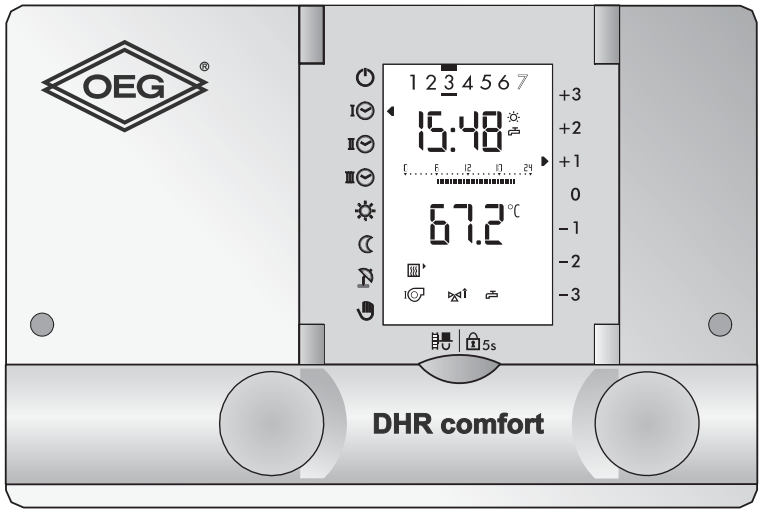
Universal heating controller
DHR - classic
DHR - comfort
DHR - expert



Operating manual
for the specialist

Dok. Nr. 112649 33/2010

Contents

1 Information for mounting 4
1.1 General information 4
1.2 Preparation of the assembly and start-up 5
1.3 Start-up 5
1.4 Allocation of the connectors 6
1.4.1 Connectors DHR - classic /- comfort 6
1.4.2 Connectors DHR - expert. 7
1.5 Dimensions and mounting information 8
1.5.1 Dimensions DHR - classic/ - comfort 8
1.5.2 Dimensions DHR - expert 9

2 Specialist notes to the operation 10
2.1 Display check 10
2.2 Structure of the parameter levels 11

3 Parameter levels 12
3.1 Level 1 and 2 12
3.2 Service level 12
3.2.1 Operating data "dat". 12
3.2.2 Switching output function on and off 12
3.2.3 Change of parameters on level 3 13
3.3 Change of settings in the coded service levels 4 to 12 15
3.3.1 Example: Sensor configuration store (parameter 4-0) 15

4 General description of functions and parameters 16
4.1 Level 3 - Heating circuits/Domestic hot water 16
4.1.1 Heating curve/base point (parameter 3-1) 16
4.1.2 Room-temperature compensation
(Reinforcement room influence, p-part) (parameter 3-7) 19
4.2 4th level - Configuration of the plant 20
4.3 5th level - Domestic hot water production 20
4.3.1 Basic function of domestic hot water production 20
4.4 7th level - Heating circle function 21
4.4.1 Basic functions heating circle function 21
4.4.2 Heating limits 22
4.5 9th-11th level - Boiler management 23

5 Overview of settings 24
5.1 3rd level 24
5.2 4th level - Configuration of the plant 26

5.3 5th level - DHW production 27
5.4 7th level - Heating circuits 27
5.5 10th level - Parameters of heat generator 28
5.6 11th level - Parameters of heat generator 28
5.7 12th level - Cascade management parameters (generators 1) 29

6 Assistance for start-up and elimination of errors 29
6.1 Checking the controller 29
6.2 Factory settings / RESET 30
6.2.1 Delete operating data 30
6.2.2 Unlock during error message 31
6.2.3 Reload factory settings 31
6.3 Displaying the controller output ports 32
6.4 Error message 33
6.5 Heating circulation pump functions 33
6.6 Remote control operation 34
6.7 FS 5601 remote control 34
6.7.1 Connecting the FS 5601 remote control 34
6.7.2 Start-up of the FS 5601 remote control 34
6.7.3 Operating with FS 5601 remote control 35

7 Technical data 36
7.1 General data 36
7.2 Checking temperature sensors 37

8 Hydraulic variants DHR - expert 38
8.1 Variant 1: DHR - expert (BBMUMULC) 38

9 Hydraulic variants DHR - classic /- comfort 39
9.1 Variant 1: DHR comfort (BBUMUL) 39
9.2 Variant 2: DHR - classic (BBUML) 39

10 Explanation of terms and abbreviations 40

11 INDEX 41

1 Information for mounting

1.1 General information

Electrical installation and safety must correspond to local regulations. The controller is to left under continuing tension in order to guarantee functional readiness at any time. Pre-positioned power switches are, therefore limited to emergency or main switches which are usually left in the ’on position.

⚠ **Warning: Make sure all electricity is switched off or fuses removed before beginning wiring work. The electricity supply must be switched off before connecting or removing connectors. Never change the wires and connections of the controller.**

Connections of sensors, remote controllers, data BUS etc. to the controller must be installed separately from those to the mains.

It may be advisable to suppress inductive loads (such as contactors, relays, mixer drive units etc.) in the vicinity of the programmable thermostat by means of RC circuits over their coils. (Recommended: 0.047 mF/100W, 250 VAC)

⚠ **Unused sensor and signal inputs and outputs must not be connected. The respective symbols and temperatures will not be displayed when checking the sensors. The parameter 7-0 must be set on 3 for an unused heating circuit.**

⚠ **The data in this chapter refers to the connector numbering at the controller. This connector numbering may deviate with installation in a switchgear cabinet etc. Please refer to the appropriate documents.**

1.2 Preparation of the assembly and start-up

The two fixing screws can be seen in the front housing.

1. Wire and attach all electrical connectors.
2. The controller must be inserted into the intended installation cut-out and fixed by means of the 2 fixing screws.

Before start-up it must be ensured that all components are correctly attached.

When the plant is correctly installed and ready for use the following safety precautions must be taken:

- check that the protective fuse of the electricity installation is in order
- check that all necessary connectors are joined
- check that all switches are switched on
- check that all necessary sensors are attached
- check that the output functions work correctly.

1.3 Start-up

The basic display (as example see the cover page) appears after switching on the boiler. The parameters can be adjusted afterwards! If no basic display appears, refer to "6.1 Checking the controller", page 29.

At start-up, determine that:

- the boiler is switched on
- the clock program is correctly programmed
- all temperatures are correctly adjusted
- heating is required according to the outside temperature
- the time and the date are set correctly.

Note: Due to the automatic summer/winter time change it is possible that the time may be adjusted by 1 h. The time in each case will not change. The time is corrected automatically, as soon as the controller is attached at the supply, on the next day between 2.00 and 3.00 o'clock

In addition, depending upon plant configuration, carry out the following start-up steps:

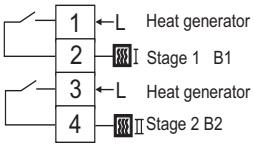
- Controller internal function check, see "6.1 Checking the controller", page 29
- Examine the sensors, see "7.2 Checking temperature sensors", page 37
- If all sensors are attached correctly, the sensor configuration must be saved (Parameter 4-0 = on)
- Switching output functions on and off, see user operating manual.

