

EQJW 246: Heating and district heating controller, equitherm

How energy efficiency is improved

Control of max. three control loops depending on the heat requirement or time programme. The control enables the system to be adjusted to the individual requirements of the user, and also to be switched off temporarily if required

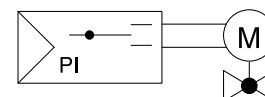
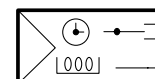
Features

- Max. three control loops in the following combinations:
 - Control of a primary heat exchanger or boiler, two regulated and one unregulated heating circuit, and control of the drinking water heating in the secondary circuit
 - Weather-dependent buffer tank control with solid fuel boiler and solar circuit control, as well as max. two mixed-heating circuits
 - Control of two weather-dependent heating circuits and one drinking water heating with three valves in the primary circuit
 - Control of three weather-dependent heating circuits
- EQJW246F003: Applications with up to six control loops via expansion modules
- Different system models, e.g. for district heating, single-stage boilers, buffer tanks, drinking water heating with solar energy
- Weather-dependent supply temperature control based on heating characteristic or 4-point characteristic
- To regulate more circuits, multiple controllers can be connected to each other via a device bus
- Convenient operation with state-of-the-art operating concept (turn and press) and large graphical display
- Convenient weekly and annual switching programmes with optimisation of switching times
- Automatic summertime/wintertime change-over
- 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, drinking water, return flow and room temperature
- Relay outputs with varistor suppression for activating control units and pumps
- Manual mode
- Logbook
- 0...10 V inputs for external requirement or outdoor temperature signal
- 0...10 V outputs for external requirement, analogue/PWM outputs, speed-controlled pump etc.
- Binary interfaces for fault signals or external requirement processing
- Interfaces for various accessories such as modem, gateway, data storage module etc.



EQJW246F002

EQJW246F003



Technical data

Power supply

Power supply	230 VAC ± 15%, 50...60 Hz
Power consumption	Max. 10 VA

Parameters

Control characteristic	Supply temperature	PI control
	Drinking water temperature	2-point
Control parameters	Amplification KP	0.1...50
	Integral action time	1...999 sec.
	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
	Outdoor temperature	-50...50 °C
	Drinking water temperature	20...90 °C
Frost-protection temperature	-15...3°C	



	Running time of valve	15...240 sec.
	Cycle time	Running time of the valve ÷ 15
Ambient conditions		
	Ambient temperature	0...40 °C
	Ambient humidity	5...95% rh, no condensation
	Storage and transport temperature	-10...60 °C
Inputs/outputs¹⁾		
	Pump relay ²⁾	5 × 2 A, 250 VAC
	Actuator relay ³⁾	F002: 6 × 2 A, 250 VAC F003: 4 × 2 A, 250 VAC, 2 × 0,12 A, 250 VAC (Triac)
	Continuous output ⁴⁾	F002: 2 × 0...10 V F003: 4 × 0...10 V
	Inputs	F002: 17 configurable Ni/Pt1000, binary, 1 × 0...10 V F003: 14 configurable Ni/Pt1000, binary, 3 × 0...10 V F002 and F003: 1 × pulse 3...800 Imp/h from heat meter for power limitation in HK1
Function		
Timer	Backup power supply	Min. 24 h; typically 48 h
	Accuracy	< 10 minutes/year
Weekly switching programme	Number of programmes	3
	Number of switching commands	42 each
	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 day
Interfaces, communication		
	M-Bus	For max. 3 M-Bus units, protocol as per EN 1434-3
	RS-485 ⁵⁾	F002: 1 × RS-485 for device bus or Modbus/RTU F003: 2 × RS-485 for device bus and Modbus/RTU
	Ethernet	Modbus TCP/IP
Construction		
	Weight	0.5 kg
	Dimensions	144 × 98 × 54 mm
	Housing	Light-grey
	Housing material	Fire-retardant thermoplastic
	Fitting	Wall, switch panel, DIN rail
	Screw terminals	For electrical cables up to 2.5 mm ²
Standards, directives		
	Type of protection	IP40 (EN 60529) (panel mounting)
	Protection class	II (IEC 60730-1)
	Software class	A (IEC 60730-1, Appendix H)
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⁾ See also "Type overview"

²⁾ Start-up current max. 16 A (1 second)

³⁾ Extra low voltage not admissible

⁴⁾ 0...10 V output, e.g. for continuous control, outside temperature, external requirement or for speed control of pumps, load > 5 kΩ.

