KNX OT box

KNX OT box	Order no. 8559200

Contents

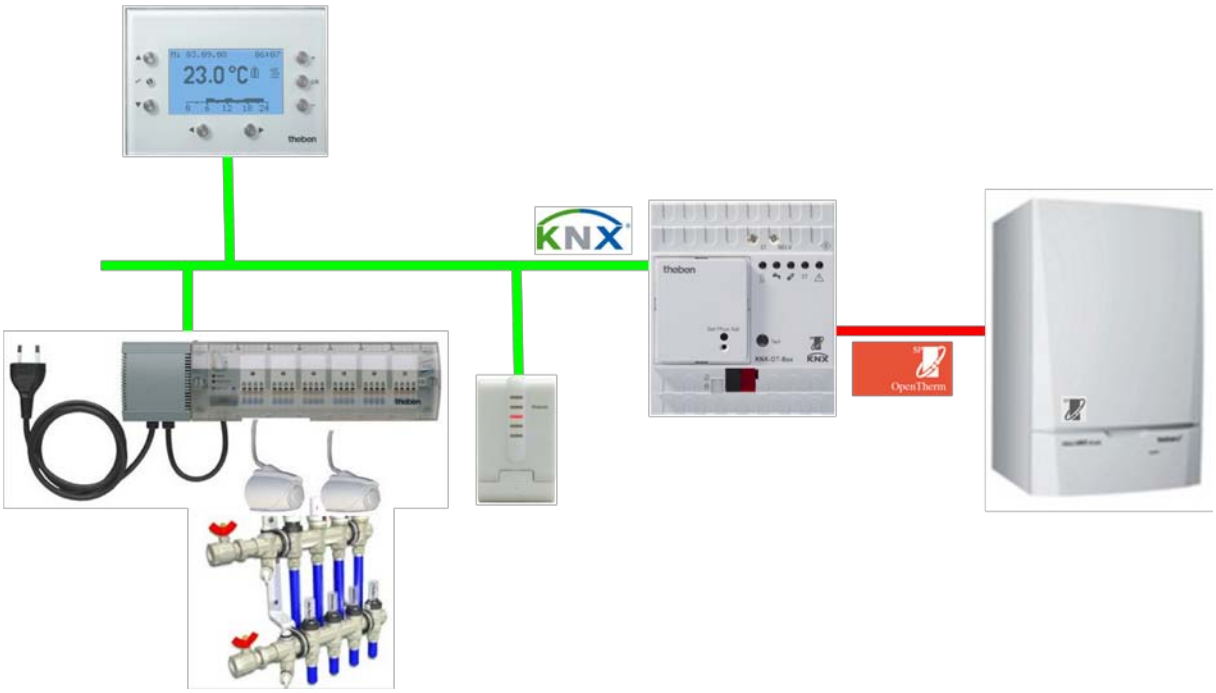
1 Functional characteristics

With the new KNX OT box Theben is breaching the gap between two worlds: KNX and OpenTherm heaters can be linked via this universal interface. It can be used as the master for the OpenTherm heater in combination with a
KNX individual room control.

- **OpenTherm and KNX**
  The new interface from Theben links the KNX BUS with the OT communication system widely used with gas water heaters. As a master, the KNX OT box enables the bidirectional exchange of data between the OpenTherm heater and the heat distribution via the KNX system for individual room control.
- **Simple to use via multi-functional display**
  The VARIA 826 KNX multi-functional display can be used to set and change settings for the boiler control. They are transmitted to the OpenTherm heater via the KNX OT box.
- **Pilot room control**
  The new interface now not only enables pilot room control but also optimizes flow temperature, taking account of every room.
- **Energy saving service water heating**
  Heating domestic water with a solar power system helps save energy as the amount of sunshine expected according to weather forecasts can be taken into account when heating water.
- **Screed drying program**
  The Theben KNX OT box can be easily and quickly set up using removable bus coupling units and the factory preset "screed drying program as per DIN EN 1264-4".

The KNT OT box serves as an interface between the OpenTherm communication system (in heating and ventilation technology) and the KNX BUS.
It supplies the necessary data for heating control (heating etc.) and transmits it to the heater.
The following functions are available with the KNT OT box:

- Customised flow control
- Weather-dependent flow control
- Control of domestic water heating
- Energy maximisation with solar support of domestic water heating
- Minimum heating requirement/screed drying program
- Legionella protection program



The ETS (Engineering Tool) enables application programs to be selected, specific parameters and addresses to be assigned and transferred to the device.
The device is designed for installation on DIN top hat rails (in accordance with EN 60715).
Only to be used in closed, dry rooms.

1.1 Operation

The OpenTherm bus is short-circuited by pressing the test button.
This normally starts the heater.

Note:
The LEDs always show the actual status of the heater and not the status of the KNX objects. The reaction time of the heater can cause a perceptible delay between a bus command and the updating of the LEDs.

Example: If object 2 receives the CH enable command, the CH enable LED will only light up if the heater has accepted and confirmed this status.

See chapter Operating instructions.

2 Technical data

2.1 Technical data

Operating voltage, KNX power consumption	Bus voltage, ≤10 mA
OT Bus protocol	OpenTherm V4.0 with SmartPower*
Installation type	DIN-rail
Width	4 module
Connection type	KNX bus terminal
Max. cable cross-section	Solid: 0.5 mm² (Ø 0.8) to 4 mm² | strand with wire end sleeve: 0.5 mm² to 2.5 mm²
Ambient temperature	0 ℃… +45 ℃
Protection rating	IP 20 in accordance with EN 60529
Protection class	III in accordance with EN 60730-1

*** Use with devices not supported by this protocol can lead to errors or faults.**

3 The application program "KNX OT box V1.0"

3.1 Selection in the product database

Manufacturer	THEBEN AG
Product family	Heating, ventilation, air conditioning
Product type	KNX-OpenTherm interface
Program name	KNX OT box V1.0

The ETS database can be found on our downloads page: http://www.theben.de/downloads .

Table 1

Number of communication objects:	39
Number of group addresses:	102
Number of associations:	102

3.2 Communication objects

Table 2:

No.	Object name	Function	Type DPT	Flags			
0	*Flow basic set point value in comfort mode*	*Define flow set point value*	2 byte 9.001	C	R	W	-
1	*Manual offset of flow set point value*	*Offset flow set point value*	2 byte 9.002	C	R	W	-
2	*Enable central heating*	*Heating on/off*	1 bit 1.003	C	R	W	-
3	*Max. actuating value zone/room 1 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 1 demand-driven			C	R	W	-
4	*Max. actuating value zone/room 2 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 2 demand-driven			C	R	W	-
5	*Max. actuating value zone/room 3 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 3 demand-driven			C	R	W	-
6	*Max. actuating value zone/room 4 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 4 demand-driven			C	R	W	-
7	*Max. actuating value zone/room 5 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 5 demand-driven			C	R	W	-
8	*Max. actuating value zone/room 6 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 6 demand-driven			C	R	W	-
9	*Max. actuating value zone/room 7 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 7 demand-driven			C	R	W	-
10	*Max. actuating value zone/room 8 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 8 demand-driven			C	R	W	-

Continuation:

No.	Object name	Function	Type DPT	Flags			
11	*Max. actuating value zone/room 9 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 9 demand-driven			C	R	W	-
12	*Max. actuating value zone/room 10 weather + demand*	*Receive actuating value*	1 byte 5.001	C	R	W	-
	Max. actuating value zone/room 10 demand-driven			C	R	W	-
13	*Summer mode*	*Summer mode on/off*	1 bit 1.001	C	R	W	-
14	*HVAC operating mode heating*	*Receive HVAC operating mode*	1 byte 20.102	C	R	W	-
15	*Lock demand control*	*1 = locked/ 0 = enabled*	1 bit 1.003	C	R	W	T
16	*Current flow temperature*	*Send current flow temperature*	2 byte 9.001	C	R	-	T
17	*Flow set point value*	*Send curr. flow set point val.*	2 byte 9.001	C	R	-	T
18	*Flame status*	*Send flame status*	1 bit 1.001	C	R	-	T
19	*General error*	*Report general error*	1 bit 1.001	C	R	-	T
20	*Error code (as per Opentherm ID 5)*	*Report error code*	1 byte 5.010	C	R	-	T
21	*Heating status*	*Report heating status*	1 bit 1.001	C	R	-	T
22	*Service required*	*Report service requirement*	1 bit 1.001	C	R	-	T
23	*Outdoor temperature*	*Receive outdoor temperature*	2 byte 9.001	C	R	W	-
		Send outdoor temperature		C	R	-	T
24	*Outdoor temperature error*	*Outdoor temp. missing or incorrect*	1 bit 1.001	C	R	-	T
25	*Domestic Hot Water (DHW) enable*	*Domestic water heating on/off*	1 bit 1.003	C	R	W	-
26	*Current solar support*	*Solar support option = 1*	1 bit 1.001	C	R	W	-
27	*Expected solar support*	*Solar support option = 1*	1 bit 1.001	C	R	W	-
28	*HVAC operating mode domestic water*	*Receive HVAC operating mode*	1 byte 20.102	C	R	W	-
29	*Forced mode domestic water*	*Forced mode = 1*	1 bit 1.001	C	R	W	-

Continuation:

No.	Object name	Function	Type DPT	Flags			
30	*Domestic water set point value in forced mode*	*Define set point value*	2 byte 9.001	C	R	W	-
31	*Domestic water temperature set point value*	*Report domestic water set point value*	2 byte 9.001	C	R	-	T
32	*Currrent domestic water temperature*	*Send current temperature*	2 byte 9.001	C	R	-	T
33	*Domestic water status*	*Report domestic water status*	1 bit 1.001	C	R	-	T
34	*Degree of modulation in %*	*Report degree of modulation*	1 byte 5.001	C	-	-	T
35	*Lower limit of domestic water set point value*	*Report boiler setting*	2 byte 9.001	C	-	-	T
36	*Upper limit of domestic water set point value*	*Report boiler setting*	2 byte 9.001	C	-	-	T
37	*Lower limit of flow set point value*	*Report boiler setting*	2 byte 9.001	C	-	-	T
38	*Upper limit of flow set point value*	*Report boiler setting*	2 byte 9.001	C	-	-	T

3.2.1 Description of objects

- **Object 0 "** *Flow base set point value in comfort mode* **"**

Desired flow temperature in comfort mode.

