CHORUS

GEWISS

# KNX fan coil actuator - DIN rail mounting


**GWA9140**

# Technical Manual

# Contents

# 1 Introduction

This manual explains the functions of the "**Fan coil actuator**" (GWA9140), and how they are set and configured using the ETS configuration software.

# 2 Application

GWA9140 is a KNX fan coil actuator for 2-pipe and 4-pipe systems. It commands a fan coil with a heating or cooling valve and up to 3 ventilation levels.
The regulation can be made via a control variable sent from an external device (e.g. the Thermo ICE thermostat, GW 16 976 Cx) or via the built-in ambient thermostat.
If the thermostat is used, the GWA9145 - NTC 100K TEMPERATURE SENSOR must be connected to the device.
There are 2 inputs for window contacts or for measuring the temperature and monitoring the drip tray.
An additional relay can command an electric heating or cooling battery, as required.
The operation status is indicated by means of 9 LEDs.
To easily adapt the programmed values to your own comfort and energy saving requirements, the built-in regulator offers four operating modes:

- Comfort
- Standby
- Night
- Frost Protection

Each operating mode is assigned a nominal value.

**Comfort** mode is used when there are people in the room.
In **Standby**, the nominal value is lowered slightly. This mode is used if the room is empty at the moment but it is expected that people will come in soon.
With **Night**, the nominal value is lowered even more because the room is not expected to be used for several hours.
With **Frost Protection**, the room temperature is such as to prevent any damage to the radiators as a result of freezing when the outdoor temperature is very low. This mode may be necessary for two reasons: the room is not occupied for several days, or a window has been opened and so there is no heating enabled for the time being.

The operating mode is usually commanded from a control panel or supervisor. For optimum command however, window contacts are also recommended.

<u>The main functions are:</u>

• Device for commanding fan coils.
• Can be used in 2-pipe and 4-pipe systems.
• Suitable for 2- and 3-point valves.
• Up to 3 ventilation levels.
• Simple start-up thanks to 2 button keys for fan test and heating/cooling mode (to be enabled via ETS).
• The additional relay for heating/cooling can also be used as a switchover output.
• 2 inputs for a window contact or external temperature sensor (GWA9145) and drip tray monitoring (or they can be used as two general binary inputs if necessary).
• Command via an external control variable or the built-in ambient thermostat.
• Mode changeover via the presence object and the window object.
• The reference temperature can be adapted in cooling mode according to the outdoor temperature.
• In the case of an external regulator, a configurable emergency program can be defined. In the case of an internal regulator, you can define the operating mode to be adopted following a restart.
• Monitoring of the fan coil filter via configurable signalling with an indication of the operating time.

## 2.1 Warning!

**Use associated with chronothermostats and KNX thermostats**

List of KNX timed thermostats and thermostats that can be used with the fan coil actuators GWA9140 and GWA9141.

- **THERMO ICE KNX wall-mounting thermostat GW16976CB/CN/CT:**
  for controlling all the functions of the fan coil actuators (that shall be configured to work with kind of used controller "remote controller") and commanding the fan in both automatic and manual mode.

- **THERMO ICE KNX flush-mounting thermostat GW16974CB/CN/CT:**
  attention - this thermostat can only be used in KNX-SYSTEM mode (configurable with ETS). For controlling the fan coil actuators (that shall be configured to work with kind of used controller "remote controller") and commanding the fan in automatic mode only - i.e. the thermostat conveys the valve opening request (0..100% byte) to the fan coil actuators, which automatically define the fan speed; the fan speed cannot therefore be controlled via the thermostat.

- **Other KNX SYSTEM timed thermostats, thermostats and probes:**
  attention - these models permit only limited use of the control functions of the fan coil actuators (that shall be configured to work with kind of used controller "remote controller"), so their validity should be evaluated for the individual situation on the basis of the application requisites.

- **KNX EASY timed thermostats, thermotats and probes:**
  attention - these models cannot be used to control the fan coil actuators.

## 2.2 Association limits

Maximum number of group addresses: 64
Maximum number of associations: 64

This means that up to 64 group addresses can be defined, and up to 64 associations can be made between communication objects and group addresses.

# 3 “General” menu

The ***General*** menu contains the parameters used to enable the various functions implemented by the device, and to set the main operating parameters.

Depending on the value defined in the **“Supported functions”** and “**Kind of used controller**” parameters, other parameters of the ***General*** menu and other menus will be made visible in the left-hand column to allow you to configure the required function.

The **“Supported functions”** parameter is used to specify the function supported by the fan coil actuator.
The values that can be set are:

- Fan
- Heating
- Cooling
- **Heating and Cooling** **(default value)**

The “**Test mode”**, “**Report filter change”, “Switch fan between Auto and forced mode”** parameters are visible in the **General** menu regardless of the type of function supported, so they are shown below and then not repeated again in this manual.

With the "**Test mode"** parameter, the user can enable the possibility to switch to "Test mode" in the first minute after reset, or else disable test mode. The possible values are:

- **disabled** **(default value)**
- enabled during 1 min. after reset

If "**disabled**" is set, test mode is not possible.

If "**enabled during 1 min. after reset"** is set, the user can switch to "Test mode" after a reset by activating a button key. The ***Testmode active*** (DPT 1.003 Enable) object will be made visible so the device can signal the activation of test mode on the BUS (value "1" =Test mode).

For the "Test mode" procedure, useful during the initial device start-up, refer to par. 18.1 "Test mode".

The **"Report filter change"** parameter allows the actuator to signal the need for a filter change after a certain number of operating weeks (set via the specific "**Filter monitoring**" menu) and operating hours. The possible values are:

- **no** **(default value)**
- yes

Setting "**yes**" will visualise the "**Filter monitoring**" menu, where the user can set the parameters for signalling a filter change, along with the ***Fan duty time since last filter change*** (DPT 7.007 time -h) object that sends the current status of the internal fan operating hour counter (the operating time is sent in hours) and ***Change filter*** (DPT 1.001 Switch) which has two functions:

1. Transmission object:
   Sends a "1" when the configured fan operating time has been reached.
   See the " **Message for filter change after duty time of (1..127 weeks)"** parameter in the menu "**Filter monitoring**".

2. Receiving object:
   Reset of the ***Change filter*** status and the fan operating hour counter (***Fan duty time since last filter change*** object). 0 = Reset.

The "**Switch fan between Auto and forced mode"** parameter is used to specify the value assumed by the "***Fan auto/forced***" (DPT 1.001 Switch) object that activates the forced contribution of the fan. The required ventilation level with forcing is defined via the 1-byte "***Forced fan step – fan control with % value***" (DPT 5.001 Scaling) object, sending a percentage value between 0% and 100%.
The possible values are:

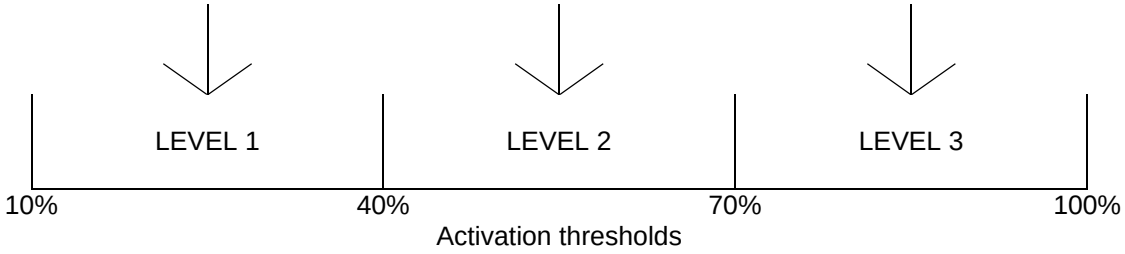
- **Via obj. Forced/auto, forced = 1** **(default value)**
- Via obj. Auto/forced, forced = 0

If "**Via obj. Forced/auto, forced = 1**" is set, the ***Fan auto/forced*** object will activate forcing if the value 1 is received, or go into automatic mode if the value 0 is received.
If "**Via obj. Auto/forced, forced = 0**" is set, the ***Fan auto/forced*** object will activate forcing if the value 0 is received, or go into automatic mode if the value 1 is received.

The forced fan contribution has no effect on valve control.
**Example:**
Registered forced telegrams with the following settings on the *"Fan"* parameter page:

*Activation threshold value for fan level 1* = 10%
*Activation threshold value for fan level 2* = 40%
*Activation threshold value for fan level 3* = 70%

| Forced telegram | Forced telegram | Forced telegram |
|---|---|---|
| 25% | 55% | 85% |




## 3.1 *Parameters and objects of the "Fan" function*

The menu that appears with "**Supported functions**" set on "**fan**" is the following:

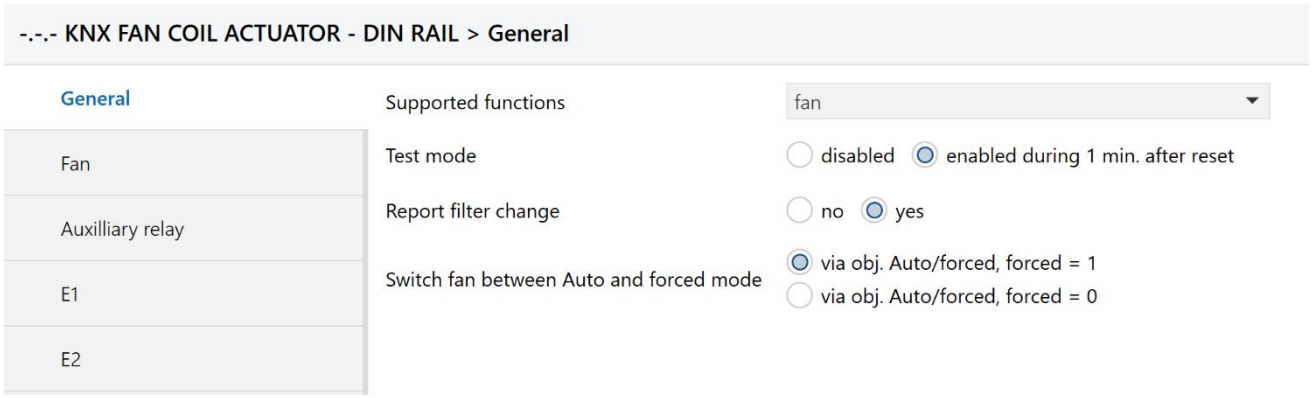



Fig. 3.1 – Menu with Supported functions = Fan

With the "**fan"** supported function, there are no other parameters apart from those already described in ch. 3 **Menu General**. The following communication objects are visible and accessible:

- ***Actuating value for fan*** (DPT 5.001 Scaling). Via this 1-byte object, the actuator receives the control variable for fan command (value as %).
- ***Fan step*** (DPT 5.010 Counter Pulses), value between 0 and 255. This object signals the current fan level (0 - 3).
- ***Auxiliary relay*** (DPT 1.001 Switch), with the function depending on the "**Switch ON auxiliary relay**" parameter configured in the **Auxiliary relay** menu.
- ***Lock additional ventilation*** (DPT 1.001 Switch), used to block the "Additional ventilation" function if activated (1=lock, 0=release).
- ***Fan lock*** (DPT 1.001 Switch), receiving object used to block the fan (1=fan lock, 0=automatic mode).
- ***Forced fan step*** (DPT Scaling %), used to set (with a value of 0 - 100%) the required ventilation level with fan forcing activated via the object ***Fan auto/forced*** (DPT 1.001 Switch).
- ***Limitation of fan step in %*** (DPT 5.001 Scaling). Used to define the maximum permitted control variable and the corresponding maximum fan level with a percentage value. The following values are used.

| Value | Maximum permitted fan level |
|---|---|
| 0% | The fan is not activated |
| 1% - 99% | Maximum permitted fan level for normal and forced mode |
| 100% | No limit - automatic mode (= object value after reset) |

**Example:**
Configured activation thresholds:
Fan level 1, or activation threshold (with fan command 0-10V) = 10%
Fan level 2 = 40% (only with standard fan command 1-3 levels)
Fan level 3 = 70% (only with standard fan command 1-3 levels)

**Table 3.1.1: standard fan command (1-3 levels)**

| Value received on object 9 | Maximum fan level |
|---|---|
| 0% .. 9%* | The fan is not activated |
| 10% .. 39% | 1 |
| 40% .. 69% | 2 |
| 70% .. 100%** | 3 |

* If the value is lower than the activation threshold or below level 1, the fan cannot be activated.
** The value is equal to - or higher than - the activation threshold for level 3 (i.e. no limit)

- ***Fan off*** (DPT 1.001 Switch), signalling object for the fan status. Sends 1 when the fan is OFF.
- ***Fan step 1, 2, 3*** (DPT 1.001 Switch), signal the fan status when set at level 1, 2 or 3 respectively. The number of fan levels can be set via the "**Number of fan steps"** parameter in the **Fan** menu. On the basis of the number of levels, the corresponding objects will be made visible.
- ***Status of window contact at E1*** (DPT 1.019 window/door), ***Actual value from E1*** (DPT 9.001 Temperature °C). The function and format of this object depend on the "**Function of E1"** parameter set in the **E1** menu. If a window contact (only available if an external regulator is used) is connected to the input, it acts as a status object for signalling the window contact status, but if an external temperature sensor (e.g. GWA9145 - NTC 100K TEMPERATURE SENSOR) is connected, it sends - on the BUS - the ambient temperature currently measured by the sensor (this is the fixed setting if an internal regulator is used).
- ***Fan auto/forced*** (DPT 1.001 Switch) activates or deactivates the forced fan contribution.
- ***Status of window contact at E2*** (DPT 1.019 window/door) signals the opening or closure of a window whose contact is connected to input E2. Useful if input E1 is used for an external sensor so input E2 can be used to monitor an open/closed window contact. The configuration parameters can be found in menu **E2**, only visible in **Fan and Heating**.

## 3.2 *Parameters and objects of the "Heating" function*

If the supported function is "**Heating**", the menu in fig. 3.2 will be visible along with the specific "**Heating valve**" menu for configuring all the parameters needed for the device to work in heating mode.

The parameter list that appears in the **General** menu with "**Supported functions**" = "**Heating**" is the following:

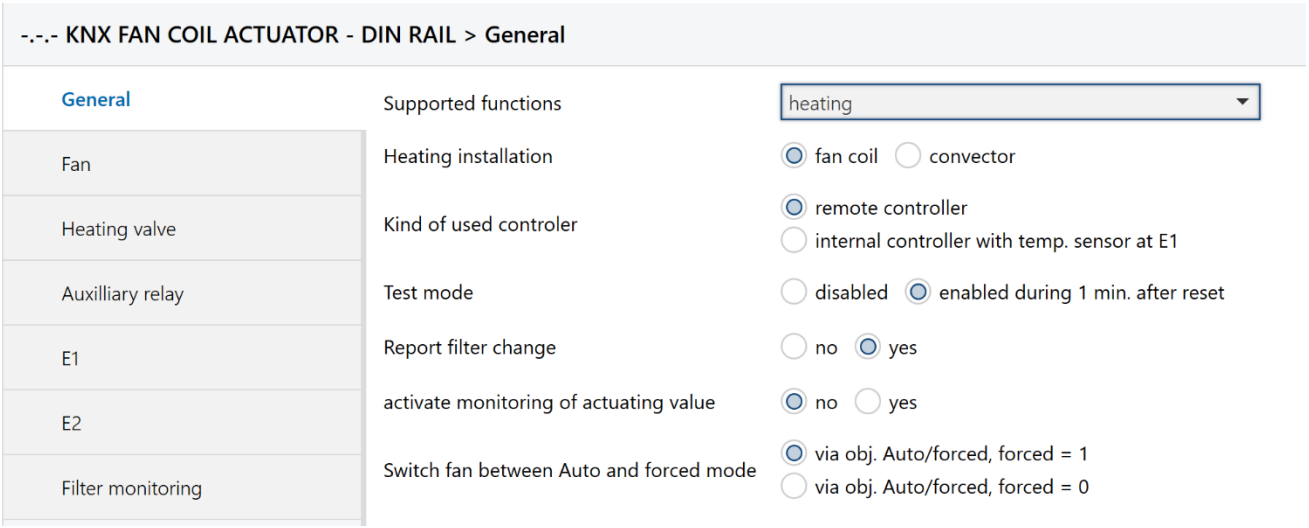



Fig. 3.2 – Supported functions = Heating

With the **Heating** supported function, the following communication objects and parameters (in addition to those already described in **ch. 3 General**) are visible and accessible:

- ***Actuating value heating*** (DPT 5.001 Scaling). Via this 1-byte object, the actuator receives the control variable for the heating valve (% value) if the "**Kind of used controller"** is **remote controller**, and sends the current control variable of the heating valve if the "**Kind of used controller"** is **internal controller with temp. sensor at E1.**

- ***Disable heating*** (DPT 1.001 Switch). This object can block the heating function (if it receives the value 1) or release the block (value 0). After the reset, the value of this object is 0 (i.e. heating permitted).

- ***Heating status*** (DPT 1.001 Switch). Sends the current heating status:
  1 = heating control variable higher than 0% (heating mode active).
  0 = heating control variable 0% (heating mode not currently active).

- ***Fan step*** (DPT 5.010 Counter Pulses). The object signals the current fan level (0 - 3).

- ***Auxiliary relay*** (DPT 1.001 Switch), with the function depending on the "**Switch ON auxiliary relay**" parameter configured in the **Auxiliary relay** menu.

- ***Lock additional ventilation*** (DPT 1.001 Switch), used to block the "Additional ventilation" function if activated (1=lock, 0=release).

- ***Fan lock*** (DPT 1.001 Switch), receiving object used to block the fan (1=fan lock, 0=automatic mode).

- ***Forced fan step*** (DPT Scaling %), used to set (with a value of 0 - 100%) the required ventilation level with fan forcing activated via the object ***Fan auto/forced*** (DPT 1.001 Switch).

- ***Limitation of fan step in %*** (DPT 5.001 Scaling). Used to define the maximum permitted control variable and the corresponding maximum fan level with a percentage value. The following values are used.

| Value | Maximum permitted fan level |
|---|---|
| 0% | The fan is not activated |
| 1% .. 99% | Maximum permitted fan level for normal and forced mode |
| 100% | No limit - automatic mode (= object value after reset) |

**Example:**
Configured activation thresholds:
Fan level 1, or activation threshold (with fan command 0-10V) = 10%
Fan level 2 = 40% (only with standard fan command 1-3 levels)
Fan level 3 = 70% (only with standard fan command 1-3 levels)

**Table 3.2.1: standard fan command (1-3 levels)**

| Value received on object 9 | Maximum fan level |
|---|---|
| 0% .. 9%* | The fan is not activated |
| 10% .. 39% | 1 |
| 40% .. 69% | 2 |
| 70% .. 100%** | 3 |

* If the value is lower than the activation threshold or below level 1, the fan cannot be activated.
** The value is equal to - or higher than - the activation threshold for level 3 (i.e. no limit)

- ***Fan off*** (DPT 1.001 Switch), signalling object for the fan status. Sends 1 when the fan is OFF.

- ***Fan step 1, 2, 3*** (DPT 1.001 Switch), signal the fan status when set at level 1, 2 or 3 respectively. The number of fan levels can be set via the "**Number of fan steps"** parameter in the **Fan** menu. On the basis of the number of levels, the corresponding objects will be made visible.

- ***Status of window contact at E1*** (DPT 1.019 window/door), ***Actual value from E1*** (DPT 9.001 Temperature °C). The function and format of this object depend on the "**Function of E1"** parameter set in the **E1** menu. If a window contact (only available if an external regulator is used) is connected to the input, it acts as a status object for signalling the window contact status, but if an external temperature sensor (e.g. GWA9145 - NTC 100K TEMPERATURE SENSOR) is connected, it sends - on the BUS - the ambient temperature currently measured by the sensor (this is the fixed setting if an internal regulator is used).

- ***Fan auto/forced*** (DPT 1.001 Switch) activates or deactivates the forced fan contribution.

- ***Status of window contact at E2*** (DPT 1.019 window/door) signals the opening or closure of a window whose contact is connected to input E2. Useful if input E1 is used for an external sensor so input E2 can be used to monitor an open/closed window contact. The configuration parameters can be found in menu E2, **E2** only visible in **Fan and Heating**.

### 3.2.1 Heating installation

This parameter is used to specify the type of heating system envisaged, selecting one of the following values:

- **Fan Coil** **(default value)**
- Convector

### 3.2.2 Kind of used controller

This parameter specifies the type of regulator used, i.e. an external device or the internal temperature control logic, by means of a temperature sensor connected to the device via input E1.

- **remote controller** **(default value)**
- internal controller with temp. sensor at E1

The term **remote controller** means that the regulation is made by another KNX device connected to the BUS system (e.g. the GW 16 976 Cx Thermo ICE thermostat) with the aim of sending the fan coil actuator the command and regulation objects to be implemented on the outputs (in this case, the device acts as a simple actuator).

If the regulation is made by an "**internal controller with temp. sensor at E1",** the device measures and autonomously manages temperature regulation by implementing it on the output load. In this case, the **Set point values**, **Regulation**, **Operating mode and Operation** menus are visualised, along with the following communication objects:

- ***Actual value from E1*** (DPT 9.001 Temperature °C). Sends the current ambient temperature measured by the sensor on the BUS. The "**Transmission of actual value at change of"** parameter in menu **E1** is used to set the method for sending the measured temperature.

- ***Sensor failure*** (DPT 1.001 Switch). Signals an error when the temperature sensor connection is interrupted or short-circuited.

- ***Operating mode preset*** (DPT 20.102 HVAC mode) or ***Night mode <-> Standby*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the menu **Operating mode and Operation**.

- ***Presence*** (DPT 1.018 occupancy) or ***Comfort*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the menu **Operating mode and Operation.**

- ***Window*** (DPT 1.019 window/door) or ***Frost protection*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the **Operating mode and Operation** menu.

- ***Current operating mode*** (DPT 20.102 HVAC mode) sends the HVAC mode active on the device (values 1=Comfort, 2=Standby, 3=Night/Economy, 4=Frost Protection/overtemperature protection). Transmission on the BUS can be set via the "**Cyclical transmission of current op. mode every**" parameter in the **Operating mode and Operation** menu.
- ***Manual adjustment*** (DPT 9.002 temperature difference K). The device uses this receiving object to receive a temperature difference for adapting the ambient temperature (active nominal value) in relation to the *Base set point*, using the following formulas:

  New nominal value (heating) = active nominal value + manual adjustment.

  New nominal value (cooling) = active nominal value + manual adjustment + dead zone + nominal value adjustment.

Values outside the range defined in the "**Limitation of manual value increasing/decreasing"** parameter of the **Operating mode and operation** menu will be limited to the maximum or minimum value.

- ***Base set point*** (DPT 9.001 temperature °C). The nominal base value is predefined for the first time during the application start-up, and saved in the *"Programmed base value"* object.
  It can be redefined at any time via this object (limit for the valid maximum or minimum nominal value). In the event of a BUS voltage failure, this object is saved and the last value will be restored when the voltage returns. The object can be overwritten any number of times.

- ***Current set point value*** (DPT 9.001 temperature °C). Signals the current nominal temperature value on the BUS.

- ***Heating required but heating disabled*** (DPT 1.001 Switch). Error signalling object. An error is signalled in the following cases:

  **Case 1:** Heating mode has been forced via the ***Heating/Cooling*** object, but the ambient temperature is so much higher than the programmed temperature that cooling is required.

  **Case 2:** Cooling mode has been forced via the ***Heating/Cooling*** object, but the ambient temperature is so much lower than the programmed temperature that heating is required.

### 3.2.3 Activate monitoring of actuating value

If "**Kind of used controller"** is set on **remote controller**, the **"Activate monitoring of actuating value"** parameter will be visualised so that control via the device can be set if the control variable is received in the standard interval. The possible values are:

- **no** **(default value)**
- yes

Setting "**yes**" visualises the ***Actuating value loss*** (DPT 1.001 Switch) object which signals - via the BUS - (value 1= Control variable error, 0 = Control variable OK) if the control variable is received within the monitoring window set via the parameters of the **Actuating value loss** menu**.**

For more information about the monitoring of the control variable, refer to par 19.1 in Annex 2.

## 3.3 *Parameters and objects of the function "Cooling"*

If the supported function is "**Cooling**", the menu in fig. 3.3 will be visible along with the "**Cooling valve**", "**Drip tray monitoring**" and "**Set point adjustment**" menus described below, where you can configure all the parameters needed for the device to work in cooling mode.

The parameter list that appears in the **General** menu with "**Supported functions**" = "**Cooling**" is the following:

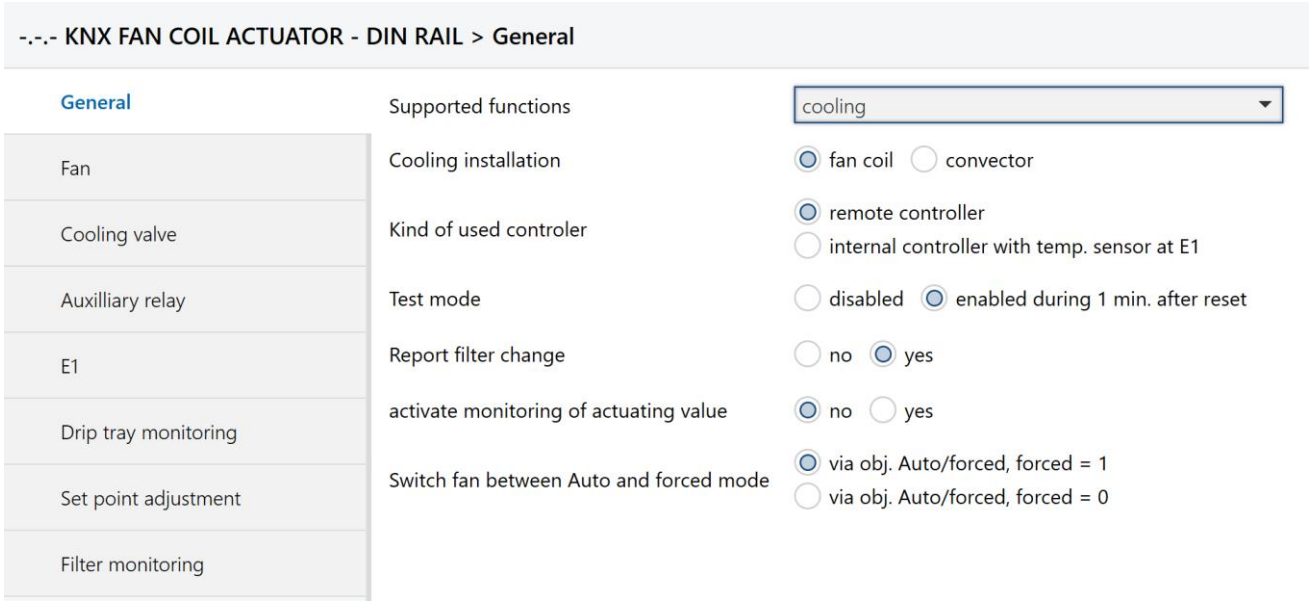



Fig. 3.3 – Supported functions = Cooling

With the **Cooling** supported function, the following communication objects and parameters are visible and accessible:

- ***Actuating value cooling*** (DPT 5.001 Scaling). Via this 1-byte object, the actuator receives the control variable for the cooling valve (% value) if the "**Kind of used controller"** is **remote controller**, and sends the current control variable of the cooling valve if the "**Kind of used controller"** is **internal controller with temp. sensor at E1.**

- ***Enable cooling*** (DPT 1.001 Switch). This object can allow the cooling function (if it receives the value 1) or block it (value 0). After the reset, the value of this object is 1 (i.e. cooling permitted).

