KNX Handbook

Room temperature regulator RAMSES 718 P / RAMSES 718 S

7189210 - RAMSES 718 P

7189200 - RAMSES 718 S

2021-03-03

Contents

1 Function description

- Individual room thermostat
- For controlling heating actuators or motorised actuators
- Can be used as a continuous or two point control (can also be combined).
- Constant PI control that can be configured for 2-stage heating (basic and additional stage, e.g. underfloor heating and radiators) or for heating and cooling (radiators and cooling ceiling)
- Two front panels are included in the scope of supply: an absolute and a relative scale[1]
- Rotary control can be limited by parameter[2].
- Buttons for presence or operating types: comfort, standby, temperature reduction at night, frost protection[3]
- 4 binary inputs for conventional switches/buttons (switching, dimming, blinds), also for external temperature sensors, window contact or presence signal
- Temperature sensor can also be connected to limit the floor temperature
- LEDs for heating/cooling and operating types

[1] Only RAMSES 718 P
[2] Only RAMSES 718 P
[3] Only RAMSES 718 P

2 Operation

RAMSES 718 S has the following control or display elements:

- A rotary knob for the base set point of the room temperature controller or for set point offset
- Three buttons for selecting operating type.
- Press button longer on comfort button to set the presence object.
  The controller changes into comfort mode.
- 3 LEDs to display the operating type.
  Red/Orange: Comfort/comfort extension **Yellow:** Standby, **Green/Blue:** Eco/Frost.
- One LED for display of heating and cooling mode.
  Red: Heating, **Blue:** cooling.

RAMSES 718 S has the following display elements

- 3 LEDs to display the operating type.
  Red/Orange: Comfort/comfort extension **Yellow:** Standby, **Green/Blue:** Eco/Frost.
- One LED for display of heating and cooling mode.
  Red: Heating, **Blue:** cooling.

3 Technical data

Operating voltage	KNX Bus voltage, I_{Bus} ≤12 mA
Type of connection	Bus connection: KNX bus terminal
Installation type	Wall-mounted
Visualization	LEDs
Interface extension	max. 30 m
Ambient temperature	+5 °C ... +40 °C
Measurement area temperature	-5 °C ... +45 °C
Setting range temperature	+5 °C ... +32 °C
Number of external inputs	4
Contact voltage	5 V, provided internally
Contact current	0.5 mA / 5 mA (peak)
Protection rating	IP 20
Protection class	III in accordance with EN 60 730-1

4 The application programmes RAMSES 718 P/S

4.1 Selection in the product database

Manufacturer	Theben AG
Product family	Heating, ventilation, air conditioning
Product type	Continuous and 2 point controller
Programme names	RAMSES 718 P RAMSES 718 S

Number of communication objects	45
Number of group addresses	255
Number of associations	255

ⓘ The ETS database can be found on our website: www.theben.de/downloads

4.2 Overview of communication objects

4.2.1 General

No.	Object name	Function	Length	R	W	C	T	DPT
1	*Temperature value*	*Send*	2 bytes	R	-	C	T	9,001
2	*Device LEDs*	*Reduced*	1 bit	-	W	C	-	1,001
		Brightness	1 byte	-	W	C	-	5,001

4.2.2 Room temperature controller (RTC)

No.	Object name	Function	Length	R	W	C	T	DPT
10	*Base set point*	*Defining the set temperature*	2 bytes	-	W	C	-	9,001
	Base set point at rotary control[4]	*Send*	2 bytes	R	-	C	T	9,001
11	*Manual set point offset*	*Receive*	2 bytes	-	W	C	-	9,002
	set point offset at rotary control[5]	*Send*	2 bytes	R	-	C	T	9,002
12	*Outdoor temperature compensation*	*Send*	2 bytes	R	-	C	T	9,001
		Adjust set point	2 bytes	-	W	C	-	9,002
13	*Operating mode preset*	*Receive*	1 byte	-	W	C	-	20,102
	Night <-> standby	*Receive*	1 bit	-	W	C	-	1,001
14	*Comfort*	*Receive*	1 bit	-	W	C	-	1,003
	Presence	*Receive*	1 bit	-	W	C	-	1,018
15	*Window status*	*Closed=0, open=1*	1 bit	-	W	C	-	1,019
	Frost	*Receive*	1 bit	-	W	C	-	1,003
16	*Current operating mode*	*Send*	1 byte	R	-	C	T	20,102
17	*Operating mode as scene*	*Save/ call up*	1 byte	-	W	C	T	18,001
18	*Heating actuating value*	*Send*	1 bit	-	-	C	T	1,001
		Send	1 byte	-	-	C	T	5,001
18	*Heating/cooling actuating value*	*Send*	1 bit	-	-	C	T	1,001
		Send	1 byte	-	-	C	T	5,001
19	*PWM heating additional stage*	*Send*	1 bit	-	-	C	T	1,001
	Actuating value additional heating stage	*Send*	1 byte	-	-	C	T	5,001
20	*Cooling actuating value*	*Send*	1 bit	-	-	C	T	1,001
		Send	1 byte	-	-	C	T	5,001
21	*PWM cooling additional stage*	*Send*	1 bit	-	-	C	T	1,001
	Actuating value additional cooling stage	*Send*	1 byte	-	-	C	T	5,001
22	*Send heating mode/cooling mode*	*0 = heating, 1 = cooling*	1 bit	R	-	C	T	1,001
		0 = cooling, 1 = heating	1 bit	R	-	C	T	1,100
	Switching between heating and cooling	*0 = heating, 1 = cooling*	1 bit	-	W	C	-	1,001
		0 = cooling, 1 = heating	1 bit	-	W	C	-	1,100
23	*Current set point*	*Setting/sending*	2 bytes	-	W	C	T	9,001
24	*Control actual value*	*Send*	2 bytes	R	-	C	T	9,001
25	*External actual value*	*Receive*	2 bytes	-	W	C	-	9,001

[4] Only RAMSES 718 P
[5] Only RAMSES 718 P

No.	Object name	Function	Length	R	W	C	T	DPT
26	*Actual value failure*	*Send*	1 bit	R	-	C	T	1,001
27	*Outdoor temperature*	*Receive*	2 bytes	-	W	C	-	9,001
28	*Dew point alarm*	*Receive*	1 bit	-	W	C	-	1,005

4.2.3 External inputs I1-I4: Switch function

No.	Object name	Function	Length	R	W	C	T	DPT
30	*Channel I1.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
31	*Channel I1.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
32	*Channel I1.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
34	*Channel I1*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
35	*Channel I2.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
36	*Channel I2.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
37	*Channel I2.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
37	*Channel I2.3*	*Send value*	1 byte	-	-	C	T	5,010

No.	Object name	Function	Length	R	W	C	T	DPT
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
39	*Channel I2*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
40	*Channel I3.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
41	*Channel I3.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
42	*Channel I3.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
44	*Channel I3*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
45	*Channel I4.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
43	*Channel I4.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
47	*Channel I4.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001

No.	Object name	Function	Length	R	W	C	T	DPT
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
49	*Channel I4*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003

4.2.4 External inputs I1-I4: Button function

No.	Object name	Function	Length	R	W	C	T	DPT
30	*Channel I1.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
31	*Channel I1.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
32	*Channel I1.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
34	*Channel I1*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
35	*Channel I2.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
36	*Channel I2.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
37	*Channel I2.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
37	*Channel I2.3*	*Send value*	1 byte	-	-	C	T	5,010

No.	Object name	Function	Length	R	W	C	T	DPT
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
39	*Channel I2*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
40	*Channel I3.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
41	*Channel I3.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
42	*Channel I3.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
44	*Channel I3*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
45	*Channel I4.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
46	*Channel I4.2*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
47	*Channel I4.3*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001

No.	Object name	Function	Length	R	W	C	T	DPT
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
49	*Channel I4*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003

4.2.5 External inputs I1-I4: Dimming function

No.	Object name	Function	Length	R	W	C	T	DPT
30	*Channel I1*	*Switching*	1 bit	-	W	C	T	1,001
31	*Channel I1*	*Brighter/darker*	4 bit	-	-	C	T	3,007
32	*Channel I1.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
34	*Channel I1*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
35	*Channel I2*	*Switching*	1 bit	-	W	C	T	1,001
		Switching	1 bit	-	-	C	T	1,001
36	*Channel I2*	*Brighter/darker*	4 bit	-	-	C	T	3,007
37	*Channel I2.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
39	*Channel I2*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
40	*Channel I3*	*Switching*	1 bit	-	W	C	T	1,001
		Switching	1 bit	-	-	C	T	1,001
41	*Channel I3*	*Brighter/darker*	4 bit	-	-	C	T	3,007
42	*Channel I3.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
44	*Channel I3*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
45	*Channel I4*	*Switching*	1 bit	-	W	C	T	1,001
		Switching	1 bit	-	-	C	T	1,001
46	*Channel I4*	*Brighter/darker*	4 bit	-	-	C	T	3,007
47	*Channel I4.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001

No.	Object name	Function	Length	R	W	C	T	DPT
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
49	*Channel I4*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003

4.2.6 External inputs I1-I4: Blinds function

No.	Object name	Function	Length	R	W	C	T	DPT
30	*Channel I1*	*Step/stop*	1 bit	-	-	C	T	1,010
31	*Channel I1*	*UP/DOWN*	1 bit	-	W	C	T	1,008
		UP	1 bit	-	-	C	T	1,008
		DOWN	1 bit	-	-	C	T	1,008
32	*Channel I1.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Height %	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
33	*Channel I1.2*	*Slat %*	1 byte	-	-	C	T	5,001
34	*Channel I1*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
35	*Channel I2*	*Step/stop*	1 bit	-	-	C	T	1,010
36	*Channel I2*	*UP/DOWN*	1 bit	-	W	C	T	1,008
		UP	1 bit	-	-	C	T	1,008
		DOWN	1 bit	-	-	C	T	1,008
37	*Channel I2.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Height %	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
38	*Channel I2.2*	*Slat %*	1 byte	-	-	C	T	5,001
39	*Channel I2*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
40	*Channel I3*	*Step/stop*	1 bit	-	-	C	T	1,010
41	*Channel I3*	*UP*	1 bit	-	-	C	T	1,008
		UP/DOWN	1 bit	-	W	C	T	1,008
		DOWN	1 bit	-	-	C	T	1,008
42	*Channel I3.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Height %	1 byte	-	-	C	T	5,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
42	*Channel I3.1*	*2 byte 9.x*	2 bytes	-	-	C	T	9.xxx

No.	Object name	Function	Length	R	W	C	T	DPT
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
43	*Channel I3.2*	*Slat %*	1 byte	-	-	C	T	5,001
44	*Channel I3*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003
45	*Channel I4*	*Step/stop*	1 bit	-	-	C	T	1,010
46	*Channel I4*	*UP*	1 bit	-	-	C	T	1,008
		UP/DOWN	1 bit	-	W	C	T	1,008
		DOWN	1 bit	-	-	C	T	1,008
47	*Channel I4.1*	*Switching*	1 bit	-	W	C	T	1,001
		Priority	2 bit	-	-	C	T	2,001
		Send percentage value	1 byte	-	-	C	T	5,001
		Height %	1 byte	-	-	C	T	5,001
		Send value	1 byte	-	-	C	T	5,010
		2 byte 9.x	2 bytes	-	-	C	T	9.xxx
		4 byte 14.x	4 bytes	-	-	C	T	14.xxx
48	*Channel I4.2*	*Slat %*	1 byte	-	-	C	T	5,001
49	*Channel I4*	*Block = 1*	1 bit	-	W	C	-	1,001
		Block = 0	1 bit	-	W	C	-	1,003

4.2.7 External inputs I3-I4: Temperature sensor function

No.	Object name	Function	Length	R	W	C	T	DPT
40	*Channel I3.1*	*Temperature actual value*	2 bytes	R	-	C	T	9,001
45	*Channel I4.1*	*Temperature actual value*	2 bytes	R	-	C	T	9,001

4.2.8 Diagnosis and alarm objects

No.	Object name	Function	Length	R	W	C	T	DPT
50	*Firmware*	*Version*	2 bytes	R	-	C	T	217,001
51	*Alarm*	*Info*	6 bytes	R	-	C	T	219,001
53	*Alarm*	*Error text*	14 bytes	R	-	C	T	16,000

4.3 Description of communication objects

4.3.1 General objects

Object 1: Temperature value
Sends the room temperature in °C, measured with the temperature sensor inside the device.

Object 2: Device LEDs
The brightness of the device LEDs can be changed via bus, if desired.
(See ***General*** parameter page).
Depending on the parameter setting (*object type*), 2 formats are possible.

Object type	Format	Object function
via switch object	1 bit	Activate preset reduced brightness.
via percentage value	1 byte	Set LED brightness individually via bus telegram.

4.3.2 Objects for the room temperature controller (RTC)

Object 10: Base set point

RAMSES 718 P: The function of the object is determined using the parameter *function of the rotary control*.

Parameter: *Rotary control function*	Object function
Base set point	Sends the base set point set at the rotary control.
Manual offset or blocked	Receives the base set point from the bus. The base set point is first specified via the application at start-up and stored in the *base set point* object. Afterwards, it can be specified again at any time this object (limited by the *minimum* or *maximum valid set point*).

RAMSES 718 S:
Receives the base set point from the bus.
The base set point is first specified via the application at start-up and stored in the *base set point* object.
Then it can be re-determined at any time with this object (limited by minimum or maximum valid target value).

Object 11: Manual set point offset / set point offset at rotary control[6]

RAMSES 718 P: The function of the object is determined using the parameter *function of the rotary control*

Rotary control function	Object function	Data direction
Base set point, or blocked	Receive manual set point offset. The object receives a temperature difference. The desired room temperature (current set point) can be adjusted against the base set point by this difference. This applies in comfort mode (heating): Actual set point = base set point + manual set point offset. Values outside the configured range are limited to the highest or lowest value. If a 0 is received, a set point temperature offset that was previously entered is reset to 0. ⓘ The offset always refers to the set base set point and not to the current set point.	Receive
Manual offset	Sends the set point offset set at the rotary control.	Send

[6] Only RAMSES 718 P

RAMSES 718 S:
Receive manual set point offset.
The object receives a temperature difference.
The desired room temperature (current set point) can be adjusted against the base set point by this difference.
This applies in comfort mode (heating):
Actual set point = base set point + manual set point offset.
Values outside the configured range are limited to the highest or lowest value.
If a 0 is received, a set point temperature offset that was previously entered is reset to 0.

ⓘ The offset always refers to a set base set point and not to the actual set point

Object 12: Outdoor temperature compensation / adjust set point

The function of the object is defined by the parameter *set point correction at high outside temperature*.

set point correction at high outside temperature	**Object function**	**Data direction**
Receive only	Receives set point correction for outdoor temperature compensation.	Receive
Calculate internally and send	Reports the current set point correction as an amount or as a differential. The format of the correction value (see following table) is set on the ***set point adjustment*** parameter page.	Send

Format of correction value	**Object function**	**Example**
Absolute	Sends the amount: base set point without correction + set point correction as set point for other temperature controllers.	Unadjusted base set point = 20 °C. set point correction = +2 K The object transmits: 22 °C
Relative	Calculated set point correction (in Kelvin) based on the outside temperature.	Unadjusted base set point = 20 °C. set point correction = +2 K The object sends: 2 K

Object 13: Operating mode preset or night <-> standby
The function of the object is defined by the parameter *Objects for determining the operating mode*.

