

## TROVIS 5475-2 Heating and District Heating Controller

On-off or three-step controller designed for wall or panel mounting (dimensions of front frame: 144 mm x 96 mm)

### Application

Controller for self-optimizing, weather-sensitive flow temperature control in hot water heating systems and domestic hot water generation incorporating two control loops in which the integration of a solar collector loop is possible. Also applicable as controller with variable limitation of return flow temperature.



The TROVIS 5475-2 Heating and District Heating Controller is a modern, weather-sensitive heating controller which is capable of calculating the ideal heating characteristic from the measured room temperature, thus eliminating the need to manually set the heating characteristic. Moreover, the instrument can be used for optimizing heating in periodically used buildings. It is provided with an adaptive algorithm for determining the building's heating characteristic from the measured temperatures and calculating the optimum switch-on and switch-off times of the system.

More features:

- Domestic hot water generation from either the primary loop, or from the secondary loop (priority loop)
- Differential temperature control for solar-supported heating of the drinking water storage tank configurable in two systems
- Up to four binary outputs for controlling the heating circulation pump, heat exchanger charging pump or solar circulation pump, storage charging pump and circulation pump
- Inputs for connection of maximum 7 PTC and Pt 100, or 7 Pt 1000 and Pt 100 or 7 NTC and Pt 100 temperature sensors
- Outdoor temperature can also be applied as current signal of 4(0) to 20 mA
- Storage temperature sensor can be replaced by a storage tank thermostat
- Variable limitation of return flow temperature with respect to the outdoor temperature
- Minimum and maximum limitation of flow temperature
- Three keys and symbols displayed on LCD provide easy operation
- 365-day clock with up to 3 time programs and automatic summertime/wintertime changeover
- Optional connection of a room temperature sensor to correct the set point and choose the operating mode
- Configuration and parameterization on the PC, data transmission by means of a memory module

### Version

**TROVIS 5475-2** (Fig. 1) · Heating and District Heating Controller



Fig. 1 · TROVIS 5475-2

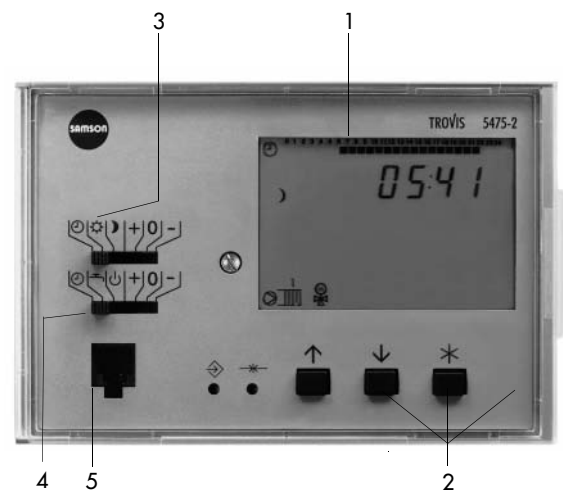


Fig. 2 · Operator interface

- |                           |                         |
|---------------------------|-------------------------|
| 1 LCD                     | 4 Set point adjuster    |
| 2 Operator keys           | Domestic hot water      |
| 3 Operating mode selector | 5 Connecting socket for |
| Heating circuit           | memory module           |

### Inputs and outputs (Fig. 3)

Inputs and outputs of the heating and district heating controller are determined by the system code number (see example in Figs. 8 and 9).

There are connections for maximum 7 temperature sensors. It is possible to use either PTC and Pt 100 sensors, or Pt 1000 and Pt 100 sensors, or NTC and Pt 100 sensors in combination.

Storage temperature sensors can be replaced by a storage tank thermostat that has its own binary input.

The signal of a calorimeter which is proportional to the flow rate or the quantity of heat can be applied to a pulse input or current input. Thus maximum and/or minimum flow rate, or maximum heat output can be limited.

When connected to actuators with an actuating time of 15 to 240 s, the heating and district heating controller shows PI action corresponding to the adjusted parameters.

Additionally, the heating and district heating controller controls the heating circulation pump, the storage charging pump and, if needed, the heat exchanger charging pump, the solar circulation pump and the circulation pump.

