equitherm®

EQJW 125: Heating controller

User's Manual

7001029003 A

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Symbols used in this manual

Information

Information concerning the use of the product.

Warnings

Factory settings of the EQJW 125 (e.g. control values, switching times etc. specified by the manufacturer)

The operating instructions give a step-by-step explanation of the individual functions of the device, with the help of the following symbols:

'PROG' is shown on the display, flashing

'09:00' is shown on the display, not flashing

〈 .... 〉 Press key...

1 General information

1.1 Introduction

Thank you for purchasing a heating controller from Sauter. The equitherm®
EQJW 125 is a quality product from one of the leading manufacturers of
controls products for heating, ventilation and air-conditioning.

The equitherm® EQJW 125 is a compact weather-compensating heating
controller with switched outputs to control the flow temperature. In automatic
mode, it uses switching commands from the weekly time-switch (weekly
switching programme) to reduce the room temperature during the night
(reduced mode) and switches to the normal temperature during the day. It is
suitable for all types of building. A fixed basic programme (ex-works setting)
ensures simple commissioning. If any adaptation to the heating plant is
required, this is carried out using the SERVice parameters. An automatic
change-over between summer and winter time relieves residents of the need
to correct the time twice a year. The equitherm® EQJW 125 contains various
protective functions such as the anti-frost function and the anti-jamming
function for the pump. Additional functions such as the automatic switch-off
have been implemented. This ensures optimum convenience with the
minimum use of energy for every plant.

Analogue or digital room remote-control units can be connected to the EQJW
125, enabling easy remote operation of the controller from the living room.

The communication interface allows the interconnection of several
controllers, a connection to a control station and alarms on a mobile
telephone via SMS messages.

1.2 Safety information

Particular care is required in order to prevent injuries, fire damage and
damage to equipment. After the device has been installed by a specialist
according to the Installation Instructions (MV505870) which are enclosed with
it, please read these instructions on how to operate it. Local regulations must
be followed during the installation. The controller is not a safety-relevant
component. The anti-frost and anti-overheating functions and the limitation of
the flow temperature do not replace the corresponding safety devices.

2 Description of the controls

2.1 Front view of the EQJW 125

Fig. 1: Front view of the EQJW 125

1 Rotary switch
2 Display
3 ESC button
4 Input knob

The device has a rotary switch with 10 positions, an input knob and a button.

2.2   Rotary switch

The meanings of the switch positions are as follows:

Operating modes: **Inputs:**

Automatic mode according to switching programme

Controller is continuously in normal mode [1]

Controller is continuously in reduced mode

Controller is continuously in back-up mode [2]

Access to manual mode

Setpoint adjustment Normal mode

Setpoint adjustment Reduced mode

Enter weekly and calendar programme

Temperature change with (without) time limit

Access to SERVice and communication level

Fig. 2: Rotary switch of EQJW 125

[1] Normal mode corresponds to nominal mode as per EN 12098-1.

[2] Back-up mode means that the heating is switched off and the anti-frost function is active.

2.3   Input knob
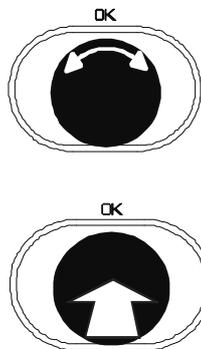
With the help of the input knob, you can scroll through menus or select and change values.

Unless explicitly stated otherwise, you can scroll through menus or change values in the form of a circular structure. There is no 'limit stop' for adjusting values or scrolling.

The input knob has a button function, i.e. it can be pushed. This movement is used to select the parameter that is currently displayed so as to make a change, or to confirm a flashing value, or to access a subordinate menu level.

2.4   ESC button

You can use the ESC button to cancel procedures or to return from a subordinate menu item to the next level up.

2.5 Display

The device has an LC-Display (siehe 2) which can show various items of information at the same time. The next illustration shows what the symbols mean:

Symbol	Description
0 1 2 3 4 5 6 7 8.........21 22 23 24	Times for normal mode on the current day
8:8 8:8.8	Time, date, setpoints, actual values, etc.
⏲	Automatic mode according to the weekly and calendar switching program; flashing: (un)limited temp. change
☼	Controller is operating in normal mode
☾	Controller is operating in reduced mode
❄	Controller is operating in back-up mode; flashing: anti-frost function is active
‖	An error has occurred (faulty sensor)
⊘	Heating medium pump is switched on
⊠	Final control element is open (▲) or closed (▼)
🌡	Display of setpoint temperature; flashing: display of actual temperature
→▥	Display of flow temperature
⌂←	Display of outdoor temperature
⌂→	Display of room temperature
‿	Controller is in summer mode
☀	Calendar switching programme is currently active
Error	An error has occurred (see Section 7)
⌂	Funktion Floor-drying (operational heating) is active

3 Commissioning

3.1 Operating the device for the first time

When you operate the equitherm® EQJW 125 for the first time, you have to set the date and time. The controller is then basically ready to use. However, depending on the particular application, it may be necessary to change more settings after this.

3.1.1 Setting the time
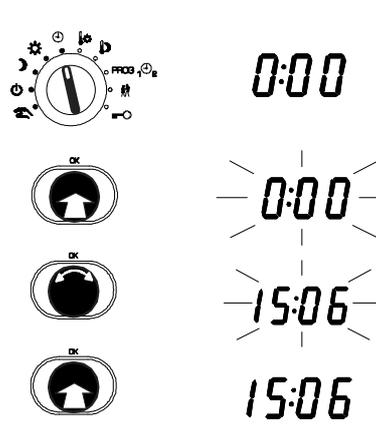
1. Set the rotary switch to automatic mode;
   - the time is shown

2. Press the input knob;
   - the time flashes

3. Turn the input knob;
   - the time is set

4. Press the input knob again;
   - the new time is confirmed

3.1.2 Setting the date
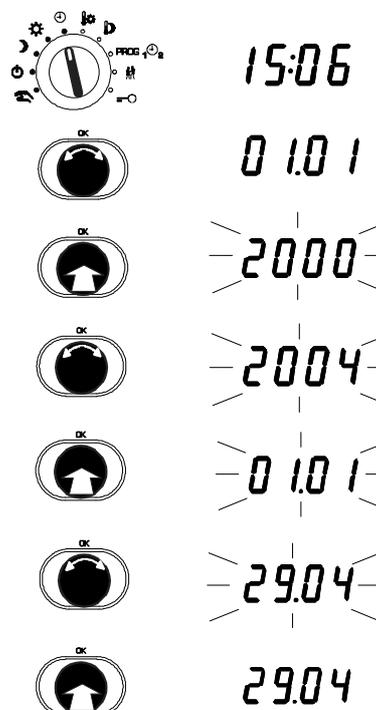
1. Set the rotary switch to automatic mode;
   - the time is shown

2. Turn the input knob until the date is shown
   - (day/month and year are shown alternately)

3. Press the input knob;
   - the number of the year flashes ...

4. Turn the input knob;
   - year is changed

5. Press the input knob;
   - year is confirmed and day/month are shown

6. Turn the input knob;
   - the date is changed

7. Push the input knob;
   - new date is confirmed

3.2 SERVice mode

In SERVice mode, a specialist can adapt the basic settings of the EQJW 125 to the plant so as to meet specific requirements. On this subject, also note the Installation Instructions (MV 505870) enclosed with the EQJW 125.

⚠ **CAUTION!**

Incorrect parameterisation (setting) of the heating controller

It can cause major faults on the plant or injuries to people and damage to the plant.

▶ SERVice mode must only be enabled by a specialist

Some of the parameters cannot be changed - they can only be viewed (version number, status information).

3.2.1 Accessing SERVice mode

	$5E$	1. Set the rotary switch to the Service position
	0000	2. Push the input knob
	0123	3. Turn the input knob, • display the code
	$5P\ 01$	4. Push the input knob; • the first SERVice parameter is shown

3.2.2 Viewing SERVice parameters

	$5P\ 16$	1. Turn the input knob;
	$75.0\ °C$	2. Select the SERVice parameter that you want
ESC	$5P\ 16$	3. Push the input knob; • the value for the parameter is shown

ℹ To leave the value unchanged, exit from the display by pushing ESC.

3.2.3   Changing SERVice parameters

ℹ️   Push the ESC button to cancel the procedure. The value is not accepted unless it has already been confirmed.

$SP\ 16$ 1. Turn the input knob;

75.0 °C   2. Select the SERVice parameter that you want
3. Push the input knob;
   • the value for the parameter is shown

68.0 °C   4. Turn the input knob;
   • the value for the parameter is changed

$SP\ 16$ 5. Push the input knob;
   • the new value is confirmed

3.2.4   List of SERVice parameters

Parameter	🏭	Description	Range	Step value
SP01		Software version Y.XX (read only)		
SP02		Device status (error coding, read only)	0…1031	1
SP04	0	Software reset ▪ 0 = no reset ▪ 1 = default SE + CO parameters ▪ 2 = default switching commands ▪ 3 = default SE + CO parameters + switching commands	0…3	1
SP05	0	Manual mode ▪ 0 = manual mode not enabled ▪ 1 = manual mode enabled	0...1	1
SP06	3	Output signal / control model ▪ 2 = PWM output ▪ 3 = 3-pt output	2...3	1
SP07	0	Room temperature connection ▪ 0 = no room temperature detection ▪ 1 = connection of NI1000 room sensor ▪ 2 = Connection for EGS 52/15 or EGT 333 with room sensor ▪ 3 = Connection for EGS 52/15 or EGT 333 w/o room sensor	0...3	1

Parameter		Description	Range	Step value
SP08	0	▪ 0 = not enabled ▪ 1 = active when $T_{RI} > T_{Rs}$ ▪ 2 = active when $T_{RI} < T_{Rs}$ ▪ 3 = active when $T_{RI} <> T_{Rs}$	0...1	1
SP09	20	Scanning time for room temperature if connected, in minutes	1...100	1
SP10	0	Room temperature correction in K	−6.0...6.0	0.1
SP11	0	Outdoor temperature correction in K	−9.9...9.9	0.1
SP12	40	Proportional band PI controller in K	2...100	1K
SP13	240	Reset time PI controller in sec	5...1000	5
SP14	120	Valve run-time in sec	30...960	15
SP15	5	Minimum limit for flow temperature in °C	5...100	1K
SP16	75	Maximum limit for flow temperature in °C	20°C...130	1K
SP17	1.4	Slope of heating curve	0.0...5.0	0.1
SP18	15	Heating limit / [°C]	0...39	1
SP19	−16	Design temperature / [°C]	−50...0	1
SP20	1	Anti-frost function ▪ 0 = not enabled ▪ 1 = enabled	0...1	1
SP21	0	Anti-jamming function for the pump 0...1 ▪ 0 = not enabled ▪ 1 = enabled		1
SP22	0	Calendar programme 0...1 ▪ 0 = not enabled ▪ 1 = enabled		1
SP23	25.10	Summer/wintertime change-over	01.01...31.12	
SP24	25.03	Winter/summertime change-over ▪ P23 = P24 means no summer/winter time change-over	01.01...31.12	
SP60	0	Floor drying ▪ 0 = not enabled ▪ 7d = functional heating ▪ 25°C = ready for laying ▪ 8 = malfunction ▪ 9 = successfully completed	0;7d; 25°C; 8;9	0;7d; 25°C; 8;9

Tab. 1: SERVice parameters

3.2.5 Explanations of SERVice parameters

SP01
Show software version
The number of the controller's software version is displayed.

