KNX K4

Actuator for Heating and Cooling

Item number 70320

elsner elektronik

Installation and Adjustment

Installation, inspection, commissioning and troubleshooting of the device must only be carried out by a competent electrician.

This manual is amended periodically and will be brought into line with new software releases. The change status (software version and date) can be found in the contents footer. If you have a device with a later software version, please check **www.elsner-elektronik.de** in the menu area "Service" to find out whether a more up-to-date version of the manual is available.

Clarification of signs used in this manual

Safety advice.

Safety advice for working on electrical connections, components, etc.

DANGER! ... indicates an immediately hazardous situation which will lead to death or severe injuries if it is not avoided.

WARNING! ... indicates a potentially hazardous situation which may lead to death or severe injuries if it is not avoided.

CAUTION! ... indicates a potentially hazardous situation which may lead to trivial or minor injuries if it is not avoided.

ATTENTION! ... indicates a situation which may lead to damage to property if it is not avoided.

ETS In the ETS tables, the parameter default settings are marked by underlining.

1. Description

The **KNX K4 actuator** offers four internal temperature regulators and four output channels for controlling heating or cooling systems. The temperature regulators can control both the outputs on the **KNX K4** and other climate control system on the KNX-Bus.
In automatic mode, the temperature regulators are set at nominal temperatures for different modes. This way, it is easy to switch between the modes, comfort, standby, eco and building protection. The switch is made via an object e. g. via a manual switch, time switch or sensor switch outputs in the KNX-System.
The buttons on the device allow for direct manual switching of the connected systems. LEDs show whether the output channel was manually operated or is running in an automatic mode.

Functions:

- **4 internal, independent temperature regulators** with automatic controls for the **heating and cooling controls** (one/two step heating and cooling)
- **4 output channels** (230 V AC, 8 Watt per output) with pulse width modulation control (PWM) for actuators
- Keypad field **4 buttons** and status LEDs

Configuration is made using the KNX software ETS. The **product file** can be downloaded from the Elsner Elektronik homepage on **www.elsner-elektronik.de** in the "Service" menu.

1.1. Technical data

Housing	Plastic
Colour	White
Mounting	Series installation on mounting rail
Protection category	IP 20
Dimensions	approx. 53 x 88 x 60 (W x H x D, mm), 3 modules
Weight	approx. 110 g
Ambient temperature	Operation -20…+70°C, storage -55…+90°C
Ambient humidity	max. 95% RH, avoid condensation
Operating voltage	KNX bus voltage
Power	on bus: 10 mA
Outputs	4 x 230 V (OUT/N), not short-circuit-proof. When connectiong one consumer load per separate channel (1 to 4): Max. load for continuous operation: 8 W per channel Max. switch-on current: 1.1 A per channel Observe the specifications in the data sheet of the consumer load.
Data output	KNX +/- bus connector terminal
BCU type	unit's own microcontroller

PEI type	0
Group addresses	max. 254
Assignments	max. 254
Communication objects	125

The product conforms with the provisions of EU directives.

2. Installation and start-up

2.1. Installation notes

Installation, testing, operational start-up and troubleshooting should only be performed by an electrician.

DANGER!
Risk to life from live voltage (mains voltage)!
There are unprotected live components within the device.

- VDE regulations and national regulations are to be followed.
- Ensure that all lines to be assembled are free of voltage and take precautions against accidental switching on.
- Do not use the device if it is damaged.
- Take the device or system out of service and secure it against unintentional use, if it can be assumed, that risk-free operation is no longer guaranteed.

