

# Set the heating curve correctly

On the basis of complaints from users about the room temperature, you suspect that the heating curve is not set correctly. Or: you have noticed that the room temperature remains high at night even though you have implemented a night-time temperature reduction.

## Action

Set the heating curve and heating limit correctly on the heating controller for the heating system.

**Setting the heating curve correctly will achieve savings of four to six per cent.**

## What to do

First, perform this action in cold weather (somewhat less than 0 °C) so the room temperature is set correctly for this outside temperature. Repeat the same step when the weather is warmer (a little over 10 °C).

### 1. Define temperatures and identify critical rooms

- Possibly in consultation with the users, define the setpoint for the room temperature (e.g. 22 °C for offices).
- Find out which rooms are difficult to heat. These include rooms facing the outside or facing north, the top floor and rooms in corner positions.

### 2. Determine and evaluate room temperatures

See page 4 (Check the interaction between the thermostat valves and the heating curve)

### 3. Correct the heating curve

Reduce the heating curve by 3 °C during the heating period (see page 2).

### 4. Adjust the heating limit

Reduce the heating limit by 1 °C during the transition period (see page 3).

### 5. Observe

Then observe the room temperature for two weeks in each room. Repeat steps 4 and/or 5 until the room temperature is no longer reached (complaints), and correct the set values as required.

### 6. Set the correct temperature and document it

- Set the correct temperature on the thermostat valves and the room temperature controllers.
- Record the new setpoint values in the logbook.

### Costs – effort

- Your own labour: approx. one working day (depending on the size of the building)
- Simple thermometer: CHF 20 to 30
- USB data logger: approx. CHF 100

### Please note!

- Keep a written record of the original setpoint values and every adjustment in the log book (journal).
- Inform users of the various rooms that the room temperature may be slightly higher in the next few days. Ask users not to adjust the thermostat valve and not to open windows. Users are welcome to document their own experiences.
- Check whether the outside temperature indicator in the heating control is correct. The temperature shown is often wrong (faulty outdoor sensor or solar radiation).
- Check whether the time setting on the heating control is adjusted correctly (e.g. winter time).

# Additional explanations

## Setting the heating curve

The heating curve (heating characteristic) describes the relationship between the outside temperature and the flow temperature of the heating system.

Diagnosis and action

Analogue controllers

Digital controllers

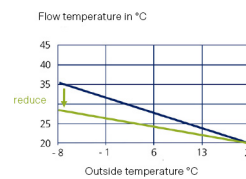
### 1. Room temperature is too high in cold weather (below 0 °C)

Reduce the flow temperature (FT/VT) by setting a flatter heating curve.

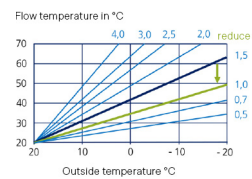
Rule of thumb for radiators: Reducing the heating curve by 5 °C decreases the room temperature by 2,5 °C.

Rule of thumb for underfloor heating: Reducing the heating curve by 2 °C decreases the room temperature by 2 °C.

e.g. set a flatter curve



e.g. select a 1,0 curve instead of 1,5.



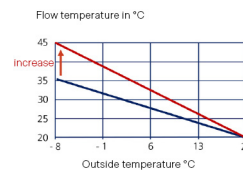
### 2. Room temperature is too low in cold weather (below 0 °C)

Increase the flow temperature (FT/VT) by setting a steeper heating curve.

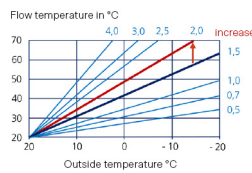
Rule of thumb for radiators: Increasing the heating curve by 5 °C increases the room temperature by 2,5 °C.

Rule of thumb for underfloor heating: Increasing the heating curve by 2 °C increases the room temperature by 2 °C.

e.g. set a steeper curve



e.g. select a 2.0 curve instead of 1.5.

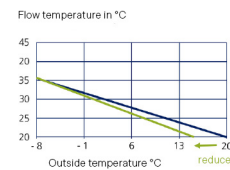


### 3. Room temperature is too high in warm weather (over 10 °C)

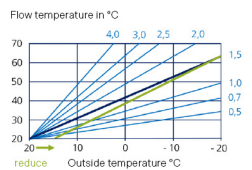
Reduce the flow temperature (FT/VT) by setting a steeper heating curve.

Rule of thumb: Reducing the heating curve by 3 °C decreases the room temperature by 1 °C.

e.g. set a steeper curve, or reduce the heating limit



e.g. reduce the heating limit

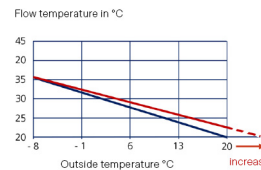


### 4. Room temperature is too low in warm weather (over 10 °C)

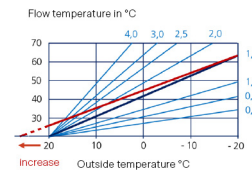
Increase the flow temperature (FT/VT) by setting a flatter heating curve.

Rule of thumb: Increasing the heating curve by 3 °C increases the room temperature by 1 °C.

e.g. set a flatter curve, or increase the heating limit



e.g. increase the heating limit



# Additional explanations

## Flow temperatures

The approximate setting for the flow temperatures is based on various guidance values, depending on the heating system, the age and type of the building, and the usage.

