Automation System TROVIS 5400
Heating and District Heating Controller
TROVIS 5475-2

SAMSON

$C\epsilon$

Fig. 1 · TROVIS 5475-2

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> Assembly, start-up and operation of the device may only be performed by trained and experienced personnel familiar with this product. Proper shipping and appropriate storage are assumed.
>
> The controller is designed for use in power installations. For connection and maintenance you are required to observe the relevant safety regulations.

1. General

The heating and district heating controller is designed for weather-compensated flow temperature control. This means it controls the flow temperature of a heating system based on a heating characteristic so that the room temperature is always maintained at the desired level regardless of the outdoor temperature. When used as a district heating controller, the controller can limit the return flow temperature variably according to the outdoor temperature.

A drinking water heating system may be operated from the primary heating circuit, using a second control loop, or from the secondary heating circuit.

A differential temperature control featuring a meter tracking the operating hours of the solar circuit pump is included in three system configurations for the solar heating of drinking water storage tanks.

The connected sensors allow the controller to measure the respective temperatures which are transmitted to the central signal processing system. Subsequently, this system issues a three-step or on/off control signal corresponding to the preset set points for each of the two control loops.

In addition, the controller controls the heating circulation pump and the pumps for drinking water heating. The signal from a heat meter that is proportional to the flow rate or capacity can be connected to a pulse or current input. This enables the limitation of a maximum and/or minimum flow rate or capacity.

These mounting and operating instructions are valid for:

Firmware version 1.0 upwards
(The firmware version installed appears for 2 seconds in the display when the controller is switched on)

What's new compared to the previous version?

The circulation pump ZP runs on a time schedule in all systems.

1.1 Notes for the user

The installation of the controller and its electrical connection described in the following and, must be carried out by authorized personnel only.

The settings for configurations described in chapter 7.1 also require specialized knowledge of heating systems and should only be performed by an expert. This also applies for the description of the controller functions and system configurations described in chapter 4 and 5.

The start-up of the controller is normally carried out by authorized personnel – all configuration data should be entered into the configured data tables in chapter 9.

The controller is programmed with default temperature values and time schedules that can be changed on start-up or by the user at a later date over the menu described in chapter 7.2.2.

The settings for the end user and non-expert should be restricted to changing the heating's flow temperature to increase or decrease room temperatures (chapter 6.3.3 on page 37) and changing the set times-of-use (chapter 7.2.2 on page 51).

The current time and date are saved in memory for at least 24 hours when the controller is left unconnected to the power supply. Other configuration data are stored in memory indefinitely and cannot be lost.

1.1 Technical data

Inputs	
Sensor inputs	Max. 7 PTC and Pt 100 or NTC and Pt 100, or Pt 1000 and Pt 100 sensors 2-wire circuit (heating circuit/drinking water circuit) 2 flow temperature sensors, alternatively 1 solar collector sensor 1 room temperature sensor 1 outdoor temperature sensor[1] 1 return flow temperature sensor (2 in system code no. 4) 2 storage tank temperature sensors
Binary inputs	Storage tank thermostat
Additional inputs	Current input 4(0)...20 mA for flow rate limitation or pulse counting input for limitation of capacity or flow rate Current input 4(0)...20 mA for outdoor temperature Remote control option for correcting flow temperature and selecting the operating mode
Outputs	
Control signal y	Three-step signals: max. load 250 V AC, 2 A; min. 10 mA, varistor suppression 300 V On/off signal: max. load 250 V AC, 2 A; min. 10 mA, varistor suppression 300 V
Binary outputs	Max. 4 outputs for pump control Load: max. 250 V AC, 2 A min. 10 mA, varistor suppression 300 V
Control parameters	$K_p = 0.1...50$; $T_n = 1...999$ s; valve transit time $T_y = 15...240$ s
Operating voltage	230 V AC (+10 %/−15 %), 48 to 62 Hz, Power failure: All parameter and configuration data are saved in an EEPROM.
Power consumption	Approx. 1.5 VA
Temperature range	Operation: 0...40 Storage: −20 to 60 °C[1]
Degree and class of protection	IP 40 according to IEC 529 and II according to VDE 0106
Degree of contamination	2 according to VDE 0110
Overvoltage category	II according to VDE 0110
Humidity rating	F according to VDE 40040
Noise immunity	Corresponding to EN 50082 Part 1
Noise emission	Corresponding to EN 50081 Part 1
Weight approx.	0.5 kg

[1]   On using Pt100 or Pt100 resistance thermometers, permissible temperature range down to −65 °C, however, display only indicates down to −40 °C

CAUTION

Safety features such as frost protection monitoring and excess temperature protection are not active in the following cases:

- Defective heating controller and failure of its functions
- Sensors are faulty, not connected or have not been deactivated
- No power supply to the controller
- Mode switch set to manual operation

1.2 Sensor resistance values

Resistance thermometer with PTC measuring element

Sensors for outdoor temperature Type 5224, for flow and return flow temperature Types 5264 and 5265, for storage tank temperature Type 5264, sensor for room temperature with remote control Type 5244

°C	−20	−10	0	+10	+20	+25	+30	+40	+50	+60	+70	+80	+90	+100	+110	+120
Ohm	694	757	825	896	971	1010	1050	1132	1219	1309	1402	1500	1601	1706	1815	1925

Room temperature sensor with remote control Type 5244	Switch position "clock", terminals 1 and 2					°C	+10	+15	+20	+25	+30
						Ohm	679	699	720	741	762

Resistance thermometer with Pt 100 measuring element

Sensors for outdoor temperature Type 5225, for flow and return flow temperature Types 5204 and 5205-47, for storage tank temperature Types 5205-46 and 5205-48, sensor for room temperature Type 5255

°C	-35	-30	-25	-20	-15	-10	-5	0	5	10
Ohm	86.25	88.22	90.19	92.16	94.12	96.09	98.04	100.00	101.95	103.90
°C	15	20	25	30	35	40	45	50	55	60
Ohm	105.85	107.79	109.73	111.67	113.61	115.54	117.47	119.40	121.32	123.24
°C	65	70	75	80	85	90	95	100	105	110
Ohm	125.16	127.07	128.98	130.89	132.80	134.70	136.60	138.50	140.39	142.29
°C	115	120	125	130	135	140	145	150		
Ohm	144.17	146.06	147.94	149.82	151.70	153.58	155.45	157.31		

Resistance values with Pt1000 measuring element

Use the resistance values in the table for the Pt100 and multiply the values by the factor of 10.

Sensor for outdoor temperature Type 5227, for flow and return flow temperature Types 5207-21, 5207-27, 5277 (thermowells required) and Type 5267 (surface sensor),
for storage tank temperature Type 5207-46 and Type 5207-48,
sensor for room temperature Type 5257-1,
room temperature sensor with remote control Type 5257-4.

2. Installation
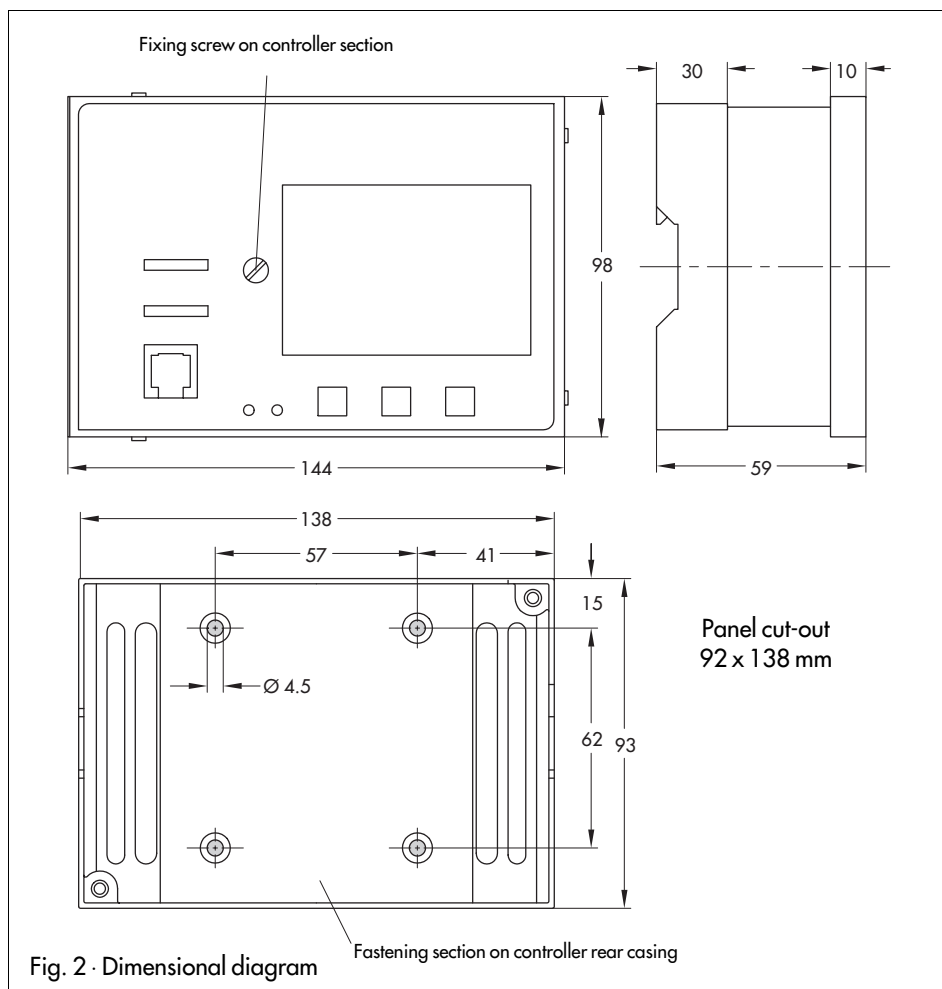
2.1 Installing the controller

The controller is made up of the controller casing which contains the electronics components and the rear casing section with the terminal blocks. To connect the controller, remove the screws on the front panel and separate the controller housing from the rear casing.

For wall mounting, use four screws to mount the rear casing to a wall. The distances between the holes are shown in Fig. 2.

For top hat rail mounting, mount the controller onto the top hat rail using the spring-mounted hook on the rear casing.

For panel mounting, push the controller casing through the panel cut-out (92 x 138 mm) and insert the fastening clips (delivered with the controller) into the notches at the top and bottom of the casing. Then turn the threaded bolts in the direction of the control panel so that the casing is pressed with its front frame against the control panel.

Fig. 2 · Dimensional diagram

2.2 Installing the sensors

2.2.1 Outdoor sensor

Use two screws to mount the outdoor sensor to the outside wall at an appropriate place. Make sure that the sensor is mounted away from direct heat sources (windows, vents etc.). In case of single family dwellings, preferably mount the sensor on the wall at the side of the house where the most frequently occupied rooms are situated.

2.2.2 Flow/return flow sensor

Mount the sensor as duct sensor or surface sensor in an easily accessible location near the control valve:

Duct sensor: Insert the duct sensor into a thermowell as far as it will go.

Surface sensor: Remove insulation from the flow pipe where the sensor is to be mounted and polish the pipe clean. Firmly press the sensor onto the pipe and secure it to the pipe using the enclosed tightening strap.

2.2.3 Room sensor

Mount the sensor on the wall approx. 150 cm above the floor at an appropriate place. Make sure that the air circulation is not obstructed by cupboards, curtains or similar items.

3. Electrical connections

3.1 General

⚠ **CAUTION!**
For wiring and connection of the controller, you are required to observe the VDE regulations and the regulations of the local power supply company. For this reason, this type of work must be carried out by a specialist.

- Use separate cables for 230 V supply line and the signal lines!
- Also use separate cables for the digital signal lines (bus lines) and the analog signal lines (sensor lines).
- In systems with a high electromagnetic noise level, we recommend that shielded cables be used for the analog signal lines.
  Ground the shield at the inlet or outlet of the control cabinet, using the largest possible cross section and via the shortest possible route.
  The central grounding point must be connected to the grounding conductor using a min. $10 \, mm^2$ cable.
  As a rule, the shield needs only be grounded on one side at the control cabinet inlet, except when an equipotential bonding exists that has much lower resistance than the shield resistance.
- To increase the noise immunity, make sure that there is a minimum distance of 10 cm between the power cables and signal lines. We recommend that this distance between these lines is also kept in the control cabinet!
- Inductances in the control cabinet, e.g. contactor coils, must be equipped with suitable interference suppressors (RC elements)!
  Control cabinet elements with a high field strength, e.g. transformers or frequency converters, should be shielded by means of separators that have good chassis ground.

Surge protection

The following measures must be taken if lines are installed outside of the building or over long distances:

- The shield of signal lines routed outside of buildings must have current carrying capacity and must be grounded on both sides.
- Surge diverters must be installed at the control cabinet inlet.

3.2 Connecting the controller

Connect the controller on the basis of the relevant terminal diagrams of the associated system code numbers (Fig. 3 to 10).

The power supply section of the controller – terminals 14 to 26 – must be connected using wires with a cross-section of 1.5 mm^2 at the minimum.

Knock out the holes marked on the rear casing for the cable entries and insert the enclosed self-sealed grommets or suitable glands.
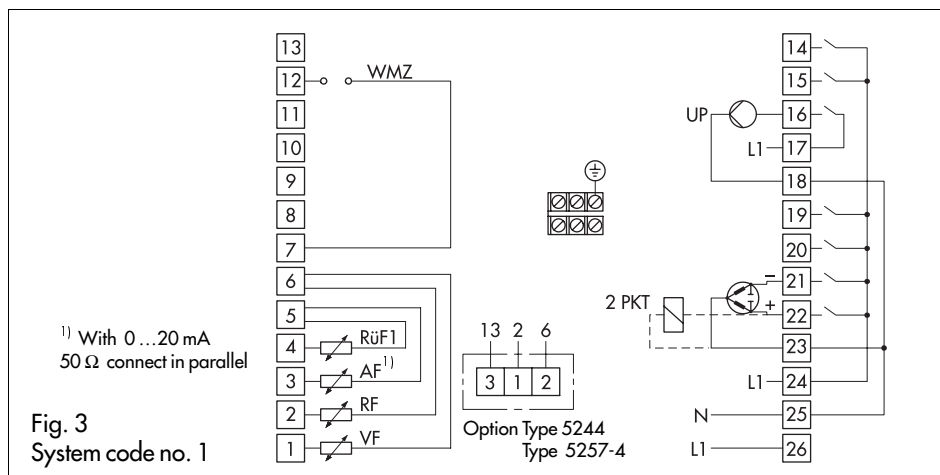
3.3 Connecting the sensors
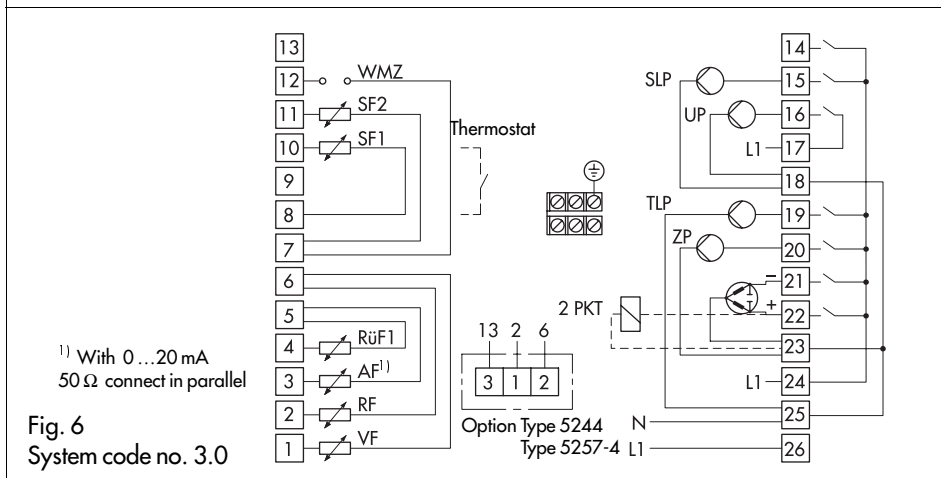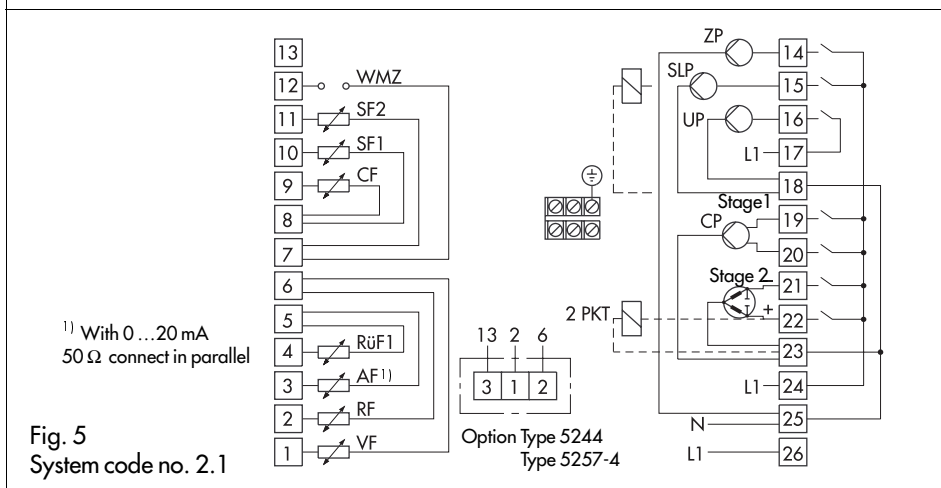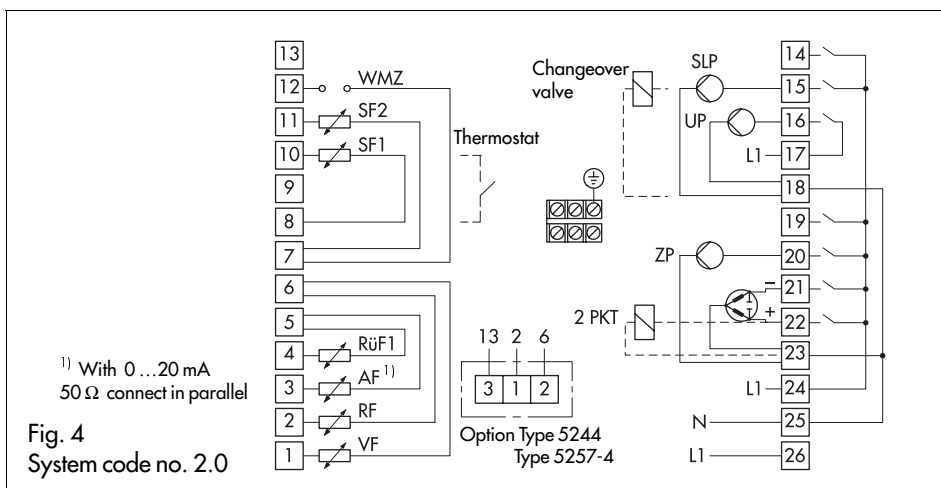
Connect the cables with a cross-section of min. 0.5 mm^2 to the terminal strip – terminals 1 to 13 – on the rear casing. See chapter 7.1.4 for Pt100 (Pt1000/PTC) on sensor calibration.