1.4 Allocation of the connectors

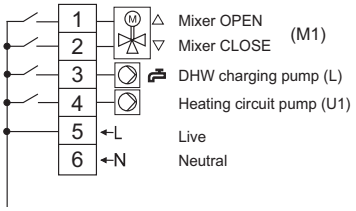
The following pages show the full range of input and output connections. Depending on the controller version and application, not all of these may necessarily be in use. When fitting the controller to a boiler, observe the boiler manufacturer's assembly instructions.

1.4.1 Connectors DHR - classic /- comfort

Connector P1
Heat generator

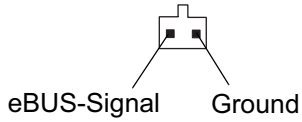


Connector P2
Net, Heating circuit, DHW charging

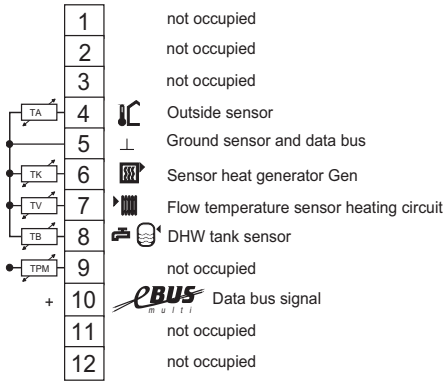


Connector P3 (DHR - comfort)
Heating circuit pump (without mixer)

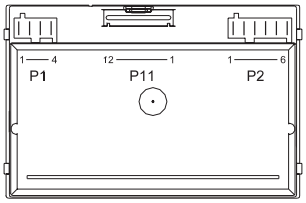
Service-connector eBUS (Front)



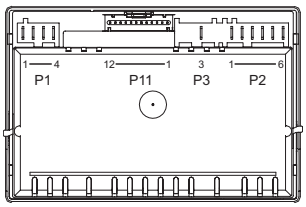
Connector P11
Heating circuit, Boiler, DHW charging, Data bus



Backside DHR - classic

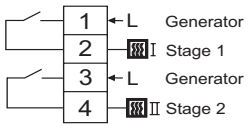


Backside DHR - comfort

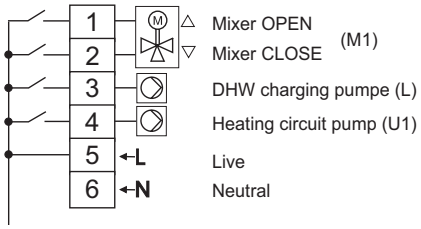


1.4.2 Connectors DHR - expert

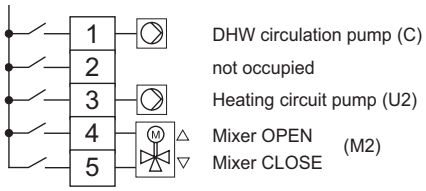
Connector P1
Heat generator



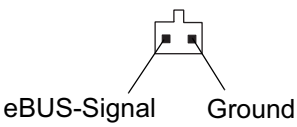
Connector P2
Net, Heating circuit 1, DHW charging



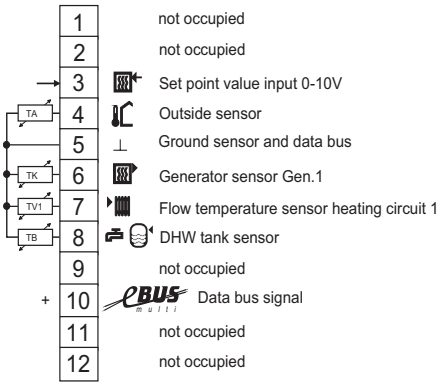
Connector P3
Heating circuit 2, DHW circulation pump



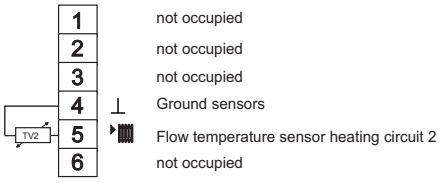
Service-connector eBUS
(Front)



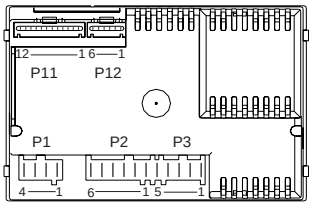
Connector P11
Heating circuit 1, heat generator,
DHW tank, data bus