0/10 V: PWM signal for pump speed control

⁵⁾ Device bus: 2-wire bus, inverse, with reverse polarity protection, max. 32 users.
Modbus/RTU: Modbus protocol data format 8N1, RJ45

Overview of types

Type	Features	Outputs	Inputs
EQJW246F002	Heating and district heating controller with graphic display, 1 × RS-485	11 relays, 2 × 0...10 V	17 × Ni1000/Pt1000 and binary 1 × 0...10 V 1 × pulse
EQJW246F003	Heating and district heating controller with graphic display, 2 × RS-485, expandable for up to 6 control loops with accessories	9 relays, 2 Triacs, 4 × 0...10 V	14 × Ni1000/Pt1000 and binary 3 × 0...10 V 1 × pulse

Accessories

Type	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***	External temperature sensor Ni1000 (see product data sheet)
0440210001	Communication module for connecting EQJW 126/146 controllers to RS-232 (PC)
0440210002	Communication module for connecting EQJW 126/146 controllers to modem
0440210003	Communication module for connecting EQJW 126/146 controllers to RS-485 bus
0440210004	Communication module for connecting EQJW 126/146 controllers to RS-485 bus (master)
0440210005	ModBus-TCP gateway
0440210006	ModBus-MBus gateway
0440210011	ModBus-GPRS gateway
0440210007	Converter/repeater for RS-232 or RS-485 interfaces
0440210008	RS-485 overvoltage protection
0440210010	Parameter storage module for transferring controller parameters
0440210012	Cable converter for 2-conductor RS-485 interface
0440210014	I/O extension module for EQJW246F003

Description of operation

The EQJW 246 heating controller performs weather-dependent control of the secondary supply temperature. Depending on the application, drinking-water control is also performed. Furthermore, the primary return temperature can be limited. Various control models are stored in the EQJW 246 for the different applications. Up to three control loops can be connected.

The outdoor temperature and the supply temperature and, depending on the application, the room, drinking water and return temperatures are determined by means of precision sensors. The microprocessor in the controller uses the digitalised temperature 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 units and pumps.

The room is supplied with the heating required to keep the room temperature constantly at the current setpoint. If a room-temperature sensor is connected to the EQJW 246 and parameterised, the current room temperature is considered in the calculation of the setpoint for the supply temperature. For the drinking water preparation, the actual value of the drinking water temperature is compared with the setpoint. If the actual value is smaller than the setpoint, the supply temperature required for the drinking water preparation 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 setpoint for the room temperature and the drinking water is adjustable. The menu navigation makes it easy to select the operating mode, e.g. the heating or the drinking water warming can be switched off during longer absences. The frost-protection facility prevents the system from freezing. The "Temporary temperature change" function can be used to activate the party function or switch to another operating mode for a specific period, thus saving energy. The current operating status of the system is indicated in the display and can thus be read by the user at all times.

Communication with the controller is possible using an interface with various accessories; see the technical manual, "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. Changing or converting the product is not admissible.

Engineering note

The equitherm EQJW 246 controller must be connected to the mains power supply all year round.

Additional technical data

Measuring accuracy	F002: $< \pm 0.3 \text{ K}$ at 25 °C F003: $< \pm 1.0 \text{ K}$ at 25 °C
Time constant for processing of measured values	$< 1 \text{ sec}$ for all sensors
Sensors in neutral zone, supply temperature (configurable)	$\pm 2 \text{ K}$
Minimum pulse duration for control unit	125 milliseconds (ms)
Follow-on time for heating pump	$2 \times T_{\gamma}$
Follow-on time for SLP	Adjustable on the configuration level
Heating characteristic	Curved or 4-point characteristic
Delayed outdoor temperature adjustment	1.0 to 6.0 °C/hr
Summertime/wintertime heating limit	Date adjustable and outdoor temperature limit value 0...30 °C
Backup power supply	Typically 48 h (min. 24 h). The device must have been supplied with mains power for at least 4 hours
Input for temperature sensor	Ni1000/Pt1000
Binary input	<ul style="list-style-type: none"> Signal "contact closed" at $< 0.8 \text{ V}$ Signal "contact open" at $> 2.5 \text{ V}$ Current across contacts BE15...17 approx. 0.1 mA F002: Open-circuit voltage: approx. 5 VDC F003: Open-circuit voltage: approx. 3 VDC
Maximum closing time, control unit	Twice the running time of the valve. The 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
Outdoor temperature switch-on value in normal operation (design temperature)	If the device is in automatic mode and the outdoor temperature is lower than the set outdoor temperature switch-on value in normal mode, the heating is controlled in normal mode independently of the switching programme