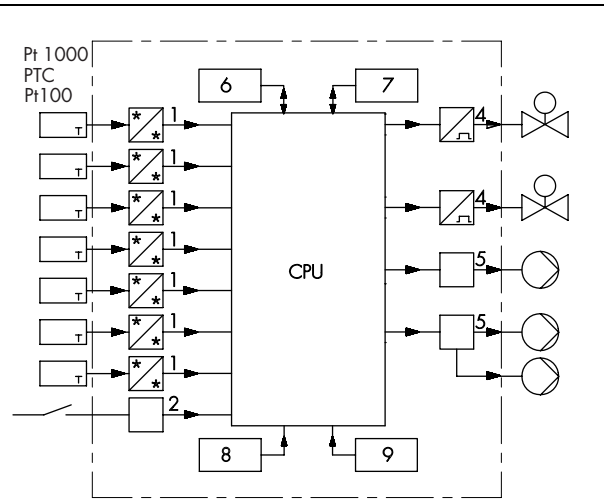
### Adaptation of the controller heating characteristic

This controller provides the option of automatically adapting the heating characteristic to the required system conditions, provided that a room temperature sensor is available. The program automatically determines the relation between flow temperature and measured outdoor temperature with respect to the room temperature. The flow temperature values can be limited to either a maximum or minimum.

### Manual setting of the heating characteristic (Figs. 4 and 5)

The heating characteristic may also be set manually. In this case, the relation between flow temperature and measured outdoor temperature is to be determined first by entering a corresponding gradient value (see Fig. 4). Then, the minimum and the maximum value of the flow temperature have to be entered. In this case, the limit values of the flow temperature are not changed.

The setting of the return flow temperature characteristic (Fig.5) also requires entering the gradient value, the maximum and minimum limit value, and the parallel displacement, if needed.



- |  |                                  |
|--|----------------------------------|
| 1 Converter for analog input signals                   | 5 Output unit for binary signals |
| 2 Binary input unit                                    | 6 Program and data memory        |
| 4 Output unit for on-off signals or three-step signals | 7 Keypad and display unit        |
|  | 8 Timer                          |
|  | 9 Power supply                   |

Fig. 3 · Hardware design

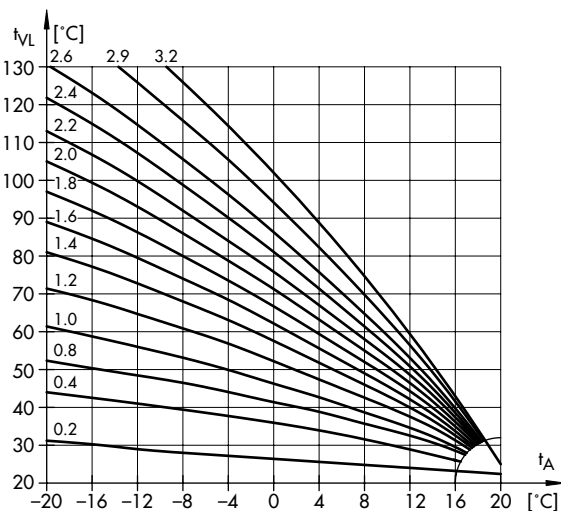


Fig. 4 · Family of heating characteristics

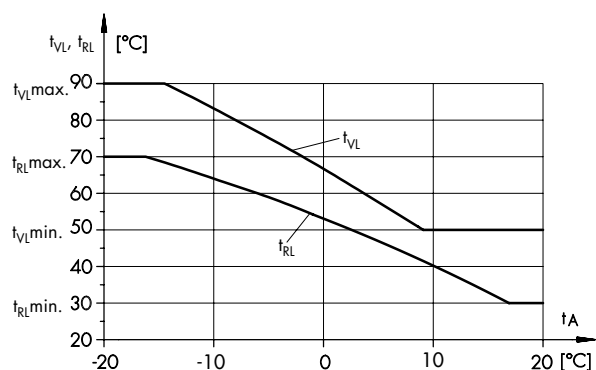


Fig. 5 · Weather-sensitive flow temperature control with variable return flow temperature limitation

### Optimizing switch-on and switch-off times (Figs. 6 and 7)

The heating and district heating controller is supplied with a program for optimizing the switch-on and switch-off times of the heating system in periodically used buildings.

Energy consumption depends on four factors, duration of energy supply, difference between room temperature and outdoor temperature, the building's thermal features, and the properties of the building's heating system. The controller determines the building's heating characteristic and the dynamic behavior of the heating system from the behavior of room and outdoor temperatures over a certain period of time. This data is used to calculate the latest possible switch-on time  $T_E$  in order to achieve minimum energy consumption.

When the heating system is not used, the controller monitors the system and switches on the heating whenever the temperature falls below the sustaining temperature  $t_{st}$  (stand-by operation).

