Arcus-EDS

Application Description

SK0x-Txxx

Outdoor Sensor SK01-TFK

Room Sensor SK03-TFK
(flush-mounting)

Multiple Sensor SK01-TTFK

Room Sensor SK02-TFK

KNX-Sensors Temperature-Humidity-Climate

Active Principles and Application:

Our product range KNX-Sensors Temperature-Humidity-Climate in SK01-Txxx series are sensors and regulators for air temperature and humidity for both indoor and outdoor use.

There are three types of casings available:

SK01-xxx (IP65)

SK02-xxx (fixed to wall)

SK03-xxx (flush-mounting)

The SK02 casing is for dry interiors (IP20) and is fixed to the wall.

The SK03 casing is for dry interiors (IP20), an in-wall version as part of an existing comprehensive switching system.

The SK01 casing is for outdoor and damp locations (IP65) or air ducts and are used with other sensors.

A wide variety of sensors and probes can be fitted for the customer's specific needs.

We use only high quality probes and sensors from well-known manufacturers.

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Application and Function Description:

KNX sensors can be set up by using ETS (KNX Tool Software) with the associated applications program. The device is delivered un-programmed.

All functions are parameterized and programmed by ETS. Some controllers and maximum value functions are switched on or off by activation or blocking via the KNX bus. Not all functions are available in all devices.

Functions *):

- Measured values of temperature and rel. humidity of the first sensor (TF)
- PI or two-position controller for temperature with steady or PWM output
- Two-position controller for rel. humidity
- Switching the operation mode between heating and cooling by an **object**
- Various operating methods for temperature control: relative RTC, absolute RTC, standard
- Maximum limit alarm with presetting via KNX bus: humidity, temperature 0-100°C
- Minimum/Maximum temperature saved
- Frost protection alarm freely adjustable
- Dew point alarm and dew point control
- Adjustment of all standards and limits
- Text displayed when entering/leaving the comfort field
- Values displayed: absolute humidity, dew point temperature, enthalpy
- Actual value adjustment for temperature and rel. humidity
- Measured values for a second temperature sensor (PT1000) with an additional two-position controller above temperature
- Additional two-position controller above the measured dew point temperature
- Optional use of second temperature sensor (PT1000);
  This measurement is especially interesting for applications which help prevent structural damage. The SK01-TTFK reads the current dew point temperature of the air. The additional external sensors are fitted to the coldest part of the building and an alarm or adjustment is activated when the temperature approaches the dew point.

*Not all functions are available in all versions, please take note of product descriptions.

Transmission Options:

All measurements and derived sizes which are made available can be transmitted in set periodic intervals by using the „periodic transmission“ option. Temperature and humidity can also be transmitted in case of change in the reading. The maximum limit can be set.

Limits:

The upper and lower limits for temperature and humidity can be fixed, and this can be adjusted at a later time using KNX. An alarm is activated if the limit is exceeded.

Maximum / Minimum Temperature:

An internal memory saves the maximum and minimum temperatures. The reset option repositions the maximum or minimum temperature to the actual temperature.

Frost Protection and Low Temperature Alarm:

The temperature setting between 0°C…+100°C enables an adaptation of your application. When frost protection is set an alarm is activated if the limit is exceeded. When RTC is activated the temperature setting for frost protection is shown.

Switching the Operation Mode of the Unit:

The Operation Mode (Heating/Cooling) can be set static or by an object. If *Heating+Cooling* is chosen, there is an object which sets the device into cooling mode if “on”.

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Operation Modes Heating / Cooling:

Fix:

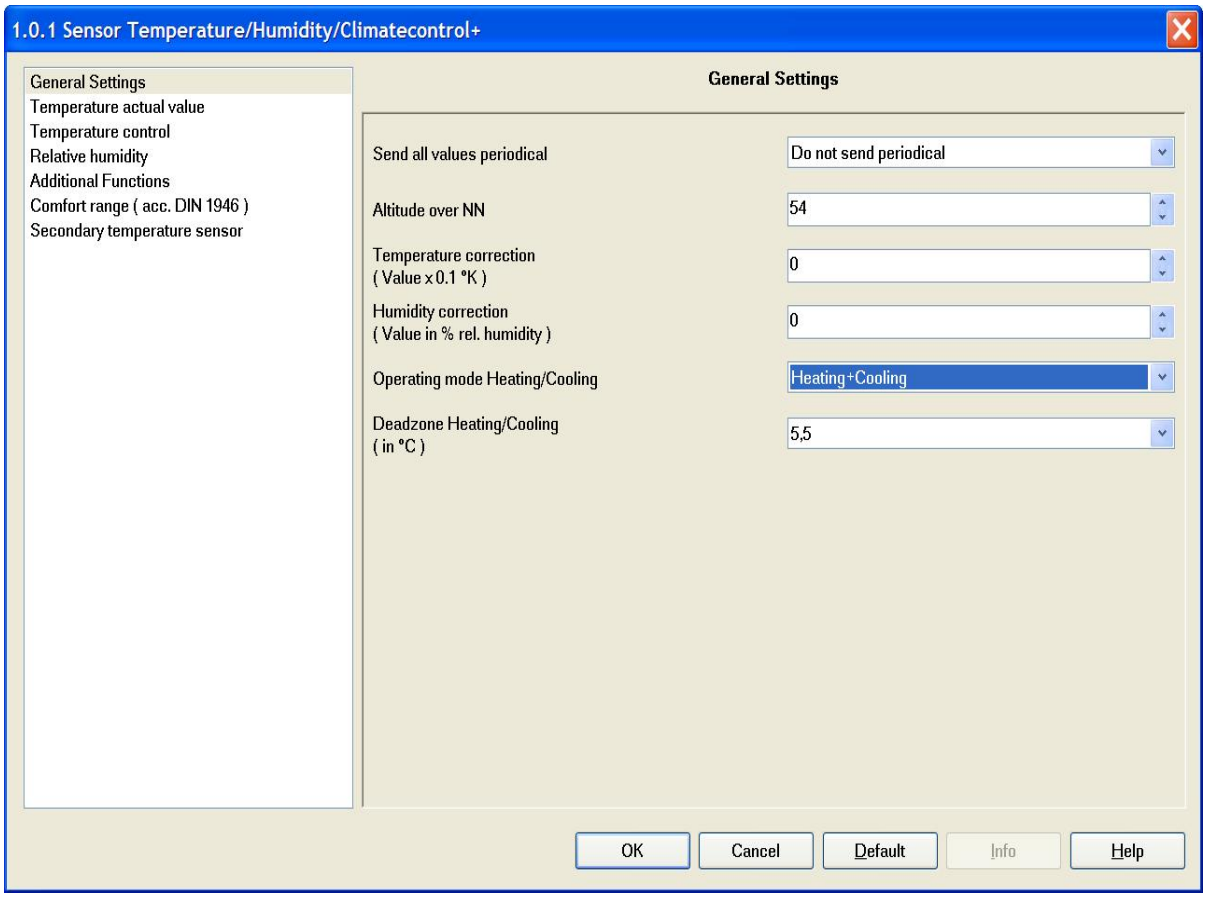
The operation mode heating or cooling is selected in the temperature control settings.

