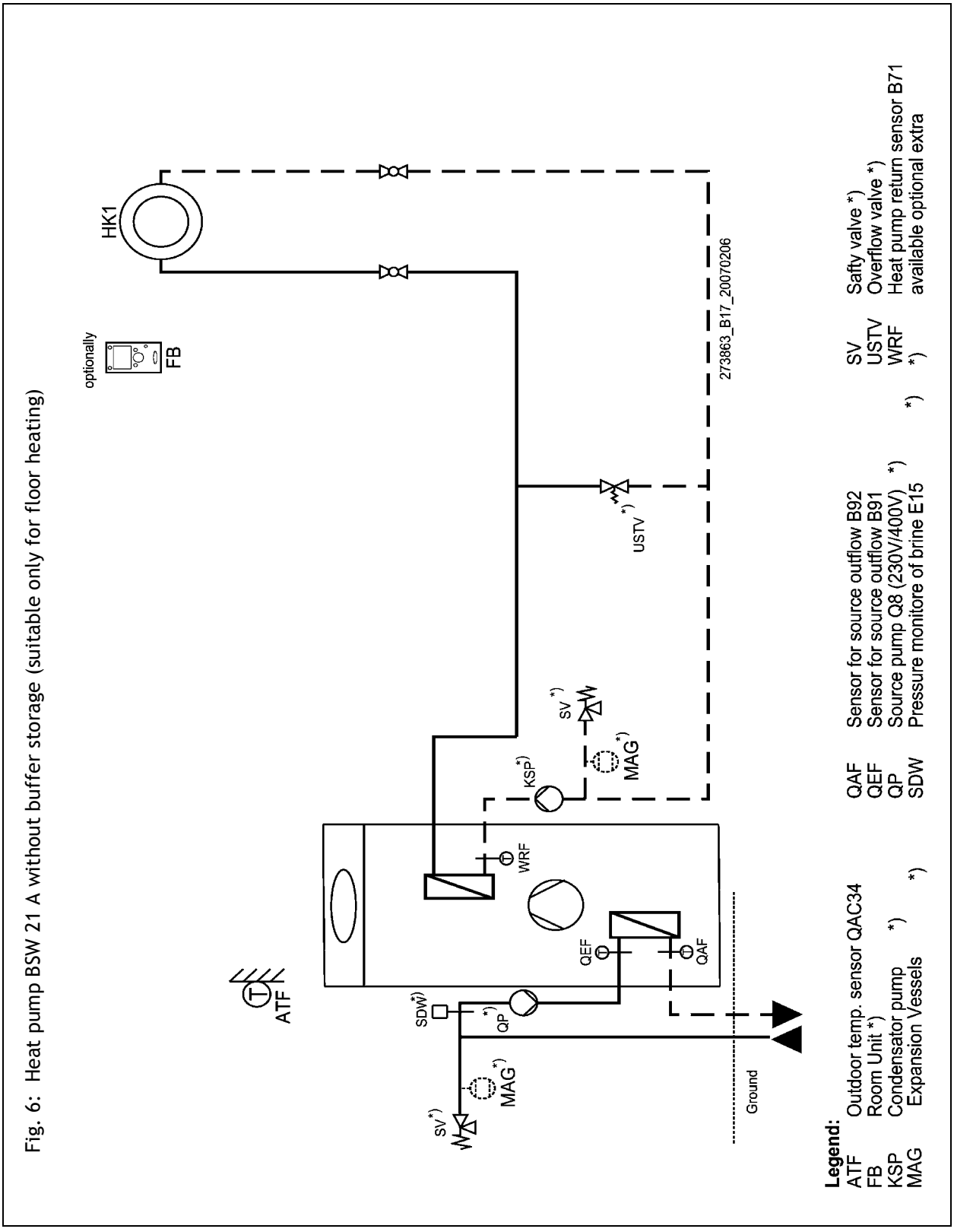
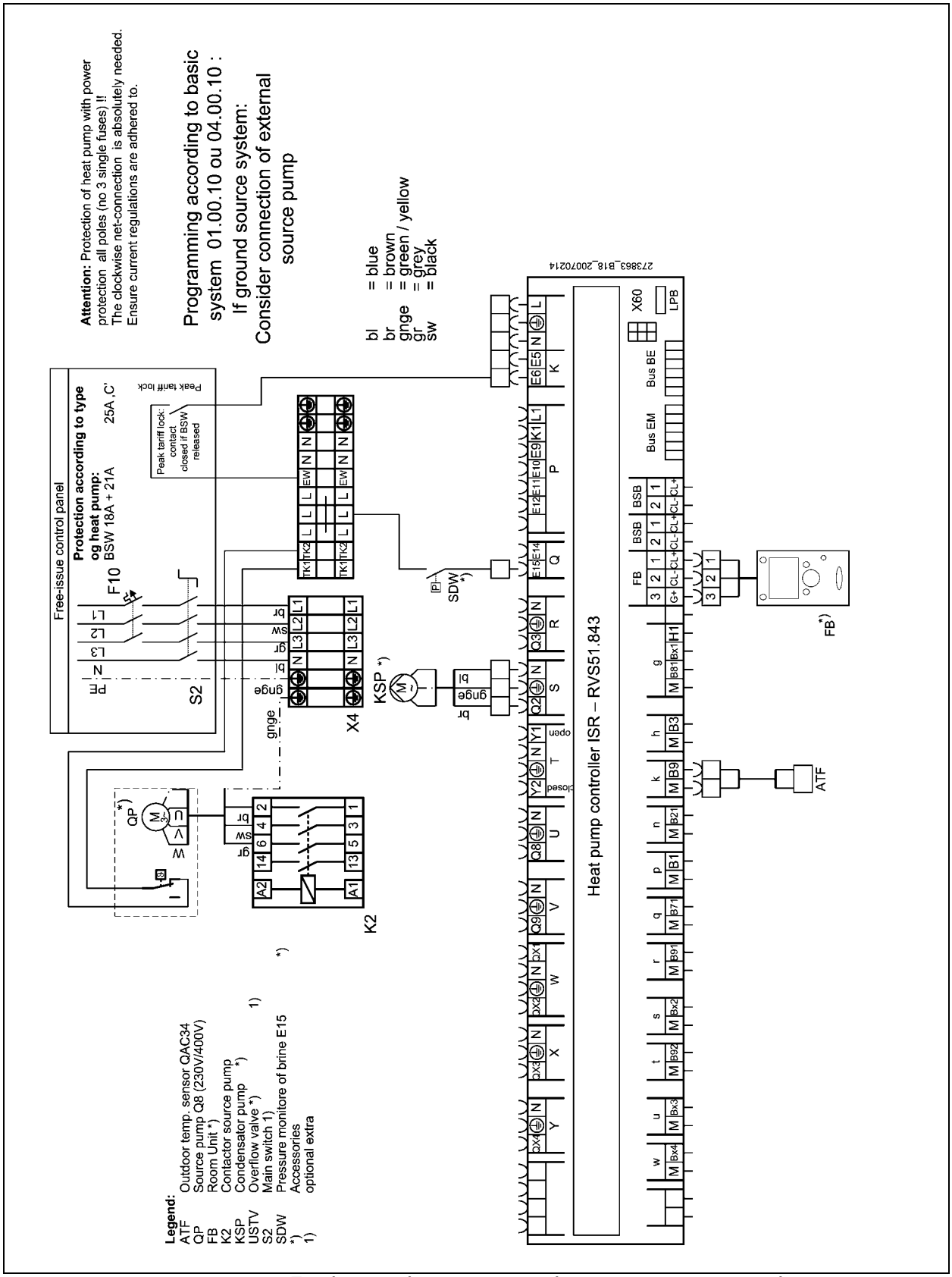


Fig. 6: Heat pump BSW 21 A without buffer storage (suitable only for floor heating)

132-369 306.4 04.08 Fh



Further application examples (mixing circuits, solar connection, etc.) may be found in the *Programming and hydraulic ystem manual*

5. Hydraulic diagrams water/water for BSW 21 A

5.1 Connection water/water for BSW 21 A

Fig. 7: General

Water/Water basic layout for **BSW 21**

Installation advive

Ground heat source
- Ensure that you have adequate access for installation equipment.
- A full survey of the ground area should be carried out prior to work starting to avoid existing pipes & cables etc.
- Provide access for electicity & water for the instalation equipment.
- Provide access for electicity & waterfor the instalation equipment.
- Make an area available for the contractor to store the soil removed during the installation.

Ground loop installation
- Keep the ground loop pipework as short as possible.
- The depth of the trench should be that the collectors are protected against frost.
- Ensure that the base of the trench is not covered with water prior to installing the ground loop.
- When the ground loop is installed in the trench cover the pipework with sand to protect against rocks etc.
- Pressure test the installation prior to back filling the trench with soil

Installation of remaining heat source pipework
- Make sure that the ground loop pipework is accessible when the trench is back filled.
- When passing pipework through walls ensure that the holes are adequately sealed
- When all exterior works are complete & tested using an appropriate method the ground works should be back filled or bore holes sealed & grouted.

Installation of pipework inside building
- Ensure all pipework is installed using pipe clips & is correctly insulated after installation.

Ground loop & heat transfer fluid
- The ground loop & heat transfer fluid are not supplied as part of the heat pump.

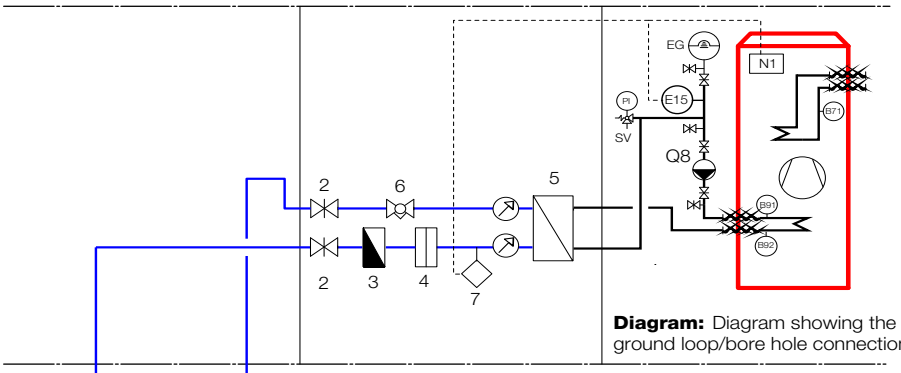
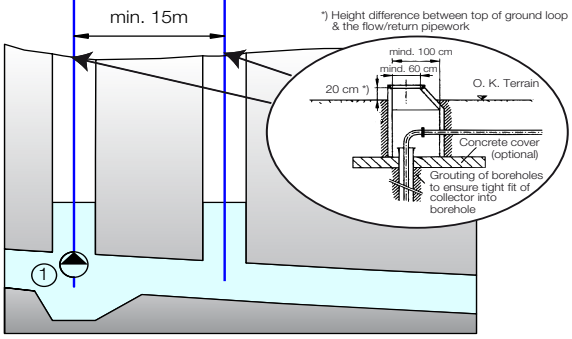


Diagram: Diagram showing the heat pump & ground loop/bore hole connections.

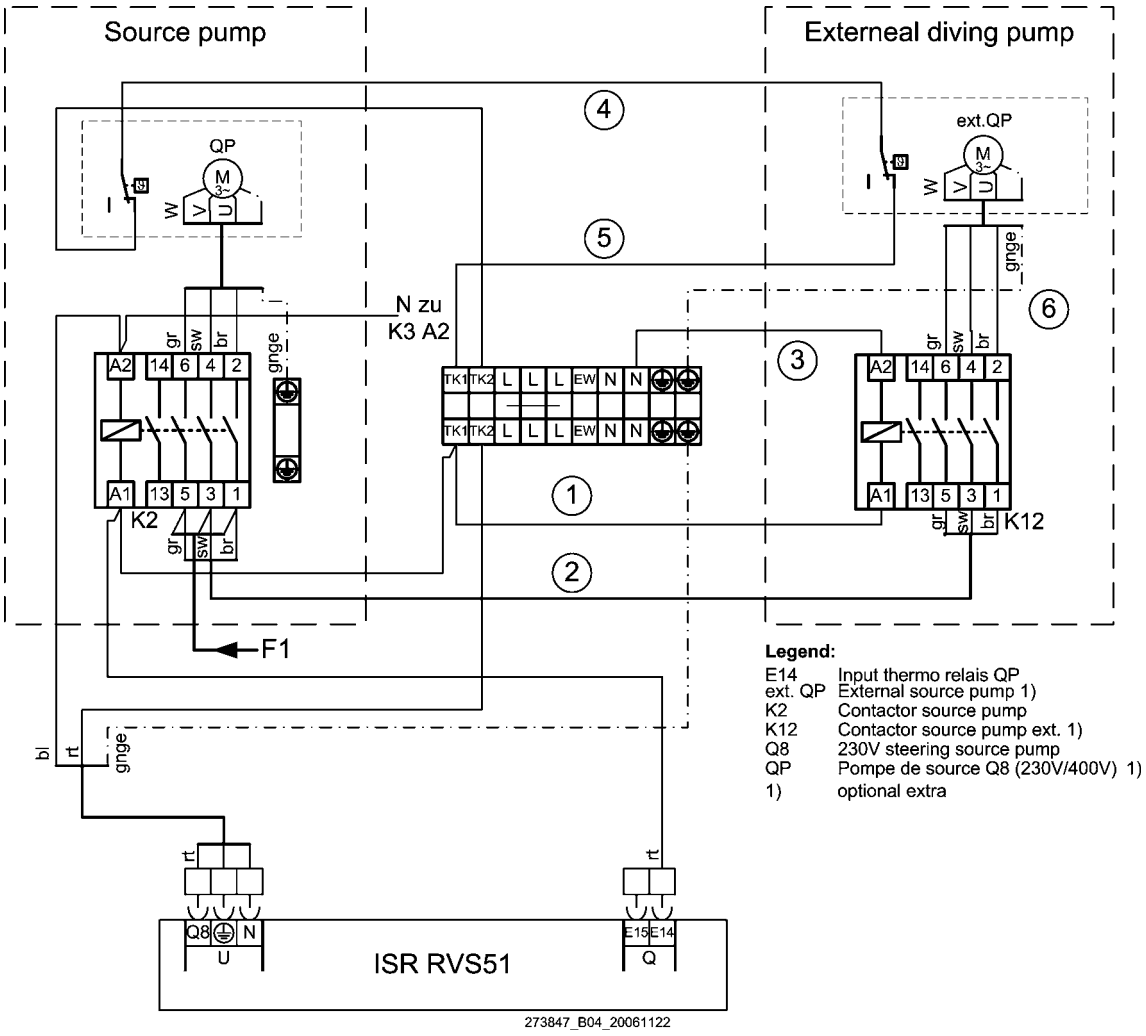


Legend

1	Tauchpumpe mit integriertem Rückflussverhinderer
2	Isolation valve for ground loop
3	Ground water flow meter
4	Strainer
5	Plate heat exchanger
6	Balancing valve
7	Flow indicator (in series with E15)
B91	Ground water sensor
B92	Frost protection sensor
E15	Pressure control switch
Q8	Ground loop pump

132-369 306.4 04.08 Fh

Fig. 8: Connection diagram BSW 21 A



Use external contactor K 12 and carry out the following cable connections:

(1) Wire up conducting K 12 A1 and TK 1

(2) Conducting 400V/3 Ph: remove from K2 1,3,5 and wire on K12 1,3,5

(3) Conducting N: remove from K12 A2 and wire up on Connecting box

Lead through the points 4,5,6 with cover conducting:

(4) Remove QP motor protection from TK1 and wire it up on external protection

(5) Wire up external motor protection on TK1

(6) Conducting 400V/3Ph : remove from K12 2,4,6 and wire up on external source pump

132-369 306.4 04.08 Fh

6. Installation

6.1 Disassembly of the covering

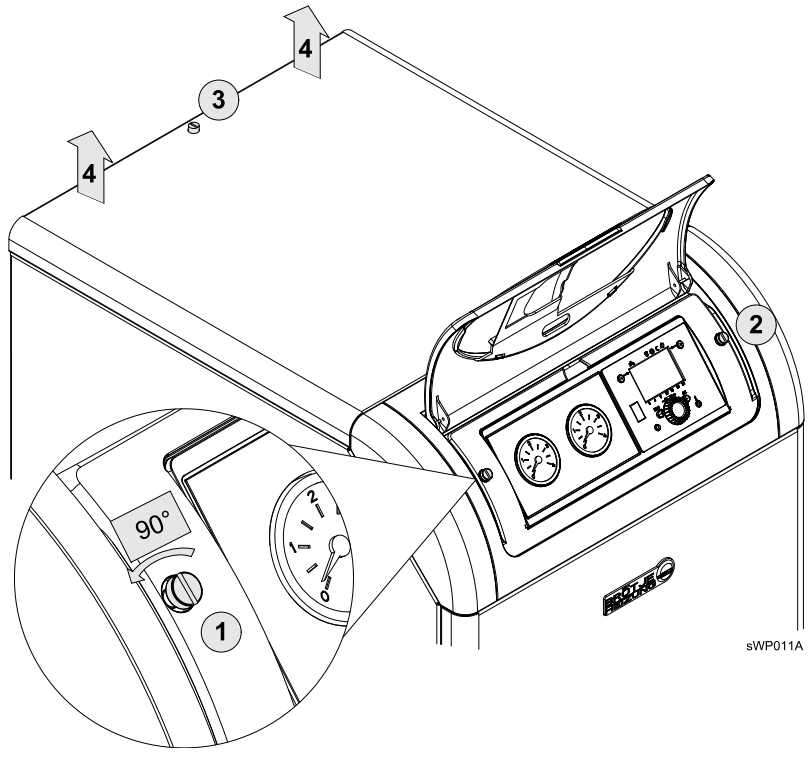
Caution! All work on these components must be exclusively carried out by employees of the manufacturer or authorised specialists.

Before the heat pump is disassembled, all fuses must be switched off.
It must be ensured that all 3 phases are dead.
Under no circumstances must the fuses be switched on during work on the components!

Removing the covering lid

- Loosening the quick-releases (2x) at the device switchboard (GSF).
  Caution! Do not fold back the switchboard.
- Loosening the rear quick-release at the covering lid.
- Lift off covering lid (fig. 9).