3.4 Terminal wiring diagrams

Legend for circuit diagrams:
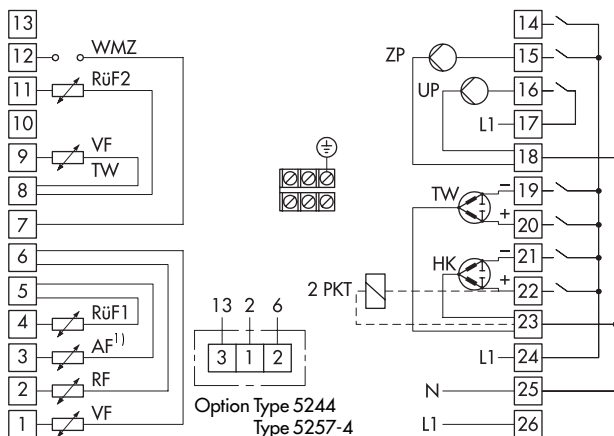
AF	Outdoor sensor	SLP	Storage tank charging pump
RF	Room sensor	UP	Circulation pump of heating circuit
RÜF	Return flow sensor	ZP	Circulation pump of drinking water circuit
SF	Storage tank sensor	WMZ	Heat meter
VF	Flow sensor	Solar circuit:	
TW	Drinking water circuit	CF	Solar circuit collector sensor
HK	Heating circuit	CP	Solar circuit pump
2 PKT	On/off		

Fig. 3
System code no. 1

$^{1)}$ With 0 …20 mA 50 Ω connect in parallel

Option Type 5244
Type 5257-4

9

Fig. 4
System code no. 2.0

1) With 0…20 mA
50 Ω connect in parallel

Fig. 5
System code no. 2.1

1) With 0…20 mA
50 Ω connect in parallel

Fig. 6
System code no. 3.0

1) With 0…20 mA
50 Ω connect in parallel

10

Fig. 7

13
12 — WMZ
11 — RüF2
10
9 — VF
8 — TW
7
6
5
4 — RüF1
3 — AF[1]
2 — RF
1 — VF

ZP — 14 / 15
UP — 16 / 17
L1 — 18
TW — 19 / 20
HK — 21 / 22
2 PKT — 23
L1 — 24
N — 25
L1 — 26

13 2 6
3 1 2
Option Type 5244
Type 5257-4

[1] With 0 …20 mA
50 Ω connect in parallel

Fig. 7
System code no. 4.0

Fig. 8

13
12 — WMZ
11 — CF
10 — SF2
9 — SF1
8
7
6
5
4 — RüF1
3 — AF[1]
2 — RF
1 — VF

CP — 14
ZP — 15
UP — 16 / 17
L1 — 18
TW — 19 / 20
HK — 21 / 22
2 PKT — 23
L1 — 24
N — 25
L1 — 26

13 2 6
3 1 2
Option Type 5244
Type 5257-4
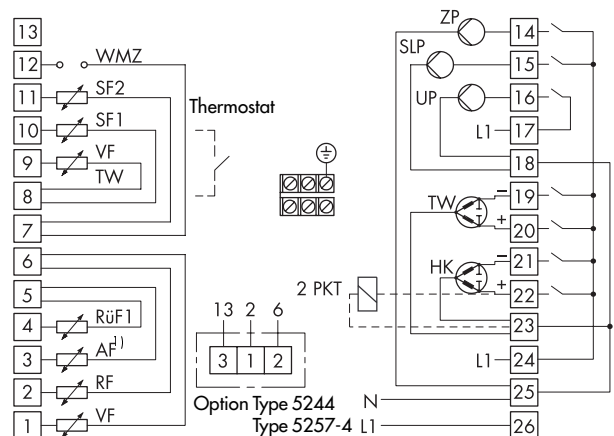
[1] With 0 …20 mA
50 Ω connect in parallel

Fig. 8
System code nos. 4.1, 4.2

Fig. 9

13
12 — WMZ
11 — SF2
10 — SF1
9 — VF
8 — TW
7
6
5
4 — RüF1
3 — AF[1]
2 — RF
1 — VF

Thermostat

ZP — 14
SLP — 15
UP — 16 / 17
18
TW — 19 / 20
HK — 21 / 22
2 PKT — 23
L1 — 24
N — 25
L1 — 26

13 2 6
3 1 2
Option Type 5244
Type 5257-4

[1] With 0 …20 mA
50 Ω connect in parallel

Fig. 9
System code no. 5.0

11

Fig. 10
System code no. 6.0

* Fast-reacting sensor/actuator

1) With 0 …20 mA 50 Ω connect in parallel

Option Type 5244
Type 5257-4

12

4. Description of the controller functions

The following function descriptions are intended to help you understand the settings required for operation.
The controller functions depend on the selected system code numbers (1 to 6). See chapter 5 for details.

4.1 Optimize

The controller is capable of automatically determining the most favorable times for activation/deactivation of the heating system in periodically occupied buildings. To activate this function, select function block setting FB 0 = ON (linked to FB 13 = ON).
In contrast to the reduced operation, the heating system is deactivated at the latest when the time of non-use starts. A reference room with an installed room temperature sensor is monitored in place of the entire building. Whenever the room temperature falls below an adjustable 'Sustained temperature', the controller activates the heating until the temperature exceeds the sustained temperature (plus approx. 0.5°C differential gap) again. To achieve this, the system can be run at the maximum permissible flow temperature.
The controller determines when the heating should be activated to start rated operation of the system so that the 'Room temperature set point' (temperature adjustable at the controller) is just reached when the set time-of-use begins. The heating may be activated up to 6 hours before the set time-of-use begins (this is the case on start-up as the controller has not yet stored any information concerning the building characteristics).

Drinking water is not heated in system code numbers 2 and 3 during the preheating time. The controller determines when the heating is to be deactivated so that the temperature does not fall significantly below the desired room temperature towards the end of time-of-use due to the heating being deactivated before the time-of-use ends (e.g. direct sunlight can cause an increase in room temperature, especially if the flash adaptation is not used, and this in turn leads to the system being deactivated too soon). The heating may be deactivated up to 2 hours before the set time-of-use ends.
If 2 rated operation times are set for one day, the controller does not monitor the 'Sustained temperature', but a 'Reduced room temperature set point' (the temperature adjustable at the controller) between both time blocks.

4.2 Adaptation

The controller is capable of automatically adapting the heating characteristic to the building characteristics. Based on the default heating characteristic (gradient value 1.8), a reference room with an installed room temperature sensor is monitored in place of the entire building. If the measured room temperature deviates from the adjustable 'Room temperature set point' on the average during the time-of-use when the mode switch is set to ○ – , the subsequent rated operation time is based on the altered heating characteristic gradient, provided the function block setting is set to FB 1 = ON. The corrected value is displayed in the parameter level as 'Gradient of the heating'; this parameter cannot be accessed to change it manually when the adaptation mode (FB = 1) is selected.
Immediate responses to deviations in room temperature can be achieved using the function block setting FB 2 = ON: the flash adaptation compensates for deviations in room temperature during time-of-use when the mode switch is set to ○ – , by lowering or raising the heating characteristic by up to 30 °C (parallel displacement of the heating characteristic). Combined with adaptation mode (FB 1 = ON), a maximum displacement of 5 °C is designated.

The displacement is displayed as 'Level of the heating characteristic'; this parameter cannot be accessed to adjust it manually when the flash adaptation mode (FB 2 = ON) is selected.

The options on the controller and remote control to correct the set point apply to the room temperature set point in adaptation/flash adaptation mode.

4.3 Reduced operation

In reduced operation, the heating circuit generally operates on a flow temperature set point value defined by the heating characteristic and reduced by the value set under 'Set-back of flow temperature for reduced operation'. If, however, during times of non-use, the outdoor temperature exceeds the value entered as the 'Outdoor temperature limit value for deactivation in reduced operation', the controller automatically deactivates the heating system by closing the control valve, and the heating circulation pump UP is deactivated after the set lag time has elapsed. If the outdoor temperature falls below the limit value (approx. 0.5 °C differential gap), the heating system immediately starts operating again.

If the outdoor temperature falls below the 'Outdoor temperature limit value for reactivation of rated operation in reduced operation' during times of non-use, the value set under 'Set-back of flow temperature for reduced operation' is ignored: the flow set point for rated operation is used.

4.4 Summer time operation

In summer time operation, the controller automatically deactivates the heating system, by closing the control valve and the heating circulation pump UP is switched off after the set lag time has elapsed.

The outdoor temperature is the decisive factor for the start of summer time operation. If it exceeds the parameter 'Outdoor temperature limit value for summer time operation' (default setting: 22 °C; setting range: 0...50 °C), summer time operation is directly activated.

When this limit value (approx. 0.5 °C differential gap) is not reached, the heating immediately starts operating again.

The 'Time-controlled summer time operation' function is linked to the setting the function block FB 3 = ON and only activated when the mode switch is set to ○ .

The decisive factors for time-controlled summer time operation to become active are:

–   The current date. If it lies within the effective time period of summer time operation (settings in the configuration level linked to the function block setting FB 3 = ON. Default: 01.06. to 30.09.)

–   The daytime mean temperature (measured between 7:00 and 22:00 hrs) exceeds the outdoor temperature limit value on the corresponding number of subsequent days (settings in the configuration level linked to the function block setting FB 3 = ON. Default: outdoor temperature limit value 18 °C – setting range 0 to 30 °C – and 2 days to activate the time-controlled summer time operation – setting range 1...3)

If the time-controlled summer time operation is active, heating operation will not start even at lower outdoor temperatures when the time-of-use starts.

The time-controlled summer time operation is only deactivated when the daytime mean temperature falls below the outdoor temperature limit value on the corresponding number of subsequent days.

(Setting in the configuration level linked to the function block setting FB 3 = ON. Default: 1 day to deactivate the time-controlled summer time operation – setting range 1...3)

If the heating system is also deactivated due to the parameters 'Outdoor temperature limit value for summer time operation' and the 'Time-controlled summer time operation', the heating is not reactivated when the temperature falls by approx. 0.5 °C below the values in the above mentioned parameters.

Info display about the time-controlled summer time operation.

If the display of the outdoor temperature is selected (function block FB 3 = ON) in the operating level when the summer time operation is activated and the ⌘ key is held down, the daytime mean temperature is displayed.

The bars at the top of the display show the temperature curve over the past 8 days. The black areas show where the temperature exceeded the limit value and the empty areas where the temperature fell below the limit value. A black area marked 1, for example, means that the outdoor temperature limit was exceeded on average on the previous day.

4.5 Automatic clock reset summer time/winter time

When you set the function block FB 5 = ON, the controller automatically resets the clock on the last Sunday in March from 2:00 to 3:00 hrs and on the last Sunday in October from 3:00 to 2:00 hrs.

4.6 Public holidays and vacations

The controller lets you define 20 public holidays and 10 vacation periods (parameter level). There is no default setting for public holidays.

On public holidays, the heating system operates based on the data entered for Sundays (heating time schedule); during vacations, the heating runs in reduced or standby operation.

The drinking water heating is not affected by public holidays and vacations when the controller operates using default settings. When you activate the function block FB 6 = ON, the drinking water heating will then operate on public holidays using the same time schedule entered for Sundays (time schedule for drinking water heating). Subsequently, the drinking water heating is then not active during vacations (frost protection monitoring from +5 °C downwards).

4.7 Delayed outdoor temperature adaptation

This function is used to determine the flow temperature set point using a calculated outdoor temperature which is delayed either:

a) only when the outdoor temperature decreases, or

b) regardless of the outdoor temperature.

For instance, if the outdoor temperature varies by 12 °C within a very short time , the 'Calculated outdoor temperature' is adapted to the outdoor temperature in small steps over a time period of 4 hours with a delay setting of 3 °C/hr. This function helps to prevent heating system overloads in combination with overheated buildings, or temporarily insufficient heating due to short-term outdoor temperature variations, e.g. caused by warm winds or excessive solar radi-

ation on the outdoor temperature sensors.

An active delayed outdoor temperature adaptation is signalized in the operating level by a blinking outdoor temperature in the display. When you keep ⊠ key pressed down, the 'Calculated outdoor temperature' is shown in the display.

If the function 'Time-controlled summer time operation' (FB 3 = ON) is activated, the calculated outdoor temperature is not indicated in the display.

4.8 Limitation of the return flow temperature

For an economical operation of a district heating system, it is required that as much heat as possible be extracted from the heat transfer medium (water) circulating through the system. The difference in temperature between the flow and return flow in the network is used to indicate how much energy is being consumed: a large difference in temperature indicates a high level of energy efficiency and a small difference indicates a low level of energy efficiency. One return flow temperature sensor is sufficient to evaluate the difference in temperature when the flow temperature in the network is predetermined.

The function is as follows: the return flow temperature can either be limited depending on the outdoor temperature (variable) or by a fixed value. If the return flow temperature measured at the return flow sensor RüF1 exceeds the limit value calculated from the set return flow characteristic or the fixed limitation value by the value x, the respective calculated or fixed set point (flow temperature of heating, charging temperature) is reduced by the value x, multiplied by return flow temperature limitation factor. As a result, the primary flow rate is reduced with the effect that the return flow temperature drops. Both the measured value of the 'Return flow temperature' and the set point (flow temperature of heating, charging temperature) blink in the display when a limitation case occurs. The function is already activated by the function block setting FB 20 = ON.

In system code numbers 2 and 3 (drinking water heating implemented in the secondary circuit), the controller switches during the heating up of drinking water over to the parameter 'Return flow limitation temperature during drinking water heating' from the return flow temperature limitation value (calculated from the return flow temperature limitation characteristic). This ensures that the return flow limitation temperature in the heating circuit can be held low in the seasonal interim period.