SP02
Display device status
SERVice parameter 2 is used to read the device status of the EQJW 125. A value of 0 means that the EQJW 125 is operating without any faults. The coding for faults is shown in Section 6.1.1. Once the fault has been rectified, the value for the SERVice parameter is reset automatically.

ℹ This coded description of errors is primarily used for fault signalling via bus, modem or SMS. You can easily read faults directly on the controller in the ERROR display (Section 6.1).

SP04
Software reset
Switching commands and / or SERVice/communication parameters are reset to the ex-works setting. To do this, the value of the SERVice parameter has to be changed and confirmed. The EQJW 125 then performs the relevant reset and assigns value 0 to the parameter.

SP05
Manual mode
SERVice parameter P05 is used to disable or enable manual mode. If the value of the parameter is 0, manual mode is disabled.

SP06
Output signal / control model
This parameter is used to select the control signal for the final control element. You can choose between a signal for 3-point control and a PWM output (Pulse – Pause) with a fixed period of 64 seconds. If the PWM signal is used, the signal is available on terminal 4.

⚠ **CAUTION!** When the PWM output is used, the functions for limitation of the flow temperature are no longer effective.

SP07
Room temperature detection
Various types of room temperature sensor can be connected:-

- 0 = no room temperature detection
- 1 = connection of room sensor NI1000
- 2 = Connection for EGS 52/15 or EGT 333 with room sensor
- 3 = Connection for EGS 52/15 or EGT 333 without room sensor

Using the EGS 52/15 room operating unit, it is possible to change the controller's operating mode remotely. Moreover, the EDB 100 room operating unit can be connected via the device bus and can be used to change the operating mode. The operating mode on the EQJW 125 can also be changed via a control station using Modbus. In the event of contradictory commands, the following priorities apply: (i) the settings on the EQJW 125 itself have priority 1; (ii) the settings via the EDB 100 room operating unit via the device

bus or a setting via the Modbus have priority 2; (iii) the settings via the binary input have priority 3. The settings on the EGS 52/15 room operating unit have the lowest priority. If the setpoint for the room temperature is altered via the setpoint adjuster of the EGS 52/15 or EGT 333 room operating unit, this causes a change in the actual value for the room temperature at the sensor input of the EQJW 125. This adjusts the flow temperature and, therefore, the heating output for the room.

SP08   Room temperature connection
A room temperature sensor (resistance sensor Ni1000 or device bus) is a requirement for this function. The flow temperature is changed, in divergence from the setpoint according to the heating characteristic, if the room temperature in the reference room diverges from the room setpoint. The change in the flow temperature is limited to a maximum of ± 30K.

SP09   Scanning time for room temperature if connected
When the room temperature connection is active, this SERVice parameter can be used to set a period within which the flow setpoint may be altered once only. A higher value is better for unresponsive buildings and heating systems than for light construction types with responsive heating systems. This period should not be too short, otherwise the control system may hunt. The algorithm prevents hunting by changing the flow setpoint more quickly (at a rate of ± 2 K within a scanning period) when the deviation of the room temperature is diminishing than when it is increasing (at a rate of ± 1 K within a scanning period). If the deviation of the room temperature is less than 0.25 K, the flow setpoint is not altered. In most cases, the factory setting (20 minutes) provides satisfactory results for residential buildings.

Open windows or other cooling or heating loads may have an effect on controllability. If these influences suddenly cease, the room temperature may briefly be exceeded or undercut in the opposite direction.

SP10   Correction of room temperature
The measured value for the room temperature is adjusted with the help of this parameter. The value that is entered is added to the measured value for the room temperature.

SP11   Correction of outdoor temperature
The measured value for the outdoor temperature is adjusted with the help of this parameter. The value that is entered is added to the measured value for the outdoor temperature.

SP12   Proportional band
SERVice parameter 12 sets the proportional band (X_P) of the PI control for the flow temperature in K.

SP13   Integral action time
SERVice parameter 13 determines the integral action time (T_N) of the PI control for the flow temperature in seconds.

SP14

Valve run-time

Valves with a motorised actuator need a certain time (known as the valve run-time) to open or close completely. This SERVice parameter is used to set the equitherm® EQJW 125 to the run-time for the valve drive that is being used. Optimal control quality and various protective functions are only ensured if the valve run-time is set correctly.

SP15, SP16

Minimum and maximum limits for flow temperature

The setpoint flow temperature can be limited. The value of SERVice parameter SP15 sets the lower limit in this case, and the value of SERVice parameter SP16 sets the upper limit. Parameters SP15 and SP16 specify a maximum and minimum flow temperature.

SP17

Slope of heating characteristic

The flow temperature is controlled according to the outdoor temperature. The heating characteristic in the controller determines the setpoint for the flow temperature in relation to a given outdoor temperature.
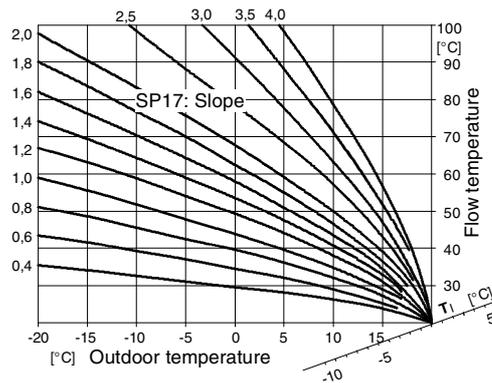
Fig. 3: Guideline for the slope of the heating characteristic:

1,4   for hot water radiator heaters ( )

1,0   for low temperature heaters

0,6   for floor heaters

SP18

Heating limit

If the averaged outdoor temperature is higher than the heating limit, heating operation is stopped. As soon as the value falls back below the heating limit, heating operation is resumed. To avoid frequent status changes, a hysteresis of 1K is taken into account in both cases.

The outdoor temperature required for control purposes can either be measured with an outdoor temperature sensor or can be received via a connected device bus. The measured outdoor temperature is averaged over 21 hours for the heating limit function in order to reduce the influence of brief fluctuations.

SP19   Design temperature
If the current outdoor temperature is less than the design temperature, the
EQJW 125 heating controller will no longer switch to reduced operating mode
but will remain in normal operating mode.

SP20   Anti-frost
The anti-frost function becomes active if the outdoor temperature falls below
the anti-frost limit (= +3°C). If the outdoor temperature rises above 4°C again,
the function is ended. The flashing ❄ symbol indicates that the anti-frost
function is active. It forces the circulating pump for the heating circuit to
switch on. The setpoint for the flow temperature of the heating circuit is set at
+10°C unless it is already higher. In addition, regardless of the outdoor
temperature, temperature T_F (flow sensor) is monitored to a limit value of
5°C. If SP20=0, the function can be disabled and the controller will no longer
offer an anti-frost function in this case!

SP21   Anti-jamming function for the pump
If this function is enabled, a daily check is carried out (at 0.00 hours) to
determine whether the pump was operated in the last 24 hours. If not, it is
operated for one minute to prevent jamming.

SP22   Calendar switching programme
This SERVice parameter is used to either enable or disable the calendar
switching programme. Only when the calendar switching programme is
enabled can calendar switching commands be entered. If the parameter has
a value of 1, the calendar switching programme is enabled; if it has a value of
0, it is disabled. The factory setting for this parameter is 1.

SP23, P24   Summer/winter or winter/summer time-change
Thanks to the calendar time-switch integrated into the equitherm® EQJW 125,
the winter/summer time-change and the summer/winter time-change are
carried out automatically. The date for the change-over is specified by the
value for SERVice parameters SP23 and SP24. A value of 16.2 corresponds to
16th February. If the date entered is a Sunday, the change-over takes place on
the same day. Otherwise, the change-over is performed on the following
Sunday. For the summer/winter time-change, the time is put back from 03:00
hours to 02:00 hours. The winter/summer time-change takes place at 02:00
hours. The time is put forward to 3:00 hours. If SERVice parameters SP23 and
SP24 have the same values, no summer/winter time-change is performed.

SP60   Floor-drying function

The EQJW 125 has two floor-drying functions:

1. Operational heating as per EN 1264, Part 4
   EN 1264, Part 4 describes how cement floors should be treated
   during operational heating before the floor covering is laid. This
   entails, first of all, maintaining an inlet temperature of 25°C for 3 days.
   Thereafter, the maximum inlet temperature should be maintained for
   four more days, i.e a total of 7 days = 7d. The controller then works in
   normal heating mode in accordance with the chosen settings.

2. Screed curing
   Screed curing starts with a flow-temperature setpoint of 25°C. This
   setpoint is gradually increased – by 5 K a day – until the maximum
   flow temperature is reached. The maximum flow temperature is
   maintained for 7 days. The setpoint for the flow temperature is then
   reduced by 5 K every day until 25°C is reached. The function is then
   finished and the controller returns to normal heating mode in
   accordance with the chosen settings.