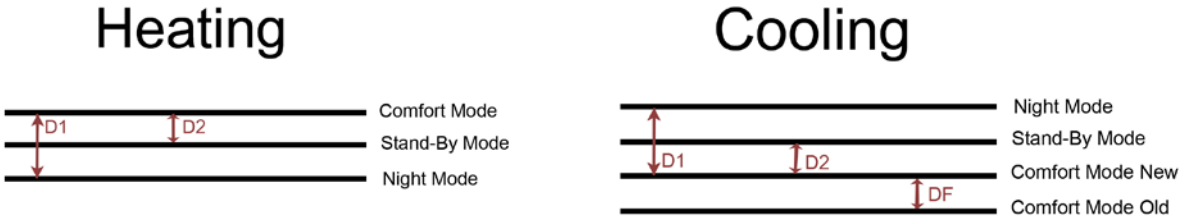
Heating+Cooling:

The operation mode heating or cooling is selected by an object. In cooling mode the sense of the actuating variable will change, additionally the temperature setpoints will change.

Deadzone Heating / Cooling:

In the operation-mode “Cooling”, the setpoint is increased by this value, also the setpoint decreases for standby- and night-mode are converted to increases when cooling.





DF: Deadzone Heating/Cooling, D1: Night-decrease, D2: Standby-decrease

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Room Temperature Controller (RTC):

Operating Modes:

Operating mode raise/lower:
To regulate the temperature a set point has to be set in the ETS, or with a KNX data point. The set point can be increased or decreased using the 1 Bit data points to raise or lower the set point. Please note that both data points can be set simultaneously, which should only be used in extraordinary circumstances. The difference in the increase or decrease can only be parameterized in ETS.

Operating Mode RTC relative:
3-level reduction of desired level compared to comfort desired level, mode selection and display by 1 Byte RTC Status or mode data point.
The lowered desired temperature, night and stand-by mode are selected using the 1 Byte data point mode. Night and stand-by temperature are parameterized within ETS relative to the comfort temperature and can be adjusted using the data points.

Operating Mode RTC absolute:
3-level absolute reduction of desired level, mode selection and display by 1 Byte RTC status or mode data point
The set point for the controller is selected using the 1 Byte data point mode. Night and stand-by temperature are parameterized with ETS in the absolute temperature. Using the KNX bus, night and stand-by desired temperatures can be changed permanently.

Parameterizing the Controller:

Every function has a particular set point. By choosing a particular function, the room temperature controller can be adjusted as desired. The following functions are available:

- Comfort Mode
  Normal function when room is being used.
- Stand-by Mode
  Lower function, for rooms not being used or about to be used.
- Night Mode
  Very low function, when room will not be used over a longer period of time.
- Frost Protection Mode
  Used when the room will not be used for a longer period of time to prevent freezing. This function can also be used to lower the temperature by opening the windows.

Changing of the functions is carried out by the 1 Byte data point 10, modes for temperature controller. This mode enables activation of the different functions. It is not necessary to transmit several data points. The room temperature controller can be switched off by using disable data point 16. For frost protection only the alarm is activated in this case.

RTC Mode Byte Input		
EIS-Type	**Value**	**Meaning of Data**
1 Byte	0	Auto means Stand-by Mode is active
	1	Comfort Mode active
	2	Stand-by Mode active
	3	Night Mode is active
	4	Frost/Overheating Protection active
	5..255	Not Allowed

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The current status can be queried using the Status-Byte.

RTC Status Byte Input		
EIS Type	**Bit.Nr**	**Meaning of Data**
1 Byte	Bit 0:	1>> Comfort Mode active
	Bit 1:	1>> Stand-by Mode active
	Bit 2:	1>> Night Mode active
	Bit 3:	1>> Frost/Overheating Mode active
	Bit 4:	1>> Controller disabled
	Bit 5:	1>> Heat 0>> Cool
	Bit 6:	1>> Controller inactive 0>>active
	Bit 7:	1>> Frost alarm

RTC Status Byte Output									
Bit 7:	**Bit 6:**	**Bit 5:**	**Bit 4:**	**Bit 3:**	**Bit 2:**	**Bit 1:**	**Bit 0:**	**Byte**	**Byte**
Frost alarm	inactive	Heat	Disable	Frost	Night	Stand-by	Comfort	Hex	Decimal
0	0	1	0	0	0	0	1	21	33
0	0	1	0	0	0	1	0	22	34
0	0	1	0	0	1	0	0	24	36
0	0	1	0	1	0	0	0	28	40
0	0	1	1	0	0	0	1	31	49
0	0	1	1	0	0	1	0	32	50
0	0	1	1	0	1	0	0	34	52
0	0	1	1	1	0	0	0	38	56
1	0	1	0	0	0	0	1	A1	161
1	0	1	0	0	0	1	0	A2	162
1	0	1	0	0	1	0	0	A4	164
1	0	1	0	1	0	0	0	A8	168
1	0	1	1	0	0	0	1	B1	177
1	0	1	1	0	0	1	0	B2	178
1	0	1	1	0	1	0	0	B4	180
1	0	1	1	1	0	0	0	B8	184