Special functions

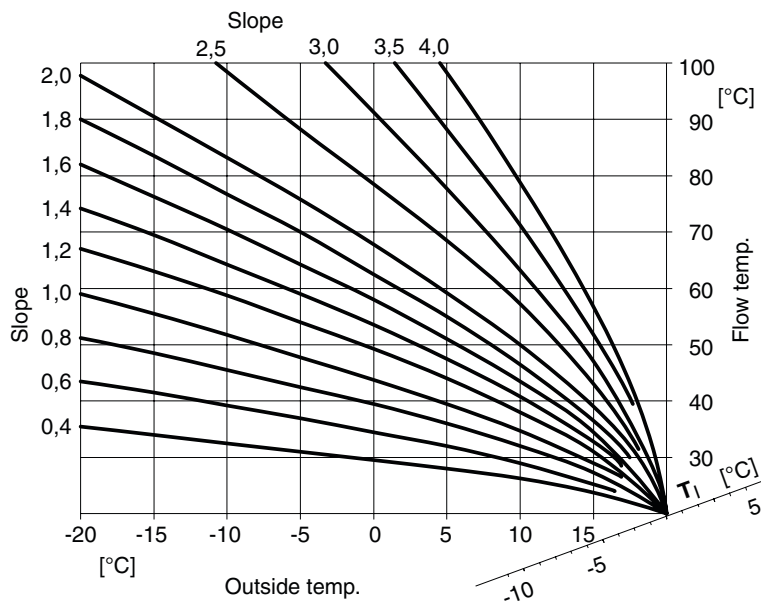
Function	Meaning
Room-temperature connection	The room-temperature connection is activated on the configuration level. A room-temperature sensor is a prerequisite. Room-temperature connection $\pm 30 \text{ K}$.
Frost protection programmes I and II	<p>Frost protection programme I: Limited frost protection when the heating circuit is in OFF mode and frost protection has been activated on the configuration level.</p> <p>Frost protection programme II: If the temperature falls below the frost limit, the heating pump (UP) is always switched on.</p> <p>The frost limit is adjustable from $-15...+3 \text{ °C}$</p>
Anti-jamming function for pump	<p>If the heating circuit pumps have not been activated for 24 hours, forced operation takes place between 12.02 and 12.03 p.m. This stops the pumps from jamming due to being stationary for too long.</p> <p>In the drinking water circuit, the circulation pump is operated between 12.04 and 12.05 p.m.</p> <p>The other pumps are operated between 12.05 and 12.06 p.m.</p> <p>The valves are also actuated with a delay</p>

