KNX®

INDIVIDUAL ROOM CONTROL

Efficient Heating with KNX

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How many of you turned down the heat control when you left the house this morning?

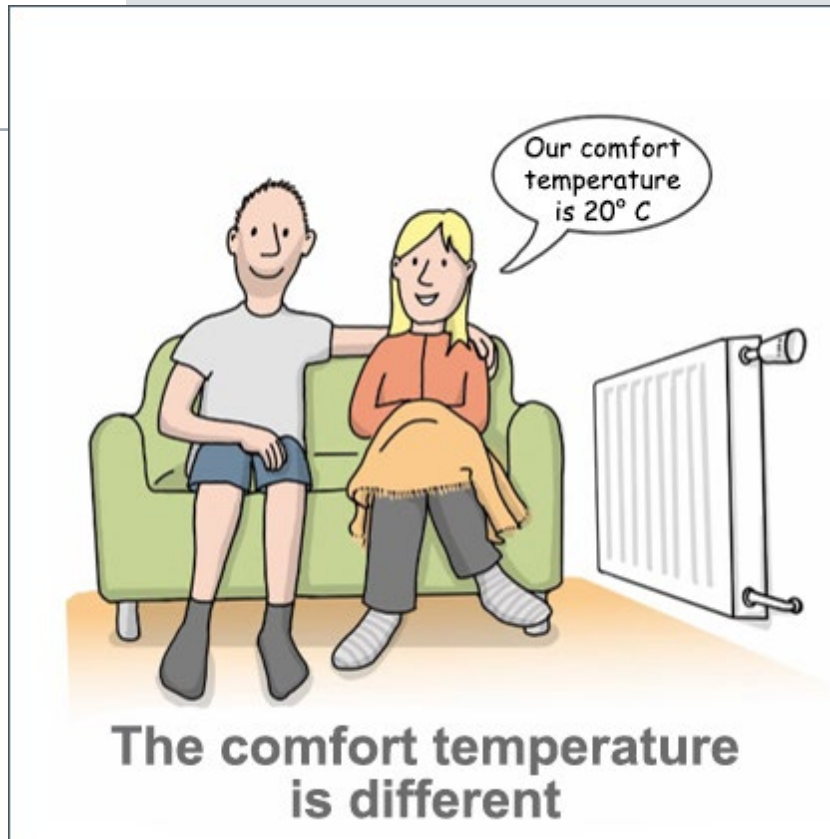# What do you think: Is the comfort temperature subjective?

Image source : Die optimale Raumtemperatur für jeden Wohnraum (heizsparer.de)

People's sensation of warmth varies greatly.

Nevertheless, "comfort" can be achieved even with comparatively low room temperatures.

- avoid drafts
- avoid temperature differences

Because that is perceived as unpleasant by most people.

Learning Goals

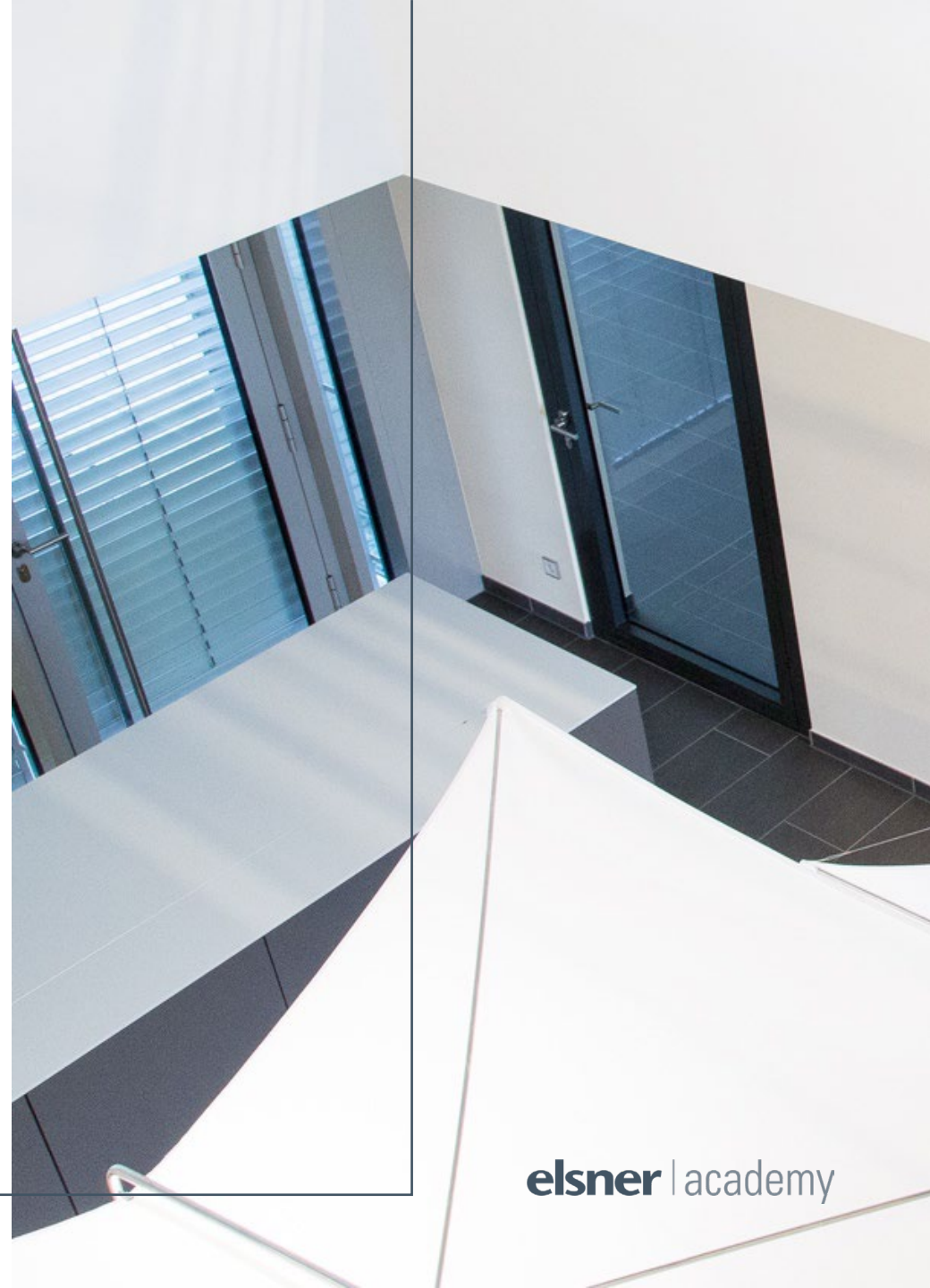After this presentation you will be able to

