

HomeBloC® Controller [HBC]

HBC13.14 - Domestic hot water preparation and zone heating



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Carefully read these instructions before installation and commissioning.
Save these instructions in the vicinity of the installation for future reference.

Scope of these instructions

These instructions describe the function, installation, commissioning and operation of the HomeBloC® Digital controller HBC13.14. Chapters marked [specialist] are intended exclusively for qualified specialists. For further components or accessories, please refer to the relevant separate instructions.

Designated use

The HomeBloC® Digital controller, subsequently referred to as the controller, is an independently installed electronic temperature controller for on-surface installation. The maintenance-free controller is exclusively intended for the controlling and monitoring of a PAW flat station. Improper usage of the controller excludes any liability claims.

This product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.

Only use PAW accessories with the controller.

Target group

The target audience of this manual are technical professionals who:

- have the knowledge of relevant terminology and the skills necessary to set up and operate flat stations.
- have the necessary professional training, knowledge and experience as well as the knowledge of the relevant regulations, in order to evaluate the following work and to detect potential dangers:
 - installation of electrical devices
 - assembly and connection of data lines
 - assembly and connection of power supply lines.

The installation and commissioning as well as the connection of electrical components require technical knowledge commensurate with a recognised vocational qualification as a fitter for plumbing, heating and air conditioning technology, or a profession requiring a comparable level of knowledge [specialist].

The following must be observed during installation and commissioning:

- relevant local and national regulations
- accident prevention regulations of the professional association
- instructions and safety instructions mentioned in these instructions



WARNING

Personal injury and damage to property!

The controller must only be used in flat stations.

The flat station can be damaged by improper operation of the device.

The device must not be connected to the mains power supply when:

- the housing is open or damaged.
- cables are damaged.
- leaks within the station

This document is part of the product. Install and use the device only after having read and understood this document. Please observe all safety instructions. Please contact an additional expert if uncertainties occur.

The measures described in this document may only be carried out by qualified technical professionals. Factory labels and markings must never be modified, removed or rendered unreadable. Observe the prescribed operating conditions. For more information, see the section Technical data.

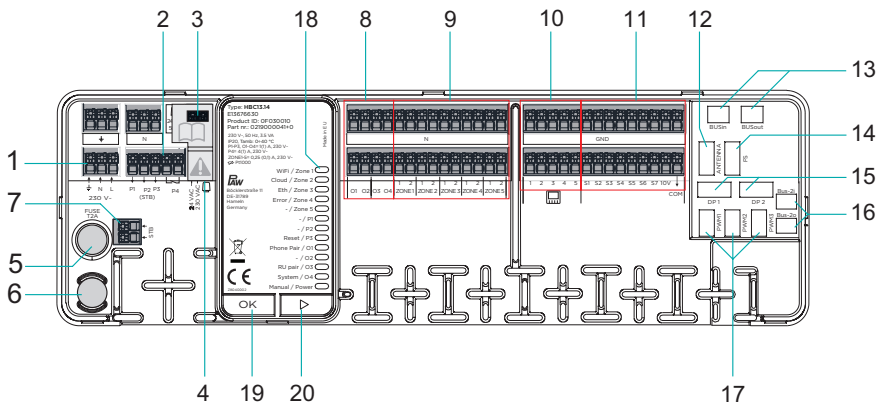
This device is **not** intended for:

- Children
- Persons with restricted physical, sensory or mental capacities.
- Persons without sufficient experience or knowledge.
Unless they are instructed in the use of the device, and initially supervised, by a person responsible for their safety.

The HBC controller has been developed to control hot water preparation and room heating. In the case of radiant floor heating, control is achieved via thermal actuators on the distribution manifold valves, based on the temperatures recorded by the room climate control units. There are 5 independent temperature zones with the option to control a total of 10 heating and cooling units. The controller allows for wired or wireless connection of the room units.

If required, additional controllers can be linked together to create more temperature zones or units.

View of the controller



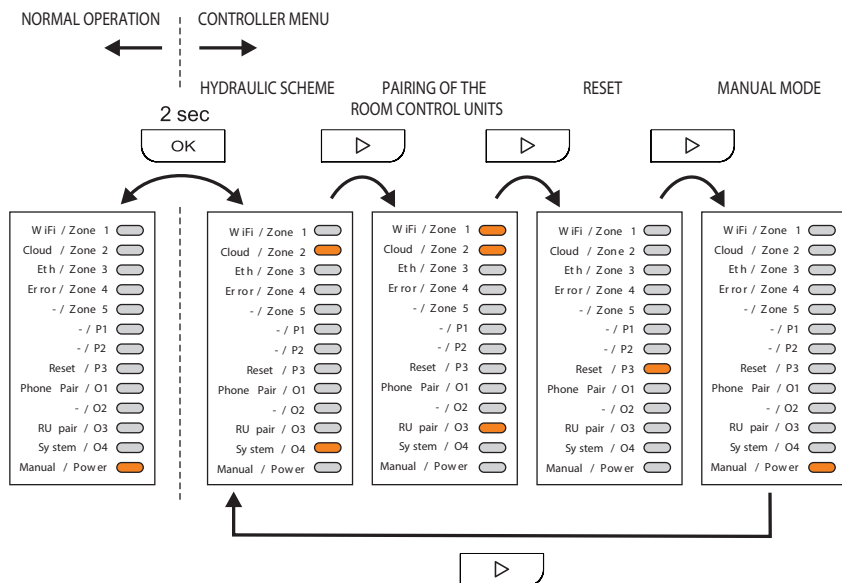
- 1** Connection terminals for the power supply of the controller (230V-)
- 2** Connection terminals for the power supply of pumps
- 3** Connection terminals for the safety temperature limiter of pump P2
- 4** Switching of the power supply for thermal actuators / control actuators
24 VAC <-> 230 VAC
- 5** Electrical fuse
- 6** Spare fuse
- 7** Connection terminals for the safety temperature limiter for pump P2
- 8** Connection terminals for switching valves and control valves
- 9** Connection terminals for controlling thermal actuators for zone valves
- 10** Connection terminals for connecting wired room control units
- 11** Connection terminals for connecting temperature sensors.
- 12** Antenna for wireless connection of room control units
- 13** Connection terminals for the BUS connection of control units
- 14** Connection terminals for volume flow sensor
- 15** Connection terminals for pressure sensors
- 16** Connection terminals for building management systems (Modbus)
- 17** Connection terminals for the PWM control signal of pumps
- 18** LEDs for operation display
- 19** Confirmation button
- 20** Selection button

- ZONE 1  — Indicates the operation of temperature zones. When the LED is lit, the thermal actuators associated with the zone are activated.*
 ZONE 2 
 ZONE 3 
 ZONE 4 
 ZONE 5 
- P1  — Indicates the operation of the pump output.
 When the LED is lit, the output is active.
 P2  — P1 - Primary pump
 P3  — P2 - Radiant floor heating circuit pump
 P3 - Hot water circulation pump
- O1  — Indicates the power supply to the switching valve.
 When the LED is lit, the switching valve is activated.
- O2  — Indicates the status of the switching valve. When the LED is off, the switching valve is set to domestic hot water preparation.
 When the LED is lit, the switching valve is switched to room heating.
- O3  — Indicates control of the control valve for the radiant floor circuit.*
- O4  — Indicates control of the control valve for the direct heating circuit. If the LED is lit, the direct heating circuit is active.*
- RU pair  — Indicates the pairing process. If the LED is lit, the controller is in the pairing phase with the room control units.
- System  — When the LED is lit, the controller is in the hydraulic system selection mode.
- Reset  — When the LED is lit, the controller is in the reset menu selection mode.
- POWER  — Indicates the controller status. When the LED is lit, the controller is in normal operation; when the LED is off, the controller is in setup mode.

* Depending on the model

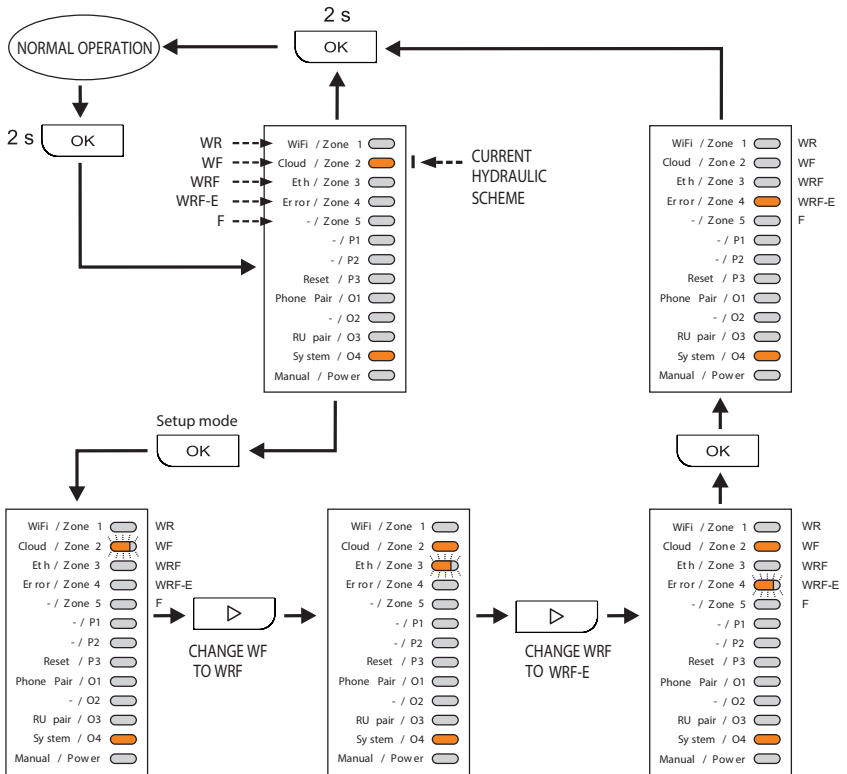
In the controller menu, you can configure the basic settings of the controller.