Connector P12
Heating circuit 2

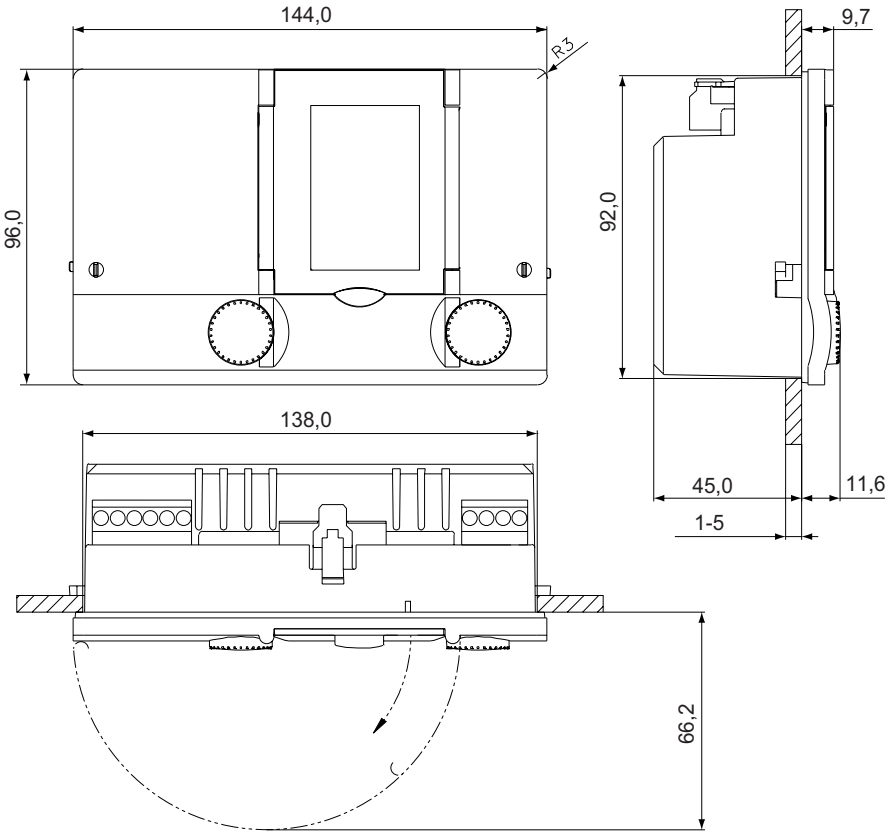


Backside DHR - expert



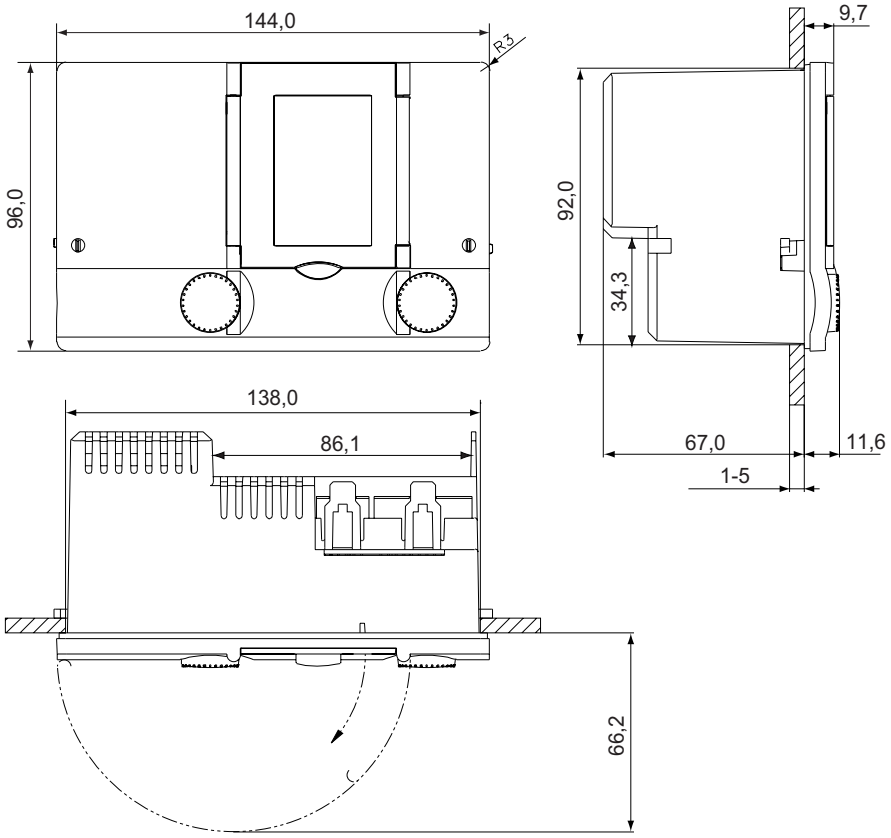
1.5 Dimensions and mounting information

1.5.1 Dimensions DHR - classic/ - comfort



The installation space amounts to 92 (0/+1) x 138 (0/+1) mm in accordance with DIN 43700. Instrument panel strengthens <5 mm

1.5.2 Dimensions DHR - expert

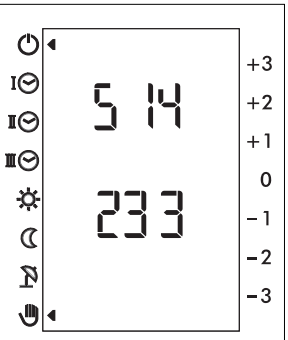
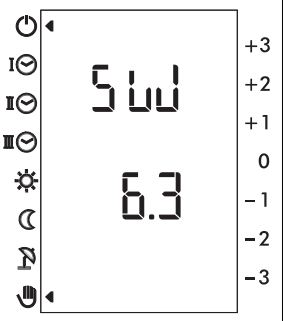
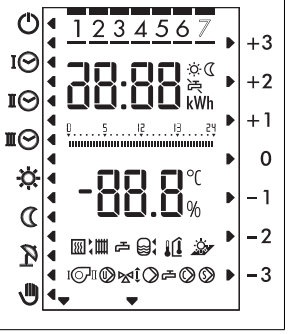


The installation space amounts to 92 (0/+1) x 138 (0/+1) mm in accordance with DIN 43700. Instrument panel strengthens <5 mm

2 Specialist notes to the operation

2.1 Display check

When first switching on or after a RESET the display appears temporary the software-version and all segments.

1. Software number 514233 **Note:** First zeros in the second line are not indicated.	
2. Software version 6.3	
3. Display representation with all segments	

The controller changes afterwards to the normal indication.

Note: The display test takes place with closed or open cover.

2.2 Structure of the parameter levels

The parameter levels and parameters are divided into three entrance stages:

- uncoded: Level 1 to 3 (user and specialist)
- code 1: Level 4 to 19 (specialist)
- code 2: Level 4 to 11 (system supplier)

Parameter levels	**uncoded** (specialist)	**coded (specialist = code 1; system supplier = code 2)**		
			...	
Parameters	3-0 ... 3-9	4-0 ... 4-7		19-0 ... 19-5

Note: In the levels 4 to 11 the individual parameters are assigned to code 1 or code 2. Parameters in code 2 are indicated only after input the code. You receive the code from your system supplier.

3 Parameter levels

3.1 Level 1 and 2

see the user operating manual doc. no. 112648.

3.2 Service level

In the service level a heating technician can make basic adjustments and queried functions which give information about the correct mode of operation of the plant.

3.2.1 Operating data "dat"

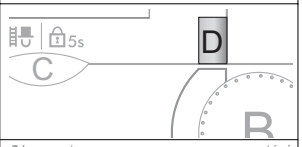
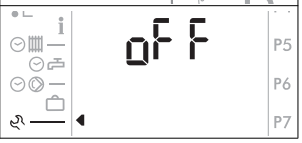
Operating data can be queried, which is important for the plant operators and also gives information about the interpretation and economy of the heating system, e.g. the burner running times. More about this can be found in the user operating manual doc. no. 112648.

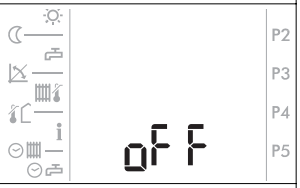
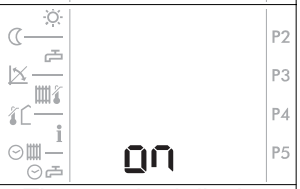
3.2.2 Switching output function on and off

This function serves the heating specialist for testing output functions. Each output function may be selected and switched on or off for checking the components such as pump, mixer etc. The system can be tested to check whether the switched-on output function is correctly executed.

This function is not executable while operating in manual mode .

During the checking of the output functions the control and security functions are not in use. The specialist must continuously check the condition of the plant, before and during this phase.
The exceeding of critical values must be prevented manually.

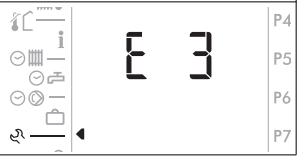
Operation step	Operation	Display
Select the heating circuit (in case of setting on 7-0)		
Select service level		

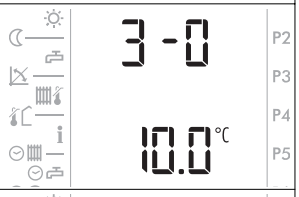
Operation step	Operation	Display
Select function "out"	B 2 x	
Select output function Example: **A1 = burner stage I = "off"**	A	
Select output function Example: **A1 = burner stage I = "on"**	B	
Select further relays or leave function	Close cover	The standard display appears

Note: Depending upon controller version, relay symbols which are not available also appear, see operating manual Doc. No. 112648, "Displaying the controller output ports".