Function	Meaning
Limitation of supply temperature	<p>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.</p> <p>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.</p> <p>When the frost-protection facility is active, the limitation of the supply temperature is disabled</p>
Limitation of drinking water temperature	The maximum setpoint for the drinking water temperature can be limited on the configuration level
Anti-legionellae function	The weekly switching programme can be used to increase the drinking water temperature at regular intervals
Limitation of the return temperature	<p>The actual value of the return temperature can be monitored.</p> <p>If the actual value exceeds the limit, the setpoint for the supply temperature is reduced. A limiting characteristic dependent on the outdoor temperature (fixed-value + schedule + fixed-value) can be defined for the heating circuit, and a fixed limit value for the drinking water preparation. The limiting function, or the limit value, and the influence on the setpoint for the supply temperature are parameterised on the configuration level</p>
Minimum throughflow limitation	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 the supply temperature is 5 K higher than the actual value
Limitation of throughflow	<p>The maximum throughflow and the maximum power consumption can be limited. Limit values can be specified for the heating, the drinking water preparation and the combination of heating and drinking water circuit. If the limit value is exceeded, the supply temperature is reduced.</p> <p>The limit values and the degree of intervention when the limits are exceeded are parameterised on the configuration level</p>
Optimising the switching times	A room sensor is required for this function. Optimising causes the heating to be switched on and off at the optimal times in automatic mode when the system changes between normal mode and set-back or back-up 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 setting is made using a menu
Automatic cut-off	<p>The heating controller uses its automatic cut-off to save energy without any loss of comfort.</p> <p>At least one of the following conditions must be fulfilled for the controller to switch off a heating circuit:</p> <ul style="list-style-type: none"> • The heating circuit is in OFF mode • The summertime/wintertime heating limit is deactivated • The outdoor temperature is above the initial point T_1 of the heating characteristic
Floor-drying function	<p>The following parameters can be set for the automatic floor-drying function:</p> <ul style="list-style-type: none"> • Start temperature: 20...60 °C • Temperature increase or decrease per day: 0...10 °C • Maximum temperature: 25...60 °C • Holding period Tmax: 0...10 days
Switching programmes	<p>3 weekly switching programmes with up to 42 switching commands each and an annual switching programme with up to 20 switching commands are available.</p> <p>The minimum switching interval is 15 minutes and 1 day respectively.</p> <p>The operating mode from the weekly and annual switching programme (holidays) with lower energy consumption has priority</p>
Logbook	A logbook is available. Events that occur, e.g. a control offset that is too big or incorrect measured values, are logged.

Disposal

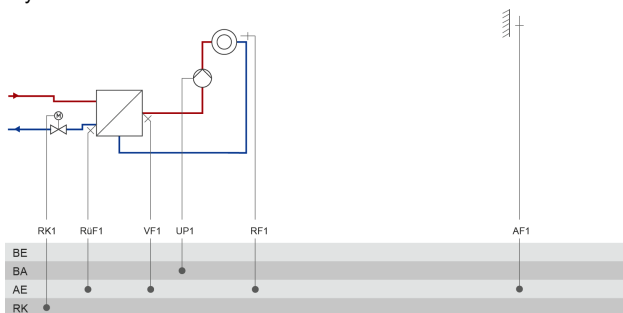
When disposing of the product, observe the currently applicable local laws. More information on materials can be found in the Declaration on materials and the environment for this product.