Objects for determining the operating mode	Object function
new: operating mode, presence, window status	Here, it is a 1 byte object. One of 4 operating modes can be directly activated. 1 = Comfort 2 = Standby 3 = Night, 4 = Frost protection (heat protection) The configured *operating mode after reset* is active until a new valid operating mode is received or changed at the device by the user.
old: comfort, night, frost	With this setting, the object is a 1 bit object. It can be used to activate the operating mode Night or Standby 0=Standby 1=Night

Object 14: Presence or comfort.
The function of the object is defined by the parameter *Objects for determining the operating mode*.

Objects for determining the operating mode	Object function
new: operating mode, presence, window status	Presence: The status of a presence detector (e.g. push button, motion detector) can be received via this object. 1 on this object activates the comfort operating mode.
old: comfort, night, frost	Comfort: 1 on this object activates the comfort operating mode. This operating mode takes priority over night and standby modes. Comfort mode is disabled again by sending a 0 to the object. ⓘ Nothing cyclical is to sent on this object as a comfort extension (using button[7] on the device) is cancelled if a 0 is received.

[7] Only RAMSES 718 P

Object 15: Window status, or frost/heat protection
The function of the object is defined by the parameter *Objects for determining the operating mode*.

Objects for determining the operating mode	Object function
new: operating mode, presence, window status	Window setting: The status of a window contact can be received via this object. 1 on this object activates the frost / heat protection operating mode.
old: comfort, night, frost	Frost/heat protection: 1 on this object activates the frost protection operating mode. During cooling mode, the heat protection operating mode is activated. The frost/heat protection operating mode has highest priority. Frost/heat protection mode remains active, until it is cleared again by a 0.

Object 16: Current operating mode.
Sends the current HVAC operating mode.
The transmission behaviour can be defined on the ***Settings*** parameter page.

Value	HVAC operating mode
1	Comfort
2	Standby
3	Night
4	Frost protection/heat protection

Object 17: Operating mode as scene.
Teaching in and calling up scenes.
A scene only consists of the current operating mode preset.
Saving scenes: The current value of the object *operating mode preset* is saved together with the corresponding scene number.
Calling up scenes: The content of the object *operating mode preset* will be overwritten by the saved value, and the new operating mode will be accepted by the RTC.
See in the Appendix, *Operating mode as scene*

Object 18: Heating actuating value or heating/cooling actuating value.
Sends the current heating actuating value (0...100%) or heating or cooling if the *output of cooling actuating value* parameter has been set to *together with heating actuating value*.
Heating (Parameter page ***Cooling control***).

Type of control	Object format
Continuous	1 byte
2-point	1 bit

Object 19: Additional heating stage actuating value or PWM additional heating stage
Sends the actuating value for the additional heating stage depending on the configuration, as 1 bit PWM, or 1 byte percentage telegram.
This object is only available if the additional stage is used.

Object 20: Cooling actuating value
Sends the current actuating value or cooling switching command depending on the type of control selected on the ***cooling control*** parameter page.
The object is only available if the cooling function has been selected on the ***Settings*** parameter page (*control* = heating and cooling).

Object 21: Additional cooling stage actuating value or PWM additional cooling stage
Sends the actuating value for the additional cooling stage depending on the configuration, as 1 bit PWM, or 1 byte percentage telegram.
This object is only available if the additional stage is used.

Object 22: Send heating/cooling operation, or change over between heating and cooling
The object is available if the cooling function has been selected on the ***Settings*** parameter page (*control = heating and cooling*).
The function of the object depends on the *change over between heating and cooling* parameter on the ***cooling control*** parameter page.

Parameter: Change over between heating and cooling	Function
Automatic	Reports whether the room thermostat is currently operating in heating or cooling mode.
Via object	Receives the switching command for switching between heating and cooling mode.

The telegram format can be set on the ***cooling control*** parameter page:

Parameter: *Format object heating/cooling*	Telegram format
DPT1.100	Heating = 1, Cooling = 0
Inverted	Heating = 0, Cooling = 1

Object 23: Current set point
Sends the currently set temperature.
The transmission behaviour can be set on the ***heating set points*** parameter page.

Object 24: Control actual value
Sends the actual value actually used by the room temperature controller.

ⓘ The control actual value might, depending on the *source for the actual value*, deviate from the internally measured temperature (object *temperature value*).

Object 25: External actual value

Only available if *external actual value* has been selected as a source.

Receives the room temperature from another measurement point via the bus.
This object can be activated on the ***actual value*** parameter page.

Object 26: Send actual value failure

Only available if the actual value monitoring is activated (*Monitor actual value = yes*).
Sends a 1, as soon as one of the selected sources for the actual value provides an unusable value, or (if selected) if no new actual value telegram has been received by the *external actual value* object within the actual value monitoring time.

Unusable temperature values might occur if a temperature sensor is mechanically damaged, or if the electrical connection is interrupted or short-circuited.

ⓘ As long as at least one valid actual value remains available, this will be continued to be used for control. This is the case if the average value is determined out of 2 or 3 sources.

Object 27: Receive outdoor temperature

Only available if the *set point correction at high outdoor temperature* parameter has been set to *calculate internally and send*.
Receives the outdoor temperature for internal set point adjustment in cooling mode

Object 28: Receive dew point alarm

The object is available if the cooling function has been selected on the ***Settings*** parameter page (*control = heating and cooling*).
When receiving a 1, cooling will be stopped, so the temperature cannot drop down to the dew point.

4.3.3 Objects for the external inputs: Switch function

Object 30: channel I1.1
First initial object of the channel (First telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 31: channel I1.2
Second initial object of the channel (Second telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 32: channel I1.3
Third initial object of the channel (Third telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 34: Channel I1 block = 1, or block = 0
The channel is blocked via this object.
The acting direction of the block object and behaviour when setting or cancelling the block can be set on the ***Channel 1*** parameter page.

Objects 35-49
Objects for channels I2-I4.

4.3.4 Objects for the external inputs: Button function

Object 30: channel I1.1
First initial object of the channel (First telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 31: channel I1.2
Second initial object of the channel (Second telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 32: channel I1.3
Third initial object of the channel (Third telegram).
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x, 4 byte DPT 14.x.

Object 34: Channel I1 block = 1, or block = 0
The channel is blocked via this object.
The acting direction of the block object and behaviour when setting or cancelling the block can be set on the ***Channel 1*** parameter page.

Objects 35-49
Objects for channels I2-I4.

4.3.5 Objects for the external inputs: Dimming function

Object 30: channel I1.1 switching
Switches the dimmer on and off.

Object 31: channel I1.1 lighter/darker, lighter / darker
4-bit dimming commands.

Object 32: channel I1.1 – switching, priority, percentage..
Initial object for the additional function with double-click.
6 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x,
4 byte DPT 14.x.

Object 34: Channel I1 block = 1, or block = 0
The channel is blocked via this object.
The acting direction of the block object and behaviour when setting or cancelling the block can be configured.

Objects 35-49
Objects for channels I2-I4.

4.3.6 Objects for the external inputs: Blinds function

Object 30: Channel I1 UP/DOWN, UP, DOWN
Sends operating command to the blind actuator.

Object 31: Channel I1 Step/Stop
Sends Step/Stop commands to the blind actuator.

Object 32: channel I1.1 – switching, priority, percentage value.., height % + slat %
Initial object for the additional function with double-click.
7 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, 2 byte DPT 9.x,
4 byte DPT 14.x, height % + slat %.

Object 34: Channel I1 block = 1, or block = 0
The channel is blocked via this object.
The acting direction of the block object and behaviour when setting or cancelling the block can be configured.

Objects 35-49
Objects for channels I2-I4.

4.3.7 Objects for the external inputs I3 and I4: Temperature sensor function

The external inputs I3 and I4 can be used as analogue inputs for temperature measurement via remote sensor.

This function is activated on the ***General*** parameter page with the parameter *function of the external inputs I3 + I4*.

Object 40: Channel I3 temperature actual value
Sends the temperature measured by the external sensor at I3.

Object 45: Channel I4 temperature actual value
Sends the temperature measured by the external sensor at I4.

4.3.8 Diagnosis and alarm objects

Object 50: Firmware version
Sends firmware version information as DPT_Version (DPT217.001).

Format, 2 byte:

Magic number					Version number					Revision number					
U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

Object 51: Alarm info
Reports error or alarm as DPT_AlarmInfo (DPT219.001).

Object 53: Alarm error text
Diagnostic object: Sends a short alarm text in case of an error (14 characters) as DPT_String_ASCII (DPT16.000).

Alarm reason	Error text
Internal temperature sensor failure	Temp Fault
Rotary control failure[8]	Wheel Fault
Light sensor failure	ALS Fault
Sensor failure external analog input 3	I3 Temp Fault
Sensor failure external analog input 4	I4 Temp Fault

If an alarm or an error occurs, this will be indicated by sending object *Alarm info*. Additionally, the object *Alarm error text* will be sent, which show the error code and a short error text.
If several alarms are active, the object *Alarm error text* will be cyclically sent with the alarm information at an interval of 10 s.
If all active alarms have been processed, the cyclical sending will be repeated after a pause of 30 s.
If no alarms are active anymore, the object *Alarm error text* (blank string) will be sent once.

[8] Only RAMSES 718 P

4.4 Parameter pages overview

The device consists of one general block and 4 main functional blocks.

Parameter page	Description
General functional block	
General	LED settings, activation of the temperature sensor inputs.
Measurement values	Setting for temperature measurement (internal sensor)
RTC functional block	
Setting	General settings to operate[9] and temperature control
Actual value	Source for actual value measurement, actual value monitoring, etc.
Operating Mode	Operating mode after reset, presence sensor etc.
Heating control	Control parameters, installation type etc. for heating mode.
Heating set points	Base set point value, lowering, frost protection etc.
Additional stage heating	Type of actuating value, proportional band, transmission behaviour.
Cooling control	Control parameters, installation type etc. for cooling mode.
Cooling set points	Dead zone, standby, heat protection etc.
set point adjustment	Setting maximum adjustment.
Additional stage cooling	Type of actuating value, proportional band, transmission behaviour.
External inputs functional block	
Channel I1	Function of the input, debounce time, number of telegrams, block function, etc. Additionally at I3 and I4: Selection of the temperature sensor, temperature calibration, etc.
Channel I2	
Channel I3	
Channel I4	
Switch object 1	Object type, transmission behaviour, etc. can be set for each object individually.
Switch object 2	
Switch object 3	
Button object 1	Object type, transmission behaviour, etc. can be set for each object individually.
Button object 2	
Button object 3	
Dimming	Type of control
Blinds	Type of control
Double-click	Additional telegrams for *dimming* and *blinds*

[9] Only RAMSES 718 P

4.5 General parameters

4.5.1 General

Designation	Values	Description
Reduce brightness of the LEDs		The LEDS should:
	never	Shine every time at maximum brightness.
	always	Always shine at the specified brightness
	only in night mode	Shine at the specified brightness if the RTC is set to night mode.
	in the dark	Shine at the specified brightness when it is dark in the room.
	via bus	Be able to be reduced or dimmed via bus telegrams.
Object type	***via switch object***	Brightness reducible via switch telegram.
	via percentage value	The brightness of the LEDs can be set as desired via dimming telegrams.
Value for reduced brightness	*0-100%* Std. = ***30%***	LED brightness for the setting *always only in night mode*, or *via switch object*.
Function of the external inputs I3+I4	***Binary input***	I3 and I4 are normal binary inputs, as I1 and I2.
	Temperature sensor input	I3 and I4 or used for temperature measurement, as well as for the internal RTC and for other bus sharing units. For this purpose, always one remote sensor is connected.

ⓘ The external inputs I3 and I4 can be used as analogue inputs for temperature measurement via remote sensor.

4.5.2 Measurement values

Designation	Values	Description
TEMPERATURE		
Transmit temperature on change of (internal sensor)		ⓘ Only valid for temperature measurement at the internal sensor.
	not due to a change	Only send cyclically (if enabled)
	0.2 K *0.3 K* *0.5 K* *0.7 K* *1 K* *1.5 K* *2 K*	Send if the value has changed by the selected amount since the last transmission.
Send temperature cyclically	***do not send cyclically*** *every min,* *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should it be resent?
Temperature calibration	*-64..+64* (x 0.1 K)	Correction value for temperature measurement if sent temperature deviates from the actual ambient temperature. **Example:** Temperature = 20°C sent temperature = 21°C Correction value = 10 (d.h. 10 x 0.1°C)

4.6 Room temperature controller RTC functional block

4.6.1 Setting

Designation	Values	Description
Control	***Heating control only***	Heating mode only
	Heating and cooling	Additionally, a cooling system is to be controlled.
Rotary control function[10]	***Base set point***	The base set point is exclusively set at the rotary control.
	Manual offset	The set point can be adjusted via the rotary control. The base set point is received via the *base set point* object.
	Blocked	The rotary control has no function. The base set point is received via the *base set point* object.
Manual offset works	***in comfort, standby and night mode,*** *in comfort and standby, only for comfort*	The set point offset: Is only considered in the selected mode and is ineffective in all operation modes.
Manual offset at the end of night mode	***Do not change*** *Reset to 0 K*	RAMSES 718 P: Only available when the function of the rotary control is set to base set point or blocked. RAMSES 718 S: always available.
Use floor temperature limitation (sensor at I4)	***No***	no floor temperature limitation.

[10] Only RAMSES 718 P

Designation	Values	Description
	yes	The floor temperature is measured by a sensor at external input I4. On the ***Heating set points*** parameter page the *Maximum floor temperature* parameter is shown. **Functionality:** If the *Maximum floor temperature* is reached, the heating actuating value is reduced to 0%. The hysteresis is 5 K. Prerequisite: The *Function of the external inputs I3+I4* parameter on the ***General*** parameter page has to be set to *Temperature sensor input*. See also Chapter: *External inputs I1-I4 functional block* → *Temperature sensor function (only I3 and I4)*
set point correction at high outside temperature	***None*** *Receive only* *Calculate internally and send*	Function is deactivated The correction value is received by the bus, and the own set point is adjusted to the increase in outside temperature. The device calculates the correction value, sends it to other controllers and adjusts the own set point to the increase in outside temperature. See in the Appendix: *set point correction*
Function of keys[11]	*Blocked* *Select operating modes*	No function. The buttons are used to select the operating mode.

Press button longer on comfort button to set the presence object[12].
The controller changes into comfort mode.

[11] Only RAMSES 718 P
[12] Only RAMSES 718 P

4.6.2 Actual value

On this parameter page the source is selected which is used as the actual value for control. This can be the temperature sensor integrated in the device, an external sensor, or a combination of up to 3 sensors.

ⓘ The control actual value might, depending on the selection of the *source for the actual value*, deviate from the internally measured temperature (object *temperature value*).

Designation	Values	Description
Source for actual value[13]	***Internal sensor***	Control actual value. The device measures and controls the room temperature via the internal sensor. (Control actual value = internally measured temperature).
	External actual value object	The room temperature is solely acquired via the bus.
	Average value of internal + ext. actual value object	The device calculates the average value of the room temperature received from the bus and the internal measurement.
	Sensor at I3	External sensor at I3.
	Average value from internal + I3	Average value of the internal value and the value measured at I3.
	Average value I3 + Obj. Ext. actual value	Use average value of I3 and bus.
	Average value of internal + I3 + obj. actual ext. actual value	Use average value from 3 sources: I3 + internal + bus.
Send control actual value in the event of change of	***not due to a change***	only cyclical sending possible.
	0.2 K, 0.3 K, 0.5 K, 0.7 K 1 K, 1.5 K, 2 K	Minimum change for resending.
Send control actual value cyclically	***no***	Only send in the event of a change.
	yes	Send in the event of a change and cyclically.

