EN

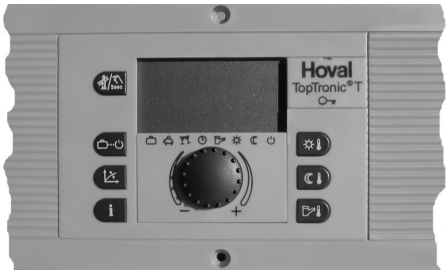
Instructions for customer service engineers

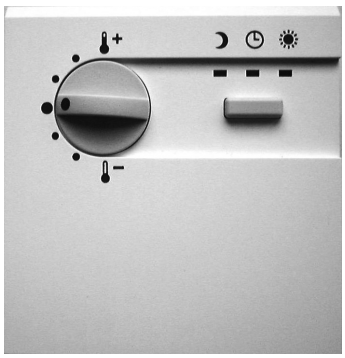
TopTronic®T V3.x

“Unit” switching field with “Rast5” plug-in technology
- TopTronic®T V3.x/U90
- TopTronic®T V3.x/U110
- TopTronic®T V3.x/UG

Single device
- TopTronic®T V3.x/N
- TopTronic®T V3.x/NWP

Room device/remote operation
- TopTronic®T V3.x/RS-T
- TopTronic®T V3.x/RFF-T





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.

Hoval

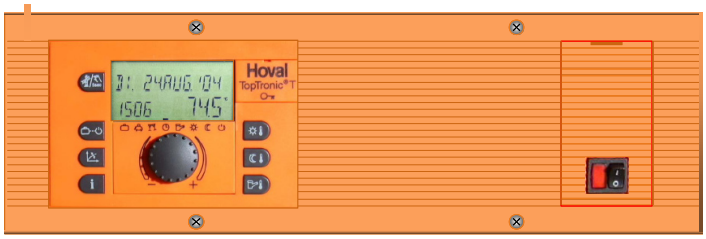
4 208 954 / 00 - 11/09

1. Controller generation

1.1 Design “Unit” with Rast5” plug-in technology

TopTronic® T/U90*) or 110*)
TopTronic® T/UG

*) Maximum temperature



Control box fuse

Power switch and burner fault light

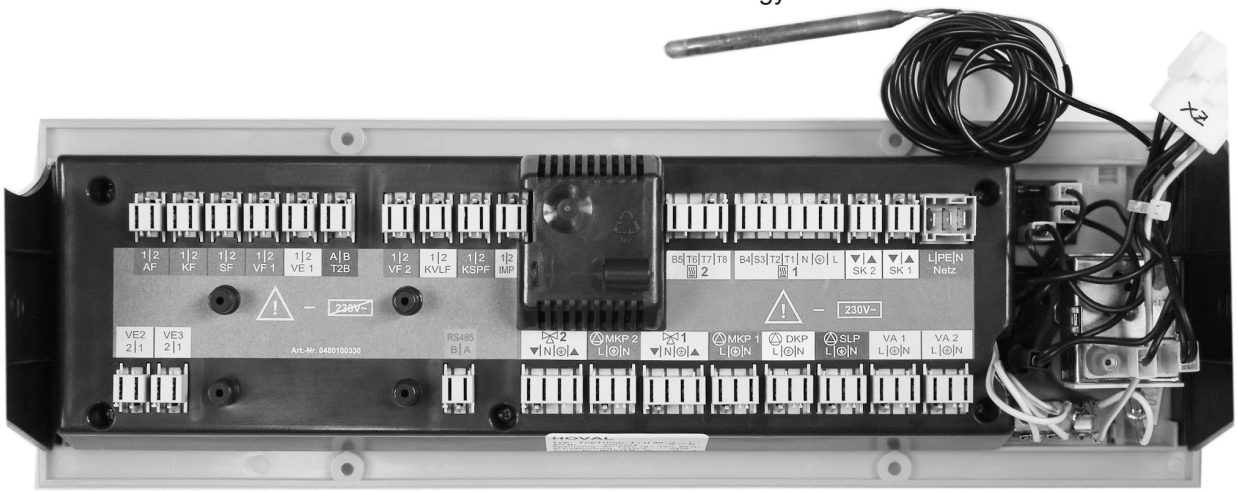
Safety temperature limiter (STL)

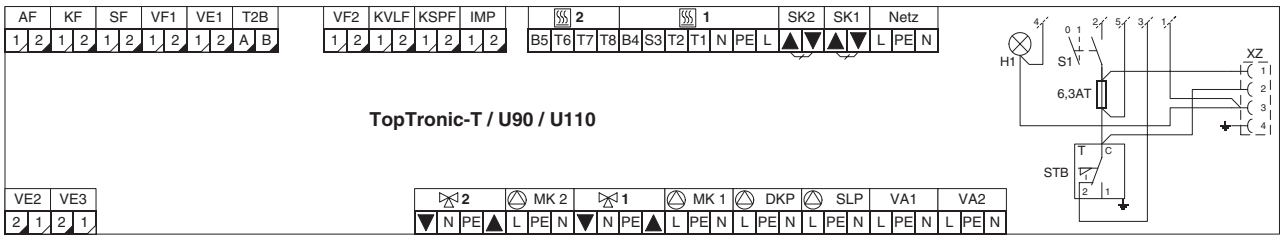
reset for UltraGas

Folding lid with brief operating instructions

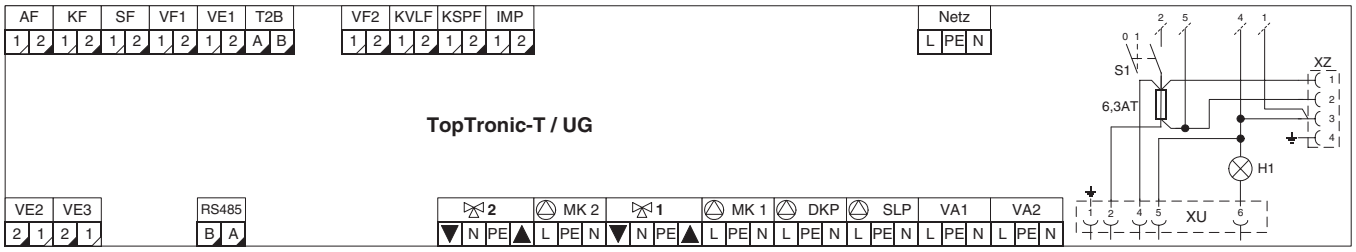
Complete equipment with...

- Power switch
- Fuse
- STL
- (electronic) thermostat
- (electronic) multi-function switch
- (electronic) running time meter
- RAST5 connection technology





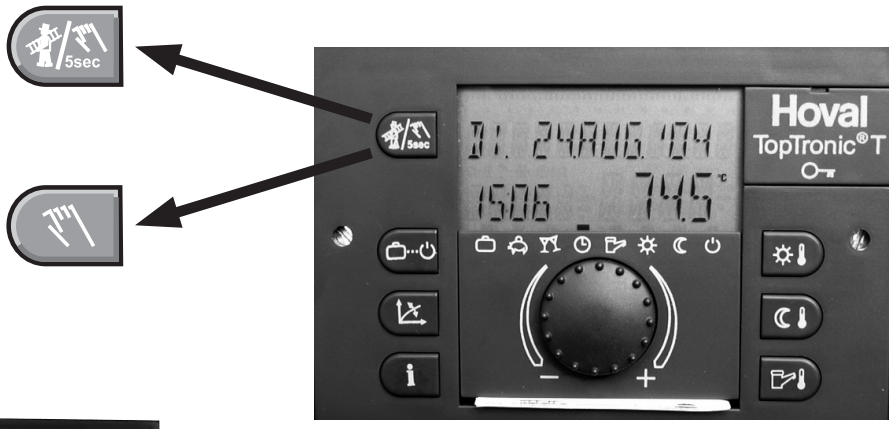
S1...	Main switch
H1...	Burner fault light
STB...	Safety temperature limiter
SK1/2..	Safety chain
	Burner control loops
T1/T2 ...	Stage 1
T6/T7/T8	Stage 2
B4 ...	Running time meter (stage 1)
B5 ...	Running time meter (stage 2)
VA1/2..	Variable output 1/2
SLP ...	Calorifier loading pump
DKP ...	Pump for heating circuit without mixer
YK1/2..	Actuator mixer 1/2
MK1/2..	Pump mixer circuit 1/2
AF ...	Outside sensor
KF ...	Boiler sensor
SF ...	Calorifier sensor
VF1/2..	Flow sensor 1/2
T2B ...	Data bus control devices
KVLF...	Solar sensor (Collector PT1000)
KSPF...	Solar sensor (Calorifier / buffer tank)
IMP ...	Pulse input solar
VE1/2/3..	Variable input 1/2/3
XZ.....	Plug connection for 2nd controller
RS485....	Data bus automatic firing device UltraGas

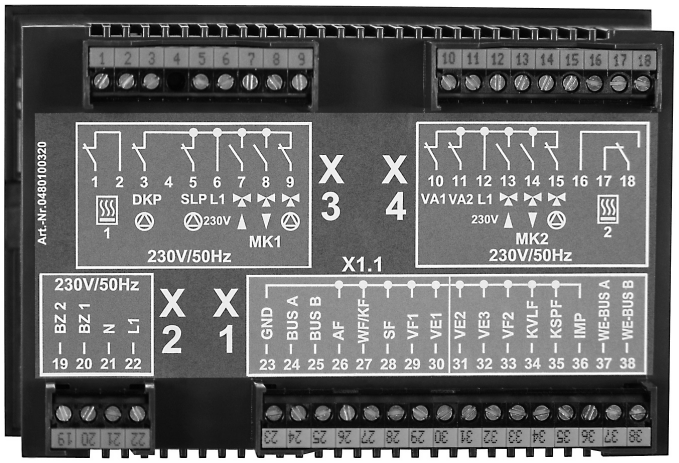


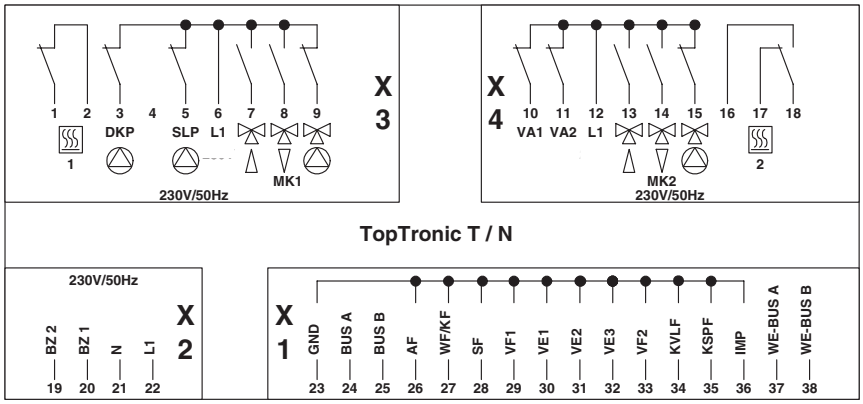
1.2 Design of individual controller TopTronic®T/N

TopTronic®T/N
- Heat generator bus
- OpenTherm
- Emission/manual key
- Software

TopTronic®T/NWP
- Heat generator bus RS485
- Manual key
- Software







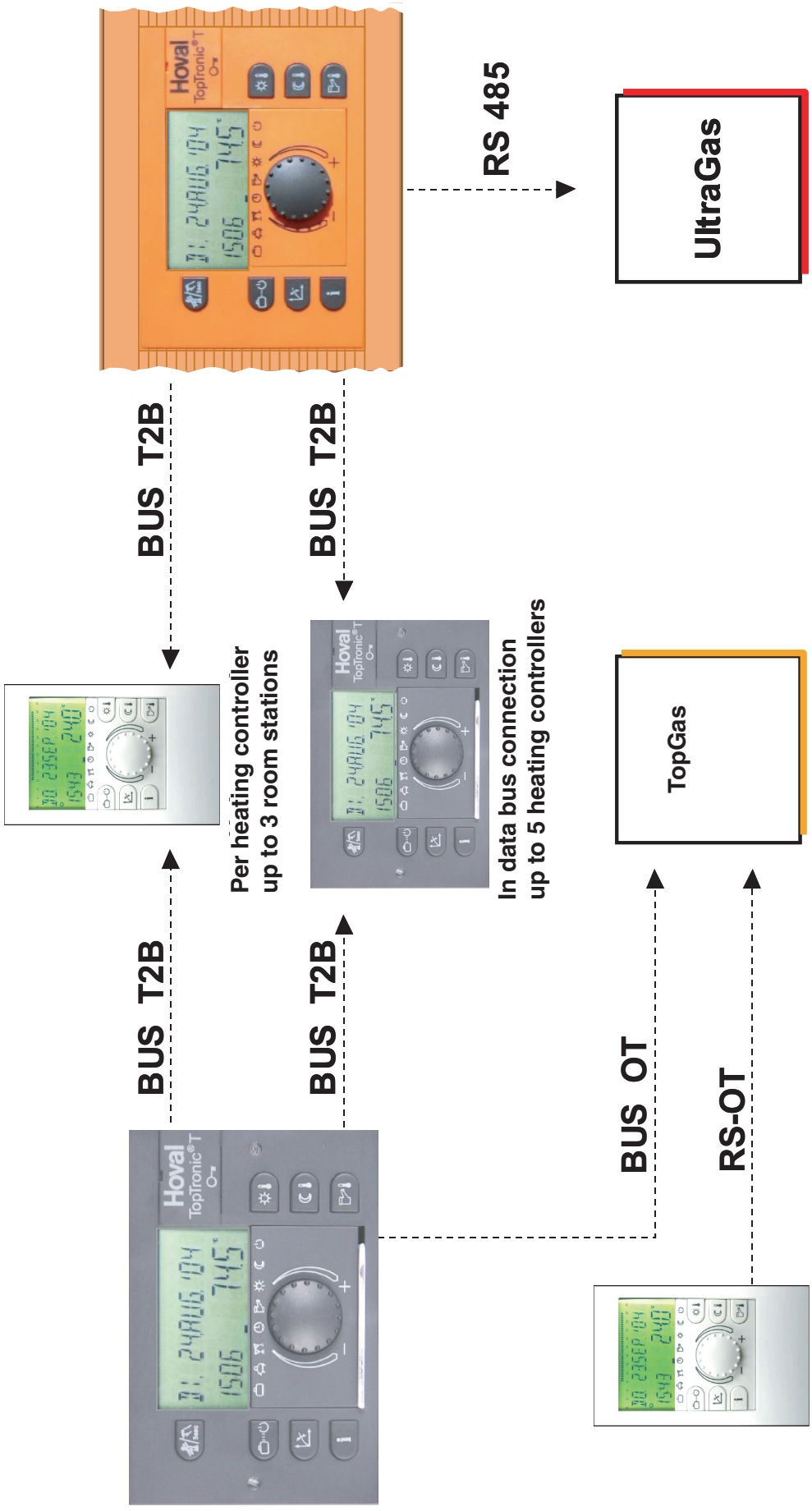
22-L1 ...	Phase 230V	} Mains supply
21-N ...	Neutral wire	
L1 ...	Phase 230V	

Burner control loops

T1/T2 ...	Stage 1
T6/T7/T8	Stage 2
BZ1 ...	Running time meter (stage 1)
BZ2 ...	Running time meter (stage 2)
VA1/2 ..	Variable output 1/2
SLP ...	Calorifier loading pump
DKP ...	Pump for heating circuit without mixer
YK1/2 ..	Actuator mixer 1/2
MK1/2 ..	Pump mixer circuit 1/2

WE-BUS A/B ...	Heat generator data bus (TTT/N-OpenTherm, TTT/NWP-RS485)
AF ...	Outside sensor
KF/WF ...	Boiler sensor/heat generator sensor
SF ...	Calorifier sensor
VF1/2 ..	Flow sensor 1/2
T2B ...	Data bus control devices (BUS A/B)
KVLF ...	Solar sensor (Collector PT1000)
KSPF ...	Solar sensor (Calorifier/ buffer sensor)
IMP ...	Pulse input
VE1/2/3 ..	Variable input 1/2/3

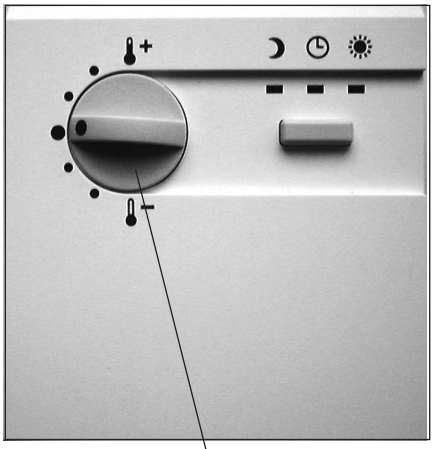
1.3 Data bus connections - complete system



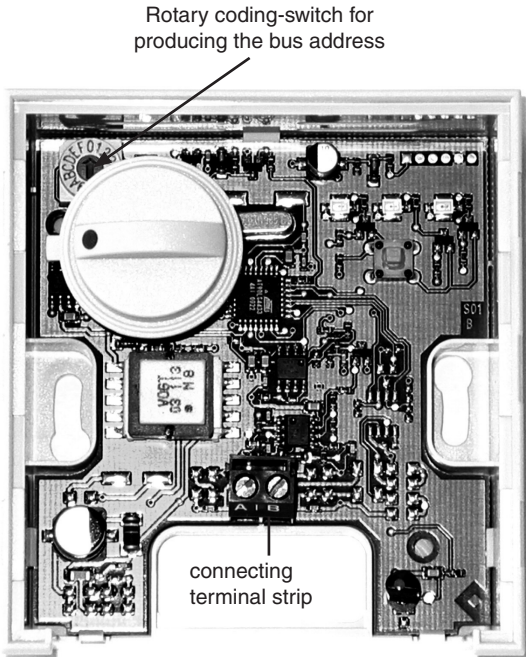
2. Remote operation

2.1 Room device RFF-T

The analogous remote control the slightly simpler room device "RFF-T"



Room temperature correction ± 6K



AUTOMATIC MODE

The heating circuit is constantly regulated according to what is specified in the switching time program P1 (or P2 or P3) that is set in the central device, plus or minus the setting on the rotary button

CONSTANT HEATING MODE

The heating circuit is constantly regulated according to what is specified by the reference daytime room temperature in the central device, plus or minus the setting on the rotary button.

CONSTANT REDUCED HEATING MODE

The heating circuit is constantly regulated according to what is specified by the reference reduced room temperature in the central device, plus or minus the setting on the rotary button.

Note: The setting for the parameter REDUCED OPERATING MODE, specified in the relevant heating circuit level in the central device, determines the functioning during reduced operation (see operating instructions for the central device)

Operating mode	Remote operation RFF
PARTY	LED ☀ flashes
ABSENT	LED ☽ flashes
HOLIDAY	LED ◷ flashes
STANDBY	All LEDs in operation

- Room sensor with remote adjuster
- Connection via data bus
- Maximum one room sensor for each heating circuit
- Addressing via coding switches

During connection – automatically changed to separate operating mode

Special operating states

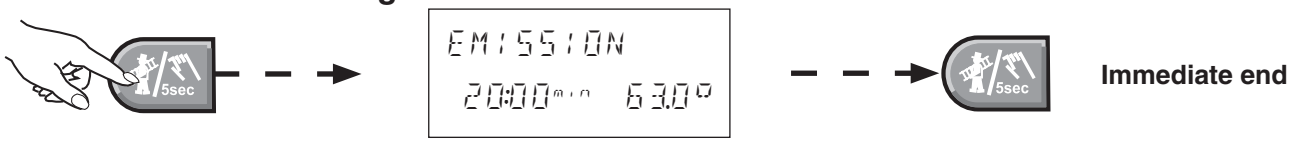
Operating state	LED ☽	LED ◷	LED ☀
Starting phase or after power failure	briefly flashing	briefly flashing	briefly flashing
Error in the address setting	flashing	on	on
Data bus fault or circuit missing	on	flashing	on

3. Functional overview

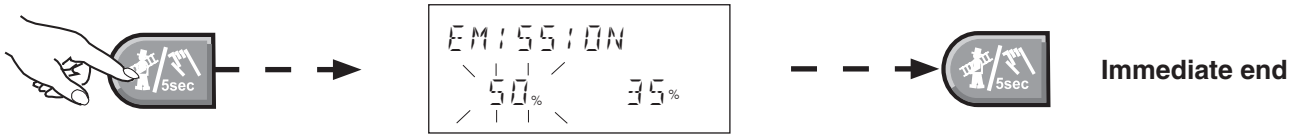
3.1 Controller including key functions

Control/key type	1.H-GEN stage	2.H-GEN stage	Modulating fan burner	Heat generator RS485-BUS (automatic firing device)	Heat generator OpenTherm-BUS (automatic firing device)	Calorifier	Direct heating circuit	Mixer circuit 1	Mixer circuit 2	Solid fuel-buffer-bivalency	Solar
TTT/U90	X	X	X			X	X	X	Expansion options by means of keys		
TTT/U110	X	X	X			X	X	X			
TTT/UG	X	X		X		X	X	X			
TTT/N	X	X			X	X	X	X			
TTT/NWP	X	X		X		X	X	X			
Key 1									X		
Key 2										X	
Key 3											X
Key 4									X	X	
Key 5									X		X
Key 6										X	X
Key 7									X	X	X

3.2 Emission metering



PRESS BRIEFLY Remaining time display

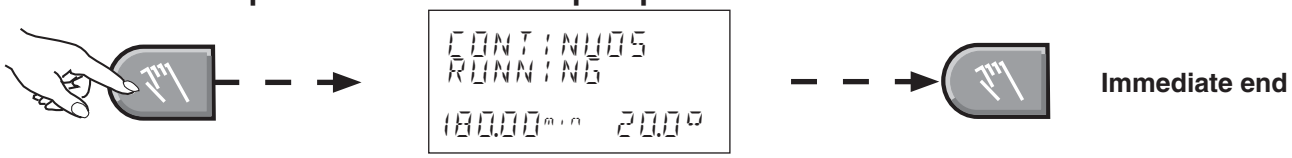


PRESS BRIEFLY Reference output / actual output
Modulation display

REACTIONS for emission metering
- **Time unit automatically 20 min**. – thereafter revert
- Heat generator temperature -> Maximum temperature limit
- With 2-stage heat generator both stages are in operation
- Regulate to the maximum temperature…
  the heating circuits and the calorifier
  (with direct heating circuit only if the HW operating mode is set to parallel operation)
  Caution! Danger of scalding with hot water, since the hot water temperature can exceed the target temperature set!

With UltraGas the current reference output/ actual output are indicated!

3.3 Manual operation heat source pump



PRESS BRIEFLY

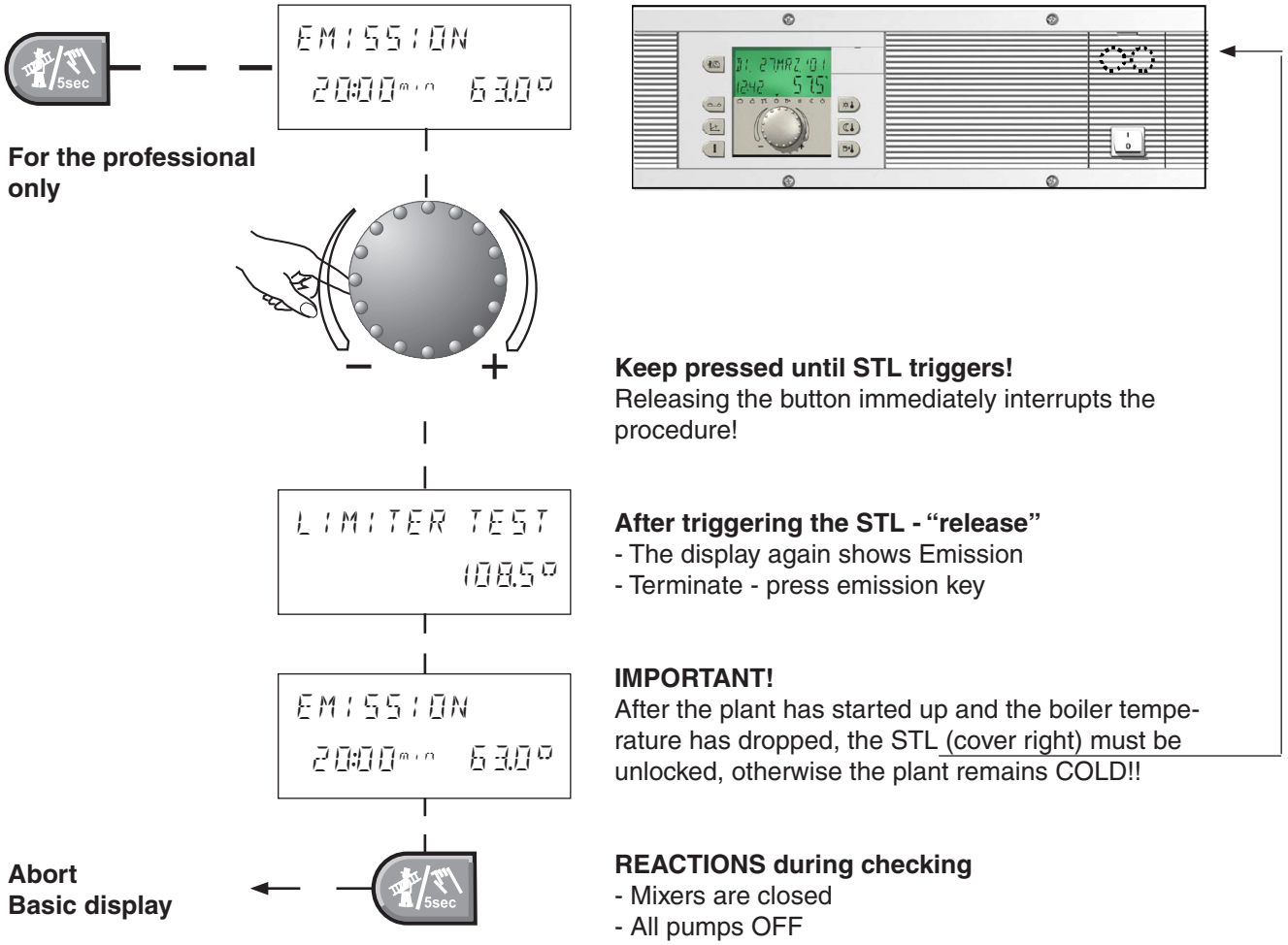
This function is available with TopTronic®T/NWP and programmed heat source pump only.
REACTIONS with manual operation
- Heat source pump is switched on
- Time unit automatically 180 min. – thereafter revert
- any other HP and heating circuit functions are switched off

3.4 Manual operation

PRESS
> 5 seconds

REACTIONS with manual operation
- **Set the reference heat generator temperature with the button!**
- All heating pumps ON
- Mixer without current - manual setting necessary!
- Note the maximum permissible temperature of the floor heating!
- The hot water temperature reaches the set
  HW maximum temperature (expert level standard 65°C)
  Caution! Danger of scalding with hot water, since the hot water temperature can exceed the target temperature set!
- Manual operation only works on heating operation (no cooling)

3.5 Safety temperature limiter (STL)- Safety test



Keep pressed until STL triggers!
Releasing the button immediately interrupts the procedure!

After triggering the STL - "release"
- The display again shows Emission
- Terminate - press emission key

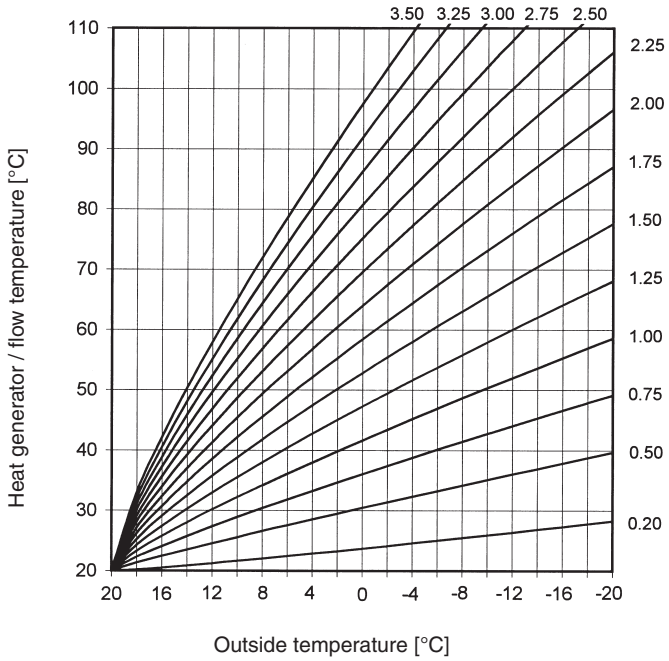
IMPORTANT!
After the plant has started up and the boiler temperature has dropped, the STL (cover right) must be unlocked, otherwise the plant remains COLD!!

REACTIONS during checking
- Mixers are closed
- All pumps OFF

3.6 Heating curve/heating characteristic curves

Setting range: OFF, 0,05...3,5
Factory setting: Direct heating circuit (HC): = OFF
Mixer heating circuit 1 (MC1): = 1,00 (0,60)
Mixer heating circuit 2 (MC2): = 1,00 (0,60)

The return to the basic display takes place after pressing the key twice, or automatically after the prescribed time.



3.7 Switching Times

Switching time program (abbreviation "P.....")
Info: P2 and P3 must be cleared; see SYSTEM parameter 2

Switching time program P1

Circuit	Day	Heating from
All heating circuits (DC,MC-1,MC-2)	Mo-Su	06.00 - 22.00
DHW circuit (DHW)	Mo-Su	05.00 - 22.00

Switching time program P2

Circuit	Day	Heating from
All heating circuits (DC,MC-1,MC-2)	Mo-Th	06.00-08.00 16.00-22.00
	Fr	06.00-08.00 13.00-22.00
	Sa-Su	07.00-23.00
DHW circuit (DHW)	Mo-Th	05.00-08.00 15.30-22.00
	Fr	05.00-08.00 12.30-22.00
	Sa-Su	06.00-23.00

Switching time program P3

Circuit	Day	Heating from
All heating circuits (DC,MC-1,MC-2)	Mo-Fri	07.00-18.00
	Sa-Su	reduced
DHW circuit (DHW)	Mo-Fri	06.00-18.00
	Sa-Su	reduced

Table for your own switching time programs

see next page for further programs

Table for switching time programs

DHW circuit

Switching time program P1							Switching time program P2						Switching time program P3					
Day	Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
Mo																		
Tu																		
We																		
Th																		
Fr																		
Sa																		
Su																		

Direct heating circuit

Switching time program P1							Switching time program P2						Switching time program P3					
Day	Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
Mo																		
Tu																		
We																		
Th																		
Fr																		
Sa																		
Su																		

Mixer heating circuit 1

Switching time program P1							Switching time program P2						Switching time program P3					
Day	Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
Mo																		
Tu																		
We																		
Th																		
Fr																		
Sa																		
Su																		

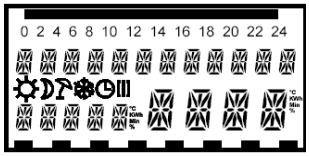
Mixer heating circuit 2

Switching time program P1							Switching time program P2						Switching time program P3					
Day	Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3		Cycle 1		Cycle 2		Cycle 3	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
Mo																		
Tu																		
We																		
Th																		
Fr																		
Sa																		
Su																		

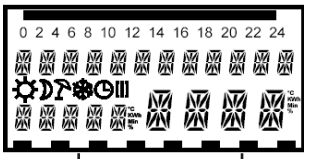
4. Commissioning

4.1 Initial commissioning (incl. set function)

CENTRAL DEVICE

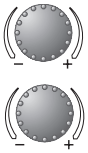


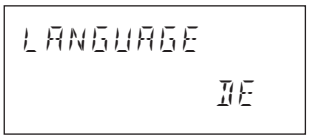
ROOM STATION



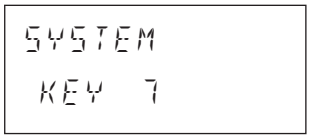
Select

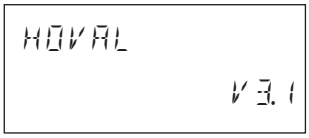
Tap

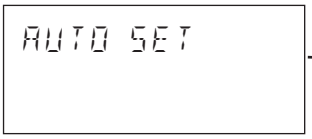


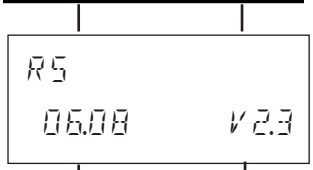


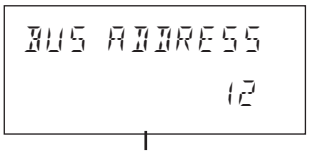
Language selection
DE = German
GB = English
FR = French
IT = Italian
...
12 further languages

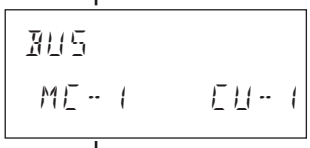




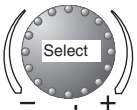




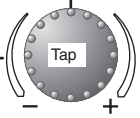




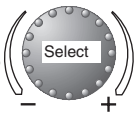
Display if already registered



The right bus address **must** be entered!



Inquiry/check/display



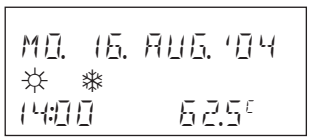
ROOM TEMP DC RS 14.5°C	Room temperature Direct heating circuit (... in conjunction with room sensor)
ROOM TEMP MC-1 RS °C -- °C	Room temperature Mixer heating circuit 1 (... without room sensor influence)

Setting heating circuit level DC, MC1+2
Room override

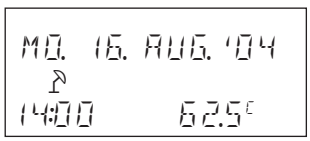
Par.: 3 = 1, 2

Par.: OFF, 3

Status displays

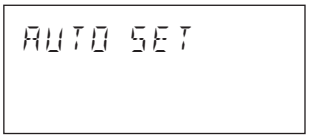


Ice crystal symbol:
Plant frost protection active (outside temperature below frost protection limit)



Umbrella symbol:
Summer disconnection active (heating switched off, hot water according to program) (outside temperature above the summer disconnection level)

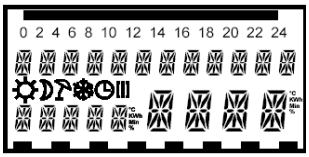
Automatic SET function
Record the assigned sensors on start-up

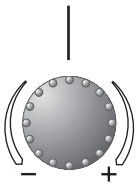


"Automatic setting"
takes place every time the heating controller is switched on, until the operating time of the first day of operation exceeds 0:00.

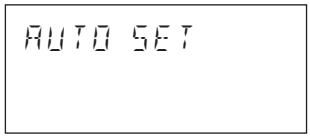
a) **After 0:00 - only "Manual Set" possible!**
b) Automatic recognition of the HW temperature recording - if resistance value - > then setting on sensor (standard = thermostat)
c) If during commissioning controller without outside temperature sensor (AF) - controller accepts an outside temperature of 0°C

Manual set function
Changes made in the sensor range (example)





During switching on, keep rotary button pressed



until "AUTOSET" appears

"Manual Set"
Current settings are checked; only under certain conditions does the setting function intervene in the parameter-setting process.
e.g.: A set return inclease on the MC-2 **cannot** be logged out and functionally converted into a mixer circuit.

Intervention/change only if these settings are found!

Input		Only implemented	
Outside sensor	(AF)		
Flow sensor 1	(VF1)	MC1:	OFF/mixer heating circuit weather-controlled
Flow sensor 2	(VF2)	MC2:	OFF/mixer heating circuit weather-controlled
Calorifier sensor	(SF)	SLP:	OFF/HW charging pump
Boiler sensor	(KF)	BR:	OFF/single-step

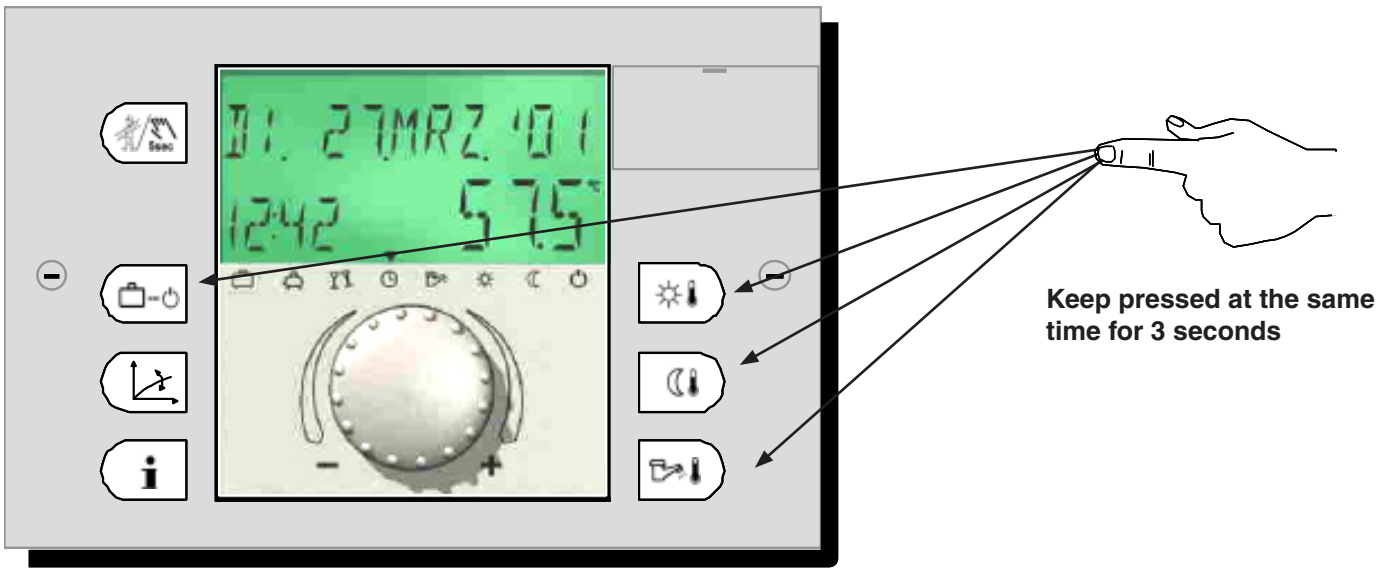
5. Reset

5.1 Resetting parameters

RESET -… the quadruple move
Resetting the parameters
Dependent on code input (parameter release)

a) "Limited RESET " (without previous code input)
Operator level to "STANDARD"
Time program/temperatures/language - without Set-up!

b) „TOTAL – RESET" (with previous code input)
Expert level/OEM to "STANDARD" - with Set-up!
"SET" everything afresh!

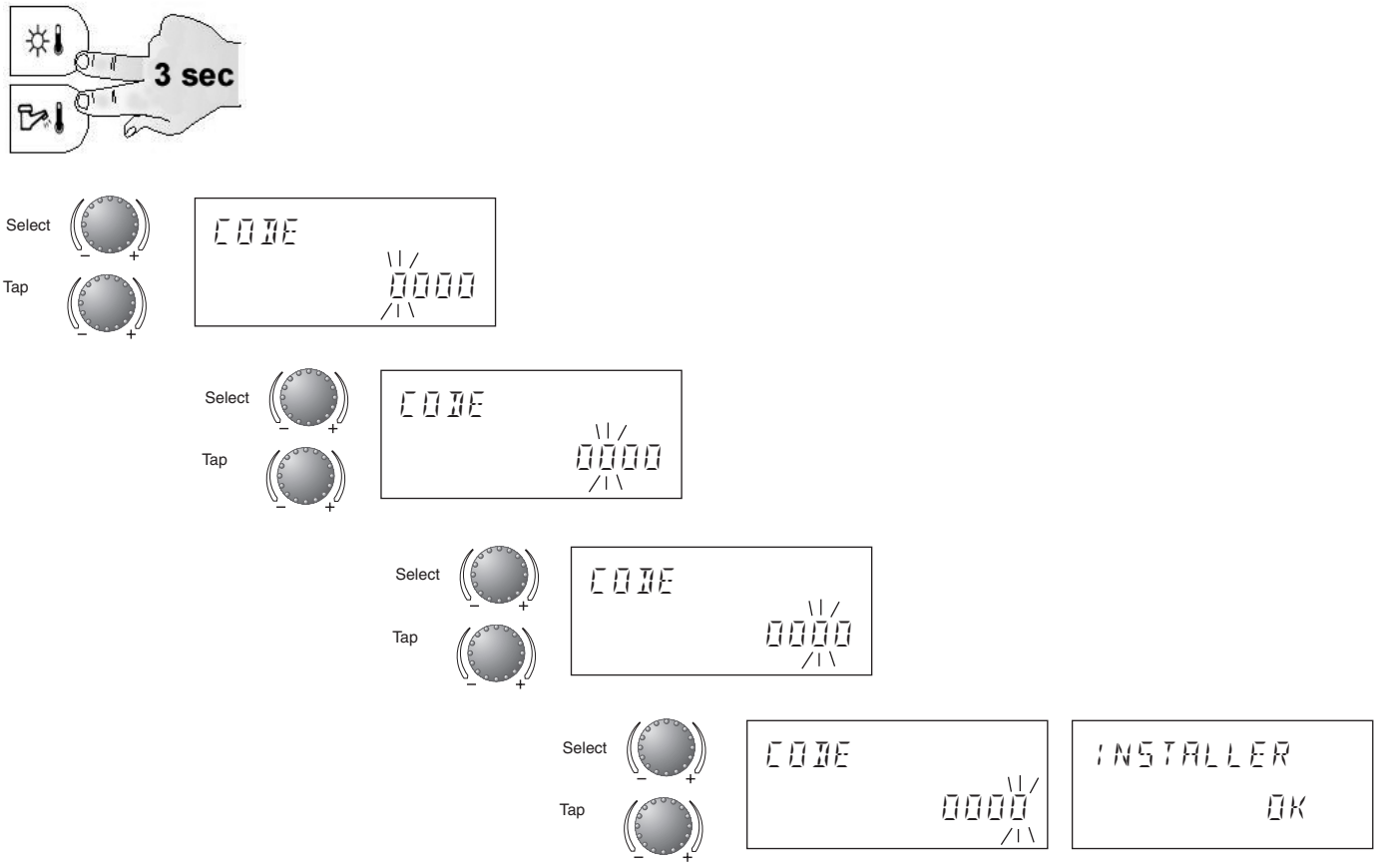


No reset of:
- Burner operating hours
- Burner starts
- Solar thermal output / solar balance
  (separately resettable via special parameters)

- Date of initial commissioning
  (reset not possible)

6. Expert level

6.1 Time-limited clearing of the expert level “CODE input”



Correction ...
INFO Key
„one step back“!

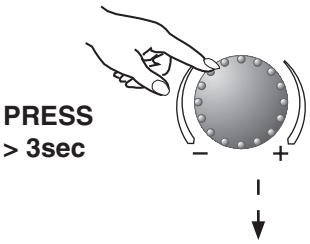
Automatic return after 10 minutes!
...takes place if after the code has been input, there is no operation of the controller!

Expert code ....
OEM code .....

6.2 Expert level

Clear through expert code .....

System-dependent parameter adjustment



OEM/ EXPERT LEVEL

TIME - DATE	TIMEPROGRAMS	HYDRAULIC HYDR.	SYSTEM SYST.	DHW DHW	UNMIXED CIRC HC	MIX. VALVE 1 MC-1	MIX. VALVE 2 MC- 2

Activated according to the plant configuration, key, ...

HEAT GEN. H-GEN	HEAT PUMP HP	BOILER CONTR	RETURN CONTR RLP	SOLAR	SOLID FUEL SOLID	BUFFER BU-T	COOLING BUFFER KPF

COMMON FLOW SVLF	CASCADE CASC	BUS	RELAY TEST	ALARM	Sensor ADJ.

INFO level

Code - explanation “fault signals”

7. System temperatures, operating states

Info LEVEL - Operating states/ system temperatures/ reference values

Operating states
Rotary button to the left (anticlockwise)
Displays depending upon the plant and device model!

Temperature displays
Rotary button to the right (clockwise)
Plant and system temperatures depending upon the plant and device model!
Reference value temperatures can be read out by “pressing down” the button!

