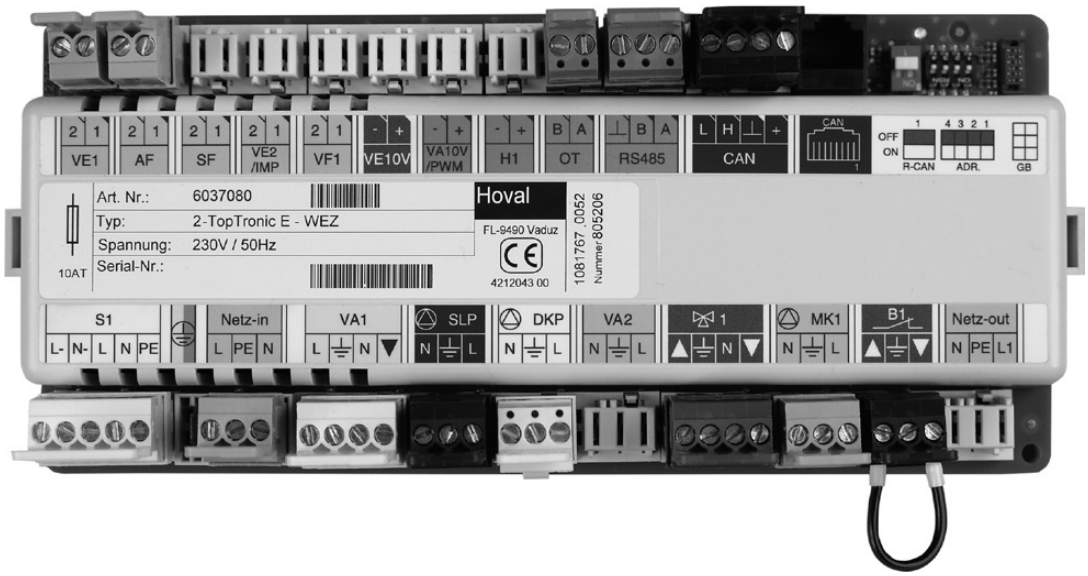
Instructions for customer service engineers

Hoval

Basic module heat generator TTE-WEZ



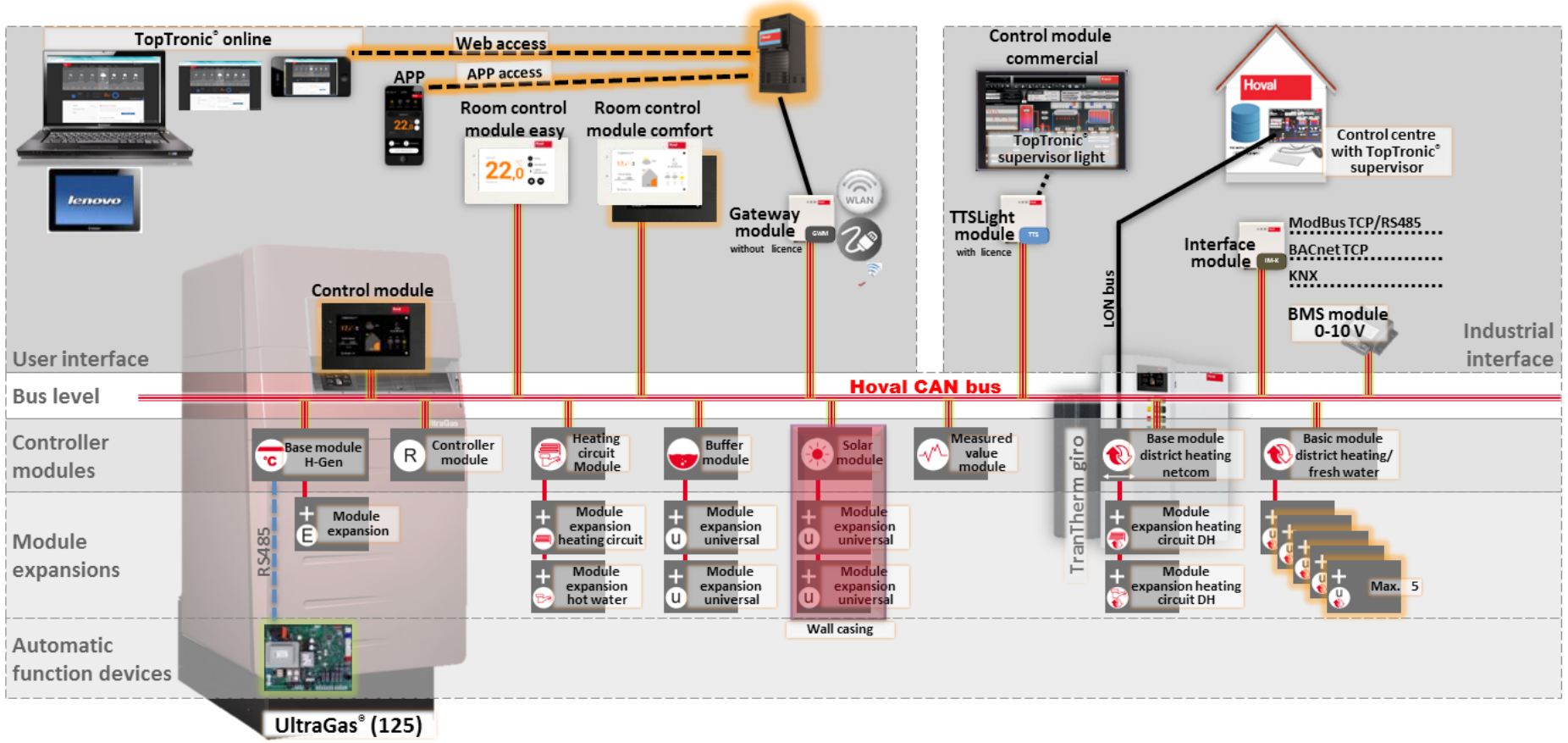
Hoval products must be installed and commissioned only by appropriately qualified experts. These instructions are intended exclusively for the **specialist**. Electrical installations may only be carried out by a qualified electrician.

1. Controller generation TopTronic® E

The TopTronic®E controller system is based on independent controller units (modules) that are connected together via the Hoval CAN bus. The individual modules can be set using one or more control modules.

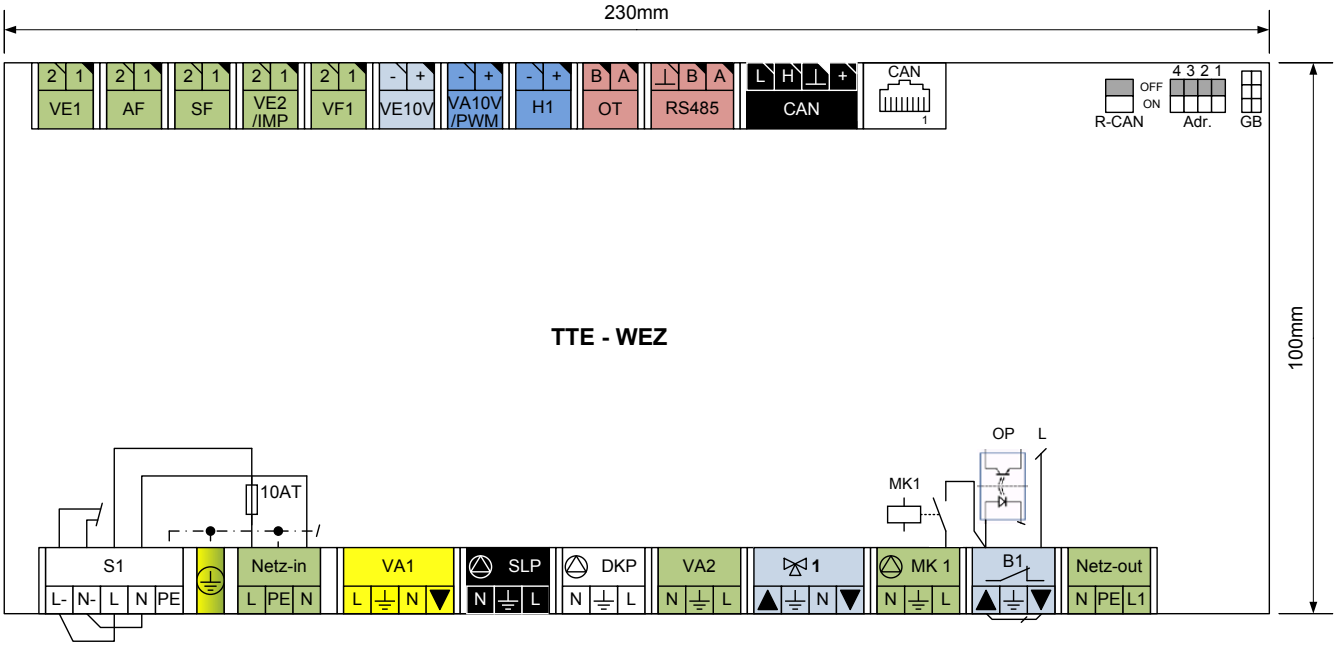
- A maximum of 16 intelligent modules can be connected. In the TTE-WEZ module, it is possible to use 16 modules as well, although only 8 heat-generators can be controlled.
- Max. two TTW-FE expansion modules can be connected to the intelligent modules. (Exception: max. 1 expansion module for TTE H-Gen module due to the installation positioning)

1.1 System overview



2. Module diagrams TopTronic® E

2.1 Basic module heat generator, TTE-WEZ



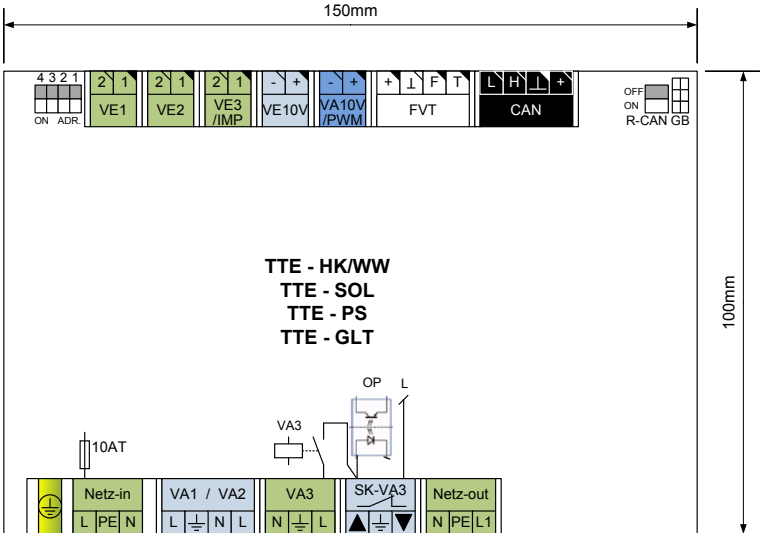
2.2 Heating circuit/DHW module, TTE-HC/WW

2.3 Solar module, TTE-SOL

2.4 Buffer module, TTE-PS

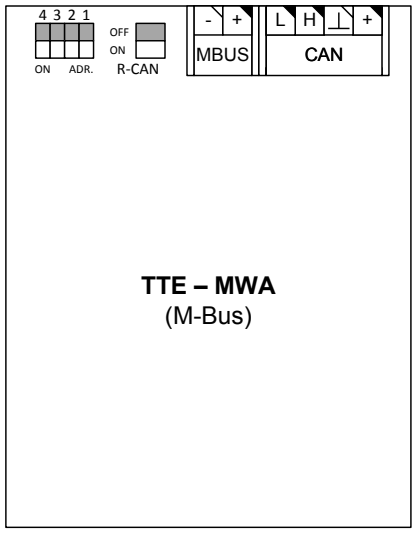
2.5 GLT module (0-10V), TTE-GLT

The connection technology of the three modules is identical. Each module is available as an individual article, however (different software and further details).



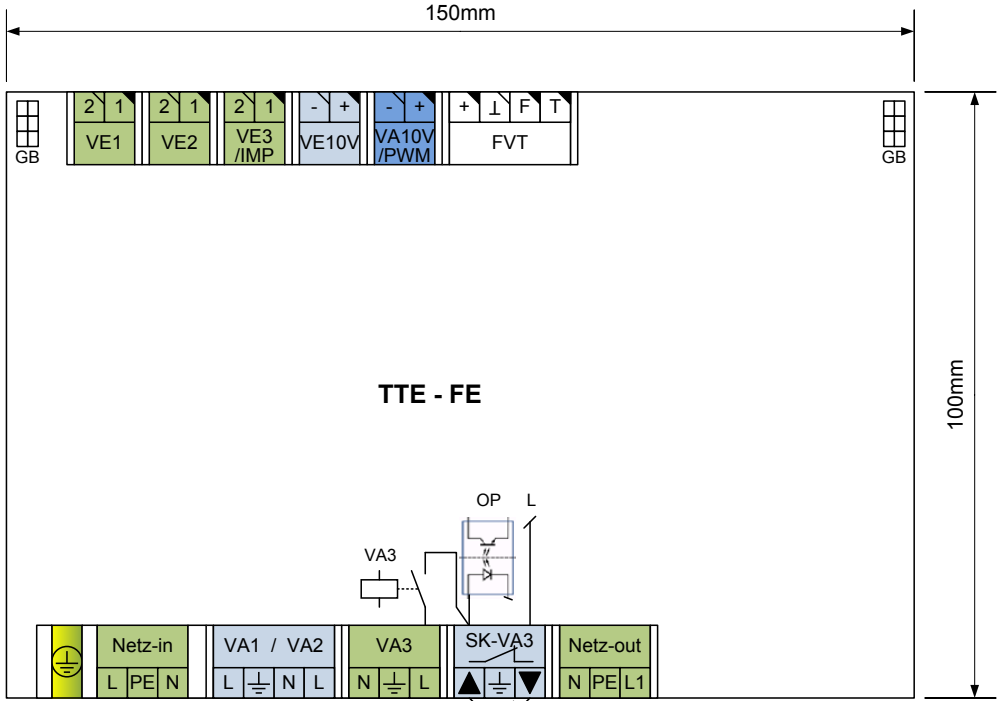
2.6 Measured value module, TTE-MWA

This module is used for integrating external M-bus counters.



2.7 Module expansion TTE-FE

Universal module for hardware expansion of inputs/outputs. Can be used for each control module except for TTE-MWA. Max. 2 module expansions are possible per control module. Exception: only one module expansion can be used with the basic module heat generator TTE-WEZ! The connection to the particular control module is made using a ribbon cable (GB plug) and mains connection plug set.



Legend:

AF	Outdoor sensor
B1	Flow temperature limit thermostat
CAN	System data bus
DKP	Pumps for heating circuit without mixer
FVT-F	Flow rate sensor (F = flow rate)
FVT-T	Flow rate sensor (T = temperature)
GB	Units - data bus internal
H1	LED lamp output
MBUS	M-Bus (counter)
MC1	Pump mixer circuit 1
Netz-In	Mains input 230V~/13A slow-blow
Netz-Out	Mains output 230V~ max. 4 A slow-blow
OT	Heat generator data bus (OpenTherm)
OP	Optocoupler
RS485	Heat generator data bus (RS485)
S1	External main switch / supply automatic unit
SF	Calorifier heater sensor
SK-VA3	Safety chain VA3 output
SLP	Calorifier loading pump
VA1,2,3	Variable output 1,2,3
VA10V/PWM	Variable output 0-10V/PWM
VE1,2,3 (IMP)	Variable input 1,2 (IMP = sensor or pulse)
VE10V 1,2,3	Variable input 0-10V 1,2,3
VE230V 1,2	Variable input 230V 1,2
VF1,2,3	Flow sensor 1,2,3
YK1,2,3	Actuator mixer 1,2,3

2.8 Control module TTE-(R)BM

3. Technical data

Designation/type	"TopTronic E Basic module heat generator"	"TopTronic E Module expansion"
Abbreviation	TTE-WEZ	TTE-FE
Power supply max	230 V AC +6 - 10%	230 V AC +6 - 10%
Frequency	50 – 60 Hz	50 – 60 Hz
"Max. power consumption incl. bus supply, module expansions"	approx. 18.9 W	approx. 1.8 W
Max. power consumption	approx. 7.8 W	approx. 1.8 W
Min. power consumption	approx. 0.8 W	approx. 0.2 W
Fuse	10 A slow-blow	"None - protection via controller module"
Outputs (high-voltage)		
Fully electronic relays	0	0
Electromechanical relays	7	3
Outputs (extra-low voltage)		
Signal output PWM or 0-10V	1	1
Switching capacity		
Electromechanical relays	2 (2) A	2 (2) A
Inputs (high-voltage)		
Optocoupler input	1	1
Inputs (extra-low voltage)		
Input 0-10V	1	1
Inputs sensors	4	2
Inputs flow rate sensor	0	1
Pulse input	1 (can be switched over to sensor)	1 (can be switched over to sensor)
Voltage measuring circuit	15 V, with protective isolation 2.9 kV	15 V, with protective isolation 2.9 kV
Expansion (module expansion)		
Max. number	1	-
Casing		
Installation (top hat rail HxD in mm)	Top hat rail mounting (35x15)	Top hat rail mounting (35x15)
"Dimensions W/H/D in mm incl. plug"	230x100x75	150x100x75
Ambient temperature	0 … 50 °C	0 … 50 °C
Storage temperature	- 20 ... 60 °C	- 20 ... 60 °C
Bus system (Hoval CAN bus)		
Capacity	"Max. 4 control modules / 3 control modules + 1 gateway"	-
Bus supply	yes	none
Bus line	4-wire bus	-
Bus length	Twisted, shielded, max. 100 m	-
Line cross-section	min 0.5 mm²	-
Other bus interfaces		
	Internal unit bus (master)	Internal unit bus (slave)
	RS485	-
	OpenTherm	-
Miscellaneous		
Spring reserve	10 years, battery buffered	-
Type of protection	IP 20	IP 20
Protection class	II – EN 60730	II – EN 60730
Plug types	Rast5 (coloured, coded)	Rast5 (coloured, coded)
Relative humidity (non-condensing)	20-80%	20-80%

4. Setting the address of modules (DIP switches)

The addresses of the individual modules are set using the DIP switches on the circuit board. Each module must have a different address. The addresses do not have to be set in consecutive sequence.

The factory settings for the modules were selected so that there is no need to change the address settings, as long as no module occurs twice.

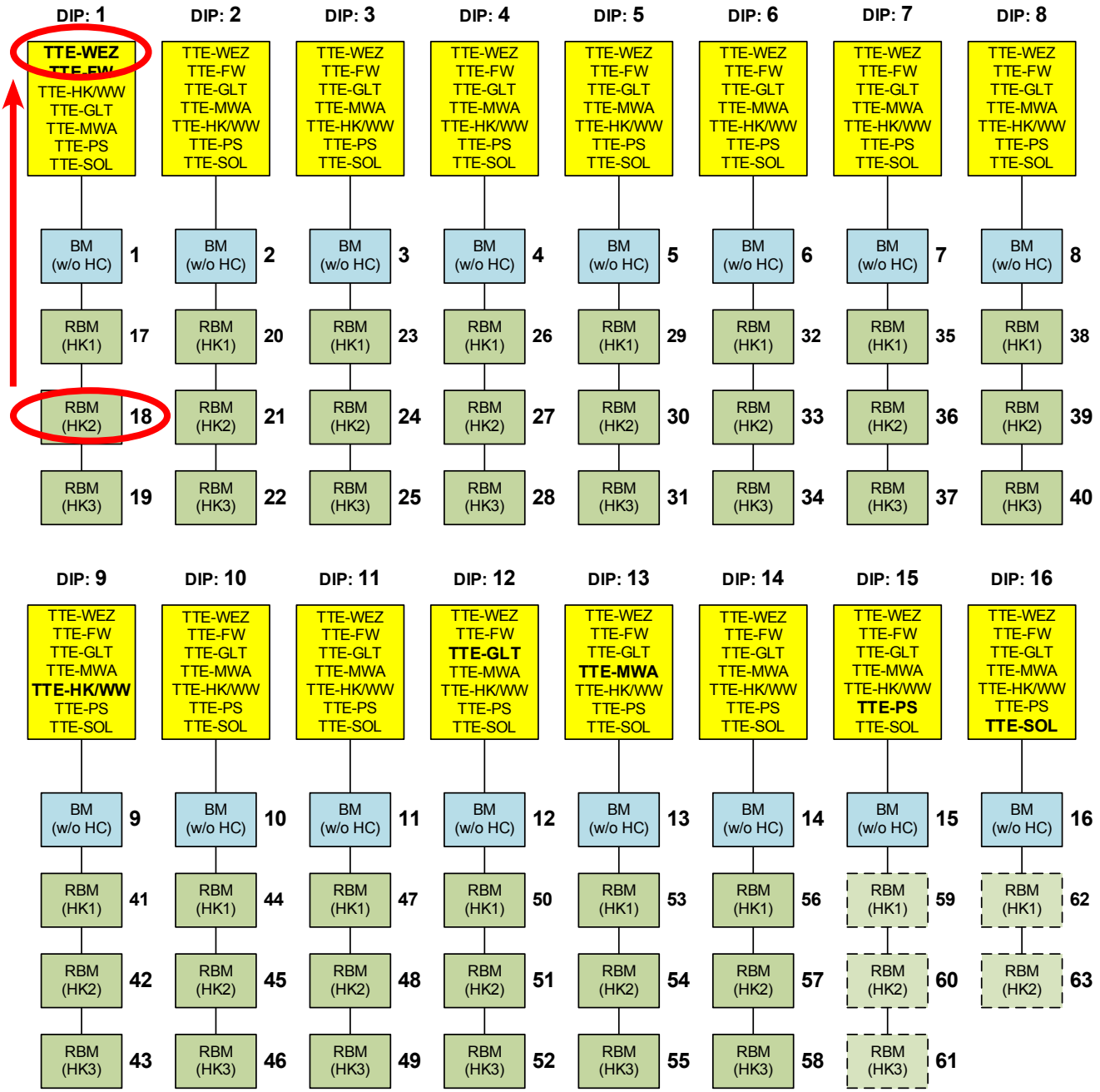
DIP switch (4 3 2 1)	Addr.	Factory setting
Off ☒☒☒☒ / On ☐☐☐☐	1	**TTE-WEZ / TTE-FW**
Off ☒☒☒☐ / On ☐☐☐☒	2	
Off ☒☒☐☒ / On ☐☐☒☐	3	
Off ☒☒☐☐ / On ☐☐☒☒	4	
Off ☒☐☒☒ / On ☐☒☐☐	5	
Off ☒☐☒☐ / On ☐☒☐☒	6	
Off ☒☐☐☒ / On ☐☒☒☐	7	
Off ☒☐☐☐ / On ☐☒☒☒	8	

DIP switch (4 3 2 1)	Addr.	Factory setting
Off ☐☒☒☒ / On ☒☐☐☐	9	**TTE-HK/WW**
Off ☐☒☒☐ / On ☒☐☐☒	10	
Off ☐☒☐☒ / On ☒☐☒☐	11	
Off ☐☒☐☐ / On ☒☐☒☒	12	**TTE-GLT** (0-10V)
Off ☐☐☒☒ / On ☒☒☐☐	13	**TTE-MWA** (M-Bus)
Off ☐☐☒☐ / On ☒☒☐☒	14	
Off ☐☐☐☒ / On ☒☒☒☐	15	**TTE-PS**
Off ☐☐☐☐ / On ☒☒☒☒	16	**TTE-SOL**

5. Setting the address of control modules

Setting example: Room control module for the 2nd heating circuit

1: Call up commissioning wizard
2: Enter address no. of control module
3: Select and acknowledge controller module type



BM … Control module
RBM .. Room control module

6. Functional overview

6.1 Basic module heat generator TTE-WEZ

Basic module heat generator	Heat generator		Additional heat generator				Direct circuit	Mixer circuit 1	Mixer circuit 2	Calorifier 1
	Automatic unit (RS485 or OpenTherm bus)	0-10 V temp.	1-stage	0-10 V temp.	0-10 V power	Solid fuel (manually)				
TTE-WEZ	X	X	X	X	X	X	X	X	+1.TTE-FE	X

6.2 Heating circuit/hot water, TTE-HC/WW module

Heating circuit/DHW module	Mixer circuit 1	Mixer circuit 2	Mixer circuit 3	Calorifier
TTE-HK/WW	X	+ 1.TTE-FE	+ 2.TTE-FE	X

1) Instead of a mixer circuit, it is also possible for a calorifier to be controlled (max. 1 calorifier)

6.3 Buffer module TTE-PS

Buffer module	Heating buffer					Cooling buffer	for more complex systems [1]
	Charging control		Discharge control			Charging control	
	with pump	with charging valve	with switchover element	with unloading mixer	Starting load relief	Charging control	
TTE-PS	X	X	X	X	X	X	+ 1-2 TTE-FE

1) In the TTE-PS, relatively complex systems can be implemented using max. 1-2 additional TTE-FE module expansions (see Hoval heating systems).
Important: Two TTE-PS modules must be used if both a heating buffer and a cooling buffer are required to be integrated in one system.

6.4 Solar module TTE-SOL

Solar module	Collector fields				Consumer				for more complex systems [1]
	1	2	Speed control	Yield measure-ment	1	2	3	4	
TTE-SOL	X	X	X	X	X	X	X	X	+ 1-2 TTE-FE

1) In the TTE-SOL, relatively complex systems can be implemented using max. 1-2 additional TTE-FE module expansions (see Hoval heating systems).

7. Switching time programs

7.1 Standard week programs heating circuits / hot water

Heating circuits:

	MON	TUE	WED	THU	FRI	SAT	SUN
Week 1	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*
	00:00 - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C
	06:00 - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C
	22:00 - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C

	MON	TUE	WED	THU	FRI	SAT	SUN
Week 2	*Morning & evening*	*Morning & evening*	*Morning & evening*	*Morning & evening*	*Morning & evening*	*All day*	*All day*
	00:00 - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C	**00:00** - 06:00 / **16°C**, 28°C
	06:00 - 08:00 / **22°C**, 23°C	**06:00** - 08:00 / **22°C**, 23°C	**06:00** - 08:00 / **22°C**, 23°C	**06:00** - 08:00 / **22°C**, 23°C	**06:00** - 08:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C	**06:00** - 22:00 / **22°C**, 23°C
	08:00 - 16:00 / **16°C**, 28°C	**08:00** - 16:00 / **16°C**, 28°C	**08:00** - 16:00 / **16°C**, 28°C	**08:00** - 16:00 / **16°C**, 28°C	**08:00** - 16:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C
	16:00 - 22:00 / **22°C**, 23°C	**16:00** - 22:00 / **22°C**, 23°C	**16:00** - 22:00 / **22°C**, 23°C	**16:00** - 22:00 / **22°C**, 23°C	**16:00** - 22:00 / **22°C**, 23°C		
	22:00 - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C	**22:00** - 24:00 / **16°C**, 28°C		

Hot water:

	MON	TUE	WED	THU	FRI	SAT	SUN
Week 1	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*
	00:00 - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**
	05:30 - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**
	22:00 - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**

	MON	TUE	WED	THU	FRI	SAT	SUN
Week 2	*Morning & evening*	*Morning & evening*	*Morning & evening*	*Morning & evening*	*Morning & evening*	*All day*	*All day*
	00:00 - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**	**00:00** - 05:30 / **45°C**
	05:30 - 08:00 / **50°C**	**05:30** - 08:00 / **50°C**	**05:30** - 08:00 / **50°C**	**05:30** - 08:00 / **50°C**	**05:30** - 08:00 / **50°C**	**05:30** - 22:00 / **50°C**	**05:30** - 22:00 / **50°C**
	08:00 - 15:30 / **45°C**	**08:00** - 15:30 / **45°C**	**08:00** - 15:30 / **45°C**	**08:00** - 15:30 / **45°C**	**08:00** - 15:30 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**
	15:30 - 22:00 / **50°C**	**15:30** - 22:00 / **50°C**	**15:30** - 22:00 / **50°C**	**15:30** - 22:00 / **50°C**	**15:30** - 22:00 / **50°C**		
	22:00 - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**	**22:00** - 24:00 / **45°C**		

7.2 Standard day programs heating circuits / hot water

Heating circuits:

All day	**00:00** - 06:00 / **16°C, 28°C** **06:00** - 22:00 / **22°C, 23°C** **22:00** - 24:00 / **16°C, 28°C**
Longer day	**00:00** - 06:00 / **16°C, 28°C** **06:00** - 23:00 / **22°C, 23°C** **23:00** - 24:00 / **16°C, 28°C**
Morning & evening	**00:00** - 06:00 / **16°C, 28°C** **06:00** - 08:00 / **22°C, 23°C** **08:00** - 16:00 / **16°C, 28°C** **16:00** - 22:00 / **22°C, 23°C** **22:00** - 24:00 / **16°C, 28°C**
Only evening	**00:00** - 16:00 / **16°C, 28°C** **16:00** - 23:00 / **22°C, 23°C** **23:00** - 24:00 / **16°C, 28°C**
NEW	**00:00** - 06:00 / **16°C, 28°C** **06:00** - 08:00 / **22°C, 23°C** **08:00** - 16:00 / **16°C, 28°C** **16:00** - 22:00 / **22°C, 23°C** **22:00** - 24:00 / **16°C, 28°C**

Hot water:

All day	**00:00** - 05:30 / **45°C** **05:30** - 22:00 / **50°C** **22:00** - 24:00 / **45°C**
Morning & evening	**00:00** - 05:30 / **45°C** **05:30** - 08:00 / **50°C** **08:00** - 15:30 / **45°C** **15:30** - 22:00 / **50°C** **22:00** - 24:00 / **45°C**
Only evening	**00:00** - 15:30 / **45°C** **15:30** - 22:00 / **50°C** **22:00** - 24:00 / **45°C**
All day legio	**00:00** - 05:30 / **45°C** **05:30** - 15:30 / **50°C** **15:30** - 16:30 / **60°C** **16:30** - 22:00 / **50°C** **22:00** - 24:00 / **45°C**
NEW	**00:00** - 05:30 / **45°C** **05:30** - 08:00 / **50°C** **08:00** - 15:30 / **45°C** **15:30** - 22:00 / **50°C** **22:00** - 24:00 / **45°C**

7.3 Standard day programs circulation / free time clock

Circulation *):

Week	MON	TUE	WED	THU	FRI	SAT	SUN
	All day	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*
	00:00 - 05:30 / **10°C**	**00:00 - 05:30 / 10°C**	**00:00** - 05:30 / **10°C**	**00:00** - 05:30 / **10°C**	**00:00** - 05:30 / **10°C**	**00:00** - 05:30 / **10°C**	**00:00** - 05:30 / **10°C**
	05:30 - 22:00 / **45°C**	**05:30 - 22:00 / 45°C**	**05:30** - 22:00 / **45°C**	**05:30** - 22:00 / **45°C**	**05:30** - 22:00 / **45°C**	**05:30** - 22:00 / **45°C**	**05:30** - 22:00 / **45°C**
	22:00 - 24:00 / **10°C**	**22:00 - 24:00 / 10°C**	**22:00** - 24:00 / **10°C**	**22:00** - 24:00 / **10°C**	**22:00** - 24:00 / **10°C**	**22:00** - 24:00 / **10°C**	**22:00** - 24:00 / **10°C**

**) In variant without circulation sensor, a threshold value of 15°C is stored. This means switching points less tham 15 °C = OFF, greater than 15 °C = ON*

Free time clock:

Week	MON	TUE	WED	THU	FRI	SAT	SUN
	All day	*All day*	*All day*	*All day*	*All day*	*All day*	*All day*
	00:00 - 06:00 / **0**	**00:00** - 06:00 / **0**	**00:00** - 06:00 / **0**	**00:00** - 06:00 / **0**	**00:00** - 06:00 / **0**	**00:00** - 06:00 / **0**	**00:00** - 06:00 / **0**
	06:00 - 22:00 / **1**	**06:00** - 22:00 / **1**	**06:00** - 22:00 / **1**	**06:00** - 22:00 / **1**	**06:00** - 22:00 / **1**	**06:00** - 22:00 / **1**	**06:00** - 22:00 / **1**
	22:00 - 24:00 / **0**	**22:00** - 24:00 / **0**	**22:00** - 24:00 / **0**	**22:00** - 24:00 / **0**	**22:00** - 24:00 / **0**	**22:00** - 24:00 / **0**	**22:00** - 24:00 / **0**

7.4 Standard week programs circulation / free time clock

Circulation

All day	**00:00** - 05:30 / **10°C** **05:30** - 22:00 / **45°C** **22:00** - 24:00 / **10°C**
Morning & evening	**00:00** - 05:30 / **10°C** **05:30** - 08:00 / **45°C** **08:00** - 15:30 / **10°C** **15:30** - 22:00 / **45°C** **22:00** - 24:00 / **10°C**
Only evening	**00:00** - 15:30 / **10°C** **15:30** - 22:00 / **45°C** **22:00** - 24:00 / **10°C**
All day legio	**00:00** - 05:30 / **10°C** **05:30** - 15:30 / **45°C** **15:30** - 16:30 / **60°C** **16:30** - 22:00 / **45°C** **22:00** - 24:00 / **10°C**
NEW	**00:00** - 05:30 / **10°C** **05:30** - 08:00 / **45°C** **08:00** - 15:30 / **10°C** **15:30** - 22:00 / **45°C** **22:00** - 24:00 / **10°C**

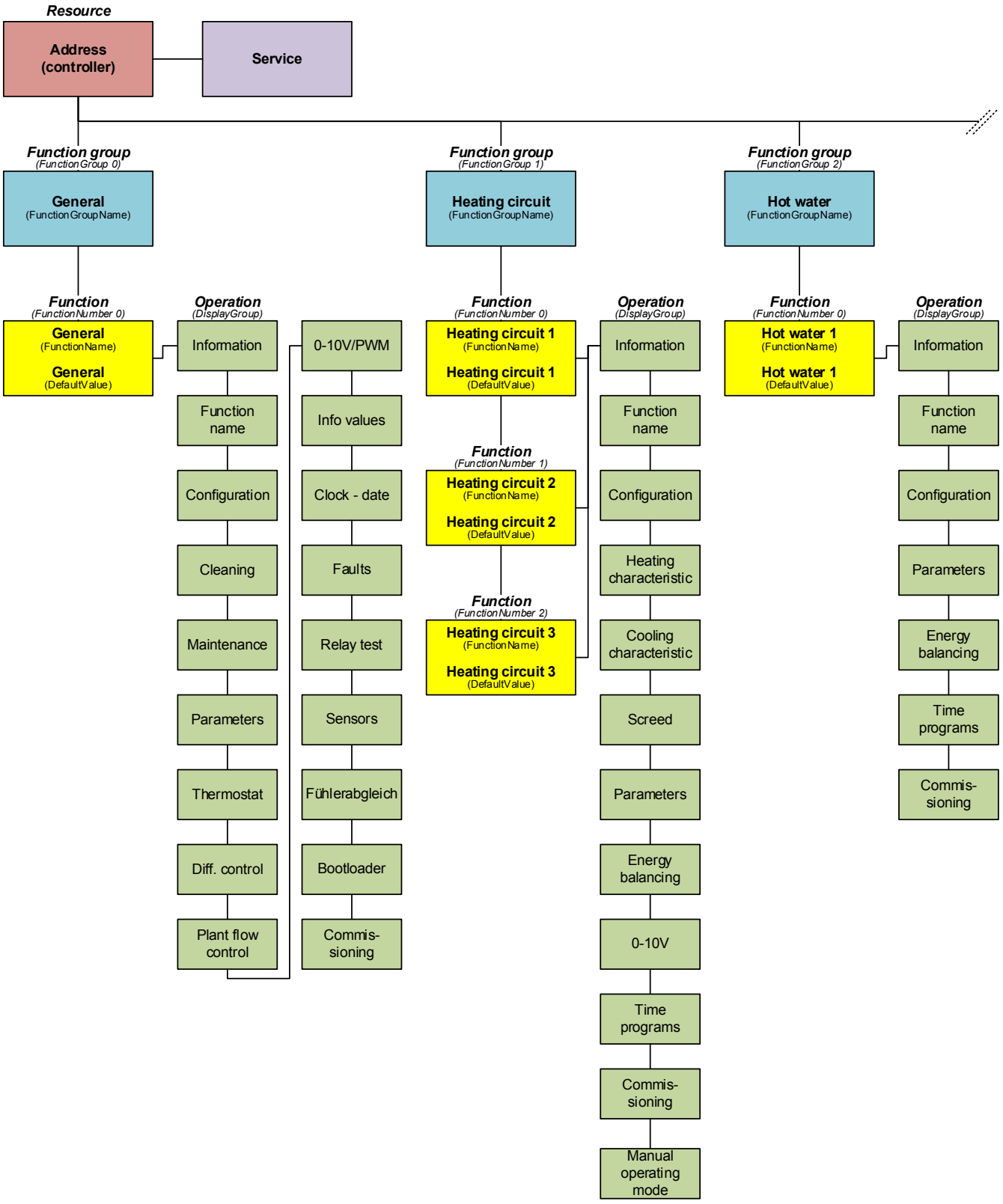
Free time clock

All day	**00:00** - 06:00 / **0** **06:00** - 22:00 / **1** **22:00** - 24:00 / **0**
Longer day	**00:00** - 06:00 / **0** **06:00** - 23:00 / **1** **23:00** - 24:00 / **0**
Morning & evening	**00:00** - 06:00 / **0** **06:00** - 08:00 / **1** **08:00** - 16:00 / **0** **16:00** - 22:00 / **1** **22:00** - 24:00 / **0**
Only evening	**00:00** - 16:00 / **0** **16:00** - 23:00 / **1** **23:00** - 24:00 / **0**
NEW	**00:00** - 06:00 / **0** **06:00** - 08:00 / **1** **08:00** - 16:00 / **0** **16:00** - 22:00 / **1** **22:00** - 24:00 / **0**

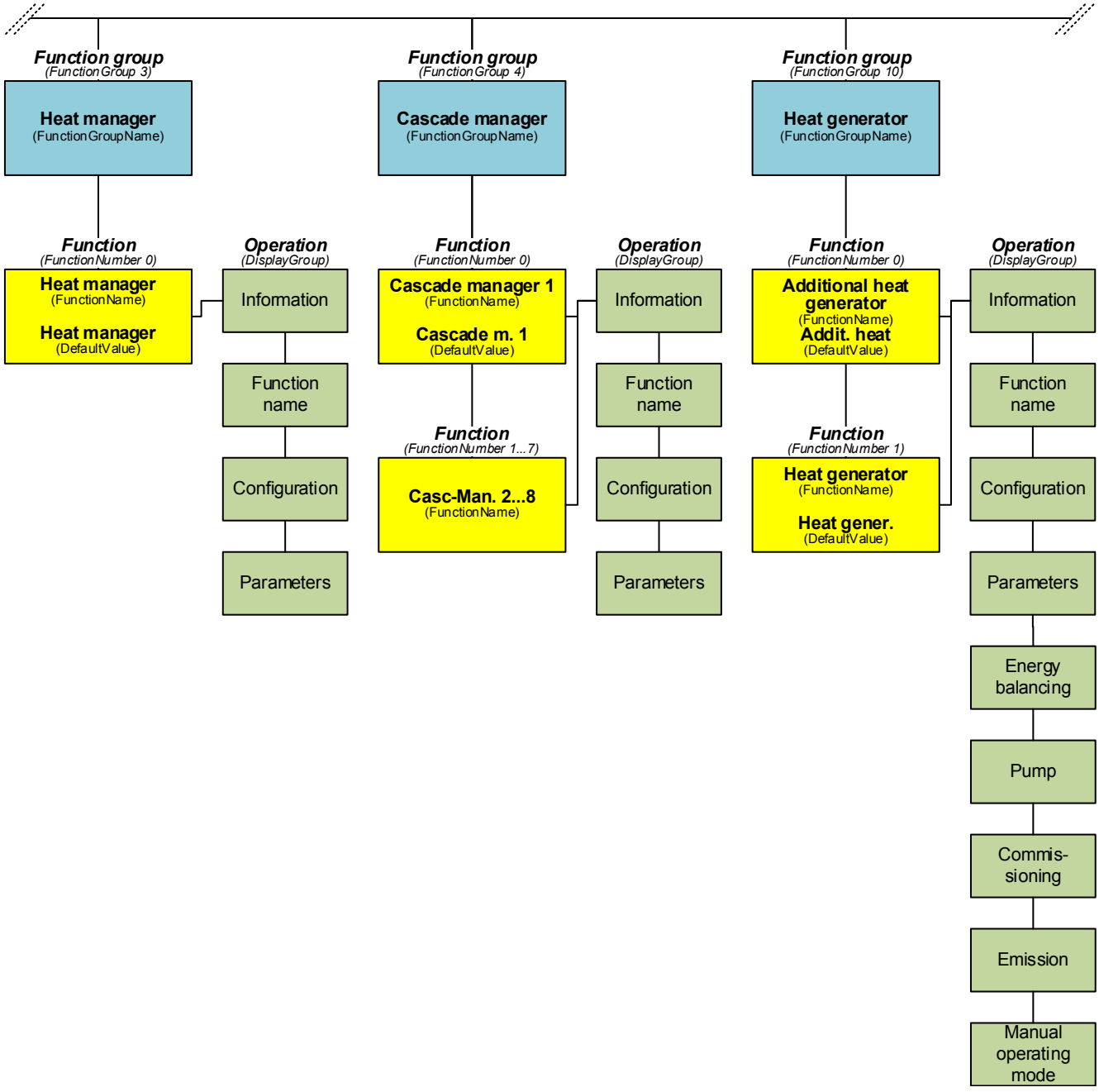
8. Overview of menu structure/function levels "Service" TTE-WEZ

In the main menu, the function levels are accessed using the "Service" button. The access depth depends on the previously entered code/user level.

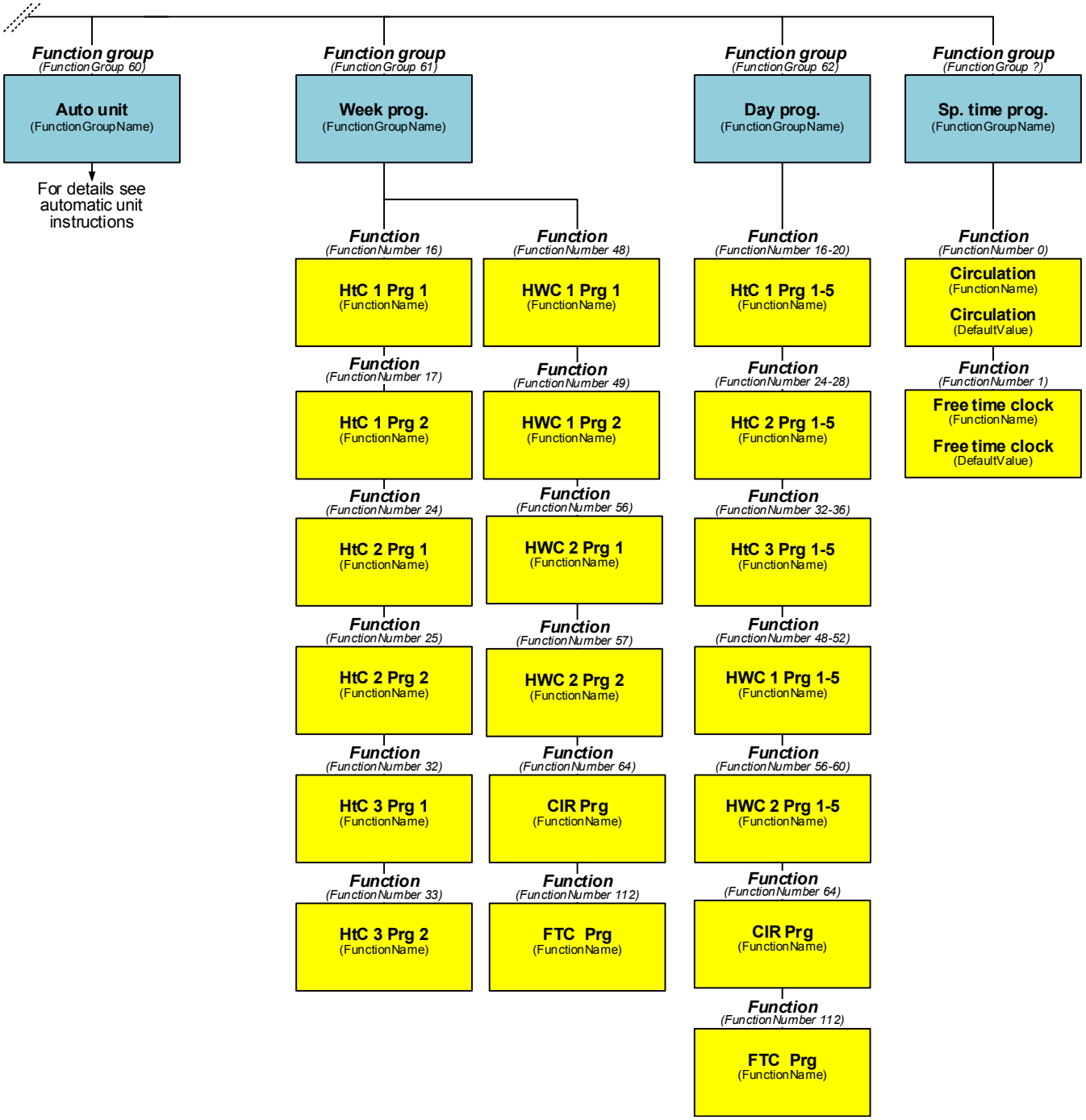
Menu structure TTE-WEZ part 1



Menu structure TTE-WEZ part 2



Menu structure TTE-WEZ part 3



9. Basic settings

9.1 Access levels / code input / user level

The TopTronic® E control system provides different access levels. The codes are entered in the main menu – "User Level" menu item.

Levels (code):
Operator code: No code
Technical operator code: …….
Service IBN code: .....
Specialist code: ……
OEM code: …….