Both functions are called up using SERVice parameter SP60.

1. To perform floor drying in accordance with EN1264 Part 4, the value
   7d should be assigned to the parameter.

2. To perform screed curing, a value of **25°C** should be assigned to the
   parameter.

The EQJW 125 should be adapted to the installation before the floor-drying
function is activated. In particular, SERVice parameter SP19 (maximum flow
temperature) should be set first of all to a suitable value for both the floor and
the heating circuit.

When the floor-drying function is active, the 'house' symbol flashes. An
additional value appears in the display. In the case of operational heating, the
remaining time is shown as follows:

▪ 7d = 7 days (at the start), the value counts down to

▪ 1d = 1 day

In the case of screed curing, the current phase is shown:

▪ 1 = Initialisation,

▪ 2 = Temperature build-up phase,

▪ 3 = Temperature maintenance phase,

▪ 4 = Temperature reduction phase

When the floor-drying function has been successfully completed, the figure 9
appears. If the floor-drying function was interrupted (due to a sensor failure or
high control deviation over a long period etc.), 8 is displayed (instead of 9) as
the error message.

In the case of operational heating in accordance with EN 1264, Part 4, deviation of more than 3 K for more than ten minutes is considered to be too high. In the case of screed curing, deviation of more than 5 K for more than 30 minutes is considered to be a malfunction. Values 8 and 9 can be read only; they cannot be assigned to the SERVice parameter. After the floor-drying has finished, the EQJW 125 runs in accordance with the switch position and the switching commands. Floor-drying can be aborted by setting parameter SP60 to 0. In the event of a power failure, the floor-drying function is interrupted. When power is restored, the drying procedure automatically re-starts from the beginning.

3.3 Communication mode

In communication mode, a specialist can enable and configure the communication functions of the EQJW 125.

Incorrect parameterisation (setting) of the heating controller

It can cause major faults or damage to the plant.

▶ Communication mode must only be enabled by a specialist

3.3.1 Access to communication mode

SE	1.	Set rotary switch to Service position.
CO	2.	Turn the input knob.
	3.	Select 'CO' (COmmunication).
0000	4.	Push the input knob.
0123	5.	Turn the input knob.
	6.	Show the code.
CP 01	7.	Push the input knob.
	•	The first communication parameter is shown.

3.3.2   Viewing the communication parameters

$$\begin{array}{l} \text{[P 0 3]} \end{array}$$

19200
BAUD

[P 03]

1. Turn the input knob.
2. Select the communications parameter you want.
3. Push the input knob.
   • The value for the parameter is shown

To leave the value unchanged, push ESC to exit from the display

3.3.3   Changing communication parameters

[P 03]

19200
BAUD

9600
BAUD

[P 03]

1. Turn the input knob.
2. Select the communications parameter you want.
3. Push the input knob.
   • The value of the parameter is shown.
4. Turn the input knob.
   • The value of the parameter is changed.
5. Push the input knob.
   • The new value is confirmed.

Push the ESC button to cancel the procedure. The value will not be accepted unless it has already been confirmed.

3.3.4 List of communication parameters

Parameter	⌁	Description	Range	Step Value
CP01		Serial number of EQJW 125 (read only)		–
CP02	2	Type of communication ▪ 0 = no communication ▪ 1 = device bus ▪ 2 = MOD bus via RS485 ▪ 3 = MOD bus via modem ▪ 4 = SMS via modem ▪ 5 = MOD bus and SMS via modem	0…4	1
CP03	19200	Baud rate	9600, 19200	–
CP04	–	*Device bus:* address EQJW 125	1…32, auto	1
CP05	–	*MOD bus via RS485:* address EQJW 125	1…247	1
CP06	–	*MOD bus via modem:* phone number of the control station	–	1
CP07	–	*SMS via modem:* telephone number of the provider (TAP protocol)	–	1
CP08	–	*SMS via modem:* telephone number of the mobile phone	–	1
CP09	1	*Device bus:* time synchronisation ▪ 0 = not enabled; 1 = enabled	0…1	1
CP10	0	*Device bus:* send outdoor temperature ▪ 0 = not enabled; 1 = enabled	0…1	1
CP11	0	*Device bus:* receive outdoor temperature ▪ 0 = not enabled; 1 = enabled	0…1	1
CP12	0	*Device bus:* send heat requirement (TF) ▪ 0 = not enabled; 1 = enabled	0…1	1
CP13	0	*Device bus:* receive heat requirement (TF) ▪ 0 = not enabled; 1 = enabled	0…1	1
CP14	0	*Device bus:* send error ▪ 0 = not enabled; 1 = enabled	0…1	1
CP15	0	*Device bus:* EDB 100 digital room operating unit ▪ 0 = EDB 100 not connected, ▪ 1 = EDB 100 connected	0…1	
CP16	–	*Device bus:* address of EDB 100 room operating unit	auto, 2…32	1

Parameter	🏭	Description	Range	Step Value
CP17	–	*SMS or MOD bus via modem:* automatic configuration of modem ▪ 0 = not enabled; 1 = enabled	0…1	1
CP18	5	*SMS or MOD BUS via modem:* dialling pause in minutes	0...255	1
CP19	5	*SMS or MOD BUS via modem:* time-out in minutes	1…255	1
CP20	5	*SMS or MOD bus via modem:* number of dialling attempts	1…255	1
CP21	0	*SMS or MOD bus via modem:* send message even if error is rectified ▪ 0 = not enabled; 1 = enabled	0…1	1
CP22	0	*SMS via modem:* select language for error message ▪ 0 = German; ▪ 1 = French; ▪ 2 = English; ▪ 3 = Italian; ▪ 4 = Spanish	0…4	1
CP23	0	*MOD bus via modem:* disable dialling control station in case of fault ▪ 0 = not enabled; 1 = enabled	0…1	1
CP24	0	*MOD bus via RS485 or MOD bus via modem:* control station commands expire after control station is inactive for 30 minutes ▪ 0 = not enabled; 1 = enabled	0…1	1

Tab. 2: Communication parameters

3.3.5 Explanations of communication parameters

CP 01

Serial number
The serial number of the controller can be shown.

CP02

Type of communication
The type of communication can be set. You can choose from these options:
- 0 = no communication
- 1 = device bus
- 2 = MOD bus via RS485
- 3 = MOD bus via modem
- 4 = SMS via modem
- 5 = MOD bus and SMS via modem

CP03   Baud rate (BAUD)
Transmission speed between BMS and controller or (for modem operation) transmission speed between controller and modem. Must match the Baud rate of the BMS.

CP04   Device bus address
This is used for the unique identification of the controller on the device bus. Each address must be assigned only once, and a device in the controller grouping must have address 1.

CP05   Modbus address
This address is used to identify the controllers for RS485 or modem operation. Each address must occur only once within a system.

CP06   Modbus via modem: phone number of the control station
The telephone number of the BMS modem must be entered here, including the dialling code or (for example) a 0 for extension systems. Short pauses between the digits can be entered with P (= 1 second), and the end of the number is identified by '–'. The phone number can comprise a maximum of 22 digits (including pauses).

CP07   SMS via modem: telephone number of the provider
The telephone number for the provider's SMS forwarding service must be entered here, including the dialling code or (for example) a 0 for extension systems. Short pauses between the digits can be entered with P (= 1 second), and the end of the number is identified by '–'. The phone number can comprise a maximum of 22 digits (including pauses). When selecting the provider, make sure that TAP (Telocator Alphanumeric Protocol) is used.

CP08   SMS via modem: telephone number of the mobile phone
The telephone number of the mobile phone must be entered here, including the complete dialling code (e.g. 00 41 ...). The phone number can comprise a maximum of 22 digits.

CP09   Device bus: time synchronisation
If CP 09 is set to 1, this controller sends time information on the device bus every 24 hours. All devices with CP 09 set to 0 will evaluate this information and set their clocks accordingly. Within a controller grouping, this function should only be active on one controller, whose time will then be set on each of the other controllers.

CP10   Device bus: send outdoor temperature
If CP 10 is set to 1, this controller sends the current outdoor temperature on the device bus.

CP11	Device bus: receive outdoor temperature
	If CP 11 is set to 1, the controller receives the outdoor temperature information from the device bus and uses it instead of a measured value of its own.

CP12	Device bus: send heat requirement
	If CP 12 is set to 1, this controller sends its current flow temperature (TF) setpoint on the device bus.

CP13	Device bus: receive heat requirement
	If CP 13 is set to 1, the controller receives flow temperature requirement requests from the device bus. The mixer is then controlled to this temperature as a minimum.

CP14	Device bus: send error
	If CP 14 is set to 1, the controller sends its current error status on the device bus in the event of an error.

CP15	Device bus: EDB 100 room operating unit
	If an EDB 100 room operating unit is to be used, CP15 should be set to 1.

ⓘ If an EDB 100 digital room operating unit is used, the actual value for the room temperature is evaluated by the EDB 100. The measured values of other room operating units or room sensors (see SP07) are ignored.

CP16	Device bus: address of EDB 100 room operating unit
	The address of the EDB 100 room operating unit assigned to the controller should be set at CP16.

CP17	SMS or Modbus via modem: automatic configuration
	If the type of communication is set, via parameter CP02, so that a modem is being used, a value of 1 is automatically assigned to parameter CP17. Otherwise, CP17 has a value of 0 ex factory. If parameter CP17 has a value of 1, the connected modem is configured automatically.

CP18	SMS or Modbus via modem: modem dialling pause
	Time between two dialling attempts. A pause of several minutes must be observed between calls so that the telecoms network is not continuously under pressure.

CP19	SMS or Modbus via modem: modem time-out
	In case of a connection via modem, the connection is terminated by the controller if no data exchange has taken place after this time has elapsed.

CP20   SMS or Modbus via modem: number of dialling attempts
The dialling attempts via modem to the provider or the control station are repeated, observing the dialling pause (CP18), if the line is busy or if it is impossible to make a connection for any other reason. When the number of dialling attempts set at CP 20 is reached, however, no further attempts are made at first and the modem status is shown as 'OFF'. The dialling attempts counter is automatically reset at 12:00 hours and then the dialling attempts to the BMS are made again.

