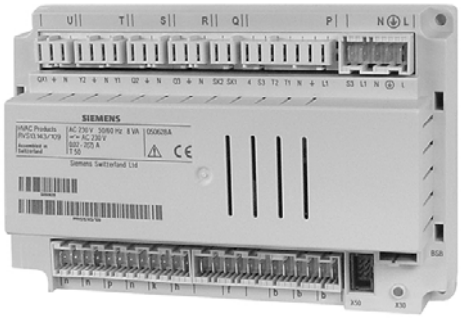
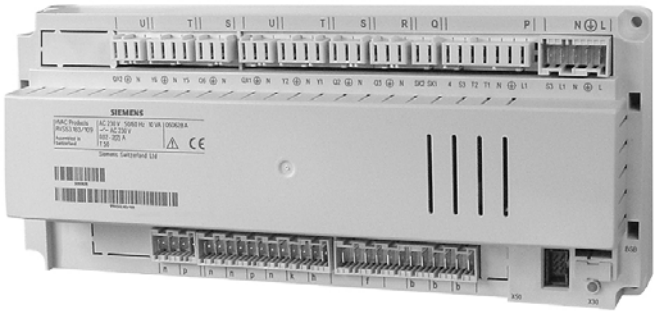





CONTROLLERS

CLIMA TOP (RVS63)

CLIMA COMFORT (RVS43)

RVS43..
RVS63..
AVS75..
AVS37..
QAA75..
QAA55..

User and OEM Manual

Connections:

	Use	*Space*	*Connector type*
L1	Phase burner	P	AGP8S.07A/109
⏚	Protective earth		
N	Neutral conductor		
T1	Phase 1st burner stage		
T2	1st burner stage on		
S3	Input burner fault		
4	Input 1st burner stage hours run		
EX2	Input 1st burner stage hours run	Z	AGP8S.04C/109
FX4 (T6)	Phase 2nd burner stage		
QX4 (T7)	2nd burner stage off		
QX4 (T8)	Burner 2nd stage on		

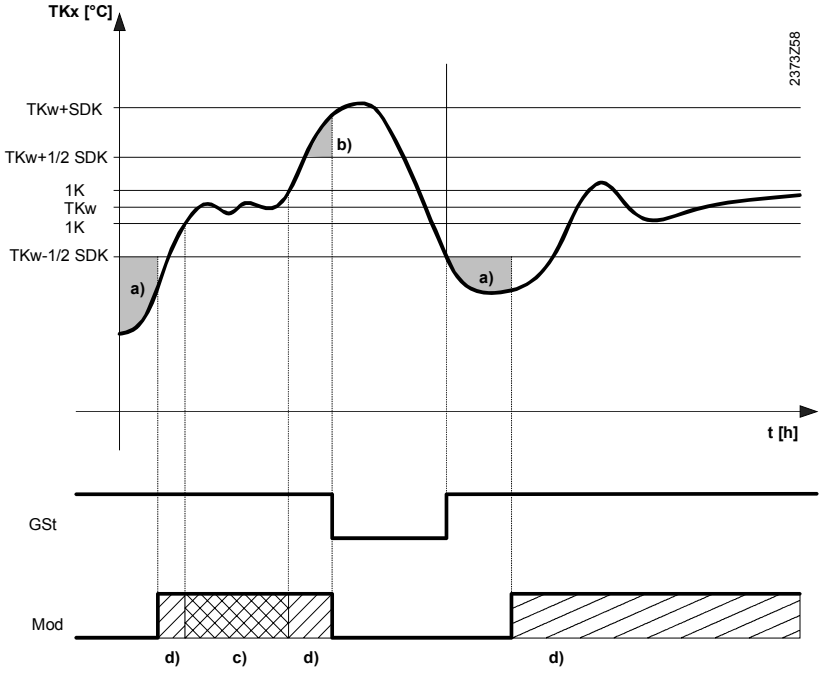
Modulating 3-position
Modulating UX

Boiler temperature control

The functioning and activation and deactivation of the first stage corresponds to that of 2-stge burner operation. Release of modulation is analogous to the release of burner stage 2.

Deactivation or locking of modulation takes place at the same time the change from the first burner stage to cycling occurs.

Maximum limitation of the boiler temperature, minimum burner running time, cascade operation and DHW separation circuit are handled analogous to 2-stage burner operation.



Release integral modulation

a) Release integral modulation (release integral second stage “2-stage burner”)
b) Reset integral modulation (reset integral second stage “2-stage burner”)
c) Neutral zone
d) On / off pulses
GSt Basic stage
Mod Modulating stage
SDK Switching differential boiler
TKw Boiler temperature setpoint

Burner control

- 3-position control and modulating UX

The actuator is controlled in PID mode. By setting the proportional band (Xp), the integral action time (Tn) and the derivative action time (Tv), the controller can be matched to the type of plant (controlled system). Also, the actuator running time is to be set.

- Neutral zone

For control operation, a neutral zone is used which is at +/- 1K about the current boiler temperature setpoint. If the boiler temperature stays in the neutral zone for more than 16 seconds, the neutral zone becomes active and positioning pulses are no longer delivered. As soon as the boiler temperature leaves the neutral zone again, control is resumed. If the boiler temperature does not stay long enough in the neutral zone, positioning pulses will also be delivered within the neutral zone.

3-position connections:

	Use	*Space*	*Connector type*
L1 ⏚ N T1 T2 S3 4	Phase burner Protective earth Neutral conductor Phase release modulating burner Release modulating burner Input burner fault Input burner hours run	P	AGP8S.07A/109
QX1	Air damper modulating burner closing	U	AGP8S.03C/109
FX4 (T6) QX4 (T8)	Phase air damper modulating burner opening Air damper modulating burner opening	Z	AGP8S.04C/109

Connections modulating UX:

	Use	*Space*	*Connector type*
L1 ⏚ N T1 T2 S3 4	Phase burner Protective earth Neutral conductor Phase release modulating burner Release modulating burner Input burner fault Input burner hours run	P	AGP8S.07A/109
UX M	DC 0…10 V modulation output Ground	n	AGP4S.02F/109

Without boiler sensor

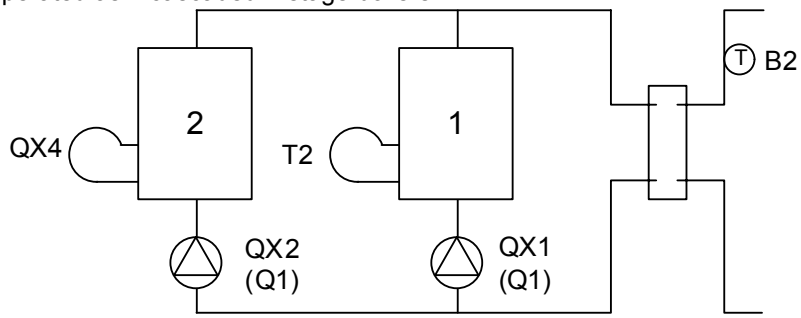
The boiler is released as soon as a valid boiler temperature setpoint is active.

Connections:

	Use	*Space*	*Connector type*
L1 ⏚ N T1 T2 S3 4	Phase burner Protective earth Neutral conductor Phase boiler release boiler release Input burner fault Input 1st burner stage hours run	P	AGP8S.07A/109

2 x 1 cascade

The 2x1 cascade is a special configuration of the basic unit, where the 2-stage boiler is operated as 2 cascaded 1-stage boilers.



Due to the temperature differential between boiler temperature setpoint and boiler temperature sensor B2 (common, mandatory cascade flow temperature sensor), switching on / off of the lag boiler (release and reset integral) takes place according to the control of a 2-stage burner. The same parameters are used.

If a boiler pump is required, QX1 and QX2 (operating lines 5890 and 5891) must be appropriately set.
A common boiler pump can be operated at any other multifunctional relay output QX parameterized as boiler pump Q1. The boiler pump of the lead boiler is always mapped on these outputs.

With the configuration of the 2x1 cascade (parameter “Type of heat source”), the following outputs and functions will be ready used or assigned.

	Use	*Space*	*Connector type*
L1	Phase burner	P	AGP8S.07A/109
⏚	Protective earth		
N	Neutral conductor		
T1	Phase burner 1		
T2	Burner 1 on		
S3	Input burner fault		
4	Input burner 1 hours run		
EX2	Input burner 2 hours run	Z	AGP8S.04C/109
FX4	Phase burner 2		
(T6)			
QX4	Burner 2 OFF		
(T7)			
QX4	Burner 2 ON		
(T8)			

Solar

Line no.	*Operating line*
5840	**Solar controlling element** Charging pump Diverting valve
5841	**External solar exchanger** Jointly DHW storage tank buffer storage tank

Solar controlling element

In place of a collector pump and diverting valves for integrating the storage tanks, the solar plant can also be operated with charging pumps.
When using a diverting valve, it is always only one heat exchanger that can be used at a time. Only alternative operation is possible.

When using a charging pump, all heat exchangers can be used at the same time. Either parallel or alternative operation is possible.

External solar exchanger

In the case of solar plants with 2 storage tanks, it must be selected whether the external heat exchanger shall be used jointly for DHW and as a buffer storage tank, or exclusively for one of the two.

Output relay QX

Line no.	*Operating line*
5890	**Relay output QX1,**
5891	**2 ,3, 4**
5892	None
5894	Circulating pump Q4
	El imm heater DHW K6
	Collector pump Q5
	H1 pump Q15
	Boiler pump Q1
	Bypass pump Q12
	Alarm output K10
	2nd pump speed HC1 Q21
	2nd pump speed HC2 Q22
	2nd pump speed HCP Q23
	Heat circ pump HCP Q20
	H2 pump Q18
	System pump Q14
	Heat gen shutoff valve Y4
	Solid fuel boiler pump Q10
	Time program 5 K13
	Buffer return valve Y15
	Solar pump ext exch K9
	Solar ctrl elem buffer K8
	Solar ctrl elem swi pool K18
	Collector pump 2 Q16
	H3 pump Q19
	Flue gas relay K17
	Assisted firing fan K30
	Cascade pump Q25
	St tank transfer pump Q11
	DHW mixing pump Q35
	DHW interm circ pump Q33
	Heat request K27
	Refrig demand K28
	Dehumidifier K29
	Diverting valve, cooling Y21

Depending on the selection made, setting the relay outputs assigns appropriate extra functions to the basic diagrams. For detailed information, refer to the section “Application diagrams“.

Multifunctional output QX4 can be used only if the operating line "Source type" (operating line 5770) is set to "1-stage", "Modulating UX" or "Without boiler sensor".

DHW circulating pump Q4

The connected pump serves as a DHW circulating pump.
Operation of the pump can be scheduled as required on operating page “DHW”, operating line “Release circulating pump”.

DHW electric immersion heater K6

Using the connected electric immersion heater, the DHW can be heated up according to operating page “DHW storage tank“, operating line “electric immersion heater“.

The electric immersion heater must be fitted with a safety limit thermostat!

Operating line 5060 of the electric immersion heater’s operating mode must be appropriately set.

Collector pump Q5
When using a solar collector, a circulating pump for the collector circuit is required.

Pump H1 Q15
Pump H1 can be used for an additional consumer. Together with an external request for heat at input H1, it is possible to operate an air heater or similar.

Boiler pump Q1
The connected pump is used for circulating the boiler water.

Bypass pump Q12
The connected pump serves as a boiler bypass pump for maintaining the boiler return temperature.

Alarm output K10
The alarm relay signals faults, should they occur.
Switching on takes place with a delay of two minutes.
When the fault is corrected, that is, when the fault status is no longer present, the relay will be deenergized with no delay.
If the fault cannot immediately be corrected, it is still possible to reset the alarm relay. This is made on operating page “Faults“.

2nd pump speed
This function facilitates the control of a 2-speed heating circuit pump, allowing the pump’s capacity to be lowered in reduced mode (e.g. during night setback). In that case, multifunctional relay QX is used to activate the 2nd pump speed in the following manner:

1st speed output Q2/Q6/Q20	2nd speed Output Q21/Q22/Q23	Pump state
Off	Off	Off
On	Off	Part load
On	On	Full load

Heating circuit pump HCP Q20
Pump heating circuit P will be activated.
- Time program

For heating circuit P, only time program 3/HCP is available. For more detailed information, refer to section "Time program".

H2 pump Q18
Pump H2 can be used for an additional consumer. Together with an external demand for heat at input H2, it is possible to serve an air heater or similar.

System pump Q14
The connected pump can be used as a system pump for supplying heat to other consumers.
The system pump is put into operation as soon as one of consumers calls for heat. If there is no demand for heat, the pump will be deactivated followed by overrun.

Heat gen shutoff valve Y4
If the buffer storage tank holds a sufficient amount of heat, the consumers can draw their heat from it, and the heat sources need not be put into operation.
Automatic heat generation lock locks the heat sources and hydraulically disconnects them from the rest of the plant with the help of heat source shutoff valve Y4.
This means that the heat consumers draw their energy from the buffer storage tank and wrong circulation through the heat sources will be eliminated.

Solid fuel boiler pump Q10
For the connection of a solid fuel boiler, a circulating pump for the boiler circuit is required.

Time program 5 K13
The relay is controlled according to the settings made in time program 5.

Buffer return valve Y15
This valve must be configured for return temperature increase / decrease or partial charging of the buffer storage tank.

Solar pump ext exch K9
For the external heat exchanger, solar pump “Ext heat exchanger K9“ must be set at the multifunctional relay output (QX).
If both a DHW and a buffer storage tank are available, operating line 5841 “External solar heat exchanger“ must also be set.

Solar ctrl elem buffer K8
If several heat exchangers are used, the buffer storage tank must be set at the respective relay output and, in addition, the type of solar controlling element must be defined on operating line 5840).

Solar ctrl elem swi pool K18
If several heat exchangers are used, the swimming pool must be set at the respective relay output and, in addition, the type of solar controlling element must be defined on operating line 5840).

Collector pump 2 Q16
When using a second solar collector, a separate circulating pump for this collector circuit is required.

H3 pump Q19
Pump H2 can be used for an additional consumer. Together with an external demand for heat at input H2, it is possible to serve an air heater or similar.

Flue gas relay K17
If the flue gas temperature exceeds the level set on operating line 7053 "Flue gas temperature limit", relay K17 closes.

Assisted firing fan K30
This setting has no function.

Cascade pump Q25
Common boiler pump for all boilers in a cascade.

St tank transfer pump Q11
If the temperature level of the buffer storage tank is high enough, the DHW storage tank can be charged by the buffer. This transfer can be made by means of transfer pump Q11.

DHW mixing pump Q35
Separate pump for storage tank circulation during the time the legionella function is active.

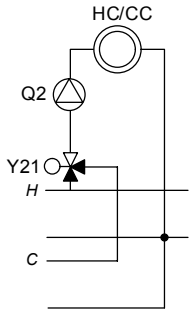
DHW interm circ pump Q33
Charging pump with DHW storage tank using an external heat exchanger.

Heat request K27
As soon as there is demand for heat, output K27 is activated.

Refrig demand K28
As soon as there is refrigeration demand, output K28 is activated.
In the case of the device with address 1, a refrigeration demand from the system can activate output K28. For this purpose, operating line 6627 "Refrig demand K28" on the operating page "LPB system" must be set to "Centrally".

Dehumidifier K29
An external dehumidifier can be enabled if the indoor air humidity rises. In this case, a humidity sensor must be connected to the H… input.
The function of the dehumidifier depends on the cooling functions.
The operation of the dehumidifier is not affected by operating modes, holiday programs, presence buttons etc.

Diverting valve, cooling Y21
With a common distribution circuit for heating and cooling, the inputs/outputs are always on the mixing valve group on the basic unit. For a 4-pipe system, diverting valve Y21 is also required.



Example:
Draw off via 4-pipe system

Input sensor BX

Line no.	*Operating line*
5930,5931, 5932, 5933	**Sensor input BX1, 2, 3, 4** None DHW sensor B31 Collector sensor B6 Return sensor B7 DHW circulation sensor B39 Buffer storage tank sensor B4 Buffer storage tank sensor B41 Flue gas temp sensor B8 Common flow sensor B10 Solid fuel boiler sensor B22 DHW charging sensor B36 Buffer storage tank sensor B42 Common return sensor B73 Cascade return sensor B70 Swimming pool sensor B13 Collector sensor 2 B61 Solar flow sensor B63 Solar return sensor B64

Depending on the selection made, setting of the sensor input assigns appropriate extra functions to the basic diagrams. For detailed information, refer to section “Application diagrams“.

Input H1 for RVS43..

The following settings for input H1 apply specifically to RVS43..

Input H1 for RVS43..

Line no.	*Operating line*
5950	**Function of input H1** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Heat generation lock Error / alarm message Min flow temp setpoint Excess heat discharge Release swimming pool Dew point monitor Flow setpt increase hygro Refrigeration demand Heat request 10V Refrig demand 10V Pressure measurement 10V Relative room humidity 10V Room temperature 10V
5951	**Contact type input H1** NC N/O
5952	**Function value, contact type H1**
5953	**Voltage value 1, H1**
5954	**Function value 1, H1**
5955	**Voltage value 2, H1**
5956	**Function value 2, H1**

Function of input H1

Changeover of operating mode

- Heating circuit

The operating modes of the heating circuits are switched to Protection mode via the H… terminals (e.g. using a remote telephone switch).

- DHW

DHW heating is locked only when using setting 1: HCs+DHW.

Heat generation lock

The heat source is be locked via the H… terminals.
All temperature requests made by the heating circuits and by DHW will be ignored.
Frost protection for the boiler will be maintained.

The chimney sweep function can be activated although the heat generation lock is switched on.

Error / alarm message

Input H1 generates a controller-internal error message.
If the “Alarm output” (relay outputs QX2-4, operating lines 5891 – 5894) is appropriately configured, the error message will be forwarded or displayed by an additional contact (e.g. an external lamp or horn).

Minimum flow temperature setpoint TVHw

The adjusted minimum flow temperature setpoint will be activated via terminals H1/2 (e.g. an air heater function for a warm air curtain) closes its contact.

The setpoint must be set via operating line 5952.

Excess heat discharge

Active dissipation of excessive heat enables an external heat source to force consumers (heating circuit, DHW storage tank, Hx pump) to draw excessive heat by delivering a forced signal.
The parameter “Excessive heat draw“ can be used to determine for every consumer whether or not it should take account of the "forced" signal, and hence whether or not that consumer should participate in the dissipation of heat.

- Local effect

When using LPB device address 0 or >1, excessive heat dissipation only acts on the local consumers connected to the controller.

- Central effect (LPB)

When using LPB device address = 1, excessive heat dissipation also acts on the consumers connected to the other controllers in the same segment.
The distribution of excessive heat from segment 0 across other segments of the system is not possible.

Release swimming pool

This function can be used to enable **direct heating of the swimming pool** with the boiler and H… pump externally (e.g. with a manual switch)
For direct charging, a release signal is always required at the H.. input.
Configuration: Set the function of input H.. to "Release swimming pool" **and** select the associated H.. pump at a QX output.

The function can be used to enable **solar heating of the swimming pool** externally (e.g. with a manual switch) or to define solar charging priority over storage.
Configuration: Set the function of input H.. to "Release swimming pool". Refer to operating line 2065 "Charging priority solar" for a description of the function.

Function of input H... (5950, 6046, 5960)	Function of output QX..	Status of H..	Release status of generator
-	x	x	No direct heating
Sw. pool	"Not" H.. pump	x	No direct heating (H.. acts on solar function)
Sw. pool	H.. pump	Inactive	Released
Sw. pool	H.. pump	Active	Released

- = "Release swimming pool" not set

x = Not relevant

Dewpoint monitor

The dewpoint monitor detects the formation of condensate. If the dewpoint monitor responds to condensation, the cooling switches off immediately.
The cooling is enabled when the monitor is no longer signalling condensation and when a definable "locking time" (operating line 946) has expired.

Flow setpoint increase, hygrostat

If the hygrostat responds, the flow setpoint is increased by the fixed value defined in "Flow setpt increase hygro" (operating line 947). As soon as the hygrostat reverts to normal, the flow setpoint returns to the "normal value".

Refrigeration demand

The refrigeration demand is transmitted to the refrigeration generating plant via a contact.

The setpoint must be set via operating line 5952.

Heating demand 10V

Heat generation receives heat requests in the form of voltage signals (DC 0...10V).
The linear characteristic curve is defined via two fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Refrig demand 10V

Refrigeration generation receives the refrigeration demand in the form of a voltage signal (DC 0...10 V).
The linear characteristic curve is defined via two fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Pressure measurement 10V

The voltage signal at input H… is converted to a pressure value in a linear manner.
The linear characteristic curve is defined via two fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Relative room humidity 10V

The voltage signal present at input Hx is converted into a linearized relative humidity value. This is used for the dewpoint calculation and dewpoint protection functions of the cooling circuit and for control of the dehumidifier.
The linear characteristic curve is defined via two fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Room temperature 10V

The voltage signal present at input Hx is converted into a linearized room temperature value. This, in conjunction with the indoor relative humidity, is used to calculate the dewpoint temperature in the cooling circuit.
If there is no room unit with a room sensor (BSB) connected for heating/cooling circuit 1, the room temperature measured at Hx is also used for room heating/cooling 1 (variant with compensation and room influence).
The linear characteristic curve is defined via two fixed points (voltage value 1 / function value 1 and voltage value 2 / function value 2).

Contact type, input H...

N/C

The contact is normally closed and must be opened to activate the selected function.

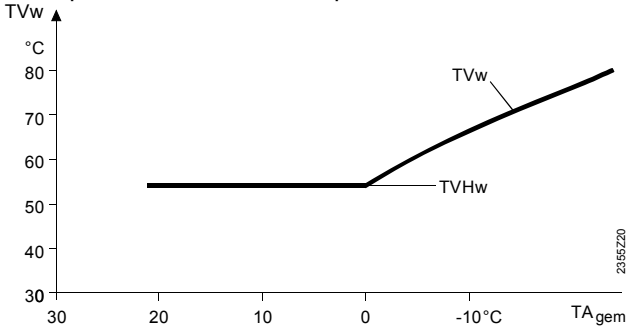
N/O

The contact is normally open and must be closed to activate the selected function.

Function value, contact H..

The function “Min flow temp setpoint” on operating line 5950 or 6046 is activated via contact H... The generating plant is controlled constantly at the temperature level set here, either until contact H.. opens again or until a higher heating/cooling demand is delivered.

Example of minimum flow setpoint:

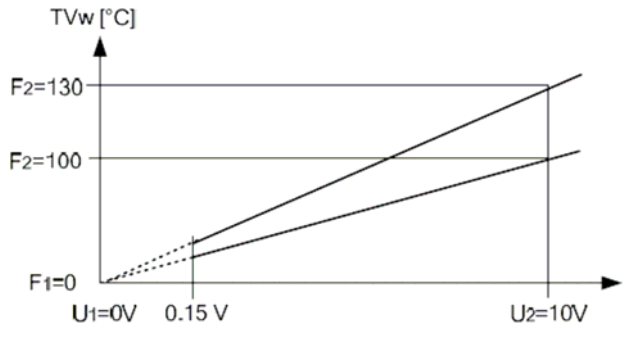


TVHw Minimum flow temperature setpoint
TVw Flow temperature setpoint

Voltage value 1
Function value 1
Voltage value 2
Function value 2

The linear characteristic is defined via two fixed points. The setting uses two parameter pairs for *Function value* and *Voltage value* (F1/U1 and F2/U2).