To switch from the home screen to the controller menu, press and hold the  button for 2 seconds; to switch between the individual groups in the menu, press the  button.



The HomeBloC® controller offers a choice of 5 hydraulic systems. Hydraulic schemes are shown in the chapter “Hydraulic Systems”.

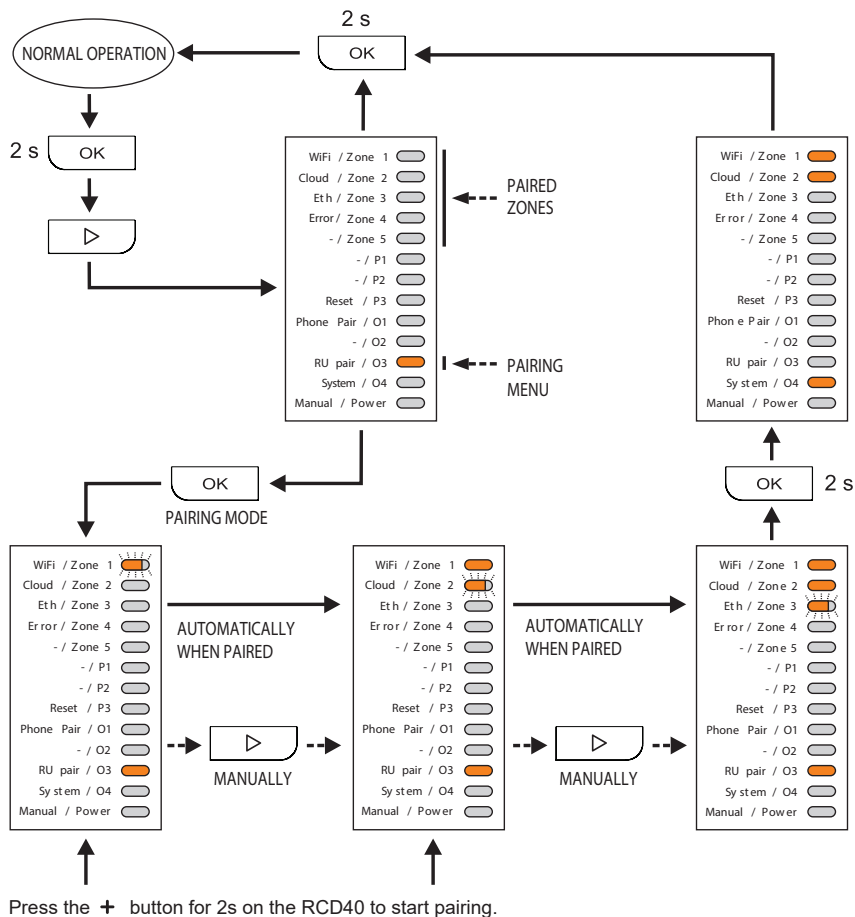
Example: Switching from scheme WF to scheme WRF-E.



ASSIGNING ROOM CONTROL UNITS TO ZONES

The pairing process allows you to connect the RCD40 room control unit to the controller and assign zones to it at the same time.

Example:



During commissioning or when testing the controller, the outputs can be switched ON or OFF manually.

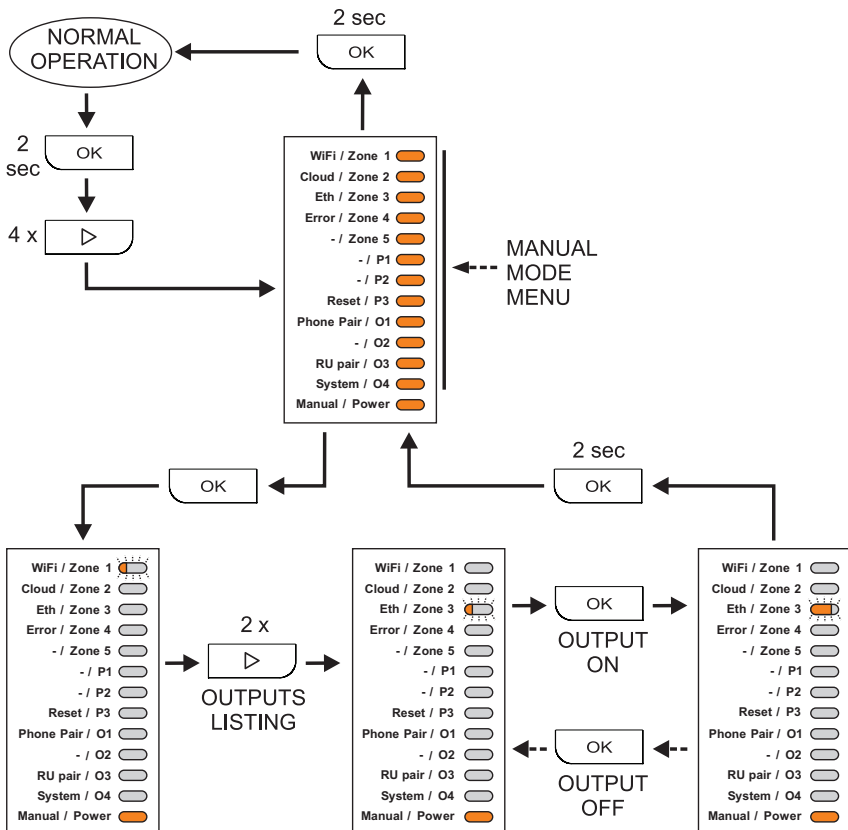
Example: Manual ON/OFF of output 3.



Long flashing interval: the selected output is ON.



Fast flashing: the selected output is OFF.



There are 4 types of reset available:

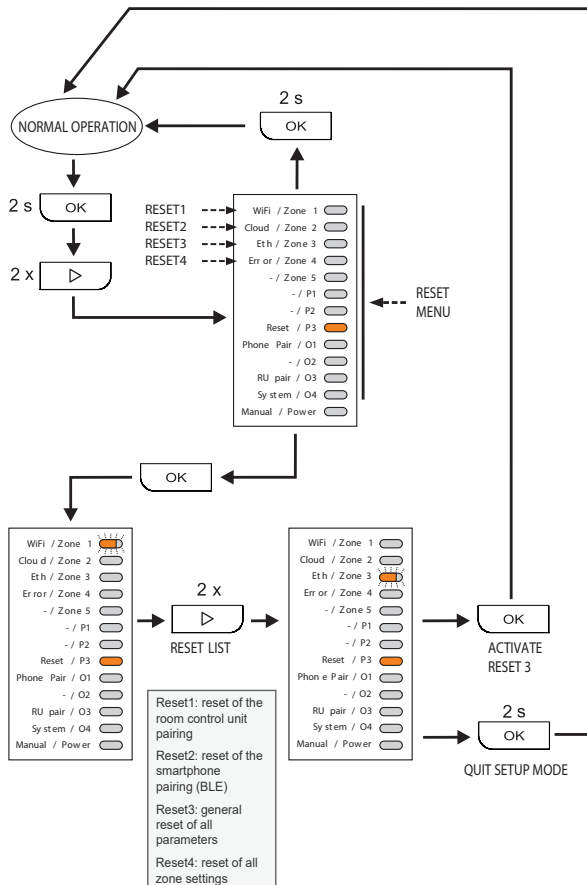
RESET 1 - Pairing reset for room control units

RESET 2 - Resetting BLE phone pairing

RESET 3 - Reset all parameters

RESET 4 - Reset all zone settings (Set temperatures, time programmes,...)

Example: Activate Reset 3



All other settings and adjustments are made using the parameters.

The parameters can be viewed via the room control unit.

This is described in the instructions for the room control unit.

In order to change the parameters (e.g. via the PC programme), the appropriate user level must be set.

Please refer to the Modbus documentation for the required user level.