Controller Algorithm:

A PI Controller or a two-position controller are standard options for the temperature regulator.
The PI controller should primarily be used as it reacts faster to changes in the temperature and prevents large temperature differences from occurring. This function requires exact settings of the parameters. By keeping the temperature stable, the desired temperature can be reduced slightly without causing any discomfort to people in the room. This lowering of the temperature can result in visible energy savings.
The controller calculates and displays the actuating variable according to the desired temperature specifications and the actual temperature. There are two actuating variables which can be selected:

- PI Controller with constant output for constant KNX valves
- PI Controller with PWM output for switching valves, such as electro-thermal valves

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PI Controller:

A PI controller is an algorithm which consists of a proportional and an integral part. By combining these two parts it is possible to adjust the temperature quickly and accurately. The room temperature regulator calculates the actuating variable every second. The current actuating variable can be queried constantly, displayed every minute by the PI controller. The PWM controller indicates the transmission interval of pre-programmed cycle. With this, the device is switched on and off during the cycle period which is displayed by data point 15. The average value is then emulated as a steady valve adjustment. If the actuating variable reaches 40%, and after ten minutes a second time after using data point 15, 4 minutes later a 1 will be transmitted, and after 6 minutes a 0.

Adjusting the PI Controller:

There are different systems for heating and cooling rooms. This is done by using water, oil or air in various designs, such as in-floor heating, cooling ceilings, and radiators. The diversity of these combinations and the design of the room, such as placement of radiators and types of windows, play an important factor in the correct adjustment of the PI Controller. Therefore, it is not possible to specify a general PI parameter. This description deals more or less with practical results of properly planned and installed heating units. If a system is improperly installed it could be either slow, need too long to reach the desired temperature or fluctuate above or below the selected temperature.

Heating Type	**Pre-programmed Value**		**Controlling Type**	**PWM Cycle Type**
	Proportional Area	**Integral**		
Warm Water Heating	5 Kelvin	150 Minutes	steady/PWM	15 Min/2-3 Min
In-Floor Heating	5 Kelvin	240 Minutes	PWM	15-20 Min
Electric Heating	4 Kelvin	100 Minutes	PWM	10-15 Min
Heating Ventilation	4 Kelvin	90 Minutes	steady	-
Split Unit	4 Kelvin	90 Minutes	PWM	10-15 Min
Cooling Type				
Cooling Ceiling	5 Kelvin	240 Minutes	PWM	15-20 Min
Air-Conditioning	4 Kelvin	90 Minutes	steady	-
Split unit	4 Kelvin	90 Minutes	PWM	10-15 Min

- Just a small change in the parameter can result in a noticeable change in the controlling performance.
- The above mentioned values are based on experience and it is suggested to use them in the adjustment of the controlling parameters.

For a more detailed description of the PI controller process, please refer to relevant technical literature.

General Basic Rules:

Parameter Specifications	**Effect**
Lower Proportional Area	Large fluctuation above the set point (perhaps continual fluctuation), quick adjustment to set point
Higher Proportional Area	Little or no fluctuation, but slow adjustment
Short Integration Period	Quick adjustment of controlling modulations (dependent on conditions), danger of continual fluctuation
Long Integration Period	Slow adjustment of controlling modulations

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Adjusting the Two-Position Controller:

The two-position controller is a very simple way to regulate. Whenever the actual temperature reaches the desired temperature minus the hysteresis, an on or off switch on the bus is transmitted. Set the hysteresis high enough to keep the energy level of the bus at a minimum. Configure the hysteresis low enough to prevent extreme temperature fluctuations.

Heating/Cooling:

By changing these parameters it is possible to switch from heating to cooling or to adjust the device to hydraulic switching (valve setting).

Type	Controlling Element at 0 Closed (NG)	Controlling Element at 0 Open (NO)
Heating	Decreasing actuating variable	Increasing actuating variable
Cooling	Increasing actuating variable	Decreasing actuating variable

Disable Function:
Under specific conditions the controller can be switched off by using the disable data point.

Humidity Controller:

To measure relative humidity the same parameters as temperature are used. What's different is that there is no room temperature regulator and PI controller. A two-position controller for humidity control is used to aerate or ventilate the room. The two-position controller has the function "lower/increase" just like the temperature controller.

Disable Function:
Under specific conditions the controller can be switched off by using the disable data point.

Enthalpy, Dew Point, Absolute Humidity:

As part of its basic functions, the climate regulator displays enthalpy, dew point and absolute humidity. These readings determine the air quality and are important factors for the functionality and assessment of ventilation and air-conditioning systems.

The dew point temperature is the point where the constant absolute humidity reaches 100% of relative humidity. If objects in the room are colder than the dew point temperature, condensation builds up in the building. These values can be used to prevent structural damage caused, for example, by mold.

The absolute humidity displays the amount of water in g/kg which is in the air. It clearly indicates the maximum amount of condensation that can develop or the amount of water that needs to evaporate.

Dew Point Alarm:

When the dew point alarm is activated (when the actual temperature falls below the calculated dew point temperature), an alarm data point is emitted on the bus.

External Temperature Probe and Two-Position Controller:

The SK01-TTFK-I offers its integrated temperature humidity sensor with a second external hook up for a temperature probe with PT1000 elements. The external temperature probe functions with a two-point controller, which sets the temperature using data point 38, or calculates the dew point temperature with data point 30. Data point 36 can also disable the dew point and temperature controller.

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Desired Temperature to Dew Point:

With the ETS the set point can be changed to adjust your controller. At 0, the two-position controller (hysteresis = 0), after reaching the measured temperature 2, switches to the dew point temperature. If the regulator switches to the dew point temperature before it is actually reached, type in a positive value. As a rule, an open construction plan should not be bedewed. Set the set point to +2.00°C, then a ventilation controller will activate before the condensation point is reached. Pay attention to the hysteresis settings.