- ✓ determine the optimal temperature in different rooms
- ✓ apply the principle of individual room control
- ✓ distinguish and correctly apply the different modes of operation of the control types
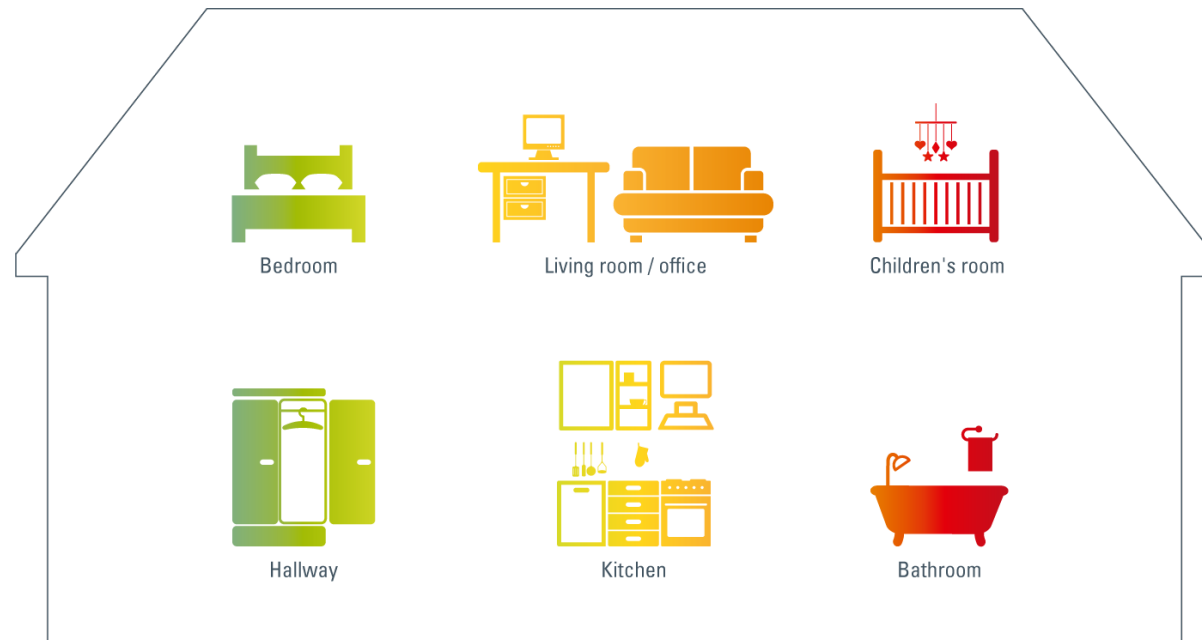- ✓ select the appropriate room controller for the project

Agenda

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1 | Optimal Room Temperatures