3.2.3 Change of parameters on level 3

Example: Room protection temperature (parameter 3-0)
Note: Control steps apply also to following parameters!

Operation step	Operation	Display
Select service level	A	
Select function	B 1 x	

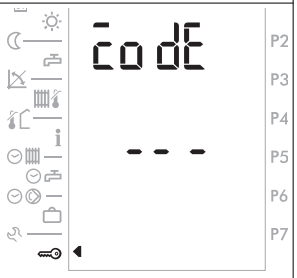
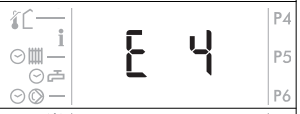
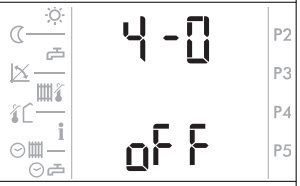
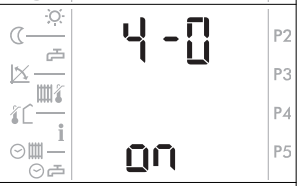
Operation step	Operation	Display
Parameter 3-0 Example: **10.0 °C**		
Parameter 3-0 change value, example: **12.0 °C**		
Select another function or close the cover The setting is stored		The selected function or the standard display appears

Note: All uncoded functions/parameters are described in the user operating manual (Doc. No. 112648) !

3.3 Change of settings in the coded service levels 4 to 12

3.3.1 Example: Sensor configuration store (parameter 4-0)

Note: Control expiration applies to all following adjusters!

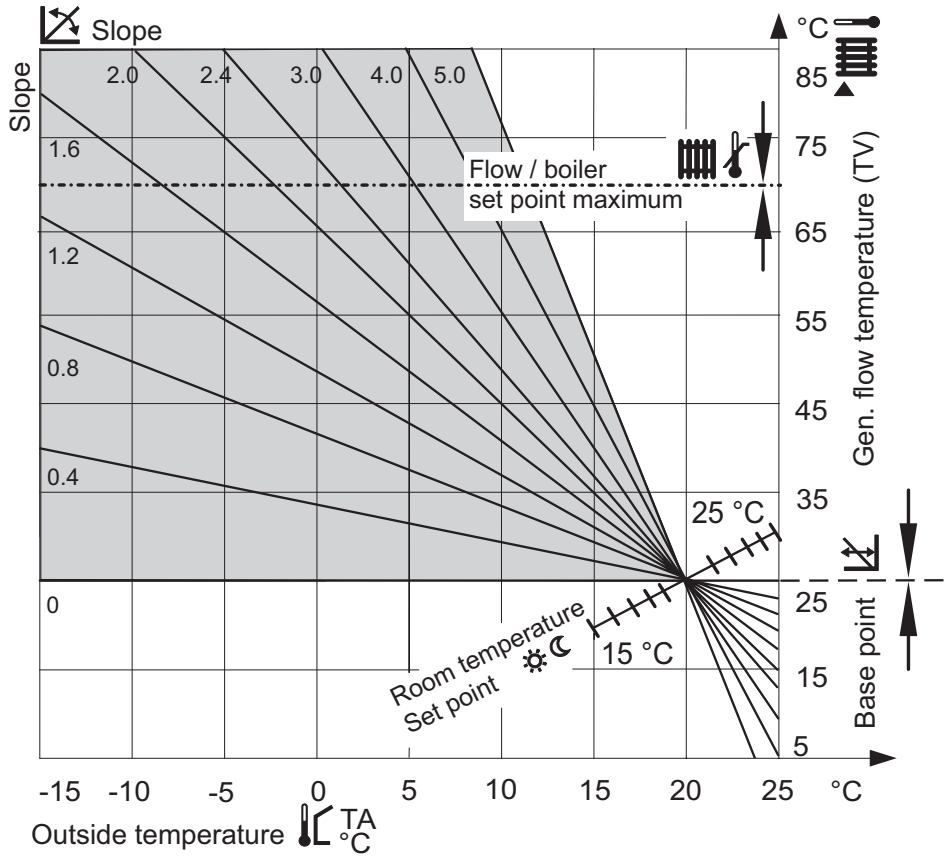
Operation step	Operation	Display
Select service level	A	
Set code	B	
Confirm code	A 1 X	
Select parameter level Example: **Level 4**	B	
Select parameter Example: **parameter 4-0**	A	
Change parameter Example: **on**	B	
Select another function or close the cover The setting is stored		The selected function or the standard display appears

4 General description of functions and parameters

4.1 Level 3 - Heating circuits/Domestic hot water

4.1.1 Heating curve/base point (parameter 3-1)

The heating curve indicates the relationship between the flow water and the outside temperature, ΔTV/ΔTA.



Because of the building's thermal inertia, it is recommended to perform no more than one adjustment step per day.

Adjusting the heating curve slope and base point

The heating curve is governed by the following adjustments:

Function	Symbol	Basic setting performed by
Slope		Specialist (probably adjusting by user)
Base point flow temperature		Specialist
Set point room temperature		User
Set point reduced room temperature		User

The table below will assist in determining the heating curve appropriate to a given heating system. You will need to know the type of heating system, and the climatic zone in which it will operate.

High-temperature	90/70	Radiator heating
Medium-temperature	70/50	Radiator heating
Low-temperature	50/35	Underfloor heating
Ultra-low temperature	40/30	Underfloor heating

Climatic zone where the building is located?

- 16 °C = **A**	- 12 °C = **C**	- 8 °C = **E**	- 4 °C = **G**	0 °C = **I**
- 14 °C = **B**	- 10 °C = **D**	- 6 °C = **F**	- 2 °C = **H**	+2 °C = **K**

Heating system class	Base point: TV at TA + 20 °C	Slope of heating curve = Δ TV / Δ TA																												
		0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.2	3.4
40/30	22	A	D		H																								
	23	B	E	G																									
	24	C	F		I	K																							
50/35	19					B		E																					
	20				A		D					I																	
	21					C		F	G	H			K																
	24				C		F																						
	25			A		E					K																		
	26			B	D		G	H	I																				
70/50	25										C	D	E				H					K							
	26								A	B				F	G				I										
	30							A							H		I		K										
	31							B	C	D	E	F	G																
90/70	30												A	B	C		D	E		F		G		H			I		K
	35											A	B	C	D	E		F		G		H		I			K		

Example:

Heating system	= 70/50	Climatic zone - 8 °C	= E
Base point at TA 20 °C	= 25 °C	Resulting :	= **1.6**

Fine-adjusting the heating curve
The slope of the heating curve becomes adjusted in the "2nd Level" and can be adapted if necessary also by the user.

Daytime outside temperature	Room temperature	
	too cold	to warm
+5 to +15 °C	reduce by 0.2 and increase by 5 K	increase by 0.2 and reduce by 5 K
-20 to -5 °C	increase by 0.2	decrease by 0.2

Aligning of set and actual temperatures (Setting Level 3, parameter 3-1)
Even if the slope of the heating curve has been set correctly, certain systems may show deviations between the actual temperature, as measured in the room with a thermometer, and the setpoint temperature. The difference can be eliminated by moving the base temperature.