[13] The selection possibilities with I3 are only available when the external inputs for temperature measuremet are set, i.e. *function of the external inputs I3 +I4* = temperature sensor input (see parameter page **General*)*.**

Designation	Values	Description
Monitor actual value	***no*** *yes*	No monitoring. All selected actual value sources are monitored. In case of an error, the object sends *actual value failure* error telegrams. ⓘ As long as at least one valid actual value remains available, this will be continued to be used for control. This is the case if the average value is determined out of 2 or 3 sources.
Monitoring time for external actual value	*2 min, 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 45 min, 60 min*	Only for the *External actual value* object. If no value is received within the configured time and the object is the only selected source, the emergency program will be activated. ⓘ As long as at least one valid actual value remains available, this will be continued to be used for control, and the emergency program remains inactive. This is the case if the average value is determined out of 2 or 3 sources.

Designation	Values	Description
Emergency program in case of actual value failure	*with PI controller: 0%, with 2-point controller: Off* ***with PI controller: 10%, with 2-point controller: On*** *with PI controller: 20%, with 2-point controller: On* *with PI controller: 30%, with 2-point controller: On* *with PI controller: 50%, with 2-point controller: On*	The emergency program will only be executed if the selected Source for actual value provides no valid value anymore. The heating/cooling will then be controlled with a fixed actuating value. This might be the case if only one *Source for actual value* is selected, e.g. only *I3*. In case of actual value failure, the value of the actuating value for the emergency program will, depending on the operating mode (heating/cooling), be output to the corresponding object. ⓘ As long as at least one valid actual value remains available, this will be continued to be used for control, and the emergency program remains inactive. This is the case if the average value is determined out of 2 or 3 sources. **Example:** *Average value of internal + I3*. If the sensor at I3 fails, the RTC controls with the remaining, i.e. with the internal sensor, in this case.
Actual value failure telegram	*always cyclically* ***only send cyclically in case of an error***	The object sends the current status always cyclically and in the event of a change: Error = 1, no error = 0 Only sends in case of an error, cyclically and in the event of a change: error = 1.
Send cyclically	*every min* *every 2 min.* *every 3 min.* … ***every 30 min.*** … *every 60 min.*	How often should it be resent?

4.6.3 Operating Mode

Designation	Values	Description
Operating mode after reset	*Frost protection* *Temperature reduction at night* ***Standby*** *Comfort*	Operating mode after start-up or reprogramming
Objects for determining the operating mode	***New: Operating mode, presence, window status*** *Old: comfort, night, frost*	The operating mode is changed depending on the window and presence contacts. Traditional setting without window and presence status. ⓘ As long as the frost protection object is = 1, no other operating mode can be selected.
Type of presence sensor	 *Presence detectors*	Only for *objects for determining the operating mode = new.*. The presence sensor activates comfort operating mode. Operating type comfort provided the presence object is set[14].

[14] Exception: if a window is opened (window object = 1), the room temperature controller switches to frost protection mode

Designation	Values	Description
	Presence button	If a new operating mode is received on the operating mode preset object with the presence object set, it will be accepted and the presence object will be reset. Reception of the same operating mode prior to the presence status (e.g. via cycl. sending) is ignored. If the presence object is set for night/frost mode, it is reset after running the parameterised comfort extension[15] If the presence object is set during standby mode, the comfort operating mode is accepted without time restriction.
When increasing the temperature at the rotary control[16]	***Do not set presence object*** *Set presence object*	Only if *type of presence sensor = presence button*. Only increase the temperature Presence object is set, the controller changes to comfort mode.
Time for comfort extension	*30 min* *1 h* *1.5 h* ***2 h*** *2.5 h* *3 h* *3.5 h*	This determines how long the controller should remain in comfort mode after the presence button is pressed.
Cyclical sending of current operating mode	***do not send cyclically*** *every 2 min.* *every 3 min.* … *every 45 min.* *every 60 min.*	How often should it be resent?

[15] Exception: if a window is opened (window object = 1), the room temperature controller switches to frost protection mode
[16] Only RAMSES 718 P

4.6.4 Heating control

Designation	Values	Description
Type of control	***Continuous*** *2-point*	Infinite control (0.. 100%). Switching control (On/Off). See in the Appendix: *Continuous and switching control*.
Number of heating stages	***Only one heating stage*** *Main stage and additional stage*	Choice of 1- or 2-stage heating
Hysteresis of 2-point controller	*0.3 K* *0.5 K* *0.7K* ***1 K*** *1.5 K*	Interval between the tripping point (set point) and the turn back on point (set point – hysteresis). The hysteresis prevents a permanent switching on/off.
Recirculation of hysteresis after switching point	***None*** *0.1 K/min* *0.2 K/min* *0.3 K/min*	The recirculation causes a gradual decrease in the hysteresis over time, and the control accuracy is increased. The hysteresis is equivalent to the programmed value for each switch-off and is gradually reduced by the recirculation process. The hysteresis can reduce to 0 K over prolonged periods of switch-off. When switching on the next time, it will be reset to the configured value.
Setting the control parameters	***Via installation type*** *User-defined*	Standard application. The control parameters are preset. Professional use: Configure P/PI controller yourself.
Installation type	***Radiator heating system*** *Underfloor heating*	PI controller with: Integrated time = 90 minutes Bandwidth = 2.5 K Integrated time = 30 h Bandwidth = 4 K
Proportional band of heating controller	*1 K, 1.5 K, 2 K,* **2.5 K**, *3 K, 3.5 K, 4 K, 4.5 K,* *5 K, 5.5 K, 6 K, 6.5 K,* *7 K, 7.5 K, 8 K, 8.5 K*	Professional setting for adapting control response to the room. Small values cause large changes in actuating values, larger values cause a finer actuating value adjustment. See in the Appendix: *Temperature control*

Designation	Values	Description
Integrated time of heating controller	*pure P controller* *30 min, 60 min* **90 min**, *120 min* *150 min, 180 min* *210 min* *4 h, 5 h, 10 h* *15 h, 20 h, 25 h* *30 h, 35 h*	Professional setting: See in the Appendix: *Response of the PI controller* This time can be adapted to suit particular circumstances. If the heating system is over-dimensioned and therefore too fast, shorter values should be used. On the other side, longer integration times are beneficial for a slightly undersized heating (slow).
Send heating actuating value cyclically	*At change by 1%* *At change by 2%* *At change by 3%* ***At change by 5%*** *At change by 7%* *At change by 10%* *At change by 15%*	After what percentage change in the actuating value is the new value to be transmitted. Small values increase control accuracy but also the bus load.
Send heating actuating value cyclically	***do not send cyclically*** *every 2 min.* *every 3 min.* … *every 45 min.* *every 60 min.*	How often should it be resent?

4.6.5 Heating set points

Designation	Values	Description
Base set point after loading the application	*18 °C, 19 °C, 20 °C* ***21 °C****, 22 °C, 23 °C 24 °C, 25 °C*	Output set point for temperature control.
Minimum valid base set point	*5-20°C in 1 degree increments* Std.: ***10 °C***	If the object receives a base set point which is lower than the minimum valid base set point, the base set point will be increased to the value set here.
Maximum valid base set point	*17..***32 °C** *in 1 degree increments*	If the object receives a base set point which is higher than the maximum valid base set point, the base set point will be set to the value set here.
Maximum valid set point offset	*+/- 1 K +/- 2 K* ***+/- 3 K*** *+/- 4 K +/- 5 K*	Limits the possible setting range for the set point offset function. Applies to both the man. set point offset as well as the rotary control17.
Reduction in standby mode (when heating)	*0 K, 0.5 K, 1 K, 1.5 K,* ***2 K,*** *2.5 K, 3 K, 3.5 K, 4 K, 4.5 K, 5 K*	**Example:** for a base set point of 21°C in heating mode and a reduction by 2K, the device regulates with a set point of 21 − 2 = 19°C.
Reduction in night mode (during heating)	*3 K, 4 K,* ***5 K*** *6 K, 7 K, 8 K*	By what value should the temperature be reduced in night mode?
set point for frost protection mode (during heating)	*3-10 °C* Std.: ***6 °C***	Preset temperature for frost protection mode in heating mode (Heat protection applies in cooling mode).
Current set point in comfort mode	***Actual value (heating <> cooling)***	Feedback of current set point value via the bus: The set point actually being used for control is always to be sent (= current set point). **Example** with Base set point 21 °C and dead zone 2 K: During heating, 21 °C is transmitted and during cooling, base set point + dead zone is transmitted (21 °C + 2 K = 23 °C)

[17] Only RAMSES 718 P

Designation	Values	Description
	Average value betw. heating and cooling	Same value in comfort mode during both heating and cooling mode, i.e.: base set point + half dead zone will be sent, so users of the room will not be irritated. **Example** with Base set point 21°C and dead zone of 2 K: Average value = 21 °C+1 K = 22 °C, but 21 °C or 23 °C are used for control
Maximum floor temperature[18]	*24 °C, 26 °C, 28 °C* ***30 °C,*** *32 °C, 34 °C* *36 °C, 38 °C, 40 °C*	Maximum permissible floor temperature.
Cyclical sending of current set point	***do not send cyclically*** *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should it be resent?

[18] This parameter is then only available when the external inputs for temperature measurement are configured, i.e. function of the external inputs I3+I4 = temperature sensor input (see parameter page General) and use the parameters of the underfloor heating (sensor at I4) when on yes.

4.6.6 Additional stage heating

Temperature control is done via a proportional controller.

Designation	Values	Description
Output of the actuating value		Control is done via a proportional controller.
	Percent	Continuous actuating value 0-100 %
	PWM	Pulse-width modulated switching actuating value.
Difference between main stage and additional stage	*0 K, 0.5 K, 1 K* *1.5 K,* **2 K**, *2.5 K* *3 K, 3.5 K, 4 K*	Defines the negative distance between the current set point and the set point of the additional stage. **Example** with base set point of 21 °C and difference of 1 K: The main stage controls with the base set point and the addition stage controls with base set point value – 1K = 20°C
Proportional band	*1 K, 1.5 K, 2 K, 2.5 K* *3 K, 3.5 K,* **4 K**, *4.5 K* *5 K, 5.5 K, 6 K, 6.5 K* *7 K, 7.5 K, 8 K, 8.5 K*	With continuous additional stage, Professional setting for adapting control response to the room. Large values cause finer changes to the control variables with the same control deviation and more precise control than smaller values.
PWM period	*3-30 min* Std.: ***5 min***	An actuation cycle consists of a switching-on and a switching-off process and forms a PWM period. **Example:** Actuating value = 20 %, PWM time = 10 min: In an actuating cycle of 10 min, 2 min switched on and 8 min switched off (i.e. 20 % on/80 % off).
Transmission of actuating value	*At change by 1%* *At change by 2%* *At change by 3%* ***At change by 5%*** *At change by 7%* *At change by 10%* *At change by 15%*	After what percentage change in the actuating value is the new value to be transmitted. Small values increase control accuracy but also the bus load.

Designation	Values	Description
Send cyclically	***do not send cyclically*** *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should it be resent?

4.6.7 Cooling control

Designation	Values	Description
Type of control	***Continuous*** *2-point*	Infinite control (0.. 100%). Switching control (On/Off). See in the Appendix: *Continuous and switching control*.
Number of cooling stages	***Only one cooling stage*** *Main stage and additional stage*	Choice of 1- or 2-stage cooling
Hysteresis of 2-point controller	*0.3 K, 0.5 K, 0.7 K* **1 K**, *1.5 K*	Interval between the tripping point (set point) and the turn back on point (set point – hysteresis). The hysteresis prevents a permanent switching on/off.
Recirculation of hysteresis after switching point	***None*** *0.1 K/min* *0.2 K/min* *0.3 K/min*	The recirculation causes a gradual decrease in the hysteresis over time, and the control accuracy is increased. The hysteresis is equivalent to the programmed value for each switch-off and is gradually reduced by the recirculation process. The hysteresis can reduce to 0 K over prolonged periods of switch-off. When switching on the next time, it will be reset to the configured value.
Setting the control parameters	***Via installation type*** *User-defined*	Standard application. The control parameters are preset. Professional use: Configure P/PI controller yourself.
Installation type	***Cooling surface*** *Fan coil unit*	PI controller with: Integrated time = 240 minutes Bandwidth = 5 K Integrated time = 180 min. Bandwidth = 4 K
Proportional band of the cooling control	*1 K, 1.5 K, 2 K, 2.5 K* *3 K, 3.5 K, 4 K, 4.5 K* **5 K**, *5.5 K, 6 K, 6.5 K* *7 K, 7.5 K, 8 K, 8.5 K*	Professional setting for adapting control response to the room. Small values cause large changes in actuating values, larger values cause a finer actuating value adjustment. See in the Appendix: *Temperature control*

Designation	Values	Description
Integrated time of the cooling control	*30 min, 60 min,* **90 min**, *120 min* *150 min, 180 min* *210 min* *4 h, 5 h, 10 h* *15 h, 20 h, 25 h* *30 h, 35 h*	Professional setting: See in the Appendix: *Response of the PI controller* This time can be adapted to suit particular circumstances. If the cooling system is over-dimensioned and therefore too fast, shorter values should be used. On the other side, longer integration times are beneficial for a slightly undersized cooling (slow).
Send cooling actuating value	*at change by 1%* *at change by 2%* *at change by 3%* ***at change by 5%*** *at change by 7%* *at change by 10%* *at change by 15%*	After what percentage change in the actuating value is the new value to be transmitted. Small values increase control accuracy but also the bus load.
Switching between heating and cooling	***Automatic*** *Via object*	The controller automatically switches to cooling mode when the actual temperature is above the set point. The cooling mode can only be activated on the bus via object *Change over between heating and cooling*. Cooling mode remains off for as long as this object is not set.
Format object heating/cooling	***DPT1.100 (Heating=1/Cooling=0)*** *Inverted (Heating=0/Cooling=1)*	Standard format. Compatible with RAM 713 S, VARIA etc.
Output of the cooling actuating value	***On separate obj. (for 4-pipe systems)*** *In common with actuating val. heating (for 2-pipe systems)*	For 4-pipe systems: The actuating values are sent to 2 separate objects: Obj. *heating actuating value* Obj. *cooling actuating value*. For 2-pipe systems: The actuating value is always sent to the same object (obj. *actuating value heating/cooling*), independent of whether heating or cooling mode is active.
Send cooling actuating value cyclically	***do not send cyclically*** *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should it be resent?

4.6.8 Cooling set points

Designation	Values	Description
Dead zone between heating and cooling	*0 K*[19]*, 0.5 K*[20]*, 1 K, 1.5 K,* **2 K**, *2.5 K, 3 K, 3.5 K 4 K, 4.5 K, 5 K, 5.5 K, 6 K + hysteresis heating*[21] *+ hysteresis cooling*[22]	Specifies the buffer zone between set points for heating and cooling mode. The dead zone is expanded through hysteresis in switching (2 point) control. See in the Appendix: *Dead zone*
Increase in standby mode (during cooling)	*0 K, 0.5 K, 1 K 1.5 K,* **2 K**, *2.5 K 3 K, 3.5 K, 4 K 4.5 K, 5 K*	The standby temperature is increased in cooling mode.
Increase in night mode (during cooling)	*3 K, 4 K,* **5 K** *6 K, 7 K, 8 K*	The in cooling mode, the temperature is increased in night mode.
set point for heat protection mode (during cooling)	***0 = 42 °C, i.e. no real heat protection*** *29 °C, 30 °C, 31 °C 32 °C, 33 °C, 34 °C 35°C*	Heat protection represents the maximum permitted temperature for the controlled room. It performs the same function during cooling as the frost protection mode during heating, e.g. saves energy while prohibiting non-permitted temperatures.