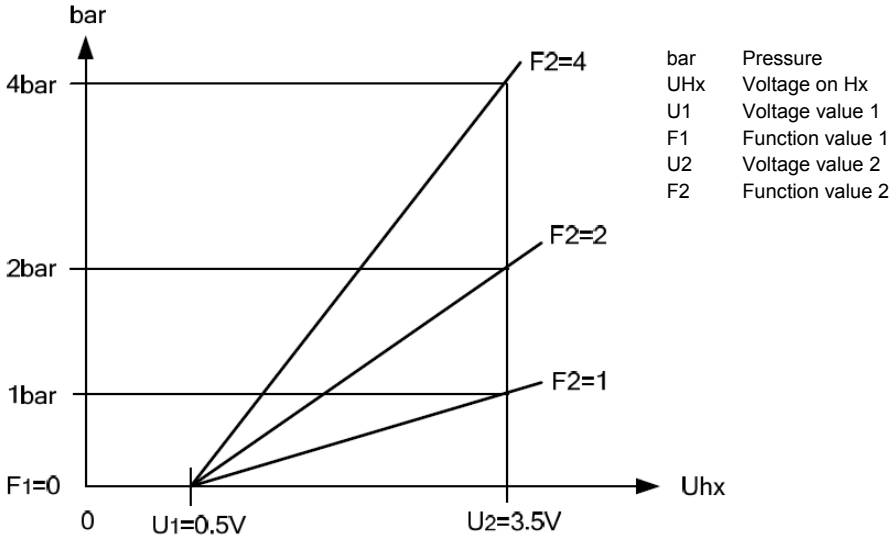
- Example for "Heating demand 10V" and "Cooling demand 10V"



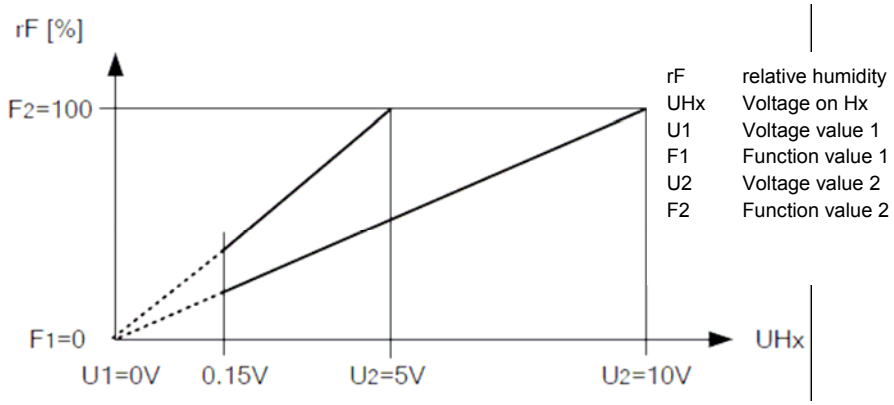
TVw Flow temperature setpoint
UHx Voltage on Hx
U1 Voltage value 1
F1 Function value 1
U2 Voltage value 2
F2 Function value 2

If the input signal drops below the limit value of 0.15 V, the heating demand is invalid and therefore has no effect.

- Example of pressure measurement 10V

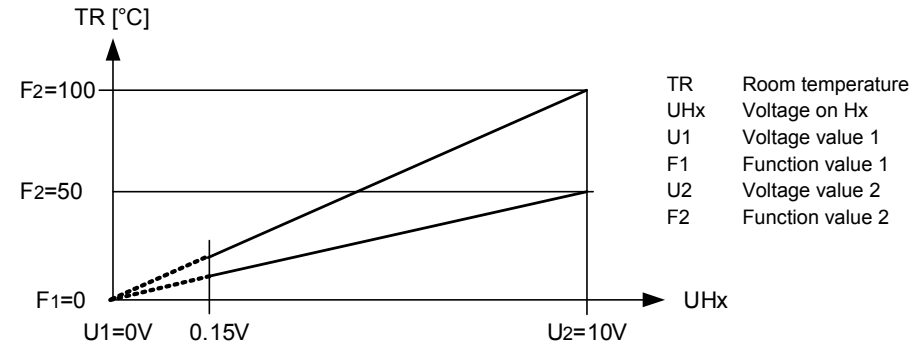


- Example of relative room humidity 10V



If the measured value is below 0.15V it is regarded as invalid and an error message is generated.

- Example of room temperature 10V



If the measured value is below 0.15V it is regarded as invalid and an error message is generated.

Input H1 and H3 for RVS63..

The following settings for input H1 apply specifically to RVS43..

Input H.. for RVS63..

Line no.	*Operating line*
5950	**function input H1** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Heat generation lock Error / alarm message Min flow temp setpoint Excess heat discharge Release swimming pool Heat request 10V Pressure measurement 10V
5951	**Contact type input H1** NC N/O
5952	**Min flow temp setpoint H1**
5954	**Temp value 10V H1**
5956	**Pressure value 3.5V H1**
5960	**Function input H3** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Heat generation lock Error / alarm message Min flow temp setpoint Excess heat discharge Release swimming pool Heat request 10V Pressure measurement 10V
5961	**Contact type H3** NC N/O
5962	**Min flow temp setpoint H3**
5964	**Temp value 10V H3**
5966	**Pressure value 3.5V H3**

Function of input H...

Changeover of operating mode

- Heating circuit

The operating modes of the heating circuits are switched to Protection mode via the H… terminals (e.g. using a remote telephone switch).

- DHW

DHW heating is locked only when using setting 1: HCs+DHW.

Heat generation lock

The heat source is be locked via the H… terminals. All temperature requests from the heating circuits and DHW are ignored. Frost protection for the boiler is maintained.

The chimney sweep function can be activated although the heat generation lock is switched on.

Error / alarm message

Input H1 generates a controller-internal error message.

If the “Alarm output” (relay outputs QX2-4, operating lines 5891 – 5894) is appropriately configured, the error message will be forwarded or displayed by an additional contact (e.g. an external lamp or horn).

Minimum flow temperature setpoint TVHw
The adjusted minimum flow temperature setpoint will be activated via terminals H1/2 (e.g. an air heater function for a warm air curtain) closes its contact.

Excess heat discharge
Active dissipation of excessive heat enables an external heat source to force consumers (heating circuit, DHW storage tank, Hx pump) to draw excessive heat by delivering a forced signal.
The parameter “Excessive heat draw“ can be used to determine for every consumer whether or not it should take account of the "forced" signal, and hence whether or not that consumer should participate in the dissipation of heat.

- Local effect

When using LPB device address 0 or >1, excessive heat dissipation only acts on the local consumers connected to the controller.

- Central effect (LPB)

When using LPB device address = 1, excessive heat dissipation also acts on the consumers connected to the other controllers in the same segment.
The distribution of excessive heat from segment 0 across other segments of the system is not possible.

Release swimming pool
This function can be used to enable **direct heating of the swimming pool** via the boiler and H… pump externally (e.g. with a manual switch)
For direct charging, a release signal is always required at the H.. input.
Configuration: Set the function of input H.. to "Release swimming pool" **and** select the associated H.. pump at a QX output.

This function can be used to enable **solar heating of the swimming pool** externally (e.g. with a manual switch) or to define solar charging priority over storage.
Configuration: Set the function of input H.. to "Release swimming pool". Refer to operating line 2065 "Charging priority solar" for a description of the function.

Function of input H... (5950, 6046, 5960)	Function of output QX..	Status of H..	Release status of generator
-	x	x	No direct heating
Sw. pool	"Not" H.. pump	x	No direct heating (H.. acts on solar function)
Sw. pool	H.. pump	Inactive	locked
Sw. pool	H.. pump	Active	Released

- = Swimming pool release not set
x = No effect

Heating demand 10V
Heat generation receives heat requests in the form of voltage signals (DC 0...10V).
The flow temperature setpoint corresponding to the voltage level of 10 V can be adjusted via parameter “Temperature value 10V H…“.

Pressure measurement 10V
The voltage signal present at input H.. converted to a pressure value in a linear manner.

The pressure value at 0.5 V is fixed at 0 bar.
The pressure value at 3.5 V can be adjusted with parameter *Pressure value 3.5V H…* (operating line 5956).

Contact type, input H...

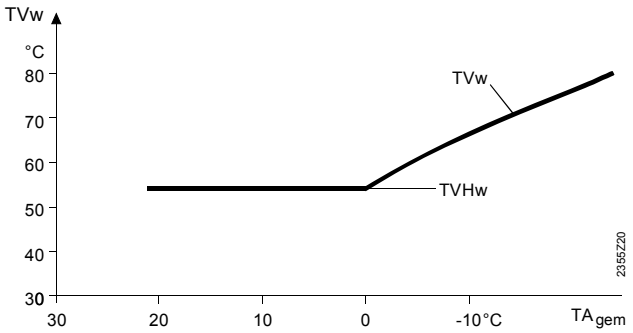
N/C contact
The contact is normally closed and must be opened to activate the selected function.

N/O contact
The contact is normally open and must be closed to activate the selected function.

Min flow temp setpoint H..

The function “Minimum flow setpoint” set on operating line 5950, 5960 or 6046 is activated via contact H... The boiler is controlled constantly at the temperature level set here either until contact H… opens again or until a higher heat request is delivered.

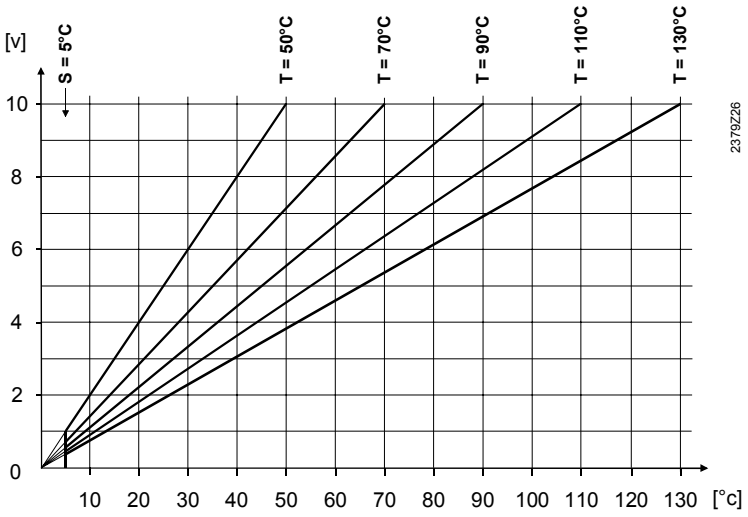
If several heat requests are received at the same time (LPB, contact H.. contact, DHW, or from the controller itself), the highest of them will automatically be selected.



TVHw Minimum flow temperature setpoint
TVw Flow temperature setpoint

Temp value 10V H..

The voltage signal present at input H.. is converted to a linearized temperature value and then forwarded as the flow temperature setpoint.
The flow temperature setpoint corresponding to the voltage level of 10 V can be adjusted via parameter “Temperature value 10V H…“.

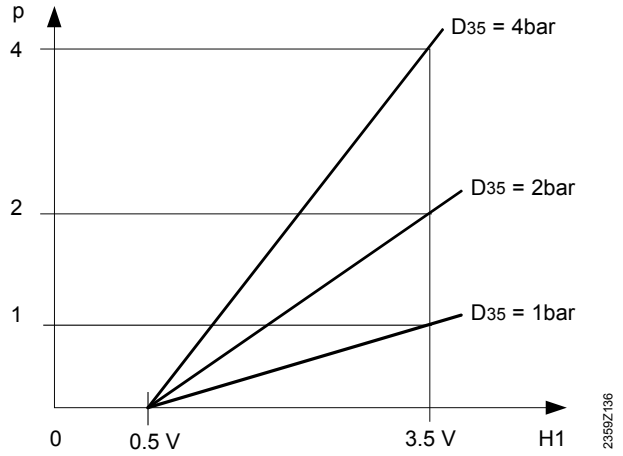


T = maximum value of heat demand
S = minimum limitation of heat demand = 5 °C

Pressure value 3.5V H…

The voltage signal present at input H… is converted into a linearized pressure value. The pressure value at 3.5 V can be adjusted with parameter *Pressure value 3.5V H..*".

Example:



p Pressure value (bar)
H1 Voltage at H..

Input EX2

Line no.	*Operating line*
5982	**Function input EX2** Counter for second burner stage Heat generation lock Error / alarm message SLT error message Excess heat discharge
5983	**Cont type input EX2** NC N/O

Function input EX2

Counter for second burner stage

The counting values (hours run and number of starts) for the second burner stage are recorded based on the signal received at input EX2. If the function is not activated, the counting values are counted based on the state of relay K5 .

Heat generation lock

The heat source will be locked via terminals EX2.

All temperature requests made by the heating circuits and by DHW will be ignored.

Frost protection for the boiler will be maintained.

The chimney sweep function can be activated although the heat generation lock is switched on.

Error / alarm message

Input EX2 generates a controller-internal error message.

If the "Alarm output" (relay outputs QX2-4, operating lines 5891 – 5894) is appropriately configured, the error message will be forwarded or displayed by an additional contact (e.g. an external lamp or horn).

SLT error message

The input generates error message 110.

Excess heat discharge
Active dissipation of excessive heat enables an external heat source to force consumers (heating circuit, DHW storage tank, Hx pump) to draw excessive heat by delivering a forced signal.
The parameter “Excessive heat draw“ can be used to determine for every consumer whether or not it should take account of the "forced" signal, and hence whether or not that consumer should participate in the dissipation of heat.

- Local effect

When using LPB device address 0 or >1, excessive heat dissipation only acts on the local consumers connected to the controller.

- Central effect (LPB)

When using LPB device address = 1, excessive heat dissipation also acts on the consumers connected to the other controllers in the same segment.

The distribution of excessive heat from segment 0 across other segments of the system is not possible.

Mixing valve groups basic unit

Line no.	*Operating line*
6014 **6015**	**Function mixing group 1** Heating circuit 1/2 Return temp controller Primary controller / system pump DHW primary controller Instantaneous DHW heater Return controller cascade Cooling circuit 1 Heating circuit/cooling circuit 1

The mixing valve groups are assigned to the following connections:

	RVS63.283 only
Mixing valve group 1	Mixing valve group 2
Q2, Y1, Y2, B1	Q6, Y5, Y6, B12

Heating circuit 1/2
For this application, the respective settings of operating page “Heating circuit 1/2” can be adapted.
Return temp controller
For this application, the respective settings of operating page “Boiler” can be adapted.
Primary controller / system pump
For this application, the respective settings of operating page “Primary controller / system pump” can be adapted.
DHW primary controller
For this application, the respective settings of operating page “DHW storage tank” can be adapted.
Instantaneous DHW heater
For this application, the respective settings of operating page “Instantaneous DHW heater” can be adapted.
Return controller cascade
For this application, the respective settings of operating page “Cascade” can be adapted.

Cooling circuit 1
For this application, the respective settings of operating page “Cooling circuit 1” can be adapted.
Heating circuit/cooling circuit 1
For this application, the respective settings of operating page “Heating circuit 1 and cooling circuit 1” can be adapted.

Extension module

6020, 6021	**Function extension module 1, 2** No function Multifunctional Heating circuit 2 Return temp controller Solar DHW Primary controller / system pump DHW primary controller Instantaneous DHW heater Return controller cascade Cooling circuit 1

Multifunctional
Functions that can be assigned to the multifunctional inputs / outputs appear on operating lines 6030, 6031, 6032 and 6040, 6041.
Heating circuit 2
For this application, the respective settings of operating page “Heating circuit 2” can be adapted.
Return temp controller
For this application, the respective settings of operating page “Boiler” can be adapted.
Solar DHW
For this application, the respective settings of operating page “Solar” can be adapted.
Primary controller / system pump
For this application, the respective settings of operating page “Primary controller / system pump” can be adapted.
DHW primary controller
For this application, the respective settings of operating page “DHW storage tank” can be adapted.
Instantaneous DHW heater
For this application, the respective settings of operating page “Instantaneous DHW heater” can be adapted.
Return controller cascade
For this application, the respective settings of operating page “Cascade” can be adapted.
Cooling circuit 1
For this application, the respective settings of operating page “Cooling circuit 1” can be adapted.

Connections:

	QX21	QX22	QX23	BX21	BX22	H2
Multifunction	*	*	*	*	*	*
Heating circuit 2	Y5	Y6	Q6	B12	*	*
Return temp controller	Y7	Y8	Q1	B7	*	*
Solar DHW heating	*	*	Q5	B6	B31	*
Primary controller	Y19	Y20	Q14	B15	*	*
DHW primary controller	Y31	Y32	Q3	B35	*	*
Instantaneous DHW heater	Y33	Y34	Q34	B38	B39	Flow switch
Return controller cascade	Y25	Y26	Q25	B70	B10	*
Cooling circuit 1	Y23	Y24	Q24	B16	*	*

* Freely selectable in QX…/ BX...

QX extension module

Can be configured for freely selectable QX…/ BX...

Line no.	*Operating line*
6030 **6031** **6032**	**Relay output QX21, QX22, QX23** None Circulating pump Q4 El imm heater DHW K6 Collector pump Q5 H1 pump Q15 Boiler pump Q1 Bypass pump Q12 Alarm output K10 2nd pump speed HC1 Q21 2nd pump speed HC2 Q22 2nd pump speed HCP Q23 Heat circ pump HCP Q20 H2 pump Q18 System pump Q14 Heat gen shutoff valve Y4 Solid fuel boiler pump Q10 Time program 5 K13 Buffer return valve Y15 Solar pump ext exch K9 Solar ctrl elem buffer K8 Solar ctrl elem swi pool K18 Collector pump 2 Q16 H3 pump Q19 Flue gas relay K17 Assisted firing fan K30 Cascade pump Q25 St tank transfer pump Q11 DHW mixing pump Q35 DHW interm circ pump Q33 Heat request K27 Refrig demand K28 Dehumidifier K29 Diverting valve, cooling Y21

Refer to function description, operating line "Relay output QX1".

BX extension module

Can be configured for freely selectable QX…/ BX...

Line no.	*Operating line*
6040 **6041**	**Sensor input BX21, BX22** None DHW sensor B31 Collector sensor B6 Return sensor B7 DHW circulation sensor B39 Buffer storage tank sensor B4 Buffer storage tank sensor B41 Flue gas temp sensor B8 Common flow sensor B10 Solid fuel boiler sensor B22 DHW charging sensor B36 Buffer storage tank sensor B42 Common return sensor B73 Cascade return sensor B70 Swimming pool sensor B13 Collector sensor 2 B61 Solar flow sensor B63 Solar return sensor B64

See the function description for operating line "Sensor input BX1".

H2 extension module

Line no.	*Operating line*
6046	**Function input H2** Optg mode changeover HCs+DHW Optg mode changeover HCs Optg mode changeover HC1 Optg mode changeover HC2 Optg mode changeover HCP Heat generation lock Error / alarm message Min flow temp setpoint Excess heat discharge Release swimming pool Dew point monitor Flow setpt increase hygro Refrigeration demand Heat request 10V Refrig demand 10V Pressure measurement 10V Relative room humidity 10V Room temperature 10V
6047	**Contact type H2** NC N/O
6048	**Function value, contact H2**
6049	**Voltage value 1, H2**
6050	**Function value 1, H2**
6051	**Voltage value 2, H2**
6052	**Function value 2, H2**

RVS43.. only

RVS63.. only

6048	**Min flow temp setpoint H2**
6050	**Temp value 10V H2**
6052	**Pressure value 3.5V H2**

The settings for input H2 on the extension module are the same as those of the H.. inputs on the basic unit. They are described under the operating line "Function of input H..". Refer to page 114,119.

10V output UX

Line no.	*Operating line*
6070	**Function output UX** None Boiler pump Q1 DHW pump Q3 DHW interm circ pump Q33 Heat circ pump HC1 Q2 Heat circ pump HC2 Q6 Heat circ pump HCP Q20 Collector pump Q5 Solar pump ext exch K9 Solar pump buffer K8 Solar pump swi pool K18 Collector pump 2 Q16 Boiler setpoint Power demand Heat demand
6071	**Signal logic output UX** Standard Inverted
6075	**Temperature value 10V UX**

Function output UX

The voltage-modulated output can be used either for speed-controlled pumps or as an output for a voltage-proportional temperature request.

Speed-controlled pumps:
The output signal at UX corresponds to the required speed for the selected pump.

Boiler temp setpoint:
The output signal at UX corresponds to the boiler setpoint

Output demand:
The output signal at UX is proportional to the output demand via the primary circuit flow.

Heat request:
The output signal at UX corresponds to the primary circuit flow setpoint.

Signal logic output UX

The voltage signal can be inverted. Thus, it can also be used to control pumps with variable speeds, or temperature request receivers that use inverted signal logic.

Temperature value 10V UX

This operating line is used to define the maximum temperature request (corresponding to 10 V).

Types of sensor/readjustment

Line no.	*Operating line*
6097	**Sensor type collector** NTC 10k Platinum 1000
6098	**Readjustm collector sensor**
6099	**Readjustm coll sensor 2**
6101	**Sensor type flue gas temp** NTC 10k Platinum 1000
6102	**Readjustm flue gas sensor**

Sensor type collector

Selection of type of sensor used. The controller will use the respective temperature characteristic.

Readjustm collector sensor

The measured value can be corrected.

Building and room model

Line no.	*Operating line*
6110	**Time constant building**

When the outside temperature varies, the room temperature changes at different rates, depending on the building's thermal storage capacity.
The above setting is used to adjust the response of the flow temperature setpoint when the outside temperature varies.

- Example:

> 20 hours
The room temperature responds *more slowly* to outside temperature variations.

10 - 20 hours
This setting can be used for most types of buildings.

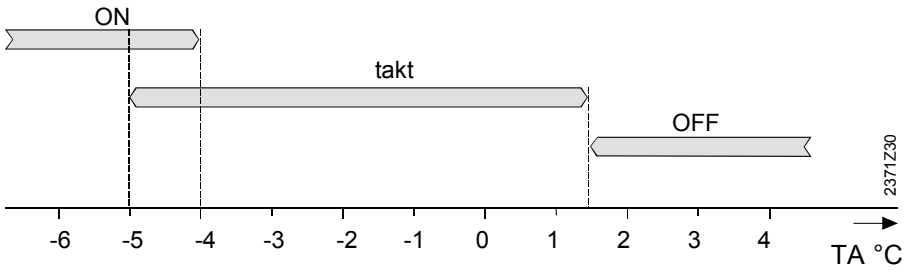
< 10 hours
The room temperature responds *more quickly* to outside temperature variations.

Frost protection for the plant

Line no.	*Operating line*
6120	**Frost protection plant**

The pumps are activated depending on the **current** outside temperature, even if there is no heat request.

Outside temperature	Pump	Diagram
...-4 °C	Continuously on	ON
-5…1.5 °C	On for 10 minutes at 6-hour intervals	Cycle (takt)
1.5 °C...	Continuously OFF	OFF



External requirements

Line no.	*Operating line*
6128	**Heat request below OT**
6129	**Heat request above OT**
6131	**Heat req in economy mode** Off ¦ On DHW ¦ On

Heat request below OT

The heat source (K27 with QX… or output UX) is put into operation only if the outside temperature lies below / above the threshold.

Heat req in economy mode

Economy mode can be selected from menu ”Special operation / service” (operating line 7139).
In Economy mode, the heat source (K27 with QX.. or output UX) operates as follows:
Off: Remains locked
Only DHW: Released for DHW charging
On: Always released.

Sensor state

Line no.	*Operating line*
6200	**Save sensors**

At midnight, the basic unit stores the states at the sensor terminals.
If, after storage, a sensor fails, the basic unit generates an error message.
This setting is used to ensure immediate saving of the sensors. This becomes a requirement when, for instance, a sensor is removed because it is no longer needed.

Parameter reset

Line no.	*Operating line*
6205	**Reset to default parameters**

All parameters can be reet to their default values. Exempted from this are the following operating pages: Time of day and date, operator section, radio communication and all time programs.

Plant diagram

Line no.	*Operating line*
6212	**Check-No. heat source 1**
6213	**Check-No. heat source 2**
6215	**Check-No. storage tank**
6217	**Check-No. heating circuits**

To identify the current plant diagram, the basic unit generates a check number.
The check number is made up of the lined up part diagram numbers.