Room temperature	Base point (parameter 3-1)
too low	increase
too high	decrease

The raising or lowering of the set value effects a corresponding change in the room temperature.
Per 5 °C change of setting the ambient temperature becomes

- Underfloor heating approx. 2 °C
- Radiator heating approx. 1 °C

Note: After the adjustment of the base point the comfort setting can be reset on 0, see at the user operating manual.

4.1.2 Room-temperature compensation (Reinforcement room influence, p-part) (parameter 3-7)

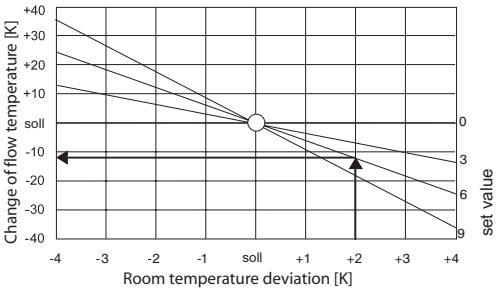
If the measured room-temperature deviates from the set value (e.g. on account of extraneous sources of heat, such as sunlight) the controller corrects the flow temperature in accordance with the value set for parameter 3-7. This value indicates the number of °C by which the flow temperature is raised or lowered for each °C of the room-temperature deviation.

- Actual room temperature higher than set value: decrease in flow temperature
- Actual room temperature lower than set value: increase in flow temperature

Recommended settings:

Radiator heating	**room/outside temperature depending**
weak compensation	1-3
middle compensation	4-6
strong compensation	7-10
underfloor heating	1-4
no compensation	0

The setting has the following effect:



☼	Adjusted room temperature set value
ΔTV	Change of flow temperature
ΔTI	Room temperature deviation
TV_{soll}	from the controller in accordance with the heating curve counted flow temperature set value

4.2 4th level - Configuration of the plant

These parameter settings have in influence on the entire plant.

Parameter	Code	Function
4-0	1	Memorise sensor configuration
4-1	1	Calculation of average outside temperature
4-2	2	Function of external setpoint value input
4-4	1	eBUS address of heating circuit/DHW controller

4.3 5th level - Domestic hot water production

4.3.1 Basic function of domestic hot water production

If the measured temperature value of the domestic hot water falls below the adjusted switching limit (5-0) and if the charge, released by a time program or a domestic hot water charge takes place. The domestic hot water set point value can be affected by the following function/parameters:

- **Time program:**
  In principle the domestic hot water heating is connected with the heating time program. It is to be noted that before providing its own domestic hot water clock program the connection must be separated in the heating clock program. Its own clock program is available for each heating circle (green/red).

- **Legionella protection:**
  The day for the activation of the legionella protection is selected with the parameter 3-9.

- **Frost protection function:**
  If the minimum system temperature falls below the switching limit adjusted to 10 °C around (parameter 5-0), the domestic water is heated on this temperature.

The following parameters affect the water heating:

Parameter	Code	Function
	-	Set point value domestic hot water
3-9	-	Legionnella protection
5-2	1	DHW production parallel or prior to heating

4.4 7th level - Heating circle function

Basic adjustments are made for the heating circles (red/green). Further parameters can be adjusted in levels 1, 2 and 3.

4.4.1 Basic functions heating circle function

In the heating mode ☼ and reduced heating mode ☾ the room temperature set point can be adjusted. Also the heating limit can be adjusted. The correction of the comfort applies to both modes of operation.

The following parameters in the level 1, 2, 3 affect the calculation of the flow temperature setpoint:

Parameter	Code	Function
☼		Room-temperature for normal heating mode
☾		Room-temperature for reduced heating mode
		Slope of heating curve
		Upper limit for flow temperature
		Heating limit
3-1		Fix point temperature
3-2		Heating limit with reduced operating
3-7		Room temperature compensation
3-8		Heating limit depending on calculated folw temperature setpoint value

The set point of the flow temperature is calculated according to the adjusted heating curve and the current outside temperature. The kind of the heating circle regulation has to be adjusted. If the heating circle is switched off with the parameter 7-0, the parameters of the level 7 are faded out.

Parameter	Code	Function
7-0	1	Type of heating circuit

4.4.2 Heating limits

There are 3 heating limits which depend on the heating program.

1. normal heating mode (house)
2. reduced heating mode (parameter 3-2)"only with clock program I to III"
3. heating limit heating circle flow (parameter 3-8)

1. Heating limit: "normal heating mode"

To reach an optimal comfort, the heating limit for the "normal heating mode" is calculated as a function of the ambient temperature set point value. This heating limit is effective in every heating program except the "reduced heating mode" (in the manual Mode no heating limits are effective).
In the normal heating mode the heating limit works if the adjusted room temperature set point is effective without change. The difference between these two values is calculated. A change of the room temperature set point lowers the heating limit about this calculated difference.

Formula:

Heating limit outdoor temp = room temperature set point actual (room temperature set point - heating limit). The adjusted and/or calculated value of the heating limit is the point of switching off. Point of switching on is lower than the switching limit of 2K.

Example:

Room temperature set point normal heating mode = 20 °C
heating limit normal heating mode = 18 °C
The difference is 2 K

room temperature set point	effective heating limit	
actual	heating mode "off"	heating mode "on"
23 °C	21 °C	19 °C
15 °C	13 °C	11 °C
10 °C	8 °C	6 °C

2. Heating limit: "lowered mode"

Using the automatic clock program I to III the adjusted heating limit (parameter 3-2) is effective as an absolute value.

3. Heating limit: "heating circle flow"
The heating limit "heating circle flow" prevents the heating circle pump from running, because the flow set point cannot heat the building.
The switching off value results from the following values:

- room temperature set point actual
- flow set point calculated
- value in parameter 3-8

If the difference between the flow temperature set point and the actual room temperature set point is smaller than the value in parameter 3-8, the heating mode is switched off. If the difference is larger than 2 K as the value from 3-8, the heating mode is released again.

Example:

room temperature set point	parameter 3-8	effective heating limit flow temperature set point	
actual		heating mode “off”	heating mode “on”
23 °C	2	25 °C	27 °C
15 °C	2	17 °C	19 °C
10 °C	2	12 °C	14 °C

4.5 9th-11th level - Boiler management

In level 9, 10, 11 the adjustments for the boilers are made.