Heating characteristic for foot point $T_1 = 20\text{ }^\circ\text{C}$

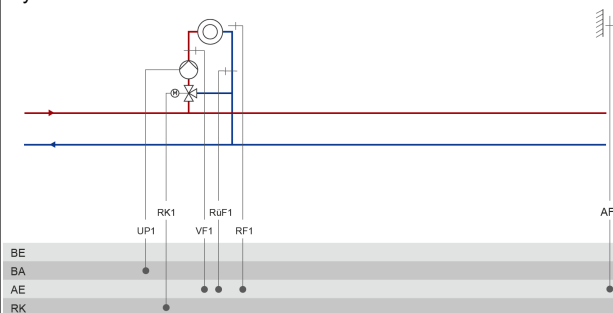


Example applications

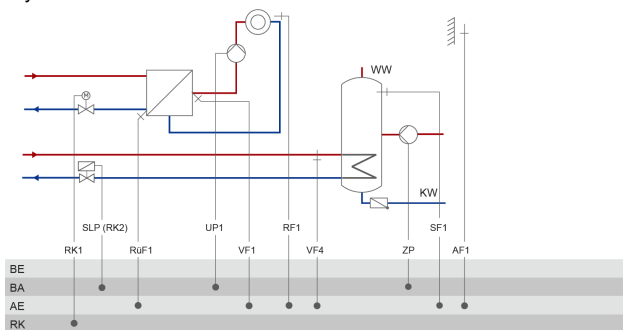
System 1.0-1



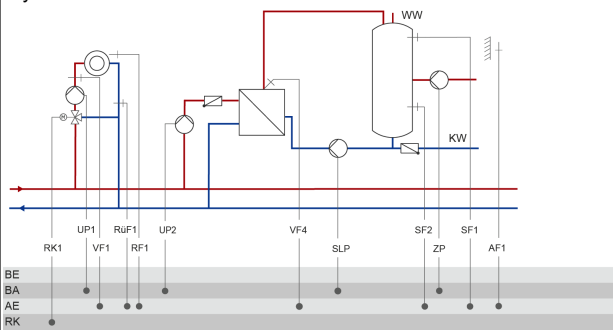
System 1.0-2



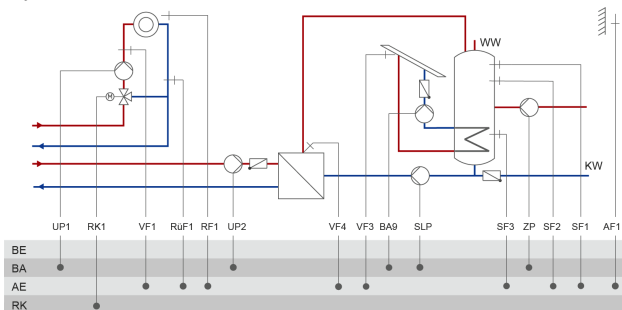
Systems 1.1-1



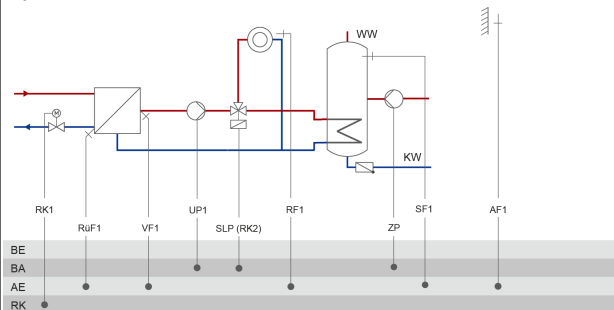
Systems 1.2



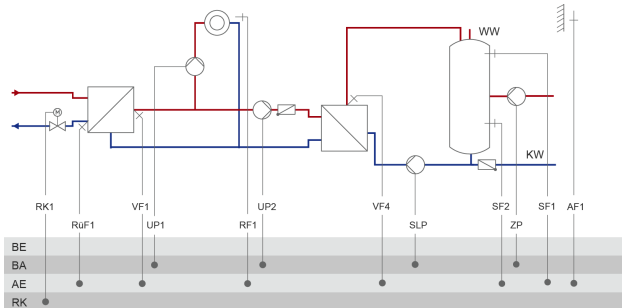
Systems 1.4



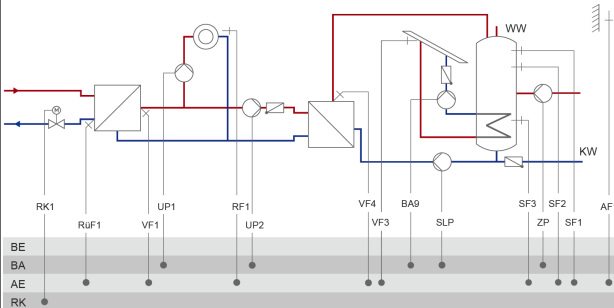
System 2.0



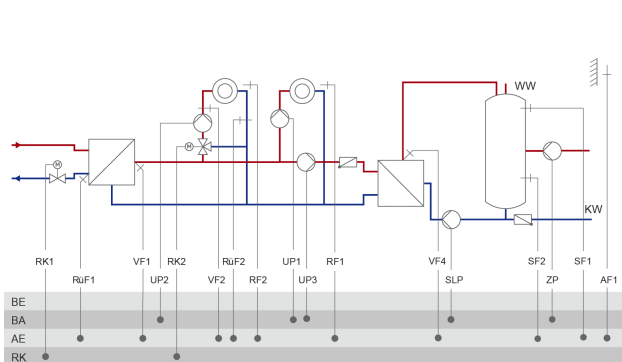
