EQJW 146: Heating and district heating controller, equitherm

How energy efficiency is improved
Convenient time programme that enables the system to be adjusted to the individual requirements
of the user, and also to be switched off temporarily if required.

Features

- Weather-dependent supply temperature control by heating curve or 4-point characteristic and DHW

- 29 system models, for example for district heating, single-stage boilers, DHW with solar energy, buffer tank.

- Convenient to use with modern operating concept (turn and press) and large LCD

- Convenient weekly and annual switching programmes with optimisation of switching times

- Automatic summertime/wintertime changeover

- Min./max. limitation of supply temperature and max. limitation of return temperature

- Frost-protection facility and anti-jamming function for valve and pump

- Floor-drying function

- Function for protecting against legionellae

- Room temperature switching using room-temperature sensors

- Ni/Pt1000 inputs for the outside, supply, Domestic Hot Water (DHW), return flow and room temperature

- Relay outputs with varistor suppression for activating control units and pumps

- Manual mode

- Logbook (EQJW146F002)

- Configurable input/output 0..10 V

- External demand processing, binary or analogue (0..10 V)

- Interface for various accessories such as modem, gateway, data memory module etc.

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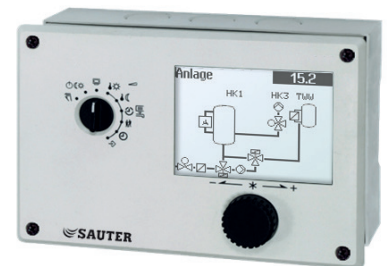
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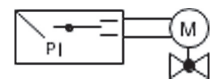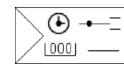
Technical data

Power supply		
Current draw	Supply voltage	230 V~, ±15%, 50...60 Hz
	Power consumption	Approx. 1.5 VA

Parameters		
Control characteristic	Supply temperature	Proportional-integral control
	Drinking water temperature	2-point
Control parameters	Proportional band	0.1...50 K
	Integral action time	1...999 s
	Switching difference for drinking water	1...30 K
Temperature ranges	Normal temperature	0...40 °C
	Reduced temperature	0...40 °C
	Supply temperature	0...140 °C
	Return temperature	0...140 °C
	Outside temperature	–50...50 °C
	DHW temperature	20...90 °C
	Frost-protection temperature	–15..3 °C
	Running time of the valve	30...300 s
	Cycle time	Running time of the valve ÷ 15

Ambient conditions

	Admissible ambient temperature	0...40 °C
	Admissible ambient humidity	5...95% rH (non-condensing)
	Storage and transport temperature	–10...60 °C

Inputs/outputs

	Number of outputs	7 relays
	Pump relay[1]	3 × 2 A, 250 V~, cos φ > 0.5
	Actuator relay[2]	4 × 2 A, 250 V~, cos φ > 0,5
	Constant input/output[3]	1 x 0..10 V
	Number of inputs	2 digital, 8 analogue
	Analogue inputs	8 Ni1000/ Pt1000

Function

Timer	Back-up power supply	Min. 24 h, typically 48 h
	Accuracy	< 1 s/d
Weekly switching programme	Number of programmes	3
	Number of switching commands	Each 42/W
	Min. switching interval	15 minutes
Annual switching programme	Number of programmes	1 (for heating circuits)
	Number of switching commands	20 each
	Min. switching interval	1 d

Interfaces and communication

Communication	Interface	RJ45
	Protocol	Modbus, device bus (TAP)

Construction

	Weight	0.5 kg
	Dimensions	144 × 98 x 54 mm
	Housing	Light grey
	Housing material	Flame-retardant thermoplastic
	Mounting	Wall, panel, DIN rail
	Screw terminals	For electric cables of up to 2.5 mm²

Standards and directives

	Ingress protection	IP40 (EN 60529) (when fitted in panels)
	Protection class	II (EN 60730-1)
	Software class	EN 60730
CE conformity according to	EMC Directive 2014/30/EU	EN 61000-6-1
		EN 61000-6-3
	Low-Voltage Directive 2014/35/EU	EN 60730-1