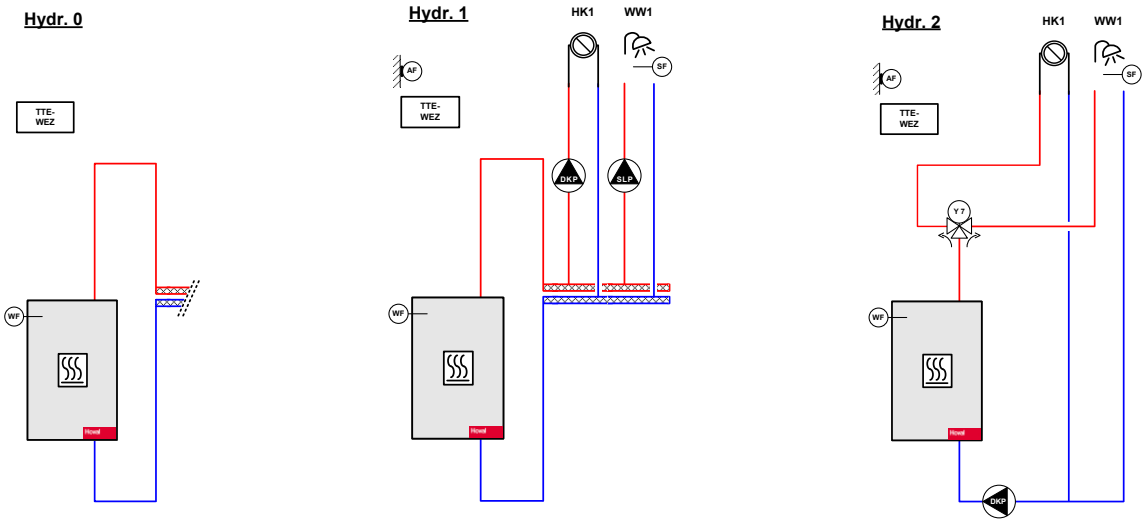
9.2 Hydraulic applications

To facilitate setting and commissioning of the TopTronic® E control system, predefined hydraulic applications can be selected in each module. Selecting the corresponding hydraulics sets very many parameters to the correct value. At the same time, this defines the input/output allocations of the functions. If a hydraulic application is adjusted, this means the parameters in the individual functions are reset to their factory setting at the same time. Consequently, during commissioning of the control system, always set the hydraulic application first.

The hydraulic application is set in the menu: General – General – Configuration – Par. 04-077:

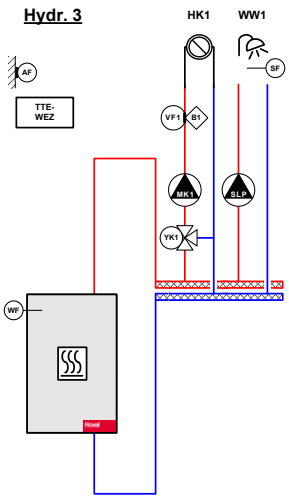
9.3 Overview of hydraulic applications TTE-WEZ

Hydraulic applications TTE-WEZ part 1:

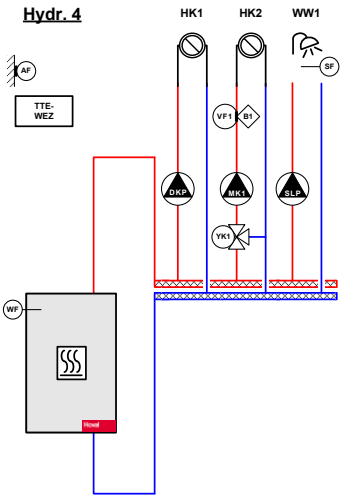


Hydraulic applications TTE-WEZ part 2:

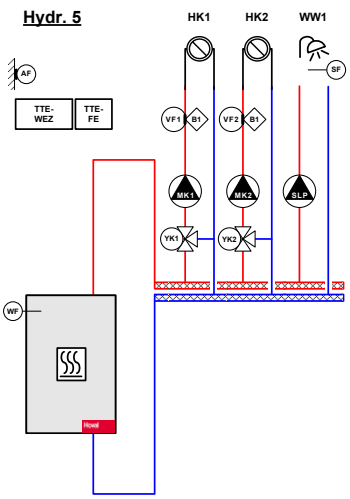
Hydr. 3



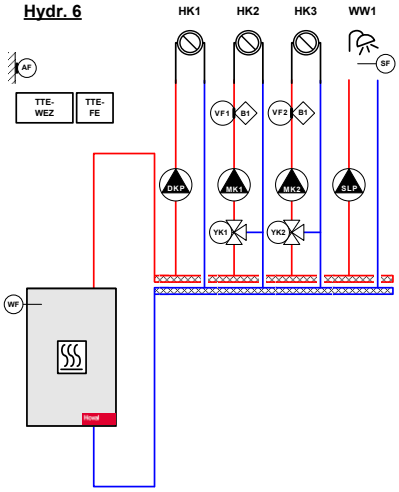
Hydr. 4



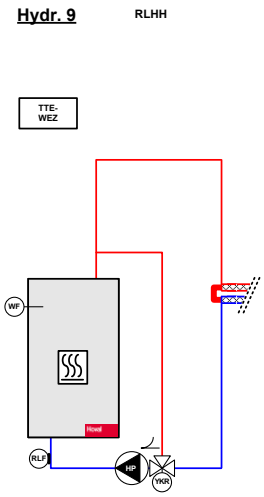
Hydr. 5



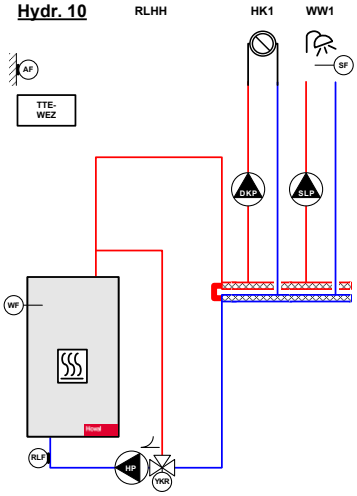
Hydr. 6



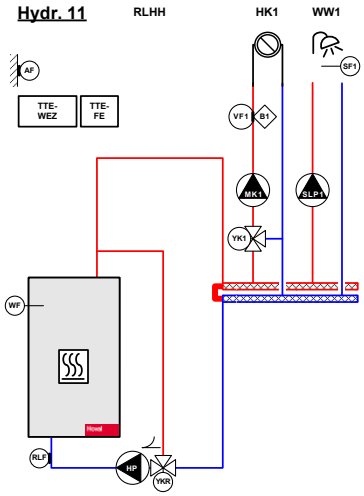
Hydr. 9



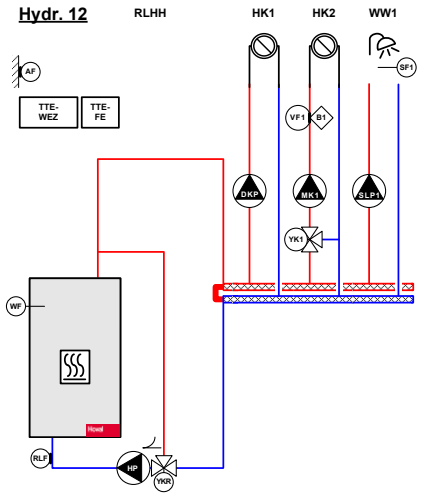
Hydr. 10

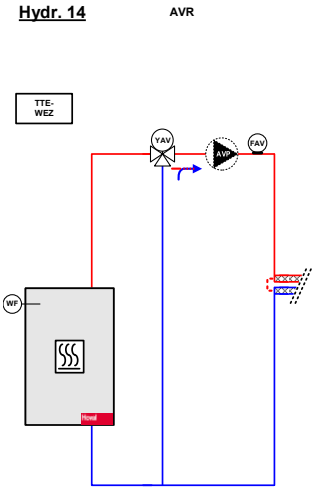


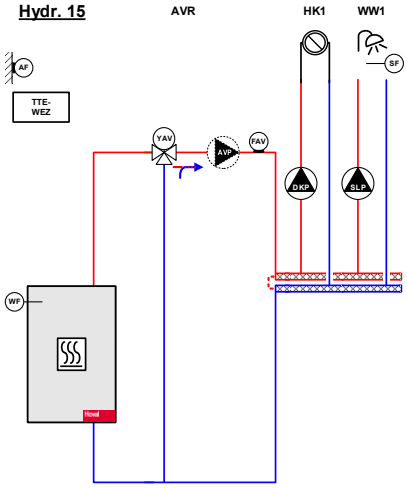
Hydr. 11

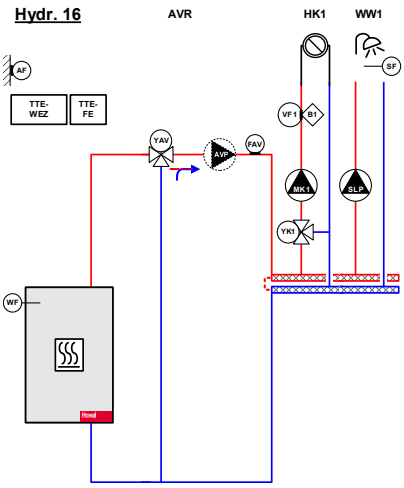


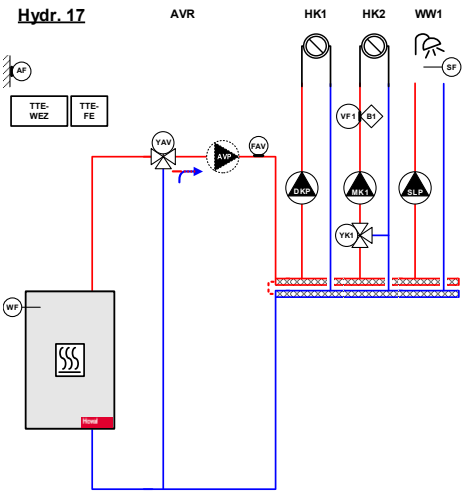
Hydraulic applications TTE-WEZ part 3:





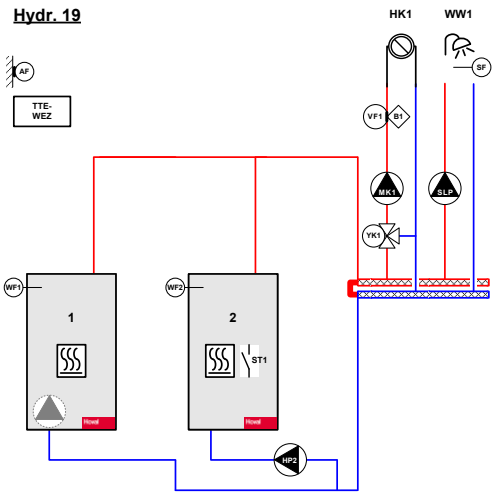




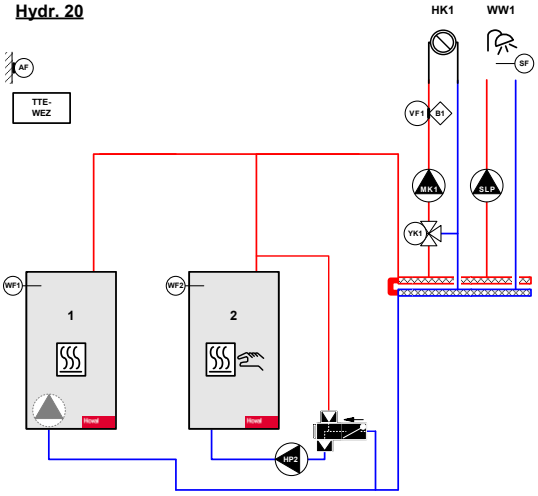


Hydraulic applications TTE-WEZ part 4:

Hydr. 19

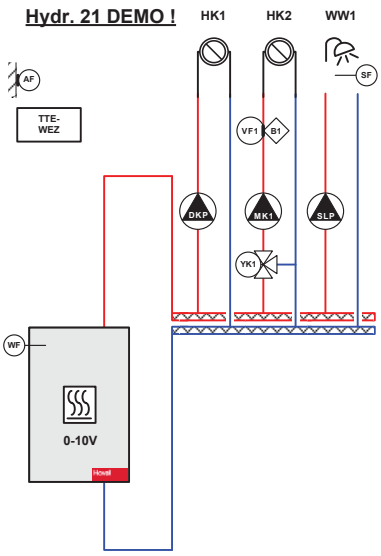


Hydr. 20



Additional HGEN function solid material
only possible without buffer!

Hydr. 21 DEMO !



Application for demo panels (from SW 2.03.xxx)
HGEN = 0-10V temp., HS=VE1, HP=VA2
HC1 : DC (time constant OT-MW:0h)
HC2 : MC (time constant OT-MW:0h)
DHW

9.4 Overview of input/output allocation hydraulic applications TTE-WEZ

Input/output table

Function			TTE-WEZ																	1st TTE-FE										
			VA1	SLP	DKP	VA2	YK1 +	YK1 -	MC1	B1	VE1	AF	SF	VE2/IMP	VF1	VE10V	VA10V/PWM	H1	RS485 / OT	VA1	VA2	VA3	SK-VA3	VE1	VE2	VE3/IMP	VE10V	VA10V/PWM	FVT T=Temp.	FVT F=Flow rate
Hydraulic applications																														
Hydr 0	H-Gen	Bus[1],0-10V[2]									WF[2]						WA[2]		WF[1]											
Hydr 1	H-Gen	Bus[1],0-10V[2]		SLP	DKP						WF[2]	AF	SF				WA[2]		WF[1]											
Hydr 2	H-Gen	Bus[1],0-10V[2]		Y7	DKP						WF[2]	AF	SF				WA[2]		WF[1]											
	H-Gen	over 0-10V		Y7	DKP						WF	AF	SF				WA													
Hydr 3	H-Gen	Bus[1],0-10V[2]		SLP			YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF[1]											
Hydr 4	H-Gen	Bus[1],0-10V[2]		SLP	DKP		YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF[1]											
Hydr 5	H-Gen	Bus[1],0-10V[2]		SLP			YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF[1]	YK2+	YK2-	MC2	B1	VF2						
Hydr 6	H-Gen	Bus[1],0-10V[2]		SLP	DKP		YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF[1]	YK2+	YK2-	MC2	B1	VF2						
Hydr 9	H-Gen+RLH	Bus[1],0-10V[2]					YKR+	YKR-	HP		WF[2]				RLF		WA[2]		WF[1]											
Hydr 10	H-Gen+RLH	Bus[1],0-10V[2]		SLP	DKP		YKR+	YKR-	HP		WF[2]	AF	SF		RLF		WA[2]		WF[1]											
Hydr 11	H-Gen+RLH	Bus[1],0-10V[2]		SLP			YKR+	YKR-	HP		WF[2]	AF	SF		RLF		WA[2]		WF[1]	YK1+	YK1-	MC1	B1	VF1						
Hydr 12	H-Gen+RLH	Bus[1],0-10V[2]		SLP	DKP		YKR+	YKR-	HP		WF[2]	AF	SF		RLF		WA[2]		WF[1]	YK1+	YK1-	MC1	B1	VF1						
Hydr 14	H-Gen+AVR	Bus[1],0-10V[2]					YAV+	YAV-	AVP		WF[2]				FAV		WA[2]		WF[1]											
Hydr 15	H-Gen+AVR	Bus[1],0-10V[2]		SLP	DKP		YAV+	YAV-	AVP		WF[2]	AF	SF		FAV		WA[2]		WF[1]											
Hydr 16	H-Gen+AVR	Bus[1],0-10V[2]		SLP			YAV+	YAV-	AVP		WF[2]	AF	SF		FAV		WA[2]		WF[1]	YK1+	YK1-	MC1	B1	VF1						
Hydr 17	H-Gen+AVR	Bus[1],0-10V[2]		SLP	DKP		YAV+	YAV-	AVP		WF[2]	AF	SF		FAV		WA[2]		WF[1]	YK1+	YK1-	MC1	B1	VF1						
Hydr 18	H-Gen+AVR	Bus[1],0-10V[2]		SLP1	DKP		YAV+	YAV-	AVP		WF[2]	AF	SF1		FAV		WA[2]		WF[1]	SLP2				SF2						
Hydr 19	H-Gen 1	Bus[1],0-10V[2]		SLP			YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF1[1]											
	H-Gen 2	Stage[3], 0-10V[4]	ST1[3]	SLP		MB2	YK1+	YK1-	MC1	B1		AF	SF	WF2	VF1		WA2[4]													
Hydr 20	H-Gen 1	Bus[1],0-10V[2]		SLP			YK1+	YK1-	MC1	B1	WF[2]	AF	SF		VF1		WA[2]		WF1[1]											
	H-Gen 2	non-controllable		SLP		MB2	YK1+	YK1-	MC1	B1	RLF	AF	SF	WF2	VF1															
Hydr 21	WEZ 0-10V+1DK+1MK+WW			SLP	DKP		YK1+	YK1-	MK1	B1	WF	AF	SF		VF1		WA													
DEMO																														

[1] H-Gen via BUS to FA (OpenTherm or RS485)

[2] H-Gen via 0-10V output + WF

[3] H-Gen 2 via stage (VA1+WF2)

[4] H-Gen 2 via 0-10V output + WF2

Legend:

AF	Fresh air sensor	**RS485/OT**	H-Gen bus RS485 or OpenTherm	**VA10V**	Variable output 0-10V
AVF	Plant flow sensor	**TTE-FE**	TopTronic E function expansion module	**VF1.2**	Flow sensor 1.2
AVP	Pump plant flow control	**TTE-WEZ**	TopTronic E heat generator module	**VE10V**	Variable input 0-10V
B1	Flow temperature controller	**AF**	Outside sensor	**VE1,2,3**	Variable input 1,2,3
DKP	Heating circuit pump direct heating circuit	**AVF**	Plant flow sensor	**VA,1,2,3**	Variable output 1,2,3
FAV	Plant flow sensor (PFC control)	**AVP**	Pump plant flow control	**WA,1,2**	Heat request heat generator 1,2
H1	LED lamp output	**B1**	Flow temperature controller	**WF,1,2**	Heat generator sensor 1,2
HP,1,2	Main pump 1,2	**DKP**	Heating circuit pump direct heating circuit	**Y7**	DHW switchover element (= SLP output)
IMP	Pulse counter	**H1**	LED lamp output	**YK1,2 +**	Heating circuit mixer 1,2: open
SF,1,2	Calorifier sensor 1,2	**HP,1,2**	Main pump 1,2	**YK1,2 -**	Heating circuit mixer 1,2: closed
SK-VA3	Safety chain variable output 3	**IMP**	Pulse counter	**YKR+**	Return mixer open
SLP,1,2	DHW charging pump,1,2	**SF,1,2**	Calorifier sensor 1.2	**YKR-**	Return mixer closed
ST1	Stage 1 request (ext. H-Gen)	**SK-VA3**	Safety chain variable output 3	**YAV+**	Plant flow - mixer open
STB	Safety temperature limiter	**SLP,1,2**	DHW charging pump, 1,2	**YAV-**	Plant flow - mixer closed
MC1,2	Pump, mixer circuit 1,2	**ST1**	Stage 1 request (ext. H-Gen)	**FVT**	FVT-T flow sensor temperature
RLF,1,2	Return sensor,1,2				FVT-F flow sensor flow

9.5 Overview of all function applications

Various function applications can be activated/set in the particular function (general, additional H-Gen, H-Gen, HC1, HC2, etc.). Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Overview of function applications:

Function	0	1	2	3	4	5	6	7
Gen.	Standard	Standard + PFC	Standard + PFC only pump *2)	Standard without AF1	Standard + PFC without AF1			
Additional H-Gen	H-Gen not active	H-Gen 1-stage without MP (ST1=-VA1, WF=VE2)	H-Gen 1-stage with MP (ST1=VA1, WF=VE2, MP=-VA2)	H-Gen FSK without MP (WF=-VE2, RLF=VE1)	H-Gen FSK with MP (WF=VE2, RLF=VE1, MP=VA2)			
H-Gen	H-Gen not active	H-Gen via FA bus	H-Gen via FA bus with MP (MP=VA2)	H-Gen via FA bus with MP, RLHH (RLF=-VF1, YRK=YK1, MP=MC1)	H-Gen 0-10V temp. *) (WF=VE1,MP=-VA2,WF-setp VA10V) ! Config. 0-10V separate!			
HC1	HC not active			Mixed HC (HC1-FE1)	Mixed HC (HC1-H-Gen-MC)	Direct HC DEMO (HC1-HGEN-DKP)	Direct HC (HC1-H-Gen-DKP)	
HC2	HC not active		Mixed HC DEMO (HC2-HGEN-MC)	Mixed HC (HC2-H-Gen-MC)	Mixed HC (HC2-FE1)		Direct HC (HC2-H-Gen-MC1)	
HC3	HC not active			Mixed HC (HC3-FE1)			Direct HC (HC3-FE1)	
DHW1	DHW not active		DHW with charging pump			DHW with switching valve Y7, and req. DKP		
HM	Distributor							
CM	No H-Gen	H-Gen2 temperature control.	AH-Gen1 (Additional H-Gen) Temperature control	CAS AH-Gen1 - H-Gen2 output control No power compensation, without sequence change CM1 200kW	CAS H-Gen2 - AH-Gen1 Power control no power compensation without sequence change	CAS H-Gen2 – H-Gen4 Power control, no power compensation without sequence change	CAS H-Gen2 – H-Gen4 Power control, no power compensation without sequence change 2 x 2-stage Stage sequence 0 1-3-2-4	CAS H-Gen2 – H-Gen4 Power control, no power compensation without sequence change 2 x 2-stage Stage sequence 1 1-2-3-4

*1) In WEZ function appl. 4 (WEZ type 0-10V temp.), additionally the output must be configured as 0-10V in "General - 0-10V/PWM"!
*2) In general function application 2 (standard + PFC only pump), the output for the pump must additionally be assigned in the «General PFC»!

9.6 Information (reference/actual values, operating states)

In the "Information" menu, you can query the appropriate plant values such as reference/actual values, operating states, etc. The information depth depends on the entered "user level".

9.7 Adapting function name

In the Function name menu, it is possible to assign a freely definable name in addition to the standard name of each function. This is then transferred to the operator level (e.g. for operating mode selection). Both names are displayed in the parameter level.

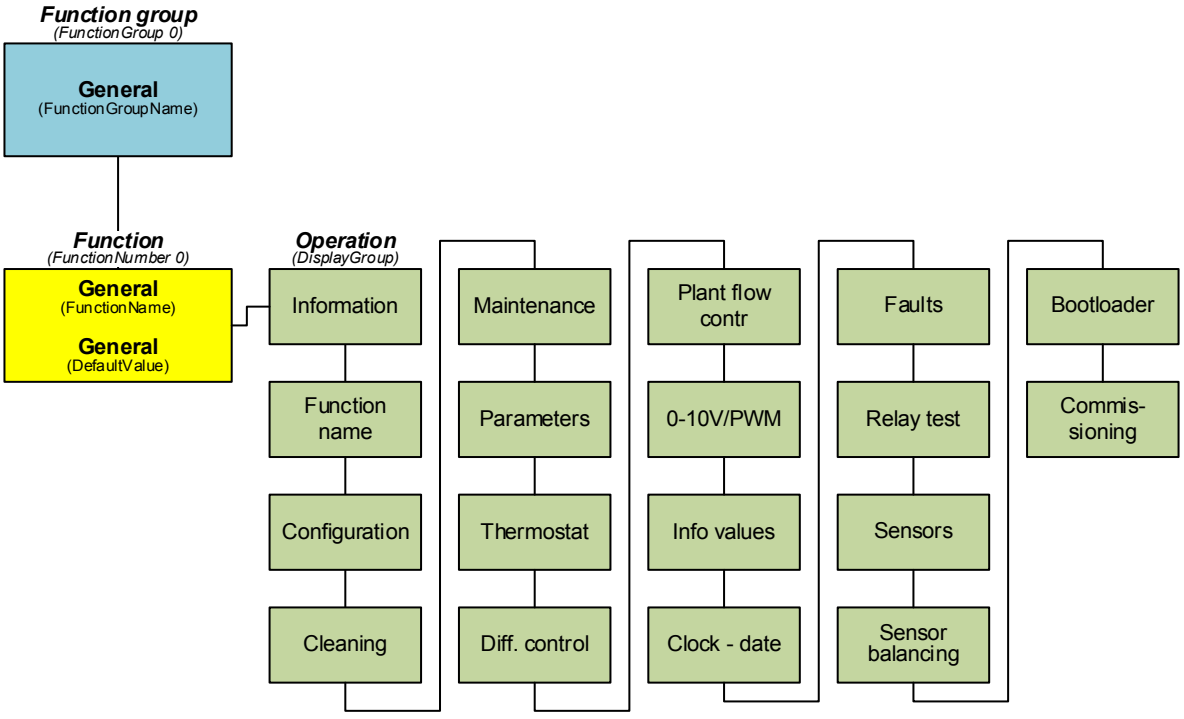
Sample function name: Standard: "Heating circuit 1"
+ free name: "Ground floor"

10. Function modules and control functions

10.1 "General" function group

In the "General" function, values must be set and settings made that are required for all function modules. Time, date, input/output allocation as well as special sequence controls.
The hydraulic application is also set here.

10.1.1 Overview of menu structure "General"



10.1.2 Parameter overview "General"

General – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
21-103	Outside temp. daily minimum	**35.2 °C**	0.0	0.0	Outside temp. daily minimum (AF1 or AFG1)	0	7
21-104	Outside temp. daily maximum	**35.5 °C**	0.0	0.0	Outside temp. daily maximum (AF1 or AFG1)	0	7
00-000	AF1 - outdoor sensor 1	**35.3 °C**	0.0	0.0	Outdoor sensor 1 (AF1, local HW input)	0	7
21-100	AF2 - outdoor sensor 2	**--- °C**	0.0	0.0	Outdoor sensor 2 (AF2, local HW input)	0	7
21-101	AFG1 system outdoor sensor 1	**--- °C**	0.0	0.0	System outdoor sensor 1 (AFG1, from BUS)	0	7
21-102	AFG2 system outdoor sensor 2	**--- °C**			System outdoor sensor 2 (AFG2, of BUS)	0	7
21-120	Info 1	**--- °C**	0.0	0.0	Info 1	0	7
20-090	Name info 1	**Info 1**	0	13	Name info 1	0	4
21-121	Info 2	**--- °C**	0.0	0.0	Info 2	0	7
20-091	Name info 2	**Info 2**	0	13	Name info 2	0	4
21-122	Info 3	**--- °C**	0.0	0.0	Info 3	0	7
20-092	Name info 3	**Info 3**	0	13	Name info 3	0	4
21-123	Info 4	**--- °C**	0.0	0.0	Info 4	0	7
20-093	Name info 4	**Info 4**	0	13	Name info 4	0	4
21-124	Info 5	**--- °C**	0.0	0.0	Info 5	0	7
20-094	Name info 5	**Info 5**	0	13	Name info 5	0	4
21-112	Info 1 IMP	**32768**	0	0	Info 1 IMP	0	7
20-105	Name info 1 IMP	**Info 1 IMP**	0	13	Name info 1 IMP	0	4
21-113	Info 2 IMP	**32768**	0	0	Info 2 IMP	0	7
20-106	Name info 2 IMP	**Info 2 IMP**	0	13	Name info 2 IMP	0	4
21-114	Info 3 IMP	**32768**	0	0	Info 3 IMP	0	7
20-107	Name info 3 IMP	**Info 3 IMP**	0	13	Name info 3 IMP	0	4
21-125	Info 1 0-10V	**---**	0	0	Info 1 0-10V	0	7
20-095	Name info 1 0-10V	**Info 1 VE0-10V**	0	13	Name info 1 0-10V	0	4
21-126	Info 2 0-10V	**---**	0	0	Info 2 0-10V	0	7
20-096	Name info 2 0-10V	**Info 2 VE0-10V**	0	13	Name info 2 0-10V	0	4
21-127	Info 3 0-10V	**---**	0	0	Info 3 0-10V	0	7
20-097	Name info 3 0-10V	**Info 3 VE0-10V**	0	13	Name info 3 0-10V	0	4
04-090	Unit identification	**TTE-WEZ**	0	0	The unit identification is the unit name.	0	7
04-089	Commissioning date	**2036-02-06**	0	0	Commissioning date	3	6
20-004	Software version	**1.1.5**	0	0	Software version	0	7
04-093	HW version	**0**	0.00	0.00	HW version of the unit	0	7
22-021	FAV flow sensor set temp.	**0 °C**	0.0	0.0	FAV flow set temp., plant flow control	3	7
21-059	FAV flow actual temp.	**--- °C**	0.0	0.0	FAV flow actual temp., plant flow control	4	7
22-055	AVP pump	**0**	0	1	AVP pump, plant flow control	3	7
22-056	YAV mixer	**0%**	0	1	YAV mixer, plant flow control	3	7
21-090	Status Smart Grid	**255**	0	0	Status Smart-Grid 0 Normal operation 1 Preferential operation 2 Blocked 3 Forced acceptance 255 Smart-Grid inactive (no complete allocation)	0	7

Par.	Designation	Value	Min.	Max.	Comments	R	W
21-091	Setpoint incr./decr. status	**11**	0	0	Status reference value increase/reduction 1x Increase undefined (input not allocated) 2x Increase inactive (input open) 3x Increase active (input closed) x1 Reduction undefined (input not allocated) x2 Reduction inactive (input open) x3 Reduction active (input closed)	1	7
01-099	Collective fault output fault reporting output	**0**	0	1		0	7
22-002	THA1 thermostat 1 output	**0**	0	1	THA1 thermostat 1 output	4	7
21-012	THF1 actual setpt. thermostatic sensor 1	**--- °C**	0.0	0.0	THF1 actual thermostat sensor 1	4	7
22-003	THA2 thermostat 2 output	**0**	0	1	THA2 thermostat 2 output	4	7
21-013	THF2 actual setpt. thermostatic sensor 2	**--- °C**	0.0	0.0	THF2 actual thermostat sensor 2	4	7
22-004	THA3 thermostat 3 output	**0**	0	1	THA3 thermostat 3 output	4	7
21-014	THF3 actual setpt. thermostatic sensor 3	**--- °C**	0.0	0.0	THF3 actual thermostat sensor 3	4	7
22-005	DFA1 diff. control 1 output	**0**	0	1	DFA1 diff. control 1 output	4	7
21-015	DF1-1 actual diff. control 1 sensor 1	**--- °C**	0.0	0.0	DF1-1 actual diff. control 1 sensor 1	4	7
21-018	DF2-1 actual diff. control 1 sensor 2	**--- °C**	0.0	0.0	DF2-1 actual diff. control 1 sensor 2	4	7
22-006	DFA2 diff. control 2 output	**0**	0	1	DFA2 diff. control 2 output	4	7
21-016	DF1-2 actual diff. control 2 sensor 1	**--- °C**	0.0	0.0	DF1-2 actual diff. control 2 sensor 1	4	7
21-019	DF2-2 actual diff. control 2 sensor 2	**--- °C**	0.0	0.0	DF2-2 actual diff. control 2 sensor 2	4	7
22-007	DFA3 diff. control 3 output	**0**	0	1	DFA3 diff. control 3 output	4	7
21-017	DF1-3 actual diff. control 3 sensor 1	**--- °C**	0.0	0.0	DF1-2 actual diff. control 3 sensor 1	4	7
21-020	DF2-3 actual diff. control 3 sensor 2	**--- °C**	0.0	0.0	DF2-2 actual diff. control 3 sensor 2	4	7
20-007	Software version expansion module 1	**0.37**	0.00	0.00	Software version expansion module 1	0	7
20-008	Hardware version expansion module 1	**0**	0.00	0.00	Hardware version expansion module 1	0	7
20-009	Software version expansion module 2	**0**	0.00	0.00	Software version expansion module 2	0	7
20-019	Hardware version expansion module 2	**0**	0.00	0.00	Hardware version expansion module 2	0	7
20-200	Version_VMLib	**1.3.0**	0	0	Library version	5	7
20-201	Version_L2Lib	**1.3.0**	0	0	Library version	5	7
20-202	Version_BSPLib	**1.3.0**	0	0	Library version	5	7
20-203	Version_CommonLib	**1.3.0**	0	0	Library version	5	7
02-067	SO/WI display	**0**	0	1	Summer/winter operation display	4	7
21-055	Date of next cleaning	**2036-02-06**	0	0		0	7
21-056	Remaining run time cleaning counter	**0**	0	0		0	7
21-057	Date of next maintenance	**2036-02-06**	0	0		0	7
21-058	Remaining run time maintenance counter	**0**	0	0		0	7

General - function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Hydr. application	**Wärmeerzeu-ger Modul**				0	5

General – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-077	Hydraulic application	**3**	0	20	Heat gen. module	0	3
04-076	Function application general	**0**			Function application type	0	3
04-045	Commands	**0=No action**			Perform command 0 = No action 9 = Reset processor (like power off-on) 21 = Error unlocking 31 = Factory reset	0	5
04-013	Alloc. AF1 as system outside sensor AFG1	**0**	0	1	Define allocation outside temperature AF1 as system outside temperature AFG1 (BUS outdoor sensor)	3	3
30-028	Allocation AF1 - ext. sensor 1 input	**1=AF**			Allocation input AF1 - outdoor sensor 1 0=OFF, 1=AF, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2	4	4
30-029	Allocation AF2 - ext. sensor 2 input	**0=OFF**			Allocation input AF2 - outdoor sensor 2 0=OFF, 1=AF, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2	3	3
32-045	Allocation SMA collective fault output	**0=OFF**			Allocation SMA collective fault output: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-035	Allocation external fault signal input	**0=OFF**			Allocation external fault signal input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-052	Allocation SmartGrid 1 input	**0=OFF**			Allocation SmartGrid 1 input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-053	Allocation SmartGrid 2 input	**0=OFF**			Allocation SmartGrid 2 input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-054	Allocation setpoint increase input	**0=OFF**			Allocation setpoint increase input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-055	Allocation setpoint reduction input	**0=OFF**			Allocation setpoint reduction input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
32-018	Output allocation free sw. contact	**0=OFF**			Output allocation free switching contact 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
32-022	Alloc. free time cl. output	**0=OFF**			Allocation free time clock output: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3

General – cleaning

Par.	Designation	Value	Min.	Max.	Comments	R	W
20-030	Cleaning configuration	**0**	0	3	Cleaning configuration 0: No display cleaning 1: Display cleaning on set date 2: Display cleaning after interval 3: Display cleaning acc. to cleaning counter	0	0
20-031	Date of next cleaning message	**2014-12-19**			The message is generated at the end of the set day. If the message is acknowledged, the event only reoccurs if a date is set after the current date.	0	0
20-032	Next cleaning interval	**0 days**	1	364	The message is generated if the interval has expired (end of the day). The interval is restarted after the message has been acknowledged.	0	0
20-033	Cleaning count value message cleaning	**0**	100	99900	The cleaning counter is formed from the total of operating hours and 0.1 x switching cycles (H-Gen). The message is generated if this counter reaches the set value. The cleaning counter is restarted after the message has been acknowledged.	0	0
21-054	Confirmation	**0**			Using the Acknowledge parameter, the value: 7 acknowledges the maintenance 8 acknowledges the cleaning	0	0
21-055	Date of next cleaning	**2036-02-06**	0	0		0	7
21-056	Remaining run time cleaning counter	**0**	0	0		0	7

General – maintenance

Par.	Designation	Value	Min.	Max.	Comments	R	W
20-034	Maintenance configuration	**0**	0	3	Configuration maintenance 0: No display maintenance 1: Display maintenance on set date 2: Display maintenance after interval 3: Display maintenance acc. to cleaning counter	2	2
20-035	Date of next maintenance message	**2014-12-19**			The message is generated at the end of the set day. If the message is acknowledged, the event only reoccurs if a date is set after the current date.	2	2
20-036	Next maintenance interval	**0 days**	1	364	The message is generated if the interval has expired (end of the day). The interval is restarted after the message has been acknowledged.	2	2
20-037	Maint. counter value message maint.	**0**	100	99900	The maintenance counter is formed from the total of operating hours and 0.1 x switching cycles (H-Gen). The message is generated if this counter reaches the set value. The maintenance counter is restarted after the message has been acknowledged.	2	2
21-054	Confirmation	**0**			Using the Acknowledge parameter, the value: 7 acknowledges the maintenance 8 acknowledges the cleaning	0	0
21-057	Date of next maintenance	**2036-02-06**	0	0		0	7
21-058	Remaining run time maintenance counter	**0**	0	0		0	7

General – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
22-009	Activation switching contact	**0**	0	1	The switching contact can be switched ON/OFF using parameters. If a switch-on duration is set in addition, the output switches on for the set switch-on duration on activation, and back off again after it expires.	3	3
29-059	Operating time free sw. contact	**0 s**	0	999	Operating time free sw. contact	3	3
04-099	Tel. no. customer service	**00423…**	0	30	Telephone number customer service (stored with error messages, for example)	3	3
04-018	Collective fault input delay	**0 min**	0.0	30.0	Collective fault input delay time	5	5
04-017	Collective fault output delay	**10 min**	0.0	60.0	Collective fault output delay time	4	4
17-004	Heating coefficient medium	**4.2 kJ/ kgK**	,1	9.99	Heating coefficient medium	4	4
20-028	Behaviour H1 output - blinking	**0**	0	8	Setting behaviour H1 output - flashing 0: Off, not lit 1: Malfunction 2: Malfunction, blocking 3: Malfunction, blocking, warnings 4: Maintenance, cleaning 5: Maintenance, cleaning, malfunction 6: Maintenance, cleaning, malfunction, blocking 7: Maintenance, cleaning, malfunction, blocking, warning 8: H-Gen running (flashing takes precedence over lit)	4	4
20-029	Behaviour H1 output - illuminates	**0**	0	9	Setting behaviour H1 output - flashing 0: Off, not lit 1: Malfunction 2: Malfunction, blocking 3: Malfunction, blocking, warnings 4: Maintenance, cleaning 5: Maintenance, cleaning, malfunction 6: Maintenance, cleaning, malfunction, blocking 7: Maintenance, cleaning, malfunction, blocking, warning 8: H-Gen running 9: On, continuously lit (flashing takes precedence over lit)	4	4

General – thermostat

Par.	Designation	Value	Min.	Max.	Comments	R	W
32-028	Alloc. THA1 - thermostat 1	**0=OFF**			Allocation output THA1 - thermostat 1: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-036	Alloc. THF1-thermostatic sensor 1 input	**0=OFF**			Allocation input THF1 - thermostat sensor 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-060	THF1 setpoint thermostatic sensor 1	**0 °C**	-20.0	250.0	THF1 ref. thermostat sensor 1	4	4
29-063	Thermostat 1 switching difference	**3 K**	1.0	90.0	Thermostat 1 switching difference	4	4
32-029	Alloc. THA2 - thermostat 2	**0=OFF**			Allocation output THA2 - thermostat 2: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-037	Alloc. THF2-thermostatic sensor 2 input	**0=OFF**			Allocation input THF2 - thermostat sensor 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-061	THF2 setpoint thermostatic sensor 2	**0 °C**	-20.0	250.0	THF2 ref. thermostat sensor 2	4	4
29-064	Thermostat 2 switching difference	**3 K**	1.0	90.0	Thermostat 2 switching difference	4	4
32-030	Alloc. THA3 - thermostat 3	**0=OFF**			Allocation output THA3 - thermostat 3: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-038	Alloc. THF3-thermostatic sensor 3 input	**0=OFF**			Allocation input THF3 - thermostat sensor 3: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-062	THF3 setpoint thermostatic sensor 3	**0 °C**	-20.0	250.0	THF3 ref. thermostat sensor 3	4	4
29-065	Thermostat 3 switching difference	**3 K**	1.0	90.0	Thermostat 3 switching difference	4	4

General – differential control

Par.	Designation	Value	Min.	Max.	Comments	R	W
32-041	Alloc. DFA1 - diff. ctrl 1	**0=OFF**			Allocation output DFA1 - diff. control1: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-039	Alloc. DF1-1-diff.ctrl 1 sensor 1 input	**0=OFF**			Allocation input DF1-1 - diff. control 1 sensor 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
30-042	Alloc. DF2-1-diff.ctrl 1 sensor 2 input	**0=OFF**			Allocation input DF2-1 - diff. control 1 sensor 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-066	Diff. control 1 switch-on differential	**8 K**	1.0	90.0	Diff. control 1 switch-on differential	4	4
29-069	Diff. control 1 switch-off differential	**4 K**	1.0	90.0	Diff. control 1 switch-off differential	4	4
29-072	Diff. control 1 min. temp.	**10 °C**	10.0	100.0	Diff. control 1 min. temp.	4	4
29-075	Diff. control 1 max. temp.	**90 °C**	10.0	100.0	Diff. control 1 max. temp.	4	4
32-042	Alloc. DFA2 - diff. ctrl 2	**0=OFF**			Allocation output DFA2 - diff. control2: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-040	Alloc. DF1-2-diff.ctrl 2 sensor 1 input	**0=OFF**			Allocation input DF1-2 - diff. control 2 sensor 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
30-043	Alloc. DF2-2-diff.ctrl 2 sensor 2 input	**0=OFF**			Allocation input DF2-2 - diff. control 2 sensor 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-067	Diff. control 2 switch-on differential	**8 K**	1.0	90.0	Diff. control 2 switch-on differential	4	4
29-070	Diff. control 2 switch-off differential	**4 K**	1.0	90.0	Diff. control 2 switch-off differential	4	4
29-073	Diff. control 2 min.temp.	**10 °C**	10.0	100.0	Diff. control 2 min.temp.	4	4
29-076	Diff. control 2 max. temp.	**90 °C**	10.0	100.0	Diff. control 2 max. temp.	4	4
32-043	Alloc. DFA3 - diff. ctrl 3	**0=OFF**			Allocation output DFA3 - diff. control3: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
30-041	Alloc. DF1-3-diff.ctrl 3 sensor 1 input	**0=OFF**			Allocation input DF1-3 - diff. control 3 sensor 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
30-044	Alloc. DF2-3-diff.ctrl 3 sensor 2 input	**0=OFF**			Allocation input DF2-3 - diff. control 3 sensor 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
29-068	Diff. control 3 switch-on differential	**8 K**	1.0	90.0	Diff. control 3 switch-on differential	4	4
29-071	Diff. control 3 switch-off differential	**4 K**	1.0	90.0	Diff. control 3 switch-off differential	4	4
29-074	Diff. control 3 min.temp.	**10 °C**	10.0	100.0	Diff. control 3 min.temp.	4	4
29-077	Diff. control 3 max. temp.	**90 °C**	10.0	100.0	Diff. control 3 max. temp.	4	4

General – plant flow control

Par.	Designation	Value	Min.	Max.	Comments	R	W
06-060	Type plant flow control PFC	**0**	0	2	Plant flow control type 0=Plant flow control 1=Plant flow control additional H-Gen (enable of PFC only when the additional H-Gen is also requested) 2=Plant flow control H-Gen (enable of PFC only when the H-Gen is also requested)	4	4
30-007	Alloc. FAV – plant flow sensor input	**0=OFF**			Allocation input plant flow sensor 0=OFF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
32-025	Allocation AVP pump output	**0=OFF**			Allocation AVP pump output: 0=OFF, 1=MK1,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
32-026	Allocation YAV mixer output-OPEN	**0=OFF**			Allocation YAV mixer output-OPEN: 0=OFF, 2=YK+,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
32-027	Allocation YAV mixer output-CLOSED	**0=OFF**			Allocation YAV mixer output-CLOSED: 0=OFF, 3=YK-,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
06-061	Plant flow control minimum temp. limit	**20 °C**	5.0	110.0	If there is a plant flow control reference value, the minimum temperature acts as the lower limit for the reference value.	4	4
06-062	Plant flow control maximum temp. limit	**90 °C**	2.0	110.0	If there is a plant flow control reference value, the maximum temperature acts as the upper limit for the reference value.	4	4
06-063	Plant flow control offset	**0 K**	-10.0	70.0	An offset can be applied to the plant flow control reference value (supplement/reduction).	4	4
06-064	Plant flow control proportional range	**10 K**	5.0	30.0		4	4
06-065	Follow-on time AVP pump	**5 min**	,5	99.0	In post operation, the pump remains switched on and the mixer continues to be controlled with the last reference value. Following post operation, the pump is switched off, the mixer is closed during the double mixer runtime.	4	4
06-066	YAV mixer run time	**120 sec**	0.0	600.0		4	4

General – 0-10V/PWM

Par.	Designation	Value	Min.	Max.	Comments	R	W
33-100	Configuration 0-10V/PWM output 1	**0**	0	3	Configuration 0-10V/PWM output 1 0: Off 1: 0-10V 2: PWM (0%=0V) 3: PWM inverted (0%=10V)	4	4
20-038	Characteristic curve 1 (X1) (%/°C)	**0**	0.0	100.0		4	4
20-039	Characteristic curve 1 vltg. (Y1) at X1	**0 V**	0.0	10.0		4	4
20-040	Characteristic curve 1 (X2) (%/°C)	**100**	0.0	100.0		4	4
20-041	Characteristic curve 1 vltg. (Y2) at X2	**10 V**	0.0	10.0		4	4
20-054	Char. curve 1 switch-off voltage	**0 V**	0.0	10.0		5	5
33-101	Configuration 0-10V/PWM output 2 (FE1)	**0**	0	3	Configuration 0-10V/PWM output 2 0: Off 1: 0-10V 2: PWM (0%=0V) 3: PWM inverted (0%=10V)	4	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
20-042	Characteristic curve 2 (X1) (%/°C)	**0**	0.0	100.0		4	4
20-043	Characteristic curve 2 vltg. (Y1) at X1	**0 V**	0.0	10.0		4	4
20-044	Characteristic curve 2 (X2) (%/°C)	**100**	0.0	100.0		4	4
20-045	Characteristic curve 2 vltg. (Y2) at X2	**10 V**	0.0	10.0		4	4
20-055	Char. curve 2 switch-off voltage	**0 V**	0.0	10.0		5	5
33-102	Configuration 0-10V/PWM output 3 (FE2)	**0**	0	3	Configuration 0-10V/PWM output 3 0: Off 1: 0-10V 2: PWM (0%=0V) 3: PWM inverted (0%=10V)	4	4
20-046	Characteristic curve 3 (X1) (%/°C)	**0**	0.0	100.0		5	5
20-047	Characteristic curve 3 vltg. (Y1) at X1	**0 V**	0.0	10.0		5	5
20-048	Characteristic curve 3 (X2) (%/°C)	**100**	0.0	100.0		5	5
20-049	Characteristic curve 3 vltg. (Y2) at X2	**10 V**	0.0	10.0		5	5
20-056	Char. curve 3 switch-off voltage	**0 V**	0.0	10.0		5	5