- ***Cooling status*** (DPT 1.001 Switch). Sends the current cooling status:
  1 = cooling control variable higher than 0% (cooling mode active).
  0 = cooling control variable 0% (cooling mode not currently active).

- ***Fan step*** (DPT 5.010 Counter Pulses). The object signals the current fan level (0 - 3).

- ***Auxiliary relay*** (DPT 1.001 Switch), with the function depending on the "**Switch ON auxiliary relay**" parameter configured in the **Auxiliary relay** menu.

- ***Lock additional ventilation*** (DPT 1.001 Switch), used to block the "Additional ventilation" function if activated (1=lock, 0=release).

- ***Fan lock*** (DPT 1.001 Switch), receiving object used to block the fan (1=fan lock, 0=automatic mode).

- ***Forced fan step*** (DPT Scaling %), used to set (with a value of 0 - 100%) the required ventilation level with fan forcing activated via the object ***Fan auto/forced*** (DPT 1.001 Switch).

- ***Limitation of fan step in %*** (DPT 5.001 Scaling). Used to define the maximum permitted control variable and the corresponding maximum fan level with a percentage value. The following values are used.

| Value | Maximum permitted fan level |
|---|---|
| 0% | The fan is not activated |
| 1% .. 99% | Maximum permitted fan level for normal and forced mode |
| 100% | No limit - automatic mode (= object value after reset) |

**Example:**
Configured activation thresholds:
Fan level 1, or activation threshold (with fan command 0-10V) = 10%
Fan level 2 = 40% (only with standard fan command 1-3 levels)
Fan level 3 = 70% (only with standard fan command 1-3 levels)

**Table 3.2.1: standard fan command (1-3 levels)**

| Value received on object 9 | Maximum fan level |
|---|---|
| 0% .. 9%* | The fan is not activated |
| 10% .. 39% | 1 |
| 40% .. 69% | 2 |
| 70% .. 100%** | 3 |

* If the value is lower than the activation threshold or below level 1, the fan cannot be activated.
** The value is equal to - or higher than - the activation threshold for level 3 (i.e. no limit)

- ***Fan off*** (DPT 1.001 Switch), signalling object for the fan status. Sends 1 when the fan is OFF.

- ***Fan step 1, 2, 3*** (DPT 1.001 Switch), signal the fan status when set at level 1, 2 or 3 respectively. The number of fan levels can be set via the ""**Number of fan steps"** " parameter in the **Fan** menu. On the basis of the number of levels, the corresponding objects will be made visible.

- ***Status of window contact at E1*** (DPT 1.019 window/door), ***Actual value from E1*** (DPT 9.001 Temperature °C). The function and format of this object depend on the "**Function of E1"** parameter set in the **E1** menu. If a window contact (only available if an external regulator is used) is connected to the input, it acts as a status object for signalling the window contact status, but if an external temperature sensor (e.g. GWA9145 - NTC 100K TEMPERATURE SENSOR) is connected, it sends - on the BUS - the ambient temperature currently measured by the sensor (this is the fixed setting if an internal regulator is used).

- ***Fan auto/forced*** (DPT 1.001 Switch) activates or deactivates the forced fan contribution.

- ***Drip tray monitoring status*** (DPT 1.001 switch). The function of the objects depends on the setting of the "**Source for drip tray monitoring"** parameter in the **Drip try monitoring** menu.

- ***Dew point alarm*** (DPT 1.001 switch). Receives dewpoint alarm telegrams (1=alarm). The behaviour is identical to that set for drip tray control.

- ***Outdoor temperature*** (DPT 9.001 temperature °C) receives the temperature for adjusting the nominal value (see annex 2, par. 19.4).

- ***Adjust set point*** (DPT 9.002 temperature difference – in K) indicates the current correction of the value programmed as figure or difference. The correction value format is defined in the **Set point adjustment** menu, via the **"Format of the adjustment value"** parameter.

### 3.3.1 Cooling installation

This parameter is used to specify the type of heating system envisaged, selecting one of the following values:

- **Fan Coil** **(default value)**
- Convector

### 3.3.2 Kind of used controller

This parameter specifies the type of regulator used, i.e. an external device or the internal temperature control logic, by means of a temperature sensor connected to the device via input E1.

- **Remote controller** **(default value)**
- Internal controller with temp. sensor at E1

The term **Remote controller** means that the regulation is made by another KNX device connected to the BUS system (e.g. the GW 16 976 Cx Thermo ICE thermostat) with the aim of sending the fan coil actuator the command and regulation objects to be implemented on the outputs (in this case, the device acts as a simple actuator).

If the regulation is made by an "**Internal controller with temp. sensor at E1",** the device measures and autonomously manages temperature regulation by implementing it on the output load. In this case, the **Set point values, Regulation**, **Operating mode and operation** menus are visualised, along with the following communication objects:

- ***Actual value from E1*** (DPT 9.001 Temperature °C). Sends the current ambient temperature measured by the sensor on the BUS. The "**Transmission of actual value at change of"**" parameter in the **E1** menu is used to set the method for sending the measured temperature.

- ***Sensor failure*** (DPT 1.001 Switch). Signals an error when the temperature sensor connection is interrupted or short-circuited.

- ***Operating mode preset*** (DPT 20.102 HVAC mode) or ***Night mode <-> Standby*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"**" parameter in the **Operating mode and Operation** menu.

- ***Presence*** (DPT 1.018 occupancy) or ***Comfort*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the menu **Operating mode and Operation.**

- ***Window*** (DPT 1.019 window/door) or ***Frost protection*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"**" parameter in the menu **Operating mode and Operation.**

- ***Current operating mode*** (DPT 20.102 HVAC mode) sends the HVAC mode active on the device (values 1=Comfort, 2=Standby, 3=Night/Economy, 4=Frost Protection/overtemperature protection). Transmission on the BUS can be set via the "**Cyclical transmission of current op. mode every**" parameter in the **Operating mode and Operation** menu.
- ***Manual adjustment*** (DPT 9.002 temperature difference K). The device uses this receiving object to receive a temperature difference for adapting the ambient temperature (active nominal value) in relation to the *Base set point*, using the following formulas:

  New nominal value (heating) = active nominal value + manual adjustment.

New nominal value (cooling) = active nominal value + manual adjustment + dead zone + nominal value adjustment.

Values outside the range defined in the "**Limitation of manual value increasing/decreasing**" parameter of the **Operating mode and operation** menu will be limited to the maximum or minimum value.

- ***Base set point*** (DPT 9.001 temperature °C). The nominal base value is predefined for the first time during the application start-up, and saved in the *"Programmed base value"* object.
  It can be redefined at any time via this object (limit for the valid maximum or minimum nominal value). In the event of a BUS voltage failure, this object is saved and the last value will be restored when the voltage returns. The object can be overwritten any number of times.

- ***Current set point value*** (DPT 9.001 temperature °C). Signals the current nominal temperature value on the BUS.

- ***Cooling required but Cooling disabled*** (DPT 1.001 Switch). Error signalling object. An error is signalled in the following cases:

  **Case 1:** Heating mode has been forced via the ***Heating/Cooling*** object, but the ambient temperature is so much higher than the programmed temperature that cooling is required.

  **Case 2:** Cooling mode has been forced via the ***Heating/Cooling*** object, but the ambient temperature is so much lower than the programmed temperature that heating is required.

## 3.4 *Parameters and objects of the "Heating and Cooling" function*

If the supported function is "**Heating and Cooling**", the menu in fig. 3.4 will be visible and, depending on whether "**Kind of installation"** is 2-pipe or 4-pipe, also the "**Heating valve**" and "**Cooling valve**" separated menus (4-pipe) or just the "**Heating/cooling valve** menu (2-pipe). The "**Drip tray monitoring**" and "**Set point adjustment**" menus described below will also be visualised.

The parameter list that appears in the **General** menu with "**Supported functions**" = "**Heating and Cooling**" (with 4-pipe system type, the default value) is the following:

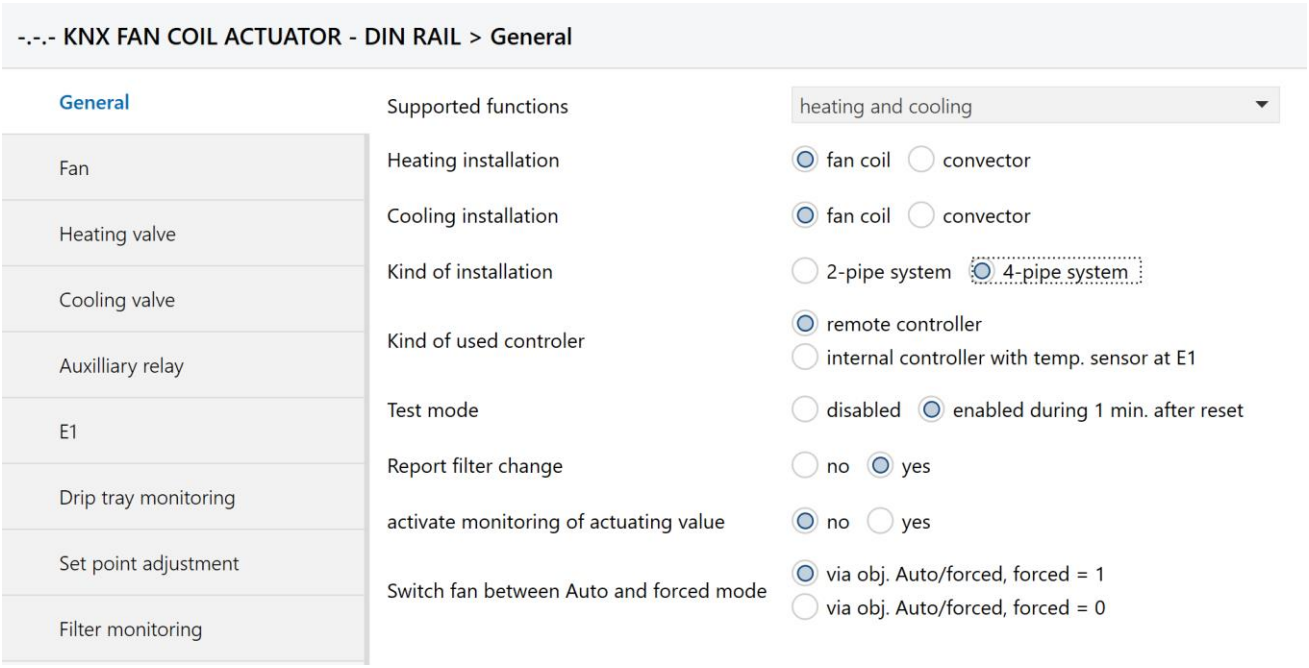



Fig. 3.4 – Supported functions = Heating and Cooling with Kind of installation = 4-pipe system

With the **Heating and Cooling** supported function, the following communication objects and parameters are visible and accessible:

- ***Actuating value heating*** (DPT 5.001 Scaling) and ***Actuating value cooling*** (DPT 5.001 Scaling), visible if "**Kind of installation"** is set on **4-pipe system**. Via this 1-byte object, the actuator receives the control variable for the heating and cooling valve respectively (% value) if the "**Kind of used controller"** is **remote controller**, and sends the current control variable of the heating and cooling valve if the "**Kind of used controller"** is **Internal controller with temp. sensor at E1.** If "**Kind of installation"** is set on **2-pipe system,** the single object that controls both systems is ***Actuating value heating/cooling*** (DPT 5.001 Scaling).

- ***Heating/Cooling.*** (DPT 1.001 Switch). This object, only visible if "**Kind of installation"** is set on **2-pipe system**, allows the device to switch between Heating and Cooling. The value (0 = Heating, 1 = Cooling, or vice versa) can be set via the **"Format object heating/cooling**" parameter**.**

- ***Heating status*** (DPT 1.001 Switch). Sends the current heating status:
  1 = heating control variable higher than 0% (heating mode active).
  0 = heating control variable 0% (heating mode not currently active).

- ***Cooling status*** (DPT 1.001 Switch). Sends the current cooling status:
  1 = cooling control variable higher than 0% (cooling mode active).
  0 = cooling control variable 0% (cooling mode not currently active).

- ***Fan step*** (DPT 5.010 Counter Pulses). This object signals the current fan level (0 - 3).

- ***Auxiliary relay*** (DPT 1.001 Switch), with the function depending on the "**Switch ON auxiliary relay**" parameter configured in the **Auxiliary relay** menu.

- ***Lock additional ventilation*** (DPT 1.001 Switch), used to block the "Additional ventilation" function if activated (1=lock, 0=release).

- ***Fan lock*** (DPT 1.001 Switch), receiving object used to block the fan (1=fan lock, 0=automatic mode).

- ***Forced fan step*** (DPT Scaling %), used to set (with a value of 0 - 100%) the required ventilation level with fan forcing activated via the object ***Fan auto/forced*** (DPT 1.001 Switch).

- ***Limitation of fan step in %*** (DPT 5.001 Scaling). Used to define the maximum permitted control variable and the corresponding maximum fan level with a percentage value. The following values are used.

| Value | Maximum permitted fan level |
|---|---|
| 0% | The fan is not activated |
| 1% .. 99% | Maximum permitted fan level for normal and forced mode |
| 100% | No limit - automatic mode (= object value after reset) |

**Example:**
Configured activation thresholds:
Fan level 1, or activation threshold (with fan command 0-10V) = 10%
Fan level 2 = 40% (only with standard fan command 1-3 levels)
Fan level 3 = 70% (only with standard fan command 1-3 levels)

**Table 3.2.1: standard fan command (1-3 levels)**

| Value received on object 9 | Maximum fan level |
|---|---|
| 0% .. 9%* | The fan is not activated |
| 10% .. 39% | 1 |
| 40% .. 69% | 2 |
| 70% .. 100%** | 3 |

* If the value is lower than the activation threshold or below level 1, the fan cannot be activated.
** The value is equal to - or higher than - the activation threshold for level 3 (i.e. no limit)

- ***Fan off*** (DPT 1.001 Switch), signalling object for the fan status. Sends 1 when the fan is OFF.

- ***Fan step 1, 2, 3*** (DPT 1.001 Switch), signal the fan status when set at level 1, 2 or 3 respectively. The number of fan levels can be set via the "**Number of fan steps"** parameter in the **Fan** menu. On the basis of the number of levels, the corresponding objects will be made visible.

- ***Status of window contact at E1*** (DPT 1.019 window/door), ***Actual value from E1*** (DPT 9.001 Temperature °C). The function and format of this object depend on the "**Function of E1"** parameter set in the **E1** menu. If a window contact (only available if an external regulator is used) is connected to the input, it acts as a status object for signalling the window contact status, but if an external temperature sensor (e.g. GWA9145 - NTC 100K TEMPERATURE SENSOR) is connected, it sends - on the BUS - the ambient temperature currently measured by the sensor (this is the fixed setting if an internal regulator is used).

- ***Fan auto/forced*** (DPT 1.001 Switch) activates or deactivates the forced fan contribution.

- ***Drip tray monitoring status*** (DPT 1.001 switch). The function of the object depends on the setting of the "**Source for drip tray monitoring** parameter in the **Drip try monitoring** menu.

- ***Dew point alarm*** (DPT 1.001 switch). Receives dewpoint alarm telegrams (1=alarm). The behaviour is identical to that set for drip tray control.

- ***Outdoor temperature*** (DPT 9.001 temperature °C) receives the temperature for adjusting the nominal value (see annex 2, par. 19.4).

- ***Adjust set point*** (DPT 9.002 temperature difference – in K) indicates the current correction of the value programmed as figure or difference. The correction value format is defined in the **Set point adjustment** menu, via the **"Format of the adjustment value"** parameter.

### 3.4.1 Kind of installation

This parameter specifies whether the system is 2-pipe or 4-pipe. The possible values are:

- 2-pipe system
- **4-pipe system** **(default value)**

### 3.4.2 Heating installation

This parameter, only visible if "**Kind of installation"** is set on **4-pipe system**, is used to specify the type of heating system by selecting one of the following values:

- **Fan Coil** **(default value)**
- Convector

### 3.4.3 Cooling installation

This parameter, only visible if "**Kind of installation"** is set on **4-pipe system**, is used to specify the type of cooling system by selecting one of the following values:

- **Fan Coil** **(default value)**
- Convector

### 3.4.4 Model of heat exchanger

This parameter, only visible if "**Kind of installation"** is set on **2-pipe system**, is used to specify the type of heat exchanger by selecting one of the following values:

- **Fan Coil** **(default value)**
- Convector

## 3.4.5 Kind of used controller

This parameter specifies the type of regulator used, i.e. an external device or the internal temperature control logic, by means of a temperature sensor connected to the device via input E1.

- **Remote controller (default value)**
- Internal controller with temp. sensor at E1

The term **Remote controller** means that the regulation is made by another KNX device connected to the BUS system (e.g. the GW 16 976 Cx Thermo ICE thermostat) with the aim of sending the fan coil actuator the command and regulation objects to be implemented on the outputs (in this case, the device acts as a simple actuator).

If the regulation is made by an "**Internal controller with temp. sensor at E1",** the device measures and autonomously manages temperature regulation by implementing it on the output load. In this case, the **Set point values, Regulation**, **Operating mode and operation** menus are visualised, along with the following communication objects:

- ***Actual value from E1*** (DPT 9.001 Temperature °C). Sends the current ambient temperature measured by the sensor on the BUS. The "**Transmission of actual value at change of"**" parameter in the **E1** menu is used to set the method for sending the measured temperature.

- ***Sensor failure*** (DPT 1.001 Switch). Signals an error when the temperature sensor connection is interrupted or short-circuited.

- ***Operating mode preset*** (DPT 20.102 HVAC mode) or ***Night mode <-> Standby*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the **Operating mode and Operation** menu.

- ***Presence*** (DPT 1.018 occupancy) or ***Comfort*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the menu **Operating mode and Operation.**

- ***Window*** (DPT 1.019 window/door) or ***Frost protection*** (DPT 1.001 Switch). The function and format of this object depend on the setting of the "**Mode setting objects"** parameter in the menu **Operating mode and Operation.**

- ***Current operating mode*** (DPT 20.102 HVAC mode) sends the HVAC mode active on the device (values 1=Comfort, 2=Standby, 3=Night/Economy, 4=Frost Protection/overtemperature protection). Transmission on the BUS can be set via the "**Cyclical transmission of current op. mode every**" parameter in the **Operating mode and Operation** menu.

- ***Manual adjustment*** (DPT 9.002 temperature difference K). The device uses this receiving object to receive a temperature difference for adapting the ambient temperature (active nominal value) in relation to the *Base set point*, using the following formulas:

  New nominal value (heating) = active nominal value + manual adjustment.

  New nominal value (cooling) = active nominal value + manual adjustment + dead zone + nominal value adjustment.

  Values outside the range defined in the "**Limitation of manual value increasing/decreasing**" parameter of the **Operating mode and operation** menu will be limited to the maximum or minimum value.

- ***Base set point*** (DPT 9.001 temperature °C). The nominal base value is predefined for the first time during the application start-up, and saved in the *"Programmed base value"* object.
  It can be redefined at any time via this object (limit for the valid maximum or minimum nominal value). In the event of a BUS voltage failure, this object is saved and the last value will be restored when the voltage returns. The object can be overwritten any number of times.

- ***Current set point value*** (DPT 9.001 temperature °C). Signals the current nominal temperature value on the BUS.

- ***No energy medium*** (DPT 1.001 Switch). Error signalling object (1= Incorrect energy type) visible if "**Supported functions"** is set on **Heating/Cooling** and "**Kind of used controller"** is **internal controller with temp. sensor at E1.** Used to signal an error message when heating or cooling needs to be activated owing to the temperatures, but the status of the ***Heating/Cooling*** (DPT 1.001 Switch) object is in conflict with this condition (in 2-pipe systems). In 4-pipe systems, the status of object 28 is taken into consideration ***Heating/Cooling*** (DPT 1.001 Switch).

# 4 “Fan” menu

The **Fan** menu contains the parameters for configuring the fan.

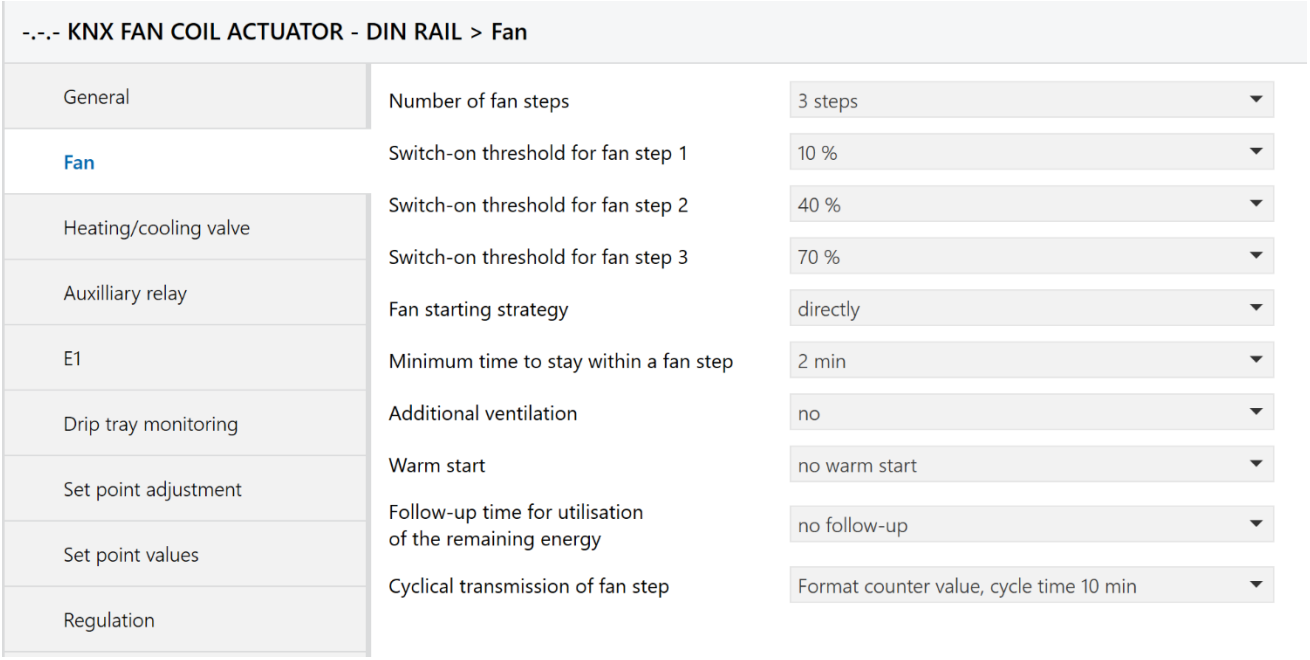



Fig. 4.1 – “Fan” menu

## 4.1 *Parameters*

### 4.1.1 Number of fan steps

This parameter specifies the number of possible fan levels. The values that can be set are:

- 1 step
- 2 steps
- **3 steps (default value)**

Depending on the number of levels selected, the ***Fan Step 1***, ***Fan Step 2*** e ***Fan Step 3*** (DPT 1.001 Switch) objects are visualised so the device can signal the set level (the value 1 is sent when the fan is set on the level corresponding to the number indicated by the name of the object).

Depending again on the number of levels, the “**Switch-on threshold for fan step X”** parameters (with X=1..3) are visualised to set the activation thresholds of the various ventilation levels.

**NB**: the gap between two activation thresholds must be **at least 15%**.

### 4.1.2 Switch-on threshold for fan step 1

Determines the control variable that is the starting point for activating ventilation level 1. The values that can be set are:

- 0.4%, 5%, **10%**, 15%, 20%, 25%, 30%, 35%, 40% **default value**

### 4.1.3 Switch-on threshold for fan step 2

Determines the control variable that is the starting point for switching from ventilation level 1 to level 2. The values that can be set are:

- 0%, 10%, 20%, 30%, **40%**, 50%, 60%, 70%, 80%, 90%, 95% **default value**

### 4.1.4 Switch-on threshold for fan step 3

Determines the control variable that is the starting point for switching from ventilation level 2 to level 3. The values that can be set are:

- 0%, 10%, 20%, 30%, 40%, 50%, 60%, **70%**, 80%, 90%, 95% **default value**

### 4.1.5 Fan starting strategy

This parameter is used to set the fan switch-on strategy on the basis of the fan level configured. The values that can be set are:

- **directly (default value)**

- above step 1, 5 s
- above step 1, 10 s
- above step 1, 15 s
- above step 1, 20 s
- above step 1, 25 s
- above step 1, 30 s

- above highest step, 5 s
- above highest step, 10 s
- above highest step, 15 s
- above highest step, 20 s
- above highest step, 25 s
- above highest step, 30 s
- above highest step, 40 s
- above highest step, 50 s
- above highest step, 60 s

If **directly** is selected, the fan starts up directly at the configured fan level,

If **above step 1, X s** is selected, the fan always starts up at the lowest level (1) and then switches to the configured level (2 or 3) after a delay of X seconds.

If **above highest step, X s** is selected, the fan always starts up at the highest level and then switches to the configured level after a delay of X seconds. This switch-on strategy must be selected if recommended by the fan manufacturer.

**NB**: the switch-on level is neither visualised nor sent while it is being executed.

### 4.1.6 Minimum time to stay within a fan step

If the control variable changes rapidly, there is the risk that the fan will switch from one level to another too often. This problem can be avoided by setting a minimum time for staying at the ventilation level. The possible values are:

- none, 1 min, **2 min**, 3 min, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 11 min, 12 min, 13 min, 14 min, 15 min

### 4.1.7 Additional ventilation

Ventilation can be activated regardless of the control variable for a period specified with this parameter. The possible values are:

- **no** **default value**

- every 30 min for 3 min step 1
- every 30 min for 5 min step 1
- every 30 min for 3 min step 3
- every 30 min for 5 min step 3
- every 60 min for 3 min step 1
- every 60 min for 5 min step 1
- every 60 min for 3 min step 3
- every 60 min for 5 min step 3

- Permanent ventilation step 1
- Permanent ventilation step 2
- Permanent ventilation step 3

If **no** is selected, no additional ventilation is activated.