7.1 System temperatures / reference values

Information	Display value	Notes
Outside temperature (1)	averaged value/current value	6-24-72 hr. dependent on the building type
Outside temperature (1)	Min./max. value	Of the current day
Outside temperature (2)	averaged value/current value	6-24-72 hr. dependent on the building type
Outside temperature (2)	Min./max. value	Of the current day
EM-SET	Reference value HC	Bottom right - highest reference value of the heating circuit in the system
	Reference value DHW	Bottom left - highest DHW reference value in the system
	Output limitation %	Bottom left if rotary pushbutton pressed
	Plant reference value	Bottom right if rotary pushbutton pressed
EM-SET-K	HC - Cooling reference value	Bottom right - lowest cooling reference value of the heating circuit in the system
	H-GEN - Cooling reference value	Bottom left - lowest H-GEN cooling reference value in the system
Heat generator temperature (1)	Reference value/actual value	Heat generator specified
Heat generator temperature (2)	Reference value/actual value	Boiler sensor 2 on variable input
Common flow sensor	Reference value/actual value	
Return temp. firing automate	Actual value	Return flow temperature - sensor on the firing autom.
Exhaust gas temperature firing autom.	Actual value	Exhaust gas temperature - sensor on the firing autom.
Water pressure	Actual value	Only OT –interface - evaluation of respective firing autom.
Return temperature	Reference value/actual value	Return sensor functions return increase active
External barrier heat generator	Blocking state ON/OFF	External heat generator blocking on variable input
Flue gas temperature	Limit reporting value/actual value	Exhaust sensor on variable input 1
HW temperature (1)	Reference value/actual value	If water heaters present
HW temperature (2)	Reference value/actual value	Tank sensor 2 on variable input
HW temperature regulator	Charging state ON/OFF	With thermostat in place of sensors
Demand (VE-1)	Demand ON/OFF	Demand contact on variable input 1
Demand (VE-2)	Demand ON/OFF	Demand contact on variable input 2
Demand (VE-3)	Demand ON/OFF	Demand contact on variable input 3
Flow temperature MC-1	Reference value/actual value	+ frost symbol in case of cooling

Flow temperature MC-2	Reference value/actual value (RG necessary)	+ frost symbol in case of cooling
Room temperature HC	Reference value/actual value (RG necessary)	In the case of active room influence, the symbol % appears. In conjunction with room device, “RS” or “RFF” appears
Room temperature MC-1	Reference value/actual value (RG necessary)	In the case of active room influence, the symbol % appears. In conjunction with room device, “RS” or “RFF” appears + frost symbol in case of cooling.
Room temperature MC-2	Reference value/actual value (RG necessary)	In the case of active room influence, the symbol % appears. In conjunction with room device, “RS” or “RFF” appears + frost symbol in case of cooling.

Thermostat function HC	THERMOSTAT HC	Room thermostat function activated OFF = temperature limit exceeded
Thermostat function MC-1	THERMOSTAT MC-1	Room thermostat function activated OFF = temperature limit exceeded
Thermostat function MC-2	THERMOSTAT MC-2	Room thermostat function activated OFF = temperature limit exceeded

Boiler temperature Solid fuel c.	Actual value	Solid fuel charging pump on variable output
Buffer temperature Solid fuel c.	Actual value	Solid fuel charging pump on variable output, depending upon configuration corresponds to KSPF or FPF
Buffer temperature top	Reference value/actual value	Buffer charging pump on variable output
Buffer temperature bottom	Reference value/actual value	Buffer sensor 2 on variable input

Collector temperature	Actual value (KVLF)	Solar charging pump on variable output
Solar sensor HW or buffer	Actual value (KSPF)	Solar charging pump on variable output
Solar return temperature	Actual value (KRLF)	Solar charging pump on variable output, solar return sensor on variable input
Solar sensor HW or buffer	Actual value (SLVF)	Solar charging valve activated

Return sensor (HP)	Min. /max. value / actual value	HP return sensor on variable input
Heat source sensor	Min. /max. value / actual value	Heat source sensor on variable input
Lock by energy supply company	ON / OFF	Lock by energy supply company on variable input (ON = HP locked)

Cooling block	ON / OFF	Cooling block on variable input (ON = cooling locked)
Cooling buffer	Reference value/actual value	Cooling buffer sensor on input KSPF

7.2 System temperatures, operating states

Information	Display values examples	Notes
Operating status direct heating circuit	AUTO-P1 ECO HC ON	Heating circuit information about the active mode of operation and the switching status of the output
Operating status mixer heating circuit 1	AUTO-P1 ECO MC-1 ON	Heating circuit information about the active mode of operation and the switching status of the output
Operating status actuator mixer 1	AUTO-P1 ECO STOP	Mixer 1 moves open or closed or remains stationary
Operating status mixer heating circuit 2	AUTO-P1 ECO MC-2 ON	Heating circuit information about the active mode of operation and the switching status of the output
Operating status actuator mixer 2	AUTO-P1 ECO OFF/STOP/ON	Mixer 2 moves open or closed or remains stationary
Operating status (stage 1) heat generator	HEAT GENERATOR ON/OFF	Information about switching status of the single-stage or first stage of the two-stage heat generator
Operating status (stage 2) heat generator	HEAT GENERATOR ST-2 ON/OFF	Information about switching status of the second stage of the two-stage heat generator
Operating status, modulating heat generator	MODULATION. 57% 60%	When setting a staged modulating heat generator, display of actual and reference value in % - UltraGas only
Operating status hot water circuit	AUTO-P1 HW ON	Heating circuit information about the active mode of operation and the switching status of the output
Function and status direct circuit pump (DKP)	OUTPUT HCP SMA ON/OFF	Information about functionality allocated to the output DKP and the switching status
Function and status variable output 1	OUTPUT VA-1 SOP ON/OFF	Information about functionality allocated to the output VA-1 and the switching status
Function and status variable output 2	OUTPUT VA-1 ZKP ON/OFF	Information about functionality allocated to the output VA-2 and the switching status
Activations, heat generator (1)	STARTS 1275	Information about number of heat generator switch-ons (burner starts) of the staged heat generator
Operating time, heat generator (1)	OP HOURS 280	Information about number of heat generator operating hours of the staged heat generator
Activations, heat generator St-2	STARTS 530 ST-2	Information about number of heat generator switch-ons (burner starts) of the second level
Operating time, heat generator St-2	OP HOURS 200 ST-2	Information about number of heat generator operating hours of the second level
Test temperature for measuring purposes	INFO TEMP 50°C	External information sensor on variable input
Operating status ext. switching modem	MODEM ABS	Information about the mode of operation by modem on variable input
Solar thermal output	H OUTPUT Number of kW SOL	Solar pump on variable output
Solar heat balance	AMOUNT OF HEAT Number of kWh SOL	Solar pump on variable output
Activations, solar charging pump	STARTS Number SOL	Solar pump on variable output
Operating time solar pump	OP HOURS Number SOL	Solar pump on variable output

8. Level and parameter overview

No.	Time/date	Switching Times	Hydraulics	System	Hot water	Direct heating circuit	Mixer heating circuit 1	Mixer heating circuit 2	Heat generator	Heat pump
1	Time (min/hr)	Heating circuit selection HC, MC 1/2, HW		Language selection	HW saving temp. (night)	Reduced operation selection	Reduced operation selection	Reduced operation selection	Type of heat generator	Type of heat generator
2	Year	Program selection P1 ...P3	Output SLP	Switching times P1 or P1-P3	Legio. protection	Heating system Exponent	Heating system Exponent	Heating system Exponent	Start-up protection	Start-up protection
3	Day -month	Week day Mo… Su Heating cycle 1… 3	Output MC1	Operating mode	Legio. protection (time)	Room override	Room override	Room override	Min. temp. limit	Min. temp. limit
4	Summer-winter time automatic	Switch-on time	Output MC2	Summer disconnection	Legio. protection (temperature)	Room influence factor	Room influence factor	Room influence factor	Max. temp. limit	
5		Switch-off time	Output DKP	Plant frost protection	Sensor or Thermostat	Adaptation heating curve	Adaptation heating curve	Adaptation heating curve	Operation of start-up protection	Operation of start-up protection
6		Cycle temperature	Output VA1	Starting contact VE-1	HW maximum limit	Switching on optimisation	Switching on optimisation	Switching on optimisation	Sensor mode of operation	Sensor mode of operation
7			Output VA2	Starting contact VE-2	HW mode of operation	Heating limit	Heating limit	Heating limit	Minimum running time	Minimum running time
8			Input VE-1	Starting contact VE-3	Buffer discharge protection	Room frostprotection temp.	Room frost protection temp.	Room frostprotection temp.	Switching difference I	Switching difference I
9			Input VE-2	Air conditioning zone	Charging temp. elevation	Room thermostat function	Room thermostat function	Room thermostat function	Switching difference II	Switching difference II
10			Input VE-3	Building type	HW switching difference	External sensor allocation	External sensor allocation	External sensor allocation	Time-out stage II	Time-out stage II
11			Indirect return increase	Autom. disconnect time	Follow-on time SLP	Constant temperature (reference value)	Constant temperature (reference value)	Constant temperature (reference value)	Release mode stage II	Release mode stage II
12			Max. limitation energy	Anti-blocking protection	Switching timer prog. ZKP	Min. limit. Heating circuit	Min. limit. Heating circuit	Min. limit. Heating circuit	HW charging mode1-2 stage	HW charging mode1-2 stage
13			Activation cooling buffer	Logical fault reporting	ZKP interval (pause)	Max. limit. Heating circuit	Max. limit. Heating circuit	Max. limit. Heating circuit	Lead time KKP	Lead time CP/ KKP
14			Release contact cooling KVLF	Automatic set function	ZKP interval (period)	Elevation heat generator	Elevation heat generator	Elevation heat generator	Follow-on time KKP / PWF	Lead time CP/ KKP/ PWF
15				Blocking code Expert		Pump follow-on (DCP)	Pump follow-on (MCP 1)	Pump follow-on (MCP 2)	Follow-on time Feed/ primary pump	Follow-on time Feed/ primary pump
16						Screed function (profile drying)	Screed function (profile drying)	Screed function (profile drying)	Exhaust gas temp. monitoring	
17					H-GEN behaviour SLP follow-on				Exhaust gas temp. limit value	
18				Release cycle temp.	DHW parallel loading		P-portion Xp	P-portion Xp	Boiler gradient	
19				Frost protection Clock operation	DHW time-out		Scanning time Ta	Scanning time Ta	Modulation P-portion Xp	Modulation P-portion Xp
20					PI reference value control		1-portion Tn	1-portion Tn	Modulation Scanning time Ta	Modulation Scanning time Ta
21				RTC adjustment	P-portion Xp		Running time actuator	Running time actuator	Modulation Reset time Tn	Modulation Reset time Tn
22					Scanning time Ta		End position Drive	End position Drive	Modul. running time	Modul. running time
23				Blocking code Control level	1-portion Tn	Room control K-factor	Room control K-factor	Room control K-factor	Modul. starting time	Modul. starting time
24				Fahrenheit		Room control Tn-factor	Room control Tn-factor	Room control Tn-factor	Modulation start-up output	Modulation start-up output
25						Operating mode holiday	Operating mode holiday	Operating mode holiday	Outside temp. blocking H-GEN	Outside temp. blocking H-GEN
26				First IBN date					Basic load elevation	Basic load elevation
27				Fault report					Start-up protection HK disconnection	Start-up protection HK disconnection
28				Fault stack 2					Start-up protection HK Switching difference	Start-up protection HK Switching difference
29				Characteristic curve emergency operation					H-GEN forced discharge	H-GEN forced discharge
30				Thermostat function sensor allocation					OEM Maximum limit	OEM Maximum limit
31				Thermostat function reference value					Minimum load control (only OT)	
32				Thermostat function switching difference						
33				HW/SW version						
34				Reset on factory values					Output limitation heating	

No.	Time/date	Switching Times	Hydraulics	System	Hot water	Direct heating circuit	Mixer heating circuit 1	Mixer heating circuit 2	Heat generator	Heat pump
35									Output limitation hot water	
36						Minimum value override	Minimum value override	Minimum value override	Outside temp. blocking 2. stage	Outside temp. blocking 2. stage
37							Mixer flow time	Mixer flow time	Running time meter behaviour	Running time meter behaviour
38							Regulation offset	Regulation offset	DHW release regulator (CU)	DHW release regulator (CU)
39									Emergency operation temperature H-Gen	Emergency operation temperature H-Gen
40										Min. switch-off time ST1
41										Max.temp. ST1
42										Outside temp. blocking 1. stage
43										Minimum running time ST2
44										Min. switch-off time ST1
45										Max. temp. ST1
46										Outside temp. blocking 2. stage
47										Control stage
48										Stage reversal time
49										Lock by energy supply company ST2
50							Cooling switch-on point outs. temp.	Cooling switch-on point outs. temp.		Charging mode cooling
51							Cooling max. point outside temp.	Cooling max. point outside temp.		Cooling delay ST2
52							Cooling Switch-on point flow	Cooling Switch-on point flow		H-GEN priority operation mode
53							Cooling max. point flow	Cooling max. point flow		Minimum running time operating mode
54							Cooling switch-on point reference RT	Cooling switch-on point reference RT		Neg. H-GEN switching diff. cool.
55							Cooling max. point reference RT	Cooling max. point reference RT		Min. return temp.
56							Cooling Min. temp.	Cooling Min. temp.		Max. return temp.
57						Name heating circuit	Name heating circuit	Name heating circuit		Downtime HW switch-over
58										Lead time heat source pump
59										Follow-on time heat source pump
60										Min. temp. heat source
61										Max. temp. heat source
62										CP release with HW charging
63									Reset stage I	Reset stage I
64									Reset Stage II	Reset Stage II

Return increase	Solar	Solid fuel	Buffer	Cooling buffer	Common flow	Cascading	Data bus	Fault 1/2	Sensor balancing	No.
Return reference value	Switch-on diff. collector//buffer	Minimum temp. limit	Minimum temp. limit	Maximum temp. limit	P-portion Xp	Switching difference	CU address	Fault 1	AF external sensor (in case of RS-T room sensor)	1
Switch-off differential Pump	Switch-off differential Collector/buffer	Maximum temp. limit	Maximum temp. limit	Switching difference	Scanning time Ta	Connecting delay	Bus rights RS HC	Fault 2	KF boiler sensor	2
Follow-on time pump	Minimum running time solar pump	Switch-on differential boiler/ buffer	Elevationeat generator	H-Gen abatement	1-portion Tn	Switching off delay	Bus rights R-S MC-1	Fault 3	SF HW sensor	3
	Max. limit collector	Switch-off differential boiler/ buffer	Switching difference	Constant reference value		Switch-over output stage sequence	Bus rights R-S MC-2	Fault 4	VF1 flow sensor mixer circuit 1	4
	Max. limit solar sensor (KSPF)	Clock blocking heat generator	Forced discharge	Cooling buffer start-up protection		Stage reversal		Fault 5	VF2 flow sensor mixer circuit 2	5
	Solar mode of operation		Skimming function switch-on differential			Control stage		Fault 6	KVLF collector sensor	6
	Clock blocking heat generator		Skimming function switch-off differential			Peak load stage		Fault 7	KSPF solar buffer sensor	7
	Solar priority/ parallel operation		Buffer start-up protection			Multiple series connection		Fault 8	Sensor VE-1	8
	Heat balance		Buffer discharge protection			DHW Fast activation		Fault 9	Sensor VE-2	9
	Reset heat balance		Buffer operating mode			Peak load elevation		Fault 10	Sensor VE-3	10
	Flow rate HT medium		Follow-on time PLP					Fault 11		11
	Density HT medium		Switch-off reference value temp.					Fault 12		12
	Thermal capacity HT medium		H-GEN release temp. skimming function					Fault 13		13
	Final switch-off temperature							Fault 14		14
	Test cycle solar charging switch-over							Fault 15		15
	Switch-over temperature (SLVF)							Fault 16		16
								Fault 17		17
								Fault 18		18
								Fault 19		19
								Fault 20		20

Designation	Factory	Regulator						Setting range/ Setting values
		U90	U110	UG		N	NWP	
	Type of device :							
	HW :							
	SW :							
	Adresse :							
Surface operation	**Key :**							
Heating curve HC	OFF	OFF	OFF	OFF		OFF	OFF	OFF, 0,20 3,5
Heating curve MC1	1.0 /0.6	1.00	1.00	1.00		1.00	***0.6***	OFF, 0,20 3,5
Heating curve MC2	1.0 /0.6	1.00	1.00	1.00		1.00	***0.6***	OFF, 0,20 3,5
Daytime target temperature HC	20°C	20	20	20		20	20	5...30°C *)
Daytime target temperature MC1 *)	20°C	20	20	20		20	20	5...30°C *)
Daytime target temperature MC2 *)	20°C	20	20	20		20	20	5...30°C *)
Daytime cooling MC1	0.0K	0	0	0		0	0	-20 … +20K
Daytime cooling MC2	0.0K	0	0	0		0	0	-20 … +20K
Night-time target temperature *)	16°C	16	16	16		16	16	5...30°C *)
Night-time target temperature MC1*)	16°C	16	16	16		16	16	5...30°C *)
Night-time target temperature MC2 *)	16°C	16	16	16		16	16	5...30°C *)
Night-time cooling MC1	0.0K	0	0	0		0	0	-20 … +20K
Night-time cooling MC2	0.0K	0	0	0		0	0	-20 … +20K
Hot water target temperature	50 /45°C	50	50	50		50	***45***	5...HW max.

*) Depending on the setting of system parameters 03 OPERATING MODE resp. availability

Overview of parameter levels

	TIMEPROGRAMS
HYDR.	HYDRAULIC
SYST.	SYSTEM
DHW	DHW
DC	UNMIXED CIRC
MC-1	MIX.VALVE-1
MC-2	MIX.VALVE-2
H-GEN	HEAT GENERATOR
HP	HEAT PUMP
	BOILER CONTR
RLP	RETURN CONTR

SOLAR	SOLAR
SOLID	SOLID FUEL
BU-T	BUFFER
K-SP	COOLING BUFFER
SVLF	COMMON FLOW
CASC	CASCADE
	BUS
	RELAY TEST
	ALARM
	SENSOR ALLOC.
	TIME-DATE

Control levels

BE	Operator level (no code)
HF	Heating expert (code.....)
OEM	Manufacturer level (code .....)

Remote operation/room stations

Type	Heating circuit	Address	HW	SW

8.1 Parameter level “Hydraulics” General

The selected “Hydraulics” has an effect on the parameters indicated later. The parameters appearing later are similarly affected by:
- the connected sensors (SET function)
- the set system parameters
- the key used

Parameters which are not necessary are no longer indicated by the device

The hydraulic parameters define the plant

- Inputs and outputs are available which are released by the “key” and its assigned function!
- By setting the parameters, the function of the appropriate output is determined!

- Changes can have profound effects on the functioning of the controller!
- Parameter settings made elsewhere can be lost!
- Individual adjustments must therefore be carried out very carefully!

Example using hydraulic parameter 5

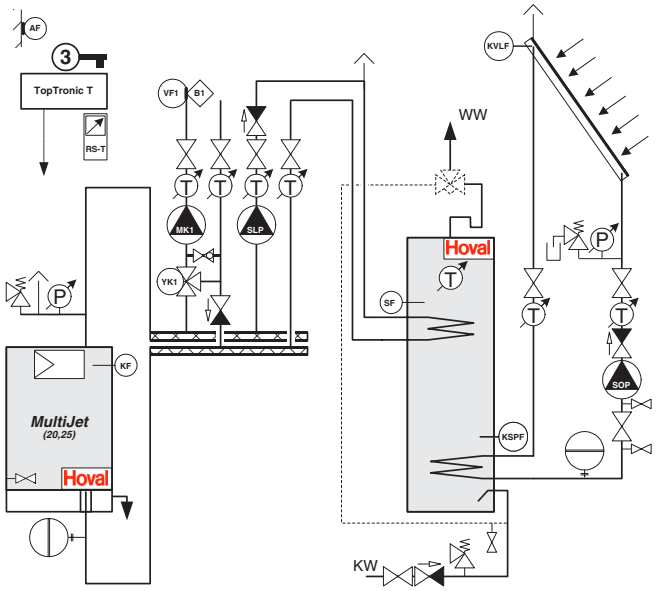
OFF no function
2 Direct circuit pump
4 Circulating pump
5 Electric heating element
6 Constant regulation
10 Feed pump
11 Boiler circuit pump 1
12 Boiler circuit pump 2
13 Collective fault
14 Timer
15 Solar pump

Function allocation for direct circuit pump - **factory-installed setting: DKP (2)**

If the function “Circulating pump (4)” is assigned to this output, the function DKP is **no longer available to this output!**

Hydraulic parameters have a hydraulic pre-setting...
- and can be changed individually!
- variable **inputs and outputs** can be adapted **individually!**
- **and hydraulics that are not pre-defined can be implemented.** (Expert knowledge required)

Examples:

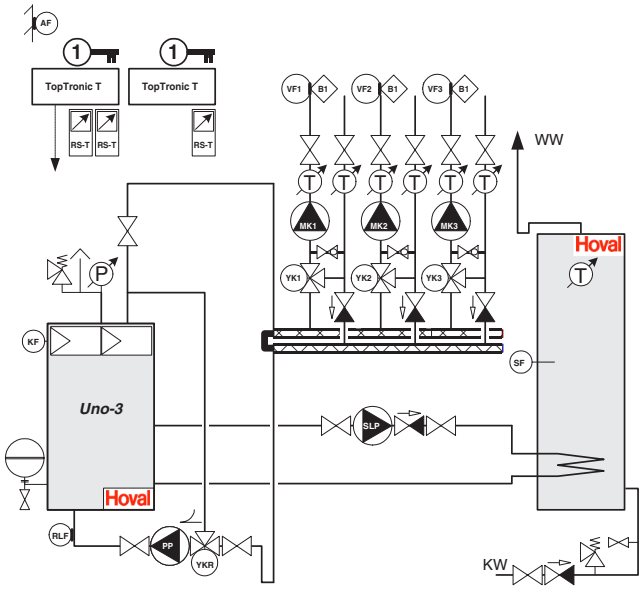


Allocation

Bezeichnung/Notation/ Denominazione/Désignation	SOP
Klemme/Terminal Morsetti/Bornes	VA1

HYDRAULIK/HYDRAULIC/ IDRAULICA/HYDRAULIQUE:

Par. 6 : 15 "Solar charging pump"



Allocation

Bezeichnung/Notation/ Denominazione/Désignation	PP	YKR	RLF
Klemme/Terminal Morsetti/Bornes	VA1	YK2	VF2

HYDRAULIK/HYDRAULIC/ IDRAULICA/HYDRAULIQUE:

Par. 04 : 08 "Return maintenance"
Par. 06 : 26 "Primary pump"

RUECKLAUFANH/RETURN CONTR/ TEMP.RITORNO/TEMP.RETOUR:

Par. 01 : .....°C "Return min. temperature"

Variable functions

… if an input value is absolutely necessary e.g.: Sensor, then this sensor is compulsorily assigned to the appropriate variable input!
- this input can then no longer be changed manually!
- if individual settings have been undertaken previously for the corresponding input, they are overwritten and the relevant functions are reset!

Example - allocation:

1st input:
- The variable **input 1** -> **outside sensor 2** (AF2 Par.: 8 =1)

2nd input:
- The variable **output 1** -> the function **"buffer charging pump"** (Par.:6 =16)

Reaction:
- The variable **input 1** is now reset automatically!
- Parameter 8 disappears from the display! AF2 is no longer present - **AF2 not active!**
- The buffer sensor is automatically assigned to **input 1** since it is needed for regulation!

If the **2nd input** were shifted to **output 2**, “both settings” would be possible!

Connection and setting table

No.	Function	Can be set at output	Inputs		
			Firmly assigned	Optional (VE 1/2)	Comments
1	Hot water charging	SLP	SF	---	Fixed sensor input
2	Direct heating circuit weather-driven	DKP,MC1,MC2	---	---	
3	Mixer heating circuit weather-driven	MC1,MC2	VF1,VF2	---	Fixed sensor input for respective mixer heating circuit
4	Circulating pump	SLP,DKP,VA1,VA2	---	---	
5	Electric heating element	SLP,DKP,VA1,VA2	---	---	
6	Constant regulation	DKP,MC1,MC2	VF1,VF2	---	Sensor with connection to MC
7	Set-value control	MC1,MC2	VF1,VF2	---	Sensor with connection to MC
8	Return maintenance	MC1,MC2	VF1,VF2	---	Constant return maintenance (3-point)
9	Bypass pump	VA1,VA2	RLF(VE1,VE2)	---	Return sensor at VE1 or VE2
10	Feed pump	DKP,VA1,VA2	---	---	
11	Boiler circuit pump 1	DKP,VA1,VA2	---	---	
12	Boiler circuit pump 2	DKP,VA1,VA2	---	---	
13	Collective fault signal	DKP,VA1,VA2	---	---	
14	Timer	HCP	---	---	
15	Solar pump	DKP,VA1,VA2	KVLF,KSPF	KRLF	Return sensor option
16	Buffer charging pump	VA1,VA2	PF(VE1,VE2)	PF1	If PLP is set, PF is firmly assigned to VE. Otherwise PF1 can be set on the free VE (activation of buffer management)
17	Solid fuel charging pump	VA1,VA2	FKF(VE1,VE2)	FPF	FKF firmly assigned to corresponding VE, standard Buffer sensor is KSPF, own solid buffer sensor FPF configurable (option)
19	Solar charging valve	VA1,VA2	SLVF(VE1,VE2)	---	SLVF in hot water tank, KSPF in buffer
20	Solar forced discharge valve	VA1,VA2			
21	Parallel H-Gen release	DKP, VA1, VA2	---	---	
25	Active cooling change-over	DKP, VA1, VA2	---	---	
26	Primary pump	VA1, VA2	---	---	
27	Hydraulic buffer relief	DKP, VA1, VA2	PF1 (VE1,2,3)	---	
28	Summer/winter	DKP, VA1, VA2	AF	---	
37	Thermostat function	DKP,MC1,MC2	---	all	Selection sensor allocation all active sensors of CU
41	Heating/ cooling change-over	DKP, VA1, VA2	---	---	
42	Heat source pump	DKP, VA1, VA2	---	QF (VE1, VE2, VE3)	Heat source sensor option
43	Condenser pump	DKP, VA1, VA2			
44	Passive cooling change-over	DKP, VA1, VA2			

8.2 Parameter level “Hydraulics” Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
2	Function allocation of the output Hot water charging pump	**1**	1	1	1		1	1	OFF No function 1 Hot water charging pump 4 Circulating pump 5 Electric heating element	HF
3	Function allocation of the output Mixer circuit 1	**3**	3	3	3		3	3	OFF No function 2 Direct circuit weather-driven 3 Mixer circuit weather-driven 6 Constant regulator 7 Fixed value regulator 8 Return maintenance 35 Plant flow control 36 Plant flow control H-Gen 38 Return maintenance with common flow control 40 Constant regulator cooling	HF
4	Function allocation of the output Mixer circuit 2	**3**	3	3	3		3	3	Setting range and allocation as in Par. 03	HF
5	Function allocation of the output Direct circuit Pump	**2**	2	2	2		2	2	OFF No function 2 Direct circuit pump 4 Circulating pump 5 Electric heating element 6 Constant regulation 10 Feed pump 11 Boiler circuit pump 1 12 Boiler circuit pump 2 13 Collective fault 14 Timer 15 Solar pump 21 Parallel heat gen. release 25 HP active cooling change-over UKA 27 Hydraulic buffer relief 28 Summer/winter output (SU-ON/OFF) 37 Thermostat function 41 Heating/ cooling change-over UHK 42 Heat source pump MWQ 43 Condenser pump CP 44 HP passive cooling change-over UKP	HF
6	Function allocation of the variable output 1	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF No function 4 Circulating pump 5 Electric heating circuit 9 Bypass pump 10 Feed pump 11 Boiler circuit pump 1 12 Boiler circuit pump 2 13 Collective fault signal 15 Solar charging pump 16 Buffer charging pump 17 Solid fuel charging pump 19 Solar charging change-over 20 Solar forced discharge 21 Parallel heat gen. release 25 HP active cooling change-over UKA 26 Primary pump 27 Hydraulic buffer relief 28 Summer/winter output (SU-ON/OFF) 37 Thermostat function 41 Heating/ cooling change-over UHK 42 Heat source pump MWQ 43 Condenser pump CP 44 HP passive cooling change-over UKP	HF
7	Function allocation of the variable output 2	**OFF/ 43**	OFF	OFF	OFF		OFF	***43***	For setting range and allocation see Par. 06	HF

Legend for hydraulics: Setting range/setting values for parameters 01 to 07
Re hydraulics parameter:02
1 Hot water charging pump/tank charging pump (SLP)

Re hydraulics parameter: 03, 04, 05
2 Direct circuit (HC)
- Weather-driven

Re hydraulics parameter: 03, 04
3 Mixer circuit (MC…)
- Weather-driven

Re hydraulics parameter: 02, 05, 06, 07
4 Circulating pump (ZKP)
- Can be appended to an existing switching time program,
- ON/OFF same as for the heating and/or HW cycle.
- If P2 and/or P3 (system level) not active, it functions in the background according to P2 and P3 standard setting.
- Further allocation under “hot water level” as for switching time program, running time and pause of the pump.

Re hydraulics parameter: 05, 06, 07
5 Electric heating element ...
- If summer disconnection active (heating and hot water OFF)
- Programmed output 1 or 2 active, the E-heating is “cleared” indirectly via a power switch/contactor provided by the customer (must be equipped with HW thermostat and safety device.)
- HW timer not active in summer operation

Re hydraulics parameter: 03, 04, 05
6 Constant regulator
- Activated in the heating circuit HC, MC-1 or MC-2
- Drives constant temperature according to default (basic heating, swimming pool etc.)
- Setting “Demand contact under VE… “ (e.g.: Par. 3 =6; Par.8 = 5)
- Allocation thereafter takes place in the system level “ - allocation of the contact visible

Re hydraulics parameter: 03, 04
7 Fixed value regulator
- Activated in the heating circuit MC-1 or MC-2
- Heating circuit drives constant temperature according to default,
- Passes on no demand value to the boiler
- Pump outlet of activated circuit not usable

Re hydraulics parameter: 03, 04
8 Return maintenance
- Function module “Return increase” is activated
- Further allocation under “Return increase”
- If a H-Gen is deactivated with cascades, the return maintenance is switched off after expiration of the follow-on time of the boiler circuit pump (KKP).

Re hydraulics parameter: 06, 07
9 Bypass pump/return bypass pump (RBP)
- Simplest type of return maintenence (return sensor necessary)
- If the return temperature to the boiler falls below the set return minimum temperature limit, the bypass pump switches to “ON” (only usable with single boiler plants)

Re hydraulics parameter: 05, 06, 07

10 Feed pump (ZUP)

- Active only if HCP, VA1 or VA2 output assigned to the feed pump
- ZUP active if heating or HW demand is present
- A central device with the bus address 10, all incoming demands have access to the ZUP
- Further controllers with the bus addresses 20, 30, 40, 50, then the ZUP remains in this range of the respective controller.
- The follow-on time etc. is set under “heat generator level”.

Re hydraulics parameter: 05, 06, 07

11 Boiler circuit pump 1 (KKP1)

- Active only if DKP, VA1 or VA2 output assigned to the boiler circuit pump
- KKP1 active if demand is present at the boiler, however is only released on the expiry of the lead time of the boilers (necessary with shut-off device - opening time.)
- At the end, the follow-on time of the boiler circuit pump still takes place
- The lead time or follow-on time etc. is set under “heat generator level”.

Re hydraulics parameter: 05, 06, 07

12 Boiler circuit pump 2 (KKP2)

- Functional sequence as for boiler circuit pump 1
- KKP2 for the subsequent boiler

Re hydraulics parameter: 05, 06, 07

13 Collective fault

- As output: activate variable output VA1 or VA2
- As input: activate variable input VE1… VE3, a short-circuit produces a fault signal in the regulator/data bus

Re hydraulics parameter: 05

14 Timer

- Only if output DKP on timer (Par.: 5 = 14)
- Controls a consumer etc. according to the current switching time program of “the direct heating circuit”.

Re hydraulics parameter: 05, 06, 07

15 Solar pump (SOP) solar functions

- If activated, two separate sensor inputs are available
- 1 x collector sensor (KVLF) and 1 x solar tank sensor (KSPF)
- For the heat balancing, there is also the solar return sensor (KRLF) via one of the variable inputs VE1, VE2, VE3
- If the collector sensor (KVLF) becomes defective, the solar pump is blocked!
- Setting under “solar level”

Re hydraulics parameter: 06, 07

16 Buffer charging pump (PLP)/buffer tank function

- Active only if VA = buffer charging pump or VE = buffer sensor (PF) have been assigned
- Transports the additional energy - > buffer/heating circuit/HW etc.
- For shift charging, a 2nd buffer sensor (PF2) is possible

Re hydraulics parameter: 06, 07

17 Solid fuel charging pump (FSP)

- For solid boiler sensor (FKF), automatic allocation to variable input VE1 or VE2
- In the case of a defective solid boiler sensor (FKF), the solid fuel charging pump is compulsorily switched on
- The solid buffer sensor (FPF) can be assigned to a free variable input VE1, VE2, VE3
- If no variable input (VE…) is used, the value of the solar tank sensor (KSPF own input) can be used as a common buffer sensor
- The sensor input KSPF can therefore be used for several heat suppliers (solar/solid etc.) - set in “solar level”.

Re hydraulics parameter: 06, 07

19 Solar charging change-over (SLV)/tank charging change-over

- The change-over (cock/switch) can take place on buffer tank/hot water tank
- With this function, a “diverting actuator” is switched depending on the charging state of two heat accumulators

Function change-over:

- The additional solar tank sensor (SLVF) is installed in the tank that is required as a priority, usually the HW tank, and it is checked at regular intervals to see whether a sufficient solar supply is present.
- If after a time interval of 30 minutes, the switch-over condition is not met and the charging conditions of the secondary tank (KSPF) are met, the solar charging pump (SOP) turns off
- During the down time (Par.15) the difference is determined continuously between collector sensor (KVLF) and the sensor for the solar charging change-over (SLVF).
- If the switch-on condition is met again, then charging of the “priority tank” begins and, if the temperature thereafter is not sufficient, after the down time has expired (Par.15) it is switched to the secondary tank.
  This cyclic check takes place continually.
- The priority tank (SLVF) is charged up to the set switch-over temperature (Par.16)
- The secondary tank (KSPF) is charged up to the set solar tank maximum temp. (Par.5)
- Parameters are set in the “solar level“

Re hydraulics parameter: 06, 07

20 Solar forced discharge / heat forced discharge

- Contributes to avoidance of outgassing in the solar medium
- The setting value for the final switch-off is independent of the collector maximum temperature, and this yields, independently of one another, an obligatory switching ON and an obligatory switching OFF of the solar charging pump (SOP)

Under the following conditions the solar forced discharge is switched:

- Release of the function (VA1, VA2), if the maximum temperature in the “solar storage” and in the collector is exceeded. Simultaneously the solar tank (KSPF) is overloaded by 10K. The solar pump is finally turned off if the final switch-off temperature or the solar tank is exceeded by max. temp. + 10K

Re hydraulics parameter: 05, 06, 07

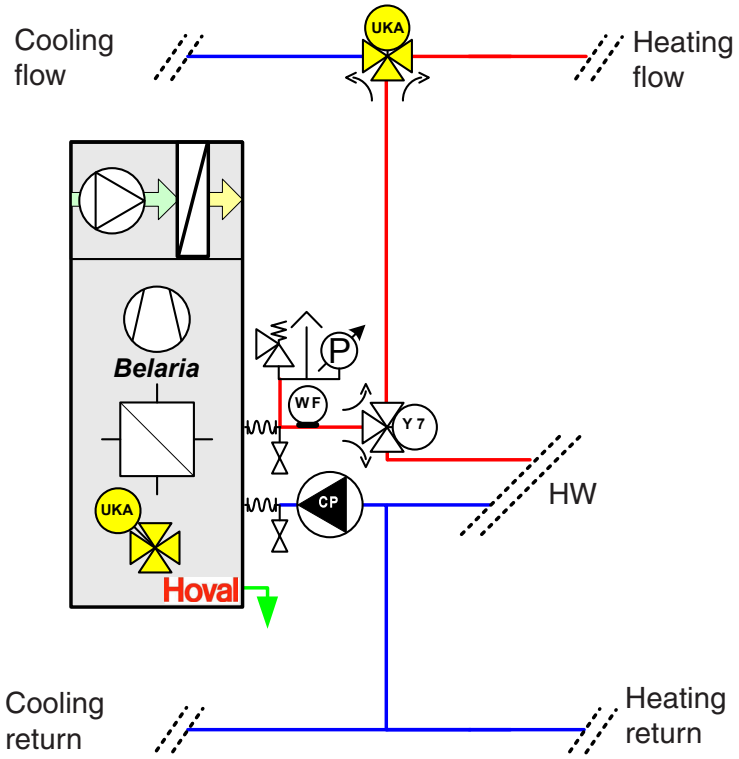
21 Parallel WEZs (heat generators) release (PWF)

- Active only if PWF is assigned DKP/VA1/VA2
- Switch-on if burner relay is active, without lead time
- Switch-off with follow-on time (H-Gen Par.14)
- Additional setting of a boiler circuit pump permissible
- The clock blocking “solar/solid” and external blocking also intervenes

Re hydraulics parameter: 05, 06, 07

25 HP active cooling change-over UKA

- The UKA output is activated if the heat pump receives a cooling reference value.
- With setting UKA (active cooling change-over), UHK (heating/ cooling change-over) or UKP (passive cooling change-over) all Par. needed for cooling are shown.
- The cooling function must then be activated separately for each heating circuit in the heating circuit tree via Par. (50) "Cooling switch-on point, OT". The cooling function for the corresponding heating circuit is only active after a reference temperature has been parameterised here (<> OFF).
- If at the same time a heating reference value is present in addition to the cooling reference value and if the heating value has higher priority due to Par. "H-GEN priority", the UKA output remains switched off (see HP Par. 52 "H-GEN Priority")



Re hydraulics parameter: 06, 07

26 Primary pump (PP)

- Active only if PP is assigned VA1/VA2
- Function corresponds “to feed pump (ZUP)” but a hot water demand is not taken into consideration

… see setting No.:10!

Re hydraulics parameter: 05, 06, 07

27 Hydraulic buffer relief (HBR-Y9)

- Carried out by means of three-way switching fitting (cock/switch)
- Distance shortening in the buffer - > partial charge; voltage present at motor
- Motor without current - > full charge
- Fixed switch-off difference 5K; i.e. if value is below reference value "ON", if +5K over buffer reference value “OFF”

Re hydraulics parameter: 05, 06, 07

28 Summer/winter

- Function: variable output for summer/winter operation
- ACTIVE = output (contact) closed, if summer operation
- INACTIVE = output (contact) open, if winter operation

Display:

- below left SU
- below right OFF/ON

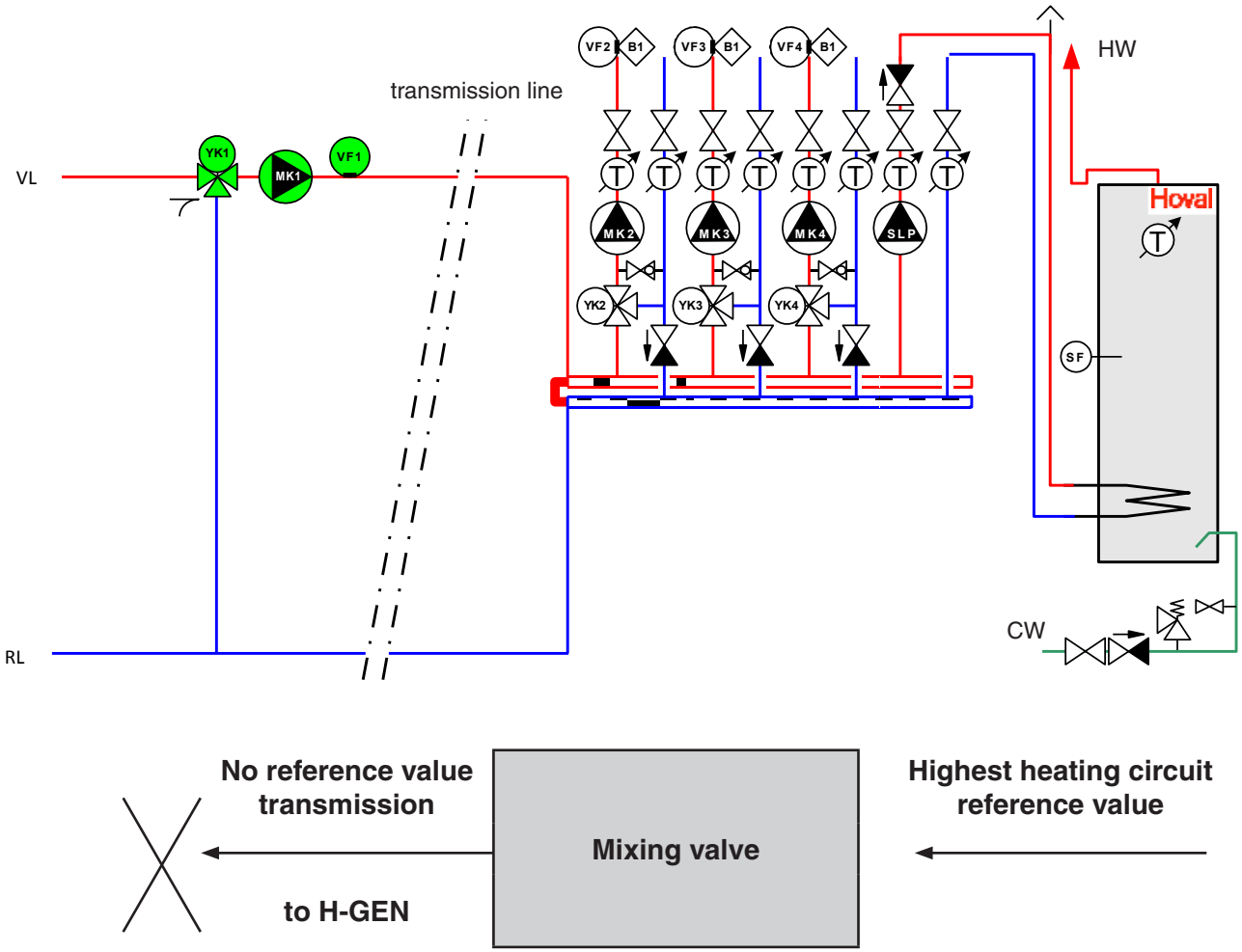
Re hydraulics parameter: 03, 04

35 Plant flow control

- The highest plant reference value of the consumer circuits is regulated by the mixer circuit output (MC1 or 2) on the flow sensor (VF1 or 2).

In parameter tree MK1 or 2, the following parameters influence the plant reference value comprehensively:
Par. 12: Minimum temperature limit (5°C ... Par.13)
Par. 13: Maximum temperature limit (Par.12 ... 105°C)
Par. 38: Offset mixer circuit (-10... +10K, Factory: 0) elevation/abatement to plant reference value

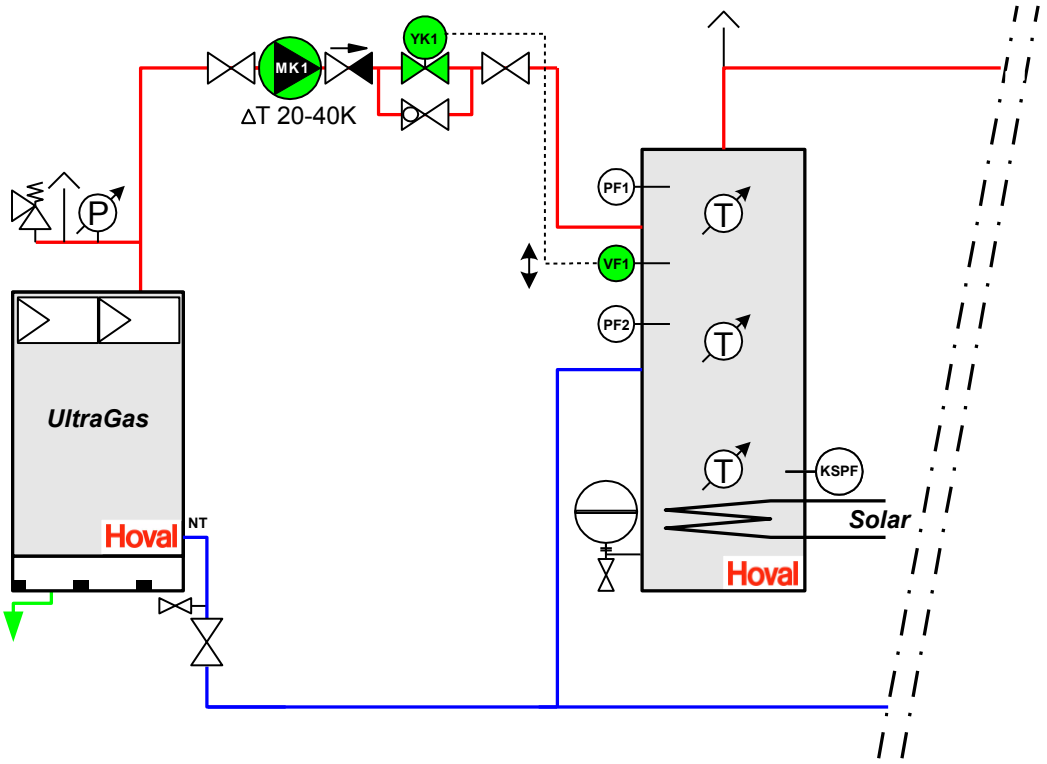
In case of demand the MC pump outlet is activated (follow-on time can be set with Par. 15)
All demand from the distributing heating circuits (HW+HCs) is handled via the plant flow control.