General – info values

Par.	Designation	Value	Min.	Max.	Comments	R	W
30-071	Alloc.inp.info 1	**0=OFF**			Allocation input information 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
20-090	Name info 1	**Info 1**	0	13	Name info 1	0	4
30-072	Alloc.inp.info 2	**0=OFF**			Allocation input information 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
20-091	Name info 2	**Info 2**	0	13	Name info 2	0	4
30-073	Alloc.inp.info 3	**0=OFF**			Allocation input information 3: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
20-092	Name info 3	**Info 3**	0	13	Name info 3	0	4
30-074	Alloc.inp.info 4	**0=OFF**			Allocation input information 4: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
20-093	Name info 4	**Info 4**	0	13	Name info 4	0	4
30-075	Alloc.inp.info 5	**0=OFF**			Allocation input information 5: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	4	4
20-094	Name info 5	**Info 5**	0	13	Name info 5	0	4
30-079	Alloc.inp.info 1 IMP	**0=OFF**			Allocation input information 1 pulse: 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	4	4
20-105	Name info 1 IMP	**Info 1 IMP**	0	13	Name info 1 IMP	0	4
20-070	Vol. flow pulse gen pulse rate info 1 IMP	**2**	,1	5000.0	Entry of the pulse rate in pulses/litre	4	4
20-080	Volume flow pulse gen. offset info 1 IMP	**0**	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	4	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
30-080	Alloc.inp.info 2 IMP	**0=OFF**			Allocation input information 2 pulse: 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	4	4
20-106	Name info 2 IMP	**Info 2 IMP**	0	13	Name info 2 IMP	0	4
20-072	Vol. flow pulse gen pulse rate info 2 IMP	**2**	,1	5000.0	Entry of the pulse rate in pulses/litre	4	4
20-082	Volume flow pulse gen. offset info 2 IMP	**0**	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	4	4
30-081	Alloc.inp.info 3 IMP	**0=OFF**			Allocation input information 3 pulse: 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	4	4
20-107	Name info 3 IMP	**Info 3 IMP**	0	13	Name info 3 IMP	0	4
20-071	Vol. flow pulse gen pulse rate info 3 IMP	**2**	,1	5000.0	Entry of the pulse rate in pulses/litre	4	4
20-081	Offset VIG Info3 IMP	**0**	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	4	4
30-076	Alloc.inp.info 1 0-10V	**0=OFF**			Allocation input information 1 0-10V: 0=OFF, 6=VE10V, 10=VE10V-FE1,16=VE10VFE2	4	4
20-100	Conversion for 10V info 1	**10**	10	1000	Conversion for 10V info 1	4	4
20-095	Name info 1 0-10V	**Info 1 VE0-10V**	0	13	Name info 1 0-10V	0	4
30-077	Alloc.inp.info 2 0-10V	**0=OFF**			Allocation input information 2 0-10V: 0=OFF, 6=VE10V, 10=VE10V-FE1,16=VE10VFE2	4	4
20-101	Conversion for 10V info 2	**10**	10	1000	Conversion for 10V info 2	4	4
20-096	Name info 2 0-10V	**Info 2 VE0-10V**	0	13	Name info 2 0-10V	0	4
30-078	Alloc.inp.info 3 0-10V	**0=OFF**			Allocation input information 3 0-10V: 0=OFF, 6=VE10V, 10=VE10V-FE1,16=VE10VFE2	4	4
20-102	Conversion for 10V info 3	**10**	10	1000	Conversion for 10V info 3	4	4
20-097	Name info 3 0-10V	**Info 3 VE0-10V**	0	13	Name info 3 0-10V	0	4

General – Clock-date

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-070	date	**2015-01-08**	0	65379		0	0
02-072	Time of day	**16:41**	0	1439		0	0
02-073	Weekday	**Thursday**	0	0		0	7

General – faults

Par.	Designation	Value	Min.	Max.	Comments	R	W
29-042	Active error 1	**xxx**	0	0		0	7
29-043	Active error 2	**xxx**	0	0		0	7
29-044	Active error 3	**xxx**	0	0		0	7
29-045	Active error 4	**xxx**	0	0		0	7
29-046	Active error 5	**xxx**	0	0		0	7
29-040	Error memory	**xxx**	0	0		4	7
29-041	Error to be transmitted	**xxx**	0	0		0	0
29-047	Module failure	**xxx**	0	0	Error resource monitoring	0	7
20-127	Fault statistics today	**xxx**	0	0	CAN bus incorrect transfers	5	7
20-126	Fault statistics since unit start	**xxx**	0	0	CAN bus incorrect transfers	5	7

General – Relay test

Par.	Designation	Value	Min.	Max.	Comments	R	W
23-084	Activate relay test	**0**	0	1	Activate relay test 0=OFF 1=ON	3	3
21-031	MC1 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-032	YK1+ HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-033	YK1- HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-034	DKP HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-035	SLP HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-036	VA1 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-037	VA2 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-039	VA1-FE1 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-040	VA2-FE1 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-041	VA3-FE1 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-043	VA1-FE2 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-044	VA2-FE2 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-045	VA3-FE2 HW output	**0**	0	1	Status output / activation 0=OFF 1=ON	3	3
21-078	VA0-10V/PWM HW output	**0%**	0	100	Status output / activation 0-100% (5% steps, 0-10V output must be configured)	3	3
21-079	VA0-10V/PWM-FE1 HW output	**0%**	0	100	Status output / activation 0-100% (5% steps, 0-10V output must be configured)	3	3

General – Sensors

Par.	Designation	Value	Min.	Max.	Comments	R	W
33-000	AF sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-001	SF sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-002	VF1 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-003	VE1 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-004	VE2 sensor/input type	**0=KTY**			0=KTY 1=PTC 2=PT1000 4=IMP (passive = only contact)	4	4
33-005	VE10V input type	**5**			0=…. 1= …..	4	4
33-006	VE1-FE1 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-007	VE2-FE1 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-008	VE3/FE1 sensor/input type	**0=KTY**			0=KTY 1=PTC 2=PT1000 4=IMP (passive = only contact)	4	4
33-009	VE10V-FE1 input type	**5**			0=…. 1= …..	4	4
33-010	FVT-T FE1 input type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
33-011	FVT-F FE1 input type	**3=IMP (sensor)**			3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)	4	4
33-012	VE1-FE2 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-013	VE2-FE2 sensor type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-014	VE3/FE2 sensor/input type	**0=KTY**			0=KTY 1=PTC 2=PT1000 4=IMP (passive = only contact)	4	4
33-015	VE10V-FE2 input type	**5**			0=…. 1= …..	4	4
33-016	FVT-T FE2 input type	**0=KTY**			0=KTY 1=PTC 2=PT1000	4	4
33-017	FVT-F FE2 input type	**3=IMP (sensor)**			3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)	4	4
04-111	Time constant averaging (filter) current outdoor sensor 1	**15 min.**				4	4
04-112	Time constant averaging (filter) current outdoor sensor 2	**15 min.**				4	4

General – sensor balancing

Par.	Designation	Value	Min.	Max.	Comments	R	W
33-050	AF sensor balancing input	**0 K**	-10.0	10.0		4	4
33-051	SF sensor balancing input	**0 K**	-10.0	10.0		4	4
33-052	VF1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-053	VE1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-054	VE2 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-055	VE1-FE1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-056	VE2-FE1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-057	VE3-FE1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-058	FVT-T FE1 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-059	VE1-FE2 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-060	VE2-FE2 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-061	VE3-FE2 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-062	FVT-T FE2 sensor balancing input	**0 K**	-10.0	10.0		4	4
33-063	FA-WF sensor balancing input	**0 K**	-10.0	10.0		4	4
33-064	FA-RLF sensor balancing input	**0 K**	-10.0	10.0		4	4

10.1.3 Function applications general

Normally, there is no need to make settings here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4
Gen.	Standard	Standard + AVR	Standard + PFC only pump *)	Standard without AF1	Standard + PFC without AF1

*) Bei Allgemein Funktionsapplikation 2 (Standard + AVR nur Pumpe), muss zusätzlich im «Allgemein - AVR « der Ausgang für die Pumpe zugeordnet werden!

10.1.4 Commands (reset)

The following commands can be carried out in the General – Configuration – Parameter 04-045 menu:

0: No action
9: Unit reset = unit restart like power off/on
(no reset of par. to factory setting)
21: Error unlocking (not used at present)
31: Factory reset (reset the controller to factory setting)

Additional info: If the hydraulic application is adjusted on the controller, all parameters are reset to their factory setting.

10.1.5 Outdoor sensor behaviour

There are various outdoor sensors in the system for measuring the outside temperature.

Overview of outdoor sensors

Outdoor sensor	Function	Par-ID
AF1: Outdoor sensor 1 (local HW input, can be determined for system outdoor sensor AFG1)	General-information	00-000
AF2: Outdoor sensor 2 (local HW input)	General-information	21-100
AFG1: System outdoor sensor 1 (one outdoor sensor in the system is defined as system outdoor sensor AFG1)	General-information	21-101
AFG2: System outdoor sensor 2 (an outdoor sensor value can be transferred to the system from the Internet/weather forecast = system outdoor sensor 2 AFG2)	General-information	21-102

Parameter

Parameter	Factory	UN	Function	Par-ID
Input allocation outdoor sensor 1 (default setting by hydraulic application, must be switched off if not used)	1 [1)]	-	General-configuration	30-028
Input allocation outdoor sensor 2	0 [2)]	-	General-configuration	30-029
Send outdoor sensor 1 as system outdoor sensor AFG1	0	-	General-configuration	04-013
Heating circuit allocation outdoor sensor (per HC)	1	-	Heating circuit .. parameter	07-037
Time constant for OT averaging, long-time value (per HC)	10	h	Heating circuit .. parameter	03-020
Weighting for average value OT heating circuit (per HC)	50	%	Heating circuit .. parameter	03-033
Replacement value outside temp. (per HC)	0	°C	Heating circuit .. parameter	03-034

1) Possible allocations: 0= OFF, 1= AF
2) Possible allocations: 0= OFF, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1

Operating parameters

Operating parameter	Factory	UN	Function	Par-ID
Outside temperature day minimum (AF1 or AFG1)	1	-	General-information	21-103
Outside temperature day maximum (AF1 or AFG1)	0	-	General-information	21-104
Outside temperature heating circuit (OT-HC, weighted outside temperature; per HC)	0	-	Heating circuit .. information	00-000
AF average value = long-term value according to time constant setting (OT average; per heating circuit)	1	-	Heating circuit .. information	02-020
Time constant for OT averaging (per HC)	10	h	Heating circuit .. parameter	03-020

Finding, distribution
Outdoor sensor 1 can be allocated to a HW input. The allocation is done by the hydraulic application type.
Outdoor sensor 1 can be sent on the system bus by means of a parameter (AFG1).
Outdoor sensor 2 can be allocated to a HW input.
Two outside temperatures (AFG1, AFG2) can be received on the system bus and used internally. These system outside temperatures are available to all other bus participants.

Note: if an outdoor sensor is allocated but not connected, an error code is generated. To prevent this, it must be set to "not allocated".
Observation
The four outside temperatures (AF1, AF2, AFG1, AFG2) are configured as information values.
Using outdoor sensor AF1 (or AFG1 if AF1 not available), the minimum (AF-Min) and the maximum (AF-Max) are obtained during the day. The limit value calculation is reset at midnight. The two extreme values are provided as information values.

Use in the heating circuit
Using a parameter 07-037, it is possible to select which outside temperature or which weighted average a heating circuit uses.
0: AFG1
1: AF1
2: AF2
3: Weighted average (AF1–AF2)
4: Weighted average (AF1–AFG1)
5: Weighted average (AF1–AFG2)
6: Weighted average (AFG1–AFG2)
Weighting average value
The parameter 03-033 "Weight for average" (G) states the value with which the first indicated temperature is weighted.
OTwAV(OTx1,OTx2) = OTx1*G+OTx2*(1-G) where G=0%-100%)

Example of weighted average AF1–AF2:
AF1=15 °C
AF2=10 °C
Weight for average: 50%
Result:
Weighted average outside temperature OTwAV: 12.5 °C

OT averaging long-term value
The weighted average value over time is obtained using parameter 03-020 "Time constant OT averaging".
OT-avge = Averaging (TwAV,tavge)

Use for characteristic curve
The weighted average value and the averaged long-term value are equally averaged for determining the flow temperature using the heating characteristic curve:
OT-HC = (OTwAV + OT-avge) / 2

Use for
The averaged outside temperature (OT-avge, long-term value) is used for determining the heating limits.

Use with heat generator
The heat generator function is used for the outside temperature-dependent block of the AF1; if this is not available then the AFG1, and if this is also not available then the replacement value (0 °C) is used.

10.1.6 Cleaning

The "Cleaning configuration" parameter sets which events trigger the cleaning display. If the parameter is set to "No display cleaning" (0) then the function is inactive.

Event cleaning according to date

The message is generated at the end of the set day. If the message is acknowledged, the event only reoccurs if a date is set after the current date.
If this event is configured, this set date is displayed in the datapoint "Date next cleaning".

Event cleaning according to interval

The message is generated if the interval has expired (end of the day). The interval is restarted after the message has been acknowledged.
If this event is configured, the date resulting from the date of the last acknowledgement and the interval is displayed in the datapoint "Date next cleaning".

Event cleaning according to cleaning counter

The cleaning counter is formed from the total of operating hours and 0.1 x switching cycles, as formed in the heat generator function (not with the additional H-Gen). The message is generated if this counter reaches the set value. The cleaning counter is restarted after the message has been acknowledged.

Process

If the set even occurs, it leads to an "entry in the error system": Error type = 7 (service/cleaning necessary).
Using the "Acknowledge" parameter, the cleaning is acknowledge with the value 8. (Value 7 would acknowledge the maintenance)
The control module displays the message directly. The customer can also acknowledge this error message there without having to enter the parameter level.

Parameter	Factory	UN	Function	Par-ID
Cleaning configuration 0: No display cleaning 1: Display cleaning on set date 2: Display cleaning according to interval 3: Display cleaning according to cleaning counter	0	-	General-cleaning	20-030
Date of next cleaning message (Max. current date +4 years)		-	General-cleaning	20-031
Next cleaning interval since acknowledgement (1 – 364 days)		Days	General-cleaning	20-032
Cleaning count value message cleaning (step width: 100) (Operating hours and 0.1 x switching cycles (H-Gen))			General-cleaning	20-033
Acknowledgement (Value 8 = cleaning acknowledgement, value 7 = maintenance acknowledgement)			General-cleaning	21-054
Information				
Date of next cleaning		-	General-information	21-055
Remaining run time cleaning counter		-	General-information	21-056

10.1.7 Maintenance

The "Maintenance configuration" parameter sets which events trigger the maintenance display. If the parameter is set to "No display maintenance" (0) then the function is inactive.

Event maintenance according to date

The message is generated at the end of the set day. If the message is acknowledged, the event only reoccurs if a date is set after the current date.
If this event is configured, this set date is displayed in the datapoint "Date next maintenance".

Event maintenance according to interval

The message is generated if the interval has expired (end of the day). The interval is restarted after the message has been acknowledged.
If this event is configured, the date resulting from the date of the last acknowledgement and the interval is displayed in the datapoint "Date next maintenance".

Event maintenance according to maintenance counter

The maintenance counter is formed from the total of operating hours and 0.1 x switching cycles, as formed in the heat generator function (not with the additional H-Gen). The message is generated if this counter reaches the set value. The maintenance counter is restarted after the message has been acknowledged.

Process

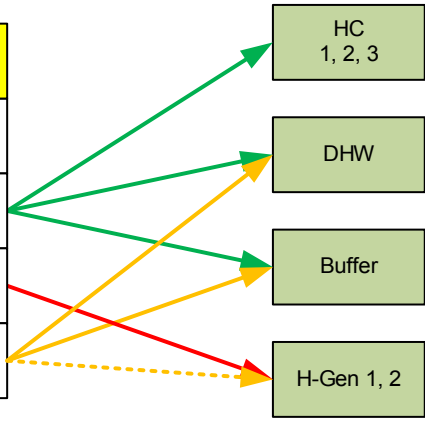
If the set even occurs, it leads to an "entry in the error system": Error type = 7 (service/maintenance necessary).
Using the "Acknowledge" parameter, the value:
7 acknowledges the maintenance. (Value 8 would be cleaning acknowledgement)
The control module displays the message directly. The specialist (user level required) can also acknowledge this error message there without having to enter the parameter level.

Parameter	Factory	UN	Function	Par-ID
Maintenance configuration 0: No display maintenance 1: Display maintenance on set date 2: Display maintenance according to interval 3: Display maintenance according to maintenance counter	0	-	General-maintenance	20-034
Date of next maintenance message (Max. current date +4 years)		-	General-maintenance	20-035
Next maintenance interval since acknowledgement (1 – 364 days)		Days	General-maintenance	20-036
Maintenance counter value message maintenance (step width: 100) (Operating hours and 0.1 x switching cycles (H-Gen))			General-maintenance	20-037
Acknowledgement (Value 7 = maintenance acknowledgement, value 8 = cleaning acknowledgement)			General-maintenance	21-054
Information				
Date of next maintenance		-	General-information	21-057
Remaining run time maintenance counter		-	General-information	21-058

10.1.8 Smart Grid

The Smart Grid function is activated on the TTE-WEZ basic heat generator module.
For this, two digital inputs are defined as Smart-Grid contacts. If one input is bridged, this is interpreted as 1 (one). This produces the following Smart Grid statuses:

Input 1	Input 2	SmartGrid operation
0	0	**Normal operation** (no influence)
0	1	**Preferential operation** (offset HC, DHW, PS)
1	0	**Blocked (blocked operation)** (H-Gen block)
1	1	**Forced acceptance** (PS-Max., DHW-Max.)



If only one input is allocated, the other is ignored, the function is inactive.

Range of action:
For influencing a function, it is a precondition that it must be configured for this. This effect is always local with the H-Gen, which means it is limited to the TTE-WEZ module where the inputs are located. In addition, the function also acts on the heating and cooling buffer.

Normal operation does not influence any of the functions. This corresponds to the situation if the inputs are not allocated.

Preferential operation influences the heating circuits in heating mode (heating buffer) and cooling mode (cooling buffer) as well as the hot water circuits.

Blocked operation influences the heat generator.

"Forced acceptance" operation influences the buffer in heating mode (heating buffer) and cooling mode (cooling buffer), the hot water circuits as well as blocking heat generators.

Effect on heating circuits:
The ***preferential operation*** status affects the heating circuits. If it is active, the room reference value in heating mode is increased according to the parameter "Offset Smart Grid room reference value heating" or is reduced in cooling mode according to the parameter "Offset Smart Grid room reference value cooling". However, this only applies if the heating circuit is in automatic heating mode or automatic cooling mode. (Automatic = week 1 or week 2 basic program)

The heating circuit status 02-051 is expanded with an additional status "Smart Grid preferential operation" (if preferential operation is requested and an offset other than 0 is set).

In general function application 2 (standard + PFC only pump), the output for the pump must additionally be assigned in the «General PFC»!

Effect on hot water
If the status = ***preferential operation***, the DHW reference value is increased according to the parameter "Offset Smart Grid hot water reference value". However, this only applies if there is also a DHW request (frost reference value does not count towards the requirements). The maximum limit is in effect.

If the status = ***forced acceptance***, the DHW reference value is increased to the set max. DHW temperature, irrespective of whether there is a DHW request.

Hot water status 02-052 is expanded with two additional statuses "Smart Grid preferential operation" (if preferential operation is requested and an offset other than 0 is set) and "Smart Grid forced acceptance" (if the forced acceptance is active).

Buffer

If the status = ***preferential operation***, the buffer reference value is increased in heating mode according to the parameter "Offset Smart Grid buffer reference value heating" or is reduced in cooling mode according to the parameter "Offset Smart Grid buffer reference value cooling". However, this only applies if there is also a heating request or a cooling request. The corresponding limits are in effect. If a Smart Grid buffer offset is set, this is added to any Smart Grid heating circuit offset.

If the status = ***forced acceptance***, the buffer reference value is increased to the set max. buffer temperature in heating mode or is reduced to the set min. buffer temperature in cooling mode, irrespective of whether there is a heating or cooling request.

Buffer status 23-082 will be expanded with two additional statuses "Smart Grid preferential operation" (if preferential operation is requested and an offset other than 0 is set) and "Smart Grid forced acceptance" (if the forced acceptance is active).

Heat generator

In blocked operation status, the heat generators are blocked that are configured in this way (like EVU block) The heat generator status 02-053 changes to "externally blocked" during blocked operation

The forced acceptance status means any blocks can be revoked. A separate request is not triggered.

Overview:

Operating parameter	Min.	Max.	Factory	UN	Function	Par-ID
Status Smart-Grid 0 Normal operation 1 Preferential operation 2 Blocked 3 Forced acceptance 255 Smart-Grid inactive (no complete allocation)			0	--	General Information	21-090
Trigger - input allocation						
Allocation SmartGrid input 1			0	--	General Configuration	30-052
Allocation SmartGrid input 2			0	--	General Configuration	30-053
Parameter						
Offset SmartGrid room setpoint heating	0	10	0	K	HC 1, 2, 3 Parameters	07-031
Offset SmartGrid room setpoint cooling	-10	0	0	K	HC 1, 2, 3 Parameters	07-046
Offset SmartGrid hot water setpoint	0	80	0	K	DHW Parameters	05-077
Offset SmartGrid buffer setpoint heating	0	90	0	K	Buffer Parameters	06-050
Offset SmartGrid buffer setpoint cooling	-30	0	0	K	Buffer Parameters	06-051

Remark: The "offset parameters" are always added. They must be set positively or negatively accordingly.

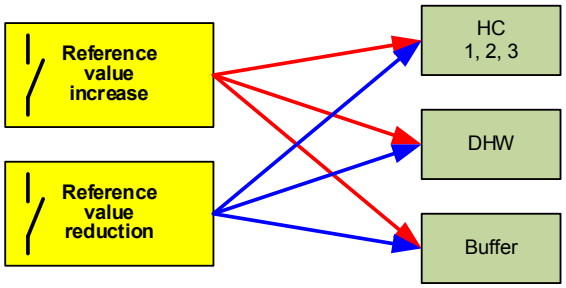
10.1.9 Reference value increase / reference value reduction

In the TTE control system, it is possible to trigger a system-wide reference value increase and/or reference value reduction. The reference value increase and reference value reduction can affect all units. At present, it is implemented on the TTE-WEZ, TTE-PS and TTE-SOL modules.

Where there are references to functions (e.g. HC, PS), this applies in the modules where these functions occur.

Overview:

The inputs for activating the reference value increase or reference value reductions act on all functions according to the illustration below in the entire system.



Triggering:

For this, two digital inputs are defined as reference value increase and/or reference value reduction.
If the digital input is assigned to reference value increase and the input is short-circuited, the system reference value increase is active.
If the digital input is assigned to reference value reduction and the input is short-circuited, the system reference value reduction is active.
If several inputs are configured, the priority sequence is as follows: active before inactive before undefined.
In addition to the contacts, a reference value increase/reduction can also be triggered by the weather forecast (e.g. a DHW reference value reduction is triggered once a particular global radiation value is reached).

Area of effect:

If a "System reference value increase" is active, this acts on each "consumer" (HC, DHW, PU) in the system in heating mode that is configured for this, or in cooling more, if the "consumer" is configured for that. If several inputs are allocated in a system and are active, these act in the same way as if there were only one.

If a "System reference value reduction" is active, this acts on each "consumer" (HC, DHW, PU) in the system in heating mode that is configured for this, or in cooling more, if the "consumer" is configured for that. If several inputs are allocated in a system and are active, these act in the same way as if there were only one.
A consumer is configured for increase / reduction if the corresponding parameter is not zero

Effect:

If an increase or reduction is active, the corresponding offset is allocated to the reference value in any event. To achieve a reduction effectively, this means a negative offset must be set.
If both the reference value increase and the reference value reduction are active in a function, the two offsets are added together. If one of the two functions (increase or reduction) collide with Smart Grid preferential operation, the offsets are also added together and the Smart Grid forced acceptance has the higher priority.

Overview:

Operating parameter	Factory	UN	Function	Par-ID
Setpoint incr./decr. status 1x increase undefined (input not allocated) 2x increase inactive (input open) 3x increase active (input closed) x1 reduction undefined (input not allocated) x2 reduction inactive (input open) x3 reduction active (input closed)	0	--	General Information	21-091
Trigger - input allocation				

Operating parameter	Factory	UN	Function	Par-ID
Allocation setpoint increase input	0	--	General Configuration	30-054
Allocation setpoint reduction input	0	--	General Configuration	30-055
Parameter				
Setpoint incr. (offset) flow setpoint heating	0	K	HC 1, 2, 3 Parameters	07-110
Setpoint incr. (offset) flow setpoint cooling	0	K	HC 1, 2, 3 Parameters	07-111
Setpoint red. (offset) flow setpoint heating	0	K	HC 1, 2, 3 Parameters	07-112
Setpoint red. (offset) flow setpoint cooling	0	K	HC 1, 2, 3 Parameters	07-113
Setpoint incr. (offset) hot water setpoint	0	K	Hot water Parameters	05-078
Setpoint reduction (offset) hot water setpoint	0	K	Hot water parameters	05-079
Setpoint incr. (offset) buffer setpoint heating	0	K	Buffer Parameters	06-052
Setpoint incr. (offset) buffer setpoint cooling	0	K	Buffer Parameters	06-053
Setpoint red. (offset) buffer setpoint heating	0	K	Buffer Parameters	06-054
Setpoint red. (offset) buffer setpoint cooling	0	K	Buffer Parameters	06-055

10.1.10 External fault reporting output (SMA)

If a fault reporting output was configured, it is also possible to set a triggering delay time

Parameter	Factory	UN	Function	Par-ID
Allocation SMA collective fault output: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	General-configuration	32-045
Collective fault output delay time	10	Min.	General-parameters	04-017

10.1.11 External fault reporting input

If an external fault reporting input was configured, it is also possible to set a triggering delay time.

Parameter	Factory	UN	Function	Par-ID
Allocation external fault signal input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	0	-	General-configuration	30-035
Collective fault input delay time	0	Min.	General-parameters	04-018

10.1.12 Free switching contact

If a free switching contact was configured, it is also possible to set the switching behaviour.
The switching contact can be switched ON/OFF using the "Activation switching contact" parameter. If a switch-on duration is set in addition, the output switches on for the set switch-on duration on activation, and back off again after it expires.

Parameter	Factory	UN	Function	Par-ID
Allocation free sw. contact output 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	General-configuration	32-018
Activation switching contact	0	-	General-parameters	22-009
Operating time free sw. contact (0-999 sec.)	0	Sec.	General-parameters	29-059

10.1.13 Free time clock

If a "free time clock" was configured, it is possible to create a week program with 5 day programs in the switching time program for this. (See standard week/day program free time clock)
The switching programs are set in the "Programs" menu. The "Free time clock" is displayed as soon as the output has been configured.

Parameter	Factory	UN	Function	Par-ID
Allocation free time clock output: 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	General-configuration	32-022

10.1.14 Behaviour H1 lamp output (12V)

Using two parameters, it is possible to configure the behaviour of the H1 lamp output (12V).
("Flashing" behaviour takes precedence over "Lit")

Parameter 20-028 behaviour H1 flashing:

OFF: No flashing
1: Faults (locking-off actions)
2: Faults, blocking actions
3: Faults, blocking actions, warnings
4: Cleaning, maintenance
5: Cleaning, maintenance, faults
6: Cleaning, maintenance, faults, blocking actions
7: Cleaning, maintenance, faults, blocking actions, warnings
8: H-Gen running (operating signal H-Gen)

Parameter 20-029 behaviour H1 lit:

OFF: Not lit
1: Faults (locking-off actions)
2: Faults, blocking actions
3: Faults, blocking actions, warnings
4: Cleaning, maintenance
5: Cleaning, maintenance, faults
6: Cleaning, maintenance, faults, blocking actions
7: Cleaning, maintenance, faults, blocking actions, warnings
8: H-Gen running (operating signal H-Gen)
9: ON, continuously lit (flashing takes precedence over lit)

10.1.15 Thermostat function

Three thermostat functions can be activated in the controller. The description below relates to the first thermostat function.
A thermostat function is activated by allocating the thermostat output THA1 and thermostat sensor THF1.

The thermostat output is switched on if the temperature drops below the reference value less half the differential gap, and is switched off if the sensor temperature rises above the reference value plus half the differential gap. The function starts switched-off when the controller is restarted.

Overview

Parameter	Factory	UN	Function	Par-ID
Allocation output THA1 - thermostat 1 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1	0	-	General-thermostat	32-028
Allocation input THF1 - thermostatic sensor 1 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1	0	-	General-thermostat	30-036
Reference value (THF ref.)	0	°C	General-thermostat	29-060
Switching difference (THF-SD symmetrical)	3	K	General-thermostat	29-063
Information				
THA1 thermostat 1 output		-	General-information	22-002
THF1 actual setpt. thermostatic sensor 1		°C	General-information	21-012

10.1.16 Differential controller

Three differential control functions can be activated in the controller. The description below relates to the first differential control.
A differential control is activated by assigning the differential control output DFA1 and the diff. sensors DF1-1, DF2-1.

If the difference between DF1-1 and DF2-1 sensor increases by the set ON differential gap, the output switches on.
If the difference between DF1-1 and DF2-1 sensor subsequently falls below the set OFF differential gap, the output switches off.
It is also possible to set a min. and max. temp.
A switch-off takes place if the temperature at the DF2-1 sensor rises above the set max. temperature.
If the sensor DF2-1 -5K falls below the max. temp. the differential control is enabled again.
A switch-off takes place if the temperature at the DF1-1 sensor falls below the set min. temperature.
If the sensor DF1-1 +5K rises above the min. temp. the differential control is enabled again.

Overview

Parameter	Factory	UN	Function	Par-ID
Allocation output DFA1 - diff. control 1 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1	0	-	General diff. control	32-041
Allocation input DF1-1 - diff. control 1 sensor 1: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1	0	-	General diff. control	30-039
Allocation input DF2-1 - diff. control 1 sensor 2: 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1	0	-	General diff. control	30-042
Differential control 1 switch-on difference	8	K	General diff. control	29-066
Differential control 1 switch-off difference	4	K	General diff. control	29-069
Differential control 1 min. temp.	10	°C	General diff. control	29-072
Differential control 1 max. temp.	90	°C	General diff. control	29-075
Information				
DFA1 differential control 1 output		-	General-information	22-005
DF1-1 actual differential control 1 sensor 1		°C	General-information	21-015
DF2-1 actual differential control 1 sensor 2		°C	General-information	21-018

10.1.17 Plant flow control PFC

Many plant flow controls are possible in the system. They can be integrated on various modules (TTE-WEZ, TTE-HK/WW). However, only one PFC is possible per control module.

Plant flow control (PFC) controls a pump and regulates the measured temperature at a reference value by means of a mixer. The behaviour of the control is very similar to that of a heating circuit mixer control. If the plant flow control is allocated to a heat generator, it is only enabled if the corresponding heat generator also processes a reference value. The plant flow control itself does not generate a reference value for the heat generator.
Remark: if the mixer is open, the flow passes through the heat generator, whereas if it is closed then the flow bypasses the heat generator.

Determining the reference value

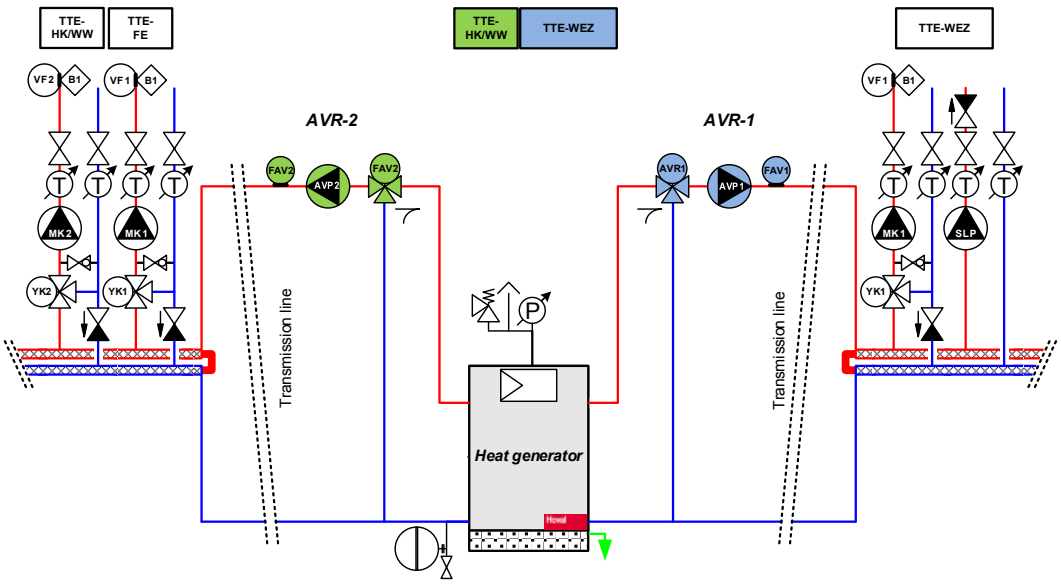
The reference value is derived from the largest value of all heating circuits and all hot water circuits that are allocated to this plant flow control. If this reference value is greater than zero then there is a request, otherwise not.
If there is a request, the reference value formed in this way is increased by the set offset, and then limited to the set minimum and maximum. (corresponding HGEN increase of the HC or DHW is also effective for the PFC nominal value)

Process

When there is a request, the pump is switched on and the mixer is controlled. If the request is cancelled, the plant flow control enters post-operation. In post operation, the pump remains switched on and the mixer is controlled with the last reference value. Following post operation, the pump is switched off, the mixer is closed during the double mixer runtime and then switched off.
If the plant flow control is blocked, the mixer remains closed and the pump off. If the plant flow control is blocked while a reference value is active, plant flow control enters post-operation. If it is blocked during post-operation, post-operation is brought to an end.

Forced removal

Plant flow control responds to forced energy greater than zero. In this case, it regulates using the reference value maximum instead of with the current reference value. If it is running, the pump is also switched on.



Overview:

Parameter	Factory	UN	Function	Par-ID
Type plant flow control: 0: Plant flow control is only controlled by reference values 1: Plant flow control additional H-Gen (enable of PFC only when the additional H-Gen is also requested) 2: Plant flow control H-Gen (enable of PFC only when the H-Gen is also requested)	0	-	General PFC control	06-060
Allocation input FAV, plant flow control sensor: 0=OFF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1	1)	-	General PFC control	30-007
Allocation output AVP, pump plant flow control: 0=OFF, 1=MK1,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1	1)	-	General PFC control	32-025
Allocation output YAV OPEN, plant flow mixer: 0=OFF, 2=YK+,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1	1)	-	General PFC control	32-026
Allocation output YAV CLOSED, plant flow mixer: 0=OFF, 3=YK-,4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1	1)	-	General PFC control	32-027
Minimum temperature PFC	20	°C	General PFC control	06-061
Maximum temperature PFC	90	°C	General PFC control	06-062
Offset PFC control	0	K	General PFC control	06-063
Proportional range PFC control	10	K	General PFC control	06-064
Follow-on time AVP pump	5	min	General PFC control	06-065
Mixer running time YAV	120	sec	General PFC control	06-066
Allocation heating circuit to PFC 1-8 = H-Gen 1 to 8 17-32 = HC/DHW 1 to 16 Example: Allocated PFC module: HC/DHW with DIP switch addr. 9 = 25		-	Heating circuit..-Parameters	07-100
Allocation hot water to PFC 1-8 = H-Gen 1 to 8 17-32 = HC/DHW 1 to 16 Example: Allocated PFC module: HC/DHW with DIP switch addr. 9 = 25		-	DHW Parameters	05-089
Information				
FAV set temperature (incl. offset)		°C	General-information	22-021
FAV actual temperature		°C	General-information	21-059
AVP pump		-	General-information	22-055
YAV mixer open/closed (+100 … -100%)		%	General-information	22-056

1) The allocation takes place by setting the hydraulic application

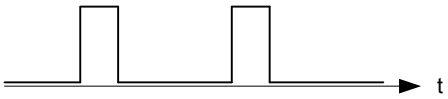
10.1.18 Configuration 0-10V/PWM output characteristic curve

Max. 2(3) 0-10V/PWM outputs can be activated in the controller.
The following document describes conversion from an internal normalised value (e.g. speed of rotation or H-Gen set-point temperature) to a 0..10V/PWM output.

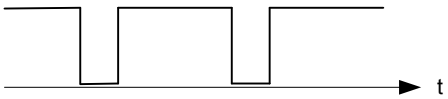
The control assumes a normalised parameter in percent (speed of rotation, output, 0..10V). This is output on the allocated output as a PWM signal or 0..10V voltage.
It is assumed that limits, where required, will be made in the outputting function. E.g. the H-Gen reference value is limited to 45 °C downwards or the speed of rotation of the main pump is limited to 30%.

Control PWM

The 0-10V/PWM output must be allocated and configured as PWM. If the function is inactive, the output must be configured to "not allocated".
The input parameter (%) his output one-to-one. That means 75% is output as PWM with a mark-to-space ratio of 3 to 1:



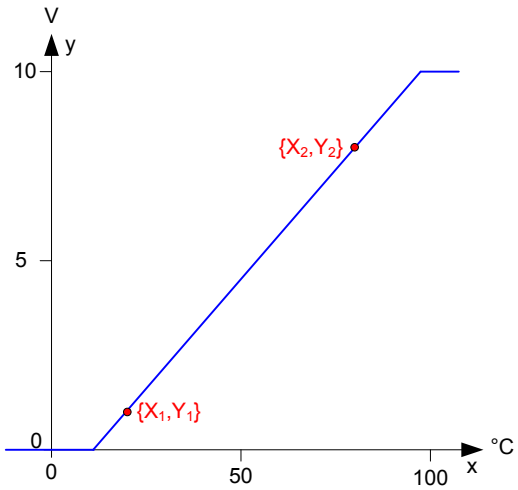
Using the "Configuration output" parameter, it is possible for the signal to be output inverted as well:



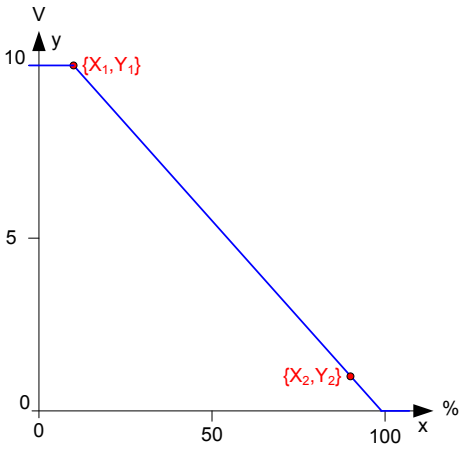
Control 0 .. 10V

The output must be allocated and configured as 0..10V. If the function is inactive, the output must be configured to "not allocated".

The input parameter (%) is converted into a voltage using a linear characteristic (according to the set characteristic) and applied to the output. The characteristic is determined by the 2 point pairs {X1,Y1} and {X2,Y2}. It is limited downwards to the switch-off voltage (UOff) and upwards to 10V.



The characteristic can also have a negative slope. In this case, the switch-off voltage is not considered.



Overview:

Parameter	Factory	UN	Function	Par-ID
Configuration 0-10V/PWM output 1: 0: Off 1: 0-10V 2: PWM (0%=0V) 3: PWM inverted (0%=10V)	0/1	-	General 0-10V/PWM	33-100
Characteristic curve 1 (X1)	0.0	%/°C	General 0-10V/PWM	20-038
Characteristic curve 1 vltg. (Y_1) at X_1	0	V	General 0-10V/PWM	20-039
Characteristic curve 1 (X_2)	100	%/°C	General 0-10V/PWM	20-040
Characteristic curve 1 vltg. (Y_2) at X_2	10	V	General 0-10V/PWM	20-041
Characteristic curve 1 sw-off voltage	0.0	V	General 0-10V/PWM	20-054

10.1.19 Info values

Various inputs can be used as information values in the Info values menu.

Variant 1: Information sensor temperature

5 temperature inputs can be defined as information sensors. Individual designations/names can be defined for each of these information sensors. The input is not monitored for interruption and short circuit. The description below relates to the first information sensor.

Parameter	Factory	UN	Function	Par-ID
Information sensor temperature 1		-	General information	21-120
Input allocation information sensor 1 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=FE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	0	-	General info values	30-071
Name information sensor 1	Info 1	-	General Information/ info values	20-090
… type of sensor 0=KTY, 1=PTC, 2=PT1000	…	-	General sensors	33-000 - …

Variant 2: Information 0-10V:

3 information values 0-10V can be defined. Individual designations/names can be defined for each of these information values.
The value is shown without unit. If a unit is required, this must be put in the freely selectable designation/name.
The voltage applied to the input is converted with a linear characteristic and displayed. The characteristic passes through the zero point (0 volt = displayed value 0) and through the point (10V, parameter "conversion for 10V").
The description below relates to the first 0-10V information value.

Parameter	Factory	UN	Function	Par-ID
Info 1 0-10V		-	General information	21-125
Input allocation information 1 0-10V 0=OFF, 4=VE10V, 10=VE10V-FE1, 16=VE10VFE2	0	-	General info values	30-076
Conversion for info 1	10	-	General info values	20-100
Name information 1 0-10V	Info 1 VE0-10V	-	General information/ info values	20-095

Example: oil level gauge 0V= 0 ltr., 10V = 5000 ltr. (TTE-PS VE10V)

30-076: 4 (alloc. inp. VE10V)
20-100: 500 (conversion factor, 10 x 500 = 5000 at 10V)
20-095: ltr. oil level (designation/name)

Variant 3: Information IMP (pulse):

3 information values IMP can be defined. Individual designations/names can be defined for each of these information values. The value is shown without unit. If a unit is required, this must be put in the freely selectable designation/name. The pulses applied to the input are converted based on the pulse rate. If required, an offset can be set (e.g. for flow rate sensors).

Parameter	Factory	UN	Function	Par-ID
Pulse input 1 info value		-	General information	21-112
Allocation input information 1 IMP: 0=OFF,5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	0	-	General info values	30-079
Name information 1 IMP	Info 1 IMP	-	General information/ info values	20-105
Pulse rate VIG information 1 IMP (pulses per unit)	2	-	General info values	20-070
Offset VIG information 1 IMP	0	-	General info values	20-080
VE… input type 4=IMP (passive = only contact)	0	-	General sensors	33-…
FVT-F input type 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)	3	-	General sensors	33-…

Example: flow rate display in ltr./min. using Huba flow rate sensor (type: DN10 1.8-32 ltr.)

30-079: 12 (alloc. inp. FVT-F FE1 for flow rate sensor)
20-105: ltr./min. flow rate (name information 1 IMP)
20-070: 721 (pulse rate VIG)
20-080: 0.2 (offset VIG)
33-011: 3 (FVT-F FE1 input type 3=IMP active flow rate sensor)

Setting various flow rate sensors:

Flow rate type	Unit of measure	Range	Pulse rate imp/ltr.	Offset l/min
Huba type 200	DN8 AG 3/4"	0.9 … 15 l/min	1523	-0.3
Huba type 200	DN10 AG 3/4"	1.8 … 32 l/min	721	-0.2
Huba type 200	DN15 AG 1"	3.5 … 50 l/min	329	-0.2
Huba type 200	DN20 AG 1 1/4"	5.0 … 85 l/min	162	-0.3
Huba Typ 200	DN25 AG 1 1/2"	9.0 … 150 l/min	81	-0.2
PAW FlowRotor	DN20	0.5 … 15 l/min	186	0.28
PAW FlowRotor	DN25	1.0 ... 35 l/min	80	0.66
PAW FlowRotor	DN32	2.0 … 50 l/min	55	0.56
VSG 1.5	DN15 AG 3/4"	0.5 … 25 l/min	2	0
VSG 2.5	DN20 AG 1"	0.5 … 40 l/min	2	0
VSG 6	DN32 AG 1 1/2"	2.0 … 100 l/min	1	0

10.1.20 Malfunctions

In the Faults menu, it is possible to read out the active faults. In addition, the last 20 faults can be requested in the error memory.

Overview:

Parameter	Factory	UN	Function	Par-ID
Active error 1		-	General malfunctions	29-042
Active error 2		-	General malfunctions	29-043
Active error 3		-	General malfunctions	29-044
Active error 4		-	General malfunctions	29-045
Active error 5		-	General malfunctions	29-046
Error memory		-	General malfunctions	29-040
Error to be transmitted		-	General malfunctions	29-041
Error module failure (resource monitoring)		-	General malfunctions	29-047

Overview of error codes, see error code list (last section)

10.1.21 Relay test

The current status of the output relay can be requested in the Relay test menu.
If the relay test is activated, all outputs are switched off at the same time. Following that, each output can be switched on/off individually.
If you forget to switch off the relay test at the end of the test, it is ended automatically after 15 minutes.

Overview:

Parameter	Factory	UN	Function	Par-ID
Activate relay test: 0=OFF, 1=ON	0	-	General relay test	23-084
MC1 Status output / activation 0=OFF 1=ON		-	General relay test	21-031
YK1+ Status output / activation 0=OFF 1=ON		-	General relay test	21-032
YK1- Status output / activation 0=OFF 1=ON		-	General relay test	21-033
DKP Status output / activation 0=OFF 1=ON		-	General relay test	21-034
SLP Status output / activation 0=OFF 1=ON		-	General relay test	21-035
VA1 Status output / activation 0=OFF 1=ON		-	General relay test	21-036
VA2 Status output / activation 0=OFF 1=ON		-	General relay test	21-037
VA1-FE1 Status output / activation 0=OFF 1=ON		-	General relay test	21-039
VA2-FE1 Status output / activation 0=OFF 1=ON		-	General relay test	21-040
VA3-FE1 Status output / activation 0=OFF 1=ON		-	General relay test	21-041
VA1-FE2 Status output / activation 0=OFF 1=ON		-	General relay test	21-043
VA2-FE2 Status output / activation 0=OFF 1=ON		-	General relay test	21-044
VA3-FE2 Status output / activation 0=OFF 1=ON		-	General relay test	21-045
VA0-10V/PWM Status output / activation 0-100% (5% steps, 0-10V output must be configured)		-	General relay test	21-078
VA0-10V/PWM-FE1 Status output / activation 0-100% (5% steps, 0-10V output must be configured)		-	General relay test	21-079

10.1.22 Sensors input/sensor type

In the Sensors menu, it is possible to set the corresponding input/sensor type for each input.