If **every X min for Z min step 1 o 3**is selected**,** the fan is activated for the period and at the level configured, regardless of the control variable.

If **Permanent ventilation step 1/2/3** is selected, the fan always works with the selected level regardless of the control variable.

### 4.1.8 Warm start

The "**Warm start**" parameter can be used to define whether or not to start up the fan as soon as the valve opens, or after a certain configured time (so that cold air is not blown into the room).
The values that can be set are:

- **No warm start** **default value**

- 30 s, 1 min, 1 min 30 s, 2 min, 2 min 30 s, 3 min, 3 min 30 s, 4 min, 4 min 30 s, 5 min, 5 min 30 s, 6 min, 6min 30 s, 7 min, 7 min 30 s

If **No warm start** is selected, the fan starts up as soon as the valve opens.

If a value between 30 seconds and 7 minutes 30 seconds is defined**,** the valve opens but the fan only starts up after the configured time.

For more information, refer to par. 19.8.2 “Time between heating and cooling and tail-off time” in annex 2.

### 4.1.9 Follow up time for utilisation of the remaining energy

When the valve closes, the residual energy in the ventilation device can be exploited, keeping the fan active for a time configured with this parameter.
The values that can be set are:

- **No follow-up default value**
- 30 s, 1 min, 2 min, 3 min, 4min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 20 min, 30 min
- until valve is closed

If **No follow-up** is selected, the fan is stopped immediately when the regulator value reaches 0.

If a time between **30 s** and **30 min** is defined, the valve closes and then the fan carries on working for the time set, in order to transfer the residual energy from the device to the room.

If **until valve is closed** is selected, the fan carries on working when the regulator value reaches 0% and continues for the valve closure time (heating or cooling).

### 4.1.10 Cyclical transmission of fan step

This parameter defines the format of the ***Fan step - report*** object, and the transmission (signalling) method on the BUS.
The possible values are:

- Format counter value, don’t transmit cyclically
- Format counter value, cycle time 3 min … 60 min
- **Format %, don’t transmit cyclically default value**
- Format percentage, cycle time 3 min … 60 min

If **Format counter value, don’t transmit cyclically** is selected, the ***Fan step*** object has a numerical format (DPT 5.010 counter pulses) and sends the current fan level with a number between 0 and 3 on change only.

If **Format counter value, cycle time 3 min … 60 min** is selected, the ***Fan step*** object has a numerical format (DPT 5.010 counter pulses) and sends the current fan level both cyclically (with the defined frequency) and on change.

If **Format %, don’t transmit cyclically** is selected, the ***Fan step*** object has a percentage format (DPT 5.001 Scaling) and sends the configured threshold value for the current level as a percentage value on change only.

If **Format percentage, cycle time 3 min … 60 min** is selected, the ***Fan step*** object has a percentage format (DPT 5.001 Scaling) and sends the configured threshold value for the current level as a percentage value, both cyclically (with the defined frequency) and on change. For example:

Thresholds configured:

- Fan level 1 = 10%
- Fan level 2 = 40%
- Fan level 3 = 70%

If fan level 2 is active, object 4 sends the value 40%. The cycle length can be set between 3 and 60 minutes.

If fan level 2 is active, object 4 sends the value 40%. The cycle length can be set between 3 and 60 minutes.

# 5 “Heating valve” menu

The **Heating valve** menu contains the parameters for configuring valve operation on the basis of the type of valve.

The menu changes according to the value defined in the “**Type of valve”** parameter (2-point or 3-point):

- 2-point valve
- **3-point valve default value**

The **2-point valve** is for standard actuators (open/closed)
The **3-point valve** is for motorised linear actuators.

## 5.1 *Parameters for Type of valve = 2-point valve*

If the “**Type of valve”** parameter is set on **2-point valve**, the following menu will appear:

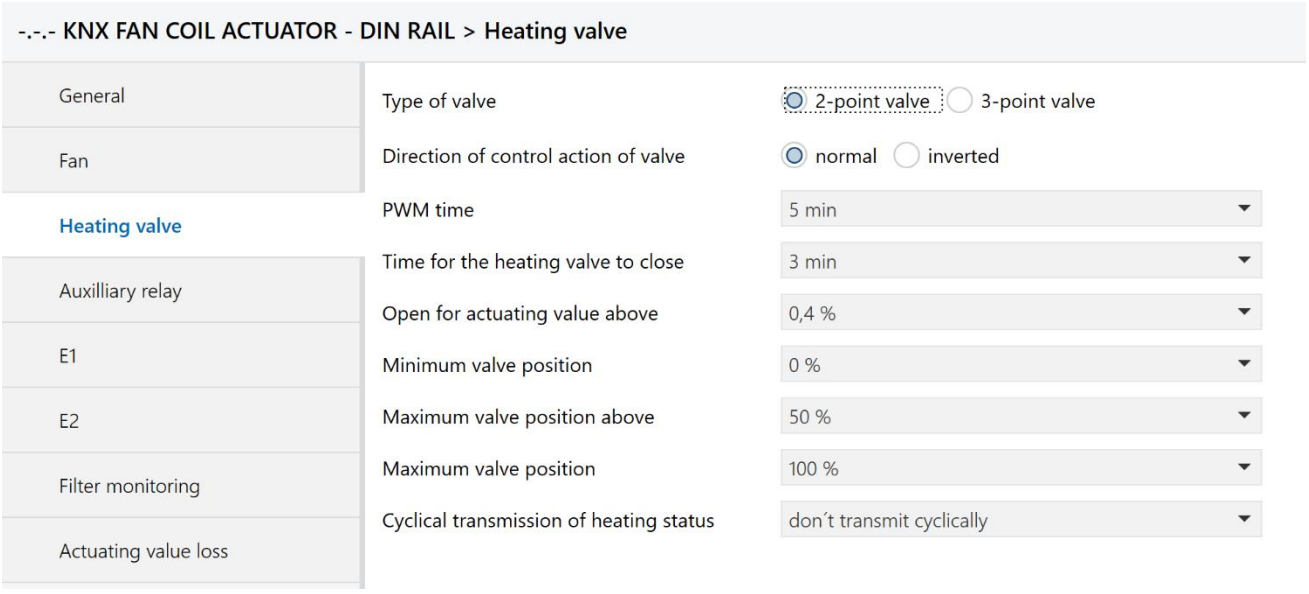



Fig. 5.1 – “Heating valve” with Type of valve = 2-point valve menu

### 5.1.1 Direction of control action of valve

The “**Direction of control action of valve**” parameter is used to specify whether the valve opens or closes when the voltage supply is enabled. The values that can be set are:

- **normal (default value)**
- inverted

The **normal** value is for valves that remain closed if there is no power supply.

The **inverted** value is for valves that remain open if there is no power supply.

### 5.1.2 PWM time

This parameter defines a constant control period in an activation period and a deactivation one, creating a PWM period. The values that can be set are:

- 3 min, 4 min, **5 min**, 6 min, …, 30min **default value**

Example:
Control variable = 20%, PWM duration = 10 min: a 10-minute control period with 2 min ON and 8 min OFF (i.e. 20% ON / 80% OFF).

### 5.1.3 Time for the valve to close

This parameter can be used to regulate a heating valve closure time, preventing the cooling valve from opening too soon. The possible values are:

- 0 min, 1 min, 2 min, **3 min**, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 20 min, 30 min

## 5.2 *Parameters for Type of valve = 3-point valve*

If the "**Type of valve"** parameter is set on **3-point valve**, the following menu will appear:

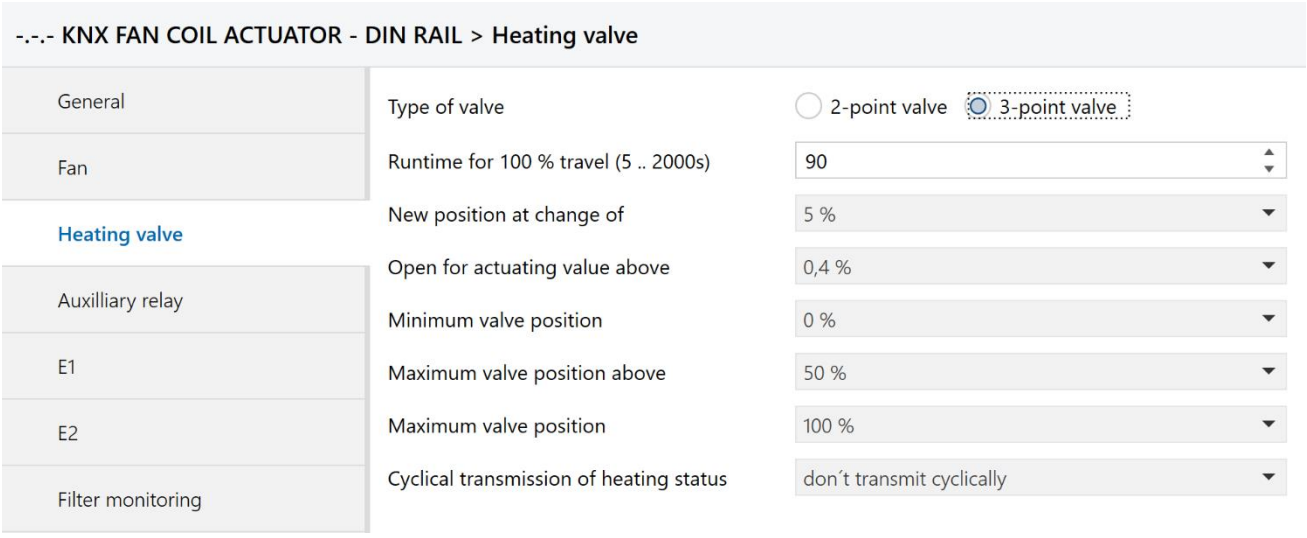



Fig. 5.2 – "Heating valve" with Type of valve = 3-point valve menu

### 5.2.1 Runtime for 100% travel (5 .. 2000s)

This parameter is used to set a 100% stroke time (value in seconds) to ensure precise positioning. The possible values are:

- 5….**90....**2000 s **default value**

### 5.2.2 New position at change of

The "**New position at change of"** parameter is used to specify when the valve is repositioned in relation to the change in the control variable. The values that can be set are:

- Always set valve exactly
- 1%, 2%,….**5%,….**15% **default value**

If **Always set valve exactly** is selected, the valve is repositioned with every change in the control variable.

If a percentage value between **1% and 15%** is defined, the valve is always repositioned only when the control variable changes (in relation to the last positioning) by a value greater than the set value. This prevents any unnecessary minimum repositioning.

### 5.2.3 Open for actuating value above

With this parameter, you can decide whether the valve should open immediately with the minimum value assumed by the control variable (0.4%), or only when the control variable has reached the set value. The possible values are:

- **0,4%** **default value**
- 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%

If **0.4%** is selected, the valve opens with the minimum control variable value.

If a value between **5% and 40%** is defined, the valve is only opened when the control variable reaches the set value. This setting prevents any whistling effect from a slightly open valve.

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 5.2.4 Minimum valve position

This specifies the minimum permitted valve position in the face of a variation of the specified control variable from this percentage. The possible values are:

- **0 %**, 5 %, 10 %, 15 %, 20 %, 25 %, 30 %, 35 %, 40 %, 45 %, 50 % **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 5.2.5 Maximum valve position above

This parameter is used to set the positioning of the valve in its maximum position, starting from the value (%) assumed by the specified control variable. The possible values are:

- 0,4 %, 10 %, 20 %, 30 %, 40 %, **50 %,** 60%, 70%, 80%, 90%, 100% **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 5.2.6 Maximum valve position

This specifies the maximum permitted valve position. The possible values are:

- 55 %, 60 %, 65 %, 70 %, 75 %, 80 %, 85 %, 90 %, 95 %, **100 %** **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 5.2.7 Delay between heating and cooling

If the "**Supported functions"** in the **General** menu is "**Heating and Cooling"**, this parameter will be visualised in order to set a delay in the switch from heating to cooling after the complete closure of the heating valve. The cooling valve can only be opened at the end of this time. The possible values are:

- **0 min**, 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 20 min, 30 min

For more information, refer to par. 19.8.2 "Time between heating and cooling and tail-off time" in annex 2.

### 5.2.8 Cyclical transmission of heating status

This parameter is used to set the cyclical transmission of the ***Heating status*** (DPT 1.001) object on the BUS. The possible values are:

- **Don't transmit cyclically** **default value**
- 3 min
- 5 min
- 10 min
- 15 min
- 20 min
- 30 min
- 60 min

# 6 “Cooling valve” menu

The **Cooling valve** menu contains the parameters for configuring valve operation on the basis of the type of valve.

The menu changes according to the value defined in the “**Type of valve”** parameter (2-point or 3-point):

- 2-point valve
- **3-point valve default value**

The **2-point valve** is for standard actuators (open/closed)
The **3-point valve** is for motorised linear actuators.

## 6.1 *Parameters for Type of valve = 2-point valve*

If the “**Type of valve”** parameter is set on **2-point valve**, the following menu will appear:

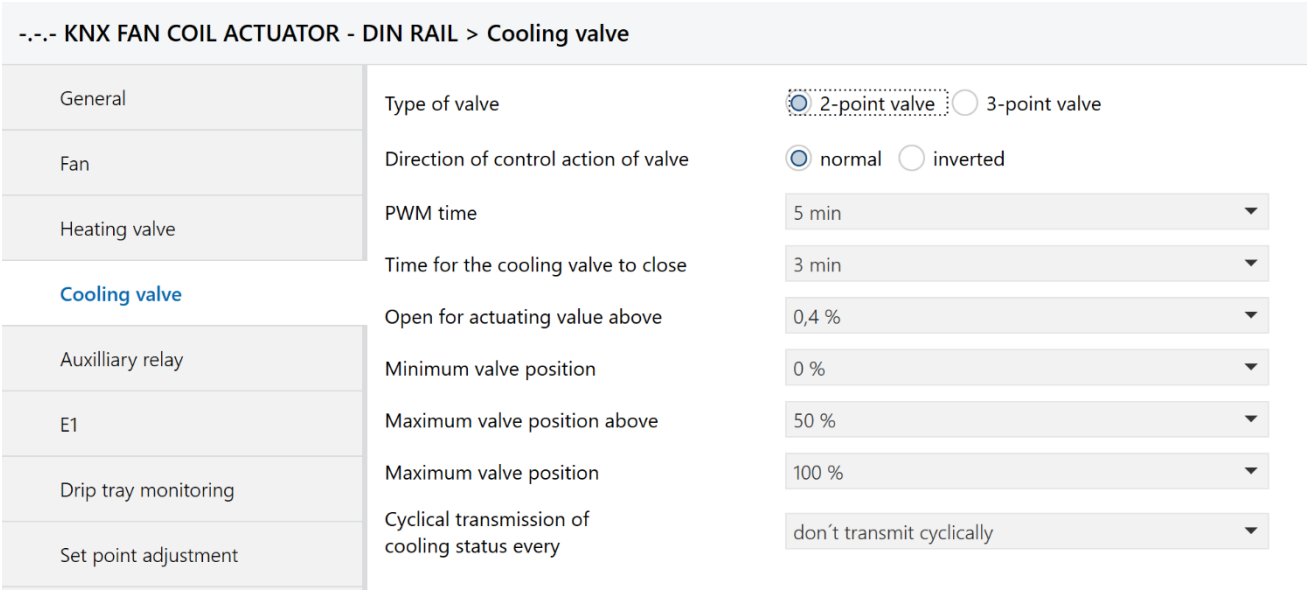



Fig. 6.1 – “Cooling valve” with Type of valve = 2-point valve menu

### 6.1.1 Direction of control action of valve

The “**Direction of control action of valve**” parameter is used to specify whether the valve opens or closes when the voltage supply is enabled. The values that can be set are:

- **normal (default value)**
- inverted

The **normal** value is for valves that remain closed if there is no power supply.

The **inverted** value is for valves that remain open if there is no power supply.

### 6.1.2 PWM time

This parameter defines a constant control period in an activation period and a deactivation one, creating a PWM period. The values that can be set are:

- 3 min, 4 min, **5 min**, 6 min, …, 30min **default value**

Example:
Control variable = 20%, PWM duration = 10 min: a 10-minute control period with 2 min ON and 8 min OFF (i.e. 20% ON / 80% OFF).

### 6.1.3 Time for the valve to close

This parameter can be used to regulate a cooling valve closure time, preventing the heating valve from opening too soon. The possible values are:

- 0 min, 1 min, 2 min, **3 min**, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 20 min, 30 min

## 6.2 *Parameters for Type of valve = 3-point valve*

If the "**Type of valve"** parameter is set on **3-point valve**, the following menu will appear:

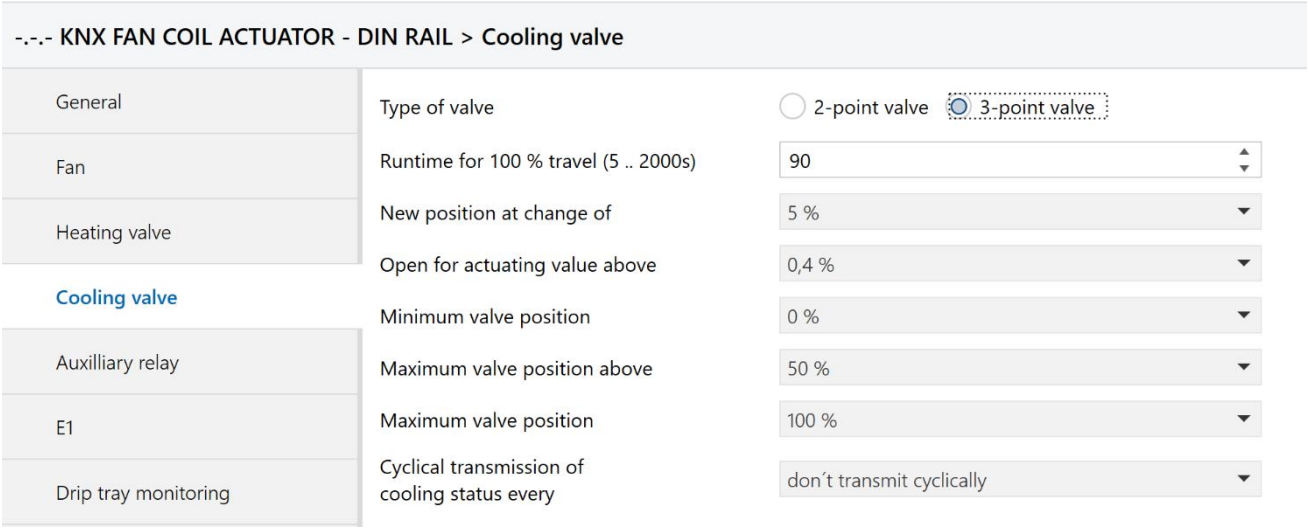



Fig. 6.2 – "Cooling valve" with Type of valve = 3-point valve menu

### 6.2.1 Runtime for 100% travel (5 .. 2000s)

This parameter is used to set a 100% stroke time (value in seconds) to ensure precise positioning. The possible values are:

- 5….**90....**2000 s **default value**

### 6.2.2 New position at change of

The "**New position at change of"** parameter is used to specify when the valve is repositioned in relation to the change in the control variable. The values that can be set are:

- Always set valve exactly
- 1%, 2%,….**5%,….**15% **default value**

If **Always set valve exactly** is selected, the valve is repositioned with every change in the control variable.

If a percentage value between **1% and 15%** is defined, the valve is always repositioned only when the control variable changes (in relation to the last positioning) by a value greater than the set value. This prevents any unnecessary minimum repositioning.

### 6.2.3 Open for actuating value above

With this parameter, you can decide whether the valve should open immediately with the minimum value assumed by the control variable (0.4%), or only when the control variable has reached the set value. The possible values are:

- **0,4%** **default value**
- 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%

If **0.4%** is selected, the valve opens with the minimum control variable value.

If a value between **5% and 40%** is defined, the valve is only opened when the control variable reaches the set value. This setting prevents any whistling effect from a slightly open valve.

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 6.2.4 Minimum valve position

This specifies the minimum permitted valve position in the face of a variation of the specified control variable from this percentage. The possible values are:

- **0 %**, 5 %, 10 %, 15 %, 20 %, 25 %, 30 %, 35 %, 40 %, 45 %, 50 % **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 6.2.5 Maximum valve position above

This parameter is used to set the positioning of the valve in its maximum position, starting from the value (%) assumed by the specified control variable. The possible values are:

- 0,4 %, 10 %, 20 %, 30 %, 40 %, **50 %,** 60%, 70%, 80%, 90%, 100% **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 6.2.6 Maximum valve position

This specifies the maximum permitted valve position. The possible values are:

- 55 %, 60 %, 65 %, 70 %, 75 %, 80 %, 85 %, 90 %, 95 %, **100 %** **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 6.2.7 Cyclical transmission of cooling status every

This parameter is used to set the cyclical transmission of the ***Cooling status*** (DPT 1.001) object on the BUS. The possible values are:

- **Don't transmit cyclically** **default value**
- 3 min
- 5 min
- 10 min
- 15 min
- 20 min
- 30 min
- 60 min

# 7 “Heating/cooling valve” menu

The **Heating/Cooling valve** menu (which only appears if, in the **General** menu, the **Heating/Cooling** function was selected and “**Kind of installation”** is set at **2-pipe system**) contains the parameters for configuring valve operation on the basis of the type of valve.

The menu changes according to the value defined in the “**Type of valve”** parameter (2-point or 3-point):

- 2-point valve
- **3-point valve default value**

The **2-point valve** is for standard actuators (open/closed)
The **3-point valve** is for motorised linear actuators.

## 7.1 *Parameters for Type of valve = 2 point valve*

If the “**Type of valve”** parameter is set on **2-point valve**, the following menu will appear:

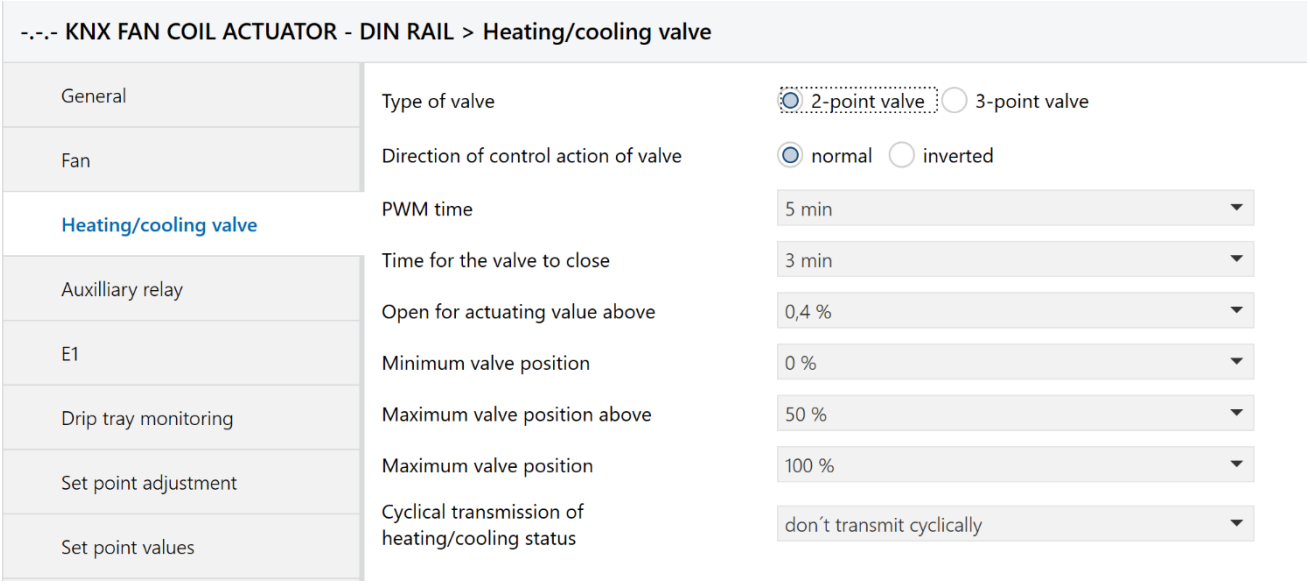



Fig. 7.1 – “Heating/cooling valve” with Type of valve = 2-point valve menu

### 7.1.1 Direction of control action of valve

The “**Direction of control action of valve**” parameter is used to specify whether the valve opens or closes when the voltage supply is enabled. The values that can be set are:

- **normal (default value)**
- inverted

The **normal** value is for valves that remain closed if there is no power supply.

The **inverted** value is for valves that remain open if there is no power supply.

### 7.1.2 PWM time

This parameter defines a constant control period in an activation period and a deactivation one, creating a PWM period. The values that can be set are:

- 3 min, 4 min, **5 min**, 6 min, …, 30min **default value**

Example:
Control variable = 20%, PWM duration = 10 min: a 10-minute control period with 2 min ON and 8 min OFF (i.e. 20% ON / 80% OFF).

### 7.1.3 Time for the valve to close

This parameter is used to set a valve closure time on the basis of the actuator used. The possible values are:

- 0 min, 1 min, 2 min, **3 min**, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 20 min, 30 min

## 7.2 *Parameters for Type of valve = 3 point valve*

If the "**Type of valve"** parameter is set on **3-point valve**, the following menu will appear:

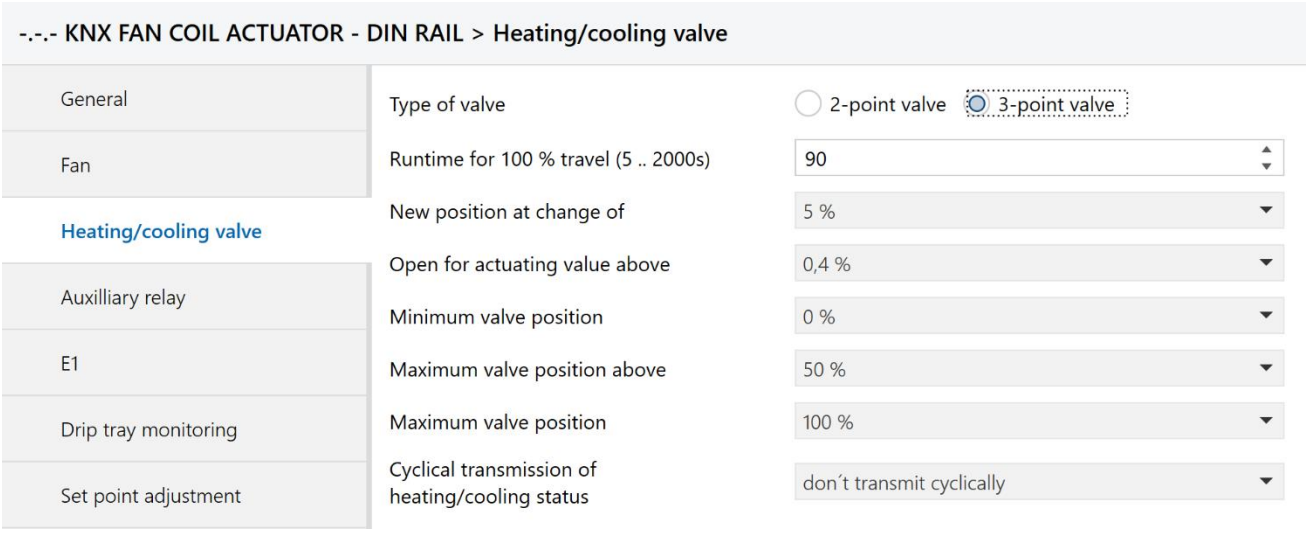



Fig. 7.2 – "Heating/cooling valve" with Type of valve = 3-point valve menu

### 7.2.1 Runtime for 100% travel (5 .. 2000s)

This parameter is used to set a 100% stroke time (value in seconds) to ensure precise positioning. The possible values are:

- 5….**90....**2000 s **default value**

### 7.2.2 New position at change of

The "**New position at change of"** parameter is used to specify when the valve is repositioned in relation to the change in the control variable. The values that can be set are:

- Always set valve exactly
- 1%, 2%,….**5%,….**15% **default value**

If **Always set valve exactly** is selected, the valve is repositioned with every change in the control variable.