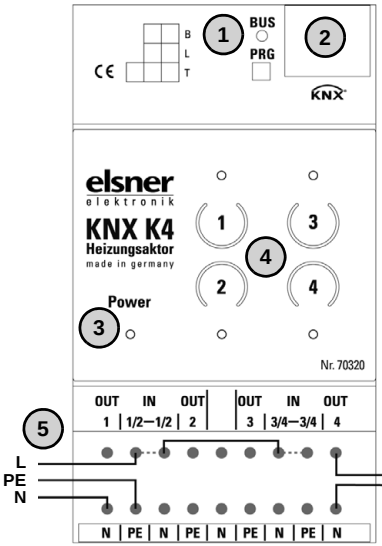
The device is only to be used for its intended purpose. Any improper modification or failure to follow the operating instructions voids any and all warranty and guarantee claims.

After unpacking the device, check it immediately for possible mechanical damage. If it has been damaged in transport, inform the supplier immediately.

The device may only be used as a fixed-site installation; that means only when assembled and after conclusion of all installation and operational start-up tasks and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

2.2. Device connection and design



Series installation on mounting rail
(3 modules)

Internally bridged cables

Per output max. 8 W
All terminals N or PE of the lower connection strip are bridged internally.

1) *Programming LED and programming buttons (PRG)*
2) *Bus terminal slot (KNX +/-)*
3) *Power LED (supply voltage/Bus)*
4) *Buttons and LEDs outputs 1-4*
5) ***Sample connection:** L (230 V) was bridged in this example from IN 1/2 to IN 3/4. Actuator on output 4 (OUT 4 | N)*

2.3. Notes on mounting and commissioning

Device must not be exposed to water (rain). This could result in the electronics being damaged. A relative air humidity of 95% must not be exceeded. Avoid condensation.

After the operating voltage has been applied, the device will enter an initialisation phase lasting a few seconds. During this phase no information can be received or sent via the bus.

2.3.1. Buttons and LEDs for the output channels

The buttons on the devices can be deactivated in the ETS (active when delivered).

Buttons

brief button press (<0,5 s)	LED shows current status (see ETS parameter: Channel LED)
button press >0,5 s	*in Automatic mode:* Switching to Manual mode *in Manal mode:* Switching from manually ON to manually OFF and reverse
long button press (>3 s)	Switching to Automatic mode (when activated in ETS)

LEDs

Behaviour of the LEDs for the output channels
in Automatic mode:

Off	Actuating variable = 0%
On	Actuating variable > 0%

in Manual mode:

Flashes slowly	Manually OFF
Flashes fast	Manually ON

3. Transmission protocol

Units:

Temperatures in degrees Celsius
Variables in %

3.1. List of all communications objects

Abbreviation flags:

C Communication
R Reading
W Writing
T Transferring
U Updating

No.	Name	Function	DPT	Flags
0	Software version	Output	217,001	C R T
1	Channel 1: Control / Status	Input / Output	5,001	C R W T
2	Channel 1: Auto / Manual	Input / Output	5.002	C R W T
3	Channel 1: Block	Input	1.001	K S
4	Channel 2: Control / Status	Input / Output	5,001	C R W T
5	Channel 2: Auto / Manual	Input / Output	5.002	C R W T
6	Channel 2: Block	Input	1.001	K S
7	Channel 3: Control / Status	Input / Output	5,001	C R W T
8	Channel 3: Auto / Manual	Input / Output	5.002	C R W T
9	Channel 3: Block	Input	1.001	K S
10	Channel 4: Control / Status	Input / Output	5,001	C R W T
11	Channel 4: Auto / Manual	Input / Output	5.002	C R W T
12	Channel 4: Block	Input	1.001	K S

Temperature control (TC)

TC 1	TC 2	TC 3	TC 4	Name	Function	DPT	Flags
25	53	81	109	TC_X_ measured temperature value	Input	9,001	K S
26	54	82	110	TC_X_ Eco-Standby HVAC 1	Input	1,003	K S
27	55	83	111	TC_X_ comfort activation HVAC 2	Input	1,003	K S
28	56	84	112	TC_X_ Frost/heat activation	Input	1,003	C R W T
29	57	85	113	TC_X_ Blocking object	Input	1.003	K S