Fig. 9: Removing the covering lid

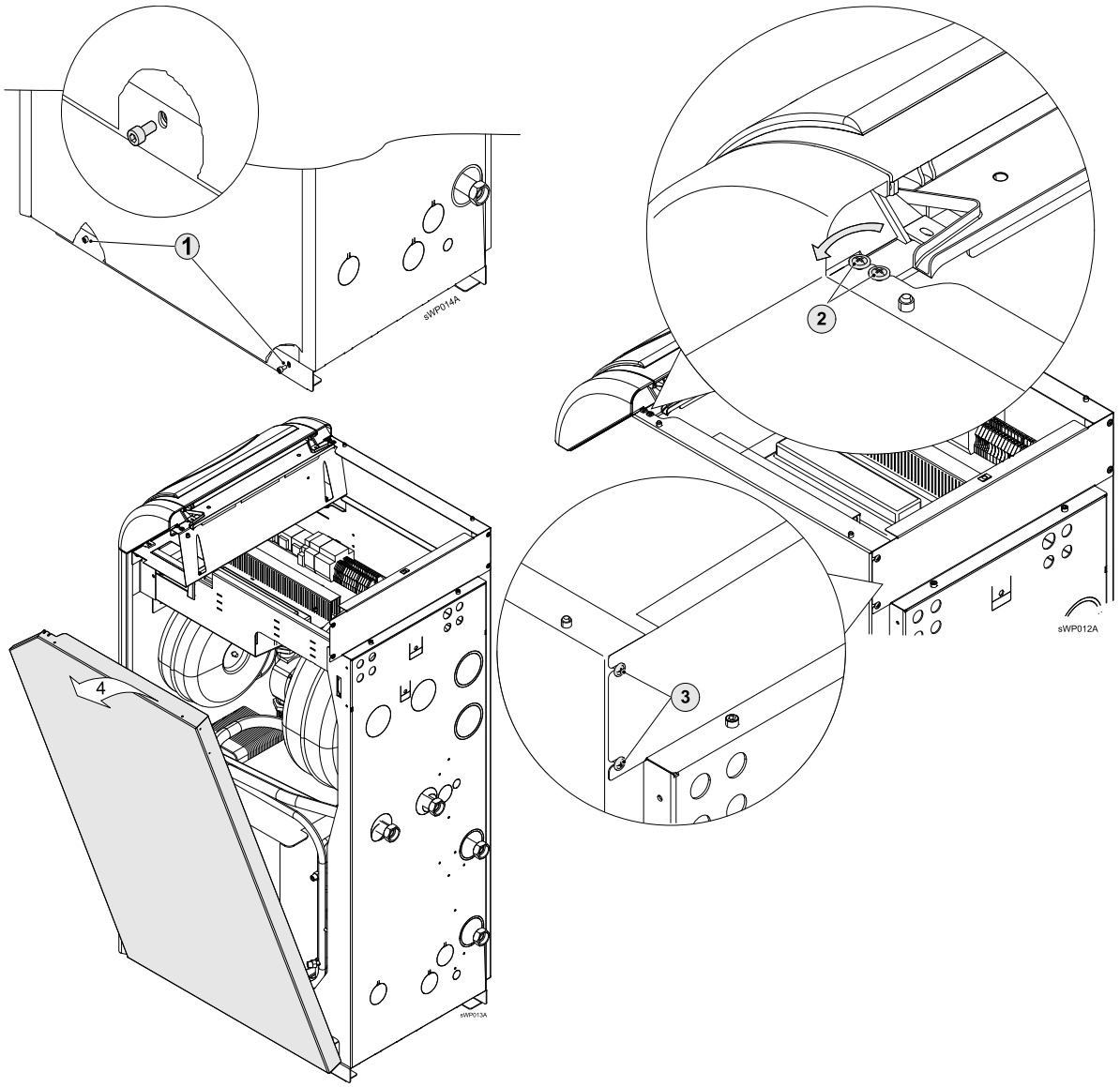


132-369 306.4 04.08 Fh

Removing the covering side walls

- Screw out screws (2x) at the bottom of the side wall.
- Loosen the screws (2x) at the front and rear.
- Tilt, lift and remove side wall (fig. 10).

Fig. 10: Remove covering side wall (here depicted right)



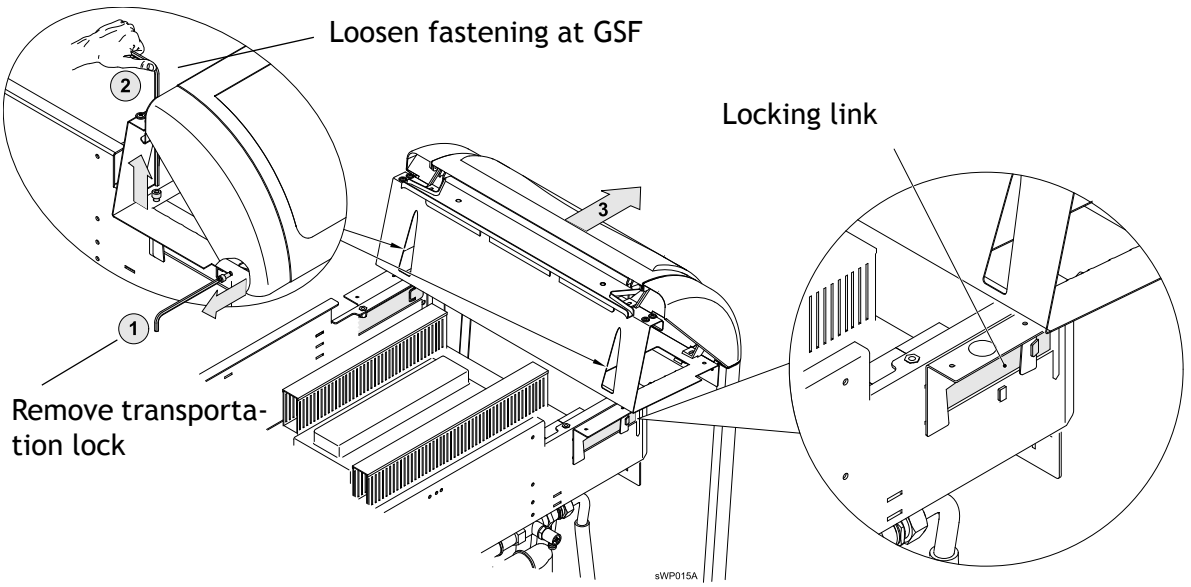
Folding up/ removing the front wall

- Removing the transportation lock (2x), screws and nuts will not be needed any more.Secure the nuts against falling off.
- Loosen the screws (2x)behind the device switchboard (GSF).
- Tilt front wall to lock (fig. 11).
- *If needed*: Push in locking links, tilt front wall by about 20 cm, push somewhat inward at the bottom, lift out and carefully place to on side.(Do not stress the connecting cables and capillary tubes).
  During the assembly of the front wall, this must be put into the

132-369 306.4 04.08 Fh

slots tilted at the bottom, pull foot points forward and then tilt into vertical.Pay attention that the locking links function correctly again.

Fig. 11: Opening the front wall



Removing compressor sound attenuator cover

- Loosen fastening screw at the rear wall of the compressor plate (access from opposite side).
- Tilt hood, push back at the bottom. lift lightly and pull out.

6.2 Connecting brine and heating circuit

During assembly, attention must always be paid that the connections are connected according to the description of the device (see technical data).
Otherwise extreme capacity losses must be expected.

6.3 Storage tank

In case of operation with a buffer storage, the BRÖTJE-storages of the series PSW are recommended.

6.4 Filling of a geothermal probe system

The following points could lead to capacity reduction or even total failure during filling the probe system:

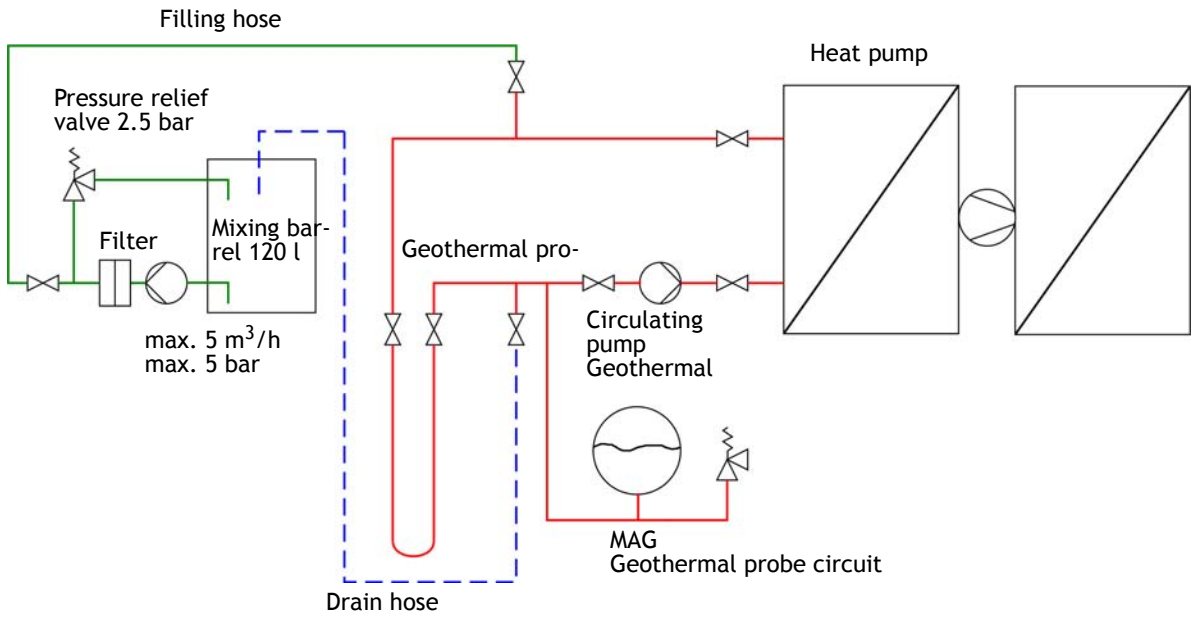
- Dirt in the brine circuit
- Badly mixed brine liquid
- Wrong brine concentration

If the correct calculated frost protection quantity is directly filled in as concentrate without respective mixing equipment, single probes could not be correctly mixed due to the high viscosity of the concentrate.Then, only almost pure water circulates in the other

132-369 306.4 04.08 Fh

probes, which could already freeze during commissioning and destroy the evaporator!
If the frost protection/water mixture is wrongly made, this could also lead to a wrong brine concentration.
➜ Too **high** brine concentration:
heat pump has a bad efficiency and a reduced capacity
➜ Too **low** brine concentration:
Corrosion and frost damages could occur!
Therefore, filling the geothermal probe system must be carried out with special care (see chapter 0.2)!chapter 6.5For this, a mixing device with filter must be used.
Filling of a brine circuit is possible without problem, when using a mixing and filling barrel (Figure 1):fig. 12
- Clean mixture
- Correct concentration
- Homogenous mixture

Fig. 12: Schematic sketch of the hydraulic connection of a mixing barrel



6.5 Correct filling with the aid of a mixing barrel

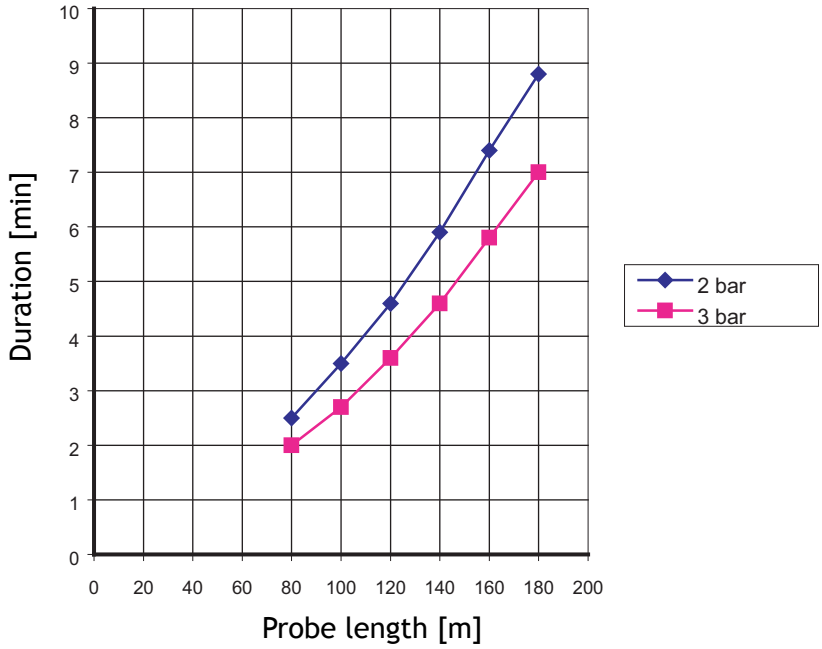
Rinsing

The circulating pump of the brine circuit and the evaporator will be cleaned from impurities like weld beads, little stones amd dirt with filtered water under presssure.
After this, every circuit of the geothermal probes will be flushed individually.

132-369 306.4 04.08 Fh

Example A 140 metre long geothermal probe (∅32 mm) must be flushed for at least 6 minute at 2 bars (see figure fig. 13).

Fig. 13: Minimal flushing duration (Probe diameter32 mm)



Filling

The whole brine circuit is filled with clean tap water after flushing. Now, the required antifreeze concentration must be generated with a 100% concentrate as described in chapter 0.3. chapter 6.6

Table 2: Calculation of the probe volume

Geothermal probes ∅ [mm]	Volume per metre [l/m]
25	1.31
32	2.12
40	3.34

6.6 Working step for correct filling

Example for necessary filling of 30%:

- Probe-∅ 32 mm; pipeline length 140 m

1. Calculation of the probe volume
   According to table 1 results*Tab. 2*: 140 m x 2.12 l/m = 297 l
   In addition, the volume of the connecting pipelines of the heat pump of 30 l must be added!
   System volume: 297 l + 30 l = 327 l
2. Proportion of the necessary 100% brine liquid (ethylene glycol):
   30% of 327 l = 98 l
3. So that the concentrate can mix in the barrel, approximately 40l of extra mixture is needed (12 l concentrate+ 28 l water).

132-369 306.4 04.08 Fh

Notice: Volume markings may be fitted to the barrel.

4. Switch on filling pump.Fill the calculated 100% brine liquid (here 98 l) together with tap water in a mixture ratio of about 50:50 continuously into the mixing barrel.
   Caution! 40 l must always be in the mixing barrel.
5. Close the shut-off valves to the evaporator.
6. Open the shut-off valves of the probe, always only 1 probe!
7. Take the drain hose out of the barrel and place it into a drain.
8. Fill in the whole antifreeze quantity except for the 40 l mixing reserve, then switch off the filling pump immediately!The surplus tap water runs out from the drain hose into the drain.
9. Now put the drain hose into the barrel, switch on the filling pump again and let it run until the concentrate and water have mixed well.
   This time is about **6 to 8 times the rinsing time** (figure 2)*Abb. 13*
10. At first, close the filling cocks at the drain hose and after this at the geothermal probe manifold.The surplus mixture returns to the barrel via the pressure release valve (2.5 bar).Switch off filling pump. A mixing reserve of 40 l remains in the barrel.
    Notice: In case of relatively long probes and bad mixture, the pressure relief valve at the barrel is triggered and, due to this, intensifies the mixing.
11. If several geothermal probes have been connected to one system, the other probes will be flushed each separately and then filled according to the above procedure.
12. When all probes are filled, the evaporator and the circulating pump of the geothermal probe circuit must then be filled:
    - Close all shut-off valves to the probes
    - Open shut-off valves to the evaporator
    - Pump in the rest of the mixture thoroughly via the shut-off valve at the filling hose.
    - Let the tap water in the circuit run out via the drain hose.
    - As soon as mixture comes out at the drain hose (colour change), close the cock and fill the MAG via the pump pressure (2.5 bar)
    - Finally, close the cock at the filling hose.
    - With this, the system is free from dirt, at correct concentration and correct operation pressure

13. Carry out pressure check, this should take a longer period of time in order to prevent costly searching for a leak at a later time.
    Notice: Antifreeze mixtures tend to leak earlier than pure water!

6.7 Electrical Connection (general)

Danger of electric shock! All electrical work in connection with the installation must only be carried out by a trained electrician!

132-369 306.4 04.08 Fh

➜ Mains voltage 1/N/PE	mains voltage 3/N/PE
➜ AC 230 V +10% -15%, 50 Hz	AC 400 V +10% -15%, 50 Hz

In Germany, the VDE and local regulations and in all other countries, the pertinent regulations should be followed during installation.
The electrical connection should be made with a correct and non-reversible polarity. In Germany the connection can be executed as an accessible plug and socket connection with non-reversible polarity or as a fixed connection. In all other countries, it should be execured as a fixed connection.
It is advisable to place a main swich before the BSW. It should be a double pole switch with a contact gap of min. 3 mm.
All connected components must be designed according to VDE-norms. Connecting cables should be fitted with strain relief clamps.

Strain reliefs

All the cables should be fixed in the starin relief clamp of the control panel and connected according to the connection diagram.

Circulating pumps

The permissible current load per pump output is $I_{N\ max}$ = 2A (max. total current consumption 6A).

Connect components

Danger of electric shock! The wiring diagram must be followed! Optional accessories must be fitted and connected according to the instructions provided. Connect to the mains. Check earthing.

Outdoor temperature sensor (included in delivery)

The outdoor temperature sensor is located in the accessory bag. For connection see connection diagram.

Replacing cables

All connecting cables apart from the mains cable must be replaced when necessary with BRÖTJE-special cables. When replacing the mains cable only
cables type H05VV-F must be used.

Protection against contact

After opening the BSW, the cladding parts to be screwed on should be screwed back on with the appropriate screws for ensuring protection against contact.

132-369 306.4 04.08 Fh

7. Commissioning

Danger! Commissioning must only be carried out by an approved heating specialist!The heating specialist checks tightness of the pipelines, correct function of all regulating, controlling and safety installations.
All devices must be commisioned by authorised customer services, otherwise the contract guaranty will be invalid.Customer services is limited to the commissioning and includes neither the connection of the heat pump nor other further work.
In case of incorrect performance exists danger of considerable damage to persons, environment and property!

7.1 Preparation by customer

The following points must be checked before commissioning:

1. Check mains voltage and frequency.
2. Connect fuses according to the values stated on the type plate and in the technical data sheets.
   Caution! Load fuse (compressor) always on all poles (not 3 single fuses)!
3. Check torque of screws for fastening electric conductors.
4. Connect terminals at the heat pump control (inputs and outputs) according to the enclosed object-specific terminal plan.
5. Check evaporator and liquefying circuit on the water side for filling and pressure.
6. Check safety valves on the water side.
7. Check cold water temperature for design value.

8. Ensure for the case of not freezing up solutions (brine circuit) that the percentage in the mixture conforms to the design data!
9. Check water circuits for air inclusions.
   Ensure venting!
10. Open all shut-off valves in the water circuits.
11. Check, if all necessary temperature sensors have been correctly connected.