5 Overview of settings

5.1 3rd level

Parameter	Function	Setting range	Factory setting	Basic setting Date: Heating circuit		Adaptions Date: Heating circuit		Unity	expert	classic/comfort
				1(green)	2 (red)	1(green)	2 (red)		X =active	
3-0	Room protection temperature	3 ÷15	10					°C	X	X
	It is valid for all heating modes if changed to holyday, standby, summer. With room temperature sensor (remote control FS 5601) room temperature becomes reference temperature.									
3-1	Fix point temperature	10÷80	25					°C	X	X
	Flow temperature at 20 °C outside temperature valid for all slopes. Recommended values (basic values): Floor heating system = 25 °C; Radiator heating system = 35 °C									
3-2	Heating limit with reduced operating (automatic programs only)	-10 ÷20	5					°C	X	X
	With average outside temperature above set value = heating gets turned off. With average outside temperature below set value - 2 K = heating gets turned on. If the set value is below 2 °C frost protection mode becomes active.									
3-6	Start optimisation	0÷999	0					m	X	X
	The set time refers to -10 °C outside temperature. It results the following anticipation: • With outside temperature at -10 °C: 100 % of the set value • With outside temperature at 20 °C: 0 % of the set value Recommended settings for basic value: • Floor heating system = 210 (minutes) • Radiator heating system = 150 (minutes) • Disabled, no function = 0									
3-7	Room temperature compensation (With remote control FS 5601 only)	0÷10	0					K/K	X	X
	• Room temperature to high in the room = decrease of flow temperature • Room temperature to low in the room = increase of flow temperature 0 = no compensation 1-3 = weak compensation 4-6 = average compensation 7-10 = strong compensation Note: With floor heating systems do not exceed setting 4.									

Parameter	Function	Setting range	Factory setting	Basic setting Date: Heating circuit		Adaptions Date: Heating circuit		Unity	expert	classic/comfort
				1(green)	2 (red)	1(green)	2 (red)		X =active	
3-8	Heating limit depending on calculated flow temperature setpoint value	-10 ÷60	2					K	X	X
	If calculated flow temperature setpoint is no more able to contribute to the heating (room temperature set point + set value), heating system is turned off. It is again activated if difference exceeds set value + 2 K. 2 = standard value -10 = function disabled									
3-9	Legionnella protection	0÷9	0					-	X	X
	Legionnella protection function becomes enabled for 2 hours when producing DHW for the first time on the selected day. (Legionnella protection temperature 60 °C) 1...7 = mon ... sun (1 = mon) 8 = everyday 9 = continuously 60 °C 0 = function disabled									

5.2 4th level - Configuration of the plant

Parameter	Functions	Setting range	Factory setting	Basic setting Date:	Adaptions Date:	Unity	expert	classic/comfort
							X = active	
4-0	Memorise sensor configuration	on/off	off				X	X
	If all necessary sensors are wired, set this value to "on" thus to memorise sensor configuration. Then change setting level or close the front cover. Setting returns automatically to "off" after about 30 seconds. It generates an error message if a sensor value gets out of measuring range.							
4-1	Calculation of average outside temperature	0÷40	10			h	X	X
	The calculation of the average outside temperature permits to consider the inertial of the building. It is used as reference value for the heating limits. 0 = none (real temperature valid) 5 = light construction 10 = normal construction 20 = heavy construction							
4-4	eBUS address of heating circuit/ DHW controller	0/2 3÷5 17÷20	2			-	X	X
	If the plant works with one single controller, the set value 2 remains unchanged. Up to 7 Slaves can be connected to a Master controller. If heating circuits/DHW production of the controller are not applied its address has to be set to 0. If heating circuits/DHW production of the Slave controllers is applied its address has to be set as follows:							

Master	= 2	Slave 2	= 4	Slave 4	= 17	Slave 6	= 19
Slave 1	= 3	Slave 3	= 5	Slave 5	= 18	Slave 7	= 20

5.3 5th level - DHW production

Parameter	Function	Setting range	Factory setting	Basic setting Date:	Adaptions Date:	Unity	expert	classic/comfort
							X = active	
5-2	DHW production parallel or prior to heating	on/off 0.2÷20.0	off			-	X	X
	According to the setting, DHW production is executed parallel, prior or parallel depending on the charge. on = absolutely parallel off = absolutely prior 20 ... 200 minutes = parallel production charge depending. Controller calculates a ramp which defines, that within the set time boiler has to reach charging temperature. Below the calculated ramp valves are gradually closing. Above that line they are acting normally.							

5.4 7th level - Heating circuits

Parameter	Function	Setting range	Factory setting	Basic setting Date: Heating circuit		Adaptions Date: Heating circuit		Unity	expert	classic/comfort
				1 (green)	2 (red)	1 (green)	2 (red)		X = active	
7-0	Type of heating circuit (adaption to the actuator)	0÷3	0					-	X	X
	0 = 3 point output for mixing valve actuators. Operating sense is controlled with an open/close command. 1 = 2 point output for mixing valve actuators with automatic return, e.g. thermally valves. The actuators gets a command to open. If this stops, it automatically runs back. 2 = 2 point output to command a flow pump for a direct heating circuit. Pump is working continuously during heating operation. (The mixing valve symbol is hidden. Do not connect a flow sensor.) 3 = heating circuit disabled									

5.5 10th level - Parameters of heat generator

Parameter	Function	Setting range	Factory setting	Basic setting Date:		Adaptions Date:		Unity	expert	classic/comfort
				1(green)	2 (red)	1(green)	2 (red)		X = active	
10-4	Minimal protection temperature TKmin	0÷80	0.0					° C	X	X
	The set temperature is maintained if boiler is turned on or if it is in preparedness.									

5.6 11th level - Parameters of heat generator

Parameter	Function	Setting range	Factory setting	Basic setting Date:		Adaptions Date:		Unity	expert	classic/comfort
				1(green)	2 (red)	1(green)	2 (red)		X = active	
11-4	Cancel operating data	on÷off	off					-	X	X
	Operating data can be reset to "0". off = standard on = reset of operating dates to "0". Note: After having set "on", programming level has to be changed or the cover to be closed. About 30 seconds later setting returns automatically to "off".									
11-5	Gen. Power controller	on÷off	off					-	X	X
	on = 2 stage burner off = 1 stage burner									

5.7 12th level - Cascade management parameters (generators 1)

Parameter	Function	Setting range	Factory setting	Basic setting Date:	Adaptions Date:	Unity	expert	classic/comfort
							X = active	
12-0	Gen. 1: eBUS address	11÷12	12			-	X	X
	This parameter define if the generator is a stage-burner or a modulated interface-controlled burner 11 = extern burner controller via interface ZIF 250 12 = one- ore two-stage burner							

6 Assistance for start-up and elimination of errors

6.1 Checking the controller

1. Open the cover
2. Press the RESET key

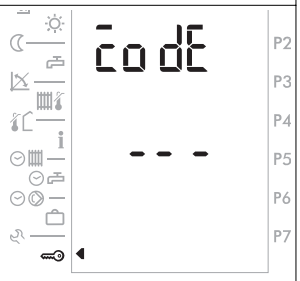
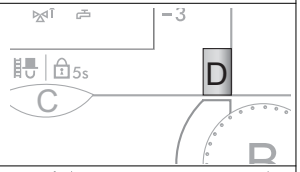
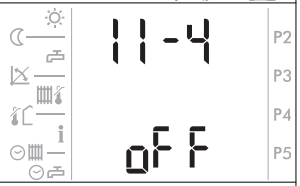
The controller is now initialised. The following sequence is then observed on the display:

3. The software number (e.g., 510 000) appears
4. This is followed by the software release (e.g., SW 6.3)
5. Then all the segments are displayed briefly

If the controller display then reverts to normal, the internal function test was successful.