System parameters

Parameter	Parameter name	Parameter description	Area	Default value
C9.1	Hydraulic variant	must correspond to the installed hydraulic system	0 - not selected 1 - WR 2 - WF 3 - WRF 4 - WRF-E 5 - F	0
C9.2	Heat exchanger	Type of the installed heat exchanger	0 - not selected 1 - E8LASHx50/1P	0
C9.3	Heat retention	Type of heat retention	0 - not selected 1 - not installed 2 - heat exchanger 3 - thermal valve 4 - overflow valve	1
C9.4	Switch valve	Type of the installed switch valve	0 - not selected 1 - not installed 2 - ESBE VZC 162	2
C9.5	Control valve injection-type circuit	Type of the installed control valve for the injection circuit	0 - not selected 1 - not installed 2 - unknown 3 - Möhlenhoff OEM 5	1
C9.6	Primary pump	Type of the installed primary pump	0 - not selected 1 - not available 2 - 230 V (On / Off) 3 - PWM heating generic 4 - PWM Solar generic 5 - Grundfos UPM 4 15-75 type C	5
C9.7	Heating pump	Type of the installed heating pump	0 - not selected 1 - not available 2 - 230 V (On / Off) 3 - PWM heating generic 4 - PWM Solar generic 5 - Grundfos UPM 4 15-75 type C	1

Parameter	Parameter name	Parameter description	Area	Default value
C9.8	Circulation pump	Type of the installed circulation pump	0 - not selected 1 - not available 2 - 230 V (On / Off) 3 - PWM heating generic 4 - PWM Solar generic 5 - Grundfos UPM 4 15-70 CIL3	1
C9.9	Heat flow meter	installed heat flow meter	0 - not selected 1 - not available	1
C9.10	Instantaneous water heater	installed instantaneous water heater	0 - not selected 1 - not available 2 - generic	1
C9.13	Flow rate sensor - type	Flow Sensor	0 - not selected 1 - VFS 2-40 2 - VTY 15 3 - VTY 15 + VFS 2-40 (V)	2
C9.14	Impulses per litre	Impulses per litre	1 ÷ 1000	234
C9.15	DP 1 type	Selection of the DPS sensor	0 - not selected 1 - not installed 2 - 600 mbar 0.5V-4.5V 3 - 600 mbar 0.5V-3.5V	3
C9.16	Calibration DP 1 - dp	Offset dp	-30 ÷ 30 mbar	0
C9.17	Calibration DP 1 - T	Offset T	-5.0 ÷ 5.0 °C	0
C9.18	DP 2 type	Selection of the DPS sensor	0 - not selected 1 - not installed 2 - 600 mbar 0.5V-4.5V 3 - 600 mbar 0.5V-3.5V	1
C9.19	Calibration DP 2 - dp	Offset dp	-30 ÷ 30 mbar	0
C9.20	Calibration DP 2 - T	Offset T	-5.0 ÷ 5.0 °C	0

General parameters

Parameter	Parameter name	Parameter description	Area	Default value
C1.1	RCU for direct connection in the WRF scheme	Selection of the room control unit for the radiator circuit in the WRF scheme	1 ÷ 5	1
C1.2	Type of thermal actuators	This setting determines whether the outputs are controlled by NC or NO thermal actuators.	1 - NC 2 - NO	1
C1.11	Modbus communication type via USB port	Selection of the communication mode on the USB port (ASCII or RTU)	0 - ASCII 1 - RTU	1
C1.12	Beep mode		0 - Off 1 - Buttons 2 - Errors 3 - Buttons and errors	1
C1.13	Automatic summer/winter time changeover	This setting automatically switches the clock between summer and winter time.	0 - NO 1 - YES	1
C1.15	Calibration S1	Setting the correction for the measured temperature for the S1 sensor	-5 ÷ 5 °C	0
C1.16	Calibration S2	Setting the correction for the measured temperature for the S2 sensor	-5 ÷ 5 °C	0
C1.17	Calibration S3	Setting the correction for the measured temperature for the S3 sensor	-5 ÷ 5 °C	0
C1.18	Calibration S4	Setting the correction for the measured temperature for the S4 sensor	-5 ÷ 5 °C	0
C1.19	Calibration S5	Setting the correction for the measured temperature for the S5 sensor	-5 ÷ 5 °C	0
C1.20	Calibration S6	Setting the correction for the measured temperature for the S6 sensor	-5 ÷ 5 °C	0

General heating parameters

Parameter	Parameter name	Parameter description	Area	Default value
C2.1	Control algorithm	Determining the control algorithm for the temperature zones. When set to 0, the control algorithm setting for each individual room control unit is taken into account, whilst for settings 1, 2 and 3, the control algorithm for all temperature zones is determined by this setting.	0 - RCD-SETTINGS 1 - P CONTROL 2 - PI CONTROL 3 - HYSTERESIS	0
C2.2	I constant	Determining the value of the I-constant in PI operating mode	0.2 ÷ 4.0	1.0
C2.3	P zone	Setting the width of the P-zone	0.5 ÷ 2.0 °C	1.0
C2.4	P-zone shift in heating mode	Determining the P-zone shift when the controller is in heating mode	0.0 ÷ 1.0 °C	0
C2.5	P-zone shift in cooling mode	Determining the P-zone shift when the controller is in cooling mode	0.0 ÷ 1.0 °C	0
C2.6	Minimum operating time zone valve	Once the thermal actuator has been switched on, it remains active for at least the set minimum time.	120 ÷ 300 sec	120
C2.7	Validity of outdoor temperature from SCADA	Validity period of the outdoor temperature received via the SCADA system (minutes)	5-1440 min	60
C2.8	Validity of room temperature RCU from SCADA	Validity period of the room temperature RCU received via the SCADA system (minutes)	5-1440 min	30
C4.1	Heating curve slope	Specification of the required radiator temperature at a given outdoor temperature	0.2 ÷ 2.6	0.5
C4.2	Parallel shift of the heating curve	Determination of the parallel shift of the heating curve or the calculated flow temperature. This setting is used to neutralise the deviation between the desired and actual room temperature.	-5.0 ÷ 5.0 °C	0.0

Parameter	Parameter name	Parameter description	Area	Default value
C4.3	Effect of the room temperature deviation	Setting the value for the amplified room temperature deviation. A lower value means a smaller effect; a higher value means a greater effect.	0,1 ÷ 3,0	1.0
C4.4	Operation mode flow temperature	Setting the method for determining the flow temperature	1 - WEATHER COMPENSATED 2 - CONSTANT TEMP.	1
C4.5	Constant flow temperature	Setting the constant flow temperature when a constant temperature has been selected for flow operation.	10 ÷ 55 °C	35
C4.6	Heating curve slope for scheme WR	Specification of the required radiator temperature at a given outdoor temperature	0.2 ÷ 2.6	0.5
C4.7	Parallel shift of the heating curve for scheme WR	Determination of the parallel shift of the heating curve or the calculated flow temperature. This setting is used to neutralise the deviation between the desired and actual room temperature.	-5.0 ÷ 5.0 °C	0

Pumps / relays (general)

Parameter	Parameter name	Parameter description	Area	Default value
C3.1	Switch-off delay P1	Setting the switch-off delay for pump 1	0 - 300 sec	60
C3.2	Switch-off delay P2	Setting the switch-off delay for pump 2	0 - 300 sec	60
C3.3	Switch-off delay P3	Setting the switch-off delay for pump 3	0 - 300 sec	60
C3.4	Switch-off delay relay R4 (relay)	Setting the switch-off delay of the relay	0 - 300 sec	60

Radiant floor circuit (general)

Parameter	Parameter name	Parameter description	Area	Default value
C4.10	Maximum calculated flow temperature - radiant floor circuit	Setting the maximum permissible flow temperature for the radiant floor circuit	20 ÷ 60 °C	45
C4.11	Minimum calculated flow temperature - radiant floor circuit	Setting the minimum permissible flow temperature for the radiant floor circuit	15 ÷ 40 °C	20

Falling below / exceeding the permissible flow temperature

The heating function is only regulated if the corresponding flow temperature is within the desired temperature range. The relevant parameters are as follows:

Parameter	Parameter name	Parameter description	Area	Default value
C5.1	T flow min - radiator circuit	Minimum temperature of the radiator circuit required for the radiator circuit to operate.	10 ÷ 60 °C	30
C5.2	T flow max - radiator circuit	Maximum temperature of the radiator circuit required for the radiator circuit to operate.	30 ÷ 95 °C	60
C5.3	Tfl min - radiant floor circuit	Minimum temperature of the radiant floor circuit required for the radiant floor circuit to operate.	10 ÷ 30 °C	22
C5.4	Tfl max - radiant floor circuit	Maximum temperature of the radiant floor circuit required for the radiant floor circuit to operate.	30 ÷ 50 °C	45
C5.9	Tfl min - check interval	Tvl check interval after the temperature falls below the minimum value	5 ÷ 60 min	30
C5.10	Tfl min - check duration	Duration of the Tfl check, in minutes, following a delay after the temperature falls below the minimum value	1 ÷ 20 min	10
C5.11	Tfl max - check interval	Tfl check interval, in minutes, after the maximum value is reached	5 ÷ 60 min	30
C5.12	Tfl max - check duration	Duration of the Tfl check, in minutes, following a delay after the maximum value is reached	1 ÷ 10 min	3

The flow temperature is measured by different sensors depending on the heating system. For radiators, the flow temperature is determined via S1, and for radiant floor heating via S3.

The following describes the procedure when the flow temperature for the radiant floor circuit falls below the set point. This procedure assumes that a temperature demand is present.

As soon as the temperature at S3 falls below the temperature set in C5.3, the timer (parameter C5.10) starts. During this countdown, the relevant zone valves are opened and the relevant pump(s) are activated. If, once this timer has elapsed, the temperature at S3 is still lower than the value set in parameter C5.3, the system pauses for the duration specified in parameter C5.9. During this time, the zone valves and the relevant pump(s) are switched off. Thereafter, a new check begins as described above.

A newly set time value is only taken into account once the relevant time period has restarted. This means: if the waiting time C5.9 has not yet elapsed, a change to this parameter will only be taken into account once the waiting time has restarted.