Overview:

Parameter	Factory	UN	Function	Par-ID
AF sensor type 0=KTY, 1=PTC, 2=PT1000	0	-	General sensors	33-000
SF sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-001
VF1 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-002
VE1 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-003
VE2 sensor/input type 0=KTY, 1=PTC, 2=PT1000, 4=IMP (passive = only contact)		-	General sensors	33-004
VE10V input type 0= , 1=		-	General sensors	33-005
VE1-FE1 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-006
VE2-FE1 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-007
VE3/FE1 sensor/input type 0=KTY, 1=PTC, 2=PT1000, 4=IMP (passive = only contact)		-	General sensors	33-008
VE10V-FE1 input type 0= , 1=		-	General sensors	33-009
FVT-T FE1 input type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-010
FVT-F FE1 input type 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)		-	General sensors	33-011
VE1-FE2 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-012
VE2-FE2 sensor type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-013
VE3/FE2 sensor/input type 0=KTY, 1=PTC, 2=PT1000, 4=IMP (passive = only contact)		-	General sensors	33-014
VE10V-FE2 input type 0= , 1=		-	General sensors	33-015
FVT-T FE2 input type 0=KTY, 1=PTC, 2=PT1000		-	General sensors	33-016
FVT-F FE2 input type 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)		-	General sensors	33-017

10.1.23 Sensor balancing

In the sensor balancing menu, each temperature input can be calibrated by -10K to +10K.
(Factory setting: 0K)

10.1.24 TTE - sensor characteristics

An interruption or short-circuit is detected as an error.
Overview of the stored sensor characteristics:

Temp.	Type 0 = KTY81-210	Type 1 = PTC	Type 2 = PT1000
°C	Ohm	Ohm	Ohm
-50	1030,00		803,10
-40	1135,00	593,00	842,70
-30	1247,00	653,00	882,20
-20	1367,00	702,00	921,60
-10	1495,00	766,00	960,90
0	1630,00	831,00	1000,00
10	1772,00	891,00	1039,02
20	1922,00	964,00	1077,93
25	2000,00	1003,00	1093,46
30	2080,00	1042,00	1116,72
40	2245,00	1121,00	1155,39
50	2417,00	1202,00	1193,95
60	2597,00	1292,00	1232,39
70	2785,00	1384,00	1270,72
80	2980,00	1476,00	1308,93
90	3182,00	1576,00	1347,02
100	3392,00	1670,00	1385,00
110	3607,00	1763,00	1422,86
120	3817,00	1856,00	1460,61
130	4008,00		1498,24
140	4166,00		1535,75
150	4280,00		1573,15
160			1610,43
170			1647,60
180			1684,65
190			1721,58
200			1758,40
220			1831,68
240			1904,51
260			1976,86
280			2048,76
300			2120,19
320			2191,15
340			2261,66
360			2331,69
380			2401,27
400			2470,38
450			2641,12
500			2811,00

10.1.25 Bootloader

Internal datapoints for the bootloader function. No settings are required here.

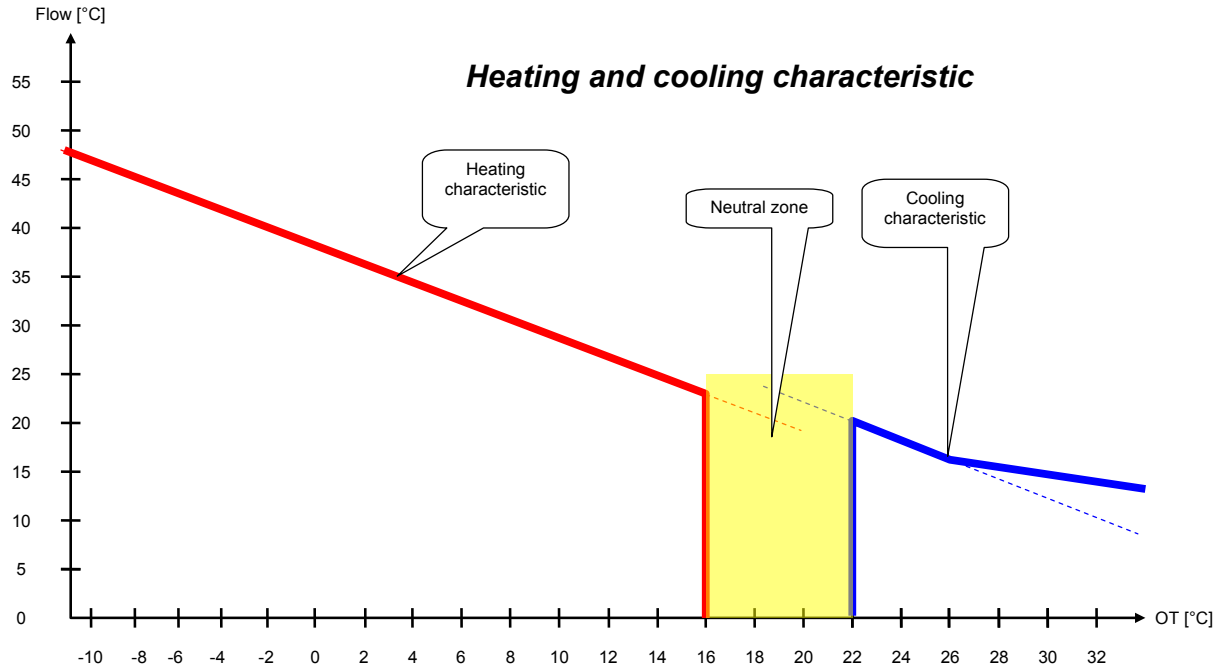
10.1.26 Commissioning

Internal datapoints for the commissioning wizard function. No settings are required here.

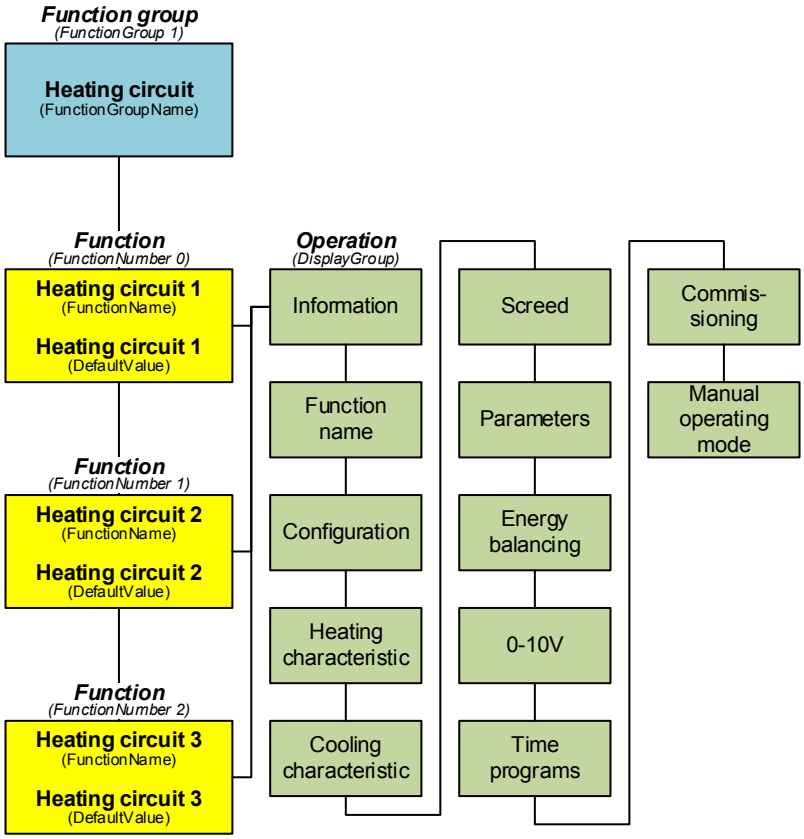
10.2 "Heating circuit" function group

In the "heating circuit" function group, values must be set and settings made that are required for the three independent heating circuits (1-3).

The heating circuit function regulates the room temperature of a heating zone in heating or cooling operation. The regulation of the room temperature can be controlled by weather during heating and cooling by means of a heating characteristic, with room control or mixed. Separate characteristics can be set for heating and cooling operation.



10.2.1 Overview of "heating circuit" menu structure



10.2.2 Parameter overview "heating circuit 1 – 3"

All three heating circuits are equipped with equivalent functions. The overview below relates to "heating circuit 1", for example.

Heating circuit .. – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-051	Status heating circuit control	**0**	0	0	Status of heating circuit control: 0 = Switched off 1 = Normal heating operation 2 = Comfort heating operation 3 = Economy heating operation 4 = Frost operation 5 = Force acceptance (with force > +50%) 6 = Force throttling (with force < -50%) 7 = Holiday operation 8 = Party operation 9 = Normal cooling operation 10 = Comfort cooling operation 11 = Economy cooling operation 12 = Fault 13 = Manual operation 14 = Protection cooling operation 15 = Party operation cooling 16 = Drying heating-up phase 17 = Drying stationary phase 18 = Drying cooling-down phase 19 = Drying end phase 22 = Cooling operation external/constant request 23 = Heating operation external/constant request 26 = Preferential operation SmartGrid	0	7
01-002	Supply setpoint	**0 °C**	0.0	0.0		0	7
00-002	Supply actual	**43.2 °C**	0.0	0.0		0	7
01-001	Room reference	**22 °C**	0.0	0.0		0	7
00-001	Room actual	**23 °C**	0.0	0.0		0	0
00-000	Outside temperature heating circuit	**35.2 °C**	0.0	0.0	Outside temperature heating circuit = (AF wAV + AF AV) / 2, this value is used for calculating the flow reference value according to heat characteristic	0	7
02-020	Outside average value	**35.2 °C**	0.0	0.0	AF average value = long-term value according to time constant setting	0	7
29-050	Heat quantity heating	**0 MWh**	0.00	0.00	Heat quantity heating	0	7
29-051	Current output heating	**0 kW**	0.0	0.0	Current output heating	0	7
29-052	Cooling quantity	**0 MWh**	0.00	0.00	Cooling quantity	0	7
29-053	Current output cooling	**0 kW**	0.0	0.0	Current output cooling	0	7
21-105	Volumetric current	**0 l/min**	0.00	0.00	Current volume flow energy balancing	0	7
01-020	Pump	**0**	0	1		0	7
01-021	Mixing valve	**-100%**	-100	100		3	7
01-087	Cooling valve change-over unit	**0**	0	1		3	7
02-019	Remaining run time screed function	**0 days**	0.0	0.0	Remaining running time screed function (forecast in days)	0	7
17-040	Energy balance sensor flow	**0 °C**	0.0	0.0	Energy balance sensor flow	3	7
17-041	Energy balance sensor return	**0 °C**	0.0	0.0	Energy balance sensor return	3	7

Heating circuit.. function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Function name	Heating circuit.				0	0

Heating circuit.. – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
07-076	Function application heating circuit	**4**			Function application type heating circuit	0	3
07-037	Alloc. outdoor sensor	**1**	0	6	Selection pressure sensor 0=AFG1 1=AF1 2=AF2 3=Weighted average value AF1-AF2 4=Weighted average value AF1-AFG1 5=Weighted average value AF1-AFG2 6=Weighted average value AFG1-AFG2	4	4
30-046	Alloc. input ext. constant req.	**0=OFF**			Allocation input ext. constant request 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VFE3-VE2, 15=FVT-T-VFE2	3	3
30-045	Alloc. switching modem contact input	**0=OFF**			Allocation switching modem contact input (open = automatic, bridged = standby) 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VFE3-VE2, 15=FVT-T-VFE2	3	3
30-030	Alloc. min. value override input	**0=OFF**			Allocation minimum value override input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-056	Alloc. release contact input cooling	**0=OFF**			Allocation release contact input cooling 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
30-057	Alloc. ext. constant req. inp cooling	**0=OFF**			Allocation external constant requirement input cooling 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
32-019	Alloc. cooling valve UHC output	**0=OFF**			Allocation cooling valve heating circuit output 0=OFF, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	4

Heating circuit .. – heating characteristic

Par.	Designation	Value	Min.	Max.	Comments	R	W
03-012	Conf. point OT heating characteristic	**-10 °C**	-30	5	Climate point/zone determined on the outside temperature axis	3	3
03-013	Design point supply temp. heating curve	**45 °C**	10.0	90.0	Reference value for the flow temperature for 20 °C room temperature set on the climate point.	0	0
03-001	Base point flow temp. heating char.	**20 °C**	0.0	80.0	Flow reference temperature for a room temperature of 20 °C in heating operation at the outside temperature base point	3	3
03-011	Base point OT heating and cooling char.	**20 °C**	-10.0	30.0	Base point on outside temperature axis	3	3
07-008	Flow maximum temp.	**50 °C**	10.0	90.0	Flow maximum temperature	3	3

Heating circuit .. – cooling characteristic

Par.	Designation	Value	Min.	Max.	Comments	R	W
03-047	Conf. point OT cooling characteristic	**35 °C**	20	40	Outside temperature for the configuration flow temperature in cooling operation	4	4
03-048	Conf. point flow temp. cooling char.	**20 °C**	10.0	20.0	Configuration flow temperature for cooling operation	4	4
03-043	Base point flow temp. cooling char.	**20 °C**	10.0	30.0	The base point temperature is the flow reference temperature for a room temperature of 22 °C in cooling operation at the outside temperature base point.	4	4
03-011	Base point OT heating and cooling char.	**20 °C**	-10.0	30.0	Base point on outside temperature axis	3	3

Heating circuit .. – screed

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-061	Flow stpt. incr. heating-up phase	**3 K/d**	,5	20.0	The parameter sets the flow reference value increase for the heating-up phase of the drying program.	3	3
04-063	Inertia phase return setpoint	**30 °C**	20.0	70.0	The parameter sets the flow reference value for the inertia phase in the drying program.	3	3
04-064	Inertia phase duration	**3 days**	0.0	25.0	The parameter sets the time duration for the inertia phase.	3	3
04-062	Flow setpoint drop cooling phase	**-6 K/d**	-50.0	-,5	The parameter sets the flow reference value decrease for the cooling-down phase in the drying program.	3	3
04-060	Activate screed function	**0**	0	1	Activate screed function	3	3
04-069	Max. temperature difference ramp increase screed fct. (from SW 2.03.xxx)	10 K	0	15	Maximum temperature difference ramp increase screed function	3	3

Heating circuit .. – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
03-032	Control strategy	**0**	0	3	Control strategy (selection of flow reference value determination) 0: Weather control only 1: Weather control with room override 2: Room control only 3: Constant control	is3	3
07-035	Setpoint req. type heating circuit	**1**	0	4	Reference value request type heating circuit: 0: None 1: H-Gen 2: Heating buffer 3: Cooling buffer 4: Heating + cooling buffer 5: Heizpuffer + Kühlen am WEZ	3	3
07-036	Flow setpoint constant req. heating	**70 °C**	10.0	90.0	Flow reference value with constant requirement heating	3	3
07-047	Flow setpoint constant req. cooling	**20 °C**	10.0	30.0	Flow reference value with constant requirement cooling	3	3
07-039	Flow setpoint min. value override	**0 °C**	0.0	70.0	Flow setpoint min. value override	4	4
07-100	Allocation plant flow control	**0**	0	32	Allocation PFC control 0 = without 1-8 = H-Gen 1 to 8 17-32 = HC/DHW 1 to 16 Example: Allocated PFC module: HC/DHW with DIP switch addr. 9 = 25	4	4
03-000	Room protection temperature	**5 °C**	-10.0	15.0	The room protection temperature is effective as room reference value in standby, holiday and summer operation.	0	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
03-002	Eco mode heating limit	**2 °C**	-10.0	20.0	In automatic operation, a separate heating limit can be set here for economy operation. If the average outside temperature exceeds the value, the heating switches off whereas if the average outside temperature drops by 0.5 K under the set value, the heating switches back on. Frost protection is activated if the value is set below 2 °C.	3	3
03-006	Hold-back time start optimisation	**90 min**	0.0	900.0	This means the switch-on time in automatic mode can be brought forward. The hold-back time specifies the heating-up time that is required for raising the room temperature by 5 K at -10 °C outside temperature. The time is automatically corrected with changing outside temperatures. Values based on experience: Underfloor heating = 210 min Radiators = 150 min 0 = No function.	4	4
03-007	Compensation room temperature	**0**	0.0	50.0	With room temperature compensation, it is possible to set a room influence if a valid room temperature is present. The set compensation multiplied by the deviation of the room temperature produces the correction of the flow temperature. Setting values: 1-3 = Weak compensation 4-6 = Medium compensation 7-10 = Strong compensation. This value should not be set higher than 4 with underfloor heating systems.	4	4
03-008	Flow setpoint heating limit	**1 K**	-30.0	10.0	The heating circuit can be switched off with the flow temperature heating limit. If the calculated flow reference temperature drops below the setting value plus the room reference temperature, the heating is switched off. This function takes precedence over outside temperature heating limit deactivation. If the reference value rises back above 0.5 K, heating control returns to operation. This function is not active at the minimum setting.	4	4
03-020	Time constants for ext. temp. av. calc.	**10 h**	0	50	Time constant for calculating the outside temperature average value (for heating limit): Heavy construction 20 - 30 h Medium construction 10 - 15 h Light construction 3 - 6 h	4	4
03-021	Outside temperature heating limit	**17 °C**	0.0	40.0	With the setting, the heating limit is determined for a room temperature of 20 °C. If the average outside temperature exceeds the value, the heating switches off whereas if the average outside temperature drops by 0.5 K under the set value, the heating switches back on. Frost protection is activated if the value is set below 2 °C.	3	3
03-023	Outside temp. frost line	**2 °C**	-10.0	20.0	If the outside temperature drops below the set value, the frost protection functions are activated for the heating circuit. If the average outside temperature increases 2 K above the set value, the frost protection function switches off again.	5	5
03-024	Time constants for room temp. av. calc.	**5 min**	0	60	With this time constant, damping of the room temperature is set for the room heating limit: 0 min = Direct heating limit function > 20 min = Delayed heating limit function	4	4
03-025	Deviation accelerates heating	**1 K**	0.0	10.0	This parameter enables the deviation from the reference room temperature to be set for forced heating operation.	5	5
03-026	Heating deviation off	**2 K**	0.0	10.0	This parameter enables the deviation from the reference room temperature to be set for switching off heating operation.	5	5
03-030	Room control adjusting time	**0 min**	0.0	200.0	If the heating circuit is controlled with room control, this allows an adjusting time to be set. The adjusting time means that a proportional error due to the room compensation is balanced out.	5	5
03-033	Outside temperature weighting	**50%**	0	100	Weighting outside temp. for outside HC	4	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
03-034	Outside temperature replacement value	**0 °C**	-50.0	50.0	Replacement value outside temperature (on failure of the outside temperature)	4	4
03-036	Outside temperature cooling limit	**22 °C**	15.0	40.0	The setting determines from which average outside temperature onwards a cooling function is blocked. If the average outside temperature increases 0.5 K above the set value, the cooling is enabled.	5	5
03-039	Dew point limit increase	**0 K**	0.0	10.0	With this parameter, a safety increase of the flow limit for the dew point it can be set in cooling operation. A setting of 0 means that the dew point limit is inactive.	5	5
03-041	Cooling deviation off	**2 K**	0.0	10.0	This parameter enables the deviation from the reference room temperature to be set for switching off cooling operation.	5	5
03-042	Deviation accelerates cooling	**1 K**	0.0	10.0	This parameter enables the deviation from the reference room temperature to be set for forced cooling operation.	5	5
03-044	Summer compensation intervention point	**25 °C**	20.0	30.0	If the outside temperature rises above the set value, the reference value for the room temperature increases with the set slope.	5	5
03-045	Summer compensation slope	**0%**	0	100	The slope sets the influence of the outside temperature change on the room temperature increase.	5	5
03-050	Heating operation choice	**Week 1**			The setting determines the operation selection of the heating circuit: 0 = Standby operation 1 = Automatic operation 4 = Continuous normal operation 5 = Continuous economy operation 6 = Summer operation 7 = Manual operation heating 8 = Manual operation cooling	0	0
03-051	Normal room temp. heating oper.	**22 °C**	10.0	30.0	The parameter selects the required reference value for the room temperature in normal heating operation.	0	0
03-053	Conservation room temp. heating oper.	**16 °C**	5.0	20.0	The parameter selects the required reference value for the room temperature in economy heating operation.	0	0
03-054	Normal room temp. cooling oper.	**23 °C**	10.0	30.0	The parameter selects the required reference value for the room temperature in normal cooling operation.	0	0
03-056	Conservation room temp. cooling oper.	**28 °C**	20.0	35.0	The parameter selects the required reference value for the room temperature in economy cooling operation.	0	0
03-058	Comfort	**0 K**	-3.0	3.0	The comfort changes the reference value of the room temperature by the set value.	0	0
03-110	Minimum plant temperature	**10 °C**	1.0	90.0	The heating circuit can be switched off with the plant temperature heating limit. If the plant temperature drops below the calculated flow reference temperature, the heating is switched off. If the plant temperature increases again by 2 K, heating control returns to operation.	5	5
03-111	System temp switch-off difference	**-100 K**	-100.0	30.0	The heating circuit can be switched off with the plant temperature differential heating limit. If the plant temperature drops below the calculated flow reference temperature plus setting value, the heating is switched off. If the plant temperature increases again by 2 K, heating control returns to operation.	5	5
03-112	Max. system temp. for cooling crct. mode	**90 °C**	1.0	90.0		5	5
03-113	Min. dist. flw set sys temp. clg mode	**-100 K**	-100.0	30.0	Minimum gap between flow reference value and plant temperature for cooling circuit operation	5	5
07-000	Mixer control proportional range	**15 K**	5.0	30.0	The parameter sets the reference/actual value deviation for 100% positioning command. A P-range of 15 K is set for standard mixer drives with 2-minute operating time. With fast mixer motors, the P-range can be set up to 30 K to reduce oscillations.	5	5

Par.	Designation	Value	Min.	Max.	Comments	R	W
07-001	heat generator Increase/reduction flow setpoint	**3 K**	-100.0	30.0	The parameter enables an increase to be set for the flow reference temperature on the heat generator system. In heating operation, the set value acts as an increase. In cooling operation, the set value acts as a reduction.	3	3
07-002	Flow minimum temp.	**0 °C**	0.0	80.0	A minimum flow temperature can be selected here. This is active if the heating circuit has not switched off.	5	5
07-003	Pump follow-on	**5 min**	0.0	30.0	After heating operation switches off, the mixer control remains in operation for the set time. Then the mixer closes and, after further time has elapsed, the mixer and pump outputs switch off.	3	3
07-005	Heating circuit type	**0**	0	3	The following heating circuit types can be set: 0 = 3-point mixer control 1 = 2-point mixer control 2 = Pump control 3 = Heating circuit without function	4	4
07-006	Return error duration	**0 h**	0.0	20.0	If the flow temperature drops below the reference value by 5 K for longer than the time set here, an error message is generated.	5	5
07-009	Manual mode set temperature	**30 °C**	10.0	90.0	In manual operation, the flow temperature is controlled at the reference value set here.	0	0
07-014	Cooling mode activation	**0**	0	3	The following operating modes can be set here for cooling operation: 0 = Cooling operation switched off 1 = Cooling operation free, mixer closed 2 = Cooling operation free, mixer open 3 = Cooling operation free, mixer controlled	4	4
07-016	Stand prot. HC pump and mixer	**1**	0	1	Stand prot. HC pump and mixer	4	4
07-034	Forced energy choice	**3**	0	3	The setting controls the response of the heating circuit to forced energy: 0 = Heating circuit does not respond to forced energy 1 = Responds to negative forced energy 2 = Responds to positive forced energy 3 = Responds to negative and positive forced energy	4	4
07-041	Mixer neutral zone	**0.4 K**	0.0	20.0	The parameter defines a neutral zone for the mixer control. If the flow temperature is within the set neutral zone around the reference value, the mixer commands are suppressed.	5	5
07-048	Flow temp. monitor delay time	**0 min**	0.0	30.0	Delay time blocking message B1 flow temp. monitor	5	5
07-031	SmartGrid room setpoint offset heating	**0 K**	0.0	12.0	SmartGrid room setpoint offset heating	6	0
07-046	SmartGrid room setpoint offset cooling	**0 K**	-60.0	0.0		3	3
07-110	Stpt. incr. (offset) flow stpt. heating	**0 K**	-90.0	90.0	Setpoint incr. (offset) flow setpoint heating	3	3
07-111	Stpt. incr. (offset) flow stpt. cooling	**0 K**	-30.0	30.0	Setpoint incr. (offset) flow setpoint cooling	3	3
07-112	Stpt. reduc. (offset) flow stpt. heating	**0 K**	-90.0	90.0	Setpoint red. (offset) flow setpoint heating	3	3
07-113	Stpt. reduc. (offset) flow stpt. cooling	**0 K**	-30.0	30.0	Setpoint red. (offset) flow setpoint cooling	3	3

Heating circuit .. – EBZ (energy balance)

Par.	Designation	Value	Min.	Max.	Comments	R	W
17-043	Reset energy balance	**0**	0	1	Reset energy balance	3	3
30-058	Alloc. energy balance sensor flow input	**0=OFF**			Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 19=WF RS485/OT	3	3
30-059	Alloc. energy balance sensor return input	**0=OFF**			Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF RS485/OT	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
30-060	Alloc. IMP volume flow input	**0=OFF**			Allocation IMP volume flow input 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	3	3
17-019	Pulse rate VIG	**721 1/l**	1.0	5000.0	Entry of the pulse rate in pulses/litre	3	3
17-021	Offset VIG	**-0.2 l/ min**	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	3	3
17-042	Volume flow at 100% pump speed	**8 l/min**	0.00	200.00	Volume flow at 100% pump speed	3	3
20-010	Heating measurement site allocation	**0=OFF**			Heating measurement site allocation: 0=OFF 1=FA controller 2=Local 3=Measuring module (M-bus) 4=District heating module	3	3
20-011	Heating measurement module no.	**1**	1	16	Number of heating measurement module, corresponds to the DIP switch setting	3	3
20-012	No. of heating measuring module meas.	**1**	1	15	Number of heating measuring module measurement	3	3
20-013	Cooling measurement site allocation	**0=OFF**			Cooling measurement site allocation: 0=OFF 1=FA controller 2=Local 3=Measuring module (M-bus) 4=District heating module	3	3
20-014	Cooling measurement module no.	**1**	0	15	Number of cooling measurement module, corresponds to the DIP switch setting	3	3
20-015	No. of cooling measuring module meas.	**1**	1	15	Number of cooling measuring module measurement	3	3

Heating circuit .. – 0-10V

Par.	Designation	Value	Min.	Max.	Comments	R	W
30-090	Allocation 0-10V heating input	**0=OFF**			Allocation 0-10V heating input	4	4
20-061	Heating 0..10V characteristic curve 1 X1	**-0.01 V**	0.00	10.00	Flow reference input heating 0..10V characteristic curve 1 X1	5	5
20-062	Heating 0..10V char. curve 1 vltg. Y1	**-0.1 °C**	0.0	100.0	Flow reference input heating 0..10V characteristic curve 1 voltage Y1	5	5
20-063	Heating 0..10V characteristic curve 1 X2	**-0.01 V**	0.00	10.00	Flow reference input heating 0..10V characteristic curve 1 X2	5	5
20-064	Heating 0..10V char. curve 1 vltg. Y2	**-0.1 °C**	0.0	100.0	Flow reference input heating 0..10V characteristic curve 1 voltage Y2	5	5
30-091	Allocation 0-10V cooling input	**0=OFF**			Allocation 0-10V cooling input	4	4
20-065	Cooling 0..10V characteristic curve 1 X1	**-0.01 V**	0.00	10.00	Flow reference input cooling 0..10V characteristic curve 1 X1	5	5
20-066	Cooling 0..10V char. curve 1 vltg. Y1	**-0.1 °C**	0.0	100.0	Flow reference input cooling 0..10V characteristic curve 1 voltage Y1	5	5
20-067	Cooling 0..10V characteristic curve 1 X2	**-0.01 V**	0.00	10.00	Flow reference input cooling 0..10V characteristic curve 1 X2	5	5
20-068	Cooling 0..10V char. curve 1 vltg. Y2	**-0.1 °C**	0.0	100.0	Flow reference input cooling 0..10V characteristic curve 1 voltage Y2	5	5

0-10V setpoint connection
approx. from 04/2016 (SW update required)

Heating circuit .. – time programs (only for readout)

Par.	Designation	Value	Min.	Max.	Comments	R	W
00-500	ID current day programme	**0**	0	14		0	6
00-502	Current day programme name	**All day**	0	0		0	6
00-503	Display status	**1**	0	255		0	6
00-504	ID current week programme	**0**	0	13		0	6
00-505	Current week programme name	**Week 1**	0	0		0	6
02-010	Party timer heating operation	**0 h**	0.0	50.0	Calculated remaining time for party operation heating circuit	0	0
02-018	Absence remaining time	**0 h**	0.0	50.0		0	0
03-078	Holiday end date	**2036-02-06**				0	0

10.2.3 Function applications heating circuit

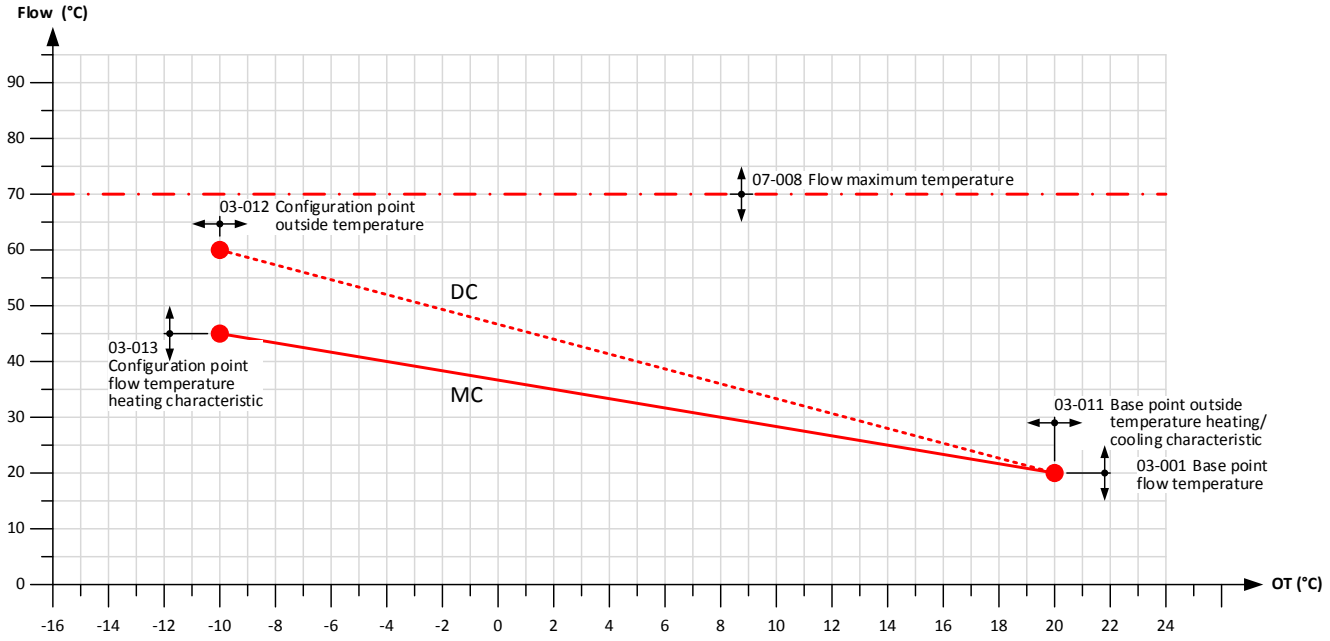
Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4	5	6	7
HK1	HC not active			Mixed HC (HC1-FE1)	Mixed HC (HC1-HGEN-MC)	Direkter HK (HC1-HGEN-DKP) DEMO	Direct HC (HC1-HGEN-DKP)	
HK2	HC not active		Mixed HC (HC2-HGEN-MC) DEMO	Mixed HC (HC2-HGEN-MC)	Mixed HC (HC2-FE1)		Direct HC (HC2-HGEN-MC1)	
HK3	HC not active			Mixed HC (HC3-FE1)			Direct HC (HC3-FE1)	

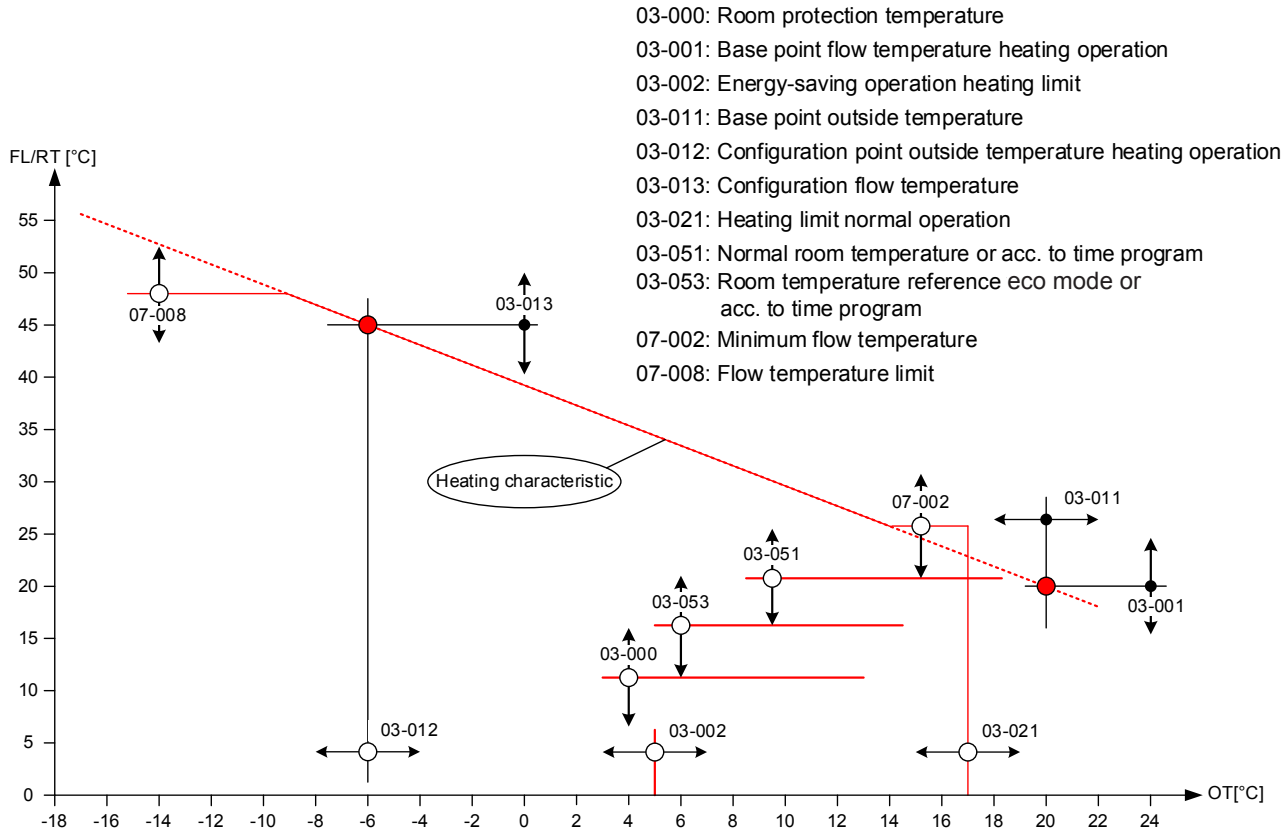
10.2.4 Heating/cooling characteristic

The heating circuit function regulates the room temperature of a heating zone in heating or cooling operation. The regulation of the room temperature can be controlled by weather during heating and cooling by means of a heating characteristic, with room control or mixed. Separate characteristics can be set for heating and cooling operation.

Heating characteristic (excerpt):



Details of heating characteristic:



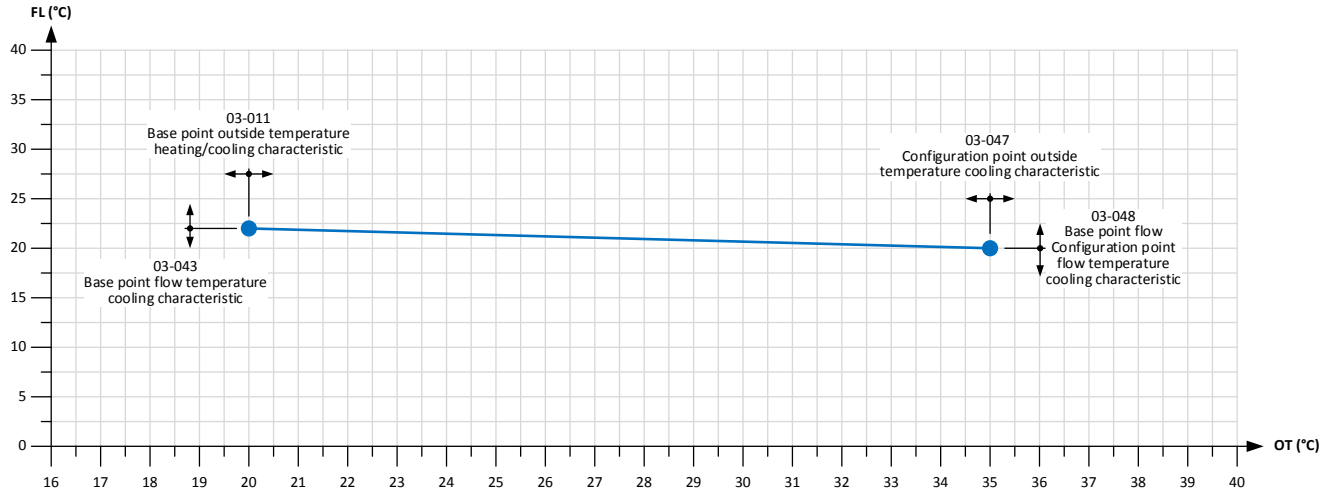
The base point outside temperature (03-011) is set to 20 °C ex-works. Important: the base point applies both to the heating and cooling characteristic.

With weather control, only the outside temperature and the heating characteristic determine the value of the flow temperature. The basic setting of the characteristic is made using the location of the base point on the outside temperature axis (03-011) and the corresponding flow temperature (03-001) as well as the location of the configuration point on the outside temperature axis (03-012) and its flow-temperature (03-013).

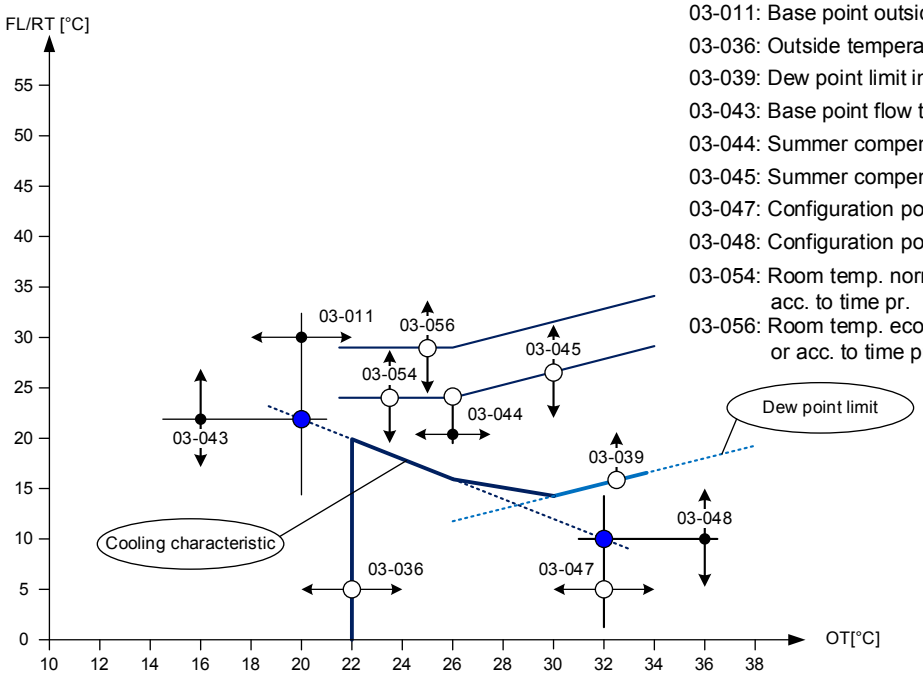
Outside temperature for heating characteristic curve:
The weighted average value and the averaged long-term value are equally averaged for determining the flow temperature using the heating characteristic curve:
(Outside HC, par. 00-000) OT-HC = (OTwAV + OT-avge) / 2

The points are set for a reference room temperature of 20 °C (planning values). If the heating controller has not switched off, a minimum flow temperature (07-002) is in effect.
According to the set room temperature reference values and the operation selection (03-050), the control determines the current reference values for the flow temperature.
With the comfort ID (03-058), the required room temperature can be increased temporarily. At the next time switching point, the set comfort is reset.
The level of the flow reference temperature is limited by the maximum flow limit (07-008).

Cooling characteristic (excerpt):



Details of cooling characteristic:



03-011: Base point outside temperature
03-036: Outside temperature cooling limit
03-039: Dew point limit increase
03-043: Base point flow temperature
03-044: Summer compensation intervention point
03-045: Summer compensation slope
03-047: Configuration point outside temperature
03-048: Configuration point flow temperature
03-054: Room temp. normal reference value cooling operation or acc. to time pr.
03-056: Room temp. economy reference value cooling operation or acc. to time pr.

The base point outside temperature (03-011) is set to 20 °C ex-works. Important: the base point applies both to the heating and cooling characteristic.

With weather control, only the outside temperature and the heating characteristic determine the value of the flow temperature. The basic setting of the characteristic is made using the location of the base point on the outside temperature axis (03-011) and the corresponding flow temperature (03-043) as well as the location of the configuration point on the outside temperature axis (03-047) and its flow-temperature (03-013).

Outside temperature for heating characteristic curve:
The weighted average value and the averaged long-term value are equally averaged for determining the flow temperature using the heating characteristic curve:
(Outside HC, par. 00-000) OT-HC = (OTwAV + OT-avge) / 2

The points are set for a reference room temperature of 23 °C (planning values). If the heating controller has not switched off, a minimum flow temperature (07-002) is in effect.
According to the set room temperature reference values and the operation selection (03-050), the control determines the current reference values for the flow temperature.

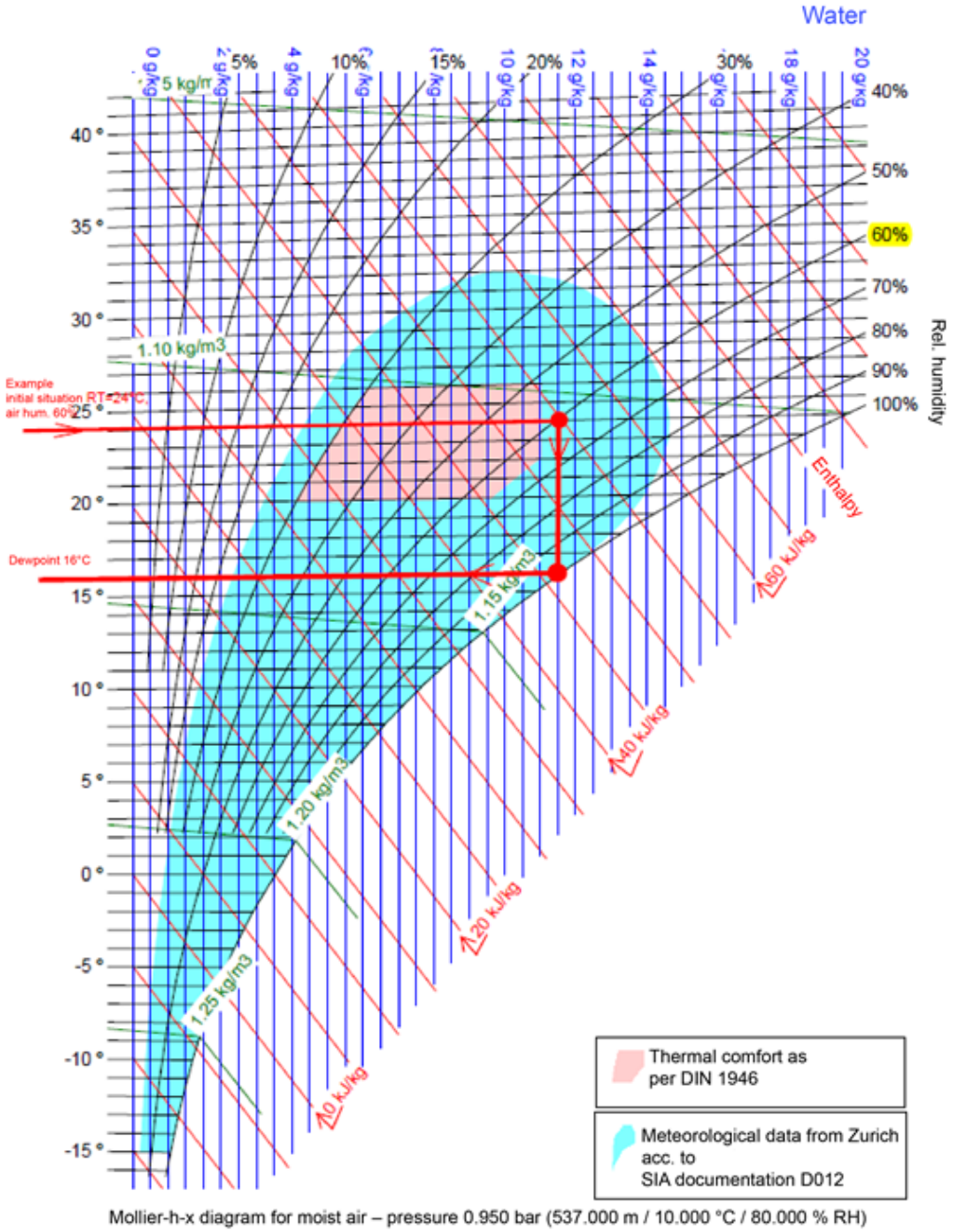
With the comfort ID (03-058), the required room temperature can be increased/reduced temporarily. At the next time switching point, the set comfort is reset.