Set Point tracing:

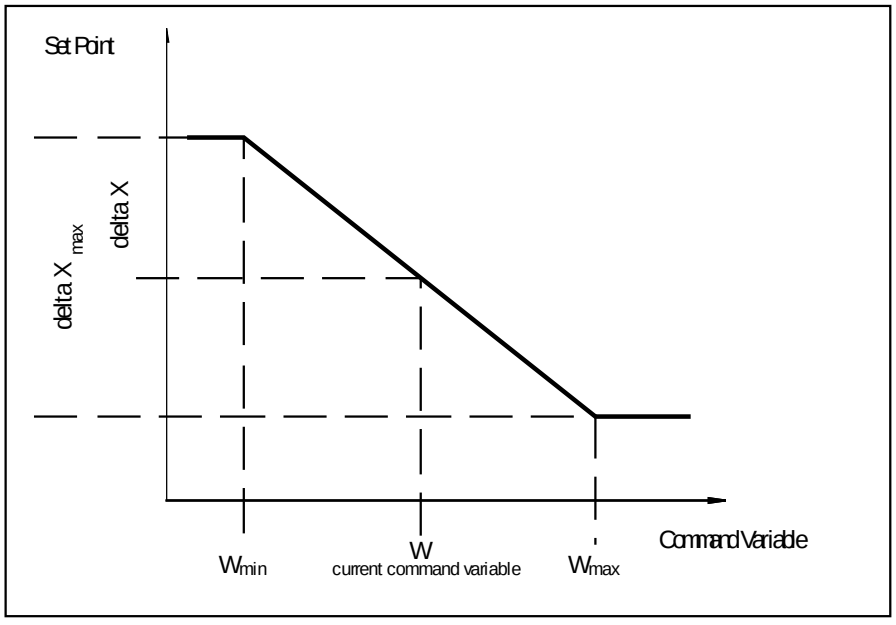
By using a separate command variable, temperature control based on weather conditions can be implemented (conservatory, cooling ceiling). All set points and fluctuations for temperature, humidity and dew point temperature can be set by using data point 33.
To determine how the command variable affects the set point, 3 parameters are shown:

- Command Variable Minimum (W_{min})
- Command Variable Maximum (W_{max})
- Set Point with Maximum Command Variable (ΔW_{max})

The change in the set point (ΔW_W) for a particular value of command variable (W) results in:

$$\Delta x_W = \Delta x_{max} * (W - W_{min)}) / (W_{min} - W_{max})$$

An increase in the set point produces a positive parameter value while a decrease in the set point produces a negative parameter value for Δx_{max} .



Decreasing the set point

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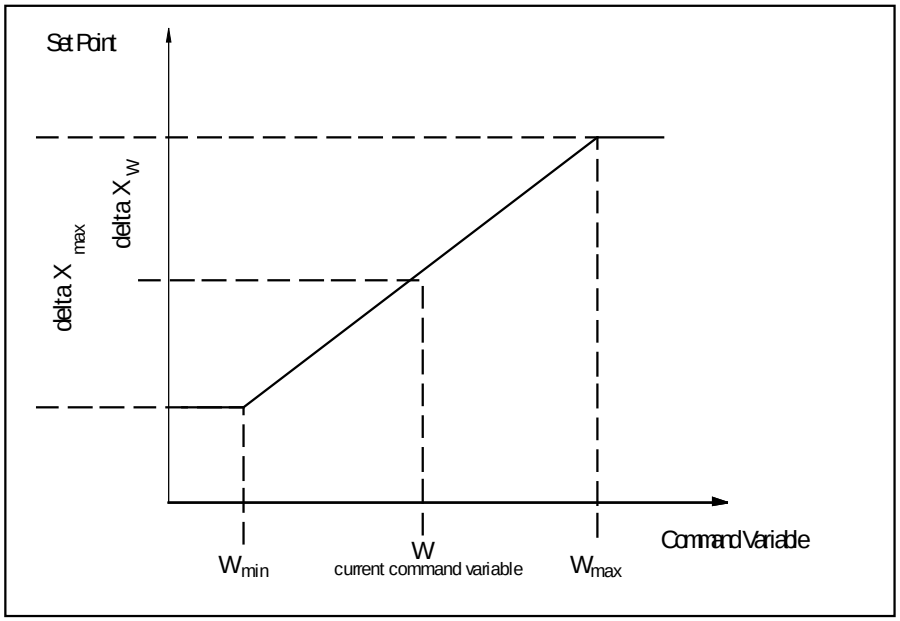
Enter the parameter in 1/100 °C in the ETS.

Example:
To cool a room, the set point, when set at 22° C, should be raised in such a way that the temperature difference between outside and inside is not greater than 6 K. This applies when the outdoor temperature increases to between 28°C to 38°C. The parameters should be set in the following way: Wmin = 28, Wmax = 38, ΔXmax = + 10. For an outdoor temperature of 30°C, the set point of the temperature controller would increase by 10 * (30 - 28) / (38 - 28) = 2 K to 22 + 2 =24 °C. At 38°C outdoor temperature the set point remains constant at 32°C.