TC 1	TC 2	TC 3	TC 4	Name	Function	DPT	Flags
30	58	86	114	RC_X_ Current set point	Output	9,001	C R T
31	59	87	115	TC_X_ Switching object (0:Heating | 1:Cooling)	Input	1,002	K S
32	60	88	116	TC_X_ Set point, comfort heating	Input / Output	9,001	C R W T
33	61	89	117	TC_X_ Set point, comfort heating (1:+ | 0:-)	Input	1.002	K S
34	62	90	118	TC_X_ Set point, comfort cooling	Input / Output	9,001	C R W T
35	63	91	119	TC_X_ Set point, comfort cooling (1:+ | 0:-)	Input	1.002	K S
36	64	92	120	TC_X_ Set point, standby heating	Input / Output	9,001	C R W T
37	65	93	121	TC_X_ Set point, standby heating (1:+ | 0:-)	Input	1.002	K S
38	66	94	122	TC_X_ Set point, standby cooling	Input / Output	9,001	C R W T
39	67	95	123	TC_X_ Set point, standby cooling (1:+ | 0:-)	Input	1.002	K S
40	68	96	124	TC_X_ Set point, eco heating	Input / Output	9,001	C R W T
41	69	97	125	TC_X_ Set point, eco heating (1:+ | 0:-)	Input	1.002	K S
42	70	98	126	TC_X_ Set point, eco cooling	Input / Output	9,001	C R W T
43	71	99	127	TC_X_ Set point, eco cooling (1:+ | 0:-)	Input	1.002	K S
44	72	100	128	TC_X_ Control variable, heating (level 1)	Output	5,001	C R T
45	73	101	129	TC_X_ Control variable, heating (level 2)	Output	5,001	C R T
46	74	102	130	TC_X_ Control variable, cooling (level 1)	Output	5,001	C R T
47	75	103	131	TC_X_ Control variable, cooling (level 2)	Output	5,001	C R T
48	76	104	132	TC_X_ Status Heating 1 (1=ON | 0=OFF)	Output	1.002	C R T
49	77	105	133	TC_X_ Status Heating 2 (1=ON | 0=OFF)	Output	1.002	C R T

TC 1	TC 2	TC 3	TC 4	Name	Function	DPT	Flags
50	78	106	134	TC_X_ Status Cooling 1 (1=ON | 0=OFF)	Output	1.002	C R T
51	79	107	135	TC_X_ Status Cooling 2 (1=ON | 0=OFF)	Output	1.002	C R T
52	80	108	136	TC_X_ Comfort Delay status	Input / Output	1,002	C R W T

4. Parameter setting

4.1. Behaviour on power failure/ restoration of power

Behaviour following a failure of the bus power supply:

The device transmits nothing.

Behaviour on bus voltage restoration and following programming or reset:

The device sends all outputs according to their transmission behaviour set in the parameters with the delays established in the "General settings" parameter block. The "Software version" communications object is sent once after 5 seconds.

4.2. General settings

The "power" LED shows ,whether bus voltage is activated for the device. Set the parameter to "no" if the LED is to remain off at all times.

Use standby LED	Yes • No

Set basic characteristics of data transfer.

Transmission delay after power-up and programming	5 s • ... • 2 h
Maximum message rate	• 1 message per second • ... • 10 messages per second • ... • 20 messages per second

Select which channels and temperature controls you would like to use. The channels control the connected heating/cooling systems on the output channels 1 to 4. Set the ambient climate automatic control in the temperature controls. The controls may be used both for internal channels and for other heating/cooling actuators.

Use channel 1..0.4	Yes• No
Use temperature control 1...4	Yes• No

4.3. Channel 1..0.4

Use the channel menus to select the controls for the heating or cooling system connected to the respective output channel.

First, select the type of valve, then the valve protection interval. This is the interval after which the valve is opened and closed once to avoid jamming.