Structure of control number

Every control number consists of 3 columns, each representing the application of a plant component. Every column shows a number with a maximum of 2 digits. Exception is the first column. If the first digit in the first column is a 0, the 0 will be hidden.

	1st column 2 digits	2nd column 2 digits	3rd column 2 digits
BZ6212		Solar	Oil / gas boiler
BZ6213		Solid fuel boiler	
BZ6215		Buffer storage tank	DHW storage tank
BZ6217	Heating circuit P	Heating circuit 2	Heating circuit 1

Check-No. heat source 1

Solar							Oil / gas boiler						
One collector field with sensor **B6** and collector pump **Q5**	2 collector fields with sensors **B6 & B61** and collector pumps **Q5 and Q16**	Buffer tank c harging pump **K8**	Solar diverting valve, buffer **K8**	Solar charging pump, swmming pool **K18**	Solar diverting valve, swimming pool **K18**	External solar heat exchanger, solar pump **K9** DHW = dom. hot water, B = Buffer	Check-Numbers	1-stage burner	2-stage burner	Modulating burner	Boiler pump	Bypass pump	Return mixing valve
0		No solar					00	No boiler					
1						*	01	x					
3						DHW/B	02		x				
5		x					03	x			x		
6			x				04		x		x		
8		x				DHW+B	05	x				x	
9			x			DHW/B	06		x			x	
10		x				DHW	07	x			x	x	
11			x			DHW	08		x		x	x	
12		x				B	09	x			x		x
13			x			B	10		x		x		x
14				x			11			x			
15					x		12			x	x		
17				x		DHW/B	13			x		x	
18					x	DHW/B	14			x	x	x	
19		x		x			15			x	x		x
20			x		x								
22		x				DHW+B							
23			x		x	DHW/B							
24		x		x		DHW							
25			x		x	DHW							
26		x		x		B							
27			x		x	B							
	31					*							
	33					DHW/B							
	35		x										
	37	x				DHW+B							
	38		x			DHW/B							
	39	x				DHW							
	40		x			DHW							
	41		x			B							
	42				x								
	44			x		DHW/B							
	45				x	DHW/B							
	46		x		x								
	48	x		x		DHW+B							
	49		x		x	DHW/B							
	50	x		x		DHW							
	51		x		x	DHW							
	52		x		x	B							

* The DHW storage tank is charged with collector pump Q5.

Check-No. heat source 2

	Solid fuel boiler
0	No solid fuel boiler
1	Solid fuel boiler, boiler pump
2	Solid fuel boiler, boiler pump, integration DHW storage tank

Check-No. storage tank

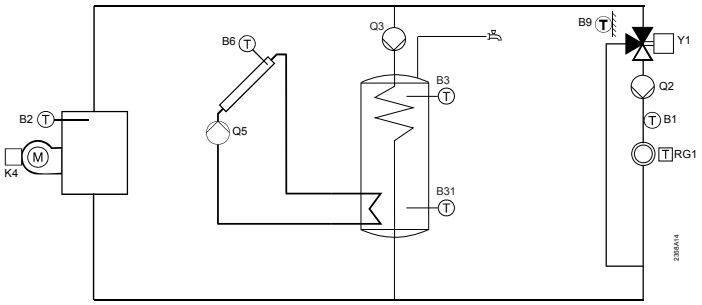
	Buffer storage tank		DHW storage tank
	0	No buffer storage tank	0 No DHW storage tank
	1	buffer storage tank	1 electric immersion heater
	2	Buffer storage tank, solar connection	2 Solar connection 4 charging pump
	4	Buffer storage tank, heat source valve	5 Charging pump, solar connection 13 Diverting valve
	5	Buffer storage tank, solar connection, heat source valve	14 Diverting valve, solar connection 16 Primary controller, without heat exchanger 17 Primary controller, 1 heat exchanger 19 Intermediate circuit, without heat exchanger 20 Intermediate circuit, 1 heat exchanger 22 Charging pump / intermediate circuit, without heat exchanger 23 Charging pump / intermediate circuit, 1 heat exchanger 25 Diverting valve / intermediate circuit, without heat exchanger 26 Diverting valve / intermediate circuit, 1 heat exchanger 28 Primary controller / intermediate circuit, without heat exchanger 29 Primary controller / intermediate circuit, 1 heat exchanger

Check-No. heating circuit

Heating circuit P		Heating circuit 2		Heating circuit 1	
0	No heating circuit	00	No heating circuit	0	No heating circuit
2	2nd heating circuit pump	02	2nd heating circuit pump	1	Circulation via boiler pump
		03	Heating circuit pump, mixing valve	2	2nd heating circuit pump
				3	Heating circuit pump, mixing valve
				5..7	Heating/cooling, 2-pipe, common distribution
				8..10	Cooling only, 2-pipe
				12	Heating/cooling, 4-pipe, common distribution
				14..16	Heating/cooling, 4-pipe, common distribution
				20..27	Heating/cooling, 2-pipe, separate distribution
				30..38	Heating/cooling, 4-pipe, separate distribution
				40..42	Cooling only, 4-pipe

Example

Heat source: Solar with collector sensor and pump, 1-stage burner and boiler pump
Storage tank: Charging pump and solar connection
Heating circuit 1: Heating circuit pump and mixing valve



Displays on the operator unit:

Check-No. heat source 1				1	0	1
Check-No. storage tank						5
Check-No. heating circuit						3

Device data

Line no.	*Operating line*
6220	**Software version** The software version indicated here represents the current version of the basic unit.

5.19 LPB

Address / power supply

Line no.	*Operating line*
6600	**Device address**
6601	**Segment address**
6604	**Bus power supply function** Off Automatically
6605	**Bus power supply state** Off On

Device address and segment address

The controller LPB address is divided into 2 parts each consisting of two 2-digit numerals. Example:

14	.	16
Segment number		Device number

Bus power supply

The bus power supply enables the bus system to be powered directly by the individual controllers (no central bus power supply). The type of bus power supply can be selected.

- Off: No bus power supply via the controller.
- Automatically: The bus power supply (LPB) via the controller is automatically switched on and off depending on the requirements of the LPB.

Bus power supply state

The display shows whether the controller currently supplies power to the bus:

- Off: The bus power supply via controller is currently inactive.
- On: The bus power supply via controller is currently active. At the moment, the controller supplies some of the power required by the bus.

Central functions

Line no.	*Operating line*
6620	**Action changeover functions** Segment System
6621	**Summer changeover** Local Centrally
6623	**Changeover of operating mode**
6624	**Manual source lock**
6625	**DHW assignment** Local HCs All heating circuits in the segment: All HCs in system
6627	**Refrigeration demand** Locally¦ Centrally
6631	**Ext source with eco mode** Off ¦ On DHW ¦ On

⚠ These settings are only relevant for device address 1.

Range of action of changeover

The range of action of central changeover can be defined.
This applies to the following types of limitation:

- Summer changeover (when selecting ”Central“ on line 6623)
- Summer changeover (with ”Central“ setting on operating line 6621)

Entries:

- Segment: Changeover takes place with all controllers in the same segment.
- System: Changeover takes place with all controllers in the entire system (in all segments). The controller must be located in segment 0!

Summer changeover

The scope of summer changeover is as follows:

- Local entry:
  Local action; the local heating circuit is switched based on operating lines 730, 1030 and 1330.
- Central entry:
  Central action; depending on the setting made on operating line “Action changeover functions“, “ either the heating circuits in the segment or those of the entire system are switched based on operating line 730.

Changeover of operating mode

The scope of the operating mode changeover via input H is as follows:

- Local entry:
  Local action; the local heating circuit is switched on and off.
- Central entry:
  Central action; depending on the setting made on operating line “Action changeover functions“, either the heating circuits in the segment or those of the entire system are switched based on operating line 730.

Manual source lock

The range of action of summer changeover is as follows:

- Local entry:
  Local action; the local source is locked.
- Entry segment:
  Central action; all sources of the cascade are locked.

Assignment of DHW heating

Assignment of DHW heating is required only if it is controlled by a heating circuit program (refer to operating lines 1620 and 5061).
Settings:

- Local heating circuits:
  DHW is only heated for the local heating circuit
- All heating circuits in the segment:
  DHW is heated for all heating circuits in the segment
- All heating circuits in the system:
  DHW is heated for all heating circuits in the system.

With all settings, controllers in holiday mode are also considered for DHW heating.

Refrigeration demand

"Refrigeration demand K28" sets the relay parameter on the QX.. for the output of the refrigeration demand.

Depending on the setting (local/central) the demand is transmitted by the local cooling circuit or all cooling circuits in the system. This option applies only to the device with device address 1.

Ext source with eco mode

Economy mode can be selected from menu ”Special operation / service” (operating line 7139).
In Economy mode, external heat sources on the LPB are operated as follows:

Off: Remains locked
Only DHW: Released for DHW charging
On: Always released.

Clock

6640	**Clock mode** Autonomously Slave without remote Slave with remote setting Master
6650	**Outside temp source**

Clock mode

This setting defines the impact of the system time on the controller's time setting. The impact is as follows :

- Autonomously: The time of day on the controller can be readjusted
  The controller's time of day is not matched to the system time
- Slave without remote adjustment: The time of day on the controller cannot be readjusted
  The controller's time of day is constantly and automatically matched to the system time
- Slave with remote adjustment: The time of day on the controller can be readjusted; at the same time, the system time is readjusted since the change is adopted from the master.
  The controller's time of day is still automatically and constantly matched to the system time
- Master: The time of day on the controller can be readjusted
  The time of day on the controller is used for the system. The system time will be readjusted

outside temperature source

Only 1 outside temperature sensor is required in the LPB plant. This sensor is connected to a freely selectable controller and delivers via LPB the signal to the controllers without sensor.
The first numeral to appear on the display is the segment no. followed by the device no.

5.20 Faults

When a fault is pending, an error message can be displayed on the info level by pressing the Info button. The display describes the cause of the fault.

Acknowledgements

Line no.	*Operating line*
6710	**Reset alarm relay**

When a fault is pending, an alarm can be triggered via relay QX... The QX... relay must be appropriately configured.
This setting can be used to reset the alarm relay.

Temperature alarms

Line no.	*Operating line*
6740	**Flow temp 1 alarm**
6741	**Flow temp 2 alarm**
6743	**Boiler temp alarm**
6745	**DHW charging alarm**
6746	**Flow temp., Cooling 1 alarm**

RVS43.. only

The difference of setpoint and actual temperature is monitored. A control offset beyond the set period of time triggers an error message.

Error history

Line no.	*Operating line*
6800…6819	**History …**

The basic unit stores the last 10 faults in non-volatile memory. Any additional entry deletes the oldest in the memory. For each error entry, error code and time of occurrence is saved.

5.21 Maintenance/special mode

Maintenance functions

Line no.	*Operating line*
7040	**Burner hoursinterval**
7041	**Burner hrssince maintenance**
7042	**Burner start interval**
7043	**Burn starts since maint**
7044	**Maintenance interval**
7045	**Time since maintenance**
7053	**Flue gas temp limit**
7054	**Delay flue gas message**
7119	**Economy function** Locked released
7120	**Economy mode** Off ¦ On

Burner hours run interval, burner start interval

As soon as the selected number of burner operating hours or the selected number of burner starts has elapsed, a service message will be displayed.
Counted for the message are the number of operating hours and the number of starts of the first burner stage (input E1).

Burner hours run, burner starts since service

The current value is summated and displayed. On this operating line, the value can be reset to 0.

Flue gas temp limit

Shows a maintenance message on the display and, if configured, activates flue gas relay K17.

Delay flue gas message

Delays display of the maintenance message and activation of the flue gas relay (K17).

Economy function

Locked
Economy mode is not possible.
Released
Economy mode can be activated.

Economy mode

Switches economy mode on or off

Chimney sweep

Line no.	*Operating line*
7130	**Chimney sweep function**

The burner will be switched on. To ensure continuous burner operation, the only switch-off point used is the boiler temperature's maximum limitation (TKmax).
First, all connected loads will be locked to ensure the boiler temperature will reach the setpoint of 64 °C as quickly as possible.
When the minimum temperature of 64 °C is attained, the available heating circuits are switched on one by one, using a dummy load, to make sure the heat generated by the boiler is drawn off so that the burner will remain in operation.
For safety reasons, maximum limitation of the boiler temperature (TKmax) remains active as long as the chimney sweep function is active.

The function is deactivated by setting -.- on this operating line, or automatically after a timeout of 1 hour.

Manual operation

Line no.	*Operating line*
7140	**Manual control**

When manual control is activated, the relay outputs are no longer energized and deenergized according to the control state but are set to a predefined manual control state in accordance with their functions (see table below).
The burner relay energized in manual control can be deenergized by the electronic temperature controller (TR).

Name		relay	State
Oil / gas boiler	Burner 1st stage	K4	On
	Burner 2nd stage	K5	On
	Burner mod. release	K4	On
	Burner mod. open	Y17 (K5)	On
	Burner mod. closed	Y18	Off
	Boiler pump	Q1	On
	Bypass pump	Q12	On
	Return mixing valve open / closed	Y7/Y8	Off
Solid fuel boiler	Boiler pump	Q10	On
Solar	Collector pump	Q5	Off
	Collector pump 2	Q16	Off
	Ext. heat exchanger pump	K9	Off
	Controlling element buffer storage tank	K8	Off
	Controlling element swimming pool	K18	Off
DHW	Charging pump	Q3	On
	Diverting valve	Q3	Off
	Mixing pump	Q32	Off
	Intermediate circuit pump	Q33	On
	Mixing valve opening / closing	Y31/Y32	Off
	Instantaneous DHW heater pump	Q34	On
	Instantaneous DHW heater on / off	Y33/Y34	Off
	Circulating pump	Q4	On
	Electric immersion heater	K6	On
buffer storage tank	Source shutoff valve	Y4	On
	Return valve	Y15	Off
Heating circuit 1...3	2nd heating circuit pump	Q2 Q6 Q20	On
	Heating circuit mixing valve opening / closing	Y1 / Y2 Y5 / Y6	Off
	Heating circuit pump 2nd speed	Q21 Q22 Q23	On
Cooling circuit 1	Cooling circuit pump	Q24	On
	Cooling circuit mixing valve opening / closing	Y23/Y24	Off
	Diverting valve for cooling	Y21	Off
Primary controller	System pump	Q14	On
	Mixing valve opening / closing	Y19/Y20	Off
Hx group	Pump H1	Q15	On
	Pump H2	Q18	On
	Pump H3	Q19	On
Auxiliary functions	Alarm output	K10	Off
	Time program 5	K13	Off
	Heat demand	K27	On
	Refrigeration demand	K28	Off
	Storage tank transfer pump	Q11	Off

Setpoint adjustment in manual control

After manual control has been activated, a change to the basic display must be made. There, the maintenance / special mode symbol appears.
Press the info button to switch to info display “Manual mode“, where the setpoint can be adjusted.

Simulations

Line no.	*Operating line*
7150	**Simulation outside temp**

To facilitate commissioning and fault tracing, outside temperatures in the range from –50 to +50°C can be simulated. During simulation, the actual, the composite and the attenuated outside temperature will be overridden by the set simulated temperature. During simulation, calculation of the 3 mentioned outside temperatures continues and the temperatures are available again when simulation is completed.

The function is deactivated by setting -.- on this operating line, or automatically after a timeout of 1 hour.

Telephone customer service

Line no.	*Operating line*
7170	**Telephone customer service**

Setting of phone number that appears on the info display.

5.22 Input / output test

Line no.	*Operating line*
7700…7999	

The input / output test is used to check the correct functioning of the connected components.
When selecting a setting from the relay test, the relevant relay is energized, thus putting the connected component into operation. The correct functioning of the relays and wiring can thus be tested.

Important:
During the relay test, limitation of the boiler temperature by the electronic control thermostat (TR) remains activated. Other limits are deactivated.
Selector sensor values are updated within a maximum of 5 seconds.
The display is made with no measured value correction.

5.23 State

The current operating state of the plant is visualized by means of status displays.

Messages

Line no.	*Operating line*
8000	**State of heating circuit 1**
8001	**State of heating circuit 2**
8002	**State heating circuit P**
8003	**State of DHW**
8005	**State of boiler**
8007	**State of solar**
8008	**State solid fuel boiler**
8010	**State buffer storage tank**
8011	**State swimming pool**

State heating circuit

End user (info level)	Commissioning, heating engineer	
Limit thermostat has cut out	Limit thermostat has cut out	3
Manual control active	Manual control active	4
Floor curing function active	Floor curing function active	102
	Overtemp protection active	56
	Restricted, boiler protection	103
	Restricted, DHW priority	104
	Restricted, buffer priority	105
Heating mode restricted		106
	Forced discharging buffer storage tank	107
	Forced discharging DHW	108
	Forced discharging heat source	109
	Forced heat release	110
	Overrun active	17
Forced heat release		110
	Opt start control + boost heating	111
	Optimum start control	112
	Boost heating	113
Heating mode Comfort	Heating mode Comfort	114
	Optimum stop control	115
Heating mode Reduced	Heating mode Reduced	116
	Frost protection room active	101
	Frost protection flow active	117
	Frost protection plant active	23
Frost protection active		24
Summer operation	Summer operation	118
	24-hour Eco active	119
	Setback Reduced	120
	Setback frost protection	121
	Room temp lim	122
Off	Off	25

Cooling

End user (info level)	*Commissioning, heating engineer*	
Dewpoint monitor active	Dewpoint monitor active	133
Manual control active	Manual control active	4
Fault.	Fault.	2
	Frost protection flow active	117
Frost protection active		24
	Locking period at end of heating	135
	Locked, energy source	205
	Locked, buffer	206
Cooling mode locked		146
	Flow setpt increase hygro	136
	Min. flow limit, dewpoint	177
	Min. flow limit, outside temp	178
Cooling mode, restricted		144
	Cooling mode, Comfort	150
	Overrun active	17
Cooling mode, Comfort		150
Protection mode, cooling	Protection mode, cooling	149
	Frost protection plant active	23

Frost protection active		24
Cooling limit OT active	Cooling limit OT active	134
	Off	25
	Room temp lim	122
	Flow limit reached	179
Off		25
Cooling mode off	Cooling mode off	138

State of DHW

End user (info level)	Commissioning, heating engineer	
Limit thermostat has cut out	Limit thermostat has cut out	3
Manual control active	Manual control active	4
Draw-off mode	Draw-off mode	199
	Recooling via collector	77
	Recooling via DHW/HCs	78
Recooling active		53
	Discharging protection active	79
	Charging time limitation active	80
	DHW charging locked	81
Charging lock active		82
	Forced, max stor tank temp	83
	Forced, max charging temp	84
	Forced, legionella setpoint	85
	Forced, nominal setpoint	86
Forced charging active		67
	Charging electric, leg setpoint	87
	Charging electric, nominal setpoint	88
	Charging electric, Red setpoint	89
	Charging electric, frost setpoint	90
	El imm heater released	91
Charging el im heater		66
	Push, leg setpoint	92
	Push, nominal setpoint	93
Push active		94
	Charging, leg setpoint	95
	Charging, nominal setpoint	96
	Charging, reduced setpoint	97
Charging active		69
Frost protection active	Frost protection active	24
Overrun active	Overrun active	17
Stand-by charging	Stand-by charging	201
	Charged, max stor temp	70
	Charged, max charg temp	71
	Forced, legio temp	98
	Charged, nominal temp	99
	Forced, Reduced temp	100
Charged		75
Off	Off	25
Ready	Ready	200

State of boiler

End user (info level)	*Commissioning, heating engineer*	
SLT has cut out	SLT has cut out	1
SLT test active	SLT test active	123
Fault.	Fault.	2
Limit thermostat has cut out	Limit thermostat has cut out	3
Manual control active	Manual control active	4
	Chimney sweep function, high-fire	5
	Chimney sweep function, low-fire	6
Chimney sweep function active		7
	Locked, manually	8
	Locked, solid fuel boiler	172
	Locked, automatically	9
	Locked, outside temperature	176
	Locked, Economy mode	198
Locked		10
	Minimum limitation	20
	Minimum limitation, low-fire	21
Minimum limitation active	Minimum limitation active	22
	Protective start-up	11
	Protective startup, low-fire	12
	Return limitation	13
	Return temperature limitation, low-fire	14
In operation		18

Charging buffer storage tank	Charging buffer storage tank	59
In operation for HC, DHW	In operation for HC, DHW	170
In partial load operation for HC, DHW	In partial load operation for HC, DHW	171
Released for HC, DHW	Released for HC, DHW	173
In operation for DHW	In operation for DHW	168
In partial load operation for DHW	In partial load operation for DHW	169
Released for DHW	Released for DHW	174
In operation for heating circuit	In operation for heating circuit	166
In partial load operation for HC	In partial load operation for HC	167
Released for HC	Released for HC	175
Overrun active	Overrun active	17
Released	Released	19
	Frost protection plant active	23
Frost protection active		24
Off	Off	25

State of solar

End user (info level)	*Commissioning, heating engineer*	
Manual control active	Manual control active	4
Fault.	Fault.	2
Frost protection collector active	Frost protection collector active	52
Recooling active	Recooling active	53
Max stor tank temp reached	Max stor tank temp reached	54
Evaporation protection active	Evaporation protection active	55
Overtemp protection active	Overtemp protection active	56
Max charg temp reached	Max charg temp reached	57
Charging DHW+buffer+swi pool	Charging DHW+buffer+swi pool	151
Charging DHW+buffer	Charging DHW+buffer	152
Charging DHW+swi pool	Charging DHW+swi pool	153
Ladung Puffer+Schwimmbad	Charging buffer+swimming pool	154
Charging DHW	Charging DHW	58
Charging buffer storage tank	Charging buffer storage tank	59
Charg swimm pool	Charg swimm pool	60
	Min charg temp not reached	61
	Temp diff insufficient	62
Radiation insufficient	Radiation insufficient	63

State solid fuel boiler

End user (info level)	*Commissioning, heating engineer*	
Manual control active	Manual control active	**4**
Fault.	Fault.	**2**
Overtemp protection active	Overtemp protection active	**56**
	Locked, manually	**8**
	Locked, automatically	**9**
Locked		**10**
	Minimum limitation	**20**
	Minimum limitation, low-fire	**21**
Minimum limitation active	Minimum limitation active	**22**
	Protective start-up	**11**
	Protective startup, low-fire	**12**
	Return temperature limitation	**13**
	Return temp. limitation, low-fire	**14**
In operation for heating circuit	In operation for heating circuit	**166**
In partial load operation for HC	In partial load operation for HC	**167**
In operation for DHW	In operation for DHW	**168**
In partial load operation for DHW	In partial load operation for DHW	**169**
In operation for HC, DHW	In operation for HC, DHW	**170**
In partial load operation for HC, DHW	In partial load operation for HC, DHW	**171**
Overrun active	Overrun active	**17**
In operation	In operation	**18**
Assisted firing fan active	Assisted firing fan active	**163**
Released	Released	**19**
	Frost protection plant active	**23**
	Frost protection boiler active	**141**
Frost protection active		**24**
Off	Off	**25**

State buffer storage tank

End user (info level)	*Commissioning, heating engineer*	
Frost protection cooling active	Frost protection cooling active	202
	Locking period at end of heating	135
	DHW charging locked	81
Charging restricted		124
	Forced charging active	67
	Full charging active	203
Charging active		69

Charged	Charged, forced charg required temp Charged, required temp Charged, min charg temp	72 73 143 75
Hot	Hot	147
No demand	No demand	51
Frost protection active	Frost protection active	24
Charging el im heater	Charging electric, em operation Charging electric, source prot Charging electric, defrost Charging electric, forced Charging electric, substitute	64 65 131 164 165 66
Charging restricted	DHW charging locked Restricted, DHW priority	81 104 124
Charging active	Forced charging active Partial charging active Charging active	67 68 69
Recooling active	Recooling via collector Recooling via DHW/HCs	77 142 53
Charged	Charged, max stor temp Charged, max charg temp Charged, forced charg required temp Charged, required temp Partially charged, temp setpoint Charged, min charg temp	70 71 72 73 74 143 75
Cold	Cold	76
No heat request	No heat request	51

State swimming pool

End user (info level)	*Commissioning, heating engineer*	
Manual control active	Manual control active	4
Fault.	Fault.	2
Heating mode restricted	Heating mode restricted	106
Forced heat release	Forced heat release	110
Heating mode	Heating mode, generation	155 137
Heated, max. sw. pool temp Heated	Heated, max. sw. pool temp Heated, solar setpoint Heated, source setpoint	156 158 157 159
Heating off	Heating mode solar off Heating mode, generation off	160 161 162
Cold	Cold	76

5.24 Diagnostics, heat generation

For diagnostic purposes, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Line no.	*Operating line*
8610…8699	

5.25 Diagnostics, consumers

For diagnostic purposes, the various setpoints, actual values, relay switching states and meter readings can be displayed.