- **Object 1 "***manual flow set point value offset* **"**

A received temperature differential causes an offset of the current flow set point value by up to +/- 15 K.
Values outside these limits are automatically restricted.

- **Object 2 "***Enable central heating* **"**

CH-enable function.
0 = Heating off
1 = Heating permitted

- **Objects 3..12 "***max. actuating value zone/room 1..10***"**

Receive the actuating value from the room thermostat in the different rooms.

- **Object 13 "***Summer mode***"**

1 = Summer mode active
0 = Summer mode inactive

- **Object 14 "***HVAC operating mode heating***"**

Receives the required operating mode, e.g. from a time switch.
1 = Comfort
2 = Standby
3 = Night,
4 = Frost protection
Other values are ignored.

- **Object 15 "***Lock demand control***"**

If this object is set (=1) only the preset *Flow set point value after reset* (*Heating* parameter page) applies.
The actuating values from the rooms are no longer taken into account.

- **Object 16** "*current flow temperature*"

Feedback from the heater.

- **Object 17** "*Flow set point value*"

Feedback from the heater.

- **Object 18** "*Flame status*"

Feedback from the heater.
0 = Burner off
1 = Burner on

- **Object 19** "*general error*"

Feedback from the heater.

- **Object 20** "*Error code (as per OpenTherm ID 5)*"

Feedback from the heater.
1 = set
0 = deleted

Bit number	Message	Description
0	Service request [service not req'd, service required]	Service request
1	Lockout reset [remote reset disabled, rr enabled]	Lockout mode can be reset (max. 3x)
2	Low water press [no WP fault, water pressure fault]	Low water pressure
3	Gas/flame fault [no G/F fault, gas/flame fault]	Gas/flame fault
4	Air press fault [no AP fault, air pressure fault]	Air pressure fault
5	Water over-temp [no OvT fault, over-temperat. fault]	Water over-temperature
6	reserved	reserved
7	reserved	reserved

- **Object 21** "*heating status*"

Feedback from the heater.
0 = The heater is not heating at the moment.
1 = The heater is heating at the moment.

- **Object 22 "***Service required***"**

Feedback from the heater.
1 = Service required

- **Object 23 "***Outdoor temperature***"**

The object can send or receive depending on the source of the outdoor temperature.

Parameter *Measuring outdoor temperature*	Function of object 23
Via object	*Receive outdoor temperature*
From heater	*Send outdoor temperature*

The outdoor temperature is required for determining requirements in summer mode and weather-dependent set point values.

- **Object 24 "***Outdoor temperature error***"**

0 = No error
1 = Outdoor temperature is not received or the received value is beyond the normal range.

- **Object 25 "***Domestic Hot Water (DHW) enable***"**

0 = No domestic hot water
1 = Activate domestic hot water

- **Object 26 "***Current solar support***"**

This object is available when *Energy optimisation with possible solar support* is selected on the *Domestic hot water* parameter page.
The solar device sends a 1 if solar energy is available.

0 = The current domestic hot water set point value applies.
1 = The preset *Set point value for solar support* applies.

- **Object 27 "***Expected solar support***"**

This object is available when *Energy optimisation with possible solar support* is selected on the *Domestic hot water* parameter page.

The weather station sends a 1 if solar energy is expected (EFR report).
0 = The current domestic hot water set point value applies.
1 = The preset *Set point value for solar support* applies.

- **Object 28 "***HVAC operating mode service water***"**

Receives the desired HVAC operating mode for domestic water heating.

- **Object 29 "***Service water forced mode***"**

0 = No force
1 = Domestic water is heated to set *Domestic water set point value in standby mode (in °C, 5..90).*

- **Object 30 "***Domestic water set point value in forced mode***"**

A new set point value can be entered here.

- **Object 31 "***Domestic hot water temperature set point value* **"**

Feedback from the heater.
Sends legionella set point value during legionella protection.
When this is reached or exceeded the object resends the current valid set point value.

- **Object 32 "***Current domestic hot water temperature***"**

Feedback from the heater.

- **Object 33 "***Domestic water status***"**

0 = No force
1 = Domestic water is heated to set *Service water set point value in standby mode (in °C, 5..90).*

- **Object 34 "***Degree of modulation in %***"**

Feedback from the heater.

- **Object 35 "***Lower limit of domestic water set point value* **"**

Feedback from the heater.

- **Object 36 "***Upper limit of domestic water set point value***"**

Feedback from the heater.

- **Object 37 "***Lower limit of flow set point value***"**

Feedback from the heater.

- **Object 38 "***Upper limit of flow set point value***"**

Feedback from the heater.

3.3 Parameter

3.3.1 Parameter pages

Table 3

Function	Description
General	Basic device settings
Heating	Set point values, reductions, operating modes etc.
Weighting of zones	Different heat zone priorities for set point value calculation
Outdoor temperature	Settings for determining outdoor temperature
Reports from "CH"	Settings for heating data feedback via the heater.
Domestic water heating	Set point values for domestic water heating and legionella protection settings
"DHW" reports	Settings for domestic water data feedback via the heater.

3.3.2 Parameter description

3.3.2.1 The "*General*" parameter page

Table 4

Designation	Values	Description
Activate minimum heating requirement	***No***	Normal operation.
	Yes	Screed drying program as per DIN EN 1264-4. See appendix: Minimum heating requirement.
Determining heating set point value	***via heating requirement, without weather***	The flow temperature is calculated based on the current maximum actuating value taking into account the weighting for individual zones.
	according to demand and weather-controlled	The flow temperature is calculated based on the current maximum actuating value (see above) and the outdoor temperature.
	via weather, without heating requirement	The flow temperature is calculated exclusively according to the currrent outdoor temperature.
Activate domestic water heating	***Yes*** */ no*	Is domestic hot water required?

3.3.2.2 The parameter page "*Heating*"

Table 5

Designation	Values	Description
Flow set point value after reset in °C (20..90)	*20..90* (Standard = ***50***)	Basis for all set point value increases and reductions (cf. basic set point value).
Base point of characteristic curve in °C (20..90)	*20..90* (Standard = ***30***)	Minimum flow temperature for determining demand-driven set point value. See appendix: Calculation of set point value.
End point of characteristic curve in °C (20..90)	*20..90* (Standard = ***80***)	Maximum flow temperature for determining demand-driven set point value. See appendix: Calculation of set point value.
Reduction in standby mode	*0 K, 5 K,* ***10 K,*** *15 K, 20 K, 25 K, 30 K, 35 K, 40 K*	Example: With a basic set point value of 50°C and a 10K reduction, the boiler controls with a set point value of 50 – 10 = 40 °C.
Reduction in night mode	*0 K, 5 K,* ***10 K,*** *15 K, 20 K, 25 K, 30 K, 35 K, 40 K*	How much should the flow temperature be reduced by in night mode?
Frost protection temperature in °C (6..30)	*6..30* (Standard = ***10***)	Flow temperature in frost protection mode
Operating mode after reset	*Frost protection* *Night mode* *Standby mode* ***Comfort mode***	Operating mode after start-up or reprogramming
Enable CH after reset	*Off* *On* ***as before bus failure***	What status should be sent to the heater after start-up, restoration of bus power or reprogramming?
Maximum flow temperature in °C (30..90)	*30..90* (Standard = ***70***)	If a set point value received by object 0 is higher than the set value, it will be limited to this maximum value.
Maximum increase of flow temperature based on demand in rooms	*0 K, 5 K, 10 K, 15 K,* ***20 K****, 25 K, 30 K, 35 K, 40 K*	Upper threshold value for increasing the flow temperature via requirement notification.
maximum reduction of flow temperature if there is no requirement	*0 K, 5 K, 10 K, 15 K,* ***20 K****, 25 K, 30 K, 35 K, 40 K*	Lower threshold value for reduction of flow temperature if all rooms do not require heating.

Continuation:

Designation	Values	Description
Delay time for adjusting set point value	*none* *1 min, 2 min, 3 min, 5 min, 10 min,* ***15 min,*** *20 min, 30 min*	Every set point value adjustment is accepted immediately. Needs-driven set point value adjustments are only accepted after set delay has expired. This means short-term requirement notifications can be ignored
Targeted maximum actuating value	*30 % 40 % 50 % 60 %* ***70 %*** *80 % 90 %*	Actuating value that is to produce the preset *flow set point value after reset* . Example with *flow set point value after reset* = 60 °C *Targeted max. actuating value* = 70 % → An actuating value of 70 % produces a flow temperature of 60 °C.
Automatic switch to summer mode	***no*** *with outdoor temp. over 18 °C* *with outdoor temp. over 20 °C* *with outdoor temp. over 22 °C* *with outdoor temp. over 24 °C*	Summer mode is only set via object 13. The boiler automatically switches to summer mode depending on outdoor temperature. If the outdoor temperature is unavailable (timeout object, sensor failure etc.) , the normal heating mode (winter mode) is switched on and the flow temperature set according to the temperature replacement value. In the event that summer mode was active, it is ended. However, summer mode can be manually restored via object at any time.