Valve type	• normally closed • normally open
Valve protection interval (days) (0=deactivated)	0…255; 14

Select the **control type** for the valve:

Control type	• via object (1 bit) • via object (8 bit ON | OFF) • via object (8 bit PWM) • via temperature controller

When controls are effected via a **1 bit object**, fixed output values are selected for 1 (On) and 0 (Off);

Value of output when object value = 1	0…100
Value of output when object value = 0	0…100

When controls are effected via a **8 bit object**, fixed output values are selected for "not 0 (On) and 0(Off);

Output value if object value is not 0	0…100
Output value if object value is 0	0…100

For controls via an **8 bit object with pulse width modulation (PWM)**, only the basic time for the pulse width modulation is set (next setting).

If control takes place **via one of the internal temperature controls,** control and variable are selected.

Temperature controller no.	1 • 2 • 3 • 4
Actuating variable	• Heating level 1 • Heating level 2 • Cooling level 1 • Cooling level 2 • Common level 1 • Common level 2

Please note that for a reset time of less than 5 minutes, the pulse with modulation may only be modified in degrees of 5%.

For all control types, add the basis time for the valve pulse width modulation. The basis time determines the signal duration for 100% open, i.e. a basic time of 100

seconds refers to a signal of 30 seconds (followed by 70 seconds without a signal) 30% opening of the valve.

Valve PWM basis time in seconds	1…6000; 100

Select whether you want the control object to be monitored (not for controls via internal temperature control)

Use control object monitoring	Yes • No
Monitoring time	5 s … 2 h; 10 min
Output value in case of time out (in %)	0...100

Determine whether the output may also be controlled manually and configure the manual function and automatic switches.
If manual control is disabled, the keys on the device are not activated. If manual operation is activated, manual mode becomes active when a key is pressed on the device or respective information is received via the "Channel X: Auto / Manual" object.

Allow manual operation	Yes• No
Object evaluation	• Auto = 0 | Manual = 1 • Auto = 1 | Manual = 0
Object value prior to 1. communication	0 • 1
Output value when On (in %)	0…100
Output value when Off (in %)	0…100
Object "Auto / Manual" sends	• not • periodically • on change • on change and periodically
Transmit cycle *(for periodical transmission only)*	5 s … 2 h; 10 s
Switching to Automatic mode is carried out	• not • after a period of time • upon extended key actuation (> 3 s) • upon extended button actuation or upon time setting
Time *(only if switched to time)*	5 s … 2 h; 1 min

Determine when the general channel status (e.g. ON, OFF, percentage) is to be sent.

Object "Control / Status" sends	• not • periodically • on change • on change and periodically
Transmit cycle *(for periodical transmission only)*	5 s … 2 h; 10 s

The channel may be blocked by a **blocking object** (e. g. block during ventilation). The output value during the block can be set.

Use block	Yes• No
Output value when blocked (in %)	0…100
Object evaluation	• 1 = block | 0 = release • 0 = block | 1 = release
Object value prior to 1. communication	0 • 1

The **channel LED** shows when the output channel is ON. When the channel is switched on in automatic mode, the LED is on. When the channel is switched on in manual mode, the LED flashes.
LED light or flashing may be switched off after a certain period to save energy.

Channel LED	• active when output ON • active when output ON for certain period
Lighting time (in minutes)	1…60; 10

4.4. Temperature controller

The **KNX K4 actuator** provides four temperature controls that are independent of the device outputs and thus may also be used for the control of other heating/cooling actuators.

4.4.1. General regulation

For an adequate regulation of the indoor temperature, comfort, standby, eco and building protection modes may be used.
Comfort when present,
Standby during short absences,
Eco as a night-time mode and
Frost/heat protection (building protection) during longer absences.

The settings for the temperature control include the set point temperatures for the individual modes. Objects are used to determine which mode is to be selected. A change of mode may be triggered manually or automatically (e.g. by a timer, window contact).