Line no.	*Operating line*
8700…9099	

5.26 List of displays

Priorities are assigned to pending errors. From priority 6, alarm messages are delivered, which are used by remote supervision (OCI). In addition, the alarm relay will be set.

5.26.1 Error code

Error code	Description of error	Priority
0	No error	
10	Outside temperature sensor error	6
20	Boiler temperature 1 sensor error	9
25	Solid fuel boiler temperature (wood) sensor error	9
26	Common flow temperature sensor error	6
28	Flue gas temperature sensor error	6
30	Flow temperature 1 sensor error	6
31	Flow temperature 1 cooling, sensor error	6
32	Flow temperature 2 sensor error	6
38	Flow temperature primary controller sensor error	6
40	Return temperature 1 sensor error	6
46	Return temperature cascade sensor error	6
47	Common return temperature sensor error	6
50	DHW temperature 1 sensor error	9
52	DHW temperature 2 sensor error	9
54	DHW primary controller sensor error	6
57	DHW circulation temperature sensor error	6
60	Room temperature 1 sensor error	6
65	Room temperature 2 sensor error	6
68	Room temperature 3 sensor error	6
70	Buffer storage tank temperature 1 sensor error	6
71	Buffer storage tank temperature 2 sensor error	6
72	Buffer storage tank temperature 3 sensor error	6
73	Collector temperature 1 sensor error	6
74	Collector temperature 2 sensor error	6
81	Short-circuit LPB	6
82	LPB address collision	3
83	BSB wire short-circuit	6
84	BSB address collision	3
85	BSB radio communication fault	6
98	Extension module 1 fault (common fault status message)	6
99	Extension module 2 fault (common fault status message)	6
100	2 clock time masters (LPB)	3
102	Clock time master without backup (LPB)	3
105	Maintenance message	5
109	Boiler temperature supervision	9
110	Lockout by SLT	9
117	Upper pressure limit (crossed)	6
118	Critical lower pressure limit (crossed)	6
121	Flow temperature 1 (HC1) supervision	6
122	Flow temperature 2 (HC2) supervision	6
126	DHW charging supervision	6
127	Legionella temperature not reached	6
131	Burner fault	9
146	Configuration error common message	3
171	Alarm contact 1 (H1) active	6
172	Alarm contact 2 (H2) active	6
173	Alarm contact 3 (EX2/230VAC) active	6
174	Alarm contact 4 (H3) active	6
176	Upper pressure limit 2 (crossed)	6
177	Critical lower pressure limit 2 (crossed)	6
178	Temperature limiter heating circuit 1	3
179	Temperature limiter heating circuit 2	3
207	Error, cooling circuit	6
217	Sensor error common message	6
217	Sensor error common message	6
218	Pressure supervision common message	6
241	Flow sensor, solar sensor error	6
242	Return sensor, solar sensor error	6
243	Swimming pool temperature sensor error	6

320	DHW charging temperature sensor error	6
321	Instantaneous DHW heater outlet temperature sensor error	6
322	Upper pressure limit 3 (crossed)	6
323	Critical lower pressure limit 3 (crossed)	6
324	BX same sensors	3
325	BX/extension module same sensors	3
326	BX/mixing valve group same sensors	3
327	Extension module same function	3
328	Mixing valve group same function	3
329	Extension module / mixing valve group same function	3
330	Sensor BX1 no function	3
331	Sensor BX2 no function	3
332	Sensor BX3 no function	3
333	Sensor BX4 no function	3
334	Sensor BX5 no function	3
335	Sensor BX21 no function	3
336	Sensor BX22 no function	3
337	Sensor BX1 no function	3
338	Sensor BX12 no function	3
339	Collector pump Q5 missing	3
340	Collector pump Q16 missing	3
341	Collector sensor B6 missing	3
342	Solar DHW sensor B31 missing	3
343	Solar integration missing	3
344	Solar controlling element buffer K8 missing	3
345	Solar controlling element swimming pool K18 missing	3
346	Solid fuel boiler pump Q10 missing	3
347	Solid fuel boiler comparison sensor missing	3
348	Solid fuel boiler address error	3
349	Buffer return valve Y15 missing	3
350	Buffer storage tank address error	3
351	Primary controller / system pump address error	3
352	Pressureless header address error	3
353	Cascade sensor B10 missing	3
357	Flow temperature cooling circuit 1 monitoring	6
366	Room temperature Hx sensor error	6
367	Relative room humidity Hx sensor error	6

5.26.2 Maintenance code

Maintenance code	Description of maintenance	Priority
1	Burner hours run exceeded	6
2	Burner starts exceeded	6
3	Maintenance interval exceeded	6
5	Water pressure heating circuit too low (dropped below lower pressure limit 1)	9
18	Water pressure 2 heating circuit too low (dropped below lower pressure limit 2)	9
10	Replace battery of outside sensor	6
21	Maximum flue gas temperature exceeded	6
22	Water pressure 3 heating circuit too low (dropped below lower pressure limit 3)	9

5.26.3 Special operation code

Special operation code	Description
301	Manual operation
302	SLT test
303	Chimney sweep function
309	Simulation outside temperature
310	Alternative energy operation
314	Economy mode

CONTROLLERS
CLIMA TOP (RVS63)
CLIMA COMFORT (RVS43)

OEM MANUAL

6 The OEM settings in detail

6.1 Operator unit

Operation and display

Line no.	*Operating line*
21	**Display special operation** Off On
30	**Save basic settings** No Yes
31	**Activate basic settings** No Yes

Save basic settings

The setting data of all operating levels are copied from the controller to the memory of the operator unit. This means that previous data in the operator unit are overwritten.

Activate basic settings

With the exception of the data listed below, the setting data of all operating levels are transferred from the memory of the operator unit to the connected controller. Previous setting data in the controller are overwritten.

The following operating lines will not be overwritten:

Line no.	*Operating line*
6600	Device address
6601	Segment address
6222	Device hours run

The following data will not be overwritten either:
RF list, hours run / start counter, yield meter, maintenance meter, slave pointer, and error history.

6.2 Heating circuits

Mixing valve control

Line no.				*Operating line*
HC1	HC2	HC3P		
835	**1135**			**Mixing valve Xp**
836	**1136**			**Mixing valve Tn**

Mixing valve Xp

By setting the right proportional band, the control action of the mixing valve actuator is matched to the behavior of the plant (controlled system).

Xp influences the P-action of the controller.

Mixing valve Tn

By setting the right integral action time, the control action of the mixing valve actuator is matched to the behavior of the plant (controlled system).

Tn influences the I-action of the controller.

RVS43..only

6.3 Cooling circuit

Mixing valve control

Line no.	*Operating line*
942	**Mixing valve Xp**
943	**Mixing valve Tn**

Mixing valve Xp

By setting the right proportional band, the control action of the mixing valve actuator is matched to the behavior of the plant (controlled system).

Xp influences the P-action of the controller.

Mixing valve Tn

By setting the right integral action time, the control action of the mixing valve actuator is matched to the behavior of the plant (controlled system).

Tn influences the I-action of the controller.

6.4 DHW

Setpoints

Line no.	*Operating line*
1614	**Nominal setpoint max**

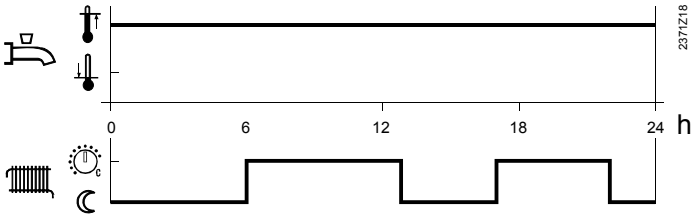
This operating line is used to limit the “Nominal setpoint“ (operating line 1610) at the top.

Release

Line no.	*Operating line*
1620	**Release** 24 h/day Time programs HCs Time program 4/DHW

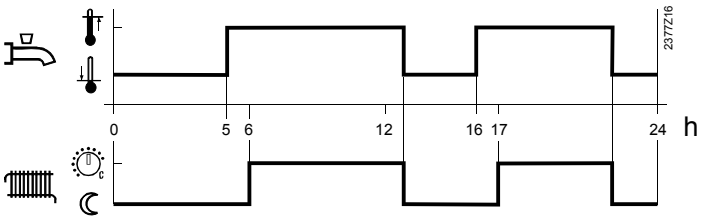
24 h/day
The DHW temperature is constantly maintained at the nominal DHW setpoint, independent of any time programs.

Example:



Time programs HCs
The DHW setpoint is switched between the nominal DHW setpoint and the reduced DHW setpoint according to the heating circuits’ time programs. The first switch-on point of each period is shifted forward in time by one hour.

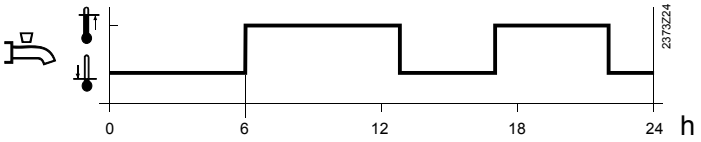
Example:



Time program 4/DHW

For DHW heating, time program 4 of the local controller is taken into consideration. The set switching times of that program are used to switch between the nominal DHW setpoint and the reduced DHW setpoint. This way, the DHW is heated independently of the heating circuits.

Example:



6.5 Pumps H

Pump Hx

Line no.				*Operating line*
H1	H2	H3		
2008	**2033**	**2044**		**H1/H2/H3 DHW charging priority** Off ¦ On

H1/H2/H3 DHW charging priority

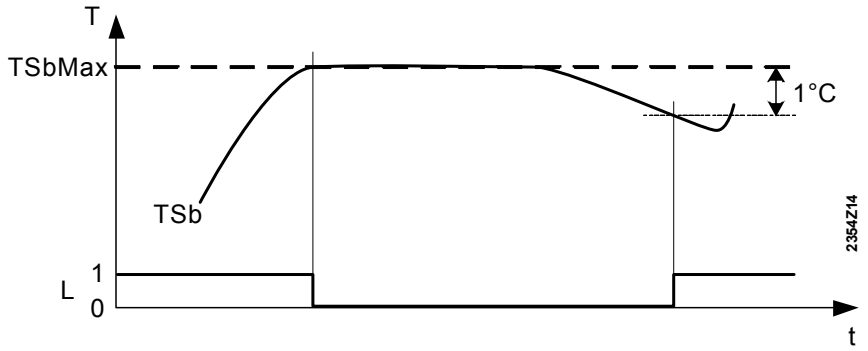
When using this setting, the connected pump H can be excluded from / included in the effect of DHW charging priority.
In the case of a ventilation system, for example, it is thus possible to ensure a constant supply of heat with no impact from the DHW charging priority.

6.6 Swimming pool

Line no.	Operating line
2070	**Swimming pool temp max**

Swimming pool temp max

If the swimming pool temperature reaches the temperature limit set here, the collector pump is deactivated. It is released again when the swimming pool temperature has dropped 1 °C below the maximum temperature limit.



TSbMax Swimming pool temp max (operating line 5051)
TSb actual value of the swimming pool temperature
L Storage tank charging: 1 = on, 0 = off

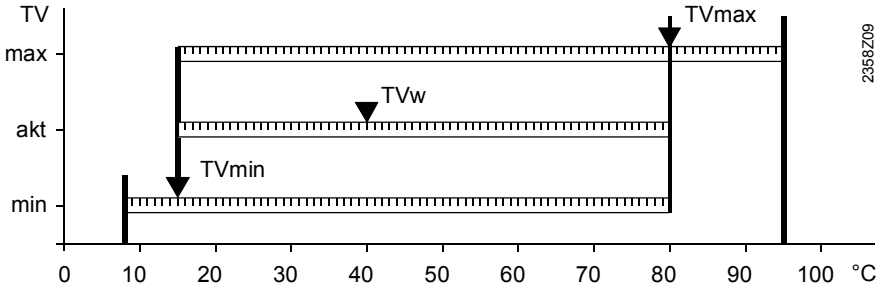
6.7 Primary controller / system pump

Flow temperature setpoint limits

Line no.	Operating line
2110	**Flow temp setpoint min**
2111	**Flow temp setpoint max**
2112	**Flow setpoint, cooling min**

Flow temp setpoint minimum/maximum

These limit values can be used to define a temperature range for the heating flow temperature setpoint.



TVw Current flow temperature setpoint
TVmax Flow temp setpoint maximum
Tvmin Flow temp setpoint minimum

Flow setpoint, cooling min

This limit value can be used to define the low limit for the flow temperature setpoint for cooling.

Mixing valve control

Line no.	Operating line

2130	**Mixing valve boost**
2131	**Mixing valve cooling offset**
2132	**Actuator type**
2133	**Switching differential 2-pos**
2134	**Actuator running time**
2135	**Mixing valve Xp**
2136	**Mixing valve Tn**

Mixing valve boost

For mixing, the actual value of the boiler flow temperature must be higher than the required setpoint of the mixing valve flow temperature since otherwise that temperature cannot be controlled. The controller generates the boiler temperature setpoint based on the increase set here and the current flow temperature setpoint.

Mixing valve cooling offset

To ensure proper mixing, the actual flow temperature of the cooling aggregate must be lower than the required mixing valve flow temperature setpoint. The cooling demand is reduced by the value set here.

6.8 Boiler

Operating mode

Line no.	*Operating line*
2200	**Operating mode** Continuous operation Automatically Auto, extended running time
2208	**Full charging of buffer** Off ¦ On

Operating mode

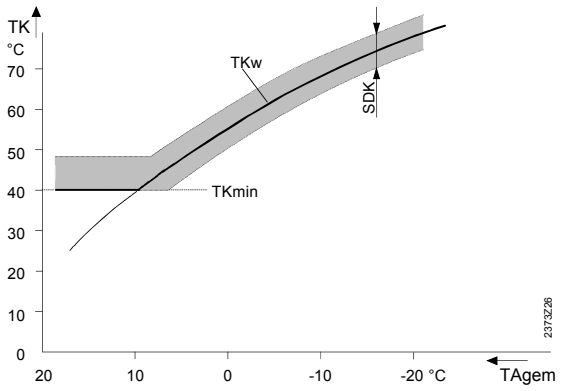
Continuous operation

The boiler is constantly released and the minimum boiler temperature maintained is the parameterized TKMin.

The boiler is only locked when all connected heating circuits are set to Protection mode and when there is no valid request.

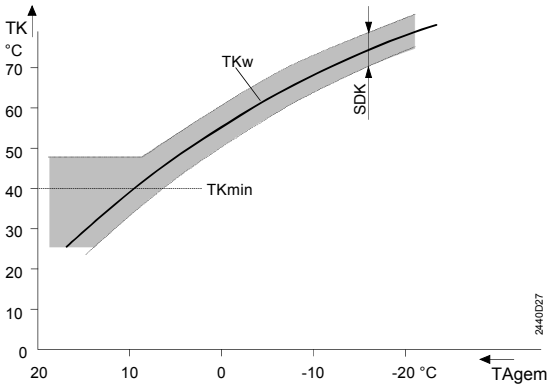
Automatically

The boiler is released as soon as there is at least one valid temperature request. Once the boiler is released, the required minimum boiler temperature will always be maintained. The boiler is locked when no valid temperature request is active. This means that with this operating mode, the boiler setpoint will be maintained at the required minimum only if a temperature request is active.



Auto mode, with extended burner running time

The boiler is released as soon as there is at least one valid temperature request. When the boiler is released, the burner will be switched on when the boiler temperature drops below the request of the consumers. The required minimum boiler temperature is maintained only if the burner had to be switched on due to a request from one of the consumers. This means that since the boiler temperature can drop below its minimum, depending on the request, this operating mode leads to a smaller number of burner switching cycles and, therefore, longer burner on times.



Full charging of buffer

Off: The boiler is not used for full charging of the buffer storage tank.

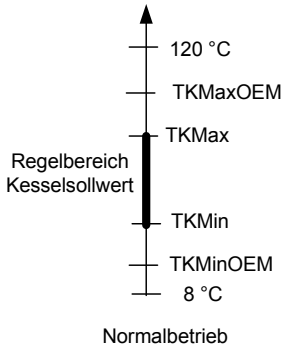
On: The boiler is included in the full charging of the buffer storage tank.
When the function is active, the heat generator is not disabled until the buffer storage is fully charged.

Setpoints

Line no.	*Operating line*
2211	**Setpoint min OEM**
2213	**Setpoint max OEM**

Setpoint minimum / maximum OEM

For this OEM boiler temperature limit control, limit values are defined for the upper and lower boiler temperature setpoints (TKMax and TKMin).



Multistage burner

RVS63.. only

Line no.	*Operating line*
2220	**Release integral stage 2**
2221	**Reset integral stage 2**

Integrals for stage 2

The temperature-time integral is a continuous summation of the temperature differential over time. In this case, the decisive temperature differential is the amount the temperature exceeds the burner's switch-on setpoint or switch-off setpoint.

Through the generation of the temperature-time integral it is not only the period of time that is considered, but also the extent of crossing. This means that when the crossing is significant, burner stage 2 is released or locked earlier than when the crossing is small.

Release integral burner stage 2

When, with burner stage 1, the temperature drops below the switch-on setpoint by the release integral set here, the controller releases burner stage 2.

Reset integral burner stage 2

When, with burner stages 1 and 2, the temperature drops below the switch-off setpoint by the reset integral set here, the controller locks burner stage 2.

Modulating burner (damper actuator / UX)

RVS63.. only

Line no.	*Operating line*
2232	**Damper actuator running time**
2233	**Modulating Xp**
2234	**Modulating Tn**
2235	**Modulating Tv**

Damper actuator running time

To ensure that control of the modulating burner works optimally, the damper actuator running time must be set.

It must be observed that the running time to be set only relates to the range.

- Example

Running time of damper actuator (90°) = 120 seconds
Minimum position of damper actuator = 20°
Maximum position of damper actuator = 80°

Hence, the air damper actuator running time effective for the control is as follows:

$$\frac{120s * (80° - 20°)}{90°} = 80s$$

- Positioning pulses

For control operation, running time-dependent minimum positioning pulses are active that are defined as follows:

Actuator running time TS	*Minimum pulse length*
7.5 s – 14.5 s	Approx. 200 ms
15 s – 29.5 s	Approx. 300 ms
30 s – 59.5 s	Approx. 500 ms
60 s – 119.5 s	Approx. 1.10 s
>120 s	Approx. 2.20 s

Modulating Xp

By setting the right proportional band, the control action of the modulating burner is matched to the plant's behaviour (controlled system).

Xp influences the controller's P-action.

Modulating Tn

By setting the right integral action time, the control action of the modulating burner is matched to the behavior of the plant (controlled system).

Tn influences the controller's I-action.

Modulating Tv

By setting the right derivative action time, the control action is matched to the behavior of the plant (controlled system).

Tv influences the controller's D-action. With Tv = 0, the D-action is deactivated.

Boiler / burner control

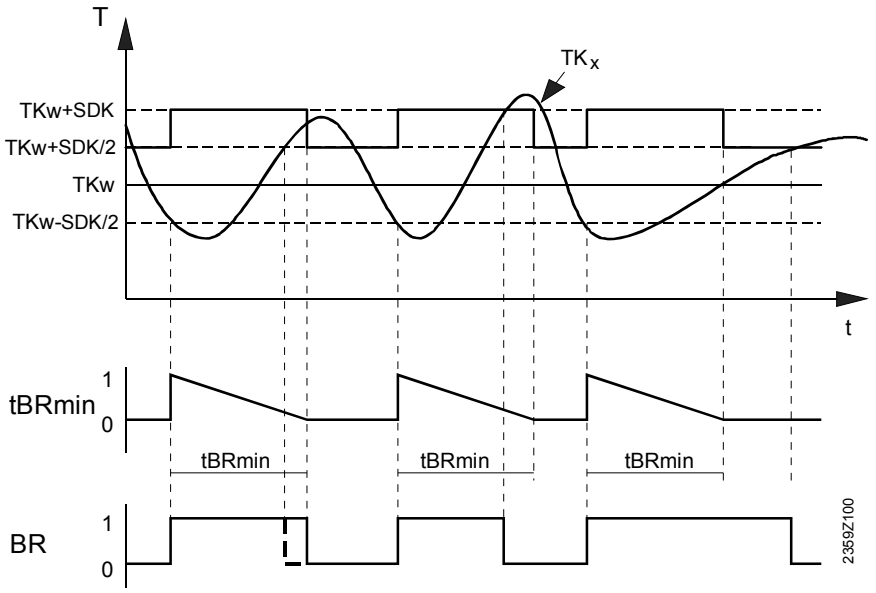
Line no.	*Operating line*
2240	**Switching differential of the boiler**
2241	**Burner running time min**

Switching differential of the boiler

The boiler temperature is controlled by a 2-position controller for which a switching differential can be set.

Burner running time min

If a minimum burner running time is parameterized, the burner's switch-off point will be raised by half the boiler's switching differential within that minimum on time. If, within the minimum burner running time, the boiler temperature exceeds the setpoint by more than the entire switching differential, the burner will also be shut down before the minimum on time has elapsed. On completion of the minimum on time, the burner's switch-off point will be set to the boiler temperature setpoint plus half the switching differential. This function only acts on the first burner stage.



T Temperature
t Time
tBRmin Burner running time min
BR Burner (0= off, 1 = on)
TKw Boiler setpoint
TKx Actual boiler temperature
SDK Switching differential of the boiler

Overtemperature protection

Line no.	*Operating line*
2250	**Pump overrun time**

Pump overrun time

If the first burner stage is switched off, or if the boiler request becomes invalid, a forced signal is delivered during the parameterized pump overrun time. Consumer pumps do not switch off during the period of time such a forced signal is active.

Minimum limitation of the boiler temperature

Line no.	*Operating line*
2260	**Prot boil startup consumers**
2261	**Prot boil startup boil pump**
2262	**Optimum start control**

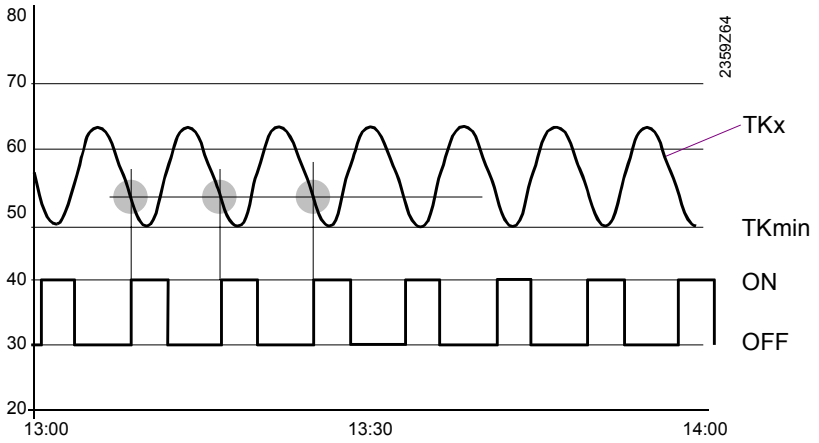
Protective start-up

Below the minimum boiler temperature, protective boiler startup accelerates heating up of the boiler by switching off or reducing the consumer load, or by keeping the boiler pump deactivated, depending on the hydraulic circuit used.