[19] Only in 2 pipe system
[20] Only in 2 pipe system
[21] Only for type of control heating = 2 points.
[22] Only with type of control cooling = 2-point.

4.6.9 set point adjustment

Designation	Values	Description
set point correction from	**25 °C**, *26 °C, 27 °C, 28 °C* *29 °C, 30 °C, 31 °C, 32 °C* *33 °C, 34 °C, 35 °C, 36 °C* *37 °C, 38 °C , 39 °C, 40 °C*	Activation threshold for set point correction.
Adjustment	*1 K per 1 K outdoor temperature* *1 K per 2 K outdoor temperature* **1 K per 3 K outdoor temperature** *1 K per 4 K outdoor temperature* *1 K per 5 K outdoor temperature* *1 K per 6 K outdoor temperature* *1 K per 7 K outdoor temperature*	Strength of the set point correction: At which change of the outdoor temperature should the set point be adjusted by 1 K?
set point adjustment format	***relative***	The *Outdoor temperature compensation* object sends a temperature difference in K, in dependence on the outdoor temperature. This value can be used as a set point offset for additional room thermostats.
	absolute	The *Outdoor temperature compensation* object sends a set point in °C (base set point without correction). This is increased in relation to the outdoor temperature and serves as set point for additional temperature controllers.
Start set point	*15 °C-30 °C* Std.: ***21 °C***	(Only with format = absolute). This is the base set point for the external controller. If correction is required, it is added to this and the result is sent as a newer, adjusted set point
Maximum adjustment	*Unlimited*[23]	The set point continues to increase as long as the outside temperature increases.

[23] *For set point correction at high temperatures = internally calculate and send.*

Designation	Values	Description
	Until heat protection temp. reached[24] *+3 K* *+5 K* *+7 K*	The set point is only increased up to the configured heat protection temperature. The set point increase ends as soon as the adjustment has achieved the set value.
Send set point adjustment	***do not send cyclically*** *every 2 min.* *every 3 min.* *...* *every 45 min.* *every 60 min.*	How often should it be resent?

[24] In case of set point correction at high temperatures = only receive.

4.6.10 Additional stage cooling

Control is done via a proportional controller.

Designation	Values	Description
Type of actuating value		Control is done via a proportional controller.
	Percent	Continuous actuating value 0-100 %
	PWM	Pulse-width modulated switching actuating value.
Difference between main stage and additional stage	*0 K, 0.5 K, 1 K* *1.5 K,* **2 K**, *2.5 K* *3 K, 3.5 K, 4 K*	Defines the negative distance between the current set point and the set point of the additional stage. **Example** with base set point of 21 °C and difference of 1 K: The main stage controls with the base set point and the addition stage controls with base set point value − 1K = 20°C
Proportional band	*1 K, 1.5 K, 2 K, 2.5 K* *3 K, 3.5 K,* **4 K**, *4.5 K* *5 K, 5.5 K, 6 K, 6.5 K* *7 K, 7.5 K, 8 K, 8.5 K*	With continuous additional stage, Professional setting for adapting control response to the room. Large values cause finer changes to the control variables with the same control deviation and more precise control than smaller values.
PWM period	*3-30 min* Std.: ***5 min***	An actuation cycle consists of a switching-on and a switching-off process and forms a PWM period. **Example:** Actuating value = 20 %, PWM time = 10 min: In an actuating cycle of 10 min, 2 min switched on and 8 min switched off (i.e. 20 % on/80 % off).
Transmission of actuating value	*At change by 1%* *At change by 2%* *At change by 3%* ***At change by 5%*** *At change by 7%* *At change by 10%* *At change by 15%*	After what percentage change in the actuating value is the new value to be transmitted. Small values increase control accuracy but also the bus load.
Send cyclically	***do not send cyclically*** *every 2 min.* *every 3 min.* … *every 45 min.* *every 60 min.*	How often should it be resent?

4.7 External inputs I1-I4 functional block

4.7.1 Switch function

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Channel function	***Switch..*** *Push button..* *Dimming..* *Blinds..*	Sends, depending on whether the input is 0 or 1.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s , 5 s, 10 s*	In order to avoid a disruptive switching due to debouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1s) can be used as a switch-on delay
Send cyclically	*every min* *every 2 min.* *every 3 min.* ... ***every 30 min.*** *every 45 min.* *every 60 min.*	Common cycle time for all 3 initial objects of the channel.
Number of telegrams	***one telegram*** *two telegrams* *three telegrams*	Each channel has 3 initial objects and can thus send up to 3 different telegrams.
Activate block function	***no*** *yes*	No block function. Show block function parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = enable 1 = block 0 = block 1 = enable

4.7.1.1 Switch object parameter pages 1, 2, 3

Each of the 3 objects can be configured individually on its own parameter page.

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)* *2 byte floating-point number DPT 9.x* *4 byte floating-point number DPT 14.x*	Telegram type for this object.
Send if input = 1	*no* ***yes***	Send if voltage is present at the input?
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *BY*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
		Function / Value
	inactive	Priority not active (no control) / 0 (00_{bin})
	ON	Priority ON Priority ON (control: enable, on) / 3 (11_{bin})
	OFF	Priority OFF (control: disable, off) / 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With object type = percentage value 1 byte	
	*0-**100%***	Any percentage value between 0 and 100 % can be sent.
	With object type = 2 byte floating-point number	
	-670760...670760 Std.: ***0***	Any value between -670760 and 670760 can be sent.
	With object type = 4 byte floating-point number	
	-1E+38.. 1E+38 Std.: ***0***	Any value between -1E+38 and 1E+38 can be sent. Input format: The ETS only allows the input as a decimal without power. **Example:** 15234825.123456
Send if input = 0	*no* ***yes***	Send if voltage is present at the input?
Telegram	See above: Same object type as *Send if input = 1*	

Designation	Values	Description
Send cyclically	***no*** *yes, always* *only if input = 1* *only if input = 0*	When should be sent cyclically? The cycle time is set on the main parameter page of the channel.
Response after restoration of the bus supply	***none*** *update (immediately)* *update (after 5 s)* *update (after 10 s)* *update (after 15 s)*	Do not send. Send update telegram immediately or with delay.
Response when setting the block	***Ignore block*** *no response* *as with input = 1* *as with input = 0*	The block function is ineffective with this telegram. Do not respond when setting the block. Respond as with rising edge. Respond as with falling edge.
Response when cancelling the block	***no response*** *update*	Do not respond when the block is cancelled. Send update telegram.

ⓘ If a channel is blocked, no telegrams will be sent cyclically.

4.7.2 Switch function I1, I2, I3, I4

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Channel function	*Switch..* ***Push button..*** *Dimming..* *Blinds..*	A push button is connected to the input.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s , 5 s, 10 s*	In order to avoid a disruptive switching due to debouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1s) can be used as a switch-on delay.
Connected push button	***NO contact*** *Opening contact*	Set the Type of connected contact.
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the push button is pressed for at least as long as the set time, then a long button push will be registered.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.
Send cyclically	*every min* *every 2 min.* *every 3 min.* *...* ***every 30 min.*** *every 45 min.* *every 60 min.*	Common cycle time for all 3 initial objects of the channel.
Number of telegrams	***one telegram*** *two telegrams* *three telegrams*	Each channel has 3 initial objects and can thus send up to 3 different telegrams.
Activate block function	***no*** *yes*	No block function. Show block function parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = enable 1 = block 0 = block 1 = enable

4.7.2.1 Parameter pages button object 1, 2, 3

Each of the 3 objects can be configured individually on its own parameter page.

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)* *2 byte floating-point number DPT 9.x* *4 byte floating-point number DPT 14.x*	Telegram type for this object.
Send after short operation	***do not send*** *Send telegram*	Respond to short button push?
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *BY*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
		Function: Priority not active (no control) — Value: 0 (00_{bin})
	inactive	
	ON	Function: Priority ON Priority ON (control: enable, on) — Value: 3 (11_{bin})
	OFF	Function: Priority OFF (control: disable, off) — Value: 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With object type = percentage value 1 byte	
	*0-**100%***	Any percentage value between 0 and 100 % can be sent.
	With object type = 2 byte floating-point number	
	-670760...670760 Std.: ***0***	Any value between -670760 and 670760 can be sent.
	With object type = 4 byte floating-point number	
	-1E+38.. 1E+38 Std.: ***0***	Any value between -1E+38 and 1E+38 can be sent. Input format: The ETS only allows the input as a decimal without power. **Example:** 15234825.123456
Send after long operation	***do not send*** *Send telegram*	Respond to long button push?
Telegram	See above: Same object type as with short operation.	
Send after double-click	***do not send*** *Send telegram*	Respond to double-click?

Designation	Values	Description
Telegram	See above: Same object type as with short operation.	
Send cyclically	***no*** *yes*	The cycle time is set on the main parameter page of the channel.
Response after restoration of the bus supply	***none*** *As with short (immediately)* *As with short (after 5 s)* *As with short (after 10 s)* *As with short (after 15 s)* *As with long (immediately)* *As with long (after 5 s)* *As with long (after 10 s)* *As with long (after 15 s)* *As with double-click (immediately)* *As with double-click (after 5 s)* *As with double-click (after 10 s)* *As with double-click (after 15 s)*	Do not send. Send update telegram immediately or with delay. The value to be sent depends on the value configured for long, short button push, or double-click.
Response when setting the block	***Ignore block*** *no response* *as with short* *as with long* *as with double-click*	The block function is ineffective with this telegram. Do not respond when setting the block. Respond as with a short button push. Respond as with a long button push. Respond as with a double-click.
Response when cancelling the block	***no response*** *as with short* *as with long* *as with double-click*	Do not respond when the block is cancelled. Respond as with a short button push. Respond as with a long button push. Respond as with a double-click.

Note: If a channel is blocked, no telegrams will be sent cyclically.

4.7.3 Dimming function I1, I2, I3, I4

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Channel function	*Switch..* *Push button..* ***Dimming..*** *Blinds..*	The input controls a dimming actuator,
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s , 5 s, 10 s*	In order to avoid a disruptive switching due to debouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1s) can be used as a switch-on delay
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the push button is pressed for at least as long as the set time, then a long button push will be registered.
Double-click additional function	***no*** *yes*	No double-click function The double-click parameter page is shown.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.
Activate block function	***no*** *yes*	No block function. Show block function parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = enable 1 = block 0 = block 1 = enable

4.7.3.1 Dimming parameter page

Designation	Values	Description
Response to "long" / "short"		The input distinguishes between a long and a short button push, and can thus carry out 2 functions.
	One button operation	The dimmer is operated with a single push button. Short button push = ON/OFF Long button push = brighter/darker release = stop With the other variants, the dimmer is operated using 2 buttons (rocker).
	brighter/ON	Short button push = ON Long button push = brighter Release = stop
	brighter/BY	Short button push = ON/OFF Long button push = brighter Release = stop
	darker/OFF	Short button push = OFF Long button push = darker Release = stop
	darker/BY	Short button push = ON/OFF Long button push = darker Release = stop
Increment for dimming		With a long button push, the dimming value is:
	100%	Increased (or decreased) until the button is released.
	50% *25%* *12.5%* *6%* *3%* *1.5%*	Increased by the selected value (or reduced)
Response in case of bus and mains restoration	***none***	Do not react.
	ON	Switch on dimmer
	OFF	Switch off dimmer

Designation	Values	Description
	after 5 s ON *after 10 s ON* *after 15 s ON* *after 5 s OFF* *after 10 s OFF* *after 15 s OFF*	Switch on dimmer with delay Switch off dimmer with delay
Response when setting the block	***Ignore block***	The block function is ineffective with this telegram.
	no response	Do not respond when setting the block.
	ON	Switch on dimmer
	OFF	Switch off dimmer
Response when cancelling the block	***no response***	Do not respond when the block is cancelled.
	ON	Switch on dimmer
	OFF	Switch off dimmer

4.7.3.2 Double-click parameter page

Designation	Values	Description	
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)* *2 byte floating-point number DPT 9.x* *4 byte floating-point number DPT 14.x*	Telegram type for this object.	
Telegram	*With object type = switching 1 bit*		
	ON *OFF* *BY*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)	
	With object type = priority 2 bit		
		Function	Value
	inactive	Priority not active (no control)	0 (00_{bin})
	ON	Priority ON Priority ON (control: enable, on)	3 (11_{bin})
	OFF	Priority OFF (control: disable, off)	2 (10_{bin})
	With object type = value 0-255		
	*0-**255***	Any value between 0 and 255 can be sent.	
	With object type = percentage value 1 byte		
	*0-**100%***	Any percentage value between 0 and 100 % can be sent.	
	With object type = 2 byte floating-point number		
	-670760...670760 Std.: ***0***	Any value between -670760 and 670760 can be sent.	
	With object type = 4 byte floating-point number		
	-1E+38.. 1E+38 Std.: ***0***	Any value between -1E+38 and 1E+38 can be sent. Input format: The ETS only allows the input as a decimal without power. **Example:** 15234825.123456	
Send cyclically	***do not send cyclically*** *every min* *every 2 min.* *every 3 min.* *...* *every 45 min.* *every 60 min.*	How often should it be resent?	
Response after restoration of the bus	***none***	Do not send.	

Designation	Values	Description
supply	*As with double-click (immediately)* *As with double-click (after 5 s)* *As with double-click (after 10 s)* *As with double-click (after 15 s)*	Send update telegram immediately or with delay. The value to be sent depends on the value configured for double-click.
Response when setting the block	***Ignore block*** *no response* *as with double-click*	The block function is ineffective with this telegram. Do not respond when setting the block. Respond as with a double-click.
Response when cancelling the block	***no response*** *as with double-click*	Do not respond when the block is cancelled. Respond as with a double-click.