6.2 Factory settings / RESET

6.2.1 Delete operating data

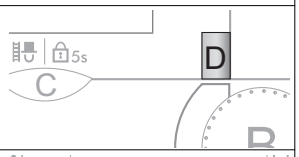
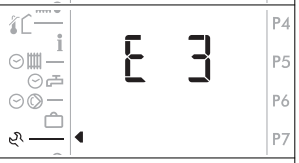
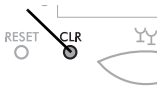
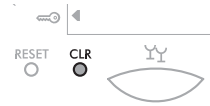
Operation step	Operation	Display
Select service level	A	
Set code	B	
Confirm code	A 1 Raster	
Select level 11	B	
Press the key **D** to select the correct heating circuit "**green**" or "**red**"	D	
Select parameter Example: **parameter 4-0**	A	
Change parameter on "**on**" **Note:** After approx. 15 s Timeout the value sets itself on "**off**"	B	
Select another function or close the cover The operating data are deleted		The selected function or the standard display appears

6.2.2 Unlock during error message

See user operating manual doc. no. 112648.

6.2.3 Reload factory settings

All uncoded and coded parameters of al levels can be reloaded on their factory settings per boiler/heating circle.

Operation step		Operation	Display
1	Press the key **D** to select the correct heating circuit 1 / generator 1 "**green**" or 2 "**red**" !		
2	Select service level		
3	Select level **E3**	 1 x	
4	Press **CLR** key with a thin object		
5	The factory settings of the selected generator/heating circuit are loaded. Select another function or close the cover		The selected function or the standard display appears

6.3 Displaying the controller output ports

Depending on the state of the unit and the operating mode, some of these symbols will be shown.

Symbol	Designation heating circuit/generator (1=green; 2=red)		DHR - classic	DHR - comfort		DHR - expert	
				1 green	2 red	1 green	2 red
	Modulation heat generator	FA	X	X	X	X	X
I	Generator I or burner stage I	b1	A6	A6		A1	
II	Burner stage II	b2	A5	A5		A12	
	Heating circuit mixing valve open	M+	A4	A4		A6	A8
	Heating circuit mixing valve closed	M-	A3	A3		A5	A7
	Heating circuit circulation pump	U	A1	A1	A7	A4	A9
	Charging pump/deflector valve	L	A2	A2		A2	
	Circulation pump DHW	C				A10	

6.4 Error message

See user operating manual doc. no. 112648.

6.5 Heating circulation pump functions

The circulation pumps run when:

- the outside temperature is below the heating limit
- *frost protection* is activated (outside temperature is lower than 2°C)
- operating mode *manual* is selected
- the *energy obligation function* of the boiler (11-2) is active

The 30-minute pump after-run is effective when:

- the outside temperature rises above the *heating limit*
- on the heating mode the *heating limit depending on calculated flow temperature setpoint value* is exceeded
- the outside temperature on the *reduced heating mode* rises above 4 °C or above the *heating limit with reduced operating*
- power is restored after an interruption or following installation
- the RESET key becomes pressed

Pump and mixer protection works daily at 12.00 o'clock at noon as follows:

15 seconds	mixer M1, M2 OPEN pump Uw, U1, U2, L, C ON
20 seconds	mixer M1, M2 CLOSE pump Uw, U1, U2 L, C OFF

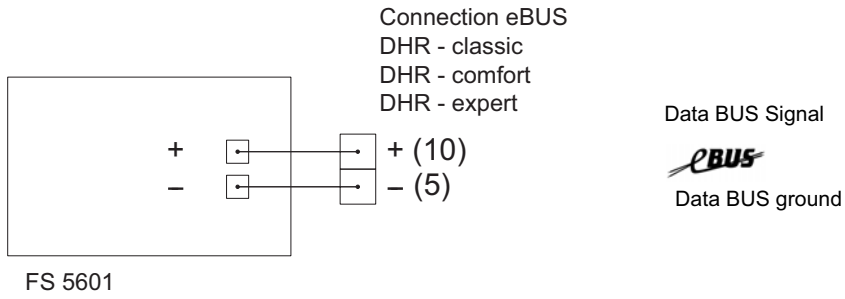
6.6 Remote control operation

Each heating circuit can be operated by its own remote control. See the corresponding instruction manual for more information.

6.7 FS 5601 remote control

6.7.1 Connecting the FS 5601 remote control

Connection allocation



6.7.2 Start-up of the FS 5601 remote control

Before the eBUS connection is attached, the controller must be switched without tension. If the connection is correctly provided and the cover closed, the controller can be restarted. Communication should be active within 2 minutes.

6.7.3 Operating with FS 5601 remote control

The connection of a FS 5601 remote control is not indicated particularly in the display on the controller, it is however recognizabe from the measured room temperature appearing on the display at the 2nd Level ℹ (cover open). The following list shows settings on the FS 5601 which have an effect depending on operating mode at the controller.

Selected operating mode on the controller		operating mode remote control			Effect on the controller				
		⏲	⏻	☼	⏻	I⏲	II⏲	III⏲	☼
⏻	Heating OFF	x				x			
			x		x				
				x					x
I⏲	Clock program I	x				x			
			x		x				
				x					x
II⏲	Clock program II	x					x		
			x		x				
				x					x
III⏲	Clock program III	x						x	
			x		x				
				x					x
☼	Heating mode	x				x			
			x		x				
				x					x

Note: The input of the FS 5601 becomes closed if other operating modes than those sepecified are selected at the controller.

If the cover on the controller is opened, communication with the remote control is interrupted and the last transmitted values are indicated (exception: the room temperature TI is continued to be shown). As soon as the cover is closed, the values are updated.

The operating mode selected on the remote control, the comfort as well as the room temperature appears on the display of the controller. The room temperature can be queried at the 2nd Level, see user operating manual.

⚠ **The controller sets the communication via eBUS with the remote control only once, within approx. 2 minutes. If no communication can be set within this time, then the controller works without remote control. The automatic controller must be set without tension and the feeder line be examined.**

7 Technical data

7.1 General data

Supply voltage	230 VAC ± 10 %, 50 Hz
Power consumption	max. 10 VA
Operational ambient temperature	0 °C ... 50 °C
Ambient temperature camp/transport	-20 °C ... 60 °C
Humidity in the enterprise	max. 85 %; not condensing
Sensor cable length, cross-section	max. 100 m; min. 0,75 mm^2
eBUS • Bus line, length, cross-section: • Loading capacity:	 2-cable bus, drilled, max. 50 m, min. 0.5 mm^2 DHR - classic /- comfort: 15 mA (constant current) DHR - expert: 27 mA (constant current)
Output switching capability	230 V 6 (2) A, 50 Hz
Set point input	0-10 V = 0-100 °C; no floating; current max. 1 mA
Certification	The controller is CE -compliant according to the following EU guidelines: • • 73/23/EWG "Low Voltage Guideline" • • 89/336/EWG "EMV guideline", including amendment guidelines up to 93/68/EWG
Protection category	II EN 60730
Protection level	IP 40 EN 60529
EMC	EN 50082-1
EMC-emission	EN 50081-1
Clock reserve	DHR - classic /- comfort = 24 h DHR - expert = max. 2 years