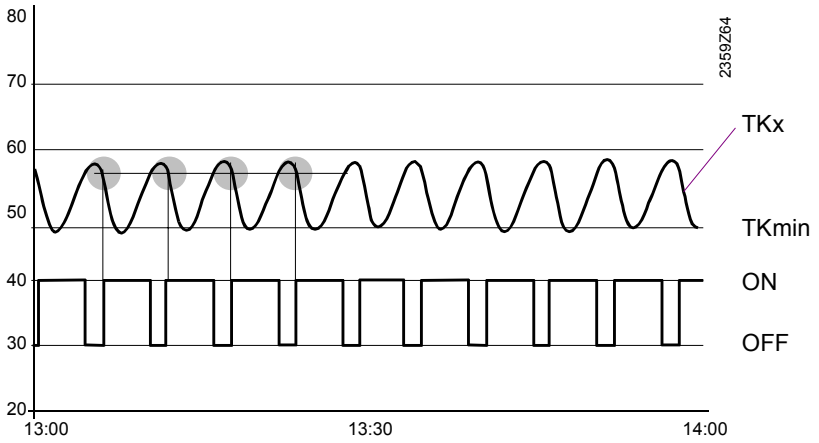
Optimum start control

When the function is activated (graph 1,2), the controller calculates the switch-on point for the burner, based on the boiler temperature gradient, thus enabling that the boiler temperature will not fall below the minimum level.
When the function is deactivated (graph 3), the controller will switch the burner on at TKmin.

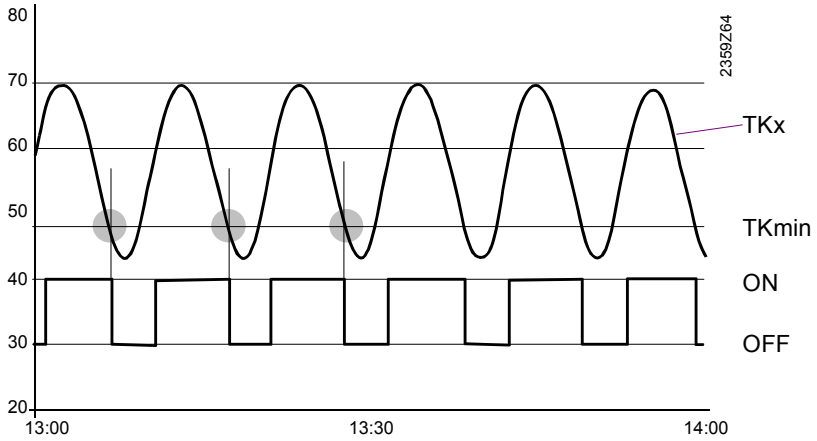
- With optimum burner start control at about 35 % load



- With optimum burner start control at about 65% load



- Without optimum burner start control at about 35 % load



ON Burner on
OFF Burner off
TKx Actual value of the boiler temperature
Tkmin Minimum limitation of the boiler temperature

Minimum limitation of the return temperature

Line no.	*Operating line*
2271	**Return setpoint min OEM**
2272	**Return influence consumers**

Return setpoint min OEM

This minimum limitation of the return temperature OEM is the lower limit value for the minimum of the return temperature setpoint.

Return influence consumers

If, with the boiler released, the return temperature falls below the set minimum temperature, a locking signal will be calculated.

- With proper pump circuits (heating circuit pump, DHW charging pump, external load) is or remains deactivated if the locking signal exceeds the respective threshold value
- In the case of mixing circuits, the flow temperature setpoint will be reduced according to the locking signal value

Return temperature minimum limitation mixing valve

Line no.	*Operating line*
2282	**Actuator running time**
2283	**Mixing valve Xp**
2284	**Mixing valve Tn**
2285	**Mixing valve Tv**

Mixing valve Xp

By setting the right proportional band, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Xp influences the controller's P-action.

- Example

In the case of a setpoint / actual value deviation of 20 °C, Xp = 20 produces a manipulated variable corresponding to the running time of the mixing valve's actuator (Tv = 0, Tn = maximum).

Mixing valve Tn

By setting the right integral action time, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Tn influences the controller's I-action.

Mixing valve Tv

By setting the right derivative action time, the control action is matched to the behavior of the plant (controlled system).

Tv influences the controller's D-action. With Tv = 0, the D-action is deactivated.

Bypass pump

Line no.	*Operating line*
2290	**Switching differential bypass pump**

Switching differential bypass pump

Control of the bypass pump "according to the boiler return temperature" is in the form of 2-position control for which a switching differential must be set.

Bypass pump

2291	**Control bypass pump** Parallel burner operation Return temperature

Control bypass pump

The boiler bypass pump improves the circulation of water through the boiler, thus preventing the boiler temperature from falling below a certain level.

Parallel with the operation of the burner

The boiler bypass pump is switched on / off according to the burner's on / off signals.

According to the boiler return temperature

The boiler bypass pump is switched on / off according to the minimum limitation of the boiler return temperature and the switching differential of the bypass pump.

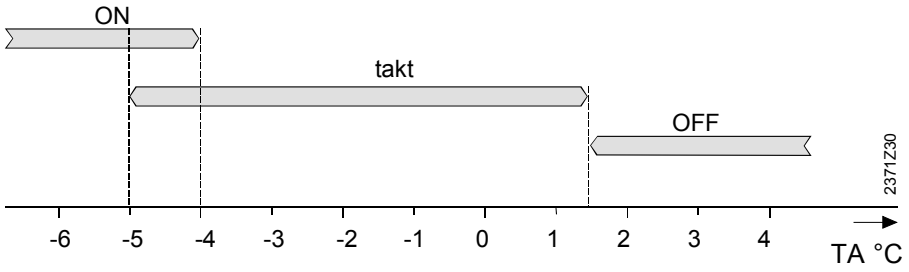
Frost protection

Line no.	*Operating line*
2300	**Frost prot plant boiler pump**

The boiler pump is activated, depending on the **current** outside temperature, although there is no request for heat.

Frost protection for the boiler operates only if frost protection for the plant on operating line 6120 is switched on.

Outside temperature (OT)	Pump	Graph
...-4 °C	Continuously on	ON
-5…1.5 °C	ON for 10 minutes at 6-hour intervals	Cycle (takt)
1.5 °C...	Continuously off	OFF



Electronic limit thermostat

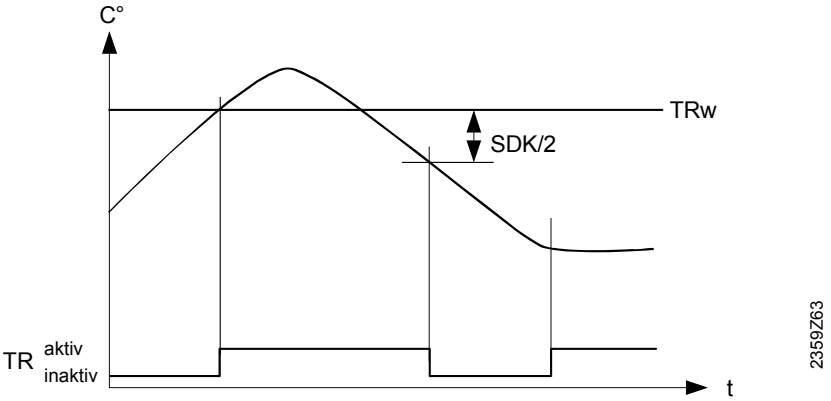
Line no.	*Operating line*
2310	**Limit thermostat function**

Limit thermostat function

The electronic limit thermostat monitors the boiler temperature (TKx) and cuts out if the set limit value (TR setpoint) is exceeded, causing the burner to shut down.

In normal control mode and for the relay test, the TR setpoint used is the boielr temperature's maximum limitation (TKMax) while the "adjustable" value TKMaxHand is used with manual control.

Parameter "Limit thermostat function" can be used to switch the limit thermostat on and off. But it is always active in manual control.



TRw Setpoint of electronic limit thermostat

The limit thermostat is activated when:

- The boiler temperature (TKx) exceeds the TR setpoint
- There is no boiler temperature signal, e.g. no signal from the sensor due to a short-circuit.

TR is deactivated when:

- The boiler temperature drops by one half the boiler switching differential (SDK/2), but at least 2°K.

The electronic limit thermostat is integrated in burner relay control in a way that relays K4/K5 will immediately be deenergized when the limit thermostat becomes active (independent of control, relay test, and manual control). It is only during the SLT (safety limit thermostat) test that the electronic limit thermostat does not become active.

Monitoring the temperature differential

Line no.	*Operating line*
2315	**Temp differential min**
2316	**Temp differential max**

When using a speed-controlled boiler pump, the pump's speed is adjusted in a way that the difference between flow and return temperature will lie within that range.
The pump's speed is significantly reduced only when the boiler delivers the required output.

Temp differential min

Minimum boiler differential
The "Minimum boiler differential" function is used to monitor the speed control of the boiler pump.

When the actual boiler flow/return differential reaches the preset value, the boiler pump speed is not increased further. If the actual differential drops below the preset value, the speed is reduced.
The function can be deactivated with the setting – – – .

Temp differential max

Maximum boiler differential
The "Maximum boiler differential" function is used to monitor the speed control of the boiler pump.
When the boiler flow/return differential reaches the preset value, the boiler pump speed is not increased further. If the actual differential exceeds the preset value, the speed is reduced.

The function can be deactivated with the setting – – – .

Speed control

RVS63.. only

Line no.	*Operating line*
2322	**Pump speed min**
2323	**Pump speed max**
2324	**Speed Xp**
2325	**Speed Tn**
2326	**Speed Tv**

Pump speed minimum/maximum

Boiler pump speed range
The boiler pump motor speed is limited by a minimum and maximum permitted speed. To ensure that the pump operates reliably on start-up, it is operated at maximum speed for the first 10 seconds.

Boiler pump speed control

The "Boiler pump speed control" function reduces the flow of water through the boiler water in order to achieve the specified boiler setpoint. The controller calculates the pump speed required to ensure that the boiler water volume is not reduced to the permissible minimum until the boiler reaches its full capacity. This prevents the boiler from reaching the setpoint at a reduced boiler capacity, causing the pump to continue to operate at reduced speed.
The pump speed is calculated by a PID controller.

With a low boiler capacity (actual capacity less than 66%) the speed-control setpoint is reduced by 10 K. If the boiler capacity rises above 66%, the pump-speed setpoint is increased, so that at 100% boiler capacity, the setpoint for the speed control calculation corresponds to boiler demand.

6.9 Cascade

Operating mode / strategy

Line no.	*Operating line*
3510	**Lead strategy** Late on, early off Late on, late off Early on, late off
3511	**Output band min**
3512	**Output band max**

Lead strategy

- **Late on, early off**

Additional boilers are switched on as late as possible (output band max) and switched off again as early as possible (output band max). This means that the **smallest possible number of boilers are in operation,** or additional boilers operate with short on times.

- **Late on, late off**

Additional boilers are switched on as late as possible (output band max) and switched off again as late as possible (output band min). This leads to the **smallest possible number of switch-on/off actions** for the boilers.

- **Early on, late off**

Additional boilers are switched on as early as possible (output band min) and switched off again as late as possible (output band min). This means that the **largest possible number of boilers are in operation,** or additional boilers operate with the longest possible on times.

Output band

The values are used as switch-on or switch-off criteria in accordance with the selected lead strategy.

Control

Line no.	*Operating line*
3530	**Release integral source seq**
3531	**Reset integral source seq**
3534	**Forced time basic stage**

Integral source sequence

The settings can be used as switch-on or switch-off criteria, in addition to the output band.

- Release integral source sequence

When, with the heat source currently in operation, the demand for heat cannot be met, the difference being the release integral set here, another boiler is switched on.
When the value is increased, additional heat sources are switched on at a slower rate.
When the value is decreased, additional heat sources are switched on at a faster rate.

- Reset integral heat source sequence

When, with the heat source currently in operation, the demand for heat is exceeded by the reset integral set here, the heat source with the highest priority is shut down.
When the value is increased, heat sources operate for longer periods of time (in the case of surplus heat).
When the value is decreased, heat sources are switched off at a faster rate.

Forced time basic stage

When switched on, every boiler operates with its basic stage for the period of time set here. The next stage is released only when this period of time has elapsed.

Minimum limitation of the boiler temperature

Line no.	*Operating line*
3550	**Prot startup cascade pump**

Protective start-up

The protective startup provided by the cascade pump accelerates heating up of the first boiler in the cascade below the minimum boiler temperature in that the cascade pump remains deactivated..

Minimum limitation of the return temperature

Line no.	*Operating line*
3561	**Return setpoint min OEM**
3562	**Return influence consumers**

Return setpoint min OEM

The minimum limitation of the cascade return temperature (operating line 3560) can be adjusted by the OEM.The person using the heating engineer level can no longer set the minimum limitation of the cascade return temperature below the minimum value required for the boiler.

Return influence consumers

If, with the boilers released, the cascade return temperature drops below the minimum temperature, a locking signal is calculated.

- In the case of pump circuits, the consumer pumps (heating circuit pump, DHW charging pump, ext. load) will be or will stay deactivated if the locking signal exceeds the respective threshold value
- In the case of mixing circuits, the flow temperature setpoint will be reduced according to the locking signal value

Return mixing valve

Line no.	*Operating line*
3570	**Actuator running time**
3571	**Mixing valve Xp**
3572	**Mixing valve Tn**

Actuator running time

Setting the running time of the actuator used with the mixing valve.

Mixing valve Xp

By setting the right proportional band, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Xp influences the controller's P-action.

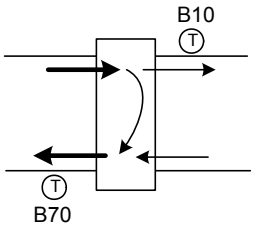
Mixing valve Tn

By setting the right integral action time, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).
Tn influences the controller's I-action.

Monitoring the temperature differential

Line no.	*Operating line*
3590	**Temp differential min**

This function prevents excessive cascade return temperatures and improves the cascade's switch-off behavior.
If the temperature differential between flow and return sensor (B10, B70) becomes smaller than the set minimum temperature differential (operating line 3550), one of the heat sources is switched off as early as possible, independent of the selected lead strategy.When the temperature differential is sufficient again, the selected lead strategy is resumed.



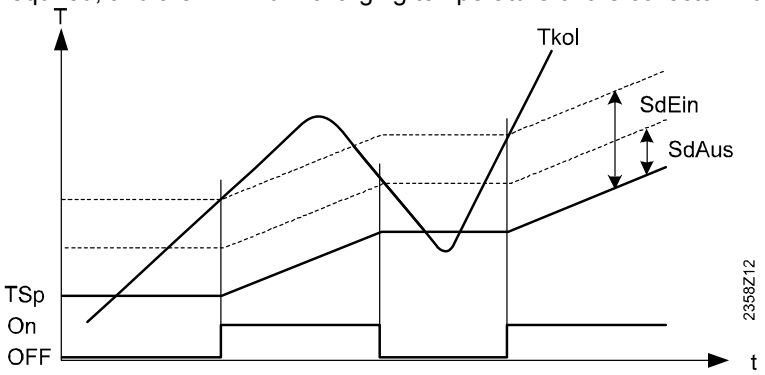
Switching off due to the minimum temperature differential does not apply to the last heat source in the cascade.

6.10 Solar

Charging controller (dT)

Line no.	*Operating line*
3813	**Temp diff ON buffer**
3814	**Temp diff OFF buffer**
3816	**Temp diff ON swi pool**
3817	**Temp diff OFF swi pool**

Setting - - - adopts the general temperature differential of solar operating lines 3810 and 3811.For charging via the heat exchanger, a sufficient temperature differential is required, and the minimum charging temperature of the collector must be reached.



TKol	Collector temperature
On / Off	Collector pump
SdOn	Temp differential on buffer / swimming pool
SdOff	Temp differential off buffer / swimming pool
TSp	Storage tank / swimming pool temperature

Start function

Line no.	*Operating line*
3830	**Collector start function**
3832	**Collector start function on**
3833	**Collector start function off**

Collector start function

If the temperature at the collector (especially in the case of vacuum tubes) cannot be correctly acquired when the pump is deactivated, the pump can be activated from time to time.

Speed control

RVS63.. only

Line no.	*Operating line*
3872	**Speed Xp**
3873	**Speed Tn**

Speed Xp and integral action time Tn

The charging setpoint of the tank with first-priority charging and the collector temperature are both used for speed control. A PI-controller calculates the speed required to ensure that the collector temperature is 2K below the switch-on temperature. If the collector temperature rises due to increased solar radiation, the speed is increased. If the collector temperature drops below this setpoint, the speed is reduced. Limit parameters can be set to define a maximum and minimum pump speed.
The PI controller can be influenced by parameters Xp and Tn. The controller has a dead band of +/- 1K.
The resulting speed is delivered at the speed output selected during configuration (Triac AX3 or 0..10V).
If the charging priority is changed, the controller regulates the speed in accordance with the new charging setpoint.

6.11 Solid fuel boiler

Overtemperature protection

Line no.	*Operating line*
4140	**Pump overrun time**
4141	**Excess heat discharge**

Pump overrun time

If the boiler temperature drops below the minimum temperature differential or the minimum setpoint, the boiler pump keeps running for the parameterized overrun time.

Excess heat discharge

If the boiler temperature reaches the adjusted maximum value, excess heat discharge becomes active. This forces the connected consumers to draw heat from the boiler. At the same time, the boiler pump will be switched on.

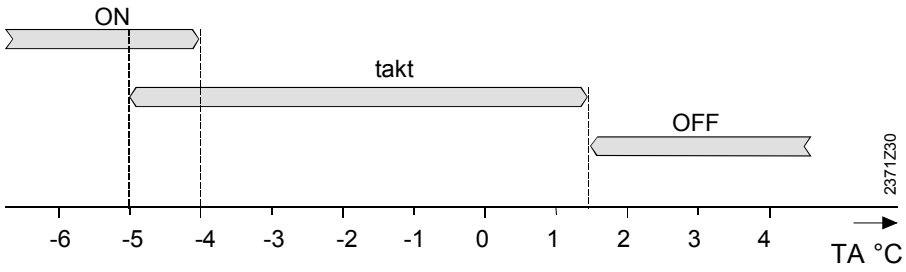
Frost protection

Line no.	*Operating line*
4170	**Frost prot plant boiler pump**

The boiler pump is activated depending on the **current** outside temperature, although there is no request for heat.

Frost protection for the solid fuel boiler operates only if frost protection for the plant on operating line 6120 is switched on.

Outside temperature (OT)	Pump	Graph
...-4 °C	Continuously on	ON
-5…1.5 °C	ON for 10 minutes at 6-hour intervals	Cycle (takt)
1.5 °C...	Continuously off	OFF



6.12 Buffer storage tank

Automatic heat generation lock

Line no.	*Operating line*
4721	**Auto heat generation lock SD**

Automatic heat generation lock ensures a temporary hydraulic disconnection of heat source and buffer storage tank. The heat sources will be put into operation only if the buffer storage tank is no longer able to satisfy the current demand for heat.

Auto heat generation lock SD
The switching differential can be adjusted.

Min st tank temp heat mode
If the actual storage tank temperature falls below this level, the heating circuits are shut down.

Stratification/decharging protection

RVS43.. only
RVS43.. only

Line no.	*Operating line*
4740	**Stratif prot temp diff max**
4743	**Stratif prot Vor'schauzeit**
4744	**Stratif prot integr action time**
4746	**DHW protection combined** Off ¦ On

The buffer storage tank anti-stratification function provides for hydraulic balancing between the consumers and the generator without the need for additional shut-off valves for the buffer storage tank.
When the function is active, the volume of water on the consumer side is adjusted so that where possible, the addition of colder water from the buffer storage tank is avoided. The function is only active if at least one of the heat generators is delivering heat.

If the temperature measured by the common flow sensor (B10 downstream of buffer) drops below the heat generation temperature by more than the preset temperature differential, the volume of water on the consumer side is reduced via locking signals (reduction in the setpoints). If the locking signal achieves 100% for longer than 10 minutes, the locking signal is deleted and re-calculated after a delay of 1 minute. This ensures that the volume of water on the consumer side is not throttled altogether so that there is no flow through sensor B10.

Note: If a primary controller is configured downstream of the buffer storage tank, and if there is no B10 connected, then the function is calculated with the connected B15.

DHW protection combined
For a combined storage tank without a charging pump/diverting valve Q3, the heat demand for room heating (lower part of tank) cannot be supplied without mixing with the DHW section (upper part of tank). It is therefore important to ensure that the water flowing into the top part of the storage tank is not too cold.The function can be activated / deactivated.
Off:
Function is deactivated. The heat demand for room heating is not increased. Hydraulic integration of the combined storage tank maintains DHW stratification.

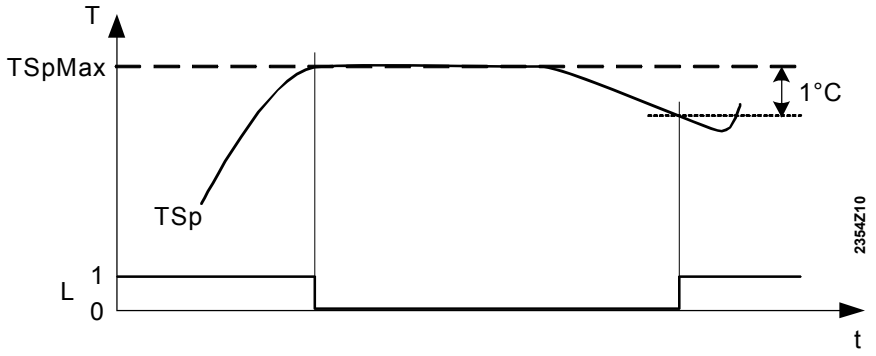
On:
The function is active. The room heating demand is increased for DHW protection. The demand signal to the heat generator is increased so that is at least equivalent to the DHW temperature (B3). At the most, the low temperature limit control remains active only until the nominal DHW setpoint is reached.

Overtemperature protection

Line no.	*Operating line*
4751	**Storage tank temp max**

Storage tank temp max

If the storage tank reaches the maximum storage tank temperature set here, the collector pump will be deactivated. It will be released again when the storage tank temperature has dropped 1 °C below the maximum storage tank temperature.



TSpMax Storage tank temp max (operating line 5051)
TSp Actual value of the storage tank temperature
L Storage tank charging: 1 = on, 0 = off

Full charging

Line no.	*Operating line*
4810	**Full charging** Off ¦ Heating mode ¦ Always
4811	**Full charging temp min**
4813	**Full charging sensor** With B4 ¦ With B42/B41

The "buffer storage tank full charging" function ensures that regardless of the automatic heat generation lock, the released heat sources are not disabled until the buffer storage tank is fully charged.
For full charging, the function "Full charging, buffer" (operating line 2208) must be enabled for the heat sources selected for this purpose.
When the function is active, the heat sources specified here for the full charging function are not disabled either until the full charging setpoint is reached or until the boilers have been switched off in accordance with the burner control function.

Full charging

Off:
The full charging function is deactivated.
Heating mode:
Full charging is active when there is a valid heat demand and the automatic heat generation lock disables the heat generators on the basis of the buffer temperature. The function is deactivated when the buffer storage tank reaches the required temperature, as measured by the sensor selected for the charging function.
Always:
Full charging is active when the automatic heat generation lock disables the heat generators on the basis of the buffer temperature or when the heat demand ceases to be valid. The function is deactivated when the buffer storage tank reaches the required temperature, as measured by the sensor selected for the charging function.

Full charging temp min

The buffer storage tank is charged at least to the preset value.

