

EQJW 135: Heating controller for boiler control systems, equitherm

How energy efficiency is improved

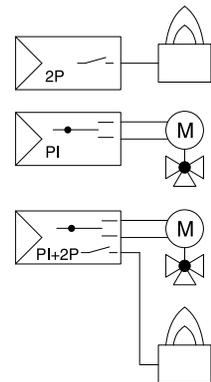
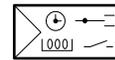
Weather-dependent control of the boiler temperature and integrated automatic cut-off for the heating to save energy

Features

- Weather-dependent boiler- and/or supply-temperature control, and drinking water circuit in buildings of all kinds
- Convenient to use with modern operating concept (turn and press) and large LCD
- Communication via Modbus RTU or proprietary device bus
- Convenient weekly and calendar switching programmes with optimisation of switching times
- Automatic summertime/wintertime changeover
- Limitation of boiler temperature and function for boiler start-up relief
- Min./max. limitation of supply temperature and maintenance of return temperature
- Frost-protection facility and anti-jamming function for valve
- Screed curing (floor-drying functions)
- Function for protecting against legionellae
- Connection of room temperature via room-temperature sensor or room operating unit
- Ni1000 inputs for the outside, supply, boiler, DHW, return and room temperatures or for room operating unit
- Relay output for activating control units and pumps and for enabling burner levels, additional multi-functional relay output
- Manual mode
- Logbook
- Notification by text message
- Electrical connection in baseplate



EQJW135F001



Technical data

Power supply		
Power supply		230 V~, ±15%, 50...60 Hz
Power consumption		Approx. 1 VA
Parameters		
Control characteristic	Boiler temperature	2-point
	Supply temperature	PI control
	Domestic-hot-water temperature	2-point
Control parameters	Proportional band	2...100 K
	Integral action time	15...1000 s
	Switching difference, boiler	1...9 K
	Switching difference, domestic hot water	1...19 K
	Frost-protection temperature	3 °C
Temperature ranges	Normal temperature	0...40 °C
	Reduced temperature	0...40 °C
	Supply temperature	0...130 °C
	Return temperature	0...130 °C
	Boiler temperature	0...130 °C
	Outside temperature	-50...50 °C
	Domestic-hot-water temperature	20...90 °C
	Running time of valve	30...300 s
	Cycle time	Running time of the valve + 15
Ambient conditions		
Admissible ambient temperature		0...50 °C
Admissible humidity		5...95% rh, no condensation
Storage and transport temperature		-25...65 °C
Inputs/Outputs		
Number of inputs		1 digital, 6 analogue



Digital inputs	Switching current approx. 1 mA
Analogue inputs	5 Ni1000, 1 Ni1000/room operating unit
Number of outputs	6 relays
Pump relay ¹⁾	3 × 2 A, 250 V~, cos φ > 0.5
Actuator relay ²⁾	2 × 0.5 A, 250 V~, cos φ > 0.5
Relay to enable burner	0.5 A, 250 V~, cos φ > 0,5
Configurable relay ³⁾	1 × 2 A, 250 V~, cos φ > 0.5

Function		
Digital timer for weekly/calendar switching programme	Accuracy	< 1 s/d
	Back-up power supply	Min. 24 h, typically 48 h
Weekly switching programme	Number of programmes	3
	Number of switching commands	48 each
	Min. switching interval	10 min
Calendar switching programme	Number of programmes	1 (for heating circuits)
	Number of switching commands	20 each
	Min. switching interval	1 d

Interfaces and communication		
	Interface	RS-485, device interface (similar to RS-232)
	Protocol	Modbus, device bus (TAP)

Construction		
	Weight	0.4 kg
	Dimensions	144 × 96 mm
	Housing	Pure white (RAL 9010)
	Housing material	Fire-retardant thermoplastic
	Fitting	Wall, panel, top-hat rail
	Screw terminals	For wire of up to 2.5 mm ²

Standards and directives		
	Type of protection (when fitted in pan-els)	IP 40 (EN 60529)
	Protection class	II (IEC 60730-1)
	Software class A	EN 60730
CE conformity according to	EMC directive 2004/108/EC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4
	Low-voltage directive 2006/95/EC	EN 60730-1