Increasing the set point

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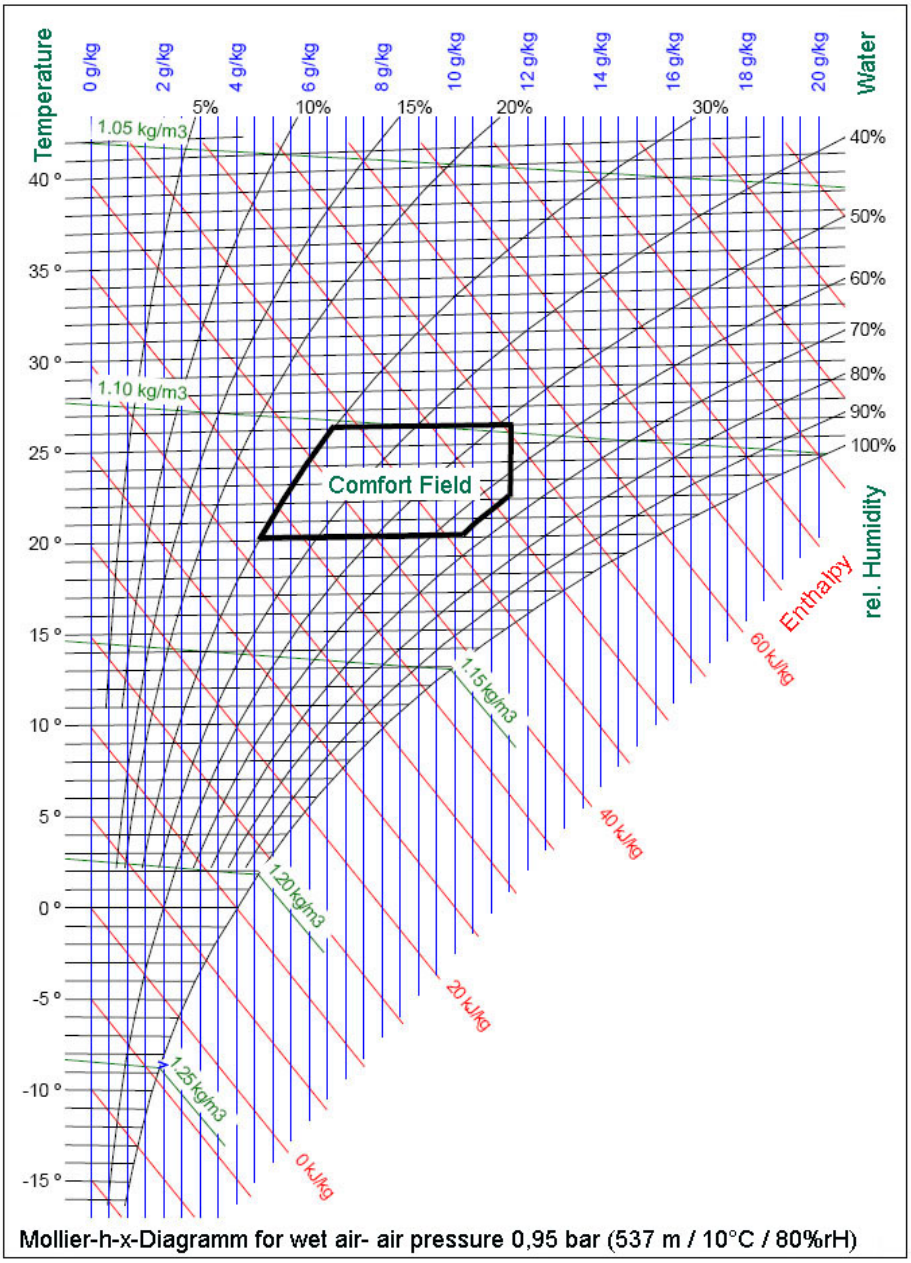
Comfort field:

The thermal comfort field in a room is shown in a field with 5 parameters. The standard value recommended by DIN 1946 is used:

- Maximum Temperature = 26 °C
- Maximum Rel. Humidity = 65 %
- Maximum Abs. Humidity = 11,5 g/kg
- Minimum Temperature = 20 °C
- Minimum rel. Humidity = 30 %

To change the standard value it is advisable to fill in the field hx-diagram, so that no unusual parameters appear. To do this it is necessary to have access to the total parameter fields.
Text Message: when the value is within or above the comfort field, a 14 Byte text message is transmitted via data point 34.



h-x-Diagram with comfort fields according to DIN

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ETS Parameters

General Set Up

			T	TF	TFK	TTFK
All Data transmitted periodically	Not periodically transmitted	Data and calculated values are not transmitted periodically	X	X	X	X
	1-120 min	Data and calculated values are transmitted every x minutes	X	X	X	X
Location Elevation above sea level	0-5000	The values of absolute humidity, enthalpy, and dew point temperature depend on the air pressure. Proper adjustment can be made by inputting the elevation above sea level. (Berlin: 34m; Hamburg: 3m; Munich: 530m)		X	X	X
Comparative value temperature probe (Factor x 0,1 °K)	-50 +50	Discrepancies from actual values in certain conditions can be compared.	X	X	X	X
Comparative value humidity probe (in % rel. humidity)	-20 +20	Discrepancies from actual values in certain conditions can be compared.		X	X	X

Temperature Current Value

			T	TF	TFK	TTFK
Data sent when value change occurs (in °K)	Not transmitted	Data transmitted periodically after set up.	X	X	X	X
	0,1 - 2	When the temperature is changed to the programmed value, a 2-Byte value is displayed on data point 0.	X	X	X	X
Temperature Limit Upper Limit (in °C)	0-100	When the upper limit is surpassed, a 1 appears on data point 1, if the limit is not surpassed, a 0 appears on 1 data point.	X	X	X	X
Temperature Limit Lower Limit (in °C)	0-100	When the lower limit is surpassed, a 1 appears on data point 1, if the value is above the limit, then a 0 is displayed.	X	X	X	X
Minimum/Maximum-Temperature	Transmitted	Minimum and maximum temperature are displayed when a change occurs; The temperatures can be reset to the actual temperature.	X	X	X	X
	Not transmitted	No transmission when minimum or maximum temperature changes.	X	X	X	X
Frost Protection Temperature	0-100	Selection of temperature limit over the actual temperature activates the frost protection alarm, and allows adjustment of this set point in RTC mode.	X	X	X	X

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Temperature Regulator			T	TF	TFK	TTFK
Type of Controller		The types of controllers differ from each other only in the specifications for reducing the temperature	X	X	X	X
	Standard (decrease, increase)	Increase and decrease relative to the specified set point, mode selection with 1 Bit data point	X	X	X	X
	RTC relative	3-level lowered set point compared to comfort set point, mode selection and display with 1Byte RTC status or adjustable data point	X	X	X	X
	RTC absolute	3-level lowered set point, completely adjustable and a comfort set point, mode selection and display with 1 Byte RTC status or adjustable data point	X	X	X	X