Full charging sensor

With B4:
Sensor B4 is used for the full charging function.
With B42/B41:
For the full charging function, sensor B42 is used, and if this is not available, then B41.

6.13 DHW storage tank

Release

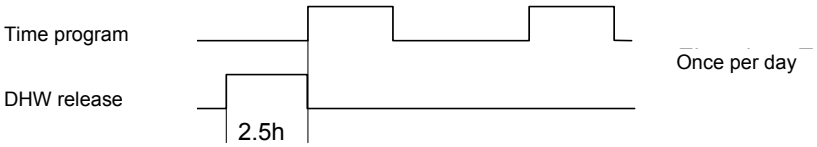
Line no.	*Operating line*
5010	**Charging** Once/day ¦ Several times/day

Charging

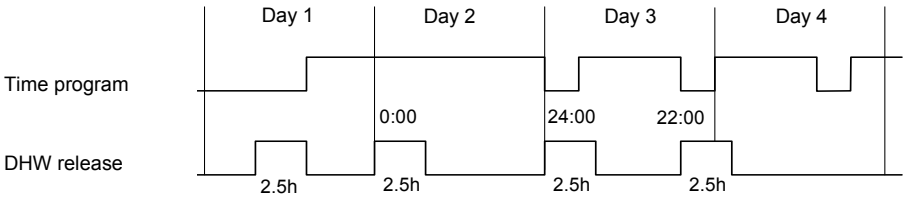
Selection of charging “Once/day“ or “Several times/day” is active only if DHW release is set according to the time programs of the heating circuits

Once / day

Release of DHW charging is given 2.5 hours before the first heat request fom the heating circuit is received. Then, the reduced DHW setpoint applies for the whole day.

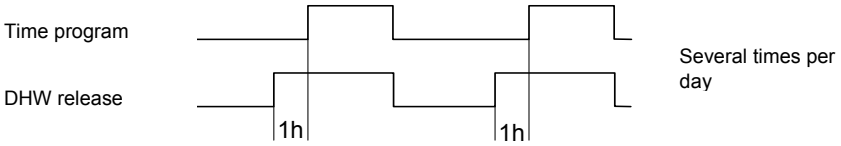


In the case of continuous heating (with no setback periods), release of DHW charging is given at 0:00. The same rule also applies if the first request for heat from the heating circuit is received before 02:30. If a request for heat is received at midnight, DHW charging is released after the first setback period, but no earlier than 2.5 hours before midnight.



Several times / day

When selecting “Several times/day“, release of DHW charging is put forward in time by 1 hour against the periods of time the heating circuit calls for heat, and is then maintained during those periods of time.



Charging control

Line no.	*Operating line*
5024	**Switching differential**

Switching differential

If the DHW temperature is lower than the current setpoint minus the switching differential set here, DHW charging will be started.
DHW charging will be terminated when the temperature reaches the current setpoint.

When DHW heating is released for the first time in a 24-hour period, forced charging will be initiated. DHW charging is also started when the DHW temperature lies within the switching differential, provided it does not lie less than K below the setpoint.

Charging time limitation

Line no.	*Operating line*
5030	**Charging time limitation**

Charging time limitation

During DHW charging, space heating may obtain no or too little energy, depending on the selected charging priority (operating line 1630) and the type of hydraulic circuit. For this reason, it is often practical to set a time limit to DHW charging.

- - -
Charging time limitation is deactivated. The DHW is heated up to the nominal setpoint, even if space heating cannot draw sufficient amounts of heat for a certain period of time.

10 – 600
DHW charging is stopped after the set period of time in minutes and then locked for the same period of time before it is resumed. During this period of time, the heat produced by the boiler is made available for space heating. This cycle is repeated until the nominal DHW setpoint is reached.

When space heating is switched off (summer operation, Eco function, etc.), DHW charging will not be stopped, independent of the selected setting.

Discharging protection

Line no.	*Operating line*
5040	**Discharging protection**

Discharging protection

This function ensures that the DHW charging pump (Q3) will be activated only when the boiler temperature is high enough.

- With sensor
  The charging pump will be activated only when the boiler temperature reaches the level of the DHW temperature plus one half the charging boost. If, during charging, the boiler temperature drops to a level below the DHW temperature plus 1/8 the charging boost, the charging pump will be deactivated again. If 2 DHW sensors are parameterized for DHW charging, the lower temperature is used for the discharging protection function (usually sensor B31).

- With thermostat
  The charging pump will be activated only when the boiler temperature lies above the nominal DHW setpoint. If, during charging, the boiler temperature drops below the nominal DHW temperature minus the DHW switching differential, the charging pump will be deactivated again.

Off
Function is deactivated.
Always
The function is always active.
Automatically
The function is active only if the heat source is not able to deliver heat, or is not available (fault, heat generation lock).

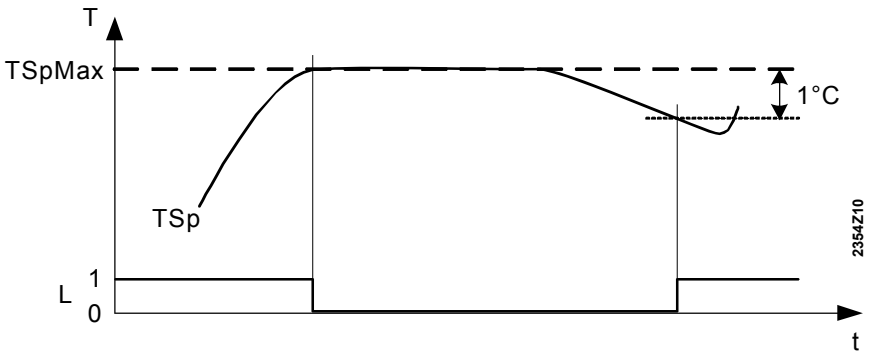
Overtemperature protection

Line no.	*Operating line*
5051	**Storage tank temp max**

Storage tank temp max

If the storage tank reaches the maximum storage tank temperature set here, charging is aborted. It will be released again when the storage tank temperature has dropped 1 °C below the maximum storage tank temperature.

The protective collector overtemperature function can reactivate the collector pump until the storage tank's safety temperature is reached.



TSpMax Storage tank temp max (operating line 5051)
TSp Actual value of the storage tank temperature
L Storage tank charging: 1 = on, 0 = off

DHW push

Line no.	*Operating line*
5070	**Automatic push** Off On
5071	**Charging prio time push**

Automatic push

The DHW push can be triggered either manually or automatically.
In that case, the DHW is heated up once to the nominal setpoint.

Off
The DHW push must be triggered manually.

On
If the DHW temperature falls below the reduced setpoint (operating line 1612) by at least 2 switching differentials (operating line 5024), one-time charging to the nominal DHW setpoint (operating line 1610) will take place again.

The automatic DHW push only works when the DHW operating mode is activated.

Charging prio time push

In the case of a DHW push, the DHW storage tank is charged with absolute priority for the period of time set here.

Excess heat draw

Line no.	*Operating line*
5085	**Excess heat draw** Off On

Excess heat draw

Excess heat draw can be triggered by the following functions:
- Inputs H1, H2, H3 or EX2
- Storage tank recooling
- Solid fuel boiler excess heat draw

When dissipation of excess heat is activated, it can be drawn by space heating. This can be adjusted separately for each heating circuit.

Speed-controlled pump

RVS63.. only

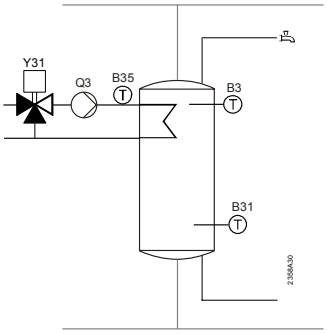
RVS63.. only

Line no.	*Operating line*
5103	**Speed Xp**
5104	**Speed Tn**

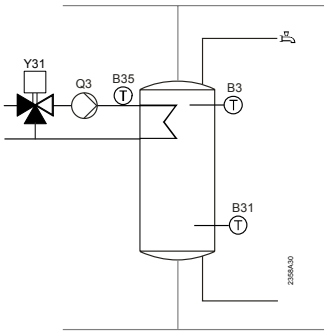
Speed control

Charging pump Q3 speed control

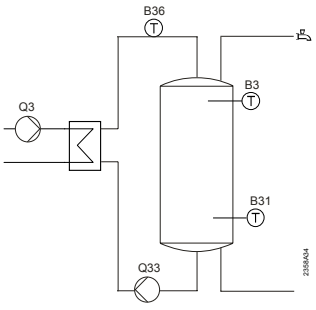
Heat exchanger in storage tank and sensor B36 in the return.
The controller calculates the charging-pump speed required to ensure that the return temperature measured by sensor B36 is 2K above the storage tank temperature (B3).



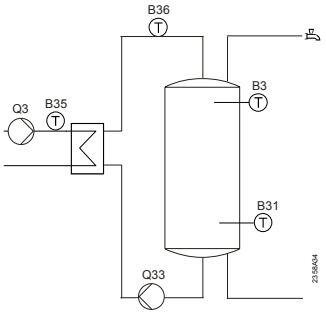
Heat exchanger in storage tank, with primary controller.
The controller calculates the charging-pump speed required to ensure that the DHW setpoint + charging increase measured at sensor B35 is achieved.



Heat exchanger outside the storage tank and sensor B36 in flow (part-schematics 22, 23)
The controller calculates the charging-pump speed required to ensure that the charging temperature measured by sensor B36 is 2K above the DHW setpoint.

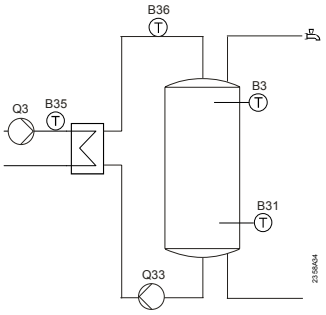


Heat exchanger outside storage tank, with primary controller.
The controller calculates the charging-pump speed required to ensure that the charging temperature measured by sensor B35 is 2K above the DHW setpoint. In this case the primary controller sensor B35 must be located in the intermediate circuit.
If a B36 is also connected, B35 must be positioned as the primary control sensor. In this case, the controller calculates the speed required to ensure that the DHW setpoint + charging increase measured by sensor B35 is achieved.



Speed control of intermediate circuit pump Q33 speed

The controller calculates the speed of the intermediate-circuit pump required to ensure that the return temperature measured by sensor B36 is 2K above the DHW setpoint.
If no B36 is connected the calculation is based on sensor B35.
If no valid sensor is connected, the pump speed is not controlled.



Mixing valve precontrol

Line no.	*Operating line*
5120	**Mixing valve boost**
5124	**Actuator running time**
5125	**Mixing valve Xp**
5126	**Mixing valve Tn**

Mixing valve boost — To ensure proper mixing valve flow temperature control, the flow temperature must be higher than the demanded setpoint of the mixing valve flow temperature. The value set here is added to the request.

Actuator running time — Setting the running time of the actuator used with the mixing valve.

Mixing valve Xp — By setting the right proportional band, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).
Xp influences the controller's P-action.

Mixing valve Tn — By setting the right integral action time, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Tn influences the controller's I-action.

Transfer

Line no.	*Operating line*
5130	Transfer strategy Always ¦ DHW release
5131	Comparison temp transfer DHW sensor B3 ¦ DHW sensor B31

Transfer strategy — Transfer is permitted either always or at the release times set (operating line 1620).

Comparison temp transfer — For the transfer, the respective DHW sensor can be selected to get a comparative temperature.

6.14 Instantaneous DHW heater

Mixing valve control

Line no.	Operating line
5545	**Mixing valve Xp**
5546	**Mixing valve Tn**
5547	**Mixing valve Tv**

Mixing valve Xp

By setting the right proportional band, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Xp influences the controller's P-action.

Mixing valve Tn

By setting the right integral action time, the control action of the mixing valve's actuator is matched to the behavior of the plant (controlled system).

Tn influences the controller's I-action.

Mixing valve Tv

By setting the right derivative action time, the control action is matched to the behavior of the plant (controlled system).

Tv influences the controller's D-action. With Tv = 0, the D-action is deactivated.

6.15 Configuration

Building and room model

Line no.	*Operating line*
6112	**Gradient room model**

Gradient room model

The room model gradient gives the period of time in minutes room heating needs to raise the temperature by 1 °C. The settings made applies to all circuits.

The setting is used to calculate the fictive room temperature of rooms that have no room temperature sensor installed (operating lines 8742, 8772, and 8802).

Setpoint compensation

RVS43.. only

Line no.	*Operating line*
6116	**Time constant setp compens**
6117	**Central setp compensation**
6118	**Setpoint drop delay**

Time constant setp compens

If required, the filter time constant (B10) of the central setpoint compensation can be adjusted.

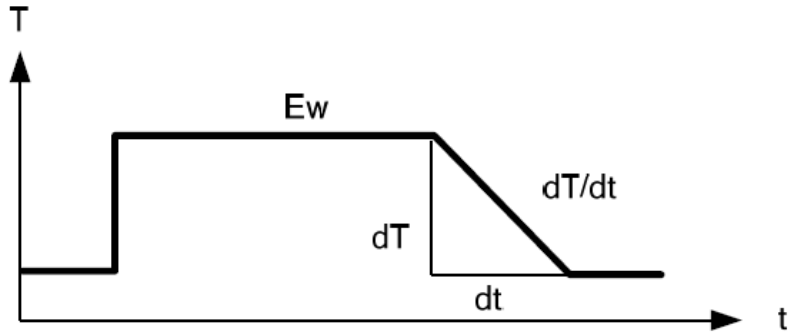
Central setp compensation

Central setpoint compensation matches the setpoint of the heat source to the required central flow temperature.
The setting limits the maximum readjustment, even in cases where grater adaptations would be called for.

This function can only be implemented when using the common flow sensor (B10).

Setpoint drop delay

This prevents multistage heat sources from switching off too quickly, or modulating heat sources from switching off instantly due to their output control.
As a result, the heat sources do not cool down since a demand for heat still exists, which means that they will resume operation a short time later.



T Temperature
t Time
dT/dt Delayed drop
Ew Heat sources set point

The delayed drop acts only in the case of a setpoint jump, but not when the request for heat no longer exists.

Pressure acquisition H1, H2 and H3

Line no.				*Operating line*
H1	H2	H3		
6140	**6150**	**6180**		**Water pressure max**
6141	**6151**	**6181**		**Water pressure min**
6142	**6152**	**6182**		**Water pressure critical min**

RVS63.. only

Water pressure max

If the pressure acquired at input H1, H2 or H3 exceeds the limit value set here, an appropriate error message will be delivered.

117: Water pressure too high
176: Water pressure 2 too high
322: Water pressure 3 too high

If the pressure drops below the limit value by one switching differential, the error will be canceled.

Water pressure min

If the pressure acquired at input Hx drops below the set limit value (parameter “Water pressure min“), the appropriate maintenance alarm will be delivered.

5: Water pressure too low
18: Water pressure 2 too low
22: Water pressure 3 too low

If the pressure exceeds the limit value by one switching differential, the maintenance alarm will be canceled.

Water pressure critical min

If the pressure acquired at input H1 or H2 falls below the limit value set here, an appropriate error message will be delivered and both burner stages immediately shut down.

118: Water pressure too low
177: Water pressure 2 low
323: Water pressure 3 low

When the pressure exceeds the limit value by a switching differential, the error is canceled.

Line no.	*Operating line*
6222	**Device hours run**

Device hours run

This indicates the total number of hours run since the controller was first commissioned.

6.16 LPB system

Error/maintenance/alarms

Line no.	*Operating line*
6610	**Display system messages**
6612	**Alarm delay**

Display system messages

This setting enables system messages transmitted via LPB to be suppressed at the connected operator unit.

Alarm delay

Delivery of the alarm to the OCI can be delayed in the basic unit by setting a delay. This ensures that unnecessary notifications of a service center resulting from short-time errors (e.g. temperature limiter cut out, communication error) can be prevented.
It is to be noted, however, that errors occurring for a short period of time, and reoccurring constantly and rapidly, will also be filtered.

Central functions

Line no.	*Operating line*
6630	**Cascade master** Always ¦ Automatically

When creating a cascade, the controller having address 1 is assigned the role of the cascade master. That controller then activates the required functionality and displays the additional operating menus including the cascade-related parameters.
The identification as the cascade master is made either automatically, depending on the selection, or can be ready assigned by selecting “Always”.

In the case of a cascaded plant, it is recommended to select “Always” on the cascade master. This selection ensures that the cascade operating menus and common functions (e.g. common return temperature control) will not be lost should a power failure occur.

6.17 Errors

History 1..10

Line no.	*Operating line*
6820	**Reset history** No Yes

Reset history

The error history with the last 10 errors will be deleted.

6.18 Diagnostics, consumers

Heating circuit 1, heating circuit 2, heating circuit P

Line no.	*Operating line*
8742	**Room temp 1 model**
8772	**Room temp 2 model**
8802	**Room temp P model**

Room temperature 1 / 2 / P model

The room model calculates a fictive room temperature for rooms that have no room temperature sensor. The value calculated for each heating circuit is indicated on these operating lines.

This allows boost heating, quick setback and optimum start and stop control to be implemented with no need for using a room temperature sensor.
The calculation takes into account the attenuated outside temperature (operating line 8703), the room model gradient (operating line 6112) for switching to a higher setpoint and the building's time constant (operating line 6110) for switching to a lower setpoint.

7 Plant diagrams

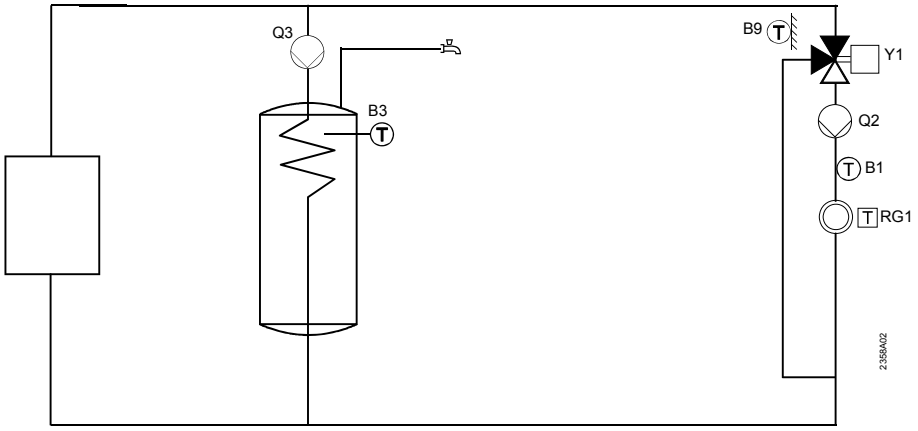
The various applications are shown in the form of basic diagrams and extra functions. The basic diagrams show possible applications that can be implemented without the use of multifunctional outputs.

7.1 Basic diagrams

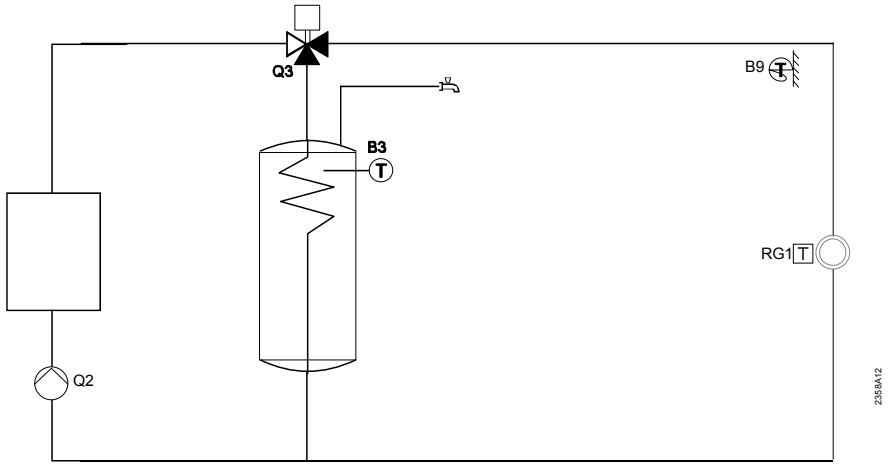
The basic diagrams are examples of plant that can be implemented with standard outputs requiring only a few settings.

7.1.1 Basic diagram RVS43.

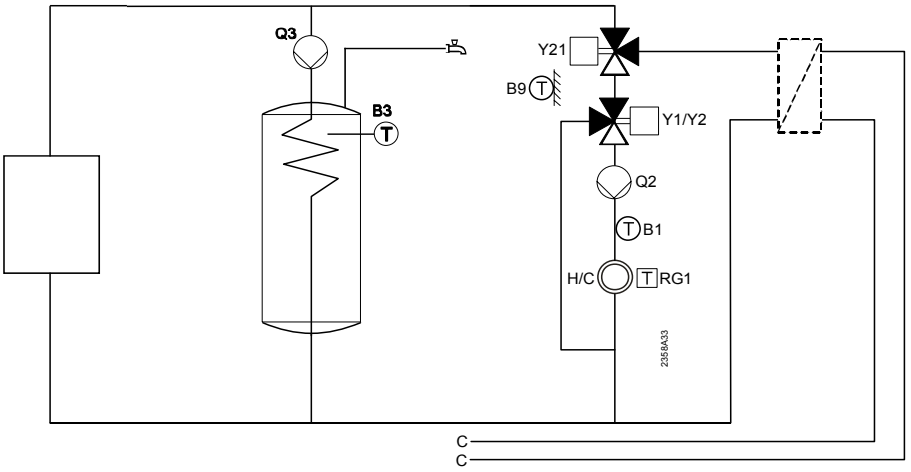
Standard diagram



DHW heating with diverting valve

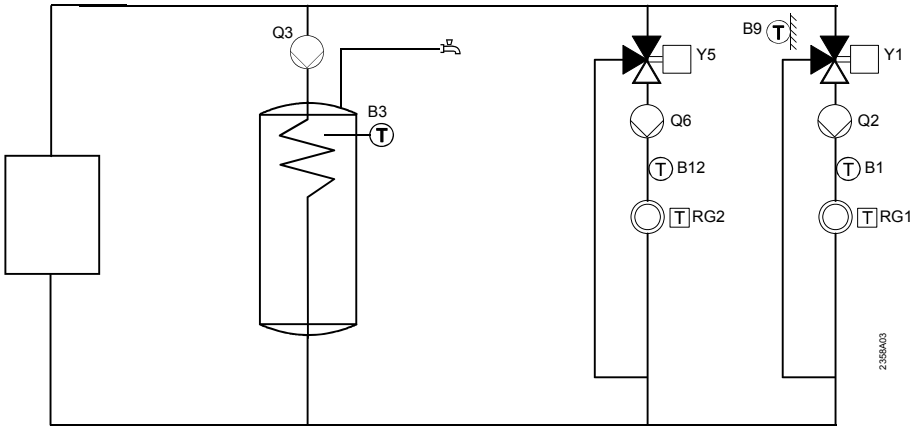


Heating/cooling via diverting valve

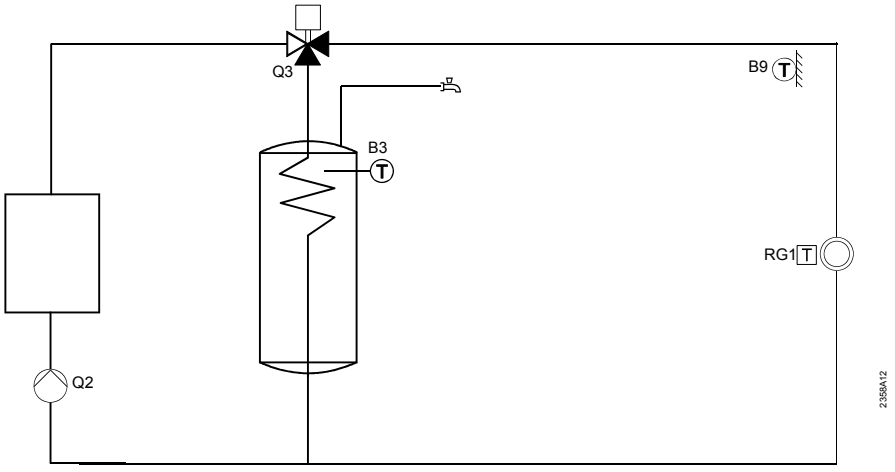


7.1.2 Basic diagram RVS63.

Standard diagram



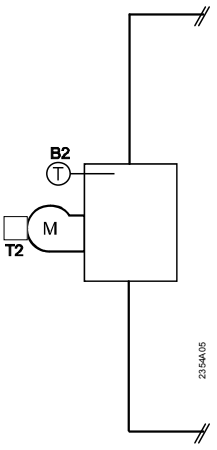
DHW heating with diverting valve



7.2 Versions of heat sources

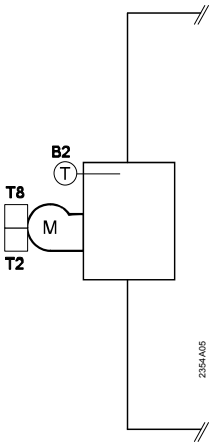
The heat generation options can be selected via the "Configuration" operating page on operating line 5779 "Source type".