3.3.2.3 The parameter page "*Weighting of zones*"

Up to 10 heat zones can be included for determining the heating requirement.
This determines to what extent each individual zone should be included in the calculation of flow temperature.

Table 6

Designation	Values	Description
Weighting factor for zone 1	*0,1* *0,2* *0,3* *0,4* *0,5* *0,6* *0,7* *0,8* *0,9* *1,0*	0,1 = Zone is unimportant .. .. 1 = Zone must be fully taken into consideration
Weighting factor for zone 2..10	*See above*	See above.

3.3.2.4 The "*Outdoor temperature*" parameter page

Table 7

Designation	Values	Description
Determining outdoor temperature	***Via object***	Outdoor temperature value is received via the bus (e.g. from a weather station etc.)
	from heater	The outdoor temperature of heater (external sensor) is used.
Renewed sending of outdoor temperature at change by	*not based on change* *1 K,* ***2 K****, 3 K, 4 K, 5 K, 6 K, 7 K, 8 K, 9 K, 10 K*	(With *Measure from heater*) Should the current outdoor temperature be sent? If yes, from which minimum change should this be resent? This setting keeps the bus load as low as possible.
Send outdoor temperature cyclically (time see "reports central h..)	***No*** *yes*	(With *Measure from heater*) If yes, the *Time for cycl. sending of all CH reports* parameter on the *CH reports* parameter page applies
Monitoring of outdoor temperature	***No***	(With *Measure via object*) No monitoring
	Yes	This tests whether the outdoor temperature is regularly received.
Outdoor temperature monitoring time	*Every 30 min* ***every 60 min***	Object 23 must receive a temperature value at least every 30 to 60 minutes. If not, object 24 reports a temperature fault.
Replacement value with failure or error in outdoor temperature	*-20..+20* (Standard = ***0***)	This value should provisionally replace the missing or false outdoor temperature value. This enables the heater to continue functioning with a defined operating status. Measurements of < -40 °C or > 60 °C are considered to be false (possibility of sensor fault).
Outdoor temperature error or failure	***report in event of change*** *report errors cyclically in event of error and report no errors cyclically*	When should an outdoor temperature be sent?

3.3.2.5 The parameter page "*Reports from CH*"

This is for setting how the "Central heating" feedback from the heater is to be sent to the bus.

Table 8

Designation	Values	Description
Renewed sending of flow set point value at change by	*not based on change*	Set point value can only be sent cyclically (if selected)
	1 K, 2 K, 3 K, 4 K, ***5 K****, 6 K, 7 K, 8 K, 9 K, 10 K*	Set point value is sent as soon as this has changed by the selected value. (see below: *Send flow set point value cyclically*)
Send flow set point value cyclically	***No*** *yes*	Regularly send independent of changes?
Resend current flow temperature in event of change at	*not based on change*	Flow temperature can only be sent cyclically (if selected)
	1 K, ***2 K****, 3 K, 4 K, 5 K, 6 K, 7 K, 8 K, 9 K, 10 K*	Flow temperature is sent as soon as this has changed by the selected value. (see below: *Send current flow temperature cyclically*)
Send current flow temperature cyclically	***No*** *yes*	Regularly send independent of changes?
Send CH status cyclically	***No*** *yes*	Regularly send independent of changes?
Send flame status cyclically	***No*** *yes*	Regularly send independent of changes?
Send general error cyclically	***No*** *yes*	Regularly send independent of changes?
Send error code cyclically	***No*** *yes*	Regularly send independent of changes?
Send service required cyclically	***No*** *yes*	Regularly send independent of changes?
Send degree of modulation cyclically	***No*** *yes*	Regularly send independent of changes?
Send limits of flow set point value cyclically	***No*** *yes*	Regularly send independent of changes?
Time for cyclical transmission of all CH reports	*2, 3, 5, 10, 15, 20, 30, 45, 60 minutes*	Common cycle time for all CH reports on this parameter page.

3.3.2.6 The parameter page "*Domestic water heating*"

Table 9

Designation	Values	Description
Domestic water set point value in comfort mode (in °C, 5..90)	*5..90* *(Standard = **60**)*	Domestic water set point temperatures for every operating mode. **At higher temperatures, it may be necessary to fit anti-scald protection depending on the type of system**. Details should be discussed with the plumber installing the system.
Domestic water set point value in standby mode (in °C, 5..90)	*5..90* *(Standard = **45**)*	
Domestic water set point value in night mode (in °C, 5..90)	*5..90* *(Standard = **30**)*	
Frost protection domestic water set point value (in °C, 6.0.30)	*6.0.30* *(Standard = **10**)*	
Operating mode after reset	*Frost protection* *Night mode* *Standby mode* ***Comfort mode***	Which operating mode should be active after download or restoration of bus?
Enable DHW after reset	*Off* *On* *as before bus failure*	What status should be sent to the heater after start-up, restoration of bus power or reprogramming?
Domestic water set point value in forced mode if not via object (in °C, 5..90)	*5..90* *(Standard = **85**)*	Set point value for domestic water temperature in forced mode. This value can be overwritten with object 30.
Maximum domestic water set point value (in °C, 30..90)	*30..90* *(Standard = **60**)*	Highest permissible temperature. **At higher temperatures, it may be necessary to fit anti-scald protection depending on the type of system.** Details should be discussed with the plumber installing the system.
Energy maximisation with potential solar support	***No***	Potentially available solar system is not taken into account.
	Yes	Domestic water should be heated using solar energy if possible. The objects for solar support (obj. 26 + 27) and the *Domestic water set point value with solar..* parameter are shown.

Continuation:

Designation	Values	Description
Domestic water set point value with solar.. (in °C, 5..90)	*5..90 (Standard = **45**)*	This set point value applies if object 26 or obj. 27 report insolation. If the current set point value for domestic water (e.g. based on operating mode) is less than the value set here, the *Domestic water set point value for solar* is not taken into account.
Activate legionella protection	*No* ***yes***	This program heats the domestic water at regular intervals to a temperature of at least 70 °C (see below) to prevent a microbial contamination of the water with legionella. See appendix: Legionella protection.
Set point value for legionella protection (in °C, 70..90)	*70..90 (Standard = **80**)*	Desired water temperature during legionella protection.
Energy saving legionella protection (performed during comfort mode)	*every 2 days* ***every 3 days*** *every 4 days every 5 days every 6 days every 7 days every 8 days*	Legionella protection is always performed if the domestic water heating tales place after completion of the set timescale in comfort mode. If that does not apply then the protection must be perofrmed by the time configured below at the latest (*unconditional legionella protection*).
Unconditional legionella protection (performed with each operating mode)	*every 2 days every 3 days every 4 days* ***every 5 days*** *every 6 days every 7 days every 8 days*	If no *energy saving legionella protection* can be performed by the set time, legionella protection will be performed independent of the current operating mode. **Example:** Energy saving legionella protection every 3 days Unconditional energy saving legionella protection every 5 days. **Case 1.** The system is switched to comfort mode after 4 days: → Energy saving legionella protection can be performed (energy saving because in comfort mode). **Case 2.** The system is to remain in frost protection mode for 2 weeks: → Unconditional legionella protection is performed after 5 days ("unconditional" as independent of operating mode).

3.3.2.7 The parameter page "*Reports from DHW*"

This is for setting how the Domestic Hot Water feedback from the heater is to be sent ot the bus.

Table 10

Designation	Values	Description
Sends the domestic water set point value on change	*No* ***yes***	
Send domestic water set point value cyclically	***No*** *yes*	
Resend current domestic water temperature in event of change at	*not based on change* *1 K, **2 K**, 3 K, 4 K, 5 K, 6 K, 7 K, 8 K, 9 K, 10 K*	Actual value can only be sent cyclically (if selected) Actual value is sent as soon as this has changed by the selected value. (see below: *Send current domestic water temperature cyclically*)
Send current domestic water temperature cyclically	***No*** *yes*	Regularly send independent of changes?
Send limits of domestic water set point value cyclically	***No*** *yes*	Regularly send independent of changes?
Send DHW status cyclically	***No*** *yes*	Regularly send independent of changes?
Time for cyclical transmission of all DHW reports	*2, 3, 5, 10, 15, 20, 30, 45, 60 minutes*	Common cycle time for all DHW reports on this parameter page.

4 Typical applications:

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

4.1 Application: Heating 10 zones with demand-driven set point value.

10 rooms needed to be heated separately.
The first room (= Zone 1) is controlled by the VARIA RTR. A RAM 713 S takes over the room temperature control for the other zones.

The actuating values for controlling the heating element actuator drives are sent to 3 HMG 4 heating actuators + 2x HME 4.
The individual actuating values also go to objects 3-12 on the KNX OT box for determining the maximum actuating value for all the zones.

The feed set point temperature is determined by the KNX OT box based on the current actuating values in all ten rooms.
The KNX OT box controls the heater via the OpenTherm bus.
The VARIA display shows the current feed temperature and the flame status (burner on/off).