Optimal room temperatures in different rooms

These temperatures are considered comfortable

Bedroom

Living room / office

Children's room

Hallway

Kitchen

Bathroom
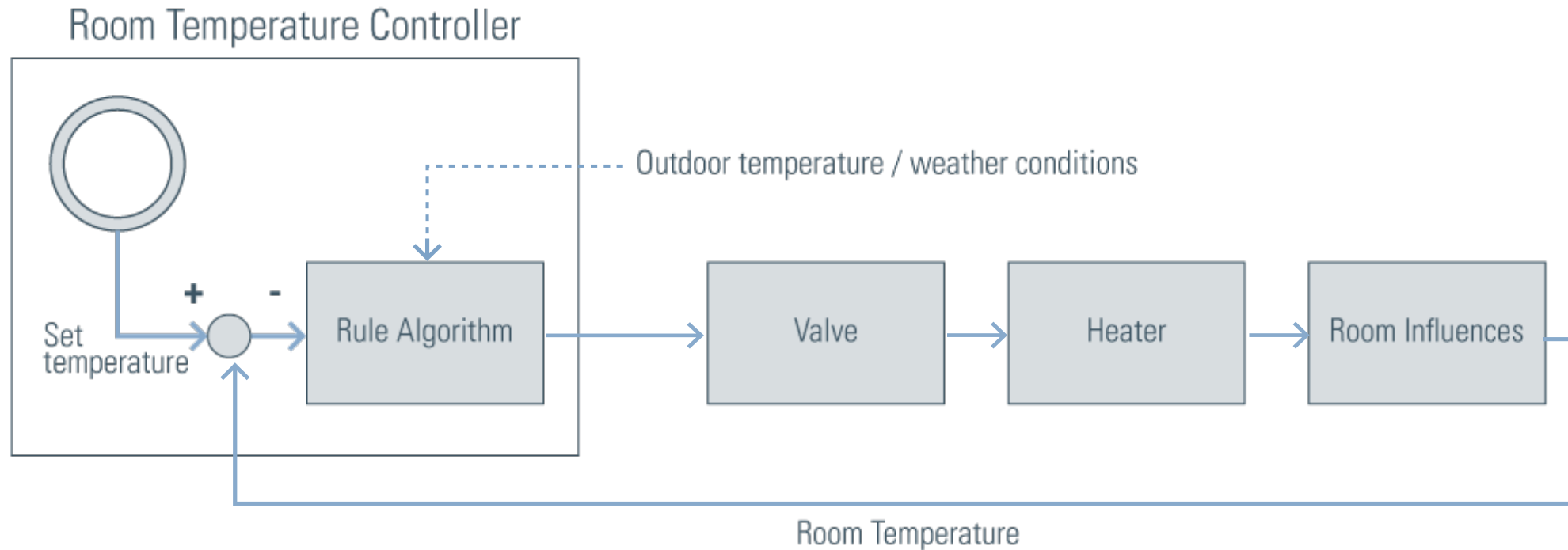
TEMPERATURE:

16°C   18°C   20°C   22°C   24°C

1 | Principle of Individual Room Control

Scheme of a room temperature controller

Influence of actual and setpoint temperature on the manipulated variable

Room Temperature Controller

Outdoor temperature / weather conditions

Set temperature

+   −

Rule Algorithm

Valve

Heater

Room Influences

Room Temperature

Scheme of an individual room control

Room controller

Heating system
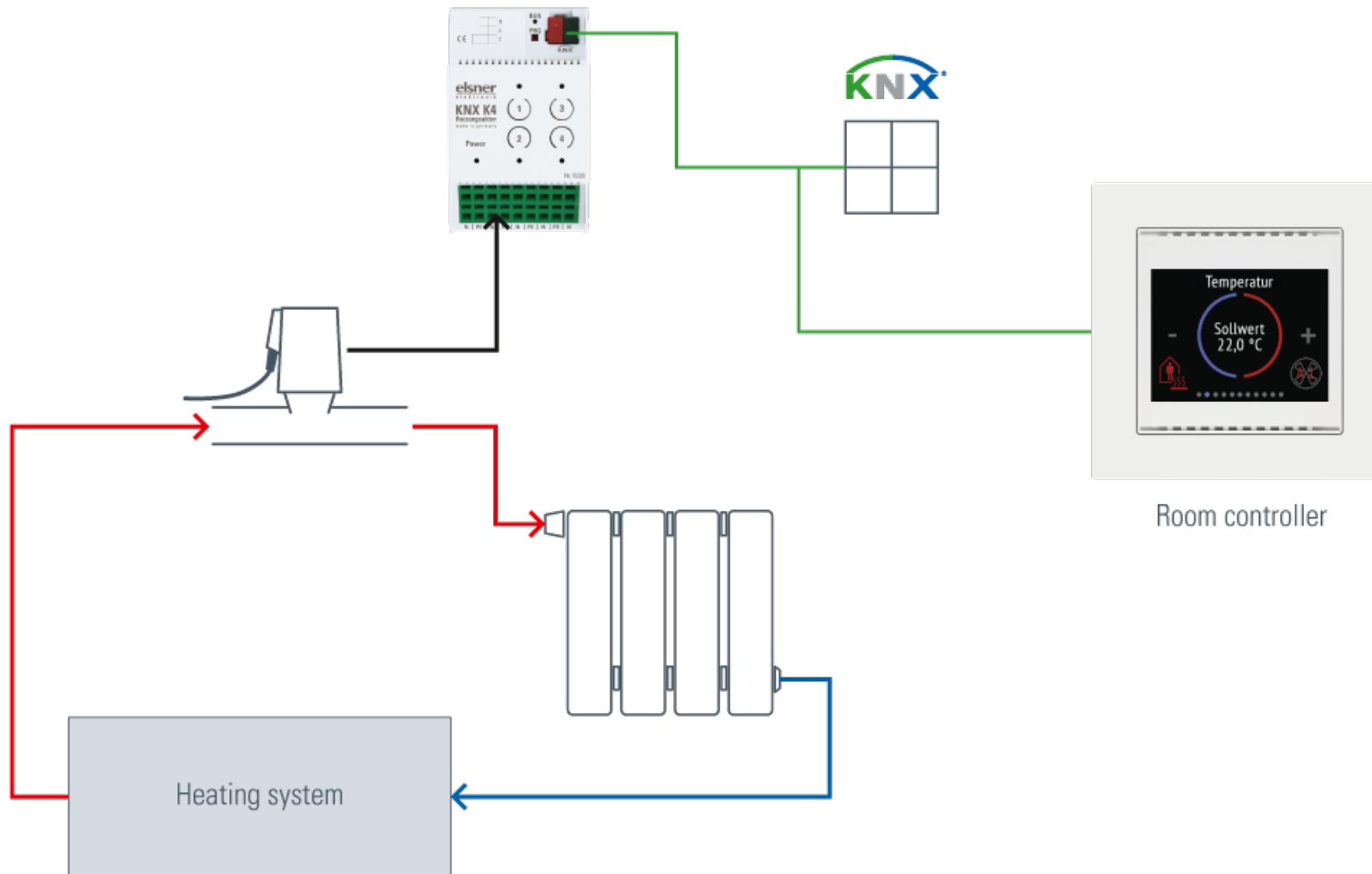
2 | Control Types: Two-point Controller