1-stage burner



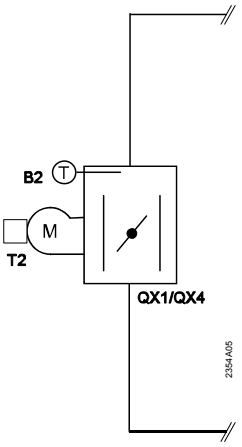
RVS43…
RVS63…

2-stage burner



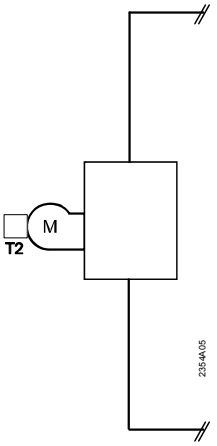
RVS63…

Modulating
3-point 0…10 V



RVS63…

Burner without boiler sensor



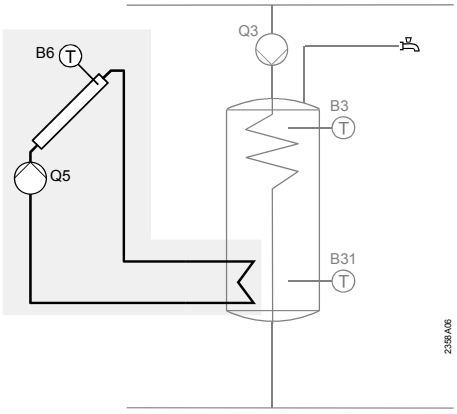
RVS63…

7.3 Extra functions in general

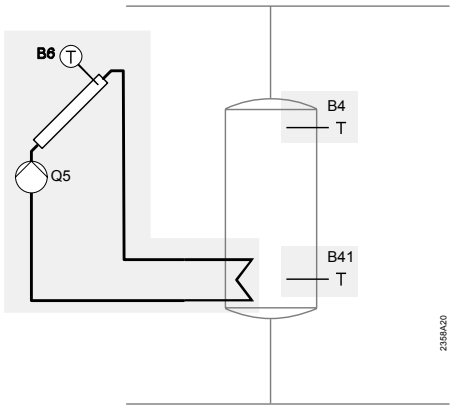
The extra functions can be selected via operating page “Configuration” and complement the basic diagrams of the respective controllers.
The type and number of extra functions that can be applied depend on the multifunctional outputs and inputs QX… or BX…
Depending on the type of application, the use of extra functions necessitates a number of appropriate operating line settings.

Solar

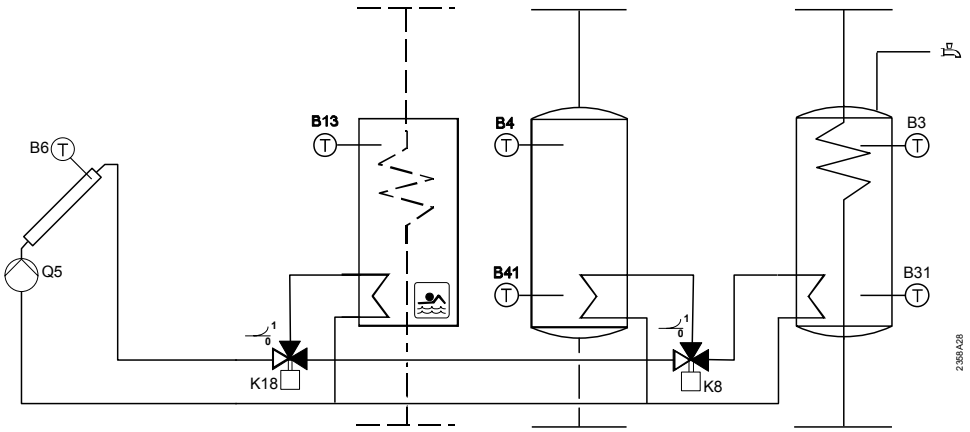
DHW charging collector pump, collector sensor



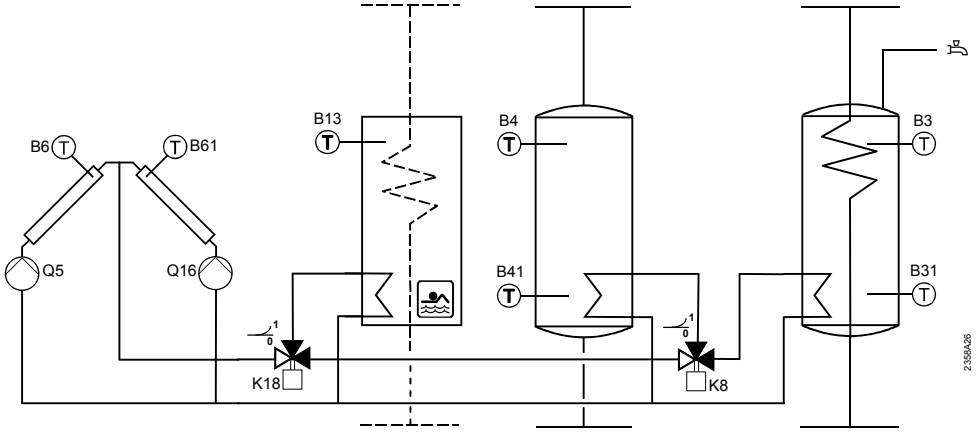
Buffer charging



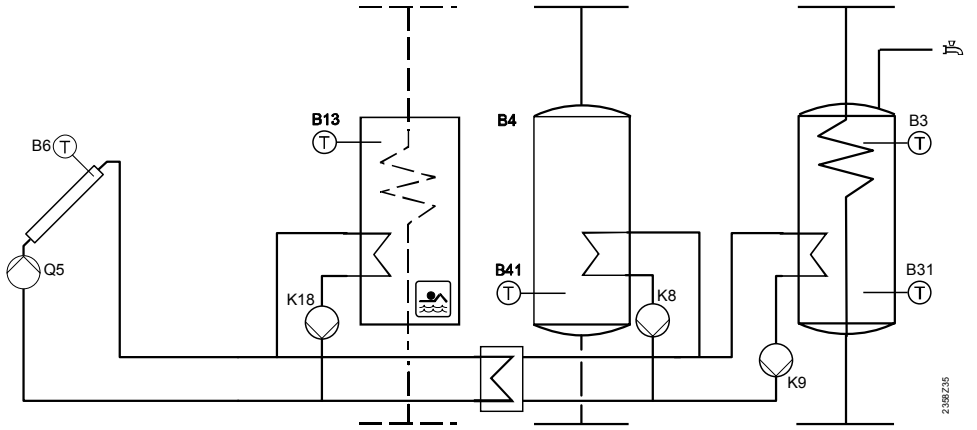
Solar storage tank and swimming pool charging via diverting valves with 1 collector



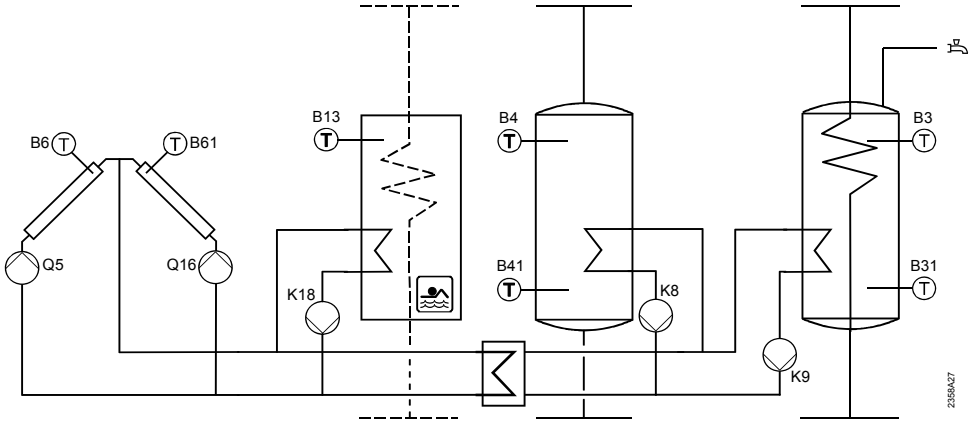
Solar storage tank and swimming pool charging via diverting valves with 2 collectors



Solar storage tank and swimming pool charging via charging pumps with 1 collector

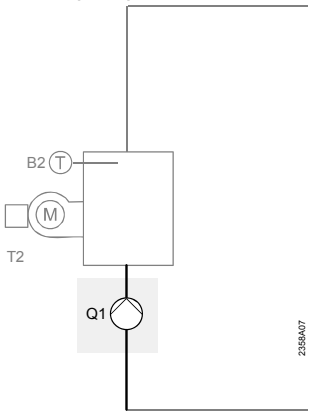


Solar storage tank and swimming pool charging via charging pumps with 2 collectors

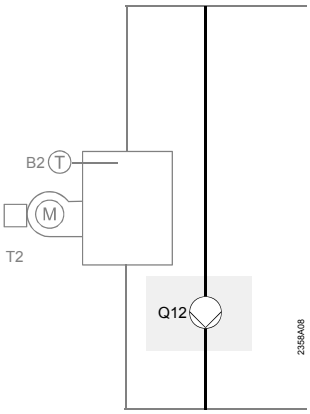


Boiler

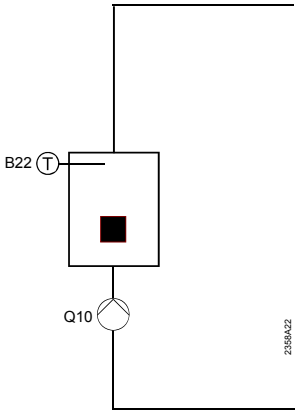
Boiler pump



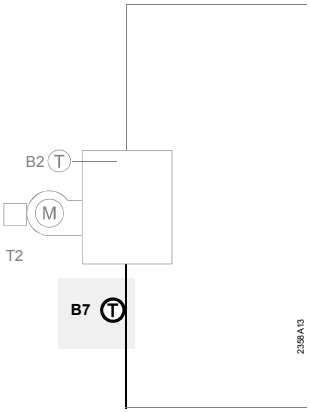
Bypass pump



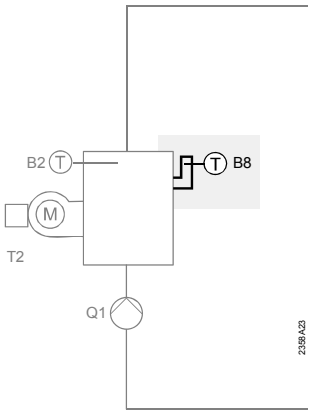
Solid fuel boiler pump



Return sensor

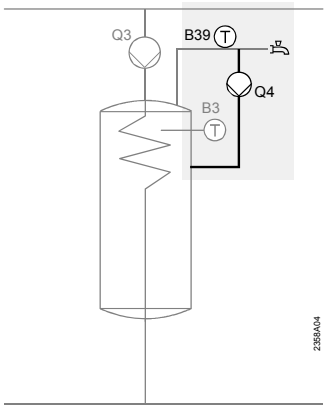


Flue gas temperature sensor

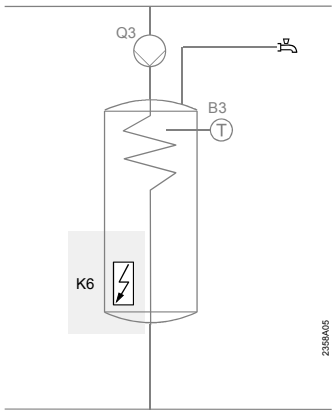


DHW storage tank (DHW)

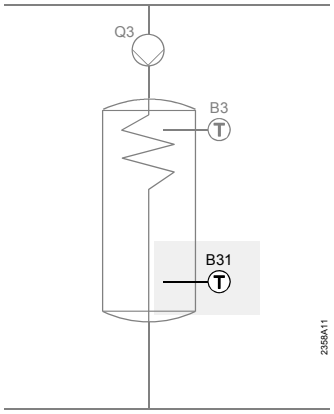
DHW circulating pump



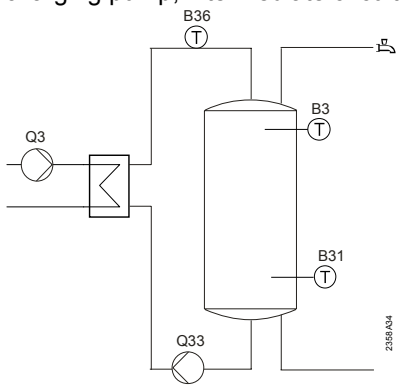
DHW el imm heater



2nd DHW sensor

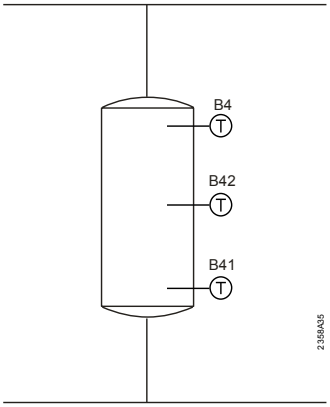


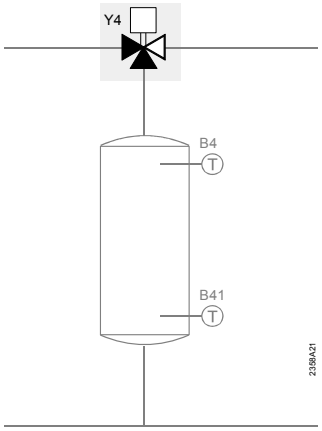
DHW tank with external heat exchanger, charging pump, intermediate circuit pump



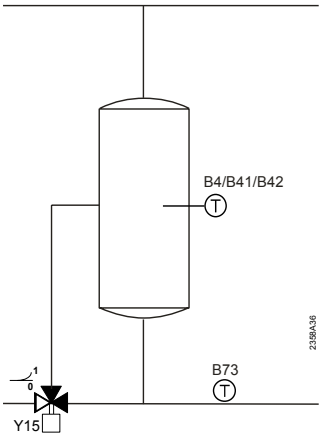
Buffer storage tank

Heat source shutoff valve buffer

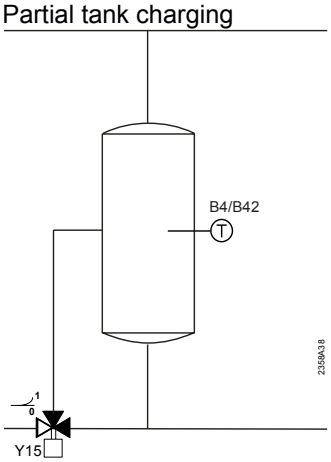




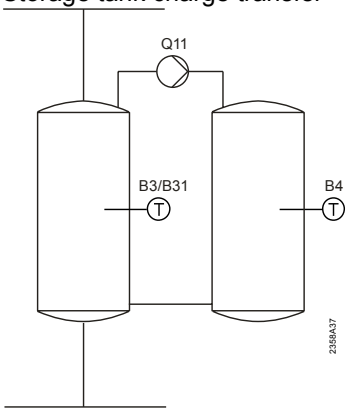
Return diversion



Partial tank charging

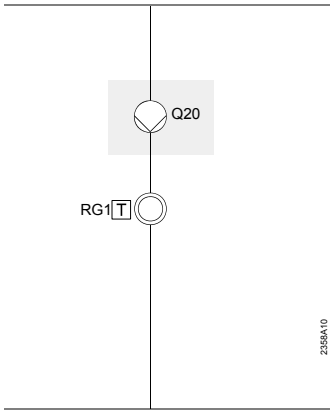


Storage tank charge transfer

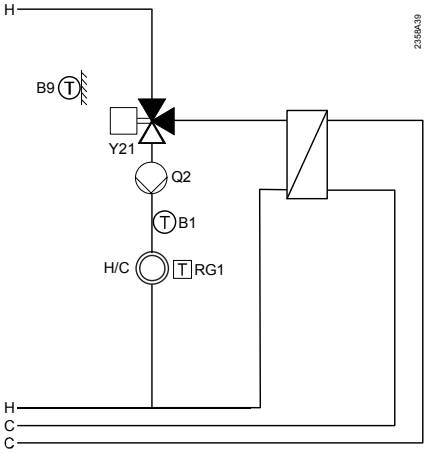


Heating/cooling circuit

Heating circuit pump HCP

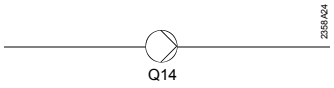


Diverting valve for cooling



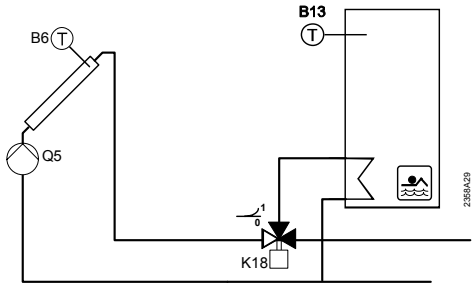
Heat converter

System pump Q14



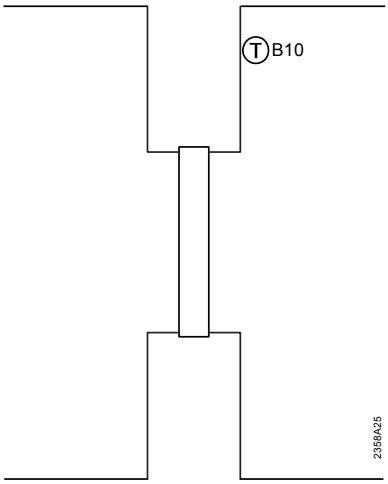
Swimming pool

Swimming pool K18



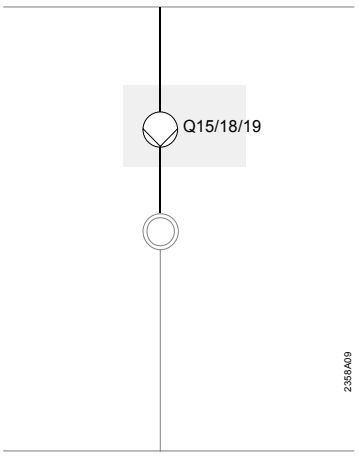
Pressureless header

Common flow sensor



Extra functions

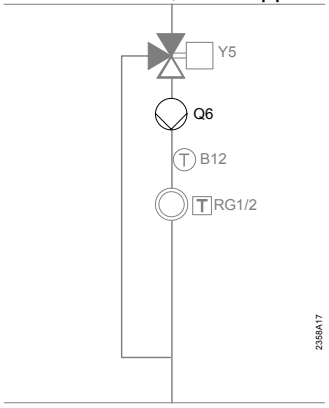
H.. Pump



7.4 Additional funct. with mix. valve group or extension module AVS75.390

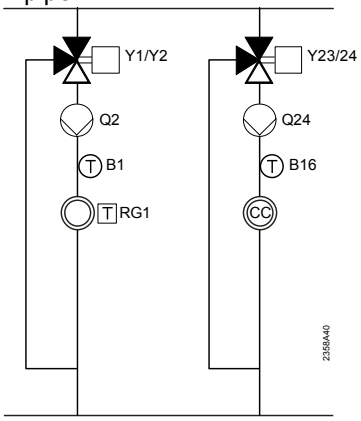
The extra functions can be selected via operating page “Configuration“, operating lines 6020 and 6021, and supplement the basic diagrams of the respective controllers.