In system code number 4, a separate return flow temperature limitation in the drinking water circuit is additionally possible, provided FB 21 = ON.

System code number 5 allows you to include the return flow temperature of the drinking water circuit. For this purpose, the return flow temperature sensor must be mounted in a return flow pipe used in both circuits, and the function block FB 21 must be activated (ON). When FB 21 is activated (ON), the parameter 'Return flow limitation temperature during drinking water heating' (the temperature is adjustable at the controller) is activated. When drinking water is being heated, the highest value from both return flow temperature limitation values (heating circuit and drinking water circuit) is used for the limitation control. When a limitation occurs, both the set point in the heating circuit and the set point in the drinking water circuit are reduced. If the priority for drinking water through set-back operation is additionally activated (FB 8 = ON, setting "Ab"), the reduced heating circuit set point is also further reduced when a limitation occurs!

In system code number 6, a return flow temperature limitation is only possible in the heating circuit.

4.9 Limitation of the system deviation for OPEN signal

When using the controller for steam pressure control, we recommend that you activate this function. It limits the controller's reaction to set point deviations which cause the control valve to open. This makes it much easier to start up such systems without complications. The controller's response to set point deviations which cause the control valve to close are not affected by this function.

In the system code numbers 1, 2 and 3, the function must be activated via FB 11 = ON.

In the system code numbers 4, 5 and 6 set
FB 11 = ON to activate the function linked to the heating circuit, and
FB 12 = ON to activate the function linked to the drinking water circuit.

4.10 Forced charging of drinking water storage tank

Systems 2, 3 and 5 are equipped with this function as standard, provided that a storage tank sensor (not a storage tank thermostat) is used.

To guarantee sufficient charging of the drinking water storage tank at the time when the rated operation of the heating circuit begins (or when the preheating period in the optimize mode begins), forced charging commences one hour before the time-of-use set of the heating circuit begins (or one hour before the preheating period in the optimize mode), provided that the time-of-use of the drinking water circuit does not end as the time-of-use the heating circuit starts.

The drinking water heating finishes as usual when the temperature 'Drinking water heating OFF' is reached.

4.11 Thermal disinfection of the drinking water storage tank

This function cannot be used in conjunction with a storage tank thermostat.

The thermal disinfection is first activated by the function block setting FB 7 = ON. You can select whether the thermal disinfection should run on a certain day of the week or daily.

Drinking water heating is started on the days concerned at the start time set to heat up the water to disinfect it. The thermal disinfection finishes at the stop time set at the latest.

(Settings in the configuration level, linked to function block setting FB 7 = ON. Default: week day 3 – Wednesday; start time 0:00 hrs, stop time 4:00 hrs, these times can be changed in 30 min. steps; deactivating temperature 70 °C, setting range 60 to 90 °C).

Systems 2, 3 and 5 function with a 5 °C higher deactivating temperature for charging the storage tank. In System 4, the drinking water set point corresponds to the deactivating temperature +5 °C; however, thermal disinfection also finishes when the deactivating temperature in the storage tank is reached.

If the required temperature in the storage tank is not reached before the stop time, the thermal disinfection procedure is interrupted. However, the return flow temperature in the drinking water circuit is not limited by it.

A parallel pump operation selected using the parameter FB 9 = ON is not carried out during thermal disinfection. The procedure of thermal disinfection is also not interrupted by an intermediate heating operation (systems 2 and 3). The circulation pump remains in operation – contrary to the default drinking water heating – in systems 2 and 4 during the thermal disinfection !

4.12 Frost protection

Generally, the heating circuit circulation pump UP is activated when the outdoor temperature falls below +3 °C. A flow temperature set point of 10 °C is used for control.

The drinking water circuit circulation pump ZP is likewise activated, provided that storage tank charging is not taking place. Outside of rated operation times for drinking water heating, the temperature of the drinking water storage tanks is additionally kept at 5 °C, provided that a storage tank thermostat is not used. In conjunction with a storage tank thermostat, there is no frost protection outside of rated operation times for drinking water heating.

Note: There is no frost protection when mode switch is set to manual!

4.13 Defective sensors – ¦ symbol appears in the display

The following described controller behavior in the event of a defect refers to a definite short-circuit and clear interruption in the sensor wiring.

Safety functions such as frost protection and excess temperature protection are therefore guaranteed when a sensor fails.

Outdoor temperature sensor AF:
If the outdoor sensor is defect, the controller either regulates a flow temperature set point of 50 °C or the maximum flow temperature, provided it is smaller than 50 °C.

Flow temperature sensor VF: If this flow sensor fails, the controller continues to operate in the last position the valve assumed.

Flow temperature sensor for drinking water circuit VF TW, (SF1 in systems 4.1, 4.2): If this sensor fails, the drinking water circuit is deactivated; the control valve of the drinking water circuit remains closed.

Return flow temperature sensor RüF: If the return flow sensor fails, the control system functions without return flow temperature limitation.

Room temperature sensor RF: If this sensor fails, the controller functions according to the settings for operation without room sensor, i.e. it switches from the optimize mode to reduced operation. If the adaptation mode has been activated, the heating characteristic most recently determined remains unchanged.

Storage tank temperature sensor SF1 and SF 2: If one of the two sensors fails, storage tank charging is not carried out anymore.

Solar circuit sensor SF2 and CF: If one of the two sensors fails, the solar circuit pump is switched off.

4.14 Forced operation of the pumps

If the pumps are not used, they are protected from blocking by forced operation. If the heating circuit circulation pump UP, the storage tank charging pump SLP or the heat exchanger charging pump are not activated within 24 hours, they are force-operated for one minute as follows: The circulation pump then starts at 12:00 hrs, storage tank charging pump and the heat exchanger charging pumps start at 12:01 hrs.

4.15 Limitation of flow rate or capacity

The TROVIS 5475-2 Heating and District Heating Controller can be used in conjunction with heat meters to limit the flow rate or capacity.

To be able to limit the flow rate based on a 0 or 4-20 mA signal issued by heat meters, the heat meters must be equipped with high-resolution measuring technology, especially the flow measuring element, and the signal must reflect the measured value with a delay time of less than 5 seconds, if necessary, caused by signal averaging.

You can activate/deactivate function block FB 22 = ON and FB 23 = ON to determine the signal range (0 or 4 to 20 mA), the upper measuring range value (the flow rate flowing through the flow measuring element at 20 mA signal), the required minimum limit value (creep feed rate) and the maximum limit value.

When the flow rate in control operation reaches the set maximum limit value, the controller switches to flow rate control with the maximum limit value as the set point; the flow temperature control then takes over from the flow rate control when the temperature at the flow sensor VF exceeds the current set point by 5 K. In system code numbers 4 to 6, the heating circuit valve is preferably controlled via flow rate.

When the flow rate in control operation falls below the set minimum limit value, the control valve of the heating circuit is temporarily closed. The control operation is first started again when the temperature at the flow sensor VF falls below the current set point by 5 K.

Alternatively, the flow rate or capacity can also be limited based on a pulse signal 3 to 500 pulse/hour from the heat meter.

The function block settings FB 22 = OFF and FB 23 = ON determine the maximum pulse rate to be limited for the mere heating operation and for drinking water heating as well as the associated influencing factors.

Since the readout of the current pulse rate – which also includes the flow rate registered in the controller or the capacity registered in the controller – is calculated as a function of the distance in time between the incoming pulses, it is natural that sudden surges in flow rate or capacity cannot be directly registered by the controller. This applies particularly to low pulse rates!

If the pulse rate P in control operation reaches the set maximum limit, the set point of the corresponding control loop is reduced. The severity of the intervention can be determined by changing the associated influencing factor.

In system code numbers 4 to 6, the set point of the control loop with a lower limit value is reduced in principle by the pulse rate limitation.

Determining P [pulse/hr]:

For example, if a heat meter issues one pulse per kilowatt hour (resolution = 1 kWh/pulse), the maximum pulse rate P [pulse/hr] must be set as described below for a desired limitation to P = 30 kW:

P [pulse/hr] = P [kW] / resolution [kWh/pulse]

P [pulse/hr] = 30 kW / 1 kWh/pulse = 30 pulse/hr

5. System descriptions and diagrams

Introduction

The system diagrams show possible connections for safety equipment as an example. These examples are represented by dot-dash lines.

Should a temperature regulator (TR) or safety temperature monitor (STM) or additionally a pressure limiter (PL) be required, you must use a control valve with fail-safe action that complies with DIN 32730.

The heating circuit must be equipped with a TR/STM combination if it is stipulated in DIN 4747 Part 1.

A Pressure Limiter (PL) must be installed if DIN 4751 requires it.

You are required to install a TR/STL combination in a primary drinking water heating circuit, if required by DIN 4753.

5.1 System code number 1.0, only heating

Weather-compensated flow temperature control with variable limitation of the return flow temperature

Fig. 11 · **Anl 1** (system code number 1.0)

5.2 System code number 2.0

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating in a storage tank system
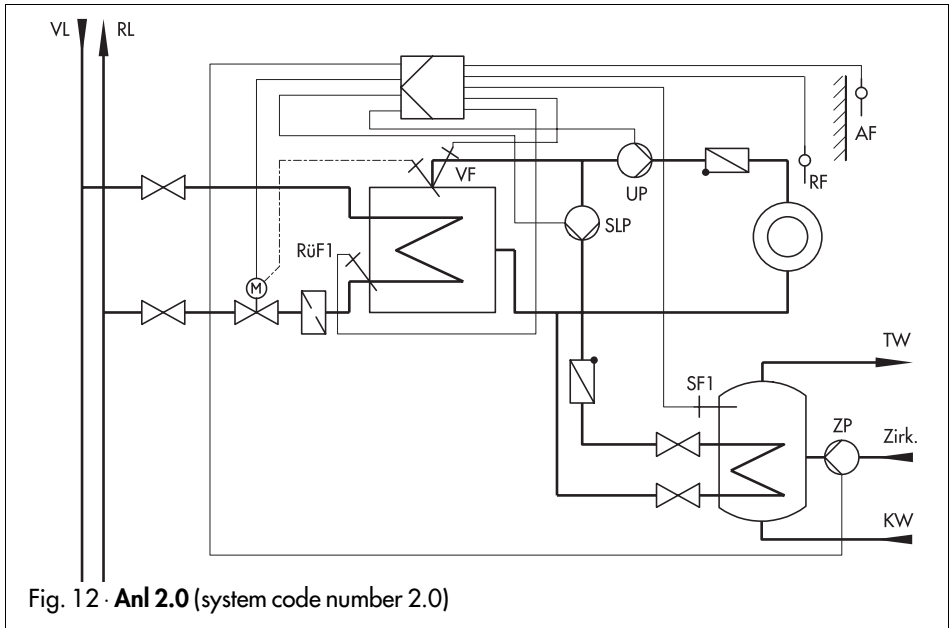
Fig. 12 · **Anl 2.0** (system code number 2.0)

System code number 2.0 with changeover valve

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating in a storage tank system with changeover valve
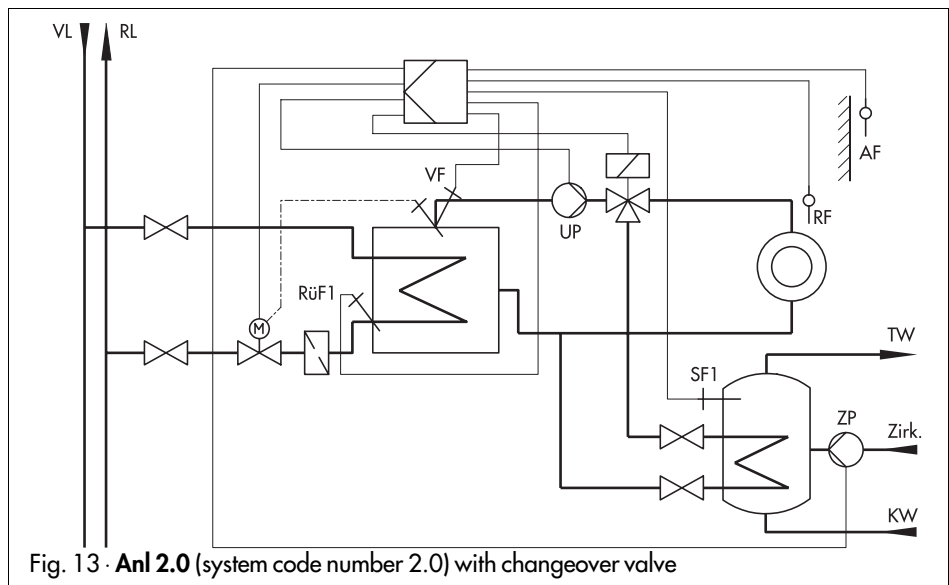
Fig. 13 · **Anl 2.0** (system code number 2.0) with changeover valve

Drinking water heating process

Charging of the drinking water storage tank is started when the drinking water temperature in the storage tank falls below the temperature value 'Drinking water heating ON' or the value set at a storage tank thermostat.

As a rule, the controller attempts to adapt the current flow temperature to the set 'Charging temperature' before the storage charging pump starts to operate. In such operating situations, the flow temperature of the heating circuit may be raised by up to 10 K, however, up to the set limit 'Max. flow temperature' at the maximum.

When the heating circuit is deactivated, the controller does not attempt this; the storage charging pump starts up immediately, or when a return flow sensor is connected and FB 20 = ON is activated with the option "SLP" selected, it first starts to operate when the return flow temperature reaches the temperature at the storage tank sensor SF1.

With the default setting FB 9 = OFF – harsh priority, i.e. the heating circuit is deactivated while the drinking water heating is active – long-term charging can be interrupted after 20 minutes for 10 minute periods by the heating operation. For this, set the function block FB 9 = OFF, and select the option "20". The same applies to the setting FB 9 = ON with the option "US" selected – system with a circulation pump and changeover valve.

With the setting FB 9 = ON and the option "PU" selected – parallel pump operation – the heating circulation pump only continues to run when the increase in flow temperature in the heating circuit is maximum 10 K – 'Max. flow temperature' at the maximum.

Should the capacity available for parallel operation be too low, causing the charging temperature to remain more than 5 K under the set value, the heating operation is interrupted for 10 minutes. The time span before the parallel operation is terminated can be set in FB 9.

The storage tank charging stops when the drinking water temperature in the storage tank reaches the temperature value 'Drinking water heating OFF' or the preset value at the storage tank thermostat. This occurs when the flow temperature demand of the heating circuit is correspondingly high because the storage charging pump has just been deactivated or in accordance with the parameter setting 'End charging process' when the flow temperature demand of the heating circuit is lower. In any case, the storage charging pump is deactivated, at the latest, after two transit periods of the control valve – 2xTy – have elapsed.