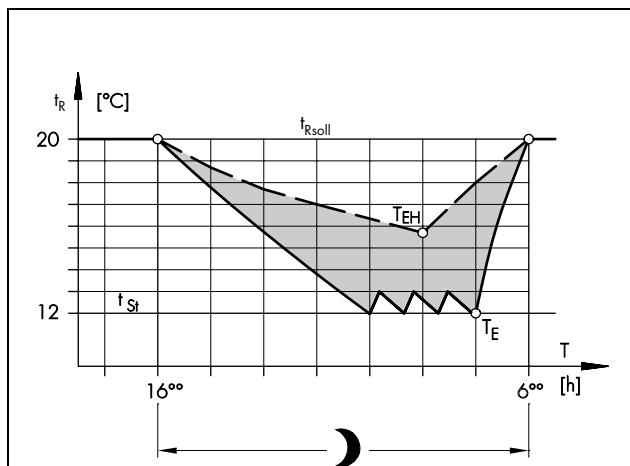


Fig. 6

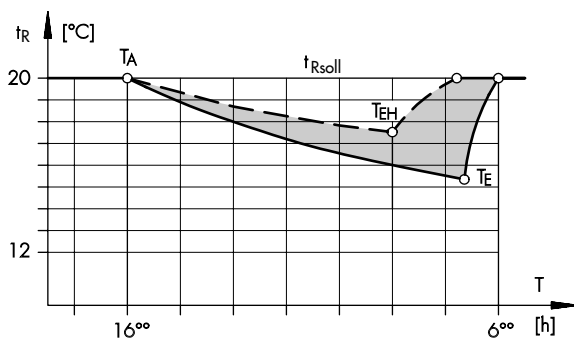


Fig. 7

--- Without optimization program  
 — With optimization program

Figs. 6 and 7

Temperature characteristic of district heating controller with and without optimization program

Fig. 6 · High heating load (low outdoor temperature)

Fig. 7 · Average heating load (average outdoor temperature)

### Operation (Fig. 2)

Three keys allow data input and data access. This is supported by symbols displayed on LCD.

To access the parameterizing mode, press the  $\blacklozenge$  key. To access the configuration mode, press the  $\uparrow$  and  $\downarrow$  keys simultaneously. The heating and district heating controller is controlled by a program. The basic adjustment of this program for the heating system in question is carried out by entering a system code number. For selecting the system code number, refer to the corresponding system configuration diagram in the "Mounting and operating instructions". Any further sensors and/or functions which are not included in the system configuration diagram have to be chosen later when determining the functional blocks.

All data, such as time, date, characteristic, set points, and nominal operating times are set in the parameterizing mode. All parameterizing data are reset to their standard values when pressing the standard key  $\Rightarrow$ .

The parameters for the return flow temperature and, if applicable, for the flow rate and heat output are protected by a user-defined code number. In addition, certain parameters or the entire configuration level may be hidden in order to provide protection against unauthorized changes.

The mode selector switch (3 and 4, Fig. 2) is used to select the operating mode for the heating circuit and for the domestic hot water separately. In addition, it is used to switch to manual operation of the control valve. Switching positions are the following:

Heating circuit (Fig. 2, 3):

- $\odot$  Time-based operation with changeover between nominal operation and reduced or stand-by operation
- $\odot$  Nominal operation
- $\bullet$  Reduced and stand-by operation

Domestic hot water (Fig. 2, 4):

- $\odot$  Time-based operation of domestic hot water
- $\text{---}$  Time-based operation of domestic hot water, heating circuit disconnected
- $\text{---}$  Heating circuit and domestic hot water disconnected, frost protection

Manual operation of heating circuit and/or domestic hot water

- + Control valve opens
- 0 Control valve stationary
- Control valve closes

### Legend for Figs. 4 to 7

- $t_{VL}$  Flow temperature
- $t_A$  Outdoor temperature
- $t_{RL}$  Return flow temperature
- ...min Minimum  $t_{VL}$  or  $t_{RL}$
- ...max Maximum  $t_{VL}$  or  $t_{RL}$
- $t_R$  Room temperature
- $t_{Rsoll}$  Set point of the room temperature
- $t_{st}$  Sustaining temperature
- T Time
- $T_{EH}$  Changeover time without optimization program
- $T_A, T_E$  Switch-on and switch-off time With optimization program