If a percentage value between **1% and 15%** is defined, the valve is always repositioned only when the control variable changes (in relation to the last positioning) by a value greater than the set value. This avoids frequent but minor positioning variations.

### 7.2.3 Open for actuating value above

With this parameter, you can decide whether the valve should open immediately with the minimum value assumed by the control variable (0.4%), or only when the control variable has reached the set value. The possible values are:

- **0,4%** **default value**
- 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%

If **0.4%** is selected, the valve opens with the minimum control variable value.

If a value between **5% and 40%** is defined, the valve is only opened when the control variable reaches the set value. This setting prevents any whistling effect from a slightly open valve.

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 7.2.4 Minimum valve position

This specifies the minimum permitted valve position in the face of a variation of the specified control variable from this percentage. The possible values are:

- **0 %**, 5 %, 10 %, 15 %, 20 %, 25 %, 30 %, 35 %, 40 %, 45 %, 50 % **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 7.2.5 Maximum valve position above

This parameter is used to set the positioning of the valve in its maximum position, starting from the value (%) assumed by the specified control variable. The possible values are:

- 0,4 %, 10 %, 20 %, 30 %, 40 %, **50 %,** 60%, 70%, 80%, 90%, 100% **default value**

This parameter affects the definition of the characteristic valve curve. For more information, refer to par. 19.2 Setting the characteristic valve curve in annex 2.

### 7.2.6 Maximum valve position

This specifies the maximum permitted valve position. The possible values are:

- 55 %, 60 %, 65 %, 70 %, 75 %, 80 %, 85 %, 90 %, 95 %, **100 %** **default value**

This parameter affects the definition of the characteristic valve curve

### 7.2.7 Cyclical transmission of heating/cooling status

This parameter is used to set the cyclical transmission of the ***Heating status*** (DPT 1.001) and ***Cooling status*** (DPT 1.001) objects on the BUS. The possible values are:

- **Don't transmit cyclically** **default value**
- 3 min
- 5 min
- 10 min
- 15 min
- 20 min
- 30 min
- 60 min

# 8 “Auxiliary relay” menu

The **Auxiliary relay** menu contains the parameters for configuring the behaviour of the additional relay on the device. The menu is as follows:

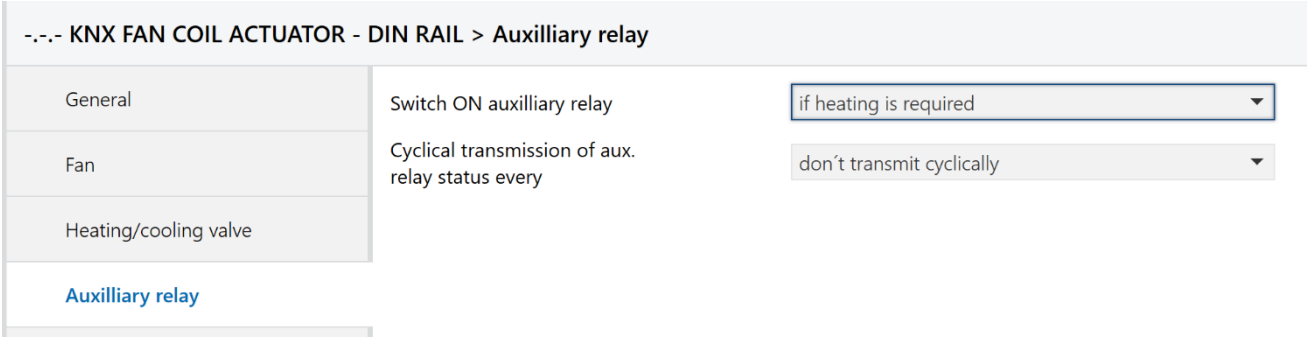



Fig. 8.1 – “Auxiliary relay” menu

## 8.1 *Parameters*

### 8.1.1 Switch ON auxiliary relay

The **“Switch ON auxiliary relay”** parameter is used to define whether the relay output should be commanded via the BUS, on the dedicated ***Auxiliary relay*** (DPT 1.001 Switch), object (on the basis of the control variable in heating or cooling) or activated when the heating or cooling valve opens. The values that can be set are:

- **via object (default value)**
- if heating is required
- if cooling is required
- together with heating valve
- together with cooling valve

If **via object**, is selected the additional relay will only be commanded externally via the BUS on the ***Auxiliary relay*** (DPT 1.001 Switch), object (entirely free of the HVAC control of the fan coil actuator), using the relay output as a general binary output to command a circuit via a push-button, sensor or other command device connected to the BUS. With this setting, the relay status is not transmitted.

If **if heating is required** is selected, the additional relay is activated as soon as the heating control variable is higher than 0%. Relay switching can be notified via the ***Auxiliary relay status*** (DPT 1.001 Switch) object, and the “**Cyclical transmission of aux. relay status every”** parameter allows you to set the cyclical transmission of the status object.

If **if cooling is required** is selected, the additional relay is activated as soon as the cooling control variable is higher than 0%. Relay switching can be notified via the ***Auxiliary relay status*** (DPT 1.001 Switch) object, and the “**Cyclical transmission of aux. relay status every”** parameter allows you to set the cyclical transmission of the status object.

If **together with heating valve** is selected, the additional relay is only activated when the heating valve is effectively opened (with the characteristic valve curve adapted, the valve can remain closed with a limited control variable). Relay switching can be notified via the ***Auxiliary relay status*** (DPT 1.001 Switch) object, and the “**Cyclical transmission of aux. relay status every”** parameter allows you to set the cyclical transmission of the status object.

If **together with cooling valve** is selected, the additional relay is only activated when the cooling valve is effectively opened (with the characteristic valve curve adapted, the valve can remain closed with a limited control variable). Relay switching can be notified via the ***Auxiliary relay status*** (DPT 1.001 Switch) object, and the "**Cyclical transmission of aux. relay status every"** parameter allows you to set the cyclical transmission of the status object.

### 8.1.2 Cyclical transmission of aux. relay status every

This parameter is used to set a cyclical transmission time for the status of the additional relay. The values that can be set are:

- **Don't transmit cyclically** **default value**
- 3 min
- 5 min
- 10 min
- 15 min
- 20 min
- 30 min
- 60 min

# 9 “E1” menu

The **E1** menu contains the parameters for configuring the E1 input that can be used for a window contact or an external temperature sensor (e.g. GWA9145).
The menu changes on the basis of this setting.

## 9.1 *Parameters with Function of E1 = window contact*

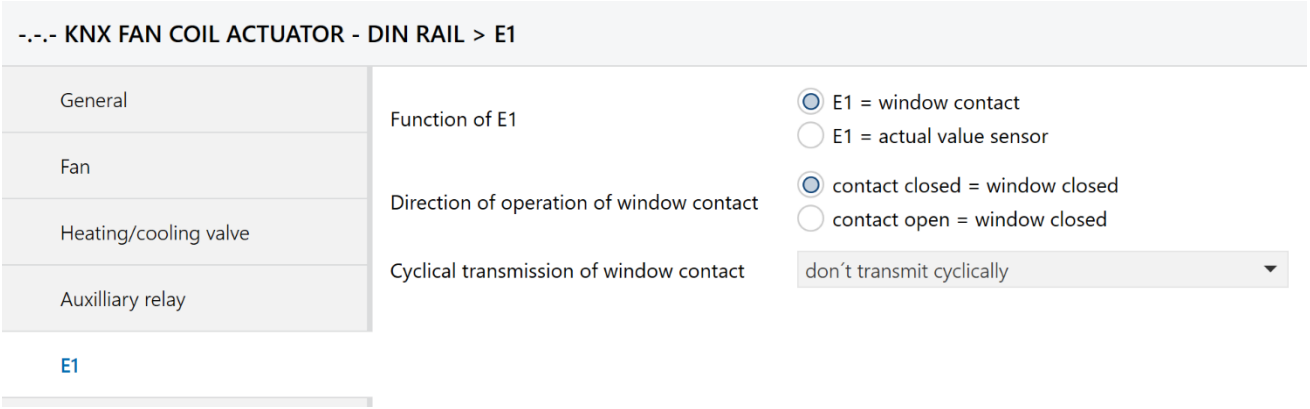



Fig. 9.1 – “E1” with Function of E1 = window contact menu

### 9.1.1 Function of E1

The **“Function of E1”** parameter is used to define whether a window contact or a temperature sensor is connected to the E1 input. The values that can be set are:

- **E1 = window contact (default value)**
- E1 = actual value sensor

If **window contact** is set, the “**Direction of operation of window contact**” and “**Cyclical transmission of window contact**” parameters are visualised to set the type of window contact (open or closed contact) and the transmission method for the status object ***Status of window contact at E1*** (DPT 1.019 window/door).

### 9.1.2 Direction of operation of window contact

Specifies the type of contact connected (opening or closure contact). The possible values are:

- **Contact closed = window closed (default value)**
- Contact open = window closed

### 9.1.3 Cyclical transmission of window contact

This parameter specifies the cyclical transmission time for the window contact status object ***Status window contact at E1*** (DPT 1.019 window/door). The possible values are:

- **Don’t transmit cyclically (default value)**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

## 9.2 *Parameters with Function of E1 = actual value sensor*

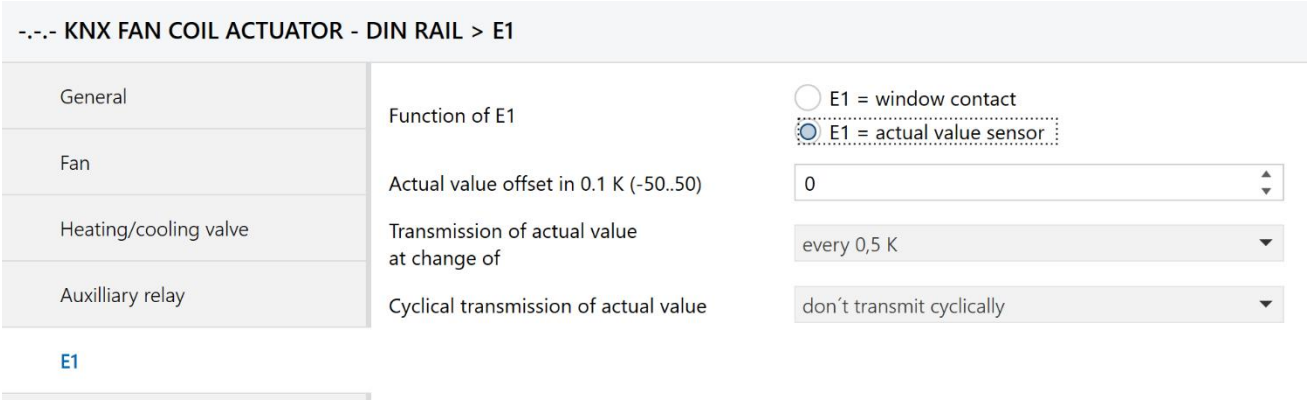



Fig. 9.2 – "E1" menu with Function of E1 = actual value sensor

### 9.2.1 Actual value offset in 0,1 K (-50..50)

With this parameter, you can enter a positive or negative correction for the temperature measured by the sensor connected to input E1, in steps of 1/10 K. The possible value is:

- Manual setting from -50 to +50 **(default value = 0)**

Examples:

a) The device sends 20.3°C.
A calibrated thermostat measures an ambient temperature of 21.0°C. To increase the temperature of the fan coil actuator to 21°C, you must set "7" (i.e. 7 x 0.1 K).

b) The device sends 21.3°C. The temperature measured is 20.5°C. To reduce the temperature sent to 20.5°C, set "-8" (i.e. -8 x 0.1 K).

### 9.2.2 Transmission of actual value at change of

If you want to send the current ambient temperature, use this parameter to set transmission upon the variation indicated by this value (or only cyclically; the temperature will be sent via the object ***Actual value from E1*** (DPT 9.001 temperature). The possible values are:

- Not due to a change
- Every 0,2 K
- Every 0,3 K
- **Every 0,5 K** **(default value)**
- Every 1 K

### 9.2.3 Cyclical transmission of actual value

This parameter can be used to set a frequency for the cyclical sending of the temperature measured by the sensor via the object ***Actual value from E1*** (DPT 9.001 temperature), regardless of the temperature variation. The possible values are:

- **Don't transmit cyclically**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

**NB:** when setting this parameter and the previous one, check the effect of the resulting load on the BUS traffic.

# 10 “E2” menu

The **E2** menu is only visible if the “**Supported functions”** specified in the **General** menu is **Heating**.
In this case, input E2 can be used to connect a window contact (if, for example, a temperature sensor is connected on E1) and the following parameters will appear.

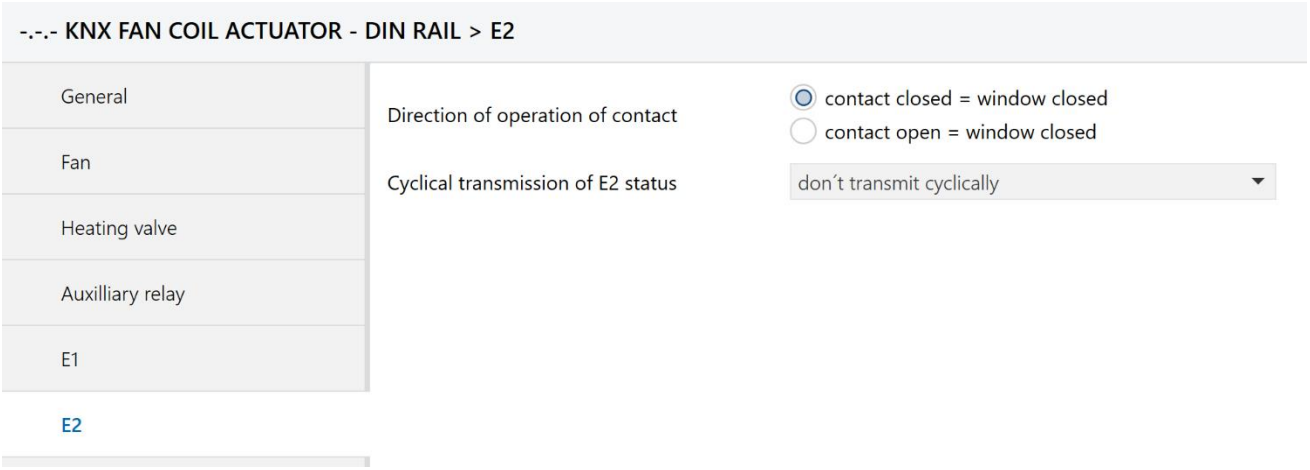



Fig. 10.1 – “E2” with Supported Functions = Heating menu

## 10.1 *Parameters*

### 10.1.1 Direction of operation of contact

Specifies the type of contact connected (opening or closure contact). The possible values are:

- **Contact closed = window closed (default value)**
- Contact open = window closed

### 10.1.2 Cyclical transmission of E2 status

This parameter specifies the cyclical transmission time for the window contact status object ***Status of window contact at E2*** (DPT 1.019 window/door). The possible values are:

- **Don’t transmit cyclically default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

# 11 “Drip tray monitoring” menu

The **Drip tray monitoring** menu is only visible if the “**Supported functions”** specified in the **General** menu is **Cooling** or **Heating/Cooling.**

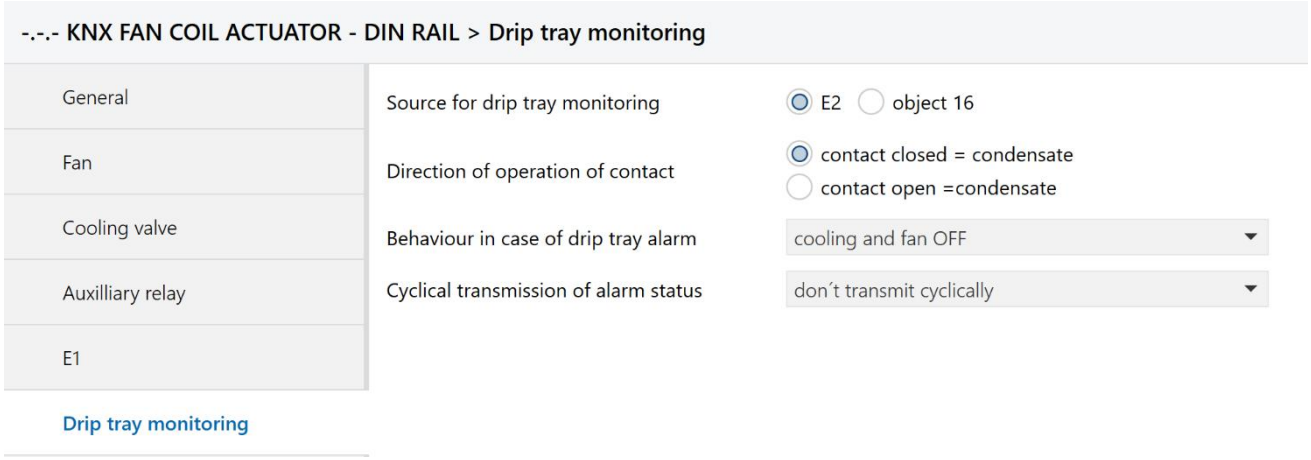



Fig. 11.1 – “Drip tray monitoring” menu with Supported function = Cooling or Heating/cooling

## 11.1 *Parameters*

### 11.1.1 Source of drip tray monitoring

Specifies whether drip tray monitoring is carried out via input E2 or via the BUS, on object 16 ***Drip tray monitoring status*** (DPT 1.001 Switch). The possible values are:

- **E2 (default value)**
- object 16

If **E2** is selected, the drip tray is monitored via the contact on input E2 and signalled on the BUS via the output object ***Drip tray monitoring status*** (DPT 1.001 Switch).

If **object 16** is selected, the drip tray is monitored via an external sensor and received from the device via the BUS on the object ***Drip tray monitoring status*** (DPT 1.001 Switch).

### 11.1.2 Direction of operation of contact

Specifies the type of drip tray signalling contact connected to input E2 or the drip tray status telegram received from the BUS. The possible values are:

- **Contact closed = Condensate (default value)**
- Contact open = Condensate

### 11.1.3 Behaviour in case of drip tray alarm

Used to specify what the device must do when a drip tray alarm is triggered. The possible values are:

- **Cooling and fan OFF (default value)**
- Cooling OFF and min. speed
- Cooling OFF and max. speed
- Only report

### 11.1.4 Cyclical transmission of alarm status

If "**Source for drip tray monitoring"** is the **E2** input, this parameter will be visualised to specify the cyclical transmission time for the ***Drip tray monitoring status*** (DPT 1.001 Switch) status object. The possible values are:

- **Don't transmit cyclically default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

# 12 “Set point adjustment” menu

The **Set point adjustment** menu is only visible if the “**Supported functions”** specified in the **General** menu is **Cooling** or **Heating and Cooling**.
The adjustment of the programmed (nominal) value dynamically adapts the nominal value to the outdoor temperature in cooling mode. If the outdoor temperature exceeds a defined threshold, the adjustment is activated and the corresponding increase of the nominal value is established.

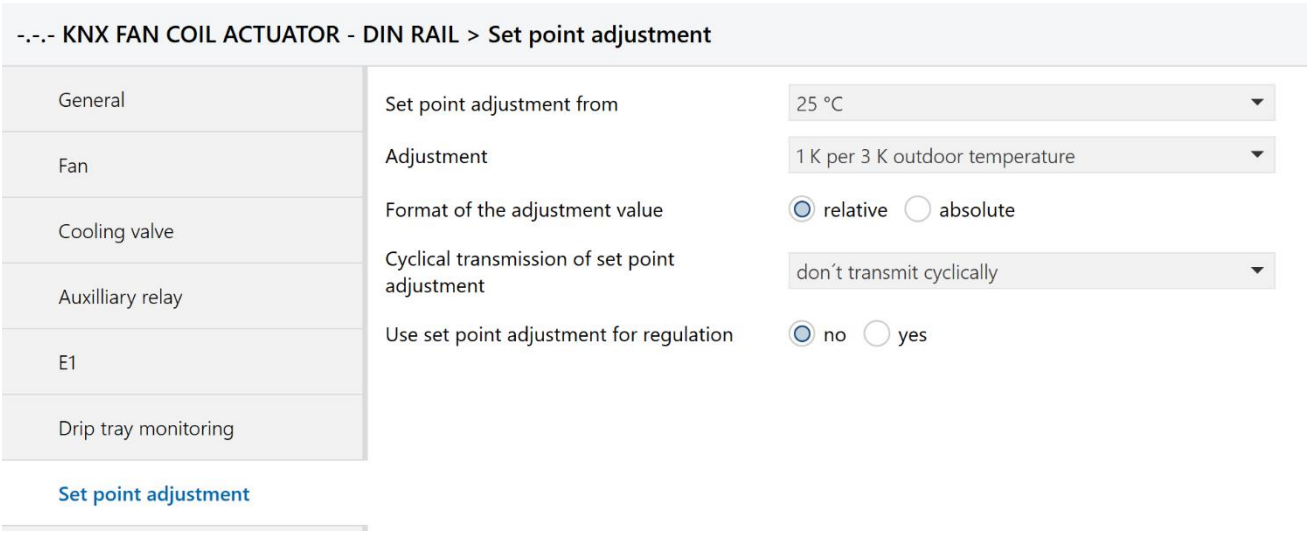



Fig. 12.1 – “Set point adjustment” menu with Supported function = Cooling or Heating/cooling

## 12.1 *Parameters*

### 12.1.1 Set point adjustment from

Specifies the activation threshold for the correction of the nominal programmed value. The possible values are:

- **25 °C**, 26 °C, 27 °C, 28 °C, 29 °C, 30 °C……, 38 °C, 39 °C, 40 °C **(default value)**

### 12.1.2 Adjustment

With this parameter, you can specify the intensity of the nominal correction - i.e. which outdoor temperature modification the nominal value (1 K) must be corrected for. The possible values are:

- none
- 1 K per 1 K outdoor temperature
- 1 K per 2 K outdoor temperature
- **1 K per 3 K outdoor temperature** **(default value)**
- 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

### 12.1.3 Format of the adjustment value

With this parameter, you can specify the format for the ***Adjust set point*** object used to send the nominal value change message to other thermostats, probes or other devices involved in HVAC control and connected to the system. The possible values are:

- **relative** **(default value)**
- absolute

If **relative** is selected, the device uses the ***Adjust set point*** (DPT 9.002 temperature difference – K) object to send a temperature difference in K on the basis of the outdoor temperature. This value can be used as an adjustment in the nominal value for other ambient thermostats.
Example:
Standard nominal value without correction = 20°C. Nominal value correction = +2 K
The object sends: 2 K(*).

If **absolute** is selected, the device uses the ***Adjust set point*** (DPT 9.001 temperature – °C) object to send a nominal value in °C given by the standard nominal value without correction + the nominal value correction, as the nominal value for other thermostats.
Example:
Standard nominal value without correction = 20°C. Nominal value correction = +2 K
The object sends: 22°C*

(*) Important: when the *"***Use set point adjustment for regulation"** parameter is set on "***yes***", the nominal value for the built-in regulator is also adjusted.
In our example, this is increased in both cases by 2 K.

### 12.1.4 Base set point without adjustment

If the "**Format of the adjustment value"** is **absolute**, this parameter can be used to specify the standard nominal value that can be used by other thermostats. The possible values are:

- 15 °C, 16 °C, 17 °C, 18 °C, 19 °C, 20 °C, **21 °C**, 22 °C, 23 °C, 24 °C, 25 °C, 26 °C, 27 °C, 28 °C,29 °C, 30 °C

**Important:** this value should coincide with the standard nominal value of the thermostats commanded.

### 12.1.5 Cyclical transmission of set point adjustment

This parameter specifies the cyclical transmission time for the nominal value correction via the ***Adjust set point*** object. The possible values are:

- **Don't transmit cyclically** **default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

### 12.1.6 Use set point adjustment for regulation

This parameter, visible if the "**Kind of used controller"** is **Internal controller with temp. sensor at E1**, defines whether or not the nominal value adjustment should affect the built-in regulator. The possible values are:

- **no** **default value**
- yes

If you select **no**, the adjustment of the nominal value has no effect on the built-in regulator

If you select **yes**, the standard nominal value for the adjustment (= *Standard nominal value after reset + Dead zone*) must be gradually regulated on the basis of the outdoor temperature.

# 13 “Set point values” menu

The **Set point adjustment** menu is only visible if the “**Kind of used controller”** specified in the **General** menu is **Internal controller with temp. sensor at E1**.
The parameters in this menu vary depending on the **Supported function** (Heating, Cooling, or Heating/Cooling).