CP21   SMS or Modbus via modem: send message even if error is rectified
If CP21 is set to 1, dialling will also take place if the fault has been rectified and the controller is operating without faults again.

CP22   SMS via modem: language for error messages
This parameter is used to select the language that is used to send an SMS. The numbers have the following meanings:
0 = German; 1 = French; 2 = English; 3 = Italian; 4 = Spanish

CP23   Modbus via modem: disable fault dialling
If CP23 is set to 1, there are no dialling attempts via modem to the BMS if a fault occurs.

CP24   Modbus via RS485 or Modbus via modem: control station commands expire after the control station has been inactive for 30 minutes
When CP24 = 1: if the controller is no longer receiving any Modbus enquiries, operating statuses specified via Modbus become invalid after 30 minutes and the controller operates independently of the control station again. If CP24 = 0, the operating statuses continue to have unlimited validity even beyond these 30 minutes.

4   Operation

4.1   Operating modes

The five positions of the rotary switch on the left (see 2) enable you to select one of the following modes:

Manual mode – outputs for pump and valve can be controlled manually[1])

Off mode – heating is switched off, anti-frost monitoring is active

Reduced mode – reduced room temperature (night temperature)

Normal mode[2]– normal room temperature (day temperature)

Automatic mode– controller changes the mode automatically, according to the weekly and calendar programmes that have been set. Automatic mode should be selected in normal cases.

The positions of the rotary switch on the right-hand side allow you to change the device settings. In these positions, the controller operates in automatic mode.

- Setpoint adjustment - normal mode (day)
- Setpoint adjustment - reduced mode (night)
- Enter switching programme
- Limited temperature change
- Service level and communication parameters; contains all the other parameters (heating characteristic, control parameters, communication settings, etc.)

4.1.1   Display in automatic mode

ESC

▶ Press the ESC button once to go directly to the time display.

You can also turn the knob in the opposite direction to scroll backwards through the displays. In special cases, more displays can be added to the display loop, e.g.

- the $Error$ display (see section 7) can be added in case of a fault,
- a display of the connection status can be added for modem operation.

---

[1] This is mainly needed for commissioning or in case of faults on the plant.

[2] Normal mode corresponds to nominal mode as per EN12098-1.

1. After you select the switch position, the current time is shown. The current operating status (here: sun for normal mode = daytime operation) and the current status of the outputs are shown on the lower margin of the display in this case (not illustrated here, see Section 2.5).

2. Turn the input knob clockwise to show the date. The numbers of the month/day and year alternate continuously in the display.

3. Turn the knob clockwise again to see the room setpoint temperature (only if a room sensor is present),

   the current actual value for the room temperature (only if a room sensor is present),

   the flow setpoint (not available in OFF mode or summer mode, for example),

   the current actual value for the flow temperature,

   and the outdoor temperature that is currently measured.

4. Turn the knob further in a clockwise direction to display the time again.

4.1.2 Display when OFF mode, reduced mode and normal mode are set

▶ Press the ESC button once to go directly to the time display.

You can also turn the knob in the opposite direction to scroll backwards through the displays. In special cases, more displays can be added to the display loop, e.g.

- the *Error* display (see section 7) can be added in case of a fault,
- a display of the connection status can be added for modem operation.

1. After you select the switch position, the current time is shown. The current operating status (here: sun for normal mode = daytime operation) and the current status of the outputs are shown on the lower margin of the display in this case (not illustrated here, see Section 2.5.)

2. Turn the input knob clockwise to show the room setpoint temperature (only if a room sensor is present),

then the current actual value for the room temperature (only if a room sensor is present),

the flow setpoint (not available in OFF mode or summer mode, for example),

the current actual value for the flow temperature,

and the outdoor temperature that is currently measured.

3. Turn the knob further in a clockwise direction to display the time again.

4.2 Entering the setpoint temperature in normal mode

▶ Press the ESC button once **before** confirming to cancel the input; the old value is retained.

1. After you select the switch position, the current room setpoint temperature for normal operation is shown.

2. Push the input knob and the numerical value will flash...

…and you can now change it by turning it upwards or downwards (step value: 0.1°C).

3. Push the input knob again to confirm the changed numerical value.

4.3 Entering the setpoint temperature in reduced mode

▶ Press the ESC button once **before** confirming to cancel the input; the old value is retained.

1. After you select the switch position, the current room setpoint temperature for reduced mode is shown.

2. Push the input knob and the numerical value will flash...

...and you can now change it by turning it upwards or downwards (step value: 0.1°C).
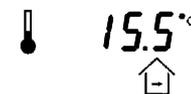
3. Push the input knob again to confirm the changed numerical value.

4.4 Weekly switching programme

The weekly switching programme repeats itself every week. It comprises a maximum of 48 switching commands (6 for each day and another 6 for the whole week) with the associated operating modes which can be entered in a 10-minute grid. The switching commands can be modified individually and they are captive. A switching command may be valid every day (1-7) or on a specified day of the week (Mon = 1, Tue = 2, etc.). If a switching command is present on a certain day of the week (Mon, Tue, etc) the daily switching command (1-7) is not valid on that day. An 'empty' switching programme is interpreted as a switching programme in normal mode.

The ex-works setting for the weekly programme is:

Day	Time	Mode
Daily	06:00	Normal mode
Daily	22:00	Reduced mode

You are recommended to note any change to the weekly switching programme in the relevant table in Section 14.

4.4.1 Calling up the weekly switching programme

4. Set the rotary switch to PROG.

5. Push the input knob.
   - The weekly programme is selected.

6. Turn the input knob.

7. Select the day of the week.

   (1 = Monday, 2 = Tuesday, ..., 1 - 7 = daily).
   5 = Friday has been selected here.

8. Push the input knob.
   - The first switching command for this day (or for the whole week) is shown.

4.4.2 Viewing switching commands
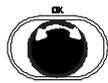
▶ Turn the input knob; the individual switching commands are shown.
   - An empty switching command is shown as '_ _ _ _'.

4.4.3 Entering a switching command

1. Turn the input knob until you reach the next empty switching command.

2. Push the input knob.
   - The new switching command is shown.
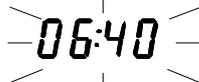
3. Turn the input knob.
   - The time for the switching command is changed.

4. Push the input knob.
   - The time for the switching command is confirmed.

5. Turn the input knob.

6. Select the mode for the switching command.

7. Push the input knob.
   - The mode is confirmed.

4.4.4 Changing and deleting a switching command

Show the switching command as described in the Section on 'View switching commands',

e.g.:

☼ *00:00*

SEt

1. Push the input knob.
   - The switching command is called up.

Clr

2. Turn the input knob.
3. Choose whether you want to delete the switching command (Clr) or change it (SEt).

4. Push the input knob.
   - Your selection is confirmed. If the switching command was deleted, the next switching command is shown.

00:00

06:40

5. For a change, the rest of the procedure is as described in the Section on 'Entering a switching command '.

   ... etc.

4.5 Calendar switching programme

4.5.1 Calling up the calendar switching programme

Before you can work with the calendar programme, it has to be enabled in SERVice mode (see Section 3.3). The calendar programme can influence automatic mode over longer periods, in addition to the weekly programme. The calendar switching programme specifies the dates of periods (e.g. for holidays) when the weekly switching programme is only enabled up to a defined mode. A maximum of 20 switching commands (10 periods) comprising the date and mode are available for this purpose; these can be entered in the day grid. An 'empty' switching programme is interpreted as a switching programme in normal mode. The switching commands are captive. You are recommended to note any change to the calendar switching programme in the relevant table in Section 14. No commands are entered in the calendar switching programme in the ex-works setting.
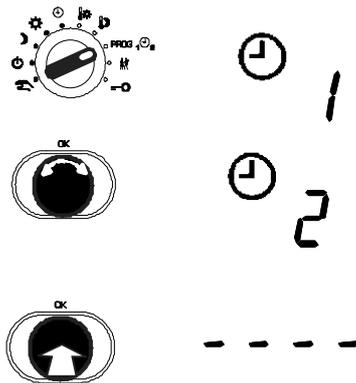
1. Set the rotary switch to PROG.

2. Turn the input knob to go to the calendar programme.

3. Push the input knob; this selects the calendar programme.

   - You see '_ _ _ _' or the first switching command if one is present.

4.5.2 Viewing switching commands

▶ Turn the input knob; the individual switching commands are shown, if any are present.

   - An empty switching command is shown as '_ _ _ _'.

4.5.3 Entering a switching command
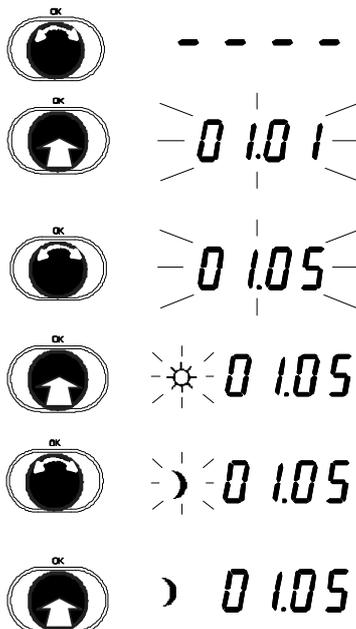
1. Turn the input knob until you reach the next empty switching command.

2. Push the input knob.

   - The new switching command is shown.

3. Turn the input knob.

   - The date for the switching command is changed.

4. Push the input knob.

   - The date for the switching command is confirmed.

5. Turn the input knob.

6. Select the mode for the switching command.

7. Push the input knob.

   - The mode is confirmed.

4.5.4 Changing and deleting a switching command

Show the switching command as described in the Section on 'Viewing switching commands',

e.g.: ❭ *01.05*
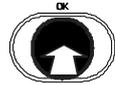
1. Push the input knob.
   - The switching command is called up.

2. Turn the input knob.

SEt

3. Choose whether you want to delete the switching command (Clr) or change it (SEt).

Clr

4. Push the input knob; your selection is confirmed.
   - If the switching command was deleted, the next switching command is shown, or '_ _ _ _' if there are no more switching commands.