Operation of a two-point controller with hysteresis

Control Variable

Maximum value (switch off)

Setpoint

Minimum value (switch on)

Hysteresis

T (Time)

Y=0

Manipulated Variable
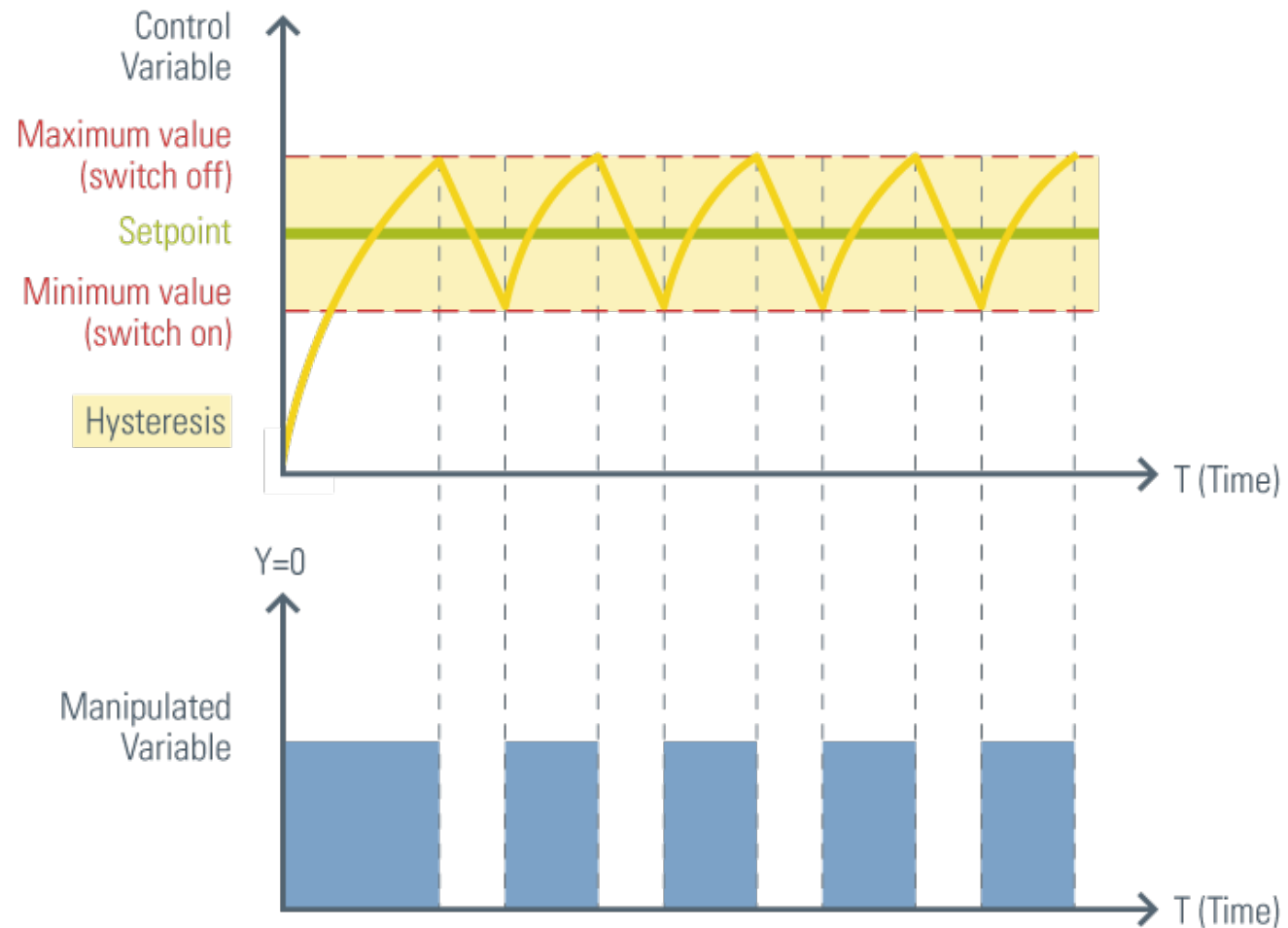
T (Time)