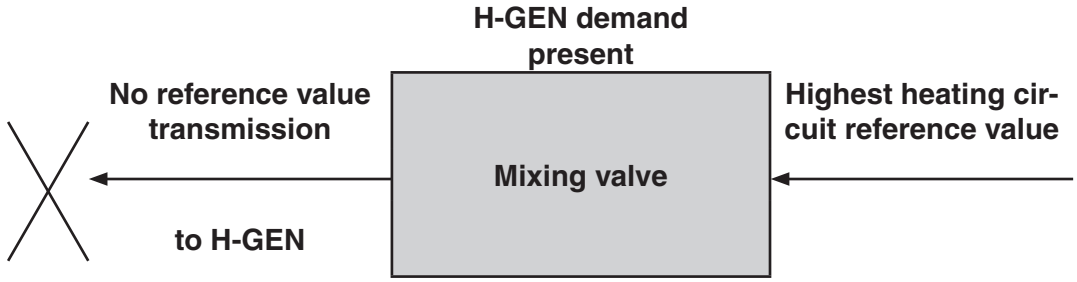


Re hydraulics parameter: 03, 04

36 Plant flow control H-GEN

- The highest plant reference value of the consumer circuits is regulated by the mixer circuit output (MC1 or 2) on the flow sensor (VF1 or 2), but only if a H-GEN is being demanded. The parameters working are the same as for mixer plant flow control.





Re hydraulics parameter: 05, 06, 07

37 Thermostat function

- On output (DKP, VA1, VA2) a thermostat function can be activated.
- A sensor is then allocated.
- In addition, a reference value and a switching difference are set.

If the actual value falls below the set reference value (-½ SD), the output activates.

Hydraulics: Par 5, 6, 7 : 37 Thermostat function
System : Par. 30 Sensor allocation (AF, KF, SF, VF1, VF2, KVLF, KSPF, VE1, VE2, VE3) Factory :AF
System : Par. 31 Reference value (-20 to +250°C) Factory: 1°C
System : Par. 32 Switching difference (symmetric 1 to 90 K) Factory : 3K

The thermostat function can be set once for each controller.
Input/ output allocation only takes places within one central device.
The sensor that has been allocated must on principle be present, e.g. if no solar system is in operation, the KVLF sensor cannot be allocated.

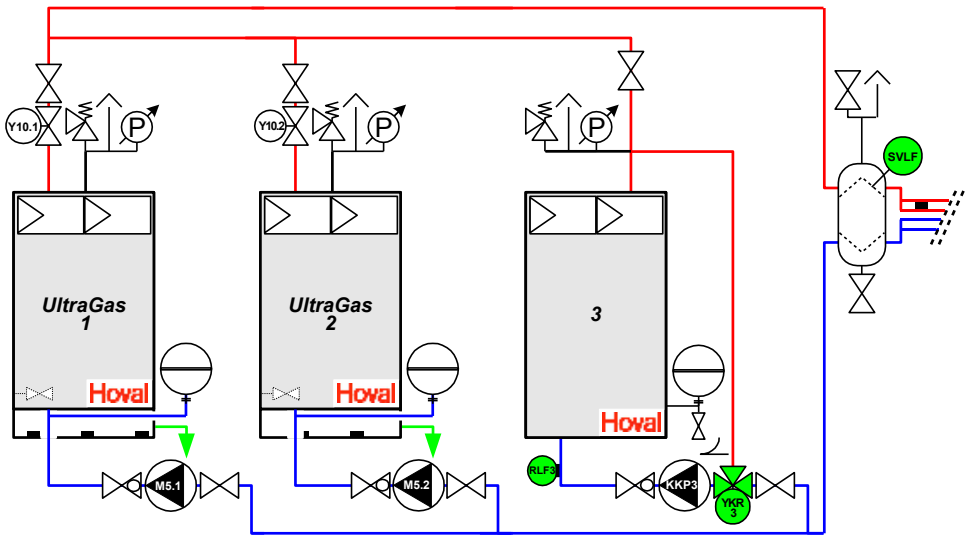
Re hydraulics parameter: 03, 04

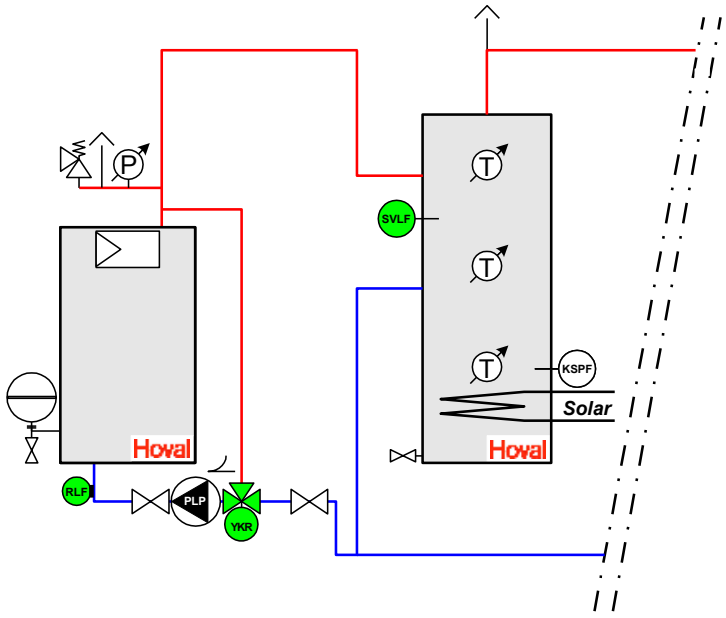
38 Return maintenance with common flow control

- The mixer circuit output (MC1 or 2) works like a return maintenance.
- In addition, a common flow sensor (SVLF) will be or has been mounted which regulates the highest plant reference value of the consumer circuits on the SVLF.
- If the return temperature falls below its reference value, this has comprehensive effect.

Return increase Par. 1: Minimum return temperature
In the parameter tree MC1 or 2 the following parameters are additionally working on the plant reference value:
Par. 12: Minimum temperature limit (5°C ... Par.13)
Par. 13: Maximum temperature limit (Par.12 ... 105°C)
Par. 38: Offset mixer circuit (-10... +70K, Factoy: 0) elevation/abatement to plant reference value

Regulation of the mixer is effected to the SVLF value, independent of any common flow control which may also be active. The return sensor is used exclusively as a limiting sensor for the minimum temperature.





Re hydraulics parameter: 03, 04

40 Constant regulator cooling

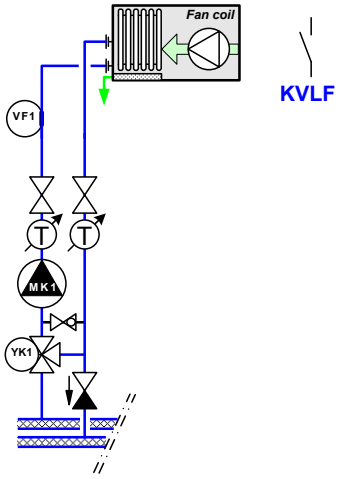
- The mixer circuit output (MC1 or 2) operates with constant temperature default. A cooling demand value exclusively is being transmitted to the energy management. - The operating mode of the corresponding heating circuit is active.- Mixing valve operation is inverse to heating operation. (OPEN demand means more cooling)
- The default constant cooling temperature is set in the corresponding parameter "Constant temperature reference value" (HK-Par. 11).
- If a heat generator temperature elevation is parameterised (HC-Par. 14), this value is deducted from the cooling reference value.
- the min. cooling temp. is also active with constant cooling (HC-Par. 56)

The constant regulator cooling can also be realised by means of a demand contact. The operating mode then does not apply, as the activation of the cooling is dependent purely on the demand contact.

Example : Constant regulator cooling on heating circuit MC1:

Parameter settings:
Hydr.: P03: 40 Constant regulator cooling (MC1)
Hydr.: P14: ON Release contact cooling (KVLF)

MK1 P11: Constant temperature reference value e.g. 10°C
(P56 adjust min.temp. cooling!)

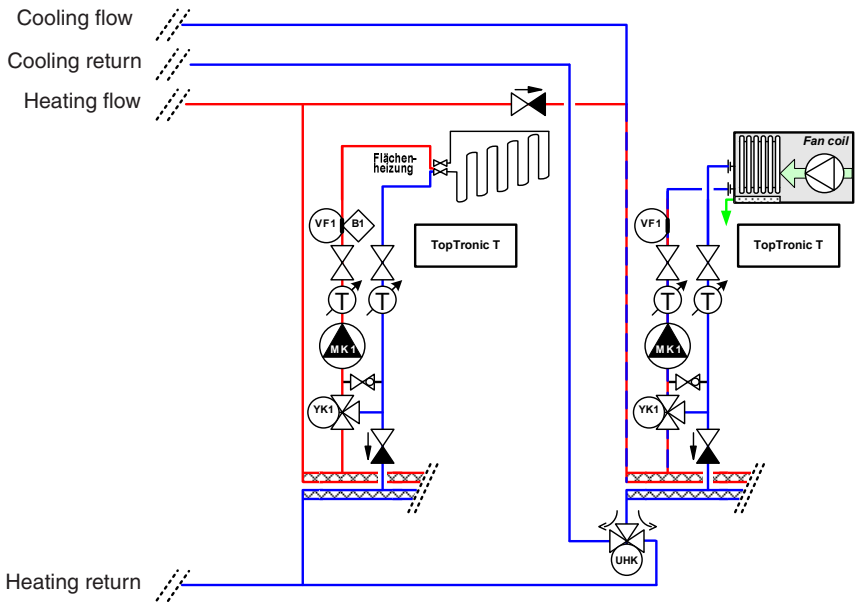


Re hydraulics parameter: 05, 06, 07

41 HK Heating/ cooling change-over (UHK)

- allows switch-over on the heating circuit side from a heating circuit to a cooling circuit and back.
  1) Output has been parameterised on central unit with address 10:
  If a heating circuit in the system (CU 10…50) has a cooling demand, the output switches ON - If no heating circuit has a cooling demand the output switches OFF
  2) Output has been parameterised on follow-up controller (address 20...50):
  If a heating circuit has a cooling demand on the same controller, the output switches ON - If no heating circuit has a cooling demand on the same controller the output switches OFF - Cooling demands of heating circuits of other controllers are not taken into account

A cooling demand may be initiated either by a weather-controller heating circuit in cooling operation or by a constant regulator cooling.



Re hydraulics parameter: 05, 06, 07

42 Heat source pump (MWQ)

- Active only if DKP, VA1 or VA2 output assigned to the heat source pump.
- MWQ active if there is a switch-on demand on H-GEN.
- separate lead resp. follow-on time can be set (HP level)
- H-GEN stage is released after expiration of the lead time only

- in passive cooling operation the heat source pump (MWQ) is switched on even if there is no H-GEN switch-on demand.

Manual operation of heat source pump:

- by tapping the manual key the MWQ is switched on
- any other HP and heating circuit functions are switched off
- the function is terminated either by pressing the manual key again or after the counter termination (180 min).

Re hydraulics parameter: 05, 06, 07

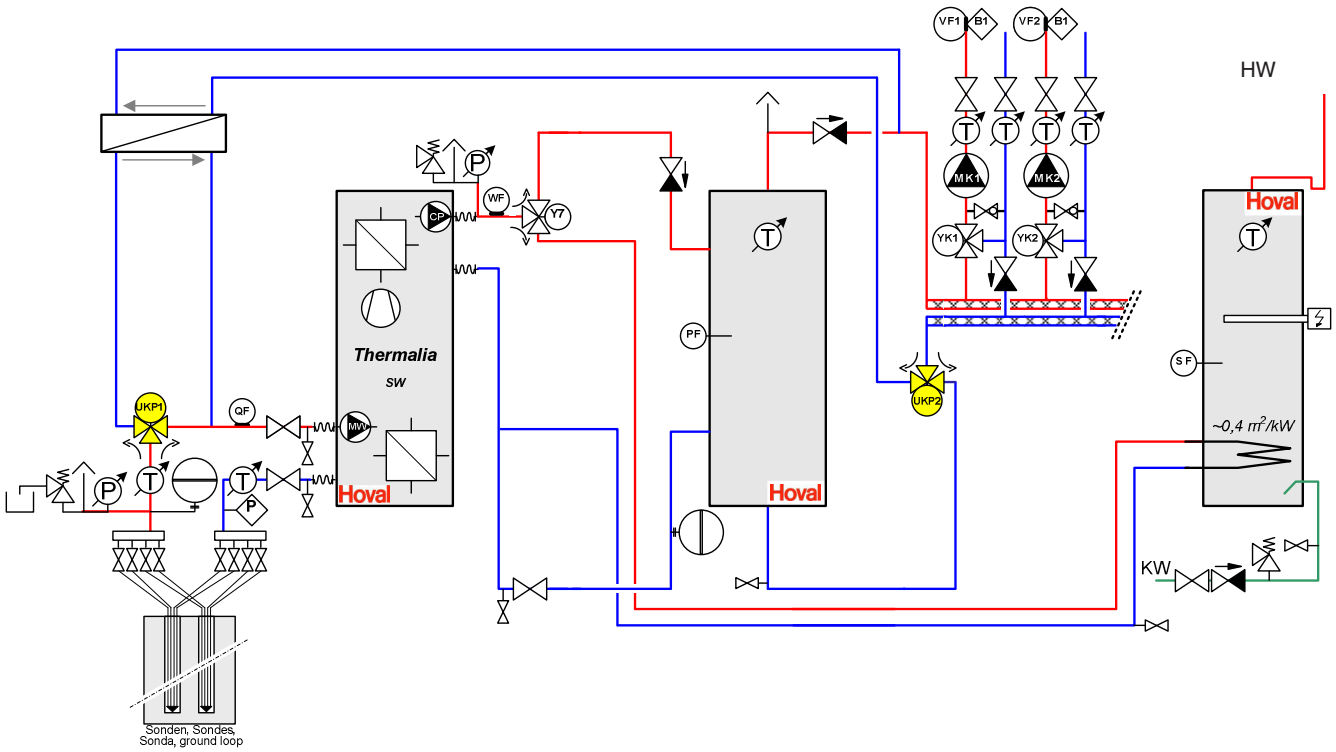
43 Condenser pump / HP main pump (CP)

- Active only if HCP, VA1 or VA2 output assigned to the condenser pump
- CP active if there is a demand on H-Gen.
- separate lead resp. follow-on time can be set (HP level)
- H-GEN stage is released after expiration of the lead time only
- additionally HP Par.62 determines whether the CP is running during HW charging process or not.

Re hydraulics parameter: 05, 06, 07

44 HP passive cooling change-over UKP

- The UKP output switches on if cooling is active
- With setting UKP all Par. needed for cooling are shown.
- The cooling function must then be activated separately for each heating circuit in the heating circuit tree via Par. (50) "Cooling switch-on point, OT". The cooling function for the corresponding heating circuit is only active after a reference temperature has been parameterised here (<> OFF).
- Passive cooling functions like active cooling except that no control of the H-GEN stages takes place.
- With active passive cooling the cooling is not interrupted in the event of a HC or HW demand (UKP remains switched)
- With active passive cooling the heat source pump (MWQ) is switched on



Parameter level "Hydraulics" 08-11

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
8	Function allocation of the variable input 1	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 1 Outside sensor 2 2 Heat generator sensor 2 3 Tank sensor 2 4 Buffer sensor 2 5 Demand contact 6 External fault reporting input 9 Return sensor 10 External heat generator blocking 11 External switching modem 12 External information 13 Common flow sensor 14 Collector return sensor 16 Exhaust gas sensor 18 Solid buffer sensor 19 Buffer sensor 1 27 Minimum value override 33 Lock by energy supply company 34 HP return sensor WPRL 35 Heat source sensor QF 36 Fault HP (WPS)	HF
9	Function allocation of the variable input 2	**OFF**	OFF	OFF	OFF		OFF	OFF	Setting range and allocation as for parameter 08, but without 16 (exhaust gas sensor)	HF
10	Function allocation of the variable input 3	**OFF/ 33**	OFF	OFF	OFF		OFF	***33***	Setting range and allocation as for parameter 08, but without 16 (exhaust gas sensor)	HF
11	Indirect return increase	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	HF
12	Maximum limit energy management	**80°C**	80	80	80		80	80	10 ... 110°C	HF
13	Activation cooling buffer	**OFF**	X	X	X		X	***OFF***	OFF, ON	HF
14	Release contact cooling to KVLF	**OFF**	X	X	X		X	***OFF***	OFF, ON	HF

Legend for hydraulics: Setting range/setting values for parameters 08 to 11

<u>Re hydraulics parameter: 08, 09, 10</u>

1 Outside sensor 2 (AF2)

- Sensor allocation only with 2nd outside sensor (AF2) at VE…
- Selection of AF1, AF2 and average value
- If an outside sensor (AF) is defective, the 2nd AF takes over - fault signal follows
- If both outside sensors are defective, regulation is according to a fictitious outside temperature of 0°C resp. after setting of Par. 29 "Characteristic curve emergency operation"

<u>Re hydraulics parameter: 08, 09, 10</u>

2 Boiler sensor 2 (KF2)

- Connection via VE1, VE2, VE3
- Operation with two single-stage boilers (KF1+KF2)
- Operation with boiler with two measuring points (KF1+KF2):
  Switch ON - if both sensor values fall below the setpoint
  Switch OFF – if both sensor values exceed the setpoint

<u>Re hydraulics parameter: 08, 09, 10</u>

3 Tank sensor 2, bottom (SF2)

- For shift charging (charging the hot water tank)
- Switch ON – if both sensor values (SF1+SF2) fall below the setpoint
- Switch OFF – if both sensor values (SF1+SF2) exceed the setpoint

Re hydraulics parameter: 08, 09, 10

4 Buffer sensor 2 bottom (PF2)

- The 2nd buffer sensor for shift charging (charging the buffer tank)
- Switch ON – if both sensor values (PF1+PF2) fall below the setpoint
- Switch OFF – if both sensor values (PF1+PF2) exceed the setpoint

Re hydraulics parameter: 08, 09, 10

5 Demand contact

- Present if a “demand contact” and the associated heating circuit have been defined
- For heating circuit HC, MC1, MC-2 (constant regulator etc.)
- The demand contact can be assigned to one of the three variable inputs VE1, VE2, VE3 in the “system level “ (par.: 6, 7, 8)
- Setting range for HC, MC1, MC-2, HW, ALL
- Note: no cross-regulator function!
- When the demand contact is activated, “modes of operation/switching times” do not have a function, reaction according to default values of the demand contact
- Modes of operation such as manual operation, emission measurement with STL test and screed function have priority

Contact functions:

- In the case of closed contact - > modes of operation “HEATING” (thus constantly on daytime reference value)
- In the case of open contact - > heating circuit is switched off, no frost protection or standby (preventive measures must be provided by the customer)

Re hydraulics parameter: 08, 09, 10

6 External fault signal

- Via variable input VE1, VE2, VE3, input
- As switching contact: Short-circuit introduces a fault signal in the data bus
- Can be passed on via a fault signal output

Re hydraulics parameter: 08, 09, 10

9 Return sensor (RLF)

- Necessary with setting P11: indirect return increase

Re hydraulics parameter: 08, 09, 10

10 External heat generator/boiler blocking

- If the assigned variable input VE… - switching contact is short-circuited, the boiler/heat generator is blocked
- If the block is lifted, the boiler is immediately released
- No logical fault signal
- Must not be used for safety disconnection

Re hydraulics parameter: 08, 09, 10

11 External switching modem

- Activated over variable input VE1, VE2, VE3 with switching modem provided by the customer by telephone
- The mode of operation of the respective wiring of VE… off
- Assigned and visible in one of the three variable inputs VE… at the “system level” (par.: 6, 7, 8), setting possibility for HC, MC1, MC-2, HW, ALL (ALL=across regulators)

Possibilities VE… contact wiring…

- Open - > “AUTO, REDUCED, HEATING, STANDBY” (according to the set programme)
- Short-circuited - > works in STANDBY
- “HEATING” mode of operation - > with resistance connection (against GND) 2.2 kOhm –
- “REDUCED” mode of operation - > with resistance connection (against GND) 3.0 kOhm
- Only one modem may be attached
- The setting of the external switching modem can take place several times simultaneously. (VE1+2+3) Function allocation ALL has top priority, subsequently priority is given in the order VE1,VE2,VE3

Re hydraulics parameter: 08, 09, 10

12 External Information

- Activated via variable input VE…
- Connection of a standard sensor
- No control effect, only INFO value
- External information can be parameterised several times (for each VE)

Re hydraulics parameter: 08, 09, 10

13 Common flow sensor (SVLF)

- Main use with a multi-boiler system
- The sensor connected at VE… records the temperature in “common flow/distributor”
- Regulation no longer takes place through “boiler sensor” but through the total flow sensor
- The boiler sensor further checks the min. and max. temperatures of the boiler

Re hydraulics parameter: 08, 09, 10

14 Solar return sensor (KRLF)

- For the heat balancing, the solar return sensor (KRLF) is needed
- Via one of the variable inputs VE1, VE2, VE3
- Set in the “solar level”

Re hydraulics parameter: 08

16 Exhaust gas sensor (AGF)

- Activated via variable input VE1…
- Sensor PT 1000, detects the other resistance values of the sensor
- In the event of a defect, it depends on the setting of the “heat generator level”
- A fault signal with switching off of the boiler (see par. 16 H-GEN)

Setting

- Display only
- Switching off for a limited time
- Locking in the event of the limit value being exceeded

Re hydraulics parameter: 08, 09, 10

18 Solid buffer sensor (FPF)

- The solid buffer sensor (FPF) can be assigned to a free variable input.
- If no variable input (VE…) is used, the value of the solar tank sensor (KSPF own input) can be used as a common buffer sensor
- The sensor input KSPF can therefore be used for several heat suppliers (solar/solid etc.) - Set in the “solar level”

Re hydraulics parameter: 08, 09, 10

19 Buffer sensor 1 (PF)

- If the buffer charging pump is active via a VA…, then the buffer sensor is activated at the variable input VE…
- For shift charging, a second buffer sensor (PF2) can be added

… See also setting 4

Re hydraulics parameter: 08, 09, 10

27 Minimum value override

- Activated via variable input VE…
- Heating circuit works according to its heating curve; on activation of the minimum value override (VE…) the programmed heating circuit (syst. par.6) runs to its programmed reference value (HC, MC1, MC2 par.36)

Re hydraulics parameter: 11
Indirect return increase
- Can take place only with mixer circuits!
- In the event of a return temperature deficit, the mixers are closed until the return temperature recovers (return sensor at VE… necessary)

Re hydraulics parameter: 08, 09, 10
33 Lock by energy supply company (EVU)
- the energy supplier may lock the heat pump via a signal
- in addition to the HP also the CP and the SLP are locked. (HW discharge protection switched to OFF, thus the SLP would start although no H-GEN is running)

- Locking is effected by opening a bridge on one of the variable inputs VE1, VE2 or VE3. (Locking inverse to H-GEN blocking, contact open HP/HW locked)

Re hydraulics parameter: 08, 09, 10
34 HP Return sensor (WPRL)
- Activated via variable input VE…
- for the return temperature separate min./max. temperatures can be programmed (see HP Par. 55+56)

Re hydraulics parameter: 08, 09, 10
35 Heat source sensor (QF)
- Activated via variable input VE…
- for the heat source temperature separate min./max. temperatures can be programmed (see HP Par. 60+61)

Re hydraulics parameter: 08, 09, 10
36 Fault HP (WPS)
- Activated via variable input VE…
- display of additional fault signal in the control system (display, signal via data bus,…)
- if with heat generator type 8 and 10 stage 2 is blocked due to an outside temperature block, this block is suspended (2. H-GEN stage is no HP but electric heating element (EG) or boiler).
- can be activated to up to three times (for each VE)

Re hydraulics parameter:12
Maximum limit energy management
- Limitation of the maximum system reference value which can be generated

Re hydraulics parameter:13
Activation cooling buffer (KPF)
- with the cooling buffer regulation activated, the KSPF input is then firmly assigned as cooling buffer sensor. Moreover, the parameter tree cooling buffer is cleared.
- thereby any other applications of the KSPF are no longer possible (e.g. solar, solid-fuel, …)

Re hydraulics parameter:14
Release contact cooling / cooling block to KVLF
- when the function release contact cooling to KVLF has been activated, the KVLF input functions like a safety chain if cooling is activated.
- all cooling functions can also be parameterised when the input is open, but the functions only work if the KVLF input is bridged.
- this applies both to active and passive cooling.

- in the case of activation at CD address 10, the setting works on all plant heating circuits (also follow-up controllers)
- in the case of activation at CD address 20…50 (follow-up controllers), the setting works exclusively on the heating circuits of the corresponding follow-up controller.

8.3 Parameter level "System" Description

Parameter level "System" Selection level, system parameters

The parameters in this level refer to general limit parameters and pre-set values within the heating system which is used.

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
LANG UAGE	Selection of the style -	**DE**	DE	DE	DE		DE	DE	DE, GB, FR, IT, HU, CZ, PL, RO, ES, TR, RU, BG, HR, PT, NL, SI	BE
2	Number of cleared switching time programs	**P1**	P1	P1	P1		P1	P1	P1 Only one switching time program P1-P3 Three switching time programs	HF
3	Clearing for separate operating mode	**1**	1	1	1		1	1	1 Common adjustment for all heating circuits 2 Separate adjustment for the individual heating circuits	HF
4	Limit temperature for summer disconnection	**22 °C**	22	22	22		22	22	OFF no function FROST .... 30 °C	HF
5	System frost protection	**3 °C**	3	3	3		3	3	OFF no function, -20...SO °C	HF
6	Demand contact module for VE1	**1**	1	1	1		1	1	1 Direct heating circuit 2 Mixer heating circuit 1 3 Mixer heating circuit 2 4 HW ALL	HF
7	Demand contact module for VE2	**1**	1	1	1		1	1	Setting values see parameter 06	HF
8	Demand contact module for VE3	**1**	1	1	1		1	1	Setting values see parameter 06	HF
9	Air conditioning zone	**-12°C**	-12	-12	-12		-12	-12	-20...0°C	HF
10	Building type	**2**	2	2	2		2	2	0 OFF 1 Light construction type 2 Medium construction type 3 Heavy construction type	HF
11	Automatic reversion time	**5 Min**	5	5	5		5	5	OFF No automatic reversion 0.5… 5 minutes after setting time, automatic reversion to basic display	HF
12	Pump and mixer compulsory operation	**ON**	ON	ON	ON		ON	ON	ON, OFF	HF
13	Logical fault signal	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	HF
14	Automatic SET function (after 24:00, is automatically set to OFF)	**ON / OFF**	ON / OFF	ON / OFF	ON / OFF		ON / OFF	ON / OFF	OFF Automatic sensor recognition deactivated ON Automatic sensor recognition activated	HF
15	Blocking code for heating Installer								OFF Blocking code switched off 0001...9999	OEM
18	Release cycle temperature	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF Cycle temperatures blocked ON Cycle temperatures released	HF
19	Frost protection mode	**30 Min**	30	30	30		30	30	OFF Continuous frost protection as per setting for parameter 5 0,5.....60min clock operation	HF
21	RTC adjustment	**0**	0	0	0		0	0	-10 ... 10 sec.	HF
23	Blocking code Control level	**OFF**	OFF	OFF	OFF		OFF	OFF	0000, ..., 9999	HF
24	Temperature display in Fahrenheit	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	OEM
26	Date of initial commissioning (after 24:00)	**—**							Display DD.MM YYYY	OEM
27	Fault report (only TTT/UG)	**2**	2	2	2		2	2	1-Indication on display only 2-Lockings 3-Lockings and blockings 4-Lockings and blockings and warnings	HF
28	Fault stack 2	**ON**	X	X	ON		X	X	OFF, ON (only for H-Gen type 5)	HF
29	Characteristic curve emergency operation	**0°C**	0	0	0		0	0	-50...30°C	HF
30	Thermostat function sensor allocation	**AF**	AF	AF	AF		AF	AF	AF, KF, VF1, VF2, SF, VE1, VE2, VE3, KVLF, KSPF	HF
31	Thermostat function reference value	**1°C**	1	1	1		1	1	-20...250°C	HF
32	Thermostat function switching difference	**3K**	3	3	3		3	3	1 ... 90K	HF
	Top: ArtNo - HW IndexBottom: Code:REV - Software version	**-----**							Software version	OEM
RES ET	Reset parameter values								depending on access code	BE

Legend for system: Setting range/setting values for parameters 02,03,04,10
Re system parameter 02 Time programs:
Factory setting: P1
Setting range: P1, P1-P3
Function:
This parameter determines the release of the switching time programs for the program selection and for individual switching time programming. In the state in which it is delivered, only one switching time program is cleared. As a result in the majority of applications in which only one switching time program is used, a simplification of operation is achieved.

Setting values: P1: Program 1 cleared,
Programs 2 and 3 = blocked
P1-P3: All three programs cleared
Effects: Unlike the previous description, the following setting options are available when the programs P1-P3 are released:

Adjusting the operating mode
In the programs Automatic and Summer, the switching time programs P1, P2 or P3 can be selected.

Switching time programming
When programming the switching time, the three switching time programs P1-P3 can be selected for each heating circuit.

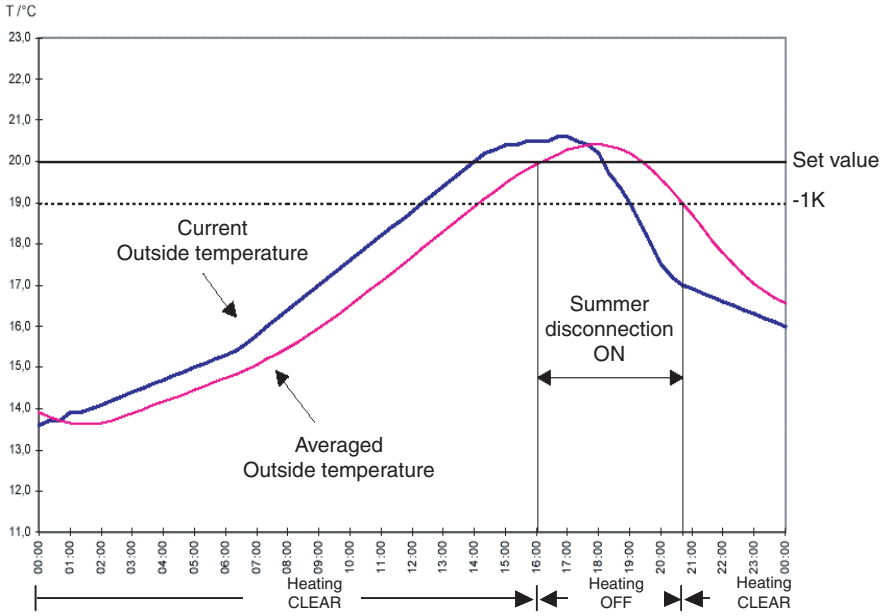
Re system parameter 03 Operating mode:
Factory setting: 1
Setting range: 1,2
This parameter determines the mode of operation and has effects on:
- the mode of operation selected with the button
- the daytime room reference value selected with the temperature selection button
- the reduction room reference value in respect of the effect on the different heating circuits, selected with the temperature selection button

Settings:
1: The selected setting (mode of operation, daytime room reference value, lowered room reference value) applies to all heating circuits jointly
2: Each heating circuit can be assigned its own setting (mode of operation, daytime room reference value, lowered room reference value)

For system parameter 04 "Summer" change-over/disconnection:
Active summer disconnection results in ....
- All mixers are closed
- Water heating remaining in operation after cessation of time program

Suspension of the disconnection
(release of heating operation for heating circuit(s)
- is suspended, if the averaged and the current outside temperature fall below the set value by 1K!
Also...
the summer disconnection is suspended if ...
- outside sensor is defective
- frost protection is active
- heating is outside "automatic"

Time function elements for recording values
- AF-long-term value for the summer disconnection and average value computation taking into account the building parameters. Recording every 20 mins. - > new OT value

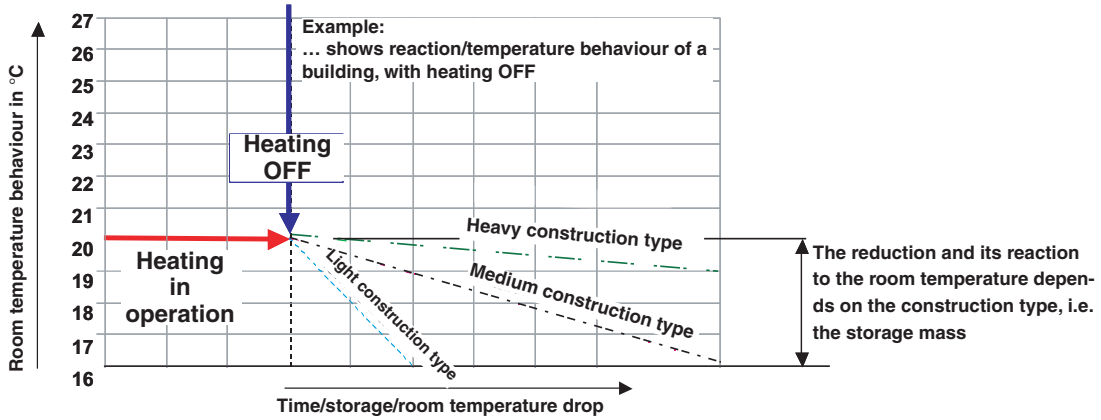


Re system parameter 10 Building type/construction type:
0 = OFF (for test purposes)

1 = light construction type: (Computing interval = 6h)
Low-energy buildings,
- Lightweight construction (wood, gypsum plasterboard and heat-insulating materials)
- Behaviour also in the case of buildings, if thermally insulated inside!

2 = medium construction type: (Computing interval = 24h)
Low-energy buildings, modern houses
- mixed construction type (mix of wood, concrete, brick and heat-insulating materials) (mass depending on MIX)

3 = heavy construction type: (Computing interval = 72h)
Thick walls, old building
- strong solidium of concrete, brick etc., heat-insulating materials



NOTE!
The construction type affects the control behaviour!
The wrong choice makes itself apparent - how?

The room temperature (RT) ...

- requires a long time to reach the appropriate RT (slow correction of the RT deviation)
- RT fluctuates (excessively rapid correction of the RT deviation)

Re system parameter 21 RTC adjustment

Time correction of controller by means of „RTC adjustment“

Clock runs fast:

System-	Time correction	Time correction
Par. 21	/ month (approx.)	/ year (approx.)
-1	- 00:30 min.	- 6 min.
-2	- 01:00 min.	- 12 min.
-3	- 01:30 min.	- 18 min.
-4	- 02:00 min.	- 24 min.
-5	- 02:30 min.	- 30 min.
-6	- 03:00 min.	- 36 min.
-7	- 03:30 min.	- 42 min.
-8	- 04:00 min.	- 48 min.
-9	- 04:30 min.	- 54 min.
-10	- 05:00 min.	- 60 min.

Clock runs slow:

System-	Time correction	Time correction
Par. 21	/ month (approx.)	/ year (approx.)
+1	+ 00:30 min.	+ 6 min.
+2	+ 01:00 min.	+ 12 min.
+3	+ 01:30 min.	+ 18 min.
+4	+ 02:00 min.	+ 24 min.
+5	+ 02:30 min.	+ 30 min.
+6	+ 03:00 min.	+ 36 min.
+7	+ 03:30 min.	+ 42 min.
+8	+ 04:00 min.	+ 48 min.
+9	+ 04:30 min.	+ 54 min.
+10	+ 05:00 min.	+ 60 min.

- With setting 0 (factory value) no correction occurs.
- For determining the time difference a time period of approx. 30 days should be used by means of a radio-controlled clock (or similar reference clock).

Re system parameter 29 Characteristic curve emergency operation

- If with cold weather and sensor fault heating according to the 0°C characteristic curve stored is not sufficient, this value can additionally be set with parameter 29.

Setting range –50 ... 30°C

8.4 Parameter level "Hot water" Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
HW-NI-GHT	HW - economy temperature	**45 /40 °C**	45	45	45		45	***40***	5 °C ... hot water maximum temperature	BE
2	HW-legionella protection-day	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF no legionella protection Mo… Su Legionella protection on indicated weekday ALL Legionella protection on every day of the week	HF
3	HW-legionella protection-time	**2:00**	2.00	2.00	2.00		2.00	2.00	00:00...23:00 Uhr	HF
4	HW-legionella protection-temperature	**65 °C**	65	65	65		65	65	10 °C...HW maximum temperature	HF
5	HW-temperature recording	**1**	1	1	1		1	1	1 HW temperature sensor 2 HW temperature regulator (thermostat)	HF
6	HW-maximum temperature limit	**65 / 50°C**	65	65	65		65	***50***	20 °C… heat generator maximum temperature (20-90°C when P7:7)	HF
7	HW mode of operation	**1**	1	1	1		1	1	1 Parallel operation 2 Priority operation 3 Limited priority 4 Weather-driven parallel operation 5 Priority operation with interim heating 6 Priority isolating circuit 7 External operation	HF
8	HW-tank discharge protection	**ON / OFF**	ON	ON	***OFF***		***ON / OFF***	***OFF***	OFF No discharge protection ON Discharge protection activated	HF
9	HW-charging temperature excess	**20 K**	20	20	20		20	20	0 ... 50 K; Difference between HW charging temperature and HW reference temperature	HF
10	HW switching difference	**5 K**	5	5	5		5	5	2 ... 20 K; Amount of HW switching difference, mode of action symmetrical around the HW reference value	OEM
11	HW-charging pump follow-on	**5 /1 min**	5	5	5		5	1	0 ... 60 min	OEM
12	ZKP-switching time program	**AUTO**	Auto	Auto	Auto		Auto	Auto	AUTO – Active HW time program 1 - P1, direct heating circuit 2 - P2, direct heating circuit 3 - P3, direct heating circuit 4 - P1, mixer heating circuit 1 5 - P2, mixer heating circuit 1 6 - P3, mixer heating circuit 1 7 - P1 mixer heating circuit 2 8 - P2, mixer heating circuit 2 9 - P3, mixer heating circuit 2 10 - P1, hot water circuit 11 - P2, hot water circuit 12 - P3, hot water circuit	HF
13	ZKP-economy interval (pause)	**0 min**	0	0	0		0	0	0 min… set value parameter 14; (pause time during period)	HF
14	ZKP-economy interval (period duration)	**20 min**	20	20	20		20	20	1 .. 60 min	HF
17	H-Gen behaviour during SLP follow-on time	**AUTO / OFF**	Auto	Auto	Auto		Auto	***OFF***	OFF: H-Gen off - SLP follow-on time AUTO: H-Gen reference value demand	HF
18	HW parallel loading	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	HF
19	HW time-out	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 240 min. HW time-out with burner switch-off	HF
20	PI reference value control	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	HF
21	PI-amplification factor, P-portion Xp	**0,1 %/K**	0.1	0.1	0.1		0.1	0.1	0,1...50 %/K	OEM
22	PI-scanning time Ta	**20 sec**	20	20	20		20	20	1...600 sec	OEM
23	PI -reset time T	**600 sec/°C**	600	600	600		600	600	1...600 sec/°C	OEM

Parameter level "Hot water" Description

Legend for hot water: Setting range/setting values

Re “hot water” parameter 01 HW night temperature/HW economy temperature:
- Regulates the temperature between the operating conditions in automatic operation
- In the case of thermostat, the parameter Economy temperature is skipped

Re “hot water” parameter 02 HW legionella protection - daytime:
- Time frame whether OFF, DAILY or on a day of the week

Re “hot water” parameter 03 HW legionella protection - time:
- Time when the legionella protection should be active (legionella protection is active for 1 hour)

Re “hot water” parameter 04 HW legionella protection - temperature:
- For killing the bacilli, the legionella protection temperature should be at least 50°C

Re “hot water” parameter 05 HW temperature recording:
- Usual with sensor, but if thermostat then no HW temperature display
- HW reference value (operator level) on the regulator but limits the maximum temperature!
- Thermostat HW charging: the maximum temperature + the charging temperature elevation are the basis for the temperature at the boiler.

Re “hot water” parameter 07 Hot water - mode of operation:

1 Parallel operation
- During calorifier load, the heating circuits remain in function

2 Priority operation
- During calorifier load the heating circuits are taken out of operation
- After that, SLP follow-on, then the heating circuits are active again - if the HW temperature is not reached after 4h - > fault signal

3 Limited priority
- Depends on the following operations - whether release or block

RELEASE: Boiler temperature = actual temperature > HW reference value temperature + HW switching difference/2 +10K
e.g.: reference = 50° + 1/2 SD (10K:2) = 5K + 10 = 65°C actual value of boiler temperature

BLOCK: Boiler temperature = actual temperature < HW reference value temperature + HW switching difference/2 + 5K
e.g.: reference = 50° + 1/2 SD (10K:2) = 5K + 5 =… below 60°C

4 Weather-driven parallel operation
- The parameter “OT frost protection limit” decides which function is used, i.e.:
  Frost protection not active -… see under Priority operation
  Frost protection active -… see Parallel operation

5 Priority operation with interim heating
- HW charging max. 20 mins., then 10 mins. interim heating, then HW charging max. 20 mins… etc.

6 Priority isolating circuit
- Charging takes place via a three-way switching fitting (connection to SLP) i.e.: the heating circuit pump (DKP) is also charging pump for the water heating
- At the end of HW charging and expiry of the follow-on time, the heating operation is switched over

7 External operation
- HW charging takes place in accordance with the specified switching differences
- Heat demand at boilers does not apply
- No calorifier priority operation to the heating circuits
- The parameters of boiler parallel displacement, boiler start-up protection, tank discharge protection and pump follow-on time do not work

Re "hot water" parameter 08 HW tank - discharge protection:
- The tank charging pump (SLP) will only release in the event of a HW demand if the temperature in the boiler is 5K above the current HW temperature
- Tank charging pump (SLP) is blocked if the temperature difference between the boiler and the HW tank is less than 2K

Re "hot water" parameter 09 HW charging temperature excess:
- This is the temperature of the boiler which is raised to the HW reference value
- In the case of several water heaters, the highest HW reference value present applies
- In the case of WH with thermostat: Par. 06 HW max. + par. 09 HW excess = boiler reference value

Re "hot water" parameters 13 and 14 ZKP circulating pump pause/period:
- Running time and pause of the pump
- Parameter 13: ZKP economy interval (pause) = standstill of the circulating pump
- Parameter 14: ZKP economy interval (period) = time frame for pause and running of the circulating pump
- Calculation:

Economy interval (period) = in total	20 mins.	or 20 min
Economy interval (break) =	15 mins.	0
Pump follow-on of the ZKP	5 mins.	continuous running (default)

Summary:
Within a time frame (period) of 20 minutes - > the circulating pump runs for 5 minutes with a downtime (pause) of 15 minutes.

Re "hot water" parameter 17 H-GEN behaviour during SLP follow-on time
- H-GEN behaviour during SLP follow-on time is set with the parameter.

HW Par. 17 :	AUTO	H-GEN reference value according to demand (factory)
	OFF	H-GEN Off during SLP follow-on time

Re „Hot water" parameter 18 HW parallel loading...
- Example: in the case of a plant with three TopTronic-Ts, each with one HW tank, all tanks may switch to charging state although only one of the tanks is being demanded. This method prevents another tank reaching charging state directly after charging of a tank. In detail, this means that when one tank switches to charging state, the other two also switch to charging state even if the value has not yet fallen below the switching hysteresis.

- This parameter must be activated for each controller with the WH to be considered.

Re „Hot water" parameter 19 HW loading interruption...
- If the H-GEN is switched off (e.g. SD exceeded) during HW charging, HW charging will be interrupted for an adjustable time. (e.g. heating circuit demand can then be dealt with).

PI reference value control
To optimise hot water charging, the H-GEN reference value is adjusted via a PI control, calculated on the basis of the deviation between the HW actual and reference value.