– – – –

5. For a change (SEt), the rest of the procedure is as described in the Section on 'Entering a switching command'.

4.6 Temporary temperature change

t
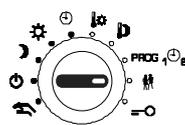
1. Set the rotary switch to the party symbol.

3h

2. Turn the input knob; set the duration for the temperature change
   (h = hours, d = days, t = until the next switching command, minimum 2 h).

3. Push the input knob.
   - The duration is confirmed.

☀

4. Turn the input knob; select the mode
   (☀, ☾ or ❄).

☾

5. Push the input knob.

2h

6. Confirm the mode.

While the time is running down, the remaining time is shown in days, hours or minutes. After the temporary temperature change has finished, the heating circuit is again controlled in accordance with the automatic mode.

ℹ Use the ESC button or set the rotary switch to another position to cancel the temporary temperature change function.

5 Manual mode

In manual mode, you can control the plant by hand during installation or in case of a fault. No regulating takes place in manual mode. The pump is switched on or off. The valve is opened and closed according to the specified values. Before you can work in manual mode, this mode has to be enabled in SERVice mode (see Section 3.2).

When the switch position is selected, the mixer initially retains its current position and the heating circulation pump is switched on. The current statuses of the controller outputs (pump on, mixer open, mixer closed) are shown on the lower margin of the display, as usual (see Section 2).

5.1 Access to manual mode

POS 1   ▶ Set the rotary switch to manual mode

5.2 Set valve position

<div>

0

1. Push the input knob.
2. I.e. select the 'Open final control element' option on the menu.
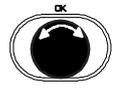
30

3. Turn the input knob.
   • Value for percentage opening of the final control element.

POS 1

4. Push the input knob.
5. Confirm the value.

</div>

5.3 Set status of pump (on/off) for manual operation

UP 1

1. Turn the input knob.
2. Select the 'Heating medium pump output' option on the menu.

0

3. Push the input knob.
4. Select the menu option.

1

5. Turn the input knob.
6. specify pump output
   (0 = pump off, 1 = pump on).

UP 1

7. Push the input knob.
   • The setting is accepted.

5.4 Ending manual mode

Manual mode is ended as soon as you turn the rotary switch to another position.

5.5 Checking measured values in manual mode

InFo
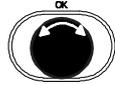
1. Turn the input knob until the 'INFO' menu option appears on the display.

2. Push the input knob.

15:06

3. Select the 'INFO' menu option.

4. Turn the input knob; the individual values are shown. The display loop is the same as for the 'automatic mode' switch position.

...

5. Push the 'ESC' button.

InFo

6. Exit from the 'INFO' menu option.

6 Communication functions

The EQJW 125 has a communication interface which can be used for the device bus or alternatively for Modbus communication – also via modem. In addition, fault messages can be sent by modem to a mobile phone as SMS messages.

6.1 Bus wiring

When constructing communication networks, the rules for RS-485 bus systems must be observed, in particular:

- Maximum length of a bus segment: 1200 m
- Maximum number of devices per segment: 32
- Allow for a terminal resistance (120 Ohm) at end of cable
- Use twisted-pair, screened cable
- Stub lines over 3 m in length are not permissible
- In accordance with standard procedures, screening should be made flat at both ends and connected with low resistivity to earth
- External measures to protect against lightning and excess voltage should be provided when wired across house limits
- On the EQJW 125, it is not necessary to adhere to a certain polarity (A or A/B).

6.2 Device bus

The device bus makes it possible to interconnect as many as 32 devices with little effort. It is primarily used to transmit measured temperature values (outdoor temperature and room temperature) and commands (mode change-over). Connecting the devices requires only two wires which are attached to the terminals regardless of polarity – to terminals 18 and 19 in the case of the EQJW 125.

6.2.1 Assigning addresses

Each device within the group should be assigned its own bus address. The address '1' must be assigned once within any group. To activate the device bus, parameter CP02 should be set to '1', then the address should be set (parameter CP04).

If a device in an operating installation is exchanged, and the addresses used are unknown, the 'Automatic address assignment' function can be used (CP04 = $Auto$). The controller then searches on the bus for an unused address and sets it as parameter CP04.

The following should be observed when automatically assigning addresses:-

- All other devices in the installation must be switched on.
- Only one device should carry out the function in each case.

6.2.2 EDB 100 room operating unit

The EDB 100 room operating unit allows the occupant, from the comfort of his living room, to alter the target temperature, call up various data and change the operating mode. To connect the EDB 100 room operating unit with the EQJW 125, the two device-bus terminals on the room operating unit should be connected with terminals Data1 and Data2 on the controller (polarity is irrelevant). The room operating unit requires its own power supply.

On the EQJW 125, parameter CP15 should be set to '1' in order to use the room operating unit. The address of the room operating unit is set via parameter CP16.

6.2.3 Sending and receiving outdoor temperatures

Controllers which have an outdoor temperature sensor can be configured so that they make the measured outdoor temperature value available to other controllers via the device bus. This allows weather-compensating control even in installations with no outdoor temperature sensors of their own.

To send an outdoor temperature, set parameter CP10 to '1' and to receive one, set parameter CP11 to '1'.

6.2.4 Requesting and processing a heat requirement

One or more controllers can be connected downstream in a controller grouping. You can use parameter CP12 to send the required flow temperatures for the various downstream control circuits to the controller for the primary circuit. If CP13 is set to '1' on the controller for the primary circuit, these data will be received. The controller will then control the highest flow temperature sent to it in the primary circuit.

6.2.5 Synchronising the time

If several controllers are interconnected, their times should be synchronised. For this purpose, CP09 is set to '1' on one of the controllers. Then, this controller sends its system time to the device bus once every 24 hours. This time is adopted by the other controllers. Regardless of the setting of communication parameter CP09, if the time is adjusted on one of the interconnected controllers, it will be adopted by the others.

6.3 Modbus communication

The EQJW 125 can respond to enquiries in the Modbus RTU protocol as a slave. For this purpose, an RS-485 two-wire bus is connected to terminals 18 and 19. A suitable Modbus master (BMS centre) can send enquiries or commands via this bus.

In a communication network, based on the Modbus RTU protocol, via an RS485 port, up to 247 devices can be addressed. Up to 32 devices can be connected within each bus segment.To activate the function, CP02 must be set to 2 (see Section 3.3.4). A unique address must be assigned at CP05 and the transmission speed (Baud rate) must be selected with CP03. The data format supported by the controller is 8n1, i.e. the data format comprises 8 data bits, no parity bits and one stop bit.

The following commands are supported:

```
_____
Read Coil:
     AA   01   XX XX   00 01   CC CC
     --   --   -----   -----   -----        Coils =
     Adr  RC   CoilNr  Coils   CRC              Number of coils to be
read
Response:
     AA   01   01   YY    CC CC
     --   --   --   --    -----                Anz =
     Adr  RC   Anz  Dat   CRC                   Number of following
data bytes
_____
Read Holding:
     AA   03   XX XX   00 01   CC CC
     --   --   -----   -----   -----        Reg. =
     Adr  RH   HR-Nr   Reg.    CRC              Number of registers
to be read
Response:
     AA   03   02   XX XX   CC CC
     --   --   --   -----   -----                Anz =
     Adr  RH   Anz  Data    CRC          Number of following data
bytes
_____
Set Coil:
     AA   05   XX XX   YY 00   CC CC           YY = 0xFF to set,
     --   --   -----   -----   -----            0x00 to delete
     Adr  SC   CoilNr  Data    CRC
(Response identical)
_____
Set Holding:

     AA   06   XX XX   YY YY   CC CC
     --   --   -----   -----   -----
     Adr  SH   HR-Nr   Data    CRC
(Response identical)
_____
```

Current measured values and operating statuses (for example) can be read out via Modbus. The controller outputs can be switched. The list of the available data points is given in the Annexe, section 6.3.1.

If desired, the controller will monitor the activity of the Modbus interface. As long as valid Modbus enquiries are registered regularly, the controller will reset the time monitoring. If no more enquiries are directed to the controller for 30 minutes, it will operate independently again. Changes to the controller outputs triggered via Modbus then become invalid. This function can be disabled with CP24.

The EQJW 125 is compatible with the 'Modbus-Frame' protocol extension. Enquiries in standard format are answered in standard format, and frame enquiries receive an answer in frame format. This format allows reliable data transmission even if the data are segmented during transmission. For Modbus communication via modem, it is advisable to use the frame format because precisely timed data transmission from the sender to the recipient is often not available with modern transmission methods (modem with compression and error correction functions, digital telephone network). Details about the protocol extension are available on request.