Overview of types	
Type	Properties
EQJW135F001	Heating controller for boiler control

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)
EGS 52/15	Room operating unit (see product data sheet)
EGT***	External temperature sensor Ni1000 (see product data sheet)
Modem	Modems tested with the EQJW*** are available on request
7001059001	User manual, German
7001059002	User manual, French
7001059003	User manual, English

¹⁾ Start-up current max. 7 A (1 s)

²⁾ Low voltage not admissible

³⁾ Start-up current max. 7 A (1 s); low voltage not admissible

General description of operation

The EQJW 135 heating controller performs weather-dependent supplier-temperature control and, depending on the application, also domestic-hot-water control and boiler temperature control. Various control models are stored in the EQJW 135 for the different applications.

The temperatures (outside and supply temperatures and, depending on the application, the boiler, return, domestic hot water 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, along with the current actual values. Additionally, the current control offset, the set control parameters and the operating mode are considered. These signals are processed further via switching amplifiers. The results are the ON/OFF commands of the relay outputs for the control unit, the pumps and the burner.

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 EQJW 135 and parameterised, the current room temperature is considered in the calculation of the setpoint for the supply temperature. For the domestic-hot-water preparation, the charge pump is activated based on the measured domestic-hot-water temperature. The output relay for enabling the burner is activated based on the heat requirement and the current boiler temperature.

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 domestic hot water can be adjusted. The operating mode can be selected easily using the rotary switch. These can be used, for example, to switch off the heating or the domestic hot water for a longer period. 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 LCD display, where the user can see it very easily at all times. A Modbus interface is used to communicate with the controller. It is also possible to connect multiple controllers with each other and connect a room remote-control unit with a digital user interface. A separate modem sends alarms via SMS if required.

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 documents must also be adhered to. Changing or converting the product is not admissible.

Engineering note

The equitherm EQJW 135 controller must be connected to the mains power supply all year round.

Abbreviations

T_A	Outside temperature	T_I	Initial point (foot point)
T_F	Supply temperature	T_R	Room temperature
T_{RF}	Return temperature	T_B	Boiler temperature
T_W	Domestic-hot-water temperature	X_p	Proportional band
T_n	Integral action time	SP	SERVICE parameters
T_y	Running time of valve	V	Valve
UP	Heating pump	LP	Charge pump for domestic hot water
$T_{S/W}$	Heating limit	S	Slope of heating characteristic
KW	Cold water	BW	Domestic hot water
<i>Symbol</i>	Factory setting	☼	Normal mode (nominal mode based on EN 12098)
☾	Reduced mode	⏻	Off or back-up mode (with/without frost-protection facility)

Indexes		Example	
X_s	Setpoint	T_{Rs}	Room-temperature setpoint
X_i	Actual value	T_{Fi}	Actual value of the supply temperature
X_{ged}	Damped value	T_{Aged}	Damped outside temperature
max	Maximum	T_{Fmax}	Maximum supply setpoint
min	Minimum	T_{Rmin}	Minimum room setpoint