Injection valve – control

Parameter	Parameter name	Parameter description	Area	Default value
C15.1	Mixing - KP	Kp factor for PID calculation	0.0 ÷ 10.0	1.7
C15.2	Mixing - TN	Tn factor for PID calculation	0.0 ÷ 1000.0	180.0
C15.3	Mixing - TV	Tv factor for PID calculation	0.0 ÷ 1000.0	20.0
C15.4	Mixing - positive gain	Gain factor for positive deviation	0.0 ÷ 5.0	1.0
C15.5	Mixing - negative gain	Gain factor for negative deviation	0.0 ÷ 5.0	1.5
C15.6	Mixing - PWM max	Maximum PWM value for valve control	0 ÷ 100%	35 %
C15.7	Mixing - maximum duration for PWM max	Longest permitted duration for control at maximum PWM value	0s ÷ 240s	120 s
C15.8	Mixing - duration pause after PWM max	Forced pause time after the runtime at maximum PWM value has been reached or if the D component is too high	0s ÷ 120s	30 s
C15.9	Mixing - PWM base value	Base value for PID / valve control	0.0 ÷ 20.0%	8.0 %
C15.10	Mixing - blocking time after Friwa operation	Blocking time following activation of the Friwa function	0s ÷ 300s	30 s
C15.11	Mixing - duration 100% after start	Duration of 100% control following activation / start-up phase	0s ÷ 300s	60 s
C15.12	Mixing - pause after 100% after start	Pause following 100% control during the start-up phase	0s ÷ 300s	40 s
C15.13	Mixing - PID reset after overshoot	Activate PID reset if overshoot is detected?	0 - No 1 - Yes	1
C15.14	Mixing - restart with 100% if no control for x seconds	Restart with 100% control if there is no output to the valve for x seconds	0s ÷ 300s	60 s
C15.17	Mixing - damping factor	Damping factor for nominal temperature	0 ÷ 200	64
C15.18	Mixing - D max before pause	Maximum D-component before initiating a pause (C15.8)	0.0 ÷ 100.0%	30.0 %
C15.19	Mixing - D max before pause hysteresis	Hysteresis relative to maximum D-component (C15.18) for terminating the pause	0.0 ÷ 100.0%	10.0 %
C15.20	Mixing - PID time base	Time base for PID calculation (calculation of new values every x seconds)	1s ÷ 10s	1 s

PWM PID parameters

Parameter	Parameter name	Area	Default value
C6.1	P – constant of PWM control 1	0.01 ÷ 10.00	1.00
C6.2	I – constant of PWM control 1	0.01 ÷ 10.00	1.00
C6.3	D – constant of PWM control 1	0.01 ÷ 10.00	1.00
C6.4	P – constant of PWM control 2	0.01 ÷ 10.00	1.00
C6.5	I – constant of PWM control 2	0.01 ÷ 10.00	1.00
C6.6	D – constant of PWM control 2	0.01 ÷ 10.00	1.00

Emergency operation zones

Parameter	Parameter name	Parameter description	Area	Default value
C7.1	Delayed switchover to emergency operation	Definition of a time-delayed switchover to emergency operation following a loss of communication between the room control unit and the controller	0 ÷ 240 min	120
C7.2	Emergency operation period	Setting the emergency operation duration	0 ÷ 240 min	60
C7.3	Emergency operation zone 1 (period %)	Setting the percentage of operation for Zone 1 during the period	0 ÷ 50%	30
C7.4	Emergency operation zone 2 (period %)	Setting the percentage of operation for Zone 2 during the period	0 ÷ 50%	30
C7.5	Emergency operation zone 3 (period %)	Setting the percentage of operation for Zone 3 during the period	0 ÷ 50%	30
C7.6	Emergency operation zone 4 (period %)	Setting the percentage of operation for Zone 4 during the period	0 ÷ 50%	30
C7.7	Emergency operation zone 5 (period %)	Setting the percentage of operation for Zone 5 during the period	0 ÷ 50%	30

Integration parameters

Parameter	Parameter name	Area	Default value
C8.1	Influence of which RCU on zone 1		6
C8.2	Influence of which RCU on zone 2	0 - RCU 1	6
C8.3	Influence of which RCU on zone 3	1 - RCU 2	6
C8.4	Influence of which RCU on zone 4	2 - RCU 3	6
C8.5	Influence of which RCU on zone 5	3 - RCU 4	6
C8.7	RCU to connection 1	4 - RCU 5	6
C8.8	RCU to connection 2	6 - none	6
C8.9	RCU to connection 3		6
C8.10	RCU to connection 4		6
C8.11	RCU to connection 5		6
C8.13	All connected room control units (wired)	0 - RCU 1 not paired 1 = RCU 1 paired Bit 1: 0 = RCU 2 not paired 1 = RCU 2 paired Bit 2: 0 = RCU 3 not paired 1 = RCU 3 paired Bit 3: 0 = RCU 4 not paired 1 = RCU 4 paired Bit 4: 0 = RCU 5 not paired 1 = RCU 5 paired	0
C8.14	All connected room control units (BLE)	0 - RCU 1 not paired 1 = RCU 1 paired Bit 1: 0 = RCU 2 not paired 1 = RCU 2 paired Bit 2: 0 = RCU 3 not paired 1 = RCU 3 paired Bit 3: 0 = RCU 4 not paired 1 = RCU 4 paired Bit 4: 0 = RCU 5 not paired 1 = RCU 5 paired	0

Zone control (thermal actuators)

Parameter C1.2 is used to select the type of thermal actuators connected to the controller. The NC type opens the thermal actuator when a control voltage is applied to the output; the NO type opens the thermal actuator when no control voltage is applied to the output.

Parameter C2.1 allows you to select between different zone control modes:

C2.1=0 - RCD-SETTINGS

C2.1=1 - P-CONTROL

C2.1=2 - PI-CONTROL

C2.1=3 - HYSTERESIS

Parameter C2.6 sets the minimum turn-on-time for the zone output (thermal actuator).

In P and PI control modes, the operating time (modulation time) of the zone output is calculated based on the deviation of the measured temperature from the required room temperature within the on-time (period). The duration of the on-time is set separately for each heating zone on the room unit. Parameter C2.3 defines the width of the zone within which on-time modulation is carried out.

Parameter C2.2 defines the value of the I-constant in PI mode. In the event of larger deviations of the measured temperature from the required room temperature, the I-constant influences the speed of the automatic shift of the P-zone (+/-0.1°C per step). The P-zone can be shifted manually using parameter C2.4 for heating and parameter C2.5 for cooling.

In hysteresis control mode, the state (ON/OFF) of the zone output is determined on the basis of the deviation of the measured temperature from the required room temperature and the set hysteresis value. The hysteresis value is set separately for each heating zone on the room control unit.

Emergency operation zones

If communication with the room control unit is lost, the control system switches to emergency operation. The delay before switching to emergency operation is set using parameter C7.1. In emergency operation, the zone is switched on for a period defined by parameter C7.2. The operating time (percentage of the period) for a specific zone is set using parameters C7.3 (for zone 1) to C7.8 (for zone 6).

Example:

C7.1: 120 minutes

C7.2: 60 minutes

C7.3: 30 %

The connection to room control unit 1 (RCU 1) is now interrupted. After a waiting period of 120 minutes (C7.1), emergency operation is activated for RCU 1. The period duration here is 60 minutes (C7.2). With the stored on-time of 30% (C7.3), the pre-set zones of RCU 1 are controlled as follows:

On: 30% of 60 minutes -> 18 minutes

Off: 70% of 60 minutes -> 42 minutes

This on-off cycle repeats periodically until communication with RCU 1 is re-established.

Room control units

Up to 5 RCD40 room control units can be connected to the controller.

Each room control unit represents a temperature zone and can control one or more heating zones. The connection between the controller and the room control units, as well as the configuration of the room control unit's effect on the zones, is carried out via a pairing process.

The pairing process is identical for wired and wireless room control units.

The room control unit exchanges the measured and desired values for its temperature zone with the controller:

- measured room temperature
- desired daytime temperature
- desired night-time temperature
- desired safety temperature
- operating mode
- user functions ON/OFF
- desired hot water temperature

Differential pressure control heating operation

In heating mode, the current differential pressure is measured and pump P1 is controlled to a preset value. This ensures an optimal supply to the consumers and means that only the energy required for optimal operation is used.

In the hydraulic system WRF, the distribution manifold pump P2 of the radiant floor heating operates in a self-regulating manner.

Parameter	Parameter name	Parameter description	Area	Default value
C12.1	dp radiant floor circuit	Differential pressure for radiant panel heating	50 hPa ÷ 400 hPa	150
C12.2	dp radiator circuit	Differential pressure for radiator	20 hPa ÷ 250 hPa	50

DESCRIPTION OF SYSTEM OPERATION

Mixing valve control of the flow temperature for radiant floor heating

When operating with a radiant floor heating, the temperature in the distribution manifold is regulated to a target temperature – as currently required by the heating zones – by adjusting the control of the thermoelectric actuator. This prevents unnecessarily high flow temperatures in the active zones and reduces the switching cycles of the zone valves.

