

Automation System TROVIS 5400

District Heating Controller TROVIS 5431



Application

Self-optimizing, weather-sensitive flow temperature control of hot water heating systems and additional control of drinking water heating



The TROVIS 5431 District Heating Controller performs weather-sensitive flow temperature control for heating systems with one heating circuit. The return flow temperatures can be limited with respect to the outdoor temperature. Drinking water heating can be included in the control system in a secondary circuit as a storage system or in a primary circuit as a flow rate system.

Special features:

- Self-optimization without and with room sensor
- Short-term adaptation
- Delayed outdoor temperature adaptation
- Automatic summertime/wintertime changeover
- Time-based and outdoor temperature-based summer mode
- Thermal disinfection of drinking water storage tank
- Forced pump operation

Version

TROVIS 5431 (Fig. 1) - District heating controller with three-step output for connection to electric control valves in heating and district heating systems.



Fig. 1 · TROVIS 5431 District Heating Controller

Inputs and outputs (Fig. 2)

Input and output assignments of the district heating controller are determined by the system code number (see examples in Figs. 9 and 10).

Pt 1000 or PTC sensors can be used to measure the temperatures needed. Additionally, a potentiometer or a room sensor with set point correction and mode selector switch can be connected for the heating circuit.

The controller has a three-step output for controlling a suitable control valve and also four binary outputs to control the circulation pump, the storage charging pump, the heat exchanger charging pump and the circulation pump. System code number 5 has its own control valve for drinking water heating.

Three optional low-power binary outputs can be used for pump management and collective fault messages.

In complex systems, the flow set point can be transmitted to other controllers via the analog output.

Operation (Fig. 3)

The district heating controller can be adapted to the required control task by using the operator controls on the front panel.

The controller is designed for different types of systems which are briefly introduced in the Table "System Code Numbers".

The user must enter the type of his heating system by selecting the corresponding system code number. This system code number not only assigns the inputs and outputs but also determines the function blocks and parameters to be selected. They have to be set individually for the heating circuit and the drinking water heating. The required data are prompted step by step. Symbols appear on the display (3) to assist in configuration and parameterization.

The function blocks in the configuration level are used to define e.g. the heating characteristic, self-optimization and summer mode.

The parameters determine, for example, the on-time intervals for heating and drinking water heating as well as the limit values for the flow temperature.

Some of the function blocks can be protected against unauthorized access by means of a code number.

The operator switch (1) enables the user to display the measured temperatures and modify the most important parameters fast and easily.

The mode selector switch (2) is used to switch between the different operating modes.

All configuration and parameterization data can be copied from one district heating controller to another by means of the memory module (6).

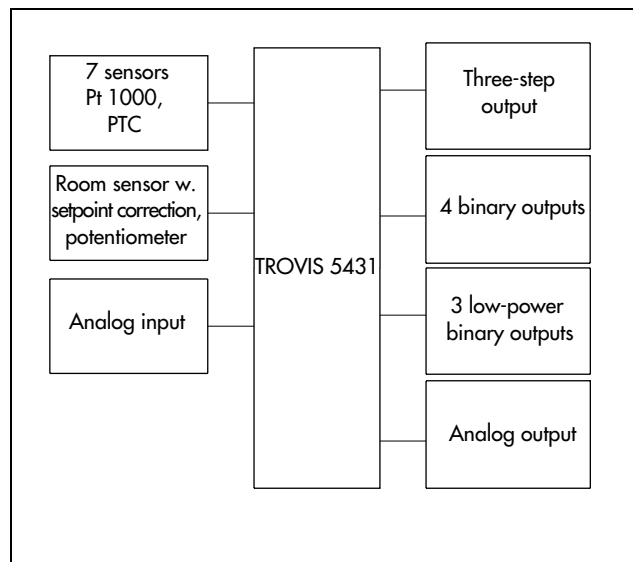
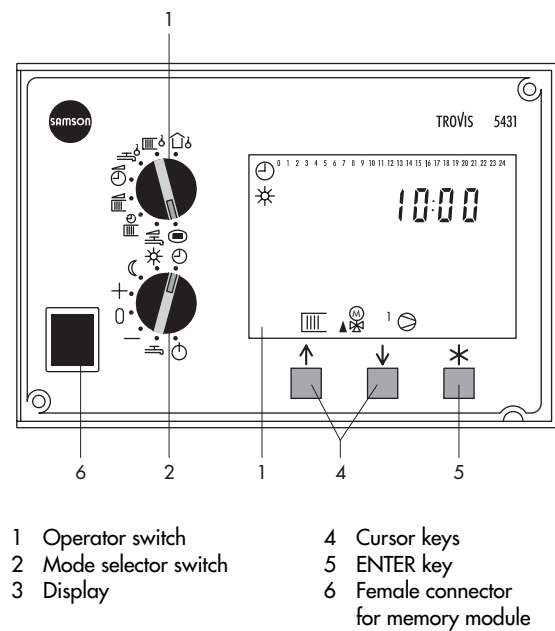