Additional technical data

Measuring accuracy	Better ± 0.3 K at 25 °C
Time constant for processing of measured values	Approx. 10 s for T_A , < 5 s for T_R and T_F
Neutral zone for supply temperature	± 0.5 K
Minimum pulse duration for control unit	250 ms
Follow-on time for heating pump	$2 \times T_y$
Follow-on time for LP	Can be set on the SERvice level
Heating characteristic	Curved, without influence of extraneous heat
Damping of outside temperature	Time constant approx. 21 hours; can be (de)activated on the SERvice level
Summertime/wintertime heating limit	ON means summer \rightarrow winter OFF means winter \rightarrow summer ON for $T_{aged} < T_{S/W} - 1$ K OFF for $T_{aged} > T_{S/W}$ Whereby T_A can also be used for T_{aged} . $T_{S/W}$ can be set using the SERvice parameters
Back-up power supply	The back-up power supply is typically 48 (min. 24) hours. The EQJW 135 must be supplied with mains power for at least 4 hours.
Input for temperature sensor	Ni1000
Zero-point correction for room temperature	Up to ± 6 K possible
Zero-point correction for outside temperature	Up to ± 9 K possible
Zero-point correction for return temperature	Up to ± 10 K possible
Digital input	If the voltage between terminal 22 and terminal 21 (DGND) 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. 12 V=.
Outputs	Relay with indication of switching status
Switching frequency, mechanical	> 5 million switching cycles
Maximum closing time, control unit	Twice the running time of the valve. The control unit is reactivated every 15 minutes.
Temporary temperature change	Changes to the setpoint for the room temperature in automatic mode. Change until next switching command (however, minimum 2 hours), or from 3 hours to 19 days possible. Indication of the remaining time in the display. Termination of changes possible.
Portion of extraneous heat	A continuous occurrence of extraneous heat (e.g. caused by heat loss from machines) can be considered in the heating control.
Design temperature	If the EQJW 135 is in automatic mode and T_A is lower than the set design temperature, the heating is controlled in normal mode independently of the switching programme. The design temperature is parameterised on the SERvice level.

Special functions

Room-temperature connection	The room-temperature connection is activated on the SERvice level. A room-temperature sensor is a prerequisite. The influence of the room-temperature connection can be adjusted on the SERvice level. Maximum change in T_F based on room-temperature connection ± 30 K.
Frost-protection facility	The frost-protection facility is activated if the operating mode of a control loop is in the OFF mode and the frost-protection facility has been enabled on the SERvice level. Additionally, the temperature must be below the anti-frost limit. The anti-frost limit is 3 °C for the outside temperature. The frost-protection facility is disabled when the outside temperature is above 4 °C. When the frost-protection facility is activated, a supply temperature of 10 °C is regulated for the heating circuits. If the domestic-hot-water temperature is < 5 °C, an increase to 10 °C is performed.
Anti-jamming function for pump	The anti-jamming function for the pump is enabled on the SERvice level. Every day at midnight, a pump is activated for 60 seconds if it has not been operated for the previous 24 hours. This function is active in all operating modes apart from the manual mode.
Multifunctional relay output	One of the output relays (terminal 8) can be parameterised for a wide range of functions. This means the output can be used as a pilot clock output, as a collective alarm, for controlling a 2nd burner level, a boiler circuit pump, a heating pump for a 2nd heating circuit, or for the forced operation of the heating pump of heating circuit 1.

Limitation of the supply temperature	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 SERvice 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.
Limitation of T_W	The maximum setpoint for T_W can be limited on the SERvice level.
Anti-legionellae function	The weekly switching programme can be used to increase T_W at regular intervals. If a higher T_W is required over a longer period independently of the switching programme, a separate switch is available for this.
Limitation of the boiler temperature	The maximum and minimum setpoints for the boiler temperature can be limited. Various conditions can be selected under which the minimum limitation is valid. A base temperature can be parameterised for the boiler.
Controlling the 2nd burner level	One of the outputs of the EQJW 135 (terminal 8) can be used to activate a 2nd burner level. The conditions under which the 2nd burner level is activated - such as outside temperature, temperature difference, delay time - are parameterised on the SERvice level.
Boiler start-up relief	If the boiler temperature gets too low, the boiler start-up relief is triggered. In the process, the charge is switched off until the boiler temperature is high enough again. The function is (de)activated on the SERvice level.
Maintenance of return temperature	The minimum actual value of T_{RF} can be monitored. If the actual value of T_{RF} falls below the limit, the setpoint for T_F is reduced. The limit value for the actual value of T_{RF} and the influence on the setpoint for T_F is parameterised on the SERvice level.
Optimising the switching times	The optimising 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 performed in a menu if manual mode has been enabled. The manual mode is enabled on the SERvice level. In the factory setting, manual mode is "not enabled".
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) $T_A \geq T_{Rs}$ (when $T_A \leq T_{Rs} - 1$ K, the controller switches on again)
Floor-drying function	Section 4 of EN 1264 describes how cement screeds must be treated with operational heating before putting down floor coverings. Initially, a supply temperature of 25 °C must be maintained for 3 days. After this, the maximum supply temperature must be maintained for a further 4 days. This function has been implemented in the EQJW 135. The function is called up on the SERvice level. An additional function is also available for screed curing.
Switching programmes	3 weekly switching programmes with a maximum of 48 switching commands each and a calendar switching programme with a maximum of 20 switching commands are available. The minimum switching interval is 10 minutes or 1 day. An operating mode from the weekly and calendar switching programmes with lower energy consumption has priority. The calendar switching programme is enabled on the SERvice level. In the factory setting, the calendar switching programme is not enabled. The commands of the calendar switching programme are kept.
Multiplication of T_A	The outside temperature is determined by an EQJW 135 and passed to the other controllers via the device bus as a measured value. The parameterisation for this is performed on the communication level.
Logbook	A logbook is available. Events that occur, e.g. a control offset that is too big or incorrect measured values, are logged.
Modbus communication	You can communicate with the EQJW 135 via an RS 485 interface using the Modbus/RTU protocol. Data can be exchanged. In the process, the EQJW 135 is always used as a slave.
Notification via SMS	A modem is used to send alarm texts as SMS to a mobile phone via a provider. An interface similar to the RS 232 is used for this. The TAP protocol (Telocator Alphanumeric Protocol) is used here.