4.7.4 Blinds function I1, I2, I3, I4

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Channel function	*Switch..* *Push button..* *Dimming..* ***Blinds..***	The input controls a blinds actuator.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s , 5 s, 10 s*	In order to avoid a disruptive switching due to debouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1s) can be used as a switch-on delay
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the push button is pressed for at least as long as the set time, then a long button push will be registered.
Double-click additional function	*no* ***yes***	No double-click function The double-click parameter page is shown.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.
Activate block function	***no*** *yes*	No block function. Show block function parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = enable 1 = block 0 = block 1 = enable

4.7.4.1 Blinds parameter page

Designation	Values	Description
Operation		The input distinguishes between a long and a short button push, and can thus carry out 2 functions.
	One button operation	The blinds are operated with a single push button. Short button push = Step. Long button push = Move.
	DOWN	Short button push = Step. Long button push = lowering.
	UP	Short button push = Step. Long button push = raising.
Movement is stopped by	*releasing the button* ***Short operation***	How is the stop command to be triggered?
Response in case of bus and mains restoration	***none***	Do not react.
	UP	Raise the blind
	DOWN	Lower blinds
	after 5 s UP *after 10 s UP* *after 15 s UP*	Raise blinds with delay
	after 5 s DOWN *after 10 s DOWN* *after 15 s DOWN*	Lower blinds with delay
Response when setting the block	***Ignore block***	The block function is ineffective with this telegram.
	no response	Do not respond when setting the block.
	UP	Raise the blind
	DOWN	Lower blinds
Response when cancelling the block	***no response***	Do not respond when the block is cancelled.
	ON	Raise the blind
	OFF	Lower blinds

4.7.4.2 Double-click parameter page

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)* *2 byte floating-point number* *DPT 9.x* *4 byte floating-point number* *DPT 14.x*	Telegram type for this object.
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *BY*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
		Function / Value
	inactive	Priority not active (no control) / 0 (00_{bin})
	ON	Priority ON Priority ON (control: enable, on) / 3 (11_{bin})
	OFF	Priority OFF (control: disable, off) / 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With object type = percentage value *1 byte*	
	*0-**100%***	Any percentage value between 0 and 100 % can be sent.
	With object type = 2 byte floating-point number	
	-670760...670760 Std.: ***0***	Any value between -670760 and 670760 can be sent.
	With object type = 4 byte floating-point number	
	-1E+38.. 1E+38 Std.: ***0***	Any value between -1E+38 and 1E+38 can be sent. Input format: The ETS only allows the input as a decimal without power. **Example:** 15234825.123456
Send cyclically	***do not send cyclically*** *every min* *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should it be resent?
Response after restoration of the bus	***none***	Do not send.

Designation	Values	Description
supply	*As with double-click (immediately)* *As with double-click (after 5 s)* *As with double-click (after 10 s)* *As with double-click (after 15 s)*	Send update telegram immediately or with delay. The value to be sent depends on the value configured for double-click.
Response when setting the block	***Ignore block*** *no response* *as with double-click*	The block function is ineffective with this telegram. Do not respond when setting the block. Respond as with a double-click.
Response when cancelling the block	***no response*** *as with double-click*	Do not respond when the block is cancelled. Respond as with a double-click.

4.7.5 Temperature sensor function (only I3 and I4)

The external inputs I3 and I4 can be used as analogue inputs for temperature measurement via remote sensor.

This function is activated on the ***General*** parameter page with the parameter *function of the external inputs I3 + I4*.

The temperature measured at I3 can be used internally as an actual value for the RTC (see *Source for actual value* parameter).

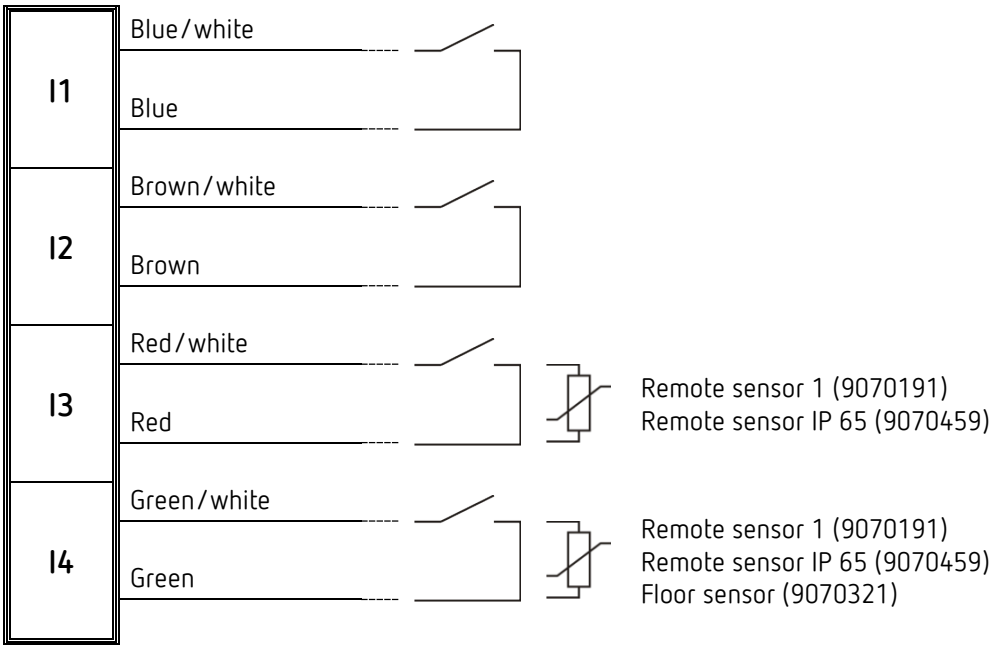
The temperature measured at I4 can be used internally as a floor temperature for the RTC. See parameter *Use floor temperature limitation (sensor at I4)* on the ***Settings*** parameter page).

Notwithstanding the above, both measurement values can also be sent to the bus.

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Sensor type	***Remote sensor 1 (9070191)***	External temperature sensor 1 Item no. 9070191, for surface-mounted installation.
	Remote sensor IP 65 (9070459)	External temperature sensor RAMSES IP65 Item no. 9070459, for surface-mounted installation.
	Floor sensor (9070321)	Only at input I4: Temperature sensor for laying in floor, IP65 protection rating.
Temperature calibration	*-64..+64* (x 0.1 K)	Correction value for temperature measurement if sent temperature deviates from the actual ambient temperature. **Example:** Temperature = 20°C sent temperature = 21°C Correction value = 10 (d.h. 10 x 0.1°C)
Transmit temperature in the event of change of	*not due to a change*	Only send cyclically (if enabled)
	0.2 K *0.3 K* ***0.5 K*** *0.7 K* *1 K* *1.5 K* *2 K*	Send if the value has changed by the selected amount since the last transmission.

Designation	Values	Description
Send temperature cyclically	***do not send cyclically*** *every min,* *every 2 min.* *every 3 min.* ... *every 45 min.* *every 60 min.*	How often should the current measured value be resent?

4.7.6 Connection of the external inputs



Contact voltage: 5V SELV
Contact current: 0.5 mA (mean value), 5 mA (peak value)

Only connect floating contacts or Theben temperature sensors.

CAUTION! Observe extra-low voltage/distances!

5 Typical applications

These typical applications are designed to aid planning and are not to be considered an exhaustive list.
It can be extended and updated as required.

5.1 Location school: Heating with presence detector and frost protection via window contact.

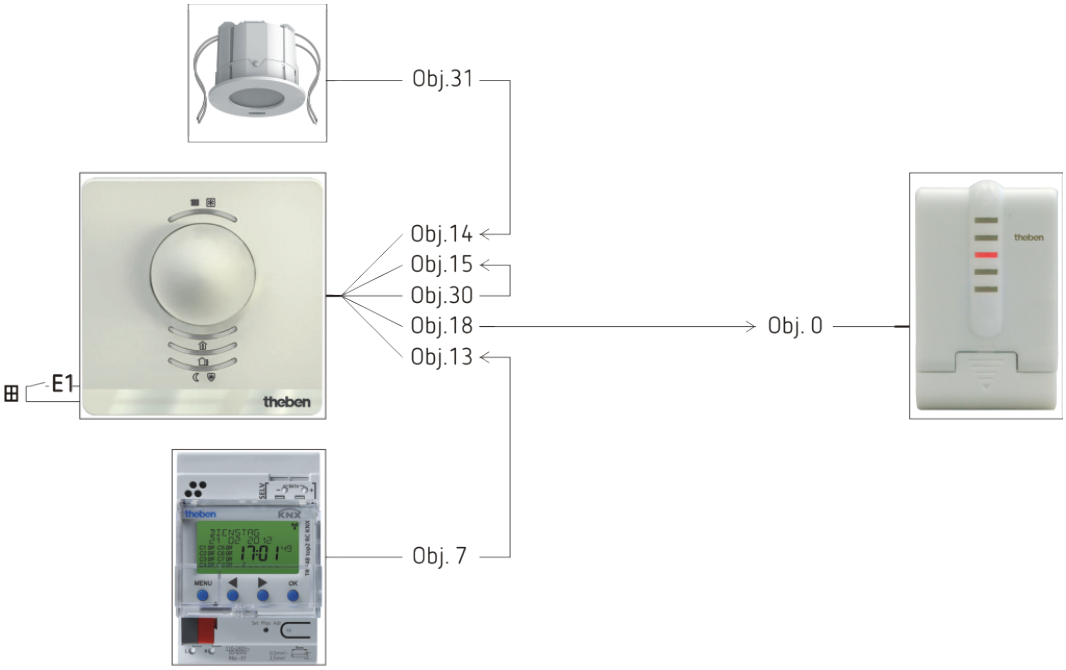
The room temperature controller (RTC) controls one or more actuators.
Once someone enters the room the controller has to change to comfort mode, otherwise it operates in standby mode during the day and in night mode at night.
If a window is opened, the controller has to automatically change to frost protection mode.
A presence detector is used for presence recognition.
The presence telegram is only sent after a switch-on delay so that the heating is not activated if the room is only occupied for a short time.
In order that no prohibited settings are made, the device RAMSES 718 S (without control elements) is recommended here.

All windows are fitted with window contacts. These are connected with input E1 on the device. As an alternative, the external interface of the Cheops drive actuator can also be used for this.
The window status is sent via a common group address to the window position input object.
The device will recognise when a window is opened and automatically switch to frost protection mode.
When the window is closed, the previously set operating mode will be restored.

5.1.1 Devices

- RAMSES 718 P/S (Order no.7189210/7189200)
- PlanoSpot 360 KNX (Order No. 2039100)
- TR 648 top2 RC KNX (Order No. 6489212)
- Cheops drive (Order No. 7319200)

5.1.2 Overview



5.1.3 Objects and links

No.	PlanoSpot 360 KNX Object name	No.	RAMSES 718 P/S Object name	Comment
31	Presence channel C4.1	14	Presence	Presence telegram. Triggers comfort mode.

No.	TR 648 top2 Object name	No.	RAMSES 718 P/S Object name	Comment
7	C1.1 switching channel – HVAC operating mode	13	Operating mode preset	Switches the controller between standby and night.

No.	RAMSES 718 P/S Object name	No.	Cheops drive Object name	Comment
18	Heating actuating value	0	Actuating value	Actuating value for actuator.

No.	RAMSES 718 P/S Object name	No.	RAMSES 718 P/S Object name	Comment
30	Channel I1.1 switching	45	Window status	The windows status is detected at input E1 (window contact) and sent to the controller (window status) via a group address. When opening the window, the controller changes into frost protection mode.

5.1.4 Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

RAMSES 718 P/S:

Parameter page	Parameter	Setting
RTC setting	*Control*	*Heating control only*
	Rotary control function[25]	*Blocked*
	Button function[26]	*Blocked*
Operating Mode	*Objects for determining the operating mode*	*New: Operating mode, presence, window status*
	Type of presence sensor type (presence obj.)	*Presence detectors*
Channel I1	*Activate channel*	*ON*
	Channel function	*Switch*
	Number of telegrams	*One telegram*
Switch object 1	*Object type*	*Switching (1 bit)*
	Send if input = 1	*yes*
	Telegram	*ON*
	Send if input = 0	*yes*
	Telegram	*OFF*
	Send cyclically	*yes*
	Response after restoration of the bus supply	*update (immediately)*

PlanoSpot 360 KNX:

Parameter page	Parameter	Setting
General	*Channel C4 – presence*	*active*
Channel C4 – presence	*Presence switch-on delay*	*5 min*
	Presence time delay	*10 min*

[25] Only RAMSES 718 P
[26] Only RAMSES 718 P

TR 648 top2 RC:

Parameter page	Parameter	Setting
General	*Activate time switch channel C1*	*yes*
Switching channel C1	*Telegram type C1.1*	*HVAC operating mode*
	As with clock -> ON	*send following telegram once*
	Telegram	*Standby*
	With clock -> OFF	*send following telegram once*
	Telegram	*Temperature reduction at night*

Cheops drive:

The standard values can be used here.

5.2 Location single-family house:

5.2.1 Heating with presence detector and frost protection via window contact.

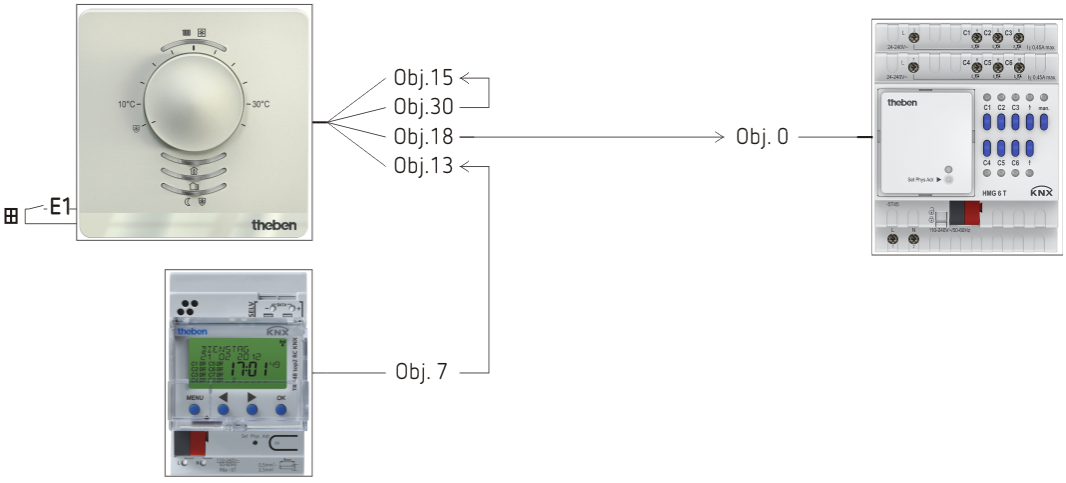
The room temperature controller (RTC) controls one or more actuators.
The comfort mode is cancelled on the device using button[27] , otherwise the controller is in standby all day and in night mode all night.
If a window is opened, the controller has to automatically change to frost protection mode.

All windows are fitted with window contacts. These are connected with input E1 on the device.
The window status is sent via a common group address to the window position input object.
The device will recognise when a window is opened and automatically switch to frost protection mode. When the window is closed the previously set operation mode will be restored.

5.2.2 Devices

- RAMSES 718 P/S (Order no.7189210)
- TR 648 top2 RC KNX (Order No. 6489212)
- HM 6 T (4940240)

5.2.3 Overview



[27] Only RAMSES 718 P

5.2.4 Objects and links

No.	TR 648 top2 Object name	No.	RAMSES 718 P Object name	Comment
7	C1.1 switching channel – HVAC operating mode	13	Operating mode preset	Switches the controller between standby and night.

No.	RAMSES 718 P Object name	No.	HM 6 T Object name	Comment
18	Heating actuating value	0	Continuous actuating value	Actuating value for the heating actuator.

No.	RAMSES 718 P Object name	No.	RAMSES 718 P Object name	Comment
30	Channel I1.1 switching	15	Window status	The windows status is detected at input E1 (window contact) and sent to the controller (window status) via a group address. When opening the window, the controller changes into frost protection mode.