System code number 2.1

Weather-compensated flow temperature control system with variable limitation of the return flow temperature and drinking water heating from the secondary circuit with differential temperature control for solar-powered heating of the drinking water storage tank system.
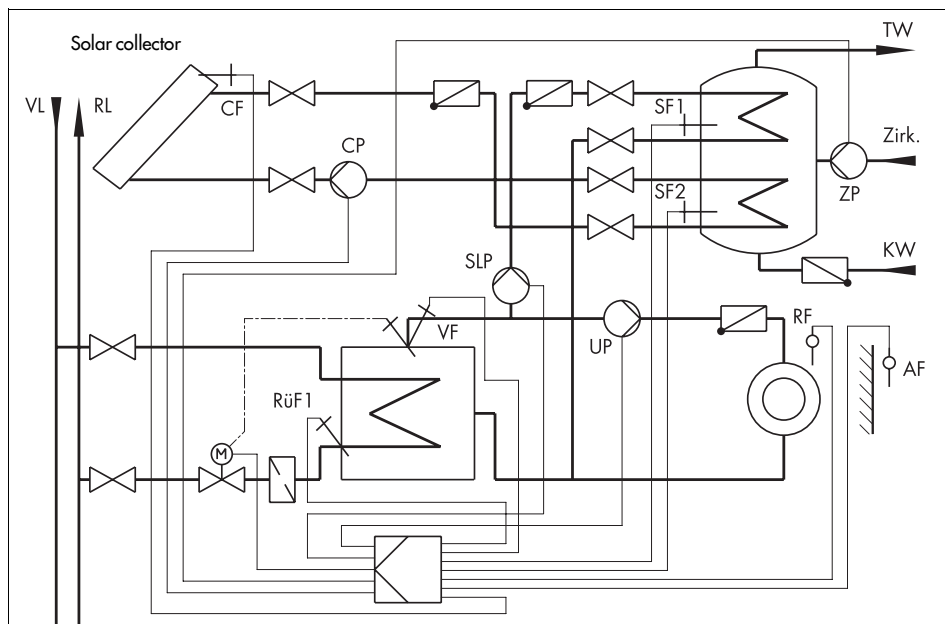


Fig. 14 · **Anl 2.1** (system code number 2.1)
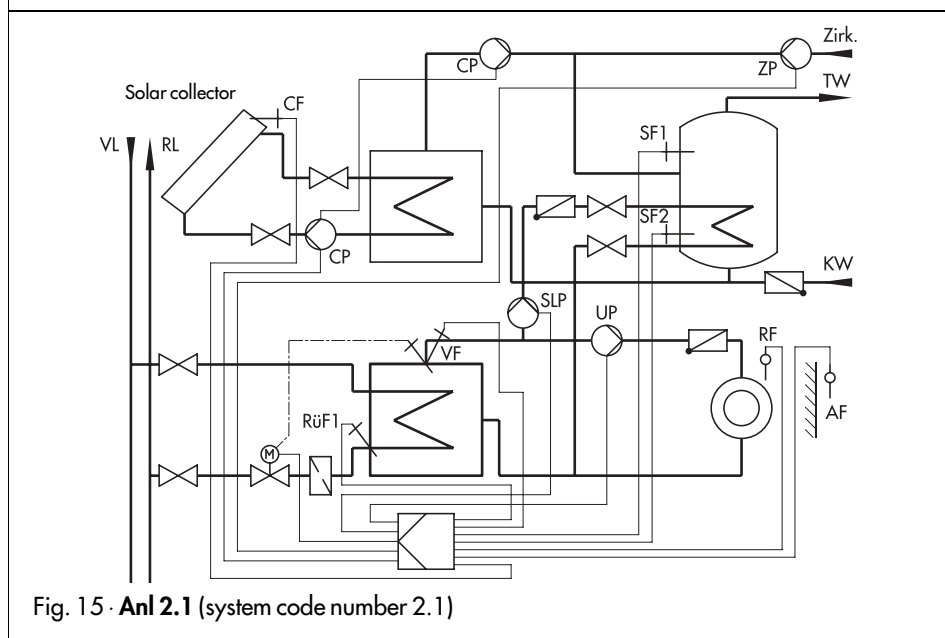
Fig. 15 · **Anl 2.1** (system code number 2.1)

If, in system code number 2, the drinking water heating takes place as already described with a storage tank sensor (storage tank sensor SF1), the storage tank sensor SF2 can be used for the solar-powered heating of the drinking water storage tank.

In addition to the "Drinking water heating process", the difference in temperature is determined between the storage tank sensor SF2 and the solar collector sensor CF.

The solar circuit pump starts its two-stage operation depending on the parameter 'Solar circuit pump ON':

Stage 2 is requested when the difference in temperature is twice as high as the value set in the parameter 'Solar circuit pump ON'.

If the difference in temperature falls below the value set in the parameter 'Solar circuit pump ON', it switches back to stage 1.

The pump stops operating if the difference in temperature falls below the parameter 'Solar circuit pump OFF'.

The solar circuit pump CP is, in principle, deactivated when the temperature measured at the storage tank sensor reaches the parameter 'Solar charging OFF'.

The time schedule for drinking water heating influences only the additional heating over the storage tank sensor SF1, not the solar circuit.

The operating hours of the solar circuit pump CP can be retrieved by entering the code number 1990.

5.3 System code number 3.0
Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating in the storage tank charging system
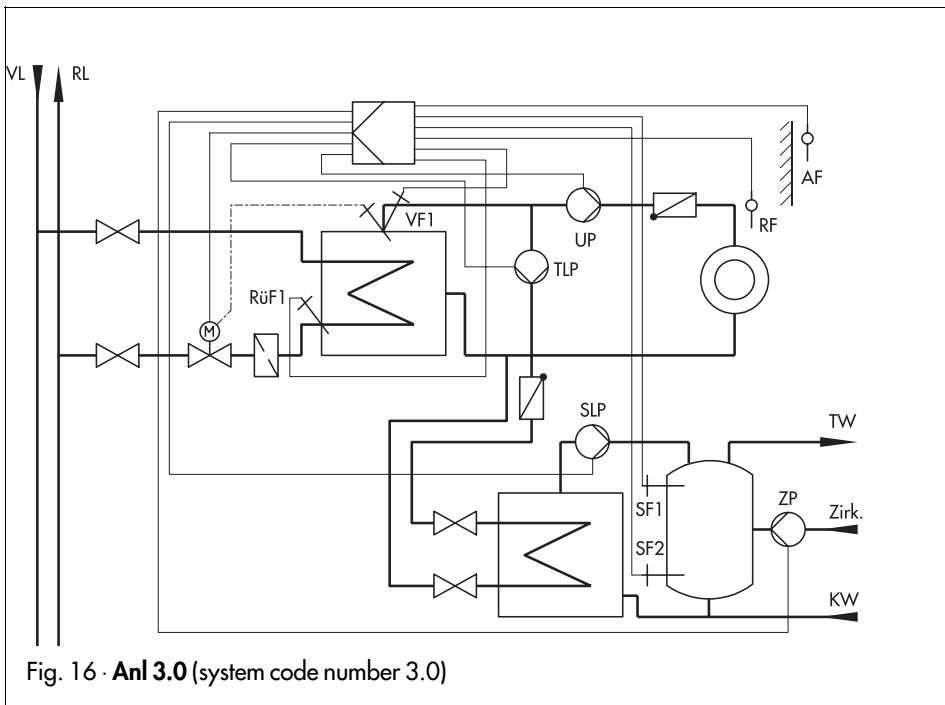
Fig. 16 · **Anl 3.0** (system code number 3.0)

Drinking water heating process

Charging of the drinking water storage tank is started when the drinking water temperature in the storage tank falls below the temperature value 'Drinking water heating ON' or the value set at a storage tank thermostat.

The controller attempts to reduce flow temperatures that are higher than the set 'Charging temperature' over the heating circuit before the heat exchanger charging pump together with the storage charging pump start to operate.

When the heating circuit is deactivated as well as at lower flow temperature demands, the storage charging pump is activated immediately, while the storage charging pump is first activated when the flow temperature reaches the temperature at the storage tank sensor SF1.

With the default setting FB 9 = OFF – harsh priority, i.e. the heating circuit is deactivated while the drinking water heating is active – long-term charging can be interrupted after 20 minutes for 10 minute periods by the heating operation. For this, set the function block FB 9 = OFF, and select the option "20".

With the setting FB 9 = ON and the option "PU" selected – parallel pump operation – the heating circulation pump only continues to run when the increase in flow temperature in the heating circuit is maximum 10 K – 'Max. flow temperature' at the maximum.

Should the capacity available for parallel operation be too low, causing the charging temperature to remain more than 5 K under the set value, the heating operation is interrupted for 10 minutes. The time span before the parallel operation is canceled can be set in FB 9.

The storage tank charging stops when the drinking water temperature in the storage tank reaches the temperature value 'Drinking water heating OFF' or the preset value at the storage tank thermostat. This occurs when the flow temperature demand of the heating circuit is correspondingly high because the storage charging pump has just been deactivated or in accordance with the parameter setting 'End charging process' when the flow temperature demand of the heating circuit is lower. In any case, the storage charging pump is deactivated, at the latest, after two transit periods of the control valve – 2xTy – have elapsed; 15 seconds after the heat exchanger charging pump has been deactivated, the storage tank pump stops running.

5.4 System code number 4.0

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating with return flow temperature limitation from the primary circuit, designed as storage tank water heater

Fig. 17 · **Anl 4.0** (system code number 4.0)

Drinking water heating process

The drinking water control valve causes a more or less fast charging of the drinking water storage tank from its closed position depending on the current system deviation and the set control parameters when the drinking water temperature in the storage tank falls below the set point of the 'Drinking water temperature'.

Should the capacity available for a parallel operation of both circuits – heating circuit and drinking water circuit – be too low when the maximum capacity is required, the function block FB 8 can be activated.

With the setting FB 8 = ON and the option "Ab" selected – Drinking water priority through set-back operation – the heating circuit is set to reduced operation for 20 minutes when there is a system deviation of more than 5 K in the drinking water circuit: its capacity requirement is moved back by reducing the current flow temperature by the value set in 'Set-back of flow temperature for reduced operation'.

With the setting FB 8 = ON and the option "In" selected – Drinking water priority through reverse control – the capacity requirement of the heating circuit is reduced when there is a system deviation of more than 5 K in the drinking water circuit. This is achieved by the three-point stepping output of the drinking water circuit having an effect on the heating circuit's control valve in the opposite direction. The time span before the priority mode responds can be set in Fb8.

System code number 4.1

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating from the primary circuit with differential temperature control for solar-powered heating of the drinking water tank.
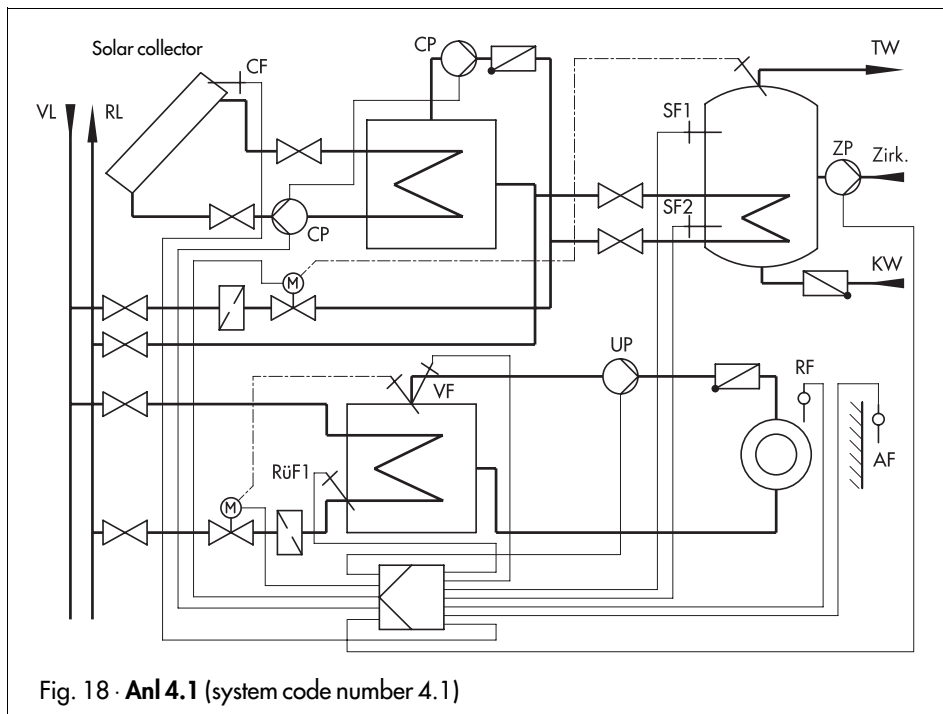
Fig. 18 · **Anl 4.1** (system code number 4.1)
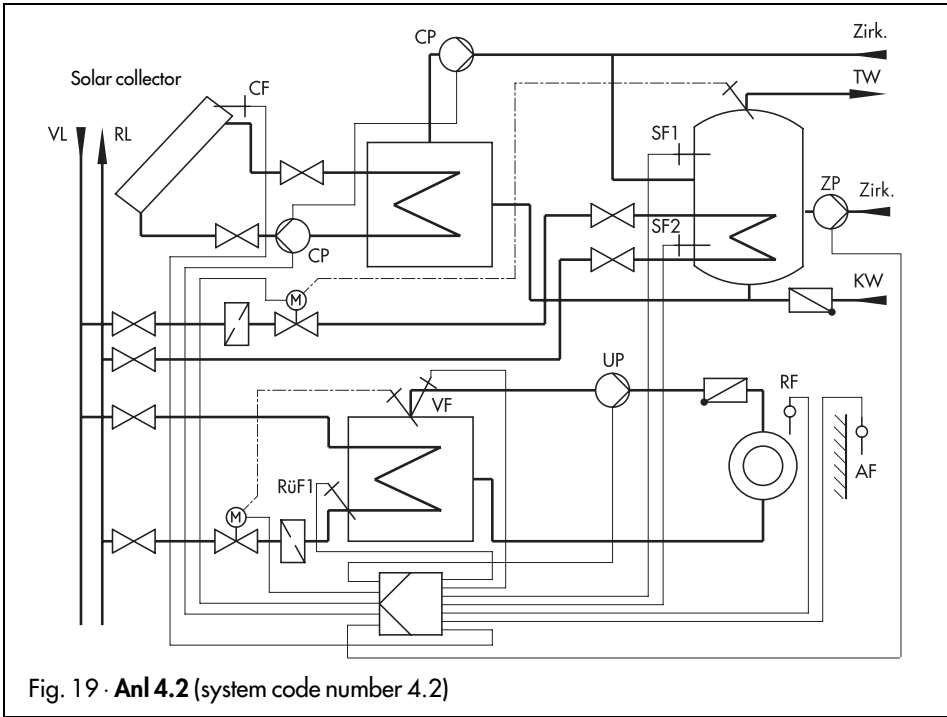
In addition to the "Drinking water heating process", the difference in temperature is determined between the storage tank sensor SF2 and solar collector sensor CF. Both solar circuit pumps start operating depending on the parameter 'Solar circuit pump ON'. At the same time, the control valve of the drinking water circuit is closed.

The solar circuit pumps stop running and the additional heating is enabled, provided their time schedules allow this, when the difference in temperature drops below the value in the parameter 'Solar circuit pumps OFF'.

The operating hours of the solar circuit pump CP can be retrieved by entering the code number 1990.

System code number 4.2

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating from the primary circuit with differential temperature control for solar-powered heating of the drinking water tank.


Fig. 19 · **Anl 4.2** (system code number 4.2)

The difference to the system code number 4.1 is that the additional heating remains active even during the operation of the solar circuit pumps, provided their time schedule allows it.

5.5 System code number 5.0

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating from the primary circuit, designed as storage tank charging system
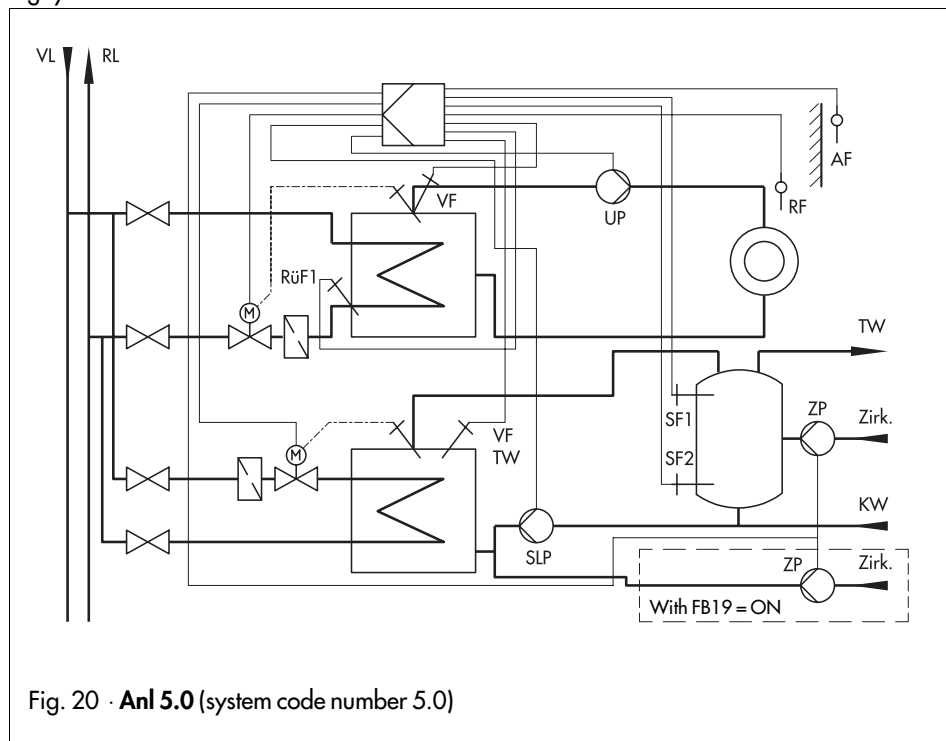
Fig. 20 · **Anl 5.0** (system code number 5.0)

Drinking water heating process

Charging of the drinking water storage tank is started when the drinking water temperature in the storage tank falls below the temperature value 'Drinking water heating ON' or the value set at a storage tank thermostat. The storage tank charging pump starts operating immediately and the 'Charging temperature' is controlled.