The **mode** may be switched with two 8 bit objects of different priority. Objects
"... HVAC mode (Prio 2)" for switching in everyday operation and
"... HVAC mode (Prio 1)" for central switching with higher priority.
The objects are coded as follows:

ID	Name	Encoding	Range	Use
20,102	DPT_HVACMode	field1 = HVACMode 0 = Auto 1 = Comfort 2 = Standby 3 = Economy 4 = Building Protection	[0 ... 4]	HVAC

Alternatively, you can use three objects, with one object switching between eco and standby mode and the two others are used to activate comfort mode or frost/heat protection mode. The comfort object then blocks the eco/standby object, and frost/heat protection objects have the highest priority. Objects
"... Mode (1: Eco, 0: Standby)",
"... comfort activation mode" and
"... frost/heat protection activation mode"

Switch mode via	• two 8-bit objects (HVAC modes) • three 1-bit objects

Select the mode to be activated after reset (e.g. power failure, reset of the line via the bus). (Default).
Then configure a block of the temperature control by the blocking object.

Mode after reset	• Comfort • Standby • Eco • Building protection
Behaviour of the blocking object at value	• 1 = block | 0 = release • 0 = block | 1 = release
Blocking object value before 1st communication	0 • 1

Determine when the current settings of the controls are to be transmitted to the bus. Periodic transmission is safer if a message does not reach a recipient. You may also set up periodical monitoring by the actuator with this setting.

Send actuating variables	• on change • on change and periodically
cycle *for periodical transmission only*	5 s • ... • 5 min • ... • 2 h

The status object shows the current status of the output variable (0 = OFF, >0 = ON) and may, for example, be used for visualisations or to switch off the heating pump as soon as the heating is off.

Send status objects	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
cycle *for periodical transmission only*	5 s • ... • 5 min • ... • 2 h

Then define the type of setting. Heating and/or cooling may be controlled in two levels.

Type of control	• One-stage heating • Dual-speed heating • Single-speed cooling • Dual-stage cooling • Single-speed heating + Single-speed cooling • Dual-speed heating + Single-speed cooling • Dual-speed heating + Dual-speed cooling

4.4.2. General set point values

You may enter separate set point values for each mode or use the comfort set point as a basic value.
If you are using the controls for both heating *and* cooling, you may also select the setting "separately with switching object". Systems used for cooling in the summer and for heating in the winter can thus be switched from one to the other.
If you are using the basic value, only the deviation from the comfort set point value is listed for the other modes (e. g., 2°C less for standby mode).

Setting the nominal values	• separate with switching object • separate without switching object • with comfort set point as a basis
Behaviour of the switching object at value *only if switching object is used*	• 0 = Heating | 1 = Cooling • 1 = Heating | 0 = Cooling
Switching object value before 1st communication *only if switching object is used*	0 • 1

The grades for the set point changes is predefined. Modifications may only remain active temporarily (do not save) or remain saved even after voltage recovery (and programming). This also applies to a comfort extension.

Grading for set point changes (in 0.1 °C)	1… 50; 10
Saving set point value(s) and comfort extension time	• not • after voltage recovery • after voltage recovery and programming (do not use for first start-up!)

The control may be manually reset to comfort mode from eco, or night mode. This allows the user to maintain the daily nominal value for a longer time, e.g. when having guests. The duration of this comfort extension period is set. After the comfort extension period is terminated, the system returns to eco mode.

Comfort extension time in seconds (can only be activated from eco mode)	1…36000; 3600

Set point Comfort

Comfort mode is usually used for daytime mode when people are present. A starting value is defined for the comfort set point as well as a temperature range in which the nominal value may be modified.

Initial heating/cooling set point (in 0.1 °C) valid till 1st communication *not upon saving the set point value after programming*	-300…800; 210
Min. object value heating/cooling (in 0.1 °C)	-300…800; 160
Max. object value heating/cooling (in 0.1 °C)	-300…800; 280

If the comfort set point is used as the basis, a dead zone is determined for the control mode "heating *and* cooling" to avoid direct switching from heating to cooling.