- At switch-on of the HW charging (HW reference minus ½ SD), the HW reference value + elevation applies as initial value for the H-GEN reference value.
- In the case of deviation from this point (HW reference minus ½ SD), the PI control will raise or lower the H-GEN reference value.
- Upper limit of dynamic H-GEN reference value : HW reference value + HW elevation + 10K (fix)

The PI control means that control during HW charging is better tailored to demand:
- in the case of high HW consumption, charging is effected with higher output and a higher charging temperature
- in the case of low consumption or re-charging, charging is effected with lower output and low temperature

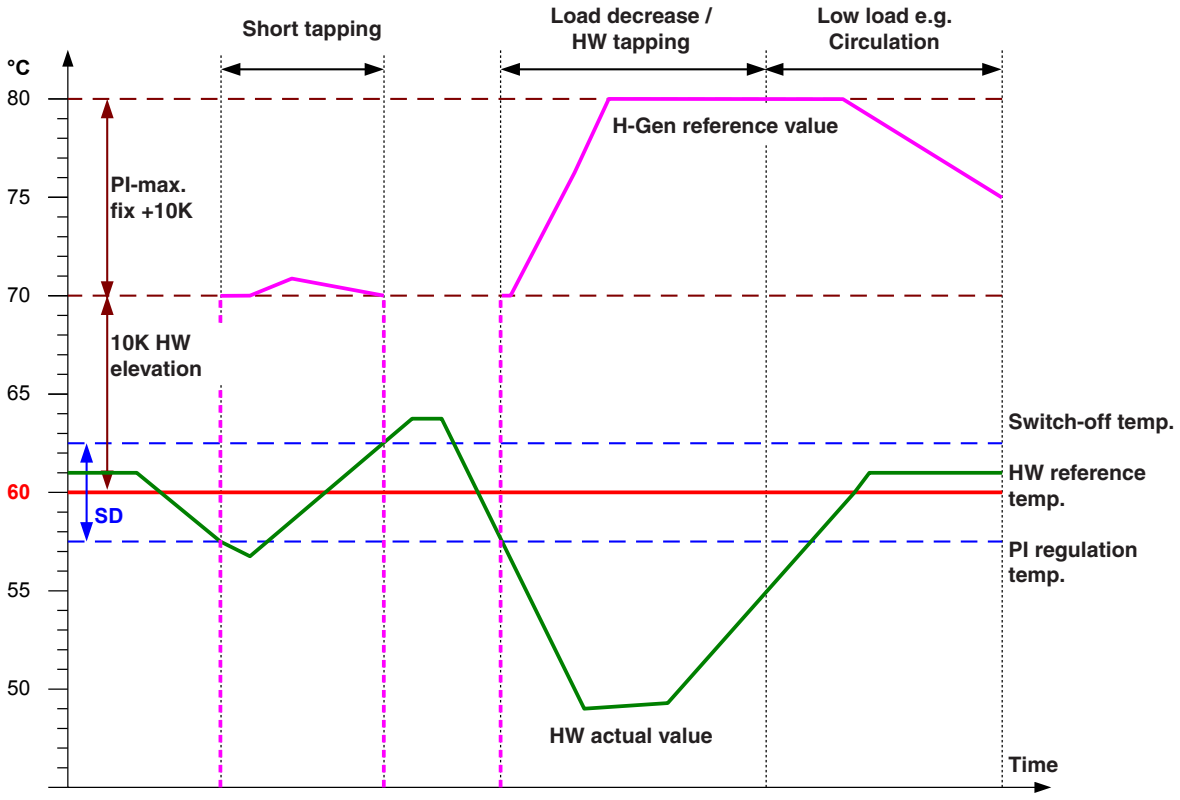
Re „Hot water“ parameter 20 PI reference value control hot water...
ON PI control ON
OFF PI control OFF (factory)

Re „Hot water“ parameter 21 PI-amplification factor, P-portion Xp ...
In the case of a change in the regulation deviation (reference value - actual value), the proportional element p determines the corresponding adjustment of the respective H-GEN reference value in accordance with the selected setting.

Re „Hot water“ parameter 22 PI Scanning time Ta ...
- The scanning time is a variable that is internal to the regulator

Re „Hot water“ parameter 23 PI reset time T ...
- The integral portion determines the dynamic behaviour of the regulator, and thus the time which the regulator needs in order to eliminate any deviation that arises.

The PI control means that control during HW charging is better tailored to demand:
- in the case of high HW consumption, charging is effected with higher output and a higher charging temperature
- in the case of low consumption or re-charging, charging is effected with lower output and low temperature



8.5 Parameter level “Direct Heating Circuit” Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
1	Type of reduced operation	**ECO / ABS**	ECO	ECO	ECO		ECO	***ABS***	ECO –Switch-off off operation ABS Lowering operation	HF
2	Heating system (exponent)	**DK= 1,30**	1.3	1.3	1.3		1.3	1.3	1,00...10,00	HF
3	Room override (in connection with room sensor)	**3**	3	3	3		3	3	OFF Display heat generator temperature, Room sensor off, operation active 1 Display room temp., room sensor active,operation active 2 Display room temp., room sensor active, operation blocked 3 Display room temp., room sensor off, operation active	HF
4	Room factor	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 10...500% influence active RC Room regulator active	HF
5	Adaptation heating curve	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	HF
6	Switch-on optimisation	**1**	1	1	1		1	1	OFF, 1 ... 18 h	HF
7	Heating limit	**0.5**	0.5	0.5	0.5		0.5	0.5	OFF, 0.5...40 K	OEM
8	Room frost protection limit	**10 °C**	10	10	10		10	10	5 ... 30 °C	HF
9	Room thermostat function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 5 K	HF
10	Outside temperature allocation	**0**	0	0	0		0	0	0 Control by average value AF 1 + AF 2 1 Control by AF 1 2 Control by AF 2	HF
11	Constant temperature reference value	**20 °C**	20	20	20		20	20	7 ... 105 °C	HF
12	Minimum temperature limit	**10 °C**	10	10	10		10	10	5°C Setting value maximum temperature limit (parameter 13)	HF
13	Maximum temperature limit	**75 /55°C**	75	75	75		75	***55***	Setting value minimum temperature limit (parameter 12) ...H-Gen OEM max.	HF
14	Temperature elevation heating circuit	**DK=0**	0	0	0		0	0	-5...20 K	HF
15	Pump follow-on	**5 Min**	5	5	5		5	5	0 ... 60 min	HF
16	Screed function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 1 Function heating 2 Surface-ready heating 3 Function heating subsequent surface-ready heating	HF
23	Room control K-factor	**8**	8	8	8		8	8	1 .... 100 (only RS-(O)T	HF
24	Room control Tn factor	**35 MIN**	35	35	35		35	35	5 ... 240 MIN (only RS-(O)T	HF
25	Operating mode holiday	**STBY**	STBY	STBY	STBY		STBY	STBY	STBY, ABS	HF
36	Minimum value override	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 10 ... 110 °C	HF
	Name heating circuit (max.5 letters)	**XXXXX**							with heating circuit function only	HF

8.6 Parameter level "Mixer circuit 1" Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
1	Type of reduced operation	**ECO / ABS**	ECO	ECO	ECO		ECO	***ABS***	ECO –Switch-off off operation ABS Lowering operation	HF
2	Heating system (exponent)	**MC= 1,10**	1.1	1.1	1.1		1.1	1.1	1,00...10,00	HF
3	Room override (in connection with room sensor)	**3**	3	3	3		3	3	OFF Display heat generator temperature, Room sensor off, operation active 1 Display room temp., room sensor active,operation active 2 Display room temp., room sensor active, operation blocked 3 Display room temp., room sensor off, operation active	HF
4	Room factor	**100%**	100	100	100		100	100	OFF 10...500% influence active RC Room regulator active	HF
5	Adaptation heating curve	**ON**	ON	ON	ON		ON	ON	OFF, ON	HF
6	Switch-on optimisation	**1**	1	1	1		1	1	OFF, 1 ... 18 h	HF
7	Heating limit	**0.5**	0.5	0.5	0.5		0.5	0.5	OFF, 0.5...40 K	OEM
8	Room frost protection limit	**10 °C**	10	10	10		10	10	5 ... 30 °C	HF
9	Room thermostat function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 5 K	HF
10	Outside temperature allocation	**0**	0	0	0		0	0	0 Control by average value AF 1 + AF 2 1 Control by AF 1 2 Control by AF 2	HF
11	Constant temperature reference value	**20 °C**	20	20	20		20	20	7 ... 105 °C	HF
12	Minimum temperature limit	**10 °C**	10	10	10		10	10	5°C ...Setting value maximum temperature limit (parameter 13)	HF
13	Maximum temperature limit	**75 /55°C**	75	75	75		75	***55***	Setting value minimum temperature limit (parameter 12) ...H-Gen OEM max.	HF
14	Temperature elevation/ abatement heating circuit	**8 /0K**	8	8	8		8	***0***	-5...20 K	HF
15	Pump follow-on	**5 Min**	5	5	5		5	5	0 ... 60 min	HF
16	Screed function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 1 Function heating 2 Surface-ready heating 3 Function heating subsequent surface-ready heating	HF
18	P-portion Xp	**2,0 %/K**	2	2	2		2	2	1 ... 50 % / K	OEM
19	Scanning time Ta	**20 sec**	20	20	20		20	20	1 ... 600.sec	OEM
20	I-portion Tn	**270 sec**	270	270	270		270	270	1 ... 600 sec	OEM
21	Running time actuator	**150 sec**	150	150	150		150	150	10 ... 600 sec	HF
22	End position function, valve	**1**	1	1	1		1	1	1 Continuous setting signal in end position 2 Setting signal suppressed in end position (actuator without current)	OEM
23	Room control K-factor	**8**	8	8	8		8	8	1 .... 100 (only RS-(O)T	HF
24	Room control Tn factor	**35 MIN**	35	35	35		35	35	5 ... 240 MIN (only RS-(O)T	HF
25	Operating mode holiday	**STBY**	STBY	STBY	STBY		STBY	STBY	STBY, ABS	HF
36	Minimum value override	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 10 ... OEM max	HF
37	Mixer flow time	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 240 sec	HF
38	Regulation offset	**0**	0	0	0		0	0	-10 ... 70°C with plant flow control only (35, 36)	HF
50	Cooling switch-on point, OT	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 15 ... 45°C	HF
51	Cooling max. point, OT	**35°C**	35	35	35		35	35	15 ... 45°C	HF
52	Cooling reference flow temp. at switch-on point	**18°C**	18	18	18		18	18	7 ... 30°C	HF
53	Cooling reference flow temp. at max. point	**24°C**	24	24	24		24	24	7 ... 30°C	HF
54	Cooling reference room temp. at switch-on point	**23°C**	23	23	23		23	23	15 ... 30°C	HF
55	Cooling reference room temp. at max. point	**28°C**	28	28	28		28	28	15 ... 30°C	HF
56	Min. temp. cooling	**18°C**	18	18	18		18	18	7 ... 24°C	OEM
	Name heating circuit (max.5 letters)	**XXXXX**							with heating circuit function only	HF

8.7 Parameter level "Mixer circuit 2" Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
1	Type of reduced operation	**ECO / ABS**	ECO	ECO	ECO		ECO	***ABS***	ECO –Switch-off off operation ABS Lowering operation	HF
2	Heating system (exponent)	**MC= 1,10**	1.1	1.1	1.1		1.1	1.1	1,00...10,00	HF
3	Room override (in connection with room sensor)	**3**	3	3	3		3	3	OFF Display heat generator temperature, Room sensor off, operation active 1 Display room temp., room sensor active,operation active 2 Display room temp., room sensor active, operation blocked 3 Display room temp., room sensor off, operation active	HF
4	Room factor	**100%**	100	100	100		100	100	OFF 10...500% influence active RC Room regulator active	HF
5	Adaptation heating curve	**ON**	ON	ON	ON		ON	ON	OFF, ON	HF
6	Switch-on optimisation	**1**	1	1	1		1	1	OFF, 1 ... 18 h	HF
7	Heating limit	**0.5**	0.5	0.5	0.5		0.5	0.5	OFF, 0.5...40 K	OEM
8	Room frost protection limit	**10 °C**	10	10	10		10	10	5 ... 30 °C	HF
9	Room thermostat function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 5 K	HF
10	Outside temperature allocation	**0**	0	0	0		0	0	0 Control by average value AF 1 + AF 2 1 Control by AF 1 2 Control by AF 2	HF
11	Constant temperature reference value	**20 °C**	20	20	20		20	20	7 ... 105 °C	HF
12	Minimum temperature limit	**10 °C**	10	10	10		10	10	5°C ...Setting value maximum temperature limit (parameter 13)	HF
13	Maximum temperature limit	**75 /55°C**	75	75	75		75	***55***	Setting value minimum temperature limit (parameter 12) ...H-Gen OEM max.	HF
14	Temperature elevation/ abatement heating circuit	**8 /0K**	8	8	8		8	***0***	-5...20 K	HF
15	Pump follow-on	**5 Min**	5	5	5		5	5	0 ... 60 min	HF
16	Screed function	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 1 Function heating 2 Surface-ready heating 3 Function heating subsequent surface-ready heating	HF
18	P-portion Xp	**2,0 %/K**	2	2	2		2	2	1 ... 50 % / K	OEM
19	Scanning time Ta	**20 sec**	20	20	20		20	20	1 ... 600.sec	OEM
20	I-portion Tn	**270 sec**	270	270	270		270	270	1 ... 600 sec	OEM
21	Running timeactuator	**150 sec**	150	150	150		150	150	10 ... 600 sec	HF
22	End position function, valve	**1**	1	1	1		1	1	1 Continuous setting signal in end position 2 Setting signal suppressed in end position (actuator without current)	OEM
23	Room controlK-factor	**8**	8	8	8		8	8	1 .... 100 (only RS-(O)T	HF
24	Room control Tn factor	**35 MIN**	35	35	35		35	35	5 ... 240 MIN (only RS-(O)T	HF
25	Operating mode holiday	**STBY**	STBY	STBY	STBY		STBY	STBY	STBY, ABS	HF
36	Minimum value override	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 10 ... OEM max	HF
37	Mixer flow time	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... 240 sec	HF
38	Regulation offset	**0**	0	0	0		0	0	-10 ... 70°C with plant flow control only (35, 36)	HF
50	Cooling switch-on point, OT	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 15 ... 45°C	HF
51	Cooling max. point, OT	**35°C**	35	35	35		35	35	15 ... 45°C	HF
52	Cooling reference flow temp. at switch-on point	**18°C**	18	18	18		18	18	7 ... 30°C	HF
53	Cooling reference flow temp. at max. point	**24°C**	24	24	24		24	24	7 ... 30°C	HF
54	Cooling reference room temp. at switch-on point	**23°C**	23	23	23		23	23	15 ... 30°C	HF
55	Cooling reference room temp. at max. point	**28°C**	28	28	28		28	28	15 ... 30°C	HF
56	Min. temp. cooling	**18°C**	18	18	18		18	18	7 ... 24°C	OEM
	Name heating circuit (max.5 letters)	**XXXXX**							with heating circuit function only	HF

Legend for heating circuits: Setting range/setting values for parameters ...

Re… heating circuits HC, MC1, MC2 parameter 01 Reduced:

ECO – Switch-off operation

- The direct heating circuit (boiler) is completely switched off at an outside temperature above the frost protection limit
- When switching off, the heating circuit pump has a follow-on time (avoidance of accumulation of heat etc.)
- Below the frost protection limit, the system switches automatically to lowering operation (ABS) if the flow temperature falls below the set reduction temperature. If a room station is attached and the room sensor activated, the system switches to lowering operation (ABS) if the room temperature falls below the set reduction temperature.

Application:

Building with strong thermal insulation and low cooling losses

ABS - Lowering operation

- During the reduced operation, the heating circuit pump runs
- The minimum temperature is not undercut
- The flow temperature is determined in accordance with the lowered/reduced heating characteristic curve

Application:

- Building with low thermal insulation and high cooling losses (old building)

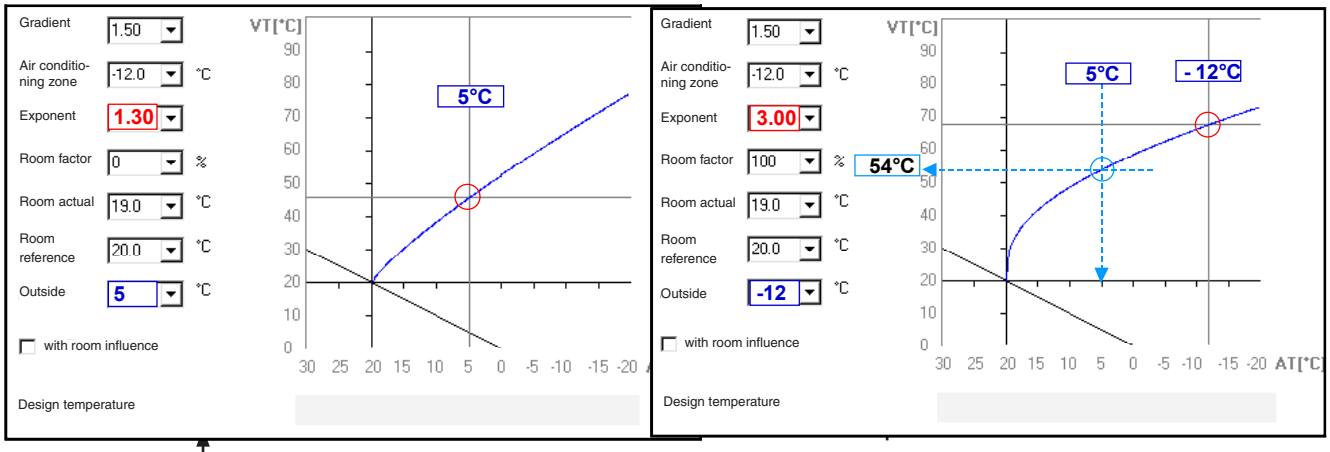
Re heating circuits HC, MC1, MC2 parameter 02 Heating system/exponent:

- The type of behaviour of the heat distribution system (floor, radiators, convectors) is undertaken through a characteristic curve adjustment (straight to appropriately curved).

1.00 linear heating characteristic curve,
... 1.10 slightly progressive heating characteristic curve (radiant panel heating)
... 1,30 progressive standard heating characteristic curve for radiator heating with m-values 1.25 & 1.35
... 2,00 progressive heating characteristic curve (convectors, baseboard heating, air heaters)
3,00 ... 10,00 strongly progressive heating characteristic curve for air heaters with high starting temperature

EXPONENT:

The setting of the curvature progression determines “the progressive characteristic” of the heating characteristic curve.



With rising exponent, the curvature of the heating curve increases accordingly in the front area!
Reaction: With the same outside temperature, the flow temperature changes accordingly!

See CD; Program “heating curve TTT”

Re heating circuits HC, MC1, MC2 parameter 03 Room override possible only with RS-T or RFF:

OFF: Display heat generator temperature, room sensor off, operation active

1: Display room temperature, room sensor active, operation active

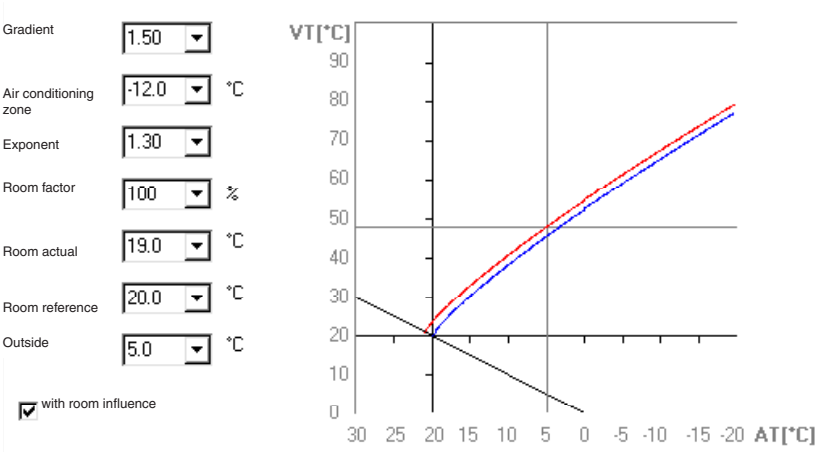
2: Display room temperature, room sensor active, operation blocked

3: Display room temperature, room sensor off, operation active

Re heating circuits HC, MC1, MC2 parameter 04 Room factor:

- The function determines how strongly a deviation of the room temperature from the RT reference value affects the boiler flow temperature
- No difference between REFERENCE and ACTUAL room temperatures
  - > regulation of the flow temperature according to the characteristic curve
- When the RT deviates, the heating characteristic curve is shifted parallel to the room temperature axis (indirectly, the RT reference value is raised) to compensate the deviation of the RT
- Through the setting of the room factor, it is determined how much/fast
- The higher the value, the faster, but if the specification is too high, this can lead to fluctuation of the room temperature.

Heating curve with exponent 1.3 and room influence



Design temperature with room factor 100 % = 48,3°C

Design temperature without room factor 0 % = 45,9°C

Example:
- Set RT reference value = 21°C
- Measured RT actual value = 20°C

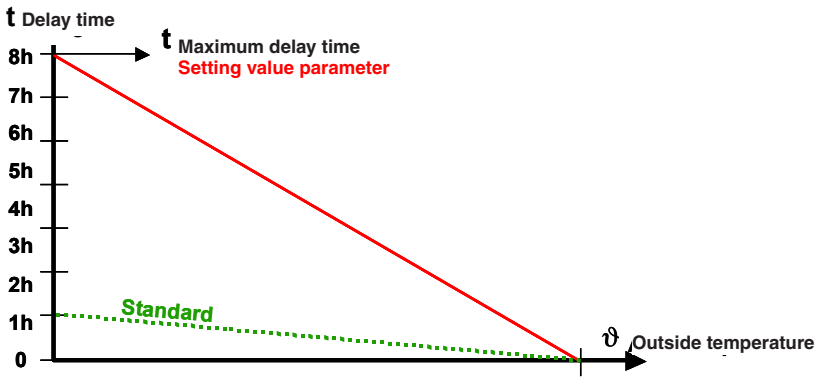
...Deviation= -1K

Formula:
- RT reference value - (deviation (K) x room factor: room factor Room factor 100%: calculation 21 - (- 1 x 100:100) = 22°C Room factor 500%: calculation 21 - (- 1 X.500: 100) = 26°C!
- RC = Pure room regulation function is possible only with a room station (RS), the device then works room-led, the room station directly determines the necessary flow reference temperature and reports it to the central device

The set room factor affects the parallel shifting of the heating characteristic curve, caused by the deviation between ACTUAL and REFERENCE VALUES!

Re heating circuits HC, MC1, MC2 parameter 05 Heating characteristic adaptation:
- Autonomous adaptation of the heating characteristic curve gradient to the building characteristic values
- Recording the outside, flow and room temperatures
- For the determination of the optimum heating characteristic curve, longer heating phases are necessary
- The values are not tanked, but are continually re-calculated, and in the event of increasing deviation a correction is made
- Active adaptation is represented by flashing at the operator level
- Adaptation is a tool for determining the correct building characteristic curve; it is recommended that after reaching the appropriate heating characteristic curve, automatic adaptation is switched off again, and that the determined value manually is set manually at the operator level!

Re "heating circuits HC, MC1, MC2 parameter 06 Switch-on optimisation:
- Within the given setting value, taking account of the outside temperature, the latest heating-up point is calculated in order to ensure the desired room temperature at the start of laying (start of heating cycle).



STANDARD Design temperature

Temperature zone e.g.: - 12°C

Room temperature
Reference value e.g.: 20°C to the point of starting time
(set switch-on time start
as per switching time program)

Re heating circuits HC, MC1, MC2 parameter 07 Heating limit (OEM):
- Additional switch-off condition for "heating limit"
- The function Heating limit can be activated separately for each heating circuit
- It has the effect that the corresponding heating circuit switches off as soon as the calculated flow reference temperature comes into the range of the room reference temperature

Mode of operation:
- If the flow reference temperature < room reference temperature + heating limits offset =>

Switching off of the heating circuit
- If the flow reference temperature > room reference temperature + heating limits offset + 2K =>

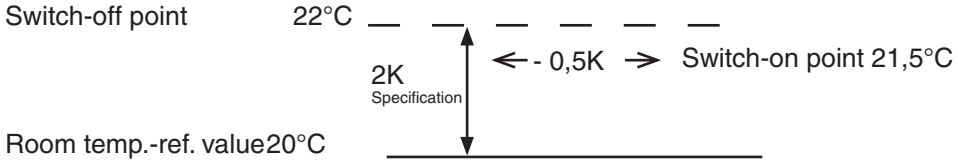
Switch-on of the heating circuit
- The function Summer disconnection has priority over the heating limit
- The function Plant frost protection has priority over the heating limit
- The function room frost protection has priority over the heating limit

Re heating circuits HC, MC1, MC2 parameter 08 Room frost protection limit:
- Determines the lowest room temperature during switch-off operation with active frost protection
- In the VACATION, AUTOMATIC modes, between the heating cycles and with continual lowering operation with active ECO function
- With RS, the area is regulated according to the room frost limit
- Without RS, the room temperature is controlled according to the specification.

Note! e.g.: Vacation - Do not forget the desired temperature for flowers (~12°C), so adapt the temperature somewhat!

Re heating circuits HC, MC1, MC2 parameter 09 Room thermostat function:
- Determines a room temperature upper limit, starting from which the heating operation is set
- if the room temperature of the heating circuit exceeds the daytime or lowering room reference value by the setting value of the thermostat function, the heating operation is interrupted
- Heating circuit pump off, in the event of further mixer circuits - mixers closed
- The heating operation is resumed if the current switch-off value is undercut by 0.5K
- In the case of active outside temperature frost protection, the thermostat function is out of operation

Example



- In cooling operation room thermostat function is active as in heating operation - it is interrupted if the value is lower than the limiting value.

Re heating circuits HC, MC1, MC2 parameter 10 Outside temperature allocation:
- Sensor allocation only possible with 2nd outside sensor (AF2), then select 1, 2 and average value
- If an outside sensor (AF) is defective, the 2nd AF takes over - fault signal follows
- In the event of a defect of both external sensors, regulation is executed according to a fictitious outside temperature of 0°C

Re heating circuits HC, MC1, MC2 parameter 11 Constant temperature - reference value:
- Only if heating circuit is set to “constant or set-value control”
- Constant temperature as specified (e.g. basic heating, swimming pool etc.)
- Demand to the boiler if “constant regulation”
- Mode of operation, switching time program active

Re heating circuits HC, MC1, MC2 parameter 12 MINIMUM temperature limit/heating circuit:
- Not active if the heating circuit works as a “constant regulator”
- Standby and ECO above the frost protection limit
- Reduced operation and automatic summer disconnection
- Used as minimum limit in the case of radiant panel heating, ventilation preliminary regulation (hot-air curtain) convector heating

Re heating circuits HC, MC1, MC2 parameter 13 Maximum temperature limit/heating circuit:
- Not active if the heating circuit works as “constant regulator”
- In the case of radiant panel heating, it is essential to prevent overheating, a thermostat

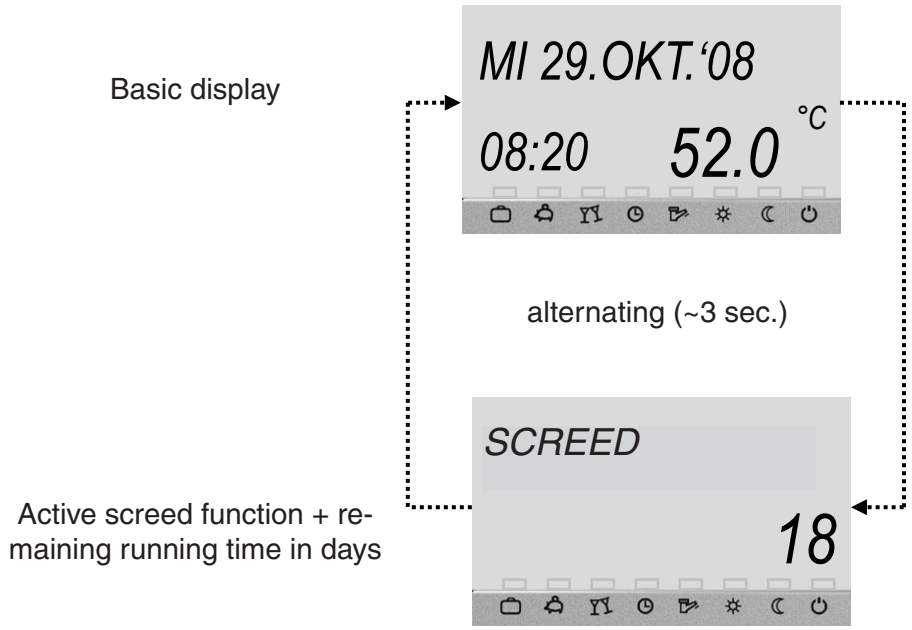
(heating pump off) is installed, with the maximum permissible plant temperature set

Re heating circuits HC, MC1, MC2 parameter 14 Temperature elevation/ abatement heating circuit:
- Elevation value for heat generator
- in case of cooling, abatement value for heat generator

Re heating circuits HC, MC1, MC2 parameter 15 Pump follow-on:
- Used to avoid any accumulation of heat in the system
- during follow-on time the MC still regulates its reference value without transmitting a demand to the H-Gen

Re heating circuits HC, MC1, MC2 parameter 16 Screed function:
- Not active if the heating circuit works as a “constant regulator”
- The screed function is exclusively for the prescribed drying-out in accordance with the prescribed temperature profile
- Special function, is not interrupted by any other mode of operation, not even during manual operation and/or emission measurement! If the screed function is to take place with HC the other circuits are switched off in the hydraulic level”! For details, see the page after next.

8.8 Controller display after activation of screed function



8.8.1 Record - Activation of screed function

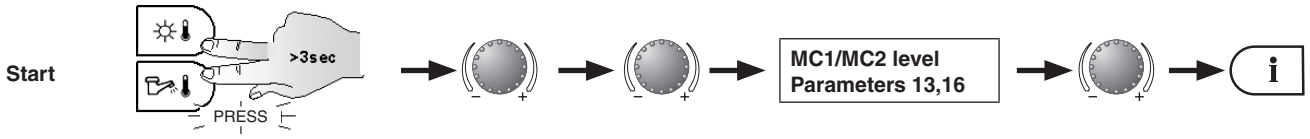
Cross where applicable;
cut out record and fasten to the control during the active screed function.

Minimum requirements for the activation of the screed function:

- ☐ **Minimum age cement screed 21 days**
- ☐ **Minimum age calcium sulphate screed 7 days**
- ☐ **Flow temperature monitor installed and connected**

For newly laid screed - see „Recommendation of the Federal Association of Radiant Panel Heating“.

Heating circuit selection for screed function and necessary parameter settings
☐ **Mixing circuit 1** ☐ **Mixing circuit 1**

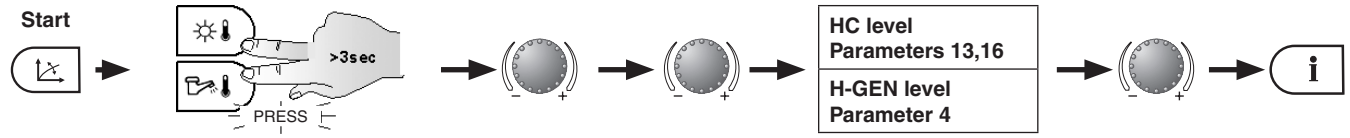


Activate Installer level (Code entry) | > 3 sec: Access to level | Select / Confirm | Set | Confirm | End / Exit

Required parameter settings:

Parameter level	Par. No	Setting	Description
MIX.VALVE (1 or 2)	13	.....°C	Maximum flow temperature to be set
MIX.VALVE (1 or 2)	16	1 ☐ 2 ☐ 3 ☐	Screed program to be set (for description see following page) 1 Function heating (duration: Starting day + 7 days) 2 Surface-ready heating (duration: Starting day + 18 days) 3 Function and surface-ready heating (duration: Starting day + 25 days)

☐ **Direct heating circuit** (possible only with H-Gen without minimum H-Gen temperature - e.g. condensing boiler)



Characteristic heating curve Enable HC | Activate Installer level (Code entry) | > 3 sec: Access to level | Select / Confirm | Set | Confirm | End / Exit

Required parameter settings:

Parameter level	Par. No	Setting	Description
- Key	DK	.....	Activate heating characteristic curve, above 0 = OFF, e.g. ~ 0.8 for FBH
UNMIXED CIRC.	13	.....°C	Maximum flow temperature to be set
UNMIXED CIRC.	16	1 ☐ 2 ☐ 3 ☐	Screed program to be set (for description see following page) 1 Function heating (duration: Starting day + 7 days) 2 Surface-ready heating (duration: Starting day + 18 days) 3 Function and surface-ready heating (duration: Starting day + 25 days)
HEAT GENER.	4	.....°C	Max. H-Gen temperature to be set, set as for max. flow temperature (after termination of screed function reset max. temperature to the value required).

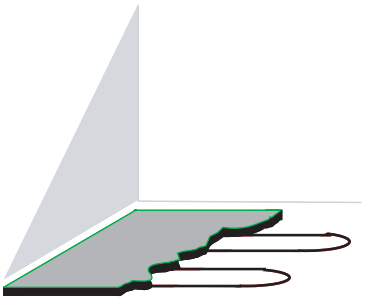
If the screed function is activated for the unmixed circuit, all the other circuits (MC, DHW) are switched off.

In alternation with the basic display of the controller, the activated screed heating is displayed giving some information about the remaining term in days „screed - 18“.

Record
Screed heating activated by: .....
Screed heating activated on: ....
Screed heating ends on: ..... Date and signature

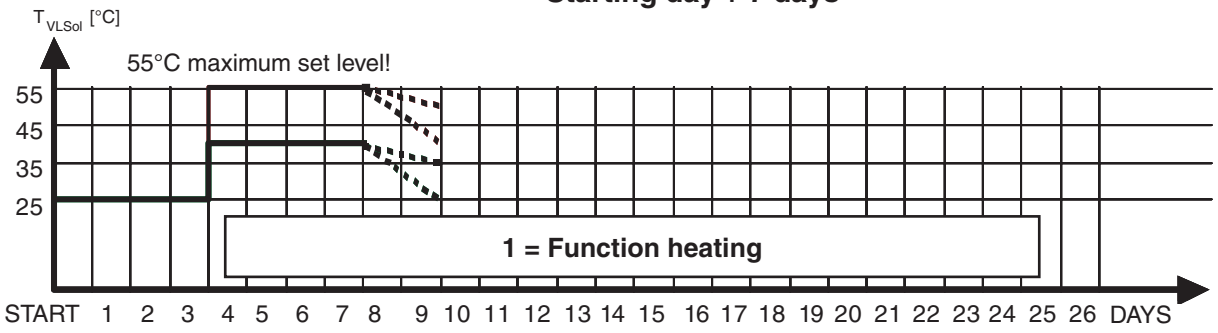
Parameter 16 „Screed function“
(Parameter HC, MC1 or MC2)

Example:
Maximum flow temperature 40°C



1 Function heating

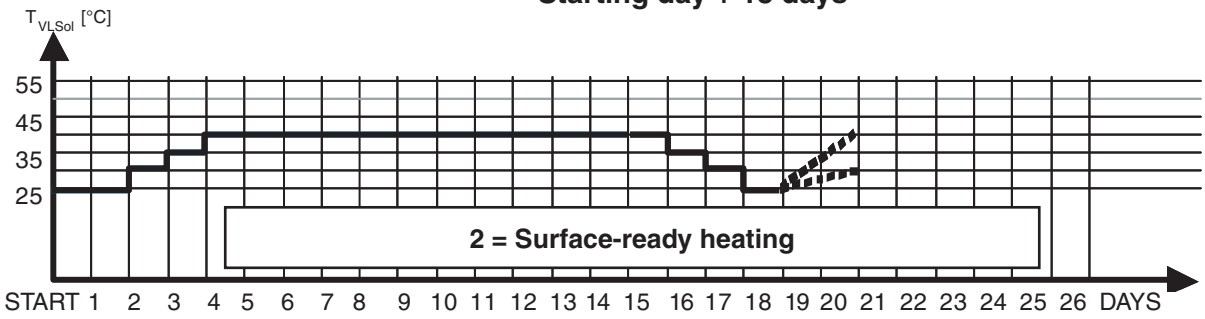
Starting day + 7 days



- On the starting day and for the three following days at 25°C constantly
- Subsequently for 4 days at the set flow maximum temp., but limited to a maximum of 55°C

2 Surface-ready heating

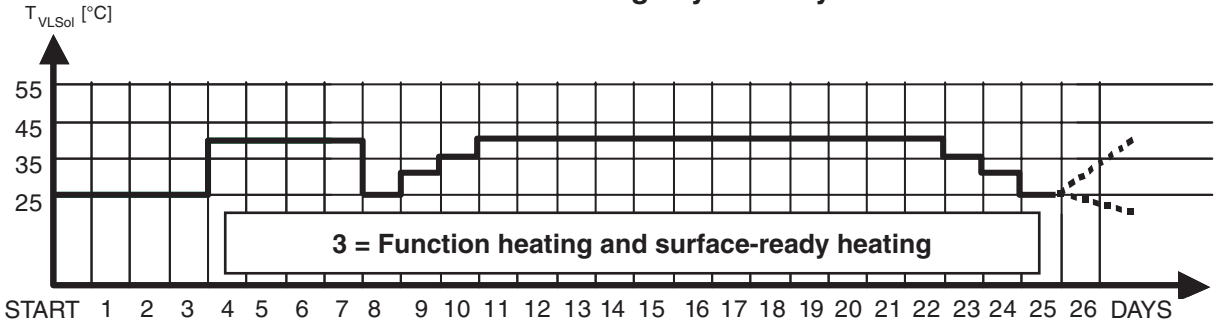
Starting day + 18 days



- On the starting day and on the 1st day constantly at 25°C, on each further day the demand value rises by 5°C until the maximum flow temperature is reached. Subsequently the temperature is lowered again in the same gradations until the low point of 25°C is reached.
  Example: Set flow maximum temp.: 40°C
  Starting day + 1st day: 25°C 5th - 15th day: constant heating with the max. flow temperature
  2nd day: 30°C 16th day: 35°C
  3rd day: 35°C 17th day: 30°C
  4th day: 40°C 18th day: 25°C

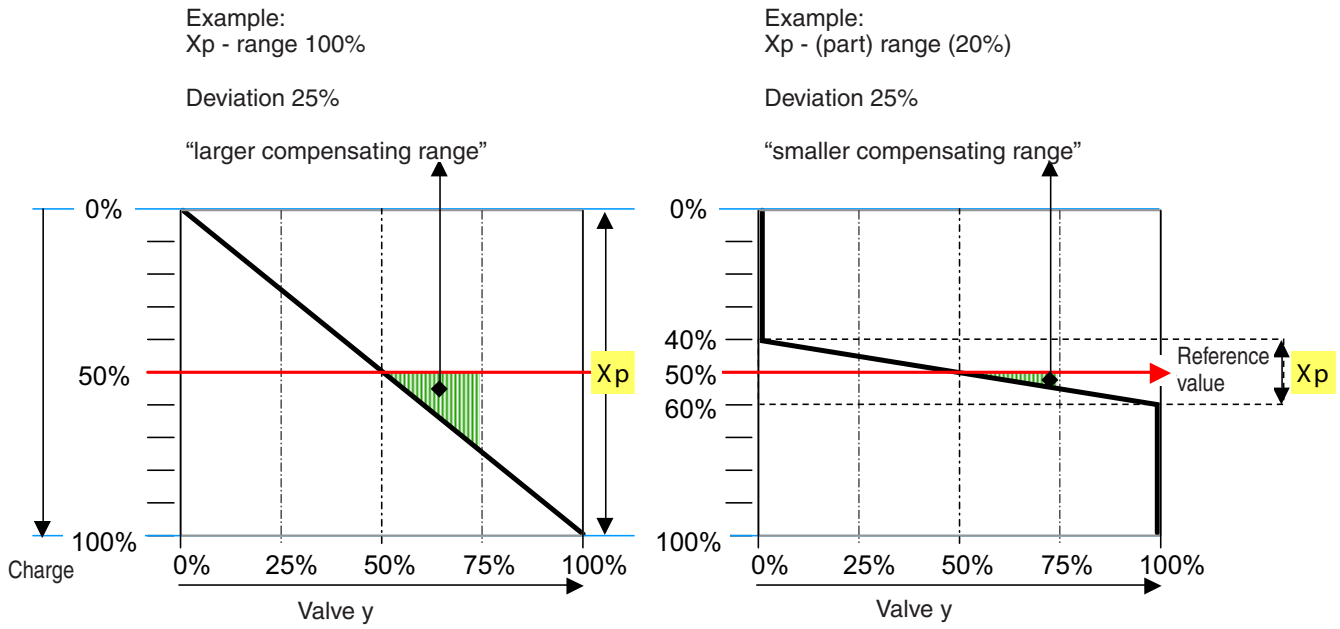
3 Function heating and surface-ready heating

Starting day + 25 days

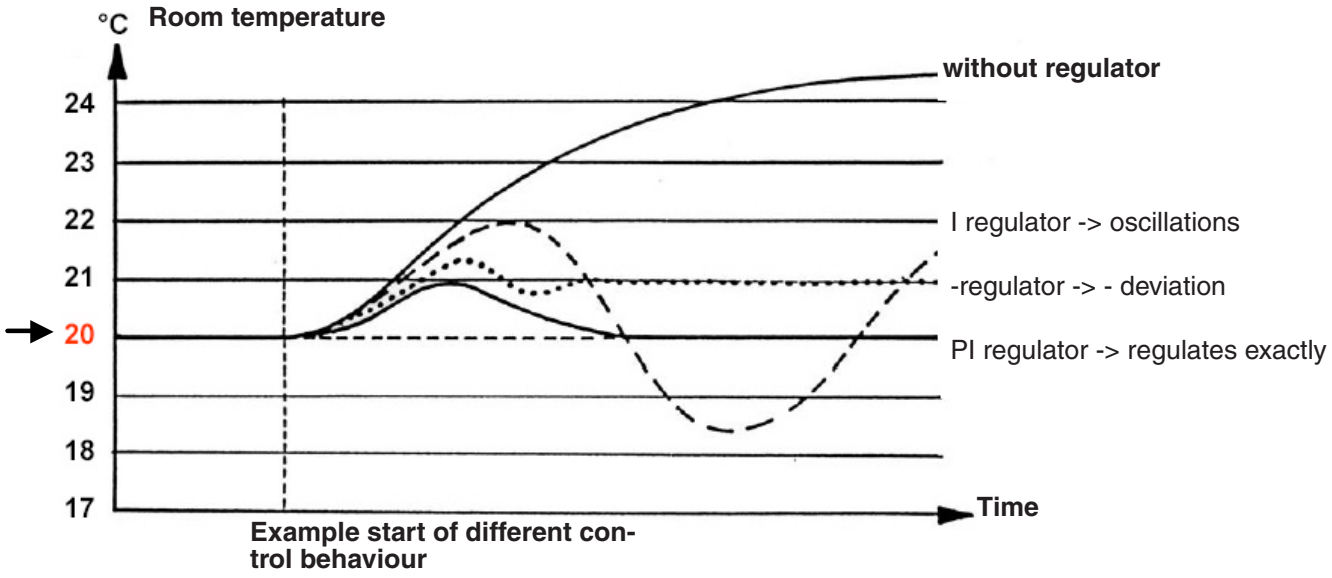


- Combination of 1 function heating and subsequently 2 surface-ready heating

Re heating circuits MC1, MC2 parameter 18 P portion Xp (OEM):



Re heating circuits HC, MC1, MC2 parameter:
18 P-portion Xp (OEM)
19 Scanning time (OEM)
20 1-portion (OEM)



8.9 TopTronicT functioning as room controller only

Legend Top Tronic®T functioning as room controller only:
- only with RS-T possible (with RFF-T not possible)
- Heating curve have to be adjusted to > OFF

Activate the following adjustments

Re „Heating circuits HC, MC1, MC2 parameter 03 room override:
- have to be adjusted to 1

Re „Heating circuits HC, MC1, MC2 parameter 04 room factor:
- have to be adjusted to RC = Room control active

Re heating circuits HC, MC1, MC2 parameter 09 Room thermostat function:
- Room thermostat function can, but must not be activated

Re „Heating circuits HC, MC1, MC2 parameter 23 room control K-factor:
- Room control K-factor (per 1K room temperature deviation, the flow (VL) setpoint increases by 8 K (P23)

Re „Heating circuits HC, MC1, MC2 parameter 24 room control Tn-factor:
- 35 min. room control Tn (if the deviation is still present after 35 min. (P24), the flow setpoint increases again by 8K (P23))

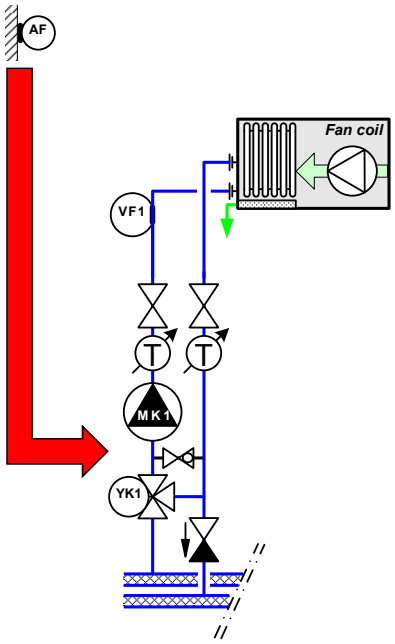
RE „Heating circuits HC, MC1, MC2 parameter 25 operating mode holiday
- In some installations heating must be continued during active holiday mode (e.g. greenhouses).
  By means of parameter 25 the operating mode for the holiday program can be set for each heating circuit separately.
  Setting value : STANDBY / REDUCED
  Standard value: STANDBY

With setting REDUCED, contrary to the previous function (STANDBY), regulation during holiday mode takes place according to the ECO or ABS programming.
The information and basic display remains the same.