The cooling characteristic is shifted in parallel using the basic settings corresponding to the set room temperature reference values (03-054, 03-056 or room reference values according to time program).

In the cooling function, the room reference temperature can be increased as the outside temperature increases (summer compensation). The influence of this summer compensation can be set with the parameters intervention point (03-044) and the slope (03-045).

The level of the flow reference temperature is limited by the dew point limit. The cooling reference value for the flow temperature always remains above the dew point.

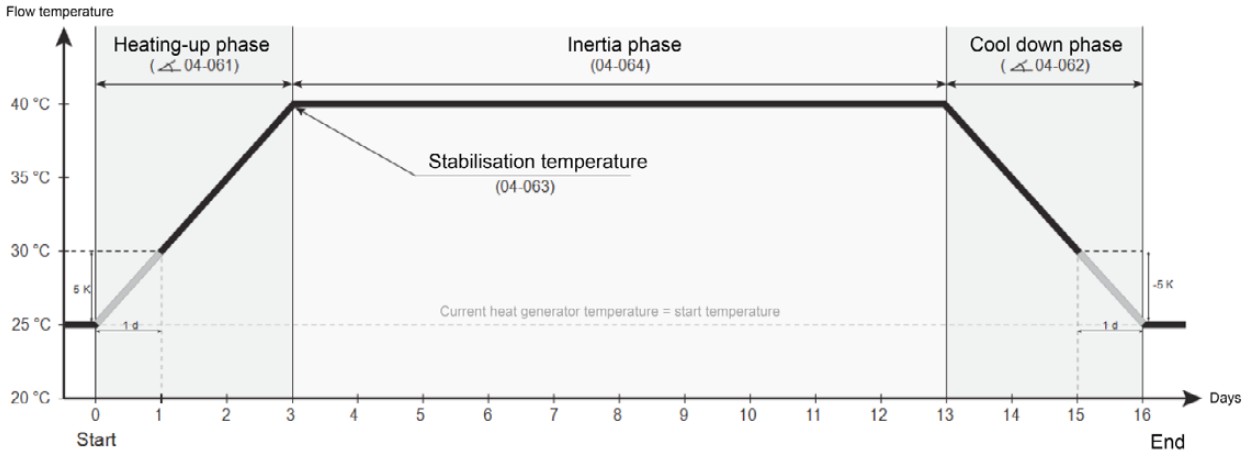
Dew point determination
If no valid relative humidity value is available, the current outdoor temperature is used as the basis for determining the dew point, with an assumed humidity of 60%. If a valid humidity value and a valid room temperature are available, the dew point is determined based on these measurement values.



Mollier-h-x diagram for moist air – pressure 0.950 bar (537.000 m / 10.000 °C / 80.000 % RH)

10.2.5 Screed drying

The screed drying function allows each heating circuit used for drying out screed floors to be set separately.



To start the screed drying, it is necessary for the individual functions to be set accordingly.

Function	Parameters	Value	Description
Heating-up phase	04-061	5 K/d	Kelvin per day (rising)
Stabilisation temperature	04-063	40.0 °C	Set maximum temperature
Inertia phase	04-064	10	Number of days in stabilisation temperature
Cooling off phase	04-062	-5 K/d	Kelvin per day (falling)
Activate screed function	04-060	1 (ON)	Start and stop screed drying
Max. temp. diff. ramp increase screed function (from SW 2.03.xxx)	04-069	10K	Kelvin (FL act/set)
Information			
Remaining run time screed function	02-019	… days	Forecast in days

! **CAUTION**

The graphic/table shows the factory settings. The time profile and the maximum flow temperature must be discussed with the screed layer, otherwise there could be damage to the screed – and in particular, cracks.

REACTION screed function

- Start/stop: datapoint 04-060 switch ON (1) or OFF (0)
- Power failure in heating-up phase: program restart
- Failure in the inertia phase: Retain maximum temperature and add the failure time to the inertia phase
- Power failure in the cooling off phase: Measurement of actual flow value and continue cooling until start value reached
- Program end: Previous basic program active again

The information finger is displayed on the main screen during screed drying.
Furthermore, pressing the i symbol allows information to be requested about the remaining runtime, the active function phase and the current flow temperature.

Additional info: When the screen function starts, the heating circuit pump is switched on and the flow temperature is measured after 5 minutes. This measured value is stored as a start and finish temperature set value.

The FL set value must be reached in each case so the controller continuously increases the flow temperature according to the set ramp. From SW TTE-WEZ V2.03.xxx, TTE-HK/WW V2.01.xxx onwards, there is a new HC parameter «04-069 Maximum temperature difference ramp increase (plant 10K)». This now makes it possible to set by how much the FL set value calculation is allowed to increase without the actual value reaching the set value.

10.2.6 Basic programs

Setting	Basic program	Function
0	Standby Holiday	The heating circuit controls to the room frost protection temperature (03-000)

The heating limit for frost protection operation is calculated:
with room temperature; According to (03-023) frost limit outside temperature
without room temperature; room frost protection temp. – dT HL (5°C -3K = 2°C)
dT HL = (NormTemp. – heating limit normal operation) e.g. 20°C – 17°C = 3K dT HG
(HL=Heating limit)

Setting	Basic program	Function
1	Automatic mode (Week 1 or 2)	The heating circuit controls according to the room reference values set in the time program.
4	Normal operation (Constant or party)	The heating circuit controls to the room normal temperature (03-051 heating operation) / (03-054 cooling operation)
5	Eco mode or absent till	The heating circuit controls to the room economy temperature (03-053 heating operation) / (03-056 cooling operation)

The heating limit is calculated based on the effective room reference value – dT HL,
dT-HL = (NormTemp. – heating limit normal operation) e.g. 20°C – 17°C = 3K
Means at an economy temperature of 16°C -3K = heating limit 13°C

Setting	Basic program	Function
6	Summer operation	The heating circuit controls to the room frost protection temperature (03-000) and cooling.
7	Manual operation heating	The heating circuit controls to the set reference temperature (07-009) for manual operation.
8	Manual operation cooling	The heating circuit controls to the set reference temperature (07-009) for manual operation.

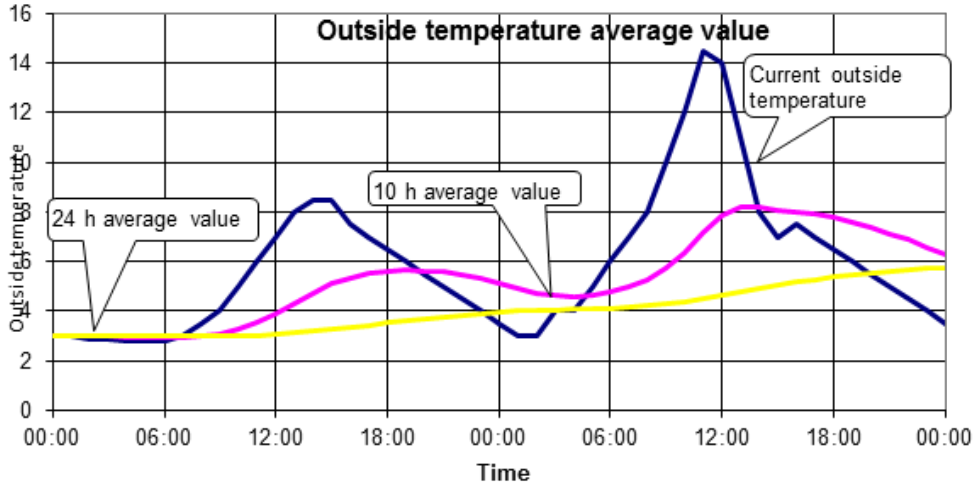
10.2.7 Heating-up optimisation

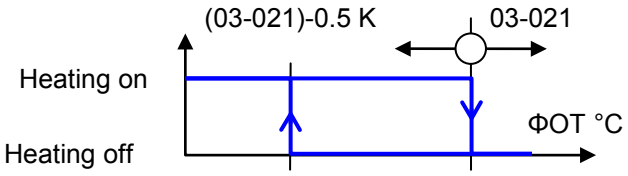
The room temperature reference value is set to normal temperature depending on the holder-back time (03-006) before the programmed heating-up switching point. The heating-up hold-back time specifies the heating-up time for raising the room temperature by 5 K at -10°C outside temperature. For slow-response underfloor heating systems, this is about 200 to 400 minutes. For radiator systems, it is accordingly 100 to 200 minutes. The effective current hold-back time is calculated from the outside temperature and the room temperature deviation. If no room temperature is active, the calculation only uses the outside temperature.

10.2.8 Outside temperature heating limit

Setting the heating limit

(03-021) determines when the heating circuit control is switched off. An average outside temperature value is calculated for the heating limit switch-off. The time constant (03-020) can be set. For light construction (low heat capacity), a time constant of 5 -10 hours is recommended, while for a heavy construction (high heat capacity), 20 – 30 hours are recommended.





Heating limit deactivation

With the setting, the heating limit is determined for a basic room temperature of 20 °C. If the average outside temperature exceeds the value, the heating switches off whereas if the average outside temperature drops by 0.5 K under the set value, the heating switches back on. If the value is set below 2 °C, frost protection is activated.

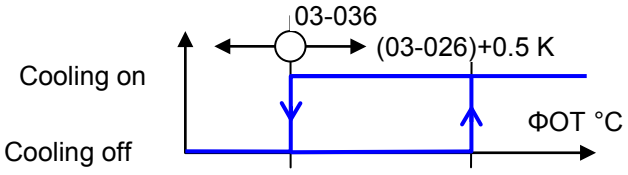
If the reference room temperature is adjusted by the operation selection or comfort, the heating limit automatically adjusts. The difference between the room reference temperature and heating limit (03-021) is retained.

Example: setting par-heating limit outside temperature 03-021: 17 °C,
Room reference value: 20 °C produces heating limit 17 °C
Room reference value: 22 °C produces heating limit 19 °C

10.2.9 Outside temperature cooling limit

For the cooling limit deactivation, the same average outside temperature value is used as for heating operation. The cooling limit (03-036) is set 2 to 3 K higher than the room reference temperature (03-054) for normal operation, depending on the comfort requirement.

If the reference room temperature is adjusted by the operation selection or comfort, the cooling limit automatically adjusts. The difference between the room reference temperature and cooling limit (03-036) is retained.
(Basic RT cooling is 22 °C)



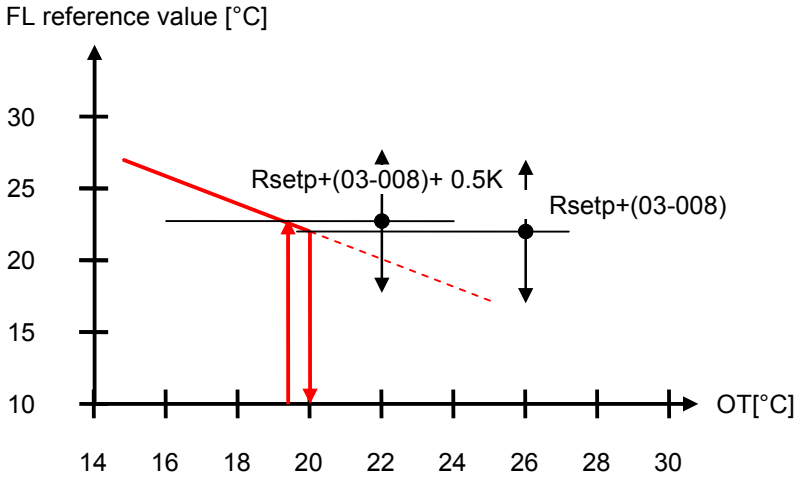
Cooling limit deactivation

10.2.10 Special heating limit (auto economy operation)

In automatic operation (week 1 or weeks 2), a separate economy operation heating limit (03-002) can be set. This means that in automatic economy operation (room reference <= 16 °C) can be set lower in well insulated buildings than would be the case with the automatic heating limit. As a result, it is possible to achieve that, in automatic economy operation, the heating is switched off during economy operation. If the setting is in the negative range, the outside temperature frost protection function provides for frost safety.

10.2.11 Special heating limits (flow reference value)

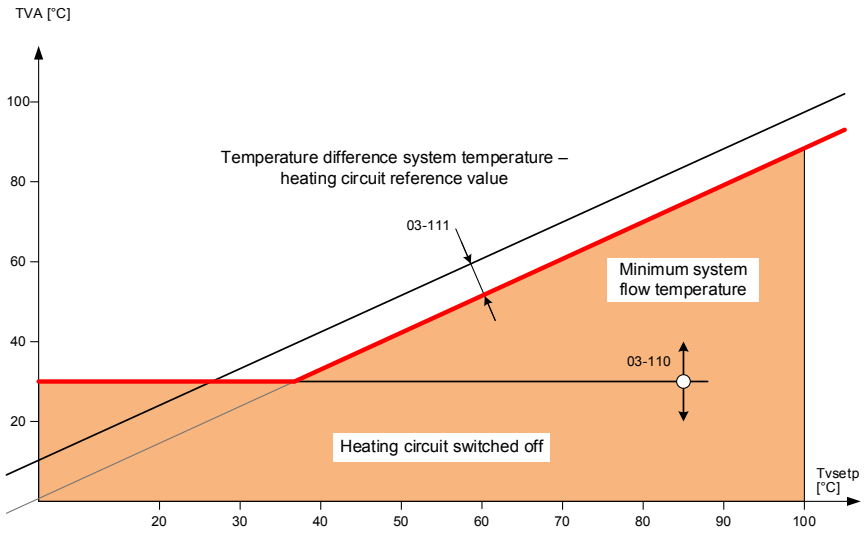
Another heating limit is derived from the flow temperature reference value. If the reference value drops below the setting value of the current room reference temperature plus flow reference value heating limit (03-008), heating operation switches off. This means if the flow reference value drops due to a high current outside temperature and is below the set threshold, the heating switches off although the heating limit deactivation has not yet been reached. If the reference value increases by 0.5 K again, heating control returns to operation.



10.2.12 Deactivation when plant temperature is too low

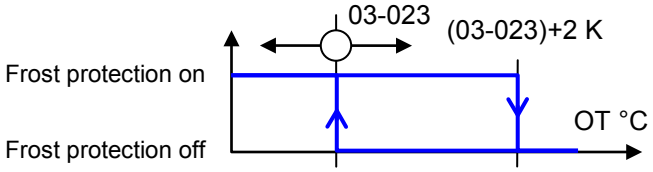
Heating circuits can be switched off depending on the available plant temperature. If the plant temperature drops below the required heating circuit «flow temperature reference», the heating circuit can switch off under certain circumstances. The deactivation takes place if an adjustable minimum plant temperature is undershot or an adjustable temperature difference between the plant temperature and the flow reference temperature is undershot.

The plant temperature is different depending on the application:
+ Buffer sensor
+ Plant flow sensor
+ H-Gen sensor



(03-110) Minimum plant temperature
If the plant temperature drops below the calculated flow reference temperature, the heating is switched off. If the plant temperature increases by 2 K again, heating control returns to operation.
(03-111) Switch-off difference plant temperature
If the plant temperature drops below the calculated flow reference temperature plus setting value, the heating is switched off. If the plant temperature difference increases by 2 K again, heating control returns to operation.

10.2.13 Outside temperature frost protection function



Outside temperature frost protection

If the outside temperature drops below the frost limit outside temperature (03-023), frost protection functions are activated.
For the heating circuit control, this means that the heating circuit pump is switched to clock operation. This means the pump is switched on for 6 minutes per hour, the mixer control operates at the flow temperature for room protection temperature. However, no heat is requested.
If the flow temperature drops below the room protection temperature (03-000) in this operating status, the control switches on. The pump operates continuously and the corresponding heat is demanded. The frost function is exited if OT > OT frost + 2K.

10.2.14 Room temperature compensation

In room temperature compensation, the magnitude of the flow reference temperature is influenced by the room temperature. For this purpose, a valid room temperature must be available. This can be obtained by a control module with corresponding circuit assignment.

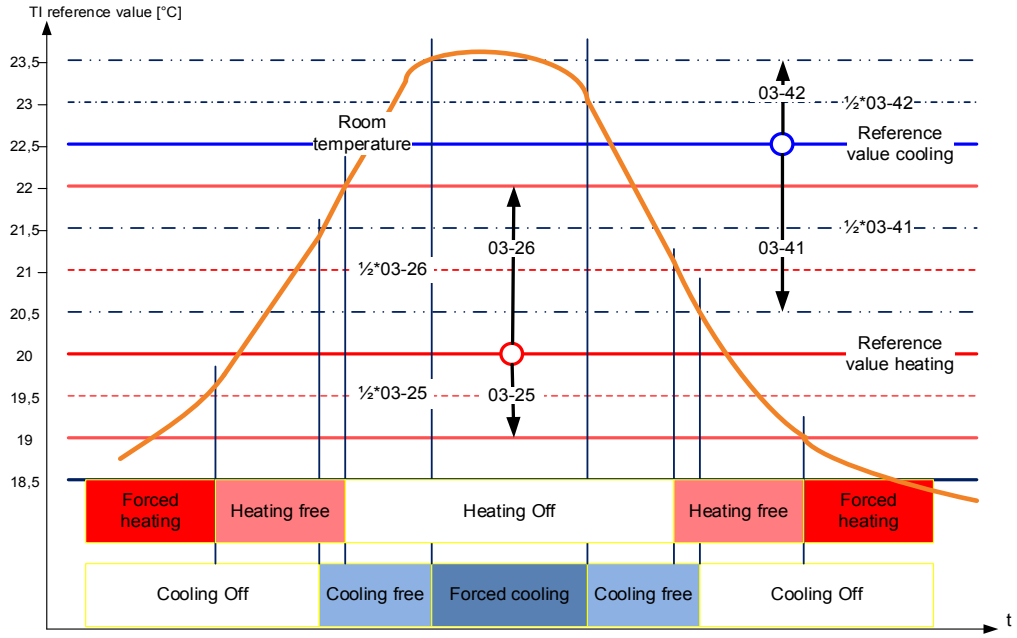
The reference flow temperature is influenced by setting a room influence. If the room temperature is too high, this causes the flow reference temperature to be reduced, and vice versa. The magnitude of the correction is set using room temperature compensation (03-007).
(03-007)*room temperature deviation = flow reference value correction
The room influence should be set between 2 and 5 for low-temperature systems and between 4 and 8 for high-temperature systems.

Example:
Room reference: 20 °C
Room actual: 17 °C
Deviation: 3 K
Room temperature compensation (03-007): 2 K

RT compensation (03-007) x RT deviation = flow reference value correction
2 x 3K = *6K flow reference value shift*

10.2.15 Room temperature heating limits

If a room influence (03-007) greater than 0 is set and there is a valid room temperature, superordinate heating limits are set by the room temperature. If the room temperature rises too high, the heating circuit controller switches off. As a corollary, the heating control can start operation if the room temperature drops too low when outside temperature heating limit deactivation is active.



With "forced", the controller also enters heating or cooling operation if the outside temperature heating limit has switched off.

With "off", the controller switches off even if the outside temperature heating or cooling limit is still enabling operation.

With "free", the outside temperature heating or cooling limit determines the operating mode of the controller. For the room temperature heating limits, a room temperature average value is calculated with a time constant of 0.5 hours.

The deviation for "forced heating" from the heating reference value can be set with the switch-on heating limit (03-025). The corresponding switching difference for "forced heating" off corresponds to half of the switch-on heating limit.

The deviation for "heating off" from the heating reference value can be set with the switch-off heating limit (03-026). The corresponding switching difference for "heating free" corresponds to half of the switch-off heating limit.

The deviation for "forced cooling" from the cooling reference value can be set with the switch-on cooling limit (03-042). The corresponding switching difference for "forced cooling" off corresponds to half of the switch-on cooling limit.

The deviation for "cooling off" from the cooling reference value can be set with the switch-off cooling limit (03-041). The corresponding switching difference for "cooling free" corresponds to half of the switch-off cooling limit.

10.2.16 Heating circuit control

The heating circuit is controlled by a pump or a pump with mixer. In a mixer circuit, the flow temperature is controlled. In a pump circuit, the heating is only switched on and off by means of the heating limits. The flow temperature is determined by the heat generation.

The heating circuit type can be set with 07-005. The cooling function is activated with 07-014.

Heating circuit type: (07-005)	
0	3-point mixer
1	2-point mixer (thermal drive)
2	Pump circuit
3	Heating circuit function switched off

Cooling function: (07-014)	
0	Cooling function switched off
1	Cooling on, mixer closed
2	Cooling on, mixer open
3	Cooling on, mixer controlled on cooling reference value

With mixer control, the mixer drive can be a reversing motor with open and closed commands or a thermal mechanism with only one open command.

If the cooling function is activated, a cooling valve can be activated with active cooling, depending on the version

10.2.17 Control strategy

The flow reference value of the heating circuit is selected here.

Control strategy 03-032:
0: Weather control only
1: Weather control with room override
2: Room control only
3: Constant control (e.g. ventilation override, ...)

10.2.18 Setpoint requirement type heating circuit

This determines where the reference value request of the heating circuit is forwarded to.

Setpoint requirement type heating circuit 07-035:
0: None
1: H-Gen
2: Heating buffer
3: Cooling buffer
4: Heating+cooling buffer
5: Heating buffer + cooling on HGEN

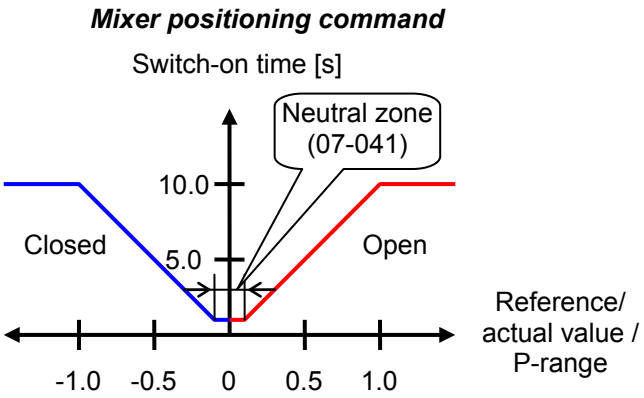
10.2.19 Pump control

The circulating pump runs continuously in heating operation. After heating operation switches off, the mixer control continues to run for the set after-run time (07-003).

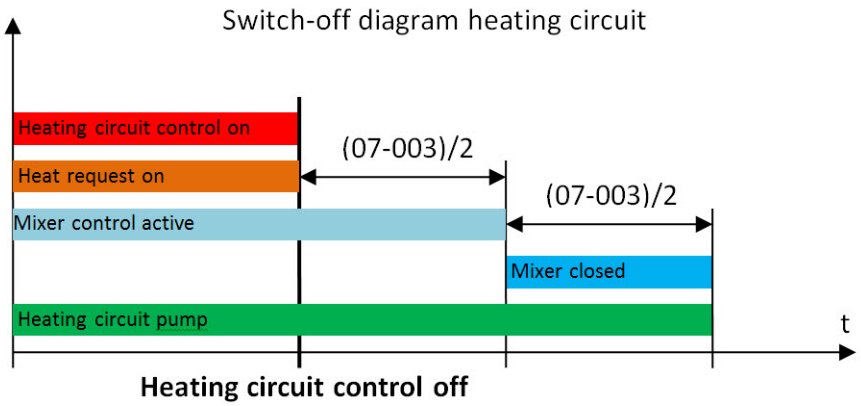
Optional: clock operation
In direct heating circuit applications, clock operation can be set for the heating circuit pump. The pump then always runs when the heat generator is running and switches off with a delay (07-061). When the heat generator is not running, the pump switches on after each set cycle time (07-060) and off again after the set switch-on time (07-061).

10.2.20 Mixer control

The mixer control takes place using a P-controller. The P range (07-000) can be adapted for adjusting the mixer runtimes.



The cycle time for the mixer commands is set to 10 seconds. Within the P range, the open and close commands are output in a linear relationship to the control deviation.
A dead zone can be set for the mixer control with the neutral zone (07-041); in this dead zone, no positioning commands are switched through to the mixer.
A P-range of 15 K is set for standard mixer drives with 2-minute operating time. With fast mixer motors, the P-range can be set up to 30 K to reduce oscillations.
PI control is in effect with thermal drives. Only the open command is controlled in this case. The cycle time is set to 1 minute here. The adjusting time is fixed at 5.0 minutes, and corrects any proportional error with a large valve stroke.
After heating operation switches off, the mixer control continues to run for *half* the set after-run time (07-003). The mixer commands switch off at the end of the *full* after-run time.



If the heating circuit switches off, the request to the heat manager is off; the last reference value of the heating circuit is retained for half the after-run time (07-003). From the second half of the after-run time onwards, the mixer is closed. After that, the CLOSED command switches the pump off.

The pump after-run time (07-003) must correspond to twice the mixer runtime at least!

10.2.21 Forced energy

The mixer controller can be force-controlled. Heat generator controllers can close the mixer controller for H-Gen protection, or force heat consumption if the H-Gen maximum temperature is exceeded. The flow maximum temperature is not exceeded in this case. Equally, hot water charging controllers can generate forced energy and close the mixer controllers or reduce the flow temperature.
By selecting forced energy (07-034), it is possible to set whether the heating circuit should react to positive, negative, both or none.

0 = No reaction to forced energy
1 = Reaction to neg. forced energy
2 = Reaction to pos. forced energy.
3 = Reaction to pos. and neg. forced energy.

With a negative forced energy, the heating circuit pump switches – 100% off with activated mixer circuit as in the pump circuit with forced energy, and is subsequently released again at – 50%.
The heating circuit status display shows forced throttling if the negative forced energy is < -50%.

10.2.22 Stand protection

To prevent the pump from seizing, a stand protection cycle is switched on daily during off operation. In each case, the pump switches on for 30 seconds at 12:00 noon.
The mixer opens at each 12:00 noon for 10 seconds and then closes for 20 seconds. The stand protection can be switched off using par. 07-016.

10.2.23 Plausibility test

An error message is generated if the reference flow temperature is not achieved within an adjustable time 0-20h (07006). The reference value deviation for an error message is fixed at 5 K. The function is inactive if the time is set to 0.

10.2.24 External constant requirement heating (ventilation, swimming pool, ...)

If a request contact has been defined with a heating circuit, the control strategy is additionally set to constant control. The heating circuit now no longer responds to the request contact.
This means operating modes, switching times of the heating circuit no longer have any effect.
Input open: Heating circuit switches off, no frost protection or standby (preventive measures must be provided by the customer)
Input closed: Heating circuit operates at its set constant temperature

Parameter	Setting	UN	Function	Par-ID
Allocation ext. constant req. input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VE2, 15=FVT-T-VE2	…	-	Heating circuit … configuration	30-046
Control strategy (selection of flow reference value determination) 0: Weather control only 1: Weather control with room override 2: Room control only ***3: Constant control***	3	-	Heating circuit ... parameters	03-032
Flow reference value with constant requirement heating	…	°C	Heating circuit ... parameters	07-036
Flow maximum temperature (set higher if required, factory setting = 70 °C))	…	°C	Heating circuit ... heating characteristic	07-008
Allocate function name for heating circuit (e.g. ventilation, …)	10	-	Heating circuit ... function name	04-005

Note: Several heating circuits can each be allocated to the same input as well.

10.2.25 Minimum value override

It is also possible to set a minimum value override for the heating circuit.
The heating circuit works according to its heating curve or its reference value. When the minimum value override is activated, the heating circuit moves at least to the set "Reference value minimum value override". If the request for the heating circuit reference value is higher, for example, it is retained. The minimum value override operates independently from the currently active operating mode.
Example: The heating circuit is in standby. The minimum value override is active – the heating circuit starts operation and controls the reference value minimum value override.

Input open: Heating circuit works according to its set heating curve or its constant value
Input closed: Reference value minimum value override is additionally active

Parameter	Setting	UN	Function	Par-ID
Allocation input minimum value override 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	…	-	Heating circuit … configuration	30-030
Flow setpoint min. value override	…	°C	Heating circuit ... parameters	07-039

Note: Several heating circuits can each be allocated to the same input as well.

10.2.26 Switching modem contact (telephone contact)

If an input has been defined as a switching modem contact in a heating circuit, the following control behaviour results.
Input open: AUTO
Input closed: STANDBY (frost protection function is active)

Parameter	Setting	UN	Function	Par-ID
Allocation switching modem contact input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	…	-	Heating circuit … configuration	30-045

Note: Several heating circuits can each be allocated to the same input as well. (also applies to the DHW circuit)

10.2.27 Energy balance

This document describes the measurement and display of output and energy quantity with heat generators, heating circuits and hot water tanks, as far as it affects the TTE-WEZ, TTE-HK/WW control modules. The measurement can also be made on external devices (M-bus). However, they are displayed in the allocated functions of the control modules.

Overview:

Information	Min.	Max.	Factory	UN	Function	Par-ID
Heat quantity heating	0.000	0.000	0	MWh	Heating circuit …-information	29-050
Current output heating	0.0	0.0	0	kW	Heating circuit …-information	29-051
Cooling quantity	0.000	0.000	0	MWh	Heating circuit …-information	29-052
Current output cooling	0.0	0.0	0	kW	Heating circuit …-information	29-053
Current volume flow energy balance	0.00	0.00	0	ltr/min	Heating circuit …-information	21-105
Energy balance sensor flow	0.0	0.0	0	°C	Heating circuit …-information	17-040
Energy balance sensor return	0.0	0.0	0	°C	Heating circuit …-information	17-041
Input allocation						

Information	Min.	Max.	Factory	UN	Function	Par-ID
Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2,19=WF-RS485/OT			0	--	Heating circuit …-energy balancing	30-058
Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=FE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF-RS485/OT			0	--	Heating circuit …-energy balancing	30-059
Allocation IMP volume flow input (if present) 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2			0	--	Heating circuit …-energy balancing	30-060
Parameter						
Heating coefficient medium (only present 1x, applies to all energy balancing of the module)	0.01	9.99	4.2	kJ/kgK	General parameters	17-004
… selection of the sensor/input type (with energy balancing flow/return sensor, IMP) 0=KTY 1=PTC 2=PT1000, 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)				---	General sensors	33-…
Reset energy balance	0	1	0	---	Heating circuit …-energy balancing	17-043
Entry of the pulse rate in pulses/litre (if pulse counter present)	1.0	5000	721	IMP/ltr	Heating circuit …-energy balancing	17-019
Offset flow sensor, is added to the measured value to obtain the finished measured value. (if present)	-10.00	+10.00	-0.2	ltr/min	Heating circuit …-energy balancing	17-021
Volume flow at 100% pump speed (with through-flow calculation)	0	200	8	ltr/min	Heating circuit …-energy balancing	17-042
Heating measurement site allocation: 0=OFF 1=FA controller 2=local 3=Measurement module (M-bus) 4=District heating module			0	--	Heating circuit …-energy balancing	20-010
Heating measurement module number (corresponds to the DIP switch setting)	1	16	1	--	Heating circuit …-energy balancing	20-011
Number of heating measuring module measurement	1	15	1	--	Heating circuit …-energy balancing	20-012
Cooling measurement site allocation: 0=OFF 1=FA controller 2=local 3=Measurement module (M-bus) 4=District heating module			0	--	Heating circuit …-energy balancing	20-013
Cooling measurement module number (corresponds to the DIP switch setting)	1	16	1	--	Heating circuit …-energy balancing	20-014
Number of cooling measuring module measurement	1	15	1	--	Heating circuit …-energy balancing	20-015

1) Allocation input parameters:
Two temperatures are required for the heat balancing of a generator or a consumer. Balancing flow sensor and return sensor.
Furthermore, a volume flow is required that is derived either from the rotation speed (activation value) of the corresponding pump or is measured by a volume flow sensor. If the sensor does not have an input allocated to it, the speed of the pump is used for determining the volume flow together with the "Volume flow at 100% pump speed" parameter:
+ the heating circuit pump
+ the DHW charging pump
+ the heat generator pump.

2) Heating and cooling:
In the heating circuits and heat generators, output and heat quantities are each measured and displayed for heating and cooling. This is done automatically on the basis of the current operating mode. However, the same are used as temperatures vice versa.
Output and heat quantities are displayed separately for heating and cooling positively (no minus).

3) Calculation:
The physical parameters of volume flow, density and specific heat capacity form the basis for calculating the heat balance and heat output, and are calculated according to the mathematical formula: $W = (V / t) \cdot rw \cdot cw \cdot Du$
W = heat capacity, V/t = volume flow, rw = density of the heat carrier medium, cw = specific heat capacity of the heat carrier medium, Du = temperature difference flow/return

The calculation is performed in all operating modes in which it is sensible, although not in the relay test. Outputs up to 4.0*108 kW are calculated with a resolution of 0.1 kW, and heat quantities up to 4,000*106 MWh with a resolution of 1.0 kWs. Heat quantities are permanently stored.
If at least one of the temperatures is invalid (defective sensor, unallocated input), the output is assumed to be zero. If the temperature difference (energy balance flow / energy balance return) is less than zero, the output is assumed to be zero (no negative outputs).
The calculated values are displayed by datapoints. A resolution of 0.001 MWh is used.

4) Display external values:
The calculation is performed in all operating modes in which it is sensible, although not in the relay test.
The heat balancing can be performed locally, on the automatic function unit (only with H-Gen-2) or on a measuring module (M-bus). The allocation is made using the "Measurement site allocation" parameter.

4.1 Measurement on automatic firing device
If the FA is allocated, the data of the locally connected automatic function unit (H-Gen-2) is read out and displayed in the corresponding datapoints.

4.2 Measurement on measuring module (M-bus)
If a measuring module (M-bus, FW) is allocated, the data is requested from the measuring module and displayed in the corresponding datapoints. For this purpose, the measuring module must be selected using the "Number measuring module" parameter and the measurement using the "Number of measurement" parameter.

The following parameters are set and defined on the measuring modules:

Function group	20
Output heating	00-001
Heat quantity	00-000
Output cooling	00-051
Cooling quantity	00-050

The data is requested from the controller (TTE-WEZ) in the measuring modules (TTE-MWA).

5) Reset energy quantity:
Using the "Reset energy quantity" command (17-043), the heat and the cold quantity of the function in question (e.g. HZK 2, WE 1, etc.) are set to zero.

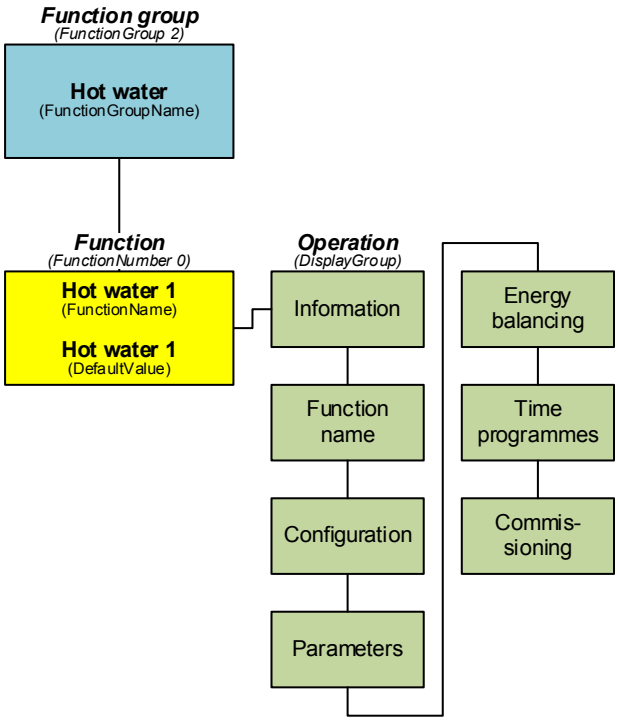
Setting various flow rate sensors:

Flow rate type	Unit of measure	Range	Pulse rate imp/ltr.	Offset l/min
Huba type 200	DN8 AG 3/4"	0.9 … 15 l/min	1523	-0.3
Huba type 200	DN10 AG 3/4"	1.8 … 32 l/min	721	-0.2
Huba type 200	DN15 AG 1"	3.5 … 50 l/min	329	-0.2
Huba type 200	DN20 AG 1 1/4"	5.0 … 85 l/min	162	-0.3
Huba Typ 200	DN25 AG 1 1/2»	9.0 … 150 l/min	81	-0.2
PAW FlowRotor	DN20	0.5 … 15 l/min	186	0.28
PAW FlowRotor	DN25	1.0 ... 35 l/min	80	0.66
PAW FlowRotor	DN32	2.0 … 50 l/min	55	0.56
VSG 1.5	DN15 AG 3/4"	0.5 … 25 l/min	2	0
VSG 2.5	DN20 AG 1"	0.5 … 40 l/min	2	0
VSG 6	DN32 AG 1 1/2"	2.0 … 100 l/min	1	0

10.3 Function group "hot water"

In the "Hot water" function group, values must be set and settings made that are required for independent hot water functions.

10.3.1 Overview of menu structure "hot water"



10.3.2 Parameter overview "hot water 1"

Hot water – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-052	Status domestic hot water control	0	0	0	Hot water control status: 0 = Switched off 1 = Normal charging operation 2 = Comfort charging operation 3 = Forced throttling (with forced E < -50%) 4 = Forced charging (with forced E > +50%) 5 = Malfunction 6 = DHW draw-off (draw-off of domestic hot water active) 7 = Warning 8 = Reduced charging operation 12 = Preferential operation SmartGrid 13 = Forced acceptance SmartGrid	0	7
01-004	Hot water setpoint	50 °C	0.0	0.0	Calc. ref. value for the hot water temp.	0	7
00-004	Hot water actual SF	56.1 °C	0.0	0.0		0	7
00-006	Hot water actual SF2	0 °C	0.0	0.0	Hot water temp. 2 (switch-off temp.)	0	7
01-066	SLP hot water charging pump	0	0	1		0	7
29-050	Heat quantity	0 MWh	0.00	0.00		0	7
29-051	Current power	0 kW	0.0	0.0		0	7
21-105	Volumetric current	0 l/min	0.00	0.00	Current volume flow energy balancing	0	7
00-118	Circulation circuit temperature	--- °C	0.0	0.0	Hot water circulation temperature	0	7
01-065	Hot water recirculation pump	0	0	1		0	7
17-040	Energy balance sensor flow	0 °C	0.0	0.0	Energy balance sensor flow	3	7
17-041	Energy balance sensor return	0 °C	0.0	0.0	Energy balance sensor return	3	7

Domestic hot water – Function name.

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Circulation pump function	**Domestic hot water**				0	0

Hot water – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
05-076	Function application domestic hot water	2			Function application type hot water	0	3
30-050	Alloc. DHW sensor 2 SF2 input	0=OFF			Allocation DHW sensor 2 SF2 input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-051	Alloc. DHW thermostat input	2=SF			Allocation DHW thermostat input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VE2, 15=FVT-T-VE2	3	3
30-032	Alloc. switching modem contact DHW input	0=OFF			Allocation switching modem contact input (open = automatic, bridged = standby) 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VE2, 15=FVT-T-VE2	3	3
32-031	Alloc. electrical heating insert output	0=OFF			Allocation electrical heating insert output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
30-031	Alloc. blocking contact ELH input	0=OFF			Allocation input blocking contact electrical heating insert (DHW recharging) 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VE2, 15=FVT-T-VE2	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
32-032	Alloc. recirculation pump ZKP output	0=OFF			Allocation circulation pump DHW-ZKP output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
30-021	Alloc. circulation sensor ZF input	0=OFF			Allocation circulation sensor ZF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	3	3
32-044	Alloc. charging with DKP output	0=OFF			Allocation charging with DKP output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3

Hot water – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
05-087	Setpoint req. type hot water	1	0	2	Reference value request type hot water: 0: None 1: H-Gen 2: Heating buffer 3: Cooling buffer 4: Heating + cooling buffer	3	3
05-089	Allocation plant flow control	0	0	32	Allocation PFC control 1-8 = H-Gen 1 to 8 17-32 = HC/DHW 1 to 16 Example: Allocated PFC module: HC/DHW with DIP switch addr. 9 = 25	4	4
05-005	DHW discharge protection/ charging stop	1	0	3	The following modes can be selected for charging pump control 0 = Temperature-independent 1 = Temperature-dependent, the charging pump is only enabled if the charging flow is greater than the hot water temperature. Hysteresis +5/+3K 2 = Temperature-independent + heat generator-dependent: hot water charging is broken off if the heat generator is not available for charging (malfunction, block, etc.) 3 = Temperature-dependent + heat generator-dependent: hot water charging is broken off if the heat generator is not available for charging (malfunction, block, etc.)	3	3
05-000	Switch-on diff. hot water supply	5 K	,5	50.0	If the hot water temperature drops below its reference value by the value set here, hot water charging is started.	3	3
05-001	Charging setpoint elevation	10 K	-100.0	30.0	This parameter enables an increase for the charging reference value to be set.	3	3
05-002	Hot water charging preference	0.1 h	0.0	10.0	This setting enables the charging preference to be set 0 = Absolute precedence, the heating circuits are blocked by forced energy 0.1 = Absolute parallel operation, no forced energy Greater than 0.1 = ramp time in which the charging temperature should be reached. Forced energy is generated if the charging temperature cannot follow the ramp.	3	3
05-003	Pump follow-on	3 min	0.0	24.0	Following hot water charging, the charging pump continues to run by the time set here.	3	3
05-006	Circulation pump function	0	0	1	With the setting, the circulation pump function can be activated: 0 = Inactive 1 = Active after time program (optionally a circulation sensor can be activated)	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
05-007	Hot water charging pump req.	0	0	1	With the parameter, the heating circuit pump can be activated for hot water charging with a corresponding configuration: 0 = Not active 1 = Heating circuit pump is switched on with hot water charging.	4	4
05-010	Release temperature recharging	100 °C	30.0	70.0	If the hot water charging mode is set accordingly, this parameter allows a recharging temperature to be set. If the hot water temperature is higher than the set recharging temperature, the charging request is switched off on the central heat generator system and a hot water-internal charging is switched off.	5	5
05-011	Hot water charging mode	1			The following hot water modes can be set 0 = Hot water function off 1 = Hot water charging via central heat generator system 2 = Stratified tank charging, hot water charging with extended charging functions 3 = Hot water reference value is transferred to the heat generator system 4 = Hot water thermostat instead of hot water sensor 5 = Hot water charging exclusively by the hot water-internal charging request 6 = Hot water charging takes place up to the set recharging temperature by the central heat generator system and above that by the hot water-internal recharging	3	3
05-013	DHW setpoint reduction if failure	0 K	0.0	20.0	If there is a heat generator fault, the hot water reference value is reduced by the value set here.	5	5
05-019	Lead time DHW switching valve	0 s	0.0	900.0	Delay of the request or flow time DHW changeover valve until request to HM takes place	4	4
05-039	Forced energy choice	3	0	3	This parameter enables the response of the hot water circuit to forced energy to be set: 0 = Hot water circuit does not respond to forced energy 1 = Responds to negative forced energy 2 = Responds to positive forced energy 3 = Responds to negative and positive forced energy	4	4
05-040	Error duration hot water fault	0 h	0.0	20.0	If the hot water temperature drops below the reference value by 5 K for longer than the time set here, an error message is generated. Setting 0 = no error message is generated	5	5
05-049	Stand protection DHW charging pump	**1**	0	1	Stand protection DHW charging pump	4	4
05-050	Hot water operation choice	Week 1			Operation selection hot water function: 0 = Switched off 1 = Automatic after time program 2 = Continuously free on reference value 3 = According to heating circuits operation selection	0	0
05-051	Normal hot water temp.	55 °C	10,,0	65,,0	This parameter sets the hot water reference value.	0	0
05-056	DHW sensor 2 (SF 2) switch-off offset	5 K	0.0	40.0	This parameter defines the switch-off differential from the reference value for the end of the hot water charging on the switch-off sensor.	4	4
05-057	Maximum hot water setpoint limit	65 °C	10	90	This parameter enables the setting range of the hot water reference temperature (05-051) to be limited.	3	3
05-081	Maximum hot water charging time	0 h	0.0	10.0	If the set maximum charging duration is exceeded, the charging procedure is interrupted and only started again if the switch-on difference (05-00) from the current hot water temperature is undershot.	3	3
05-082	Max. recharging time if charging stop	0 h	0.0	10.0	If recharging is activated by a charging cancellation in hot water mode (ID 05-011) 6 or 7, this can be terminated with the maximum recharging time after the time set here. Recharging is not activated at all with the setting 0.	3	3
05-086	Conservation hot water temp.	45 °C	10	65		0	0
05-077	Smart-Grid (offset) DHW setpoint	0 K	0.0	80.0	Smart-Grid (offset) hot water setpoint	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
05-078	Stpt. incr. (offset) DHW stpt.	0 K	-80.0	80.0	Setpoint incr. (offset) hot water setp.	3	3
05-079	Stpt. reduc. (offset) DHW stpt.	0 K	-80.0	0.0	Setpoint red. (offset) hot water setp.	3	3
08-079	DHW min. temp with solar active	40°C	0.0	60.0	In intensive solar charging, the hot water reference temperature for recharging by the heat generator is reduced by the set value.	4	4

Hot water – EBZ (energy balance)

Par.	Designation	Value	Min.	Max.	Comments	R	W
17-043	Reset energy balance	0	0	1	Reset energy balance	3	3
30-058	Alloc. energy balance sensor flow input	0=OFF			Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 19=WF RS485/OT	3	3
30-059	Alloc. energy balance sensor return input	0=OFF			Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF RS485/OT	3	3
30-060	Alloc. IMP volume flow input	0=OFF			Allocation IMP volume flow input 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	3	3
17-019	Pulse rate VIG	721 1/l	1.0	5000.0	Entry of the pulse rate in pulses/litre	3	3
17-021	Offset VIG	-0.2 l/min	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	3	3
17-042	Volume flow at 100% pump speed	8 l/min	0.00	200.00	Volume flow at 100% pump speed	3	3
20-010	Heating measurement site allocation	0=OFF			Heating measurement site allocation: 0=OFF 1=FA controller 2=Local 3=Measuring module (M-bus) 4=District heating module	3	3
20-011	Heating measurement module no.	1	1	16	Number of heating measurement module, corresponds to the DIP switch setting	3	3
20-012	No. of heating measuring module meas.	1	1	15	Number of heating measuring module measurement	3	3

Hot water 1 – time programs (only for readout)

Par.	Designation	Value	Min.	Max.	Comments	R	W
00-500	ID current day programme	0	0	14		0	6
00-502	Current day programme name	All day	0	0		0	6
00-503	Display status	1	0	255		0	6
00-504	ID current week programme	0	0	13		0	6
00-505	Current week programme name	Week 1	0	0		0	6
02-011	Heat pump party timer remaining time	0 h	0.0	4.0	Calc. rem. time for party operat. HW ch.	0	0
02-018	Absence remaining time	0 h	0.0	50.0	Absence remaining time	0	0
03-078	Holiday end	2036-02-06			Holiday end	0	0

10.3.3 Function applications domestic hot water

Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4	5	6	7
WW	WW Not active		DHW with charging pump					WW with switching valve Y7, and req. DKP

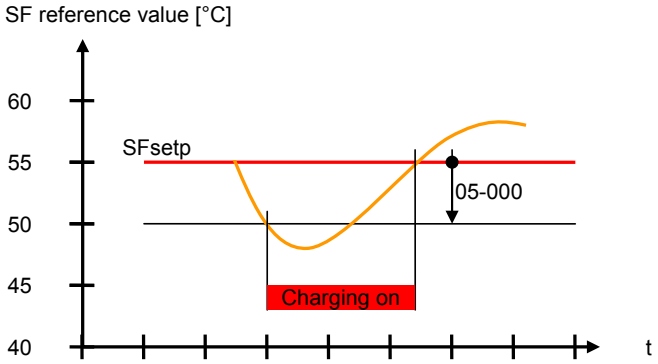
10.3.4 Reference value request type hot water

This determines where the reference value request of the hot water circuit is forwarded to.