Should the capacity available for a parallel operation of both circuits – heating circuit and drinking water circuit – be too low when the maximum capacity is required, the function block FB 8 can be activated.

With the setting FB 8 = ON and the option "Ab" selected – Drinking water priority through setback operation – the heating circuit is set to reduced operation for 20 minutes when there is a system deviation of more than 5 K in the drinking water circuit: its capacity requirement is moved back by reducing the current flow temperature by the value set in 'Set-back of flow temperature for reduced operation'.

With the setting FB 8 = ON and the option "In" selected – Drinking water priority through reverse control – the capacity requirement of the heating circuit is reduced when there is a system deviation of more than 5 K in the drinking water circuit. This is achieved by the three-point stepping output of the drinking water circuit having an effect on the heating circuit's control valve in the opposite direction. The time span before the priority mode responds can be set in FB 8.

Charging of the storage tank finishes when the drinking water temperature in the storage tank reaches the temperature 'Drinking water heating OFF' or the value preset at the storage tank thermostat. With the default setting FB19 = OFF, the control valve of the drinking water circuit is closed for this purpose.

The storage charging pump is deactivated when the charging temperature has dropped below the value set in the parameter 'End charging process', or at the latest, after two transit periods of the control valve in the drinking water circuit – 2xTy – have elapsed.

With the setting FB19 = ON – Circulation via the heat exchanger – the control of the charging temperature is retained, if required, after intermediate reduction of the charging temperature as set in the parameter 'End charging process'.

5.6 System code number 6.0

Weather-compensated flow temperature control with variable limitation of the return flow temperature and drinking water heating from the primary circuit, designed as system with instantaneous water heater
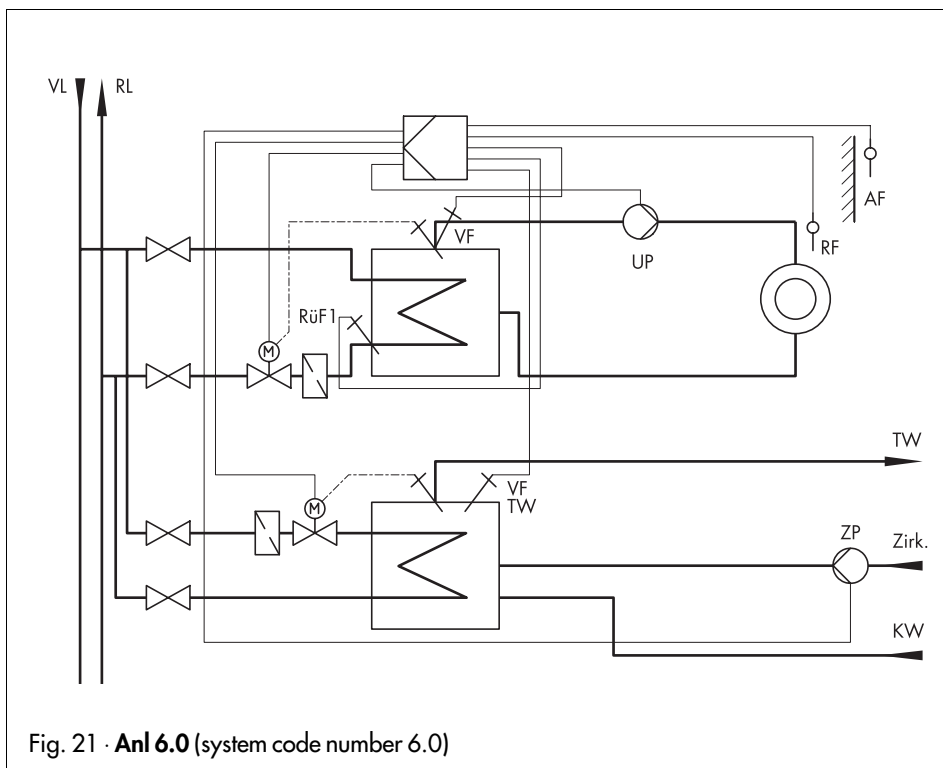
Fig. 21 · **Anl 6.0** (system code number 6.0)

Drinking water heating process

The drinking water outlet temperature of the heat exchanger is controlled according to the set point in the parameter 'Drinking water temperature'. The setting of the control parameters concerning the achievable control quality is decisive for this.

Should the capacity available for a parallel operation of both circuits – heating circuit and drinking water circuit – be too low when the maximum capacity is required, the function block FB 8 can be activated.

With the setting FB 8 = ON and the option "Ab" selected – Drinking water priority through set-back operation – the heating circuit is set to reduced operation for 20 minutes when there is a system deviation of more than 5 K in the drinking water circuit: its capacity requirement is moved back by reducing the current flow temperature by the value set in 'Set-back of flow temperature for reduced operation'.

With the setting FB 8 = ON and the option "In" selected – Drinking water priority through reverse control – the capacity requirement of the heating circuit is reduced when there is a system deviation of more than 5 K in the drinking water circuit. This is achieved by the three-point stepping output of the drinking water circuit having an effect on the heating circuit's control valve in the opposite direction. The time span before the priority mode responds can be set in FB 8.

The circulation pump ZP always runs according to its time schedule.

Observe the following for devices to be used in the drinking water control loop regarding the drinking water temperature sensor VFTW and the control valve:

You must use a temperature sensor with fast response (we recommend a Pt100 sensor with z 09 = 2.3 seconds Type 5209) for measuring the drinking water outlet temperature. This is necessary in order to keep the duration of temperature peaks as well as the temperature peaks themselves as small as possible. In addition, an actuator with a transit time of max. 40 seconds is required.

We strongly recommend that the circulation pump be operated during times-of-use of the drinking water circuit!

6. Operation

6.1 Operating controls

To access the operator controls, open the front cover of the controller.
Besides the mode switches, the following keys can be used to configure the controller.

Changeover key

Lets you change from the operating level to the parameter level or configuration level

Reset key

Lets you reset all freely accessible parameters to default values (factory setting)
This key's function is active only on the parameter level!

Arrow keys

These keys let you adjust the displays as well as retrieve and set data by moving up and down

Enter key

Operating level: lets you view adjusted set points
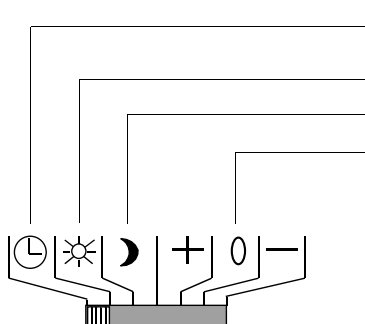
Parameter level: lets you access and acknowledge entered values and data

Configuration level: lets you access and acknowledge adjusted system code numbers and function blocks

6.2 Selecting the operating modes

Use the mode switch to select the mode for each control loop (heating circuit or drinking water heating circuit). Time-controlled operation is used as the default setting. The switch positions with the assigned symbols mean the following:

Mode switch for the heating circuit

Time-controlled operation with switchover between rated operation and reduced or standby operation

Rated operation
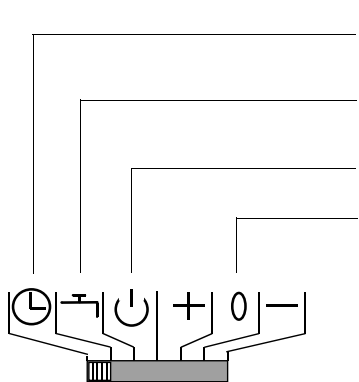
Reduced or standby operation

Manual operation: *
Control valve opens – inactive – closes, UP on
(for on/off control: + = ON, 0 = OFF)

* If the controller only reacts to these switch positions as in reduced or standby operation, the manual level is locked. See chapter 7.3 on page 57 for more details.

Mode switch for the drinking water heating circuit

Time-controlled operation with option to deactivate drinking water heating circuit

Time-controlled operation, heating circuit deactivated, only frost protection active

Heating and drinking water heating circuits deactivated, only frost protection active
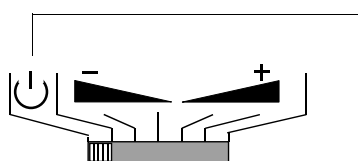
Manual operation: *
Control valve opens– inactive – closes
(no function in **system 1**; in **system 2** and **3** only
position 0 = drinking water circuit deactivated
position + = SLP and, if needed, TLP switched on)

* If the controller only reacts to these switch positions as in deactivated mode (heating and drinking water heating circuits are deactivated), the manual level is locked. See chapter 7.3 on page 57 for more details.

Set point correction switch

Heating circuit deactivated, only frost protection active

Switch for set point correction during rated operation to increase (+) or decrease (–) the set point as an alternative to the mode switch for the drinking water heating circuit.
Switch symbol sticker is delivered with the controller.
See chapter 7.4 on page 58 about how to activate this switch

$\Delta T_{\text{flow max}} = \pm 4\,K \times$ heating characteristic gradient (without adaptation)

$\Delta T_{\text{room max}} = \pm 2\,K$ (with adaptation)

6.2.1 Remote controlling the heating system
(only with room temperature sensot Type 5244 or Type 5257-4 with remote control)

You can change the operating mode or correct a set point of the heating circuit directly from the room using the remote control.
Switch positions at the remote control are only effective when the mode switch at the controller is set to the time-controlled operation ⏱ symbol.

⏱ Time-controlled operation

☀ Rated operation

☽ Reduced or standby operation

Set point correction during rated operation periods

+ Increase room temperature   – Decrease room temperature

$\Delta T_{\text{flow max}} = \pm 5\,K \times$ heating characteristic gradient (influencing range without adaptation)

$\Delta T_{\text{room max}} = \pm 5\,K$ (influencing range with adaptation)

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6.3 Control levels

Upon connection to the power supply during start-up, the controller automatically switches to the operating level. To configure the controller, you must first switch over to the configuration level and then the parameter level.

6.3.1 Configuration level: You can adapt the controller to the individual system requirements using the functions available.

6.3.2 Parameter level: You can enter user data such as the time, date, heating characteristic, set points, times-of-use, etc.

6.1.3 Operating level: On this level, the controller is standard set to rated operation with time-controlled switchover to reduced or standby operation.

Use the mode switches to change to other operating modes; times-of-use and current operating states are indicated in the display.

As a rule, the basic display (Fig. 22) appears with the current time and bars indicating the current times-of-use as well as various operating states.

If you keep the ⊠ key pressed down when the time appears in the display, the display alternates between the current date and year.
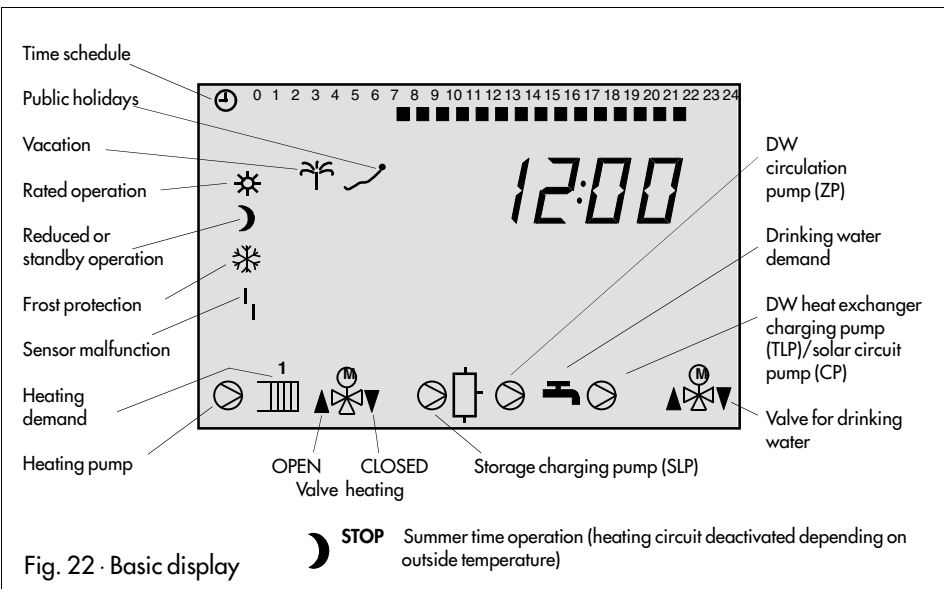
If you want to display other values, e.g. current temperature values, proceed as follows:

⬇   Press the arrow key to view next display or

⬆   Press the arrow key to view the previous display

If you want to view the associated set point instead of the current temperature value, keep the ⊠ key pressed down.

If you continue to press the ⬇ key, other images appear in the display with other symbols. These depend on the system code entered during configuration (see chapter 7.1) as well as the adjusted function blocks.

Fig. 22 · Basic display

STOP   Summer time operation (heating circuit deactivated depending on outside temperature)

Configuration level

Operating level

Parameter level

Press both keys simultaneously

Press key for 2 s

Key held pressed:
Date displayed

Key held pressed:
Set point shown

Enter current
time and date

Enter
values

Fast setting
warmer/colder

07:10

Current Anl

Function blocks

Temperatures
heating

Temperatures
drinking water

Time schedules
heating

Time schedules
drinking water

Public holidays
Vacations

Time

Data
heating

Time schedules
heating

Public holidays
Vacations

Data
drinking water

Time schedules
drinking water

Fig. 23 · Control levels

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The most important symbols and their meaning:

|		Meaning when ⊠ key is kept pressed down.
⌂	Outdoor temperature	Info 'Time-controlled summer time operation' Calculated outdoor temperature (only with delayed outdoor temperature adaptation)
▥	Flow temperature Heating	Set point (blinks in case of limitation of return flow, flow rate or capacity)
◫	Return flow temperature (only with return flow sensor) (blinks when limitation is active)	Limit value
⌂	Room temperature (only with room sensor)	Set point (only in adaptation and optimizing mode)
▯	Storage tank temperature (bottom)	Drinking water heating ON / OFF for system code nos. Anl 2.0, Anl 3.0 and Anl 5.0 with just **one storage tank sensor** (SF1) depending on deactivated/activated DW heating Drinking water heating OFF for system code nos. Anl2.0, Anl3 and Anl5 with **two storage tank sensors** Solar circuit pump OFF for system code nos. Anl 2.1, 4 .1 and 4.2
▯	Storage tank temperature (top)	Drinking water heating ON for system code nos. Anl 2.0, 3.0 and 5.0 with two storage tank sensors Drinking water heating ON / OFF for system code no. Anl 2.1 depending on deactivated/activated DW heating Set point for system code no. Anl 4
◫▯	Charging temperature (only for Anl 2, 3 and 5)	Set point (for system code nos. Anl 2 and 3 only during activated DW heating)
▯	For Anl2.1, Anl4.1, Anl4.2: collector temperature	Solar circuit pump ON
◫	Drinking water temperature (only for Anl6)	Set point
V̇	Flow rate/pulse rate (only on flow rate or capacity limitation) (blinks when limitation is active)	Limit value

Increase/decrease heating's set point on the operating level

The room temperature can be adjusted from the operating level by simply pressing a few keys. This is achieved by changing the flow temperature of the heating circuit via displacement of the heating characteristic to make it warmer or cooler, or in adaptation mode, by directly changing the room temperature set point.
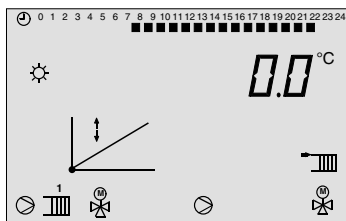
This setting is only effective when the heating system is running during a rated operation period!
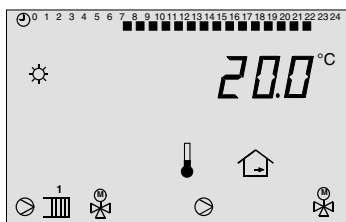
Operating level, e.g. time shown in the display

If you want to change the set point:

⬆   Press the arrow key until the gradient of the heating characteristic or room set point (see below) appears in the display.

⊠   Press the enter key. The displacement arrows start to blink.

⬇⬆   Use the arrow keys to set the required displacement value in °C . Upwards = increase and downwards = decrease room temperature.

A displacement by 5 °C, for example, causes a 1°C increase in the room temperature.

⊠   Press the enter key to acknowledge the value. Shortly after, the display returns to the current time.