>>> Standard (Lowering, Raising)			T	TF	TFK	TTFK
Set point (in °C)	0-100	Desired temperature, set to absolute temperature possible with data point 9	X	X	X	X
Set point Increase (Factor x 0,1 °K)	0-100	Set point increase, compared to added set point, selection by 1 Bit data point 10=1, no setting in KNX possible	X	X	X	X
Set point Decrease (Factor x 0,1 °K)	0-100	Set point decrease, compared to subtracted set point, selection by 1 Bit data point 11=1, no setting in KNX possible	X	X	X	X

>>> RTC-relative			T	TF	TFK	TTFK
Comfort Temperature (in °C)	0-100	Nominal temperature for comfort, set with data point 9 in absolute temperature, selection in RTC mode data point 10=0	X	X	X	X
Night Temperature Decrease, relative (Factor x 0,1 °K)	0-100	Nominal temperature decrease for night function, subtracted from the comfort temperature, set with data point 12 only in absolute value!! Temperature possible, selection in RTC Mode data point 10=1	X	X	X	X
Stand-by Temperature Decrease, relative (Factor x 0,1 °K)	0-100	Nominal temperature decrease for stand-by, subtracted from the comfort temperature, set with data point 13, only in absolute value!! Temperature possible, selection in RTC Mode data point 10=2	X	X	X	X
Set point Decrease (Factor x 0,1 °K)	0-100	Set point decrease subtracted from set point; Selection with 1 Bit data point 11=1, no setting in KNX possible	X	X	X	X

>>> RTC-absolute			T	TF	TFK	TTFK
Comfort Temperature (in °C)	0-100	Desired temperature for comfort, set with data point 9 in absolute temperature, selection in RTC Mode data point 10=1	X	X	X	X
Night Temperature Decrease, absolute (in °C)	0-100	Nominal temperature for night function, set with data point 12 in absolute temperature, selection in RTC Mode data point 10=3	X	X	X	X
Stand-by Temperature Decrease, absolute (in °C)	0-100	Nominal temperature for stand-by, set with data point 13 in absolute temperature, selection in RTC Mode data point 10=2	X	X	X	X

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Temperature Regulator (Continued)			T	TF	TFK	TTFK
Transmit Set point	Transmitted	Current set point displayed (Data point 14), current set point can be adjusted with data point „Increase/Decrease“ and is the specific variable for the Temperature regulator	X	X	X	X
	Not transmitted	Data point 14 is not transmitted	X	X	X	X
Controller Set Up		Selection of controlling algorithms	X	X	X	X
	Constant PI Controller	Displays PI Controller in 1 Bit data point 15	X	X	X	X
	Switching PI Controller	Displays PWM Controller in 1 Bit data point 15	X	X	X	X
	Two-Position Controller	Displays two-position controller in 1 Bit data point 15	X	X	X	X

>>> Constant PI Controller			T	TF	TFK	TTFK
Function (by constant increasing temperature)	Lowering Actuating Variable	Controller is switched to heating	X	X	X	X
	Increasing Actuating Variable	Controller is switched to cooling	X	X	X	X
Proportional Area in °K	1-25	The proportional area marks the area of the set amount, which is affected by an overall change in the actuating variable. Example: An adjustment of 6 K for the P Area would change the actuating variable of 2 K by 255/3=85. The time period of the actuating variable depends on the parameter “periodically transmit”, or „transmit when value changes“ in the window „General Settings“.	X	X	X	X
Integral Gain in Minutes	0-255	Displays the time for function. Example: Warm Water Heating 5°K - 240 min In-Floor Heating 5°K - 150 min Electric Heating 4°K - 100 min Heating Ventilation 4°K - 90 min	X	X	X	X

>>> Switching PI Controller			T	TF	TFK	TTFK
Function (by increasing temperature)	Decreasing Actuating Variable	Controller is switched to heating	X	X	X	X
	Increasing Actuating Variable	Controller is switched to cooling	X	X	X	X
Proportional Area in °K	1-25	The proportional area marks the area of the set amount, which is affected by an overall change in the actuating variable Example: An adjustment of 6 K for the P-Area would change the actuating variable of 2 K by 255/3=85	X	X	X	X
Integral Gain in Minutes	0-255	Displays the time period for function. Example: Warm Water Heating 5°K - 240 min In-Floor Heating 5°K - 150 min Electric Heating 4°K - 100 min Heating Ventilation 4°K - 90 min	X	X	X	X
PWM Period in Minutes	1-60	Period of time for the functions on/off	X	X	X	X

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>>> Two-Position Controller			T	TF	TFK	TTFK
Function (by increasing temperature)	1 Transmitted	Switches the controller to cooling	X	X	X	X
	0 Transmitted	Switches the controller to heating	X	X	X	X
Differential Gap (Factor x 0,1 °K)	1-100	Hysteresis within a change in the set point causes no change in the controller; a large differential gap prevents attrition but induces temperature fluctuation	X	X	X	X

Relative Humidity			T	TF	TFK	TTFK
Data transmitted when change occurs (in % rel. humidity)	Not Transmitted	Data transmitted periodically after set up		X	X	X
	1-20	Data transmitted when a change in the humidity above the set point is registered		X	X	X
Humidity Upper Limit (in % rel. humidity)	5-99	If the upper limit is surpassed, a 1 is transmitted on data point 1, if the lower limit is surpassed, a 0 is transmitted on data point 1			X	X
Humidity Lower Limit (in % rel. humidity)	5-99	If the lower limit is surpassed, a 1 is transmitted on data point 2, if the lower limit is not surpassed a 0 will be transmitted on data point 2			X	X
Nominal Relative Humidity (in % rel. humidity)	5-99	Set point for the humidity controller, set with data point 21 in relative humidity			X	X
Set point Increase (in % rel. humidity)	1-50	Set point increase added to the set point, selection with 1 Bit data point 22=1, no setting in KNX possible			X	X
Set point Decrease (in % rel. humidity)	1-50	Set point decrease, subtracted from set point, selection with 1 Bit data point 23=1, no setting in KNX possible			X	X
Transmit Set point	Transmitted	Displays the current set point on data point 24; the current set point is set on data point „Increase/Decrease“ and is the specific set point for the humidity controller			X	X
	Not Transmitted	Data point 24 is not transmitted			X	X
Function (by increasing humidity)	0 Transmitted	Switches controller to humidifying or drying			X	X
	1 Transmitted				X	X
Differential Gap (in % rel. humidity)	1-50	Hysteresis within a change in the set point causes no change in the controller; a large differential gap prevents attrition but induces humidity fluctuation			X	X