Setpoint request type hot water 05-087:
0: None
1: H-Gen
2: Heating buffer

10.3.5 Hot water charging

The current reference value for the hot water temperature depends on the set reference values, the operation selection and the time programs.
If there are heat generator faults and solar charging is integrated, the set reference value can be overridden.
Hot water charging is started if the current reference value is undershot by the switch-on difference (05-000) and ends when the current reference value is reached.
The maximum hot water reference temperature that can be set can be limited with the parameter (05-057).



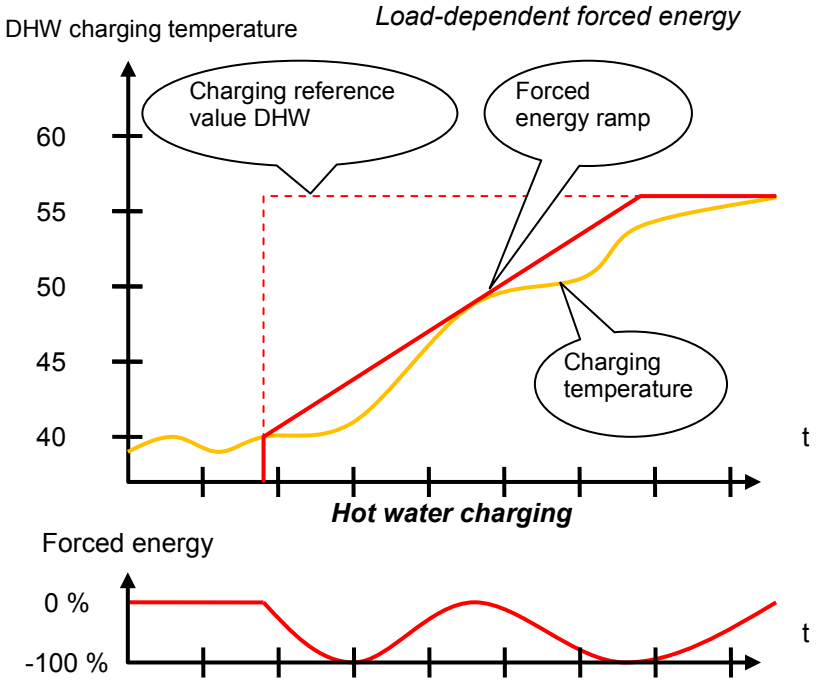
Hot water charging

10.3.6 DHW charging preference

With **preferential charging** (setting 05-002 = 0 h) only the set hot water charging output is requested. Equally, a negative forced energy is generated, by means of which other consumer circuits can be blocked.
With the setting **0.1 h**, charging takes place in parallel to an additional request. No forced energy is generated in this case and the requested output is not limited to the set hot water charging output.
With the setting > **0.1** h, charging is made in parallel and, depending on the load, a forced energy is generated.
With the setting > **0.1** h, a forced energy ramp is generated for the charging temperature. If the charging temperature undershoots the ramp, a negative forced energy is generated. Heating circuits are enabled if the ramp temperature is reached

In plants with DHW supply from buffer storage tank, DHW parallel operation is always active.

The forced energy is related to the charging flow temperature.
This is different depending on the application:
+ Plant flow sensor
+ H-Gen sensor



10.3.7 HW charging mode

Various types of hot water charging can be set using the charging mode parameter (05-011).

Setting	Operating mode	Function
0	No DHW Function	The hot water charging function is not active.

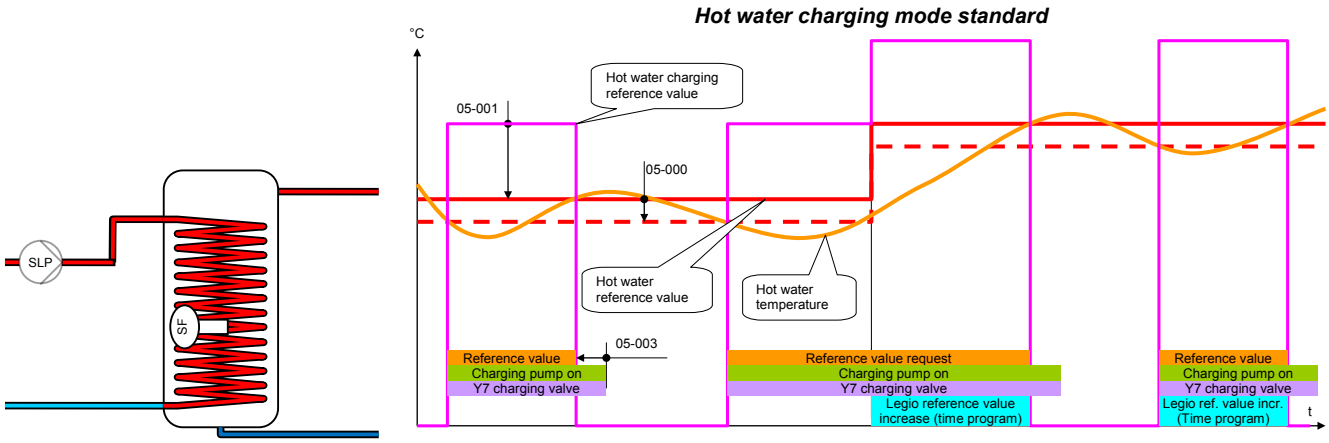
Setting	Operating mode	Function
1	Standard charging	With a charging request, the charging pump is enabled and a reference value request is generated for the heat manager.
2	Stratified tank	If a switch-off sensor SF2 is defined, charging is switched on when SF < SFsetp-SD and switched off when SF2 > SFsetp. Applications via heat exchanger and control are possible.

Setting	Operating mode	Function
3	DHW reference value	Hot water reference value is passed onto heat manager, but no output is activated. (SLP output free)
4	Thermostat charging	A thermostat can be used instead of the hot water sensor. Caution! It is essential to set all DHW set values in the switching time program higher than the DHW thermostat set value!

Setting	Operating mode	Function
5	Charging local	Hot water charging takes place using a heating element in the hot water tank. No charging reference value is generated for the heat manager.

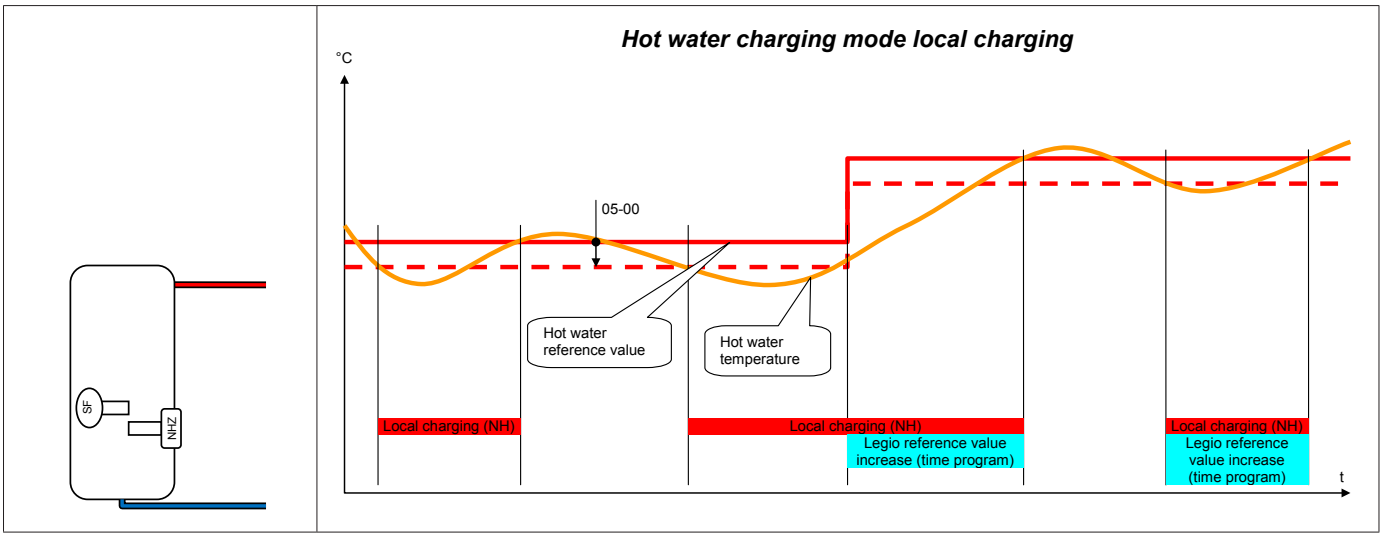
Setting	Operating mode	Function
6	Recharging	With a charging request, the charging pump is enabled and a reference value request is generated for the heat manager. After the recharging temperature (05-010) has been reached, the reference value request and charging pump are switched off and the recharging takes place by means of the heating element in the hot water tank.

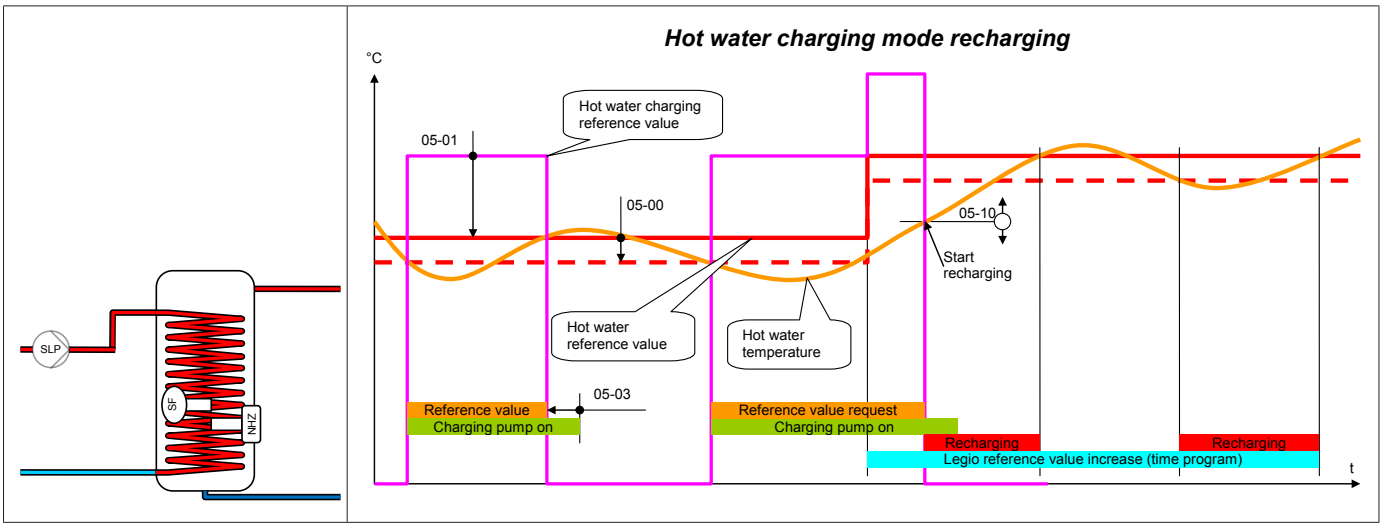
Standard charging



Charging local

Hot water charging takes place using a heating element (32-031) in the hot water tank. No charging reference value is generated for the heat manager.

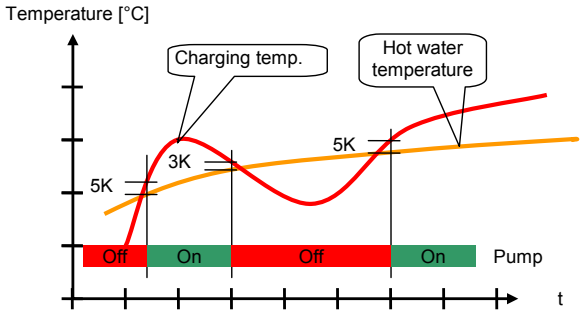




10.3.8 DHW discharge protection/charging stop

The following modes can be selected for DHW charging + charging pump control (05-005):
DHW discharge protection/charging stop 05-005:
0 = Temperature-independent SLP enable
1 = Temperature-dependent SLP enable
2 = Temperature-independent SLP enable + charging stop
3 = Temperature-dependent SLP enable + charging stop

Temperature-dependent charging pump enable:
The charging pump is only enabled if the charging flow is higher than the hot water temperature. (Hysteresis +5K/+3K)



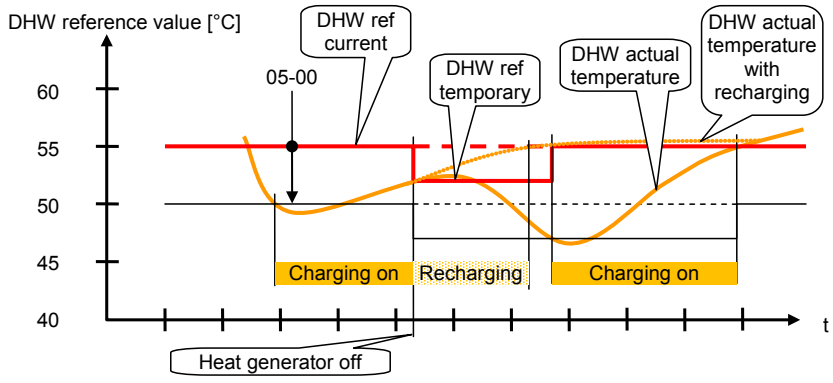
Charging pump temperature-dependent

Charging stop:
Hot water charging is cancelled if there is no heat generator for the charging.

By heat generator switch-off:
This function is activated if the charging stop mode is set to 2 or 3. If no heat generator can terminate charging due to malfunction, external H-Gen block, blocking or "H-Gen blocked for DHW charging" during a hot water charging, this is switched off. (not possible in conjunction with BIC960)
The current hot water actual value is stored and is stored as a temporary reference value for the next charging phase. The exception here is if there is an EVU block. Here, there is no temporary DHW reference value adjustment. Speciality power utility (EVU) block: DHW charging is cancelled and the DHW reference value is reduced to 10 °C during the EVU block, but there is no temporary DHW reference value adjustment to DHW-act as with the other charging stop triggers. Only the DHW reference values of the local TTE-WEZ module are adjusted, i.e. not across various controllers.

By heat generator switch-off with current recharging:
If the DHW charging mode (05-011) is set to 6 (recharging), the charging is brought to a completion with the post-heating element irrespective of the recharging temp. (05-010).
The recharging is limited to a maximum recharging time (05-082) (only if the "Max. DHW charging duration" has already been exceeded with H-Gen charging). If the maximum recharging time is set to 0, no recharging is carried out when charging stops, in spite of the recharging function being activated.

By maximum charging time:
With the parameter 05-081, a time limit for the hot water charging can be set in addition. If the charging lasts longer than the set time, the actual value is also stored as a temporary reference value for the next charging phase. The same criteria apply to hot water type with recharging as for the heat-generator-dependent cancellation.



10.3.9 Forced energy

Heat generator controllers can switch off the hot water controller for H-Gen protection, or force heat consumption if the H-Gen maximum temperature is exceeded. The set maximum temperature is not exceeded here.
The forced energy can be configured with the parameter (05-039):
0 = No reaction to forced energy
1 = Reaction to neg. forced energy
2 = Reaction to pos. forced energy
3 = Reaction to pos. and neg. forced energy

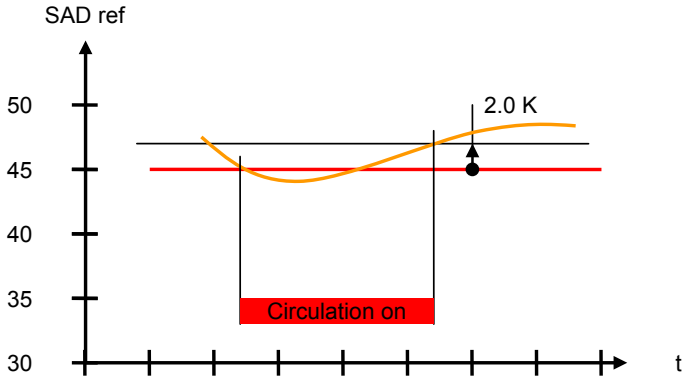
10.3.10 Recirculation pump

Optionally, a recirculation pump function can be used.

Overview:

Parameter	Factory	UN	Function	Par-ID
Allocation recirculation pump output	0	-	Hot water..- configuration	32-032
Allocation circulation sensor (optional)	0	-	Hot water..- configuration	30-021
Recirculation pump behaviour 0 = Inactive, 1 = Active by time program	0	-	Hot water..- parameters	05-006
Circulation circuit release temp. (according to setting of circulation switching time program)	45/10	°C	Hot water switching prog.	
Information				
Hot water circulation temperature		°C	Hot water .. information	00-118
Hot water recirculation pump		-	Hot water .. information	01-065

If a temperature sensor is available for the circulation return, this is additionally controlled with a temperature-dependent function.



Recirculation pump

10.3.11 Switching modem contact (telephone contact)

If an input has been defined as a switching modem contact in a DHW circuit, the following control behaviour results.
Input open: AUTO
Input closed: STANDBY (frost protection function is active)

Parameter	Setting	UN	Function	Par-ID
Allocation switching modem contact input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-FE2, 15=FVT-T-FE2	…	-	Hot water configuration	30-032

Note: Several DHW/heating circuits can each be allocated to the same input as well.

10.3.12 Energy balance

This document describes the measurement and display of output and energy quantity with heat generators, heating circuits and hot water tanks, as far as it affects the TTE-WEZ, TTE-HK/WW control modules. The measurement can also be made on external devices (M-bus). However, they are displayed in the allocated functions of the control modules.

Overview:

Information	Min.	Max.	Factory	UN	Function	Par-ID
Heat quantity heating	0.000	0.000	0	MWh	DHW information	29-050
Current output heating	0.0	0.0	0	kW	DHW information	29-051
Current volume flow energy balance	0.00	0.00	0	ltr/min	DHW information	21-105
Energy balance sensor flow	0.0	0.0	0	°C	DHW information	17-040
Energy balance sensor return	0.0	0.0	0	°C	DHW information	17-041
Input allocation						
Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2,19=WF-RS485/OT			0	--	DHW energy balancing	30-058
Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF-RS485/OT			0	--	DHW energy balancing	30-059
Allocation IMP volume flow input (if present) 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2			0	--	DHW energy balancing	30-060
Parameter						
Heating coefficient medium (only present 1x, applies to all energy balancing of the module)	0.01	9.99	4.2	kJ/kgK	General parameters	17-004
… selection of the sensor/input type (with energy balancing flow/return sensor, IMP) 0=KTY 1=PTC 2=PT1000, 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)				---	General sensors	33-…
Reset energy balance	0	1	0	---	DHW energy balancing	17-043
Entry of the pulse rate in pulses/litre (if pulse counter present)	1.0	5000	721	IMP/ltr	DHW energy balancing	17-019

Information	Min.	Max.	Factory	UN	Function	Par-ID
Offset flow sensor, is added to the measured value to obtain the finished measured value. (if present)	-10.00	+10.00	-0.2	ltr/min	DHW energy balancing	17-021
Volume flow at 100% pump speed (with through-flow calculation)	0	200	8	ltr/min	DHW energy balancing	17-042
Heating measurement site allocation: 0=OFF 1=FA controller 2=local 3=Measurement module (M-bus) 4=District heating module			0	--	DHW energy balancing	20-010
Heating measurement module number (corresponds to the DIP switch setting)	1	16	1	--	DHW energy balancing	20-011
Number of heating measuring module measurement	1	15	1	--	DHW energy balancing	20-012

For details see description under heading heating circuits – energy balance.

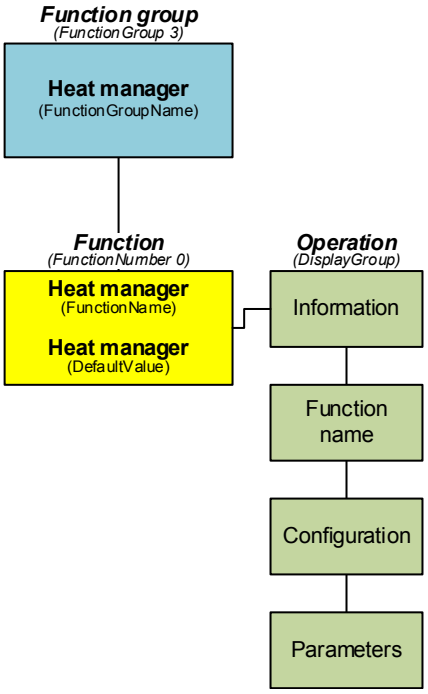
Setting various flow rate sensors:

Flow rate type	Unit of measure	Range	Pulse rate imp/ltr.	Offset l/min
Huba type 200	DN8 AG 3/4"	0.9 … 15 l/min	1523	-0.3
Huba type 200	DN10 AG 3/4"	1.8 … 32 l/min	721	-0.2
Huba type 200	DN15 AG 1"	3.5 … 50 l/min	329	-0.2
Huba type 200	DN20 AG 1 1/4"	5.0 … 85 l/min	162	-0.3
Huba Typ 200	DN25 AG 1 1/2"	9.0 … 150 l/min	81	-0.2
PAW FlowRotor	DN20	0.5 … 15 l/min	186	0.28
PAW FlowRotor	DN25	1.0 ... 35 l/min	80	0.66
PAW FlowRotor	DN32	2.0 … 50 l/min	55	0.56
VSG 1.5	DN15 AG 3/4"	0.5 … 25 l/min	2	0
VSG 2.5	DN20 AG 1"	0.5 … 40 l/min	2	0
VSG 6	DN32 AG 1 1/2"	2.0 … 100 l/min	1	0

10.4 Function group "heat manager"

The heat manager collects all upcoming heating or cooling requests and forms a maximum value in each case.

10.4.1 Overview of menu structure "heat manager"



10.4.2 Parameter overview: "heat manager"

Heat manager – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-054	Heat manager status	**0**	0	0	Status heat manager function: 0 = Heating off 1 = Heating operation 2 = Cooling operation 16 = Fault	0	7
00-096	System flow temperature	**48 °C**	0.0	0.0		0	7
01-096	Plant temp. setpoint heating current	**0 °C**	0.0	0.0		0	7
01-097	Plant temp. setpoint DHW current	**0 °C**	0	0		0	7
22-098	Plant temp. setpoint cooling current	**0 °C**	0.0	0.0		0	7
02-040	Plant output setpoint heating current	**-100 kW**	0.0	0.0		0	7
02-041	Plant output setpoint DHW current	**100 kW**	0.0	0.0		0	7
02-042	Plant output setpoint cooling current	**0 kW**	0.0	0.0		0	7

Heat manager – Function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Function name	Heat manager				0	5

Heat manager – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
06-076	Heat manager function application	**0**			A correspondingly defined function application type can be preselected with this parameter.	0	3
30-000	Alloc. system flow input heating	**0=OFF**			Allocation system flow input heating 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-001	Alloc. system flow input DHW	**0=OFF**			Allocation system flow input DHW 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-002	Alloc. system flow input cooling	**0=OFF**			Allocation system flow input cooling 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
32-010	Alloc. cooling valve CM output UKA	**0**			Allocation Cooling valve UKA 0=AUS, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	4	4
32-012	Alloc. ... Xxx	**0**			Assignment output - function still open 0=AUS, 4=DKP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2		

Heat manager – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
06-000	Maximum system hot water charging output	**100 kW**	0.0	999.0	Total output that should be used as maximum for hot water charging operation.	4	4
06-001	Max. system heat output	**100 kW**	0.0	999.0	Total output that should be used as maximum for heating operation.	4	4
06-002	Maximum cooling capacity system	**100 kW**	0.0	999.0	Total output that should be used as maximum for cooling operation.	4	4
06-010	Proportional range heat manager	**20 K**	2.0	100.0	This parameter sets the reference/actual value deviation for 100% positioning command.	4	4
06-011	Heat manager adjusting time	**20 min**	0.0	100.0	The variable is doubled within the set time when the control deviation remains constant.	4	4
06-012	Heat manager hold-back time	**0 min**	0.0	100.0	The hold-back time allows a differential portion to be allocated to the heat manager. The current slope of the main flow temperature multiplied by the hold-back time results in a corresponding reference value shift.	4	4
06-013	Red. system flow stpt. if fault	**0 K**	0.0	25.0	During a fault of the heat pump, the heating reference value is reduced by the set value.	4	4
06-015	Heat manager operation choice	**1**			The following operating modes can be selected: 1 = Automatic operation 4 = Manual heating operation 5 = Manual cooling operation	0	0
06-016	Manual mode set temperature	**40°C**	0	90	In manual operation, the distributor temperature is controlled at the reference value set here.	0	0
06-017	Max. setpoint incr. heating mode (K/min)	**1**	0.0	25.0	This setting makes it possible to set a maximum increase of a change in the reference value for the plant temperature. The limit is not in effect if the setting is 0.	4	4
06-018	Max. stpt. incr. DHW oper. (K/min)	**3**	0.0	25.0	This setting makes it possible to set a maximum increase of a change in the reference value for the hot water. The limit is not in effect if the setting is 0.	4	4
06-029	System flow error duration	**0 h**	0.0	20.0	If the output request remains at 100% for longer than the time set here, any bivalence block in the heat generators is removed. Setting 0 = no function	4	4
06-045	Output level switch off peak-load H-Gen	**85%**	0,0	95	Output level switch off peak-load H-Gen	3	3

10.4.3 Function applications heat manager

Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4	5	6	7
WM	Distributor							

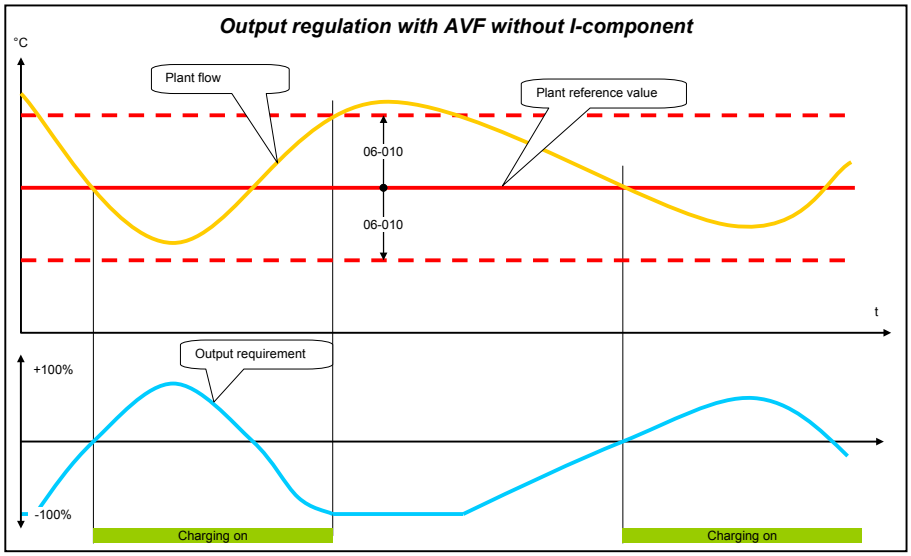
10.4.4 Functional descriptions "heat manager"

The heat manager collects all upcoming heating or cooling requests and forms a maximum value in each case. In addition, it selects whether solar energy is available. The PID controller calculates the necessary heat generator output from this.
If a controlled heat generator is integrated, the output calculation is not performed. In this case, the plant flow temperature is not measured. The maximum reference value is passed on directly to the heat generator.
If there is a cooling request, any existing heating request takes precedence, i.e. cooling can only take place if there is no heating request. (Exception: passive cooling)

A) Temperature control
No sensor is necessary in the distribution system with temperature control.

B) Output regulation
In output control, it is always necessary to have a plant flow sensor in the distributor in order to measure the distributor temperature. If no plant flow sensor is defined, the heat generator sensor WF of the guidance H-Gen is automatically used as the plant flow sensor.
A PID controller determines the necessary heat output by the reference value deviation.

Output regulation with plant flow sensor without I-component
For single-stage heat generator systems, the PID controller can be set without I-component. This means the reset time (06-011) is set to 0.
The output request is proportional to the plant temperature deviation within the set P-range (06-010).
The heat generation is switched on if there is a request >0% and switched off if there is a request -100%.

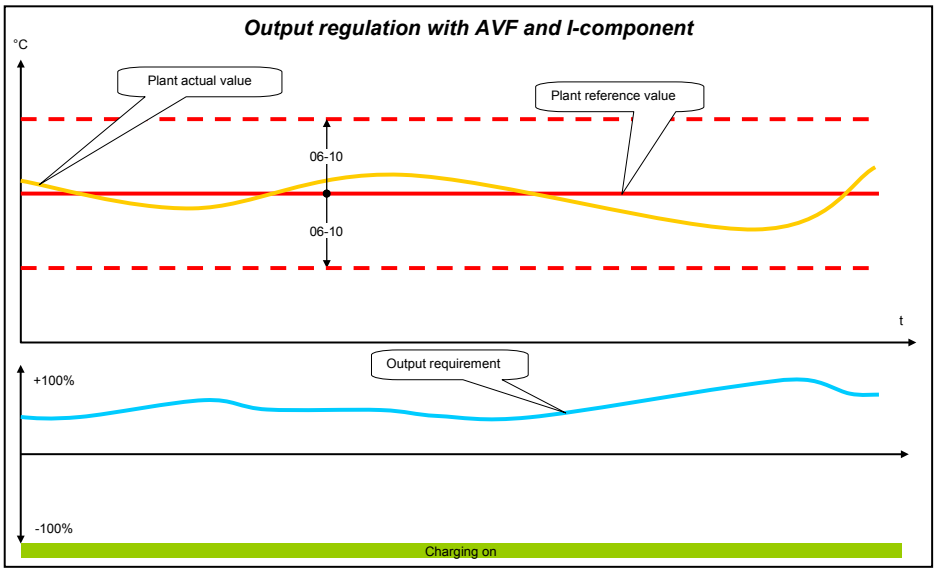


The function can also be interpreted using the temperature image. According to this, the request switches on if the plant temperature drops below the reference value and switches off if the actual value exceeds the reference value by the set P-range (06-010).

Output regulation with plant flow sensor and I-component

An I-component should be set along with the P-component for multi-stage or continuously modulating heat generator systems. This is set with the reset time (06-011).

With a constant actual value deviation, the I-component doubles the output request within the reset time. With an optimum PI setting, the necessary modulating heat generators remain in operation continuously with the same heat load. With multi-stage heat generators, at best the one requested last switches on and off for controlling the heat output.



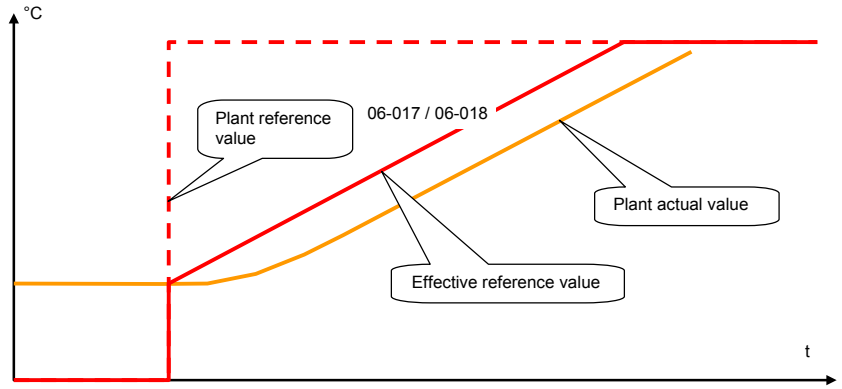
Fast load changes are compensated with a delay by the I-component. If in individual cases the delay is too long, this can be compensated by activating a D-component. The de-component is set with the hold-back time (06-012). The change in the actual value per second multiplied by the hold-back time produces the change in the output request.

System outputs

If the system is operating with output control, the maximum consumption outputs must be set. With maximum hot water load output (06-000), the output is set that can be withdrawn for hot water charging. This means only so much heat generator output is requested for hot water charging as is withdrawn. The same also applies for heating and cooling operation. The corresponding settings are maximum heating output (06-001) and maximum cooling output (06-002).

Ramp function

Reference value ramp limit



To prevent unnecessary heat generators from being switched on in cascaded heat generator systems when there are reference value changes, the effective reference temperature can be limited in its increase. The ramp limit can be set for the hot water charging reference value (06-018) and for the heating reference value (06-017) separately.

Operating mode with fault
The parameters for hot water reference value reduction on fault (05-013) and plant reference value reduction on fault (06-013) enable the corresponding reference value reduction to be set in case of a fault.
The reduction can also be set in the general functions as forced operation (04-009).

Integration of solar functions
The solar energy is taken into account by reference value reduction. In the TTE solar module, this sets which DHW tank the reduction should apply to. (Solar general 08-041).
With hot water support, the recharging reference value for hot water is limited to the setting value (HW: 08-079) if the average solar pump speed rises above 50%.
If the average speed reaches 80% and the normal hot water reference temperature is reached on the tank sensor, the reference value reduction is also activated for 18 h.

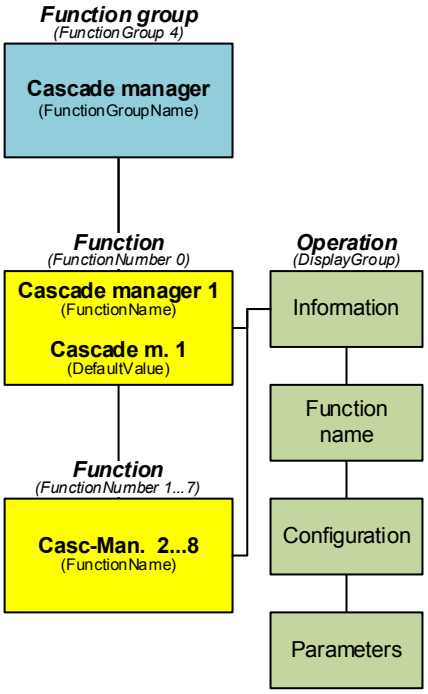
With heating support, the current plant recharging reference value of the buffer storage tank is reduced by the setting (bugger 08-072) if the average speed rises above 50%.

The reductions become inactive if the average speed drops below 40% again.

10.5 Function group "cascade manager"

The data for a total of 8 heat generators is entered in the cascade manager.
The cascade manager is available in all TTE-WEZ modules. The settings for the cascades are made in the cascade manager of the TTE-WEZ module with address 1.

10.5.1 Overview of menu structure "cascade manager"



10.5.2 Parameter overview "cascade man. 1-8"

Cascade manager .. – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-055	Cascade manager status	**2**	0	0	Status of cascade manager function: 0 = No request 1 = Request 2 = Malfunction	0	7
00-007	Heat generator flow temperature	**48 °C**	0	0		0	7
00-009	H-Gen actual output	**-100%**	0	0	H-Gen actual output	0	7
01-009	Set value output heat generator	**-127%**	0.0	0.0	Calc. setp. for heat output in heat gen.	0	7
02-043	0 - 100% current req. on heat generator	**0%**	0	0		0	7
02-046	H-Gen availability current	**11**	0	0	8 instances, status …. = available / …. = not available (possibly or later additional ones as temporarily unavailable, etc.)	5	5

Cascade manager .. – Function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Function name	**Cascade manager…**				0	5

Cascade manager .. - configuration

The configuration is only available in cascade manager 1

Par.	Designation	Value	Min.	Max.	Comments	R	W
11-076	Cascade manager function application	**1**			A correspondingly defined function application type can be preselected with this parameter.	0	3

Cascade manager .. – parameters

Par.	Designation	**Value**	Min.	Max.	Comments	R	W
11-001	Heat generator control command	**1**	1	4	The control command sets whether a heat generator is requested by output or temperature with or without hot water function: 1 = Temperature control with DHW 2 = Output control with DHW 3 = Temperature control without DHW 4 = Output control without DHW.	4	4
11-002	Heat generator nominal output	**100 kW**	0.0	999.0	The parameter sets the maximum output of the heat generator from 0 to 999 kW.	4	4
11-003	Heat generator minimum output	**0%**	0	100	The parameter sets the minimum output of the heat generator as a percentage of the maximum output.	4	4
11-004	Heat generator series switch-on power	**100%**	0	100	The parameter sets the enable for the sequence heat generator in %.	4	4
11-005	Sequence change	**0**	0	3	The sequence change parameter can be set for each heat generator, to determine whether it takes part in the run-time balancing. For example, this means a peak load heat generator can be removed from the sequence change: 0 = No changeover on sequence change 1 = Changeover on sequence change 2 = Cannot be used 3 = Cannot be used	3	3
04-022	H-Gen target address	**2**	0	16	Allocation target heat generator: 1=TH-Gen(1), 2=H-Gen(1) 3=TH-Gen(2), 4=H-Gen(2) 5=TH-Gen(3), 6=H-Gen(3) 7=TH-Gen(4), 8=H-Gen(4) 9=TH-Gen(5), 10=H-Gen(5) 11=TH-Gen(6), 12=H-Gen(6) 13=TH-Gen(7), 14=H-Gen(7) 15=TH-Gen(8), 16=H-Gen(8) Entering the H-Gen target address (04-022) activates the function of a heat generator request. Setting at 0 means that no heat generator is requested. The address must be entered for the required target heat generator.	4	4
06-020	Sequence change (time)	**0**	0	8	0 = No sequence change 1…7 = Sequence change every 1…7 calendar weeks 8 = Immediate one-time sequence switching (effective only when the next switch-on occurs)	0	0
11-013	CAS mode output control	**1**	0	1	Selection: 0 = 2nd stage sliding / 1 = 2nd stage fixed 100%	4	4
11-014	CM stage sequence	**0**	0	1	CM stage sequence 0= First start up all 1st stages, only after that the 2nd stages 1= Utilise full capacity of each H-Gen before switching on the next H-Gen	3	3
11-021	CM H-Gen modulation type	**0**	0	1	CM H-Gen modulation type 0= Modulating H-Gen,1= 2-stage H-Gen	3	3
11-022	Basic load elevation heating operation	**0 K**	0.0	40.0	H-Gens that are already running should be given a higher reference temperature when the next H-Gen is switched on, thereby guaranteeing that they deliver more than the new one.	3	3

11-023	Peak load elevation heating operation	**0 K**	0.0	40.0	If a peak-load H-Gen is switched on, the base-load HGens receive a peak-load increase. This guarantees that they do not modulate down, so that the peak-load H-Gen does not become the leading parameter.	3	3
11-024	Base load reduction cooling operation	**0 K**	-40.0	0.0	H-Gens that are already running should be given a lower reference temperature when the next H-Gen is switched on, thereby guaranteeing that they deliver more than the new one.	3	3
11-025	Peak-load H-Gen	**0**	0	1	Peak-load H-Gen, 1 = Peak-load H-Gen. Used as information for the CM about which H-Gens are operated as peak-load H-Gen (purpose: activating the peak load increase with all other H-Gens)	3	3
11-026	Switch-on delay sequence H-Gen	**0 min**	0.0	240.0	Switch-on delay sequence H-Gen (or switch-on duration nominal output)	3	3

10.5.3 Function applications cascade manager

Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4	5	6	7
KM	No WEZ	HGEN2 Temperature control.	AHGEN1 (Additional HGEN) Temperature control	KAS AHGEN1 - AHGEN2 power st. no power compensation, without sequence change CM1 200kW	KAS HGEN2 - AHGEN1 Power control, no power compensation without sequence change	KAS HGEN2 – HGEN4 Power control, no power compensation without sequence change	KAS HGEN2 – HGEN4 Power control, no power compensation without sequence change 2 x 2-stage Stage sequence 0 1-3-2-4	KAS HGEN2 – HGEN4 Power control, no power compensation without sequence change 2 x 2-stage Stage sequence 1 1-2-3-4

10.5.4 Functional descriptions "cascade manager"

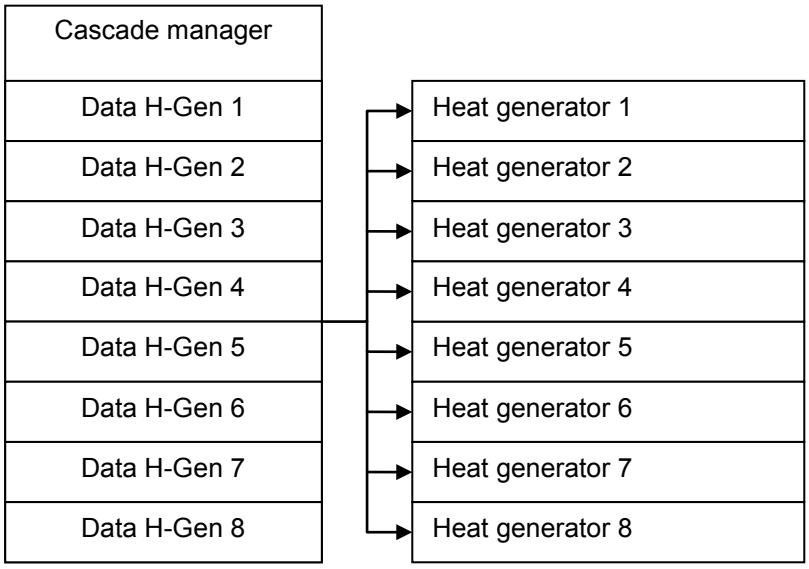
The data for a total of 8 heat generators is entered in the cascade manager. As a result of the heat generator data, the requested output from the heat manager is distributed between individual heat generators. The priority of the individual heat generators is determined by the input sequence. The first heat generator has the highest priority.

10.5.4.1 Heat generator data

The data for the individual heat generators must be entered in the cascade manager:

- Target address of the heat generator.
- Control command for the heat generator.
- Output of the heat generator.
- Minimum output of the heat generator.
- Capacity utilisation of the heat generator for enable of the sequential heat generator.
- Definition for runtime and output compensation with sequential switchover.
- Basic load elevation
- Peak load elevation
- ….

Heat generator data



10.5.4.2 H-Gen target address

Entering the target address (04-022) activates the function of a heat generator request. Setting at 0 means that no heat generator is requested. The output data entered subsequently is not taken into account for the energy balance. The address must be entered for the required target heat generator.

Allocation target heat generator:

Module	Additional H-Gen	Main H-Gen
TTE-WEZ 1	1 = TH-Gen	2 = H-Gen
TTE-WEZ 2	3 = TH-Gen	4 = H-Gen
TTE-WEZ 3	5 = TH-Gen	6 = H-Gen
TTE-WEZ 4	7 = TH-Gen	8 = H-Gen
TTE-WEZ 5	9 = TH-Gen	10 = H-Gen
TTE-WEZ 6	11 = TH-Gen	12 = H-Gen
TTE-WEZ 7	13 = TH-Gen	14 = H-Gen
TTE-WEZ 8	15 = TH-Gen	16 = H-Gen

Example: Cascade with 3 x UltraGas

Allocation target address heat generator
Cascade man. 1, par. 04-022: 2 = H-Gen (1st UltraGas)
Cascade manager 2, par. 04-022: 4 = H-Gen (2nd UltraGas)
Cascade manager 3, par. 04-022: 6 = H-Gen (3rd UltraGas)

10.5.4.3 Control command

The control command (11-001) defines whether the heat generator is integrated via temperature or output control, and whether it is involved with hot water charging or not.