[1] Start-up current max. 16 A, (1 s)
[2] Extra low voltage not admissible
[3] As input for requirement or outside temperature signal. As output for constant control or requirement request, load >5kΩ

Overview of types

Type	Features
EQJW146F001	With symbol display
EQJW146F002	With graphic display

Accessories

Typ	Description
AVF***	Motorised valve actuator (see product data sheet)
AVM***	Motorised valve actuator (see product data sheet)
AXM***	Motorised valve actuator (see product data sheet)
EGT***	Temperature sensor Ni1000 (see product data sheet)
0440210001	Communication module for connecting EQJW126/146 controllers to RS-232 (PC)
0440210002	Communication module for connecting EQJW126/146 controllers to a modem (analogue/GSM/ISDN)
0440210003	Communication module for connecting EQJW126/146 controllers to RS-485 bus
0440210004	Communication module for connecting EQJW126/146 controllers to RS-485 bus (master)
0440210005	ModBus-TCP gateway
0440210006	ModBus-MBus gateway
0440210007	Converter/repeater for RS-232 or RS-485 interfaces
0440210008	RS-485 overvoltage protection
0440210010	Parameter storage module for transferring controller parameters
0440210011	ModBus-GPRS gateway
0440210012	Cable converter 2 wires RS-485

Description of operation

The EQJW146 heating controller performs weather-dependent controlling of the secondary supply temperature and, depending on the application, also DHW control. Furthermore, the primary-return temperature can be limited. Various control models are stored in the EQJW146 for the different applications.

The temperatures (outside and supply temperatures and, depending on the application, the return, DHW and room temperatures) are determined with precision sensors and digitalised in the controller. The microprocessor in the controller uses these values to calculate the signals for the outputs. Using the stored control model, the calculation of the output signals is based on the specified setpoints, the current control offset, the set control parameters and the operating mode, along with the current actual values. These signals are processed further via switching amplifiers. The results are the ON/OFF commands of the relay outputs for the control unit(s) and the pumps.

The room is supplied with the heat required to keep the room temperature constantly at the current setpoint. If a room-temperature sensor is connected to the EQJW146 and parameterised, the current room temperature is considered in the calculation of the setpoint for the supply temperature. For the DHW preparation, the actual value of the DHW temperature is compared with the setpoint. If the actual value is smaller than the setpoint, the supply temperature required for the DHW circuit is regulated and the charge pump is switched on.

The switching programmes, which the user can adapt individually, provide an optimal comfort level at the lowest energy consumption. The temperature setpoint for the room and the drinking water can be adjusted. The operating mode can be selected easily using the menu. For example, the heating or the DHW can be switched off for a longer period, during which the frost-protection facility prevents the system from freezing.

The "temporary temperature change" function can be used to activate the party function or switch easily to another operating mode for a specific period, thus saving energy. The current operating status of the system is indicated in the display, where the user can see it very easily at all times.

Communication with the controller is possible using an interface with various accessories, see the technical manual for EQJW126/146, Communication connection.

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.

All related product regulations must also be adhered to. Modifying or converting the product is not admissible.

Engineering note

The equitherm EQJW 146 controller must be connected to the mains power supply all year round.

Abbreviations

AF	Outdoor temperature (sensor)	TI	Initial point (foot point)
VF	Supply temperature (sensor)	Tn	Integral action time
RüF	Return temperature (sensor)	TY	Running time of the valve
RF	Room temperature (sensor)	Xp	Proportional band
SF1	Storage temperature (sensor) 1 (upper)	S	Slope of heating characteristic
SF2	Storage temperature (sensor) 2 (lower)	DHW	Domestic hot water
UP	Heating pump		
SLP	DHW charging pump	☾	Reduced mode
ZP	Circulation pump	☼	Normal mode (nominal mode based on EN 12098)
HC/RK	Control unit with 3-point motorised drive	⏻	Off or back-up mode (with/without frost-protection facility)