⊠   Press the enter key. The room temperature arrow starts to blink.

⬇⬆   Use the arrow keys to set the required value in °C.

⊠   Press the enter key to acknowledge the value. Shortly after, the display returns to the current time.

7. Starting up and configuring the controller

Switch on the power supply to start up the controller.
After briefly switching between displays, the controller automatically goes to the operating level and the time appears in the display.
You must first configure the controller before setting it.
Then enter any required user data as described in chapter 7.2 on parameterization.

7.1 Configuration

Configure the controller to adapt its functions to the requirements of the system. To do this, select the appropriate system diagram from the system descriptions in chapter 5 (Figs. 11 to 21).
After this, determine the functions required for the chosen system diagram by activating and setting certain function blocks.

Note: The set system code number as well as the function blocks FB 20 to FB 23 are protected by a **code number**.
You can only access the settings for the system code numbers, function blocks and all the data required for parameterization and configuration after entering a valid code number!
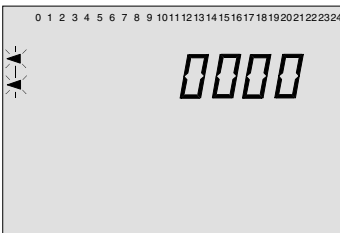
**Note:** If you cannot change any function block settings in the parameter level and various parameters are not shown in the display, the write protection function for the configuration level is enabled. See chapter 7.3 on page 57 for more details.

7.1.1 Setting the code number

The valid code number is written on page 62 of this manual. If you want to keep this code number, but prevent any unauthorized person from using it, cut out or scribble out the number on page 62.

Personal code number: You can enter your own personal code number. See chapter 7.3 on page 57 for more details.

0 0 0 0 appears in the display after you have selected a system code number or a protected function block

↓	Press the arrow key until you approximately reach the code number (the longer you press the key, the faster the displayed number changes).
↑↓	Use the arrow keys to set the number.
✳	Press the enter key to acknowledge the set code number.

7.1.2 Setting the system code number (Anl)

⇨ Use a pencil (or similar item) to press the changeover key. A triangle (parameter level) starts to blink in the top left-hand corner of the display.

⬆⬇ Press the arrow keys simultaneously; two triangles (configuration level) start to blink and the currently active system code number is shown in the display.

If you want to keep the system code number shown in the display:

⬆ Press the arrow key. Bars indicating the associated function blocks appear in the display.

If you want to change the system code number shown in the display, you must first enter the code number. See also chapter 7.1.1:

✠ Press the enter key. *0 0 0 0* appears in the display.

⬇ Press the arrow key until you approximately reach the code number (the longer you press the key, the faster the displayed number changes).

⬆⬇ Use the arrow keys to set the code number.

✠ Press the enter key to acknowledge the set code number. *Anl* blinks in the display.

⬆⬇ Use the arrow keys to set the system code number of the selected system diagram (Anl 1 to Anl 6, Figs. 11 to 21).

✠ Press the enter key to acknowledge the system code number.
Bars indicating the associated function blocks for that system appear in the display.

7.1.2 Setting the function blocks

Directly after you have set and acknowledge the system code number, bars appear in the display together with the basic setting of the associated function blocks.

If you select additional sensors and/or functions that are not included in the basic setting, do not forget to set the corresponding function blocks (ON or OFF). Refer to the following list for further explanations about the function blocks.

The black bars under the numbers 1...24 at the top of the display mean the function blocks are activated (ON). Blank areas under the numbers mean the function blocks are deactivated (OFF).
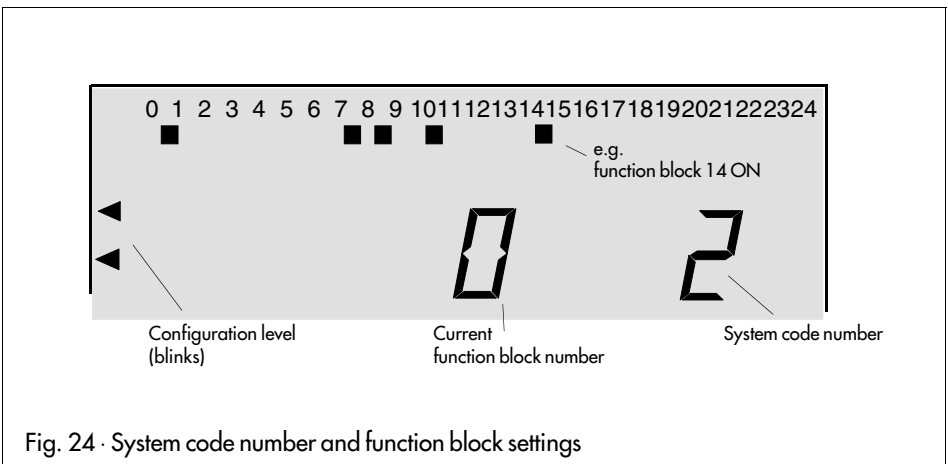
Fig. 24 · System code number and function block settings

If you want to change the basic setting of a function block, proceed as follows:

⇨   Use a pencil (or similar item) to press the changeover key. A triangle (parameter level) starts to blink in the top left-hand corner of the display.

⬆⬇   Press the arrow keys simultaneously; two triangles (configuration level) start to blink and the currently active system code number is shown in the display.

⬆   Press the arrow key. Bars indicating the function blocks appear in the display.

⬆⬇   Use the arrow keys to set the number of the function block you want to change.

✳   Press the enter key. The function block number starts to blink.

⬆   Press the arrow key to switch the function block **ON** or

⬇   Press the arrow key to switch the function block **OFF**

✳   Press the enter key to acknowledge the setting.

⬆⬇   Use the arrow keys to select the next function block.

    Proceed as described above to switch a function block ON or OFF.
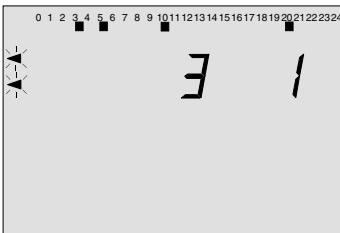
Note:

Certain function blocks require that you set the parameters directly after you have activated them. Observe the instructions in the function block list before setting these parameters.

Parameters that must be set start to blink with their symbol in the display.
If you want to change the default setting shown:
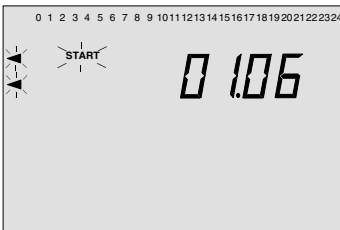
⬆⬇   Use the arrow keys to set the new value.

✳   Press the enter key to acknowledge the new value.


Example:
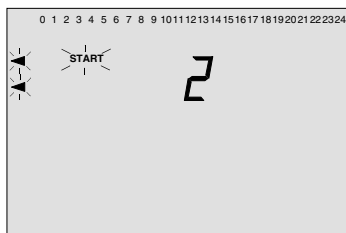
The function block setting FB 3 = ON is acknowledged using the ✳ key (time-controlled summer time operation)

The date when the summer time operation should start appears in the display.
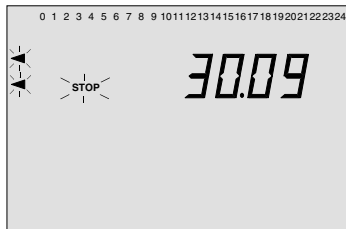
⬆⬇   Use the arrow keys if you want to change the date, following this or alternatively

✳   Press the enter key to acknowledge the date.
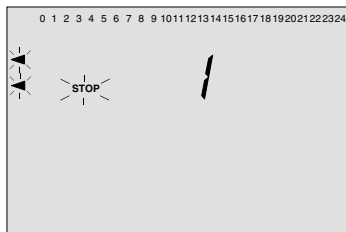
The number of days to activate the time-controlled summer time operation appears in the display

⬆⬇ Use the arrow keys if you want to change the number,
following this or alternatively

⌗ Press the enter key to acknowledge the number.
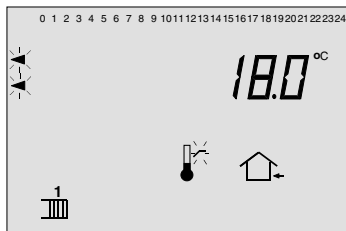
The number of days to deactivate the time-controlled summer time operation appears in the display

⬆⬇ Use the arrow keys if you want to change the number,
following this or alternatively

⌗ Press the enter key to acknowledge the number.
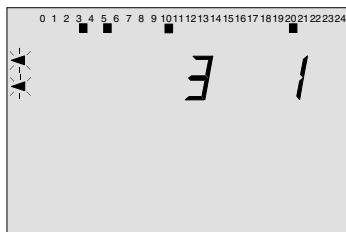
The number of days to start the heating appears in the display

⬆⬇ Use the arrow keys if you want to change the number,
following this or alternatively

⌗ Press the enter key to acknowledge the number.

The limit value of the outdoor temperature appears in the display

⬆⬇ Use the arrow keys if you want to change the limit value,
following this or alternatively

⌗ Press the enter key to acknowledge the limit value.

Function block FB 3 reappears in the display.

⬆⬇ Use the arrow keys to select the next function block ...

Exiting the configuration level

⇄ Press the changeover key. This lets you enter the parameter level.

⇄ Press the changeover key again to exit the parameter level. The basic display of the operating level appears in the display.

If you do not press any keys for 5 minutes, the controller automatically returns to the operating level and the current time appears in the display (basic display)

7.1.3 Function block list

FB	Function	FS	Anl	Comment
Legend:	FB – Function block number	FS – Factory (default) setting	Anl – System code number		
0	Optimize (Chapter 4.1)	OFF		If FB 0 = ON is selected, FB13 is automatically activated and cannot be deactivated
1	Adaptation (Chapter 4.2)	OFF		If FB 1 = ON is selected, FB13 is automatically activated and cannot be deactivated
2	Flash adaptation (Chapter 4.2)	OFF		If FB 2 = ON is selected, FB13 is automatically activated and cannot be deactivated. FB 2 = ON directly determines after how many minutes a 1°C change in flow temperature by 1 °C should occur. 1 to 100 minutes (default: 10 min)
3	Summer time operation (Chapter 4.4)	OFF		FB 3 = ON directly determines how long the summer time operation should be effective: (default: 01.06.to 30.09.), the number of days, setting range 1 to 3 days to activate/deactivate the function (default: 2/1) as well as outdoor temperature limit 0 to 30 °C (default: 18 °C)
4	Delayed outdoor temperature adaptation (Chapter 4.7)	OFF		FB 4 = ON allows you to select the function just when the outdoor temperature drops (Ab) or when the outdoor temperature rises or drops (AufAb). Then enter delay from 1 to 6 °C/h (default: 3 °C/h)
5	Automatic clock reset summer time/winter time	ON		FB 5 = ON to activate the automatic clock reset summer time/winter time
6	Public holiday and vacation schedule, valid for drinking water heating	OFF		FB 6 = ON to allow the drinking water heating to run during public holidays using Sunday settings; the drinking water heating is deactivated completely during vacation periods
7	Thermal disinfection	OFF		If FB 7 = ON is selected, FB14 is automatically activated and cannot be deactivated (storage tank thermostat not possible). FB 7 = ON to select the settings for day of week, setting 1 – 7 = daily, setting 1 = Monday, (default: 3), start time (default: 0:00 hrs), stop time (default: 4:00 hrs), as well as deactivating temperature 60 to 90 °C (default: 70 °C)

| 8 | Priority for drinking water control circuit

(See description of system diagrams in chapter 5) | OFF | Only 4, 5, 6 | FB 8 = ON allows you to select priority for drinking water using set-back operation (Ab) or priority for drinking water through reverse control (In). Then enter time span 2 to 10 min (default: 10 min) before priority operation should respond |
|---|---|---|---|---|
| 9 | Parallel pump operation

(See description of system diagrams in chapter 5) | OFF | Only 2 + 3 | FB 9 = ON allows you only in Anl 2 to select a parallel pump operation (PU) or operation with a changeover valve (US). The setting "PU" in Anl 2 or FB 9 = ON in Anl 3 requires you to enter data for:
Time span 2 to 10 min (default: 10 min) before parallel operation should be canceled. Finally you must determine whether the operating phases in which parallel operation is not possible should take place with or without intermediate heating. Option: "20" or "– –"
With FB 9 = ON "US" and with FB 9 = OFF you must first determine the parameters concerning intermediate heating:
"20" activates it after 20 min,
 "– –" means no intermediate heating takes place. |
| 10 | 3-point stepping control of the heating circuit, control parameter | ON | | The heating circuit functions as a three-point stepping control loop when FB 10 = ON. Then enter data for:
$Kp = 0.1...50.0$ (default: 2.0),
$Tn = 1...999$ sec (default: 200),
$Ty = 15, 30, 45, ..., 240$ sec (default: 90 s),
Pump lag time $= Ty, 2 \times Ty, 3 \times Ty$, up to $10 \times Ty$ (default: 180 sec)
The heating circuit functions as an on/off control loop when FB 10 = OFF.
Then enter differential gap =
1 to 30 °C (default: 5 °C). |
| 11 | Limitation of system deviation for OPEN signal heating circuit (in Sys. 3 and 3 also drinking water heating) | OFF | | FB 11 can only be activated when FB 10 = ON. If FB 10 = OFF is selected, FB 11 is automatically deactivated and cannot be activated.
The limitation of the system deviation to 2...10 °C is determined when FB 11 = ON (default: 2 °C) |
| 12 | Limitation of system deviation for OPEN signal (drink. water circuit) | OFF | Only 4, 5, 6 | The limitation of the system deviation to 2...10 °C is determined when FB 12 = ON (default: 2 °C) |

13	Room sensor RF	OFF		When FB 13 = ON, the room temperature display does not affect the control loop; when Type 5244 or Type 5257-4 Sensors with remote control are connected, the remote adjustment of operating modes is additionally activated
14	Storage tank sensor SF1 (See chapter 5 for description on switching behavior)	ON	2, 3, 4.1, 4.2, 5	When FB 14 = ON, the sensor SF1 is activated. Fb14 cannot be deactivated in Anl 2.1, 4.1 and 4.2. It can only be deactivated in all other systems when FB 15 = OFF. Set FB 14 = FB 15 = OFF when storage thermostat is used!
15	Storage tank sensor SF2 (See chapter 5 for description on switching behavior)	ON	2, 3, 4.1, 4.2, 5	When FB 15 = ON, the sensor SF2 is activated. Fb 15 cannot be deactivated in Anl 2.1, 4.1, 4.2
16	Sensor selection	OFF		When FB 16 = OFF, PTC and Pt100 sensors can be connected, mixed circuit is possible. When FB 16 = ON and "*P1000*" is selected, Pt1000 and Pt 100 sensors can be connected, when "*ntc*" is selected, NTC and Pt 100 sensors can be connected, mixed circuit is possible
17	3-point stepping control for drinking water circuit, control parameters	ON	Only 4, 5, 6	When FB 17 = ON, the drinking water circuit functions as 3-point stepping control loop. Enter the following: K_P = 0.1…50.0 (default: 2.0), T_N = 1…999 sec (default: Anl 5, 6: 60 sec; Anl 4: 200 sec), Ty = 15, 30, 45, …, 240 sec (default: Anl5, 6: 30 sec; Anl4: 90 sec) When FB 17 = OFF, the drinking water circuit functions as on/off control loop. Enter differential gap = 1 to 30 °C (default: 5 °C)
18	Outdoor temperature – signal input	OFF		When FB 18 = OFF, the sensor input for outdoor temperature measurement is activated. When FB 18 = ON, the signal input for outdoor temperature measurement is activated. Option between 0 or 4 to 20 mA signal connection (Measuring range: −20…+50 °C). Connect a 50 Ohm resistance to terminals 3 (+) and GND (terminals 5 to 8) parallel to signal!
19	Circulation via heat exchanger (See chapter 5 for description)	OFF	5	When FB 19 = ON, the control release of the drinking water circuit is retained even after active storage tank charges

You will be prompted to enter a code number when you select one of the following function blocks!