## 13.1 *Parameters with the supported function Heating*

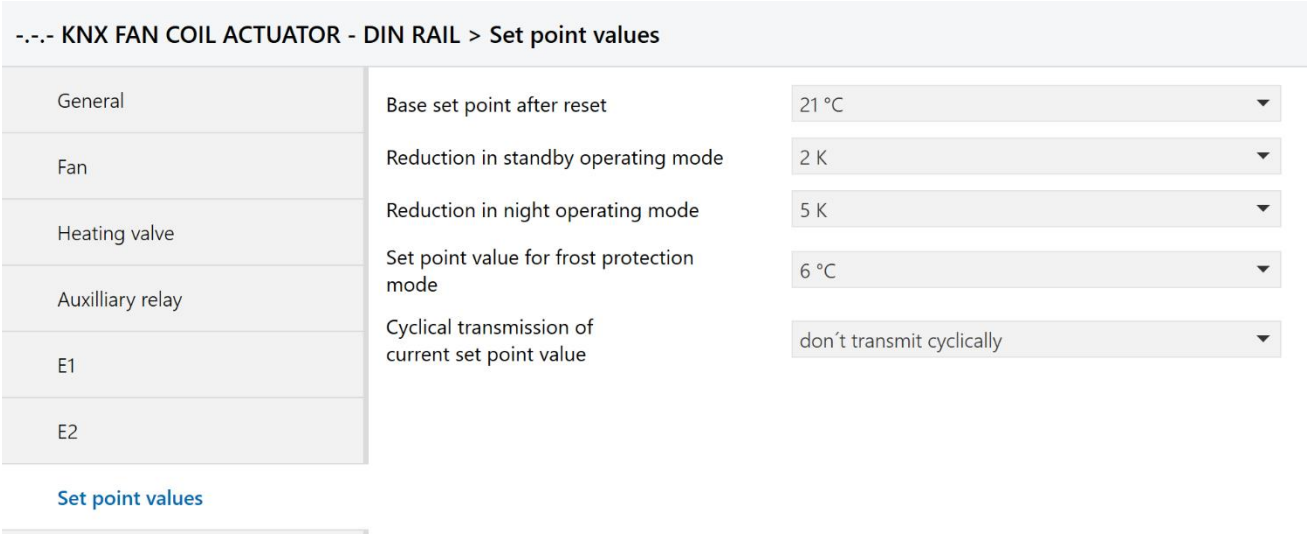



Fig. 13.1 – “Set point values” menu with Supported function = Heating

### 13.1.1 Base set point after reset

Specifies the nominal value assigned for temperature regulation. The possible values are:

- 15°C, 16 °C, 17 °C, …, **21 °C**,…, 29°C, 30°C **(default value)**

### 13.1.2 Reduction in standby operating mode

Specifies how much the temperature must be reduced in Standby mode during heating. The possible values are:

- 0,5 K, 1 K, 1,5 K, **2 K,** 2,5 K, 3 K, 3,5 K, 4 K **(default value)**

### 13.1.3 Reduction in night operating mode

Specifies how much the temperature must be reduced in Night mode during heating. The possible values are:

- 3 K, 4 K**, 5K,** 6K, 7K, 8K **(default value)**

### 13.1.4 Set point value for frost protection mode

Specifies the nominal value assigned for Frost Protection mode during heating. The possible values are:

- 3 °C, 4 °C, 5 °C, **6 °C**, 7 °C, 8 °C, 9 °C, 10 °C **(default value)**

### 13.1.5 Cyclical transmission of set point value

Used to specify the cyclical transmission time for the active nominal value via the object ***Current setpoint value*** (DPT 9.001 temperature). The possible values are:

- **Don't transmit cyclically default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

## 13.2 *Parameters with the supported function Cooling*

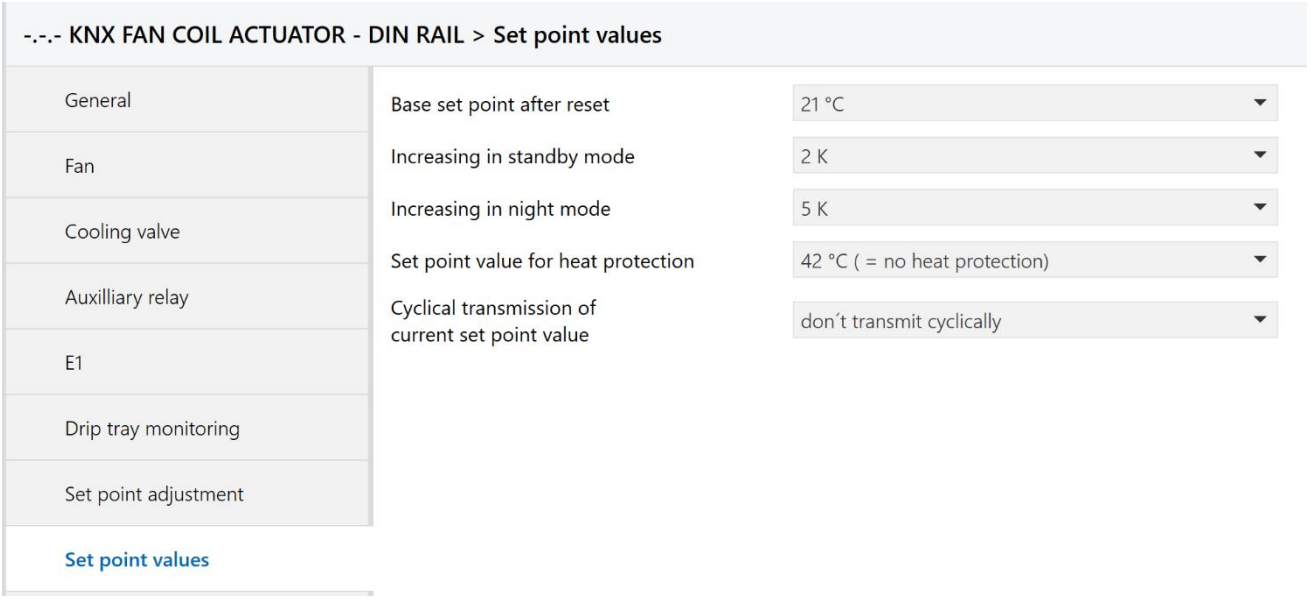



Fig. 13.2 – "Set point values" menu with Supported function = Cooling

### 13.2.1 Base set point after reset

Specifies the nominal value assigned for temperature regulation. The possible values are:

- 15°C, 16 °C, 17 °C, …, **21 °C**,…, 29°C, 30°C **(default value)**

### 13.2.2 Increasing in standby mode

Specifies how much the temperature must be increased in Standby mode during cooling. The possible values are:

- 0,5 K, 1 K, 1,5 K, **2 K,** 2,5 K, 3 K, 3,5 K, 4 K (**default value**)

### 13.2.3 Increasing in night mode

Specifies how much the temperature must be increased in Night mode during cooling. The possible values are:

- 3 K, 4 K**, 5K,** 6K, 7K, 8K **(default value)**

### 13.2.4 Set point value for heat protection

Specifies the nominal value assigned for Heat Protection mode (overtemperature) during cooling. Heat Protection is the max. permitted temperature for the room in question. During cooling, it fulfils the same role as Frost Protection during heating - i.e. it saves energy and at the same time prevents unpermitted temperatures. The possible values are:

- **42 °C** (= no heat protection) **(default value)**
- 29 °C
- 30 °C
- 31 °C
- 32 °C
- 33 °C
- 34 °C
- 35 °C

### 13.2.5 Cyclical transmission of current set point value

Used to specify the cyclical transmission time for the active nominal value via the ***Current setpoint value*** (DPT 9.001 temperature) object. The possible values are:

- **Don't transmit cyclically default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

## 13.3 *Parameters with the supported function Heating/Cooling*

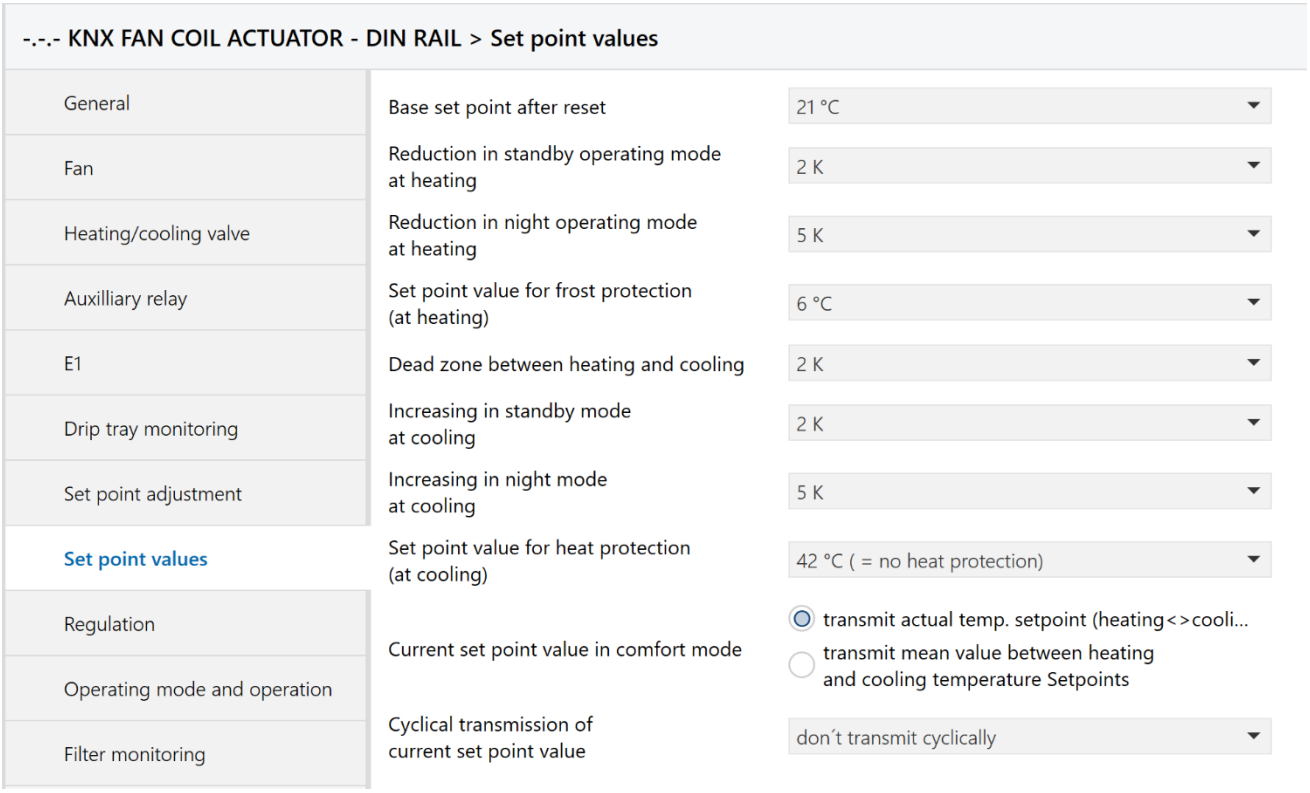



Fig. 13.3 – “Set point values” menu with Supported function = Heating/cooling

### 13.3.1 Base set point after reset

Specifies the nominal value assigned for temperature regulation. The possible values are:

- 15°C, 16 °C, 17 °C, …, **21 °C**,…, 29°C, 30°C **(default value)**

### 13.3.2 Reduction in standby operating mode at heating

Specifies how much the temperature must be reduced in Standby mode during heating. The possible values are:

- 0,5 K, 1 K, 1,5 K, **2 K**, 2,5 K, 3 K, 3,5 K, 4 K **(default value)**

### 13.3.3 Reduction in night operating mode at heating

Specifies how much the temperature must be reduced in Night mode during heating. The possible values are:

- 3 K, 4 K**, 5K,** 6K, 7K, 8K **(default value)**

### 13.3.4 Set point value for frost protection (at heating)

Specifies the nominal value assigned for Frost Protection mode during heating. The possible values are:

- 3 °C, 4 °C, 5 °C, **6 °C**, 7 °C, 8 °C, 9 °C, 10 °C **(default value)**

### 13.3.5 Dead zone between heating and cooling

Determines the transit area between the programmed values for Heating mode and Cooling mode (refer to par. 19.6 in Annex 2 - Dead zone).
The possible values are:

- 1 K, **2 K,** 3 K, 4 K**,** 5K, 6K **(default value)**

### 13.3.6 Increasing in standby mode at cooling

Specifies how much the temperature must be increased in Standby mode during cooling. The possible values are:

- 0,5 K, 1 K, 1,5 K, **2 K**, 2,5 K, 3 K, 3,5 K, 4 K **(default value)**

### 13.3.7 Increasing in night mode at cooling

Specifies how much the temperature must be increased in Night mode during cooling. The possible values are:

- 3 K, 4 K**, 5K,** 6K, 7K, 8K **(default value)**

### 13.3.8 Set point value for heat protection (at cooling)

Specifies the nominal value assigned for Heat Protection mode (overtemperature) during cooling. Heat Protection is the max. permitted temperature for the room in question. During cooling, it fulfils the same role as Frost Protection during heating - i.e. it saves energy and at the same time prevents unpermitted temperatures.
The possible values are:

- **42°C** (i.e. almost no Heat Protection) **(default value)**
- 29°C
- 30°C
- 31°C
- 32°C
- 33°C
- 34°C
- 35°C

### 13.3.9 Current set point value in comfort mode

This parameter is used to define which nominal value must be active in Comfort mode. The possible values are:

- **Transmit actual temp. (Heating <> Cooling)** **(default value)**
- Transmit mean value Heating/Cooling setpoints

If you select **Transmit actual temp. (Heating <> Cooling),** the nominal value for making the true regulation (= active nominal value) is always sent.

Example:
with a standard nominal value of 21°C and a dead zone of 2 K: the value 21°C is sent during heating, whereas the standard nominal value + dead zone (21°C + 2 K = 23°C) is sent during cooling

If you select **Transmit mean value Heating/Cooling setpoints**, the same value is sent for both heating and cooling in Comfort mode: standard nominal value + half the dead zone.
In this way, the people in the room are not disturbed.

Example:
with a standard nominal value of 21°C and a dead zone of 2 K: average value = 21°C + 1 K = 22°C.
The regulation, however, is made with 21°C in heating and 23°C in cooling.

### 13.3.10 Cyclical transmission of current set point value

Used to specify the cyclical transmission time for the active nominal value via the object ***Current set point value*** (DPT 9.001 temperature). The possible values are:

- **Don't transmit cyclically** **default value**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

# 14 “Regulation” menu

The **Regulation** menu is only visible if the “**Kind of used controller”** specified in the **General** menu is **Internal controller with temp. sensor at E1**.
The parameters in this menu vary depending on the **Supported function** (Heating, Cooling, or Heating/Cooling).

## 14.1 *Parameters with the supported function Heating*

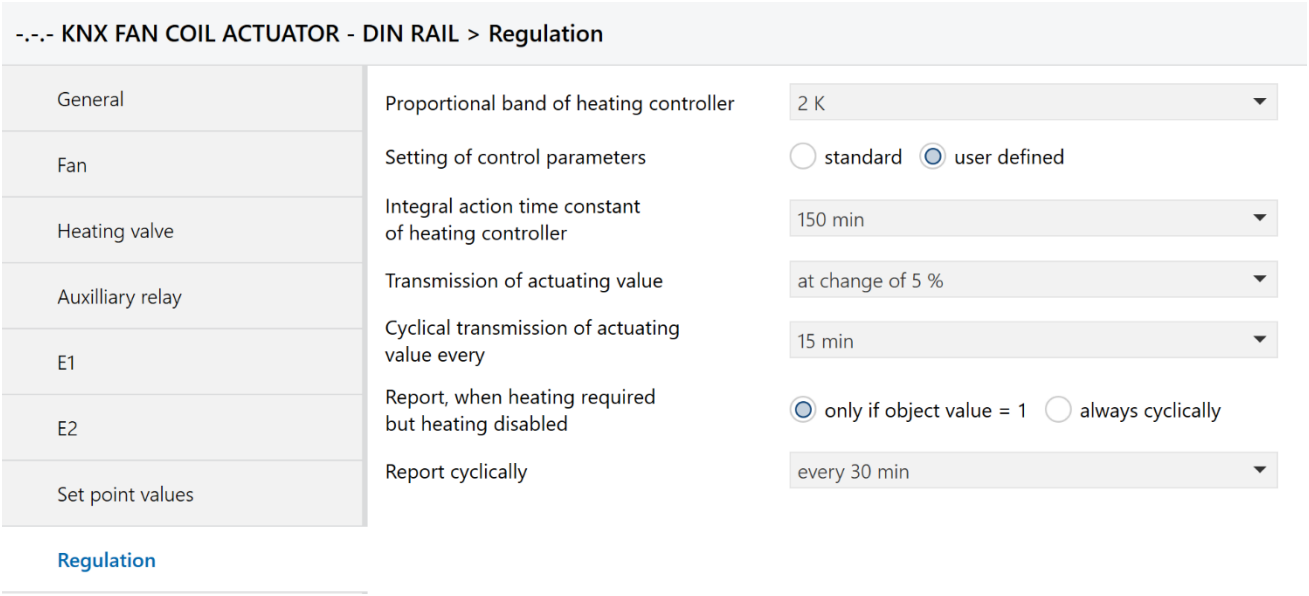



Fig. 14.1 – “Regulation” menu with Supported function = Heating

### 14.1.1 Setting of control parameters

This parameter specifies whether to leave the standard setting for the regulation parameters, or personalise them. The possible values are:

- **Standard** **(default value)**
- User defined

If **user defined** is selected, the regulation parameters can be individually set, so the following parameters will appear: “**Proportional band of heating controller.”** and “**Integral action time constant of heating controller.”**

### 14.1.2 Proportional band of heating controller

Professional setting for adapting the regulation behaviour to the room.
Small values make big changes to the control variable, whereas large values make a more limited change.
The possible values are (**default value 2K**):

- 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

### 14.1.3 Integral action time constant of heating controller

Setting of the regulator integration time, selected as a pure proportional regulator, or setting of an integration time (for PI regulator only). The possible values are:

- Only proportional controller
- 15 min., 30 min., 45 min., 60 min., 75 min., 90 min., 105 min., 120 min., 135 min., **150 min**., 165 min., 180 min., 195 min., 210 min., 225 min.

For more information, refer to par. 19.9 Regulating the temperature in Annex 2.

### 14.1.4 Transmission of actuating value

This parameter can be used to define the % variation of the control variable after which a new value must be sent (variation starting from the last transmission). The possible values are:

- at change of 1 %
- at change of 2 %
- at change of 3 %
- **at change of 5 %** **(default value)**
- at change of 7 %
- at change of 10 %
- at change of 15 %

### 14.1.5 Cyclical transmission of actuating value every

Used to specify a cyclical transmission time for the control variable. The possible values are:

- Don't transmit cyclically
- 3 min, 5 min, 10 min, **15 min**, 20 min, 30 min, 60 min **(default value)**

### 14.1.6 Report when heating required but heating disabled

This parameter can be used to signal when heating is required but is blocked. The signalling is made via the ***Heating required but heating disabled*** (DPT 1.001 Switch) object, sending an error message when heating should be activated owing to the temperature but it is blocked by the object ***Disable heating*** (DPT 1.001 Switch). The possible values are:

- **Only if object value = 1**
- Always cyclically

### 14.1.7 Report cyclically

Used to specify a cyclical transmission time for the error message. The possible values are:

- 3 min, 5 min, 10 min, 15 min, 20 min, **30 min**, 60 min **(default value)**

## 14.2 *Parameters with the supported function Cooling*

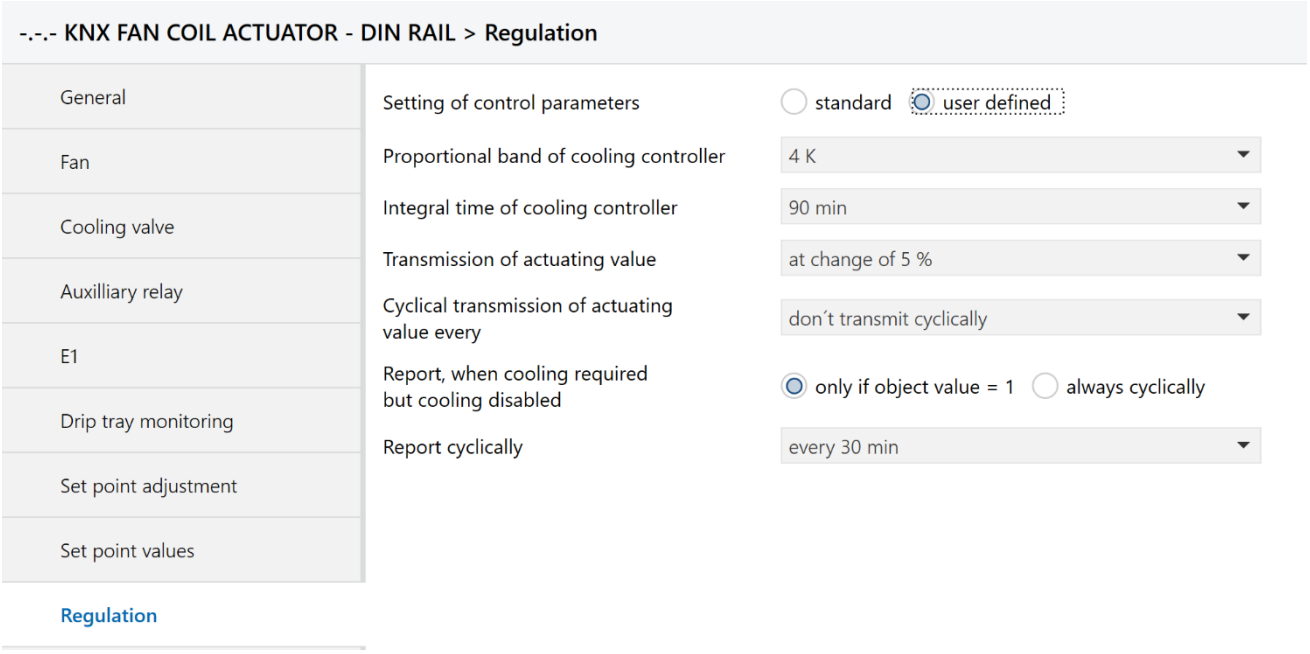



Fig. 14.2 – “Regulation” menu with Supported function = Cooling

### 14.2.1 Setting of control parameters

This parameter specifies whether to leave the standard setting for the regulation parameters, or personalise them. The possible values are:

- **Standard** **(default value)**
- User defined

If **user defined** is selected, the regulation parameters can be individually set, so the following parameters will appear: “**Proportional band of cooling controller** and “**Integral time of cooling controller”.**

### 14.2.2 Proportional band of cooling controller

Professional setting for adapting the regulation behaviour to the room.
Small values make big changes to the control variable, whereas large values make a more limited change.
The possible values are (**standard value 4K**):

- 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

### 14.2.3 Integral time of cooling controller

Setting of the regulator integration time, selected as a pure proportional regulator, or setting of an integration time (for PI regulator only). The integration time determines the regulation reaction time. These times can be altered to suit the conditions. If the cooling system is oversized and therefore too fast, shorter times should be selected. On the other hand, longer integration times are needed if the cooling system is small (slow).
The possible values are:

- Only proportional controller

- 15 min., 30 min., 45 min., 60 min., 75 min., 90 min., 105 min., 120 min., 135 min., **150 min**., 165 min., 180 min., 195 min., 210 min., 225 min.

For more information, refer to par. 19.9 Regulating the temperature in Annex 2.

### 14.2.4 Transmission of actuating value

This parameter can be used to define the % variation of the control variable after which a new value must be sent (variation starting from the last transmission). The possible values are:

- at change of 1 %
- at change of 2 %
- at change of 3 %
- **at change of 5 %** **(default value)**
- at change of 7 %
- at change of 10 %
- at change of 15 %

### 14.2.5 Cyclical transmission of actuating value every

Used to specify a cyclical transmission time for the control variable. The possible values are:

- **Don't transmit cyclically** **(default value)**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

### 14.2.6 Report when cooling required but cooling disabled

This parameter can be used to signal when cooling is required but is blocked. The signalling is made via the ***Cooling required but cooling disabled*** (DPT 1.001 Switch) object, sending an error message when heating should be activated owing to the temperature but it is blocked by the object ***Enable cooling*** (DPT 1.001 Switch). The possible values are:

- **Only if object value = 1**
- Always cyclically

### 14.2.7 Report cyclically

Used to specify a cyclical transmission time for the error message. The possible values are:

- 3 min, 5 min, 10 min, 15 min, 20 min, **30 min**, 60 min **(default value)**

## 14.3 *Parameters with the supported function Heating/Cooling*

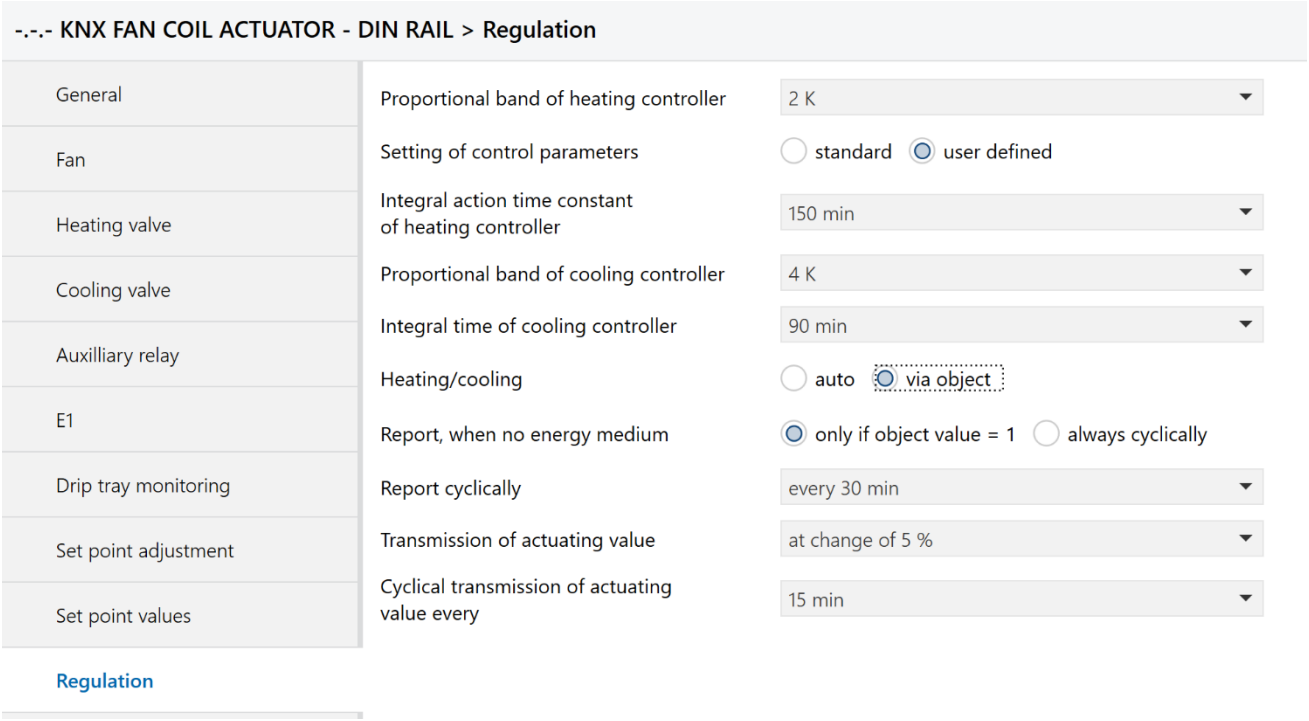



Fig. 14.3 – “Regulation” menu with Supported function = Heating/cooling

### 14.3.1 Setting of control parameters

This parameter specifies whether to leave the standard setting for the regulation parameters, or personalise them. The possible values are:

- **Standard** **(default value)**
- User defined

If **user defined** is selected, the regulation parameters can be individually set, so the following parameters will appear: “**Proportional band of heating controller.”** and “**Integral action time constant of heating controller.”**, “**Proportional band of cooling controller** and “**Integral time of cooling controller”.**

### 14.3.2 Proportional band of heating controller

Professional setting for adapting the regulation behaviour to the room.
Small values make big changes to the control variable, whereas large values make a more limited change.
The possible values are (**default value 2K**):

- 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

### 14.3.3 Integral action time constant of heating controller

Setting of the regulator integration time, selected as a pure proportional regulator, or setting of an integration time (for PI regulator only). The possible values are (**default value 150 min):**

- Only proportional controller
- 15 min., 30 min., 45 min., 60 min., 75 min., 90 min., 105 min., 120 min., 135 min., **150 min**., 165 min., 180 min., 195 min., 210 min., 225 min.