Indexes / Example

Indexes		Example	
Xs	Setpoint	VFs	Supply temperature setpoint
Xi	Actual value	VFi	Actual value of the supply temperature
max	Maximum	VFsmax	Maximum supply setpoint
min	Minimum	RFsmin	Minimum room setpoint

Additional technical data

Measuring accuracy	Better ±0.3 K at 25 °C
Time constant for processing of measured values	< 1 sec for all sensors
Neutral zone for supply temperature	±0.5 K
Minimum pulse duration for control unit	125 ms
Follow-on time for heating pump	2 × TY
Follow-on time for SLP	Adjustable on the configuration level
Heating characteristic	Curved or 4-point characteristic
Delayed adjustment for outside temperature	1.0 to 6.0 °C /h
Summertime/wintertime heating limit	Adjustable date and outside temperature limit value 0..30 °C
Back-up power supply	The back-up power supply is typically 48 (min. 24) hours. The EQJW 146 must be supplied with mains power for at least 4 hours.
Input for temperature sensor	Ni1000/Pt1000

Binary input	If the voltage between terminal 9 or 10 and terminal 12 (COM) is less than 1.5 V, the contact is interpreted as closed. If the voltage is greater than 2.5 V, the contact is interpreted as open. The current across the contacts is approx. 1 mA and the no-load voltage approx. 5 V=.
Switching frequency, mechanical	> 5 million switching cycles
Maximum closing time, control unit	2x valve's running time, control unit is constantly actuated
Temporary temperature change	Temperature change from 15 minutes to 48 hours
Proportion of extraneous heat	A continuous occurrence of extraneous heat (e.g. caused by heat loss from machines) can be considered in the heating control.
Outside temperature switch-on value in normal operation	If the EQJW146 is in automatic mode and the outside temperature is lower than the set outside temperature switch-on value in normal mode, the heating is controlled in normal mode independently of the switching programme.

Special functions

Room-temperature connection	The room-temperature connection is activated on the configuration level. A room-temperature sensor is a prerequisite. Room-temperature connection ±30 K.
Frost protection I and II	Frost protection I: limited frost protection when the heating circuit is in OFF mode and frost protection has been activated on the configuration level. Frost protection II: UP always switched on as soon as the temperature falls below the frost limit. The frost limit is adjustable from -15..3 °C.
Anti-jamming function	If the heating circuit pumps have not been activated for 24 hours, forced operation takes place between 12.02 and 12.03 to stop the pumps from jamming from being stationary too long. In the drinking water circuit, the circulation pump is operated between 12.04 and 12.05, and the other pumps between 12.05 and 12.06. The valves are also actuated with a delay.
Supply temperature limit	The maximum and minimum setpoints for the supply temperature are limited. If a setpoint is calculated for the supply temperature that is outside these limits, the limit temperature is regulated. The limit value is set on the configuration level. In manual mode, the supply-temperature control is not active and therefore the limitation of the supply temperature does not apply. When the frost-protection facility is active, the limitation of the supply temperature is disabled.
DHW limit	The maximum setpoint for DHW can be limited on the configuration level.
Anti-legionellae function	The weekly switching programme can be used to increase DHW at regular intervals.
Return temperature limit	The maximum actual value of RüF can be monitored. If the actual value of RüF exceeds the limit, the setpoint for VF is reduced. A limiting characteristic dependent on the outside temperature (fixed-value + schedule + fixed-value) can be defined for the heating circuit, and a fixed limit value for the drinking water circuit. The limiting function, or the limit value, and the influence on the setpoint for VF are parameterised on the configuration level.