Re „heating circuits HC1, MC2 parameter 37 Mixer lead time ...
- to ensure forced circulation, in the event of a H-GEN demand of the mixer circuit the transmission of the reference value is delayed for a period of time that can be set.

Re heating circuits MC1, MC2 parameter:
50 Cooling switch-on point, Outside temperature
- with parameter setting 50 "Cooling switch-on point, OT" >OFF, cooling operation is activated for the cooresponding heating circuit.

Depending on this activation:
- further parameters are released for cooling in the heating circuit tree
- operation is switched to separate operating mode
- when outside temperature > cooling switch-on point = cooling active (same average value calculation as summer disconnection but with separate reference value)
- when outside temperature < cooling switch-on point -1K = cooling inactive
- for calculation in the cooling characteristic, the OT average value assigned to the heating circuit is used



Point 1 of the flow cooling characteristic
Par. 50 Cooling switch-on point, OT
- Outside temperature which activates cooling
Par. 52 Cooling reference flow temperature at switch-on point

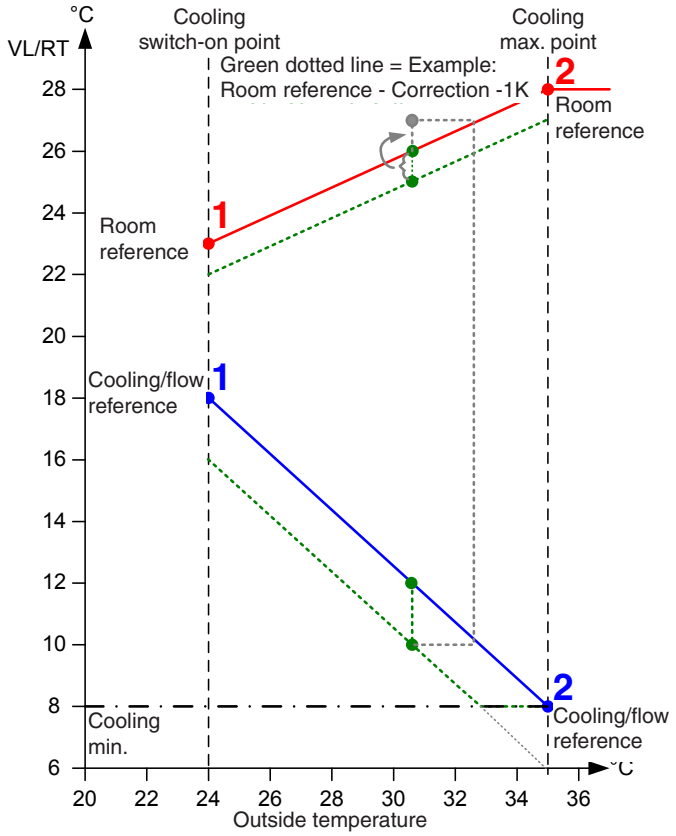
Point 2 of the flow cooling characteristic
Par. 51 Cooling max. point, OT
- Max. outside temperature cooling characteristic
Par. 53 Cooling reference flow temperature at max. point

Point 1 of the reference room value cooling characteristic
Par. 54 Cooling reference room temperature at switch-on point

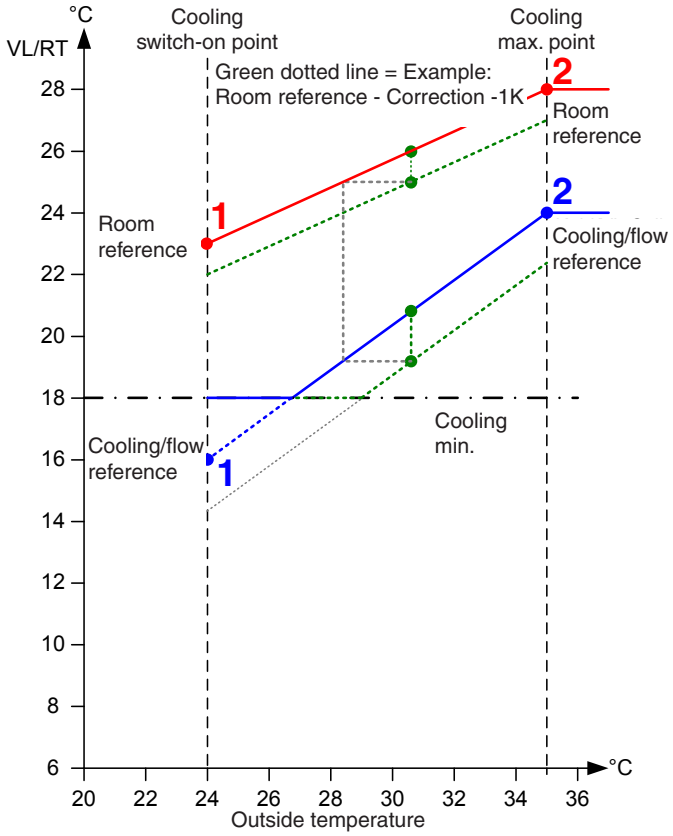
Point 2 of the reference room value cooling characteristic
Par. 55 Cooling reference room temperature at max. point

Protective function: sets lower limit of flow cooling characteristic
Par. 56 Minimum temperature limit cooling
- works comprehensively as lower limiting temperature

Example: Cooling characteristic with FanCoil's



Example: Cooling characteristic with floor heating



8.10 Parameter level "Heat generator" Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
1	H-GEN model	**1 /2 /5**	1	***2***	***5***		***1 /5***	X	OFF without heat generator 1 Oil/gas single-stage 2 Oil/gas, two-stage 3 Oil/gas 2x single stage (2nd WF necessary) 4 Modulating burner (units only) 5 Automatic firing device (with H-GEN bus)	HF
2	Start-up protection H-GEN	**3 /3 /OFF**	3	3	***OFF***		***3 / OFF***	X	OFF No start-up protection 1 Unrestricted start-up protection 2 Weather-driven start-up protection 3 Start-up protection separate	HF
3	Minimum temperature limit H-GEN	**48/75/5°C**	48	***75***	***5***		***48 /5***	X	5°C...Maximum temperature limit	HF
4	Maximum temperature limit H-GEN	**85°C**	85	85	85		85	X	Minimum temperature limit… Setting limit maximum temperature H-GEN	HF
5	Mode of action minimum temperature limit H-GEN	**1**	1	1	1		1	X	1 Demand-dependent minimum limit 2 Restricted minimum limit 3 Unrestricted minimum limit	HF
6	Sensor mode operation for H-GEN	**1**	1	1	1		1	X	1 H-Gen switch-off in the event of a defect 2 External H-Gen switch-off 3 H-Gen release in the event of a defect Take note of warning note !!!	OEM
7	Minimum burner running time	**2 Min**	2	2	2		2	X	0 ... 20 Min	HF
8	Burner switching difference I	**6 K**	6	6	6		6	X	Single-stage: 2 ... 30K 2-stage: 2 ... (SDII – 0,5K)	HF
9	Burner switching difference II	**12 K**	12	12	12		12	X	(SD I + 0,5 K) ... 30 K	HF
10	Time-out stage II	**10**	10	10	10		10	X	0 ... 60 Min (0 = 10 sec)	HF
11	Release mode stage II	**1**	1	1	1		1	X	1 Unrestricted release duringstart-up relief 2 Time-out during start-up relief	HF
12	Hot water charging mode 1-2 stage	**2**	2	2	2		2	X	1 Two-stage HW charging with delay of full load stage 2 Two-stage HW charging unrestricted 3 Single-stage HW charging (only part load stage)	HF
13	Lead time Boiler circuit pump	**1 Min**	1	1	1		1	X	0 ... 10 Min (KKP or MK=RLHH)	HF
14	Follow-on time, boiler circuit pump resp. parallel heat generator release	**5 Min**	5	5	5		5	X	0 ... 60 Min (KKP or. MK=RLHH)	HF
15	Search time feed pump, primary pump	**5 Min**	5	5	5		5	X	0 ... 60 min	HF
16	Exhaust gas temperature monitoring	**OFF**	OFF	OFF	OFF		OFF	X	OFF Only display of the exhaust gas temperature 0… 60 H-Gen blocking in the event of limit value being exceeded for set time STB H-Gen locking device in the event of limit value being exceeded	HF
17	Exhaust gas limit value	**200°C**	200	200	200		200	X	50 ... 500 °C	HF
18	Boiler gradient	**OFF**	OFF	OFF	OFF		OFF	X	OFF, 0,5 ... 30 K/Min	OEM
19	Modulation P-portion Xp	**5 %/K**	5	5	5		5	X	0,1...50 %/K	OEM
20	Modulation scanning time Ta	**20 sec**	20	20	20		20	X	1...600 sec	OEM
21	Modulation reset time Tn	**180sec/°C**	180	180	180		180	X	1...600 sec/°C	OEM
22	Modulation running time	**12 sec**	12	12	12		12	X	5...600 sec	HF
23	Modulation starting time	**200 sec**	200	200	200		200	X	0...900 sec	HF
24	Modulation start-up output	**0.7**	0.7	0.7	0.7		0.7	X	0...100%	HF
25	Outside temperature block	**OFF**	OFF	OFF	OFF		OFF	X	OFF, -20 ... 30 °C	OEM
26	Basic charge elevation	**0 /10K**	10	10	***0***		10	X	0 ... 60 K	OEM
27	Minimum temperature limit, heating circuits	**38/65/5°C**	38	***65***	***5***		***38 /5***	X	5°C… KT-min. (only if Para02 = 3)	HF

Parameter level "Heat generator" Description

No.	Designation	Factory	U90	U110	UG		N	NWP	Setting range/Setting values	Lev.
28	Switching difference, minimum temperature limit Heating circuits	**2 K**	2	2	2		2	X	2 K… 20K (only if Para02 = 3)	OEM
29	Heat generator forced discharge	**OFF**	OFF	OFF	OFF		OFF	X	OFF 1 Discharge into sanitary water tank 2 Discharge into heating circuits 3 Discharge into buffer tank	HF
30	OEM maximum limit	**110 °C**	110	110	110		110	X	Minimum temperature limit…110°C	OEM
31	Minimum load control	**OFF**	OFF	OFF	OFF		OFF	X	OFF, 1… 10 mins. (only with Open Therm)	OEM
34	Output limitation heating	**100%**	100	100	100		100	X	50 ...100 % (only TTT/UG)	HF
35	Output limitation hot water	**100%**	100	100	100		100	X	50 ...100 % (only TTT/UG)	HF
36	Outside temp. blocking 2. burner stage	**OFF**	OFF	OFF	OFF		OFF	X	OFF, -20 ... 30 °C	HF
37	Running time meter	**1**	1	1	1		1	X	Metering with AUTO= Response or demand 1= only response 2= meter freely applicable -only response	HF
38	DHW release regulator (CU)	**ON**	ON	ON	ON		ON	X	OFF, ON (only for cascades)	HF
39	Emergency operation temperature H-Gen (e.g. for 70-8)	**70°C**	70	70	70		70	X	OFF, H-Gen min. ..... H-Gen max.	HF
RESET ST-1	Reset counter starts and running time, stage 1							X	SET	OEM
RESET ST-2	Reset counter starts and running time, stage 2							X	SET	OEM

Legend for heat generator: Setting range/setting values for parameters ...

Modulation

Re heat generator/boiler parameter 01 Design of boiler/H-GEN:

OFF without heat generator
1 Oil/gas single-stage
2 Oil/gas, two-stage
3 Oil/gas 2 x single-stage
4 Modulating burner*
5 Automatic firing device (with H-GEN bus)**

* only with TopTronic®T/U (U12 Relay, N only 11 Relay!)
** In the case of H-Gen-bus –recognition, automatically H-Gen = 5

Re heat generator/boiler parameter 02 Start-up protection boiler/H-Gen:

- Not required for condensing devices
- For low-temperature boiler etc. this is a protective measure for the life span of the device

1 = Unrestricted start-up protection ...

- If the temperature in the boiler drops 2K below the minimum temperature limit, then pumps OFF and mixers closed
- Release takes place if the temperature is above the minimum temperature + ½ burner switching difference

2 = Weather-driven start-up protection...

- The heating-up behaviour is as for unrestricted start-up protection
- The weather-driven start-up protection becomes active again when the boiler temperature according to the boiler line drops below the reference value

3 = Separate start-up protection

- Separation of the temperature for the switching on of the burner and switching off of the heating circuits at the boiler minimum temperature limit (temperatures are set at Par. 3 and Par. 27)

Re heat generator/boiler parameter 03 Minimum temperature limit boiler/H-GEN:
... See details for parameter 05

Re heat generator/boiler parameter 04 Maximum temperature limit boiler/H-GEN:
- Maximum temperature that is permissible for the boiler
- OFF if exceeded
- ON again if temperature falls below - ½ burner switching difference + 2K below the set limit value

Re heat generator/boiler parameter 05 Mode of action minimum temperature limit boiler/H-GEN:
Three different modes of action
1 = **Demand-dependent minimum limit**, no demand - boiler OFF, no minimum limit, the boiler falls below the heat generator frost protection temperature +5°C, heating to the minimum temperature limit
2 = **Restricted minimum limit**, works as lower limit value
- Disconnection of the boiler only in the case of active summer disconnection

3 = **Unrestricted minimum limit**, boiler temperature is limited to the minimum temperature independently of demand or switching-off modes of operation

Re heat generator/boiler parameter 06 Sensor mode of operation boiler/boiler sensor (OEM):
Reaction in the event of fault/defect
1 = Defective boiler sensor
- Burner OFF – in the event of short-circuit or interruption, fault signal

2 = External burner switch-off
- Burner OFF/ON, no fault signal

3 = Burner release in the event of defective boiler sensor
- In the event of a short-circuit or interruption, a fault signal and an unrestricted release of the burner take place

Note
This function may be installed only if additionally a boiler thermostat is installed
- this is located in series with the safety temperature limiter (STB)

Re heat generator/boiler parameter 07 Minimum burner running time:
- Causes an extension of the burner running times and reduction of the burner starts
- At least the set time must have elapsed for the burner to turn off
- The maximum temperature limit naturally interrupts the minimum burner running time

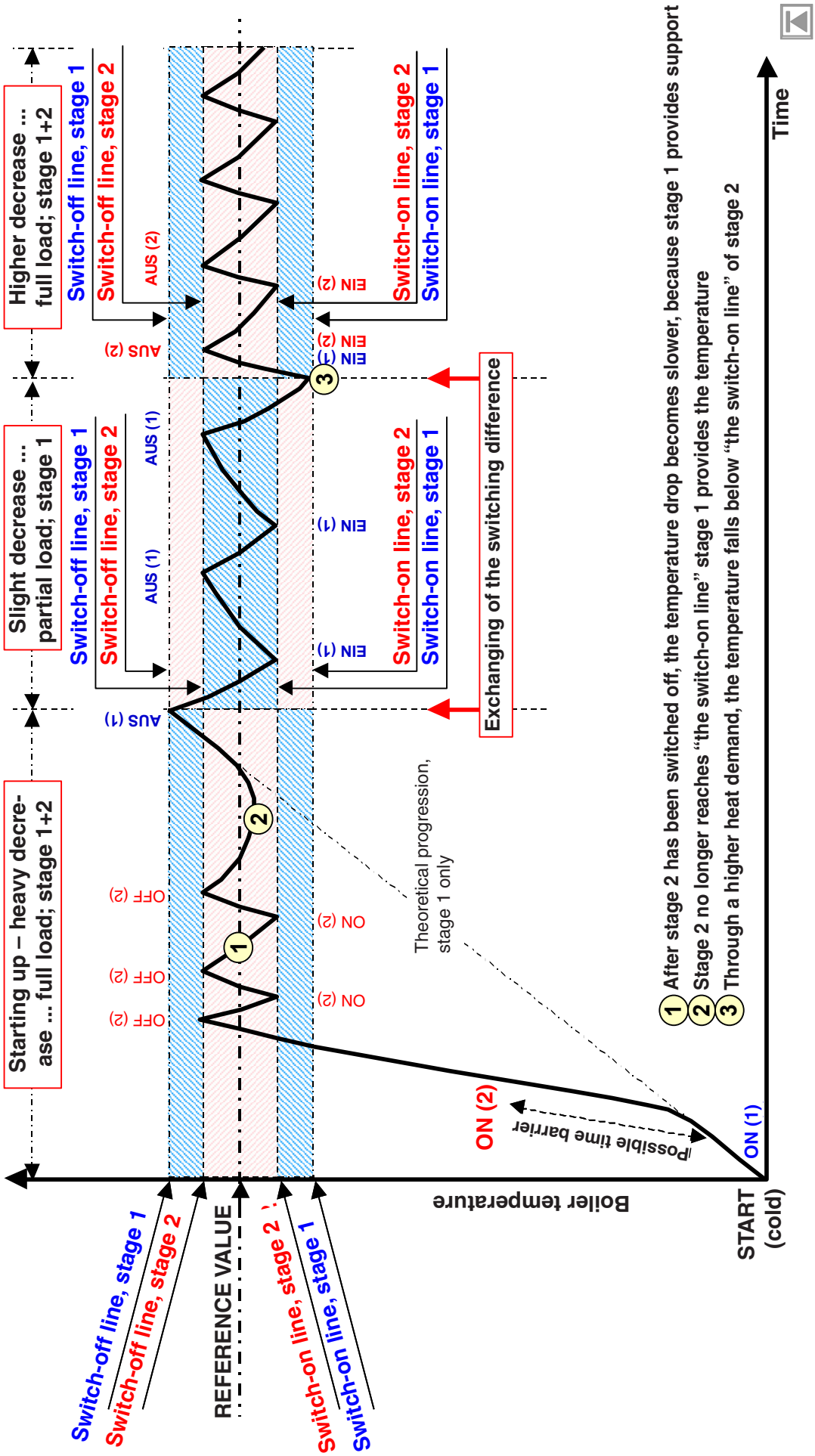
Re heat generator/boiler parameters:
08 Burner switching difference 1
09 Burner switching difference 2 ... For function sequence, see next page
- The regulator is equipped with two different adjustable switching differences, related to the same reference value.

Switching difference 1
- Depending on load and demand, regulates the boiler temperature, ON/OFF switching of Stage 1 takes place within a set switching difference which is located centrally on the reference value
  e.g.: Switching difference = 6K reference value = 60°C ON at 57°C and OFF at 63°C.

Switching difference 2
- Determines how many stages are necessary for the covering heat requirement (partial load 1 - full load 2)
- The switching difference of stage 2 is symmetrically overlaid over switching difference 1, and can only be set to higher values
- Cascade operation overlays this setting and is then not available

Re heat generator/boiler parameter 10 Time-out:
- Function active only in the start-up phase
- The release of stage 2 can additionally be prescribed via a time-out
- If stage 1 is in basic load and stage 2 is demanded, then connection takes place without delay
- In the case of “cascade connection”, this function is overlaid and is then not available

Sequence of functions, burner switching difference 1 + 2



Re heat generator/boiler parameter 11 Release mode stage 2:
- Influence only during the start-up phase below the “boiler minimum temperature limit”

Unrestricted release
- During start-up relief, both stages are “released”

Time-out during start-up relief
- Is released after expiry of the time-out
- In the case of “cascade connection” this function is overlaid and is then not available

Re heat generator/boiler parameter 12 Hot water charging mode 1-2 stage:
Three possibilities for the mode of operation of two-stage or two single-stage boilers:
1. Two-stage tank charging - stage two is time-delayed
2. Unrestricted tank charging - both stages “released”
3. Restricted tank charging - stage 1 “clear” stage 2 “blocked”

Re heat generator/boiler parameter 13 Lead time (KPP):
- Used only if no boiler circuit pump is installed, but e.g.: a motor valve/ motor throttle, so that the opening time is waited for.

Re heat generator/boiler parameter 14 + 15 Follow-on time (KKP/ZUP):
- To avoid an “accumulation of heat or residual heat utilisation” through the set time delay

Re heat generator/boiler parameter 16 Flue gas temperature monitoring:
Setting
1 = Display only
2 = Switching off for a limited time
3 = Locking where the limit value is exceeded

Re heat generator/boiler parameter 17 Flue gas limit value
- Locking where the limit value is exceeded – plant STOP
- Release only by switching the regulator ON/OFF!

Re heat generator/boiler parameter 18 Boiler gradient (OEM):
- Description in general

Re heat generator/boiler parameter 19 Modulation P-portion Xp (OEM):
- In the case of a discontinuous change in the reference value, the proportional element Xp determines the corresponding adjustment of the respective control element in the burner in accordance with the selected setting.

Example:
At a maximum boiler temperature of 70°C, the control element in the modulating burner must sweep a temperature difference of 50K (based on room temperature = 20°C). This would correspond to a deviation of 100%, so that the setting value is calculated as follows:

Xp (%)/K x 50K = 100 % bzw. Xp = 2 %/K

Re heat generator/boiler parameter 20 Scanning time Ta (OEM):
- The scanning time is a variable that is internal to the regulator and defines the duration between two consecutive control pulses in the case of deviation that applies. Smaller scanning times lead to finer deviation control.

Re heat generator/boiler parameter 22 Modulation running time
- Means the time needed by the burner to get from low to high output

Re heat generator/boiler parameter 23 Modulation starting time
- The parameter Start time determines the duration of the starting phase in modulating mode to ensure a stable start. When the set Start time has expired, modulation switches to its usual control behaviour in accordance with the modulation-related parameters.

Re heat generator/boiler parameter 24 Modulation start-up output

- The parameter Start-up output determines an adjustable percentage of the modulation running time during the starting phase. At a setting of 0%, the control valve remains closed during the entire Start time. When the set Start time has expired, modulation switches to its usual control behaviour in accordance with the modulation-related parameters

Re heat generator/boiler parameter 21 Modulation reset time Tn (OEM):

- The integral portion (= reset time) determines the dynamic behaviour of the regulator, and thus the reset time which the regulator needs in order to eliminate any deviation that arises. The reset time remains constant, independently of the size of the deviation.

Re heat generator/boiler parameter 25 Outside temperature block (OEM):

- Can close a H-GEN as soon as the current outside temperature is exceeded
- Heating circuits continue working, but the boiler does not come in any longer
- Likewise via a regulator, irrespective of whether two-stage burner or several boilers !
- With “cascade” there are two regulators, so boiler 2 can then be assigned the outside temperature block! The latter is suspended if :
  + there is a fault signal via BUS for H-Gen type 5
  + takes place for other H-GEN types it should be effected depending on a VE input (VE setting 6 = External fault)

  The OT temperature blocking suspension applies to all H-Gen

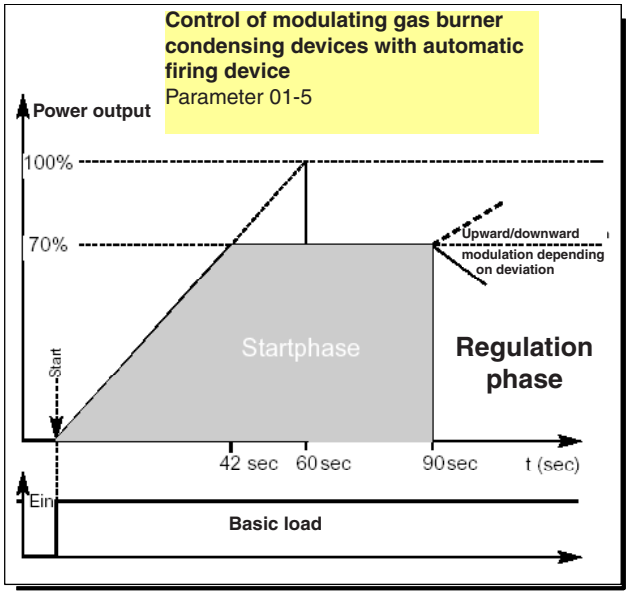
Re heat generator/boiler parameter 26 Basic load elevation (OEM):

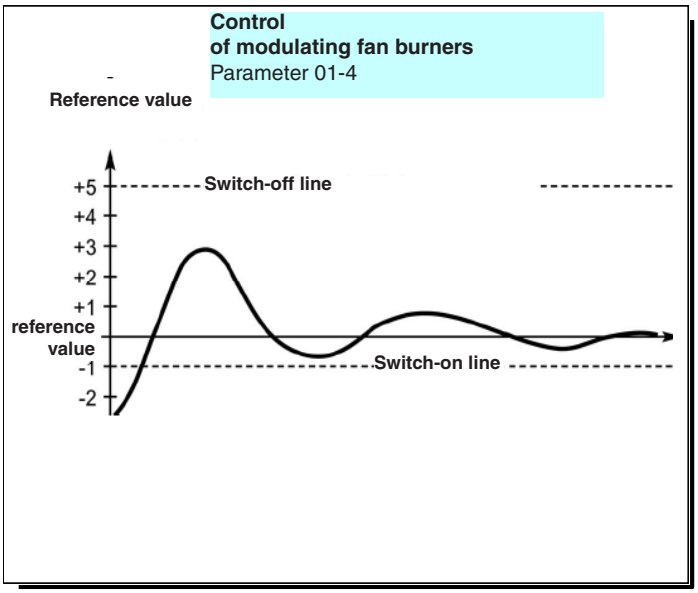
- For cascade i.e. several boilers,
- Burner stages operating in basic load receive a higher reference value than the one of the stage connected at last (Current reference value + basic load elevation)

Re heat generator/boiler parameter 27 Minimum temperature limit heating circuit (only if P02; 3):

- If the [current] boiler temperature *KTist* <= the parameter setting 27 *(Ktmin-HK),* then the heating circuit pumps (DKP, SLP, MKP, PLP) are switched off
- Mixer valves close
- If *KTist* > KTmin-HK + *SKmin–HK*, then the heating circuit pumps and the mixer valves are released again

Modulation





Re heat generator/boiler parameter 29 Heat generator forced discharge (OEM):
- If the temperature in the heat generator exceeds its given maximum temperature limit, then any surplus energy is diverted into circuits downstream
- This function works across regulators in the bus system
- The forced discharge is suspended 2K below the maximal limitation
- Discharge into hot water storage (only where storage facilities are provided)

Note: Thermal mixing valve prescribed at the water heater output, because there is a danger of scalding.

Discharge into the heating circuits
- The surplus heat is diverted into existing heating circuits
- The set maximum temperature is not exceeded here
- The desired room temperature can be exceeded briefly here

Thermostat function

Note: In the case of floor heating systems, it is essential that a plant thermostat is deployed, for compulsory pump shut-off
- Discharge into buffer tank

Re heat generator/boiler parameter 31 Setting minimum load control with OT (Open Therm) control devices (OEM):
- If the burning time (flame ON) is below 8 minutes, then there is a switch-over into minimum load control
- The heat generator is then blocked for a period of time that can be set (reference value = 0)
- After that, the reference value is set to the maximum boiler requirement value
- As soon as the regulator reads back the flame bit, the demand value is reset to the current demand reference value
- This has the effect that the automatic device switches to minimum performance control
- If the running time of the heat generator is below 8 minutes, blocking takes place again. If the running time is higher, then the charging control is ended, and the heat generator is not blocked

Re Heat generator / boiler parameter 34, 35 Output limitation heating / hot water ...

Single boiler :
- Par.34: Max. output heating mode
- Par.35: Max. output DHW mode
- with DHW parallel operation the higher limiting value is working

Re heat generator/boiler parameter 36 Outside temperature block 2nd stage...
- the 2. H-Gen stage is blocked as soon as the current outside temperature exceeds the set outside temperature

Re heat generator/boiler parameter 37 running time meter / starting counter...

With Par. 37 running time meter/ starting counter behaviour is set.

- AUTO (Metering with response or demand)
- 1 only response (metering only with response, optocoupler or bus)
- 2 freely applicable (metering with response - both meters freely applicable, independent of whether an H-GEN is present or not)

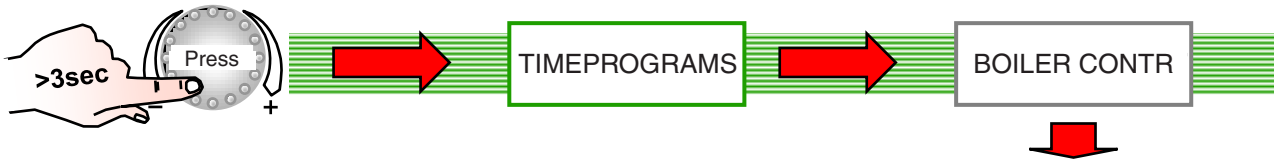
Re H-GEN/ boiler parameter 38 DHW release regulator (CU)
- If the controller for hot water charging is not released, the heat generator receives no hot water reference value
- This means that the H-GEN is excluded from hot water charging.
- In the case of HW parallel operation, the stage can continue to work in accordance with the heating circuit reference value.

Re heat generator/boiler parameter 39 Emergency operation temperature H-Gen...

- If in a cascade, the controller with the address 10 (cascade manager) fails, each further H-GEN switches to emergency operation and heats to the respective emergency operation temperature set at Par. 39
- Fault signal 70-8 (Device with address 10 is missing)

Parameter level "boiler control"

Clear through expert code _ _ _ _ !



For further information consult separate instructions for firing device

Attention:
The parameters in the automatic firing device are NOT set back by reset of the controller

8.11 Parameter level "Heat pump" Description

No.	Designation	Factory	NWP	Setting range/Setting values	Lev.
1	H-GEN model	**6**	6	OFF without heat generator 6 HP single stage 7 HP 2-stage 8 HP 2xsingle stage (2ndWF necessary) 9 Modulating HP 10 Modulating HP + 1 stage H-Gen	HF
2	Start-up protection H-GEN	**OFF**	OFF	OFF No start-up protection 1 Unrestricted start-up protection 2 Weather-driven start-up protection 3 Start-up protection separate	HF
3	Minimum temperature limit H-GEN	**6°C**	6	5°C Maximum temperature limit	HF
5	Mode of action minimum temperature limit H-GEN	**1**	1	1 Demand-dependent minimum limit 2 Restricted minimum limit	HF
6	Sensor mode operation for H-GEN	**1**	1	1 H-Gen switch-off in the event of a defect 2 External H-Gen switch-off 3 H-Gen release in the event of a defect Take note of warning note !!!	OEM
7	Minimum running time ST1	**0 min**	0	0 ... 60 min	HF
8	HP switching difference I	**6 K**	6	Single-stage: 2 ... 30K 2-stage: 2 ... (SDII – 0,5K)	HF
9	HP switching difference II	**8 K**	8	(SD I + 0,5 K) ... 30 K	HF
10	Time-out stage II	**30 Min**	30	0 ... 60 Min (0 = 10 sec)	HF
11	Release mode stage II	**2**	2	1 Unrestricted release during start-up relief 2 Time-out during start-up relief	HF
12	Hot water charging mode 1-2 stage	**1**	1	1 Two-stage HW charging with delay of full load stage 2 Two-stage HW charging 3 Single-stage HW charging (only part load stage) 4 HW charging with 2. stage only	HF
13	Lead time condenser pump (CP), KKP	**1 Min**	1	0 ... 10 Min	HF
14	Follow-on time condenser pump (CP), KKP, PWF	**2 Min**	2	0 ... 10 Min	HF
15	Search time feed pump, primary pump	**5 Min**	5	0 ... 60 min	HF
19	Modulation P-portion Xp	**5 %/K**	5	0,1...50 %/K	OEM
20	Modulation scanning time Ta	**20 sec**	20	1...600 sec	OEM
21	Modulation reset time Tn	**180sec /°C**	180	1...600 sec/°C	OEM
22	Modulation running time	**12 sec**	12	5...600 sec	HF
23	Modulation starting time	**200 sec**	200	0...900 sec	HF
24	Modulation start-up output	**0.7**	0.7	0...100%	HF
25	Outside temperature block	**OFF**	OFF	OFF, -20 ... 30 °C	OEM
26	Basic charge elevation	**10 K**	10	0 ... 60 K	OEM
27	Minimum temperature limit, heating circuits	**6°C**	6	5°C… KT-min. (only if Para02 = 3)	HF
28	Switching difference, minimum temperature limit Heating circuits	**2 K**	2	2 K… 20K (only if Para02 = 3)	OEM
29	Heat generator forced discharge	**OFF**	OFF	OFF 1 Discharge into sanitary water tank 2 Discharge into heating circuits 3 Discharge into buffer tank	HF
30	OEM maximum limit	**110 °C**	110	Minimum temperature limit…110°C	OEM
36	Outside temperature block ST 2 (OT higher than P36 = ST2 OFF)	**OFF**	OFF	OFF, -20 ... 30 °C	HF
37	Running time meter	**1**	1	Metering with AUTO= Response or demand 1= only response 2= meter freely applicable -only response	HF
38	DHW release regulator (CU)	**ON**	ON	OFF, ON (only for cascades)	HF
39	Emergency operation temperature H-Gen (e.g. for 70-8)	**45°C**	45	OFF, H-Gen min. ..... H-Gen max.	HF
40	Minimum switch-off time ST 1	**1 Min.**	1	0 ... 60 min	HF
41	Max. temp. ST 1	**55°C**	55	Min. temp. … 95°C	HF
42	Outside temperature block ST 1 (OT lower than P42 = ST1 OFF)	**OFF**	OFF	OFF, -20 … +30°C	HF
43	Minimum running time ST2	**0 Min.**	0	0 ... 60 min	HF

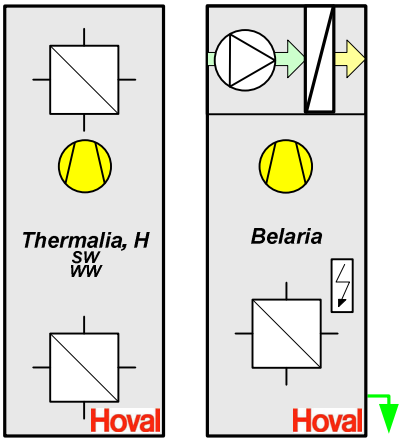
Parameter level "Heat pump" Description

No.	Designation	Factory	NWP	Setting range/Setting values	Lev.
44	Minimum switch-off time ST 2	**1 Min.**	1	0 ... 60 min	HF
45	Max. temp. ST 2	**55°C**	55	Min. temp. … 95°C	HF
46	Outside temperature block ST 2 (OT lower than P46 = ST2 OFF)	**OFF**	OFF	OFF, -20 … +30°C	HF
47	HP control stage	**1**	1	1, 2	HF
48	Stage reversal time	**OFF**	OFF	OFF, 1 …. 250 days	HF
49	Lock by energy supply company ST2	**ON**	ON	OFF, ON (only for H-Gen type 8, 10)	HF
50	Charging mode cooling	**1**	1	1: 1- stage cooling 2: 2 stage cooling with delay 2nd stage	HF
51	Cooling connection delay ST 2	**30 Min**	30	0 … 60 Min	HF
52	Heat generator priority (operation mode)	**1**	1	1: Prio1=HW, Prio 2=HC-Heat Prio3=HC-Cool 2: Prio1=HC-Cool, Prio 2=HW, Prio3=HC Heat 3: Prio1=HW, Prio 2=HC Cool, Prio3=HC Heat	HF
53	Minimum running time operating mode	**5 Min.**	5	0 ... 60 min	HF
54	Negative H-Gen switching difference cooling operation	**4 K**	4	1K … 10 K below reference value H-Gen	HF
55	Minimum return temperature limit	**5°C**	5	OFF, 5 … 70°C	HF
56	Maximum return temperature limit	**45°C**	45	OFF, 5 … 70°C	HF
57	Downtime H-Gen HW switch-over	**2 Min.**	2	OFF, 0 … 60 Min	HF
58	Lead time heat source pump MWQ	**2 Min.**	2	0 … 10 Min	HF
59	Follow-on time heat source pump MWQ	**1 Min.**	1	0 … 10 Min	HF
60	Heat source minimum temperature	**-10°C**	-10	-20 … +50°C	HF
61	Heat source maximum temperature	**20°C**	20	-10 … +50°C	HF
62	CP release with HW charging	**ON**	ON	OFF, ON	HF
RESET ST-1	Reset counter starts and running time, stage 1			SET	OEM
RESET ST-2	Reset counter starts and running time, stage 2			SET	OEM

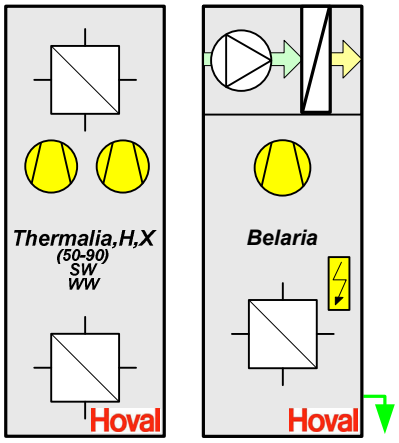
Legend for HP: Setting range/setting values for parameters...
Re HP parameter 01 Design of heat generator…

OFF without heat generator
6 P single stage
7 WP 2-stage
8 2 x single-stage (2ndWF necessary)
9 modulating HP (0-10V)
10 modulating HP (0-10V) + 1-stage H-Gen

H-Gen – type 6 : single-stage

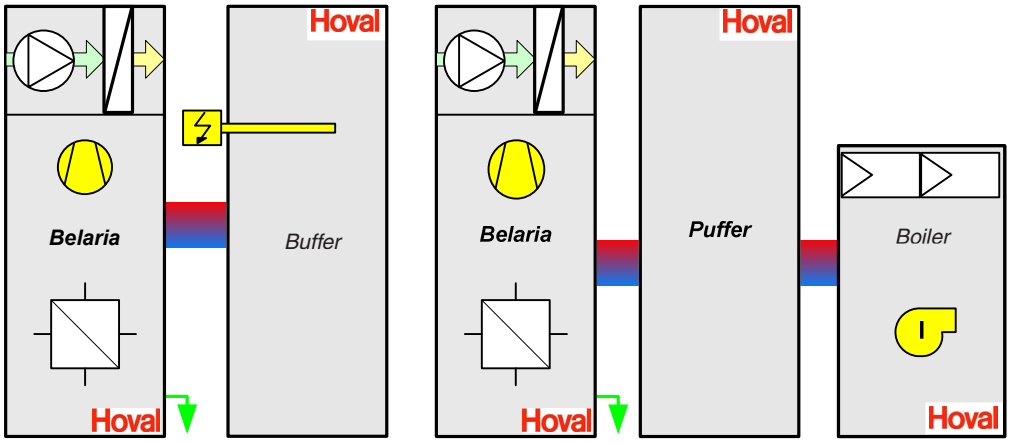


H-Gen – type 7 : 2-stage



old design

H-Gen – type 8 : 2 x single-stage (2 WF necessary)



…….. H-Gen types 9, 10 currently not in operation!

8.11.1 Input/ output allocation heat pump - Example

Input Output	Belaria (1/2 stage)	Thermalia (1/2 stage)	Thermalia/Belaria (1-stage) + 2 H-Gen (1-stage)	Cooling
HCP			LN - LowNoise	UKA(P) - Cooling change-over
VA1	LN - LowNoise	MW - Heat source pump	MW - Heat source pump	MW - Heat source pump
VA2	CP - Condenser pump	CP - Condenser pump	CP - Condenser pump	CP - Condenser pump
VE1	PF - Buffer sensor	PF - Buffer sensor	PF - Buffer sensor	PF - Buffer sensor
VE2		QF - Heat source sensor	WF2 - 2nd Heat generator sensor	QF - Heat source sensor
VE3	Lock by energy supply company	Lock by energy supply company (EVU)	Lock by energy supply company	Lock by energy supply company (EVU)
KVLF				KS - Lock/Demand cooling
KSPF				KPF - Cooling buffer sensor
External			External heat source surveillance	LN - LowNoise external control
ELH	by means of defrost control		by means of defrost control (Belaria)	by means of defrost control (Belaria)

8.11.2 Overview of heat generator types HP / Correlations

No type of heat generator	6 1-stage	7 2-stage	8 2 x 1-stage		9 Modul.	10 Modul. + 1-stage	
1. stage	HP	HP	HP	HP	HP modul.	HP modul.	HP modul.
2. stage	-	HP	E-heating	Oil/Gas/E-heating	-	E-heating	Oil/Gas
Single-stage control with WF2 to VE (optional)	-	no	no	yes	-	no	yes
H-Gen min / H-Gen max for stage (independently adjustable)	1	1 / 2	1 / 2	1 / 2	1	1 / 2	1 / 2
Min. running time for stage (independently adjustable)	1	1 / 2	1 / 2	1 / 2	1	1 / 2	1 / 2
Min. switch-off time for stage (independently adjustable)	1	1 / 2	1 / 2	1 / 2	1	1 / 2	1 / 2
Outside temp. blocking (bivalence point) for stage (independently adjustable)	1	1 / 2	1 / (2)	1 / (2)	1	1 / (2)	1 / (2)
Stage reversal function for internal operation	-	yes	yes	yes	yes	-	yes
QF minimum switch-off working on stage	1	1 / 2	1	1	1	1	1
QF maximum switch-off in cooling operation working on stage	1	1 / 2	1	1	1	1	1
QF defect blocking stage	1	1 / 2	1	1	1	1	1
RL return minimum switch-off working on stage	1	1 / 2	1	1	1	1	1
RL return maximum switch-off in heating operation working on stage	1	1 / 2	1	1	1	1	1
Lock by energy supply company (also cooling operation) working on...	1	1 / 2	P48	P48	1	P48	P48
OT blocking suspension in the event of HP fault working on stage	-	-	2	2	-	2	2
Condenser pump (CP) switches at stage	1	1 / 2	1	1	1	1	1
2-stage cooling operation	-	yes	no	no	-	no	no

Re HP parameter 02 Start-up protection heat generator…

1 = Unrestricted start-up protection ...

- If the temperature in the H-Gen drops 2K below the minimum temperature limit, then pumps OFF and mixers closed
- Release takes place if the temperature is above the minimum temperature + ½ H-Gen switching difference

2 = Weather-driven start-up protection...

- The heating-up behaviour is as for unrestricted start-up protection
- The weather-driven start-up protection becomes active again when the H-Gen temperature according to the boiler line drops below the reference value

3 = Separate start-up protection...

- Separation of the temperatures for the switching on of the H-Gen and switching off of the heating circuits at the H-Gen minimum temperature limit

Re HP parameter 03 Minimum temperature limit heat generator …

... See details for parameter 05

Re HP parameter 05 Mode of action minimum temperature limit heat generator …

Three different modes of action

1 = Demand-dependent minimum limit, no demand – H-Gen OFF, no minimum limit, the H-Gen falls below the H-Gen frost protection temperature +5°C, heating to the minimum temperature limit

2 = Restriced minimum limit, works as lower limit value
- disconnection of the H-Gen only in the case of summer disconnection

3 = Unrestricted minimum limit, H-Gen temperature is limited to the minimum temperature independently of demand or switching-off modes of operation

Re HP parameter 06 Sensor mode of operation H-Gen sensor ...

Reaction in the event of fault/defect

1 = Defective H-Gen sensor
- H-Gen OFF - in the event of short-circuit or interruption, fault signal

2 = External H-Gen switch-off
- H-Gen OFF / ON, no fault signal

3 = H-Gen release in the event of defective H-Gen sensor
- In the event of a short-circuit or interruption, a fault signal and an unrestricted release of the H-Gen take place.

Note!
This function may be installed only if additionally a temperature monitoring is installed in the H-Gen

Re HP parameter 07 minimum running time stage 1 ...