Setting the hysteresis in the two-point controller

Large hysteresis:

- Few on and off cycles of the heating valve (gentle)
- The regulation is inaccurate

Small hysteresis:

- Many on/off cycles, therefore not suitable for heating actuators with relays
- The control hits the desired temperature more precisely

2.1 | Control Types: PI Control

Functionality of a PI controller (continuous controller)

Sensitive adaptation of the actuating variable to the temperature difference in the room

Proportional-integral controller
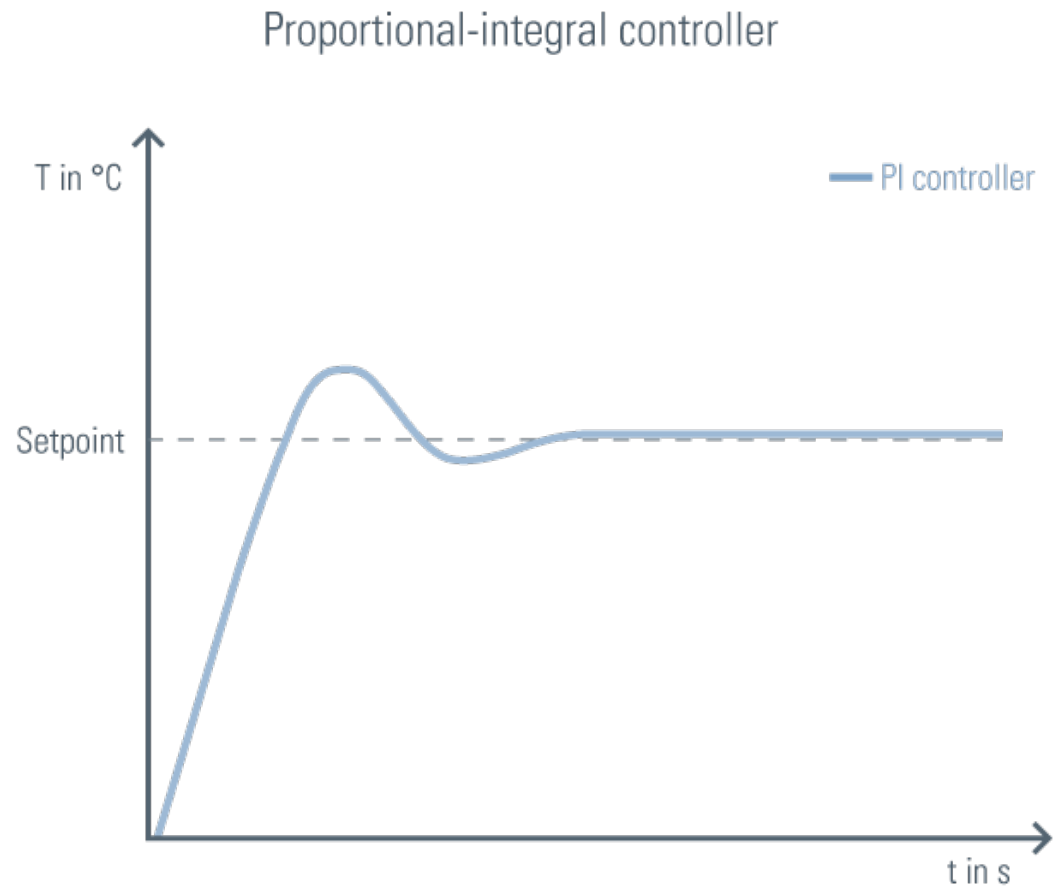
Advantages and disadvantages of the PI / continuous controller

Advantages

- The controller regulates continuously

- The desired set temperature is reached very precisely

Disadvantages

- The setting of the control parameters is more complex

- Must be adapted to the used heating system

Selection of the control according to the type of heating

Heating system	Recommended regulation
Hot water convector heating	For low flow temperature (30-45°C): PWM /continuous controller or 2-point control. At normal flow temperature (45-70°C): PWM control.
Floor/wall heating	Very inert system, therefore PWM / continuous control with long cycle time.
Hot water fan heater	For control of the water circuit: continuous PI control. If a fan is switched together with the hot water circuit: 2-point control.
Electric heating	For convector heating: continuous PI control. For fan heating: 2-point control.