Minimum throughflow limit.	The minimum throughflow can be limited. This is done using a pulse signal from a throughflow measuring device or the signal from an auxiliary contact of a control unit. If the function is activated, the valve is closed on the primary side and is only opened again when the setpoint of VF is 5 K higher than the actual value.
Throughflow and power limit	The maximum throughflow and the maximum power consumption can be limited. Limit values can be specified for the heating, the drinking water circuit and the combination of heating and drinking water circuit. If the limit value is exceeded, the supply temperature is reduced. The limit values and the degree of intervention when the limits are exceeded are parameterised on the configuration level.
Optimisation of switching times	This function needs a room temperature sensor. The optimisation ensures that the heating is switched on and off at the optimal times in automatic mode when the system changes between reduced mode or back-up mode and normal mode. The times are selected to ensure that the room-temperature setpoint is reached at the time specified in the switching programme. At the same time, energy is saved by switching the heating on as late as possible, and turning it off as early as possible.
Manual mode	In manual mode, the relays can be activated separately for the different outputs. The settings are made using a menu.
Automatic cut-off	The heating controller uses its automatic cut-off to save energy wherever possible without any loss of comfort. The following options are available for switching off the heating circuit using the heating controller: a) The current operating mode for the heating circuit is OFF b) Summertime/wintertime heating limit OFF c) Outdoor temperature above the foot point of heating characteristic TI
Floor-drying function	The following parameters can be set for the automatic floor-drying function: Start temperature: 20..60 °C Temperature increase/decrease/day: 0..10 °C Maximum temperature: 25..60 °C Holding period Tmax: 0..10 days
Switching programmes	3 weekly switching programmes with up to 42 switching commands each and an annual switching programme with up to 20 switching commands are available. The minimum switching interval is 15 minutes and 1 day respectively. An operating mode from the weekly and annual switching programme (holidays) with lower energy consumption has priority.
Logbook (EQJW146F002)	A logbook is available. Events that occur, such as a control offset that is too big or incorrect measured values, etc., are logged.

Disposal

The local, currently valid laws must be observed when disposing of the device.

You will find more information on the materials and substances in the Declaration on materials and the environment for this product.

Characteristics

Heating characteristics for foot point TI = 20 °C

Systems

System 1.0

System 1.1 to 1.3

DHW

System 1.5
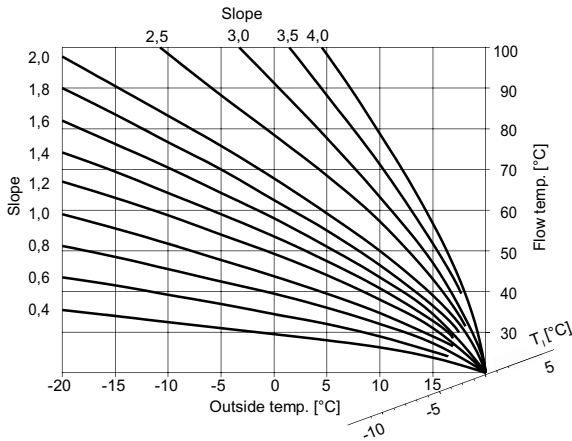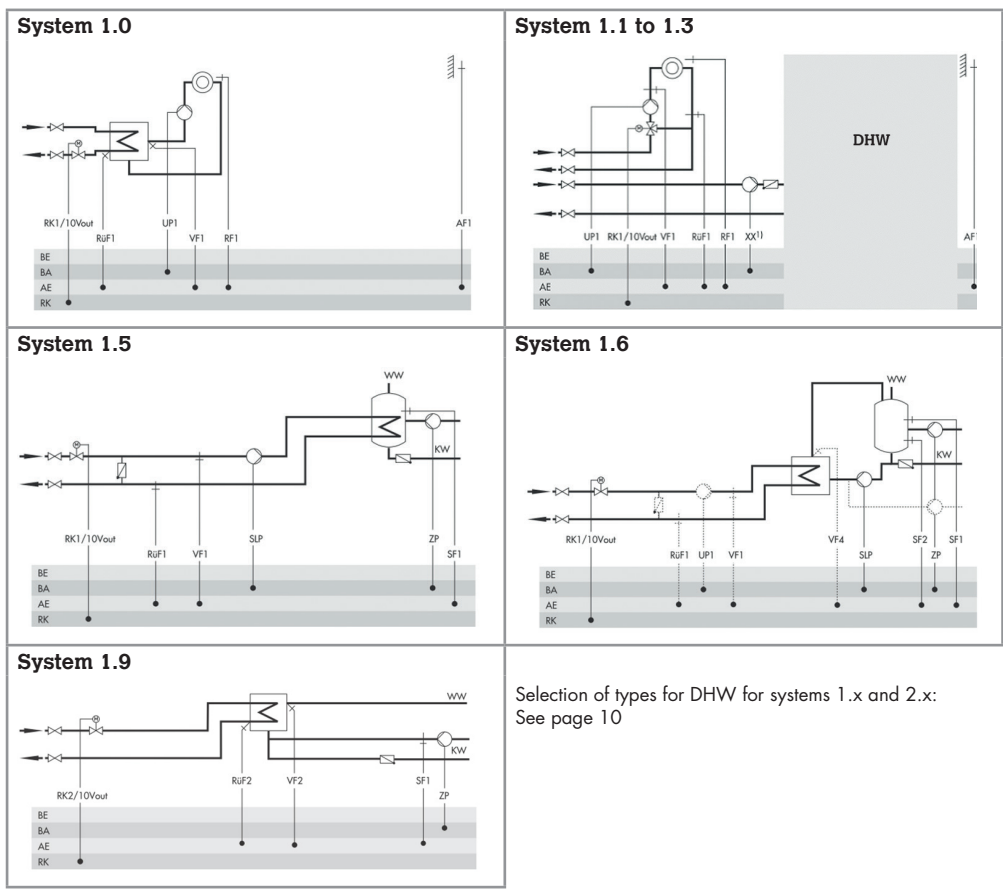
System 1.6