7.2 Commissioning (by customer services)

The device may be switched on after careful performance of the points named above.
The following points must be performed or checked:

1. Hydraulic circuits: Check conformity to supplied documentation.
2. Check electric connections and fuses.
3. Check terminal connections at heat pump control unit.
4. Configure controller parameters according to the available hydraulic basic concept.
5. Carry out inmput and output tests, as well as check if circuits on the water side have been vented and the circuits are filled at the correct pressure.
6. Start heat pump and check operating values (according to

132-369 306.4 04.08 Fh

technical data):

- The current consumption of the compressor must not exceed the values given in the table Technical Data.
- Check temperature values in heating circuit and source circuit (brine circuit).
- Check heating water flow.
  (with the aid of temperature difference between water inlet and outlet at the condenser)

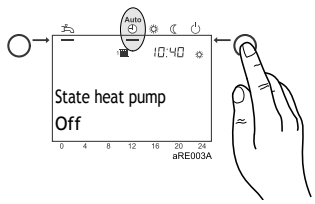
$$\text{Flow volume } (m^3/h) = \frac{\text{Device heating capacity (kW) x 0.86}}{\text{Temperature difference (K)}}$$

- Check brine flow
  (with the aid of the temperature difference between brine inlet and outlet at the evaporator)

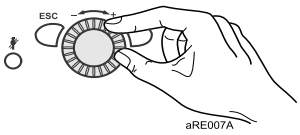
$$\text{Flow volume } (m^3/h) = \frac{\text{Device refrigerating capacity (kW) x 0.97 }^{1}}{\text{Temperature difference (K)}}$$

1. 0.97 for brine circuit; 0.86 for groundwater circuit

7. Additional work for water/water design:
   - Cleaning of dirt collector in water circuit
   - Function check of flow switch
   - Setting of frost protection temperature at the heat pump control
8. Only for new building systems (if necessary):
   Carry out drying out of the building (for ground probe systems only with the aid of electric heater insert)
   -> see programming and hydraulics manual BSW
   Supplying sufficient heating capacity.
9. Select the operation mode **automatic operation** with the operation mode button on the control unit Auto.



10. Set required room temperature at the control knob of the control operating unit.



7.3 Temperatures for heating and DHW

The information in the section programming for setting the temperatures for heating and DHW.
For DHW processing a setting of 55°C is recommended.

7.4 Programming of necessary parameters

Normaly, the parameters of the control do not need to be modified.Only date/time and possibly time programmes need to be set.

132-369 306.4 04.08 Fh

Setting of the parameters is described in the section programming.

7.5 Instruction of the customer

Instruction

The customer must be extensively instructed about the operation of the heating system and the function of the protective installations.He must be especially instructed about the following:

- Checking the state of the housing:Checking fastening of the outer covering.
- Avoiding to lean or place items against or on the device to protect the lacquer.
- The outer parts of the heat pump can be wiped with a moist cloth and with commercially available cleaning agents.(Do not use scouring cleaners with solvents!)
- The customer has to carry out the following control checks himself>:
  - Pressure check on the manometer;
  - Leaks in the brine circuit or heating water circuit; An authorised services office is responsible for servicing work.(Oxydation products could form due to ingress of oxygen into the heating circuit.)
- The mains cable of the heat pump to the switching cabinet must neither be torn nor scraped or show other damages which could reduce the isolation.An authorised services office is responsible for the servicing work.
- Only approved gas installers may carry out the inspection and cleaning work at intervals.

Documents

- Keep the brief instruction in the compartment behind the cover of the operation module.
- The documents, belonging to the heating plant, have to be handed over with the instruction that they have to be kept in the installation room of the device.
- Check list of commissioning with confirmation and legally binding signature to the customer: Only components, tested to the respective standard and marked, have been used.All components have been installed according to the maufacturer's instruction.The whole system conforms to the standard.

132-369 306.4 04.08 Fh

7.6 Check list for commisioning

11.	Have all pipelines and connections been checked for tightness?			❑
12.	Have pipelines in the brine and heating water circuit been vented?			❑
13.	Has the operating pressure been checked?		mbar	.....
14.	Free wheeling of pumps checked?			❑
15.	Fill heating plant			❑
16.	Used water additives			.....
17.	Current consumption of compressor measured?		mA	.....
18.	Temperatures:	in heating circuit	°C	.....
		in brine circuit	°C	.....
19.	Flow check:	Heating water flow	m^3/h	.....
		Brine flow	m^3/h	.....
20.	only for water/water design:	Dirt collector cleaned? Function check flow switch Set frost protection temperature	°C	❑❑ .....
21.	Only for new building systems	Carry out building drying out		❑
22.	Function test:	Heating mode		❑
		DHW operation		❑
23.	Programming:	Time /date		❑
24.		Comfort setpoint heating circuit 1/2	°C	.....
25.		Setpoint DHW	°C	.....
26.		Automatic day time programme	Clock	.....
27.	Tightness in operation checked?			❑
28.	Customer instructed?			❑
29.	Documents handed over?			❑

Only components tested to the respective standard and marked have been used.All system components have been installed according to the manufacturer's instruction.The whole system conforms to the standard.

Date /signature

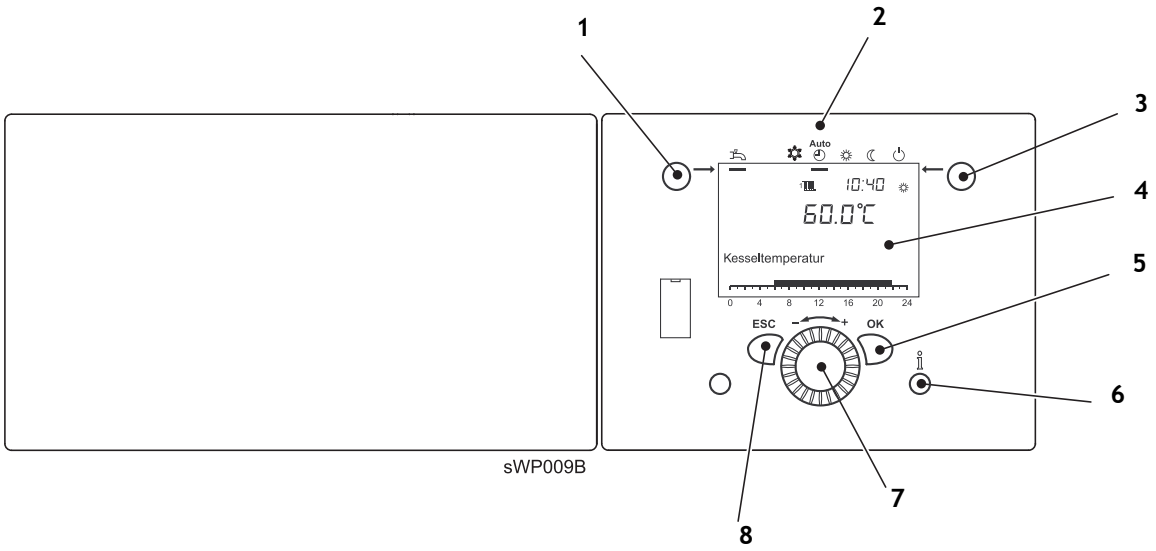
.....

132-369 306.4 04.08 Fh

8. Operation

8.1 Operation elements

Fig. 14: Operating elements

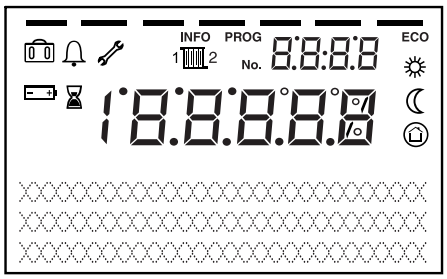


1. Operation mode button drinking water operation
2. Control operating unit
3. Operating mode button heating operation
4. Display
5. OK-button (acknowledgment)
6. Information button
7. Control knob
8. ESC-button (Interruption)

132-369 306.4 04.08 Fh

8.2 Displays

Fig. 15: Symbols in the display

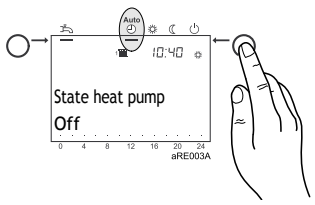


Meaning of the displayed symbols

☼	Heating at comfort nominal value
☾	Heating at reduced nominal value
⌂	Heating at frost protection nominal value
⧗	Current process
🧳	Holiday function activated
1 2	Reference to heating circuit 1 or 2
🔧	Maintenance message
🔔	Fault message
INFO	Information level activated
PROG	Setting level activated
ECO	Heating operation stopped (Automatic summer/winter switch-over or automatic day heating limit activated)

132-369 306.4 04.08 Fh

8.3 Operation



Stop heating operation

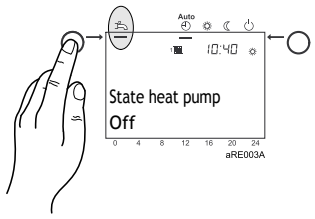
Change-over between operating modes for heating operation will be carried out with the operating button '" Heating operation'. The selected setting will be marked with a bar underneath the operating mode symbol.

Automatic operation Auto

- Heating operation according to time programme
- Nominal temperature values ☼ or ☾ according to time programme
- Protection functions (plant frost protection, overheating protection) activated
- Automatic summer/winter switch-over (automatic switching over between heating and summer operation from a certain outside temperature on)
- Automatic day heating limit (automatic change-over between heating and summer operation, if outside temperature exceeds the nominal room value)

Continuous operation ☼ or ☾

- Heating operation without time programme
- Protection functions activated
- Automatic summer/winter switch-over not activated in case of continuous operation with comfort setpoint
- Automatic day heating limit not activated in case of continuous operation with comfort setpointProtection⏻
- No heating operation
- Temperature after frost protection
- Protection functions activated
- Automatic summer/winter switch-over activated
- Automatic day heating limit activated

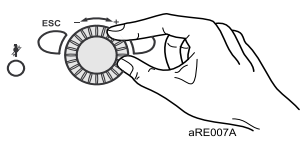


Stop drinking water operation

➜ Switched on: Drinking water is processed according to the selected switching programme.

➜ Switched off: Drinking water processing is deactivated.

Setting room setpoint



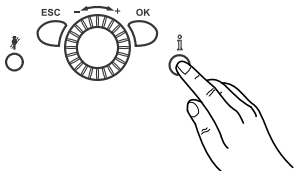
➜ Comfort setpoint ☼ The comfort setpoint is set directly with the rotating knob higher (+) or lower (-).

➜ Reduced setpoint ☾ The reduced setpoint is set as follows:

- Push acknowledgement button (OK)
- Select heating circuit.
- Select parameter *Reduced setpoint*
- Set reduced setpoint with the control knob
- Push acknowledgment button (OK) again.

132-369 306.4 04.08 Fh

Return to basic display from programming or information level by operating the operation mode button *heating circuit*.



Display information

Various temperatures and messages can be called up by pushing the information button<, among others:

- Room and outside temperature
- Fault or service messages

When no faults occur and no service messages exist, this information is not displayed.

Fault message

If the fault sign appears in the display,a fault exists in the system. Additional information regarding the fault can be called-up by pressing the information button (see f*ault code table*).

Servicing message

If the maintenance sign appears in the display a maintenance message exists or the system is in special operation.By pressing the information button, additional information can be called-up (see *maintenance code- table*).

The maintenance message has not been activated by the setting in the factory.

132-369 306.4 04.08 Fh

132-369 306.4 04.08 Fh

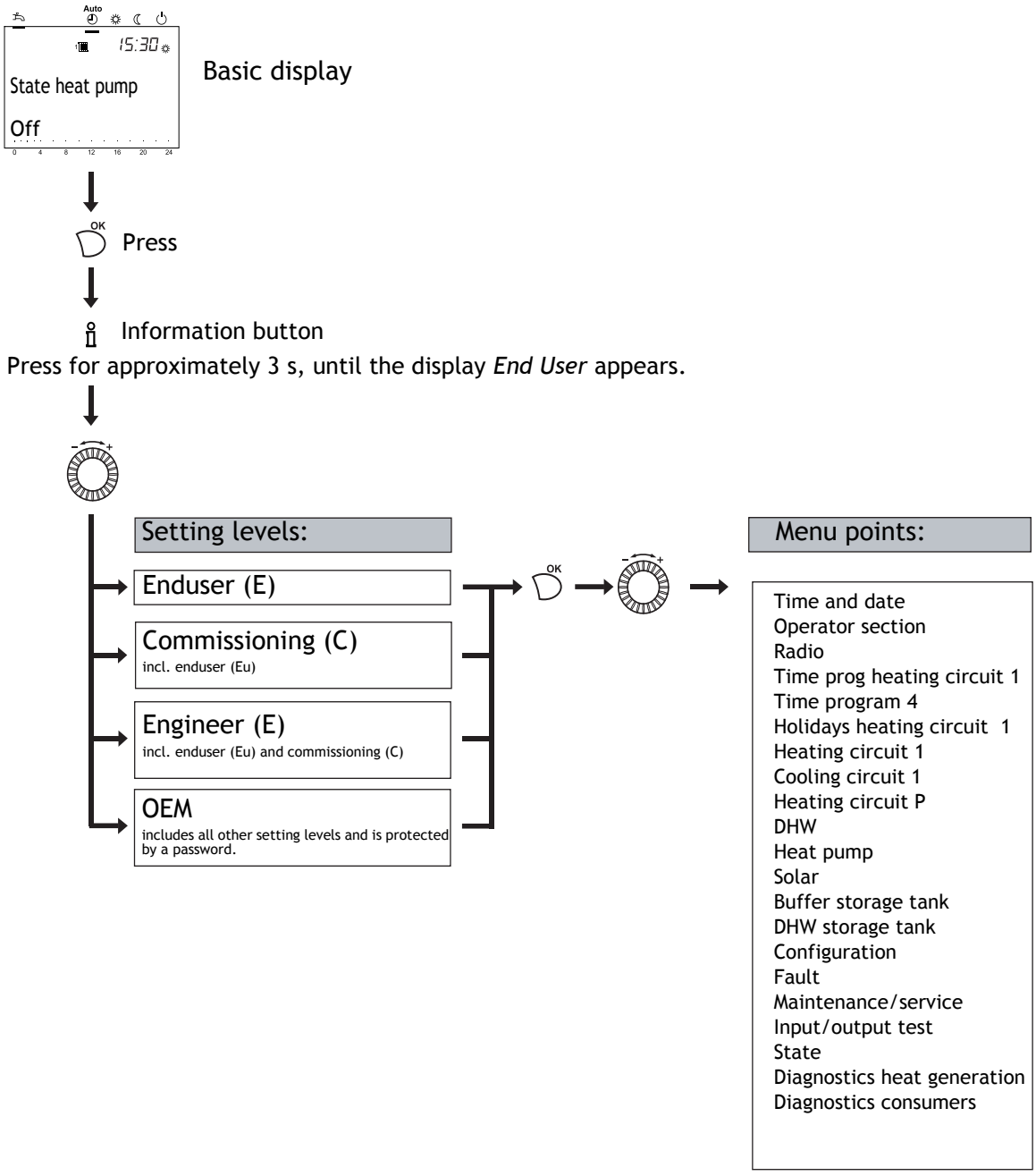
9. Programming

After the installation, the control is locked and must be programmed.After this, the control must be unlocked.

9.1 Programming procedure

The selection of the setting levels and menu points for end users and heating specialists is carried out by means of the following diagram:

Fig. 16: Selection of setting levels and menu points



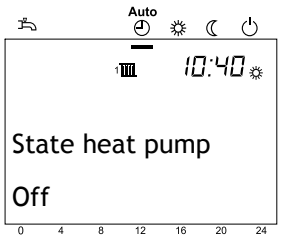
Not all menu points are visible, depending on the selection of setting level and programming!

132-369 306.4 04.08 Fh

9.2 Modification of parameters

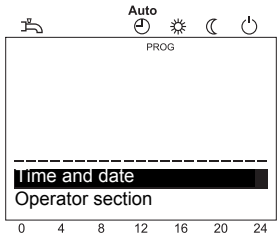
Settings, which are not directly modified via the front panel, have to be carried out in the setting level.
The basic programming processs is depicted in the following by the setting of time and date.

Basic display:



OK Press.

Select the menu point **time and date** with .

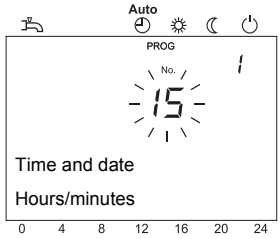


Acknowledge selection with OK.

Select the menu point **hours/minutes** with .

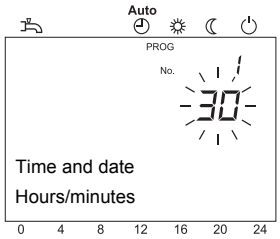
Acknowledge selection with OK.

Carry out hour setting (e.g. 15 hours) with .



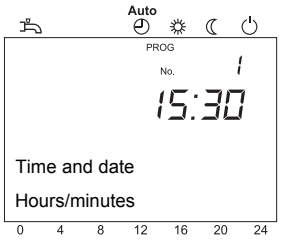
Acknowledge setting with OK.

Carry out minute setting (e.g. 30 minutes) with .

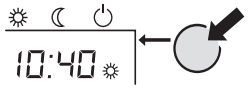


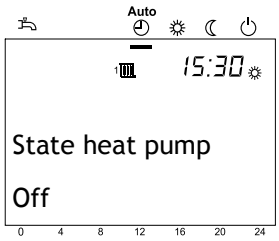
132-369 306.4 04.08 Fh

Acknowledge setting with OK.



Press heating circuit operation mode button to return to the basic display.





The previous menu point will be called-up by pressing the ESC-button without taking over previously modified values.
If no settings are carried out for approximately 8 minutes, the basic display is called-up without taking over previously modified values.

9.3 Setting table

- Not all parameters displayed in the display are listed in the setting table.
- Depending on the plant configuration, not all parameters listed in the setting table are displayed in the display.
- In order to get to the setting levels: Enduser (Eu), Commissioning (C) and Engineer (E), press button OK. After this, press for approximately 3 s the Information button, select the reqired level with the rotating knob and acknowledge with the button OK.