Dead zone between heating and cooling *only if both heating AND cooling are used.*	1…100; 50

Set point for standby

Standby mode is usually used for daytime mode when people are absent.

If set point values are entered separately:

A starting set point value is defined as well as a temperature range in which the nominal value may be modified.

Initial heating/cooling set point (in 0.1 °C) valid till 1st communication	-300…800; 210
Min. object value heating/cooling (in 0.1 °C)	-300…800; 160
Max. object value heating/cooling (in 0.1 °C)	-300…800; 280

If the comfort set point value is used as a basis:

If the comfort set point value is used as a basis, the deviation from this value is set.

Reduce nominal heating value (in 0.1°C) *for heating*	0…200; 30
Increase nominal cooling value\r\n (in 0.1°C) *for cooling*	0…200; 30

Eco set point

Eco mode is usually used for night mode.

If set point values are entered separately:

A starting set point value is defined as well as a temperature range in which the nominal value may be modified.

Initial heating/cooling set point (in 0.1 °C) valid till 1st communication	-300…800; 210
Min. object value heating/cooling (in 0.1 °C)	-300…800; 160
Max. object value heating/cooling (in 0.1 °C)	-300…800; 280

If the comfort set point value is used as a basis:

If the comfort set point value is used as a basis, the deviation from this value is set.

Reduce nominal heating value (in 0.1°C) *for heating*	0…200; 50
Increase nominal cooling value\r\n (in 0.1°C) *for cooling*	0…200; 60

Set point values for frost/heat protection (building protection)

The building protection mode is used during longer absences. Set points for frost protection (heating) and heat protection (cooling) are determined which may not be modified from outside (no access via operating devices etc.). The building protection mode may be activated with delay, which allows you to leave the building before the controls switch to frost/heat protection mode.

Nominal value frost protection\r\n (in 0,1°C)	-300…800; 70
Nominal value heat protection (in 0,1°C)	-300…800; 350
Activation delay	no • 5 s • ... • 5 min • ... • 2 h

General variables

This setting appears for the control types "Heating *and* Cooling" only. This is where you can decide whether to use a common variable for heating and cooling. If the 2nd level has a common variable, this is also where you determine the control mode of the 2nd level.

For heating and cooling	• separate variables are used • common variables are used for Level 1 • common variables are used for Level 2 • common variables are used for Level 1+2
Control type *only for level 2*	• 2-point control • PI control
Regulating variable of the 2nd Stage is on *only for level 2*	• 1-bit object • 8-bit object

4.4.3. Heating control level 1/2

If a heating control mode is configured, one or two setting sections for the heating levels are displayed.

On the 1st level, heating is controlled by a PI control which allows to either enter control parameters or select predetermined applications.

On the 2nd level (therefore only in case of a 2 level heating), heating is controlled via a PI or a 2-point-control.
On level 2, the set point deviation between the two levels must furthermore be determined, i. e. the lowest set point value from which the 2nd level is then added (when values exceed this set point).

Set point difference between levels 1 and 2 (in 0.1°C) *only for level 2*	0…100; 40
Control type *only for level 2 and if no common variables are used*	• 2-point control • PI control

PI control with control parameters:

This setting allows individual input of the parameters for PI control.

Control type	**• PI control**
Set control using	**• Controller parameter** • provided applications

Determine the deviation from the set point value which reaches maximum variable value, i. e. the point at which maximum heating power is activated.
The reset time shows how quickly the controls react to deviations from the set point value. In case of a short reset time, the controls react with a fast increase of the variable. In case of a long reset time, the controls react somewhat more gently and needs longer until the necessary variable for the set point deviation is reached.
You should set the time appropriate to the heating system at this point (note manufacturer instructions).

Maximum control variable is reached at set point/actual difference of (in °C)	0...5
Reset time (in min.)	1…255; 30

Now determine what should be transmitted when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

In case of a common variable for heating and cooling, 0 is always transmitted as a fixed value.