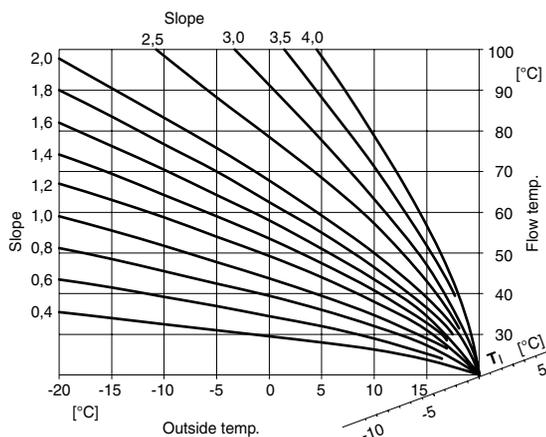
Disposal

When disposing of the product, observe the currently applicable local laws.

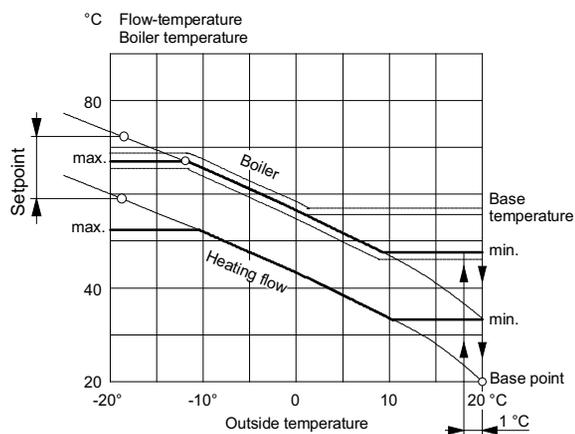
More information on materials can be found in the Declaration on materials and the environment for this product.

Characteristics

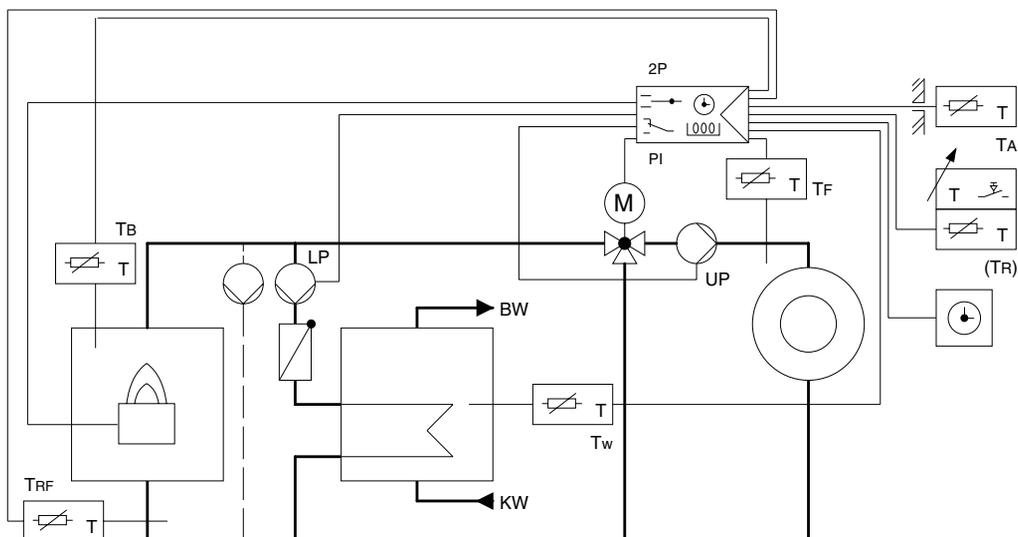
Heating characteristics for foot point $T_I = 20\text{ }^\circ\text{C}$