Table 3: Setting the parameters

Function	Prog. -No.	Setting level [1]	Standard value	Modified value
Time and date				
Hours/minutes	1	Eu	00:00 (h:min)	
Day/month	2	Eu	01.01 (day. month)	
Year	3	Eu	2004 (year)	
Start of summertime	5	E	25.03 (day. month)	
End of summertime	6	E	25.10 (day. month)	
Operating unit				
Language	20	Eu	German	
Info Temporarily | Permanently	22	E	Temporarily	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Operation lock Off | On	26	E	Off	
Programming lock Off | On	27	E	Off	
Used as Room unit 1 | Room unit 2 | Operator unit | Service unit This parameter is only visible in the room device!	40	C	Room unit 1	
Assignment device 1 Heating circuit 1 | Heating circuits 1and 2 This parameter is only visible in the room device, as the operating unit in the device is fixed programmed for the operating device!	42	C	Heating circuit 1	
Operation HC2 Commonly with HC1 | Independently	44	C	Commonly with HC1	
Operation HCP Commonly with HC1 | Independently	46	C	Commonly with HC1	
Action occupancy button None | Heating circuit 1 | Heating circuit 2 | Com-monly This parameter is only visible in the room device!	48	C	None	
Readjustment room sensor	54	E	0.0°C	
Software version	70	E	-	
Radio Parameter only visible, if wireless room device exists!				
Binding No | Yes Delete device Yes | No	120	C	No	
Testmode No | Yes Delete device Yes | No	121	C	No	
Room unit 1 Missing | Ready | No reception | Change battDelete device? Yes | No	130	C	Display	
Room device 2 Missing | Ready | No reception | Change battDelete device? Yes | No	131	C	Display	
outdoor sensor Missing | Ready | No reception | Change battDelete device? Yes | No	132	C	Display	
Repeater Missing | Ready | No reception | Change battDelete device? Yes | No	133	C	Display	
Operator unit Missing | Ready | No reception | Change battDelete device? Yes | No	134	C	Display	
Service unit Missing | Ready | No reception | Change battDelete device? Yes | No	135	C	Display	
Delete all devices No | Yes Delete device Yes | No	138	C	No	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Time programme heating circuit 1				
Preselection Mo-Su Mo-Su | Mo-Fr | Sa-Su | Mo |Tu |We | Th | Fr | Sa | Su	500	Eu	Mo - Su	
1st phase on	501	Eu	05:00 (h/min)	
1st phase off	502	Eu	23:00 (h/min)	
2nd phase on	503	Eu	24:00 (h/min)	
2nd phase off	504	Eu	24:00 (h/min)	
3rd phase on	505	Eu	24:00 (h/min)	
3rd phase off	506	Eu	24:00 (h/min)	
Standard values No |Yes	516	Eu	No	
Time programme 4				
Preselection Mo-Su Mo-Su | Mo-Fr | Sa-Su | Mo |Tu |We | Th | Fr | Sa | Su	560	Eu	Mo - Su	
1st phase on	561	Eu	00:00 (h/min)	
1st phase off	562	Eu	05:00 (h/min)	
2nd phase on	563	Eu	24:00 (h/min)	
2nd phase off	564	Eu	24:00 (h/min)	
3rd phase on	565	Eu	24:00 (h/min)	
3rd phase off	566	Eu	24:00 (h/min)	
Standard values No |Yes	576	Eu	No	
Holidays heating circuit 1				
Start	642	Eu	--.-- (day. month)	
Finish	643	Eu	--.-- (day. month)	
Operation level Frost protection | Reduced	648	Eu	Frost Protection	
Heating circuit 1				
Comfort setpoint	710	Eu	21.0°C	
Reduced setpoint	712	Eu	19.0°C	
Frost protection setpoint	714	Eu	10.0°C	
Comfort setpoint max	716	E	28.0°C	
Nominal line gradient	720	Eu	0.76	
Heating curve displacement	721	E	0.0	
Heating curve adaption	726	E	Off	
Summer/winter heating limit	730	Eu	20.0°C	
24-hour heating limit	732	E	0°C	
Flow temp setpoint min	740	C	8°C	
Flow temp setpoint max	741	C	80°C	
Room influence	750	E	- - - %	
Room temp limitation	760	E	0.5°C	
Boost heating	770	E	- - -°C	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Quick setback Off | Down to reduced setpoint | Down to frost prot setpoint	780	E	Down to reduced setpoint	
Optimum start control max	790	E	0 min	
Optimum stop control max	791	E	0 min	
Red setpoint increase start	800	E	- - -°C	
Red setpoint increase end	801	E	-15°C	
Overtemp prot pump circuit Off | On	820	E	Off	
Mixing valve boost	830	E	0°C	
Actuator type 2-position | 3-position	832	E	3-position	
Switching differential 2-pos	833	E	2°C	
Actuator running time	834	E	120 s	
Floor curing function Off | Functional heating | Curing heating | Functional/ curing heating | Manually	850	C	Off	
Floor curing setp manually	851	Eu	25°C	
Recooling storage tank Off | Heating mode | Always	860	Eu	Always	
Cooling circuit 1				
Operating mode Off | Automatic	901	Eu	Automatic	
Comfortsetpoint	902	Eu	24°C	
Release 24h/day | Time programmes HCs | Time programme 4/DHW	907	Eu	24h/day	
Flow temp setp at OT 25°C	908	Eu	20°C	
Flow temp setp at OT 35°C	909	Eu	16°C	
Cooling limit at OT	912	Eu	24°C	
Lock time at end of heating	913	E	48 h	
Summer comp start at OT	918	E	26°C	
Summer comp end at OT	919	E	30°C	
Summer comp setp increase	920	E	2°C	
Flow temp setp at OT 25°C	923	C	18°C	
Flow temp setp at OT 35°C	924	C	18°C	
Room influence	928	E	100 °C	
Room temp limitation	932	E	- - -°C	
Frost prot plant CC pump Off | On	937	E	On	
Actuator type 2-position | 3-position	939	E	3-position	
Switching differential 2-pos	940	E	2°C	
Actuator running time	941	E	120 s	
Mixing valve in heating mode Open | Closed	945	C	Open	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Lock time dewpoint limiter	946	E	60 min	
Flow temp setp incr hygro	947	E	3°C	
Heating circuit P				
Operating mode Protection | Automatic | Reduced | Comfort	1300	Eu	Automatic	
DHW **Drinking water**				
Setpoint	1610	Eu	55°C	
Reduced setpoint	1612	E	40°C	
Release 24h/day | Time programmes HCs | Time programme 4/DHW	1620	C	Time program-mes HCs	
Charging priority Absolute | Shifting | None | MC shifting, PC absolute	1630	C	Absolute	
Legionella function Off | Periodically | Fixed weekday	1640	E	Fixed weekday	
Legionella funct periodically	1641	E	3	
Legionella funct weekday Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday	1642	E	Monday	
Legionella funct time	1644	E	- - : - -	
Legionella funct setpoint	1645	E	65°C	
Legionella funct duration	1646	E	---	
Legionella function circ pump Off | On	1647	E	On	
Circulating pump release Time programme 3 / HCP | DHW release | Time pro-gramme 4/DHW	1660	E	DHW release	
Circulating pump cycling Off | On	1661	E	On	
Heat pump				
Frost protection cond pump Off | On	2800	C	Off	
Prerun time cond pump	2802	C	5 s	
Overrun time cond pump	2803	C	5 s	
Req temp diff condenser	2805	E	8	
Source frost prot temp.	2815	C	3°C	
Source protection temp	2816	C	-1°C	
Switching diff source prot	2817	C	3°C	
Increase source prot temp	2818	C	2°C	
Prerun time source pump	2819	C	60 s	
Overrun time source pump	2820	C	60 s	
Source startup time max	2821	C	5 min	
Time limit source temp min	2822		6 h	
Switching diff return temp	2840	C	6°C	
Compressor run time min	2842	C	0 min	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Compressor off time min	2843	C	20 min	
Switch-off temp max	2844	C	62°C	
Lock stage 2 with DHW Off | On	2860	C	On	
Release stage 2 below OT	2861	C	-5°C	
Release integral stage 2	2863	E	250°C*min	
Reset integral stage 2	2864	E	10°C*min	
Solar				
Temperature difference ON	3810	E	8°C	
Temperature difference OFF	3811	E	4°C	
Charge temperature min DHW	3812	E	- - -°C	
Collector start function	2830	E	- - - min	
Min run time collector pump	3831	E	60 s	
Collector frost protection	3840	E	- - -°C	
Collector overtemp prot	3850	E	- - -°C	
Evaporation heat carrier	3860	E	- - -°C	
Buffer storage tank				
Forced charging setp cooling	4708	C	12°C	
Forced charg setp heating None | Forced charg setp heating | Slave pointer set-point heating	4709	C	None	
Forced charg setp heating	4710	C	50°C	
Forced charging time	4711	C	02:00	
Forced charg duration max	4712	C	4 h	
Temp diff buffer/HC	4722	E	0°C	
Temp diff buffer/CC	4723	E	0°C	
Max st tank temp cool mode	4726	F	25°C	
DHW storage tank Parameter depends on hydraulic system!				
Type of charging With B3| With B3/B31 | With B3, legio B3/B31	5022	F	With B3/B31	
Charging temperature max	5050	E	80°C	
Recooling temperature	5055	E	60°C	
Recooling via heat gen/HCs Off | On	5056	E	Off	
Recooling collector Off | Summer | Always	5057	E	Off	
El imm heater optg mode Substitute | Summer | Always	5060	E	Substitute	
El immersion heater release 24/day / HCP | DHW release | Time programme 4/ DHW	5061	E	DHW release	
With buffer storage tank No |Yes	5090	C	No	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Configuration				
Presetting	5700	C	---	
Heating circuit 1 Off | On	5710	C	On	
Cooling circuit 1 Off | 4-pipe system | 2-pipe system	5711	C	Off	
Use of mixing valve 1 None | Heating | Cooling | Heating and cooling	5712	C	Heating and cooling	
DHW control element Q3 None | Charging pump | Diverting valve	5731	C	Diverting valve	
Heat source Brine | Water | Air	5800	C	Brine	
Differential HC at OT -10°C	5801	C	8°C	
Combi storage tank No |Yes	5870	C	No	
Relay output QX1 None | Compressor 2 K2 | El imm heater flow K26 | El imm heater buffer K16	5890	C	None	
Relay output QX2 None | Circulating pump Q4 | El imm heater DHW K6 | Alarm output K10 | HCP actuator Q20 | H1 pump Q15 | 2nd pump speed HC1 Q21 | 2nd pump speed HC2 Q22 | 2nd pump speed HCP Q23 | Diverting valve cooling Y21 | Process revers valve Y22 | Collector pump Q5	5891	C	None	
Relay output QX3 None | Circulating pump Q4 | El imm heater DHW K6 | Alarm output K10 | HCP actuator Q20 | H1 pump Q15 | 2nd pump speed HC1 Q21 | 2nd pump speed HC2 Q22 | 2nd pump speed HCP Q23 | Diverting valve cooling Y21 | Process revers valve Y22 | Collector pump Q5	5892	C	None	
Relay output QX4 None | Circulating pump Q4 | El imm heater DHW K6 | Alarm output K10 | HCP actuator Q20 | H1 pump Q15 | 2nd pump speed HC1 Q21 | 2nd pump speed HC2 Q22 | 2nd pump speed HCP Q23 | Diverting valve cooling Y21 | Process revers valve Y22 | Collector pump Q5	5894	C	Alarm output K10	
Sensor input BX1 None | Buffer st tank sensor B4 | Buffer st tank sensor B41 | Collector sensor B6 | DHW sensor B31 | Hot-gas sensor B82 | Refrig sensor liquid B83	5930	C	Hot-gas sensor B82	
Sensor input BX2 None | Buffer st tank sensor B4 | Buffer st tank sensor B41 | Collector sensor B6 | DHW sensor B31 | Hot-gas sensor B82 | Refrig sensor liquid B83	5931	C	Refrig sensor liquid B83	
Sensor input BX3 None | Buffer st tank sensor B4 | Buffer st tank sensor B41 | Collector sensor B6 | DHW sensor B31 | Hot-gas sensor B82 | Refrig sensor liquid B83	5932	C	Buffer st tank sensor B4	
Sensor input BX4 None | Buffer st tank sensor B4 | Buffer st tank sensor B41 | Collector sensor B6 | DHW sensor B31 | Hot-gas sensor B82 | Refrig sensor liquid B83	5933	C	Buffer st tank sensor B41	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Function input H1 Optg mode change HCs+DHW | Optg mode changeover HCs | Optg mode change-over HC1 | Optg mode change-over HC2 | Optg mode change-over HCP | Error/alarm message | Min flow temp setpoint | Heat request | Dewpoint monitor | Flow temp setp incr hygro	5950	C	Heat request	
Contact type H1 NC | NO	5951	C	NO	
Min flow temp setpoint H1	5952	C	70°C	
Heat request 10V H1	5954	C	60°C	
Function extension module 1 No function | Heating circuit | Cooling circuit 1	6020	C	Heating circuit	
Readjustm outside sensor	6100	E	0.0°C	
Time constant building	6110	E	20 h	
Frost protection plant Off | On	6120	E	On	
Save sensors No |Yes	6200	C	No	
Reset sensors No |Yes	6201	E	No	
Save parameters No |Yes	6204	E	No	
Reset to default parameters No |Yes	6205	E	No	
Check no heat source 1	6212	Eu	-	
Check no heat source 2	6213	Eu	-	
Check no storage tank	6215	Eu	-	
Check no heating circuits	6217	Eu	-	
Software version	6220	E		
Fault				
Reset alarm relay No |Yes	6710	C	No	
Reset HP No |Yes	6711	C	No	
Flow temperature 1 alarm	6740	E	- - - min	
Flow temperature 2 alarm	6741	E	- - - min	
Time stamp error history 1	6800	E		
Error code history 1		E		
Time stamp error history 2	6802	E		
Error code history 2		E		
Time stamp error history 3	6804	E		
Error code history 3		E		
Time stamp error history 4	6806	E		
Error code history 4		E		
Time stamp error history 5	6808	E		
Error code history 5		E		

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Time stamp error history 6	6810	E		
Error code history 6		E		
Time stamp error history 7	6812	E		
Error code history 7		E		
Time stamp error history 8	6814	E		
Error code history 8		E		
Time stamp error history 9	6816	E		
Error code history 9		E		
Time stamp error history 10	6818	E		
Error code history 10		E		
Maintenance / Ser-vice				
HP interval	7070	C	---	
HP time since maint	7071	C	0 months	
Max starts compr1/hrs run	7072	C	4	
Cur starts compr1/hrs run	7073	C	0	
Max starts compr2/hrs run	7074	C	6	
Cur starts compr2/hrs run	7075	C	0	
Diff condens max/week	7076	C	25	
Cur diff condens max/week	7077	C	0	
Diff condens min/week	7078	C	10	
Cur diff condens min/week	7079	C	0	
Diff evap max/week	7080	C	10	
Cur diff evap max/week	7081	C	0	
Diff evap min/week	7082	C	10	
Cur diff evap min/week	7083	C	0	
DHW storage tank interval	7090	C	-- months	
DHW stor tank since maint	7091	C	0 months	
DHW charg temp HP min	7092	C	45°C	
Curr DHW charg temp HP	7093	C	20°C	
Emergency operation Off | On	7141	Eu	Off	
Emergency op function type Manually | Automatically	7142	E	Manually	
Simulation outside temp	7150	C	- - -°C	
Reset limitation No |Yes	7160	E	No	
Phone no. responsibility 1	7181	C	-	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Setting level [1]	Standard value	Modified value
Input/output test				
Relay test No test | Everything off | Source pump Q8 | Compressor 1 K1 | Condensor pump Q9 | DHW pump Q3 | Heating circuit pump Q2 | Heat circ mix valve op Y1 | Heat circ mix valve cl Y2 | Relay output QX23 module 1 | Relay output QX21 module 1 | Relay output QX22 module 1 | Relay output QX1 | Relay output QX2 | Relay output QX3 | Relay output QX4	7700	C	No test	
Outside temp B9	7730	C	-	
Flow temp B1	7732	C	-	
DHW temp B3	7750	C	-	
Flow temp HP B21	7770	C	-	
Return temp HP B71	7771	C	-	
Hot-gas temp B81	7772	C	-	
Source inlet temp B91	7775	C	-	
Sensor temp B92, B84	7777	C	-	
Sensor temp BX1	7820	C	-	
Sensor temp BX2	7821	C	-	
Sensor temp BX3	7822	C	-	
Sensor temp BX4	7823	C	-	
Sensor temp BX21 module 1	7830	C	-	
Voltage signal H1	7840	C	-	
Contact state H1 Open | Closed	7841	C	-	
Low tariff E5 0V | 230V	7885	C	-	
HP lock E6 0V | 230V	7886	C	-	
Low-pressure switch E9 0V | 230V	7889	C	-	
High-pressure switch E10 0V | 230V	7890	C	-	
Winding prot compr 1 E11 0V | 230V	7891	C	-	
Pressure/flow source E15 0V | 230V	7895	C	-	
Signal input E12, E17 0V | 230V	7896	C	-	
Signal input E14, E16 0V | 230V	7897	C	-	
State				
State heating circuit 1	8000	C	-	
State heating circuit 2	8001	C	-	
Status heating circuit P	8002	C	-	
State DHW	8003	C	-	
State heat pump	8006	C	-	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
State solar	8007	C	-	
State buffer storage tank	8010	C	-	
Time stamp state history 1	8050	C	-	
State code history 1	8051	C	-	
Time stamp state history 2	8052	C	-	
State code history 2	8053	C	-	
Time stamp state history 3	8054	C	-	
State code history 3	8055	C	-	
Time stamp state history 4	8056	C	-	
State code history 4	8057	C	-	
Time temper Status history	8058	C	-	
State code history 5	8059	C	-	
Time stamp state history 6	8060	C	-	
State code history 6	8061	C	-	
Time stamp state history 7	8062	C	-	
State code history 7	8063	C	-	
Time stamp state history 8	8064	C	-	
State code history 8	8065	C	-	
Time stamp state history 9	8066	C	-	
State code history 9	8067	C	-	
Time stamp state history 10	8068	C	-	
State code history 10	8069	C	-	
Diagnostics heat generation				
Compressor 1 K1 Off | On	8400	Eu	-	
Compressor 2 K2 Off | On	8401	Eu	-	
El imm heater flow K25 Off | On	8402	Eu	-	
Source pump Q8 Off | On	8403	Eu	-	
Condensor pump Q9 Off | On	8405	Eu	-	
Return temp HP	8410	Eu	-°C	
Setpoint HP	8411	Eu	-°C	
Flow temp HP	8412	Eu	-°C	
Hot-gas temp 1	8415	Eu	-°C	
Hot-gas temp max	8416	Eu	-°C	
Hot-gas temp 2	8417	Eu	-°C	
Refrig temp liquid	8420	Eu	-°C	
Temp diff condensor	8425	Eu	-°C	
Temp diff evaporator	8426	Eu	-°C	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Source inlet temp	8427	Eu	-°C	
Source inlet temp min	8428	C	-°C	
Source outlet temp	8429	Eu	-°C	
Source outlet temp min	8430	C	-°C	
Remain stage1 off time min	8440	C	- - - min	
Remain stage2 off time min	8441	C	- - - min	
Remain stage1 on time min	8442	C	- - - min	
Remain stage2 on time min	8443	C	- - - min	
Remain limit source temp min	8444	C	- - - min	
Remain auto reset	8445	C	---- h	
Compressor sequence 1-2 | 2-1	8446	C	---	
Hours run compressor 1	8450	Eu	0 h	
Start counter compressor 1	8451	Eu	0	
Hours run compressor 2	8452	Eu	0 h	
Start counter compressor 2	8453	Eu	0	
Locking time HP	8454	Eu	0 h	
Counter number of locks HP	8455	Eu	0	
Hours run el flow	8456	Eu	0 h	
Start counter el flow	8457	Eu	0	
Collector temp 1	8510	Eu	-°C	
Collector temp 1 max	8511	C	200°C	
Collector temp 1 min	8512	C	-28°C	
dt collector 1/DHW	8513	C	0°C	
Hours run solar yield	8530	E	00:00 h	
Hours run collect overtemp	8531	E	00:00 h	
Diagnostics consumers				
Outside temp	8700	Eu	-°C	
Outside temperature minimum	8701	C	-°C	
Outside temperature maximum	8702	C	-°C	
Outside temp attenuated	8703	C	-°C	
Outside temp composite	8704	C	-°C	
Heating circuit pump Q2 Off | On	8730	Eu	-	
Heat circ mix valve op Y1 Off | On	8731	Eu	-	
Heat circ mix valve cl Y2 Off | On	8732	Eu	-	
Room temp 1	8740	Eu	-°C	
Room setpoint 1		Eu	-°C	
Flow temp 1	8743	Eu	-°C	
Flow temp setpoint 1		Eu	-°C	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Cooling circuit pump Q24	8751	C	-	
Cool circ mix valve op Y23	8752	C	-	
Cool circ mix valve cl Y24	8753	C	-	
Diverting valve cooling Y21	8754	C	-	
Flow temp cooling 1	8756	C	-°C	
Flow temp setp cooling 1		C	-°C	
Heating circuit pump Q6 Off | On	8760	Eu	-	
Heat circ mix valve op Y5 Off | On	8761	Eu	-	
Heat circ mix valve cl Y6 Off | On	8762	Eu	-	
Room temp 2	8770	Eu	-°C	
Room setpoint 2		Eu	-°C	
Flow temp 2	8773	Eu	-°C	
Flow temp setpoint 2		Eu	-°C	
Room temp P	8800	Eu	-°C	
Room setpoint P		Eu	-°C	
Flow temp setpoint P	8803	Eu	-°C	
DHW pump Q3 Off | On	8820	Eu	-	
El imm heater DHW K6 Off | On	8821	Eu	-	
DHW temp 1	8830	Eu	-°C	
DHW temp setpoint		Eu	-°C	
DHW temp 2	8832	Eu	-°C	
Start counter DHW pump	8840	E	0 h	
Start counter DHW pump	8841	E	0	
Hours run el DHW	8842	E	0 h	
Start counter el DHW	8843	E	0	
DHW pump Q3 Off | On	8820	Eu	-	
El imm heater DHW K6 Off | On	8821	Eu	-	
Buffer temp 1	8980	C	-°C	
Buffer st tank setpoint 1		C	-°C	
Buffer temp 2	8982	C	-°C	
Hours run el buffer	8990	E	0 h	
Start counter el buffer	8991	E	0	
Flow temp setpoint H1	9000	Eu	-°C	
Relay output QX1 Off | On	9031	Eu	-	
Relay output QX2 Off | On	9032	Eu	-	