Setting	Function	Description
1	Temperature control with hot water charging	The heat generator is integrated in the hot water charging request

Setting	Function	Description
2	Output control with hot water charging	The heat generator is integrated in the hot water charging request
3	Temperature control without hot water charging	The heat generator is not integrated in the hot water charging request

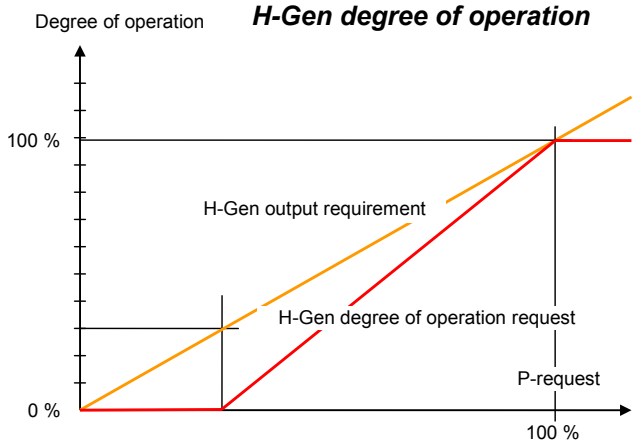
Setting	Function	Description
4	Output control without hot water charging	The heat generator is not integrated in the hot water charging request

10.5.4.4 Temperature control

In setting 1 and 3, the heat generator is requested if the system reference value for heating operation is greater than 0 °C. Only a reference temperature without output limit (100%) is sent to the heat generator. The output controller in the heat generator controls to the predefined reference temperature. If there is a hot water charging request, the higher of the two temperature requests is sent to the generator.

10.5.4.5 Output control

In setting 2 and 4, the heat generator is only requested if this is required for covering the heat output. The output is sent as a degree of operation. The degree of operation is calculated from the minimum output = 0% to the maximum output = 100%. The degree of operation is calculated from the minimum output with the request output in the cascade manager according to the adjacent graph.



10.5.4.6 Heat generator output

With the heat generator output (11-002), the effective output of the heat generator is entered. According to the requested output, the cascade manager switches the corresponding heat generator on.

10.5.4.7 Heat generator minimum output

The minimum output (11-003) sets the minimum relative heat generator output in %. The degree of operation is calculated from this.

A single-stage heat generator has a minimum output of 100%. The output of the basic level is set as the minimum output for a two-stage heat generator with 50%.

10.5.5 Runtime compensation

The sequence change parameter can be set for each heat generator, to determine whether it takes part in the run-time balancing. For example, this means a peak load heat generator can be removed from the sequence change.
After that, the sequence change time can be set to calendar weeks with parameter 06-020. (The sequence change time is set in the cascade manager 1.)

Overview:

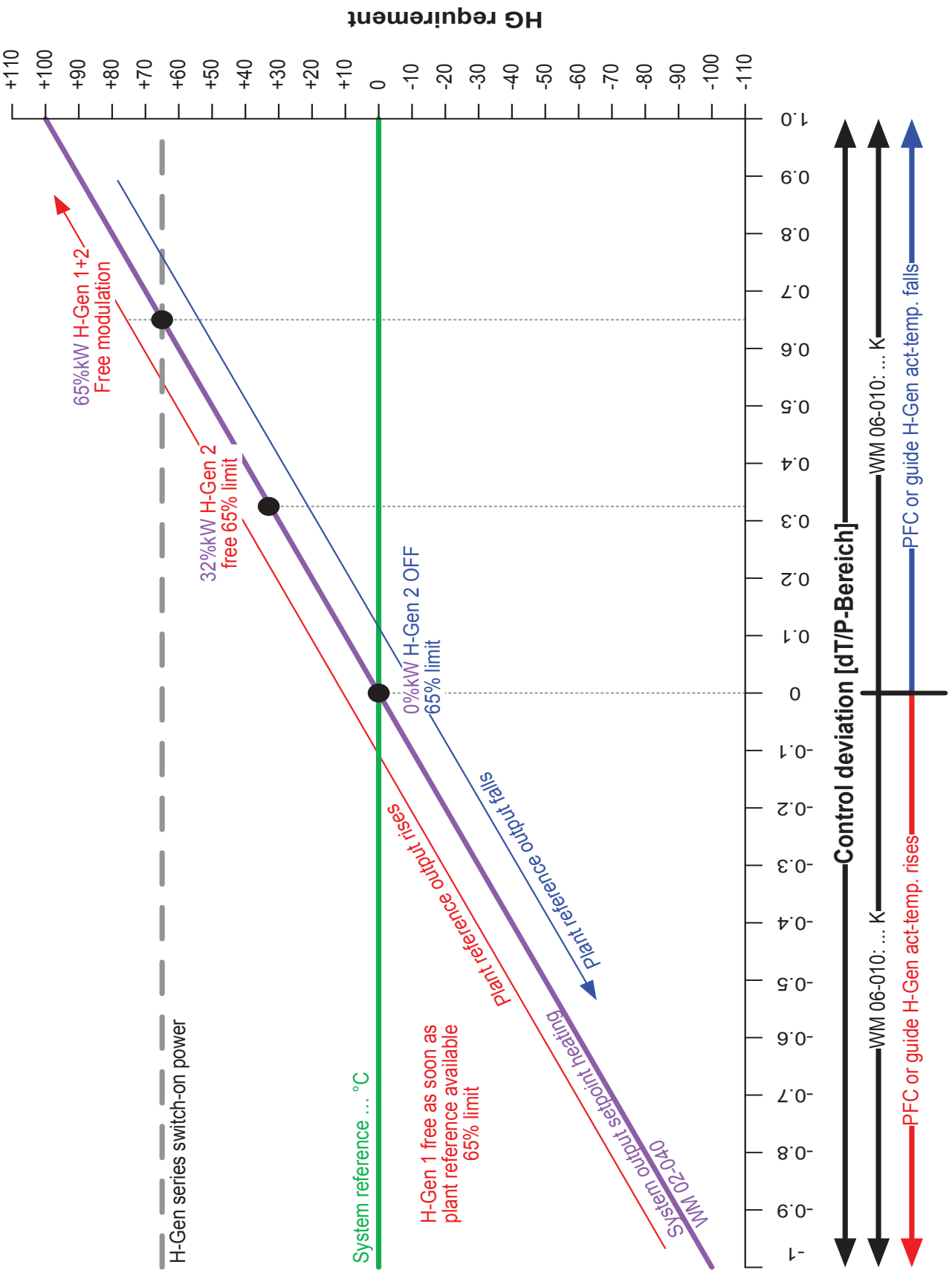
Function	Par.	Wert	Designation	Comments
Cascade manager 1..8	11-005	0,1	Sequence change	0 = No sequence change 1 = Participation in the sequence change
Cascade manager 1	06-020	0 - 8	Sequence change time	0 = Off 1-7 = Calendar weeks 8 = One-time sequence change

10.5.6 Cascade emergency operation

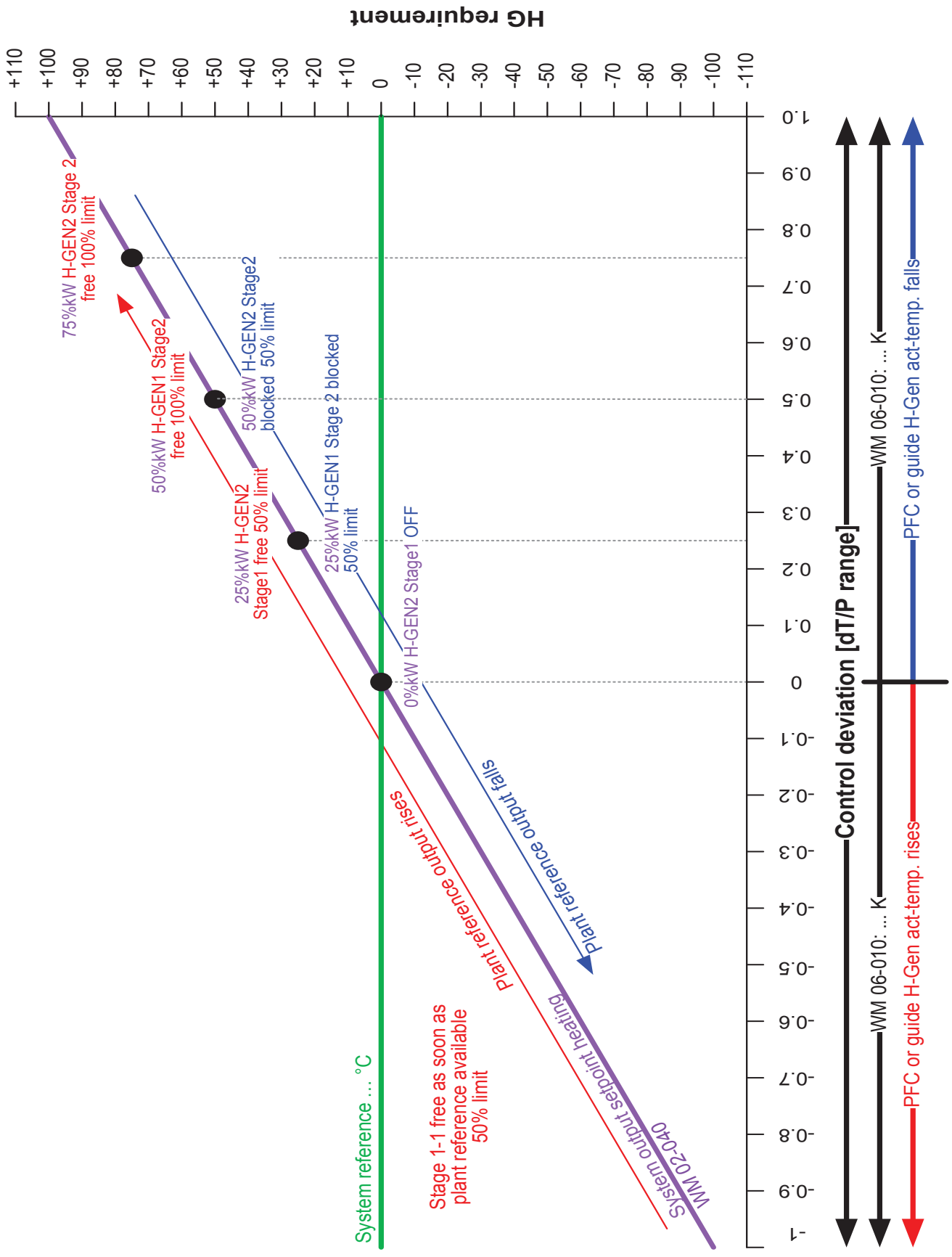
If controller 1 fails (from SW 2.03.xxx onwards), the heat generators switch to emergency operation and heat to the set emergency operation temperature. A separate emergency operation temperature can be set for each heat generator. Moreover, it is possible to set whether an OT-blocked HGEN starts in emergency operation.
IMPORTANT: Systems bus configuration must have been saved. (Using start-up wizard)

Function	Par.	Wert	Designation	Comments
Heat generator, additional heat generator	10-114	70°C	Set temperature emergency operation	0-110°C, setting 0°C means no participation in emergency operation
Cascade manager 1	06-020	1	OT block (active in em. op.)	0 = OT block revoked 1 = OT block remains active

10.5.6.1 Cascade 2 x modulating (65% switch-on output sequence H-Gen, KM1 11-076:5)



10.5.6.2 Cascade 2 x 2-stage (50% switch-on output sequence H-Gen, stage sequence 0: 1-3-2-4, KM1 11-076:6))

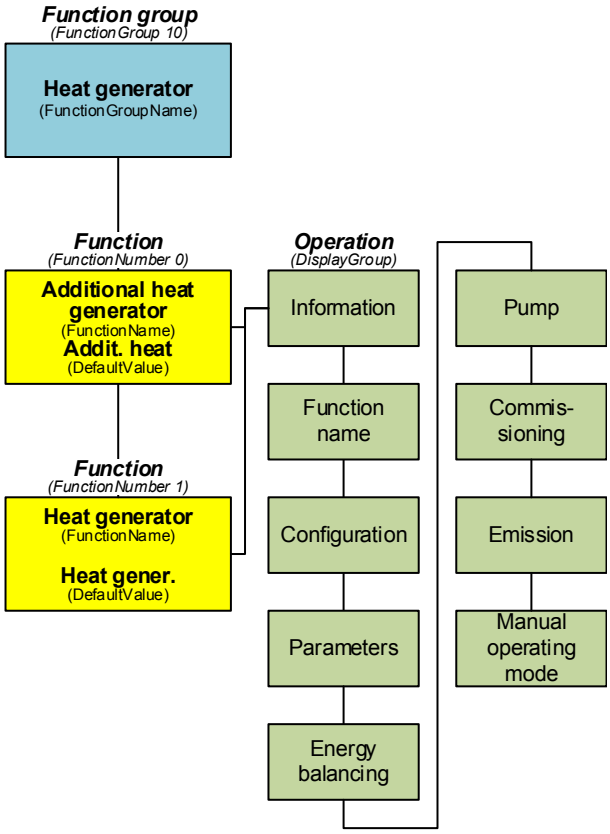


10.6 Function group "heat generator"

Two independent heat generator functions are integrated in the heat generator function group.
(Heat generator, additional heat generator)

	Heat generator type				
Range of functions	**FA controller (RS485 or Open-Therm)**	**0-10V Temp.**	**0-10V Output**	**1-stage (Relay output)**	**Solid fuel (manually)**
Heat generator	X	X			
Additional heat generator		X	X	X	X

10.6.1 Overview of menu structure "heat generator"



10.6.2 Parameter overview "heat generator"

Heat generator – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-053	Status heat generator control	**0**	0	0	Status of heat generator control: 0 = Switched off 1 = Heating operation 2 = Flow time heating operation 3 = Externally blocked (also with SmartGrid blocking operation) 4 = Cooling operation 5 = Flow time cooling operation 15 = Alarm 16 = Fault 17 = Blocked 21 = WFmax switch-off 22 = WFset switch-off 26 = Bivalence deactivation 27 = Hot water charging block 28 = Minimum off time 29 = Minimum on time 32 = Post-operation 33 = Delay sequence H-Gen 34 = Operation overtemperature	0	7
20-051	FA status	**0**	0	0	Status FA controller	0	7
01-007	Heat generator setpoint	**0 °C**	0.0	100.0	Calc. setp. for heat gen. flow temp.	0	7
00-007	Heat generator actual	**85 °C**	0.0	100.0		0	7
20-052	Modulation	**0%**	0	100	Current H-Gen modulation FA	0	7
02-081	Operating hours heat generator	**0 h**	0	0		0	7
02-080	Switching cycles heat generator	**0**	0	0		0	7
02-082	Operating hours heat generator >50%	**0 h**	0	0		0	7
02-083	Switching cycles heat generator >50%	**0**	0	0		0	7
29-050	Heat quantity heating	**0 MWh**	0.00	0.00	Heat quantity heating	0	7
29-051	Current output heating	**0 kW**	0.0	0.0	Current output heating	0	7
29-052	Cooling quantity	**0 MWh**	0.00	0.00	Cooling quantity	0	7
29-053	Current output cooling	**0 kW**	0.0	0.0	Current output cooling	0	7
21-028	H-Gen setpoint heating	**0 °C**	0.0	0.0	H-Gen setpoint heating	3	7
21-029	H-Gen hot water setpoint	**0 °C**	0.0	0.0	H-Gen hot water setpoint	3	7
21-030	H-Gen setpoint cooling	**0 °C**	0.0	0.0	H-Gen setpoint cooling	3	7
20-053	Operating message	**0**	0	0	Burner flame FA or compressor FA (WP) 0=OFF, 1=ON	0	7
20-050	Water pressure	**--- bar**	0.0	8.0	Water pressure FA	0	7
01-022	Pump heat generator	**0%**	0	100		0	7
00-022	Main pump rotation speed	**0%**	0	1	Main pump rotation speed	3	7
21-105	Volumetric current	**0 l/min**	0.00	0.00	Current volume flow energy balancing	0	7
17-040	Energy balance sensor flow	**0 °C**	0.0	0.0	Energy balance sensor flow	3	7
17-041	Energy balance sensor return	**0 °C**	0.0	0.0	Energy balance sensor return	3	7
00-008	Return temperature heat generator	**--- °C**	0.0	100.0		0	7
22-008	Status PWF	**0**	0	1	Status contact parallel H-Gen enable PWF	3	7

Heat generator – Function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Function name	**Heat generator**				0	0

Heat generator – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-076	Heat generator function application	**1**			A correspondingly defined function application type can be preselected with this parameter.	0	3
30-047	Allocation WEZ sensor WF input	**19=RS485/ OT**			Allocation H-Gen sensor WF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 19=RS485/OT	3	3
30-048	Allocation WEZ return RLF input	**0=OFF**			Allocation WEZ return flow sensor RLF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RS485/OT	3	3
32-034	Allocation WEZ main pump output	**0=OFF**			Allocation H-Gen main pump output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
32-017	Allocation 0-10V/PWM main pump output	**0=OFF**			Allocation 0-10V/PWM main pump output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3
30-026	Allocation external block WEZ input	**0=OFF**			Allocation external block WEZ input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VFE2, 15=FVT-T-VE2	3	3
32-037	Alloc. parallel HGEN release output	**0=OFF**			Allocation parallel HGEN release output (PWF) 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-VFE2	3	3
32-039	Allocation WEZ start load relief output	**0=OFF**			Allocation WEZ start load relief output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
32-046	Allocation WEZ set temp. 0-10V output	**0=OFF**			Allocation WEZ set temp. 0-10V output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3
32-047	Allocation WEZ actual temp. 0-10V output	**0=OFF**			Allocation WEZ actual temp. 0-10V output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3
32-048	Allocation WEZ actual perf. 0-10V output	**0=OFF**			Allocation H-Gen actual output 0-10V output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3

Heat generator – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
20-024	H-Gen FA type	**0=FA RS485**			H-Gen type 0= FA RS485 1= FA OpenTherm IC3, BIC300 3= 0-10V temperature control 5= FA OpenTherm BIC335	3	3
09-003	H-Gen secondary setpt. incr. to min. temp.	**10 K**	0.0	20.0	The parameter determines the switch-on reference value of the heat generator for the protection function. Switch-on reference value = protection temperature reference value + setting value.	3	3
09-004	Cascade manager switch-on delay	**0 min**	0.0	300.0	Switch-on delay of the heat generator after a heat request. This also corresponds to the flow time of the source pump or blower, because these switch on with the heat request.	4	4
09-005	Protection function activation	**3**	0	15	Activation protection function: 0 = Protection function not active 1 = Protection function active with heating req. 2 = Protection function active with DHW req. 3 = Protection function active with heating or DHW req.	3	3
09-006	Protection temperature constantly active	**0**	0	20	This parameter determines the activation of the protection temperature: 0 = Protection temperature is only active if the H-Gen has a request 1 = Protection temperature is always active >1 = Protection temperature remains active following a switch-off of the request for the setting value in days	4	4
09-009	Protection ctrl. proportional range	**2 K**	1.0	30.0	The parameter sets the reference/actual value deviation for 100% positioning command for the protection function. (non-controlled = hysteresis)	3	3
09-010	Protection control hold-back time	**0 sec**	0.0	100.0	The parameter sets the hold-back time for the protection control. The current slope of the protection temperature multiplied by the hold-back time results in a corresponding reference value shift.	4	4
09-011	Conditional heat generator release	**0**	0	3	The parameter enables a conditional enable for the H-Gen to be set: 0 = Unconditionally free 1 = Unconditionally blocked 2 = OT > BiP (H-Gen free above bivalence point) 3 = OT < BiP (H-Gen free below bivalence point)	4	4
09-012	Outside temperature released	**-50 °C**	-50.0	50.0	The setting determines the outside temperature at which the heat generator is enabled according to the conditional enable setting (09-11).	4	4
09-013	Forced energy function	**3**	0	3	The forced energy function configures the forced energy: 0 = No forced energy 1 = Negative forced energy with active protection control 2 = Positive forced energy with overtemperature 3 = Positive and negative forced energy	3	3
09-014	Forced energy offset positive	**10 K**	-30.0	30.0	With the parameter, the intervention point of the positive forced energy can be set for the heat generator maximum temperature (10-31).	3	3
09-015	Sensor allocation protection function	**0**	0	1	The setting selects the reference temperature for the protection function: 0 = Protection temperature = WF 1 = Protection temperature = RLF	3	3
09-020	Manual mode set temperature	**60 °C**	0.0	90.0	Setp. for heat gen. flow temp. in man op	0	0

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-023	Minimum heat generator downtime	**0 min**	0.0	100.0	The parameter sets the minimum standstill time of the heat generator after a switch-off.	4	4
09-031	Heat generator minimum runtime	**0 min**	0.0	40.0	Minimum runtime for the heat generator. The H-Gen runs for at least the set runtime after a switch-on command, providing a limit value is not exceeded.	4	4
09-032	Heat generator minimum temp.	**5 °C**	0.0	70.0	Minimum H-Gen temperature that is retained if the HGen enters readiness or is in operation. If the value is undershot, the controller generates a corresponding command depending on the selected protection function.	3	3
09-037	Temperature increase/reduction HGEN	**0 K**	-50.0	50.0	Temperature increase/reduction HGEN In heating operation, the set value acts as an increase. In cooling operation, the set value acts as a reduction.	5	5
09-058	Manual mode output setpoint	**100%**	0	100	Fixed value manual operation	5	5
09-071	Behaviour Biv. lock-off in SmartGrid	**0**	0	1	Selection of bivalence lock with SmartGrid forced draw-off (off/on = do not consider bivalence lock)	3	3
09-074	External heat generator block	**0**	-1	1	«External HGEN block» behaviour 0 = OFF 1 = HGEN is blocked with block signal (input bridged) -1 = Inverted function (input open HGEN blocked)	3	3
09-075	Heat generator operation choice	**Automatic mode**			The following operating modes can be selected: 0 = Heat generator off 1 = Automatic operation 4 = Manual heating operation 5 = Manual cooling operation	0	0
09-127	Stand protection H-Gen pump+Y-KR	**0**	0	1	Stand prot. H-Gen pump and RT mixer	0	6
10-031	Heat generator maximum temperature	**85 °C**	0.0	110.0	If the maximum H-Gen temperature is exceeded, the W-Gen is unconditionally switched off and the controller generates a corresponding command according to the selected forced output (9 – 13)	3	3
10-038	OEM max. temp. WEZ	**110 °C**	5.0	110.0	OEM max. temp H-Gen (limits the setting range FM max. temp.)	5	5
10-100	Operating data command	**0**			With this command, the operating data counter of a heat generator can be reset: 0 = No function 1 = Reset operating data 2 = Reset energy data	0	0
10-109	Follow-on time PWF	**0 min**	0.0	120.0	Follow-on time parallel H-Gen enable PWF	3	3
10-110	Emissions test output limitation	**100%**	1	100	Can be requested for each H-Gen, can be changed continuously as parameter, initialise emissions at start	0	0
10-111	Max. output heating operation	**100%**	0	100	0 … 100%, highest permitted request to the FA	5	5
10-112	Max. output DHW operation	**100%**	0	100	0 … 100%, highest permitted request to the FA	5	5
10-113	Max. output cooling operation	**100%**	0	100	0 … 100%, highest permitted request to the FA	5	5
10-114	Set temperature cascade emergency operation (from SW 2.03.xxx onwards)	**70°C**		110,0	If controller 1 fails (WM/KM), the heat generator switches to emergency operation and heats to the set emergency operation temperature.	3	3
10-115	OT block (active in emergency operation, from SW 2.03.xxx onwards)	**1**		1	If cascade emergency operation is active, it is possible to set here whether an OT-blocked HGEN starts. 0 = OT block revoked 1 = OT block remains active	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
23-085	Activate emissions test	**0**	0	1	Activate emissions test 0=OFF, 1=ON	0	0
23-086	Emissions test remaining run time	**0 min**	1	999		0	0
20-025	Heat generator setpoint comparison	**1**	0	1	Reference value comparison H-Gen 0: Separate independent htg./DHW reference values 1: Highest reference value htg./DHW is compared and sent to FA	5	5

Heat generator – EBZ (energy balance)

Par.	Designation	Value	Min.	Max.	Comments	R	W
17-043	Reset energy balance	0	0	1	Reset energy balance	3	3
30-058	Alloc. energy balance sensor flow input	0=OFF			Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 19=WF RS485/OT	3	3
30-059	Alloc. energy balance sensor return input	0=OFF			Allocation energy balance sensor return input 0=AUS, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF RS485/OT	3	3
30-060	Alloc. IMP volume flow input	0=OFF			Allocation IMP volume flow input 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	3	3
17-019	Pulse rate VIG	721 1/l	1.0	5000.0	Entry of the pulse rate in pulses/litre	3	3
17-021	Offset VIG	-0.2 l/min	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	3	3
17-042	Volume flow at 100% pump speed	8 l/min	0.00	200.00	Volume flow at 100% pump speed	3	3
20-010	Heating measurement site allocation	0=OFF			Heating measurement site allocation: 0=OFF 1=FA controller 2=Local 3=Measuring module (M-bus) 4=District heating module	3	3
20-011	Heating measurement module no.	1	1	16	Number of heating measurement module, corresponds to the DIP switch setting	3	3
20-012	No. of heating measuring module meas.	1	1	15	Number of heating measuring module measurement	3	3
20-013	Cooling measurement site allocation	0=OFF			Cooling measurement site allocation: 0=OFF 1=FA controller 2=Local 3=Measuring module (M-bus) 4=District heating module	3	3
20-014	Cooling measurement module no.	1	0	15	Number of cooling measurement module, corresponds to the DIP switch setting	3	3
20-015	No. of cooling measuring module meas.	1	1	15	Number of cooling measuring module measurement	3	3

Heat generator – pump

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-002	Protection function type H-Gen pump	**0**			The setting determines the protection function of the HGen pump: 0 = No active protection 1 = WEP as bypass pump (off when protection temperature > (09-32)) 2 = WEP as feed pump (off when protection temperature < (09-32)) 3 = Heat generator protection via return mixer, pump and return sensor 4 = WEP on request always on 5 = WEP as feed pump (off when protection temperature < (09-32)). Protection temperature value = 0, if heat generator switched off.	4	4
09-000	Heat generator pump follow-on time	**5 min**	0.0	40.0	The heat generator pump remains in operation for the follow-on time set here after the heat generator request is switched off.	3	3
06-044	Modulation mode pump	**0**	0	2	Modulation mode pump 0=OFF 1=Constant 2=Delta-T	3	3
06-043	Priority spread	**1**	0	1	Priority spread: 0=Hot water 1=Heating	3	3
06-034	Setpoint spread dT setpoint heating	**20 K**	1.0	50.0	Setpoint spread dT setpoint heating	3	3
06-041	Setpoint spread dT setpoint hot water	**20 K**	1.0	50.0	Setpoint spread dT setpoint hot water	3	3
06-042	Setpoint spread dT setpoint cooling	**5 K**	1.0	50.0	Setpoint spread dT setpoint cooling	3	3
06-035	Start rpm	**25%**	0	100	Start rpm	3	3
06-036	Start time	**5.0 min**	0.0	60.0	Start time	3	3
06-037	Minimum speed of rotation	**25%**	0	100	Minimum speed of rotation	3	3
06-038	Maximum speed of rotation	**100%**	0	100	Maximum speed of rotation	3	3
06-039	Control boost	**10 K**	5.0	50.0	Control boost	5	5
06-040	Controller reset time	**180 sec**	1.0	600.0	Controller reset time	3	3

10.6.3 Parameter overview "additional heat generator"

Additional heat generator – information

Par.	Designation	Value	Min.	Max.	Comments	R	W
02-053	Status heat generator control	**22**	0	0	Status of heat generator control: 0 = Switched off 1 = Heating operation 2 = Flow time heating operation 3 = Externally blocked 4 = Cooling operation 5 = Flow time cooling operation 15 = Alarm 16 = Fault 17 = Blocked 21 = WFmax switch-off 22 = WFsetp switch-off 26 = Bivalence deactivation 27 = Hot water charging block 28 = Minimum off time 29 = Minimum on time 30 = Start-up heating 31 = Burnout 32 = Post-operation 33 = Delay sequence H-Gen 34 = Operation overtemperature	0	7
00-007	Heat generator actual	**19.8 °C**	0.0	100.0		0	7
01-007	Heat generator setpoint	**0 °C**	0.0	100.0	Calc. setp. for heat gen. flow temp.	0	7
01-009	Set value output heat generator	**0**	0	0	Calc. setp. for heat output in heat gen.	0	7
02-081	Operating hours heat generator	**0 h**	0	0		0	7
02-080	Switching cycles heat generator	**0**	0	0		0	7
01-100	Burner stage	**0**	0	2		0	7
29-050	Heat quantity heating	**0 MWh**	0.00	0.00	Heat quantity heating	0	7
29-051	Current output heating	**0 kW**	0.0	0.0	Current output heating	0	7
21-105	Volumetric current	**0 l/min**	0.00	0.00	Current volume flow energy balancing	0	7
17-040	Energy balance sensor flow	**0 °C**	0.0	0.0	Energy balance sensor flow	3	7
17-041	Energy balance sensor return	**0 °C**	0.0	0.0	Energy balance sensor return	3	7
01-022	Pump heat generator	**0**	0	100		0	7
00-022	Main pump rotation speed	**0**	0	1	Main pump rotation speed	3	7
00-008	Return temperature heat generator	**--- °C**	0.0	100.0		0	7
22-008	Status PWF	**0**	0	1	Status contact parallel H-Gen enable PWF	3	7

Additional heat generator – Function name

Par.	Designation	Value	Min.	Max.	Comments	R	W
04-005	Function name	**Additional heat generator**				0	5

Additional heat generator – configuration

Par.	Designation	Value	Min.	Max.	Comments	R	W
12-007	Heat generator function application	**1**			A correspondingly defined function application type can be preselected with this parameter.	0	3
30-047	Allocation WEZ sensor WF input	**5=VE2**			Allocation H-Gen sensor WF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-048	Allocation WEZ return RLF input	**0=OFF**			Allocation WEZ return flow sensor RLF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
32-034	Allocation WEZ main pump output	**0=OFF**			Allocation H-Gen main pump output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
32-017	Allocation 0-10V/PWM main pump output	**0=OFF**			Allocation 0-10V/PWM main pump output H-Gen 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3
30-026	Allocation external block WEZ input	**0=OFF**			Allocation external block WEZ input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VFE2, 15=FVT-T-VFE2	3	3
32-037	Alloc. parallel HGEN release	**0=OFF**			Allocation parallel HGEN release output (PWF) 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 10=FVT-T-FE1, 12=VE1-FE2, 13=VE2-FE2, 14=VE3-VE2, 15=FVT-T-VE2	3	3
32-039	Allocation WEZ-1 start load relief output	**0=OFF**			Allocation WEZ start load relief output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	3	3
32-046	Allocation WEZ set temp. 0-10V output	**0=OFF**			Allocation WEZ set temp. 0-10V output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=-VA10V/PWM FE2	3	3

Additional heat generator – parameters

Par.	Designation	Value	Min.	Max.	Comments	R	W
20-024	H-Gen type	**2=1-stage**			H-Gen type 2: 1-stage 3: 0-10V temperature control 4: 0-10V output control	3	3
09-003	H-Gen secondary setpt. incr. to min. temp.	**5 K**	0.0	20.0	The parameter determines the switch-on reference value of the heat generator for the protection function. Switch-on reference value = protection temperature reference value + setting value.	3	3
09-004	Cascade manager switch-on delay	**0 min**	0.0	300.0	Switch-on delay of the heat generator after a heat request. This also corresponds to the flow time of the source pump or blower, because these switch on with the heat request.	4	4
09-005	Protection function activation	**3**	0	15	Activation protection function: 0 = Protection function not active 1 = Protection function active with heating req. 2 = Protection function active with DHW req. 3 = Protection function active with heating or DHW req.	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-006	Protection temperature constantly active	**0**	0	20	This parameter determines the activation of the protection temperature: 0 = Protection temperature is only active if the H-Gen has a request 1 = Protection temperature is always active >1 = Protection temperature remains active following a switch-off of the request for the setting value in days	4	4
09-009	Protection ctrl. proportional range	**2 K**	1.0	30.0	The parameter sets the reference/actual value deviation for 100% positioning command for the protection function. (non-controlled = hysteresis)	3	3
09-010	Protection control hold-back time	**0 sec**	0.0	100.0	The parameter sets the hold-back time for the protection control. The current slope of the protection temperature multiplied by the hold-back time results in a corresponding reference value shift.	4	4
09-011	Conditional heat generator release	**0**	0	3	The parameter enables a conditional enable for the H-Gen to be set: 0 = Unconditionally free 1 = Unconditionally blocked 2 = OT > BiP (H-Gen free above bivalence point) 3 = OT < BiP (H-Gen free below bivalence point)	4	4
09-012	Outside temperature released	**-50 °C**	-50.0	50.0	The setting determines the outside temperature at which the heat generator is enabled according to the conditional enable setting (09-11).	4	4
09-013	Forced energy function	**3**	0	3	The forced energy function configures the forced energy: 0 = No forced energy 1 = Negative forced energy with active protection control 2 = Positive forced energy with overtemperature 3 = Positive and negative forced energy	3	3
09-014	Forced energy offset positive	**0 K**	-30.0	30.0	With the parameter, the intervention point of the positive forced energy can be set for the heat generator maximum temperature (10-31).	3	3
09-015	Sensor allocation protection function	**0**	0	1	The setting selects the reference temperature for the protection function: 0 = Protection temperature = WF 1 = Protection temperature = RLF	3	3
09-020	Manual mode set temperature	**60 °C**	0.0	90.0	Reference value for the heat generator temperature in manual operation.	0	0
09-021	Sw-off diff. heat generator control	**10 K**	-30.0	30.0	If the WF-setp temperature on the WF sensor plus setting value is exceeded, the H-Gen switches off.	3	3
09-023	Minimum heat generator downtime	**0 min**	0.0	100.0	The parameter sets the minimum standstill time of the heat generator after a switch-off.	4	4
09-025	Modulation reset time heat generator	**0 min**	0.0	180.0	The variable is doubled within the set time when the control deviation remains constant.	4	4
09-026	Hold-back time modulation heat generator	**0 sec**	0.0	100.0	In modulation and 2-stage operation, a hold-back time (D-component) can be set for the modulation. The current slope of the flow temperature multiplied by the hold-back time results in a corresponding reference value shift.	4	4
09-031	Heat generator minimum runtime	**0 min**	0.0	40.0	Minimum runtime for the heat generator. The HGen runs for at least the set runtime after a switch-on command, providing a limit value is not exceeded.	4	4

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-032	Heat generator minimum temp.	**55 °C**	0.0	70.0	Minimum H-Gen temperature that is retained if the H-Gen enters readiness or is in operation. If the value is undershot, the controller generates a corresponding command depending on the selected protection function.	3	3
09-034	Switch-on delay H-Gen module or 2nd stage	**0 min**	0.0	40.0	The switch-on delay modulation can be set in modulating or 2-stage heat generators.	4	4
09-035	H-Gen modulation proportional range	**0 K**	-20.0	20.0	Specifies at which reference/actual value deviation the positioning command for modulation is 100%. Setting 0 means single-stage operation. A negative setting means 2 stage operation with a switching difference corresponding to the setting value.	4	4
09-036	Outside temperature release modulation	**50 °C**	-50.0	50.0	If the outside temperature is above the set value, the 2nd heat generator stage or the modulation is blocked.	4	4
09-037	Temperature increase heat generator	**0 K**	-50.0	50.0	Temperature increase heat generator	5	5
09-054	Relative minimum capacity	**0**	0	100	Minimum output of the heat generator that can be modulated	4	4
09-058	Manual mode output setpoint	**1**	0	100	Fixed value manual operation	5	5
09-071	Behaviour Biv. lock-off in SmartGrid	**0**	0	1	Selection of bivalence lock with SmartGrid forced draw-off (off/on = do not consider bivalence lock)	3	3
09-074	External heat generator block	**0**	-1	1	«External HGEN block» behaviour 0 = OFF 1 = HGEN is blocked with block signal (input bridged) -1 = Inverted function (input open HGEN blocked)	3	3
09-075	Heat generator operation choice	**Deact.**			The following operating modes can be selected: 0 = Heat generator off 1 = Automatic operation 4 = Manual heating operation 5 = Manual cooling operation	0	0
09-127	Stand protection MP, YKR	**0**	0	1	Stand protection main pump, return flow mixer	0	6
10-031	Heat generator maximum temperature	**90 °C**	0.0	110.0	If the maximum H-Gen temperature is exceeded, the W-Gen is unconditionally switched off and the controller generates a corresponding command according to the selected forced output (9 – 13)	3	3
10-037	Sw-on diff. max. temp. disconnection	**10 K**	2.0	30.0	With a WFmax switch-off (10-31), this set hysteresis is always active for the reactivation.	5	5
10-038	OEM max. temp. WEZ	**110 °C**	5.0	110.0	OEM max. temp H-Gen, limits 10-031 max. temp. H-Gen	5	5
10-100	Operating data command	**0=No function**			With this command, the operating data counter of a heat generator can be reset: 0 = No function 1 = Reset operating data 2 = Reset energy data	0	0
10-109	Follow-on time PWF	**0 min**	0.0	120.0	Follow-on time parallel H-Gen enable PWF	3	3
12-008	Successive heat generator off-period	**0 h**	0.0	40.0	At the end of the burnout, the following heat generator is blocked for this time.	4	4
12-031	FSK fl-rtn sw-off diff. start burnout	**5 K**	0.0	300.0	The parameter defines the flow/return differential for the burnout phase. The burnout phase is started if the difference is less than the set value - 2 K. If the difference rises back to the setting value, operation is reactivated.	3	3

Par.	Designation	Value	Min.	Max.	Comments	R	W
12-032	Solid-fuel boiler minimum burn-out time	**10 min**	0	60	This parameter sets the duration of the burnout phase.	4	4
12-033	Solid-fuel boiler pmp follow-on burn-out	**2 min**	0	60	This parameter sets the follow-on time of the HGen at the burnout start.	4	4
12-034	FSK return fault time window	**0 min**	0	180	0 = Function inactive	5	5
10-110	Emissions test output limitation	**1**	1	100	Can be requested for each H-Gen, can be changed continuously as parameter, initialise emissions at start	0	0
10-114	Set temperature cascade emergency operation (from SW 2.03.xxx onwards)				If controller 1 fails (WM/KM), the heat generator switches to emergency operation and heats to the set emergency operation temperature		
10-115	OT block (active in emergency operation, from SW 2.03.xxx onwards)				If cascade emergency operation is active, it is possible to set here whether an OT-blocked HGEN starts. 0 = OT block revoked 1 = OT block remains active		
23-085	Activate emissions test	**0**	0	1	Activate emissions test 0=OFF, 1=ON	0	0
23-086	Emissions test remaining run time	**0 min**	1	999		0	0
20-053	Operating message	**0**	0	0	Dummy datapoint	0	7

Additional heat generator – EBZ (energy balance)

Par.	Designation	Value	Min.	Max.	Comments	R	W
17-043	Reset energy balance	**0**	0	1	Reset energy balance	3	3
30-058	Alloc. energy balance sensor flow input	**0=OFF**			Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-059	Alloc. energy balance sensor return input	**0=OFF**			Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2	3	3
30-060	Alloc. IMP volume flow input	**0=OFF**			Allocation IMP volume flow input 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2	3	3
17-019	Pulse rate VIG	**721 1/l**	1.0	5000.0	Entry of the pulse rate in pulses/litre	3	3
17-021	Offset VIG	**-0.2 l/min**	-10.00	10.00	Offset flow sensor, is added to the measured value to obtain the finished measured value (litres/minute).	3	3
17-042	Volume flow at 100% pump speed	**8 l/min**	0.00	200.00	Volume flow at 100% pump speed	3	3
20-010	Heating measurement site allocation	**0=OFF**			Heating measurement site allocation: 0=OFF 1=FA controller 2=Local 3=M-bus module 4=District heating module	3	3
20-011	Heating measurement module no.	**1**	1	16	Number of heating measurement module, corresponds to the DIP switch setting	3	3
20-012	No. of heating measuring module meas.	**1**	1	15	Number of heating measuring module measurement	3	3

Additional heat generator – pump

Par.	Designation	Value	Min.	Max.	Comments	R	W
09-002	Protection function type H-Gen pump	**0**			The setting determines the protection function of the HGen pump: 0 = No active protection 1 = WEP as bypass pump (off when protection temperature > (09-32)) 2 = WEP as feed pump (off when protection temperature < (09-32)) 3 = Heat generator protection via return mixer, pump and return sensor 4 = WEP on request always on 5 = WEP as feed pump (off when protection temperature < (09-32)). Protection temperature value = 0, if heat generator switched off.	4	4
09-000	Heat generator pump follow-on time	**5 min**	0.0	40.0	The heat generator pump remains in operation for the follow-on time set here after the heat generator request is switched off.	3	3
06-044	Modulation mode pump	**0**	0	2	Modulation mode pump 0=OFF 1=Constant 2=Delta-T	3	3
06-043	Priority spread	**1**	0	1	Priority spread: 0=Hot water 1=Heating	3	3
06-034	Setpoint spread dT setpoint heating	**20 K**	1.0	50.0	Setpoint spread dT setpoint heating	3	3
06-041	Setpoint spread dT setpoint hot water	**20 K**	1.0	50.0	Setpoint spread dT setpoint hot water	3	3
06-035	Start rpm	**25%**	0	100	Start rpm	3	3
06-036	Start time	**5 min**	0.0	60.0	Start time	3	3
06-037	Minimum speed of rotation	**25%**	0	100	Minimum speed of rotation	3	3
06-038	Maximum speed of rotation	**100%**	0	100	Maximum speed of rotation	3	3
06-039	Control boost	**10 K**	5.0	50.0	Control boost	5	5
06-040	Controller reset time	**180 sec**	1.0	600.0	Controller reset time	3	3

10.6.4 Operation choice

The heat generator control has its own operation selection (09-075) with the following settings:
0: Heat generator switched off
1: Automatic mode (is controlled by the request)
4: Manual mode heating (to an adjustable set temperature)
5: Manual mode cooling (to an adjustable set temperature, not with AH-Gen)

10.6.5 Function applications heat generator

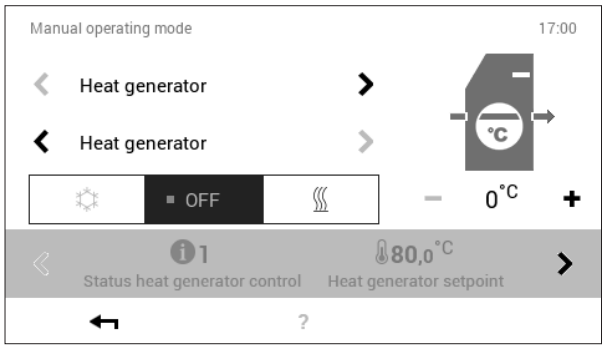
Normally, there is no need to make settings for the function applications here because in most cases the correct function application will be preselected when the hydraulic application is selected. In various cases, adjusting the function application allows fine-tuning or deactivation of a function.

Function	0	1	2	3	4
HGEN	HGEN not active	HGEN via FA bus	HGEN via FA bus with HP (HP=VA2)	HGEN via FA bus with HP, RLHH (RLF=VF1, YKR=YK1, HP=MC1)	HGEN 0-10V temp. (WF=VE1, HP=VA2, WF-setp VA10V) ! Config. 0-10V *1) separate !
AHGEN	ZWEZ nicht aktiv	HGEN 1-stage without HP (ST1=VA1, WF=-VE2)	HGEN 1-stage with HP (ST1=VA1, WF=VE2, HP=VA2)	HGEN FSK without HP (WF=VE2, RLF=VE1)	HGEN FSK with HP (WF=VE2, RLF=VE1, HP=VA2)

*1) In HGEN function application 4 (HGEN type 0-10V temp.), additionally the output must be configured as 0-10V in «General - 0-10V/PWM»!

10.6.6 Manual operation

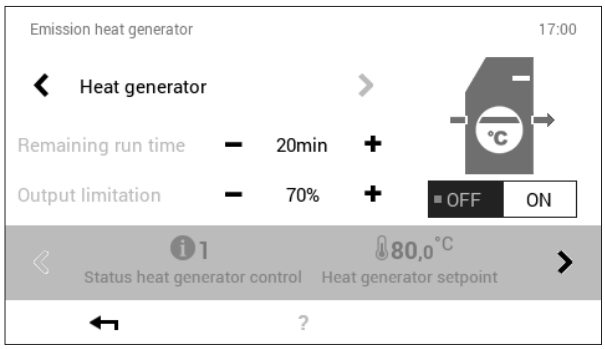
The setting is made using the control module under the "Manual operation" main menu item
In manual operation, this means the H-Gen reference temperature to be set.
In this case, it is possible to select whether heating or cooling operation is involved.



During H-Gen manual operation, the consumer circuits continue to work normally. If the heating circuit should also be set to manual operation, this can be done in the same screen if at the top the function heating circuit – heating circuit … is selected.
Activated manual operation remains active until it is deactivated again. The hand symbol is visible on the home screen during manual operation. No H-Gen manual operation can be activated with a room control module.

10.6.7 Emission metering

The setting is made using the control module under the "Emission" main menu item
Here, as well as activation, it is also possible to set the remaining run time and the power limitation.



Reaction / behaviour in emission metering:
+ Go back after expiry of the time unit/time specification
+ Setpoint temperature = Maximum temperature limit
+ Power limitation behaviour:

<u>1-stage H-Gen:</u>
0% = OFF
1-100% = Stage 1 released
<u>2-stage H-Gen:</u>
0% = OFF
1-50% = Stage 1 released, stage 2 blocked
51-100% = Stage 1 + 2 released
<u>Modul. H-Gen:</u>
0% = OFF
1-100% = Corresponding modulation limit

At the same time the heating circuits are switched on.
Forced energy is used in an attempt to keep the corresponding heat generator temperature at HGEN-Min.Temp.
(E.g. HGEN-Min. 60°C : < 58 °C => - 100%; > 62 °C => 0 %; between that continuously 0 to -100 %)
Heating circuits and the calorifiers regulate to their maximum temperature (in the direct heating circuit only if the hot water basic program is set to parallel operation)
No emissions measurement can be activated with a room control module.

10.6.8 Heat generator type

Setting the heat generator type.

H-Gen type selection Par. 20-024:	H-Gen type	Function H-Gen	Function Additional H-Gen
0	FA RS485	X	
1	FA OpenTherm IC3, BIC300	X	
2	1-stage (relay output)		X
3	0-10V temperature increase	X	X
4	0-10V output increase		X
5	FA OpenTherm BIC335	X	

10.6.9 Protection functions

Various types of protection controls can be activated to protect the protection against corrosion. The protection control is only activated if there is an operation request for the H-Gen or the protection is set continuously active and released accordingly.