## Technical Data

<b>Inputs</b>	Depending on the selected system code number, maximum of 7 temperature sensors (PTC and Pt 100 or Pt 1000 and Pt 100 or NTC and Pt 100) 2 flow temperature sensors (or 1 solar collector sensor as an alternative) 1 room temperature sensor 1 outdoor temperature sensor 1 return flow temperature sensor, 2 in system 4.0 2 storage temperature sensors
Binary inputs	Storage tank thermostat
Further inputs	Pulse input for limitation of heat output or flow rate, or current input 4(0) to 20 mA for flow rate limitation Remote control unit (room sensor incl. correction of the flow set point and selection of the operating mode)
<b>Outputs</b>	Depending on selected system code number
Control signal y	Three-step signal; load max. 250 V~, 2 A, min. 250 V~, 10 mA On-off signal; load max. 250 V~, 2 A, min. 250 V~, 10 mA
Binary outputs	Up to 4 outputs for pump control; load max. 250 V~, 2 A
<b>Control parameters</b>	$K_p = 0.1$ to $50$ ; $T_n = 1$ to $999$ s Actuating time 15 to 240 s
<b>Operating voltage</b>	230 V~ (+10%, -15%), 48 to 62 Hz, power consumption 1.5 VA
<b>Ambient temperature</b>	0 to 40 °C (operation) -20 to 60 °C (transport and storage)
<b>Degree of protection</b>	IP 40 according to IEC 529
<b>Class of protection</b>	II according to VDE 0106
<b>Degree of contamination</b>	2 according to VDE 0110
<b>Overvoltage category</b>	II according to VDE 0110
<b>Class of moisture</b>	F according to VDE 40040
<b>Noise immunity</b>	Corresponding to EN 50082 Part 1
<b>Noise emission</b>	Corresponding to EN 50081 Part 1
<b>Weight</b> approx. kg	0.5

## Electrical connection and assembly

The controller consists of a controller housing containing the electronic components, and a separate terminal board for the electrical connections. Two wires of max. 1.5 mm<sup>2</sup> can be connected to each terminal. The 230 V supply lines and the sensor connection lines have to be installed in separate cables. To increase noise immunity, it is recommended to keep a distance of at least 10 cm between the two cables.

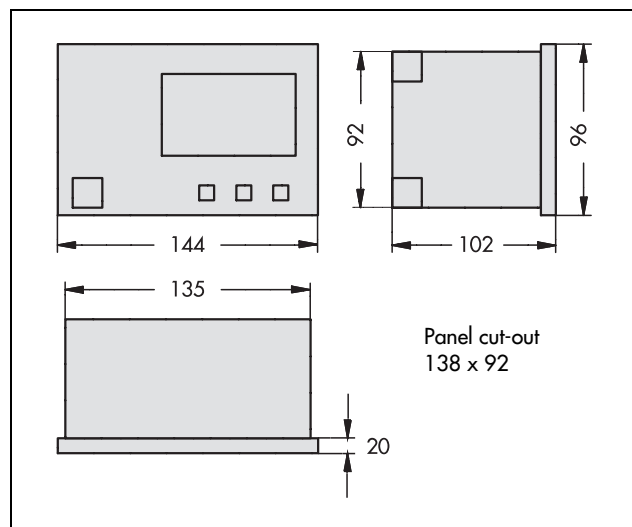
For wall mounting, the terminal board has to be attached to the wall by using screws. When all electrical connections are completed the housing has to be fastened onto the terminal board and secured with a screw.

The controller may also be mounted on a control panel by using two mounting brackets.

## Ordering text

TROVIS 5475-2 Heating and District Heating Controller  
Memory module no. 1400-7142