### 14.3.4 Proportional band of cooling controller

Professional setting for adapting the regulation behaviour to the room.
Small values make big changes to the control variable, whereas large values make a more limited change.
The possible values are (**default value 4K**):

- 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

### 14.3.5 Integral time of cooling controller

Setting of the regulator integration time, selected as a pure proportional regulator, or setting of an integration time (for PI regulator only). The integration time determines the regulation reaction time. These times can be altered to suit the conditions. If the cooling system is oversized and therefore too fast, shorter times should be selected. On the other hand, longer integration times are needed if the cooling system is small (slow).
The possible values are:

- Only proportional controller
- 15 min., 30 min., 45 min., 60 min., 75 min., **90 min**., 105 min., 120 min., 135 min., 150 min., 165 min., 180 min., 195 min., 210 min., 225 min.

For more information, refer to par. 19.9 Regulating the temperature in Annex 2.

### 14.3.6 Heating/Cooling

This parameter, visible if the system is a **4-pipe system,** specifies whether the device should be automatically switched to Cooling mode when the real temperature is higher than the threshold, or if Cooling mode should only be activated via the BUS on the object ***Heating/Cooling*** (DPT 1.001 Switch). The possible values are:

- **auto** **(default value)**
- via object

With **auto**, the actuator switches to **Cooling** mode automatically when the real temperature is higher than the threshold.

With **via object**, Cooling mode can only be activated on the BUS side via the object ***Heating/Cooling*** (DPT 1.001 Switch),value 1= Cooling. If this object is not set (= 0), Cooling mode remains deactivated. The values can be inverted using the following parameter.

### 14.3.7 Report when no energy medium

This parameter signals an error message on the ***No energy medium*** (DPT 1.001 Switch) object when heating or cooling needs to be activated owing to the temperatures, but the status of the ***Heating/Cooling*** (DPT 1.001 Switch) object is in conflict with this condition (in 2-pipe systems). In 4-pipe systems, the status of the ***Heating/Cooling*** (DPT 1.001 Switch) object is taken into consideration. The possible values are:

- **Only if object value = 1**
- Always cyclically

### 14.3.8 Report cyclically

Used to specify a cyclical transmission time for the error message. The possible values are:

- 3 min, 5 min, 10 min, 15 min, 20 min, **30 min**, 60 min **(default value)**

### 14.3.9 Transmission of actuating value

This parameter can be used to define the % variation of the control variable after which a new value must be sent (variation starting from the last transmission). The possible values are:

- at change of 1 %
- at change of 2 %
- at change of 3 %
- **at change of 5 %** **(default value)**
- at change of 7 %
- at change of 10 %
- at change of 15 %

### 14.3.10 Cyclical transmission of actuating value every

Used to specify a cyclical transmission time for the control variable. The possible values are:

- Don’t transmit cyclically
- 3 min, 5 min, 10 min**, 15 min,** 20 min, 30 min, 60 min **(default value)**

# 15 “Operating mode and operation” menu

The **Operating mode and operation** menu is only visible if the “**Kind of used controller”** specified in the **General** menu is **Internal controller with temp. sensor at E1.**
This menu is used to configure certain parameters for managing the operating mode in specific circumstances.

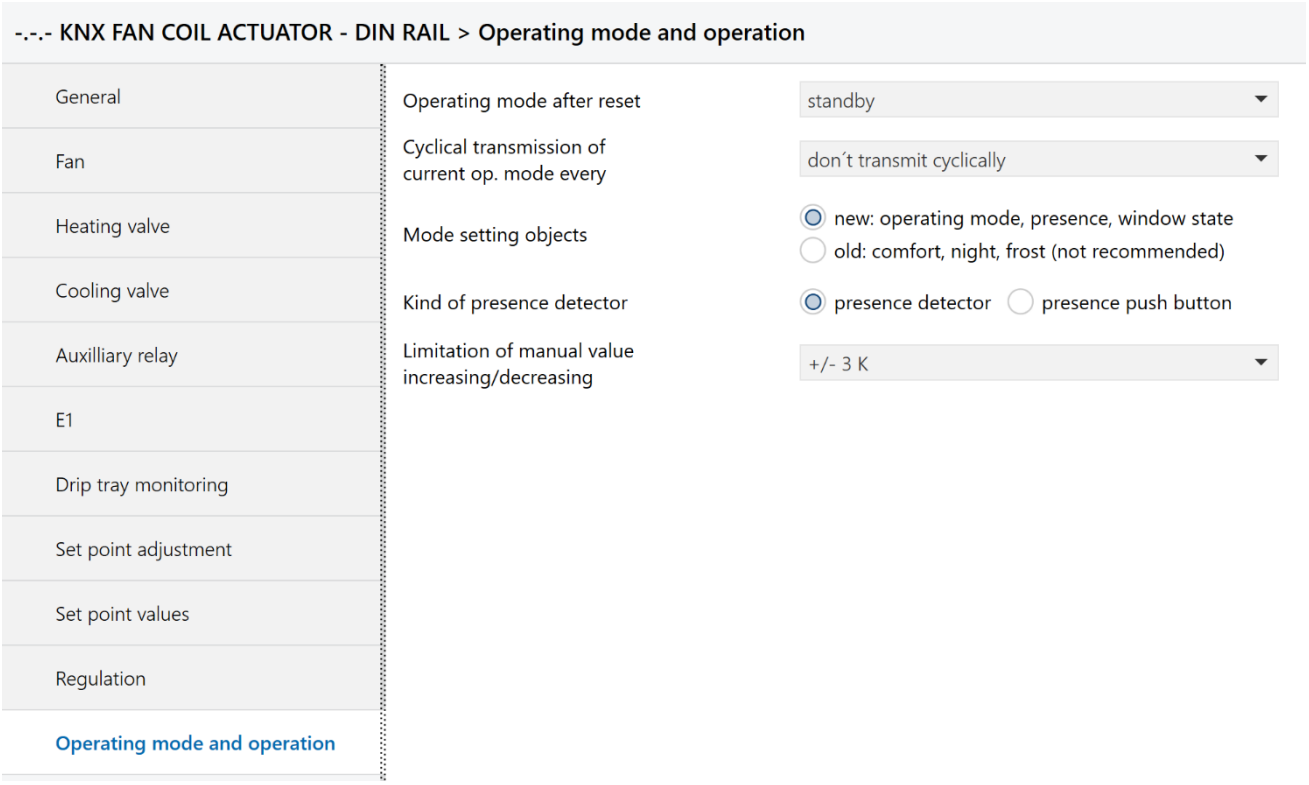



Fig. 15.1 – “Operating mode and operation” menu

## 15.1 *Parameters*

### 15.1.1 Operating mode after reset

This parameter specifies which mode must be active after the device has been set up with ETS or has been reprogrammed. The possible values are:

- Frost/Heat protection
- Night reduction
- **Standby (default value)**
- Comfort

### 15.1.2 Cyclical transmission of current op. mode every

This parameter specifies whether the active mode (indicated on the BUS by sending the ***Current operating mode*** (DPT 20.102 HVAC mode), object) should be sent cyclically. The possible values are:

- **Don’t transmit cyclically (default value)**
- 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min

### 15.1.3 Mode setting objects

The device can change the temperature control mode on the basis of the window contacts and the presence of people.
Depending on the selection made with this parameter, the names and formats of objects 21, 22 and 23 will be different.
The possible values are:

- **new: Operating mode, presence, window state (default value)**
- old: Comfort, Night, frost. (not recommended).

If is **new: Operating mode, presence, window state,** selected,***Operating mode preset*** (DPT 20.102 HVAC mode), ***Presence*** (DPT 1.018 occupancy) and ***Window*** (DPT 1.019 window/door).the objects will be made visible

With the ***Operating mode preset*** (DPT 20.102 HVAC mode) object, one of the four HVAC modes can be activated directly (1= Comfort, 2=Standby, 3=Night, 4=Frost Protection (in heating, or Overtemperature Protection in cooling). If another different value is received (0 or a number >4), Comfort mode is activated.

The ***Presence*** (DPT 1.018 occupancy) object allows the presence indicator status (e.g. a push-button or a movement sensor) to be received. If a value = 1 is received on this object, the device activates Comfort mode.

The ***Window*** (DPT 1.019 window/door) object allows the status of a window contact to be received. A value = 1 on this object activates Frost Protection / Heat Protection mode

If you select **old: Comfort, Night, frost. (not recommended),** (the traditional setting without window or presence status), the .***Night mode <-> Standby*** (DPT 1.001 Switch), ***Comfort*** (DPT 1.001 Switch), ***Frost protection*** (DPT 1.001 Switch).objects will be made visible

With the ***Night mode <-> Standby*** (DPT 1.001 Switch) object, Night or Standby mode can be activated.

With the object ***Comfort*** (DPT 1.001 Switch), the device activates Comfort mode if it receives a value = 1. This mode takes priority over Night and Standby. Comfort mode is deactivated by sending a value = 0 on the object.

With the object ***Frost protection (***DPT 1.001 Switch), the device activates Frost Protection mode if it receives a value = 1. In Cooling mode, Heat Protection is activated. Frost Protection / Heat Protection takes maximum priority. Frost Protection / Heat Protection remains active until it is deactivated with a 0.

### 15.1.4 Kind of presence detector

This parameter specifies whether the presence of people is signalled via a presence sensor or a push-button. In the case of a push-button, the next parameter - "**Time for comfort extension**" - appears so you can define how long the regulator must stay in Comfort mode once the presence of people has been detected (not necessary if a sensor is used).

The possible values are:

- **Presence detector (default value)**
- Presence push button

If **Presence detector** is selected**,** the presence sensor activates Comfort mode and remains active as long as it is enabled by the presence object ***Presence*** (DPT 1.018 occupancy).

If **Presence push button** is selected and, following activation via the presence object ***Presence*** (DPT 1.018 occupancy), an HVAC mode change is received on the ***Operating mode preset*** (DPT 20.102 HVAC mode) object, the new mode will be enabled and the presence object will be reset. If the presence object is set in Night / Frost Protection mode, the reset is only made at the end of the configured "**Time for comfort extension**" (see below). The presence object is not signalled on the BUS.

### 15.1.5 Time for comfort extension

If a **Presence push button**, is used, this parameter tells the regulator how long it must remain in Comfort mode once the presence of people has been signalled via the push-button. The possible values are:

- 30 min.
- 1 h
- 1,5 h
- **2 h** **(default value)**
- 2,5 h
- 3 h
- 3,5 h

### 15.1.6 Limitation of manual value increasing/decreasing

This parameter limits the variation from the nominal value received on the object ***Manual adjustment*** *(*DPT 9.002 temperature difference – K). The value expresses, in K, the maximum permitted variation (plus or minus) from the nominal value. The possible values are:

- No increasing/decreasing
- +/- 1 K
- +/- 2 K
- **+/- 3 K** **(default value)**
- +/- 4 K
- +/- 5 K

# 16 “Filter monitoring” menu

The **Filter monitoring** menu is only visible if the “**Report filter change”** parameter in the **General** menu has been set to **yes.**
This menu is used to configure certain parameters for managing filter monitoring and the replacement signal.

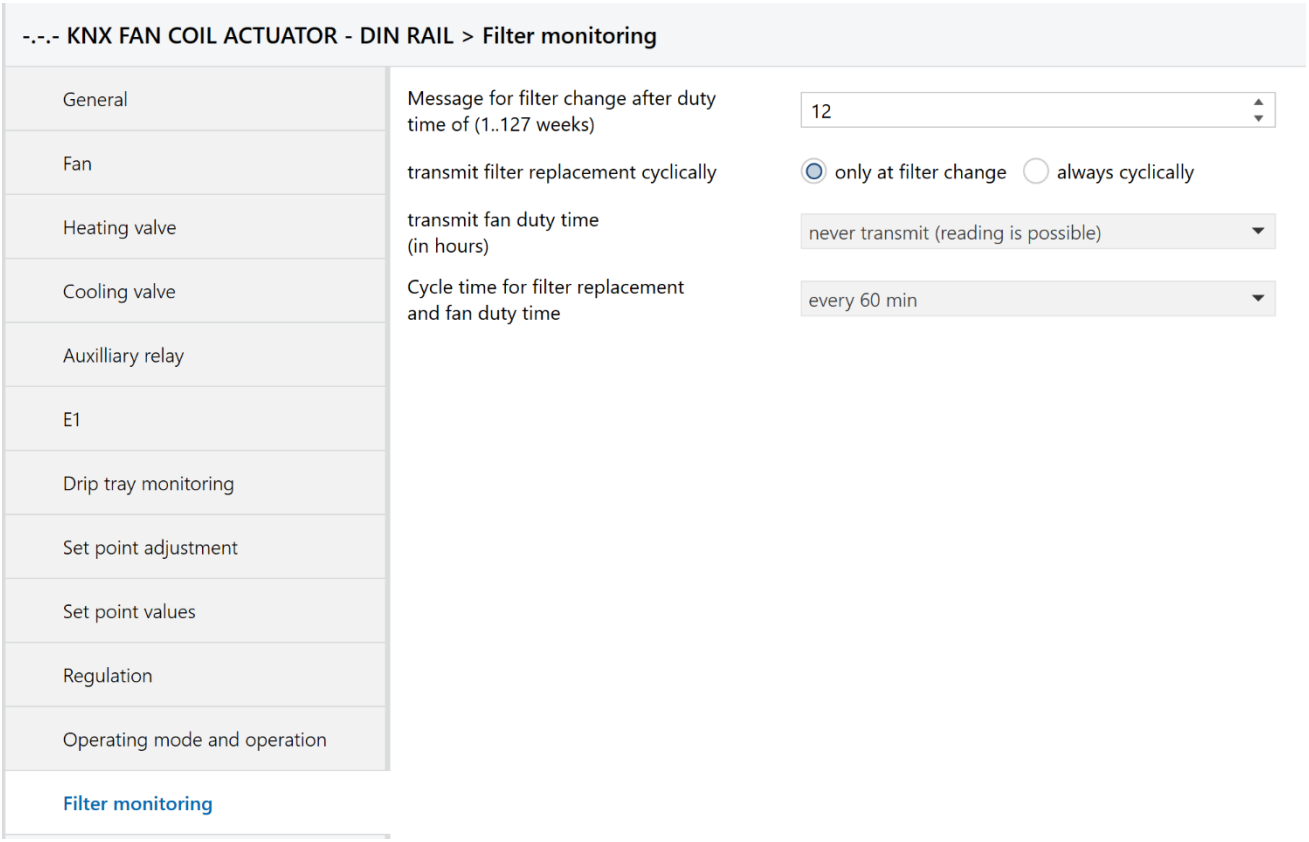



Fig. 16.1 – “Filter monitoring” menu

## 16.1 *Parameters*

### 16.1.1 Message for filter change after duty time of (1..127 weeks)

This parameter specifies how often the device must signal a filter change. The signalling is made by sending the ***Change filter*** (DPT 1.001 Switch) object with value = 1 (1= change, 0=reset). The value, from 1 to 127, is entered manually and defines the gap between two filter changes in terms of weeks:

- From 1 to 127 (**12 default value**)

### 16.1.2 Transmit filter replacement cyclically

This parameter specifies when the filter change signal must be sent via the object ***Change filter*** (DPT 1.001 Switch). The possible values are:

- **Only at filter change** **(default value)**
- Always cyclically

If **only at filter change** is selected**,** the ***Change filter*** (DPT 1.001 Switch) object is only sent when the filter needs to be changed (value 1 = change filter).

If **always cyclically** is selected, the ***Change filter*** (DPT 1.001 Switch) object sends the filter status cyclically (0 = filter OK, 1= change filter).

### 16.1.3 Transmit fan duty time (in hours)

The fan operating time is calculated internally with great precision (to the second), but the value is not sent automatically. This parameter specifies whether the device should send the fan operating time (in hours) via the ***Fan duty time since last filter change*** (DPT 7.007 time - h) object in response to a request (e.g. from a supervisor), only on change, or cyclically and on change.
The possible values are:

- **Never transmit (reading is possible)** **(default value)**
- Only on changes
- Cyclically and on changes

With **Never transmit (reading is possible),** the device only sends the value if a read request is received from the BUS on the object ***Fan duty time since last filter change*** (DPT 7.007 time - h).

With **Only on changes**, the counter level is sent whenever the fan operating time increases by one hour.

With **Cyclically and on changes**, the hour count is sent on the basis of the time specified in the "**Cycle time for filter replacement and fan duty time**" parameter and on change.

**NB:** the counter and filter status are reset when the ***Change filter*** (DPT 1.001 Switch) object is received with value = 0.

### 16.1.4 Cycle time for filter replacement and fan duty time

This parameter specifies the time for the cyclical transmission of the counter level. The possible values are (**every 60 min default value):**

- Every 3 min, every 5 min, every 10 min, every 15 min, every 20 min, every 30 min, every 45 min, **every 60 min**

# 17 “Actuating value loss” menu

The **Actuating value loss** menu is only visible if the “**Activate monitoring on actuating value”** parameter in the **General** menu has been set to **yes** in case of **remote controller.**
This menu is used to configure certain parameters for managing control variable monitoring.

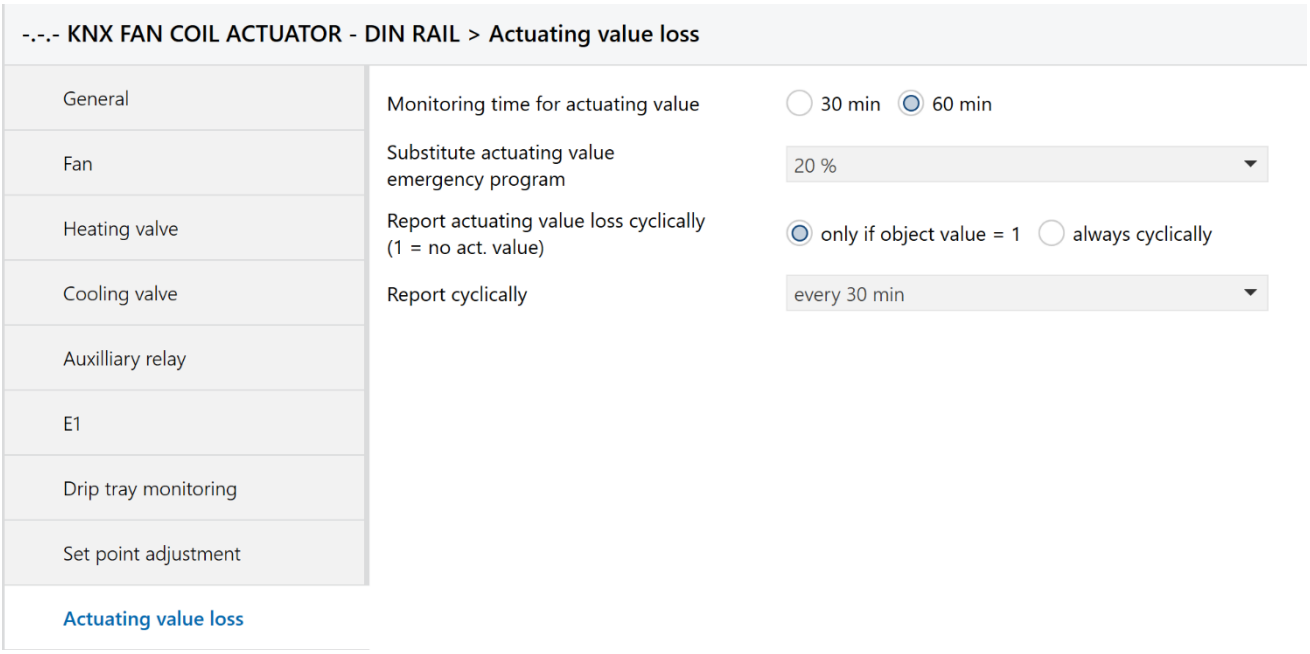



Fig. 17.1 – “Actuating value loss” menu

## 17.1 *Parameters*

### 17.1.1 Monitoring time for actuating value

If no control variable is received within the time configured, the substitute control variable is used. The possible values are:

- 30 min
- **60 min** (**default value**)

### 17.1.2 Substitute actuating value emergency program

Control variable for the emergency program as long as the ambient thermostat receives no new control variable. The possible values are:

- 0 %, 10 %, **20 %,** 30 %, 40 %, 50 %, 60 %, 70 %, 80 %, 90 %, 100 % (**default value**)

### 17.1.3 Report actuating value loss cyclically (1= no act. value)

This parameter is used to define whether the ***Actuating value loss*** (DPT 1.001 Switch) object must be sent only in the event of a control variable error, or cyclically (with a time defined in the "**Report cyclically**" parameter). The possible values are:

- **Only if object value = 1 (default value)**
- Always cyclically

### 17.1.4 Report cyclically

If "always cyclically" is selected in the previous parameter, this parameter can specify the time for the cyclical transmission of the control variable status via the object ***Actuating value loss*** (DPT 1.001 Switch). The possible values are (**every 30 min default value**):

- Every 3 min, every 5 min, every 10 min, every 15 min, every 20 min, **every 30 min**, every 45 min, every 60 min

# 18 Annex 1: Initial start-up

## 18.1 *Test mode*

Test mode is used to check the system, for instance during start-up or when looking for errors. In this mode, the button keys can be used to manually set the valves and fan as required. A temperature sensor (GWA9145 - NTC 100K TEMPERATURE SENSOR) or window contacts can also be checked.

**Important indications for test mode:**

- Regulation and BUS telegrams are deactivated.
- All the settings can be made, without limits.
- The valves are commanded until they are manually deactivated.
- The drip tray alarm is not taken into consideration.
- **The user is responsible for avoiding unpermitted operating conditions (e.g. heating and cooling valves both open simultaneously, or one valve constantly powered, etc.).**

**Enabling / cancelling test mode:**
Test mode is enabled or cancelled via the **"Test mode"** parameter with **enabled during 1 min. after reset** on the ***General*** parameter page.

**Activating test mode:**
Activate the **reset** by means of a download or the enabling of the BUS voltage:
→ The test mode LED will flash for 1 minute.
During this time, test mode can be launched via the valve button key ( / ) or the fan button key ( ).
→ The device switches to test mode and the "Test" LED lights up with a fixed light.

**Deactivating test mode:**
Test mode can be terminated by simultaneously pressing the two button keys or reset.

**If no button key is used while the test mode LED is flashing, the device switches automatically to normal mode after one minute.**
*During the initial start-up (i.e. with no application program), the LED flashes with no time limit.*

**Operation:**

- Commanding the fan:

Press button key A (fan) to apply the following operation statuses in the order shown.

**Table 18.1**

| Press on button key | Function | LED |
|---|---|---|
| 1 | Fan level 1 | S1 ON |
| 2 | Fan level 2 | S2 ON |
| 3 | Fan level 3 | S3 ON |
| 4 | Fan OFF | S1-S3 OFF |

- Commanding the valves / Switching the additional relay:

Press button key A (valves) to apply the following operation statuses in the order shown.

**Table 18.2**

| Press on button key | LED | Output |
|---|---|---|
| 1 | Cooling LED ON | After 2 sec V2+ ON |
| 2 | Cooling LED flashing | After 2 sec V2- ON |
| 3 | Heating LED ON | After 2 sec V1+ ON |
| 4 | Heating LED flashing | After 2 sec V1- ON |
| 5 | LED C1 ON | After 2 sec C1 ON |
| 6 | All the LEDs OFF | All the outputs OFF |

With delayed switching of the outputs, the user can use quick button key selection to skip the individual modes without modifying the valve position.

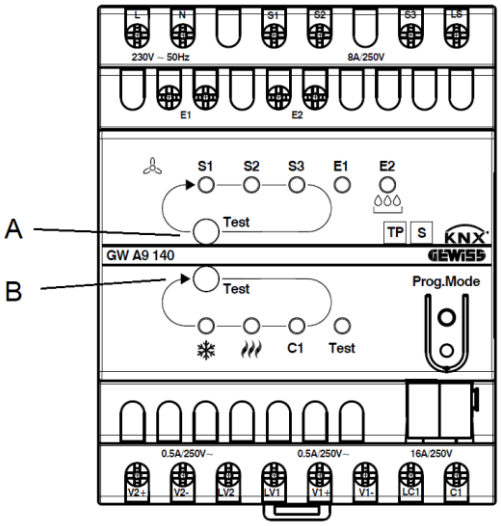



Figure 18.1

Table 18.3: Indication of the heating and cooling valve status.

| LED | Status | Meaning | |
|---|---|---|---|
| | | With 3-way valves | With 2-way valves |
| ❄ | OFF | The cooling valve is not commanded | The cooling valve is not commanded |
| | ON | The cooling valve is opened (C+) | The cooling valve is opened (C+) |
| | Flashing | The cooling valve is closed (C-) | The cooling valve is closed (i.e. no longer commanded). |
| ≋ | OFF | The heating valve is not commanded | The heating valve is not commanded |
| | ON | The heating valve is opened (H+) | The heating valve is opened (C+) |
| | Flashing | The heating valve is closed (H-) | The heating valve is closed (i.e. no longer commanded). |

**Checking the temperature sensor (GWA9145 - NTC 100K TEMPERATURE SENSOR):**
If a temperature sensor is connected to input E1, and E1 is suitably configured in the application, the measured ambient temperature is sent on object 14 ***Actual value from E1*** (DPT 9.001 Temperature - °C).

A broken sensor or a short-circuit on the sensor cable is signalled by the value -60°C.

**Checking the window contacts:**
If a window contact is connected to input E1, and E1 is suitably configured in the application, the window status is sent on object 14 ***Status of window contact at E1*** (DPT 1.019 window/door)
Input E2 (object 16, ***Drip tray monitoring status*** or ***Status of window contact at E2***) can be checked in the same way.