132-369 306.4 04.08 Fh

Function	Prog. -No.	Set-ting level [1]	Standard value	Modi-fied value
Relay output QX3 Off | On	9033	Eu	-	
Relay output QX4 Off | On	9034	Eu	-	

1. Eu = End user; C = Commissioning; E = Engineer

Parameters with the programme numbers 1-48 are individual parameters of the operating unit and the room unit and may, therefore, be set differently on both devices. All paramteres from programme number 500 onwards are stored on the controller and, therefore, identical. The value modified last, is the valid value.

9.4 Explanations for setting table

Time and date

Time and date (1 to 3) The control has a year clock with setting possibilities for time, day/month and year. Time and date muste be correctly set, so that the heating programs can operate to previously carried out programming.

Summer time (5 and 6) The start of summer time can be set under programme number 5; the end of summer time will be set under programme number 6.The time changing will be carried out on the Sunday following the set date.

Operating unit

Language (20) The language of the menu guidance can be modified under programme number 20.

Info (22) *Temporary*:The iInformation display returns to the basic display after 8 minutes.
Permanently:The information display remains permanently displayed after call-up with the information button.

Display of error (23) Setting, when only code or code and text will be displayed.

Operation lock (26) The following operating elements can be locked:
- Operating mode buttons for heating and drinking water mode
- Control knob (comfort-setpoint room temperature)
- Presence button (only room device)

Programming lock (27) In case of switched on lock, the parameters can be displayed, but not changed.
- Tempoary unlocking:Press the OK- and the ESC-button simultaneously for at least 3 sec. The lock will be re-activated after leaving the setting level.
- Permanent unlocking: At first temporary unlocking, then programme no. 27 to """"OFF.

Used as (40) Selection of the operating unit. Depending on the selected operating unit, further settings are necessary, which are described under the following program numbers.

132-369 306.4 04.08 Fh

Assignment room unit 1 (42)

If the setting **Room unit 1** (programme number 40) has been selected at the room unit, it must be set under programme number 42, if the room unit will be attributed to heating circuit 1 or both heating circuits.

Operation HC2/HCP (44, 46)

When selecting **room unit 1** or **Operator unit** (programme number 40), it must be set under programme number 44 or 46, if the heating circuits HC2 and HCP have to be operated together with heating circuit 1 or independent from heating circuit 1 by the operator unit.

Action occupancy button (48)

The effect of the presence button on the heating circuits has to be set under programme number 48.

Readjustment room sensor (54)

The temperature display of the value, transmitted by the room sensor, can be corrected under program no. 54.

Software version (70)

Display of the current software version.

9.5 Radio

Detailed descriptions are in the assembly and setting manual of the room device RGTF.

Binding(120)

Familiarisation of accompanying devices with each other during commissioning.

Test mode(121)

Check of radio communication after installation of the room device.

Device lists(130 to 135)

The state of the respective device will be displayed under programme numbers 130 to 135.

Delete all devices(138)

The radio connections to all devices will be cancelled under programme number 138. To restore a radio connection, the programme number 120 must be re-called and binding carried out.

Time programmes

Pre-selection (500, 520, 540, 560)

Before a time programme is set, the individual days (Mo, Tue, Wed, etc) or day groups (Mo-Sun, Mo-Fri, Sa-Su) have to be selected, at which the time programme has to be activated.

When the set time of a day group is changed, this will automatically be taken over for all 3 on/off phases in this day group.

Heating phases (501 to 506, 521 to 526, 541 to 546 and 561 to 566)

Up to three heating phases may be set per heating circuit, which will be activated on the days, set under the **pre-selection** (programme numbers 500, 520, 540, 560). In the heating phases, it will be heated at the set comfort setpoint. Outside the heating phases, it will be heated at the reduced setpoint.

The time programmes are only activated in the operation mode “Automatic“.

Default values (516, 536, 556, 576)

Setting of the default values given in the setting table

132-369 306.4 04.08 Fh

Holiday programmes

The heating circuits may be set to a selectable operation level with the holiday programme during a certain holiday period.

Holiday start (642, 652) Entering the holiday start

Holiday end (643, 653) Input of holiday end

Operating level (648, 658) Selection of the operation level (reduced setpoint or frost protection) for the holiday programme

The holiday programmes are only activated in the operation mode “ Automatic “.

Heating circuits

Comfort setpoint (710, 1010, 1310) Setting the comfort setpoint

Reduced setpoint (712, 1012, 1312) Setting the reduced setpoint for reducing the room temperature during the secondary usage periods (e.g. night or absence).

Frost protection setpoint (714, 1014, 1314) Setting the frost protection setpoint, so that a too big reduction of the room temperature will be avoided.

Comfort setpoint maximum (716, 1016, 1316) Setting the maximum comfort setpoint.

Characteristic curve slope (720, 1020, 1320) The flow temperature setpoint, used for control of the flow temperature depending on the weather, is formed with the aid of the heating curve.

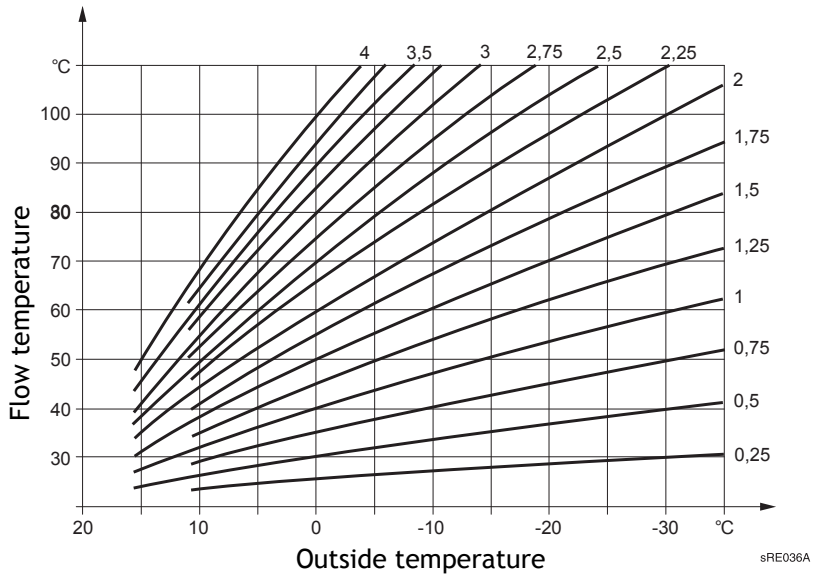
Determination of the heating curve slope

Enter lowest calculated outside temperature according to climate zone into the diagramme (see figure 1)siehe *Abb. 17* e.g. vertical line at -10°C. Enter maximum flow temperature of the heating cir-

132-369 306.4 04.08 Fh

cuit (e.g. horizontal line at 40°C).
The intersecting point gives the value for the heating curve slope.

Fig. 17: Heating curve diagram



Heating curve displacement (721, 1021,1321)

Correction of the heating curve by parallel shifting in case of generally too high or too low room temperature.

Nominal line adaptation (726, 1026, 1326)

Automatic adaptation of the heating nominal line to the actual circumstances, due to which a correction of the heating nominal line gradient becomes obsolete.

For automatic adaption of the heating curve a room sensor must be connected. The value for room influence (see prog. no. 750, 1050, 1350) must be set between 1% and 99%. Should there be radiator valves in the leading room (assembly location of the room sensor), these have to be fully opened.

Summer/winter heating limit (730, 1030, 1330)

The heating will be changed-over from summer to winter operation at the temperature set here, whereby the dampened outside temperature acts as the reference temperature (programme number 8703

Day heating limit (732, 1032, 1332)

This function serves mainly during the transition phases in spring and autumn to react short-term on temperature fluctuations. By changing the set value, the respective heating phases are either shortened or extended Increasing the value effects an earlier switching over to heating operation; lowering the value effects a later switching over to heating operation.

In the operation mode **continuous setpoint temperature** this function is not activated.

Flow setpoint limits Minimum (740, 1040, 1340) Maximum (741, 1041, 1341)

With this function, a range can be defined for the flow setpoint. When the required flow temperature setpoint of the heating circuit reaches the respective limit value, this remains constantly on maximum or minimum value during continuously increasing or decreasing heat requirement.

132-369 306.4 04.08 Fh

Room influence (750, 1050, 1350)

In the case of room infuence, the deviations from the room temperature setpoint is recorded by a room sensor and taken into account for the temperature control.

A room sensor must be connected. the value for the room influence must be between 1% and 99%.Should there be radiator valves in the leading room (assembly location of the room sensor), these have to be fully opened.
Setting for weather lead with room influence:1%/99%.
Setting for pure weather lead:..../%
Setting for pure room lead: 100%

Room temperature limit (760, 1060, 1360)

The heating circuit pump will be switched on or off, depending on the room temperature due to the switching difference set here.

A room sensor must be connected.
This function only applies to pumped heating circuits.

Boost heating (770, 1070, 1370)

In case of a change from reduced to comfort setpoint, heating is carried out by boost heating at an increased flow temperature until reaching the comfort setpoint, that the room is heated up quickly.

Quick setback (780, 1080, 1380)

If this function is activated the heating pump will be switched off. When reaching the setpoint, the heating pump will be re-started and the temperature controlled to the reduced setpoint or the frost protection setpoint. The duration of the quick setback depends on the outside temperature, time constant building (prog. no. 6110) an the temperature difference, by which the room temperature will be lowered.

Duration of the quick setback for setback by 2°C in h:

Outside temperature mixed:	**Building time constant (configuration, programme number 6110)**						
	0 hrs	2 hrs	5 hrs	10 hrs	15 hrs	20 hrs	50 hrs
15°C	0	3.1	7.7	15.3	23		
10°C	0	1.3	3.3	6.7	10	13.4	
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

132-369 306.4 04.08 Fh

Duration of quick setback for setback by 4°C in h:							
Outside temperature mixed:	Building time constant (configuration, programme number 6110)						
	0 hrs	2 hrs	5 hrs	10 hrs	15 hrs	20 hrs	50 hrs
15°C	0	9.7	24.1				
10°C	0	3.1	7.7	15.3	23.0		
5°C	0	1.9	4.7	9.3	14.0	18.6	
0°C	0	1.3	3.3	6.7	10.0	13.4	
-5°C	0	1.0	2.6	5.2	7.8	10.5	26.2
-10°C	0	0.9	2.1	4.3	6.4	8.6	21.5
-15°C	0	0.7	1.8	3.6	5.5	7.3	18.2
- 20 °C	0	0.6	1.6	3.2	4.7	6.3	15.8

Switching-on optimisation max (790, 1090, 1390)
Switching-off optimisation max (791, 1091, 1391)

Outside the usage time, the heating will be heated at a reduced temperature.By optimising the switching-on time, the switching point will be calculated in such a way that the room temperature has already reached the setpoint at the beginning of the usage time.
The optimisation of the switching-off time causes that the room temperature is at the end of usage time under the setpoint by 0.25 °C.

Reduced increase Start (800, 1100, 1400)
Reduced increase end (801, 1101, 1401)

Too strong cooling of the rooms is counteracted by increasing the reduced setpoint and, in this way, reduces the heating-up time for heating to the setpoint.

Overheating protection pumped heating circuit (820, 1120, 1420)

This function prevents overheating of the pumped heating circuit by switching-on and switching-off the pump, if the flow temperature is higher than the flow temperature required according to the heating curve (e.g. in case of higher demands of other consumers).

Mixing valve boost (830,1130)

Increasing the flow temperature achieves a constant mixer flow temperature.
Increasing: Undercutting the mixer flow temperature will be avoided.
Lowering: Mixer flow temperature undercutting possible

Drive type (832,1132)

2-Point: The controller controls the drive via only one relay output.In case of a signal at the output, the actuated valve opens. If the signal is missing, the valve closes automatically.
3-Point: the controller controls the drive via two relay outputs.For opening and closing of the actuated valve, one each output is used.

Switching difference 2-point (833,1133)

The switching difference 2-point must possibly adjusted for the 2-point drive.The switching diiference has no effect on the 3-point drive.

Drive running time (834, 941, 1134)

For mixing circuits, a kick-start of the mixer drive is carried out after a pump kick-start (Pump is OFF). In this case, the mixer will be controlled in direction OPEN and CLOSED.
The time of activation in direction OPEN corresponds to the drive running time.

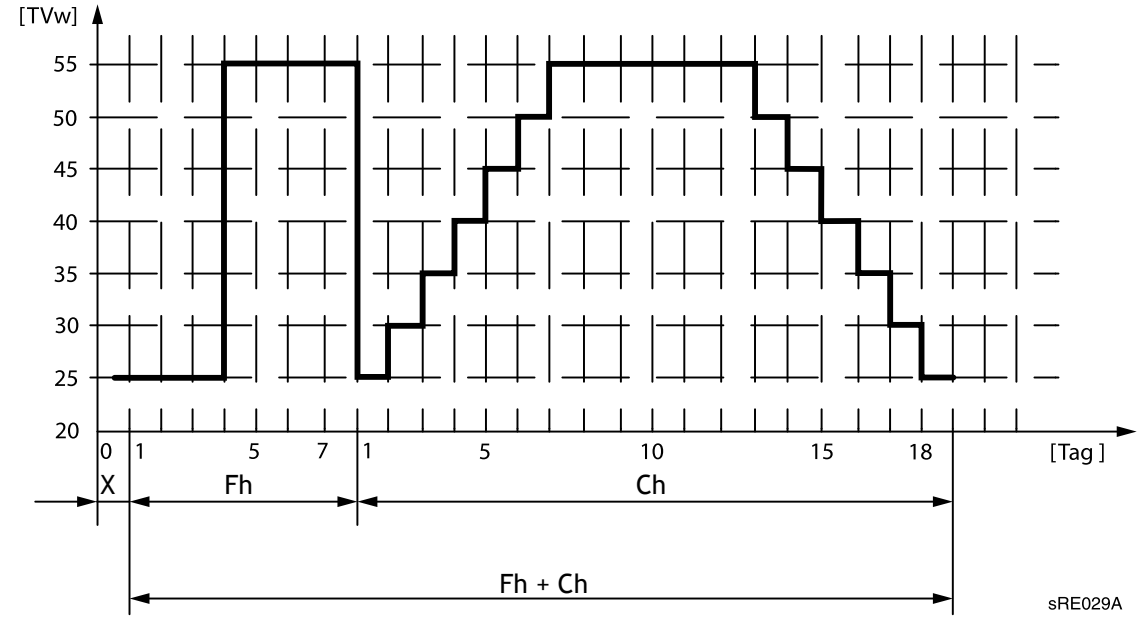
Screed function (850, 1150, 1450)

The floor curing function serves controlled drying out of screed floors

132-369 306.4 04.08 Fh

Off*:* the function is switched off.
Functional heating (Fh): Part 1 of the temperature profil will be run through automatically.
Curing heating (Ch): Part 2 of the temperature profile will be run through automatically.
Functional heating and curing heating: The whole temperature profile will be run through automatically.
Manuell: Control to the **floor curing setpoint manually**.

Fig. 18: Temperature profile during screed drying out function



X Start day
Fh Functional heating
Bh Accompanying heating

Important! The respective regulations and standards of the screed manufacturer have to be observed.
A correct function is only possible with a correctly installed plant (hydraulic, electrical systems and settings).
Deviations can only lead to damage of the screed.
The floor curing function can be stopped prematurely by setting **0 OFF**.
.

Important! It is recommended, to carry out **building drying** with a brine/water heat pump **exlusively with an electric heater set.**The installed heat pump controller has a brine freeze protection function, which allows performing building drying via the geothermal probe.However, this may lead to a protective switching-off during the heating period in cricitally designed systems. One should always be critical about building drying via the geothermal probe!