System 1.9

Selection of types for DHW for systems 1.x and 2.x:
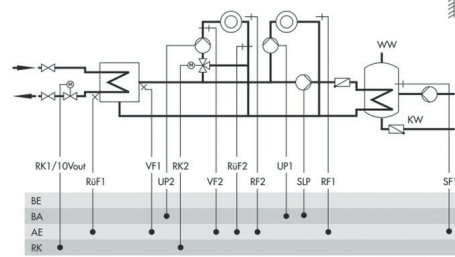See page 10

System 2.0

System 2.1 to 2.3

DHW
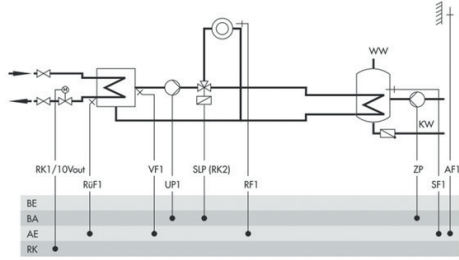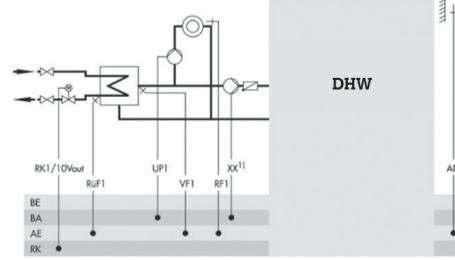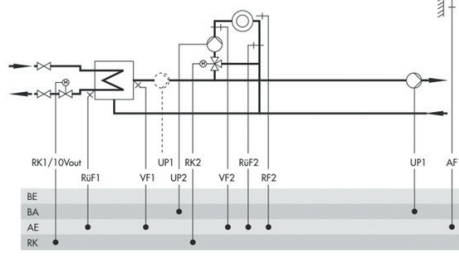
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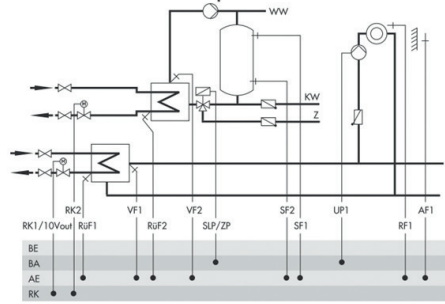