2nd Mixing valve heating circuit

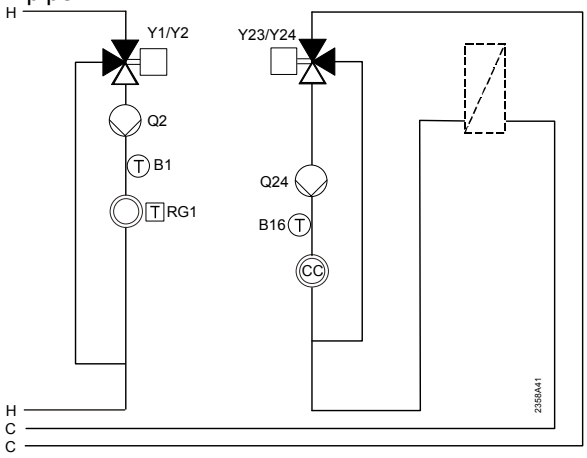


Cooling circuit

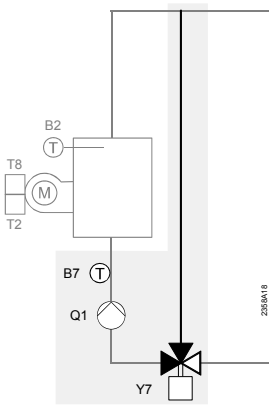
2-pipe



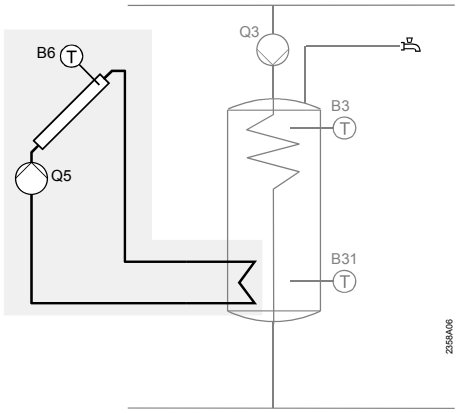
4-pipe



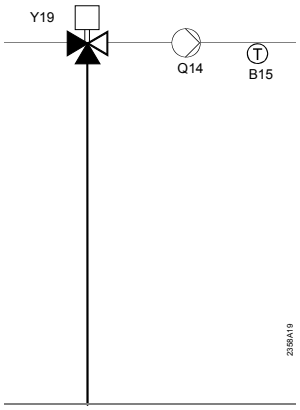
Return temp controller



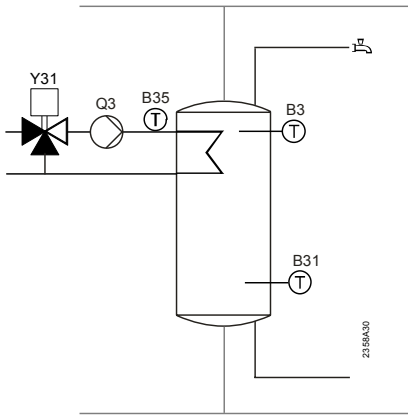
Solar DHW heating



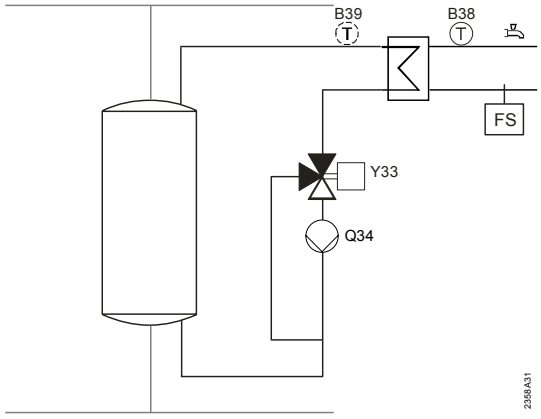
Primary controller



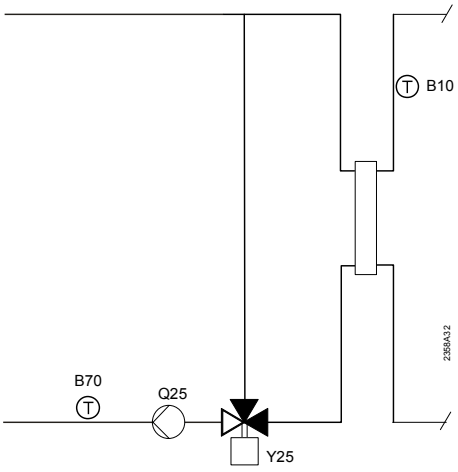
Primary DHW controller



Instantaneous DHW heater



Return controller cascade



Legend mains voltage

Diagram	*Function*
T2	Burner 1st stage
	Release modulating burner
T8	Burner 2nd stage
	Air damper modulating burner opening
Q1	Boiler pump
Q2	1st heating circuit pump
Q3	DHW charging pump / diverting valve
Q4	circulating pump
Q5	Collector pump
Q6	2nd heating circuit pump
Q10	Solid fuel boiler pump
Q11	Storage tank charging pump
Q12	Bypass pump
Q14	System pump
Q15/18/19	H1/2/3 pump
Q16	Collector pump 2
Q20	Heating circuit pump HCP
Q24	Cooling circuit pump
Q25	Cascade pump
Q33	DHW intermediate circuit pump
Q34	Instantaneous heater pump
Y1	1st Heating circuit mixing valve
Y4	Heat source shutoff valve
Y5	2nd Heating circuit mixing valve opening
Y6	2nd Heating circuit mixing valve closing
Y7	Maintained boiler return temperature
Y15	Buffer return valve
Y19	Primary controller
Y21	Diverting valve for cooling
Y25	Maintained boiler return temperature valve opening
Y26	Maintained boiler return temperature valve closing
Y31	DHW primary controller mixing valve opening
Y32	DHW primary controller mixing valve closing
Y33	Instantaneous DHW heater valve opening
Y34	Instantaneous DHW heater valve closing
K6	Electric immersion heater
K5	Air damper modulating burner closing
K8	Solar controlling element buffer
K9	Solar pump ext. heat exchanger
K18	Solar controlling element swimming pool

Legend low-voltage

B1	Flow temperature sensor HK1
B12	Flow temperature sensor HK2
B13	Swimming pool sensor
B2	Boiler temperature sensor TK1
B22	Solid fuel boiler sensor
B3	DHW sensor top
B31	2nd DHW sensor bottom
B35	DHW flow temperature sensor
B36	DHW charging sensor
B38	DHW temperature outlet sensor
B4	Buffer storage tank temperature sensor
B41	Buffer storage tank temperature sensor
B42	Buffer storage tank temperature sensor
B15	Flow sensor primary controller
B39	DHW circulation sensor B39
B6	Collector sensor
B61	Collector sensor 2
B7	Return sensor
B70	Cascade return sensor
B73	Primary circuit return sensor
B8	Flue gas temperature sensor
B9	Outside sensor.
B10	Common flow sensor
RG1	Room unit 1
RG2	Room unit 2
F_S	Flow switch

8 Technical data

8.1 Basic units RVS…

Power supply	Rated voltage	AC 230 V (±10%)
	Rated frequency	50/60 Hz
	Power consumption	RVS43.143: 8.5 VA RVS63.243: 10 VA RVS63.283: 11 VA
	Fusing of supply lines	max. 10 AT
Wiring of terminals	Power supply and outputs	solid wire or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores: 0.5. mm^2..1.5 mm^2 3 cores: Not permitted
Functional data	Software class	A
	Mode of operation to EN 60 730	1.B (automatic)
Inputs	Digital inputs H1 and H2	safety extra low-voltage for potential free low-voltage contacts: voltage with contact open: DC 12 V current with contact closed: DC 3 mA
	Analog input H1, H2	protective extra low-voltage operating range: DC (0...10) V internal resistance: > 100 kΩ
	Mains voltage S3, 4 and EX2	AC 230 V (±10 %) internal resistance: > 100 kΩ
	Sensor input B9	NTC1k (QAC34)
	Sensor inputs B1, B2, B3, B12, BX1, BX2, BX3, BX4	NTC10k (QAZ36, QAD36)
	Sensor inputs BX1…BX4	PT1000 (optionally for collector and flue gas sensor)
	Perm. sensor cables (copper)	
	with cross-sectional area:	0.25 0.5 0.75 1.0 1.5 mm^2
	Max. length:	20 40 60 80 120 m
Outputs	Relay outputs	
	Rated current range	AC 0.02…2 (2) A
	Max. switch-on current	15 A während ≤1 s
	Max. total current (of all relays)	AC 10 A
	Rated voltage range	AC (24...230) V (for potential-free outputs)
	Triac output QX3 (custom solution only)	
	Rated current range	
	On / off operation	AC 0.05…2 (2) A
	Speed control	AC 0.05…0.4 (1) A
	Max. switch-on current	4 A for ≤1 s
	Analogous to output U1	output is short-circuit-proof
	Output voltage	U_{out} = 0 ... 10.0 V
	Current rating	±2 mA RMS; ±2.7 mA peak
	Ripple	≦ 50 mVpp
	Accuracy at zero point	< ± 80 mV
	Error remaining range	≦ 130 mV

Interfaces, cable lengths	BSB	2-wire connection, not interchangeable
	Max. cable length	
	Basic unit – peripheral device	200 m
	Max. total length	400 m (max. cable capacitance) 60 nF)
	Min. cross-sectional area	0.5 mm^2
	LPB	(copper cable 1.5 mm^2, 2-wire **not** interchangeable)
	with bus power supply via controller (per controller)	250 m
	With central bus power supply	460 m
	Bus loading number	E = 3
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP 00
	Safety class to EN 60 730	low-voltage-carrying parts meet the requirements of safety class II, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to IEC721-3-1 class 1K3	temp. -20…65 °C
	Transport to IEC721-3-2 class 2K3	temp. -25…70°C
	Operation to IEC721-3-3 class 3K5	temp. 0...50 °C (non-condensing)
Weight	Without packaging	RVS43.143: 587 g RVS63.283: 648 g

8.2 Extension module AVS75.390

Power supply	Rated voltage	AC 230 V (±10%)
	Bemessungsfrequenz	50/60 Hz
	Power consumption	4 VA
	Fusing of supply lines	max. 10 AT
Wiring of terminals	(Power supply and outputs)	solid wire or stranded wire (twisted or with ferrule): 1 core: 0.5...2.5 mm^2 2 cores 0.5...1.5 mm^2
Functional data	Software class	A
	Mode of operation to EN 60 730	1b (automatic operation)
Inputs	Digital inputs H2	safety extra low-voltage for potential-free low-voltage contacts: voltage with contact open: DC 12 V current with contact closed: DC 3 mA
	Analog input H2	protective extra low-voltage operating range: DC (0...10) V internal resistance: > 100 kΩ
	Mains input L	AC 230 V (±10 %) internal resistance: > 100 kΩ
	Sensor inputs BX6, BX7	NTC10k (QAZ36, QAD36)
	Perm. sensor cables (copper)	
	with cross-sectional area:	0.25 0.5 0.75 1.0 1.5 mm^2
	Max. length:	20 40 60 80 120 m
Outputs	Relay outputs	
	Rated current range	AC 0.02…2 (2) A
	Max. switch-on current	15 A for ≤1 s
	Max. total current (of all relays)	AC 6 A
	Rated voltage range	AC (24...230) V (for potential-free outputs)
Interfaces	BSB	2-wire connection, not interchangeable
	Max. cable length	
	Basic unit – peripheral device	200 m
	Max. total length	400 m (max. cable capacitance) 60 nF)
	Min. cross-sectional area	0.5 mm^2
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP 00
	Safety class to EN 60 730	low-voltage-carrying parts meet the requirements of safety class II, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 60730-2-9
Climatic conditions	Storage to IEC721-3-1 class 1K3	temp. -20…65 °C
	Transport to IEC721-3-2 class 2K3	temp. -25…70°C
	Operation to IEC721-3-3 class 3K5	temp. 0...50 °C (non-condensing)
Weight	Without packaging	293 g

8.3 Operator unit and room units AVS37... / QAA7x… / QAA55..

Power supply	For devices without batteries:	
	Bus power supply	BSB
	For devices with batteries:	
	Batteries	3 pcs
	Type of batteries	1.5 V alkaline, size AA (LR06)
	Battery life	approx. 1.5 years
Room temperature measurement (only with QAA7x...) / QAA55...)	Measuring range	0...50 °C
	According to EN12098:	
	Range 15...25 °C	within tolerance of 0.8 K
	range 0..15 °C or 25...50 °C	within tolerance of 1.0 K
	resolution	1/10 K
Interfaces	AVS37../QAA75../QAA55..	BSB-W, 2-wire connection, not interchangeable
	Max. cable length basic unit – peripheral device	QAA75../QAA55.. = 200 m AVS37.. = 3 m
	QAA78...	BSB-RF frequency band 868 MHz
Degree of protection and safety class	Degree of protection of housing to EN 60 529	IP20 for QAA7../ QAA55.. IP40 for AVS37… IP20 (when mounted) Normal pollution
	Safety class to EN 60 730	low-voltage-carrying parts meet the requirements of safety class III, if correctly installed
	Degree of pollution to EN 60 730	Normal pollution
Standards, safety, EMC, etc.	CE conformity to	
	EMC directive	89/336/EEC
	- Immunity	- EN 61000-6-2
	- Emissions	- EN 61000-6-3
	Low-voltage directive	73/23/EEC
	– Electrical safety	- EN 60730-1, EN 50090-2-2
	Radio	EN 300 220-1 (25-1000MHz)
Climatic conditions	For devices without batteries:	
	Storage to IEC721-3-1 class 1K3	temperature -20…65 °C
	Transport to IEC721-3-2 class 2K3	temperature –20...70 °C
	Operation to IEC721-3-3 class 3K5	temperature 0...50 °C (non-condensing)
	For devices with batteries:	
	Storage to IEC721-3-1 class 1K3	temperature -20…30 °C
	Transport to IEC721-3-2 class 2K3	temperature –20...70 °C
	Operation to IEC721-3-3 class 3K5	temperature 0...50 °C (non-condensing)
Weight	Without packaging	AVS37.294: 160 g QAA75.61x: 170 g QAA55.110: 115 g

8.4 Sensor characteristics

8.4.1 NTC 1 k

T [°C]	R[Ohm]	T [°C]	R[Ohm]	T [°C]	R[Ohm]
-30.0	13,034	0.0	2,857	30.0	827
-29.0	12,324	1.0	2,730	31.0	796
-28.0	11,657	2.0	2,610	32.0	767
-27.0	11,031	3.0	2,496	33.0	740
-26.0	10,442	4.0	2,387	34.0	713
-25.0	9,889	5.0	2,284	35.0	687
-24.0	9,369	6.0	2,186	36.0	663
-23.0	8,880	7.0	2,093	37.0	640
-22.0	8,420	8.0	2,004	38.0	617
-21.0	7,986	9.0	1,920	39.0	595
-20.0	7,578	10.0	1,840	40.0	575
-19.0	7,193	11.0	1,763	41.0	555
-18.0	6,831	12.0	1,690	42.0	536
-17.0	6,489	13.0	1,621	43.0	517
-16.0	6,166	14.0	1,555	44.0	500
-15.0	5,861	15.0	1,492	45.0	483
-14.0	5,574	16.0	1,433	46.0	466
-13.0	5,303	17.0	1,375	47.0	451
-12.0	5,046	18.0	1,320	48.0	436
-11.0	4,804	19.0	1,268	49.0	421
-10.0	4,574	20.0	1,218	50.0	407
-9.0	4,358	21.0	1,170		
-8.0	4,152	22.0	1,125		
-7.0	3,958	23.0	1,081		
-6.0	3,774	24.0	1,040		
-5.0	3,600	25.0	1,000		
-4.0	3,435	26.0	962		
-3.0	3,279	27.0	926		
-2.0	3,131	28.0	892		
-1.0	2,990	29.0	859		

8.4.2 NTC 10 k

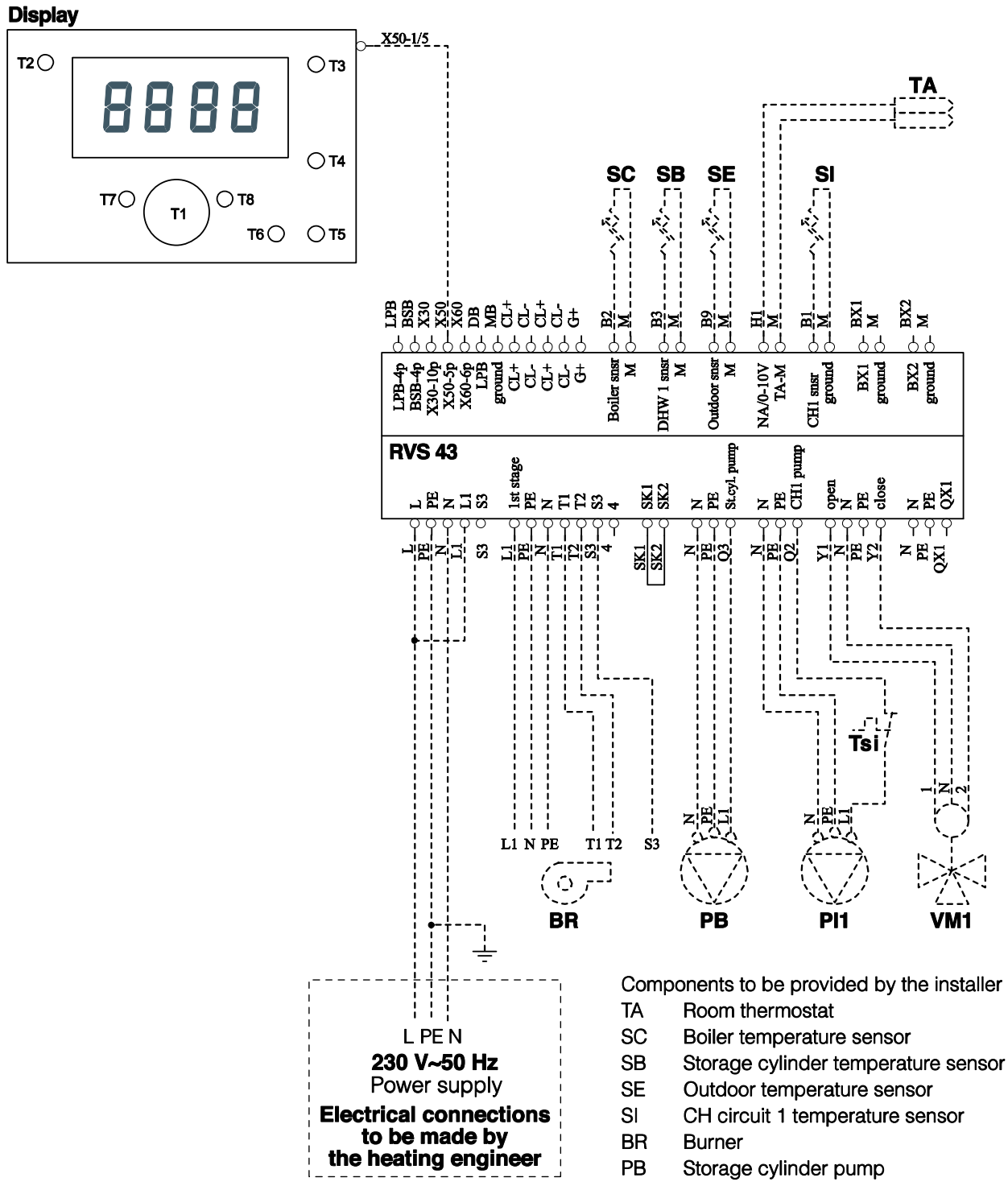
T [°C]	R[Ohm]	T [°C]	R[Ohm]	T [°C]	R[Ohm]
-30.0	175203	50.0	3605	130.0	298
-25.0	129289	55.0	2989	135.0	262
-20.0	96360	60.0	2490	140.0	232
-15.0	72502	65.0	2084	145.0	206
-10.0	55047	70.0	1753	150.0	183
-5.0	42158	75.0	1481	155.0	163
0.0	32555	80.0	1256	160.0	145
5.0	25339	85.0	1070	165.0	130
10.0	19873	90.0	915	170.0	117
15.0	15699	95.0	786	175.0	105
20.0	12488	100.0	677	180.0	95
25.0	10000	105.0	586	185.0	85
30.0	8059	110.0	508	190.0	77
35.0	6535	115.0	443	195.0	70
40.0	5330	120.0	387	200.0	64
45.0	4372	125.0	339		

8.4.3 PT1000

T [°C]	R[Ohm]	T [°C]	R[Ohm]	T [°C]	R[Ohm]
–30	882.2	50	1194.0	130	1498.3
–25	901.9	55	1213.2	135	1517.1
–20	921.6	60	1232.4	140	1535.8
–15	941.2	65	1251.6	145	1554.6
–10	960.9	70	1270.8	150	1573.3
–5	980.4	75	1289.9	155	1591.9
0	1000.0	80	1309.0	160	1610.5
5	1019.5	85	1328.0	165	1629.1
10	1039.0	90	1347.1	170	1647.7
15	1058.5	95	1366.1	175	1666.3
20	1077.9	100	1385.1	180	1684.8
25	1097.3	105	1404.0	185	1703.3
30	1116.7	110	1422.9	190	1721.7
35	1136.1	115	1441.8	195	1740.2
40	1155.4	120	1460.7	200	1758.6
45	1174.7	125	1479.5		

TYPICAL COMPONENT CONNECTION DIAGRAM FOR SYSTEM WITH

RVS 43...



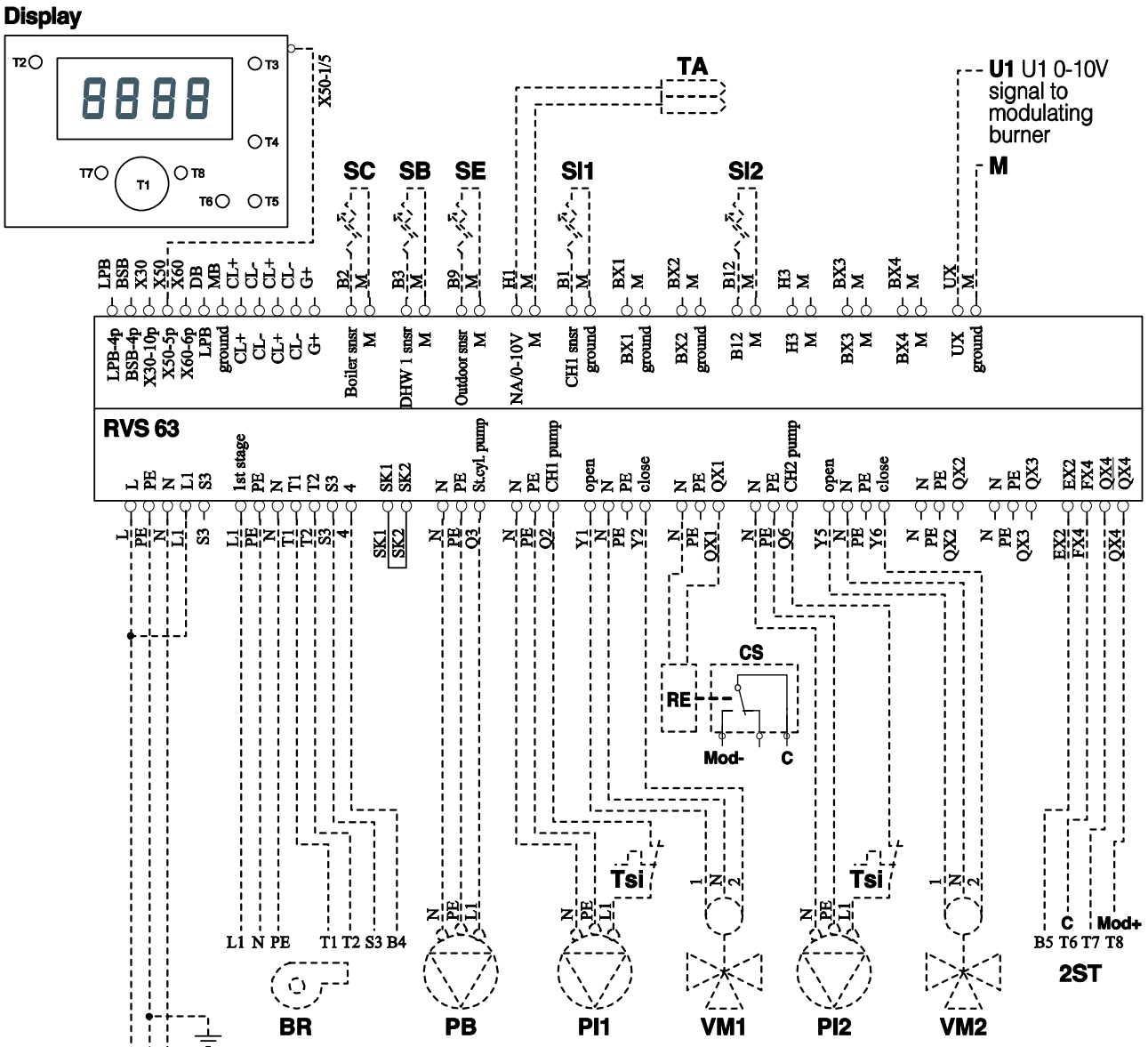
Components to be provided by the installer

TA	Room thermostat
SC	Boiler temperature sensor
SB	Storage cylinder temperature sensor
SE	Outdoor temperature sensor
SI	CH circuit 1 temperature sensor
BR	Burner
PB	Storage cylinder pump
PI1	CH circuit 1 pump
VM1	CH circuit 1 mixer valve
Tsi	CH system safety thermostat

NB. Connect up the various components to suit the type of boiler and the configuration of the individual central heating system.
Check the electrical connections to the components and to the burner, referring to the instructions provided with each item.

TYPICAL COMPONENT CONNECTION DIAGRAM FOR SYSTEM WITH

RVS 63...



NB. Connect up the various components to suit the type of boiler and the configuration of the individual central heating system. Check the electrical connections to the components and to the burner, referring to the instructions provided with each item. If a modulating burner with a three position controller is installed (with a dry contact for increasing heat output and a dry contact for reducing heat output) an interface relay must be fitted as shown in the wiring diagram.

Components to be provided by the installer

- TA Room thermostat
- SC Boiler temperature sensor
- SB Storage cylinder temperature sensor
- SE Outdoor temperature sensor
- SI1 CH circuit 1 temperature sensor
- SI2 CH circuit 2 temperature sensor
- BR Burner (T1-T2 1st stage ON)
- 2ST Second burner stage (T6-T8 2nd stage ON)
  For increasing heat output from a three position modulating burner (C Mod+)
- CS Switch contacts
- RE Relay coil

  For reducing heat output from a three position modulating burner (C Mod-)
- PB Storage cylinder pump
- PI1 CH circuit 1 pump
- VM1 CH circuit 1 mixer valve
- PI2 CH circuit 2 pump
- VM2 CH circuit 2 mixer valve
- Tsi CH system safety thermostat