5.2.5 Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

RAMSES 718 P:

Parameter page	Parameter	Setting
RTC setting	*Control*	*Heating control only*
	Rotary control function	*Manual offset*
	Button function	*Presence button*
Operating Mode	*Objects for determining the operating mode*	*New: Operating mode, presence, window status*
Channel I1	*Activate channel*	*ON*
	Channel function	*Switch*
	Number of telegrams	*One telegram*
Switch object 1	*Object type*	*Switching (1 bit)*
	Send if input = 1	*yes*
	Telegram	*ON*
	Send if input = 0	*yes*
	Telegram	*OFF*
	Send cyclically	*yes*
	Response after restoration of the bus supply	*update (immediately)*

TR 648 top2 RC:

Parameter page	Parameter	Setting
General	*Activate time switch channel C1*	*yes*
Switching channel C1	*Telegram type C1.1*	*HVAC operating mode*
	As with clock -> ON	*send following telegram once*
	Telegram	*Standby*
	With clock -> OFF	*send following telegram once*
	Telegram	*Temperature reduction at night*

HM 6 T:

Parameter page	Parameter	Setting
Channel H1: Configuration options	*Channel function*	*Heating actuator*
	Type of actuating value	*continuous..*

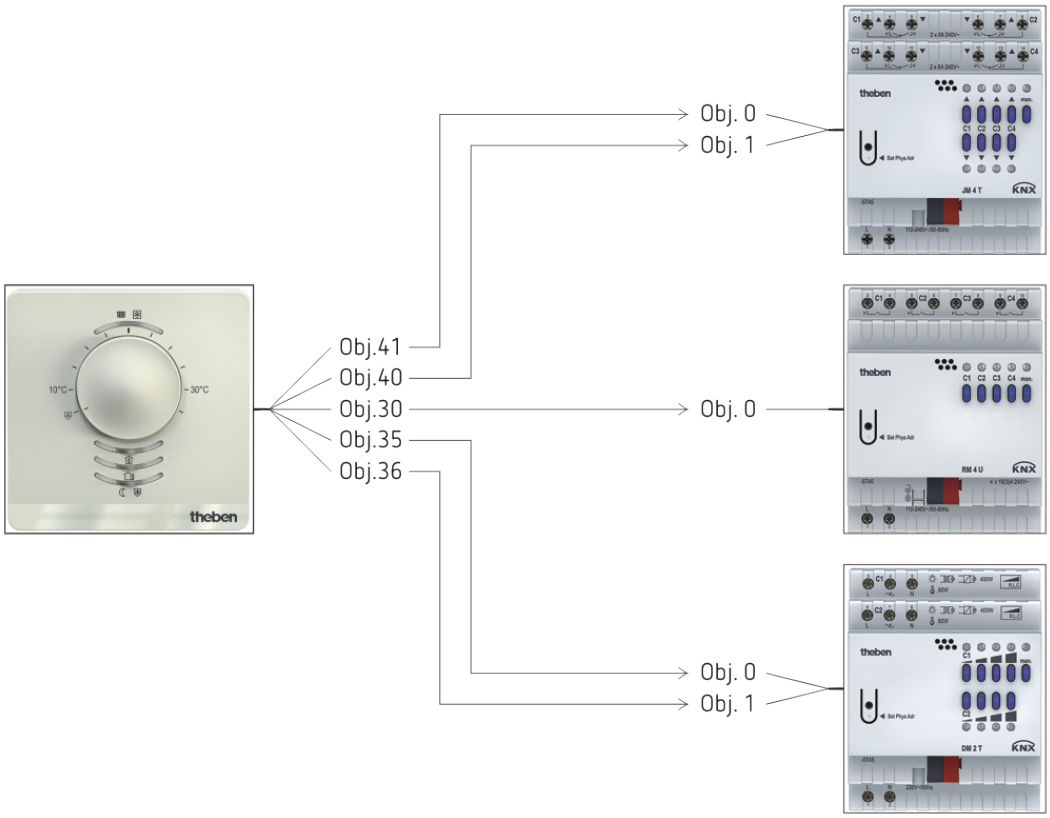
5.3 Switching, dimming light and controlling blinds

Via the external inputs, it is possible to simply control various actuators, such as switching, blinds, and dimming actuators, with conventional buttons.

5.3.1 Devices

- RAMSES 718 P/S (Order no.7189210/7189200)
- RM 4 U (Order No. 4940223)
- DM 2 T (Order No. 4940270)
- JM 4 T (Order No. 4940250)

5.3.2 Overview



5.3.3 Objects and links

No.	RAMSES 718 P/S Object name	No.	RM 4 U Object name	Comment
30	Channel I1.1 – switching	0	Channel C1 – switch object	Switch command for the light.

No.	RAMSES 718 P/S Object name	No.	DM 2 T Object name	Comment
35	Channel I2 – switching	0	Switching ON/OFF	Switch command for the light.
36	Channel I2 – brighter/darker	1	Brighter/darker	4 bit dimming command

No.	RAMSES 718 P/S Object name	No.	JM 4 T Object name	Comment
40	Channel 3 – step/stop	1	Step/stop	Switch command for the light.
41	Channel I3 – up/down	0	Up/Down	1 bit operating command

5.3.4 Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

RAMSES 718 P/S:

Parameter page	Parameter	Setting
Channel I1	*Activate channel*	*ON*
	Channel function	*Push button*
	Number of telegrams	*One telegram*
Button object 1	*Object type*	*Switching (1 bit)*
	Send after short operation	*Send telegram*
	Send after long operation	*do not send*
	Send after double-click	*do not send*
Channel I2	*Activate channel*	*ON*
	Channel function	*Dimming*
	Double-click additional function	*no*
Dimming	*Reaction to long/short*	*One button operation*
Channel I3	*Activate channel*	*ON*
	Channel function	*Blinds*
	Double-click additional function	*no*
Blinds	*Operation*	*One button operation*

RM 4 U:

Parameter page	Parameter	Setting
Channel C1: Configuration options	*Channel function*	*switch On/Off*

DM 2 T:

Parameter page	Parameter	Setting
Dimming response	*Load selection*	To be set system-specific.

JM 4 T

Parameter page	Parameter	Setting
Channel C1: Configuration options	*Type of motor*	To be set system-specific.
	Type of hanging	*Blinds.*.
Drive settings	*Complete runtime down (s)*	To be set system-specific.
	Complete slat turning	To be set system-specific.

5.4 Two-stage heating for floor and radiators

A room is heated via the floor and additionally via radiators.
Both heating sources have very different requirements and are therefore controlled via 2 separate heating stages.
The first heating stage controls and limits the floor temperature (slow, inert heating).
The second heating stage controls one or several radiators (fast heating).

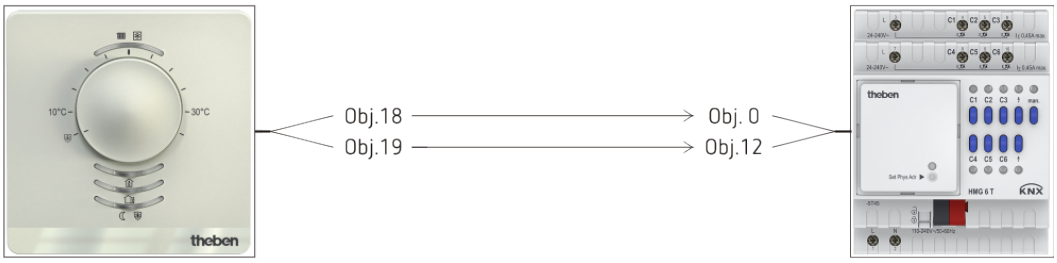
The floor temperature is measured by an external floor sensor (Order No. 907321) at input E4.

Here, the focus is on the 2 heating stages with floor temperature limitation.
The automatic change of the operating mode via time switch or presence detector, as well as the change of the operating mode and the frost protection function are not explicitly mentioned again (see previous examples).

5.4.1 Devices

- RAMSES 718 P/S (Order no.7189210/7189200)
- HM 6 T (4940240)

5.4.2 Overview



5.4.3 Objects and links

No.	RAMSES 718 P/S Object name	No.	HM 6 T Object name	Comment
18	Heating actuating value	0	Channel H1 – continuous actuating value	Actuating value for underfloor heating
19	Actuating value additional heating stage	12	Channel H2 – continuous actuating value	Actuating value for the radiators

5.4.4 Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

RAMSES 718 P/S:

Parameter page	Parameter	Setting
General	*Function of the external inputs I3 + I4*	*Temperature sensor input..*
Setting	*Control*	*Heating control only*
	Use floor temperature limitation (sensor at I4)	*yes*
Heating control	*Type of control*	*continuous*
	Number of heating stages	*Main stage and additional stage*
	Setting the control parameters	*Via installation type*
	Installation type	*Underfloor heating*
Heating set points	*Maximum floor temperature*	*e.g. 30 °C*
Additional stage heating	*Type of actuating value*	*Percent*
	Difference between main stage and additional stage	*0 K*
Channel I4	*Activate channel*	*ON*
	Sensor type	*Floor sensor (9070321)*

HM 6 T:

Parameter page	Parameter	Setting
Channel H1: Configuration options	*Channel function*	*Heating actuator*
	Type of actuating value	*continuous..*
Channel H2: Configuration options	*Channel function*	*Heating actuator*
	Type of actuating value	*continuous..*

6 Appendix

6.1 LED colors for temperature control

Status RTC		Heating
		Cooling

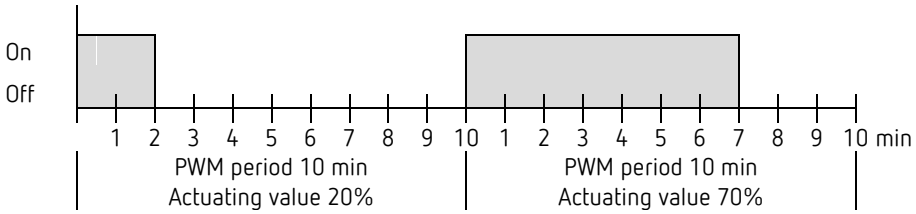
Operating Mode		Comfort
		Comfort extension
		Standby
		Frost
		Eco

6.2 PWM cycle

6.2.1 Basic principle

The 50% control variable is converted into switch-on/switch-off cycles in order to achieve a heating output of 50%.
The actuator is switched on for 50% of the time and switched off for 50% of the time over a fixed period (10 minutes in our example).

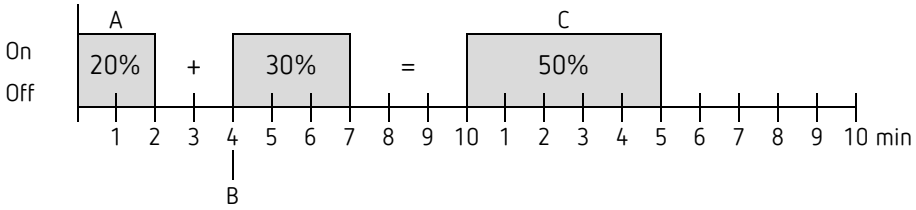
Example: 2 different turn-on times of 2 and 7 minutes indicate the implementation of 2 different actuating values, that is once 20% and once 70% during a PWM period of 10 minutes.



6.2.2 Response to changes in the actuating value

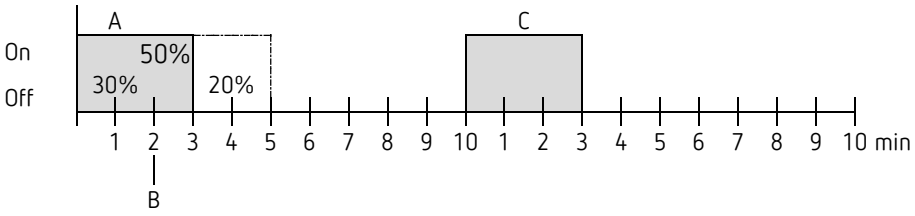
Every change in the actuating value is immediately transferred to the PWM cycle in order to respond to changes in the quickest possible time.

Example 1: The last actuating value was 20% (A).
A new actuating value of 50% is received during the cycle (B).
The output is immediately switched on and the missing 30% switch-on time is added.
The next cycle is executed with 50% (C).



If the rated switch-on time for the current cycle has already exceeded while receiving the new actuating value, the output is immediately switched off and the new actuating value is executed during the next cycle.

Example 2: The last control variable was 50% (A)
A new actuating value of 30% is received during the cycle (B).
The output is switched off after completing 30% of the PWM cycle and thus the new control variable is executed.



6.3 Operating mode as scene (RTC)

6.3.1 Principle

The current operating mode can be saved via an object with the scene functions and restored later at any time.
The current operating mode is allocated to the appropriate scene number when a scene is saved.
The previously saved operating mode is reactivated when a scene number is called.
This allows the device to be easily associated to each chosen user scene.
The scenes are permanently stored and remain intact even after the application has been downloaded again.

In order to save or call up the scene, the respective code is sent to the object *Operating mode as seen*.

Scene	Call up		Save		Scene	Call up		Save	
	Hex	Dec.	Hex	Dec.		Hex	Dec.	Hex	Dec.
1	$00	0	$80	128	33	$20	32	$A0	160
2	$01	1	$81	129	34	$21	33	$A1	161
3	$02	2	$82	130	35	$22	34	$A2	162
4	$03	3	$83	131	36	$23	35	$A3	163
5	$04	4	$84	132	37	$24	36	$A4	164
6	$05	5	$85	133	38	$25	37	$A5	165
7	$06	6	$86	134	39	$26	38	$A6	166
8	$07	7	$87	135	40	$27	39	$A7	167
9	$08	8	$88	136	41	$28	40	$A8	168
10	$09	9	$89	137	42	$29	41	$A9	169
11	$0A	10	$8A	138	43	$2A	42	$AA	170
12	$0B	11	$8B	139	44	$2B	43	$AB	171
13	$0C	12	$8C	140	45	$2C	44	$AC	172
14	$0D	13	$8D	141	46	$2D	45	$AD	173
15	$0E	14	$8E	142	47	$2E	46	$AE	174
16	$0F	15	$8F	143	48	$2F	47	$AF	175
17	$10	16	$90	144	49	$30	48	$B0	176
18	$11	17	$91	145	50	$31	49	$B1	177
19	$12	18	$92	146	51	$32	50	$B2	178
20	$13	19	$93	147	52	$33	51	$B3	179
21	$14	20	$94	148	53	$34	52	$B4	180
22	$15	21	$95	149	54	$35	53	$B5	181
23	$16	22	$96	150	55	$36	54	$B6	182
24	$17	23	$97	151	56	$37	55	$B7	183
25	$18	24	$98	152	57	$38	56	$B8	184
26	$19	25	$99	153	58	$39	57	$B9	185
27	$1A	26	$9A	154	59	$3A	58	$BA	186
28	$1B	27	$9B	155	60	$3B	59	$BB	187
29	$1C	28	$9C	156	61	$3C	60	$BC	188
30	$1D	29	$9D	157	62	$3D	61	$BD	189
31	$1E	30	$9E	158	63	$3E	62	$BE	190
32	$1F	31	$9F	159	64	$3F	63	$BF	191

6.4 set point correction

The set point correction enables a *dynamic adjustment* of the set point to the outdoor temperature when cooling.

This function prevents too great a temperature deviation between the outside area and the cooled interior with high outside temperatures.

If the outdoor temperature exceeds a set threshold, adjustment is activated and a corresponding increase of the set point is calculated.

The current outside temperature for calculating the correction is received via object *Outside temperature*.

The set point correction is activated on the RTC ***Settings*** parameter page via the *Use set point correction with high outside temperatures* parameter and is set on the ***set point adjustment*** parameter page.

The set point correction is internally linked to the RTC, so no bus connection is required.