- At least the set time must have elapsed for the stage 1 to turn off
- The maximum temperature limit interrupts the minimum running time
- for stage 1 + 2 separate minimum running times can be set

Re HP parameter 08 HP switching difference 1 … / 09 HP switching difference 2 … (Sequence of functions see next page)

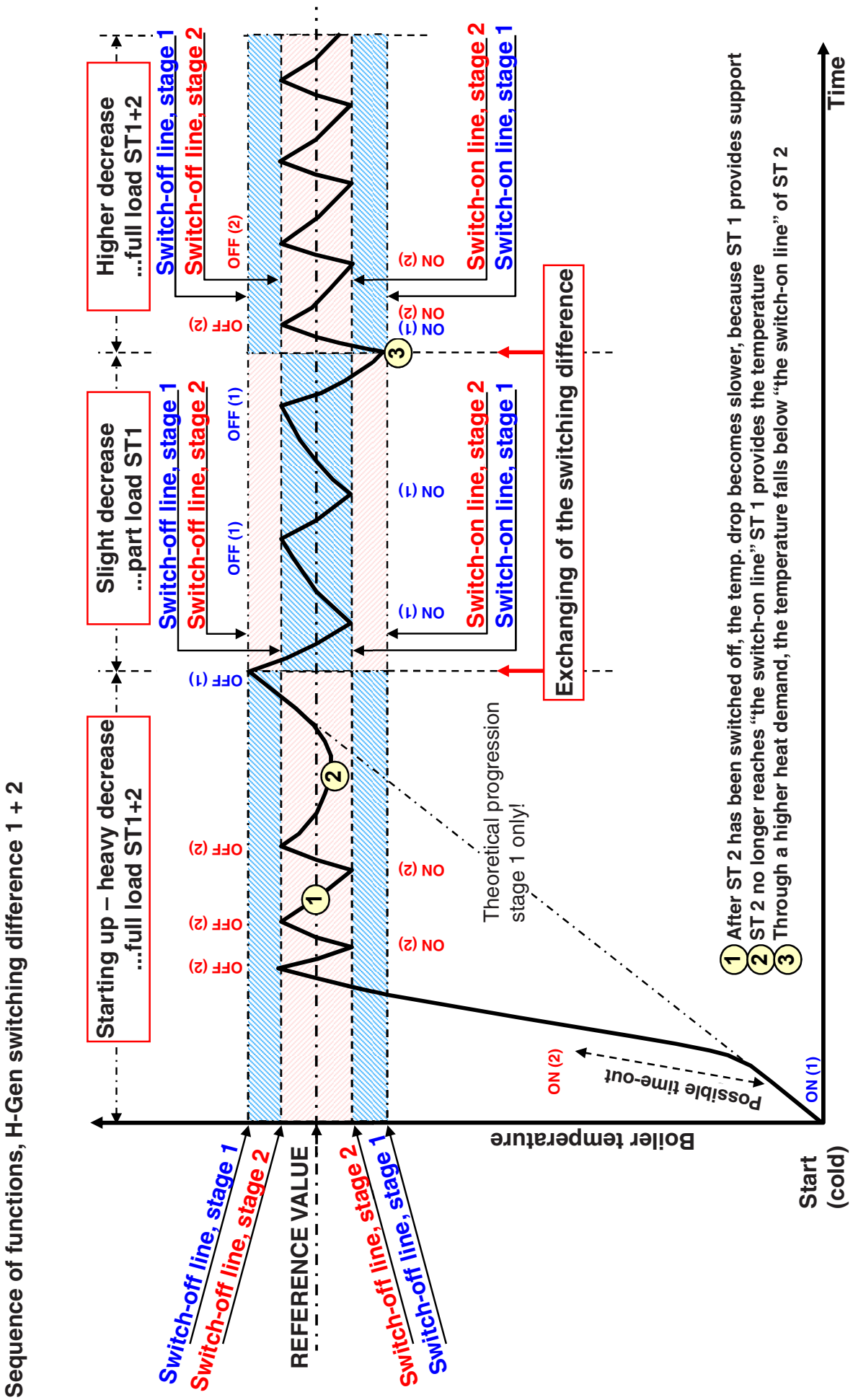
- The regulator is equipped with two different adjustable switching differences, related to the same reference value.

Switching difference 1

- Depending on load and demand, regulates the H-Gen temperature, ON/OFF switching of Stage 1 takes place within a set switching difference which is located centrally on the reference value e.g.: Switching difference = 6K reference value = 40°C ON at 37°C and OFF at 43°C.

Switching difference 2

- Determines how many stages are necessary for the covering heat requirement (partial load 1 - full load 2)
- The switching difference of stage 2 is symmetrically overlaid over switching difference 1, and can only be set to higher values
- Cascade operation overlays this setting and is then not available


Sequence of functions, H-Gen switching difference 1 + 2
Starting up – heavy decrease ...full load ST1+2
Slight decrease ...part load ST1
Higher decrease ...full load ST1+2
Switch-off line, stage 1
Switch-off line, stage 2
REFERENCE VALUE
Switch-on line, stage 2
Switch-on line, stage 1
Boiler temperature
Time
Start (cold)
OFF (1)
OFF (2)
ON (1)
ON (2)
Exchanging of the switching difference
Theoretical progression stage 1 only!
Possible time-out
1 After ST 2 has been switched off, the temp. drop becomes slower, because ST 1 provides support
2 ST 2 no longer reaches "the switch-on line" ST 1 provides the temperature
3 Through a higher heat demand, the temperature falls below "the switch-on line" of ST 2

Re HP parameter 11 Release mode stage 2...
- Influence only during the start-up phase below the “H-Gen minimum temperature limit”

Unrestricted release
- During start-up relief, both stages are “released”

Time-out during start-up relief
- Is released after expiry of the time-out
- In the case of “cascade connection”, this function is overlaid and is then not available

Re HP parameter 12 Hot water charging mode 1-2 stage...

Three possibilities for the mode of operation of two-stage or two single-stage H-Gen:
1. Two-stage tank charging - stage two is time-delayed
2. Unrestricted tank charging - both stages “released”
3. Restricted tank charging - only with stage 1
4. Restricted tank charging - only with stage 2

Re HP parameter 13 Lead time (CP/ KPP)...
- if for instance a condenser pump is activated , then the CP is switched on first in the event of a H-Gen demand
- after expiration of the lead time the H-Gen is released.

Re HP parameter 14 + 15 Follow-on time (CP/ KKP/ ZUP/ PP)...
- To avoid an “accumulation of heat or residual heat utilisation” through the set time delay

Re HP parameter 19 Modulation P-portion Xp...
- In the case of a discontinuous change in the reference value, the proportional element Xp determines the corresponding adjustment of the respective control element in the burner in accordance with the selected setting.

Example:

At a maximum boiler temperature of 70°C, the control element in the modulating H-Gen must sweep a temperature difference of 50K (based on room temperature = 20°C). This would correspond to a deviation of 100%, so that the setting value is calculated as follows:

Xp (%)/K x 50K = 100 % bzw. Xp = 2 %/K

Re HP parameter 20 Modulation scanning time Ta...
- The scanning time is a variable that is internal to the regulator and defines the duration between two consecutive control pulses in the case of deviation that applies. Smaller scanning times lead to finer deviation control.

Re HP parameter 21 Modulation reset time Tn...
- The integral portion (= reset time) determines the dynamic behaviour of the regulator, and thus the reset time which the regulator needs in order to eliminate any deviation that arises. The reset time remains constant, independently of the size of the deviation.

Re HP parameter 22 Modulation running time...
- Means the time needed by the H-Gen to get from low to high output

Re HP parameter 23 Modulation starting time...
- The parameter Start time determines the duration of the starting phase in modulating mode to ensure a stable start. When the set Start time has expired, modulation switches to its usual control behaviour in accordance with the modulation-related parameters.

Re HP parameter 24 Modulation start-up output...
- The parameter Start-up output determines an adjustable percentage of the modulation running time during the starting phase. At a setting of 0%, the control valve remains closed during the entire Start time. When the set Start time has expired, modulation switches to its usual control behaviour in accordance with the modulation-related parameters.

Re HP parameter 25 Outside temperature block...
- Can close a H-Gen as soon as the current outside temperature is exceeded
- Heating circuits continue working, but the H-Gen does not come in any longer
- via a regulator, irrespective of whether two-stage H-Gen or 2 x 1-stage!
- With “cascades” there are at least two regulators, so H-Gen adr. 20 can then be assigned the outside temperature block! The latter suspended if:
  + there is a fault signal via BUS for H-Gen type 5
  + for the other H-Gen types a VE input is defined as "External fault".
  +The OT temperature blocking suspension applies to all H-Gen

8.11.3 Overview outside temperature blocks HP controller

HP - Par.	Behaviour	Remarks /application examples
25	AT higher than P25 – blocking H-Gen controller	Cascades – blocking entire H-Gen
36	AT higher than P36 – blocking stage 2	Bivalence operation - blocking E-Garniture (ST2)
42	AT lower than P42 – blocking stage 1	Bivalence operation - blocking air heat pump (ST1)
46	AT lower than P46 – blocking stage 2	Bivalence operation

Re HP parameter 26 Basic load elevation...
- For cascade i.e. several heat generators,
- H-Gen stages operating in basic load receive a higher reference value than the one of the stage connected at last (Current reference value + basic load elevation)

Re HP parameter 27 Minimum temperature limit heating circuit (only if P02; 3)...
- if the actual H-Gen temperature WFist <= of parameter setting 27 (WFmin-HK), then the heating circuit pumps (DKP, SLP, MK, PLP) are switched off
- Mixer valves close
- If actual H-Gen WFist > WFmin-HK + SKmin–HK, then the heating circuit pumps and the mixer valves are released again

Re HP parameter 28 Switching difference minimum temperature limit heating circuit (only if P02; 3)...
- if min. temperature heating circuits falls below the setpoint, heating circuit release only takes place when the min. temp. HC (Par.27) + switching difference (Par.28) is reached.

Re HP parameter 29 Heat generator forced discharge...
- If the temperature in the heat generator exceeds its given maximum temperature limit, then any surplus energy is diverted into circuits downstream
- any active forced discharge is suspended -2K below the set maximum temp.
- This function works across regulators in the bus system

- Discharge into hot water storage (only where storage facilities are provided) - Note: Thermal mixing valve prescribed at the water heater output, because there is a danger of scalding.

Discharge into the heating circuits
- The surplus heat is diverted into existing heating circuits
- The set maximum temperature is not exceeded here
- The desired room temperature can be exceeded briefly here if the corresponding circuits are provided with room stations

Thermostat function
Note: In the case of floor heating systems, it is essential that a plant thermostat is deployed, for compulsory pump shut-off
- Discharge into buffer tank

Re HP parameter 30 OEM-maximum temperature limit heat generator ...
- Limits the setting range of the expert max.temp.

Re HP parameter 36 Outside temperature block 2nd stage ...
- the 2. H-Gen stage is blocked as soon as the current outside temperature exceeds the set outside temperature

Re HP parameter 37 running time meter / starting counter...
With Par. 37 running time meter/ starting counter behaviour is set.

- AUTO (Metering with response or demand)
- 1 only response (metering only with response, optocoupler or bus)
- 2 freely applicable (metering with response – both meters freely applicable, independent of whether an H-GEN is present or not)

Info: with the HP controller, the cooling hrs./starts are counted

Re HP parameter 38 DHW release regulator (CU)
- If the controller for hot water charging is not released, the heat generator receives no hot water reference value
- This means that the H-GEN is excluded from hot water charging.
- In the case of HW parallel operation, the stage can continue to work in accordance with the heating circuit reference value.

Re HP parameter 39 Emergency operation temperature H-Gen...
- If in a cascade, the controller with the address 10 (cascade manager) fails, each further H-GEN switches to emergency operation and heats to the respective emergency operation temperature set at Par. 39.
- Fault signal 70-8 (Device with address 10 is missing)

Re HP parameter 40 minimum switch-off time stage 1 ...
- If the H-Gen switches ST1 off due to its switching difference, then the stage remains switched off for at least the minimum switch-off time set.
- for stage 1 + 2 separate minimum switch-off times can be set

Re HP parameter 41 maximum temperature stage 1 ...
- the 1. H-Gen stage is blocked as soon as the set max. temperature is exceeded.
- max. temp. surveillance takes place separately for both stages. This means that for ST1 the max. temp. can be set lower than the one for ST2.

Re HP parameter 42 Outside temperature block stage 1...
- the 1. H-Gen stage is blocked as soon as the current outside temperature is lower than the set outside temperature

Re HP parameter 43 minimum running time stage 2 ...
- At least the set time must have elapsed for the stage 2 to turn off
- The maximum temperature limit interrupts the minimum running time
- for stage 1 + 2 separate minimum running times can be set

Re HP parameter 44 minimum switch-off time stage 2 ...
- If the H-Gen switches ST2 off due to its switching difference, then the stage remains switched off for at least the minimum switch-off time set.
- for stage 1 + 2 separate minimum switch-off times can be set

Re HP parameter 45 maximum temperature stage 2 ...
- the 2. H-Gen stage is blocked as soon as the set max. temperature is exceeded.
- max. temp. surveillance takes place separately for both stages. This means that for ST1 the max. temp. can be set lower than the one for ST2.

Re HP parameter 46 Outside temperature block stage 2...
- the 2. H-Gen stage is blocked as soon as the current outside temperature is lower than the set outside temperature

Re HP parameter 47 HP control stage ...
- Even if the automatic stage sequence switching is switched off, the control stage can be set manually to any stage
- can also be set for 2-stage HP

Re HP parameter 48 Stage reversal time ...
- Within the H-Gen, a run time-dependent change of control stage can be activated
- After a set period of operation has expired, the system switches to the next stage (Days of operation, 1 day = 24hrs running time)
- can also be set for 2-stage HP

Re HP parameter 49 Lock by energy supply company stage 2 ...
- determines if a programmed Lock by the energy company also works on the 2nd stage
- only for H-Gen types 8, 10

Re HP parameter 50 Charging mode cooling...
- 1-stage cooling
- 2-stage cooling with stage 2 time-delayed

Re HP parameter 51 Cooling connection delay stage 2 ...
- Connection delay stage 2 with cooling

Re HP parameter 52 Heat generator priority (operating mode) ...
- as soon as cooling has been programmed, the priority of the operating modes HC cooling, HC heating and HW can be set using parameter 52 :

Priority setting 1:
- Prio.1: HW demand
- Prio.2: heating demand
- Prio.3: cooling demand

Priority setting 2:
- Prio.1: cooling demand
- Prio.2: HW demand
- Prio.3: heating demand

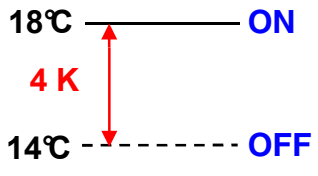
Priority setting 3:
- Prio.1: HW demand
- Prio.2: cooling demand
- Prio.3: heating demand

Re HP parameter 53 minimum running time operating mode ...
- in the case of a switch-over to a lower-priority operating mode during cooling, this operating mode must be maintained for at least the time set at H-GEN Par. 53 before switching back to the higher operating mode.
- this does not apply if the operating mode that is pending is fulfilled prematurely.

Re HP parameter 54 Negative H-Gen switching difference cooling operation ...
- Depending on load and cooling demand, regulates the H-Gen temperature, ON/OFF switching of stage takes place with negative switching difference

Example: **H-GEN - Cooling reference value**

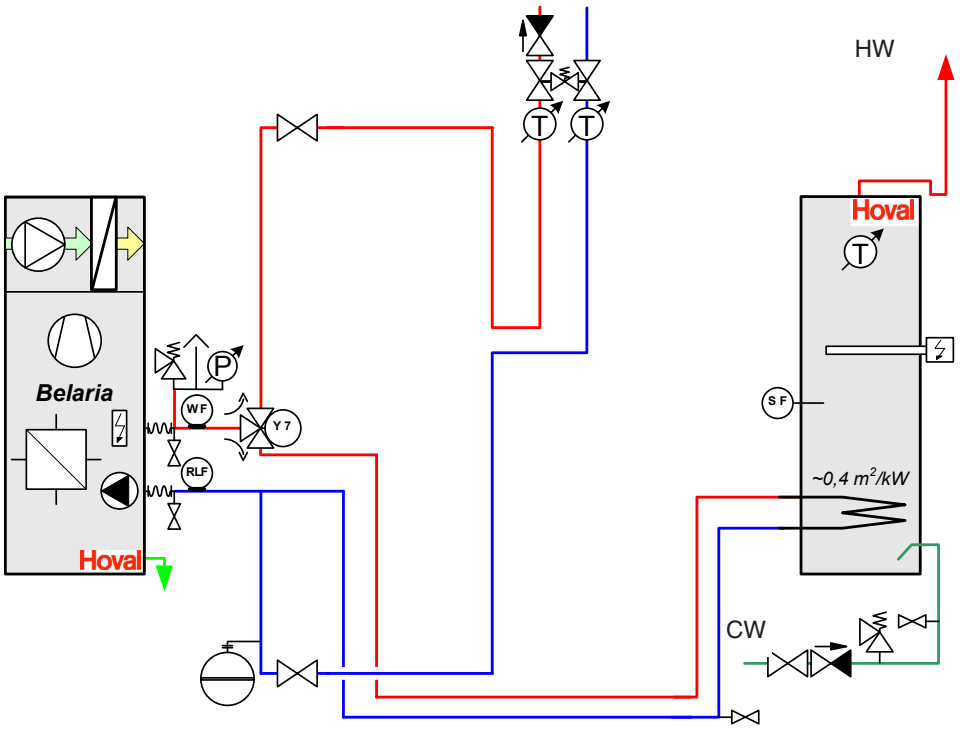
Par. 54 Negative switching difference



RE HP parameter 55 Return minimum temperature limit...
- is always active, if the value drops below the limit, the heating/cooling operation is interrupted. The switch-off condition is lifted if the temperature rises above the set value + 2K.
- while the value is below the limit, the fault signal "ERROR 85-4" is generated at the controller.
- this function is working on all heat pump stages, e.g. for H-GEN types 6, 8, 9, 10 on stage 1 and for H-GEN 7 on stage 1 and 2.

Re HP parameter 56 Return maximum temperature limit...
- while heating operation is active, if the value rises above the limit, heating operation is interrupted. The switch-off condition is lifted if the temperature falls below the set value - 2K.
- while the value is above the limit, the fault signal "ERROR 85-5" is generated at the controller.
- this function is working on all heat pump stages, e.g. for H-GEN types 6, 8, 9, 10 on stage 1 and for H-GEN 7 on stage 1 and 2.

Re HP parameter 57 downtime H-Gen HW switch-over ...
- when a switch-over valve switches, there may in some cases temporarily be no flow and the HP may switch to fault status. To prevent this, the H-GEN is switched off for an adjustable time during the switch-over.
- this function is only effective if the corresponding stage for hot water charging is released.
- the down time begins with the switch-over signal for the switch-over valve. This function becomes active both at the beginning of HW charging and at the end of HW charging.
- for correct functioning, the HW Par.17 must be set to OFF. (H-GEN behaviour during SLP follow-on time)

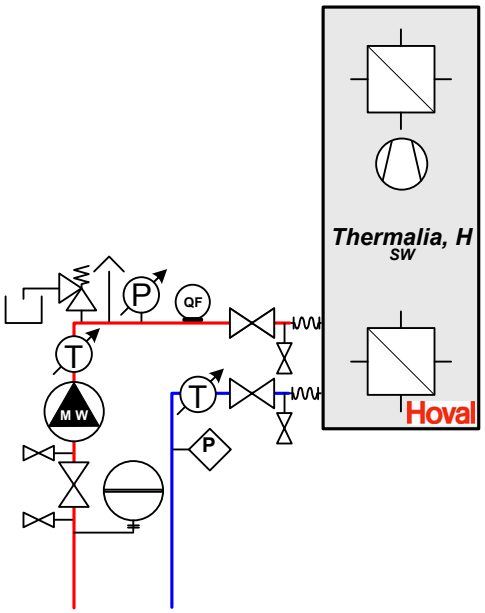


Re HP parameter 58 Lead time heat source pump (MW) ...
- if a heat source pump is activated , then the heat source pump (MW) is switched on first in the event of a H-Gen demand
- after expiration of the lead time the H-Gen is released.

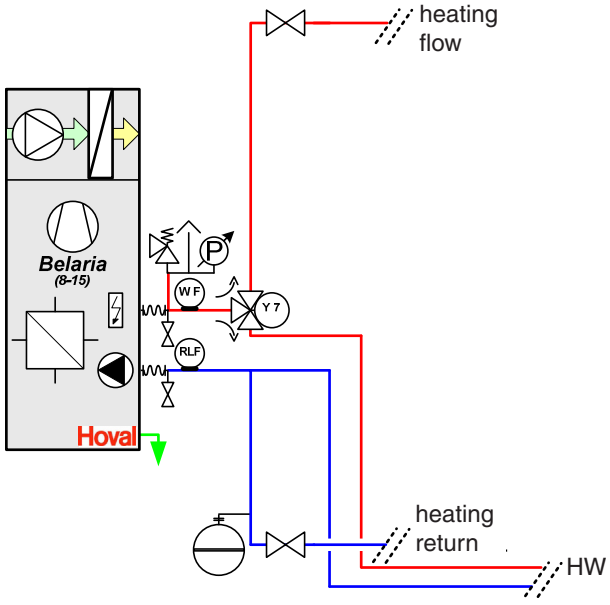
Re HP parameter 59 Follow-on time heat source pump (MW) ...
- To avoid an “accumulation of heat or residual heat utilisation” through the set time delay

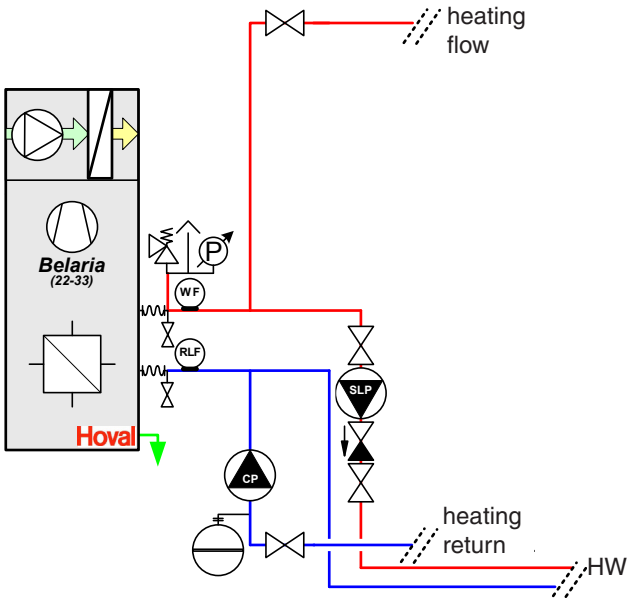
Re HP parameter 60 heat source minimum temperature ...
- if the heat source temperature falls below the limit, the heat pump is blocked
- the switch-off condition is lifted if the temperature rises above the set value - 2K.
- while the value is below the limit, the fault signal "ERROR 85-4" is generated at the controller.
- in the case of H-GEN design 8 (2x1-stage), the 2nd stage remains released
- the heat source pump switches off after expiry of the follow-on time.

Re HP parameter: 61 heat source maximum temperature ...
- in the case of cooling, the heat source maximum temperature is monitored
- if it is exceeded, cooling operation is blocked
- the switch-off condition is lifted if the temperature has fallen below the set value - 5K.
- while the value is above the limit, the fault signal "ERROR 85-5" is generated at the controller.
- the heat source pump runs on during this time



Re HP parameter 62 Release condenser pump (CP) with HW charging ...
- Par. 62 determines whether in the event of HW charging the condenser pump is running or not during HW charging process.





8.12 Parameter level "Return temperature increase" Description

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Minimum limit return temperature / referance value return temperature	**38 °C**	38	38	38		38	38	10 ... 95 °C	HF
2	Switch-off difference	**2 K**	2	2	2		2	2	1...20 K	HF
3	Pump follow-on time	**1 Min**	1	1	1		1	1	0 ... 60 min	HF

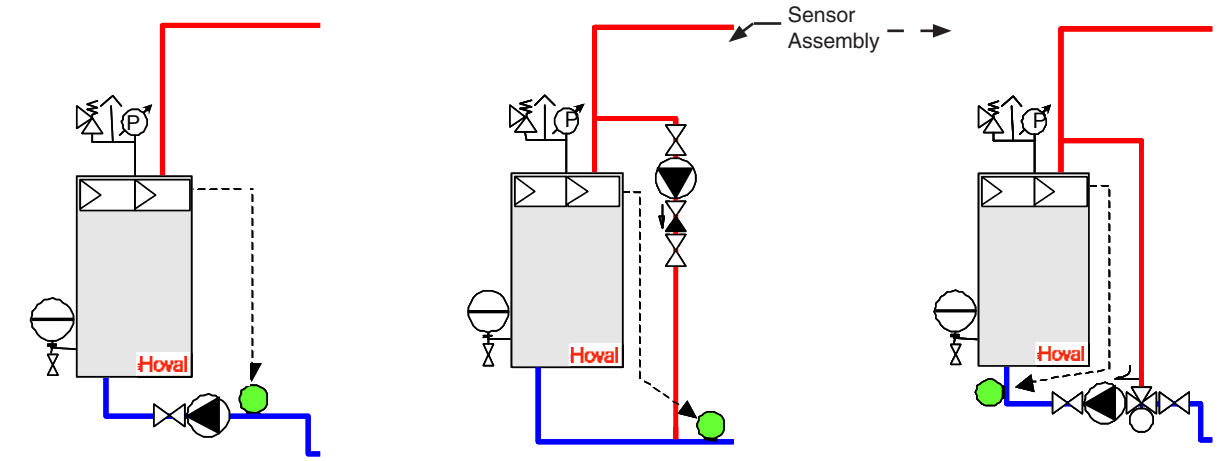
Legend for return increase: Setting range/setting values for parameters ...

Re return increase parameter:
01 + 02 + 03 return minimum limit/return reference value

Clearing of the “return increase”, we differentiate between three kinds:
Return increase by means of bypass pump (RBP) ...
To avoid cycling, the sensor from the point of admixture must be installed in the direction of the consumer, on the return (as previously the thermostat). RBP “ON”… if the temperature falls below the return minimum temperature limit. “OFF”… if the return temperature rises and exceeds the return minimum temperature + return switching difference and the follow-on time is ended in a time-delayed manner.

Constant return increase ...
The return sensor (RLF) is connected at the connection of the flow sensor (VF1) of the respective mixer circuit!
The sensor must be installed in the control loop
- between point of admixture and boiler on the return.

Indirect return increase ...
can take place only with mixer circuits!
Where the temperature falls below the return temperature
the mixers are closed until
the return temperature recovers



Indirect return increase via distributor bypass/switch

Return increase via Bypass pump

Constant return increase

8.13 Parameter level “Solar” Description

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Switch-on difference	**10 K**	10	10	10		10	10	(Switch-off difference + 3 K) ... 30 K	HF
2	Switch-off difference	**5 K**	5	5	5		5	5	2 K ... (Switch-on difference - 3 K)	HF
3	Minimum running time SOP	**3 Min**	3	3	3		3	3	0 ... 60 min	HF
4	Solar collector maximum temperature	**100°C**	100	100	100		100	100	OFF, 70 ... 210 °C	HF
5	Solar tank maximum limit	**65 °C**	65	65	65		65	65	20 ... 110 °C (KSPF)	HF
6	Solar mode of operation	**2**	2	2	2		2	2	1 Priority operation (all circuits) 2 Parallel operation 3 Priority operation (hot water) 4 Priority operation (buffer)	HF
7	Clock block heat generator (only if PARA 06=1,3,4)	**0,5 h**	0.5	0.5	0.5		0.5	0.5	OFF, 0.5...24 h	HF
8	Solar priority parallel change-over	**10 K**	10	10	10		10	10	OFF 1 ... 30 K	HF
9	Solar heat balance	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF No heat balance 1 Heat balance via flow rate calculation 2 Heat balancing viapulse input	HF
SOL AR RES ET	Reset heat balance								SET by pressing the turning wheel	HF
11	Volumetric flow rate	**0,0 l/ Min** **0,0 l/ IMP**	0	0	0		0	0	0,0 ... 30 l/Min 0,0 ... 30 l/Pulse	HF
12	Density, medium	**1,05 kg/l**	1.05	1.05	1.05		1.05	1.05	0,8 ... 1,2 kg/l	HF
13	Specific thermal capacity, medium	**3,6 KJ/ kgK**	3.6	3.6	3.6		3.6	3.6	2,0 ... 5,0 KJ/kgK	HF
14	Final switching-off temperature	**120 °C**	120	120	120		120	120	OFF, 90 ... 210 °C	HF
15	Test cycle solar charging switch-over	**10 min**	10	10	10		10	10	1 ... 60 min	HF
16	Switch-over temperature	**60 °C**	60	60	60		60	60	20 ... 110 °C (SLVF)	HF

Legend for solar: Setting range/setting values for parameters ...

Re solar parameters:

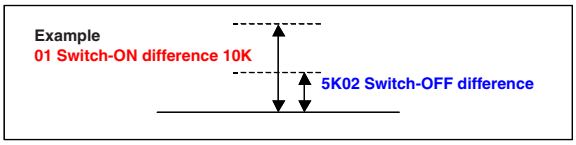
01 Switch-ON difference SDON

- Between the collector sensor (KVLF) and tank sensor (KSPF) there is a set temperature difference
- If this increases, then the solar charging pump (SOP) switches “ON”
- The minimum setting value is always 3K above the switch-off difference

Re solar parameters:

02 Switch-OFF difference SDOFF

- Between the collector sensor (KVLF) and tank sensor (KSPF) there is a set temperature difference
- If this decreases, then the solar charging pump (SOP) switches “OFF”
- The maximum setting value is always 3K below the switch-on difference



Re solar parameter 03 Minimum running time of the solar pump (SOP):

- The solar charging pump remains in function at least for the set value
- The minimum running time has priority over the switch-off difference SDOFF

Re solar parameter 04 Collector maximum temperature:
- Thermal protection of the collector
  If the maximum temperature of the collector is exceeded, additionally the tank maximum temperature (KSPF) is increased by 10 K (solar tank overloading by 10K) before the solar charging pump (SOP) is compulsorily switched off
- If the temperature in the solar tank drops by 2K below the “increased maximum value” - > solar pump ON
- If the temperature in the collector falls by 2K below the collector maximum limit - > solar pump ON, but at the same time the elevation of the tank reference value is revoked
- In the case of plants with solar switch-over, this applies likewise, with collector tank sensor (KSPF)
- If the collector final switch-off temperature is exceeded, the solar pump is switched off

Re solar parameter 05 Tank maximum temperature limit (KSPF):
- If the temperature in the HW tank or in the buffer tank exceeds the set value the solar pump is switched off
- For the exception of compulsory switch-on… see “04 Collector maximum temperature” (overloading +10K)

Re solar parameter 06 Mode of operation:
This function determines “the charging mode” between SOLAR and BOILER!

1 - Solar priority operation (all circuits)	-> During solar charging, any demand made to the boiler is suppressed (additional required adjustment - Solar Par. 08: OFF)
2 - Solar parallel operation	-> During solar charging, any demand made to the boiler is permitted
3 - Solar priority operation hot water	-> During solar charging, the DHW setpoint for heat generator re-charging is reduced
4 - Solar priority operation buffer	-> During solar charging, the buffer setpoint for heat generator re-charging is reduced

With the priority operation modes a just switched on heat generator (H-GEN) remains in operation until the next norm switch-off.

Re solar parameter 07 Clock block boiler/heat generator:
...only if parameter 06 = 1, 3, or 4 (priority operation)
- This is to avoid “cycling” between boilers and solar charging
- After “the solar charging” a set time must elapse, so that “charging through boilers” can take place!

Re solar parameter 08 Solar priority parallel change-over:
This function determines an “auxiliary measure” between SOLAR and BOILER!
...only if parameter 06 = 1, 3, or 4 (priority operation)
- If during the priority solar charging, the temperature falls below the reference value temperature of the solar tank by the set value, then it is switched to parallel operation
- Lifting the clock block, clearing the boiler
- After reaching the HW reference value + HW switching difference, there is a switch-over to priority operation

Re solar parameter 09 Heat balance:
- Parameter setting can be selected between
- Volumetric flow rate/flow rate in l/min or volumetric flow rate/flow rate in litres/pulse - > conventional pulse flow meters

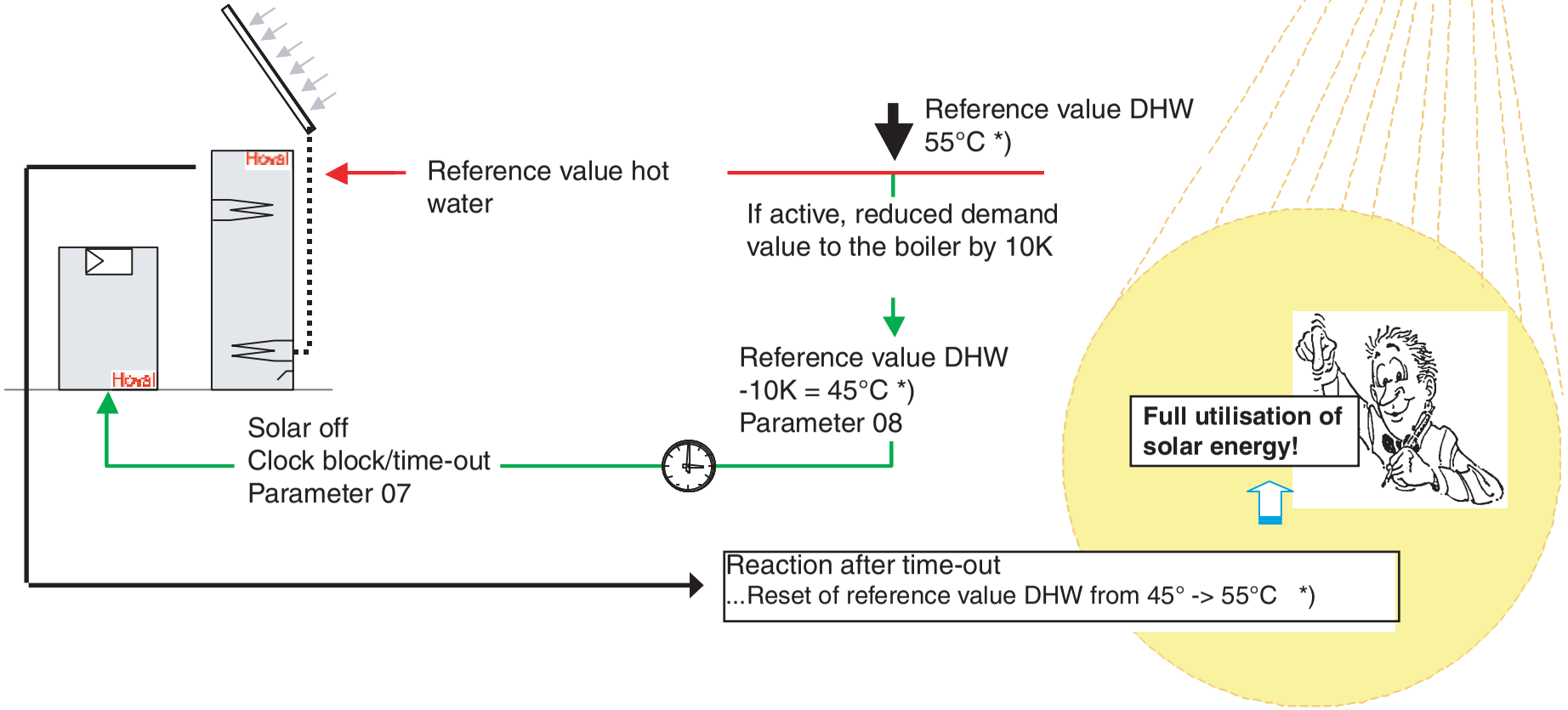
The physical variables such as volumetric flow rate, density, spec. thermal capacity and temperature difference form the basis for determining the solar heat balance and the solar output

Formula: $W = (V / 60) . r_w . c_w . \Delta u$

W = solar thermal output (kW), V = volumetric flow rate (l/min), $r_w = \rho$(rho) density of the heat transfer medium (kg/l), c_w spec. thermal capacity (KJ/kgK), Δu = temperature difference (K) - between VL u. RL,

Example: (30 l/min / 60) = **0,5** (l/sec) . **1,05** (kg/l) . **3,6** (KJ/kgK) . **10** (K) = **18,9** KJ/sec = **18,9** KW

Function interaction - example
Solar parameter 06 operating mode 83 = priority DHW
Solar parameter 07 Clock block / time out (0,5h)
Solar parameter 08 Solar priority parallel change-over (10K)



*) referring to the example

Re solar parameter 10 Reset heat balance - > RESET:
Resetting the heat counter balance

Re solar parameter 11 Volumetric flow rate:
... only with active heat balance!
The volumetric flow rate in accordance with the transporting capacity of the solar charging pump can be set ...
- in litres/minute with calculation of the through-flow rate, or
- in litres/pulse where the pulse input is used

Re solar parameter 12 Density medium:
... only with active heat balance!
- Depends on the heat distribution medium – take account of manufacturer's data!

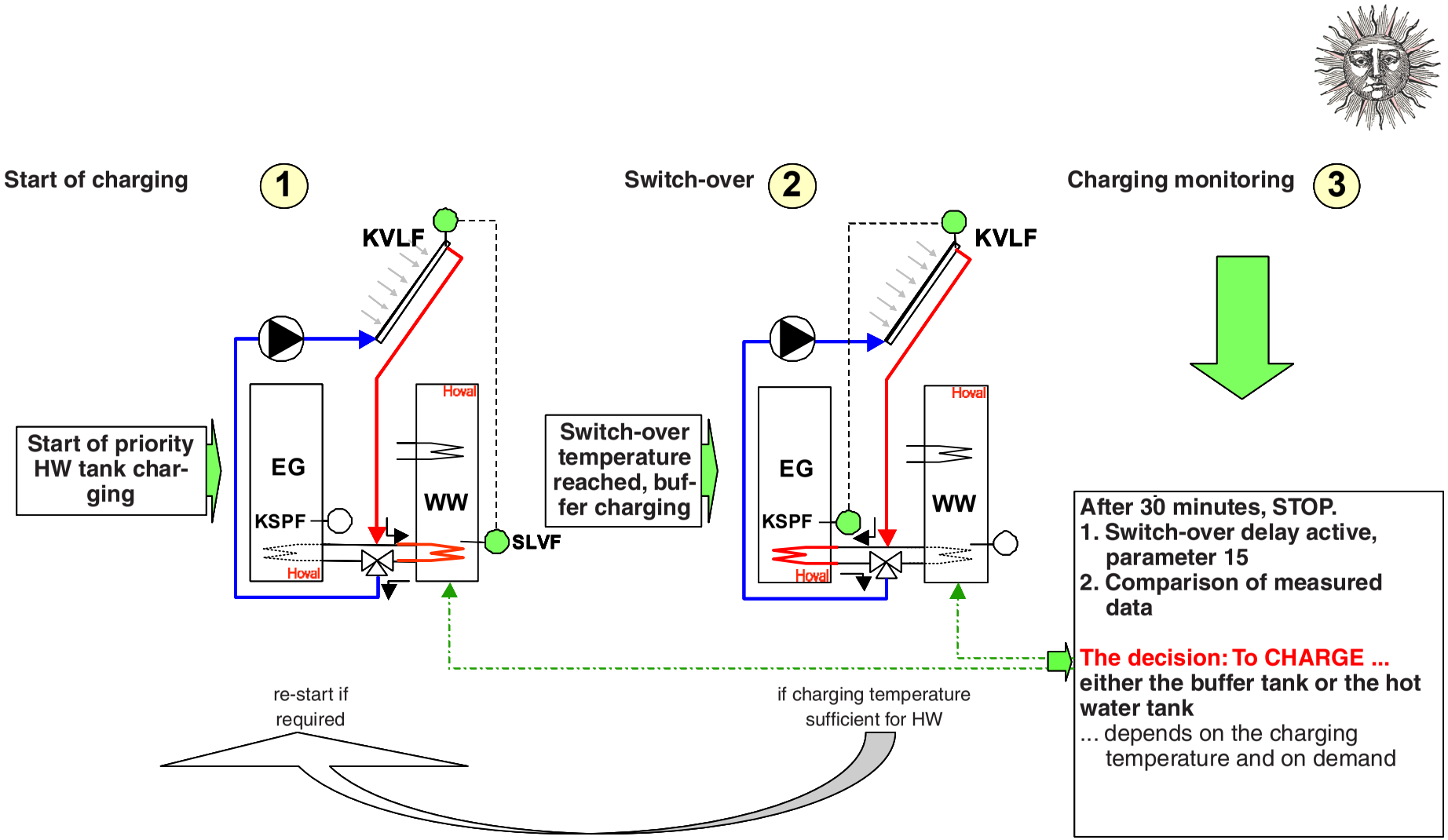
Re solar parameter 13 Specific thermal capacity:
... only with active heat balance!
- Depends on the heat transfer medium used, and its mixture (proportion of frost protection, and/or for what temperature below zero it is designed)

Re solar parameter 14 Final switching-off temperature:
- Contributes to avoidance of outgassing in the solar medium
- The setting value of the final switch-off is independent of the collector maximum temperature; this yields, independently of one another, compulsory switching ON and compulsory switching OFF of the solar charging pump (SOP)

Under the following conditions the solar forced discharge is switched:
- Solar forced discharge programmed on VA1 or VA2
- The function is released if the maximum temperature in the "solar tank" is exceeded and the maximum temperature of the "COLLECTOR" is exceeded - (SOP keeps running and overloads the solar tank KSPF by 10K)
- The solar pump is turned off if the final switching off temperature or elevated solar tank temperature is exceeded

Re solar parameters:
15 Test cycle solar charging switch-over
16 Switch-over temperature:
This function determines the switch-over between two heat accumulators (HW tank and buffer tank)
Function switch-over: The additional solar tank sensor (SLVF) is installed in the priority tank, as a rule the HW tank, and at regular intervals it is checked whether a sufficient solar supply is present
- If after a time interval of 30 minutes, the switch-over condition is not met and the charging conditions of the secondary tank (KSPF) are met, the solar charging pump (SOP) turns off
- During the down time (Par.15) the difference is determined continuously between collector sensor (KVLF) and the sensor for the solar charging change-over (SLVF).
- When the switching-on conditions are met once more, the charging of the "priority tank" begins, and if the temperature thereafter is not sufficient, after the down time (par.15) has expired, it switches to the secondary tank.
- This cyclic check takes place continually.
- The priority tank (SLVF) is charged up to the set switch-over temperature (Par.16)
- The secondary tank (KSPF) is charged up to the set solar tank maximum temp. (Par.5)
- Parameters are set in the "solar level"

Function interaction - example
Solar parameter 15 (Test cycle solar - charging switch-over)
Solar parameter 16 (Change-over temperature (SLVF))



Output SLV On = KSPF Charge
Output SLV Off = SLVF Charge (only continuous phase to switch)

8.14 Parameter level “Solid Fuel” Description

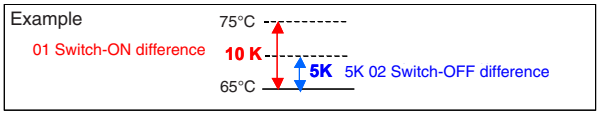
No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Minimum temperature	**60 °C**	60	60	60		60	60	20 ... 80 °C	HF
2	Maximum temperature	**95 °C**	95	95	95		95	95	30 ... 100 °C	HF
3	Switch-on difference	**10 K**	10	10	10		10	10	(Switch-off difference+3K) ... 20 K	HF
4	Switch-off difference	**5 K**	5	5	5		5	5	2 K ... (Switch-on difference - 3K)	HF
5	Clock block, heat generator	**15**	15	15	15		15	15	OFF, 2 ... 180 Min	HF

Legend for solid fuel: Setting range/setting values for parameters ...
General
The solid fuel function makes it possible ...
- to incorporate the solid fuel boiler in conjunction with a buffer tank into the heating system
- Activation under “hydraulics” of the solid fuel charging pump (for example, parameters: 6 or 7 = 17)
- After that, “solid fuel” is released/activated,
- Allocation of the sensor, as required (for example, parameters: 8 or 9 or 10 = 18 or 19)

Re solid fuel parameter 01 Minimum temperature limit:
- If the temperature rises by 10 K over the set minimum temperature, - > solid fuel charging pump “ON”
- If the temperature falls below the minimum temperature - > solid fuel charging pump “OFF”

Re solid fuel parameter 02 Maximum temperature:
- If the temperature rises above the set maximum temperature, the charging pump is compulsorily switched on
- The surplus heat can be compulsorily diverted into “preselected heating circuits… see under “buffer””.
- If the temperature drops by 10 K below the maximum temperature, the charging pump is switched off and the forced diversion is terminated

Re solid fuel parameter 03 Switch-on difference SD_{ON}:
- The solid fuel charging pump comes “ON” if the temperature in the boiler is higher than that in the buffer tank by the set switch-on difference.
- Precondition: The temperature in the solid fuel boiler is at least 10K above the minimum temperature limit, e.g.: buffer is at 65°C, SD = 10K, the solid fuel boiler must be at 65+10K = 75°C in order to charge



Re solid fuel parameter 04 Switch-off difference SD_{OFF}:
- The solid charging pump goes “OFF” if the temperature difference between boiler and buffer drops below the set SD_{OFF} . e.g.: Buffer is at 75°C, SD = 5K, the solid fuel boiler must drop below 75°C+ 5K = 80°C in order to switch the charging pump off

Re solid fuel parameter 05 Clock block boiler/heat generator:
- To avoid “cycling” between boiler and oil/gas-fired boiler
- A set time must elapse after the “solid fuel charging”, so that “oil/gas boiler charging” can take place

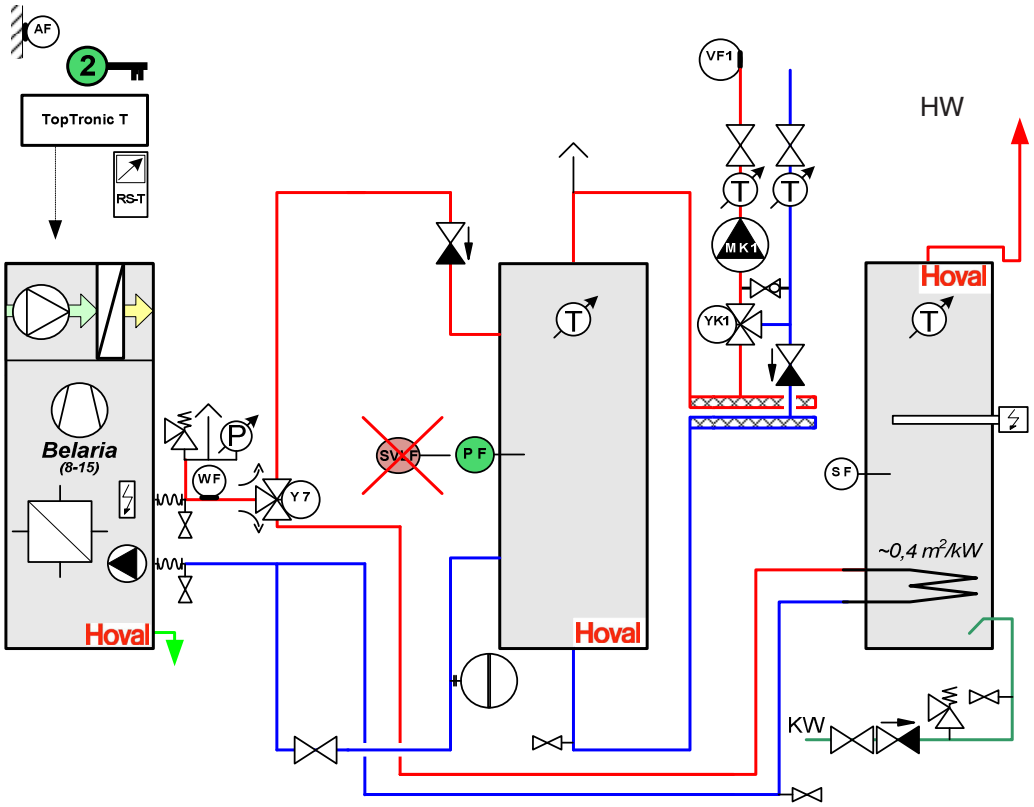
8.15 Parameter level “Buffer” Description

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Minimum temperature	**5 /20 °C**	20	20	20		20	***5***	5°C...Maximum temperature	HF
2	Maximum temperature	**95 °C**	95	95	95		95	95	Minimum temperature ... 95 °C	HF
3	Temperature elevation, heat generator	**8 /10K**	8	8	8		8	***10***	-10 K ... 80 K	HF
4	Switching difference	**2 /5K**	2	2	2		2	***5***	1 K ... 70 K	HF
5	Forced discharge	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF 1 Into sanitary water tank 2 Into heating circuits	HF
6	Skimming function switch-on difference	**10 K**	10	10	10		10	10	OFF, Switch-off difference + 2 K ... 50 K	HF
7	Skimming function switch-off difference	**5 K**	5	5	5		5	5	1 K ... Switch-on difference – 2 K	HF
8	Start-up protection	**ON**	ON	ON	ON		ON	ON	OFF No start-up protection ON Start-up protection active	HF
9	Discharge protection	**ON**	ON	ON	ON		ON	ON	OFF No discharge protection ON Discharge protection active	HF
10	Buffer mode of operation	**3 /2**	3	3	3		3	***2***	1 Charging control HC and HW 2 Charging control HC without HW 3 Discharge control HC and HW 4 Discharge control HC without HW 5 Charging control with switch-over HW 6 Discharge control to the heat generator	HF
11	Pump follow-on time	**3 MIN**	3	3	3		3	3	0 .... 60 min.	HF
12	Reference value switch-off temp.	**70°C**	70	70	70		70	70	OFF, 5 ... Max. temp.	HF
13	H-Gen release temp. skimming function	**60°C**	60	60	60		60	60	OFF, 10 ...100°C	HF

Legend for buffer: Setting range/setting values for parameters ...
General
The buffer reference temperature is the temperature which the buffer tank must have to supply the connected heating circuits, and is determined by the highest demand value.
e.g.: Demand value of… MC1-> 45°C, MC2 - > 55°C, HW - > 65°C - > **buffer reference value 65°C**
(in the case of discharge controls, a fixed 5K is taken off, so the buffer reference value is therefore 60°C)

Heat pump systems with buffer or common flow sensor
- In the case of heat pump plants with buffer tanks, a buffer charging control should be activated.
- However, this has not been done so far, as a buffer key module is required
- Instead, the common flow sensor function was misused for this purpose.