Depending on the application, the reference sensor protection function can be defined as WF or RLF (09-015)
0 = Protection temperature WF
1 = Protection temperature RLF
To protect the maximum heat generator temperature, heat consumers can be forced to consume heat using the forced output function.

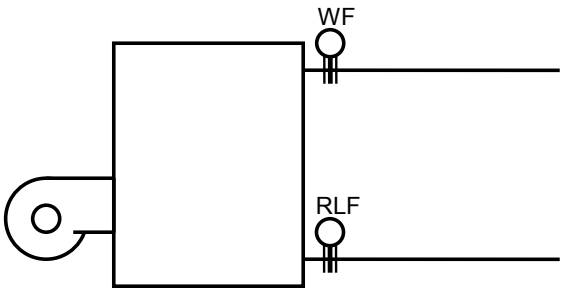
10.6.10 Protection function type H-Gen pump

Protection function H-Gen pump (09-002)

0: No protection
1: Protection function with bypass pump
2: Protection function with feed pump
3: Protection function with return flow mixer and flow limiting
4: Only feed pump without protection function
5: Protection temp. only active when H-Gen switched on with feed pump

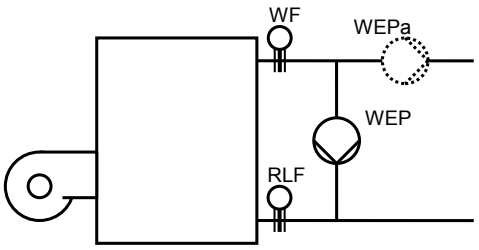
Protection type 0

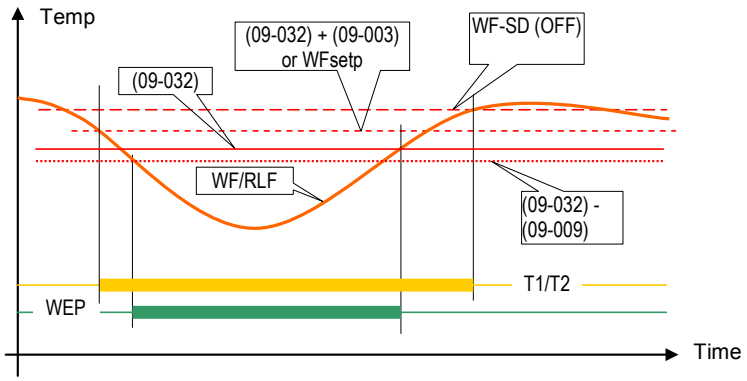
In protection type 0, there is no active H-Gen protection. Using the forced output function, however, heat generators can be restricted to such an extent that a set minimum temperature can be maintained on the heat generator.



Protection type 1 (bypass pump off if WF/RLF > 09-032)

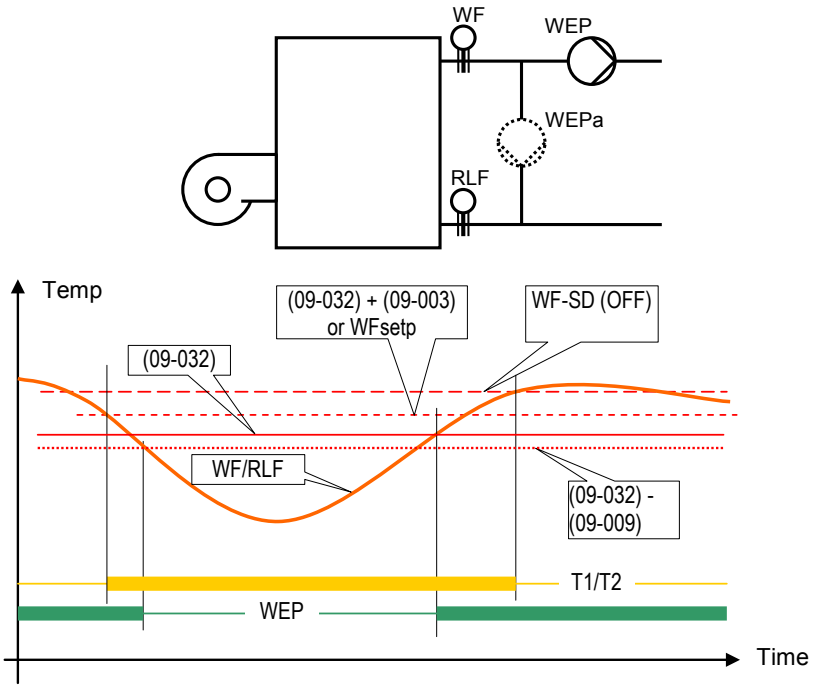
In protection type 1, the H-Gen protection can be actively controlled by activation of a bypass pump. Additionally, using the forced output function, however, heat generators can be restricted to such an extent that a set minimum temperature can be maintained on the heat generator.





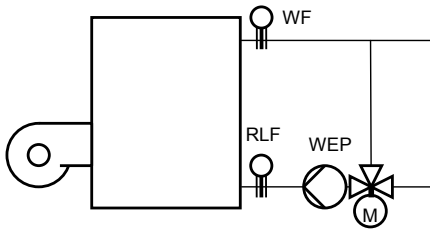
09-032: Min. temp
09-003: H-Gen reference value increase to min. temp.
09-009: Protection control proportional range

Protection type 2 (feed pump off if WF/RLF < 09-032)
In protection type 2, the H-Gen protection can be actively controlled by activation of a main pump.



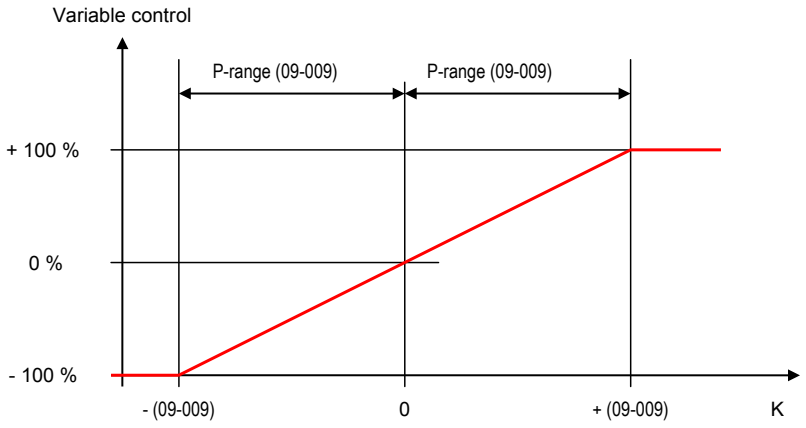
09-032: Min. temp
09-003: H-Gen reference value increase to min. temp.
09-009: Protection control proportional range

Protection type 3 (pump, return mixer)
The protection temperature is controlled in protection type 3. The pump is switched on at the request of the H-Gen, and switched off after the request is switched off and the set follow-on time has expired.



09-032: Min. temp
09-003: H-Gen reference value increase to min. temp.
09-009: Protection control proportional range (~15K)

P-range control (09-009)
The control characteristics are set with the protection control P-range (09-009) parameter.
The P-range specifies at which reference value deviation the mixer opens 100%.



10.6.11 Modulating main pump HP, shut-off device Y10 (0-10V/PWM)

The following configurations of the modulation (volume flow control) for the HP-/Y10 can be set:
(from SW 2.03.xxx onwards)

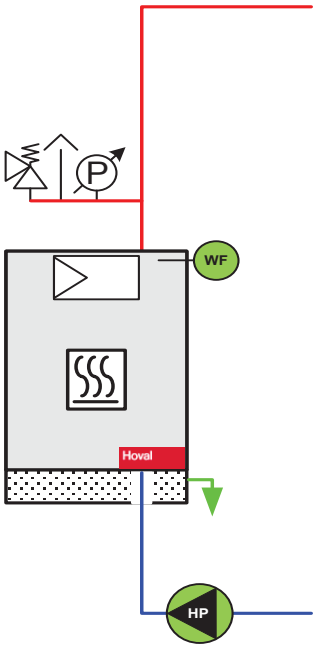
1 Constant temperature control
2 Differential temperature control (dT-controlled)

1 Constant temperature control e.g. main pump:
If a main pump, shut-off/control device is programmed and is in operation, a 0-10V output is used for controlling the flow rate of the main pump or the shut-off/control device.
Depending on the deviation of the current HGEN ACT temperature in relation to the SET temperature, the flow rate is activated on the 0-10 V/PWM output.

If the current HGEN temp. is less than the necessary HGEN set temp., the flow rate or the output voltage is limited. The HGEN temperature rises as a result.
If the current HGEN temp. is above the necessary HGEN set temp., the flow rate or output voltage is increased. The HGEN temperature falls as a result.

On request by the HGEN, the programmed start-up output is held for the adjustable start time. Only when the start time has expired is the constant temperature control enabled.
The signal follows a straight line. The starting/finishing points can be set.
In the case of pumps, it is possible for the switch-off to take place by a 0-10 V signal «off voltage».

HGEN act temp. below HGEN set – speed decreases (HGEN-act increases)
HGEN act temp. above HGEN set – speed increases (HGEN-act decreases)

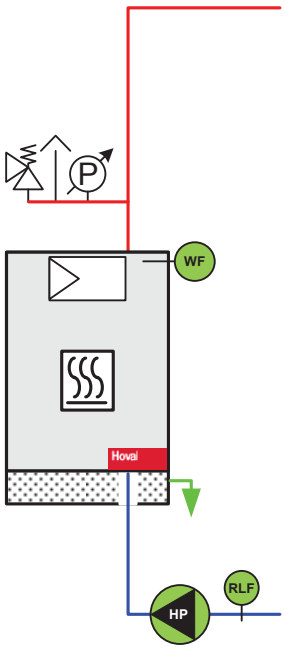


2 Temperature differential control e.g. main pump (dT-controlled)
If a main pump, shut-off/control device is programmed and is in operation, a 0-10V/PWM output is used for controlling the flow rate of the main pump or the shut-off/control device.
Depending on an adjustable «dT-Htg.», «dT-DHW» or «dT-Cool» between the heat generator sensor and another participating return cooler, the flow rate is activated on the 0-10 V/PWM output..

If dT is too small, the flow rate or output voltage is restricted.
The HGEN temperature rises as a result.
If dT is too large, the flow rate or output voltage is increased.
The HGEN temperature falls as a result.

On request by the HGEN, the programmed start-up output is held for the adjustable start time. Only when the start time has expired is the dT control enabled. The signal follows a straight line. The starting/finishing points can be set.
In the case of pumps, it is possible for the switch-off to take place by a 0-10 V signal «off voltage».
If both a heating and DHW request are active at the same time, it is possible to select which dT should be maintained using the «Priority dT» parameter.

dT too small – speed decreases (HGEN-act increases, dT increases)
dT too large – speed increases (HGEN-act decreases, dT decreases)



Overview of parameters:

HGEN configuration	Setting	EH	Function	Par-ID
Allocation HGEN sensor HS input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 19=RS485/OT	19	-	HGEN configuration	30-047
Allocation HGEN return sensor RLF input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RS485/OT	0	-	HGEN configuration	30-048
Allocation main pump HGEN output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	HGEN configuration	32-034
Allocation 0-10V/PWM main pump output 0=OFF, 8=VA10V/PWM,12=VA10V/PWM FE1,16=VA10V/PWM FE2	0	-	HGEN configuration	32-017
HGEN pump				
Protection function type HGEN pump: 0 = OFF, 1 = HGEN pump as bypass pump, 2 = HGEN pump as feed pump, 3 = Heat generator protection via return mixer, pump and return cooler, 4 = HGEN pump always on on request	0	-	HGEN pump	09-002
Heat generator pump follow-on time	5	min	HGEN pump	09-000
Modulation mode pump 0=OFF, 1=Constant, 2=Delta-T	0	-	HGEN pump	06-044
Priority spread 0=Hot water, 1=Heating	1	-	HGEN pump	06-043
Setpoint spread dT setpoint heating	20	K	HGEN pump	06-034
Setpoint spread dT setpoint hot water	20	K	HGEN pump	06-041
Setpoint spread dT setpoint cooling	5	K	HGEN pump	06-042
Starting rpm	25	%	HGEN pump	06-035
Start time	5	min	HGEN pump	06-036
Minimum speed of rotation	25	%	HGEN pump	06-037
Maximum speed of rotation	100	%	HGEN pump	06-038
Control boost	10	%/K	HGEN pump	06-039
Controller reset time	180	sec	HGEN pump	06-040
General - Configuration 0-10V characteristic curve				
Configuration 0-10V/PWM output … 0: Off 1: 0-10V 2: PWM (0%=0V) 3: PWM inverted (0%=10V)	1	-	General 0-10V/ PWMP	33-100, 33-101, 33-102
Characteristic curve 1 (X1) (%/°C)	0	°C	General 0-10V/ PWMP	20-038
Characteristic curve 1 vltg. (Y1) at X1	0	V	General 0-10V/ PWMP	20-039
Characteristic curve 1 (X2) (%/°C)	100	°C	General 0-10V/ PWMP	20-040
Characteristic curve 1 vltg. (Y2) at X2	10	V	General 0-10V/ PWMP	20-041
Char. curve 1 switch-off voltage	0	V	General 0-10V/ PWMP	20-054

10.6.12 Protection function activation

The protection function (09-005) can be switched off for certain H-Gen operating modes. The following operating modes are possible:

Protection function activation 09-005:
1: Protection function active in heating operation
2: Protection function active in hot water charging operation
3: Protection function active in heat and hot water charging operation

10.6.13 Protection function by consumer

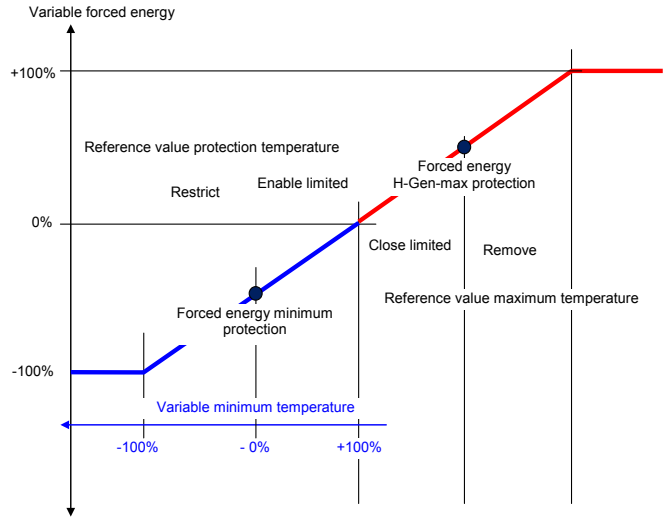
Forced energy function (forced throttling)

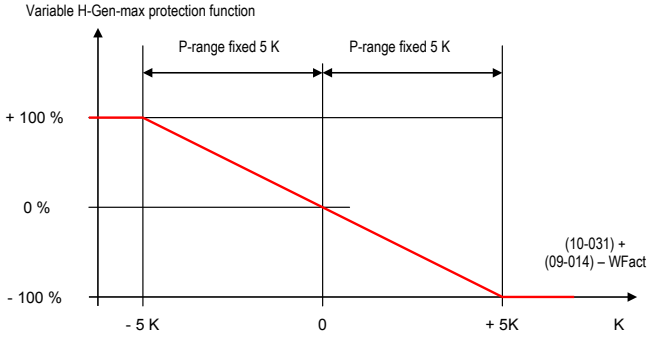
Basically, corrosion protection can be set for the H-Gen using the heat consumers. This restricts the heat removed by the consumers until the protection temperature is reached. Activating this function only makes sense in protection types 0 and 1. The necessary forced energy value is determined by a PD controller.

Forced energy function (forced acceptance)

The forced energy value is also significant for protecting the H-Gen maximum temperature. This is determined by a P controller. The reference value for the forced value can be shifted by the forced output offset from WFmax setting (09-014).

Forced energy function (09-013)
0: No protection by consumer
1: Minimum temperature protection by consumer (forced throttling)
2: Maximum temperature protection by consumer (forced acceptance)
3: Minimum and maximum temperature protection by consumer (forced throttling/acceptance)

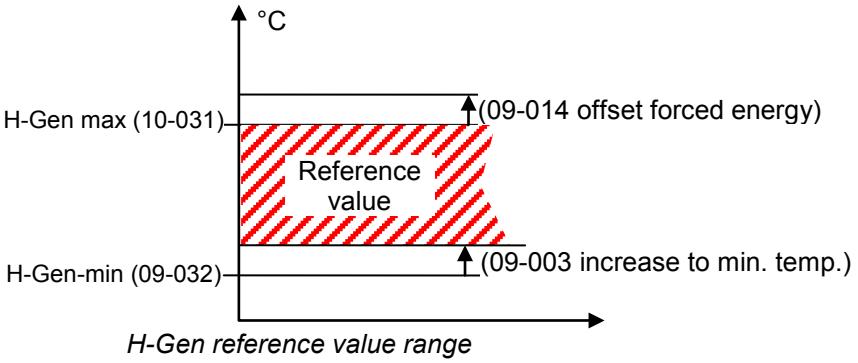




10-031: Max. temp. H-Gen
09-014: Offset forced energy

10.6.14 Min. temp. / increase on min. temp. / max. temp. / offset forced energy

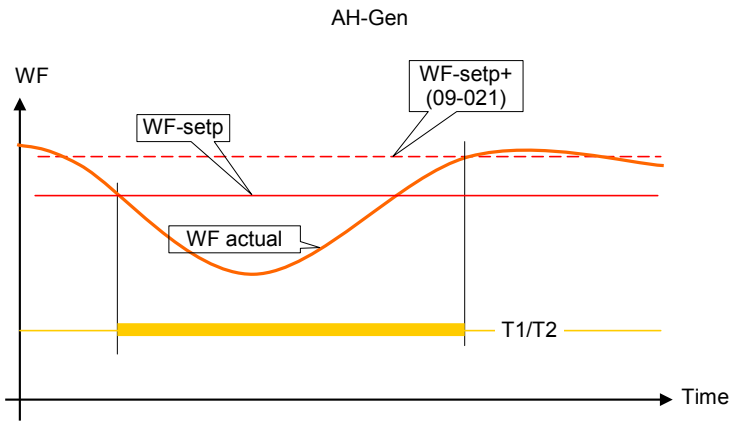
H-Gen min. temp. 09-032:
A protection temperature can be set for the H-Gen with this parameter. This is always active if the H-Gen enters readiness or is in operation.
H-Gen increase to min. temp. 09-003
For the protection function to operate correctly, it is necessary to use this parameter to set an increase on the set reference temperature.
H-Gen maximum temperature 10-031
For the protection function to operate correctly, it is necessary to use this parameter to set an increase on the set reference temperature.
Offset forced energy 09-014
For the protection function to operate correctly, it is necessary to use this parameter to set an increase on the set reference temperature.



H-Gen reference value range

10.6.15 Switch-off difference 09-021 (additional H-Gen)

In the H-Gen, only the reference values are limited both upwards and downwards, because the FA decides itself when to switch on/off.
In the additional H-Gen, however, the switch on/off is controlled by TTE-WEZ. The AH-Gen switches off when WF-setp + switch-off difference is reached. Any set minimum runtime takes precedence, however, providing WF-Max is not exceeded.



10.6.16 H-Gen output control 0-10V (additional H-Gen)

Depending on the setting (09-035) for proportional range heat generator modulation, an output control for modulation operation is possible. The function can be released depending on the outside temperature (09-036) and/or time-delayed (09-034).

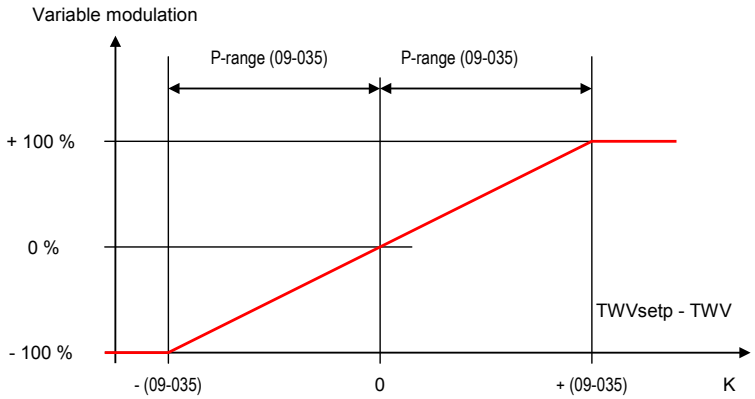
In modulation status, the output of a heat generator can be controlled using a PID controller. The output is made on a 0 – 10 V output.

P-range output control (09-035)

The P-range specifies at which reference value deviation the mixer opens 100%.

Hold-back time output regulation (09-026)

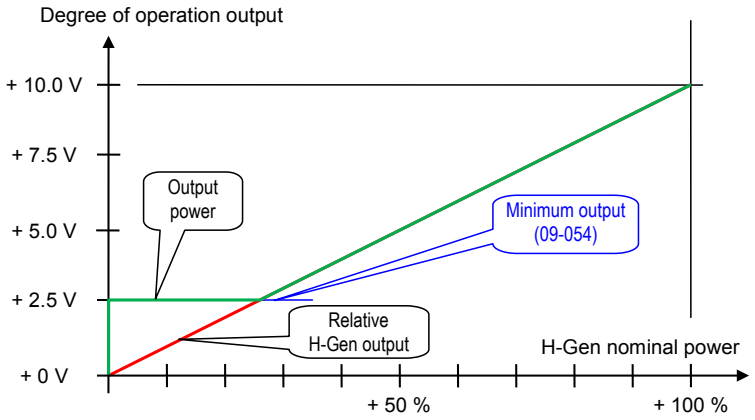
The hold-back time makes it possible to counteract rapid variable changes.



0 – 10 V output

The parameters of the output function can be adjusted in the general settings 0-10V/PWM. Depending on the modulation variable, a voltage between 0 and 10 V is output.

If the minimum output (11-003) is set to 0% in the cascade manager, the degree of operation corresponds to the relative heat generator output. The minimum output is determined in 09-054.



It corresponds to the minimum voltage on release. The output power is set to 0% if the heat generator switches off.

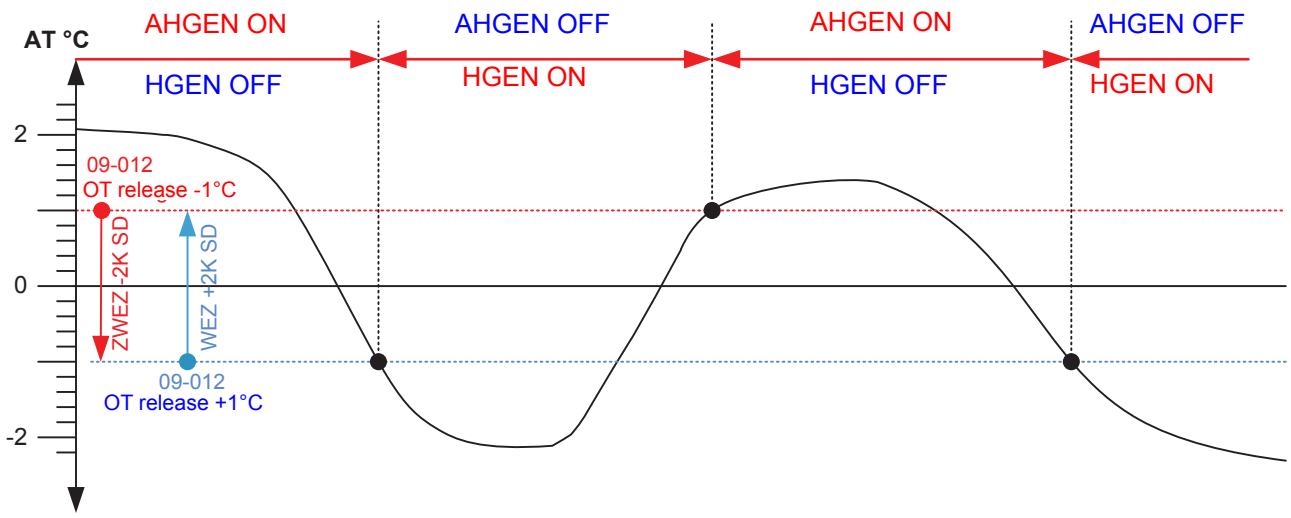
10.6.17 Non-controllable heat generator - solid fuel boiler (additional H-Gen)

In the "non-controllable heat generator", the temperature difference is measured between flow and return temperature. The burnout timer is started if the set difference (12-031) is undershot by 2 K or the minimum temperature (09-032) is undershot. In this case, the MP continues to run for the set time (12-033) and then switches off. If the flow temperature now rises back above (09-032) + (09-003) and the flow/return difference is above the set value (12-031), the burnout timer is reset and the heat generator returns to normal operation. If both conditions are not met in the burnout phase, the heat generator switches off after the burnout phase.

10.6.18 Conditional release - outside temperature block

Various releases can be set with parameter (09-011) in conditional release. The outside temperature threshold can be used in various ways. Conditional heat generator release 09-011 (can be set separately with each HGEN function):
0 : No block active
1 : Heat generator blocked
2 : Heat generator with OT greater than 09-012 (OT release temp.) free (hysteresis -2K)
3 : Heat generator with OT less than 09-012 (OT release temp.) free (hysteresis +2K)

Example: Bivalent alternative operation HGEN below 0°C active
HGEN 09-011:3, 09-012: -1°C
AHGEN 09-011:2, 09-012: +1°C



IMPORTANT! To ensure monovalent operation of 2 H-Gens without interruption, the particular switch-off difference of 2K must be complied with.

10.6.19 External H-GEN block

An external block is an input signal on the controller. With parameter 09-074, it is possible to set whether the heat generator is blocked if the signal is present or whether the block is ignored.

Overview:

Parameter	Factory	UN	Function	Par-ID
Allocation "external block WEZ" input	0	-	Heat generator configuration	30-026
"External H-GEN block" behaviour: 0 = OFF 1 = H-Gen is blocked with block signal (input bridged) -1 = Function inverted (input open H-Gen blocked)	0	-	Heat generator-parameters	09-074
Information				
Heat generator status: 3 = External blocked		-	Heat generator information	02-053

10.6.20 Parallel H-GEN release

The PWF is active if the H-Gen is in operation (HGEN set value present)
It is also possible to set a follow-on time.

Parameter	Factory	UN	Function	Par-ID
Allocation parallel H-GEN release output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	Heat generator configuration	32-037
Follow-on time parallel H-Gen enable PWF	0	Min.	Heat generator-parameters	10-109
Information				
Status parallel H-Gen enable PWF: 0 = OFF, 1 = on		-	Heat generator information	22-008

10.6.21 Start load relief H-Gen

If the H-Gen actual temperature (WF) drops below the H-Gen reference value, the hydr. H-Gen start load relief output is activated. If the H-Gen actual temperature (WF) +5 K rises above the H-Gen reference value, the output switches off.

Parameter	Factory	UN	Function	Par-ID
Allocation WEZ start load relief output 0=OFF, 4=DKP, 5=SLP, 6=VA1, 7=VA2, 9=VA1-FE1, 10=VA2-FE1, 11=VA3-FE1, 13=VA1-FE2, 14=VA2-FE2, 15=VA3-FE2	0	-	Heat generator configuration	32-039

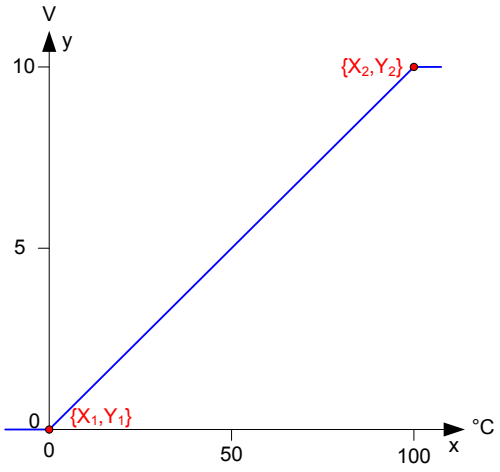
10.6.22 Output 0-10V H-Gen reference temperature

If a heat generator should be activated above 0-10V temperature then this takes place on the H-Gen by switching over the function application. A range of necessary parameters is configured automatically with the function application switchover.

Setting example: H-Gen 0-10V temperature activation 0V=0°C, 10V=100°C (VA10V-outp.H-Gen)

Parameter	Setting	UN	Function	Par-ID
Function application 4 = H-Gen 0-10V temp. (WF=VE1, MP=VA2, WF-setp=VA10V) (Configuration 0-10V characteristic separate!)	4	-	Heat generator configuration	09-076
Allocation WEZ sensor WF input, 5=VE2 (is already set by function application)	5	-	Heat generator configuration	30-047
Allocation main pump output, 7=VA2 (is already set by function application, can be switched off if there is no MP)	7	-	Heat generator configuration	32-034
Allocation WEZ set temp. 0-10V output, 8=VA10V (is already set by function application)	8	-	Heat generator configuration	32-046
Configuration 0-10V characteristic curve				
Configuration 0-10V/PWM output 1 1=0-10V	1	-	General 0-10V/PWM	33-100
Characteristic curve 1 (X1) (%/°C)	0	°C	General 0-10V/PWM	20-038
Characteristic curve 1 vltg. (Y1) at X1	0	V	General 0-10V/PWM	20-039
Characteristic curve 1 (X2) (%/°C)	100	°C	General 0-10V/PWM	20-040
Characteristic curve 1 vltg. (Y2) at X2	10	V	General 0-10V/PWM	20-041

Characteristic curve H-Gen 0-10V temperature activation 0V=0 °C, 10V=100 °C



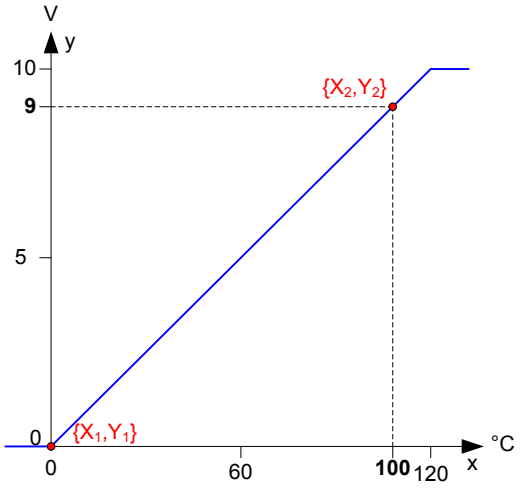
10.6.23 Output 0-10V H-Gen actual temperature (only with H-Gen)

If the heat generator actual temperature should be output via 0-10V signal, this is done by allocating the H-Gen act temp. 0-10V output. Following that, the 0-10V characteristic curve must be configured.

Setting example: H-Gen 0-10V actual temperature output 0V=0 °C, 10V=120 °C (VA10V-outp. FE1)

Parameter	Setting	UN	Function	Par-ID
Allocation WEZ act temp. 0-10V output 0=OFF, 8=VA10V/PWM, 12=VA10V/PWM FE1, 16=VA10V/PWM FE2	12	-	Heat generator configuration	32-047
Configuration 0-10V characteristic curve				
Configuration 0-10V/PWM output 1 1=0-10V	1	-	General 0-10V/PWM	33-100
Characteristic curve 1 (X1) (%/°C)	0	°C	General 0-10V/PWM	20-038
Characteristic curve 1 vltg. (Y1) at X1	0	V	General 0-10V/PWM	20-039
Characteristic curve 1 (X2) (%/°C)	100	°C	General 0-10V/PWM	20-040
Characteristic curve 1 vltg. (Y2) at X2	9	V	General 0-10V/PWM	20-041

Characteristic curve H-Gen 0-10V temperature activation 0V=0 °C, 10V=120 °C



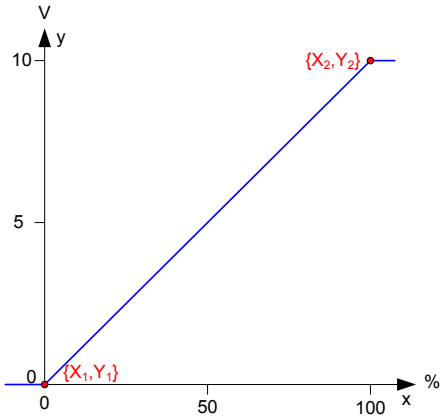
10.6.24 Output 0-10V H-Gen actual output (only with H-Gen)

If the heat generator actual output should be output via 0-10V signal, this is done by allocating the H-Gen act output 0-10V output. Following that, the 0-10V characteristic curve must be configured.

Setting example: H-Gen 0-10V actual power output 0V=0%, 10V=100% (VA10V-outp. H-Gen)

Parameter	Setting	UN	Function	Par-ID
Allocation WEZ actual output 0-10V output 0=OFF, 8=VA10V/PWM, 12=VA10V/PWM FE1, 16=VA10V/PWM FE2	8	-	Heat generator configuration	32-048
Configuration 0-10V characteristic curve				
Configuration 0-10V/PWM output 1 1=0-10V	1	-	General 0-10V/PWM	33-100
Characteristic curve 1 (X1) (%/°C)	0	%	General 0-10V/PWM	20-038
Characteristic curve 1 vltg. (Y1) at X1	0	V	General 0-10V/PWM	20-039
Characteristic curve 1 (X2) (%/°C)	100	%	General 0-10V/PWM	20-040
Characteristic curve 1 vltg. (Y2) at X2	10	V	General 0-10V/PWM	20-041

Characteristic H-Gen 0-10V actual output 0V=0%, 10V=100%



10.6.25 Energy balance

This document describes the measurement and display of output and energy quantity with heat generators, heating circuits and hot water tanks, as far as it affects the TTE-WEZ, TTE-HK/WW control modules. The measurement can also be made on external devices (M-bus). However, they are displayed in the allocated functions of the control modules.

Overview:

Information	Min.	Max.	Factory	UN	Function	Par-ID
Heat quantity heating	0.000	0.000	0	MWh	(A)Heat gen. information	29-050
Current output heating	0.0	0.0	0	kW	(A)Heat gen. information	29-051
Cooling quantity	0.000	0.000	0	MWh	Heat gen. information	29-052
Current output cooling	0.0	0.0	0	kW	Heat gen. information	29-053
Current volume flow energy balance	0.00	0.00	0	ltr/min	(A)Heat gen. information	21-105
Energy balance sensor flow	0.0	0.0	0	°C	(A)Heat gen. information	17-040
Energy balance sensor return	0.0	0.0	0	°C	(A)Heat gen. information	17-041
Input allocation						
Allocation energy balance sensor flow input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2,19=WF-RS485/OT			0	--	(A)Heat gen. energy balancing	30-058
Allocation energy balance sensor return input 0=OFF, 1=AF, 2=SF, 3=VF1, 4=VE1, 5=VE2, 7=VE1-FE1, 8=VE2-FE1, 9=VE3-FE1, 11=FVT-T-FE1, 13=VE1-FE2, 14=VE2-FE2, 15=VE3-FE2, 17=FVT-T-FE2, 20=RLF-RS485/OT			0	--	(A)Heat gen. energy balancing	30-059
Allocation IMP volume flow input (if present) 0=OFF, 5=VE2, 9=VE3-FE1, 12=FVT-F FE1, 15=VE3-FE2, 18=FVT-F FE2			0	--	(A)Heat gen. energy balancing	30-060
Parameter						
Heating coefficient medium (only present 1x, applies to all energy balancing of the module)	0.01	9.99	4.2	kJ/kgK	General parameters	17-004
… selection of the sensor/input type (with energy balancing flow/return sensor, IMP) 0=KTY 1=PTC 2=PT1000, 3=IMP (active = flow rate sensor, Huba) 4=IMP (passive = only contact, VSG, PAW Flowrotor)				---	General sensors	33-…
Reset energy balance	0	1	0	---	(A)Heat gen. energy balancing	17-043
Entry of the pulse rate in pulses/litre (if pulse counter present)	1.0	5000	721	IMP/ltr	(A)Heat gen. energy balancing	17-019
Offset flow sensor, is added to the measured value to obtain the finished measured value. (if present)	-10.00	+10.00	-0.2	ltr/min	(A)Heat gen. energy balancing	17-021
Volume flow at 100% pump speed (with through-flow calculation)	0	200	8	ltr/min	(A)Heat gen. energy balancing	17-042

Information	Min.	Max.	Factory	UN	Function	Par-ID
Heating measurement site allocation: 0=OFF 1=FA controller 2=local 3=Measurement module (M-bus) 4=District heating module			0	--	(A)Heat gen. energy balancing	20-010
Heating measurement module number (corresponds to the DIP switch setting)	1	16	1	--	(A)Heat gen. energy balancing	20-011
Number of heating measuring module measurement	1	15	1	--	(A)Heat gen. energy balancing	20-012
Cooling measurement site allocation: 0=OFF 1=FA controller 2=local 3=Measurement module (M-bus) 4=District heating module			0	--	Heat gen. energy balancing	20-013
Cooling measurement module number (corresponds to the DIP switch setting)	1	16	1	--	Heat gen. energy balancing	20-014
Number of cooling measuring module measurement	1	15	1	--	Heat gen. Energy balancing	20-015

1) Allocation input parameters:
Two temperatures are required for the heat balancing of a generator or a consumer. Balancing flow sensor and return sensor.
Furthermore, a volume flow is required that is derived either from the rotation speed (activation value) of the corresponding pump or is measured by a volume flow sensor. If the sensor does not have an input allocated to it, the speed of the pump is used for determining the volume flow together with the "Volume flow at 100% pump speed" parameter:
+ the heating circuit pump
+ the DHW charging pump
+ the heat generator pump.

2) Heating and cooling:
In the heating circuits and heat generators, output and heat quantities are each measured and displayed for heating and cooling. This is done automatically on the basis of the current operating mode. However, the same are used as temperatures vice versa.
Output and heat quantities are displayed separately for heating and cooling positively (no minus).

3) Calculation:
The physical parameters of volume flow, density and specific heat capacity form the basis for calculating the heat balance and heat output, and are calculated according to the mathematical formula:

$W = (V / t) \cdot rw \cdot cw \cdot Du$

W = heat capacity, V/t = volume flow, rw = density of the heat carrier medium, cw = specific heat capacity of the heat carrier medium, Du = temperature difference flow/return
The calculation is performed in all operating modes in which it is sensible, although not in the relay test. Outputs up to 4.0*108 kW are calculated with a resolution of 0.1 kW, and heat quantities up to 4,000*106 MWh with a resolution of 1.0 kWs. Heat quantities are permanently stored.

If at least one of the temperatures is invalid (defective sensor, unallocated input), the output is assumed to be zero. If the temperature difference (energy balance flow / energy balance return) is less than zero, the output is assumed to be zero (no negative outputs).

The calculated values are displayed by datapoints. A resolution of 0.001 MWh is used.

4) Display external values:
The calculation is performed in all operating modes in which it is sensible, although not in the relay test.
The heat balancing can be performed locally, on the automatic function unit (only with H-Gen-2) or on a measuring module (M-bus). The allocation is made using the "Measurement site allocation" parameter.

4.1 Measurement on automatic firing device
If the FA is allocated, the data of the locally connected automatic function unit (H-Gen-2) is read out and displayed in the corresponding datapoints.

4.2 Measurement on measuring module (M-bus)
If a measuring module (M-bus, FW) is allocated, the data is requested from the measuring module and displayed in the corresponding datapoints. For this purpose, the measuring module must be selected using the "Number measuring module" parameter and the measurement using the "Number of measurement" parameter.

The following parameters are set and defined on the measuring modules:

- Function group 20
- Output heating 00-001
- Heat quantity 00-000
- Output cooling 00-051
- Cooling quantity 00-050

The data is requested from the controller (TTE-WEZ) in the measuring modules (TTE-MWA).

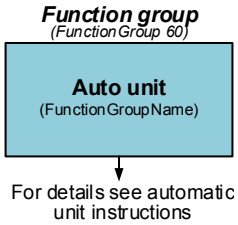
5) Reset energy quantity:
Using the "Reset energy quantity" command (17-043), the heat and the cold quantity of the function in question (e.g. HZK 2, WE 1, etc.) are set to zero.

Setting various flow rate sensors:

Flow rate type	Unit of measure	Range	TTE-WEZ pulse rate imp/ltr.	FA ECR pulse rate … / imp	Offset l/min
Huba type 200	DN8 AG 3/4″	0.9 … 15 l/min	1523	0.66 ml	-0.3
Huba type 200	DN10 AG 3/4″	1.8 … 32 l/min	721	1.39 ml	-0.2
Huba type 200	DN15 AG 1″	3.5 … 50 l/min	329	3.04 ml	-0.2
Huba type 200	DN20 AG 1 1/4″	5.0 … 85 l/min	162	6.17 ml	-0.3
Huba Typ 200	DN25 AG 1 1/2″	9.0 … 150 l/min	81	12.3 ml	-0.2
PAW FlowRotor	DN20	0.5 … 15 l/min	186	5.38 ml	0.28
PAW FlowRotor	DN25	1.0... 35 l/min	80	12.5 ml	0.66
PAW FlowRotor	DN32	2.0… 50 l/min	55	18.18 ml	0.56
VSG 1.5	DN15 AG 3/4"	0.5 … 25 l/min	2	0.5 ltr	0
VSG 2.5	DN20 AG 1"	0.5 … 40 l/min	2	0.5 ltr	0
VSG 6	DN32 AG 1 1/2"	2.0 … 100 l/min	1	1 ltr.	0

10.7 Function group "automatic unit"

In the automatic unit function group, the parameters of a wide variety of automatic function units are set.
See the instructions for the corresponding automatic function unit for further information.



10.8 Function groups "Week prog." / "Day prog." / "Special time prog."

In the function groups "Week prog." / "Day prog." / "Special time prog.", the settings are stored that are made for the different switching time programs on the control module.
These function groups are only used as storage/readout location. No settings are changed here.

11. Error code list [1]:

Cod.	Description	Cod.	Description
30	Bus interruption to automatic device	146	Tank sensor bottom
31	Bus fault heat generator 2	147	Tank sensor top
32	Bus fault heat generator 3	149	Collector sensor 2
33	Bus fault heat generator 4	157	Collector flow sensor (TKV)
34	Bus fault heat generator 5	158	Collector return sensor (TKR)
35	Bus fault heat generator 6	159	Volumetric current
36	Bus fault heat generator 7	160	Additional tank sensor top (cert. DHW tank)
37	Bus fault heat generator 8	161	Plate heat exchanger sensor (decentral charging)
42	Bus fault remote control	162	Plate heat exchanger sensor (central charging)
48	Bus node not available	163	Bypass sensor
50	Flow actual value deviation (VF1)	164	Pressure
51	Flow actual value deviation (VF2)	172	TPR pump heat exch. primary return temperature
52	Hot water actual value deviation	179	TUZ tank addition down temperature
53	Pump speed does not match ctrler. spec.	180	TOZ additional tank sensor top
54	Legionella prot. temperature not reached	181	TPR pump heat exch. primary return temperature
55	Caution frost protection active	182	TSRU tank return switchover
56	Ref. temp. circulation not reached	183	Flow sensor primary circuit
57	Max. circulation temperature exceeded	184	TSV pump heat exch. secondary flow temperature
60	Flow temperature guard heating circuit	185	TSR pump heat exch. secondary return temperature
61	External fault via digital input	187	EBZ flow sensor
68	Screed drying active	188	EBZ return sensor
69	Cleaning necessary	193	Buffer discharge flow sensor (PEF)
70	Maintenance necessary	194	Sensor thermostat 1
71	Temperature difference between collector 1 and storage tank too large	195	Sensor thermostat 2
73	Temperature difference between collector 2 and storage tank too large	196	Sensor thermostat 3
90	Fault heat generator 1	197	Sensor 1 differential control 1
91	Fault heat generator 2	198	Sensor 1 differential control 2
92	Fault heat generator 3	199	Sensor 1 differential control 3
93	Fault heat generator 4	201	Sensor 2 differential control 1
94	Fault heat generator 5	202	Sensor 2 differential control 2
95	Fault heat generator 6	203	Sensor 2 differential control 3
96	Fault heat generator 7	205	Outdoor sensor 2 (AF2)
97	Fault heat generator 8	255	No error
110	DHW sensor 2 (SF2), CW sensor (flow sensor inp.)	256	Plant flow temperature (AVF)
111	Solar sensor DHW (TBU)	300	Ref. value > max. temperature in tank
112	Circulation temperature	301	Maximum temp. > prot. temperature in tank
113	DHW charging flow sensor (SFx)	302	Legionella prot. temp. > max. tank temp.
114	Heat generator sensor	303	Tanks 1 & 2 have the same priority
115	DHW sensor (SF)	304	Tanks 1 & 3 have the same priority
116	Outdoor sensor (AF)	305	Tanks 1 & 4 have the same priority
117	Heating circuit flow sensor (VFx)	306	Tanks 2 & 3 have the same priority
118	Plant flow or buffer sensor (AVF/PF)	307	Tanks 2 & 4 have the same priority
119	Collector sensor (TKO)	308	Tanks 3 & 4 have the same priority
120	Buffer switch-off sensor (PF2)	309	Switch-off threshold recharging >= (switch-on threshold recharging – HYS_TEMP_DFLT)
121	Solar sensor heating	310	Switch-off thd. disch. >= (switch-on thd. discharge – HYS_ TEMP_DFLT)

Cod.	Description	Cod.	Description
122	Room air sensor	311	Switch-off thd. return flow increase >= (switch-on thd. return flow increase – HYS_TEMP_DFLT)
123	Heating circuit return sensor	312	Collector max. temp. > collector prot. temp.
124	Heat generator return sensor	313	Switch-off thd. collector pump >= (switch-on thd. collector pump tank – HYS_TEMP_DFLT)
143	Heat generator flow and return sensor simultaneously	314	Switch-off thd. add. boiler disch. >= (switch-on thd. add. boiler discharge – HYS_TEMP_DFLT)
145	Heat gen. flow sensor pre-ctrld. (flow 4-wy mixer)	315	No tank active, all types tank to 0
		317	RT circ. (05-054) > tank max. temp. 1 (08-059)
		319	RT circ. (05-054) > leg. prot. temp. (05-004)

1) Controller malfunctions, automatic device malfunctions see corresponding FA instructions