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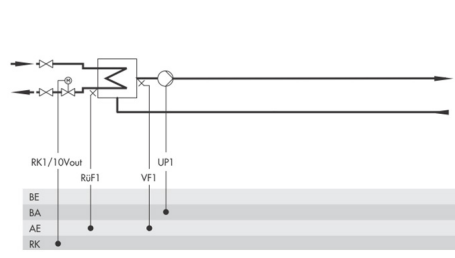
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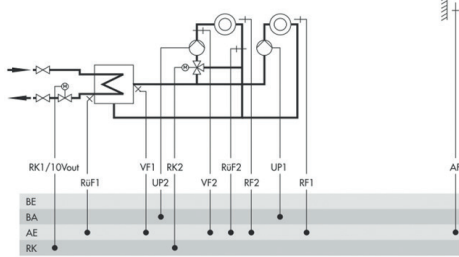
System 4.1

System 4.5
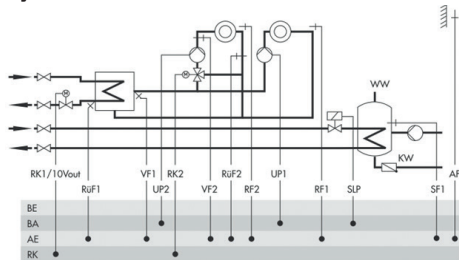
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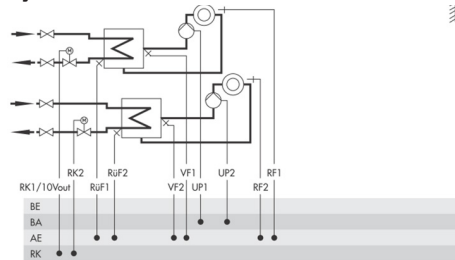
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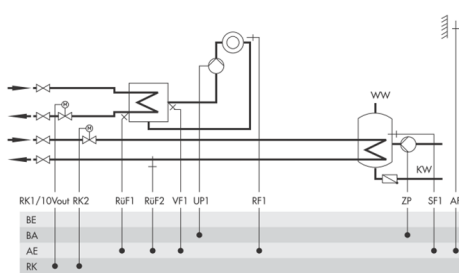
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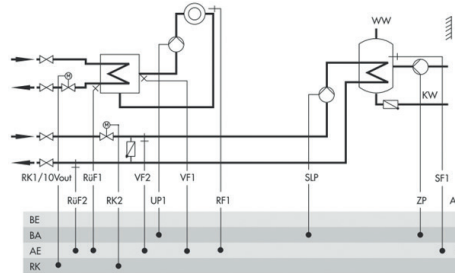
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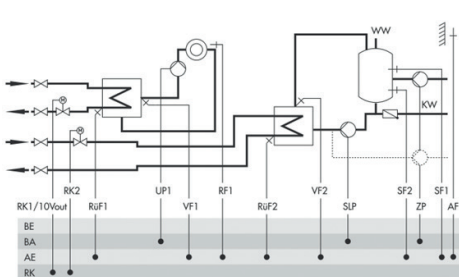
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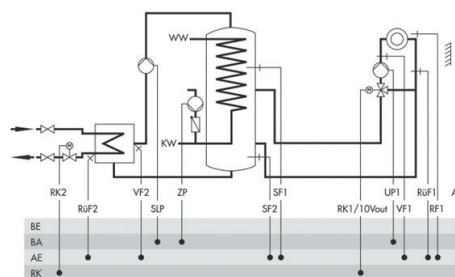
Selection of types for DHW for systems 1.x and 2.x: See page 10