Comparison SVLF / PF control:
- The common flow sensor (SVLF) was developed for cascades
- the SVLF already influences the switching behaviour on a 2-stage H-GEN type
- with the SVLF, a reference value is always transmitted to the H-GEN, even when the buffer is warm.
- the SVLF is located in the buffer. When responding to a HW demand , this will have an influence on the SVLF, although it has nothing to do with the HW charging.
- in SVLF plants, the H-GEN sensor is warm after supplying HW, and as a result, the HP starts up very late, as the H-GEN sensor has to cool without circulation.
- these problems are solved with a buffer control, as the respective plants can be realised by setting "buffer operating mode"
- buffer charging control means longer HP run times, which has a positive effect on the service life of the heat pump.



For these reasons, with the introduction of the HP controller, the heating systems are **only** shown with buffer function in the case of **heat pump plants** with **buffer tank.**

<u>Re buffer parameter 01 Minimum temperature limit:</u>
- If the temperature falls below this limit, the buffer tank is re-charged by the boiler (in the case of charging control)
- The buffer start-up protection is taken into consideration
- Switches the heating circuits off if the temperature falls below this e.g. with discharge control (also with activated heat generator barrier)

<u>Re buffer parameter 02 Maximum temperature limit:</u>
- If the temperature rises above the set maximum temperature, the charging pump is compulsorily switched on
- The surplus heat is compulsorily diverted into the “preselected heating circuit”
- If the temperature drops below the maximum temperature limit value by 2K, then the forced diversion is terminated.

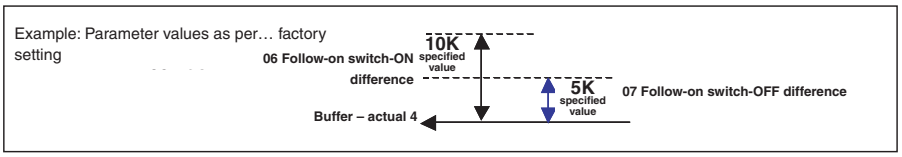
Note! Solid fuel maximum limit and buffer tank maximum limit are separate in terms of function, since the buffer tank is supplied not only by the solid fuel boiler. e.g.: solar etc.

Re buffer parameter 03 Temperature elevation for boiler (only in the case of charging control):
- To ensure a sufficient control reserve for all consumers connected to the buffer tank, the demand value directed at the boiler can be additionally impinged

Re buffer parameter 04 Switching difference:
- If the buffer temperature rises above the current demand value by the set value, the charging pump switches “OFF”
.- If the temperature drops below the current demand value, it switches “ON” again (applies also to H-GEN)

Re buffer parameter 05 Forced discharge:
- If the buffer maximum temperature is exceeded, the surplus energy is compulsorily diverted into the heating circuits intended for this
- In the case of hot water tank selection, a thermal mixing valve must be installed- otherwise there is danger of scalding
- In the case of the heating circuits, the maximum temperatures are not exceeded

Re buffer parameter 06 / 07 Skimming function (only in the case of charging control):
- Active if there is surplus energy in the boiler e.g.: by reheating, so that this is not lost
- The temperature difference between the boiler and the buffer tank is continually checked
- If the temperature difference rises above the follow-on switch-ON difference - > charging pump “ON”
- If this drops below the follow-on OFF difference, then - > charging pump “OFF“



Re buffer parameter 08 Start-up protection (only in the case of charging control):
- In the case of buffer operation, there is no start-up protection on the boiler
- This works only the buffer charging pump
- If in the case of active start-up protection, the temperature falls below the buffer minimum temperature, depending on the buffer operating mode, the consumer circuits are separated - > pumps switch off
- Pumps switch ON again if the minimum temperature + ½ the switching difference is exceeded
- Where the buffer start-up protection is switched off, the pumps in the consumer circuit remain in operation

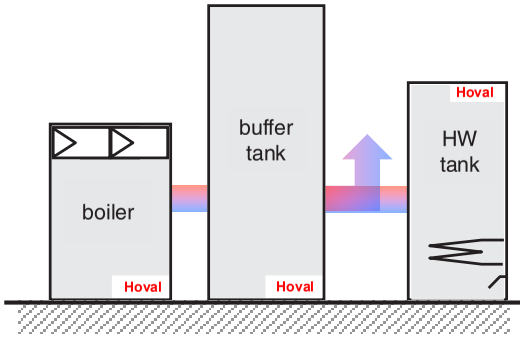
Re buffer parameter 09 Discharge protection (only in the case of charging control):
- The buffer charging pump remains blocked until boiler temperature is 5K above the buffer reference value
- This measure prevents buffer discharge
- The buffer charging pump is blocked again if the temperature difference between the boilers and the buffer tank drops below 2K

Re following diagrams - buffer operating modes parameter 10
Definition:

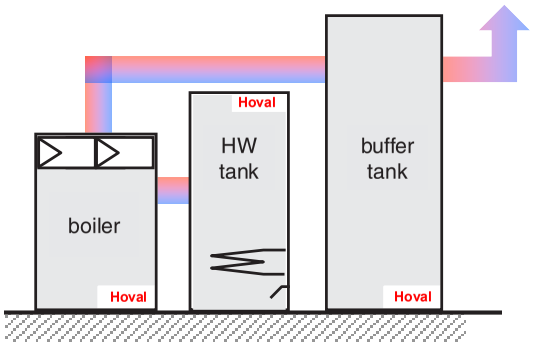
Charging control ...
- The heating circuits and the hot water tank are supplied from the buffer tank, or the hot water tank can also be supplied directly by the boiler!
- The buffer regulation ensures sufficient energy from the controlled boiler.

Discharge control:
- The heating circuits and the hot water tank are supplied either from the buffer tank or via switch-over directly from the boiler!
- Diagram 6 - shows supply always via the boiler with buffer tank as back-up
  i.e. if the temperature is not sufficient, the boiler reheats.

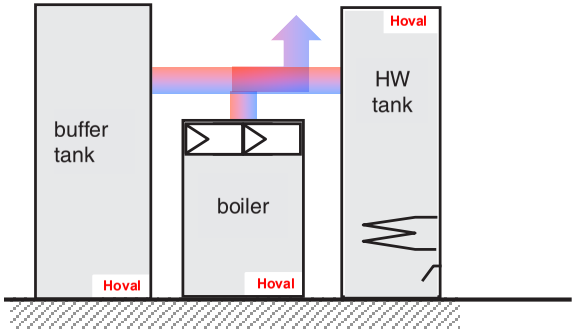
8.16 Buffer operating modes



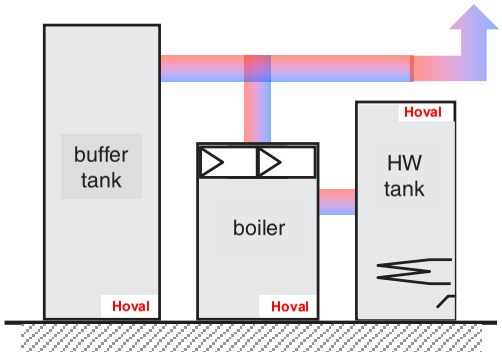
1 Charging control
Demand via buffer
-> Heating circuit(s) and HW



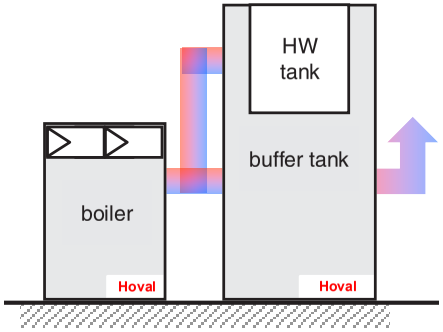
2 Charging control
Demand via buffer
-> only heating circuit(s)



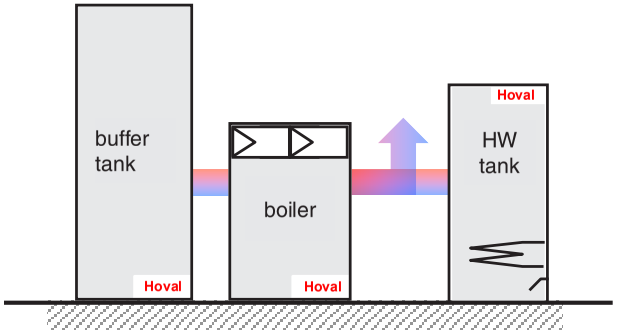
3 Discharge control
Demand via buffer
-> Heating circuit(s) and HW



4 Discharge control
Demand via buffer
-> Heating circuit(s)



5 Charging control
with switch-over HW



6 Discharge control
to the boiler

8.17 Buffer demand

	Buffer operating mode					
	1	**2**	**3**	**4**	**5**	**6**
Buffer demand from	HC/DHW	HK	HC/DHW	HC	HC	---
Heat generator demand from	BUFFER	BUFFER/HW	BUFFER	BUFFER/HW	PUFFER/HW	HC/HW
Buffer control type	Charging	Charging	Discharge 1	Discharge 1	Charging	Discharge 2
Buffer start-up protection works on	HC/DHW	HC	HC/DHW	HC	HC	---
Buffer discharge protection	X	X	---	---	X	---
Buffer frost protection monitoring	X	X	---	---	X	---
Buffer minimum temperature monitoring	X	X	X	X	X	---
Buffer maximum temperature monitoring	X	X	X	X	X	X
Buffer forced discharge into	HC/DHW	HC	HC/DHW	HC	HC	HC/DHW
Buffer skimming function	X	X*	---	---	X*	---
Charging temperature elevation works from	HC/DHW	HC	---	---	HC	---
Heat generator start-up protection on PLP	X	X	---	---	X	---
Function PLP without demand	OFF	OFF	OFF	OFF	OFF	OFF
Function PLP in the case of manual operation	ON	ON	OFF	OFF	ON	OFF
Function PLP in the case of sensor defect	ON	ON	OFF	OFF	ON	OFF
Function PLP in the case of heat generator blocking	---	---	ON	ON	---	---

Re buffer parameter 12 Buffer - reference value switch-off...

- Limits the maximum buffer reference value

- The parameter acts on the existing buffer sensors. In the case of PF1+PF2, both must have exceeded the value before the reference value to the H-GEN is taken away. The H-GEN reference value is only transmitted again when the reading at both sensors has fallen - 5K below the set value.

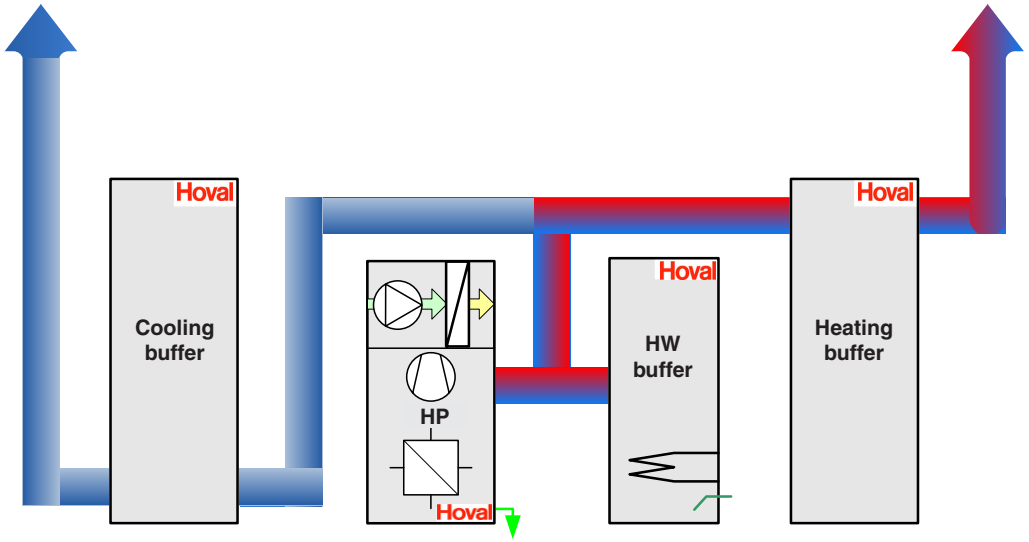
Re buffer parameter 13 H-Gen release temp. skimming function ...

- the skimming function is released only above the set temp. +2K

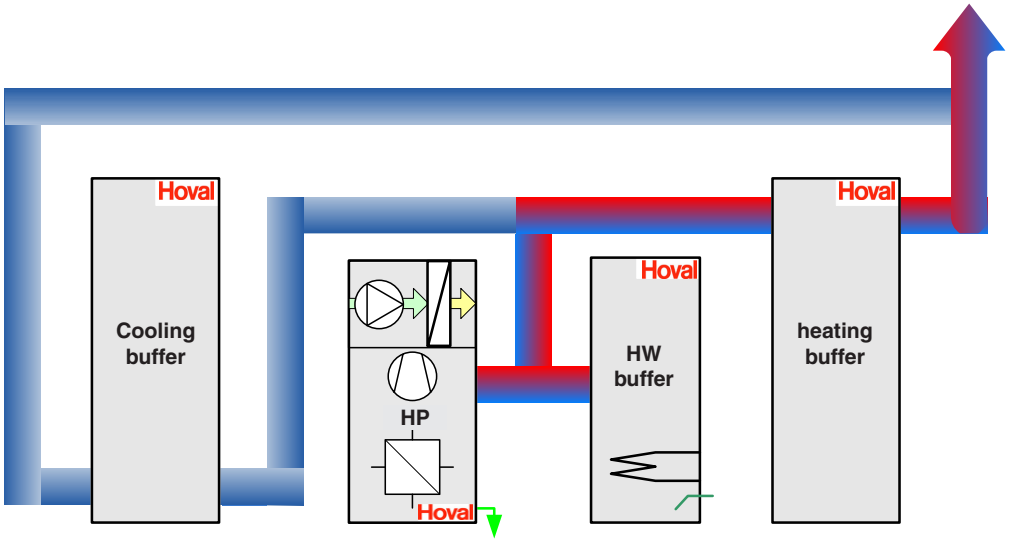
8.18 Parameter level "cooling buffer" Description

No.	Designation	Factory	NWP	Setting range/Setting values	Lev.
1	Maximum temperature	**30°C**	30	5 … 40°C	HF
2	Switching difference cooling buffer	**4 K**	4	1 … 20 K	HF
3	H-Gen abatement	**6 K**	6	0 … 30 K	HF
4	Constant reference value cooling buffer	**OFF**	OFF	OFF, 5 … 25°C	HF
5	Cooling buffer start-up protection	**ON**	ON	OFF / ON	HF

Re cooling buffer parameter: Example cooling buffer plant



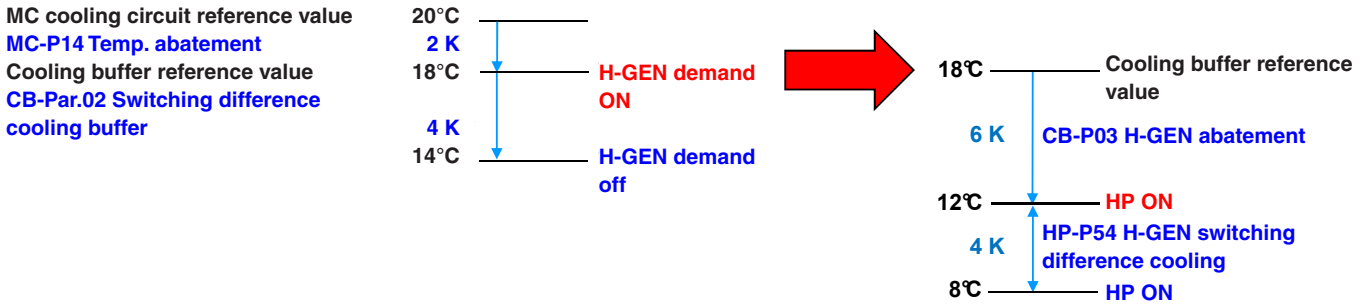
separate heating/cooling circuits



common heating/cooling circuits

General

- As an option, a cooling buffer control can be activated. The KSPF input is then firmly assigned as cooling buffer sensor. All other uses of the KSPF are then no longer possible. (e.g. solar, solid-fuel, ...)
- Parameter tree COOLING BUFFER is available if Hydraulics parameter 13 „Activation cooling buffer“ is set to ON and UKA (active cooling change-over) has been parameterised to a DC or VA output.
- Reference value transmission is performed analogue to the heating buffer, but with negative alignment (temperature abatements, deduction of offsets,…). To provide cooling capacity and to enable interim heating e.g. for HW, the cooling buffer can be maintained constantly at a set temperature via an additional constant reference value. The coolest value will then always be transmitted to the H-GEN (either coolest HC reference value or constant reference value for cooling buffer)



Re cooling buffer parameter 01 Maximum temperature limit...

- adjustable max. temp. cooling buffer
- necessary for cooling buffer start-up protection (see Par. 05)

Re cooling buffer parameter 02 Switching difference...

- If the cooling buffer temperature drops below the current demand value by the set value, the H-Gen demand is switched off
- If the temperature rises above the current demand value, it switches “ON” again

Re cooling buffer parameter 03 Temperature abatement to heat generator ...

- to ensure that there is adequate control reserve for cooling buffer charging, the H-GEN has an added temperature abatement value.

Re cooling buffer parameter 04 Constant cooling buffer reference value ...

- constant temperature reference value cooling buffer
- Demand /release cooling is carried out solely from the set Hydr. P14 "Release contact cooling to KVLF"
- if a heating circuit cooling is active at the same time, the coolest value is taken as the cooling buffer reference value.

Re cooling buffer parameter 05 Start-up protection cooling buffer ...

- The cooling buffer start-up protection ensures that the heating circuits are only supplied with cooling energy when the temperature falls below the maximum temperature limit (Par. 01) of the cooling buffer.

  Conditions for release:
  Heating circuits for cooling blocked: KPF > KPmax
  Heating circuits for cooling released: KPF < KPmax – ½ KPSD

- Where the cooling buffer start-up protection is switched off, the pumps in the consumer circuit remain in operation

8.19 Parameter level “Cascading” Description

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Switch-off difference	**3 K**	3	3	3		3	3	0,5 ... 30 K	OEM
2	Connecting delay	**20**	20	20	20		20	20	0 ... 200 Min	OEM
3	Switch-off delay	**5**	5	5	5		5	5	0 ... 60 min	OEM
4	Switching output stage sequence	**65**	65	65	65		65	65	10...100%	OEM
5	Stage reversal	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1... 240 days	OEM
6	Control stage	**1**	1	1	1		1	1	1 ... [max. stages]	BE
7	Peak load stage	**OFF**	OFF	OFF	OFF		OFF	OFF	2 ... [max. stages]	OEM
8	Group switch-over	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, ON	OEM
9	DHW-Fast activation	**OFF**	OFF	OFF	OFF		OFF	OFF	OFF, 1 ... [max. stages]	OEM
10	Peak load elevation	**10 K**	10	10	10		10	10	0 ... 60K	OEM

Legend for cascading: Setting range/setting values for parameters ...
General
- Different boiler types can be combined
- The cascade is recognised automatically if several central devices are programmed to “Heat generator/boiler”
- After that, the parameter module “cascading” is released in the regulator with the bus address 10
- In the case of cascade setting, there is no 2-stage boiler control (stage switching takes place via cascade control)

Re cascading parameter 01 Cascade switch-off difference...
- indicates when the next boiler is deactivated
- on Par. 1 the switch-off difference is regulated
- the switch-on difference is fixed to –5K and cannot be regulated

Re cascading parameter 02 Connecting delay...
- indicates when a follow-up stage is activated dime-delayed
- The connecting delay is dynamic: great deviation setpoint-/ actual value= shorter connecting time
- parameter 2 sets the maximum connecting time

Re cascading parameter 03 Switch-off delay...
- So that not all the boilers switch off simultaneously on reaching the cascade switch-off temperature, the revocation of the boiler is controlled by the switch-off delay

Re cascading parameter 04 Switch-over output...
- Is intended for boilers with automatic firing device and H-Gen Bus (e.g. UltraGas®)
- As long as the last burner stage is not in operation, up to then all of them are reduced to the switching output (set value)
- After the last burner stage connection, modulation of the boilers is fully released (there is no output limitation anymore)
- As soon as a stage reduces, the switch-over output works on all burner stages.

Re cascading parameter 05 Stage reversal...
- Also known under priority switch-over
- Within the cascade, a run time-dependent change of control stage can be activated
- After a set period of operation has expired, the system switches to the boiler with the next higher bus address (Days of operation, 1 day = 24hrs burner running time)

Re cascading parameter 06 Control stage...
- Even if the automatic stage sequence switching is switched off, the control stage can be set manually to any stage
- Existing cascade stages are numbered consecutively with the corresponding data bus number
- If a change is made to the type of heat generator, within the central device with the bus address 10, automatic resetting of the control stage level to the first boiler takes place

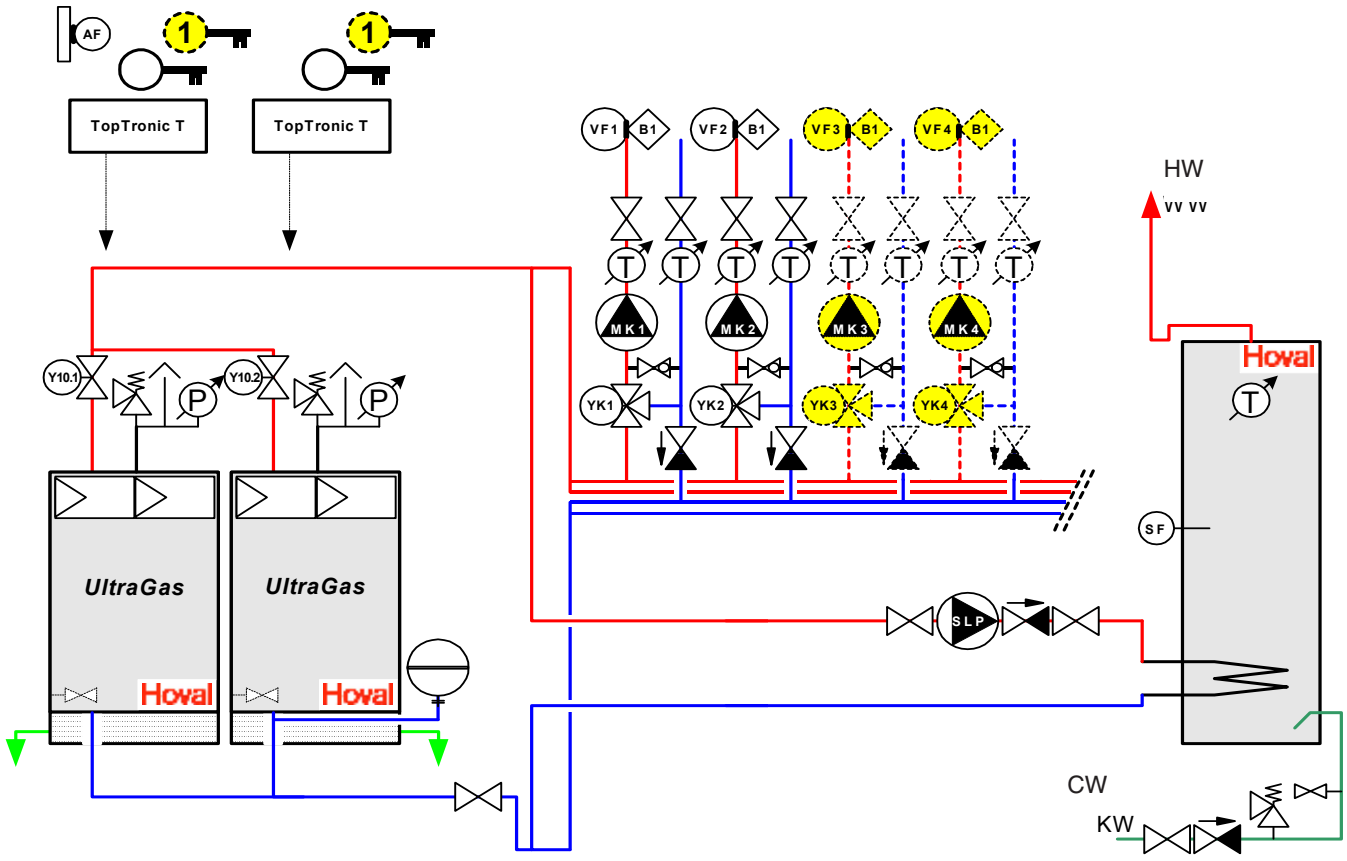
Re Cascade parameter 07 peak load stage ...
- an activated peak load stage is not considered during activated stage reversal (switches on always last, if for example 3 is set, then all heat generators from address 3 are peak load stages)
- In mixed cascades, such as 2x UG + Max-3, the setting of “peak load stage 3” releases at the same time the modulation of UltraGas® before the activation of the peak load stage. (>65%)

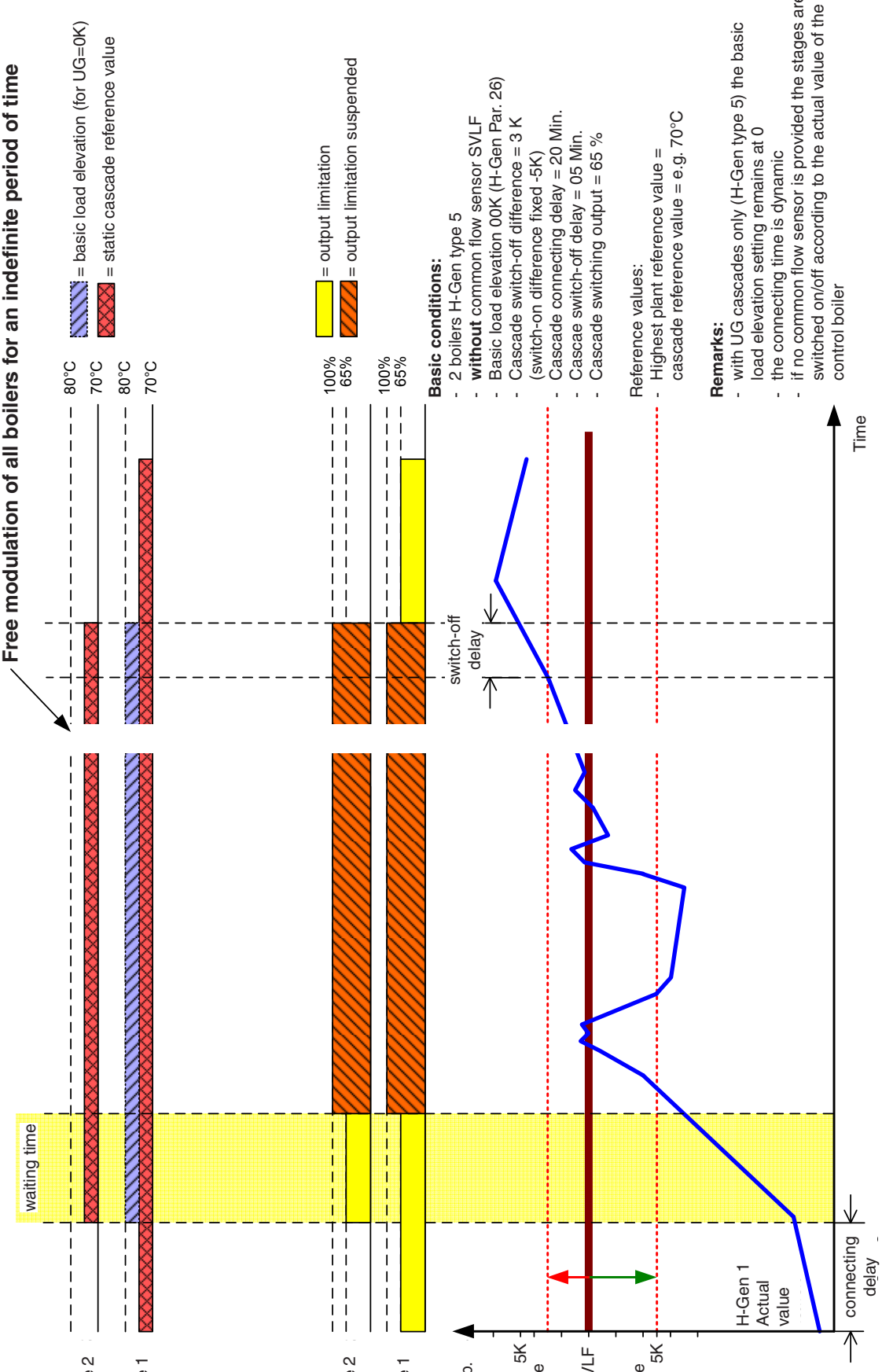
Re Cascade parameter 08 group change-over...
- not used by Hoval

Re Cascade parameter 09 DHW fast activation...
- With a present DHW demand the switch-on of the follow-up stages up to the adjusted maximum number of stages for DHW-charging will be done with a fixed value of 10 seconds instead of PARAMETER 02.
- With DHW-charging (priority operation) the number of heat generators is limited by PARAMETER 09.
- With parallel operation (Demand of heating circuits and DHW at the same time) – no limitation of the number of stages.
- If a heating circuit is in operation with more than the stages released for DHW operation, and a DHW-charging should be done in priority operation, the not for DHW operation released stages will be directly switched off. With parallel operation a switch-off of the activated stages does not take place!

Re cascading parameter 10 Peak load elevation ...
- In cascades with peak load boilers, on activation of the peak load boiler an elevation to the basic load boilers can be set
- The elevation is added to the demand value of the basic load boilers + basic load elevation

UltraGas® double boiler without common flow sensor




Free modulation of all boilers for an indefinite period of time
= basic load elevation (for UG=0K)
= static cascade reference value
= output limitation
= output limitation suspended
80°C
70°C
80°C
70°C
100%
65%
100%
65%
Basic conditions:
- 2 boilers H-Gen type 5
- without common flow sensor SVLF
- Basic load elevation 00K (H-Gen Par. 26)
- Cascade switch-off difference = 3 K (switch-on difference fixed -5K)
- Cascade connecting delay = 20 Min.
- Cascae switch-off delay = 05 Min.
- Cascade switching output = 65 %
Reference values:
- Highest plant reference value = cascade reference value = e.g. 70°C
Remarks:
- with UG cascades only (H-Gen type 5) the basic load elevation setting remains at 0
- the connecting time is dynamic
- if no common flow sensor is provided the stages are switched on/off according to the actual value of the control boiler
switch-off delay
waiting time
Stage 2
Stage 1
Stage 2
Stage 1
Temp.
Cascades Switch-off difference Par. 01: 3 K
5K
Reference value SVLF
Cascades Switch-on difference fixed -5 K
5K
H-Gen 1 Actual value
connecting delay
Time

8.20 Parameter level “Common flow” Description

only if VE1 = SVLF

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	PI-amplification factor, P-portion Xp	**0 %/K**	0	0	0		0	0	0,0...50 %/K	HF
2	PI-scanning time Ta	**20 sec**	20	20	20		20	20	1...600 sec	HF
3	PI -reset time T	**600 sec/°C**	600	600	600		600	600	1...600 sec/°C	HF

Legend for common flow: Setting range/setting values for parameters...
PI common flow control (with common flow sensor SVLF)
- If a common flow sensor is activated the parameter tree Common flow is cleared.
- Pi regulation behaviour of common flow regulation can be set with this parameter
- From the reference/ actual value deviation of the common flow sensor a dynamic boiler reference value is being generated, this value lies within the cascade switching difference range.
- A common flow sensor must be connected to the controller with bus address 10 on variable input 1 (VE1).

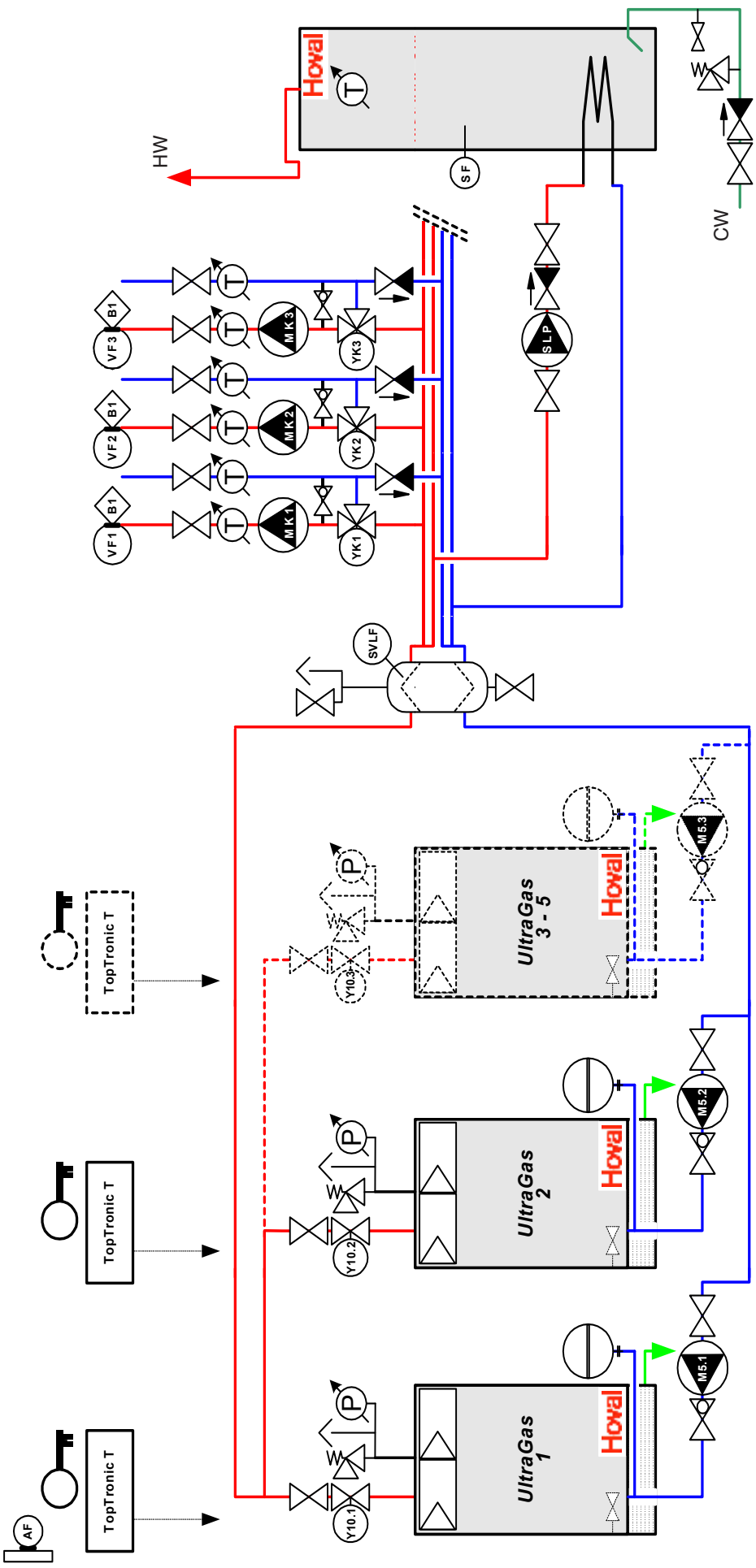
Re SVFL parameter 01 Common flow P-portion Xp...

In the case of a change in the regulation deviation (reference value - actual value), the proportional element Xp determines the corresponding adjustment of the respective H-Gen reference value in accordance with the selected setting.

- if Par.1 is set to 0 the PI regulation is deactivated. The H-Gen receive no dynamic reference value anymore but a fix value (factory setting)

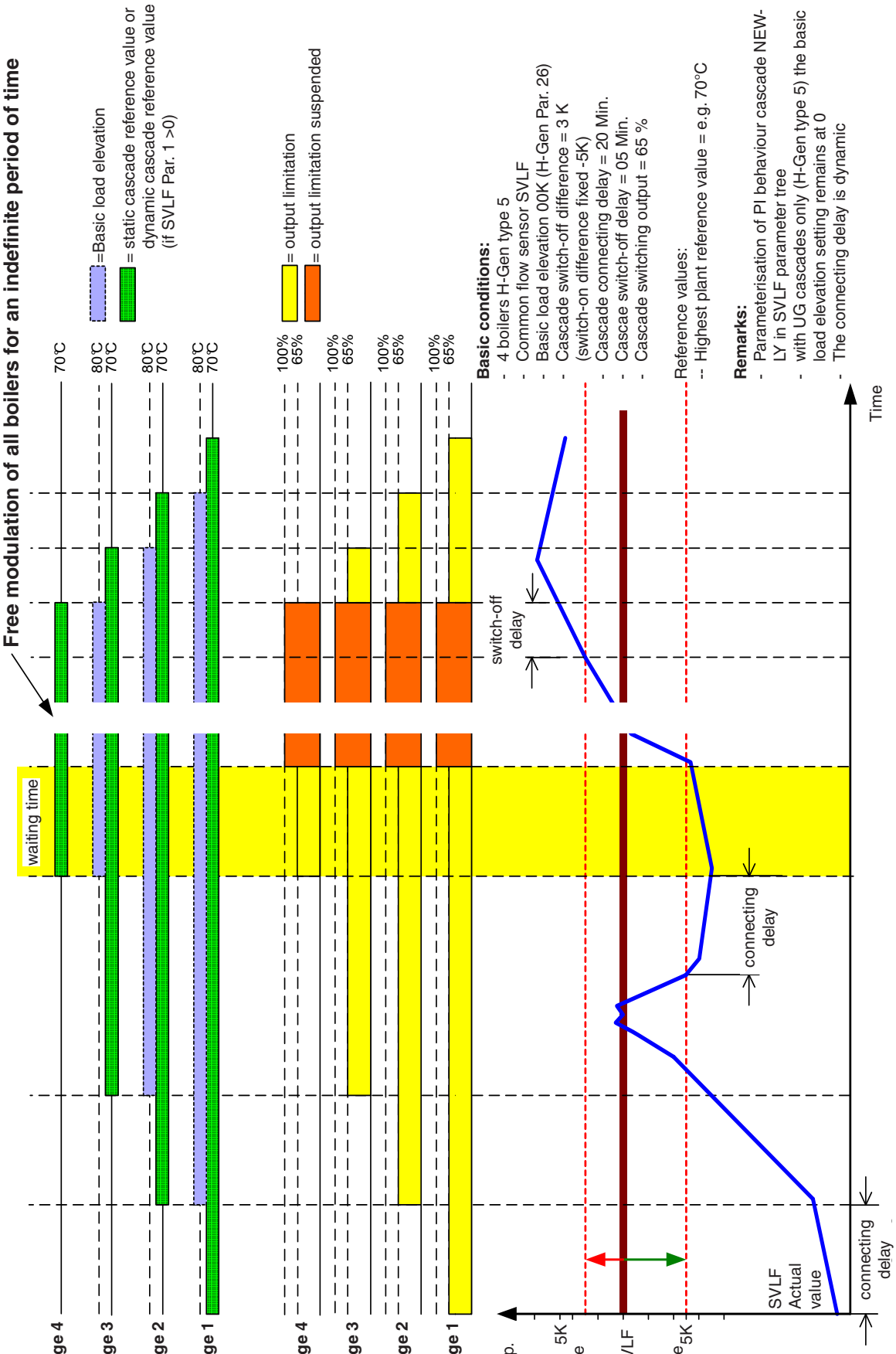
Re SVLF parameter 02 Common flow scanning time Ta ...
- The scanning time is a variable that is internal to the regulator

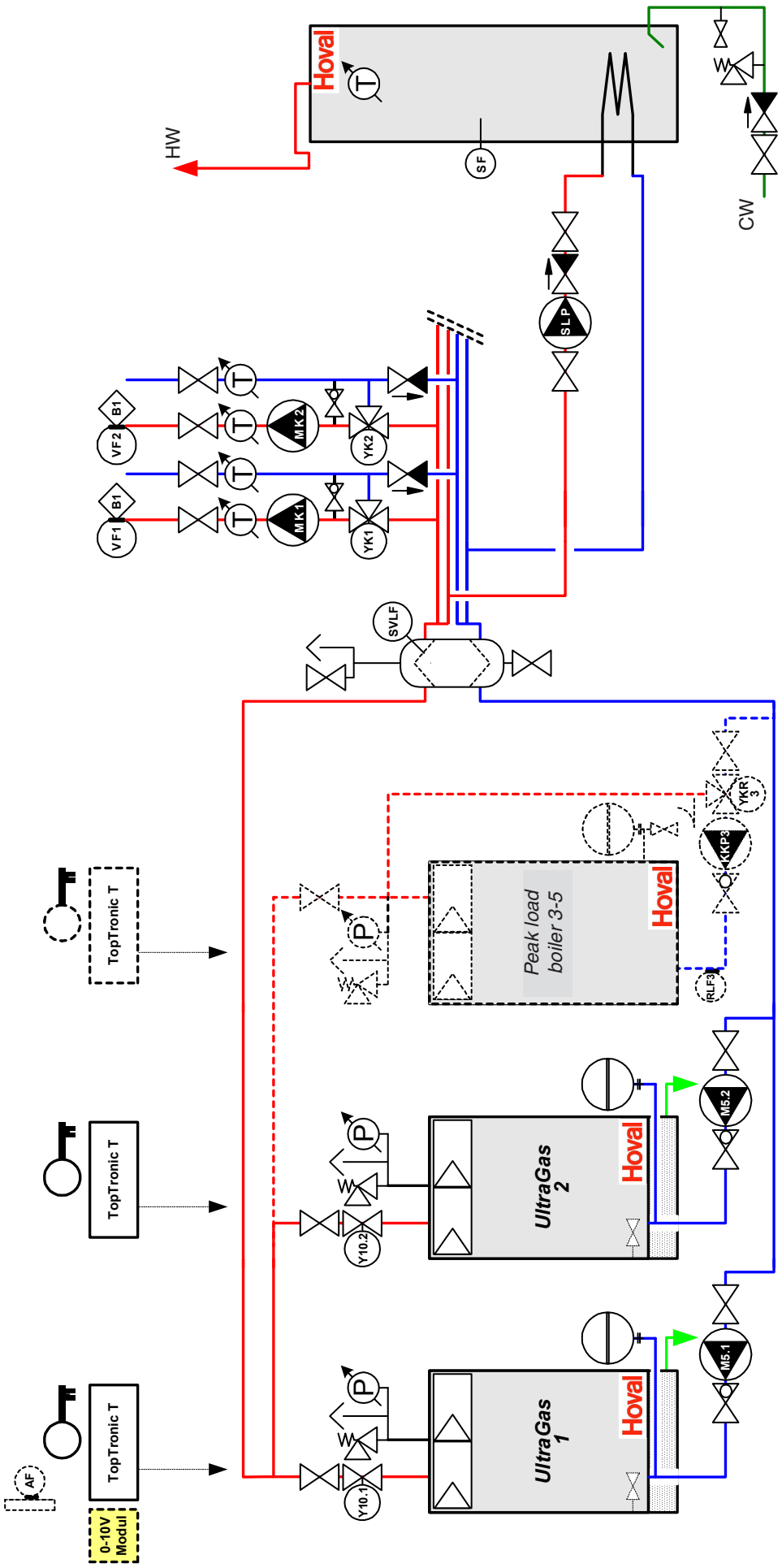
Re SVLF parameter 03 Common flow reset time Tn ...
- The integral portion determines the dynamic behaviour of the regulator, and thus the time which the regulator needs in order to eliminate any deviation that arises.