Domestic hot water operation / Friwa

The supply of hot drinking water always takes priority over the heating system. When a user draws hot water, this is detected by the flow meter. The switch valve is switched towards the heat exchanger and the primary pump is activated in such a way that the temperature measured at the hot water sensor (S2) is regulated to the set target value. The switch valve remains in this position for a further 2 minutes after the tapping process has finished. This speeds up the stabilisation of the domestic hot water temperature should another tapping occur during this period. If no further tapping takes place, the switch valve is switched back to heating mode.

When a instantaneous water heater is installed, the hot water is preheated in hot water mode, thereby reducing the instantaneous water heater's energy consumption. Furthermore, the flow temperature can be decreased, enabling further savings.

Parameter	Parameter name	Parameter description	Area	Default value
C10.1	Nominal temperature	Target temperature Friwa	Nominal temperature min ÷ nominal temperature max (C10.02 ... C10.03)	45 °C
C10.2	Nominal temperature [min]	Lower setting limit for C10.1	20 ÷ 40 °C	25 °C
C10.3	Nominal temperature [max]	Upper setting limit for C10.1	50 ÷ 70 °C	60 °C

Operation with instantaneous water heater

When operating with a instantaneous water heater (IWH), this heats the hot water to the desired nominal temperature. The nominal temperature must be set separately on the instantaneous water heater.

The Friwa function is used to preheat the hot water to a fixed or dynamic temperature. In the case of dynamic preheating, the current line flow temperature (S1) is used as the input variable.

Parameter	Parameter name	Parameter description	Area	Default value
C11.1	Friwa Function for IWH	How should the DHW module operate when a IWH is installed?	0 - Inactive - HW only via IWH 1 - Dynamic Tnom calculation [Tnom = Tfl - dT] 2 - Standard Tnom [parameter C10.1]	1
C11.2	IWH dT	Dynamic calculation of the nominal temperature based on the flow temperature. Tnom = Tfl - dT	2 ÷ 25K	5 K
C11.3	IWH Tnom min	Minimum temperature for dynamic Tnom calculation	25 °C ÷ (C11.4 - 10 K)	35 °C
C11.4	IWH Tnom max	Maximum temperature for dynamic Tnom calculation	(C11.3 + 10 K) ÷ 65°C	45 °C
C11.6	IWH PWM	Maximum PWM value of the primary pump in Friwa mode when a IWH is installed	30 ÷ 100%	80 %
C11.15	Friwa overtemperature shut-off available	Overtemperature shut-off of the DHW module is available	0 - NO 1 - YES 2 - YES with restart optimisation	2
C11.16	Friwa overtemperature shut-off delay	Duration for which the overtemperature must persist before the primary pump is switched off.	5 ÷ 120 sec	32sec
C11.17	Friwa overtemperature shut-off ΔT	Temperature rise to be classified as an overtemperature.	2 ÷ 25K	8 K

DESCRIPTION OF SYSTEM OPERATION

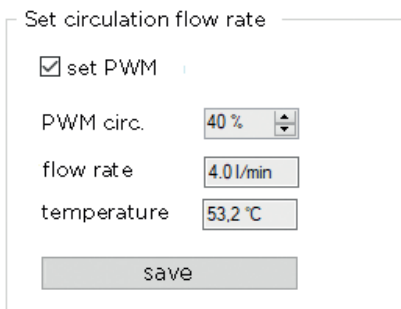
Circulation

By means of a circulation function, the drinking water in the circulation line is heated to the desired nominal temperature. The designated circulation pump is actuated by the controller via the P3 / PWM 3 connection.

When commissioning the circulation pump for the first time, you must specify the following parameters via the PC software in order to adapt the operation of the DHW module to the current circulation line:

- PWM value (0 ... 100 %) for the control of the circulation pump (PWM 3)
- Cold water temperature sensor (internal or external circulation sensor)

You will find the relevant parameters under Settings -> Friwa -> Circulation. To adjust the revolution speed, the checkbox next to "Set PWM" must be ticked.



Whilst changing the PWM value, all relevant values are displayed. With the setting, the flow in the circulation line is modified, and consequently the temperature difference between inlet and outlet.

Please bear in mind that the temperature change occurs with a delay, caused by the circulation line. No hot water must be tapped whilst the setting is being adjusted.

Once the adjustment is complete, the PWM value and the corresponding flow rate (with no active hot water tapping) are saved by clicking the "Save" button.

NOTICE

An additional external circulation sensor can be defined. This can be useful to minimise the runtimes of the circulation pump or to determine the temperatures of pipes with a bad circulation.

To prevent the heating system from being under-supplied (the frost protection function always takes priority over the DHW mode), there are further parameters:

Maximum runtime (C10.18): To ensure that the heating system is not under-supplied even when the circulation pump is running continuously, there is a maximum runtime for the circulation pump. As soon as this is reached, the circulation pump is switched off for a pause time (C10.19).

The circulation function offers 3 operating modes which can be combined with each other.

- Temperature control
- Time control
- Demand

Depending on the activated mode, additional settings are required.

Operation mode "temperature control"

Either the cold water sensor (S4) or an external temperature sensor connected to input S6 can be selected as the temperature sensor for temperature control. If the temperature measured at the selected sensor falls below the switch-on temperature, the circulation pump is actuated. If the temperature measured at the selected sensor is higher than the switch-off threshold (switch-on temperature + ΔT), the circulation pump is switched off.

To compensate for temperature fluctuations caused by a sub-optimal supply, the switch-off can be delayed using the "Run-on" parameter (C10.13).

For the run-on time, the temperature at the sensor must have met the switch-off condition for the circulation to be switched off.

Operation mode "time control"

The controller allows you to manage 2 time programmes, each with 21 time slots. If the current time lies within a defined time window, the circulation pump is actuated. For each time slot, the time can be set in 15-minute increments.

Operation mode "demand via tap impulse"

Is a tap open for a few seconds (max 5 s) and closed, the flow rate sensor detects this tap impulse. If the "Demand via tap impulse" mode is activated, this tap impulse initiates the switch-on of the circulation pump for the determined runtime. After the end of the runtime, the circulation pump is locked for a defined waiting time. During the runtime as well as during the waiting time, no new demand is accepted.

Any setting changes made during a circulation cycle in process will not be applied until after the circulation process has ended (including the waiting time).

DESCRIPTION OF SYSTEM OPERATION

Operation mode "demand via bus"

If a corresponding demand is sent via the bus, circulation is activated for the set runtime. To send a demand via the bus, the value 1 must be sent to Modbus register 40402.

If a demand is sent via the bus during the pause time (C10.19), it is executed once the pause time has elapsed.

Any setting changes made during a circulation cycle in process will not be applied until after the circulation process has ended (including the waiting time).

Connecting the operation modes

You can also combine the operation modes "temperature-controlled", "time-controlled" and "demand via tap pulse" to adapt the circulation to your specific requirements.

The following combinations are possible:

- **Time control + temperature control:**
The temperature control is only active during the determined time windows. The circulation pump is switched on and off by the conditions of the temperature control.
- **Temperature control + demand via tap impulse:**
The circulation is switched on on demand (tap impulse). The circulation is switched off when the switch-off threshold temperature is exceeded or after the end of the runtime. After that, the demand for a determinable break is locked.
- **Time control + demand via tap impulse:**
During the time windows, the circulation runs continuously. Outside the time windows, the circulation starts on demand and stops after the end of the runtime. After that, the demand for a determinable break is locked.
- **Time control + temperature control + demand via tap impulse:**
The temperature control is only active during the determined time windows. Outside the time windows on demand. When the desired temperature is reached, the demand ends ahead of time. If it is reached, the function is still locked by the demand for the determined break and can only be activated if the break has ended.

Parameter	Parameter name	Parameter description	Area	Default value
C10.4	Circulation activated	Activates the circulation	0: Off 1: On	0
C10.5	Circulation temperature-controlled	Circulation operates on a temperature-controlled basis	0: Off 1: On	0
C10.6	Circulation time-controlled	Circulation operates on a time-controlled basis	0: Off 1: time programme 1 2: time programme 2	0
C10.7	Circulation on demand via tap impulse	A separate tap must be detected for less than 5 seconds.	0: Off 1: On	0
C10.8	Circulation on demand via Bus	Circulation operates on an external demand via Modbus.	0: Off 1: On	0
C10.9	Circulation sensor	S4 refers to the sensor installed in the station. Alternatively, S6 can be installed as an external sensor in the circulation line.	0: S4 1: S6	0
C10.10	Circulation rotation speed		0 % ... 100 %	40 %
C10.11	Circulation switch-on temperature	Applies to temperature-controlled circulation	Nominal temp. [min] - 2.0 K ... nominal temperature - 2.0 K	40.0 °C
C10.12	Circulation dT	Applies to temperature-controlled circulation	2.0 ... 10.0 K	3.0 K
C10.13	Circulation run-on	Applies to temperature-controlled circulation	0 ... 600 s	10 s
C10.14	Circulation runtime for demand via tap impulse	Pump runtime after a demand by a tapping	20 ... 600 s	60 s
C10.15	Circulation waiting time	Circulation on demand via tap impulse; waiting time until the next demand is evaluated.	0 ... 60 minutes	10 min
C10.16	Circulation runtime on demand Bus	Pump runtime after a demand via Bus	20 ... 600 s	60 s
C10.17	Circulation flow rate	Flow rate when the circulation pump is active	0.0 ... 50 l/min	0.0 l/min
C10.18	Circulation maximum runtime	Maximum continuous runtime of the circulation pump	1... 60 min	5 min
C10.19	Circulation pause after maximum runtime	Pause after the maximum runtime has been reached	10 ... 60 min	15 min

DESCRIPTION OF SYSTEM OPERATION

Line heating

Line heating reduces unwanted cooling of the supply line, thereby ensuring the prompt supply of hot water at the tap.