20	Return flow sensor RüF (See chapter 4.8)	ON		When FB 20 = ON, the return flow sensor RüF is activated. Set the limitation factor, setting range 0.1 to 10 (default: 1). In Anl2, you can select afterwards between "SLP" (default) – SLP activated depending on return flow temperature with drinking water demand and deactivated heating circuit – and "– –" – immediate activation of SLP with drinking water demand and deactivated heating circuit.
21	Return flow temperature limitation in drinking water circuit by means of RüF1 (RüF2 in Anl 4.0) (See chapter 4.8)	ON OFF	4.0, 5	In Anl4.0 when RüF2 is activated, set the limitation factor = 0.1 to 10 (default: 1); In Anl 5 FB 21 can only be activated when FB 20 = ON. It is only appropriate when the return flow sensor RüF1 is installed in the common return flow pipe. FB 21 is automatically deactivated and cannot be activated when FB 20 = OFF
22	Signal input for flow rate measurement (See chapter 4.15)	OFF		When FB 22 = ON, the signal input is defined for flow rate measurement. Furthermore, you can select between 0 or 4 to 20 mA signal connection. This function can only be activated with FB23! Connect a 50 Ohm resistance to terminals 12 (+) and GND (terminals 5 to 8) parallel to signal! When FB 22 = OFF, the pulse input is defined for limitation. This function can only be activated with FB23!
23	Limitation of capacity or flow rate (See chapter 4.15)	OFF		When FB 23 = ON and FB 22 = OFF, the pulse rate limitation is activated. You must then set the limit value for heating, its associated limitation factor and, if needed, the limit value for drinking water heating and its associated limitation factor. Respective setting ranges 3 to 500 pulse/hr and 0.1 to 10! When FB 23 = ON and FB 22 = ON, the flow rate limitation via current signal is activated. You must determine upper measuring range value – setting range 0.1 to 100 m^3/hr –, the flow rate's minimum limit value and maximum limit value – Setting ranges for both 0.01 to 100 m^3/hr –

7.1.4 Sensor calibration
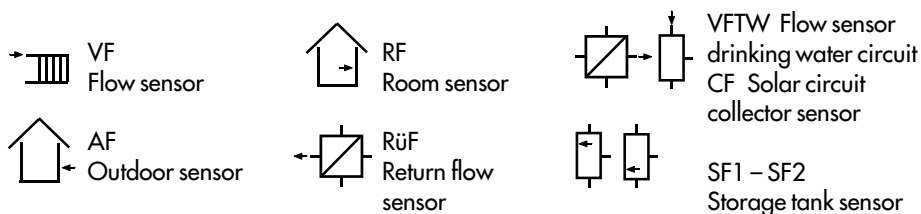
The measured values of all of the connected sensors can be changed or reset. When calibrating a sensor, change the sensor value currently displayed to make it match the temperature (reference value) measured directly at the point of measurement.

Enter the code number 1999 in the configuration level to calibrate sensors.

To do this, proceeds as follows:

⇨　　Use a pencil (or similar object) to press the changeover key, a triangle (parameter level) starts to blink in the top left-hand corner of the display.

⬆⬇　Press the arrow keys simultaneously, two triangles (configuration level) start to blink in the display as well as the currently active system code number.

⊠　　Press the enter key. **0 0 0 0** appears in the display.

⬇　　Press the arrow key once. The code number **1999** appears.

⊠　　Press the enter key to acknowledge this code number.

　　　The symbol for the flow temperature appears in the display together with its current temperature (initially without calibration).

⊠　　Press the enter key to acknowledge the sensor shown for calibration.

　　　The actual temperature (used as the reference value) must be read from a thermometer directly at the point of measurement.

⬆⬇　Use the arrow keys until the displayed value matches the reference value.

⊠　　Press the enter key to acknowledge the corrected temperature value.

⬇　　Press the arrow key to continue to the next sensor. Proceed with the calibration as described above.

⬇　　Press the arrow key to exit the calibration menu.

Sensor symbols

VF Flow sensor	RF Room sensor	VFTW Flow sensor drinking water circuit CF Solar circuit collector sensor
AF Outdoor sensor	RüF Return flow sensor	SF1 – SF2 Storage tank sensor

7.2 Parameterization

Only the system-specific parameters are displayed in the parameter level depending on the configuration carried out beforehand.

You automatically enter the parameter level when you exit the configuration level.
A blinking triangle in the top left-hand section of the display indicates that you are in the parameter level.

If you are still in the operating level:

⇨   Press the changeover key to access the parameter level.

⬇   Press the arrow key, the first parameter (time) appears in the display.

In the following summary (chapter 7.2.2), all the parameters are listed in the same sequence as they appear when you enter user data.
Only the parameters that correspond to the preset system configuration in chapter 5.3 are taken into account when you enter new data.

How to enter data in the parameter level:

⬆⬇   Use the arrow keys to access the parameter you want to change.

✳   Press the enter key to acknowledge the parameter,
the corresponding symbol starts to blink in the display when the parameter value
can be changed.

⬆⬇   Use the arrow keys to set the value as required.

✳   Press the enter key to acknowledge the set value,
the next parameter appears in the display.

Proceed as described above.

Note:

If you do not press any keys for five minutes, the controller automatically leaves the parameter level.

⇨   Press the changeover key again to enter the parameter level.

7.2.1 Resetting to default values

If you are in the parameter level, you can reset all parameters you have entered to return to the default settings by pressing the ✳ reset key.
The protected parameter values are only affected by this if the code number you entered beforehand is still valid. (The code number becomes invalid five minutes after the last entry!) The function block settings are still stored.

The controller is basically ready for operation with default values (factory setting). However, you are still required to enter the current time and date as the first parameters.
The default values are listed in the following summary.
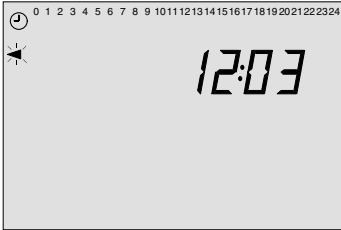
7.2.2 Entering and modifying user data

The individual parameters are listed together with their symbols and default setting!

⇨ Press the changeover key, the blinking triangle indicates that you are in the parameter level, a time appears in the display.
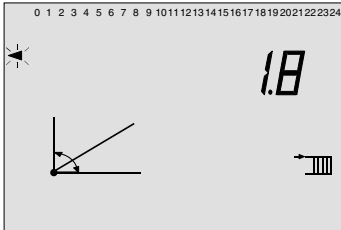
Entering current time and date

You are required to enter these data on start-up and when a power supply failure has occurred lasting longer than 24 hours!

⊠   Press the enter key, the clock symbol blinks.

↓↑   Use the arrow keys to set the correct time.

⊠   Press the enter key to acknowledge the time, a date now appears in the display.

↓↑   Use the arrow keys to set the correct date.

⊠   Press the enter key to acknowledge the date, the year now appears in the display.

↓↑   Use the arrow keys to set the correct year.

⊠   Press the enter key to acknowledge the year the next parameter now appears in the display.

Entering parameters for heating circuit:
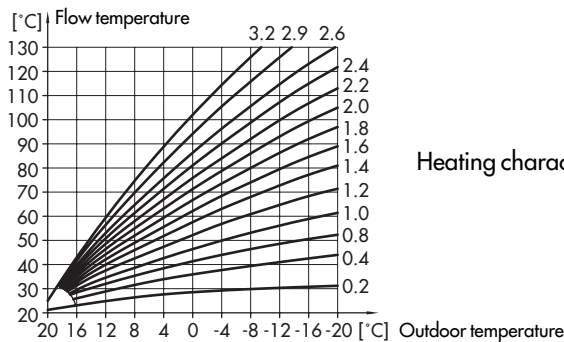
Gradient of the heating characteristic
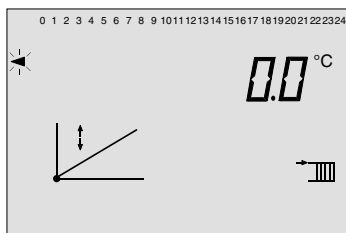
The correlation between the outdoor temperature and the flow temperature is determined by a gradient value from 0.2 to 3.2.

If you want to change it:

⊠   Press the enter key, the gradient arrow blinks.

↓↑   Use the arrow keys to set the required characteristic value.

⊠   Press the enter key to acknowledge the value.

(You can only change it when the adaptation function is deactivated)

Heating characteristics

Level of the heating characteristic
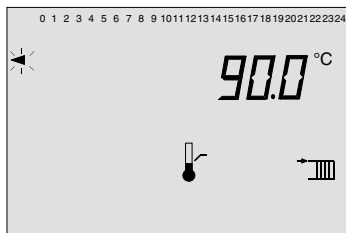
Parallel displacement of the heating characteristic determined by the displacement value upwards (positive value) or downwards (negative value) (−30 to +30 °C)

If you want to change it:

⊠   Press the enter key, the displacement arrows start to blink.

↓↑   Use the arrow keys to set the required displacement value in °C.

⊠   Press the enter key to acknowledge the value.
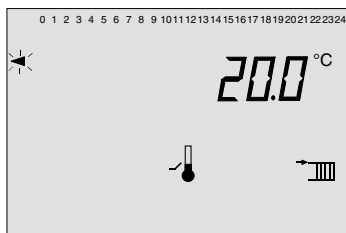
(You can only change this setting when the flash adaptation is not activated)

Proceed in the same manner to enter the following parameters!
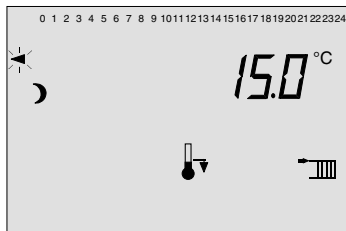
Max. flow temperature
(20 to 130 °C)

If you set the max. value = min. value, this results in a fixed value
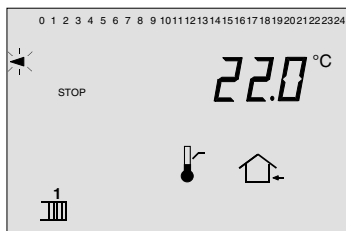
Min. flow temperature
(20 to 130 °C)
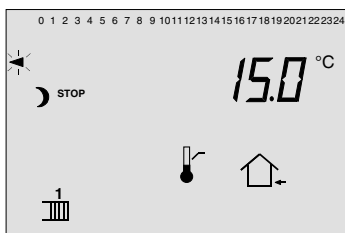
**Set-back of flow temperature
for reduced operation**
(0 to 50 °C)

See chapter 4.3 on reduced operation

Outdoor temperature limit value for summer time operation
(0 to 50 °C)
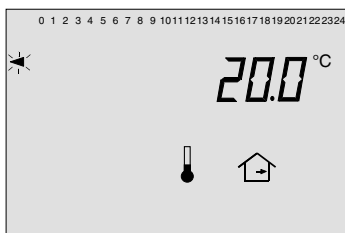
See chapter 4.4 on summer time operation
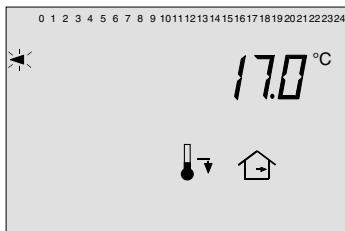
Outdoor temperature limit value for deactivation in reduced operation
(–10 to 50 °C)

Outdoor temperature limit value for return to rated operation
(–30 to 50 °C)
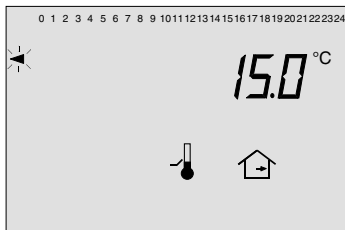
Room set point
(0 to 40 °C)
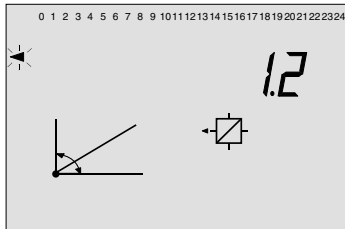
Reduced room set point
(0 to 40 °C)
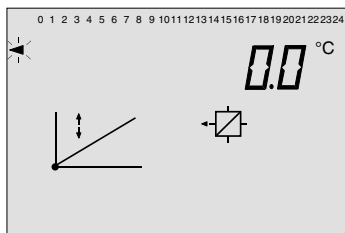
See chapters 4.1 and 4.2 on optimize and adaptation modes

Sustained temperature
(0 to 40 °C)
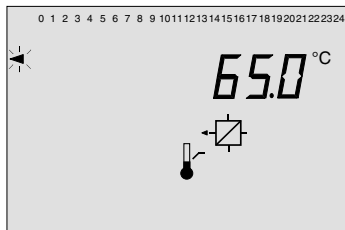
Gradient of the return flow characteristic for limitation of return flow temperature
(0.2 to 3.2) You must first enter the code number before you can change this value.
The correlation between outdoor temperature and return flow temperature is determined corresponding to the flow temperature by the gradient value. See chapter 4.8 on limitation of the return flow temperature.

Level of the return flow characteristic
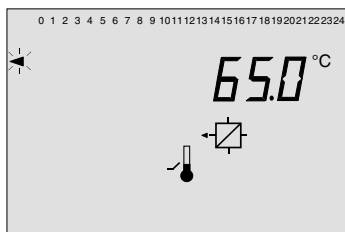
(–30 to 30 °C) You must first enter the code number before you can change this value.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	
0.0 °C	

Max. return flow temperature

(20 to 90 °C) You must first enter the code number before you can change this value.
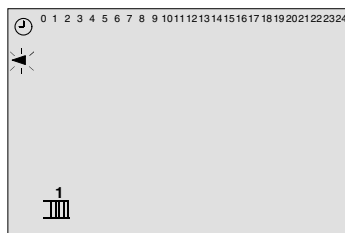
If you set the max. value = min. value, this results in a fixed limit value

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
65.0 °C

Min. return flow temperature

(20 to 90 °C) You must first enter the code number before you can change this value.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
65.0 °C

Time schedule for heating

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1

Times-of-use of the heating

You can enter two time periods for the time-controlled operation (mode switch set to clock symbol), during which the heating runs in rated operation.

The default setting is a daily rated operation from **6:00 to 22:00 hrs**.

The heating runs dependent on the outdoor temperature according to the predetermined heating characteristic (see page 48).

The heating is switched over to reduced operation when the default rated operation time period ends at 22:00 hrs. This saves energy in the times of non-use, e.g. at night time.

In reduced operation, the heating runs, for example with a set-back of the flow temperature by 15 °C. The values for the reduced operation are preset as set-back of flow temperature for reduced operation (page 49).

The heating switches back to rated operation when the reduced operation ends at 7:00 hrs.

You can enter the time schedules in time blocks **1 – 7** (Mon – Sun), **1 – 5** (Mon – Fri) and **6 – 7** (Sat – Sun) or as individual days **1** (Mon), **2** (Tue), **3** (Wed), etc.

⊡⬆ Use the arrow keys to select the required time block.

For the rated operation, enter the time periods that alternate between **START** and **STOP**. If you do not require the second period, acknowledge the STOP of the first period and the START of the second period at 12:00 hrs (default).

Note: Later, you can only check time blocks (START – STOP) that you have already entered with the individual day entry and by calling up each individual day using the ⊡⬆ keys.
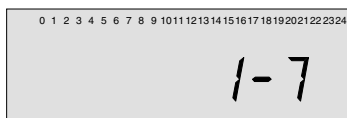
If you want to change the default times:

✳ Press the enter key

After accessing the parameter level, activate the parameter for the time schedule for heating. **1 – 7** appears in the display.

If you want to continue to another time block:

⊡ Press the arrow key until you reach the required block **5 – 6, 6 – 7** or **1**-, **2** etc.

If you want a change to be effective daily at the same time, select time block **1 – 7**, for example.

✳ Press the enter key to access the selected block.

The starting time for the first time period appears in the display. **START** – appears, the clock symbol blinks. The current set time period is indicated in the display as bars.

⊡⬆ Use the arrow keys to set the time when the rated operation should start (30 min increments, the bars indicate how the time block is progressing).

✳ Press the enter key to acknowledge the set time, **STOP** and a time (default 12:00) appear in the display.

⊡⬆ Use the arrow keys to set the time when the first period should end.

✳ Press the enter key to acknowledge the set time, **START** and a time (default 12:00) appear in the display.

⊡⬆ Use the arrow keys to set the time when the second period should start.

✳ Press the enter key to acknowledge the set time, **STOP** and a time (default 22:00) appear in the display.
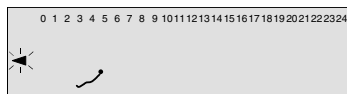
⊡⬆ Use the arrow keys to set the time when the second period should end.

✳ Press the enter key to acknowledge the set time.

Then at the enter block for individual days (**1**, **2**, **3** etc.),

⊡ Press the arrow key to exit the menu for the time schedule for heating.