4.1.1 Devices:

- KNX OT box (order no. 8559200)
- VARIA 824 / 826 (order nos. 8249200/8269200)
- 9x RAM 713 S (order no. 7139201)
- HMG 4 (order no. 4900210)
- 2x HME 4 (order no. 4900211)

4.1.2 Overview

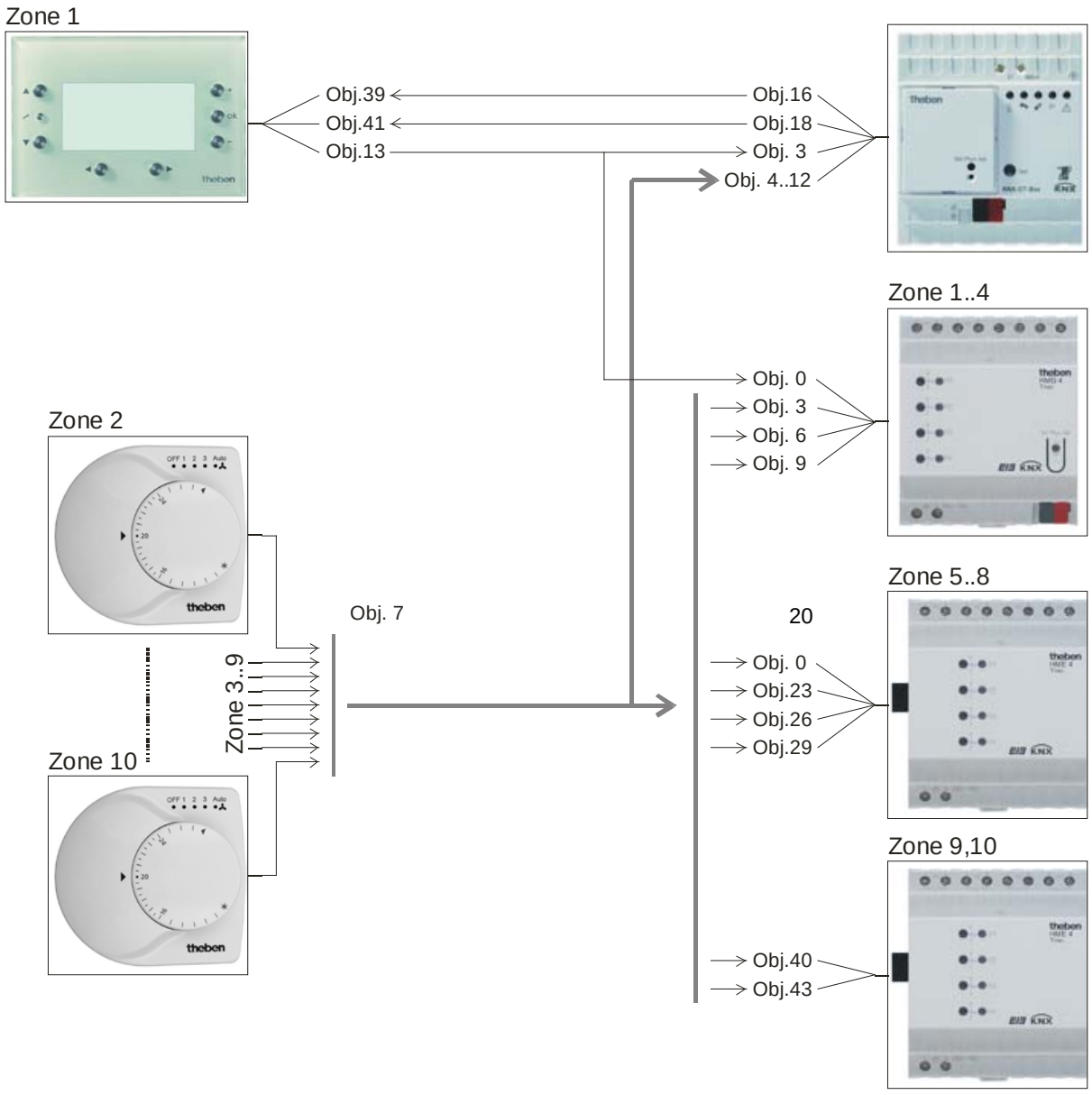


Figure 1

4.1.3 Objects and links

Table 11: Feedback from heater and actuating value zone 1

No.	VARIA Object name	No.	KNX OT box Object name	Comments
13	*Heating actuating value*	3	*Maximum actuating value zone/room 1 demand-driven*	Actuating value for zone 1
39	*Display page 1, line 1*	16	*Current feed temperature*	Feedback from heater
41	*Display page 1, line 2*	18	*Flame status*	Is the burner turned on?

Table 12

No.	VARIA Object name	No.	1. HMG 4 Object name	Comments
13	*Heating actuating value*	0	*GM HMG 4 channel 1*	Control of set point actuator for zone 1

Table 13: Actuating values for the heating actuator

No.	RAM 713 zone 2 Object name	No.	HMG 4 Object name	Comments
7	*Heating actuating value*	3	*GM HMG 4 channel 2*	Control of set point actuators for zones 2-10
	RAM 713 zone 3		HMG 4	
7	*Heating actuating value*	6	*GM HMG 4 channel 3*	
	RAM 713 zone 4		HMG 4	
7	*Heating actuating value*	9	*GM HMG 4 channel 4*	
	RAM 713 zone 5		1. HME 4	
7	*Heating actuating value*	20	*EM1 HME 4 channel 1*	
	RAM 713 zone 6		1. HME 4	
7	*Heating actuating value*	23	*EM1 HME 4 channel 2*	
	RAM 713 zone 7		1. HME 4	
7	*Heating actuating value*	26	*EM1 HME 4 channel 3*	
	RAM 713 zone 8		1. HME 4	
7	*Heating actuating value*	29	*EM1 HME 4 channel 4*	
	RAM 713 zone 9		2. HME 4	
7	*Heating actuating value*	40	*EM2 HME 4 channel 1*	
	RAM 713 zone 10		2. HME 4	
7	*Heating actuating value*	43	*EM2 HME 4 channel 2*	

Table 14: Determination of maximum actuating value.

No.	RAM 713 zone 2 Object name	No.	KNX OT box Object name	Comments
7	*Heating actuating value*	4	*Maximum actuating value zone/room 2 demand-driven*	Feedback of actuating value zones 2-10
	RAM 713 zone 3			
7	*Heating actuating value*	5	*Maximum actuating value zone/room 3 demand-driven*	
	RAM 713 zone 4			
7	*Heating actuating value*	6	*Maximum actuating value zone/room 4 demand-driven*	
	RAM 713 zone 5			
7	*Heating actuating value*	7	*Maximum actuating value zone/room 5 demand-driven*	
	RAM 713 zone 6			
7	*Heating actuating value*	8	*Maximum actuating value zone/room 6 demand-driven*	
	RAM 713 zone 7			
7	*Heating actuating value*	9	*Maximum actuating value zone/room 7 demand-driven*	
	RAM 713 zone 8			
7	*Heating actuating value*	10	*Maximum actuating value zone/room 8 demand-driven*	
	RAM 713 zone 9			
7	*Heating actuating value*	11	*Maximum actuating value zone/room 9 demand-driven*	
	RAM 713 zone 10			
7	*Heating actuating value*	12	*Maximum actuating value zone/room 10 demand-driven*	

4.1.4 Important parameter settings

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

Table 15: KNX OT box

Parameter page	Parameter	Setting
General	*Determining heating set point value*	*Via heating requirement, without weather*
Reports from CH	*Resend current feed temperature in event of change at*	*2 K*
	Send current feed temperature cyclically	*Yes*
	Send flame status cyclically	*Yes*

Table 16: VARIA

Parameter page	Parameter	Setting
RTC setting	*Control*	*Heating control only*
Heating control	*Number of heating stages*	*Only one heating stage*
	Type of control	*Continuous control*
Select screens	*Show page 1 for display objects*	*Yes*
Display objects page 1	*Fade in operating instructions on page 1*	*No*
	Page heading	*Heating*
Page 1, line 1	*Line format*	*Object type: Temperature*
	Text for line 1	*Flow*
	Unit for display object	*°C*
	Authorise amendment of object value?	*no*
Page 1, line 2	*Line format*	*Switch on object type*
	Text for line 1	*Burner*
	Text at object value = 0	*Off*
	Text at object value = 1	*On*
	Authorise amendment of object value?	*no*

Table 17: HMG / HME 4 (zones 1-10)

Parameter page	Parameter	Setting
General	*Type of basic module*	*GM is a HMG 4*
	Number of upgrade modules	*2 Upgrade modules*
	Type of upgrade module 1	*EM1 is an HME 4*
	Type of upgrade module 2	*EM2 is a HME 4*
GM HMG 4 H1	*Type of actuating value*	*Continuous*
GM HMG 4 H2		
GM HMG 4 H3		
GM HMG 4 H4		
EM1(2) HME 4 H1		
EM1(2) HME 4 H2		
EM1(2) HME 4 H3		
EM1(2) HME 4 H4		

Table 18: RAM 713 S (zones 2-10)

Parameter page	Parameter	Setting
Settings	*Control*	*Standard*

4.2 Application: Demand-driven setpoint value and weather-controlled

The feed setpoint temperature is determined by the KNX OT box based on the current outside temperature. This is received via the OpenTherm bus and shown on the Varia display.

In this example, individual channels are combined for determining the maximum actuating value in groups of four (number of channels in heating actuator).
Each group of four rooms forms its own zone.

Instead of the individual actuating values (see previous application), the maximum actuating value determined from each heating actuator is sent to the KNX OT box.
Each actuator represents one zone and makes it possible to take into account up to 40 channels/rooms to determine the maximum actuating value.

The heating actuators HMT 6 and HMT 12 (4900273 / 4900274) allow 6 and 12 channels respectively to be combined per zone.
This means the maximum actuating value can cover up to 120 rooms (= 12 channels, 10 zones).