Heating system	Outside temperature	-8 °C	15 °C
		↓	↓
<b>Radiator heating</b>			
Built before 1980	Flow temperature	60–70 °C	25 °C
Built between 1980 and 2000	Flow temperature	50–60 °C	25 °C
Built between 2000 and 2010	Flow temperature	40–50 °C	25 °C
Built after 2010	Flow temperature	35–40 °C	20 °C
<b>Underfloor heating</b>			
Built before 1990	Flow temperature	35–50 °C	25 °C
Built between 1990 and 2010	Flow temperature	30–40 °C	25 °C
Built after 2010	Flow temperature	30–35 °C	20 °C

Lower flow temperatures can usually be set in buildings with many internal loads (e.g. equipment or lights that give off heat).

## Automatic summer-winter switchover

Modern controllers are equipped with an automatic summer-winter switchover feature. Depending on the product, this feature is activated by functions such as “heating limit”, “summer limit” or “ECO”. The advantage of the automatic function is that the control automatically switches off the heating group or pump according to the outside temperature. In this case, it is no longer necessary to switch the heating groups off manually in spring or to switch them on in autumn. However, it is worth checking periodically to see whether this function is working as you want it to.

## Setting the heating limit

The heating limit is defined as the outside temperature at which the heating controller switches the heating system off because the building no longer needs to be heated in order to provide the desired indoor temperature (e.g. 20 °C). Once this temperature is reached, the heat stored in the building, solar radiation and heat dissipated indoors (from lighting and computers, etc.) is sufficient to maintain the temperature. The heating limit is set so that the room temperature does not decrease in the transition period. Consequently, the heating limit is always set lower than the room temperature. These factors allow a lower heating limit to be set:

- better building insulation,
- more solid building construction,
- lower room temperature,
- smaller required air change,
- faster response by the heat delivery system.

**Setting a lower heating limit reduces the operating period for the heating and allows more savings in the transition period**

## Guidance values for the heating limit

These values relate to a room temperature of 20 °C.

- Non-insulated old buildings erected before 1977: 15–17 °C
- Buildings erected between 1977 and 1995: 14–16 °C
- Buildings erected between 1995 and 2010: 12–15 °C
- Minergie buildings: 9–14 °C
- “Passive houses”, Minergie-P buildings: 8–10 °C

It is best to make and check changes to the heating limit settings in autumn, at daytime outside temperatures of about 12 to 18 °C and without solar radiation insofar as possible.

# Additional explanations

## Room temperature control concepts

The heating curve plays an important part in these control systems:

### 1. Pure flow temperature control

The flow temperature setting determines the room temperature. Changes to the heating curve are noticed immediately in the rooms. For the same reason, users immediately notice incorrectly adjusted heating curves as well (it is either too hot or too cold).

### 2. Thermostat valve or single room controls

External influences can be taken into account optimally if a local control system (thermostat valves, single-room controllers) is used for the fine adjustment of the temperature in the rooms. For example, these devices switch off the radiator in the room as soon as the sun heats the room on its own. But in this case too, the flow temperature for the heating boiler or heating groups is adjusted via the heating curve.

#### – If the heating curve has been set too low

If the heating curve is set too low, the required room temperature will not be reached. This leads to complaints, and the heating curve must be “lifted up” as appropriate.

#### – If the heating curve has been set too high

If the heating curve is set too high, the local control system limits the room temperature so as to avoid overheating the rooms (provided the control system is set correctly). Users do not notice this – everyone is satisfied. But because the flow temperature is too high, there are increased heat losses in the generating and distribution system. Also, the effect of the night reduction is diminished, or there may even be no night reduction at all – because, although the heating controller reduces the flow temperature, it may still be high enough to keep the room at the daytime temperature setpoint. So with this system, an incorrectly set heating curve “covertly” leads to unwanted energy losses and energy costs.

## Check the interaction between the thermostat valves and the heating curve

If the temperature in the rooms does not fall at night even though a night reduction has been programmed, the reason could be that the flow temperature is set too high.

- Set all the thermostat valves in these rooms to the maximum temperature (position 5) or dismantle them completely.
- If you have a room temperature controller or manual valves, set them to the highest level.
- Use a thermometer or USB logger to measure the room temperature for two to three days. The correct temperature is determined inside the room, at a height of approx. 1.5 m and without any disruptive influences (solar radiation, heat dissipated by printers, etc.).
- Use the recorded data to check whether the temperature in the rooms corresponds to the setpoint values.

## Individual rooms are too cold

If the heating curve has to be increased significantly on account of only a few rooms, the problem can be solved in those rooms:

- Check the flow rate. Is the entire surface of the radiator warm? Are the valves fully open?
- Vent the radiator
- Remove anything blocking the radiator (curtain, furniture)
- (Possibly) remove sludge from underfloor heating pipes
- (Possibly) increase the circulating pump pressure

## Minimum flow temperature

If a minimum flow temperature (base temperature) can be set on the controller, it must be checked and set as follows for outside temperatures starting from 20 °C:

- Underfloor heating: 20 °C
- Radiators: 22 to 23 °C

## Additional information

- [Energy manual for caretakers](#)