Systems 2.2



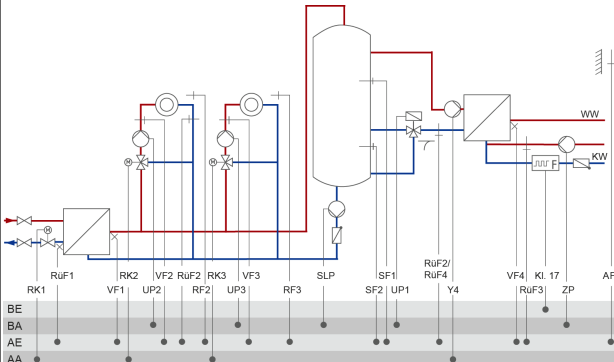
Systems 2.4



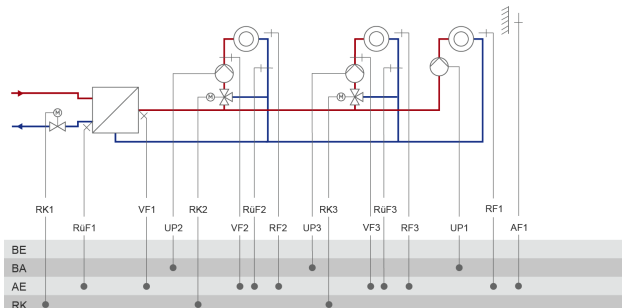
Systems 4.2



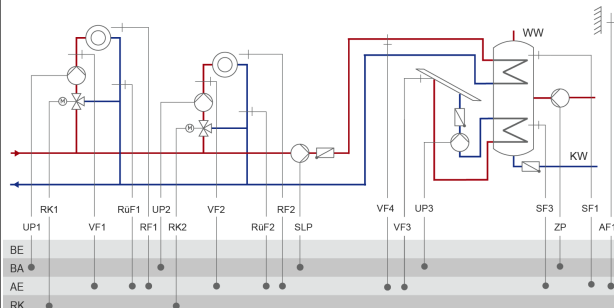
System 5.9



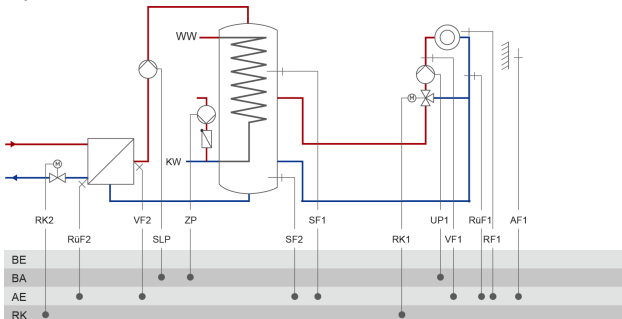
System 6.0



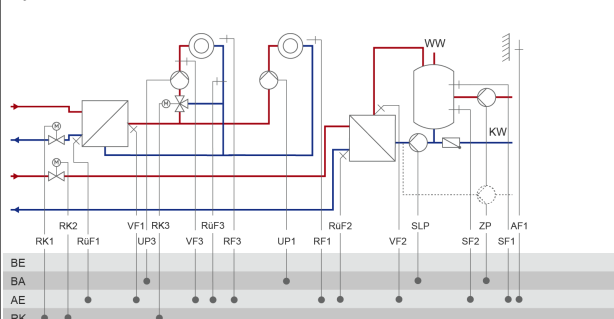
Systems 10.3-2



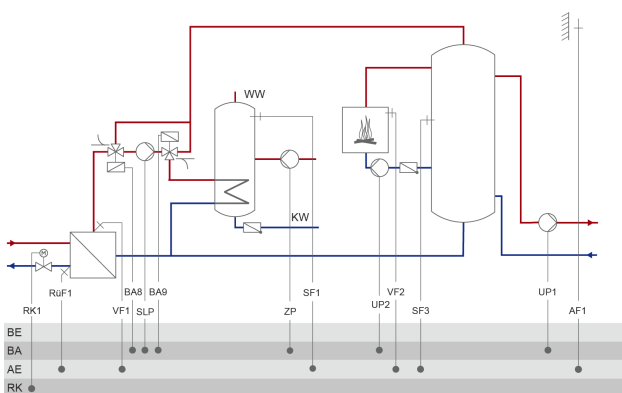
System 11.1-3 with buffer tank



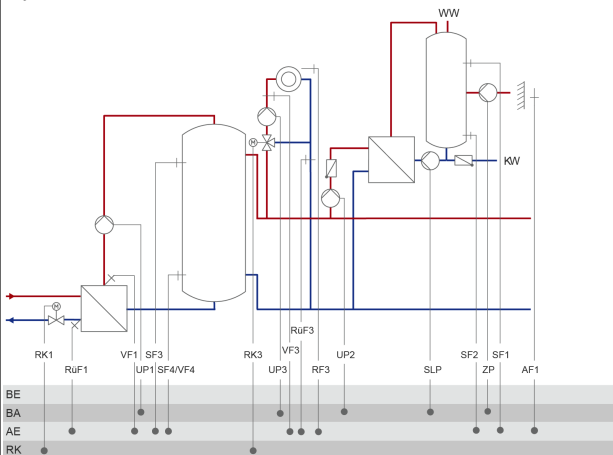
Systems 13.2-1



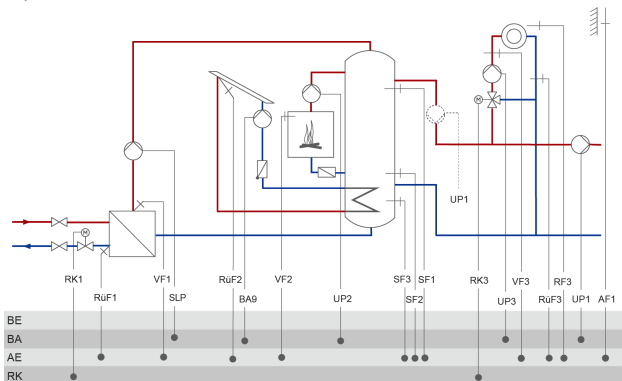
Systems 14.1



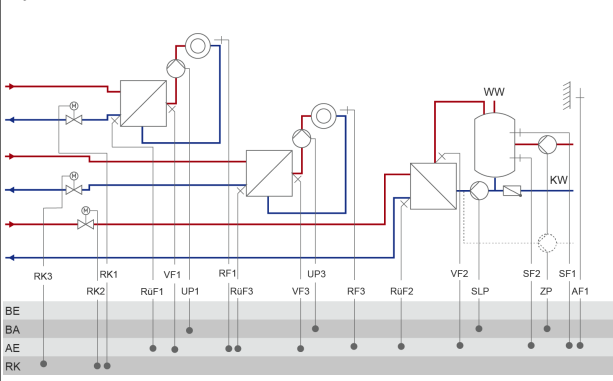