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Other Functions			T	TF	TFK	TTFK
Transmit Dew Point Temperature	Transmitted	From the value of temperature 1 and the humidity, the dew point temperature of the air in °C can be calculated; If the dew point temperature of the air exceeds the surface temperature of an object in the room, condensation builds up; Displayed in data point 28			X	X
	Not Transmitted	Dew point temperature not transmitted			X	X
Dew Point Alarm (Factor x 0,1 °K)	50-250	Sets the minimum surface temperature of an object in the room; if this setting is exceeded, such as minimum temperature on the cooling ceiling, an alarm is activated on data point 30. The alert must be activated on data point 29 with a 1.			X	X
Transmit Absolute Humidity (Unit g/kg)	Transmitted	From the value of temperature 1 and the humidity, the absolute humidity of the air in °C can be calculated. Displayed in data point 31			X	X
	Not Transmitted	Data point 31 not transmitted			X	X
Transmit Enthalpy (Unit kJ/kg)	Transmitted	From the value of temperature 1 and the humidity the enthalpy of the air and the warmth can be calculated; Displayed in data point 32			X	X
	Not Transmitted	Data point 32 not transmitted			X	X
Set Point Tracing		The various parameters of the sensors can be tracked using a command variable on data point 33 (2-Byte Float DPT_Type 9) The set points, the upper and lower limits and the dew point alarm of the controller can be selected.	X	X	X	X
Command Variable Minimum (Factor x 0,01 °K)	-32000 until +32000		X	X	X	X
Command Variable Maximum (Factor x 0,01 °K)	-32000 until +32000		X	X	X	X
Set point Change Maximum Command Variable (Factor x 0,01 °K)	-32000 until +32000		X	X	X	X
Data points for Set point Tracing	Temperature Regulator Set point		X	X	X	X
	Temperature Upper Limit		X	X	X	X
	Temperature Lower Limit		X	X	X	X
	Humidity Controller Set point				X	X
	Humidity Upper Limit				X	X
	Humidity Lower Limit				X	X
	Dew Point Temperature Upper Limit				X	X
Input, set Heating/Cooling	0-1	1 = Operation Mode Cooling 0 = Operation Mode Heating	X	X	X	X

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Comfort field (DIN 1946)			T	TF	TFK	TTFK
Limit Parameter (Preset according to DIN 1946)		Changes in specifications are made according to hx-diagram			X	X
Maximum Temperature (26 °C)	1-100				X	X
Minimum Temperature (20 °C)	1-100				X	X
Maximum rel. Humidity (65%)	5-99				X	X
Minimum rel. Humidity (30%)	5-99				X	X
Maximum abs. Humidity (11,5 g/kg)	8-15				X	X
Text Outside Comfort field	uncomfortable	14 byte text on data point 34 to indicate uncomfortable conditions			X	X
Text Within Comfort field	comfortable	14 byte text on data point 34 to indicate comfortable conditions			X	X

External Temperature Sensor			T	TF	TFK	TTFK
Comparative Value (Factor x 0,1 °K)	-50 until + 50	Changes in measurement readings in special conditions can be compared here				X
Transmit Data When Change Occurs	Not Transmitted	Measurement reading is not transmitted when a change occurs				X
	0,1 - 2	In case of a temperature change above the set point, a 2-Byte value is displayed on data point 35				X
Function of Two-Position Controller	No Function	An external temperature sensor is not operated by the controller				X
	Two-Position Controller Temperature					X
	Two-Position Controller Dew Point					

>>> Two-Position Controller Temperature			T	TF	TFK	TTFK
Function (by increasing temperature)	1 Transmit	Switches controller to cooling				X
0 Transmit	Switches the controller to heating					X
Differential Gap (Factor x 0,1 °K)	1-100	Hysteresis within a change in the set point causes no change in the controller; a large differential gap prevents wear and tear but induces temperature fluctuation				X
Set point in °C	0 until +100	Desired temperature displayed on Data point 38 in absolute temperature				X

>>>Two-Position Controller Dew Point			T	TF	TFK	TTFK
Function (falling below the dew point)	1 Transmitted	Switches the controller to heating or cooling				X
	0 Transmitted	Cooling				X
Differential Gap (Factor x 0,1 °K)	1-100	Hysteresis within a change in the set point causes no change in the controller; a large differential gap prevents attrition but induces temperature fluctuation				X
Set point Gap from Dew Point (Factor x 0,1 °K)	-100 until +100	Correction to adjust the threshold of the dew point controller; Changes only possible in ETS				X

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Data Point Table for Applications T-TF-TFK-TTFK