Fig. 2 · Inputs and outputs



- | | |
|------------------------|--------------------------------------|
| 1 Operator switch | 4 Cursor keys |
| 2 Mode selector switch | 5 ENTER key |
| 3 Display | 6 Female connector for memory module |

Fig. 3 · Operator controls

Manual setting of heating characteristic (Figs. 4 to 6)

The heating characteristic can be set manually by entering either a gradient value (Fig. 4) or any of four coordinates (Fig. 6). The four coordinates must be determined within a flow temperature t_V range of 20 to 120 °C and an outdoor temperature t_A range of -20 to 50 °C. In addition, the user can define limit values for the maximum and minimum flow temperature. If required, parallel displacement of the characteristic is possible. In this case, the limit values for the flow temperature remain unchanged.

The return flow temperature characteristic (Fig. 5) is determined in the same way as the flow temperature characteristic. Either a gradient value or any of four coordinates must be entered and, if needed, a maximum and minimum limit value. Parallel displacement is also possible.

Optimizing switch-on and switch-off times

The district heating controller automatically optimizes switch-on and switch-off times of heating systems in periodically used buildings, thus minimizing energy consumption. The controller determines the building's thermal characteristic and the dynamic behavior of the heating system by measuring the room and outdoor temperature over a certain period of time. This data is then used to calculate the optimum switch-on and switch-off times.

Self-optimization can be performed with or without using a room sensor.

Without connected room sensor, the switch-on time is shifted as a function of the outdoor temperature. During unoccupied periods, a definable reduced flow set point is used to operate the heating system (reduced operation).

A connected room sensor permits monitoring an adjustable sustaining room temperature value during unoccupied periods. If necessary, the heating system is put into operation over a short period of time.

Electrical connections and mounting

The controller housing with the electronics section as well as a separate terminal board for electrical connection are part of the district heating controller. Each screw terminal can take two 0.75 mm² wires. The connecting lines of the sensors must be laid separately from the output lines.

For wall mounting, the terminal board must be screwed to the wall. After the electrical connections have been installed, the controller housing must be plugged on the terminal board and secured with two screws.

For panel mounting, the controller is fastened to the control panel using two mounting pieces.

Ordering text

TROVIS 5431 District Heating Controller
Optional: binary outputs BA1 to BA3 or BA3 only