Screed setpoint manual (851, 1151, 1451)
Setting of temperature, up to which manual control is carried out at activated floor curing function (see prog.no. 850).

Re-cooling storage (860, 1160, 1460)
If too hot, a DHW-storage can be re-cooled via the heating circuits.Heating circuits still not switched on will be started.The heat

132-369 306.4 04.08 Fh

removal from heating circuits already in operation will be increased by increasing the flow temperature.
The function will be interrupted as soon as the DHW-storage has reached its re-cooling setpoint.
Off: The cooling-down function via the respective heating circuit is switched off.
*He*ating operation: The re-cooling function via the respective heating circuit is only possible in heating operation.
Always: The re-cooling function via the respective heating circuit is always active.

Cooling circuit 1

Operating mode (901)

The operating mode can be set via the operation mode button at the room device or via this operating line.
Off: The cooling function is switched off permanently.
Automatic:The cooling function will be released and, if needed, switched on automatically by means of the selected time switching programme (operating line 907) of the holiday programme and the presence button.

Comfort setpoint (902)

Setting the comfort setpoint

Release (907)

The parameter determines, according to which time switching programme the cooling will be released.
24 h/day: The cooling is released continuously (24 h/day).
Time prog heating circuit: The cooling release is carried out according to the time switching programme of the heating circuit.
Time program 3/HCP: The cooling release is carried out according to the pumped heating circuit time switching programme.
Time programme 4/DHW: The cooling release is carried out according to the time switching programme 4.

Cooling curve

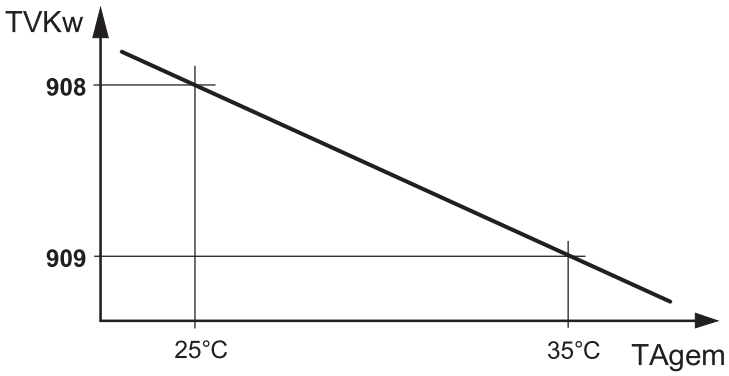
Flow temp setp at OT 25°C/35°C (908, 909)

The controller determines by means of the cooling curve the necessary flow temperature at a determined mixed outside temperature.The cooling curve will be determined by definition of two fixed points (flow setpoint at 25°C and at 35°C).
vFlow temp setp at OT 25°C: Determines the flow temperature needed at a mixed outside temperature of 25°C without accounting for summer compensation.

132-369 306.4 04.08 Fh

Flow temp setp at OT 35°C: Determines the flow tremperature needed at a mixed outside temperature of 35°C without accounting for summer compensation.

Fig. 19: Cooling curve



TVKw Flow temperature setpoint for the cooling.
TAgem Mixed outside temperature

Cooling limit OT active (912)

If the mixed outside temperature is above the cooling limit, the cooling is released.If the mixed outside temperature drops below the cooling limit, the cooling will be locked.

Lock time at end of heating (913)

In order to avoid too rapid switching on of the cooling after end of heating, the cooling function will be locked during the time which can be set here.The locking time starts, if no valid heating requirement of the heating circuit 1 exists.Heating request from heating circuit 2 or heating circuit P will not be considered.
When triggering the cooling function via the operating mode at the room device, the locking time will not be considered.Manual triggering of the cooling function is only possible, if the heating circuit 1 is not in heating mode.

Summer compensation

In summer, the comfort setpoint (programme number 902) will be sliding increased. With this, cooling energy will be saved and too large temperature differences between room and outside temperature will be avoided.
The resulting room setpoint (cooling) can be called-up at the information level.

Summer comp start at OT (918)

From the outside temperature set here, summer compensation starts working.For further rising outside temperature the comfort setpoint will be continuously raised.

Summer comp end at OT (919)

At this outside temperature, the summer compensation reaches its full effect (programme number 920)Further increasing outside temperature has no effect on the comfort setpoint.

Summer comp setp increase (920)

The setting determines by how much the comfort setpoint should be increased at maximum.

132-369 306.4 04.08 Fh

Flow temp setpoint limitations

Flow temp setp min at OT 25°C/35°C (923, 924)
Defines the lowest allowed flow temperature at a mixed outside temperature of 25°C or 35°C.

Room temp limitation (932)
An active room limiting function results from:
Room temp. < Room temp.setpoint - Room temperature limit
During active room limiting function, no cooling demand will be made to the generator.
The function is switched off for the following points:
- Room sensor does not exist
- Room temp limitation (prog.no. 932) = ---
- Room influence (prog.no. 928) = --- (pure weather leading)

Frost prot plant CC pump (937)
Defines, if active plant frost protection should work on the cooling circuit pump of the extension module.
Off: The cooling circuit pump does not run in case of active plan frost protection.
On: The cooling circuit pump runs in case of active plant frost protection.

Mixer control

For cooling with extension module, the mixer settings of the cooling circuit are valid only for the mixer on the extension module. The mixer on the basic device uses the mixer settings of the heating circuit.

Actuator type (939)
2-position: The control controls the drive with only one relay output.In case of a signal at the output, the actuated valve opens. If the signal is missing, the valve closes automatically.
3-position: The control controls the drive with two relay outputs.For opening and closing of the actuated valve, one each output is used.

Switching differential 2-pos (940)
For the 2-point drive, this parameter must possibly be adjusted.The switching diiference has no effect on the 3-point drive.

Actuator running time (941)
For the 3-point drive, the drive running time of the used mixer drive can be adjusted.The drive running time has no effect on the 2-point drive.

Mixing valve in heating mode (945)
Defines the position of the mixer 1(Y1 / Y2) for active heating operation.
Open: The valve regulates in cooling operation, it is open during heating operation.
Closed: The valve regulates in cooling operation, it is closed during heating operation.

Dew point **detector**

Lock time dewpoint limiter (946)
As soon as the connected dewpoint detector detects forming of condensate, it closes the contact and, by this, switches off the cooling.
As soon as the contact opens again, the locking time, set here, starts running.Only after this locking time must the cooling be put into operation again.

132-369 306.4 04.08 Fh

The dewpoint detector must be attributed to the input H1 (programme number 5950).

Flow temp setp incr hygro (947)

In order to prevent condensation forming due to too high air humidity in the room, a hygrostat can be used.As soon as the humidity exceeds the value set at the hygrostat, this closes the contact and, in this way, triggers a flow temperature setpoint increase.The value of the setpoint increase can be set here.

The hygrostat must be attributed to the input H1 (programme number 5950).

DHW

Setpoint (1610) Setting the DHW-setpoint

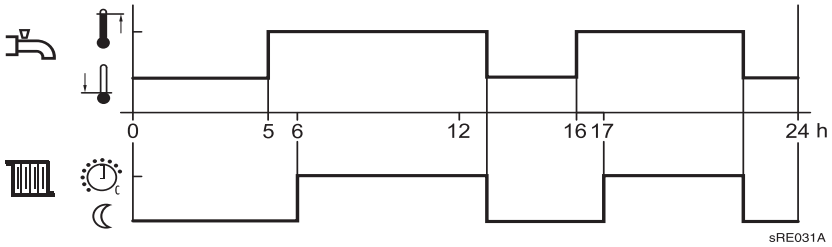
Reduced setpoint (1612) The DHW reduced setpoint is set under programme number 1612.

Release (1620) *24h/day:* The DHW temperature will be continuously controlled to the DHW/setpoint independent from the time switching programmes.

Time programmes heating circuits: The DHW temperature will be changed over between the DHW temperature setpoint and the reduced DHW temperature setpoint depending on the time switching programmes. Every time, the switching-on time will be moved forward.

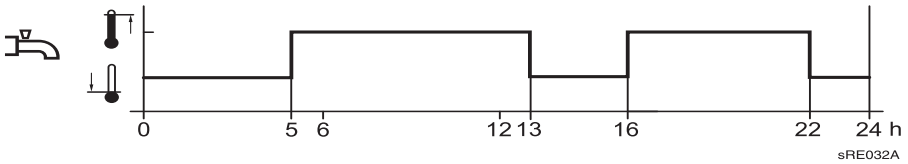
In case of one release per day, it is moved forward by 2.5 hours.In case of several releases per day, it is moved forward by 1 hour (siehe *Abb. 20*).

Fig. 20: Release depending on the time switching programmes of the heating circuits (example#)



Time programme 4: The DHW temperature will be switched over between the setpoint and the reduced setpoint independent from the time switching programmes of the heating circuits. In this case, the time switching programme 4 will be used (siehe *Abb. 21*).

Fig. 21: Release according to time switching programme 4 (example)



Charging priority(1630) This function ensures that the boiler capacity is primarily made available for DHW in case of simultaneous capacity demand by room heatings and DHW.

132-369 306.4 04.08 Fh

	Absolute priority: Mixer and pumped heating circuits are blocked until the DHW has been heated up. *Sliding priority:* Should the boiler capacity not be sufficient to heat up DHW, mixer and pumped heating circuits will be restricted. *No priority:* Charging DHW is carried out in parallel with heating operation. *Mixer heating circuit sliding, pumped heating circuit absolute:* The pumped heating circuits are blocked until DHW has been heated up.Should the boiler capacity not be sufficient, also the mixer circuit will be restricted.
Legionella function (1640)	Function to kill legionella germs by heating up to the set legionella function setpoint (see programme number 1645). OFF*:* Legionela function is switched off. *Periodically:* Legionella function is repeated periodically, depending on the set value (programme number 1641). *Fixed weekday:* Legionella function will be activated on a certain weekday (programme number 1642).
Legionella funct periodically (1641)	Setting the interval for the **legionella function periodically** (recommended setting in case of additional drinking water heating by solar plant).
Legionella funct weekday (1642)	Selection of the weekday for the legionella function **fixed weekday** (factory setting).
Legionella funct time (1644)	Setting the start time for the legionella function. The legionella function will be carried out at the first release of the DHW preparation with the setting "---".
Legionella funct setpoint (1645)	Setting the temperature setpoint for killing the germs.
Legionella function duration (1646)	Setting duration of legionella function.
Legionella fct circ'pump (1647)	ON: The circulation pump will be switched on in case of active legionella function.
	**Caution!** There exists a hazard of scalding at the tapping locations iIn case of activated legionella function.
Circulating pump release (1660)	*Time programme 3:* The circulation pump is released, depending on the time programme 3 (see programme numbers 540 to 556). *Drinking water release:* The circulation pump will be released, when the drinking water preparation has been released. *Time programme 4:* The circulation pump will be released, depending on the time programme 4 of the local controller.
Circulation pump cycle operation (1661)	The circulation pump will be switched on for 10 minutes and off for 20 minutes within the release time.
	Heat pump
Frost protection cond pump (2800)	It can be defined, if the condenser pump should be started in case of active plant frost protection. *Off*: The condenser pump does not run in case of active plant frost protection.

132-369 306.4 04.08 Fh

On: The condenser pump runs in case of active plant frost protection.

Prerun time cond pump (2802)
Before start-up of the compressor, the condenser pump must be started, so that the sensors can measure a correct temperature.

Overrun time cond pump (2803)
After the condenser is switched off, the condenser pump continues running for the set after-run time.

In case of heat pump fault, the condenser pump switches off until the fault has been removed.
The plant frost ptotection and heat pump frost protection as well as the electric heater insert K26 can still start the condenser pump, if they are activated.

Req temp diff condenser (2805)
Desired temperature spread (heating) of the consumer-side medium between inlet into the condenser (B71) and outlet from the condenser (B21).
The function is only active, if both sensors are available.

Max dev temp diff cond (2806)
Maximum deviation from the desired temperature spread against top or bottom.If the measured deviation is higher than the set maximum deviation for at least 3 minutes, a respective state message appears.

Source frost prot temp. (2815)
The source frost protection prevents heat pump operation at too low source outlet temperature.It is intended for plants, which use water as heat source.
If the source outlet temperature drops below the source frost protection temperature during operation, the pump and compressor switch off for the time which can be set under programme number 2822.

Source protection temp (2816)
The source protection function is intended for plants, which use geothermal energy for a source.The function is identical with the source frost protection. However, the source inlet temperature will be used instead of the source outlet temperature.

Due to this, the source will be protected from cooling down too much.

Switching diff source prot (2817)
After the set pre-running time, the source temperature must be above the frost protection or source protection temperature by at least this switching difference, so that the compressor switches on - in case of valid heat request.

Increase source prot temp (2818)
The controller increases the source protection temperature automatically by this value during screed drying.

Prerun time source pump (2819)
The source pump must be started before starting the compressor, so that there is a flow in the evaporator and the sensors can measure a correct temperature.

Overrun time source pump (2820)
After switching the compressor off, the source pump continues running by the set after-running time.

Source startup time max (2821)
If the source temperature does not reach the necessary temperature during this time, the heat pump goes into fault state.The fault must be reset by hand or automatically.

132-369 306.4 04.08 Fh

Time limit source temp min (2822)

See description programme number 2815.

The source pump switches off in case of heat pump fault until the fault has been removed.

Switching diff return temp (2840)

For plants without buffer or combined storage
If the return temperature exceeds the setpoint by half the switching difference, the heat pump switches off. If it undercuts the setpoint by half the switching temperature, the controller requests the start of the heat pump.
If the return setpoint drops below 30°C, the switching difference reduces, so that the switching on point approaches the setpoint.At a return setpoint of 20°C, the switching-on point is at the return setpoint.

The calculation of the return temperature setpoint is described in programme number 5801.

Compressor run time min (2842)

In order to avoid damages due to too frequent switching-on and off of the compressor, the compressor keeps running after start-up at the minimum during the time set here.During storage charging and for active limits the minimum compressor running time is not effective.

Compressor off time min (2843)

For the same reason, the compressor stays out of operation during the time set here after switching off at mimimum.

Switch-off temp max (2844)

If the flow or return temperature exceeds the maximum switching-off temperature, the compressor switches off.
The heat pump switches on again, if both sensors have dropped by a *switching difference compressor* below the maximum switching-off temperature and the minimum standstill time has passed.
A BW-charging or forced buffer charging will be interrupted at the maximum switching- off temperature reduction.If an electric insert exists in the TWW-storage, this finishes the charging (see DHW-functions and buffer storage forced charging).
If a request exists from a room heating, the controller changes over to this request and the heat pump continues operation without interruption, if the switching-off condition has still not been met.

Instead of the second compressor, the internal electric heating insert is used in the flow (K26) for BSW 6-15 A.

Lock stage 2 with DHW (2860)

It can be set, if the electric heater insert in the flow will be released during DHW-charging.
Off: The electric heater insert in the flow is released during DHW-storage charging.
On: The electric heater insert in the flow is locked during DHW-storage charging.

Release stage 2 below OT (2861)

If the reduced outside temperaturw is above the set release temperature, the electric heater insert in the flow is locked.

132-369 306.4 04.08 Fh

Release integral stage 2 (2863)

As soon as the locking time for the second heat pump stage has passed, the controller starts adding up a possibly existing heat deficit and forms the actual temperature gradient.
Only if the actual value to be expected is below the required setpoint after repeated passing of the *locking time stage 2* (programme number 2860), the electric heater insert in the flow will be released.

Reset integral stage 2 (2864)

If both stages together have too much capacity, the electric heater insert in the flow switches off immediately after reaching the (possibly reduced) maximum switching-off temperature.

Solar

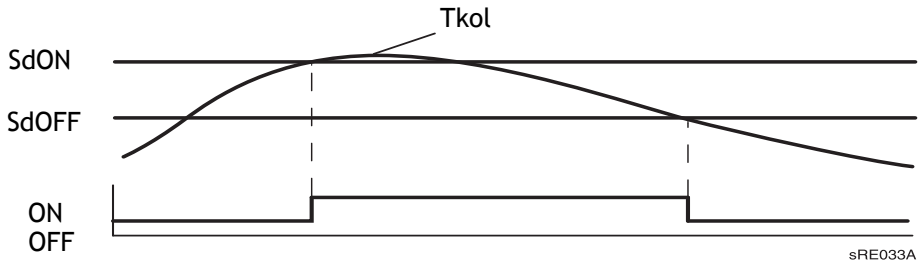
Temp diff ON exchanger 1(3810)Temp diff OFF exchanger 1(3810)

The switching-on and switching-off point of the collector pump is set with these functions. Basis is the temperature difference between collector temperature and storage temperature.

Charge temperature min DHW 1 (3812)

In addition to the temperature difference, reaching a certain collector temperature is necessary for the storage charging process.

Fig. 22: Charging controller (dT)



Tkol	Collector temperature
ON/OFF	Charging
SdEin	Temp diff ON
SdAus	Temp diff OFF

Collector start function(3830)

The temperature at the collector cannot be measured correctly, if the pump is switched-off.For this reason, the pump must be activated from time to time.

Min run time collector pump(3831)

The pump will lbe activated by the collector starting function (see programme number 3830) for the minimum running time set here.

Collector frost protection(3840)

In order to prevent freezing of the collector, the collector pump will be activated in case of frost danger.

Collector overtemp prot(3850)

In case of overheating danger, charging of the storage will be continued, to remove heat.When reaching the storage safety temperature, charging of the storage will be interrupted.

Evaporation heat carrier(3860)

Pump protecting function, to prevent overheating of the collector pump in case of evaporating danger of the heat carrying medium due to high collector temperature.

132-369 306.4 04.08 Fh

Buffer storage tank

Forced charging

In order to save electricity costs, a forced buffer storage charging can be triggered during the low tariff period.By this, the operation of the heat pump will be continued until the desired forced charging setpoint (heating/cooling) is reached in the buffer storage or until the forced charging is not released any more.

If the plant is in cooling operation, the *forced charging setpoint cooling* is used, in heating operation the setpoint, selected under programme number 4709.

The forced charging can either be triggered via the low tariff input E5 or via the programme number 4711.

If the forced charging is interrupted, because the heat pump had to be switched off, it will be started again, as soon the buffer storage temperature has dropped by 5°C (heating) or increased (cooling).The forced charging must still be released at this time.Otherwise, the controller waits to the following regular triggering of the forced charging.