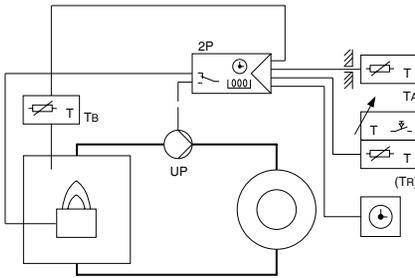
Characteristic for supply and boiler temperatures



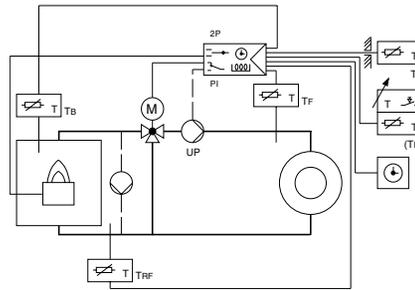
Example applications



Weather-dependent supply-temperature control with precontrolling of the boiler temperature and the domestic-hot-water control

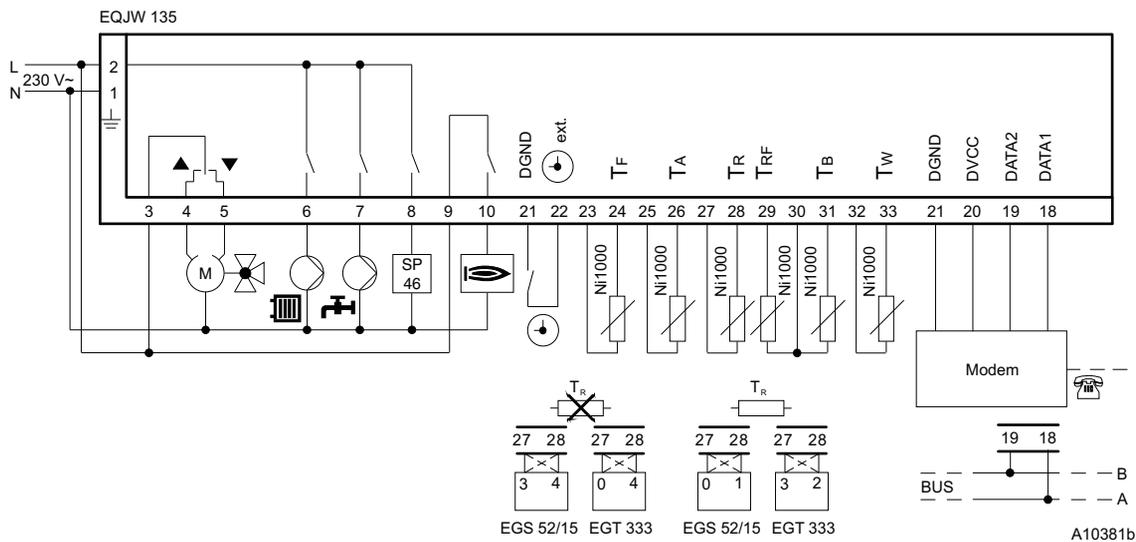


Weather-dependent boiler-temperature control



Weather-dependent PI control of the supply temperature with precontrolling of the boiler temperature

Connection diagram



Dimension drawing