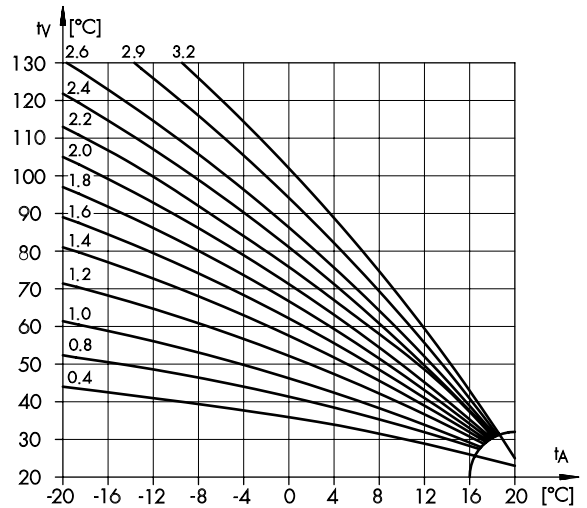


Fig. 4 · Heating characteristics

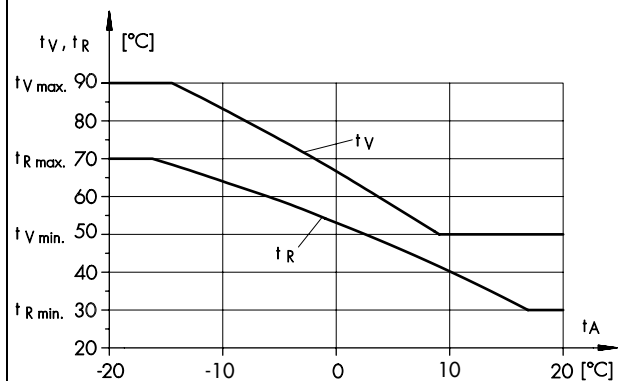


Fig. 5 · Weather-sensitive flow temperature control with variable return flow temperature limitation

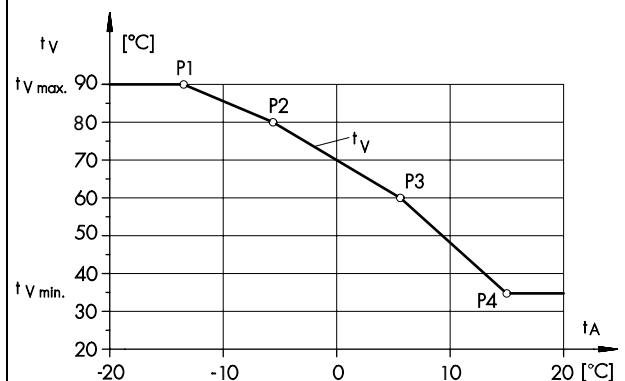


Fig. 6 · Characteristic with four coordinates

t_V	Flow temperature	... min.	minimum t_R or t_V
t_R	Return flow temperature	... max.	maximum t_R or t_V
t_A	Outdoor temperature	P1 to P4	Coordinates 1 to 4

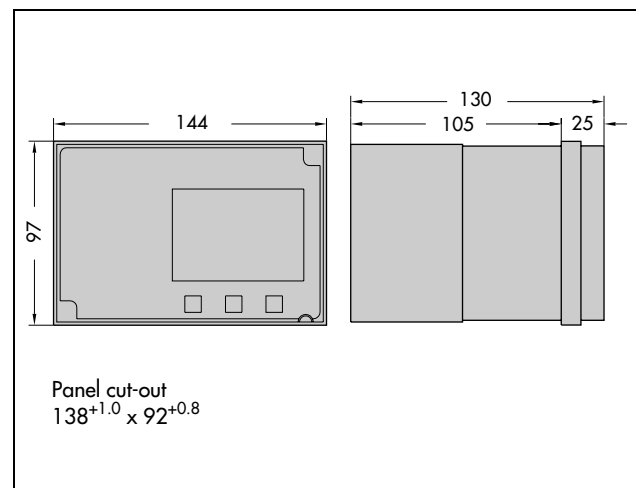
Technical data

Inputs	Depending on selected system code no.
Sensor inputs	Max. 7 configurable inputs for temperature sensors (PTC or Pt 1000) 2 flow temperature sensors 1 room sensor 1 outdoor temperature sensor 1 return flow temperature sensor 2 storage temperature sensors
Binary inputs	Storage thermostat
Additional inputs	Input for potentiometer or room sensor with set point correction and mode selector switch
Analog input	0 to 10 V, ($R_i = 20 \text{ k}\Omega$)
Outputs	Depending on selected system code no.
Control signal y	Three-step signal: Max. load: 20 to 250 V AC; 0.5 A AC On/off signal: Max. load: 20 to 250 V AC; 0.5 A AC
Binary outputs	4 outputs for pump control non-floating: 230 V AC, 2 A AC ($\cos \varphi > 0.5$)
Optional	3 outputs (BA1 to BA3) for pump management and collective fault message: 30 V, 100 mA AC/DC or BA3 only: 230 V 50 mA AC/DC
Analog output	0 to 10 V, load $> 2 \text{ k}\Omega$
Power supply	230 V AC (+10%, -15%), 48 to 62 Hz, power consumption approx. 3 VA
Ambient temperature	0 to 50 °C (operation) -10 to 60 °C (transport and storage)
Degree of protection	IP 40 according to IEC 529
Class of protection	I 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	According to EN 50082 Part 1
Noise emission	According to EN 50081 Part 1
Weight	Approx. 0.6 kg