Forced charging setp cooling(4708)

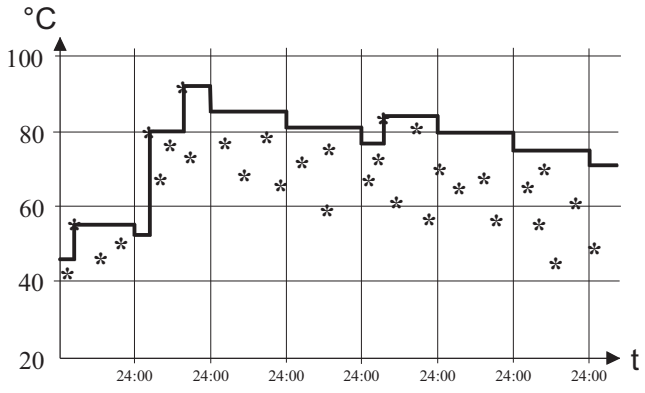
The cooling-forced charging of the buffer storage is completed, if the forced charging setpoint cooling (°C) has been reached.The forced charging cooling is switched off with the setting ---. In order to get the forced charging started, the lower storage temperature must be at least 2K above the set setpoint.If the lower sensor does not exist, the upper storage sensor is valid.

Forced charging heating(4709)

None: No forced charging is carried out during heating operation.
Forced charg setp heating: The buffer storage has to be charged during the forced charging to the *forced charging setpoint heating*.
Drag-pointer setpoint heating: The buffer storage should be charged during the forced charging to the *drag-pointer setpoint heating*.

The drag-pointer collects the maximum values of the heating circuit temperature requests and stores them.Each time at midnight, the drag-pointer setpoint will be reduced by 5%.

Fig. 23: Forced charging



* Single temperature requests

Forced charg setp heating(4710)

Setting the setpoint (°C) for the forced charging heating.

132-369 306.4 04.08 Fh

Forced charging time(4711)
The forced charging starts every day at the time set here (00:00 - 24:00).

Forced charg duration max(4712)
The forced charging will be interrupted, if the desired setpoint has not been reached after the duration set here.

Temp diff buffer/ HC(4722)
If the temperature difference between buffer storage and heating circuit temperature request is sufficiently large, the heat required by the heating circuit will be taken from the buffer storage.The heat generator is locked.

Temp diff buffer/ CC(4723)
If the temperature difference between buffer storage and cooling circuit temperature request is sufficiently large, the low temperature required by the cooling circuit will be taken from the buffer storage.The refrigerating generator is blocked.

Max st tank temp cool mode(4726)
If the upper storage temperature (B4) is above the set maximum storage temperature for cooling operation, the cooling operation will be locked.The cooling circuit pumps will be switched off and the mixers close.The cooling request for the generator continues to exist.If the storage temperature drops below the maximum storage temperature minus 0.5 K the locking will be cancelled.

DHW-storage

Charging type (5022)
Storage charging is possible with one or two sensors.
It is also possible to realise charging with one sensor and the legionella function with two sensors (3rd setting).

Charging temperature maximum (5050)
With this setting, the maximum charging temperature for the connected storage of the solar system will be limited.If the DHW-charging value is exceeded, the collector pump switches off.

The collector pump can be re-activated by the collector overheating protecting function (see programme number 3850) until the storage safety temperature has been reached.

Re-cooling temperature (5055)
Setting the temperature for re-cooling the DHW-storage.

Re-**cooling boiler/HK (5056)**
Re-cooling by heat removal of the room heating (see programme numbers 860, 1160, 1460).

Re-cooling collector (5057)
Re-cooling by transmission of energy to the environment via the collector area.

Electric insert operating mode (5060)
Replacement: The electric heater insert takes over DHW-charging, as soon as the heat pump has failed or is switched off or the DHW-charging by the heat pump has been interrupted.
Summer: When all heating circuits have been changed-over to summer operation, the electric heater insert takes over the DHW-charging from the following day on.Therefore, the heat pump remains switched-off during summer operation.
The DHW-preparation will be carried out with the heat pump only, if at least one heating circuit has been changed-over to heating operation.
In the heating mode, the electric heater insert is operated as described in the setting *replacement*.
Always: The DHW-charging is always carrried out via the electric heater insert.

132-369 306.4 04.08 Fh

The DHW-operating mode button also operates the electric heater insert.The operating mode buttone for DHW must be switched on for charging the DHW.

Electric insert release (5061)

24h/day: Permanent release of the electric insert.
DHW *release:* Release of the electric insert depending on DHW-release (see programme number 1620).
Time programme 4: Release of the electric insert via the time switching programme 4 of the local controller.

Electric insert control (5062)

External thermostat: The storage temperature will be achieved with an external thermostat without setpoint control of the controller.
DHW-sensor: The storage temperature will be achieved with an external thermostat with setpoint control of the controller.

Configuration

Pre-setting (5700)

Setting of the code for the hydraulic system. The data of the respective code may be taken from the respective application example.

The respective sensors must be connected for programming the scheme.In case of later programming appears "---".
The setting is still available.

Heating circuit 1 (5710)

The heating circuit can be switched on or off via this setting.

Cooling circuit 1 (5711)

The cooling circuit 1 can be switched on or off via this setting.
The cooling circuit is switched on as soon as the hydraulic design of the cooling circuit has been defined>:

- Heating and cooling have separate lines in case of the 4-conductor system.However, transfer of heating/low temperature is again via the same heating/cooling system.
- The 2-conductor system must not be used.

Usage mixer 1 (5712)

Defines the usage purpose of the mixer 1(Y1 / Y2).
The parameter is only effective for a 4-conductor system.

DHW-regulating unit Q3 (5731)

None: DHW-charge de-activated via Q3.
Charge pump: DHW-charging via the connection of a charge pump to Q3/Y3.
Deflecting valve: DHW-charging via connection of a deflecting valve at Q3/Y3.

Heat source (5800)

Brine: e.g. when using geothermal heat
Water: e.g. when using groundwater, sea water, river water
Air: The heat source air will not be supported.

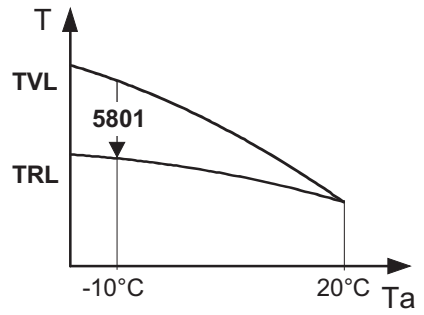
Spreading HK at TA -10°C (5801)

The control of the heat pump is carried out by the return temperature.The spreading, entered in this operating line at an outside temperature of -10 °C will be converted to the actual mixed outside temperature.

132-369 306.4 04.08 Fh

In case of an outside temperature of -10°C, the flow temperature setpoint will be reduced by the set value. At an outside temperature of 20°C no reduction is carried out.

Fig. 24:



TVL Flow temperature
TRL Return temperature
Ta outside temperature

Important! Instead of the input of the correct spreading at -10°C also '0' can be entered as spreading.In this case, the heating curve must be set for the return temperature setpoint.This possibility exists only for systems without mixer heating circuits.
The programme number 5801 is only effective, if neither a buffer storage nor a mixer heating circuit exist.

The parameter is without effect in cooling operation.For control by the return temperature, the cooling curve must be set to the return setpoint.

Combined storage (5870)

Combined storage-specific functions will be activated with this setting. For instance, the buffer storage electric heater insert can be used for heating as well as for DHW.
No: No combined storage exists.
Yes: A combined storage exists.

Relay output QX1 (5890)

Compressor *2 K2*: Not supported.
Electric insert flow K26/electric insert buffer K16: The relay QX1 is used for control of one electric heater insert in the flow (K26) or in the buffer storage (K16) (see compresssor 2).

Important! Electric inserts must be fitted with safety thermostat.

Relay outputs QX2/QX3/ QX4 (5891,5892,5894)

None: Relay output QX2/QX3/QX4 de-activated.
Circulating pump *Q4*: The connected pump serves as DHW-circulating pump (see programme number 1660).
DHW-electric heater insert *K6*: The DHW can be charged according to programme number 5060/5061 with the connected electric heater insert.

Important! Electric inserts must be fitted with safety thermostat.
Alarm output K10: In case of a fault, this will be signalled by the alarm relay. The contact will be closed with a delay time of 10 minutes.
If no fault message exists, the contact opens without delay.

132-369 306.4 04.08 Fh

The alarm relay can be re-set without having removed the fault (see programme number 6710)
Heating circuit pump HKP Q20: Activation pumped heating circuit P).
H1-pump Q15: The H1-pump can be used for an additional consumer. Together with an external heat demand at the inlet H!, the application can be used e.g. for an air heater. The pump has generally 1 minute after-running time.
2. Pump stage HK1 Q21/HK2 Q22/HKP Q23: Function for controlling a 2-stage heating circuit pump, to reduce the pump capacity for a reduced heating level.
Diverting valve cooling Y21: Control of the diverting valve cooling. The diverting valve COOLING will be used for changing-over from heating to cooling operation, if the heat pump is not only used for heating purposes but also at the same time for cooling.
Process reversing valve Y22: Not supported.
C*ollector pump Q5*: Connection of a circulating pump in case of solar collector use.

Sensor input BX1, 2, 3, 4 (5930,5931, 5932, 5933)

None: Sensor inputs BX1/BX2/BX3/BX4 de-activated
B*uffer storage sensor B4*: Connection of a buffer storage sensor
B*uffer storage sensor B41*: Connection of a second buffer storage sensor
C*ollector sensor B6*: Connection of one collector sensor
DHW sensor B31: Connection of a second DHW-sensor
Hot gas sensor B82: Not supported.
Kältemittelfühler flüssig B83: Muss fest auf BX2 programmiert sein

Function input H1 (5950)

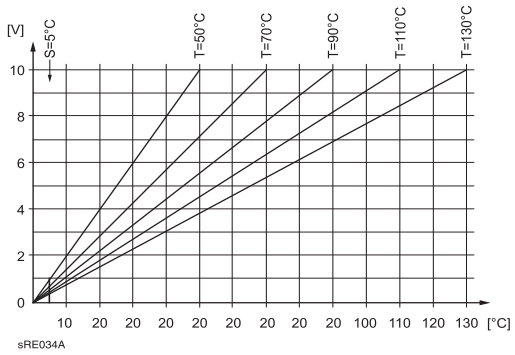
BA-change-over HK's+TWW: Change-over of the operating modes of the heating circuit to protecting operation and blocking DHW-charging for closed contact at H1.
BA-change-over HK1 to HKP: Change-over of the operating modes of
Heating circuits to protective operation.

Blocking the DHW-charging is only possible under the setting **BA-change-over HK's+TWW**.
Fault/alarm message: Closing the input H1 causes a control unit-internal fault message, which will also be signalled via a relay output programmed as alarm output or in the remote management system.
Minimal flow setpoint: In case of closed contact, the boiler will be operated constant at the value set under programme number 5952.
Heat demand: The voltage signal at H1 will be converted into a temperature value and used as flow value.The flow setpoint,

132-369 306.4 04.08 Fh

which corresponds to the 10-V voltage value can be set under programme number 5954.

Fig. 25: Heat request (examples)



Dew point monitor: A dew point monitorr can be connected to the input H1 for detecting condensate forming.By closing the contact this switches off the cooling for the set locking *duration dew point detector* (programme number 946).
Flow setpoint rising H*ygro*: To prevent condensate forming in the room due to too high air humididty, a hygrostat can be connected to the input H1.When closing the contact, it triggers a flow temperature setpoint rise (programme number 947).

Effect input H1 (5951)

With this function, the contact H1 can be set as rest or working contact.

Heat request 10V H1 (5954)

See programme number 5950

Heat request 10V H1 (5954)

See programme number5950

Function extension module 1 (6020)

Specification of the functions, with are controlled by the extension module 1.

Connection terminal on module	Application **heating circuit**	Application **Cooling circuit**
QX21*	Mixer OPEN (Y5)	Mixer OPEN (Y23)
QX22*	Mixer CLOSED (Y6)	Mixer CLOSED (Y24)
QX23*	Heating circuit pump ON (Q6)	Cooling circuit pump ON (Q24)
BX21	Flow sensor (B12)	Flow sensor (B16)
Multi-function sensor input	Multi-function sensor input	Multi-function sensor input
H2	- - -	- - -

Readjustm outside sensor (6100)

Setting a correction value for outside sensor.

Time constant building (6110)

The reaction speed of the nominal flow value at fluctuating outside temperatures is influenced by the value set here, depending on the building design.
Example values:

132-369 306.4 04.08 Fh

40 For buildings with thick stonewalls or outside insulation
20 For buildings of normal building design.
10 For buildings of light building design.

Plant frost protection (6120)

The heating circuit pump will be activated by the outside temperature without heat requestIf the outside temperature reaches the lower setpoint of -4°C,the heating circuit pump will be activated. If the outside temperature is between -5°C and +1.5°C, the pump will be activated every 6 hours for 10 minutes.When reaching the upper limit of 1.5°C, the pump will be switched off.

Storing sensor (6200)

Sensor statuses can be stored under programme number 6200.This happens automatically. However, after changing the plant (removal of a sensor) the state at the sensor terminals must be stored new.

Cancel sensors (6201)

All connected sensors will be cancelled with this settingThe sensors will be entered new with the function *store sensors* (programme number 6200) or automatic at midnight, if the controller had been in operation before for at least 2 hours.

Store parameters (6204)

The actual parameter settings can be stored as new standard settings. Excepted from this are the operating pages: Time and date, operating unit, radio and all time programmes as well as operating hours and the various counters.

Caution! The **factory settings** will be overwritten in this process and **will be** irretrevably **lost**!

Re-setting parameters (6205)

The parameters can be re-set to the standard settings.From this excepted are the operating pages: Time and date, operating unit, rodio and all time programmes as well as operating hours and the verious counters.

Control numbers generator 1/storage/heating circuit (6212, 6213, 6215, 6217)

The basic device generates a control number for identification of the plant scheme, which is composed of the numbers compiled in table 1, page 10.*Tab. 4, Seite 79*

132-369 306.4 04.08 Fh

Table 4: Control numbers for generator 1, storage and heating circuit

Check no heat source 1		
		Solar
		0 No solar 1 Solar with collector sensor and collector pump
Check no heat source 2		
		Heat pump
		0 No heat pump 0 Brine/water heat pump 1-stage 1 Brine/water heat pump 2-stage 0 Brine/water heat pump 1-stage with passive 1 cooling 1 Brine/water heat pump 2-stage with passive 1 cooling 4 Water/water heat pump 1-stage Water/water heat pump 2-stage 1 Water/water heat pump 1-stage with passive 5 cooling Water/water heat pump 2/stage with passive 3 cooling 0 3 1 3 4 3 5
Check no storage tank		
No buffer storage	Buffer storage	DHW-storage
0 No combined sto- 0 rage 0 Combined storage 1 With diverting 0 valve 4 With charge pump 0 7	0 No buffer storage 0 Buffer storage 0 1	0 No DHW storage 1 Electric insert 2 Solar connection 4 Charge pump from heatinand solar connection 5 Charge pump from heating and solar connection 1 Diverting valve from heating and solar connec- 3 tion 1 Diverting valve from heating and solar connec- 4 tion

132-369 306.4 04.08 Fh

Table 4: Control numbers for generator 1, storage and heating circuit

Control number Heating circuit		
Heating circuit P	Heating circuit 2	Heating circuit 1
0 No heating circuit 0 Heating circuit 0 pump 2	0 No heating circuit 0 Heating circuit 0 pump 2 Heating circuit 0 pump and mixer 3	0 No heating circuit 0 Circulation via condenser pump 0 Heating circuit pump 1 Heating circuit pump and mixer 0 2-conductor heating circuit/cooling circuit with 2 circulation via condenser pump 0 2-conductor heating circuit/cooling circuit with 3 circulating pump 0 2-conductor heating circuit/cooling circuit with 5 circulating pump, mixer 4-conductor heating circuit/cooling circuit with 0 circulating pump, mixer H/K and change-over 6 valve for cooling 0 4-conductor heating circuit/cooling circuit with 7 circulating pump, mixer H/K and change-over valve for cooling 1 4-conductor heating circuit with circulating 2 pump, change-over valve cooling and mixer valve for cooling circuit 1 4-conductor heating circuit/ cooling circuit with 4 circulating pump, heat exchanger and mixer valve for cooling circuit 1 2-conductor with separate pumped heating cir- 6 cuit and mixer cooling circuit 2-conductor with separate mixer heating circuit and mixer cooling circuit 1 4-conductor with separate pumped heating cir- 7 cuit and mixer cooling circuit 4-conductor with separate mixer heating cir- 2 cuit and mixer cooling circuit 5 2 7 3 5 3 8

Software version (6220)

Display of the actual software version.

Fault

If the sign 🔔 appears in the display, a fault exists and the respective fault message can be called up via the information button

Reset alarm relay(6710)

An output relay QX, programmed as an alarm relay can be reset via this setting.

Reset HP(6711)

Existing heat pump fault messages will be reset with this programme number. The pre-set switching-on delay can be bridged in this way, due to which waiting times can be avoided during commissioning&/troubleshooting.This function should not be used during normal operation.

Temperature-Alarms(6740, 6741)

Setting the time, after which a fault message will be triggered in case of persisting deviation from temperature nominal and actual values

132-369 306.4 04.08 Fh

(6800 - 6818) Fault storage of the last 10 occured faults.

Error history/error codes (6800 to 6819) The last 10 fault messages with fault code and time of fault occurrence will be stored in the fault storage.

Table 5: Fault reports

No: Fault text	Location	Reset		HP operation
		Manually	Auto	
10: Outside sensor	B9	no	no	yes
30: flow sensor 1	B1	no	no	yes
31: flow sensor cooling 1	B16	no	no	yes
32: flow sensor 2	B12	no	no	yes
33: flow sensor HP	B21	no	no	yes
35: Source inlet sensor	B91	no	no	no for brine
36: hot-gas sensor 1	B81	no	no	yes
37: hot-gas sensor 2	B82	no	no	yes
39: Evaporator sensor	B84	no	no	yes
44: return sensor HP	B71	no	no	system-dependend
45: Source outlet sensor	B92	no	no	No for water
48: refrig sensor liquid	B83	no	no	yes
50: DHW sensor 1	B3	no	no	yes
52: DHW sensor 2	B31	no	no	yes
60: room sensor 1		no	no	yes
65: room sensor 2		no	no	yes
68: room sensor 3		no	no	yes
70: buffer st tank sensor 1	B4	no	no	system-dependend
71: buffer st tank sensor 2	B41	no	no	System-dependend
73: collector sensor 1	B6	no	no	yes
83: BSB short-circuit		no	no	yes
84: BSB address collision		no	no	yes
85: Radio communication		no	no	yes
98: mixer module 1		no	no	yes
105: Maintenance message		no	no	yes
106: Source temp too low		yes	yes	no
107: Hot-gas compressor 1		yes	no *	no
108: Hot-gas compressor 2		yes	no *	no
121: Flow temp HC1 too low		no	no	yes
122: Flow remp HC2 too low		no	no	yes
127: Legionella temp		no	no	yes
146: Configuration error		no	no	yes
171: Alarm contact 1 active		no	no	yes
204: Fan overload		yes	no	no

132-369 306.4 04.08 Fh

Table 5: Fault reports

No: Fault text	Location	Reset		HP operation
		Manually	Auto	
222: Hi-press on HP op	E10	yes	no *	no
223: Hi-press on start HC	E10	yes	no	no
224: Hi-press on start DHW	E10	yes	no	no
225: Low-pressure	E9	yes	no	no
226: Winding prot compr 1	E11	yes	adjustable	no
227: Winding prot compr 2	E12	yes	einstellbar	no
228: Flow swi heat source	E15	yes	yes *	no
229: Press swi heat source	E15	yes	yes *	no
230: TS source pump	E14	yes	no	no
247: Defrost fault		yes	no	no

* These system statuses do not lead directly to a fault message, but at first generate a state report.
Only if fault reappears within a time which can be set, a fault message will be generated.