When this function is active, water flows through the primary side of the heat exchanger at regular intervals.

An ongoing line heating cycle is terminated and deemed successful as soon as the target temperature at the station's inlet sensor (S1) is reached or a sufficiently rapid rise in temperature is detected.

Depending on the selected operation mode, the target temperature can be either the set hot water nominal temperature or the maximum temperature recorded at S1 during a previous period, used as a dynamic reference.

If the maximum runtime for the function is exceeded, the line heating is terminated and deemed unsuccessful.

Reactivation takes place in accordance with the selected time intervals.

Parameter	Parameter name	Parameter description	Area	Default value
C12.07	Line heating - mode	Operating mode of line heating	0 - Inactive 1 - Thw_nom 2 - Dynamic Tfl_max	2
C12.08	Line heating - Ttarget min	Minimum temperature that may be reached.	20°C ÷ (line heating Ttarget_max)	30 °C
C12.09	Line heating - Ttarget max	Maximum temperature that may be reached.	(Line heating Ttarget_min) ÷ 50°C	45 °C
C12.10	Line heating - period consideration T flow max	When selecting the "Dynamic Tfl_max" operation mode, the flow temperatures from the previous x hours are taken into account.	2 ÷ 48 h	24 h
C12.11	Line heating - ΔT on	The function only becomes active if the temperature falls below the target temperature by ΔT	(Line heating ΔT_off + 2K) ÷ 10K	4 K

Parameter	Parameter name	Parameter description	Area	Default value
C12.12	Line heating - ΔT off	The function is (successfully) terminated when the target temperature has been reached by ΔT	$0K \div (\text{line heating } \Delta T_{\text{on}} - 2K)$	2 K
C12.13	Line heating - run time	Maximum runtime; once this has elapsed, the function is deemed unsuccessful	$20 \div 500 \text{ sec}$	240 s
C12.14	Line heating - check interval successful	Pause between two function cycles if the last check was successful	$1 \div 120 \text{ min}$	40 min
C12.15	Line heating - check interval not successful	Pause between two function cycles if the last check was not successful	$1 \div 120 \text{ min}$	20 min
C12.16	Line heating - PWM pump	Maximum setpoint speed of the pump during line heating	$40 \div 90 \%$	90 %
C12.17	Line heating - ramp duration	Ramp time for accelerating to the maximum setpoint speed	$60 \div 180 \text{ s}$	180 s
C12.18	Line heating - check time ΔT	Check period for temperature increase	$2.0 \div 5.0 \text{ s}$	3.0 s
C12.19	Line heating - successful $\Delta T/\Delta t$	Required temperature rise for early, successful termination of the function	$1.0 \div 10.0 \text{ K}$	2.0 K

DESCRIPTION OF SYSTEM OPERATION

Communication interfaces

BUSin and BUSout are used for communication between identical HBC13.14 controllers.

Bus-2i and Bus-2o are suitable for communication via Modbus-RTU with SCADA systems.

Parameter	Parameter name	Parameter description	Area	Default value
C08.19	Bus 1 - address	Bus 1 has the connection designation BUSin / BUSout	0 - NOT USED 1 - 247 SERVER-ADDRESSES 255 - CLIENT	0
C08.20	Bus 1 - number of server devices	Bus 1 has the connection designation BUSin / BUSout	0 - 5	0
C07.12	Port settings	Communication parameters of the Modbus-RTU connection	0-115200,8,1,N 1 - 57600,8,1,N 2 - 38400,8,1,N 3 - 19200,8,1,N 4-9600,8,1,N	3
C07.13	Server ID	RTU Port Server ID	1 ... 247	1
C07.14	Com-Port - Modbus ID	Modbus ID of the USB interface	1 ÷ 247	128

Blocking protection

The blocking protection activates all actuator outputs on a weekly basis, thereby preventing the pump(s) and control valves from seizing up. Unwanted heat input into the heating system is prevented by a step-by-step sequence of the functions.

The start time can be chosen freely. In addition, an individual start offset (C20.1) is defined for each controller depending on its serial number. This prevents all devices installed in the system from starting simultaneously.

Process: / Procedure

1. The switch valve switches to Friwa
2. Zone valves and the heating valve are opened (duration approx. 4 mins)
3. Heating pump P2 runs at 50 % power for 15 seconds.
4. Zone valves and heating valves are closed (duration approx. 4 mins)
5. The switch valve switches to heating mode.
6. The primary pump P1 runs at 50 % power for 15 seconds.

Domestic hot water operation can take place in parallel during steps 1 to 4. If domestic hot water operation occurs in step 5 or 6, the blocking protection is immediately deactivated.

Parameter	Parameter name	Parameter description	Area	Default value
C13.01	Activate blocking protection	Activate blocking protection	0 - NO 1 - YES	1
C13.02	Blocking protection - week day	Start time week day	1 ÷ 7 (1==Mon, 2==Tue, ... 7==Sun)	5
C13.03	Blocking protection - hour	Start time hour	0 ÷ 23	20
C20.01	Time offset for special functions	Device-specific offset (for blocking protection, etc.); initially calculated based on the serial number	0 ÷ 59	0

DESCRIPTION OF SYSTEM OPERATION

scada - Fallback

Parameter	Parameter name	Parameter description	Area	Default value
C14.1	Fallback T flow	Fallback value if Tfl has a fault	45 °C ÷ 80 °C	58
C14.2	Fallback Tcw	Fallback value if Tcw has a fault	5 °C ÷ 20 °C	15
C14.11	Fallback operation mode RCU 1	If the SCADA system does not send a value within the required time, which room temperature should then be used?	"0: Fallback room temperature RCU 1 1: Current value RCU 1"	0
C14.12	Fallback operation mode RCU 2	If the SCADA system does not send a value within the required time, which room temperature should then be used?	"0: Fallback room temperature RCU 2 1: Current value RCU 2"	0
C14.13	Fallback operation mode RCU 3	If the SCADA system does not send a value within the required time, which room temperature should then be used?	"0: Fallback room temperature RCU 3 1: Current value RCU 3"	0
C14.14	Fallback operation mode RCU 4	If the SCADA system does not send a value within the required time, which room temperature should then be used?	"0: Fallback room temperature RCU 4 1: Current value RCU 4"	0
C14.15	Fallback operation mode RCU 5	If the SCADA system does not send a value within the required time, which room temperature should then be used?	"0: Fallback room temperature RCU 5 1: Current value RCU 5"	0
C14.16	Fallback room temperature RCU 1	Fallback value if no RCU is connected and there is no connection to the SCADA system	6 °C ÷ 30 °C	18
C14.17	Fallback room temperature RCU 2	Fallback value if no RCU is connected and there is no connection to the SCADA system	6 °C ÷ 30 °C	18
C14.18	Fallback room temperature RCU 3	Fallback value if no RCU is connected and there is no connection to the SCADA system	6 °C ÷ 30 °C	18
C14.19	Fallback room temperature RCU 4	Fallback value if no RCU is connected and there is no connection to the SCADA system	6 °C ÷ 30 °C	18
C14.20	Fallback room temperature RCU 5	Fallback value if no RCU is connected and there is no connection to the SCADA system	6 °C ÷ 30 °C	18

Adaptation

Parameter	Parameter name	Parameter description	Area	Default value
C16.1	Adaptation - active	Activate dP Adaptation	"0 - No 1 - Yes"	1
C16.2	Adaptation - pause between 2 steps	Waiting time between steps	4.0 s ÷ 20.0 s	8.0 s
C16.3	Adaptation - pause directly after step	Waiting time after reading the Flow2Speed table	1.0s ÷ 10.0s	2.0 s
C16.4	Adaptation - dp min for step detection	dP deviation for detecting a step	10 mbar ÷ 100 mbar	20 mbar
C16.5	Adaptation - Duration step detection	Time period for dP deviation for detecting a step	1.0s ÷ 5.0s	1.0 s
C16.6	Adaptation - delay	Timing for PWM start upon step detection	1.0s ÷ 5.0s	1.0 s
C16.7	Adaptation step end after	Timing for final adaptation for step detection	1.0s ÷ 5.0s	1.5 s
C16.8	Adaptation - maximum cycles	Maximum number of adaptation cycles for step detection	1 ÷ 5	2
C16.9	Adaptation - max. cycles at Friwa start	Maximum number of adaptation cycles after reading the table	1 ÷ 5	1
C16.10	Adaptation - dT max after Friwa start	Maximum dT deviation for adaptation after reading the table	0.0 K ÷ 5.0 K	1.0 K
C16.11	Adaptation - limit pos for neg dT	Maximum positive adaptation for a negative temperature deviation	40 ÷ 100 %	90 %
C16.12	Adaptation - limit pos for pos dT	Maximum positive adaptation for a positive temperature deviation	40 ÷ 100 %	60 %
C16.13	Adaptation - limit neg for neg dT	Maximum negative adaptation for a negative temperature deviation	40 ÷ 100 %	90 %
C16.14	Adaptation - limit neg for pos dT	Maximum negative adaptation for a positive temperature deviation	40 ÷ 100 %	60 %
C16.15	Adaption - max dT for maximal adaptation	Maximum temperature deviation for maximum adaptation	0.0 ÷ 5.0 K	2.0 K
C16.16	Adaptation - PWM min for step detection	Minimum PWM for step detection	5 ÷ 30 %	10 %