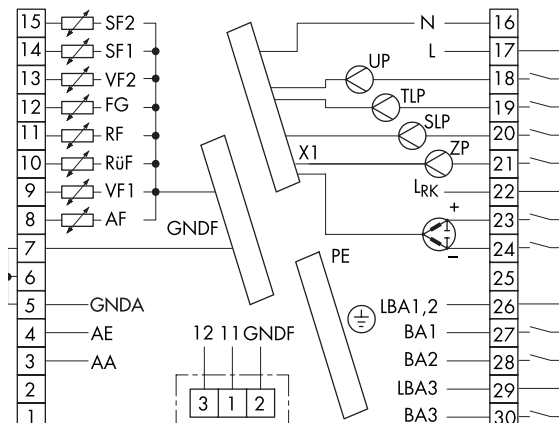
System code numbers

System code number	System description
1	One heating circuit
2	One heating circuit, secondary drinking water heating circuit with storage system
3	One heating circuit, secondary drinking water heating circuit with storage charging system
4	One heating circuit, primary drinking water heating circuit with storage charging system and self-operated regulators
5	One heating circuit, primary drinking water heating in flow rate system

Dimensions in mm

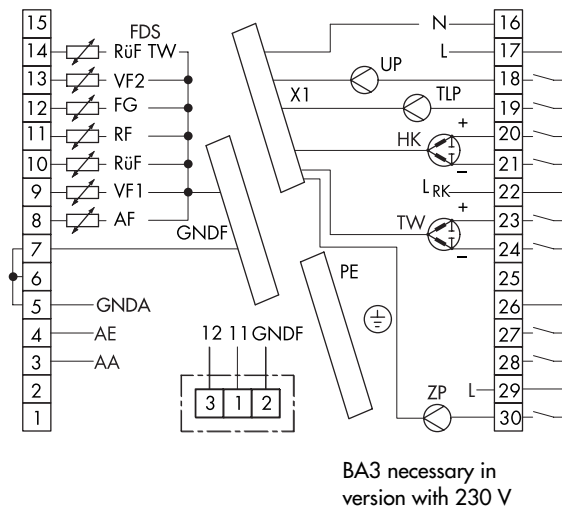


Terminal assignment



The illustration shows maximum equipment. The assigned inputs and outputs vary depending on the system code number selected.

Fig. 7 · Terminal assignment TROVIS 5431



BA3 necessary in version with 230 V

AA	Analog output 0 to 10 V
AE	Analog input 0 to 10 V
AF	Outdoor temperature sensor
BA1...3	Binary output
FDS	Hydraulic pressure switch
FG	Potentiometer
GND	Ground
LBA1...3	Voltage supply
L _{RK}	Voltage supply for actuator
RF	Room sensor
RüF	Return flow temperature sensor
RÜV TW	Return flow drinking water sensor
SF1	Storage sensor ON
SF2	Storage sensor OFF
SLP	Storage charging pump
TLP	Heat exchanger charging pump
UP	Circulation pump
VF1	Flow temperature sensor
VF2	Flow temperature sensor
ZP	Circulation pump