Devices:

- KNX OT box (order no. 8559200)
- VARIA 824 / 826 (order nos. 8249200/8269200)
- 9x RAM 713 S (order no. 7139201)
- HMG 4 (order no. 4900210)
- 2x HME 4 (order no. 4900211)

4.2.1 Overview

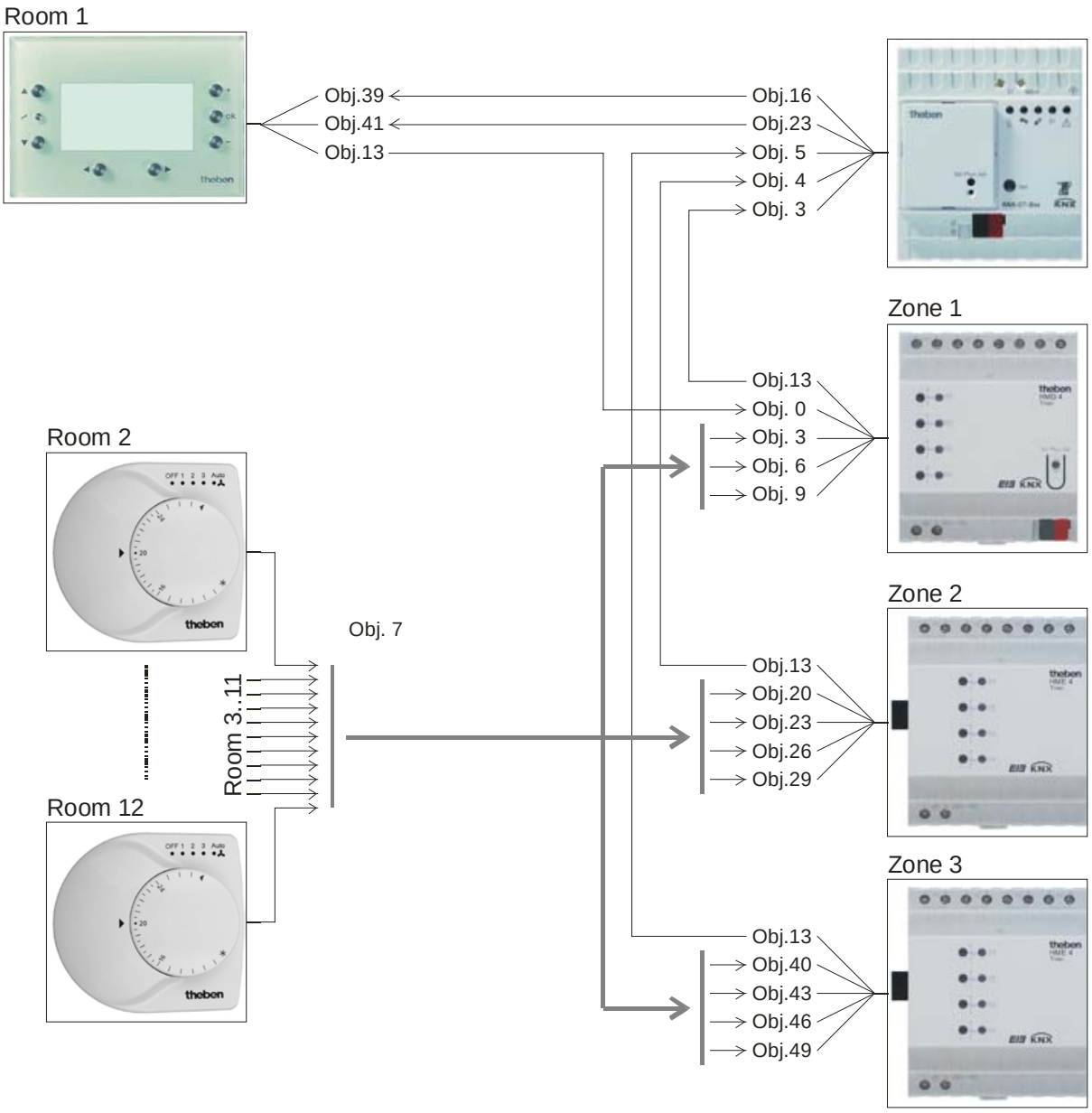


Figure 2

4.2.2 Objects and links

Table 19: Feedback from heater

No.	VARIA Object name	No.	KNX OT box Object name	Comments
39	*Display page 1, line 1*	16	*Current feed temperature*	Feedback from heater
41	*Display page 1, line 2*	23	*Outdoor temperature*	Display outside temperature

Table 20

No.	VARIA Object name	No.	1. HMG 4 Object name	Comments
13	*Heating actuating value*	0	*GM HMG 4 channel 1*	Control of set point actuator for zone 1

Table 21: Actuating values for the heating actuator

No.	RAM 713 Room 2 Object name	No.	HMG 4 Object name	Comments
7	*Heating actuating value*	3	*GM HMG 4 channel 2*	Control of set point actuators for rooms 2-12
	RAM 713 Room 3		HMG 4	
7	*Heating actuating value*	6	*GM HMG 4 channel 3*	
	RAM 713 Room 4		HMG 4	
7	*Heating actuating value*	9	*GM HMG 4 channel 4*	
	RAM 713 Room 5		1. HME 4	
7	*Heating actuating value*	0	*EM1 HME 4 channel 1*	
	RAM 713 Room 6		1. HME 4	
7	*Heating actuating value*	3	*EM1 HME 4 channel 2*	
	RAM 713 Room 7		1. HME 4	
7	*Heating actuating value*	6	*EM1 HME 4 channel 3*	
	RAM 713 Room 8		1. HME 4	
7	*Heating actuating value*	9	*EM1 HME 4 channel 4*	
	RAM 713 Room 9		2. HME 4	
7	*Heating actuating value*	0	*EM2 HME 4 channel 1*	
	RAM 713 Room 10		2. HME 4	
7	*Heating actuating value*	3	*EM2 HME 4 channel 2*	
	RAM 713 Room 11		2. HME 4	
7	*Heating actuating value*	6	*EM2 HME 4 channel 3*	
	RAM 713 Room 12		2. HME 4	
7	*Heating actuating value*	9	*EM2 HME 4 channel 4*	

Table 22: Determination of maximum actuating value.

No.	HMG 4 Object name	No.	KNX OT box Object name	Comments
13	*Largest actuating value of all channels*	3	*Maximum actuating value zone 1 demand-driven*	Feedback of actuating value zones 1-3
	EM1 HME 4			
33	*Largest actuating value of all channels*	4	*Maximum actuating value zone 2 demand-driven*	
	EM2 HME 4			
53	*Largest actuating value of all channels*	5	*Maximum actuating value zone 3 demand-driven*	

4.2.3 Important parameter settings

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

Table 23: KNX OT box

Parameter page	Parameter	Setting
General	*Determining heating set point value*	*According to demand and weather-controlled*
Reports from CH	*Resend current feed temperature in event of change at*	*2 K*
	Send current feed temperature cyclically	*Yes*
Outdoor temperature	*Determining outside temperature*	*From heater*

Table 24: VARIA

Parameter page	Parameter	Setting
RTC setting	*Control*	*Heating control only*
Heating control	*Number of heating stages*	*Only one heating stage*
	Type of control	*Continuous control*
Select screens	*Show page 1 for display objects*	*Yes*
Display objects page 1	*Fade in operating instructions on page 1*	*No*
	Page heading	*Heating*
Page 1, line 1	*Line format*	*Object type: Temperature*
	Text for line 1	*Flow*
	Unit for display object	*°C*
	Authorise amendment of object value?	*no*
Page 1, line 2	*Line format*	*Object type: Temperature*
	Text for line 2	*Outdoor temperature*
	Unit for display object	*°C*
	Authorise amendment of object value?	*no*

Table 25: HMG / HME 4 (zones 1-10)

Parameter page	Parameter	Setting
General	*Type of basic module*	*GM is a HMG 4*
	Number of upgrade modules	*2 Upgrade modules*
	Type of upgrade module 1	*EM1 is an HME 4*
	Type of upgrade module 2	*EM2 is a HME 4*
GM HMG 4 H1 *GM HMG 4 H2* *GM HMG 4 H3* *GM HMG 4 H4* *EM1(2) HME 4 H1* *EM1(2) HME 4 H2* *EM1(2) HME 4 H3* *EM1(2) HME 4 H4*	*Type of actuating value*	*Continuous*
GM HMG 4 Pump *EM1 HME 4 Pump* *EM2 HME 4 Pump*	*Take into account channel 1 for the pump control unit and the highest actuating value*	*Yes*
	Take into account channel 2 for the pump control unit and the highest actuating value	*Yes*
	Take into account channel 3 for the pump control unit and the highest actuating value	*Yes*
	Take into account channel 4 for the pump control unit and the highest actuating value	*Yes*

Table 26: RAM 713 S (rooms 2-10)

Parameter page	Parameter	Setting
Settings	*Control*	*Standard*

4.3 Application: Determining set point value according to demand with heating actuators and Cheops drive actuators

The use of Cheops drive actuators allows
any number of rooms or heaters to be covered for each of the ten zones (see zone 3).

In this example, the maximum actuating value for zones 1 and 2 is determined via the heating actuators.

The maximum actuating value for zone 3 is determined by 6 (or more) Cheops drive actuators.
Cheops drive actuators compare their actuating values with each other and send them to a common address.

Devices:

- KNX OT box (order no. 8559200)
- 14x RAM 713 S (order no. 7139201)
- HMG 4 (order no. 4900210)
- 1x HME 4 (order no. 4900211)
- 6x Cheops drive (order no. 7319201)

4.3.1 Principle and functionality

The actuating values are constantly compared between all Cheops actuators.
Whichever one is bigger then the recipient, is allowed to send it; whichever is smaller is not allowed to send.
In order to speed up the process, an actuator sends even quicker the bigger the difference between their own and the received actuating value.
The actuator with the highest actuating value sends first and takes precedence over all others.

The actuating value comparison takes place via Object 3 (*maximum position*).
In addition, a common group address for the maximum position for each valve actuator is set on Object 3.