Explanation PWM= Pulse Width Modulation
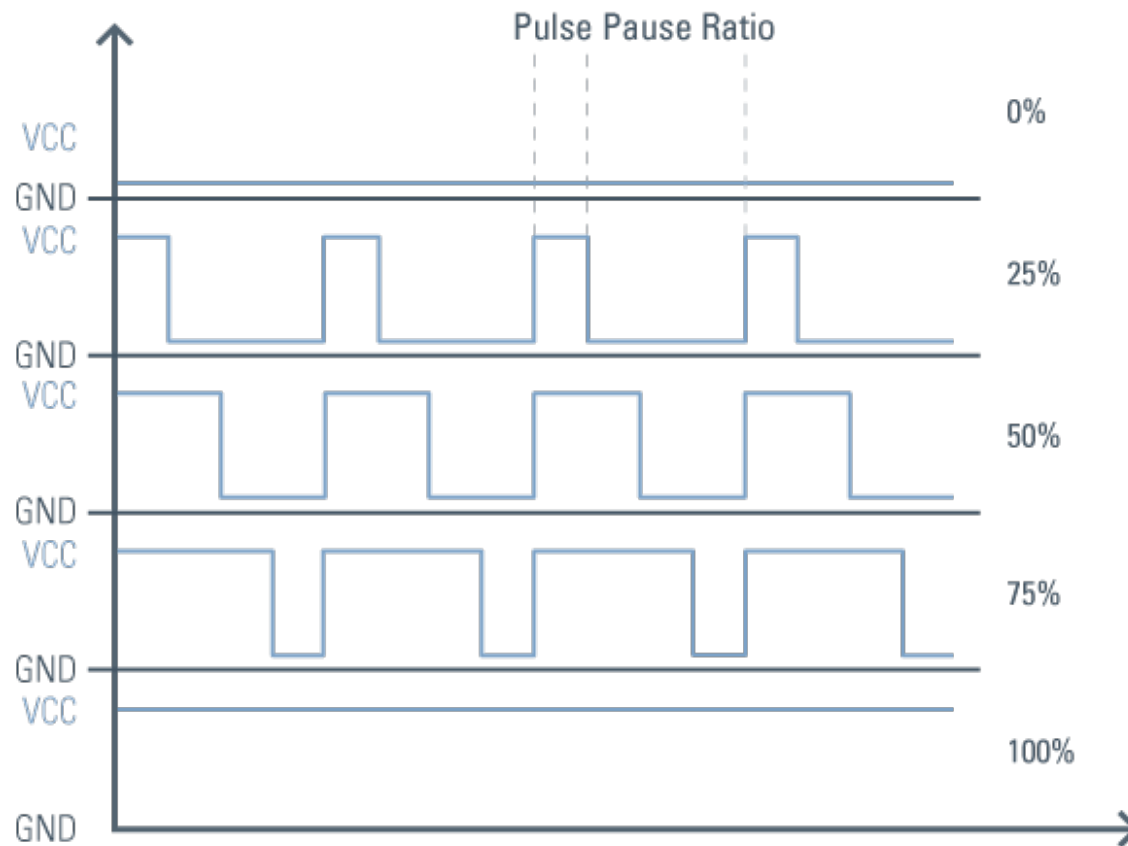
3 | Room Temperature Controller with Operating Mode Changeover

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HVAC operating modes in the temperature controller