Public holidays

```
  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
◀
        ⌒
```

Default: – – – –

Entering additional days:
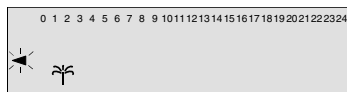
✳   Press the enter key, the first set date appears in the display.

⬇   Press the arrow key until – – – – appears.

✳   Press the enter key, the public holiday symbol starts to blink in the display.

⬇⬆   Use the arrow keys to set additional public holidays.

✳   Press the enter key to acknowledge the date.

Set any additional public holidays as described above.

Deleting set days:

✳   Press the enter key, the first set date appears in the display.

⬇   Press the arrow key to find the public holiday you want to delete.

✳   Press the enter key, the public holiday symbol starts to blink.

⬇⬆   Use the arrow keys until – – – – appears in the display. (– – – – is between 31.12 and 01.01)

✳   Press the enter key to delete the holiday.

Vacations (max. 10 vacation periods possible)

```
  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
◀
     ⚘
```

Default: – – – –

Entering vacation periods:

✳   Press the enter key, the start of the first vacation appears in the display.

⬇   Press the arrow key until – – – – appears.

✳   Press the enter key, the vacation symbol starts to blink.

⬆   Press the arrow key to set the date when the vacation should start.

✳   Press the enter key to acknowledge the date. The vacation symbol blinks and STOP appears in the display.

⬇⬆   Use the arrow keys to set the date when the vacation should end.

✳   Press the enter key to acknowledge the date.

Set any additional vacations as described above.

Deleting vacation periods:
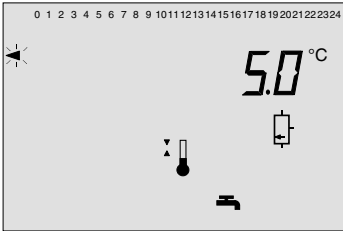
✳   Press the enter key, the start of the first vacation appears in the display.

⬇   Press the arrow key to find the start of the vacation you want to delete.

✳   Press the enter key, the vacation symbol starts to blink.

⬇⬆   Use the arrow keys until – – – – appears in the display. (– – – – is between 31.12 and 01.01)

✳   Press the enter key to delete a vacation period.

Entering parameters for drinking water circuit:
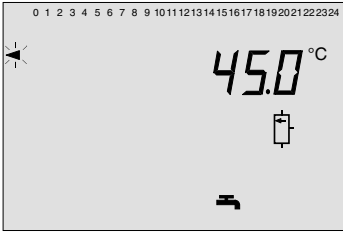
Drinking water heating ON
(20 to 90 °C)
In systems 2 .0,
3 and 5 with just one storage tank sensor SF1
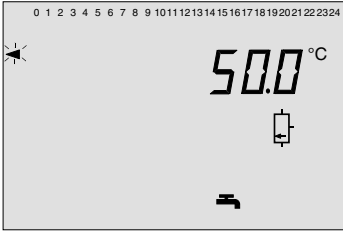
followed by
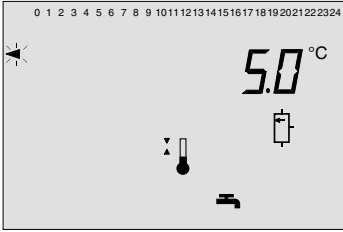
Differential gap
(0 to 30 °C)
In systems 2.0,
3 and 5 with just one storage tank sensor SF1
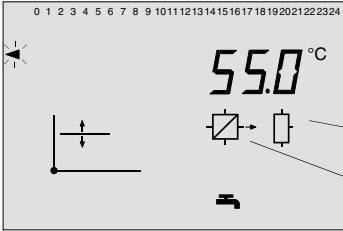
Drinking water heating ON
(20 to 90 °C)
In systems 2, 3 and 5 with two storage tank sensors SF1
and SF2
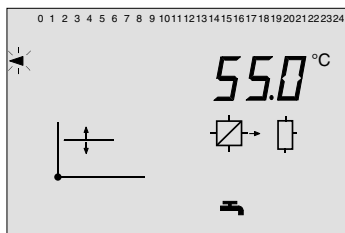
Drinking water heating OFF
(20 to 90 °C)
In systems 2.0,
 3 and 5 with two storage tank sensors SF1 and SF2

alternatively
Differential gap
(0 to 30 °C)
In system 2.1
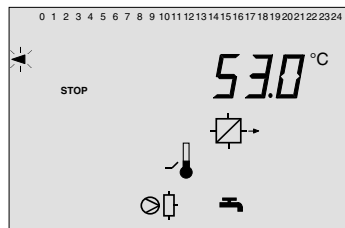
Drinking water temperature
(20 to 90 °C)
In systems 4 and 6
System 4

System 6

Charging temperature set point
(20 to 90 °C)
In systems 2, 3 and 5
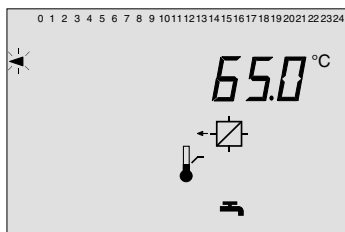
End charging process
(20 to 90 °C)
In systems 2, 3 and 5
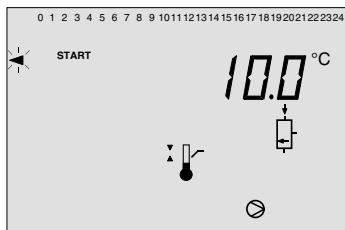
Return flow limitation temperature during drinking water heating
(20 to 90 °C) You must first enter the code number before you can change this value.

In systems 2, 3, 4.0 and 5
See chapter 4.8 on limitation of the return flow temperature
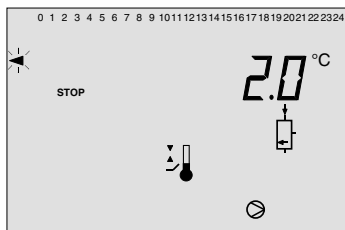
Solar circuit pump ON
(0 to 30 °C)
In systems 2.1, 4.1 and 4.2
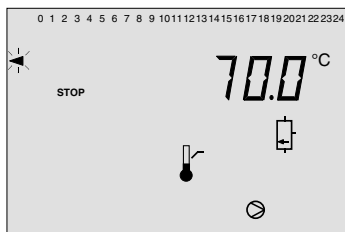
Solar circuit pump OFF
(0 to 30 °C)
In systems 2.1, 4.1 and 4.2
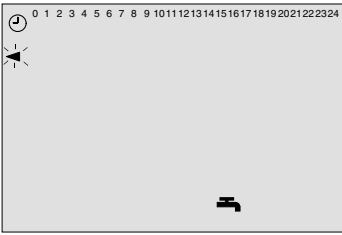
Solar charging OFF
(20 to 90 °C)
In systems 2.1, 4.1 and 4.2
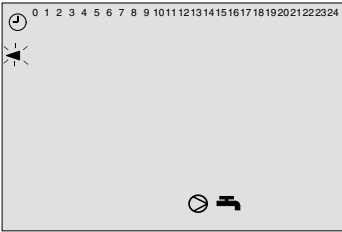
Time schedule for drinking water heating

Default rated operation 1 – 7   00.00 – 24.00

Enter as described for time schedule for heating on page 51.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Time schedule for circulation pump

Default rated operation 1 – 7   00.00 – 24.00

Enter as described for time schedule for heating on page 51.

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7.3 Personal code numbers, locking the mode switch for manual operation, enabling the write protect function for the configuration level and masking out parameters

Note: You can only choose a personal code number between 100 and 1900!

You must first enter the code number **1995** before you can enter a personal code number or restrict the access.

To do this, proceed as follows:

⇨ Use a pen (or a similar item) to press the changeover key, a triangle (parameter level) starts blinking in the top left-hand corner of the display.

⬆⬇ Press both keys simultaneously, two triangles (configuration level) start blinking in the display. The currently active system code number appears in the display.

✳ Press the enter key, *0 0 0 0* appears in the display.

⬇ Press the arrow key five times, the code number *1995* appears in the display.

✳ Press the enter key to acknowledge the code number, the code number *0 0 0 0* reappears in the display.

⬇ Use the arrow key to set the code number (from page 62 or a new one).

✳ Press the enter key, the code number starts to blink .

⬆⬇ Use the arrow keys to set a new personal code number or, if you do not want to change it.

✳ Press the enter key to acknowledge the code number.

You can now lock the manual level, if required, as described below.

Locking the manual level

When the locking is activated, the mode switch positions **+, 0** and **–** stand for ❱ in the heating circuit and ⏻ in the drinking water heating circuit.

The manual level is activated when **HAnd** appears in the display, the manual level is locked when **– –** appears in the display.

✳ Press the enter key, the **HAnd** or **– –** starts to blink.

⬆⬇ Use the arrow keys to change between **HAnd** and **– –**.

✳ Press the enter key to acknowledge the setting selected.

Now you can enable the write protect function for the configuration level, if required, which also masks out parameters.

Enabling the write protect function for the configuration level

Only the system code number **AnI** appears in the configuration level when the write protect function is enabled. The function blocks appear in the display on pressing the ⬆ key, but you cannot change the parameter settings anymore at this point.

In the parameter level, all the parameters in the display are masked out except for the following parameters: 'Time/Date/Year', 'Heating characteristic gradient', 'Heating characteristic level', 'Set-back of flow temperature for reduced operation' - alternatively 'Room set point' and 'Sustained temperature' - the drinking water set points ('Drinking water heating ON' and 'Differential gap' or 'Drinking water heating ON' and 'Drinking water heating OFF' in Anl2, Anl3 and Anl5, 'Drinking water temperature' in Anl4 and Anl6), as well as 'Time schedules', if applicable 'Public holidays' and 'Vacations'.

The configuration level is not write protected when **COPA** appears in the display,
the write protect function is enabled when **– –** appears in the display.

⊠   Press the enter key, the display blinks.

⬆⬇   Use the arrow keys to change between **COPA** and **– –**.

⊠   Press the enter key to acknowledge the setting selected.

7.4 Configuring the correction switch
(The correction switch label is delivered with the controller)

First enter the code number **1998** to configure the switch.

Proceed as described below:

⇨   Use a pen (or a similar item) to press the changeover key, a triangle (parameter level starts blinking in the top left-hand corner of the display.

⬆⬇   Press both keys simultaneously, two triangles (configuration level) start blinking in the display. The currently active system code number appears in the display.

⊠   Press the enter key, **0 0 0 0** appears in the display.

⬇   Press the arrow key twice, the code number **1998** appears in the display.

⊠   Press the enter key to acknowledge the code number.
        The mode switch for drinking water heating is activated if **btrS** appears in the display.
        The correction switch is activated if **corrS** appears in the display.

⬆⬇   Use the arrow keys to change between **btrS** and **corrS.**

⊠   Press the enter key to acknowledge the setting selected.

8. Data transfer using memory module

To simplify configuration and parameterization of the controller, you can use the memory module 1400-7142 or 1400-7436 for data transfer between controller and module or controller and PC.

The memory module 1400-7142 has a Sub-D 25-pin female connector to connect it to a PC and a modular jack to connect it to the controller's socket located on the front panel.

The memory module 1400-7436 has a modular jack to connect it to the controller's socket located on the front panel. It can only be used to transfer data between the controller and the memory module.

⚠ **The memory module must not be connected simultaneously to both the controller and PC.**

For data transfer to the controller, insert the memory module into the controller. Use the ⬇ ⬆ keys to select the direction of data transfer and acknowledge it by pressing the ⊞ key. **SP-75** in the display indicates the data transfer is from the memory module to the controller. **75-SP** in the display indicates the data transfer is from the controller to the memory pen.

The bars run across the top section of the display to indicate that data transmission is in progress. You can remove the memory pen when the bars stop running across the display!

9. Configured data

Station
Operator
Responsible SAMSON office
System code number

Function blocks FB ON or OFF											
00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

Flash adaptation (FB 02) Change after every [10] min	
Summer time operation (FB 03)	
Start [01.06]	
End [30.09]	
1 to 3 days for activation [2]	
1 to 3 days for deactivation [1]	
Outdoor temp. limit value 0.0 to 30 [18] °C	
Delayed outdoor temperature adaptation (FB 04)	
Operating direction of delay	
Delay 1 to 6 [3] K/h	
Thermal disinfection (FB 07)	
Cycle weekly/daily [week day 3]	
Start time [0:00] hrs	
Stop time [4:00] hrs	
Deactivation temperature 60 to 90 [70] °C	
Parallel pump operation (FB 09)	
Switching version PU/US	
Time before parallel operation is canceled 2 to 10 [10] min	
Intermediate heating 20 [– –]	

Control parameters for heating circuit (FB 10)	
Gain K_P 0.1 to 50.0 [2.0]	
Reset time T_N 1 to 999 [200] s	
Valve transit time Ty 15 to 240 [90] s	
UP lag time 15 to 2400 [180] s	
Differential gap 2 to 10 [5] °C	
Limitation of system deviation in the heating circuit (FB 11)	
Limit value 2 to 10 [2] °C	
Limitation of system deviation in the drinking water circuit (FB 12)	
Limit value 2 to 10 [2] °C	
Control parameters for the drinking water circuit (FB 17)	
Gain K_P 0.1 to 50.0 [2.0]	
Reset time T_N 1 to 999 [200/60] s	
Valve transit time Ty 15 to 240 [90/30] s	
Differential gap 2 to 10 s [5] °C	
Signal input for outdoor temperature (FB 18)	
Signal option (0 to 20 / 4 to 20 mA)	
Return flow temperature sensor RüF1 (FB 20)	
Limitation factor 0.1 to 10 [1.0]	
Setting SLP/– – in Anl 2	
Return flow temperature sensor RüF2 (FB 21)	
Limitation factor 0.1 to 10 [1.0]	
Signal input for flow rate (FB 22)	
Signal option (0 to 20 / 4 to 20 mA)	
Parameters for flow rate limitation (FB 23)	
Pulse rate $P_{heating\ circuit}$ 3 to 500 pulse/hr [10]	
Influencing factor$_{heating\ circuit}$ 0.1 to 10.0 [1.0]	
Pulse rate $P_{drinking\ water\ circuit}$ 3 to 500 pulse/hr [30]	
Influencing factor$_{drinking\ water\ circuit}$ 0.1 to 10.0 [1.0]	
Assignment 20 mA 0.1 to 100 m^3/hr [2.0]	
Minimum limitation 0.01 to 100 m^3/hr [0.01]	
Maximum limitation 0.01 to 100 m^3/hr [1.0]	

Characteristics	
Flow characteristic with gradient	
Gradient 0.2 to 3.2 [1.8]	
Parallel displacement −30.0 to 30 [0] °C	
Max. flow temperature 20 to 130 [90] °C	
Min. flow temperature 20 to 130 [20] °C	
Set-back for reduced operation 0 to 50 [15] °C	
Return flow characteristic with gradient	
Gradient 0.2 to 3.2 [1.2]	
Parallel displacement −30.0 to 30 [0] °C	
Max. return flow temperature 20 to 130 [65] °C	
Min. return flow temperature 20 to 130 [65] °C	
Limit values of the outdoor temperature	
Summer time operation 0 to 50 [22] °C	
Reduced operation −10 to 50 [15] °C	
Rated operation −30 to 50 [−15] °C	
Set points for room temperatures	
Rated operation 0 to 40 [20] °C	
Reduced operation 0 to 40 [17] °C	
Sustained temperature 0 to 40 [15] °C	
Set points for drinking water heating	
DW heating ON 20 to 90 [45] °C	
DW heating OFF 20 to 90 [50] °C	
Differential gap 0 to 30 [5] °C	
Charging/drinking water temperature 20 to 90 [55] °C	
End charging process 20 to 90 [53] °C	
Return flow temp. limitation 20 to 90 [65] °C	
Solar circuit pump ON 0 to 30 [10] °C	
Solar circuit pump OFF 0 to 30 [2] °C	
Solar charging OFF 20 to 90 [70] °C	

Code number   **1732**

Times-of-use

Heating circuit [6:00 to 22:00 hrs]

	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Start 1							
End 1							
Start 2							
End 2							

Public holidays

Vacation periods

Drinking water heating [00:00 to 24:00 hrs]

	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Start 1							
End 1							
Start 2							
End 2							

Circulation pump [00:00 to 24:00 hrs]

	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Start 1							
End 1							
Start 2							
End 2							

EB 5475-2 EN

S/CD 2001-10