**Configuring the device upon delivery (prior to the initial start-up with ETS):**
Before downloading the application software for the first time via ETS, inputs E1 and E2 and the additional relay C1 are already connected to common group addresses:
E1 = 7/4/100
E2 = 7/4/101
C1 = 7/4/100, 7/4/101
If the contact on E1 or E2 is closed, the additional relay C1 is activated. This makes it possible to check both inputs during installation without ETS.

**Deactivating test mode**
Test mode is terminated by making a reset, therefore by:

- simultaneously pressing the two button keys (A+B)
- downloading the application
- interrupting and then restoring the BUS voltage

## 18.2 *Device LEDs in automatic mode*

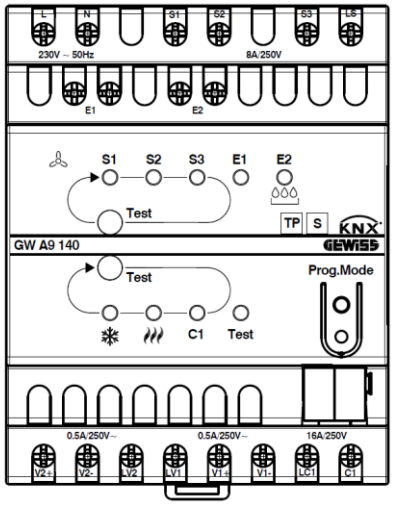



Figure 18.2

| LED | Function | Explanation |
|---|---|---|
| S1 | Fan level 1 | Lights up when fan level 1 is active (the *switch-on strategy* is not taken into consideration). |
| S2 | Fan level 2 | Lights up when fan level 2 is active (the *switch-on strategy* is not taken into consideration). |
| S3 | Fan level 3 | Lights up when fan level 3 is active (the *switch-on strategy* is not taken into consideration). |
| ❄ | Cooling | Lights up when the cooling valve is open.<br>Flashes when the opening of the cooling valve is delayed because the heating valve has not yet closed completely or the *Time between heating and cooling* has not terminated. |
| ≋ | Heating | Lights up when the heating valve is open.<br>Flashes when the opening of the heating valve is delayed because the cooling valve has not yet closed completely or the *Time between heating and cooling* has not terminated. |
| C1 | Additional relay | Lights up when the additional relay is activated. |
| Test | Test mode | Flashes after the reset, when *Test mode* can be selected or when the device has not yet been programmed.<br>Lights up when the device is in *Test mode*. |
| E1 | Input 1 | If used as a *Window contact*:<br>Lights up when the contact is closed.<br>If used as a *Real value sensor*:<br>Remains OFF in the normal temperature range (i.e. -10°C to .. 60°C).<br>Flashes if there is an interruption or short-circuit on the sensor line and the temperature is outside the normal range. |
| E2 | Input 2 | If used as a *Window contact* (only with *Supported function = Heating* or *Ventilation*):<br>Lights up when the contact is closed.<br>With *Supported function = Heating and Cooling* or *Cooling*:<br>Flashes if there is a drip tray alarm, regardless of the *Source for drip tray monitoring*. |

## 18.3 *Recognising a power supply failure with 3-point valves*

If there is a power failure during the positioning of a 3-point valve, the valve will be in an unrecognised position when power is restored.

For this reason, the mains voltage in terminals L and N is monitored and, when power is restored, the valve is completely closed and then brought to the correct position.

**Important:**
this function is only possible if the device and the valves are connected to the same electrical circuit (overload circuit breaker).

# 19 Annex 2: Functional temperature control specifications

## 19.1 *Control variable monitoring*

### 19.1.1 Use

If there is a fault on the external ambient thermostat, and the last control variable sent was equal to 0%, all the valves remain closed regardless of the ambient temperature trend.
This can cause considerable damage if, for example, the outdoor temperature is below zero and cold air enters the room.

To avoid this risk, the GWA9140 device guarantees the following functions:

1. monitoring of the correct operation of the ambient thermostat
2. launch of an emergency program in the event of a control variable error
3. transmission of the control variable monitoring status

### 19.1.2 Principle

GWA9140 checks that at least 1 control variable telegram is received within the time configured, and applies a predefined nominal value in the event of a control variable error.

### 19.1.3 Practice

The ambient thermostat is configured on the cyclical transmission of the control variable.

The monitoring time in the GWA9140 is set on a value at least double that of the cyclical ambient thermostat time.
For example, if the ambient thermostat sends the control variable every 15 minutes, the monitoring time must be at least 30 minutes.

Following a control variable error, normal operation is resumed as soon as a new control variable is received.

When the lock function is activated (object 1: *Heating lock* = 1 or *Cooling consent* = 0), only the control variable error telegram is sent.
The relative valve remains/is closed and the configured control variable emergency program is only applied when the lock has been removed.

## 19.2 *Characteristic valve curve setting*

The parameters of the *Heating valve* and *Cooling valve* pages allow the exact adaptation to the type of valve used, and also allow the regulation to be adjusted.

Example for a valve that begins opening at a position of 10% and is already fully open at 80%.

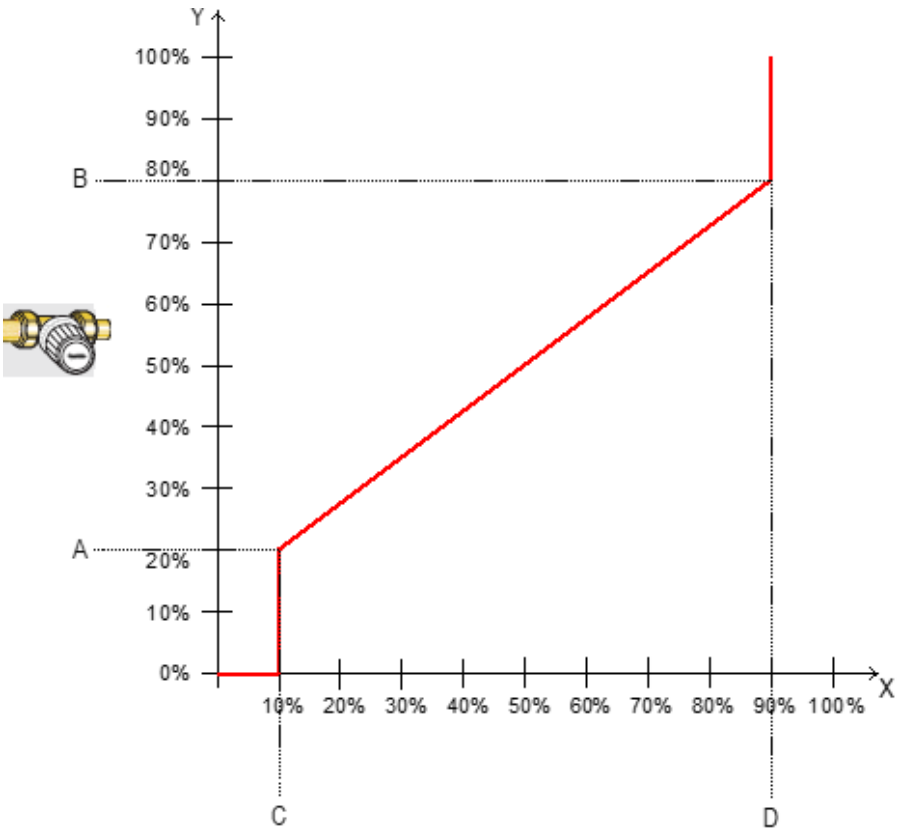



Figure 19.1

Table 19.1

| | Description | Value |
|---|---|---|
| X | Regulator control variable | 0 .. 100% |
| Y | Resulting valve position | 0 .. 100% |
| A | Parameter: Minimum valve position | 20% |
| B | Parameter: Maximum valve position | 80% |
| C | Parameter: Open for actuating value above | 10% |
| D | Parameter: Maximum valve position above | 90% |

## 19.3 *Nominal value adjustment*

The active nominal value can be adjusted via object 25 "***Manual adjustment***", by a maximum of +/- 5 K.

Every time a modification is made, the new nominal value is sent by the ***Current set point value*** object (object 27).

The adjustment limits are fixed in the **Operating mode and operation** menu, via the "**Limitation of manual value increasing/decreasing***"* parameter.

## 19.4 *Nominal value adaptation*

The nominal value adjustment dynamically adapts the nominal value to the outdoor temperature in cooling mode.

If the outdoor temperature exceeds a defined threshold, the adjustment is activated and the corresponding increase of the nominal value is established.

### 19.4.1 Using with the built-in regulator

Nominal value adaptation can also be used for the built-in regulator. In this case, the "**Use set point adjustment for regulation"** parameter in the **Set point adjustment** menu must be set on ***yes*****.**

The adaptation of the nominal value of the built-in regulator ("**Base set point after reset"**) is always relative, i.e. it is increased or reduced by the correction value defined (see Figure 19.2 below).

In addition, it is possible to generate an independent nominal value that makes the adaptation available to any other regulators in the building (see below, par. 19.4.4: Format of the nominal value correction: absolute).

### 19.4.2 Using with an external regulator

For external regulators, there are two possible types of nominal value correction: relative and absolute.

See also: Menu **Nominal value adaptation**.

### 19.4.3 Format of the nominal value correction: relative

The adaptation of the nominal value is sent by object 19 ***Adjust set point*** (DPT 9.002 temperature difference) as a temperature difference.
The value 0 is sent until the nominal value correction threshold, set with the "**Set point adjustment from"** parameter, is reached.

If the nominal value correction threshold is exceeded, the value is increased by 1 K every time the outdoor temperature increases by the value set in the parameter "**Adjustment**".

**Example: correction value sent**
*"Programmed value correction from"*: 25°C

**Figure 19.2: Correction value on the basis of the outdoor temperature**

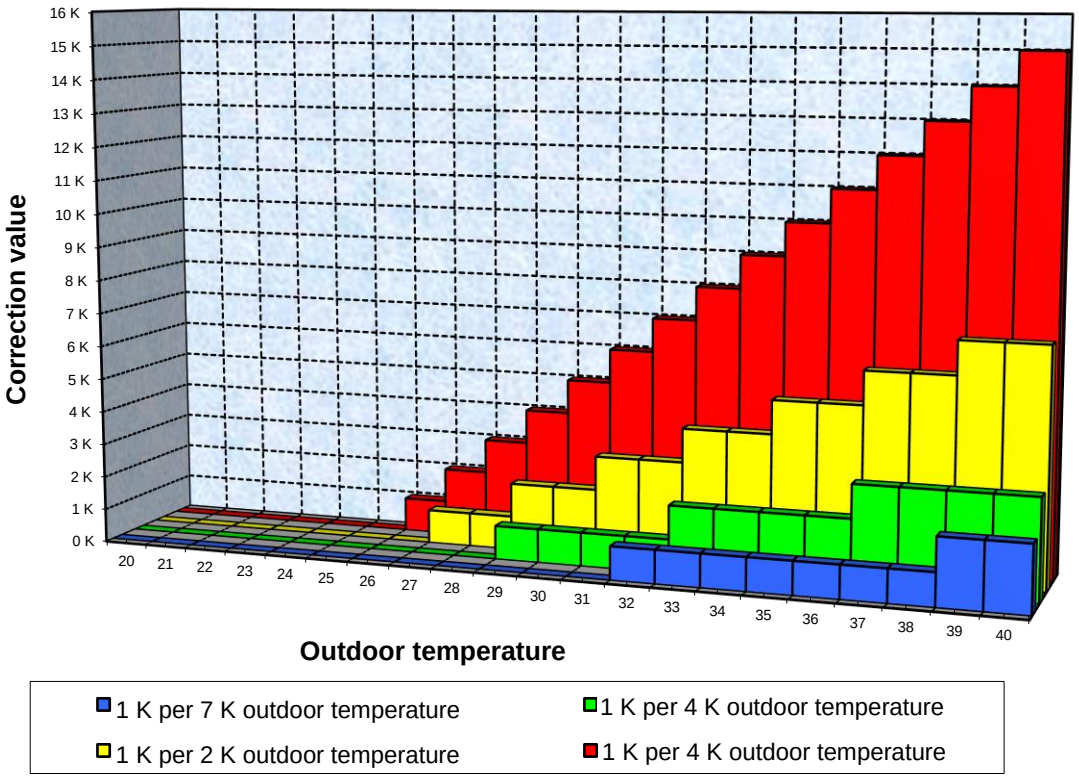


**Table 19.2: Correction values**

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

### 19.4.4 Format of the nominal value correction: absolute

This nominal value is calculated as follows:
*standard nominal value without correction + dead zone + adaptation*.

**Example:**
*"Programmed value correction from"*: 25°C, *Standard nominal value without correction*: 21°C, *Dead zone* = 2 K

**Figure 19.3: Adaptation of the nominal value on the basis of the outdoor temperature**

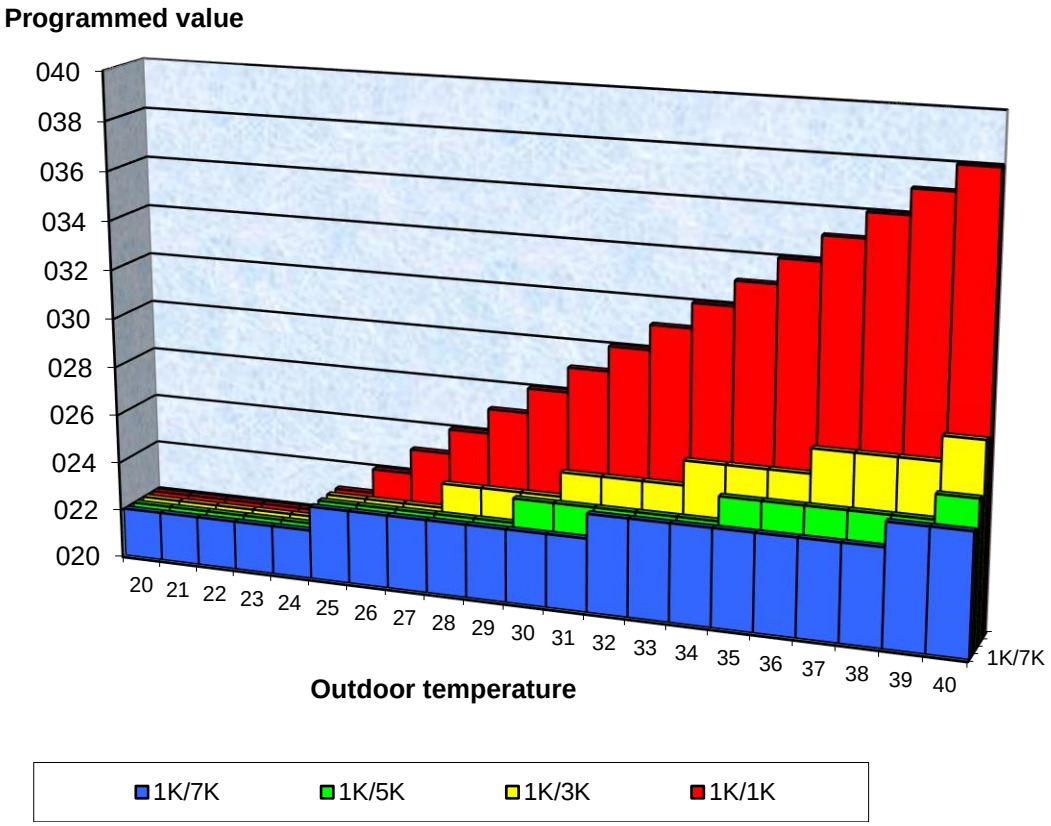


**Table 19.3: Programmed values**

| Outdoor temp. | 1K/1K | 1K/2K | 1K/3K | 1K/4K | 1K/5K | 1K/6K | 1K/7K |
|---|---|---|---|---|---|---|---|
| **20** | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 |
| **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 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 |
| **26** | 24.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 |
| **27** | 25.00 | 24.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 |
| **28** | 26.00 | 24.00 | 24.00 | 23.00 | 23.00 | 23.00 | 23.00 |
| **29** | 27.00 | 25.00 | 24.00 | 24.00 | 23.00 | 23.00 | 23.00 |
| **30** | 28.00 | 25.00 | 24.00 | 24.00 | 24.00 | 23.00 | 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 |

## 19.5 *Frost Protection mode (or heat protection) with window contact*

### 19.5.1 With external regulator

The window contact is connected to E1. The window status is sent by object 14 ***Status of window contact at E1*** on the BUS, as an order for the external regulator.
The regulator can switch automatically to Frost Protection (or heat protection) mode if the window is opened.

The "**Function of E1"** parameter in the ETS **E1** menu must be set on **E1 = window contact.**

### 19.5.2 With built-in regulator

This function is only possible if the "**Mode setting objects"** parameter in the **Operating mode and operation** ETS menu is set on **New: operating mode, presence, window state.**

The "*Open window*" information can be detected in 2 different ways:

- The window contact is connected to a binary input (e.g. GW 90 727) and the window status is received on object 23 **Window – Input for window contact** (DPT 1.019 window/door).

- The window contact is connected to E2 (only possible with "**Supported functions***"* = ***Heating***).
  **Important:** the relative switching object (object 16, ***Status of window contact at E2 - report***) must be connected with the group address to object 23 (***Window – Input for window contact***).
  GWA9140 detects the opening of the window and switches automatically to Frost Protection (heat protection) mode.
  When the window is closed, the previously set mode is restored.

## 19.6 *Dead zone*

The dead zone is a transit area between Heating and Cooling operation.
Neither heating nor cooling is carried out within this area.

If a control panel switches the device to Cooling, the nominal value is internally increased by the dead zone value.

Without this transit area, the system would switch continuously between heating and cooling. As soon as the nominal value was exceeded, heating would be activated, but then cooling would begin as soon as the nominal value was reached so the temperature would fall below the nominal value and this would activate heating once again.

## 19.7 *Determining the active mode*

The active nominal value can be adapted to the varying needs by selecting temperature control mode.
This mode can be defined using objects 21, 22, 23.
There are two procedures:

### 19.7.1 New modes

In the **Operating mode and operation** ETS menu, if the "**Mode setting objects"** parameter is set on **New: operating mode, presence, window state,** the active mode can be defined as follows:

**Table 19.4**

| Mode pre-selection Object 21 | Presence Object 22 | Window status Object 23 | Active mode (Object 24) |
|---|---|---|---|
| As preferred | As preferred | 1 | Frost Protection/heat protection |
| As preferred | 1 | 0 | Comfort |
| Comfort | 0 | 0 | Comfort |
| Standby | 0 | 0 | Standby |
| Night | 0 | 0 | Night |
| Frost Protection/heat protection | 0 | 0 | Frost Protection/heat protection |

**Typical application:**
With a control panel or another KNX device that can send the HVAC modes, object 21 ***Operating mode preset*** (DPT 20.102 HVAC mode) allows "Standby" or "Comfort" mode to be activated in the morning and "Night" in the evening.
For holiday periods, object 21 can be used to select Frost Protection/heat protection mode, which can be activated via another KNX device.
Object 22 ***Presence – input for presence signal*** is connected to a presence indicator. If any presence is detected, GWA9140 switches to Comfort mode (see table).
Object 23 ***Window – input for window contact*** is connected to a window contact via the BUS (binary input). As soon as the window is opened, GWA9140 switches to Frost Protection mode.

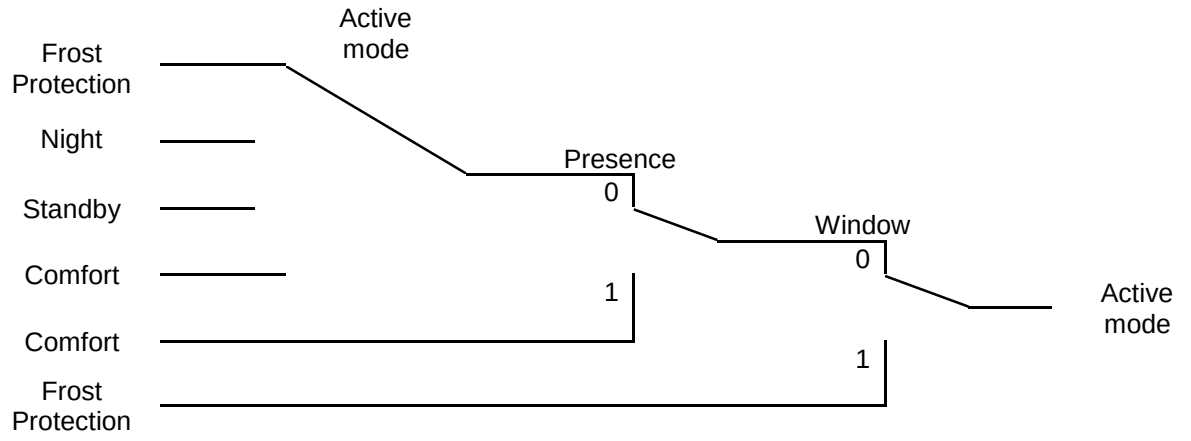



**Figure 19.4**

## 19.7.2 Old mode

In the **Operating mode and operation** ETS menu, if the "**Mode setting objects"** parameter is set on **old: comfort, night, frost (not recommended)**, the active mode can be defined as follows:

**Table 19.5**

| Night Object 21 | Comfort Object 22 | Frost Protection/heat protection Object 23 | Active mode Object 24 |
|---|---|---|---|
| As preferred | As preferred | 1 | Frost Protection/heat protection |
| As preferred | 1 | 0 | Comfort |
| Standby | 0 | 0 | Standby |
| Night | 0 | 0 | Night |

**Typical application:** With a control panel or another KNX device, object 21 ***Night mode <-> Standby*** allows "Standby" mode to be activated in the morning and "Night" in the evening.

For holiday periods, object 23 ***Frost protection*** can be used to select Frost Protection/heat protection mode, activated via a control panel or another KNX device
Object 22 ***Comfort*** is connected to a presence indicator. If any presence is detected, GWA9140 switches to Comfort mode (see table).
Object 23 ***Frost protection*** can be connected to a window contact. As soon as the window is opened, GWA9140 switches to Frost Protection mode.

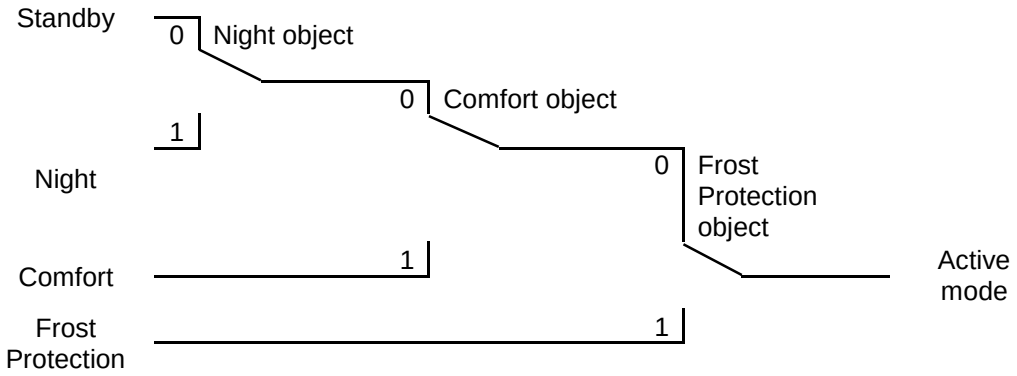



**Figure 19.5**

There are 2 disadvantages in the old procedure, compared with the new one:

1. To swap from Comfort mode to Night mode, 2 telegrams are needed (sent from a control panel, supervisor or another KNX device): object 22 must be set on "0" (Comfort - OFF) and object 21 on "1" (Night - ON).
2. If the window is opened and then closed again while “Frost Protection/heat protection” mode is selected, this mode will be removed.

## 19.7.3 Determining the nominal value

### 19.7.3.1 Calculating the nominal value for Heating

**Table 19.6: current nominal value for Heating**

| Operating mode | Current nominal value |
|---|---|
| **Comfort** | Standard nominal value +/- nominal value adjustment |
| Standby | Standard nominal value +/- nominal value adjustment - reduction in Standby mode |
| Night | Standard nominal value +/- nominal value adjustment - reduction in Night mode |
| Frost Protection/heat protection | Nominal parameterised value for Frost Protection mode |

**Example:**
Heating in Comfort mode.

**Table 19.7: Parameter settings:**

| ETS menu | Parameter | Setting |
|---|---|---|
| *Nominal values* | Standard programmed value after reset | 21°C |
| | Reduction in Standby mode (during heating) | 2 K |
| *Mode and operation* | Manual adjustment limit | +/- 2 K |

The programmed value was previously increased by 1 K via the ***Manual adjustment*** object.

Calculation:

Current nominal value = Standard nominal value + nominal value adjustment

= 21°C + 1 K = 22°C

If the change is made in Standby mode, the current nominal value is calculated as follows:

Current nominal value = Standard nominal value + nominal value adjustment - Reduction in Standby mode

= 21°C + 1 K - 2 K = 20°C

### 19.7.3.2 Calculating the nominal value for Cooling

**Table 19.8: current nominal value for Cooling**

| Operating mode | Current nominal value |
|---|---|
| Comfort | Standard nominal value + nominal value adjustment + dead zone |
| Standby | Standard nominal value + nominal value adjustment + dead zone + increase in Standby mode |
| Night | Standard nominal value + nominal value adjustment + dead zone + increase in Night mode |
| Frost Protection/heat protection | Nominal parameterised value for heat protection mode |

**Example:**
Cooling in Comfort mode.

The ambient temperature is too high so a control panel or another KNX device switches to Cooling mode.

**Table 19.9: Parameter settings:**

| ETS menu | Parameter | Setting |
|---|---|---|
| General | Supported function | Heating and Cooling |
| Nominal values | Standard programmed value after reset | 21°C |
| Nominal values | Dead zone between heating and cooling | 2 K |
| | Increase in Standby mode | 2 K |
| Mode and operation | Manual adjustment limit | +/- 2 K |

The nominal value was previously reduced by 1 K via object 25 ***Manual adjustment***.

Calculation:

Current nominal value = Standard nominal value + nominal value adjustment + dead zone

= 21°C - 1 K + 2 K
= 22°C

A change in Standby mode leads to another increase in the nominal value (energy savings), which is then:

Nominal value = standard nominal value + nominal value adjustment + dead zone + increase in Standby mode

= 21°C - 1 K + 2 K + 2 K
= 24°C

### 19.7.4 Heating and Cooling in a 2-pipe system

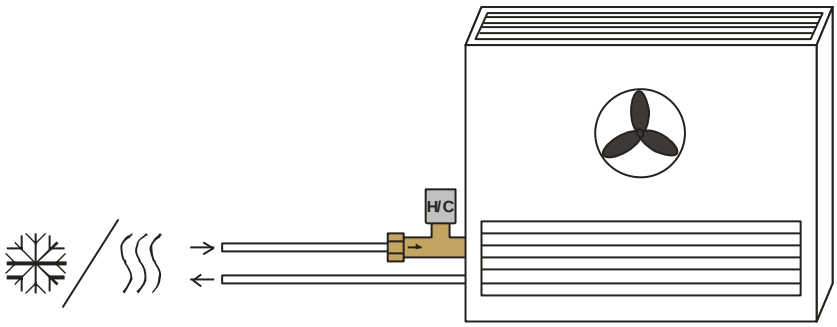



**Figure 19.6**

The following points need to be considered when using a 2-pipe heating/cooling system:

- In a 2-pipe system, the heating and cooling fluids (depending on the season) travel through the same pipes and are commanded by the same valve.
  This is connected to the valve terminals *V1*.