HVAC = Heating, Ventilation, Air Conditioning, Cooling

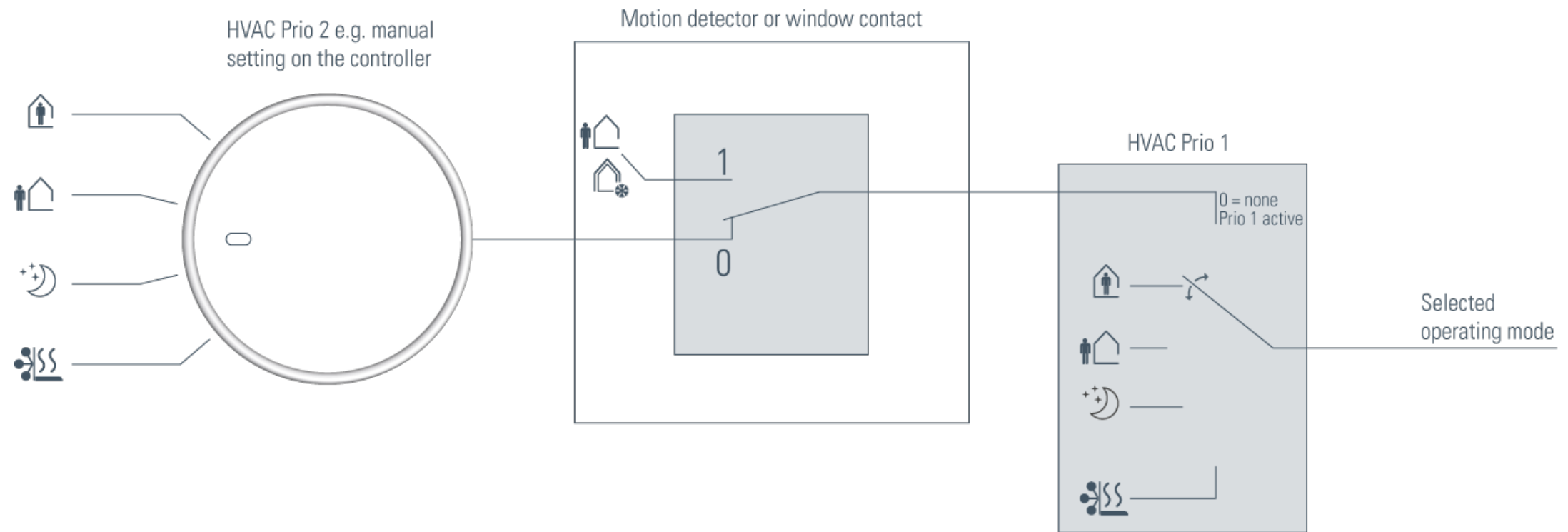| Operating mode	Value of the KNX object	Start value before 1st communication in the controller	Start values of the setting range that can be changed via communication object
Automatic	0	-	-
Comfort	1	21°C	16−28°C
Standby (Precomfort)	2	18°C	16−20°C
Eco	3	16°C	16−28°C
Building protection	4	7°C	No range specification

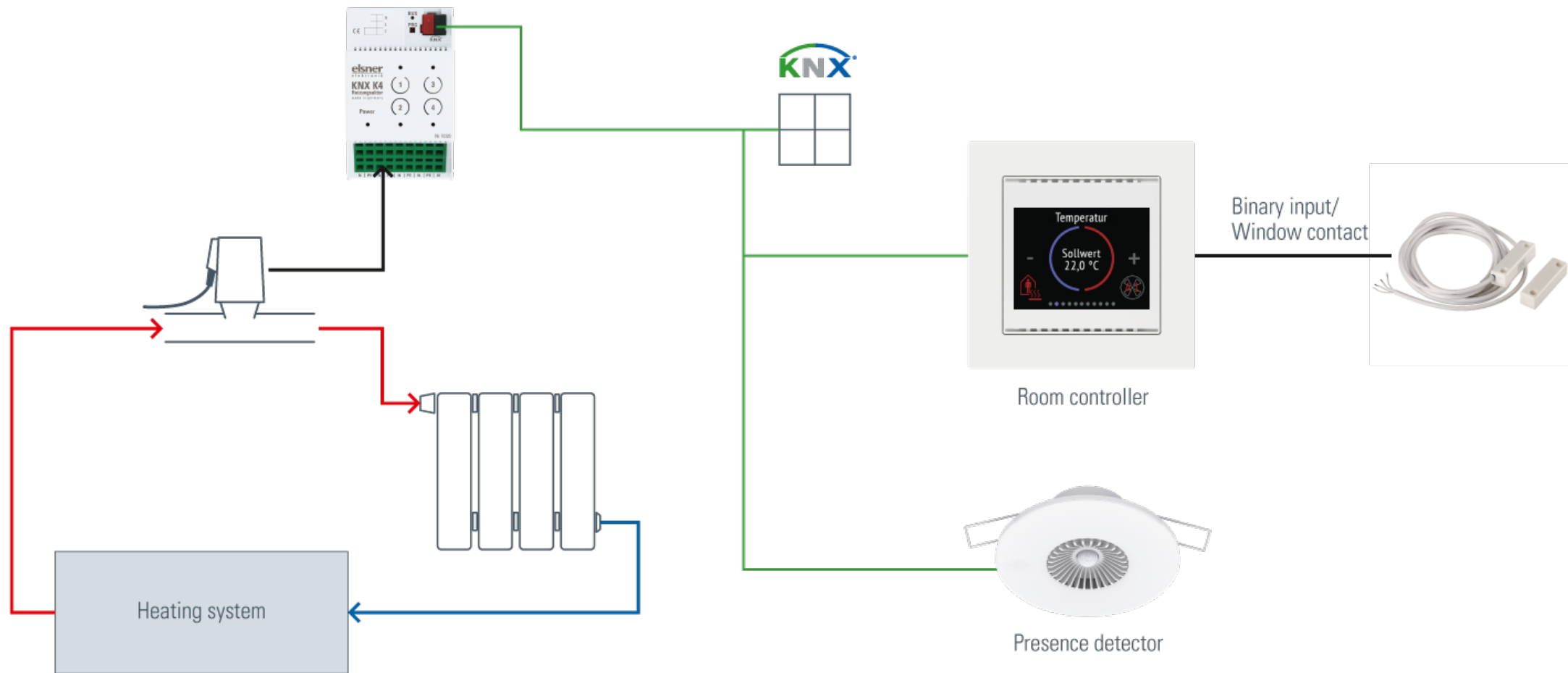# Operating mode changeover with 3x 1-bit in the temperature controller