System 15.0



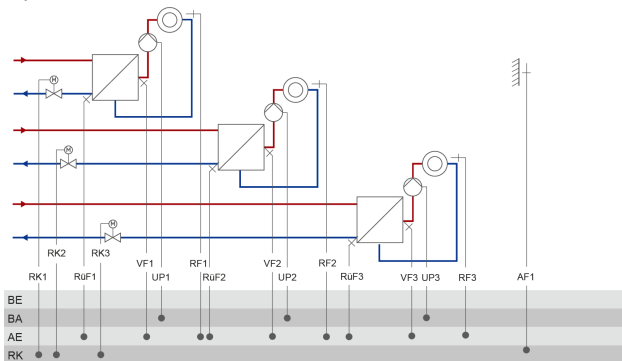
System 16.7



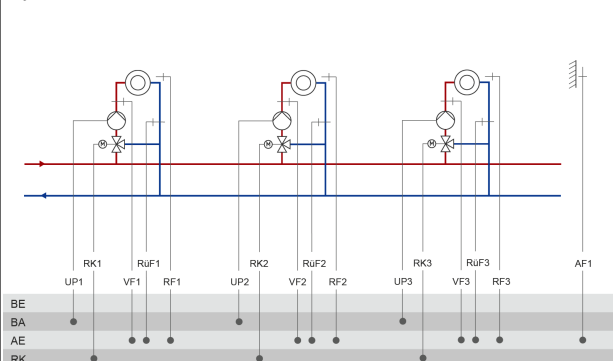
System 21.2-1



System 25.0-1



System 25.0-2



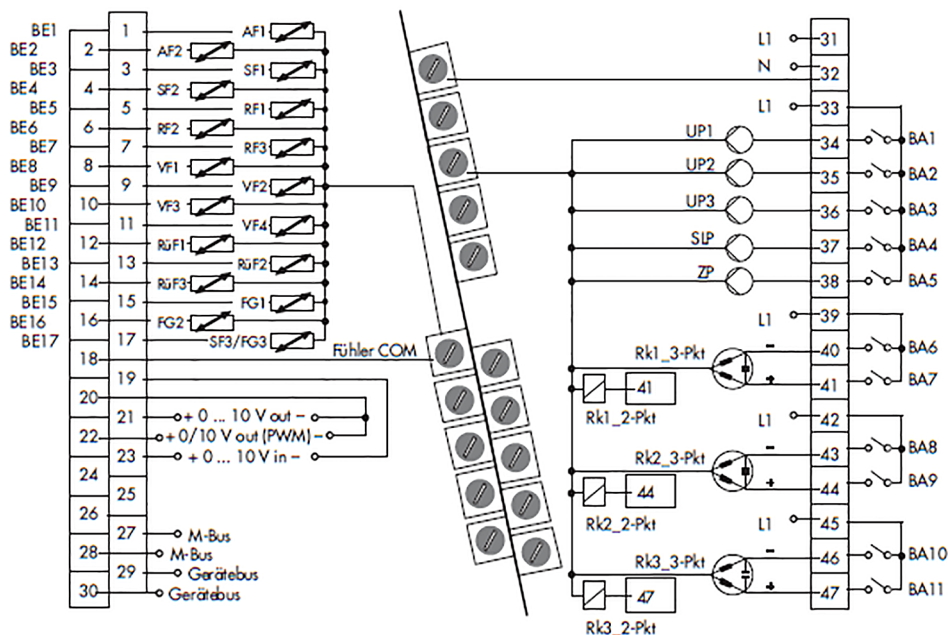
Key for example applications and connection diagram

- AA: Analogue output
- AE: Analogue input
- AF: Outdoor temperature (sensor)
- BA: Binary output
- BE: Binary input
- FG: Release/binary input
- PWM: Pump speed control
- RF: Room temperature (sensor)
- RK: Control loop control unit with 3-point motorised actuator