6.3.1 Modbus data points (holding register)

Number of holding register	Description	Comment	Read only	Decimal points	Units	With math. sign?
40001	Product number	Product number, device code	yes	0		no
40003	Firmware version	Firmware version	yes	2		no
40004	Hardware version	Hardware version	yes	2		no
40010	OutdoorTemp_AF1	Measured value for input T_A	no	1	°C	yes
40013	FlowTemp_VF1	Measured value for input T_F	yes	1	°C	yes
40020	RoomTemp_RF1	Measured value for input T_F	yes	1	°C	yes
40100	Time	Time (hours, minutes)	no	2		no
40101	Date	Date (day, month)	no	2		no
40102	Year	Year	no	0		no
40103	Switch position	Rotary switch: 0= Position for inputs, 1=Auto, 2=Off, 3=Manual, 4=Normal, 5=Reduced	yes	0		no
40106	Mode_Rk1	1=Auto, 2=Stdby, 3=Manual, 4=Sun, 5=Moon	no	0		no
40107	ControlSignal_Rk1	Opening for control signal [0...100%]	no	0	%	no
40117	AT_HeatOff_Rk1	Value T_A heating switch-off	no	1	°C	yes
40145	Write-En_Modem	Write enable for modem (code number input)	no	0		no

Number of holding register	Description	Comment	Read only	Decimal points	Units	With math. sign?
40146	Cycl_Init_Modem	Modem - cyclical initialisation	no	0	min	no
40147	DialPause_Modem	Modem - dialling pause after engaged tone	no	0	min	no
40148	DialRpt_Modem	Modem - number of dialling attempts	no	0		no
40149	Time-out_Modem	Watchdog, 'Modem time constant'	no	0	min	no
40150	Device statusReg	Device status register	yes	0		no
40152	ErrorstatArchiv	Device status archive	no	0		no
40154	ErrorCounterReg	Error counter register	no	0		no
41000	FlowSetp_Rk1	Flow setpoint	no	1	°C	yes
41001	MaxFlow_Rk1	Maximum flow temperature	no	1	°C	yes
41002	MinFlow_Rk1	Minimum flow temperature	no	1	°C	yes
41003	Day_Setp_Rk1	Setpoint, normal mode	no	1	°C	yes
41004	Night_Setp_Rk1	Setpoint, reduced mode	no	1	°C	yes
41006	Slope_HeatCh_Rk1	Slope of heating characteristic	no	1		no
41065	Kp_Rk1(Y1)	Proportional band	no	1		no
41066	Tn_Rk1(Y1)	Reset time	no	0	sec	no
41067	Ty_Rk1	Run-time for actuator	no	0	sec	no
42000 to 42047	Switching commands	48 possible switching commands for the 1st heating circuit	no	0		no
42500 to 42519	Calendar switching program	20 possible switching commands for the calendar switching program	no	0		no

Tab. 3: Modbus data points

The data points are transmitted in 16 bits.

Read and write the weekly switching commands by Modbus

The holding registers as from 42000 contain the switching commands for the heating circuit as per the table below:

	Command 1	Command 2	Command 3	Command 4	Command 5	Command 6
Mon	42000	42001	42002	42003	42004	42005
Tue	42006	42007	42008	42009	42010	42011
Wed	42012	42013	42014	42015	42016	42017
Thu	42018	42019	42020	42021	42022	42023
Fri	42024	42025	42026	42027	42028	42029
Sat	42030	42031	42032	42033	42034	42035
Sun	42036	42037	42038	42039	42040	42041
Whole week	42042	42043	42044	42045	42046	42047

Tab. 4: Switching commands

Every possible switching command has its own holding register (16-bit value), which can be read or written. The register has the following content:

	Command	Time				
Numerical value (decimal)	3	0	7	3	0	30730

1 = stand-by mode

2 = reduced mode

3 = normal mode

Examples

To change the factory setting for the first switching command (every day, as from 6:00 hrs, nominal operation) to 7:30 hrs, the value 30730 (instead of 30600) should be written in register 42042.

Read and write calendar switching commands via Modbus

The 20 holding registers from 42500 to 42519 contain the 20 possible calendar switching commands as per the table below:

	Command	**Date**					
Numerical value (decimal)	1	3	1	1	2		13112

1 = stand-by mode

2 = reduced mode

3 = normal mode

ℹ Notes on the weekly and calendar switching programme:

- All registers for unused switching commands should contain the numerical value of 0.
- The switching commands should be entered in chronological order (time or date); the first command of the day or year should, therfore, be 'Command1'.

6.3.2 Modbus data points (coils)

Number of coil register	Description	Comments	Set (Coil = 0)	Delete (Coil = 1)	Coil = 0 means	Coil = 1 means
4	Collective bit	Control of all functions	Yes	No	As specified	Auton.
57	Bit for terminal 6	Heating medium pump (see coil register 96)	Yes	Yes	Off	On
89	Bit for operating mode	Switch over operating mode (see holding register 40106)	Yes	No	As specified	Auton.
90	Bit for final control element	Control of final control element (see holding register 40107)	Yes	No	As specified	Auton.
96	Bit for heating medium pump	Control of heating medium pump	Yes	No	As specified	Auton.
116	Bit for setpoint value T_F	Calculation of the setpoint value for T_F	Yes	No	As specified	Auton.
150	Manual mode	Enable manual mode	Yes	Yes	Inactive	Active
157	Disable modem	Dialling the control station via modem if a fault occurs is disabled (see CP23)	Yes	Yes	Inactive	Active

Number of coil register	Description	Comments	Set (Coil = 0)	Delete (Coil = 1)	Coil = 0 means	Coil = 1 means
158	Dial if error is rectified	Dial the control station even if error is rectified again (see CP21)	Yes	Yes	Inactive	Active
159	Time-out for control station	EQJW 125 closes the connection to the control station after 30 minutes (see CP24)	Yes	Yes	Inactive	Active

Tab. 5: Modbus data points

ⓘ If a function is specified to the EQJW 125 via modbus by the control station through the holding register, the associated coil register is automatically set to "1", i.e. deleted. In addition, the collective bit (number 4 of the coil register) is also set to "1". Examples of this include holding registers 40106, 40107 and 41000, and also the associated coil registers 89, 90 and 116.

If coil register 57 is deleted, coil register 96 and coil register 4 are automatically deleted as well.

Coil registers 4, 89, 90, 96 and 116 cannot be deleted directly. They are deleted by modifying the associated holding register (or, in the case of coil register 96, the associated coil register 57). The other registers can be set or deleted. These results in the consequences listed in the table, i.e. a function is enabled or disabled or the heating medium pump is switched on or off.

All the coil registers can be set. This means that the functions are controlled from the EQJW 125 (numbers 57, 89, 90, 96, 116) or that the functions are activated as a basic rule (nos. 150, 157, 158, 159). If coil register 4 is set, then coil registers 89, 90, 96 and 116 are also set automatically as a result.

6.4 Modem operation

A modem of type KT DataMod10 can be connected to the communication interface (terminals 18 to 21) via a special connection line[3]. This modem can be used for Modbus communication with a control station, or to send error messages via SMS. In both cases, the controller can build up a connection automatically if a fault occurs.

The two functions can be combined; in this case, an error is signalled via SMS and via Modbus.

6.4.1 Modbus operation via modem

CP02 must be set to 3 or 5. In Modbus mode, the controller accepts calls from a control station to the modem. In the event of an error, the control station is called on the telephone number entered at CP06.

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[3] The line between the controller and the modem must not be longer than 1.5 m for reasons related to EMC.

In the case of a modem connection, before executing write commands via Modbus, the valid code number (123) must be written to Modbus register 40145. Otherwise, only read commands will be processed. This is used to prove the legitimacy of the management system.

If an incorrect code number is entered three times via Modbus, this is recorded as a prohibited access attempt. As the result, an error bit is set and the control station is dialled by the controller.

6.4.2 Sending SMS if there is a fault on the plant

A modem enables the controller to send an error message to a mobile phone as an SMS message. As soon as a fault is registered in the device status register of the controller, an SMS message is sent. This requires modem access from a provider (SMSC = Short Message Service Centre) which accepts SMS messages in TAP protocol. The message on the display of the mobile phone will then read something like this:

'Heating controller EQJW 125 / Device status:
[XXXX] / Note: 0 = no error; >0 = error has occurred'

The value shown for the device status corresponds to the value of SERVice parameter SP02. The error that has occurred is stored in this value in encoded form (see Section 6). The SMS Centre usually sends the date, time and sender's telephone number for this message.

Access numbers for SMSC[4]:

- D1 network of Deutsche Telekom: 0171 2521002
  ditto via ISDN using X.75:   0171 2521001
- O_2 Germany: 0179 7673425
- E-PLUS Germany: 0177 1167
- Cellnet (GB)   0044 7860980480

To enable the function, CP02 must be set to 4 (or 5) and the telephone numbers of the provider and the mobile phone must be entered at CP07 and CP08. (see section 3.3).

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[4] No guarantee is given of the availability and correctness of these numbers. Up-to-date information on this subject must be requested from the network operator.

6.4.3 Displays for modem operation

When modem operation is enabled, an additional item appears in the display loop to show the current modem status. The following displays may appear here:

Display	Meaning
FrEE	No communication, modem on standby
PAUSE	No communication, dialling pause has not yet elapsed (however, calls are accepted)
Init	Modem is being initialised
Conn	There is a connection to the provider or the control station
CALL	The connection is being built up
EndE	The connection is being disconnected
OFF	It was impossible to reach the provider or the control station with the permitted number of dialling attempts (new dialling attempts will be made on the next day)

Tab. 6: Display for modem operation

6.5 Setting parameters using the PC

The EQJW 125 can be configured and parameterised with a PC using an additional USB adaptor and the *Config-equitherm* software. To do so, the adaptor should be connected to the terminals for Modbus communication on the EQJW 125.
Modbus RTU (CP02 = 2) is the type of communication that has been set ex works. However, the address 255 has been set, rather than a valid Modbus address in the range 1 - 247. This makes it possible to communicate with the controller via the *Config-equitherm* software without having to set communication parameters on the EQJW 125.

It is not possible to communicate with non-configured controllers if there are several controllers in a network that have not yet been configured. In such cases, all but one of the controllers that have not yet been configured has to be switched off beforehand.

7 Faults

Before you call a heating specialist, check: electrical fuses, main plant switch, burner function, circulating pump, valve, fault display, time and day of the week for the EQJW 125.

7.1 Displaying faults

An operating fault is shown on the display by the flashing fault symbol (see Section 2). The 'Error' message is shown. Press the input knob to open the error level. In certain circumstances you can poll several faults by turning the input knob. As long as an acute operating fault is present, the error message is kept in the display loop, even if it is not opened by pushing the input knob. The error is shown in the error level according to the list below.

In the first three minutes after you switch the controller on, evaluation and display of faults is suppressed to wait until other parts of the plant are switched on.

7.1.1 Error list

Err 1	Sensor failure T_F
Err 2	Sensor failure T_A
Err 3	Sensor failure T_R
Err 11	Prohibited access via modem

Tab. 7: Error list

7.1.2 Device status

The device status register contains the information about faults that are present according to the error list, in coded form. The register can be read with the help of the service parameters, the communication parameters or via the Modbus. If a fault message is sent via SMS or Modbus, the fault is notified in the form of the device status.