In order to start the actuating value comparison between the participants, one (and **only one**), participant must send a value to this group address in cycles.
This task is achieved by one of the actuators.

On the *Security and forced mode* parameter page, the *Sending of maximum actuating value object (for boiler control)* parameter must be set to any choice of cycle time. This actuator then regularly sends its own actuating value and the others can respond accordingly.

With all other actuators, the *Sending of maximum actuating value object (for boiler control)* parameter must remain set to default value, i.e. *only when own actuating value is bigger*.

4.3.2 Overview

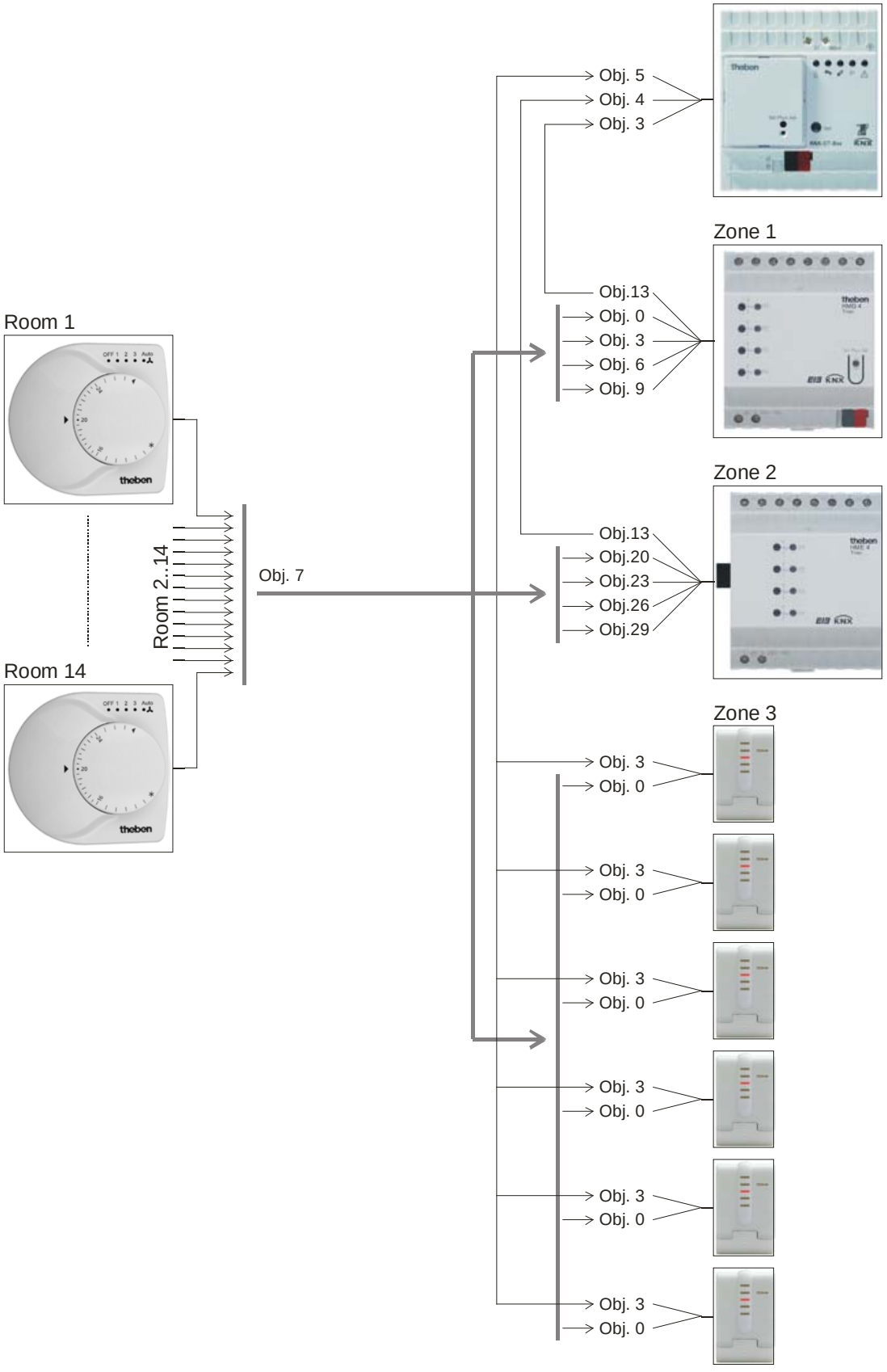


Figure 3

4.3.3 Objects and links

Table 27: Actuating values for the heating actuator

No.	RAM 713 Room 1 Object name	No.	HMG 4 Object name	Comments
7	*Heating actuating value*	0	*GM HMG 4 channel 1*	Control of setpoint actuators for rooms 1-8
	RAM 713 Room 2		HMG 4	
7	*Heating actuating value*	3	*GM HMG 4 channel 2*	
	RAM 713 Room 3		HMG 4	
7	*Heating actuating value*	6	*GM HMG 4 channel 3*	
	RAM 713 Room 4		HMG 4	
7	*Heating actuating value*	9	*GM HMG 4 channel 4*	
	RAM 713 Room 5		1. HME 4	
7	*Heating actuating value*	0	*EM1 HME 4 channel 1*	
	RAM 713 Room 6		1. HME 4	
7	*Heating actuating value*	3	*EM1 HME 4 channel 2*	
	RAM 713 Room 7		1. HME 4	
7	*Heating actuating value*	6	*EM1 HME 4 channel 3*	
	RAM 713 Room 8		1. HME 4	
7	*Heating actuating value*	9	*EM1 HME 4 channel 4*	

Table 28: Actuating values for the Cheops drive actuators zone 3

No.	RAM 713 Room 9 Object name	No.	Cheops drive room 9 Object name	Comments
7	*Heating actuating value*	0	*Actuating value*	Control of set point actuators for rooms 9-14
	RAM 713 Room 10		Cheops drive room 10	
7	*Heating actuating value*	0	*Actuating value*	
	RAM 713 Room 11		Cheops drive room 11	
7	*Heating actuating value*	0	*Actuating value*	
	RAM 713 Room 12		Cheops drive room 12	
7	*Heating actuating value*	0	*Actuating value*	
	RAM 713 Room 13		Cheops drive room 13	
7	*Heating actuating value*	0	*Actuating value*	
	RAM 713 Room 14		Cheops drive room 14	
7	*Heating actuating value*	0	*Actuating value*	

Table 29: Determination of maximum actuating value.

No.	HMG 4 Object name	No.	KNX OT box Object name	Comments
13	*Largest actuating value of all channels*	3	*Maximum actuating value zone/room 1 demand-driven*	Feedback of actuating value zones 1-3
	EM1 HME 4			
33	*Largest actuating value of all channels*	4	*Maximum actuating value zone/room 2 demand-driven*	
	All Cheops drives			
3	*Maximum position*	5	*Maximum actuating value zone/room 3 demand-driven*	

4.3.4 Important parameter settings

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

Table 30: KNX OT box

Parameter page	Parameter	Setting
General	*Determining heating set point value*	*Via heating requirement, without weather*

Table 31: HMG / HME 4 (zones 1-10)

Parameter page	Parameter	Setting
General	*Type of basic module*	*GM is a HMG 4*
	Number of upgrade modules	*1 Upgrade module*
	Type of upgrade module 1	*EM1 is an HME 4*
GM HMG 4 H1 *GM HMG 4 H2* *GM HMG 4 H3* *GM HMG 4 H4* *EM1 HME 4 H1* *EM1 HME 4 H2* *EM1 HME 4 H3* *EM1 HME 4 H4*	*Type of actuating value*	*Continuous*
GM HMG 4 Pump *EM1 HME 4 Pump*	*Take into account channel 1 for the pump control unit and the highest actuating value*	*Yes*
	Take into account channel 2 for the pump control unit and the highest actuating value	*Yes*
	Take into account channel 3 for the pump control unit and the highest actuating value	*Yes*
	Take into account channel 4 for the pump control unit and the highest actuating value	*Yes*

Table 32: RAM 713 S (rooms 1-14)

Parameter page	Parameter	Setting
Settings	*Control*	*Standard*

Table 33: Cheops drive (room 9)

Parameter page	Parameter	Setting
Safety and forced mode	*Sending “ maximum actuating value“ object (for boiler control)*	*Every 5 minutes*

Table 34: Cheops drive (rooms 10-14)

Parameter page	Parameter	Setting
Safety and forced mode	*Sending “ maximum actuating value“ object (for boiler control)*	*Only if an internal actuating value is greater*

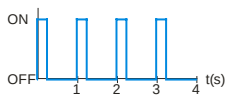
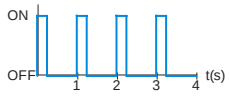
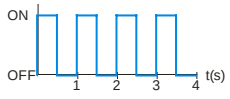
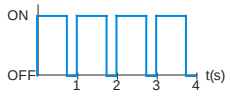
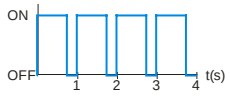
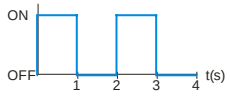
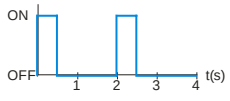
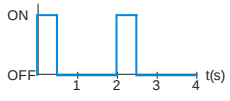
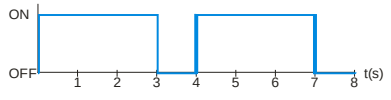
5 Appendix

5.1 Minimum heating requirement/screed drying program

- The device supports minimum heating requirement in accordance with DIN EN 1264-4.
- The minimum heating requirement function is set ex works and is activated on set-up (LED 1 flashes).
- The function can be deactivated via the ETS (minimum heating parameter) or reactivated.
- The function can be interrupted up to start-up by withdrawal of KNX bus module.