HP operation
Informs, if the operation of the heat pump can be continued or not in case of the occurring fault.
Yes:
Heat pump operation continues despite fault message
No:
Fault leads to switching off the heat pump
No for brine:
For brine heat pump, the fault leads to switching off the heat pump, for water and air heat pumps, the heat pump continues to operate.
No for water:
For water heat pumps, the fault leads to switching off the heat pump, for brine and air heat pumps, the heat pump continues to operate.
System-dependent:
Switching off the heat pump depends on the actual plant scheme.

Maintenance / Service

HP interval(7070)
Setting of the time interval (months) within which the heat pump must be serviced.

HP time since maint(7071)
Display of the time gone by since the last maintenance.If the value is above the setting under programme number 7070, the symbol appears and in the information level the message:
➜ 17: HP interval*Reset*: This value can be reset.

Max starts compr1/hrs run(7072)
Setting of the maximum permissible number of start of the compressor 1 per operating hour.

Cur starts compr1/hrs run(7073)
On average reached number of starts of compressor 1 per operating hour, averaged over the last 6 weeks.
If the value is above the setting under programme number 7072, the symbol # appears and in the information level the message :
➜ 8: Too many starts Verd1*Reset*: this value can be reset.

Max starts compr2/hrs run(7074)
Setting of the maximum permissible number of starts of compressor 2 per operating hour.

Cur starts compr2/hrs run(7075)
On average reached number of starts of compressor 2 per operating hour, averaged over the last 6 weeks.
If this value is above the setting under programme number 7074, the symbol appears and in the information level the message:
➜ 9: Too many starts Verd2*Reset*: This value can be reset.

132-369 306.4 04.08 Fh

Diff condens max/ week(7076)
Setting how often the maximum temperature spread over the condenser may be exceeded within 7 days.

Cur diff condens max/ week(7077)
Number of exceeding the maximum temperature spread over the condenser within 7 days
If the value is above the setting under programme number 7076, the symbol appears and in the information level the message:
➜ 13: Diff condens max*Reset*: This value can be reset.

Diff condens min/ week(7078)
Informs, how often the minimum temperature spread over the condenser may be undercut within 7 days.

Cur diff condens min/ week(7079)
Number of undercuts of the minimum temperature spread over the condenser within 7 days.
If the value is above the setting under programme number 7078, the symbol appears and in the information level the message:
➜ 14: Diff condens min*Reset*: this value can be reset.

Diff evap max/ week(7080)
Informs, how often the maximum temperature spread over the evaporator may be exceeded within 7 days.

Cur diff evap max/ week(7081)
Number of exceeding the maximum temperature spread over the evaporator within 7 days.
If the value is above the setting under programme number 7080, the symbol appears and in the information level the message:
➜ 15: Diff evap max*Reset*: This value can be reset.

Diff evap min/ week(7082)
Informs, how often the minimum temperature spread over the evaporator can be undercut within 7 days.

Cur diff evap min/ week(7083)
Number of undercut minimum temperature spreads over the evaporator within 7 days.
If the value is above the setting under programme number 7082, the symbol appears and in the information level the message:
➜ 16: Diff evap min*Reset*: This value can be reset.

DHW storage tank interval(7090)
Setting of the time interval (months) within which the DHW-storage must be serviced.

DHW stor tank since maint(7091)
Time gone by (months) since the last servicing.
If the value is above the setting under programme number 7090, the symbol appears and in the information level the message:
➜ 11: TWW storage tank interval*Reset*: This value can be reset.

DHW charg temp HP min(7092)
Minimum temperature, to which the DHW-storage must be charged by the heat pump wihout interruption of the charging.

Curr DHW charg temp HP(7093)
The controller stores the DHW-temperature at which the charging with the heat pump was interrupted for the last time, as the heat pump has reached the limit for high pressure, hot gas or maximum switching-off temperature.
If the value is below the setting under programme number 7092, the symbol appears and in the information level the message:
➜ 12: DHW charg temp HP too low*Reset*: this value cannot be reset.
If the minimum charging temperature is reached in the following DHW-charging, also this message will be stored.If it is not reached, the message remains.

132-369 306.4 04.08 Fh

Emergency mode(7141)

If the heat pump does not operate properly, an emergency operation can be maintained.For the heating, this is carried out either via an electric heater insert in the flow or in the buffer storage.For the hot DHW, the emergency operation is carried out via a possibly existing electric heater insert in the DHW-storage.
Off: The emergency mode is switched off.
On: The emergency mode is switched on.

Emergency op function type(7142)

Manually: The emergency operation can only be switched on or off on the programming level with programme number 7141.
Automatically: As soon as a fault appears on the heat pump, the emergency operation switches on automatically.It switches off again, after the fault has been repaired and if, necessarily, has been reset (Reset). However, the emergency operation can also be switched on or off via the programme number 7141.

Simulation outside temp(7150)

Simulation of an outside temperature in the range of -50°C...50°C to facilitate commissioning and simplified troubleshooting.

Reset limitation(7160)

If the heat pump is switched off because of the *minimum standstill time* or *limitation source temperature minimum*, it can be re-started with this parameter.

Input/output test

Input/output test(7700 bis 7897)

Tests for checking the connected components for function.

Diagnostics heat generation/consumers

Diagnostics heat generation/consumers (8310 to 8980)

Display of the different nominal and actual values and meter readings for diagnosis purposes.

State

State (8000 bis 8010)

With this function the state of the selected system can be requested.
The following messages are possible under **Heating circuit**:

End user (E)	Commissioning, Engineer
Monitor has tripped	Monitor 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 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
Protection mode cooling	Protection mode cooling
Heating off/cooling locked	Cooling limit OT active Locking time after heating Cooling mode locked
Cooling mode restricted	Flow temp setp incr hygro

132-369 306.4 04.08 Fh

End user (E)	Commissioning, Engineer
Cooling mode comfort	Cooling mode comfort
Cooling mode ready	Cooling mode ready
Cooling mode off	Dewpoint monitor active Room temp limitation
Summer operation	Summer operation
Off	24-hour Eco active Setback reduced Setback frost protection Room temp limitation Off

The following messages are possible under **DHW**:

End user (E)	Commissioning, Engineer
Monitor has tripped	Monitor has tripped
Manual control active	Manual control active
Frost protection active	Frost protection active
Recooling active	Recooling via collector Recooling via heat gen Recooling via HCs
Charging lock active	Discharging prot active Charg time limitation active Charging locked
Forced charging active	Forced, max stor tank temp Forced, max charging temp Forced, legionella setp Forced, nominal setp
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
Overrun active	Overrun active
Charged, max st tank temp	Charged, max st tank temp
Charged, max charging temp	Charged, max charging temp
Charged, legionella temp	Charged, legionella temp
Charged, nominal temp	Charged, nominal temp
Charged, reduced temp	Charged, reduced temp
Off	Off

The following messages are possible under **Heat pump**:

End user (E)	Commissioning, Engineer
Emergency operation	Emergency operation
Fault	Fault
Locked, externally	Locked, externally
Limitation time active	Limit source temp min Limit HP in HP mode Limit flow switch Limit pressure switch Limit hot-gas compr1 Limit hot-gas compr2 Limit switch-off temp max Limit switch-off temp min Compr off time min active Compens surplus heat
Frost protection active	Frost protection HP

132-369 306.4 04.08 Fh

End user (E)	Commissioning, Engineer
Defrost active	Forced defrost active Dripping Defrost active
Active cooling mode	Switch-off temp max cooling Compr run time min active Compressors1 and 2 on Compressor1 on Compressor2 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 Compr1 and electro on Compressors1 and 2 on Compressor1 on Compressor2 on
Passive cooling mode	Passive cooling mode
Frost protection active	Frost prot plant active
Off	Flow active Overrun active Released, evap ready No heat request

The following messages are possible under **Solar**:

End user (E)	Commissioning, 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
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

The following messages are possible under **Buffer storage tank**:

End user (E)	Commissioning, Engineer
Frost protection active	Frost protection active
Charg el imm heater	El charg, emergency mode El charg, source protection Electric charging defrost
Charging restricted	Charging locked Restricted, DHW priority
Charging active	Forced charging active * Partial charging active Charging active
Recooling active	Recooling via collector Recooling DHW/HCs

132-369 306.4 04.08 Fh

End user (E)	Commissioning, Engineer
Charged	Charged, max st tank temp Charged, max charging temp Charged, forced temp Charged, required temp * Part charged, required temp Charged, min charging temp
No heat request	No heat request

132-369 306.4 04.08 Fh

10. Servicing

Danger of electric shock! Before removing parts of the cover, the device has to be deenrgised.
Work under voltage (removed cover) must only be carried out by an electrician!

10.1 Maintenance work

Maintenance work includes among others:

- BSW Clean SOB outside.
- Check connection and sealing positions of water, brine and refrigerants containing parts.
- Check safety valves for correct function.
- Check operating pressure and possibly top up water or brine.
- De-aerate heating plant and return gravity lock into operating position.

It is recommended to carry out maintenance and cleaning of the BSW annually.

Caution! Performing work inside the housing is subject to full liability.Therefore, work to restore the device function must absolutely be given to an authorised services office with the required knowledge.

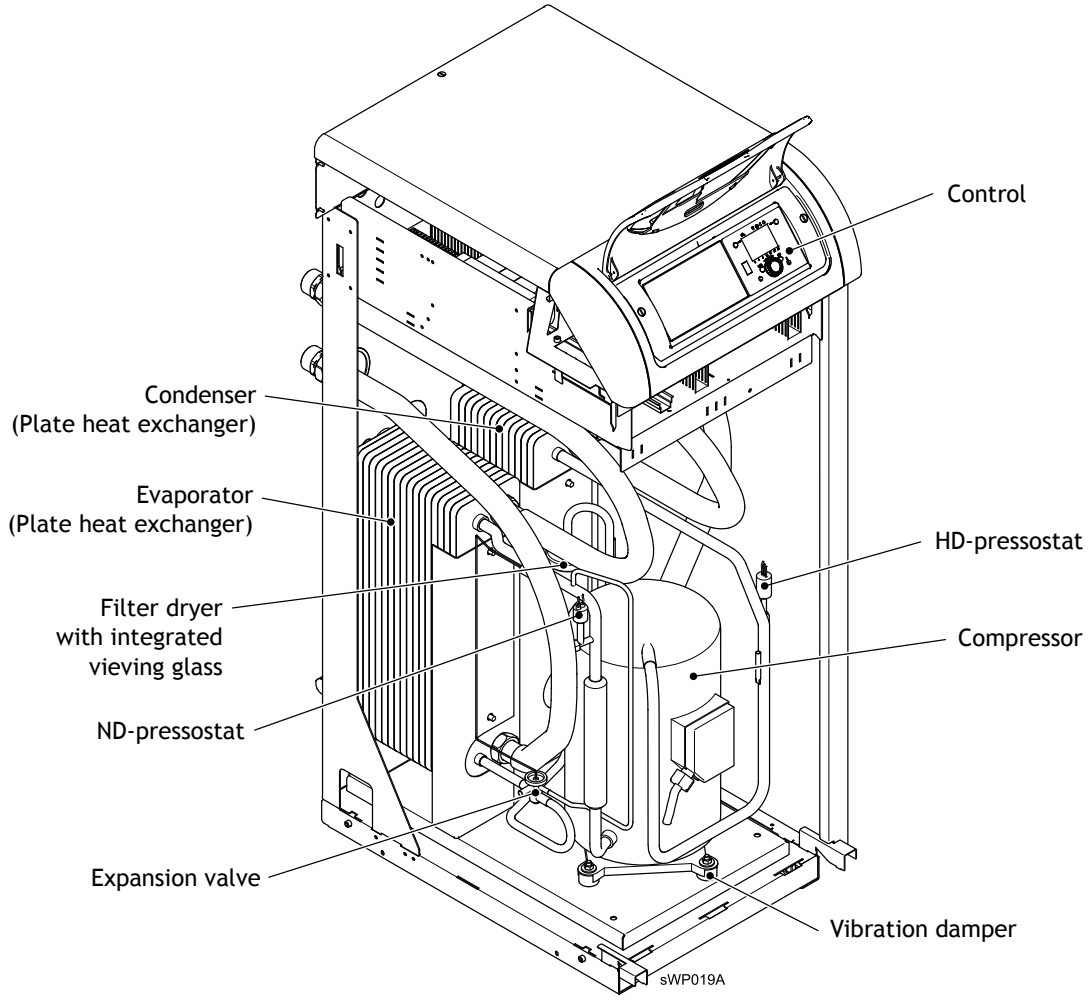
10.2 Protection against contact

Danger of electric shock! To ensure shock-proof protection, all parts of the device to be screwed on, have to be screwed on correctly; especially the cover parts!

132-369 306.4 04.08 Fh

10.3 View BSW

Fig. 26: Device view BSW 21 A



The filling cocks are at the rear of the device for filling the brine or heating circuit:

- at the evaporator for the brine circuit
- at the condenser for the heating circuit

10.4 Faults

Operation faults displayed by the heat pump controller

In principle, faults or operation disturbances will be managed by the heat pump controller and also reset automatically (automatic reset function).

The fault cause as well as the further procedure will be displayed, when pressing the information button at the controller operator unit.

Depending on the fault type, the fault can be reset by manual reset and the heat pump re-started.In case of repetition of the same fault as well as not resettable faults, the respective specialist partner (installer) must be contacted.

132-369 306.4 04.08 Fh

Breakdowns

In the following, the behaviour in case of an operation fault, which is not displayed by the heat pump controller.

Display of the controller remains empty (no display).
• Are the fuses in order?
• Has the wiring checked by a specialist.
Heat pump does not heat.
• Check fuses.
• EW-lock activated?
• No request exists (check operating mode, time and time programme).
• Check sensor connections and sensor values.
• Function check of circulating pumps.
• Check controller settings.
• Carry out RESET (Disconnect heat pump from the mains (e.g. switch off via the fuse box).
DHW does not get hot.
• Check operating mode.
• Check time programme TWW.
• Check setpoint and actual DHW-temperature.
• Function check of diverting valve (or TWW-charge pump)
• EW-lock or external locking signal active?
Room temperature does not correspond to the desired value.
• Check room temperature setpoints.
• Setting operating mode.
• Heating curve (slope and parallel displacement) correctly set?
• Check connection and display value of the outside temperature sensor.
Heating system does not operate correctly.
• Check parameterising at the heat pump controller.
• Check inputs (temperature sensors as well as thermostat statuses).
• Check outlets (pump connections, etc.).

Caution! The preformance of work inside the housing is under full liability.Therefore, work for restoring the device function must, absolutely, be placed with an authorised service office with the required knowledge.

132-369 306.4 04.08 Fh

Troubleshooting

In the following, the fault messages, occurring during operation, will be described and explained.

Table 6: Troubleshooting

Fault	Cause	Remedy,measures
106 (sensor B92)	Source temperature too low A Flow too low B Source inlet temperature too cold	A Check flow quantity. A1 Immersion pump defect. A2 Adjust immersion pump stage A3 Check damper position. B Check source
222 (Terminal E10)	High pressure compressor High pressure pressostat in refrigerating circuit triggered.Heat cannot be delivered. A in heating mode B in DHW-mode C High pressure pressostat switches at too low pressure. In case of a fault or failure, the module sets the respective unit into safe state.	A Check flow heating water A1 Damper closed A2 Heating circulating pump A3 Overflow valve A4 Heating curve set too high B1 DHW-temperature set too high. B2 DHW-sensor placed too low. B3 Damper closed. B4 DHW-circulating pump C If A and B can be excluded, check at which heating water outlet temperature from the heat pump the high pressure pressostat switches.If the switching point is well below 65°C can: C1 the switching point of the pressostat be too low (pressostat de-adjusted) C2 the refrigerant quantity be too high.
225 (Terminal E9)	Low pressure compressor Low pressure pressostat in the refrigeratin circuit triggered. A No flow of brine in the evaporator B Groundwater pump defect. C Leak in refigerating circuit	A A1 Brine pump blocked, repair brine pump A11 Thaw blocking brine in the evaporator (remove insulation, thaw with hair dryer or wait for 1 day) A2 In case of inhomogeneous brine mixture, the brine can partially block in the evaporator. A21 Mix the brine better (see information regarding filling of the geothermal probe) B Check groundwater pump. B1 Check: Are all dampers open? C If all the above points have been checked and if the compressor goes into low pressure fault within a few seconds after start, a leak in the refrigerating circuit exists. Oil traces in the device are a further indication for a leak in the refigerating ciruit (oil must not be mistaken with brine!).
229 (Terminal E15)	A : SW-heat pump: Brine pressure too low	A1 Check brine pressure with manometer
228(at WW)	B: SW-heat pump with intermediate circuit for groundwater connection indirect: Fault display= flow monitor heat source Cause=Brine pressure too low!	A2 Check function brine pressure sensor A3 Top up brine A4 Check expansion container, top up at brine circuit (if pressure rapidly increases when filling the probe, the expansion container is not in operation) A5 If it occurs repeatedly check brine circuit for leak B Check filling and flow in intermediate circuit.
230 (Terminal E14)	Brine pump/groundwater pump A Pump failure A1 Pumpe blocked A2 Motor protection triggered A3 Pump defect In case of a fault or failure, the module sets the respective unit into safe state.	A1 Remove blockage pump, investigate cause for blockage. A2 Check why motor protection has triggered: A21 Check current consumption of pump (Ampère) A22 Check trigger value of motor protection. A23 Check motor protection for defect. A3 Replace pump in case of defect.

132-369 306.4 04.08 Fh

Table 6: Troubleshooting

Fault	Cause	Remedy,measures
Locked externally	External lock of the energy supply company (EVU) /power station (EW)	No fault. Check if release of EW exists.Check of installed rotating field monmitor relay (if it flashes red, it must be replaced - fault goes to EW-lock input)

132-369 306.4 04.08 Fh

Index

T

U

11. Space for notes

132-369 306.4 04.08 Fh

132-369 306.4 04.08 Fh

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All descriptions and illustrations contained within this leaflet have been carefully prepared, but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information in this leaflet.

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