The coding is as follows:

Err 1 (Sensor failure T_F) $\leftrightarrow$ 1

Err 2 (Sensor failure T_A) $\leftrightarrow$ 2

Err 3 (Sensor failure T_R) $\leftrightarrow$ 4

Err 11 (Prohibited access) $\leftrightarrow$ 1024

The value shown as the device status is the total of the codings for the existing errors.

Example Error on T_F and T_R (Err1 and Err3) provides a value of 5 for the device status.

Err1   1
Err3   4

Total (= value of device status)   5

7.2   Reset functions

It is possible to reset the EQJW 125 to the ex-works setting. To do this, go to the SERVice level (see Section 3.2) and set parameter SP04 to:

1. Reset SERVice and communication parameters
2. Reset switching commands
3. Reset SERVice and communication parameters and switching commands

7.3   Actions to deal with faulty temperature readings

The 'Sensor fault' symbol (see chapter 2.5) appears if there is a short-circuit or an interruption in sensor supply lines. The following list states how the controller behaves if individual sensors fail.

Outdoor temperature sensor If the outdoor sensor is faulty, a flow temperature setpoint of 50°C is operated, or if the maximum flow temperature (set at parameter SP16) is less than 50°C, the maximum flow temperature is operated.

Flow temperature sensor If the flow temperature sensor is faulty, the valve assumes the 30% valve position.

Room temperature sensor If the room sensor fails, the controller operates according to the settings for operation without a room sensor.

8　Application

The EQJW 125 controller is used for weather-compensating flow temperature control of a heating circuit. An additional room temperature connection is possible. The controller changes the operating status in accordance with the switching commands that are entered, on a time-dependent basis.

It has an anti-frost function, an automatic summer time change-over function, an anti-jamming feature for the pump and a floor drying function.

A communication interface allows connections with other devices and with a Modbus control station (also via modem), or automatic transmission of fault messages to a mobile phone as SMS messages via modem.

A rotary switch allows immediate mode changes and direct access to the main settings. An input knob makes it easy to change the device's settings.
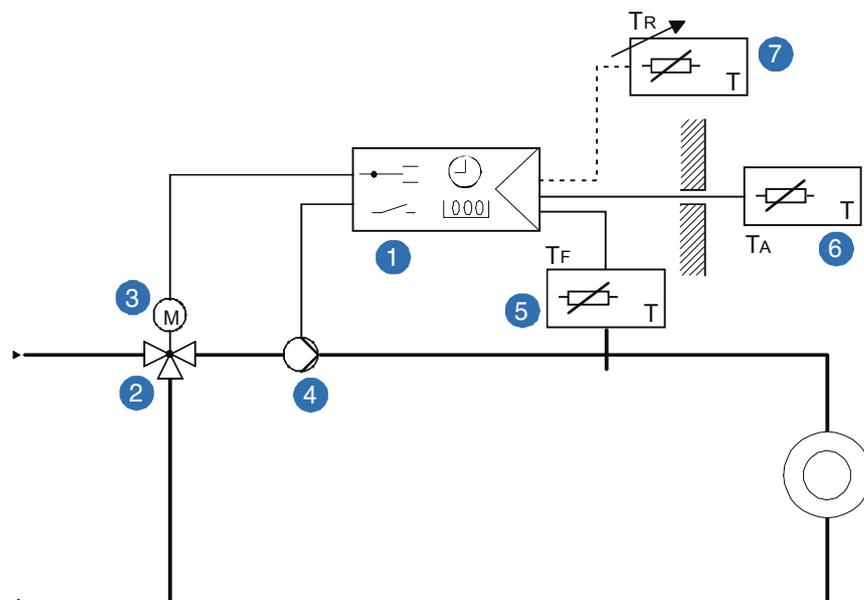
8.1　Plant schematic

Fig. 4: Plant schematic

1 EQJW 125 heating controller
2 Final control element
3 Drive
4 Heating medium pump
5 Flow temperature sensor
6 Outdoor temperature sensor
7 Room sensor or room remote control unit (if present)

8.2   General information

CAUTION!

This application requires an additional safety thermostat.

Before the plant is commissioned, the slope of the characteristic and the flow temperature limit must be checked in every case.

Depending on the application, the following settings are recommended:

Radiator heating

characteristic slope	SERVice parameter SP17	value 1.4 (⌂̈)
flow temperature limit	SERVice parameter SP16	value 75°C (⌂̇)

Floor heating

characteristic slope	SERVice parameter SP17	value 0.6
flow temperature limit	SERVice parameter SP16	value 50°C

The recommended values have been tried and tested but they are not necessarily the ideal solutions for every plant. No liability is accepted for the values indicated here.

9   Economy tips

Heating is by far the largest consumer of energy in the household. 78 % of the energy required in a household is consumed by the heating (source: 'Wohnen & Energie Sparen / Living and Saving Energy'; BINE Information Service of the Karlsruhe Technical Information Centre; July 2004). It is precisely here that major savings are possible. Most residents under-estimate the potential for saving on heating and over-estimate the potential for saving on other consumers.
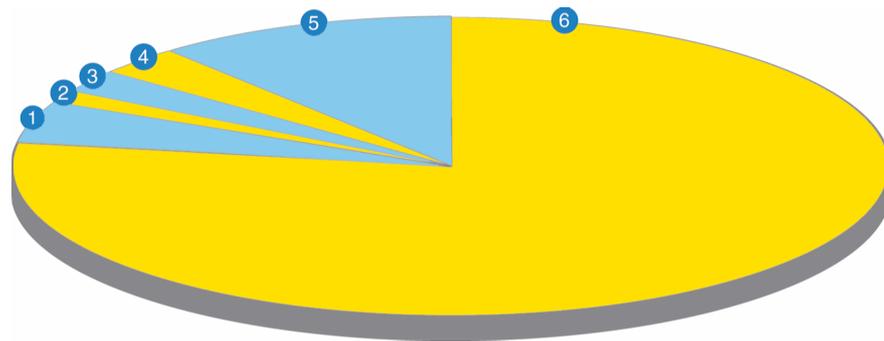

Fig. 5: Energy consumption in the home

1	Hot water	11%
2	Cooling, freezing	3%
3	Washing, cooking, rinsing	2,5%
4	Light	1,4%
5	Others	4,5%
6	Heating	78%

Better insulation could save almost half of the heating energy. Savings are also possible thanks to modern heating plants with intelligent control. A reduction of 3°C at night with the heating controller saves about 5 to 8 % of the heating energy. A constant bedroom temperature of 18°C with a reduced night-time temperature in the living rooms saves about 12 to 15 %. A constant bedroom temperature of 16°C with a reduction of 3°C in the living rooms during absences and at night will save about 25 %.

More economy tips bring the time when reduced mode starts as far forward as possible. Each degree by which the normal temperature is reduced will save about 6% of heating costs. Only ventilate briefly, but well. Close shutters and blinds at night. Keep heaters clear, i.e. do not place any furniture or curtains in front of the heaters, etc.

10 Resistance values for the Ni1000 sensors

The temperature sensors required depending on the use of the EQJW 125 must conform to DIN 43760.

Temperature (°C)	Resistance value (Ω) Ni1000
90	1549
80	1483
70	1417
60	1353
50	1291
40	1230
30	1171
20	1112
10	1056
0	1000
−10	946
−20	893
−30	842
−40	791

Tab. 8: Resistance value Ni1000

The resistance value of the nickel measuring resistor changes in relation to the temperature. The temperature coefficient is always positive, i.e. the resistance increases as the temperature rises. See the table of values (DIN 43760). Within the specified tolerances, the sensors can be exchanged without calibration.

11 Accessories

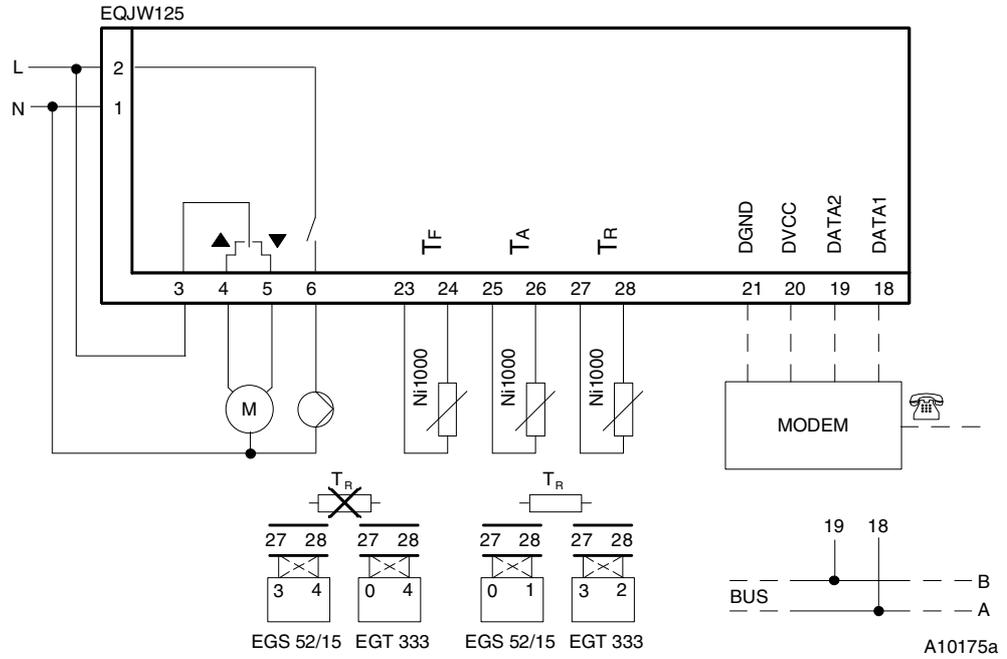See the Sauter PDS for more components.