6.4.1 Format of set point correction: Relative

set point correction is sent as a temperature difference.
Below the set point correction threshold (*set point correction from*) the value 0 is sent.

If the set point correction threshold (*set point correction from*) is exceeded, the set point will be increased linearly depending on the change of the outside temperature.

Example: Calculated correction value
set point correction from: 26 °C

Outdoor temp.	Adjustment							
	1 K/1 K	1 K/2 K	1 K/3 K	1 K/4 K	1 K/5 K	1 K/6 K	1 K/7 K	
20°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	Correction value
21°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	
22°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	
23°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	
24°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	
25°C	0 K	0 K	0 K	0 K	0 K	0 K	0 K	
26°C	**1 K**							
27°C	2 K	**1 K**						
28°C	3 K	1 K	**1 K**					
29°C	4 K	2 K	1 K	**1 K**				
30°C	5 K	2 K	1 K	1 K	**1 K**			
31°C	6 K	3 K	2 K	1 K	1 K	**1 K**		
32°C	7 K	3 K	2 K	1 K	1 K	1 K	**1 K**	
33°C	8 K	4 K	2 K	2 K	1 K	1 K	1 K	
34°C	9 K	4 K	3 K	2 K	1 K	1 K	1 K	
35°C	10 K	5 K	3 K	2 K	2 K	1 K	1 K	
36°C	11 K	5 K	3 K	2 K	2 K	1 K	1 K	
37°C	12 K	6 K	4 K	3 K	2 K	2 K	1 K	
38°C	13 K	6 K	4 K	3 K	2 K	2 K	1 K	
39°C	14 K	7 K	4 K	3 K	2 K	2 K	2 K	
40°C	15 K	7 K	5 K	3 K	3 K	2 K	2 K	

6.4.2 Format of set point correction: Absolute

Sends the corrected set point to the bus for additional room thermostats.

This set point is calculated from:
Base set point without correction + dead zone + adjustment.

Example: *set point correction from*: 25 °C, *start set point*: 20 °C, *dead zone* = 2 K

Outdoor temp.	Adjustment							
	1 K/1 K	1 K/2 K	1 K/3 K	1 K/4 K	1 K/5 K	1 K/6 K	1 K/7 K	
20	22.00	22.00	22.00	22.00	22.00	22.00	22.00	set point
21	22.00	22.00	22.00	22.00	22.00	22.00	22.00	
22	22.00	22.00	22.00	22.00	22.00	22.00	22.00	
23	22.00	22.00	22.00	22.00	22.00	22.00	22.00	
24	22.00	22.00	22.00	22.00	22.00	22.00	22.00	
25	**23.00**							
26	24.00	**23.00**						
27	25.00	24.00	**23.00**					
28	26.00	24.00	24.00	**23.00**				
29	27.00	25.00	24.00	24.00	**23.00**			
30	28.00	25.00	24.00	24.00	24.00	**23.00**		
31	29.00	26.00	25.00	24.00	24.00	24.00	**23.00**	
32	30.00	26.00	25.00	24.00	24.00	24.00	24.00	
33	31.00	27.00	25.00	25.00	24.00	24.00	24.00	
34	32.00	27.00	26.00	25.00	24.00	24.00	24.00	
35	33.00	28.00	26.00	25.00	25.00	24.00	24.00	
36	34.00	28.00	26.00	25.00	25.00	24.00	24.00	
37	35.00	29.00	27.00	26.00	25.00	25.00	24.00	
38	36.00	29.00	27.00	26.00	25.00	25.00	24.00	
39	37.00	30.00	27.00	26.00	25.00	25.00	25.00	
40	38.00	30.00	28.00	26.00	26.00	25.00	25.00	

6.5 Temperature control

6.5.1 Introduction

If the device is not configured as a switching controller, it can alternatively be configured as a P or as a PI controller, whereby PI control is preferable.

With the proportional controller (P controller), the actuating value is statically adjusted to the control deviation.
The proportional integral controller (PI controller) is far more flexible, i.e. it controls dynamically, i.e. more quickly and more accurately.

To explain the function of both temperature controls, the following example compares the room to be heated with a vessel

The filling level of the vessel denotes the room temperature.
The water feed stands for the radiator output.
The heat losses of the room are shown by a discharge.

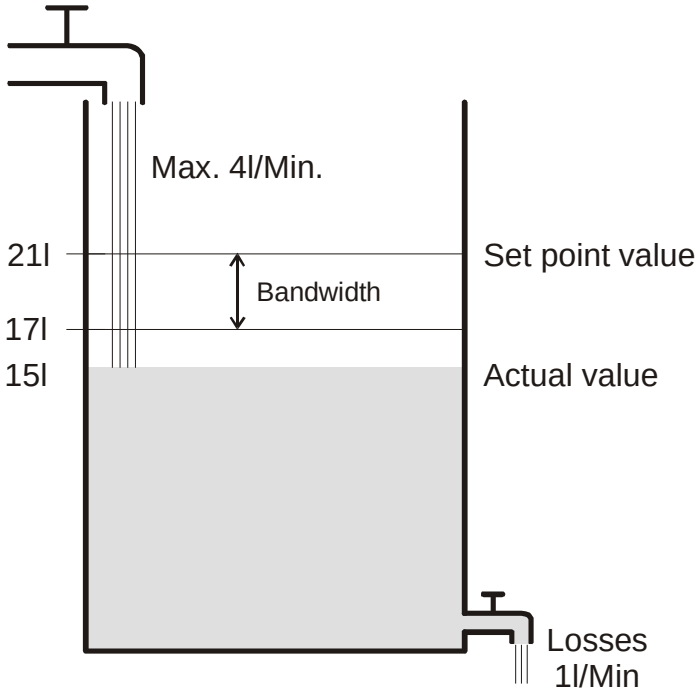
In our example, the maximum feed is assumed at 4 litres per minute and at the same time is the maximum heat output of the radiator.
This maximum output is achieved with an actuating value of 100%.
Accordingly, with an actuating value of 50% only half of the water volume, i.e. 2 litres per minute, would flow into our vessel.

The bandwidth is 4 l.
This means, the controller will control at 100%, as long as the actual value will be smaller or equal (21 l – 4 l) = 17 l.

Task:

Desired filling volume:
21 litres (= set point)
When should the feed be reduced, in order to prevent an overflow? :
4l below the desired filling volume, i.e. at 21l – 4l = 17l (= bandwidth)
Original filling volume
15 l (=actual value)
The losses are 1 l/minute

6.5.2 Response of the P controller



If the filling quantity is 15 l, there is a control deviation of 21 l – 15 l = 6 l
As our actual value lies outside the bandwidth, the control will operate the feed at 100%, i.e. with 4 l/minute.

The feed quantity (= actuating value) is calculated from the control deviation (set point – actual value) and the bandwidth.
Actuating value = (control deviation / bandwidth) x 100

The following table illustrates the behaviour and also the limits of the P controller.
Table 1

Filling level	Actuating value	Feed	Losses	Increase of filling level
15 l	100%	4 l/min	1 l/min	3 l/min
19 l	50%	2 l/min		1 l/min
20 l	25%	1 l/min		0 l/min

The last line shows that the filling level cannot be increased any more, because the inlet feeds as much water as can be discharged by the losses.
The result is a permanent control deviation of 1 l. The set point can never be achieved.
If the losses were increased by 1 l, the permanent control deviation would be increased by the same amount, and the filling level would never exceed the 19 l mark.
In case of a room, this would mean that the control deviation increases with decreasing outdoor temperature.

P controller as temperature controller

Just as in the previous example, the P controller behaves in a heating control.
The set temperature (21 °C) can never be completely reached.

The permanent control deviation is increased the higher the heat losses, i.e. the colder the outdoor temperatures.

6.5.3 Response of the PI controller

In contrast to the pure P controller, the PI controller functions dynamically.
With this type of controller, the actuating value remains unchanged, even at a constant deviation.

At the first moment, the PI controller sends the same actuating value as the P controller.
However, this will be increased further the longer the set point will not be reached.
This increase is time-controlled over the so-called integration time.
During this calculation method, the actuating value will not be changed anymore when the set point equals the actual value.
In our example, this results in the balance between feed and discharge.

A good control depends on the adjustment of bandwidth and integration time with the room to be heated.
The bandwidth influences the increment of the actuating value change:
Large bandwidth = finer increments for the actuating value change.
The integration time influences the response time to temperature changes:
Long integration time = slow response.
Poor adjustment can result in either the set point being exceeded (overshoot), or the controller taking too long to reach the set point.

The best results are generally achieved using the standard settings or with the settings via installation type.

6.6 Continuous and switching control

A switching (2 point) control recognises only 2 statuses, On or Off.
A continuous control works with an actuating value between 0% and 100% and can thus exactly dose the energy input. This provides a pleasant and precise degree of control.

Table 2: Overview of control functions

Operating mode/stage	Type of control	Hysteresis
Heating	2-point/PI controller	positive
Cooling	2-point/PI controller	negative
Additional stage	2-point/P control	negative

6.7 Hysteresis

Hysteresis determines the difference between a controller's switching on and off temperature.

It can be both positive and negative.
With a combination of heating and cooling control, it influences the amount of the dead zone.

Without hysteresis, the controller would activate and deactivate continuously, as long as the temperature lies within the range of the set point.

6.7.1 Negative hysteresis:

Heating: Is provided until the set point has been reached.
Afterwards, the heating is only switched on again when the temperature falls below the "Hysteresis set point value" threshold.
Cooling: Lasts until the "Hysteresis set point" threshold has been achieved.
Afterwards, it is only switched on again when the temperature rises above the set point.

Example of additional heating stage:
Additional stage with a set point of 20 °C, hysteresis 0.5 K and starting temperature 19 °C.
The additional stage is switched on and does not switch off again until the set point (20°) is reached.
The temperature decreases, and the additional stage only is switches on at 20 °C-0.5K= 19.5 °C.

Cooling example:
Cooling with set point of 25 °C, hysteresis = 1 °C and ambient temperature 27 °C.
The cooling is switched on and switches off again only when a temperature of 24 °C (25 °C − 1 °C) is achieved.
It switches on again when the temperature rises above 25 °C.

6.7.2 Positive hysteresis

Heating lasts until the temperature reaches the "set point + hysteresis " threshold.
The heating is only switched on again when the temperature falls below the set point value.

Heating example:
Heating with set point 20 °C, hysteresis = 1 °C and ambient temperature 19 °C.
The heating is switched on and only switches off again when a temperature of 21 °C (= 20 °C + 1 °C) is achieved.
It switches on again when the temperature falls below 20 °C.

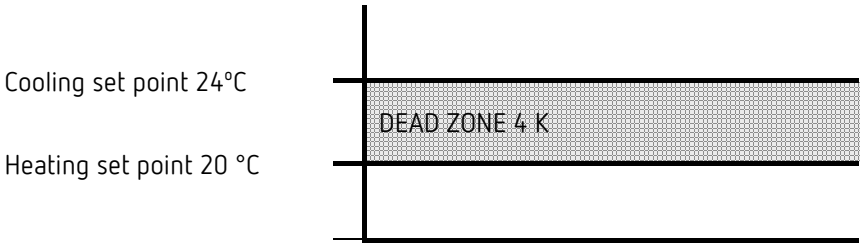
6.8 Dead zone

The dead zone is a buffer area between heating and cooling mode.
Within this dead zone, neither heating nor cooling occurs.

Without this buffer area, the system would permanently switch between heating and cooling. As soon as the set point was fallen below, the heating would be activated. After hardly reaching the set point, the cooling would immediately start, the temperature would fall below the set point and switch on the heating again.

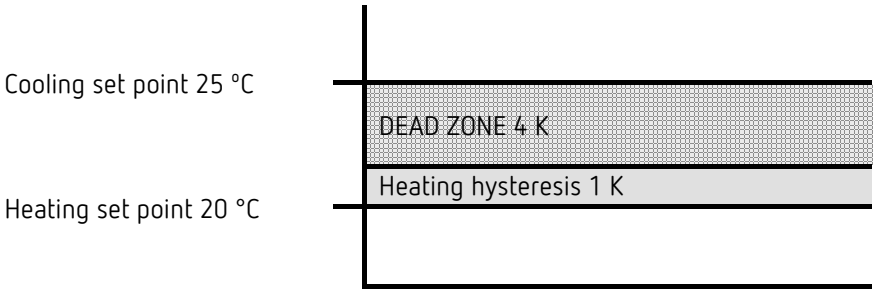
Depending on the type of control, the dead zone can be extended by the value of the hysteresis.

Case 1: Heating and cooling with continuous control



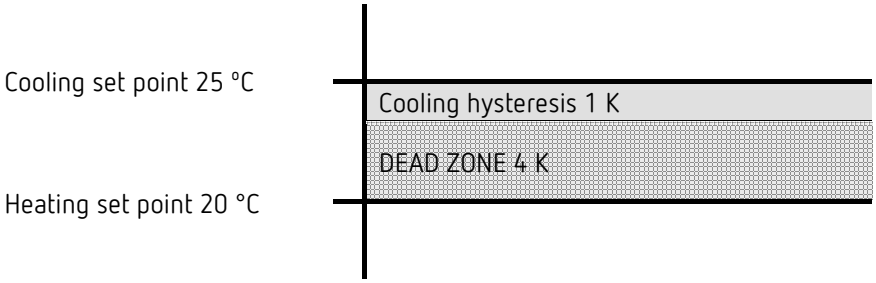
The dead zone (4 K) is not affected.

Case 2: Heating with 2-point control and cooling with continuous control



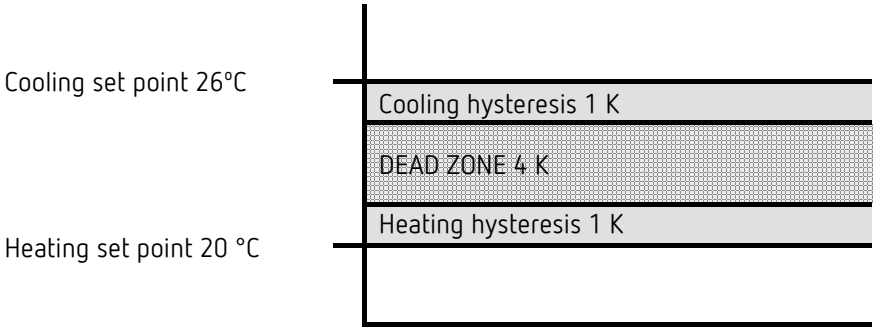
The dead zone (4 K) is increased by the value of the hysteresis (1K) and offsets the cooling set point value to 25 °C.

Case 3: Heating with 2-point control and cooling with continuous control



The dead zone (4 K) is increased by the value of the hysteresis (1K) and offsets the cooling set point value to 25 °C.

Case 4: Heating and cooling with 2-point control



The dead zone (4 K) is increased by the value of both hysteresis (2K) and offsets the cooling set point to 26 °C.

6.9 Operating mode selection

6.9.1 Priorities for operating mode selection

The operation mode selection between comfort, standby, night operation and frost protection can
happen in 3 different ways:

- Via the object *Operating mode preset*
- Manually at the device
- Via scene controls

All 3 possibilities are all on the same priority level.

> In principle the following applies: The last instruction overwrites the previous one.
> **Exception:** Frost mode via window contact has priority over all other operating modes.

Upon selection of the *presence button* parameter, the following also applies:
If a new operating mode is received on the object with the presence object set (*operating mode preset)*, it is accepted and the presence object is reset (only with presence button).