Minimum heating requirement is the preparation for laying floor coverings and serves to dry the screed to enable fast laying of floor *.

Table 35: Program sequence

Time	Temperature	Flashing frequency of LED
1. day	Flow temperature 25 °C	
2. day	Flow temperature 35 °C	
3. day	Flow temperature 45 °C	
4. day	Flow temperature 55 °C, highest max. flow temperature.	
Day 5 to day 15	Flow temperature 55 °C, highest max. flow temperature.	
day 16	Flow temperature 45 °C	
day 17	Flow temperature 35 °C	
day 18	Flow temperature 25 °C	
After-wards	Set flow temperature	

* This test must be performed by the floor layer.

The program is activated on the *General* parameter page and starts immediately after download..
This deactivates the normal function of the device.

In order to continue the program at the right place after bus failure, the time of the program elapsed is regularly saved (permanently).

If bus failure occurs in te first 12 hours of the first day, the program is reset and starts agin from the beginning.

This is intended to prevent the program begins at first start-up without the heating system being ready.
An electrician can temporarily deactivate the program by pulling out the bus module until set-up has been completed by the heating engineer.

5.2 Legionella protection

This concerns a function to reduce legionella
in the DHW storage tank.
Further details on legionella disinfection of the whole DHW system can be found in DVGW worksheet W 551 "*Technical measures for reduction of legionella growth*".

Legionella protection should preferably be performed when the system is in comfort mode
→ Energy saving legionella protection.
This keeps the surmountable temperature differential to a minimum and maximises the energy saving effect.

However, this is not always possible as the system is not switched to the comfort operating mode for an extended period, e.g. during holidays.
In order to nevertheless guarantee legionella protection, the domestic water should be heated up to the legionella protection temperature at a minimum every 8 days
→ unconditional legionella protection.

5.3 Objects for data exchange with Opentherm:

No.	Object name	Data object	OT ID
2	*Enable central heating*	Central Heating Enable	ID0-R Bit 0
13	*Summer mode*	Summer/winter mode	ID0-R Bit 5
16	*Current flow temperature*	Boiler water temp.	ID25
17	*Flow set point value*	Control set point	ID1
18	*Flame status*	Flame status	ID0-W Bit 3
19	*General error*	fault indication	ID0-W Bit 0
20	*Error code (as per Opentherm ID 5)*	Application-specific fault flags	ID5
21	*Heating status*	Central Heating Mode	ID0-W Bit 1
22	*Service required*	Service	ID0-W Bit 6
23	*Outdoor temperature*	Outdoor temperature *(Limitation -30..60 °C)*	ID 27
25	*Domestic Hot Water (DHW) enable*	DHW enable	ID 0 Bit 1
31	*Domestic water temperature set point value*	DHW set point	ID 56
32	*Currrent domestic water temperature*	Tdhw	ID 26
33	*Domestic water status*	Domestic Hot Water Mode	ID0-W Bit 2
34	*Degree of modulation in %*	Rel.-mod-level	ID 17
35	*Lower limit of domestic water set point value*	TdhwSet-LB	ID 48
36	*Upper limit of domestic water set point value*	TdhwSet-UB	ID 48

5.4 Calculation of set point value:

Set point value (comfort mode)
= Comfort set point value parameter or object (0) +/– manual offset

Set point value (standby)
= Comfort mode set point value – reduction in standby mode – manual offset

Set point value (night)
= Comfort mode set point value – reduction in night mode – manual offset

Set point value (frost protection) = Frost protection set point value parameter

Note: The set point value via object 0 is only valid if the object has received at least 1 value since start-up a or restoration of the bus.

Example:
Flow temperatures of operating modes
Parameters: Comfort set point value = 50 °C, Reduction Standby = 10 K
Reduction Night = 20 K, Frost protection temp. = 12 °C

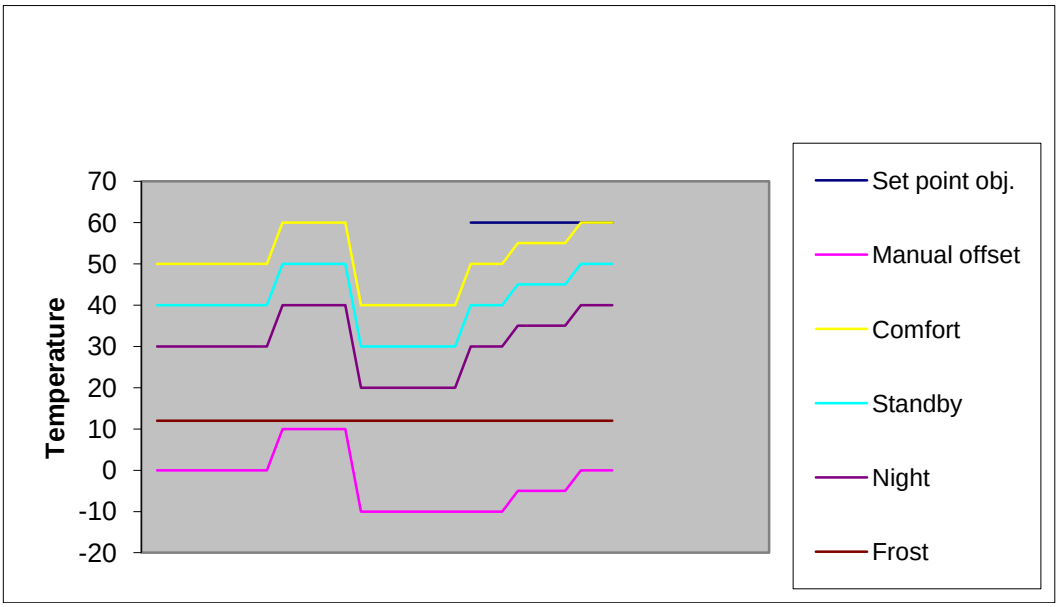


Figure 4

5.4.1 Determination of set point value via heating requirement

The flow temperature is calculated based on the current maximum actuating value of the building (maximum value from the objects 3..12 "maximum actuaing value 1..10").
The determination of the relevant zone requires the multiplication of the actauting values of the individual zones and the related weighting factor (parameter page: Weighting of zones).

This does not influence the configured temperature in frost protection mode.

The zone with the largest product (actuating value . factor) determines set point value calculation.
The curve for calculating the flow temperature is primarily oriented to the flow set point value after reset and to the targeted maximum actuating value (see red line in diagram). The required set point value is calculated according to the actual heating requirement.
Base and end point of the curve are determined firstly via the *maximum reduction* and then via the *maximum increase flow temperature*.

The increase/reduction of flow temperature only ever occurs in 2 K stages

After reset, download or restoration of the bus the set point value adjustment starts with the reception of the first actuating value.
It is recommended to send the actuating values cyclically to the OT box.

Manual set point value offset (obj. 1) can be used to adjust this up or down , but the end point is limited by the *maximum flow temperature* parameter.

Example:

Flow temperature after reset = 40 °C
Targeted maximum actuating value = 70 %
Max. increase = 20 K
Max. reduction = 20 K

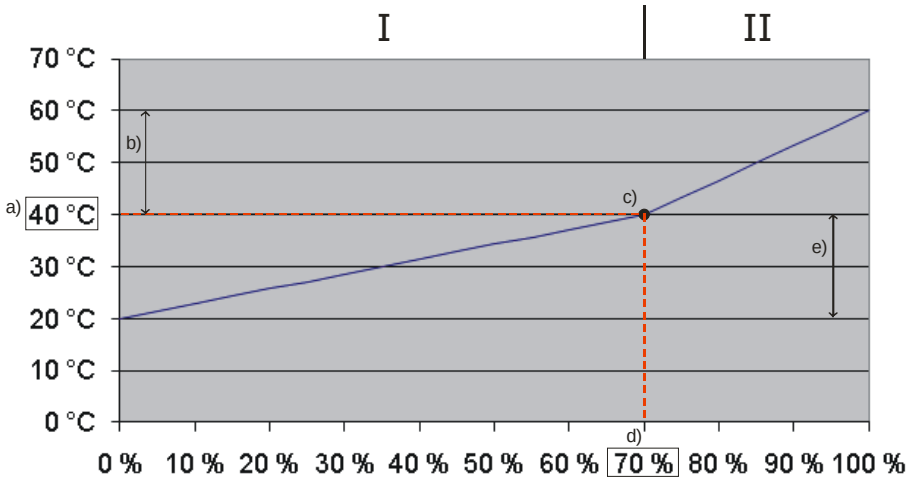


Figure 5

Key:

I = Energy saving range
II = Comfort range for quickly heating rooms.

a) Flow temperature specified after reset or via object 0.
b) Max. increase
c) Starting point for calculating the set point value
d) Targeted maximum actuating value
e) Max. reduction

5.4.2 Determination of set point value via weather, without heating requirement

With weather-dependent flow control, the flow temperature is controlled in proportion to the external temperature.

The curve for calculating the flow temperature is linked to 2 fixed points:

- Base point of characteristic curve: Flow temperature with an outdoor temperature of 20 °C
- End point of characteristic curve: Flow temperature with an outdoor temperature of -20 °C

Linear interpolation is performed dependent on outdoor temperature.

If a value <> 0 is sent to object 0, weather-dependent control ends and this value, plus manual offset, is assumed as set point value for comfort mode.
In standby and night operating modes, this value is reduced via the configured offset (parallel offset of curve).

This does not influence the configured temperature in frost protection mode.