UltraGas® multiple boilers with common flow sensor

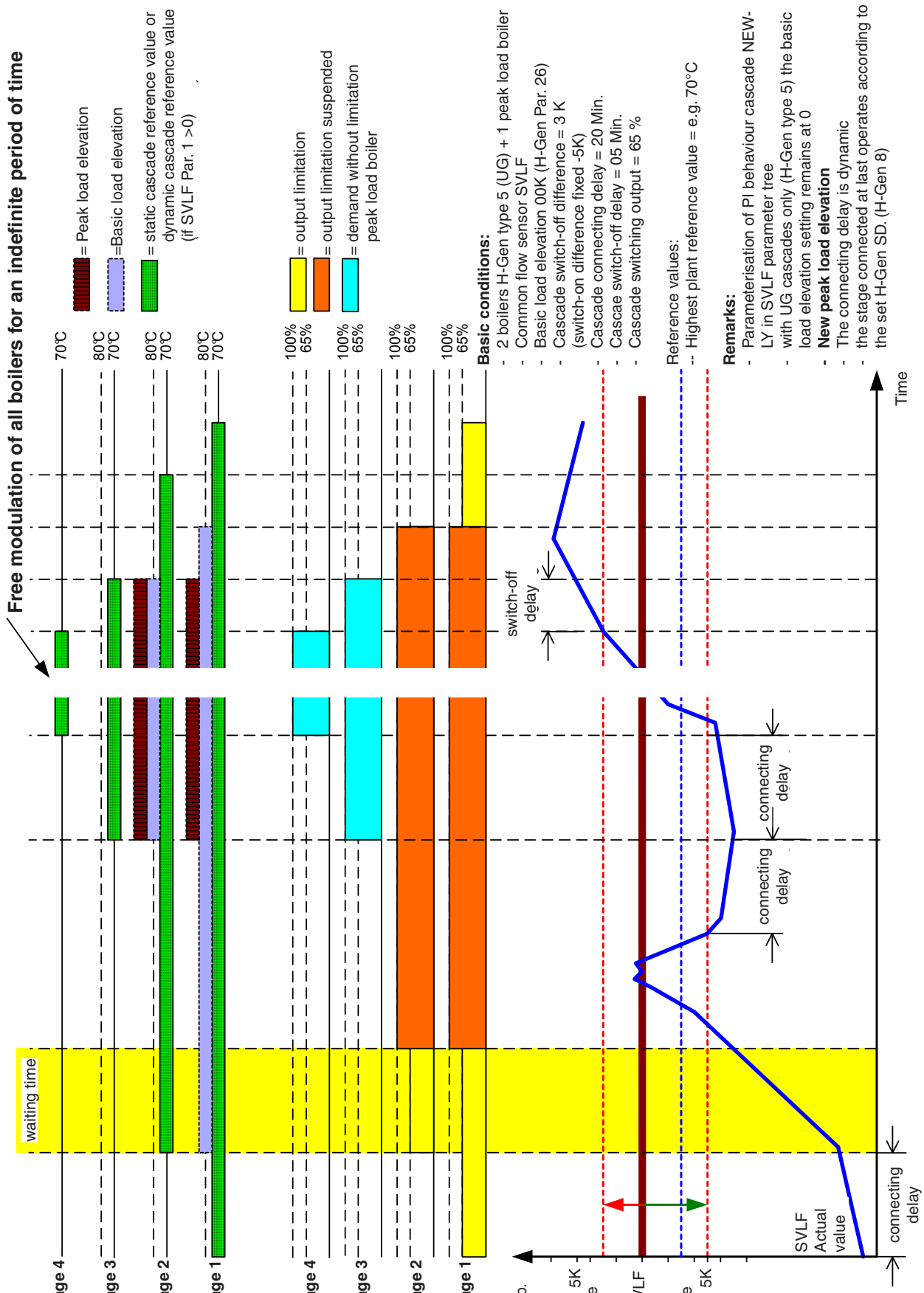
UltraGas® multiple boilers with common flow sensor





2 x UltraGas® + 1 peak load boiler with common flow sensor

2 x UltraGas® + 1 peak load boiler with common flow sensor



8.21 Parameter level "Data bus, bus address" Description

No.	Designation	Factory	U90	U110	UG	UFFA	N	NWP	Setting range/Setting values	Lev.
1	Bus address central device	**10**	10	10	10		10	10	10, 20, 30, 40, 50	HF
2	Bus right RS direct circuit	**1**	1	1	1		1	1	1 Extended access authorisation 2 Simple access authorisation	HF
3	Bus right RS mixer circuit 1	**1**	1	1	1		1	1	1 Extended access authorisation 2 Simple access authorisation	HF
4	Bus right RS mixer circuit 2	**1**	1	1	1		1	1	1 Extended access authorisation 2 Simple access authorisation	HF

Legend for data bus: Setting range/setting values for parameters ...

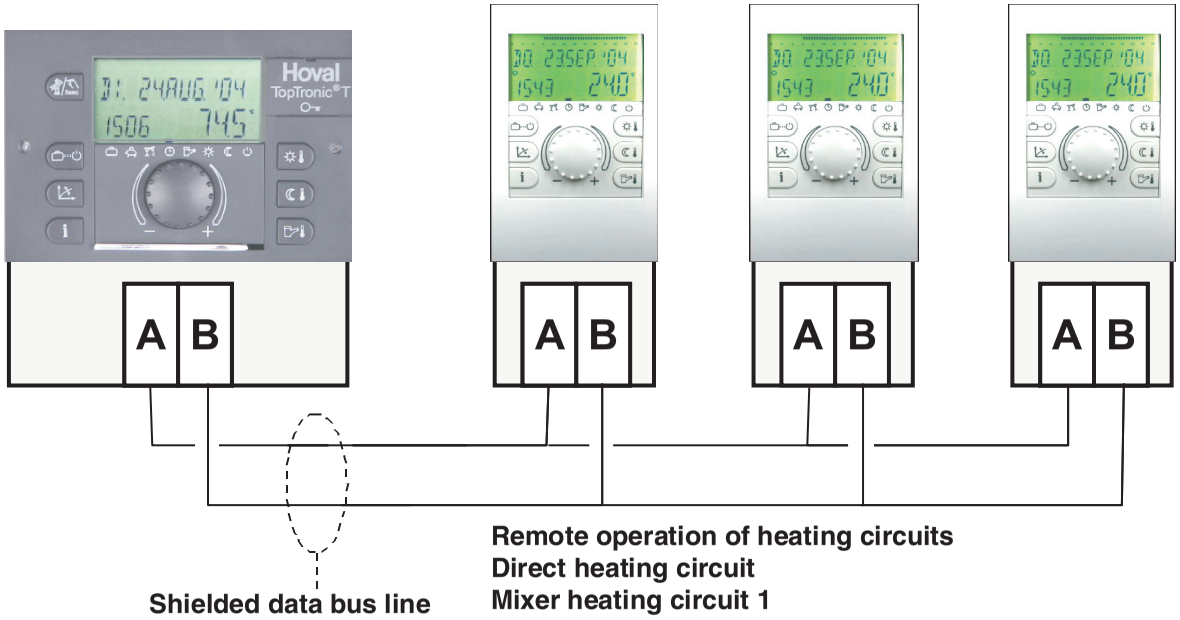
Re data bus parameter 01 Bus address central device:
Up to 5 central devices can communicate, bus addresses: The 1st device is always 10, the others 20, 30, 40, 50

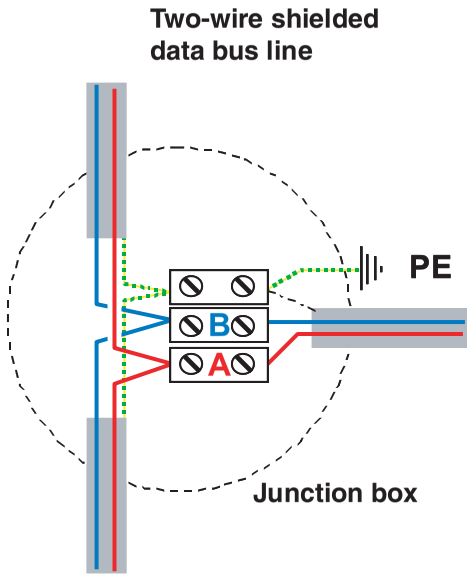
Re data bus parameters:
02 Bus rights room station Direct circuit
03 Bus rights room station Mixer circuit 1
04 Bus rights room station Mixer circuit 2

1 = Extended access authorisation = house owner status
For all heating circuits, hot water circuit, the parameters/ switching times of the respective central device can be read and changed

2 = Simple access authorisation = tenant status
Only for one's own assigned heating circuit can the parameters/switching times be read and changed

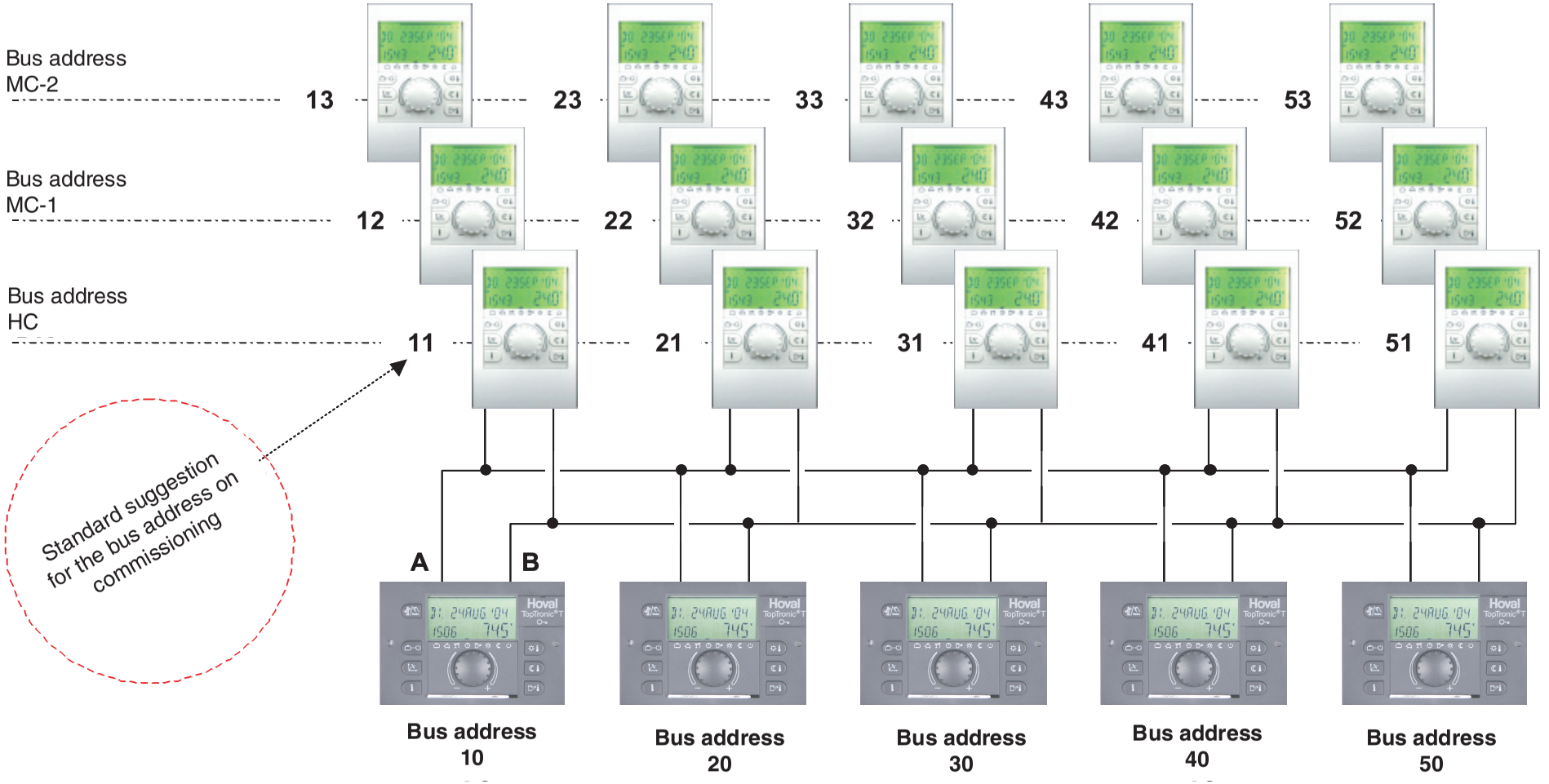
Data bus connections between one another





Note!
Data bus lines (A-B) must not be exchanged

Data bus addresses



With a start-up of several TopTronic®T devices in the data bus network (TTT, RS-T,...), the following procedure is to be kept:

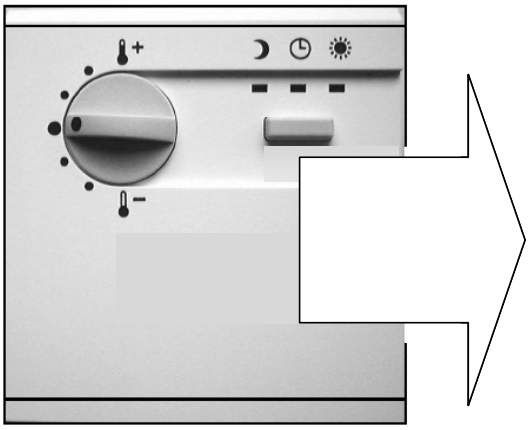
1) Switch off all controllers (currentless, dead)
2) Make a bus interconnection on the hardware side for controllers, room stations, ... (2-pole shielded)
3) Switch on all controllers

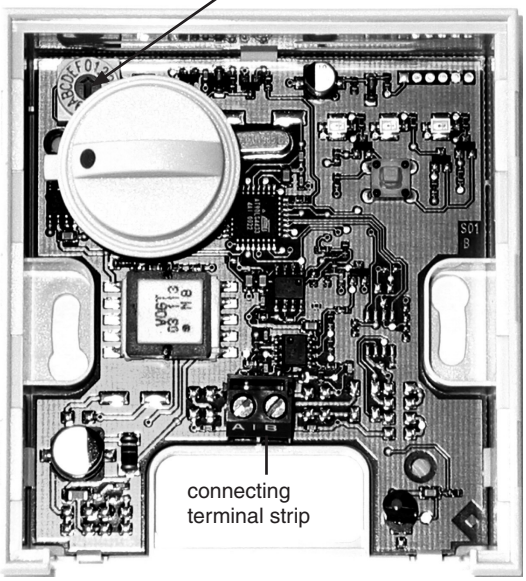
4 a) Initial commissioning
- Central units, room stations start up and stop with bus address – make adjustments

b) Additional address changes: (e.g. controls, or changes of devices already adjusted)
- Central units: parameter level bus Par. 01 - adjustment or query of central unit addresses
- Room stations: RESET = „the quadruple move“ (at the RS-T, without code) Room station starts again – After the choice of language, keep pressed the “PRESS & TURN” button until bus address can be adjusted / queried. (Reset at RS-T doesn’t change parameters or settings, except the choice of language)

Devices with bus interconnection / bus group: Switch on of devices (TTT, RS-T, line printers for computers,...) or plugging of devices (RS-T) during the operation, can cause failure in the control system.

Bus address setting/assignment for room device RFF





Room device RFF Bus address	Central device				Heating circuit
1	**1**		**10**		Direct heating circuit
2					Mixer heating circuit 1
3					Mixer heating circuit 2
4	**2**		**20**		Direct heating circuit
5					Mixer heating circuit 1
6					Mixer heating circuit 2
7	**3**		**30**		Direct heating circuit
8					Mixer heating circuit 1
9					Mixer heating circuit 2
A	**4**		**40**		Direct heating circuit
B					Mixer heating circuit 1
C					Mixer heating circuit 2
D	**5**		**50**		Direct heating circuit
E					Mixer heating circuit 1
F					Mixer heating circuit 2
0	Undefined				Undefined

8.22 Parameter level "Relay test" Description

Par..	Designation	Factory setting	Setting Reg. 1	Setting Reg. 2	Setting Reg. 3	Setting Reg. 4	Setting Reg. 5	Setting range/Setting values	Level
1	Test heat generator	---						Different relay switching sequence depending on set heat generator	HF
2	Test direct heating circuit pump	–						OFF-ON-OFF-...	HF
3	Test mixer circuit pump 1	–						OFF-ON-OFF-...	HF
4	Test mixer control element 1	–						STOP OPEN STOP CLOSED STOP…	HF
5	Test mixer circuit pump 2	–						OFF-ON-OFF-...	HF
6	Test mixer control element 2	–						STOP OPEN STOP CLOSED STOP…	HF
7	Test hot water charging pump	–						OFF-ON-OFF-...	HF
8	Test variable output 1	–						OFF-ON-OFF-...	HF
9	Test variable output 2	–						OFF-ON-OFF-...	HF

Parameter level “sensor balancing” only for RS-T
...other sensor tuning only at the OEM level!
Change/adaptation of room sensor directly in the room station RS-T

No.	Designation	Factory	U90	Lev.
1	Balancing external sensor	0	- 5 K ... + 5 K	OEM
only RS-T	Balancing room sensor (only adjustable with RS-T)	0	- 5 K ... + 5 K	HF
2	Balancing heat generator	0	- 5 K ... + 5 K	OEM
3	Balancing tank sensor	0	- 5 K ... + 5 K	OEM
4	Balancing flow sensor 1	0	- 5 K ... + 5 K	OEM
5	Balancing flow sensor 2	0	- 5 K ... + 5 K	OEM
6	Balancing solar collector sensor	0	- 5 K ... + 5 K	OEM
7	Balancing solar buffer sensor	0	- 5 K ... + 5 K	OEM
8	Balancing variable input 1	0	- 5 K ... + 5 K	OEM
9	Balancing variable input 2	0	- 5 K ... + 5 K	OEM
10	Balancing variable input 3	0	- 5 K ... + 5 K	OEM

Sensors connected to the automatic gas firing device are not adjustable

8.23 Fault signal types

1. Sensor fault signals
Error code 10 ... 20,
Index 0=Short circuit, 1 Interruption
- Interruption
- Short-circuit
- Measured value deviation

2. Boiler/heat generator fault signals
Error code 30… 40, index 0,1 or 2
- respective switching status

3. Logical fault signals
Error code 50… 60, index 0,1 or 2
- expected control result

4. Bus fault signal address error
Error code 70… 80, index 0 or 1
- Double allocation
- Non-recognition of address settings within the data bus

5. Fault signals from the automatic firing device
The fault signals come from the automatic firing device,
- permanent faults (permanent locking)
Error code E-XX (FA code)
- temporary faults (self-lifting locking)
Error code B-XX (FA code)
- Warning W-XX (FA code) disconnection

8.24 Parameter level “Fault Signals” Description

Fault signals 1

No.	Designation	Remark	Setting range/Setting values	Lev.
1	Fault signal 1		Last fault signal	OEM
2	Fault signal 2		Next to last fault signal	OEM
3	Fault signal 3		Third to last fault signal	OEM
4	Fault signal 4		Fourth to last fault signal	OEM
5...20	Alarm 5 - 20		Fifth to last fault signal	OEM
21	Reset fault signal		SET	OEM

Fault signals 2 (can be activated only for H-Gen 5)

No.	Designation	Remark	Setting range/Setting values	Lev.
1	Fault signal 1		Last fault signal	OEM
2	Fault signal 2		Next to last fault signal	OEM
3	Fault signal 3		Third to last fault signal	OEM
4	Fault signal 4		Fourth to last fault signal	OEM
5...20	Alarm 5 - 20		Fifth to last fault signal	OEM
21	Reset fault signal		SET	OEM

Fault reporting overview

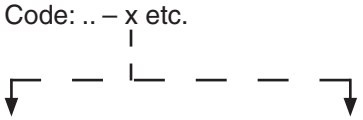
Status	Designation	Error type	Code	Remark
System	Outside sensor	Interruption	10-0	
System	Outside sensor	Short-circuit	10-1	
System	Boiler sensor	Interruption	11-0	
System	Boiler sensor	Short-circuit	11-1	
System	Flow sensor 1	Interruption	12-0	MC1=off, YK1=no current
System	Flow sensor 1	Short-circuit	12-1	MC1=off, YK1=no current
System	Calorifier sensor	Interruption	13-0	
System	Calorifier sensor	Short-circuit	13-1	
System	VE 2	Interruption	14-0	
System	VE 2	Short-circuit	14-1	
System	VE 2	Fault signal	14-7	
System	VE 3	Interruption	15-0	
System	VE 3	Short-circuit	15-1	
System	VE 3	Fault signal	15-7	
System	VE 1	Interruption	16-0	
System	VE 1	Short-circuit	16-1	
System	VE 1	Fault signal	16-7	
System	Solar tank sensor	Interruption (KSPF)	17-0	
System	Solar tank sensor	Short-circuit (KSPF)	17-1	
System	Flow sensor 2	Interruption	18-0	MC2=off, YK2=no current
System	Flow sensor 2	Short-circuit	18-1	MC2=off, YK2=no current
System	Collector sensor	Interruption (KVLF)	19-0	
System	Collector sensor	Short-circuit (KVLF)	19-1	
System	Room sensor (RS)	Interruption	20-0	
System	Room sensor (RS)	Short-circuit	20-1	
System	Burner 1	No switching off (1 Min.)	30-2	With par. log. fault signal can be switched off
System	Burner 1	No switching on (10 Min.)	30-3	With par. log. fault signal can be switched off
System	Burner 2	No switching off (1 Min.)	31-2	With par. log. fault signal can be switched off
System	Burner 2	No switching on (10 Min.)	31-3	With par. log. fault signal can be switched off
System	Pulse counter	No pulse (5 min.)	90-0	
System	Flue gas temperature	exceeded	33-5	
System	Flue gas temperature	STB triggered	33-8	

Logical	Boiler temperature	Not reached (90 mins.)	50-4	
Logical	calorifien temperature	Not reached (4 hr.)	51-4	
Logical	MC1 VL-temp.	Not reached (1 hr.)	52-4	
Logical	MC2 VL-temp.	Not reached (1 hr.)	53-4	
Logical	RT DC	Not reached (3 hr.)	54-4	
Logical	RT MC1	Not reached (3 hr.)	55-4	
Logical	RT MC2	Not reached (3 hr.)	56-4	
System	Address	Address collision	70-0	
System	Activity	No T2B signal	70-1	
System	Activity	No FA signal	70-6	
System	Activity	Regulator with address 10 is missing	70-8	
System	Activity	Data bus error	70-9	No Hoval regulator
System	HP return sensor	Return min. temp. below setpoint	85-4	
System	HP return sensor	Return max. temp. exceeded	85-5	
System	Heat source sensor (QF)	Heat source min. temp. below setpoint	86-4	
System	Heat source sensor (QF)	Heat source max. temp. exceeded (cooling operation)	86-5	
System	Heat source sensor (QF)	Fault heat source sensor	--	Standard signal «VE-x»
System	Fault HP (WPS)	Variable input HP fault	87-7	
System	Pulse counter	No pulse (5 min.)	90-0	
System	Fault	Warnung	W:XX	Warning automatic firing device
System	Fault	Locking	EnXX	Fault in automatic firing device
System	Fault	Blocking	BnXX	Fault in automatic firing device

Extended fault signals, automatic firing devices

FA	WATER PRESSURE	HIGH	80-1	
FA	WATER PRESSURE	LOW	80-6	
FA	WATER PRESSURE	MIN	80-2	
FA	VENTING		81-0	
FA	MAINTENANCE		82-0	
FA	HEATING SYSTEM	OFF	-	
FA	SERVICE		240-1	

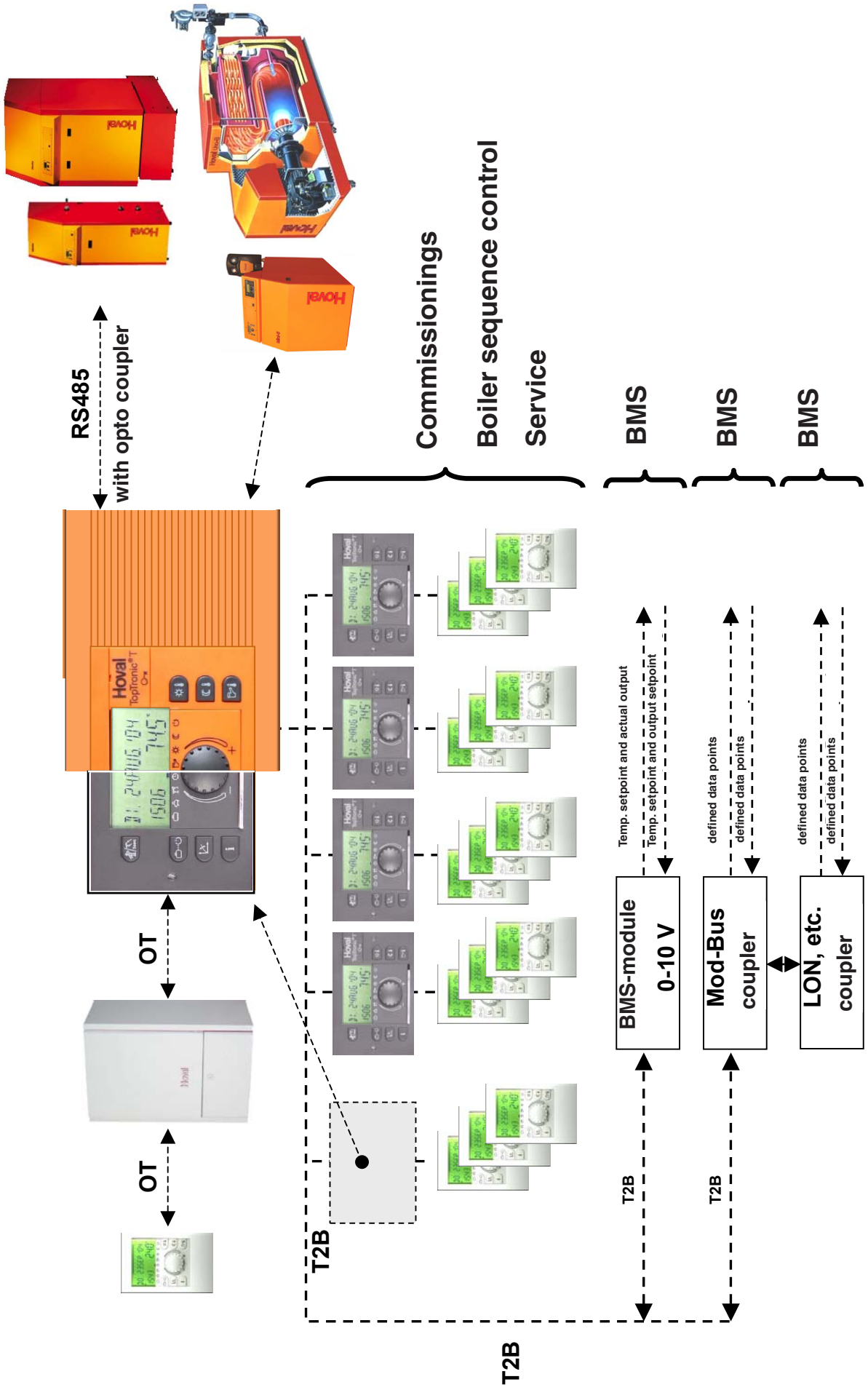
Meaning of code end digit:
Code: .. – x etc.



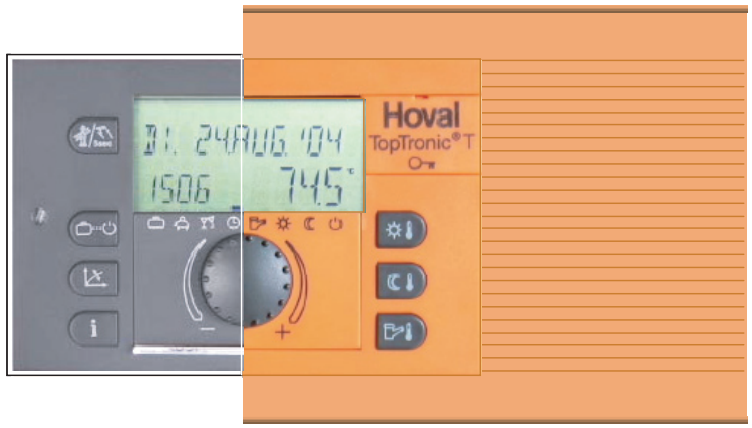
0 = Interruption
1 = short-circuit
2 = no OFF
3 = no ON
4 = not reached
5 = exceeded
6 = no signal of automatic firing device
7 = fault signal
8 = STB problem
9 = no Hoval regulator

9. Communication, interfaces

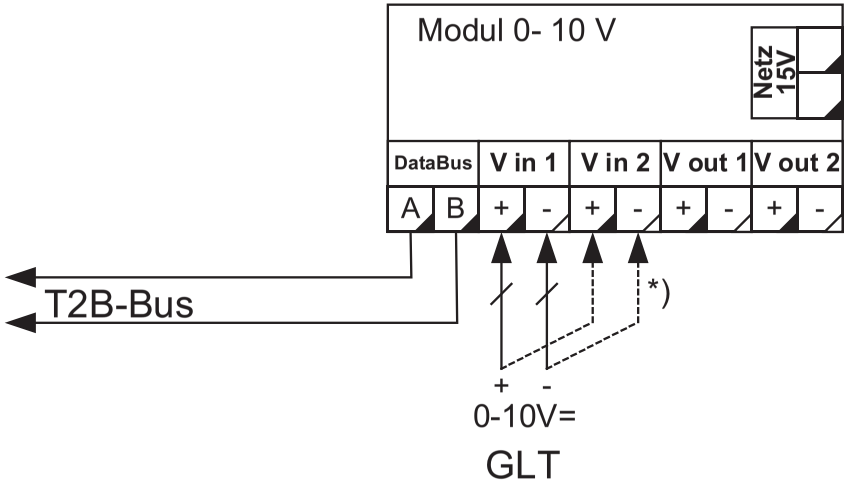
9.1 Building management system (BMS) -communication



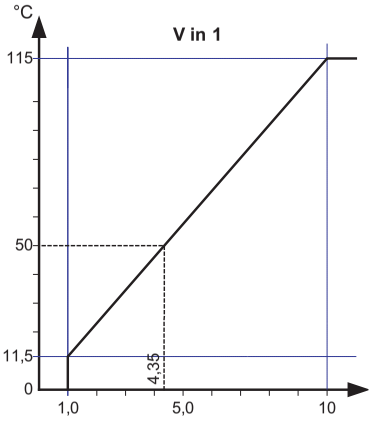
9.2 Control via 0-10V module



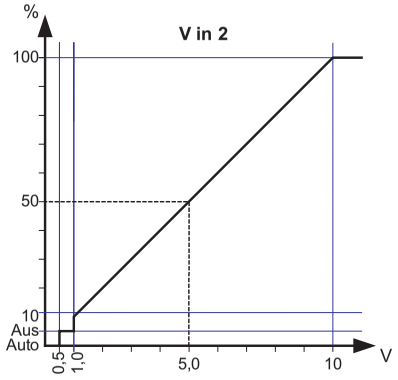
Only one Module in one bus possible



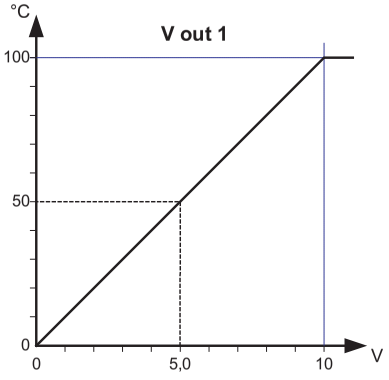
External temperature control with 0-10V (V in 1):
0 - 1V .... Reference value 0
1,0 - 10V .... 11,5ºC - 115ºC



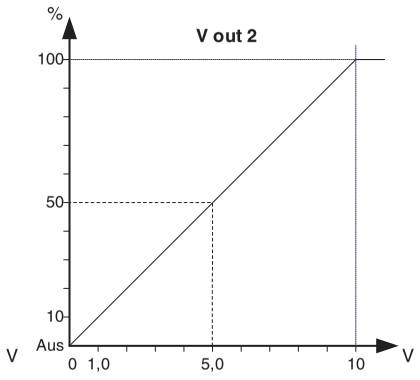
***) External output control with 0-10V (V in 2):**
0 - 0,4 V .... without output control (Automatic)
0,5 - 0,9 V .... Boiler OFF 0%
1,0 - 10V .... 10% - 100%



Temperatur reference value with 0-10V (V out 1):
0 - 10V .... 0ºC - 100ºC



Output actual value with 0-10V (V out 2) : (for H-Gen type 5)
0 - OFF
0,1 - 10 V ... 1% - 100%



10. List of abbreviations

10.1 Description

ABS	Lowering operation	PF (1)	Buffer sensor (top)
AF	Outside sensor	PF 2	Buffer sensor 2 (bottom)
AF 2	Outside sensor 2	PLP	Buffer charging pump
AGF	Exhaust gas sensor	PWF	Parallel H-Gen release
AT	Outside temperature	RBP	Return bypass pump
BUS	System data bus (T2B)	RG	Room device for room temperature recording
BZ1	Running time meter burner stage 1	RLP	Return pump
BZ2	Running time meter burner stage 2	SD I	Switching difference I
DC	Direct heating circuit	SD II	Switching difference II
HCP	Direct heating circuit pump	SF	Calorifier sensor
ECO	Eco operation	SLP	Calorifier charging pump
ELH	Electric heating element	SLV	Water by-pass solar circuit
FKF	Solid fuel boiler sensor	SLVF	Solar sensor HW or buffer
FPF	Solid fuel buffer sensor	SZV	Solar forced guidance
FR	Set-value control	SOP	Solar charging pump
FSP	Solids-handling pump	VA	Variable output
HK	Heating circuit (general)	VE	Variable input (general)
IMP	Pulse input	VE1	Variable input 1
KKP	Boiler circuit pump	VE2	Variable input 2
KR	Constant regulation	VE3	Variable input 2
KRLF	Solar return sensor	VF1	Flow sensor mixer circuit 1
KSPF	Solar sensor HW or buffer	VF2	Flow sensor mixer circuit 2
KVLF	Collector sensor	WE-Bus	Heat generator data bus
MC	Mixer circuit	H-GEN	Heat generator
MKP	Mixer circuit pump	WF/KF	Heat generator sensor
P1	Switching time program	DHW	Hot water
P2	Switching time program	ZKP	Circulating pump
P3	Switching time program	ZUP	Feed pump

11. Safety precautions

11.1 Installation conforming to EMC rules

1. Mains cables and sensors or data bus cables carrying mains voltage must in principle be installed separately. A minimum distance of 2 cm between the cables must be observed. It is permitted for cables to cross each other.

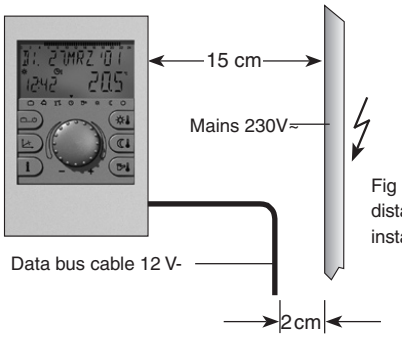


Fig 1: Minimum distances for electrical installation

2. In the case of control devices with their own mains connection, it must be ensured that there is separate installation of mains and sensor and/or bus cables. Where cable ducts are used, they must be provided with separating fins.

3. When installing control devices or room stations, a minimum distance of 40 cm must be observed from other electrical facilities with electromagnetic emission, such as contactors, motors, transformers, dimmers, microwave ovens and televisions, loudspeakers, computers, radio telephones etc.

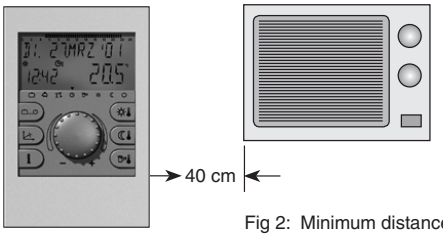


Fig 2: Minimum distance from other electrical devices

4. Between room devices and central devices, a minimum distance of 40 cm must be observed. Several central devices in the data bus network can be installed directly next to each other.

5. The mains connection of the heating plant (boiler, switching field control device) must be designed as an independent electrical circuit. Neither fluorescent lamps nor other sources of interference for the relevant machinery may be connected or capable of connection.

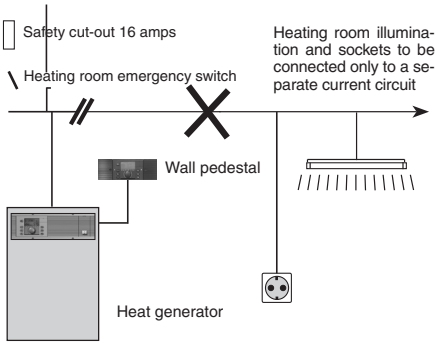


Fig 3: Electric cabling in the heating room

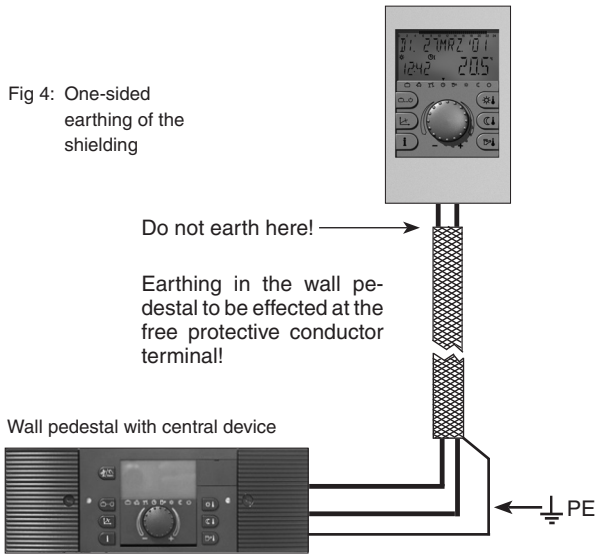
6. Shielded cables must be used for the data bus cables. The recommended designs are: J-Y(St)Y 2 x 2 x 0.6

   The maximum permitted cable length is 100 metres

   Longer connection cables must be avoided because of the danger of fault irradiation!

7. The cable shielding must be earthed at one side when the protective conductor is connected, for example on the trim panel of the heat generator, protective conductor terminal etc. Multiple earthing of a cable is not permitted (leakage pickup) and can lead to faults.

Fig 4: One-sided earthing of the shielding



In the case of star-shaped data bus networks, double earthing is not permitted. The earthing must be carried out one-sided at the star point!

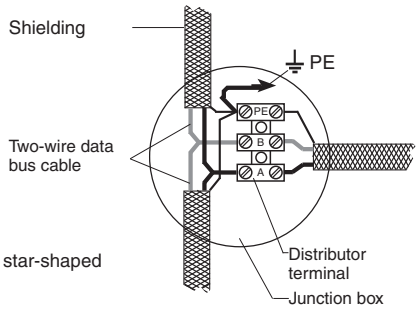


Fig 5: Earthing for star-shaped data bus

8. The external sensor may not be installed in the proximity of transmitter and receiver devices (on garage walls in the vicinity of reception systems for garage door openers, amateur radio antennae, radio alarm systems and in the immediate vicinity of major transmission systems etc).

Recommended cable diameters and maximum permitted cable lengths:

All cables bearing mains voltage (mains connection, burner, pumps, servomotors etc): 1,5 mm^2

Maximum permitted length: no limit in the context of installation inside a house

All sensor and extra-low voltage cables: minimum 0.5 mm^2

Maximum permitted cable length: 50m

Longer connection cables should be avoided because of the danger of fault irradiation!

12. Technical specifications of the sensor and digital inputs

12.1 Sensor resistance

Resistance values, KTY sensor for AF, WF/KF, SF, VF2, VF2, VE1, VE2, VE3, KSPF							
°C	kOhm	°C	KOhm	°C	kOhm	°C	kOhm
-20	1.368	0	1.63	20	1.922	70	2.786
-18	1.393	2	1.658	25	2.00	75	2.883
-16	1.418	4	1.686	30	2.080	80	2.982
-14	1.444	6	1.714	35	2.161	85	3.082
-12	1.469	8	1.743	40	2.245	90	3.185
-10	1.495	10	1.772	45	2.33	95	3.29
-8	1.522	12	1.802	50	2.418	100	3.396
-6	1.549	14	1.831	55	2.507		
-4	1.576	16	1.862	60	2.598		
-2	1.603	18	1.892	65	2.691		

Resistance values, PT 1000-sensor for KVLF and VE1 setting AGF							
°C	Ohm	°C	Ohm	°C	Ohm	°C	Ohm
0	1000.00	80	1308.93	140	1535.75	280	2048.76
10	1039.02	85	1327.99	150	1573.15	300	2120.19
20	1077.93	90	1347.02	160	1610.43	320	2191.15
25	1093.46	95	1366.03	170	1647.60	340	2261.66
30	1116.72	100	1385.00	180	1684.65	360	2331.69
40	1155.39	105	1403.95	190	1721.58	380	2401.27
50	1193.95	110	1422.86	200	1758.40	400	2470.38
60	1232.39	115	1441.75	220	1831.68	450	2641.12
70	1270.72	120	1460.61	240	1904.51	500	2811.00
75	1289.84	130	1498.24	260	1976.86		

12.2 Sensor measurement range

Designation	Abbreviation	Type of sensor	Measuring range
Outside sensor	AF	KTY	-50°C...90°C
Heat generator sensor	KF	KTY	-50°C...120°C
Flow sensor 1	VF1	KTY	-50°C...120°C
Flow sensor 2	VF2	KTY	-50°C...120°C
Calorifier sensor	SF	KTY	-50°C...120°C
Collector sensor	KVLF	PT1000	-50°C...210°C
Solar tank/buffer sensor	KSPF	KTY	-50°C...120°C
Variable input VE1 *	VE1	KTY PT1000	-50°C...120°C -50°C...500°C
Variable input VE2	VE2	KTY	-50°C...120°C
Variable input VE3	VE3	KTY	-50°C...120°C

* Depending on selection of the assigned function, PT1000 e.g. for connection of a waste gas sensor

12.3 Digital inputs

Designation	Abbreviation	Type of input	Measuring range
Pulse counter	Imp	Extra-low voltage	<= 10 Hz
Running time meter burner stage 1	BZ1	230V	OFF,ON
Running time meter burner stage 2	BZ2	230V	OFF,ON

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