Operating mode	Frost protection	Night-time reduction	Comfort
Comfort	0	X	1
Standby (PreComfort)	0	0	0
Eco / Night	0	1	0
Building protection	1	X	X

X = Condition has no influence

Operating mode changeover: Functionality

HVAC Prio 2 e.g. manual setting on the controller

Motion detector or window contact

1

0

HVAC Prio 1

0 = none
Prio 1 active

Selected operating mode

Scheme of an intelligent individual room control system

Room controller

Binary input/
Window contact

Presence detector

Heating system

5 | Two-stage Heating

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Two-stage Heating

Combined heating with two heating systems

– Inert heating

– Combined with an auxiliary heater for rapid heating

Example Bathroom :

The underfloor heating maintains the standard room temperature.

If a significantly higher temperature is requested (setpoint/actual difference e.g. 3°C), the wall heating is additionally activated. The desired room temperature is reached quickly.

6 | Overview Elsner Room Controllers & Heating Actuators

KNX eTR series

Room controller

KNX eTR 101

- Integrated temperature measurement
- Temperature control
- Also available as version with binary input (eTR 101-BA2)

KNX eTR 208

- Integrated temperature measurement
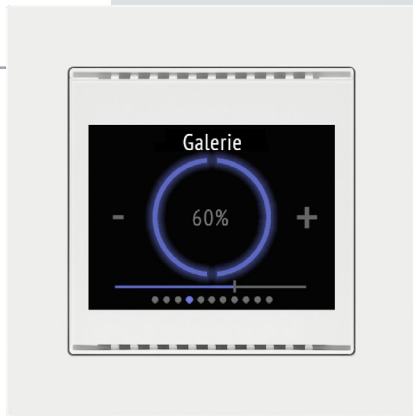- Temperature control
- Switch / dim light
- Sunshade / Window

KNX eTR 102 FC

- Integrated temperature measurement
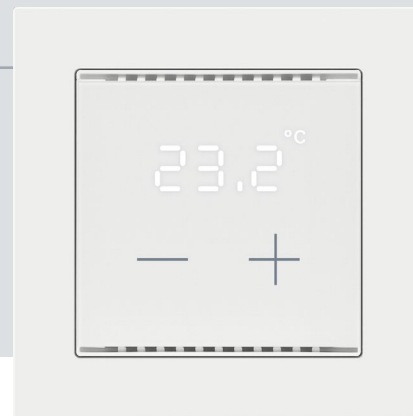- Temperature control
- Fan level control

Series Cala KNX

Room controller

Cala KNX T (Item no. 7080x)

- Integrated temperature measurement
- Temperature control
- Switch / dim light
- Sunshade / Window
- 4 binary inputs

Cala KNX 101 (Item no. 7098x)

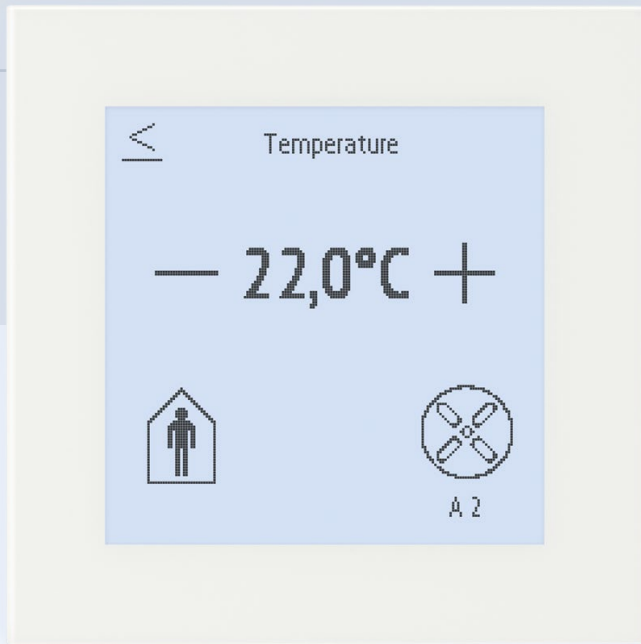- Integrated temperature measurement
- Temperature control

Cala KNX MultiTouch T Light/Sunblind (Item no. 7089x)

- Integrated temperature measurement
- Temperature control
- Switch / dim light
- Sunshade / Window

Nunio KNX

Universal Push Button

- Integrated temperature measurement
- Temperature control
- Switch / dim light
- Sunshade / Window
- One display page as single, double, triple or quad push buttons
- One display page for temperature setpoint adjustment
- Size: 85 mm × 85 mm

Heating actuators

KNX K4 (Item no. 70320)

- 4x output channels for 230V valves/actuators
- Integrated temperature controller for each channel
- PWM control

KNX K8 (Item no. 70321)

- 8x output channels for 230V valves/actuators
- Integrated temperature controller for each channel
- PWM control

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