- RüF: Return temperature (sensor)

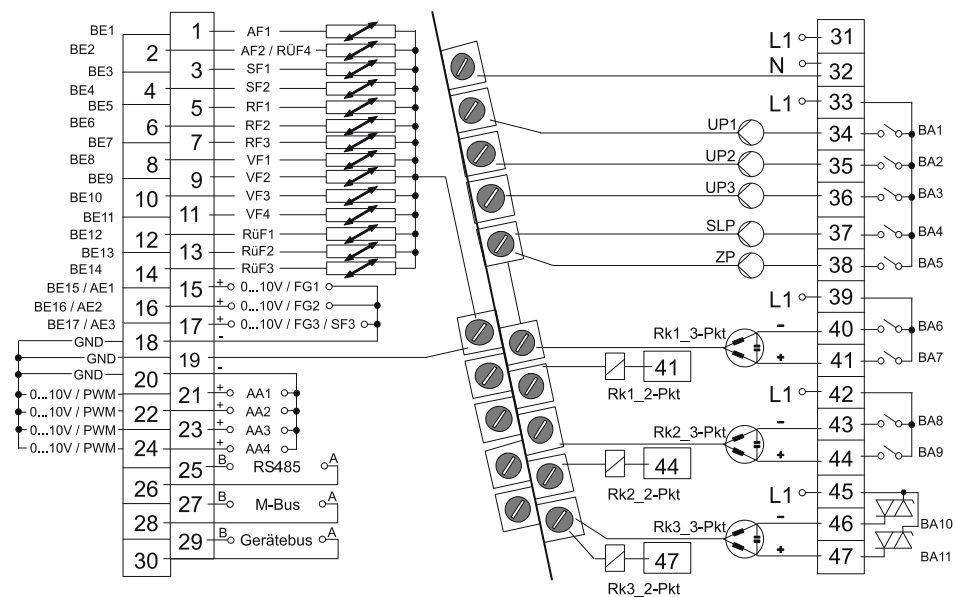
- SF1: Storage temperature (sensor), upper
- SF2: Storage temperature (sensor)
- SF3/FG3: Storage temperature (sensor), binary demand processing
- SLP: Drinking water charging pump
- TW: Drinking water
- UP: Heating pump
- VL/RL: Supply/return for drinking water heating
- VF: Supply temperature (sensor)
- ZP: Circulation pump

Connection diagram

EQJW246F002



EQJW246F003



Dimension drawing

All measurements in millimetres.