INSTALLATION [SPECIALIST]

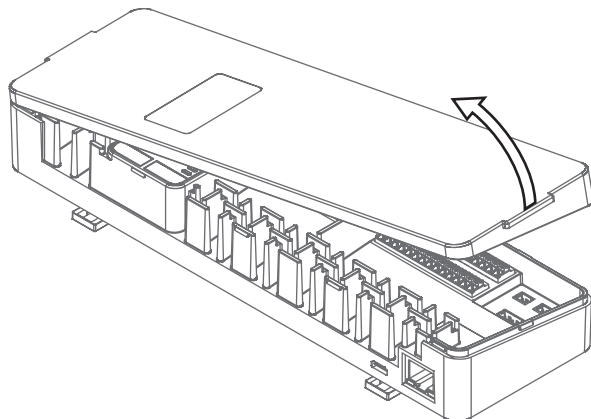


WARNING

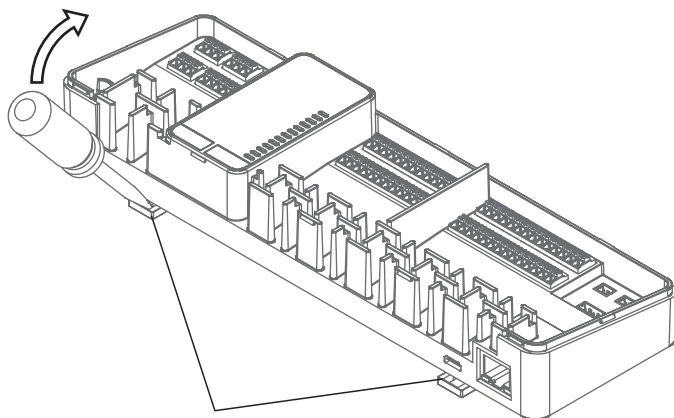


Risk to life and limb due to electric shock!

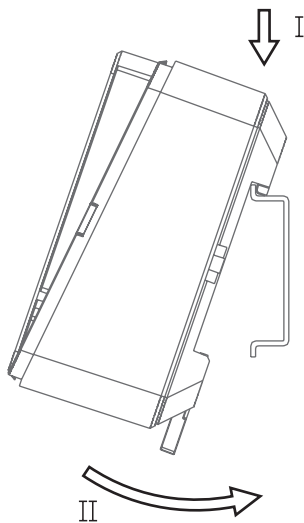
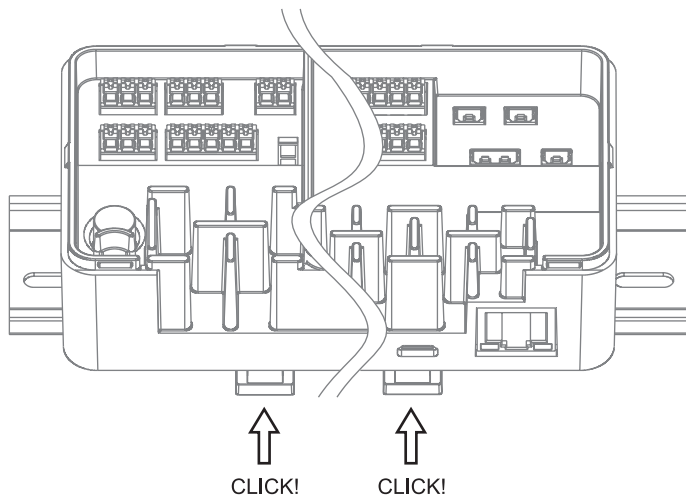
- Disconnect the controller from the power supply before opening the housing.
- Make sure that the power supply cannot be unintentionally switched on when the housing is open.



1



2


3

4

ELECTRICAL CONNECTION [SPECIALIST]

Each project must be based on your own calculations and plans, which must comply with the applicable regulations. The illustrations and text in these instructions are provided for illustrative purposes only, and the publisher accepts no liability. The publisher expressly excludes any liability for unprofessional or incorrect installation, or for any resulting damage. Subject to technical changes.

The connection of the control units must be carried out by a specialist with corresponding qualification or by an authorised organisation. Before you start wiring, ensure that the main switch is switched off. Observe the regulations for low-voltage installations IEC 60364 and VDE 0100, the statutory provisions on accident prevention, the statutory provisions on environmental protection and other national regulations. Each time you open the housing, ensure that all poles of the power supply are disconnected. Failure to follow these instructions may result in serious injury, such as burns, or even be life-threatening. All low-voltage connections, such as those for temperature sensors, must be located separately from connections that are live.



WARNING

Risk to life and limb due to electric shock!

Make sure that the following conditions are satisfied when performing the work described in this section:

- All cables leading to the controller must be disconnected from the power supply and it must be ensured that they cannot be unintentionally reconnected during installation.
- The protective earth conductors (PE) from the mains cable and pump and valve cables must be connected to the protective earth conductor terminal block.
- All cables must be laid so that persons cannot stand on them or trip over them.
- The cables must satisfy the requirements listed in the Technical data section.
- The local power supply must match the specifications on the type plate of the controller.
- The power supply cable is to be connected to the mains power as follows:
 - using a plug connected to a wall mains socket or
 - via an isolating mechanism allowing complete isolation in the case of permanent wiring.
- The power supply cable must be laid according to all applicable legal guidelines and regulations of the local electricity supplier.





CAUTION

Danger of damage and malfunction!

Connect only components that do not overload the controller inputs and outputs; more information is provided on the type plate and in the "Technical data" section. When using a circulation pump, the power consumption of the pump connected to the controller must absolutely be observed and it has to be checked whether they are compatible with the controller. In some cases the circulation pump directly has to be supplied by the mains connection. The speed is controlled via the PWM signal.

NOTICE

- Any connection polarity may be used for the 1 - 4 signal inputs and outputs.
- Only type Pt1000 temperature sensors may be used.
- Lay the sensor cables at least 100 mm away from any power supply cables.
- Use shielded sensor cables when inductive sources are present, e.g. high-voltage lines, radio transmitters, microwave devices.

Each system is available in variants with different heat exchangers, circulation pumps and electric instantaneous water heaters [IWH].

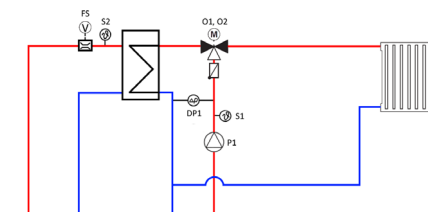
Depending on the hydraulic system installed, the following operation modes are supported:

- WR - Domestic hot water preparation with radiator heating
- WF - Domestic hot water preparation with radiant floor heating
- WRF - Domestic hot water preparation with radiator and radiant floor heating with self-regulating pump
- WRF E - Domestic hot water preparation with radiator and radiant floor heating with dp control

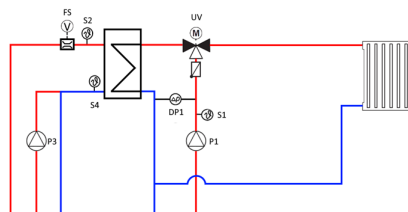
Parameter	Parameter name	Parameter description	Setting range	Default value
C9.01	Hydraulic variant	Must correspond to the installed hydraulic system.	0 - not selected 1 - WR 2 - WF 3 - WRF 4 - WRF-E 5 - F	0

WR: DHW module, radiator, IWH, circulation

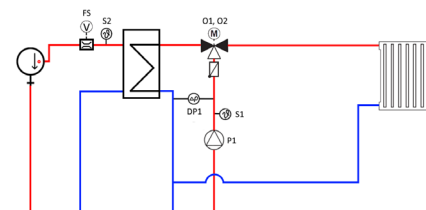
Switching valve: [O1=always ON; O2: ON=heating, OFF=DHW module]



WR - without IWH - without circulation



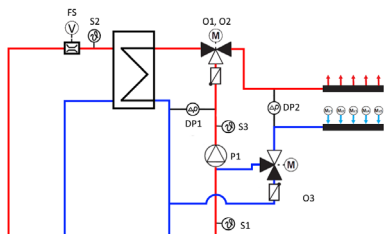
WR - without IWH - with circulation



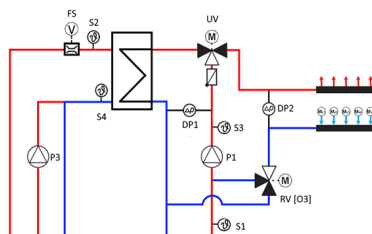
WR - with IWH - without circulation

WF: DHW module, radiant floor heating, IWH, circulation

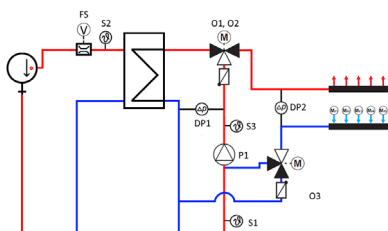
Switching valve: [O1=always ON; O2: ON=heating, OFF=DHW module]