PI control with predetermined application:

This setting provides fixed parameters for frequent applications.

Control type	• **PI control**
Set control using	• Controller parameter • **provided applications**
Application	• Warm water heating • Floor heating • Convection unit • Electric heating
Maximum control variable is reached at set point/actual difference of (in °C)	Warm water heating: 5 Floor heating: 5 Convection unit: 4 Electric heating: 4
Reset time (in min.)	Warm water heating: 150 Floor heating: 240 Convection unit: 90 Electric heating: 100

Now determine what should be transmitted when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

In case of a common variable for heating and cooling, 0 is always transmitted as a fixed value.

2-point-rule (only level 2):

The 2-point-rule is used for systems which are only set to ON or OFF.

Control type *is determined at a higher level for common variables*	• **2-point control**

Enter the hysteresis that prevents frequent on/off switching of temperatures in the threshold range. Then determine whether a 1 bit object (on/off) or an 8 bit object (on with percentage/off) should be used.

Hysteresis (in 0.1°C)	0…100; 20
Actuating variable is a	• 1-bit object • 8-bit object
Value (in %) *only for 8 bit objects*	0...100

Now determine what should be transmitted when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

4.4.4. Cooling control level 1/2

If a cooling control mode is configured, one or two setting sections for the cooling levels are displayed.

On the 1st level, cooling is controlled by a PI control which allows to either enter control parameters or select predetermined applications.

On the 2nd level (therefore only in case of a 2 level cooling), cooling is controlled via a PI or a 2-point-control.
On level 2, the set point deviation between the two levels must furthermore be determined, i. e. the highest set point value from which the 2nd level is then added (when values exceed this set point).

Set point difference between levels 1 and 2 (in 0.1°C) *only for level 2*	0…100; 40
Control type *only for level 2 and if no common variables are used*	• 2-point control • PI control

PI control with control parameters:

This setting allows individual input of the parameters for PI control.

Control type	• **PI control**
Set control using	• **Controller parameter** • provided applications

Determine the deviation from the set point value which reaches maximum variable value, i. e. the point at which maximum cooling power is activated.
The reset time shows how quickly the controls react to deviations from the set point value. In case of a short reset time, the controls react with a fast increase of the variable. In case of a long reset time, the controls react somewhat more gently and needs longer until the necessary variable for the set point deviation is reached.
You should set the time appropriate to the cooling system at this point (note manufacturer instructions).

Maximum control variable is reached at set point/actual difference of (in °C)	0...5
Reset time (in min.)	1…255; 30

Now determine what should be transmitted when the control is blocked.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

In case of a common variable for heating and cooling, 0 is always transmitted as a fixed value.

PI control with predetermined application:

This setting provides fixed parameters for a cooling ceiling

Control type	• **PI control**
Set control using	• Controller parameter • **provided applications**
Application	• Cooling ceiling
Maximum control variable is reached at set point/actual difference of (in °C)	Cooling ceiling: 5
Reset time (in min.)	Cooling ceiling: 30

Now determine what should be transmitted when the control is blocked.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

2-point-rule (only level 2):

The 2-point-rule is used for systems which are only set to ON or OFF.

Control type *is determined at a higher level for common variables*	• **2-point control**

Enter the hysteresis that prevents frequent on/off switching of temperatures in the threshold range. Then determine whether a 1 bit object (on/off) or an 8 bit object (on with percentage/off) should be used.

Hysteresis (in 0.1°C)	0...100; 20
Actuating variable is a	• 1-bit object • 8-bit object
Value (in %) *only for 8 bit objects*	0...100

Now determine what should be transmitted when the control is blocked.
Upon release, the control variable follows the rule again.

When blocked, the variable shall	• not be transmitted • send a specific value
Value (in %) *only if a value is transmitted*	0...100

In case of a common variable for heating and cooling, 0 is always transmitted as a fixed value.

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