12 Wiring diagram
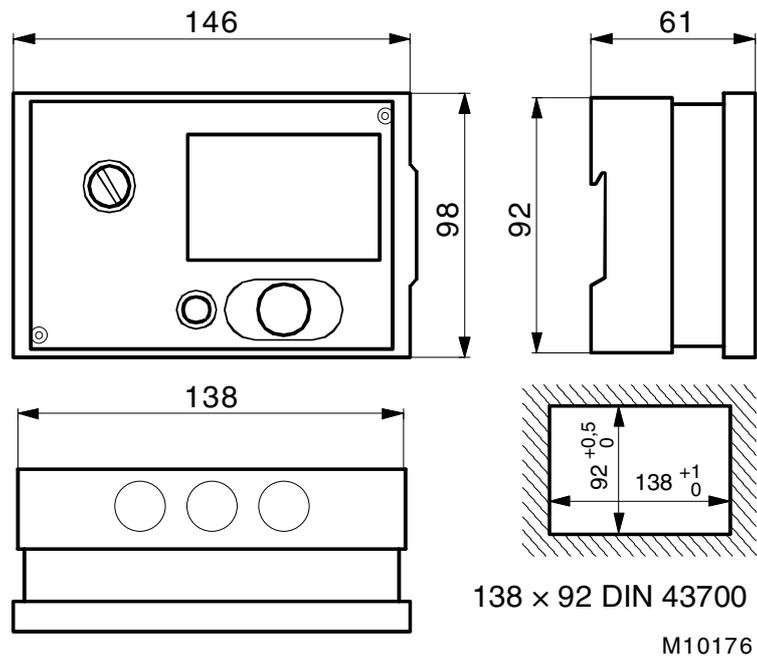

Fig. 6: Wiring diagram

13 Dimension drawing

Fig. 7: Dimension drawing

14 Technical data

14.1 Overview of technical data

Power supply:	230 V
Power supply tolerance:	±15 %, 50,…60 Hz
Power consumption:	approx. 2 VA
Degree of protection:	IP40 (when fitted in panels) (EN 60529)
Protection class:	II (EN 60730-1)
Permitted ambient temperature:	0…+50°C
Permitted storage temperature:	−25°C…+65°C
Permitted ambient humidity:	5…95%rh (no condensation)
Conformity EMC immunity	EN 12098 and CE EN 61000-6-1, 2
EMC irradiation	EN 61000-6-3, 4
Safety	EN 60730-1
Weight with base	approx. 0.4 kg
Dimensions with base (W × H × D)	146 × 98 × 41
Time-switch: ▪ Running capacity	 Min. 24 hours, after supply was connected for min. 4 hours; parameters, switching commands are stored permanently
▪ Accuracy	< 1sec / day
▪ Switching period for weekly programme	10 min
▪ Number of switching commands in weekly programme	6 per day or 48 per week
▪ Switching period for calendar prog.	1 day
▪ Number of switching commands in calendar programme	20
Inputs: ▪ 2 temperature sensors	 Ni1000
▪ 1 temperature sensor or remote control panel	Ni1000

Outputs:	3 relays
▪ relay output for pump	normally open contact, 230V / 2A / cos φ > 0.5 permitted start-up current 7A (max. 1sec)
▪ relay outputs for final control element	2 × normally open contacts, 230V / 0.5A / cos φ > 0.5
Interface:	
▪ electrical specification:	RS485, 2-wire, similar to RS232
▪ interface protocols:	Modbus (slave, format Modbus RTU, connection with control station) or alternatively, device bus for connection to other devices
Measuring accuracy	better than ± 0.3 K à 25°C
Time constant for processing measured values	approx. 10 sec for T_A, < 5 sec. for T_R and T_F,
Cycle time	Valve running time/15
Neutral zone	< 1.0 K
Minimum pulse duration	250 msec
Pump after-run time	2 × Ty
Heating characteristic	Curved, without the influence of extraneous heat (see SP 17)
Attenuation of outdoor temperature	Time constant approx. 21 hours
Summer/winter heating limit	ON equals summer → winter; OFF equals winter → summer On when $T_{Aged} < T_{S/W} - 1$ K; OFF when $T_{Aged} > T_{S/W}$ $T_{S/W}$ can be set via SP 18
Zero-point correction for room temp	up to ± 6 K is possible
Zero-point correction for outside temp.	up to ± 9 K is possible

Tab. 9: Overview of technical data

14.2   Overview of main functions

Room temperature connection

The room temperature connection is enabled in the SERVice level. A room temperature sensor is required. The influence of the room temperature connection can be adjusted in the SERVice level. Maximum change of T_F due to the room temperature connection: $\pm$ 30 K.

Frost protection

The frost protection function intervenes if the controller is in Off mode, and if the frost protection function has been enabled in the SERVice level. In addition, the temperature must have fallen below the frost protection limit. The frost protection limit is 3°C for the outdoor temperature. The frost protection function is turned off if the outdoor temperature is higher than 4°C. When the frost protection function intervenes, a flow temperature of +10°C is controlled.

Pump anti-jamming protection

The pump anti-jamming protection function is enabled in the SERVice level. At 00:00 hours daily, the pump is switched on for 60 seconds if it was not operated during the previous 24 hours. This function is active in all modes except manual mode.

Limitation of flow temperature

The maximum and minimum setpoint values for the flow temperature are limited. If a calculated setpoint value for the flow temperature is obtained which is beyond the limit, the limit temperature is controlled. The limit value is set in the SERVice level. In manual mode, the flow temperature control is not active and there is consequently no flow temperature limitation. If the frost protection function is active, the flow temperature limitation is turned off.

Manual mode

In manual mode, the pump and the valve can be controlled separately. The adjustment is menu-guided if manual mode has been enabled. Manual mode is enabled in SERVice mode. In the ex-works settings, manual mode is 'not enabled'.

Automatic switch-off

Thanks to the automatic switch-off feature, the heating controller saves energy with no loss of comfort wherever possible. The following possibilities are available for switching off the heating controller:

a) EQJW 125 is in back-up mode
b) summer/winter limit OFF
c) $T_A \geq T_{Rs}$ (if $T_A \leq T_{Rs} - 1$ K switches controller on again)

Switching programmes

A weekly switching programme with a maximum of 48 switching commands and a yearly switching programme with a maximum of 20 switching commands are available. The minimum switching intervals are 10 minutes or 1 day respectively. The operating mode from the weekly and yearly switching programmes with the lower energy consumption has priority. An 'empty' switching programme is interpreted as normal mode. The yearly switching programme is enabled in the SERVice level. In the ex-works setting, the yearly

switching programme is not enabled. The commands in the yearly switching programme are not deleted after they have been executed.

Multiplication T$_A$ The outdoor temperature is registered by an EQJW 125 and is made available to the remaining controllers as a measured value via the device bus. The parameterisation for this purpose is performed in the communication level.

Floor-drying function. EN 1264, Part 4 describes how anhydrite cement floors should be treated during operational heating before the floor covering is laid. This entails, first of all, maintaining an inlet temperature of 25°C for 3 days. Thereafter, the maximum inlet temperature should be maintained for four days. This function has been included on the EQJW 125; it can be activated via the SERVice level.

In addition, the controller has a screed curing facility. This involves gradually increasing the flow temperature, starting at 25°C, by 5 K per day until the maximum flow temperature is reached, which is maintained for 7 days. Thereafter, the flow temperature is reduced gradually by 5 K per day until it has again reached 25°C. These functions are called up from within the SERVice level.

Modbus communication Communication with the EQJW 125 is possible via an RS 485 interface with the help of the Modbus RTU protocol . Data can be exchanged. The EQJW 125 is always used as a slave in this case.

Alarms via SMS An additional modem is used to send alarm texts as SMS to a mobile telephone, via a provider. An interface similar to an RS 232 is used for this purpose. The TAP protocol (Telocator Alphanumeric Protocol) is used here. The settings are made in the communication level.

15 Overview of controller settings

15.1 List of SERVice parameters

If the ex-works setting for the SERVice parameters is changed, the modified values must be entered in the table below.

Parameter:	🏭	✏️ (change)	Parameter:	🏭	✏️
SP01:	X.xx		SP14:	120	_____
SP02:	0		SP15:	0	_____
SP03:			SP16:	75	_____
SP04:	0		SP17:	1.4	_____
SP05:	0	_____	SP18:	15	_____
SP06:	3	_____	SP19:	16	_____
SP07:	0	_____	SP20:	1	_____
SP08:	0	_____	SP21:	0	_____
SP09:	20	_____	SP22:	0	_____
SP10:	0	_____	SP23:	25.10	_____
SP11:	0	_____	SP24:	25.03	_____
SP12:	40	_____	SP60:	0	_____
SP13:	240	_____			

Tab. 10: List of SERVice parameters

15.2 List of communication parameters

If the ex-works setting for the communication parameters is changed, the modified values must be entered in the table below.

Parameter:	🏭	✎ (change)	Parameter:	🏭	✎
CP01:	X		CP14:	0	_____
CP02:	2		CP15:	0	_____
CP03:	19.200		CP16:	auto	_____
CP04:	-	_____	CP17:	0	_____
CP05:	-	_____	CP18:	5	_____
CP06:	-	_____	CP19:	5	_____
CP07:	-	_____	CP20:	5	_____
CP08:	-	_____	CP21:	0	_____
CP09:	1	_____	CP22:	0	_____
CP10:	0	_____	CP23:	0	_____
CP11:	0	_____	CP24:	0	_____
CP12:	0	_____			
CP13:	0	_____			

Tab. 11: List of communication parameters

15.3   Weekly switching programme

Ꮭ

Day	Time	Mode	(Deleted)
Daily	06:00	Normal mode	☐
Daily	22:00	Reduced mode	☐

Switching commands added for the weekly switching programme

Day	Time	Mode
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

15.4   Calendar switching programme

Switching commands added for the calendar switching programme

Day	Month	Mode
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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Abbreviations

Abbreviations	Term
CO	communication
SE	SERVice
SP	SERVice parameter
T_A	outdoor temperature
T_F	flow temperature
T_{Fi}	actual value for the flow temperature
T_{FS}	setpoint for the flow temperature
T_{Fsmax}	maximum limit for the setpoint for T_F
T_{Fsmin}	minimum limit for the setpoint for T_F
T_R	room temperature
T_{Ri}	actual value for the room temperature
T_{Rmax}	maximum limit for the adjusting range for T_{RS}
T_{Rmin}	minimum limit for the adjusting range for T_{RS}
T_{RS}	setpoint for the room temperature
$T_{S/W}$	heating limit
T_Y	valve run-time
X_P	proportional band
X_S	setpoint

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