WF - without IWH - without circulation



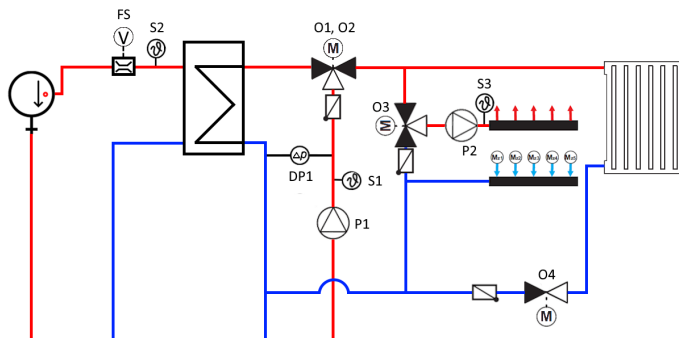
WF - without IWH - with circulation



WF - with IWH - without circulation

WRF: DHW module, radiator, radiant floor heating, IWH

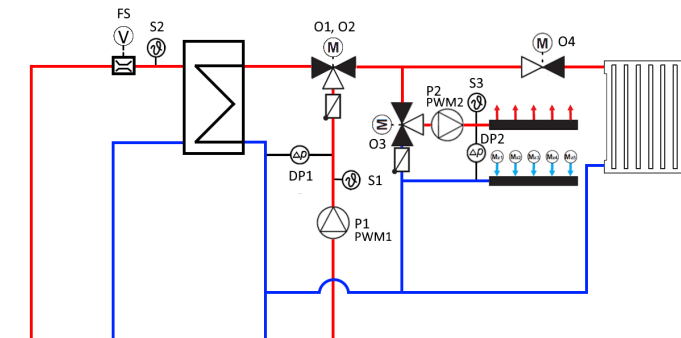
Switching valve: [O1=always ON; O2: ON=heating, OFF=DHW module]



WRF - with IWH - without circulation

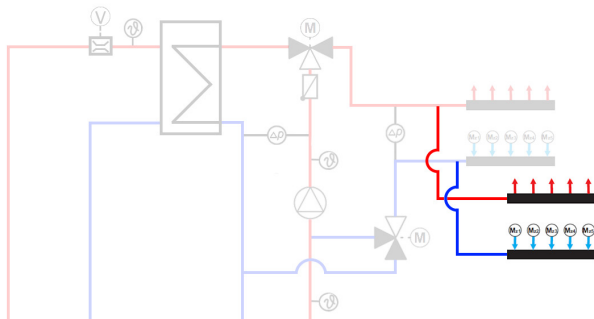
WRF-E: DHW module, radiator, radiant floor heating

Switching valve: [O1=always ON; O2: ON=heating, OFF=DHW module]



WRF-E - without IWH - without circulation

F: Add up to five additional zones with up to 10 actuators.

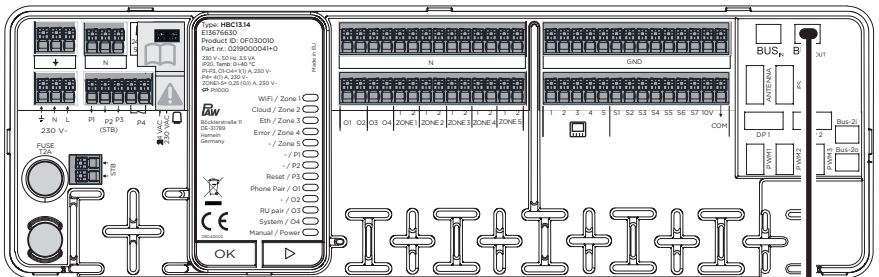


F - Extension radiant floor heating

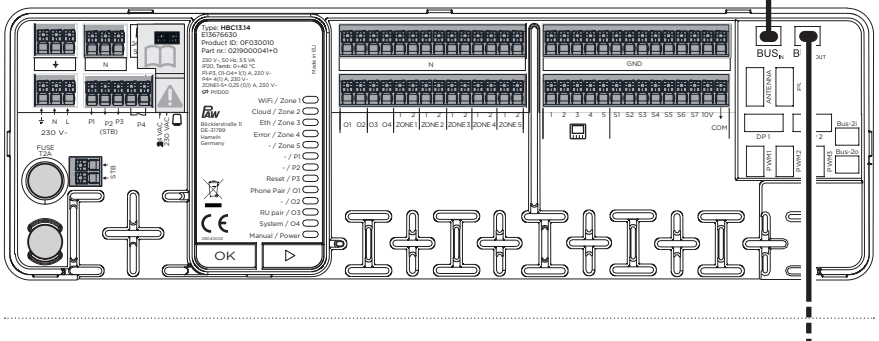
To expand the system to include further zones or branches, additional controllers (up to a maximum of 6) can be connected via a BUS connection. The first controller in the BUS connection (which controls the energy source, the mixing valve and the pump) must be set as the master (client) controller, whilst the other controllers are slave (server) controllers (see chapter MENU – client CONTROLLER). The controllers must be paired using the supplied cable (see the chapter MENU – PAIRING THE CONTROLLERS). The pairing process establishes the communication links between the controller and defines the order of the controllers (address) in the BUS connection (Client, first Server, second Server, etc.).

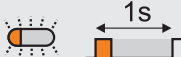
Via the BUS connection, the client controller sends information on measured temperatures and the operating mode, as well as other data, to the server controllers, and receives from them the desired zone temperatures and a request to switch on the power source.

Master (client) controller



First slave (server) controller



Signalling	Error
On the home screen, the LED flashes briefly or continuously to indicate the operating status of the zone. ZONE 1  ZONE 1 	Error with the connection to the room control unit. What can I do? For a wired connection, please check the connection between the controller and the room control unit. For a wireless connection, check the antenna connection on the controller. If the fault persists, the room control unit and the controller will need to be serviced. The process is automatically adjusted as follows: Once the set time has elapsed, the controller switches to what is known as emergency operation.

	HBC
Weekly programme timer	Yes
Power supply	230 V~, 50 Hz
Power supply timer	R1025 (Li-Mn) 3V battery
Time accuracy	+/-1s (24h) at 20°C
Temperature sensor	Pt1000
Maximum power consumption	5 W
Power consumption in standby mode	3.5 VA
Degree of protection	IP 20 in accordance with EN 60529
Safety class	I in accordance with EN 60730-1
Housing	PC+ABS - thermoplastic
Dimensions (W × H × D)	233 × 163 × 48 mm
Installation method	Top-hat rail for mounting the controller
Ambient temperature	5-40 °C
Storage temperature	-20 °C to +65 °C
Weight	370g
P1-P3, O1-O4	1(1) A, 230 V~
P4	4(1) A, 230 V~
ZONE 1-5	10 x 0.25 (0.1) A, 230 V~

**NOTICE**

Electrical and electronic devices must not be disposed of in the household waste.

For your return, there are free collection points for electrical appliances and, if necessary, additional points of acceptance for the reuse of the devices in your area. The addresses can be obtained from your city or communal administration.

If the old electrical or electronic device contains personal data, you are responsible for deleting it before returning the device.

Batteries and rechargeable batteries must be removed prior to the disposal of the product. Depending on the product equipment (partly with optional accessories), single components can also contain batteries and rechargeable batteries. Please observe the disposal symbols on the components.

**NOTICE****Disposal of transport and packaging materials**

The packaging materials are made of recyclable materials and can be disposed of with recyclable materials.

The manufacturer can neither monitor the compliance with this manual nor the conditions and methods during the installation, operation, usage and maintenance of the controller. Improper installation of the system may result in damage to property and, as a result, to bodily injury.

Therefore, the manufacturer assumes no responsibility and liability for loss, damage or costs which result from or are in any way related to incorrect installation, improper operation, incorrect execution of installation work and incorrect usage and maintenance. Similarly, we assume no responsibility for patent right or other right infringements of third parties caused by usage of this controller.

The manufacturer reserves the right to make changes to the product, technical data or installation and operating instructions without prior notice.

In accordance with German statutory regulations, there is a 2-year legal guarantee on this product for the customer. The seller will remove all manufacturing and material faults that occur in the product during the guarantee period and affect the correct functioning of the product. Natural wear and tear do not constitute a malfunction. No legal guarantee can be offered if the fault can be attributed to third parties, unprofessional installation or commissioning, incorrect or negligent handling, improper transport, excessive loading, use of improper equipment, faulty construction work, unsuitable construction location or improper operation or use. Legal guarantee claims shall only be accepted if notification of the fault is provided immediately after it is discovered. Guarantee claims are to be directed to the seller.

The seller must be informed before guarantee claims are processed.

For processing a guarantee claim an exact fault description and the invoice / delivery note must be provided.

The seller can choose to fulfil the legal guarantee either by repair or replacement. If the product can neither be repaired nor replaced, or if this does not occur within a suitable period in spite of the specification of an extension period in writing by the customer, the reduction in value caused by the fault shall be replaced, or, if this is not sufficient taking the interests of the end customer into consideration, the contract is cancelled. Any further claims against the seller based on this guarantee obligation, in particular claims for damages due to lost profit, loss-of-use or indirect damages are excluded, unless liability is obligatory by law.

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