- The switch between heating fluid and cooling fluid is made by the system, and must therefore be signalled to the regulator.
  The heating/cooling system must send a 0 (in Heating mode) or a 1 (in Cooling mode) on object 1 "***Heating/Cooling"*** of GWA9140.

### 19.7.5 Heating and Cooling in a 4-pipe system

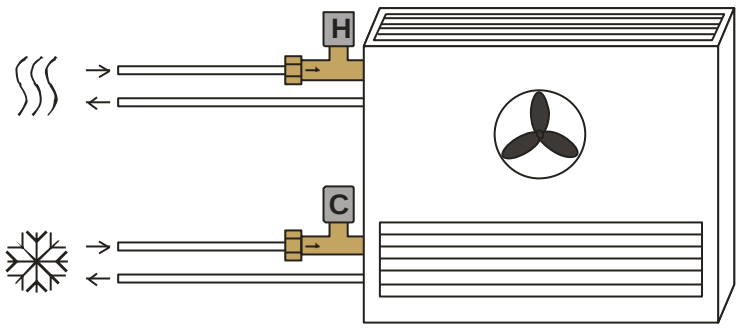



**Figure 19.7**

If a 4-pipe heating/cooling system is used, the heating valve is connected to terminals *V1* and the cooling valve to terminals *V2*.

## 19.8 *Fan check*

### 19.8.1 Priorities

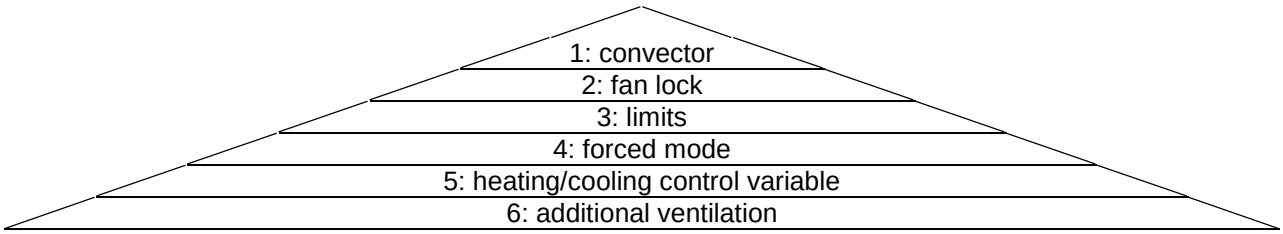



**Figure 19.8**

The "**Heating installation"** = *Convector / Fan Coil* and "**Cooling installation"** = *Convector / Fan Coil* parameters have top priority (1). In the case of a *Convector*, the fan is not commanded.

The "**Additional ventilation"** parameter has the lowest priority and is only taken into consideration if the fan is switched off because of the control variable and *Additional ventilation* is admitted in the parameter.

**Important:**
in normal Heating/Cooling mode, the "**Open for actuating value above"** parameter (in the **Heating valve**, **Cooling valve** or **Heating/Cooling valve** menu) is also considered.

**Table 19.10: Example with the parameter *Open for actuating value above* = 40 %:**

| Control variable | Fan behaviour |
|---|---|
| 1 .. 39% | The fan is not started up because the valve is not open*. |
| 40% .. 100% | The relative fan level is applied |

*The *Additional ventilation* function is still possible.

## 19.8.2 Forced fan mode

This function allows you to manually preselect the fan level via the KNX BUS.

**Note**: forced operation can be activated with 1 or 0.

Refer in particular to the "**Switch between auto and forced mode"** parameter on the **General**, menu page. With this, you can not only change the value for activating operation, but also define the behaviour of the device at start-up. If "**via obj. Forced/auto, forced = 1**" is selected, automatic mode is active at start-up and forced mode must be activated by sending 1 on the dedicated object (object 15). If "**via obj. Auto/forced, forced = 0**" is selected, forced mode is active at start-up and automatic mode must be activated by sending 1 on the dedicated object (object 15).

The forced regulating value received (object 8) is received as a percentage value and evaluated on the basis of the activation threshold values for fan level 1/2/3.

**Behaviour on sending fan value in forced mode with** "**Switch between auto and forced mode"** = **via obj. Forced/auto, forced = 1**:
The control panel or supervisor sends a 1 to the fan coil actuator on object 15, thereby activating forced mode. The regulating value is then sent (to object 8) for the fan level selected on the basis of the threshold value set. Forced mode is terminated by means of a telegram with the value 0 to object 15, after which automatic mode is reset.

**Behaviour on sending fan value in forced mode with** "**Switch between auto and forced mode"** = **via obj. Auto/forced, forced = 0**:

**The thermostat (e.g. GW 16 976 Cx Thermo ICE) sends the regulating value for the required fan level directly (to object 8) and thereby activates forced mode. Object 15 is automatically brought back to 0.**
NB: until value 1 is sent to object 15 to activate automatic mode, the arrival of a forced control variable on object 8 is sufficient for activating forced mode.

Forced mode is terminated by means of a telegram with the value 1 to object 15, after which automatic mode is reset.

**Important: the forced control variable received must always be slightly higher than the threshold setting of the fan coil actuator.**

**Table 19.11: example of a forced command sent to the fan**

| Fan level | Values sent by<br><br>Thermo ICE GW 16 976 Cx | Default threshold values<br><br>for GWA9140 |
|---|---|---|
| 1 | 33% | 10% |
| 2 | 66% | 40% |
| 3 | 100% | 70% |

If fan level 2 is selected, Thermo ICE GW 16 976 Cx sends the regulating value 66%.

As the threshold value for level 2 in the fan coil actuator is set at 40%, the control variable received (66%) is clearly assigned to fan level 2 and is applied by the fan.

## 19.8.3 Time between heating and cooling and tail-off time

When switching from heating to cooling, first of all the heating valve is closed and simultaneously the "**Follow-up time for utilisation of the remaining energy**" (if configured) begins.
After the closure of the heating valve, the configured "**Delay between heating and cooling"** begins.

During this time, the tail-off phase can continue. At the end of the tail-off phase, the cooling valve can be opened. In this case, the tail-off phase is interrupted if it hasn't yet ended.
If the cooling valve is not to be opened because the ambient temperature is in the dead zone, the tail-off phase can continue.
The same procedure applies when switching from cooling to heating.
As soon as the heating valve is opened, the *Warm start* can begin (if required).

**Operation for using the residual energy:**

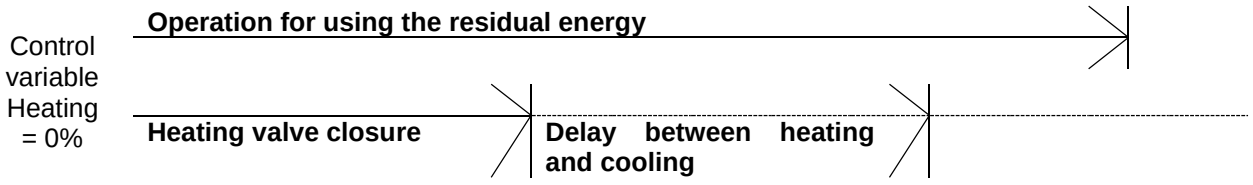



**Figure 19.9**

**Switch from heating to cooling**.

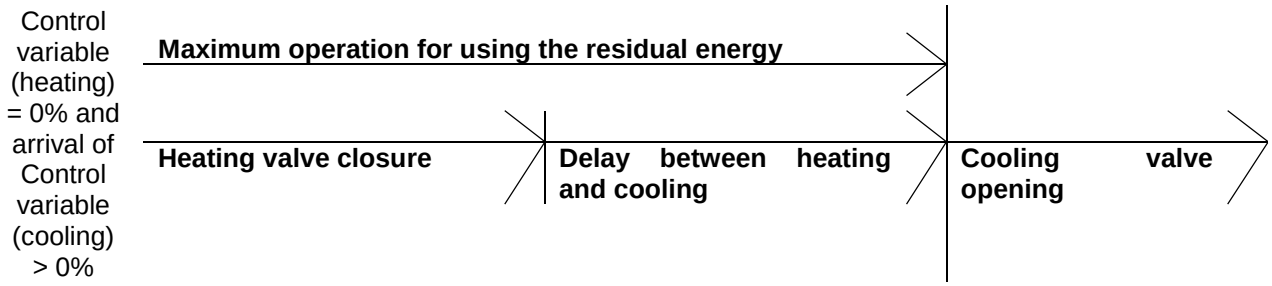



**Figure 19.10**

**Switch from cooling to heating**

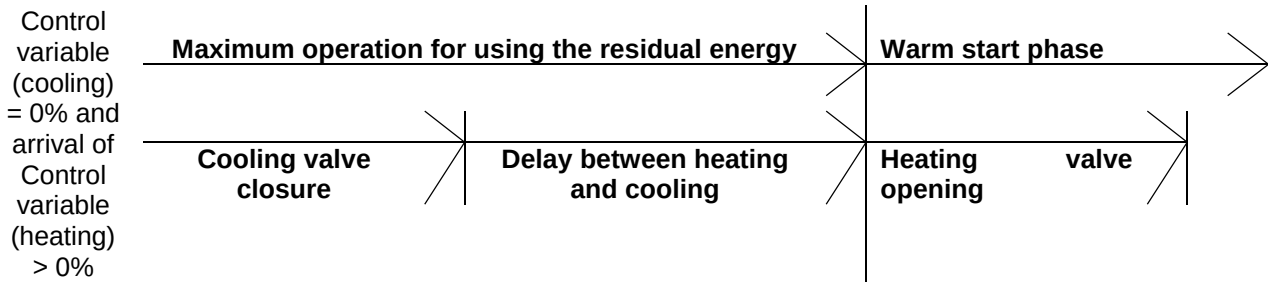



**Figure 19.11**

## 19.8.4 Hysteresis

To avoid unnecessary continuous switching between the fan levels, they are switched over with a 10% fixed hysteresis.
The next higher fan level is implemented when the control variable reaches the activation threshold.
The lower fan level is only implemented if the control variable has been reduced by the hysteresis value (see figure).

Example:
Activation threshold for fan level 1 = 10%
Activation threshold for fan level 2 = 40%
Activation threshold for fan level 3 = 70%

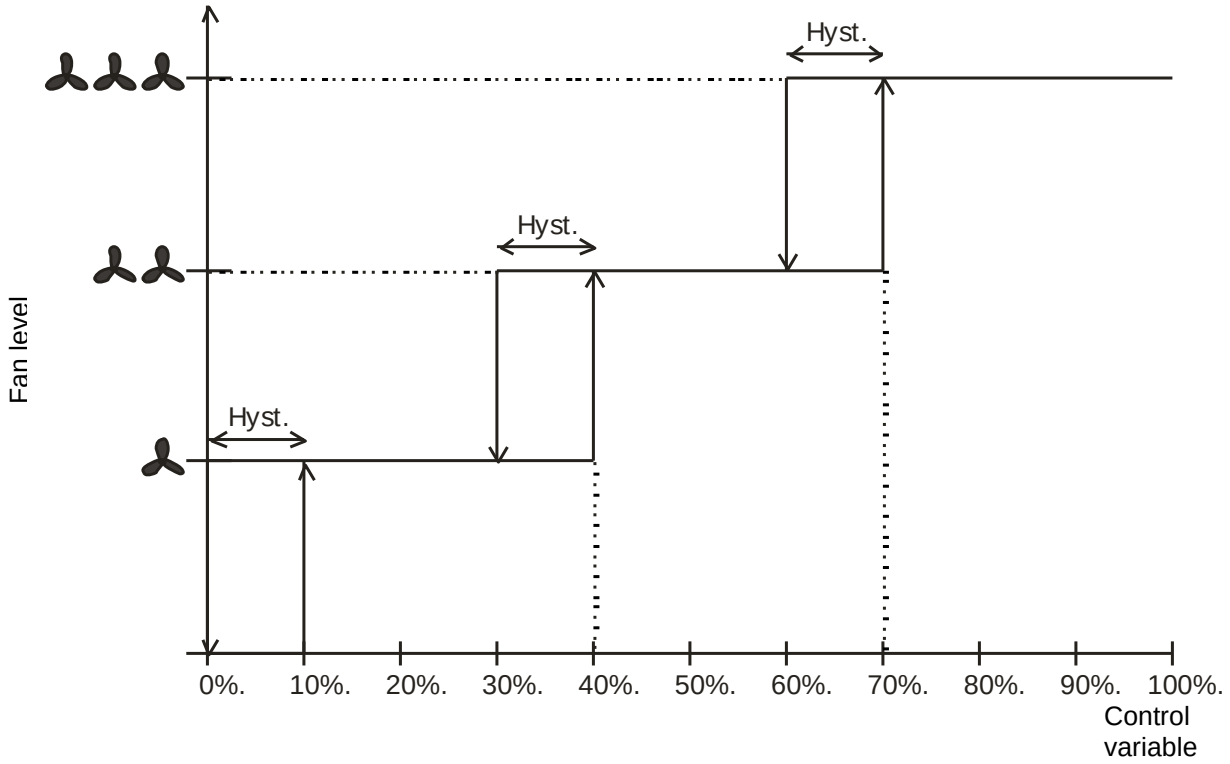



**Figure 19.12**

## 19.9 *Regulating the temperature*

### 19.9.1 Introduction

When an external regulator (e.g. GW 16 976 Cx Thermo ICE) is not used, the device can be configured as a P or PI regulator (PI regulation is preferable).

The proportional regulator (P regulator) adapts the regulating value to the deviation in static mode.
The proportional integral regulator (PI regulator) is much more flexible, i.e. it regulates in dynamic mode and is quicker and more accurate.

To explain how the regulators work, in the following example the room to be heated is compared with a container.

The filling level of the container represents the ambient temperature.
The water inflow represents the radiator power.
The water outflow represent the heat loss in the room.

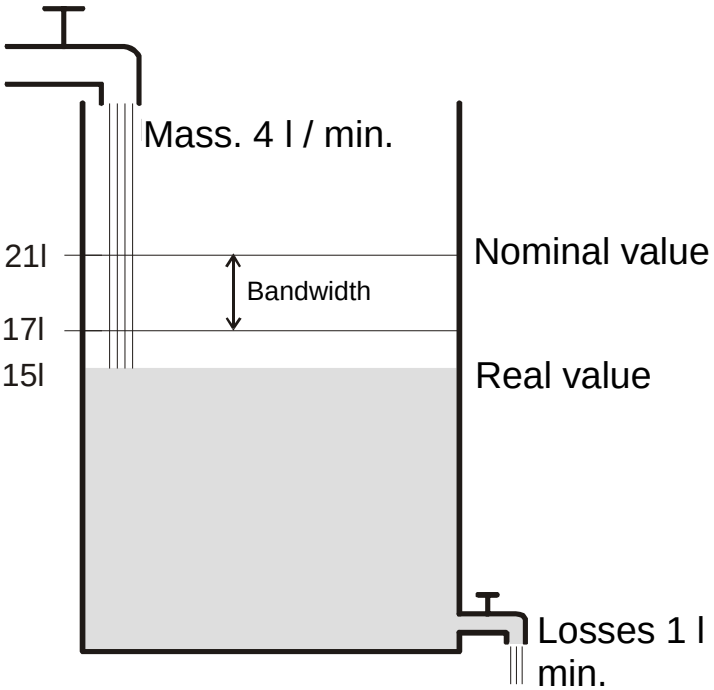
Our example assumes a max. inflow of 4 litres per minute, which is also the max. heating power of the radiator.
This maximum power is reached with a regulating value of 100%.
This means that a regulating value of 50% would imply only half the amount of water - i.e. 2 litres per minute.

The bandwidth is 4 l.
The regulator will therefore enable the command until the real value is less than - or equal to - 17 l (21 l – 4 l).

**Task:**

- Filling quantity required:
  21 litres (= nominal value)
- When should the inflow be reduced to avoid an overflow?:
  4 l below the required filling quantity, = 21 l - 4 l = 17 l (= bandwidth)
- Filling quantity assigned
  15 l (= real value)
- The losses are 1 l per minute

## 19.9.2 Behaviour of the P regulator




If the filling quantity is 15 l, there is a deviation of 21 l - 5 l = 6 l
Given that the real value is outside the bandwidth, the regulator will command the inflow with 100%, i.e. 4 l per minute.

The inflow (= regulating value) is calculated on the basis of the deviation (nominal value - real value) and the band width.
Regulating value = (deviation / bandwidth) x 100

The following table shows the behaviour and therefore also the limits of the P regulator.

**Table 19.11**

| Filling level | Regulating value | Inflow | Losses | Filling level increase |
|---|---|---|---|---|
| 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 row shows that the filling level can't increase anymore because the water outflow is equal to the loss. The result is a remaining deviation of 1 l; the nominal value can never be reached.
If the losses increase by 1 l, the remaining deviation will increase by the same amount and so the filling level will never exceed 19 l.
This means that the deviation in a room will increase if the outdoor temperature falls.

**P regulator as the temperature regulator**

The P regulator, in the case of heating adjustment, behaves exactly as explained in the previous example.
The nominal temperature (21°C) will never be fully reached.

The remaining deviation will increase on the basis of the heat losses - i.e. the outdoor temperature values fall.

## 19.9.3 Behaviour of the PI regulator

Unlike the P regulator, the PI regulator works dynamically.
The regulating value does not remain unchanged, even in the case of constant deviation.

At the beginning, the PI regulator sends the same regulating value as the P regulator, but it increases according to the time in which the nominal value is not reached.
This increase is made in timed mode, using the so-called "integration time".
The regulating value is no longer changed in the moment when the nominal value and the real value are identical.
This means our example shows a balance between inflow and outflow.

**Notes for regulating the temperature:**

A good regulation depends on the syntonisation of the bandwidth and integration time with the room to be heated.
The bandwidth influences the increase in the regulating value modification:
large bandwidth = slight increase in regulating value modification.

The integration time influences the reaction time to the temperature modifications:
long integration time = slow reaction.

Imperfect syntonisation may mean that the nominal value is exceeded, or that the regulator takes too long to reach the nominal value.

The best solutions are usually obtained using the standard settings or the settings via the system type.

# 20 Annex 3: Technical data of the GWA9140 device

| | |
|---|---|
| Power supply from the mains: | 230 +/-10V AC 50 Hz |
| Mains absorption | max. 3 VA |
| Power supply from the BUS | max. 10 mA |
| Triac switching power: | resistive load 0.5 A,<br>inductive load 0.3 A cos φ 0.6,<br>minimum load 24V AC, 5 mA,<br>no capacitive load,<br>not suitable for DC voltage |
| Additional relay switching power: | resistive load 16 A<br>inductive load 3 A cos φ 0.6,<br>minimum load 12V DC 100 mA |
| Fan switching power | resistive load 8 A, inductive load 1.5 A<br>cos φ 0.6, minimum load 5V DC 10 mA |
| Temperature range | -5°C ... 45°C |
| Protection class | Protection class II |
| Type of protection | Degree of protection IP20 |

| **Temperature regulator class** | **Contribution to the energy efficiency of room heating in %** |
|---|---|
| IV (as an ambient temperature regulator) | 2.0 |
| VII (as a regulator on the basis of the atmospheric conditions with room effect) | 3.5 |

For more information and for the wiring, refer to the Instruction Manual of the device.

# 21 Annex 4: Communication objects

The following table summarises all the communication objects with their specific ID numbers, names and functions displayed in ETS, plus a brief description of the function and the type of Datapoint.

**Output objects**

| No. | Object name | Object function | Description | DPT Type |
|---|---|---|---|---|
| 0 | | | | DPT 5.001 |
| | *Actuating value heating* | *Sends % value* | *Sends the current heating valve control variable (with built-in regulator).* | |
| | *Actuating value heating/cooling* | *Sends % value* | *Sends the heating/cooling valve control variable (with built-in regulator and 2-pipe system).* | |
| | *Actuating value cooling* | *Sends % value* | *Sends the current cooling valve control variable (with built-in regulator).* | DPT 5.001 |
| 2 | *Heating status* | *On/Off* | *Sends the current heating status (1=operating; 0= not operating)* | DPT 1.001 |
| 3 | *Cooling status* | *On/Off* | *Sends the current cooling status (1=operating; 0= not operating)* | DPT 1.001 |
| 4 | *Fan step* | *Sends the value as % or number (0..255)* | *Signals the current ventilation level.* | DPT 5.010 DPT 5.001 |
| 5 | *Auxiliary relay* | *On/Off* | *Sends the additional relay status* | DPT 1.001 |
| 10 | *Fan off* | *On/Off* | *Fan status signalling* | DPT 1.001 |
| 11 | *Fan step 1* | *On/Off* | *Signalling of level 1 active* | |
| 12 | *Fan step 2* | *On/Off* | *Signalling of level 2 active* | |
| 13 | *Fan step 3* | *On/Off* | *Signalling of level 3 active* | |
| 14 | *Actual value from E1* | *Temperature (°C)* | *Sends the current temperature measured by the sensor connected to E1* | DPT 9.001 |
| | *Status of window contact at E1* | *Open/Closed* | *Signalling of window opening/closure status on E1* | DPT 1.019 |
| 16 | *Drip tray monitoring status* | *On/Off* | *Signals the drip tray status* | DPT 1.001 |
| | *Status of window contact at E2* | *Open/Closed* | *Signalling of window opening/closure status on E2* | DPT 1.019 |
| 19 | *Adjust set point* | *Delta in K* | *Sends the temperature difference in relation to the nominal value (in K)* | DPT 9.002 |
| | | *Value in °C* | *Sends the absolute temperature value (new nominal value) (in °C)* | DPT 9.001 |
| 20 | *Actuating value loss* | *1 = Control variable error* | *Signalling of non-arrival of control variable (with external regulator)* | DPT 1.001 |
| | *Sensor failure* | *On/Off* | *Signals temp. sensor error if interrupted or short-circuited* | DPT 1.001 |
| 24 | *Current operating mode* | *HVAC mode* | *Sends current HVAC mode* | DPT 20.102 |
| 27 | *Current set point value* | *Temperature °C* | *Sends current nominal temperature value (°C)* | DPT 9.001 |
| 29 | *No energy medium* | *1 = Incorrect energy type* | *Signalling of error in switch between Heating and Cooling* | DPT 1.001 |

| | | | | |
|---|---|---|---|---|
| | *Heating required but heating disabled* | *1 = Heating blocked* | *Signalling of error in switch between Heating and Cooling* | |
| | *Cooling required but cooling disabled* | *1 = Cooling blocked* | *Signalling of error in switch between Heating and Cooling* | |
| 30 | *Fan duty time since last filter change* | *Time in hours* | *Sends the number of fan operating hours since the last filter change* | DPT 7.007 |
| 31* | *Change filter* | *1 = Change* | *Signalling of filter change* | DPT 1.001 |
| 32 | *Testmode active* | *Enabled/Disabled* | *Signalling of test mode enabled/disabled* | DPT 1.003 |

* Also used as a reset input for the filter change status.

**Input objects**

| No. | Object name | Object function | Description | DPT type |
|---|---|---|---|---|
| 0 | *Actuating value for fan* | *Value as %* | *Arrival of control variable for fan command* | DPT 5.001 |
| | *Actuating value heating* | *Value as %* | *Arrival of control variable for heating valve* | |
| | *Actuating value heating/cooling* | *Value as %* | *Arrival of control variable for heating/cooling valve (2-pipe system)* | |
| | *Actuating value cooling* | *Value as %* | *Arrival of control variable for cooling valve* | |
| 1 | | | | |
| | *Heating/Cooling* | *On/Off switchover (0=Heating 1= Cooling)* | *Arrival of switching command between heating and cooling (with 2-pipe system)* | DPT 1.001 |
| | *Disable heating* | *1 = Heating blocked* | *Arrival of heating block* | |
| | *Enable cooling* | *1 = Cooling consent* | *Arrival of cooling consent* | |
| 5 | *Auxiliary relay* | *On/Off switchover* | *Arrival of a relay switching command* | DPT 1.001 |
| 6 | *Lock additional ventilation* | *1 = block* | *Arrival of additional ventilation block* | DPT 1.001 |
| 7 | *Fan lock* | *1 = block* | *Arrival of fan block* | DPT 1.001 |
| 8 | *Forced fan step* | *Fan control with% value* | *Arrival of ventilation level with the required level number in the forcing status* | DPT 5.001 |
| 9 | *Limitation of fan step in %* | *0% = Auto 1%..100% = Limit* | *Arrival of maximum permitted ventilation level* | DPT 5.001 |
| 15 | *Fan auto/forced* | *On/Off* | *Activates or deactivates the forced fan contribution* | DPT 1.001 |
| 16 | *Drip tray monitoring status* | *On/Off* | *Arrival of the drip tray status from the external sensor* | DPT 1.001 |
| 17 | *Dew point alarm* | *On/Off* | *Arrival of a dew point alarm* | DPT 1.001 |
| 18 | *Outdoor temperature* | *Input* | *Arrival of the outdoor temperature for nominal value adaptation* | DPT 9.001 |
| 21 | *Operating mode preset* | *Mode pre-selection* | *Arrival of the HVAC mode* | DPT 20.102 |
| | *Night mode <-> Standby* | *1 = Night mode* | *Arrival of Night/Standby mode activation* | DPT 1.001 |

| | | | | |
|---|---|---|---|---|
| 22 | *Presence* | *Input for presence signal* | *Arrival of presence signalling from an external sensor* | DPT 1.001 |
| | *Comfort* | *1 = Comfort mode* | *Arrival of Comfort mode activation* | |
| 23 | *Window* | *Input for window contact* | *Arrival of the window contact status from the external sensor* | DPT 1.001 |
| | *Frost protection* | *1 = Frost Protection mode* | *Arrival of Frost Protection/heat protection mode activation* | |
| 25 | *Manual adjustment* | *Temperature difference in K* | *Arrival of the temperature difference for variation of the nominal value* | DPT 9.002 |
| 26 | *Base set point* | *Nominal temperature °C* | *Arrival of the standard nominal value* | DPT 9.001 |
| 28 | *Heating/Cooling* | *On/Off (0 = Heating, 1= Cooling)* | *Switchover between Heating and Cooling* | DPT 1.001 |

code 70194329

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