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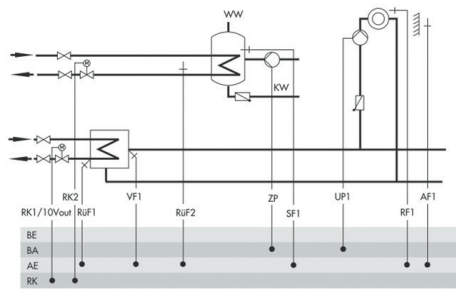
System 11.6

System 11.9
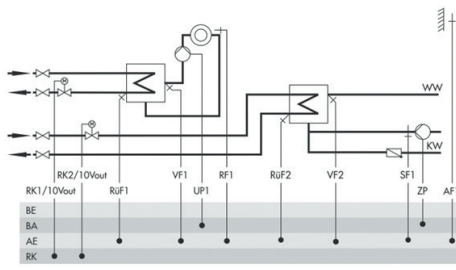
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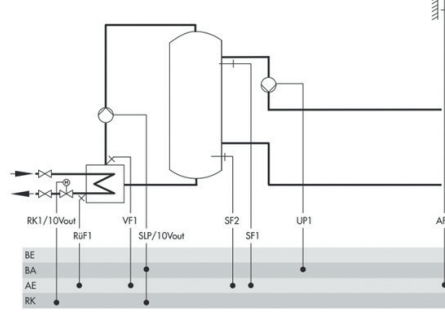
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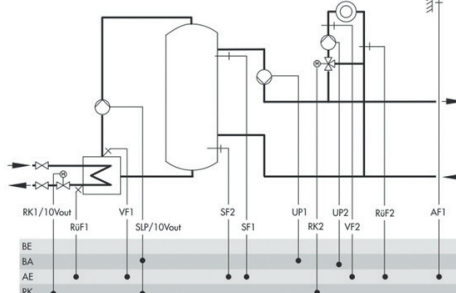
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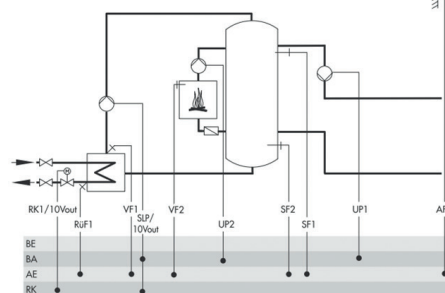
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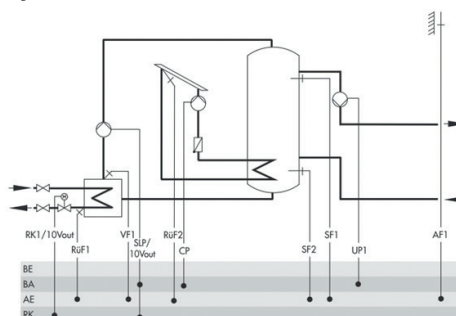
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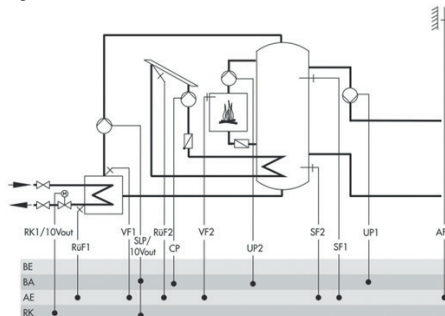
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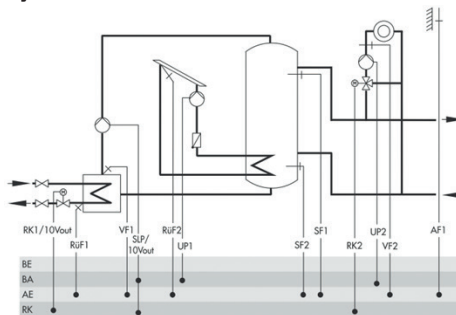
Types for DHW (systems 1.x and 2.x)

Type 1	Type 2	Type 3

Connection diagram

Dimension drawing

138 × 92 DIN 43700