Dimensions in mm



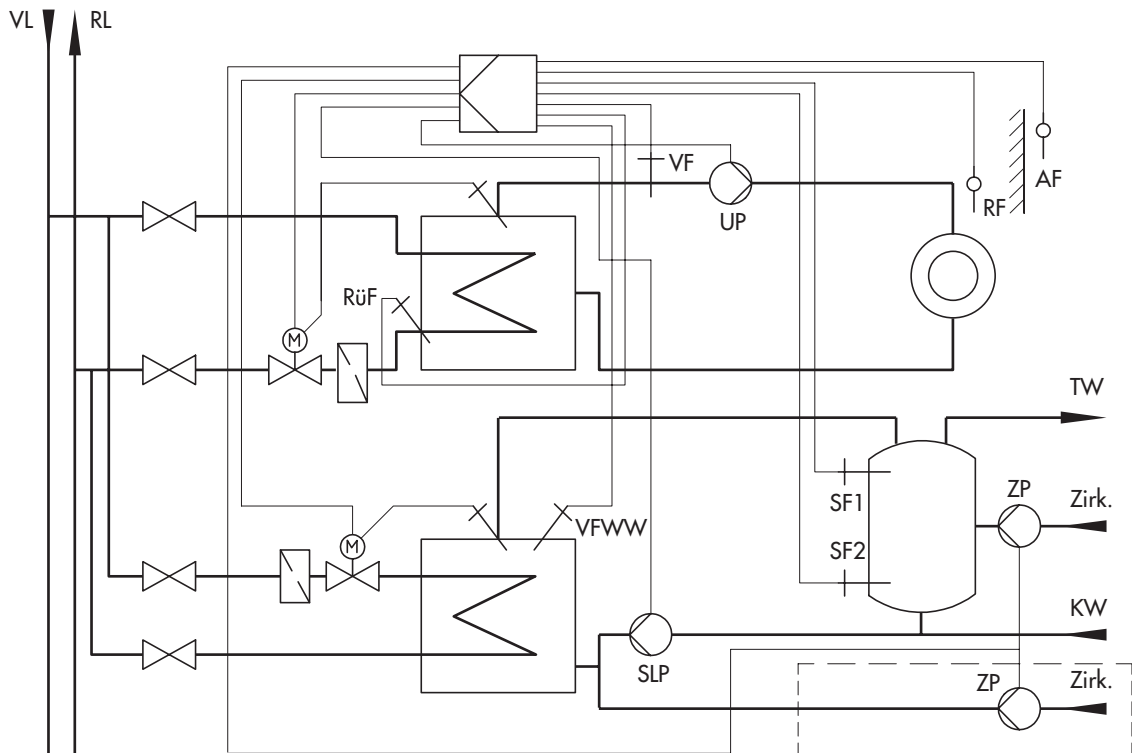


Fig. 8 · System code number 5.0

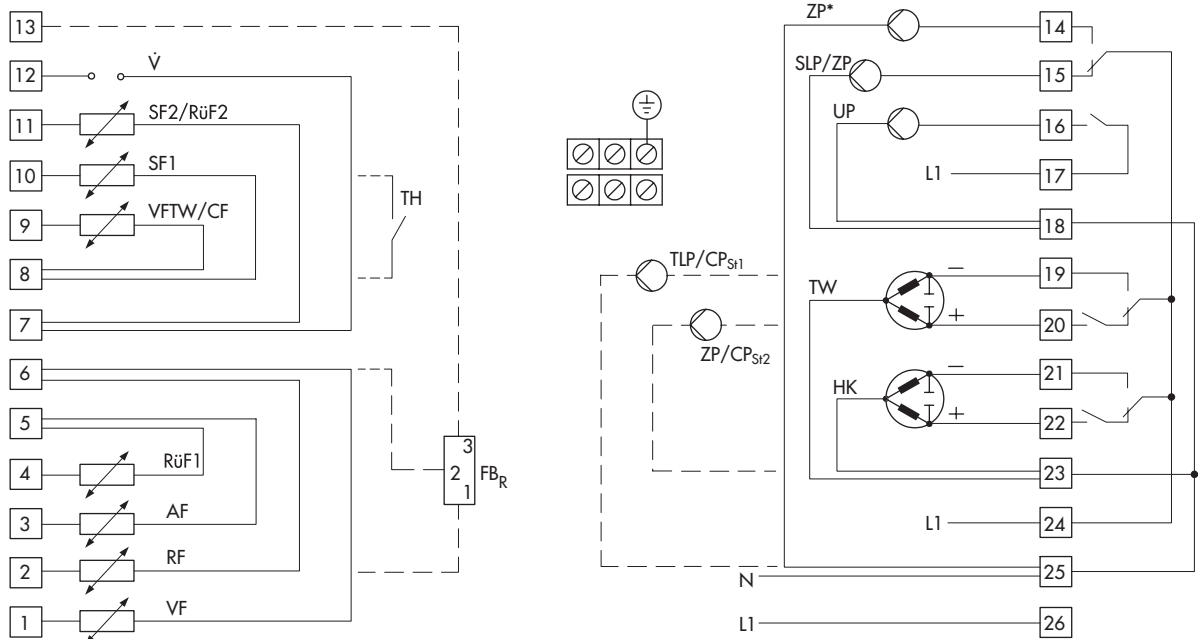


Fig. 9 · Terminal assignment

AF	Outdoor temperature sensor
CF	Solar collector sensor
CP	Solar circulation pump (St1 level 1, St2 level 2)
FBR	Remote control unit
HK	Heating circuit
KW	Cold water
RF	Room temperature sensor
RL	Return flow
RüF	Return flow temperature sensor
SF	Storage temperature sensor
SLP	Storage charging pump

TH	Thermostat
TW	Domestic water circuit
UP	Heating circulation pump
V	Flow rate/heat output limitation
VF	Flow temperature sensor
VFWW	Flow temperature sensor for domestic water
VL	Flow
Zirk	Circulation
ZP	Circulation pump
*	Without time program



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