Fig. 8 · Terminal assignment of system code number 5

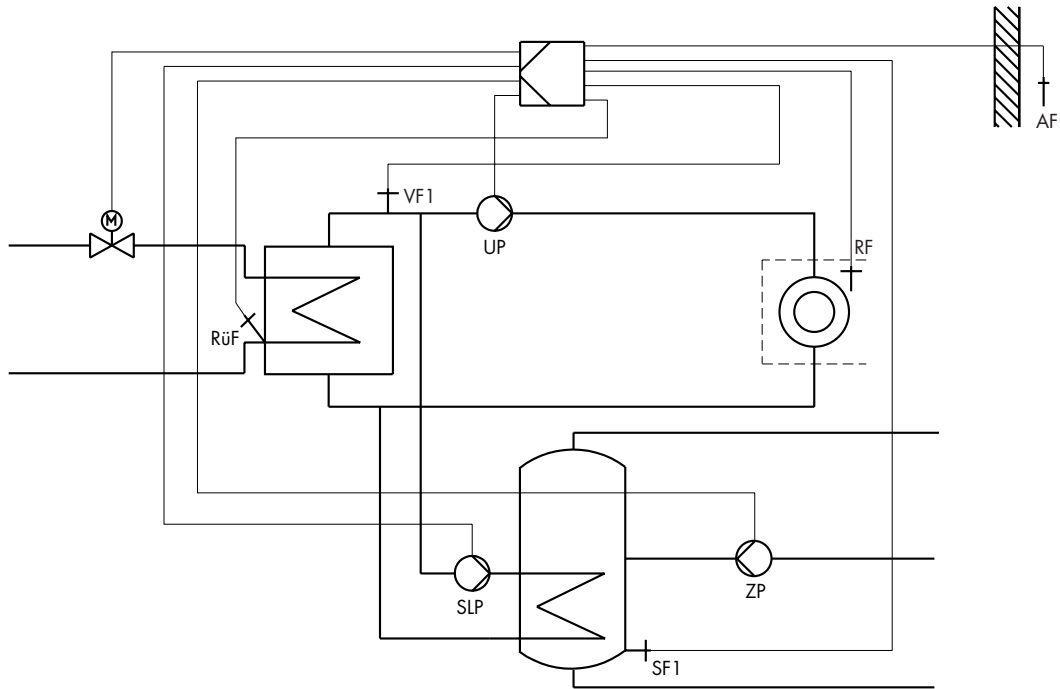


Fig. 9 · System code number 2

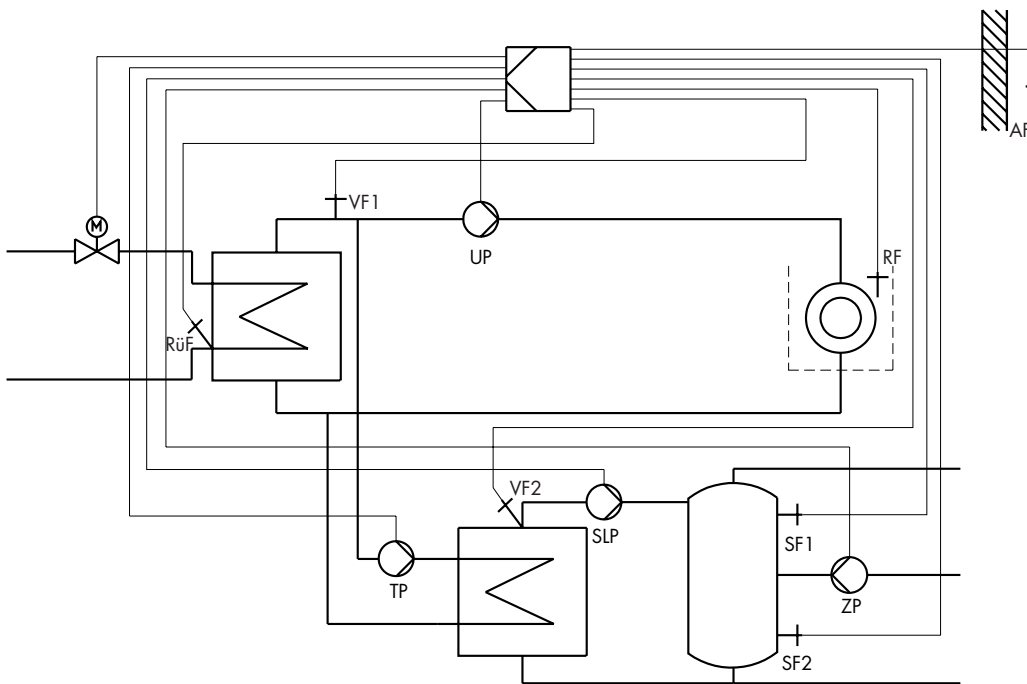


Fig. 10 · System code number 3

SF1	Storage sensor ON	AF	Outdoor temperature sensor	TP	Heat exchanger charging pump
SF2	Storage sensor OFF	RF	Room sensor	SLP	Storage charging pump
VF1	Flow temperature sensor	RüF	Return flow temperature sensor	ZP	Circulation pump
VF2	Flow temperature sensor	UP	Circulation pump		