Example:

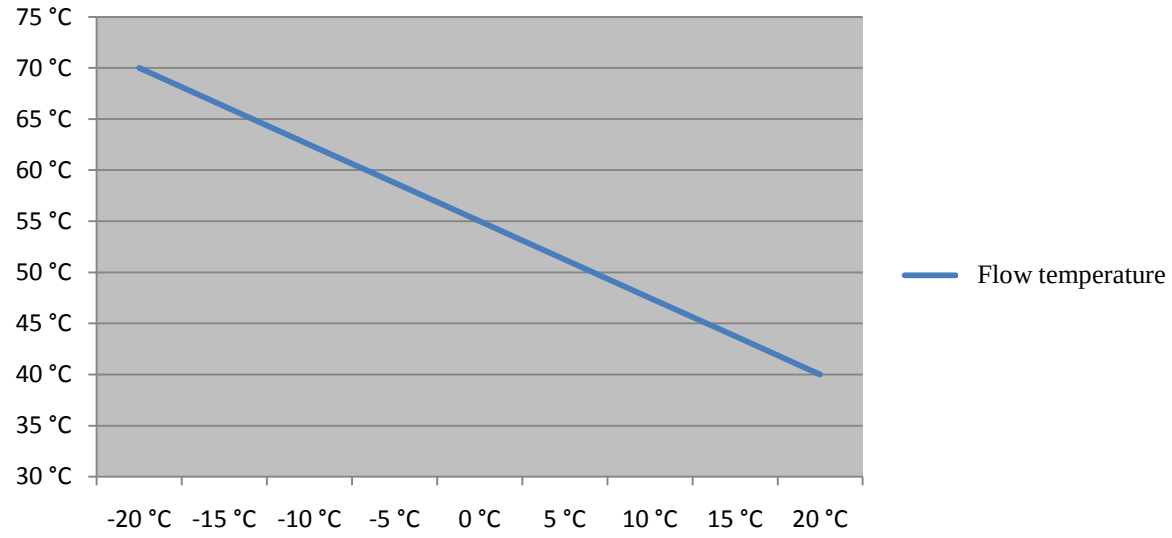


Figure 6

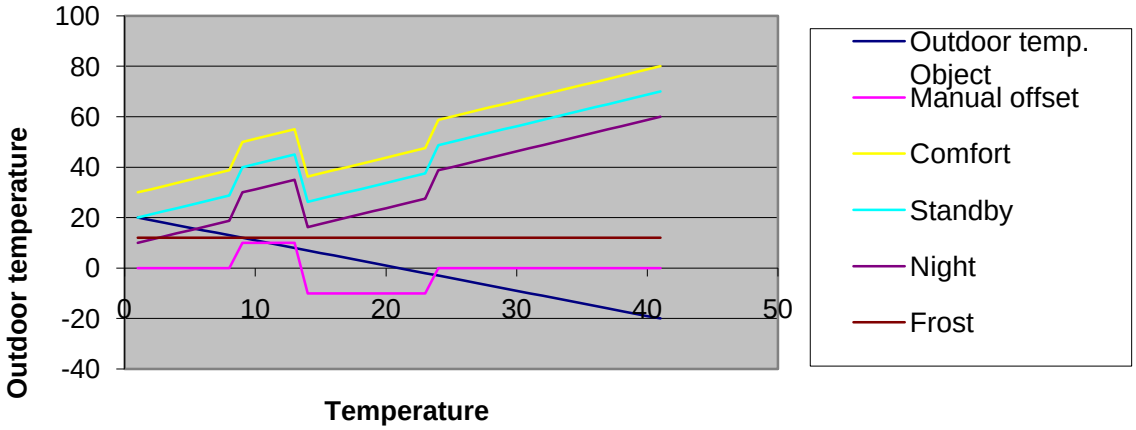


Figure 7: Flow set point value dependent on external temperature with the different HVAC operating modes.

5.4.3 Determination of set point value from requirement and weather-controlled

This method combines the advantages of the previously described procedures.
Both the heating requirement and the external temperature are taken into account.

Calculation of the set point value is performed as with the Determination of set point value via heating requirement (see above) where the Starting point for calculating the set point value (c), based on external temperature, can move up or down.
The ranges for set point value increases and reductions change analogically to point c).

This does not influence the configured temperature in frost protection mode.

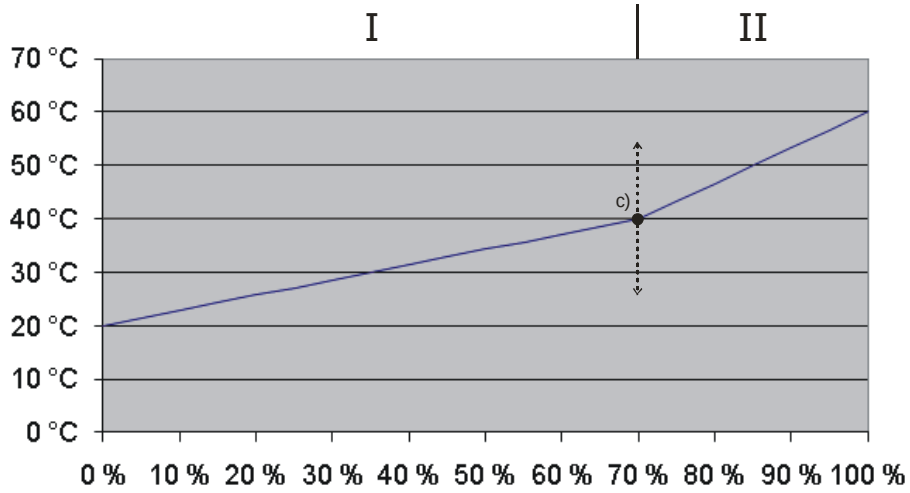


Figure 8

Key:

I = Energy saving range
II = Comfort range for quickly heating rooms.

c) Starting point for calculating the set point value

6 Operating instructions

309 483

theben

KNX OT box

OpenTherm interface for KNX

855 9 200

Designated use

The KNT OT box serves as an interface between the heating system in the OT bus (simple bus system in heating and ventilation technology) and the KNX system.
It delivers the necessary data for heating control (heating etc.) and sends it to the heater. The following functions are available with the KNT OT box:
– needs-driven advance control
– weather-dependent advance control
– control of domestic water heating
– energy maximisation with solar support of domestic water heating
– minimum heating requirement/screed drying program
– legionell a protection program

ETS (engineering tool) enables application programs to be selected, specific parameters and addresses to be assigned and transferred to the device.
The device is designed for installation on DIN top hat rails (in accordance with EN 60715). Only to be used in closed, dry rooms.

Safety advice

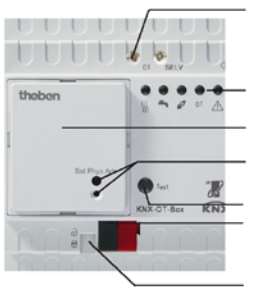
NOTE

➢ Installation should only be carried out by a professional electrician.

Please note the provisions of EN 50428 for switches or similar installation material for use in building systems technology with regard to the correct installation of bus lines and device start-up procedure.
Tampering with, or making modifications to, the device will invalidate the guarantee.

Description

KNX OT box



Description of LEDs

	LED 1 green	Central heating (flashes when minimum heating requirement is active)	OT: CH enable
	LED 2 green	Domestic water heating	OT: DHW enable
	LED 3 green	Burner on/off	OT: flame state
OT	LED 4 green	OpenTherm active (flashes with OT telegram)	
	LED 5 red	Error (flashes)	OT: error

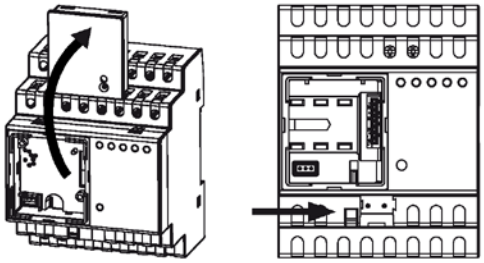
Installation

➢ Clip KNX OT box onto the distributor rail.

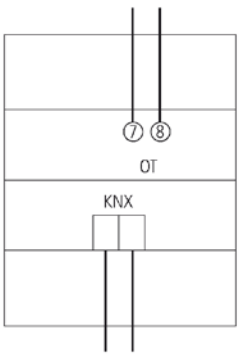
KNX bus module

KNX OT box and KNX bus module can be separated mechanically.

➢ Unlock and remove KNX module ③ on the KNX OT box ⑦ or replace and lock it.



Connection



Manual operation – push button test

➢ Press **test** button until heater switches on.
This test function checks whether the KNX OT box is correctly connected to the burner.

Minimum heating requirement/screed drying program

Minimum heating requirement is the preparation for laying floor coverings and serves to dry the screed to enable fast laying of floor (= minimum heating requirement). This test must be performed by the floorer.

- The device supports minimum heating requirement in accordance with DIN EN 1264-4.
- The minimum heating requirement function is set ex works and is activated on set-up (LED 1 flashes).
- The function can be deactivated via the ETS (**Minimum heating parameter**) or reactivated.
- The function can be interrupted up to start-up by withdrawal of KNX bus module.

Technical data

- Operating voltage (bus): 30 V
- Current consumption (bus): 10 mA
- Permissible ambient temperature: –0 °C ... +45 °C
- Protection class: III in accordance with EN 60730-1
- Protection rating: IP 20 in accordance with EN 60529
- Mode of operation: Type 1 in accordance with EN 60730-1
- Pollution degree: 2 in accordance with EN 60730-1
- Rated impulse with stand voltage: 4 kV

Observe deviating technical data on the device rating plate!
Technical changes reserved.
The ETS database is available at **www.theben.de**
Please refer to the KNX Handbook for detailed functional descriptions.

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