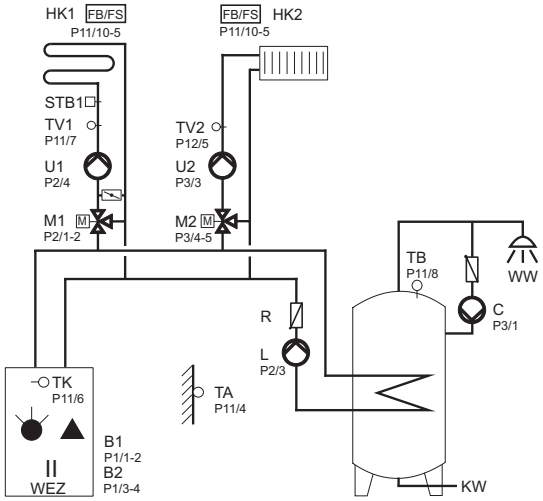
7.2 Checking temperature sensors

All temperature sensors for DHR classic /- comfort /- expert have the same characteristic (NTC, 5000 Ω with 25 °C). The resistance values are shown in the following table. Temperature sensors, which are attached at the firing automat and/ or at the controller, have different resistance values. These are shown by the following table (depending upon firing automat NTC 12'000 or NTC 10'000).

Temperature °C	**Sensor at the controller**	**Sensor at the firing automat**	
	Resistance Ω ZAF 200 / ZTF 222.x ZTF 223 / ZVF 210	Resistance Ω ZAF 250 / ZTF 250 (Honeywell) 12 kΩ	Resistance Ω ZAF 260 / ZTF 260 (Honeywell) 10 kΩ
-20	48'535	98’820	94’143
-15	36’475	75’940	71’172
-10	27’665	58’820	54’308
-5	21’165	45’910	41’505
0	16’325	36’100	32’014
5	12’695	28’590	25’011
10	9’950	22’790	19’691
15	7’855	18’290	15’618
20	6’245	14’770	12’474
25	**5’000**	**12’000**	**10’000**
30	4’029	9’805	8’080
40	2’663	6’653	5’372
50	1’802	4’609	3’661
60	1’244	3’253	2’536
70	876	2’337	1’794
80	628	1’707	1’290
90	458	1’266	942
100	339	952	697

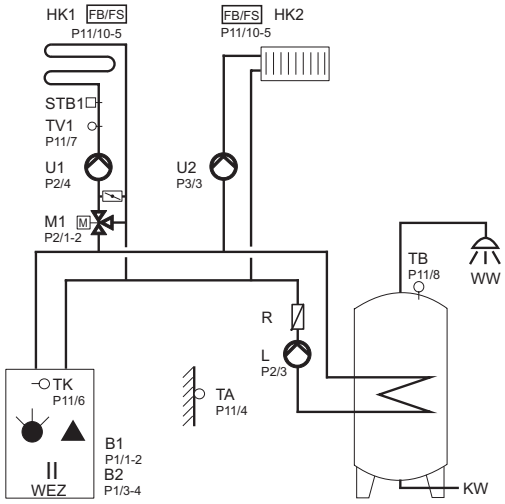
8 Hydraulic variants DHR - expert

8.1 Variant 1: DHR - expert (BBMUMULC)

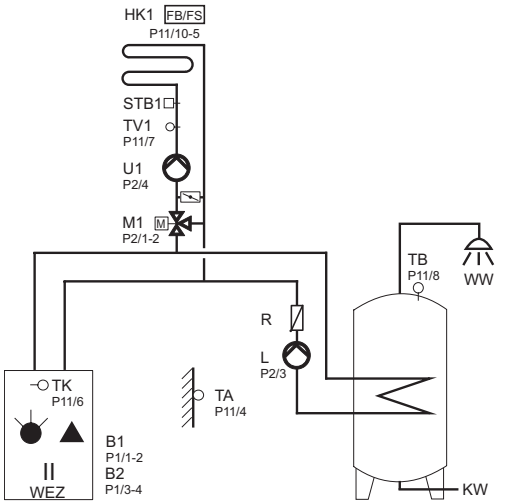


9 Hydraulic variants DHR - classic /- comfort

9.1 Variant 1: DHR comfort (BBUMUL)



9.2 Variant 2: DHR - classic (BBUML)



10 Explanation of terms and abbreviations

Actual value	measured value (temperature)
C	DHW circulation pump
DHW	Domestic hot water
eBUS	2-wiring data bus for the heating technology
FA	Firing controller (modulating, eBUS)
FS	Remote control FS 5601
Gen.1	Heat generator sensor 1
GND	Ground
h	Hours
HG	Heating limit
HK	Heating circuit
HK1	Heating circuit 1; green key
HK2	Heating circuit 2; red key
K	Kelvin
kW	Kilowatt (power)
KW	cold water
L	DHW charging pump/diverter valve
m	Minute
M	Motor drive
M1	Mixer heating circuit 1 (green)
M2	Mixer heating circuit 2 (red)
Net	Net connection 230V VAC
R	Backstopp valve
Set point value	Temperature witch is to reach by the controller
SW	Set point value input analogue 0-10 V (0-100 °C)
TA	Outside temperature sensor
TB, TBO	DHW temperature sensor (top)
TBmax	DHW max. temperature
TBmin	DHW minimal temperature
TI	Room temperature
TPU	Storage tank sensor bottom (Solar application)
TV1	Flow temperature sensor heating circuit 1 (green)
TV2	Flow temperature sensor heating circuit 2 (red)
U1	Heating circuit pump 1 (green)
U2	Heating circuit pump 2 (red)
WEZ	Heat generator

11 INDEX

A
Aligning of set and actual temperatures 18
Allocation of the connectors 6
Assistance for start-up and elimination of errors 29

B
base point 17

C
Change of parameters on level 3 . 13
Checking the controller 29
Connecting the FS 5601/FB 5811 remote control 34
Connectors DHR - expert 7
Connectors DHR - classic /-comfort 6

D
Delete operating data 30
Dimensions and mounting information 8
Display check 10
Displaying the controller output ports 32

E
Error messages 33
Explanation of terms and abbreviations 40

F
Fine-adjusting the heating curve .. 18

H
Heating circulation pump functions 33
heating curve slope 17
Heating curve/base point 16
Hydraulic variants DHR - expert .. 38

I
Information for mounting 4

M
mixer protection 33

O
Operating with FS 5601/FB 5811 remote control 35
P
Parameter levels 12
Pump protection 33

R
Reload factory settings 31
Remote control operation 34
RESET 29
Riepilogo dei dati di regolazione .. 24
Room temperature 18

S
Service level 12
Start-up 5
Start-up of the FS 5601/FB 5811 remote control 34
Steilheit 17
Structure of the parameter levels . 11
Switching output function on and off 12
T
Technical data 36
Temperature sensors examine 37
too high 18
too low 18

U
Unlock during error message (TEM firing automat) 31

Note:

Note:

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