Reception of the same operating mode as prior to the presence status
(e.g. via cycl. sending) is ignored.

If the *presence object* is set during night/frost mode, it is reset after the configured comfort extension has expired (see below).

If the *presence object* is set during standby mode, the comfort operating mode is accepted without time restriction.

6.9.2 Determining the current operation mode

The current set point can be adjusted to the relevant requirements via the choice of operating mode.
The operating mode can be specified via the objects *operating mode preset, presence, and window setting*.
For this, there are two methods:

6.9.2.1 New operating modes

If *objects for determining the operating mode*" = *New*:... was selected on the ***Settings*** parameter page, then the current operating mode can be defined as follows:

Obj. Operating mode preset	Obj. Presence	Obj. Window position	Obj. Current operating mode
any	any	1	Frost/heat protection
any	1	0	Comfort
Comfort	0	0	Comfort
Standby	0	0	Standby
Night	0	0	Night
Frost/heat protection	0	0	Frost/heat protection

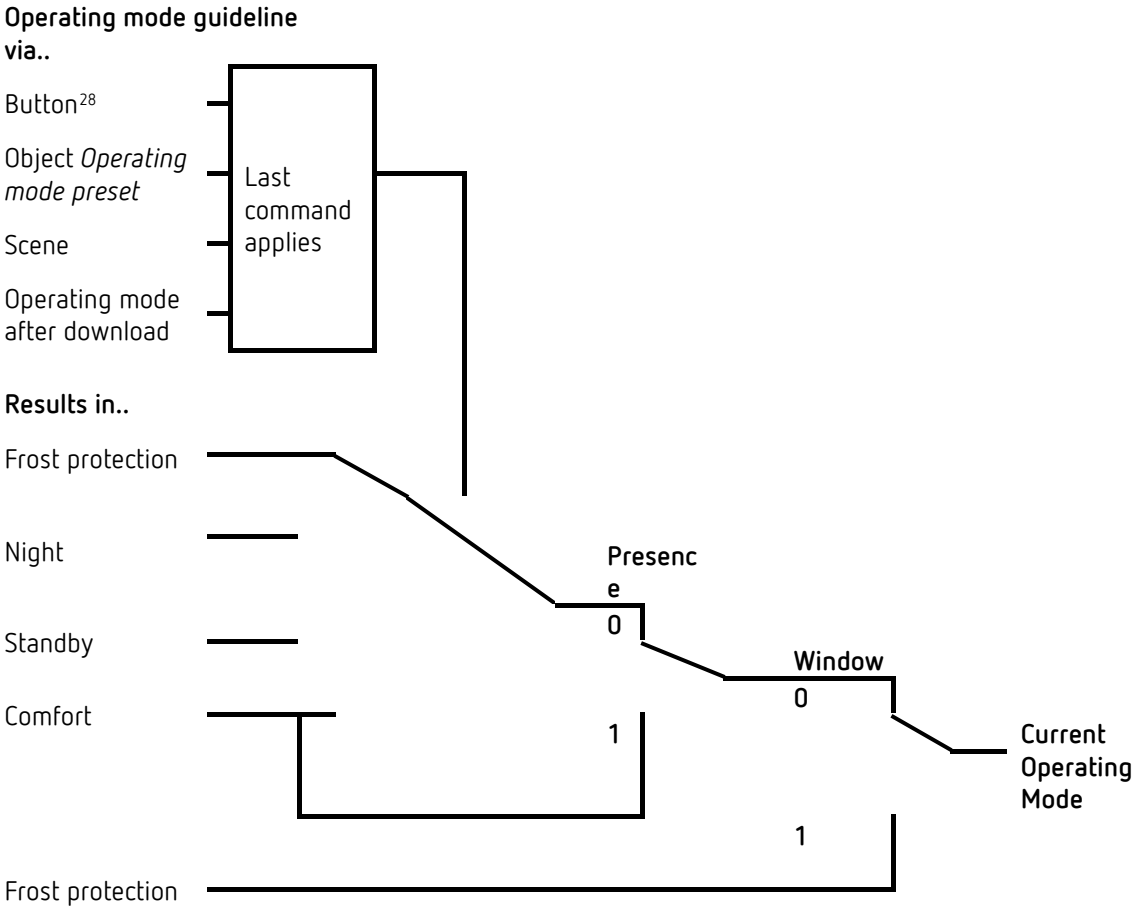
Typical application:

In the morning, the *Operating mode* object activates "Standby" or "Comfort", and in the evening, "Night" is activated via a time switch (e.g. TR 648).
During holiday periods, frost/heat protection is selected via another channel, also via the same object.

Object *Presence* is linked to a presence detector. If presence is detected, the controller switches to comfort operating mode (see table).

Object *Window status* is linked to a window contact via the bus (external input).
As soon as a window is opened, the controller switches to frost protection operating mode.

Determining the operating mode when using a presence detector



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6.9.2.2 Old operating modes

If on the ***Settings*** parameter page *objects for determining the operating mode = Old:...* was selected, then the current operating mode can be defined as follows:

Obj. Night/standby	Obj. Comfort	Obj. Frost/heat protection	Obj. Current operating mode
any	any	1	Frost/heat protection
any	1	0	Comfort
Standby	0	0	Standby
Night	0	0	Night

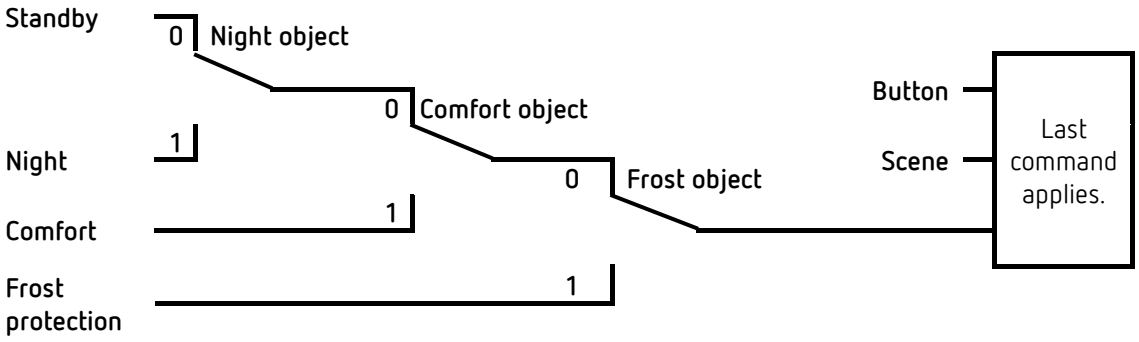
Typical application:

In the morning, "standby" operating mode, and in the evenings "night" operating mode is activated via the object by a time switch.

In holiday periods, frost/heat protection is selected on another channel via the object.

The object *Comfort* is linked with a presence detector. If presence is detected, the controller switches to comfort operating mode (see table).

The object *Frost protection* is linked with a window contact: As soon as a window is opened, the controller switches to frost protection mode.



The old method has 2 disadvantages over the new method:
To switch from Comfort to Night operating mode, 2 telegrams (2 time switch channels if necessary) are required:
The object *Comfort* must be set to "0", and object *Night/standby* to "1".

If the window is opened and then closed again during periods when "Frost/heat protection" is selected via the time switch, the "Frost/heat protection" mode is cleared.

6.10 Determination of the set point

6.10.1 set point calculation in heating mode

See also: *Base set point and current set point*

Current set point during heating:

Operating Mode	Current set point
Comfort	Base set point +/- set point offset
Standby	*Base set point* +/- set point offset – *reduction in standby mode*
Night	*Base set point* +/- set point offset – *reduction in standby mode*
Frost/heat protection	configured *set point for frost protection mode*

Example: Heating in comfort mode.

Parameter page	Parameter	Setting
set points	*Base set point after reset*	*21°C*
	Reduction in standby mode (during heating)	*2 K*
Heating set points	*Maximum valid set point offset*	*+/- 2 K*

The set point was previously increased by 1K using the rotary control [29].

Calculation:

Current set point = base set point + set point offset
= 21 °C + 1 K
= 22 °C

If operation is switched to standby mode, the current set point is calculated as follows:

Current set point = base set point + set point offset – reduction in standby mode
= 21°C + 1K – 2K
= 20 °C

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6.10.2 set point calculation in cooling mode

Current set point during cooling:

Operating Mode	Current set point
Comfort	Base set point + set point offset + dead zone
Standby	Base set point + set point offset + dead zone + increase in standby mode
Night	Base set point + set point offset + dead zone + increase in night mode
Frost/heat protection	configured set point for heat protection mode

Example: Cooling in comfort operating mode.
The room temperature is too high, the controller has switched to cooling mode

Parameter page	Parameter	Setting
Heating set points	*Maximum valid set point offset*	*+/- 2 K*
	Base set point after loading the application	*21°C*
Cooling set points	*Dead zone between heating and cooling*	*2 K*
	Increasing in standby mode (during cooling)	*2 K*

The set point was previously lowered by 1 K on the device.

Calculation:

Current set point = base set point + set point offset + dead zone
= 21 °C - 1 K + 2 K
= 22 °C

Changing to standby mode causes a further increase in the set point (energy saving), resulting in the following set point.
set point = base set point + set point offset + dead zone + increase in standby mode
= 21 °C - 1 K + 2 K + 2 K
= 24 °C

6.11 set point offset

With this function, the user can increase or reduce the room temperature individually, as desired.

The current set point can either be offset via the object *manual set point offset*, or via the rotary control.[30]
See p*arameter function of the rotary control*[31].

The offset limits are defined on the ***set points*** parameter page via the *Maximum valid set point offset* parameter.

The offset always refers to the set base set point and not to the current set point.

Example Base set point of 21°C, *function of the rotary control = base set point*:

If the value of +2 K is received, the new set point is calculated as follows:
21 °C + 2 K = 23 °C.
In order to afterwards take the set point to 22 °C, the difference to the set base set point (here 21 °C at the rotary control) is resent to the object, in this case 1 K (21 °C + 1 K = 22 °C).
See object *Manual set point offset/set point offset at rotary control*.

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[31] Only RAMSES 718 P

6.12 Base set point and current set point

The *base set point* is the standard temperature for the comfort mode and the reference temperature for reduction in standby and night modes.
The base set point can be defined directly at the rotary control, [32] or via the object base set point (see parameter function of the rotary control).[33]

The configured base set point (see *base set point after loading application*) is stored in the object *base set point* and can be changed any time via the bus by sending a new value to this object (only when *function of the rotary control* [34] = *manual offset*).
After reset (restoration of the bus supply), the previously used base set point will be restored.

The *current set point* is the value that actually is used for control. It is the result of all reductions or increases associated with the operating mode and control function.

Example: At a base set point of 22 °C and a reduction in night mode of 4 K, the current set point (in night mode) is: 22 °C - 4 K = 18 °C. During the day (in comfort mode) the current set point is 22 °C (in heating mode).

The formation of the current set point on the basis of the base set point can be observed in the block diagram on the next page:
The base set point on the left is specified via object, or set on the device.
The current set point is on the right, i.e. the value upon which the room temperature is effectively controlled.

As you can see in the block diagram, the current set point depends on the operating mode (5) and the selected control function (4).

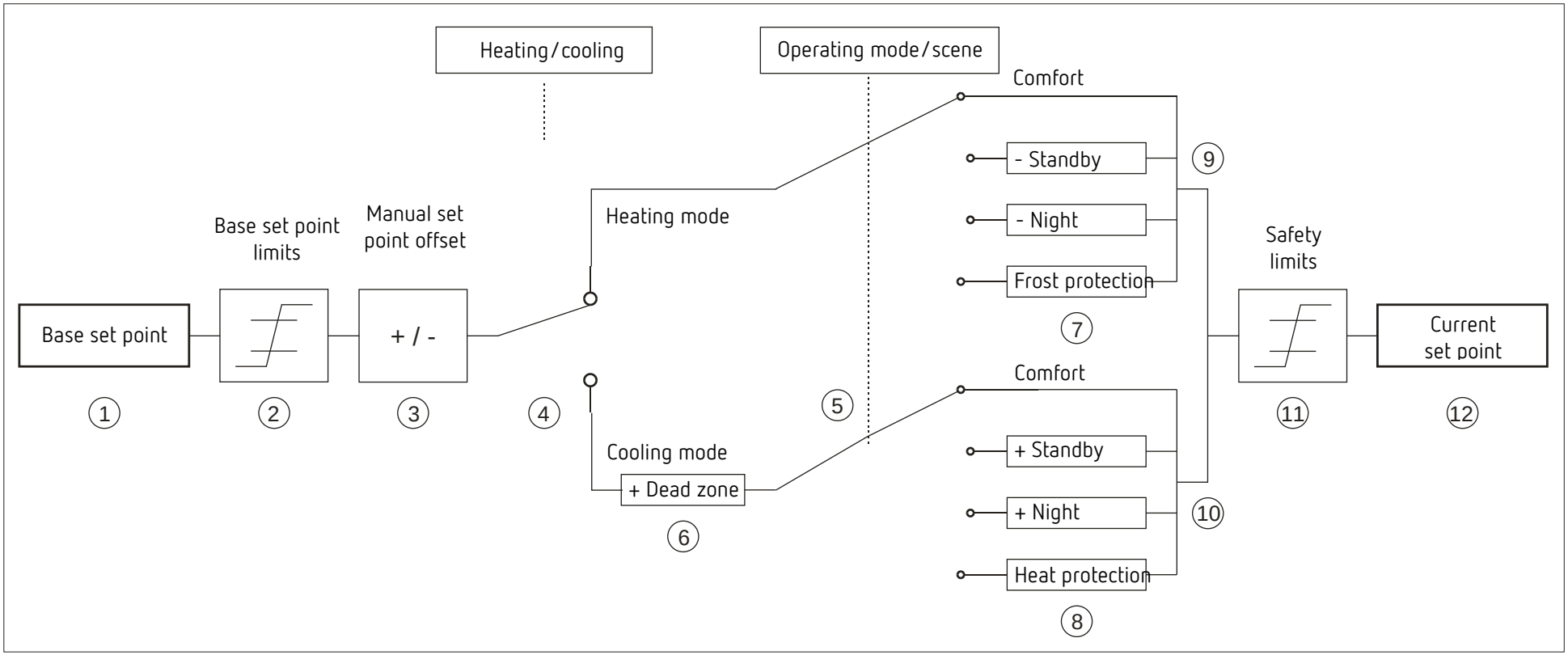
The base set point limits (2) prevent an incorrect base set point from being specified at the object. These are the following parameters:

- *Minimum valid base set point*
- *Maximum valid base set point*

If the set point is outside the configured values for frost and heat protection, because of a set point offset, it is restricted to these values by the safety limits (11).

[32] Only RAMSES 718 P
[33] Only RAMSES 718 P
[34] Only RAMSES 718 P

6.12.1 set point calculation



1 Fixed base set point of object or rotary control (only RAMSES 718 P)
2 Max. and min. valid base set points
3 Manual set point offset
4 Change between heating and cooling: Automatically or via object
5 Selection of operating mode, by operator, object, switching program or scene.
6 The set point is increased in cooling mode by the amount of the dead zone
7 The set point is replaced by the set point for frost protection mode
8 The set point is replaced by the set point for heat protection mode
9 set point after reductions caused by the operating mode
10 set point after increases caused by the operating mode
11 The limits for frost and heat protection must be adhered to
12 Current set point after increases, reductions and limits caused by the operation