Data Point Table KNX Sensors Temperature-Humidity-Climate

Nr.	Function	T	TF	TFK	TTFK
0	Actual temperature	X	X	X	X
1	Alarm when upper temperature limit is exceeded	X	X	X	X
2	Alarm when lower temperature limit is exceeded	X	X	X	X
2	Input for switching the Operation Mode (Heating/Cooling)	X	X	X	X
3	Alarm when pre-set frost protection limit is exceeded	X	X	X	X
4	Maximum temperature is reached	X	X	X	X
5	Minimum temperature is reached	X	X	X	X
6	Reset min/max temperature to the current temperature	X	X	X	X
7	Change upper temperature limit	X	X	X	X
8	Change lower temperature limit	X	X	X	X
9	Change comfort temperature set point (RTC abs/rel)	X	X	X	X
9	Change temperature controller set point specifications (lower, raise)	X	X	X	X
10	Switch between RTCC function modes (comfort, stand-by, night, frost protection)	X	X	X	X
10	Modes for temperature controller to increase set point	X	X	X	X
11	Status confirmation of RTC modes (comfort, stand-by, night, frost protection, lock)	X	X	X	X
11	Modes for temperature controller to increase set point	X	X	X	X
12	Absolute change of night decrease set point for RTC (abs) in °C	X	X	X	X
12	Change relative night decrease for RTC (rel) in °C	X	X	X	X
13	Change stand-by decrease set point for RTC (abs)	X	X	X	X
13	Change relative stand-by decrease for RTC (rel)	X	X	X	X
14	Current temperature controller set point	X	X	X	X
15	PWM actuating variable of PI temperature controller	X	X	X	X
15	Switching actuating variable of two-position controller	X	X	X	X
15	Constant actuating variable of PI temperature controller	X	X	X	X
16	Deactivate temperature controller	X	X	X	X
17	Current humidity		X	X	X
18	Alarm when upper humidity limit is exceeded			X	X
19	Alarm when lower humidity level is exceeded			X	X
20	Switching actuating variable of two-position humidity controller			X	X
21	Change the set point specifications for the humidity controller (lower, raise)			X	X
22	Modes for humidity controller to increase set point			X	X
23	Modes for humidity controller to decrease set point			X	X
24	Current humidity controller set point			X	X
25	Deactivate humidity controller			X	X
26	Change the upper humidity limit			X	X
27	Change lower humidity limit			X	X
28	Calculated dew point temperature			X	X
29	Change dew point alarm activation			X	X
30	Alarm when the dew point temperature exceeds a set factor			X	X
31	Calculated absolute humidity			X	X
32	Calculated absolute enthalpy			X	X
33	Input external command variable	X	X	X	X
34	Saved text for current comfort field			X	X
35	Current temperature 2				X
36	Deactivate dew point controller 2				X
36	Deactivate temperature controller 2				X
37	Switching actuating variable for two-point humidity controller				X
37	Switching actuating variable for two-point temperature controller				X
38	Change temperature controller 2 set point specifications				X

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Number	Name	Object Function	Length
0	Output, temperature	Measured value	2 Byte
1	Output, exceeding upper temperature limit	Exceeding upper limit	1 bit
2	Input, set Heating/Cooling	Input, set Heating/Cooling	1 bit
3	Output, frost protection	Alarm	1 bit
4	Output, maximum temperature	Extremum	2 Byte
5	Output, minimum temperature	Extremum	2 Byte
6	Input, minimum/maximum reset	Reset	1 bit
7	Input, temperature upper limit	Limit value	2 Byte
8	Input, temperature lower limit	Limit value	2 Byte
9	Input, temperature control comfort temperature	Setpoint	2 Byte
10	Input Output RTC mode	Setpoint	1 Byte
11	Output, RTC status	Setpoint	1 Byte
12	Input temperature controller, night mode dec.	Setpoint	2 Byte
13	Input, temperature control, standby temperature	Setpoint	2 Byte
14	Output, temperature control setpoint	Setpoint	2 Byte
15	Output, PI control steady output	Control output	1 Byte
16	Input, lock temperature control	Lock	1 bit
17	Output, rel. humidity	Measured value	2 Byte
18	Output, rel. humidity upper limit	Exceeding upper limit	1 bit
19	Output, rel. humidity lower limit	Exceeding lower limit	1 bit
20	Output, humidity two-level control	Control output	1 bit
21	Input, humidity setpoint	Setpoint	2 Byte
22	Input, humidity control, increase setpoint	Setpoint	1 bit
23	Input, humidity control decrease setpoint	Setpoint	1 bit
24	Output, humidity control setpoint	Setpoint	2 Byte
25	Input, lock humidity control	Lock	1 bit
26	Input, humidity control upper limit	Limit value	2 Byte
27	Input, humidity control lower limit	Limit value	2 Byte
28	Output, dewpoint temperatur	Calculated dewpoint tem...	2 Byte
29	Input, activate dewpoint alarm	Activate	1 bit
30	Output, dewpoint alarm	Alarm	1 bit
31	Output, absolut humidity	Calculated absolute humi...	2 Byte
32	Output, Enthalpy	Calculated Enthalpy	2 Byte
33	Input, reference value	Setpoint adjustment	2 Byte
34	Output, comfort range string	Deviation	14 B...
35	Output, secondary temperature	Measured value	2 Byte
36	Input, lock secondary temperature control	Lock	1 bit
37	Output, secondary temperature control	Control output	1 bit
38	Input, secondary temperature setpoint	Setpoint	2 Byte

Table of Datapoints: Double Temperature Humiditiy Climate Sensor, Heating/Cooling, SK0X-XXXX

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Num...	Name	Object Function	Group A...	Length
0	Output, temperature	Measured value	5/2/0	2 Byte
1	Output, exceeding upper temperature limit	Exceeding upper limit	5/2/1	1 bit
2	Output, exceeding lower temperature limit	Exceeding lower limit	5/2/2	1 bit
3	Output, frost protection	Alarm	5/2/3	1 bit
4	Output, maximum temperature	Extremum	5/2/4	2 Byte
5	Output, minimum temperature	Extremum	5/2/5	2 Byte
6	Input, minimum/maximum reset	Reset	5/2/6	1 bit
7	Input, temperature upper limit	Limit value	5/2/7	2 Byte
8	Input, temperature lower limit	Limit value	5/2/8	2 Byte
9	Input, temperature control comfort temperature	Setpoint	5/2/9	2 Byte
10	Input Output RTC mode	Setpoint	5/2/10	1 Byte
11	Output, RTC status	Setpoint	5/2/11	1 Byte
12	Input temperature controller, night mode dec.	Setpoint	5/2/12	2 Byte
13	Input, temperature control, standby temperature	Setpoint	5/2/13	2 Byte
14	Output, temperature control setpoint	Setpoint	5/2/14	2 Byte
15	Output, PI control steady output	Control output	5/2/45	1 Byte
16	Input, lock temperature control	Lock	5/2/16	1 bit
17	Output, rel. humidity	Measured value	5/2/17	2 Byte
18	Output, rel. humidity upper limit	Exceeding upper limit	5/2/18	1 bit
19	Output, rel. humidity lower limit	Exceeding lower limit	5/2/19	1 bit
20	Output, humidity two-level control	Control output	5/2/20	1 bit
21	Input, humidity setpoint	Setpoint	5/2/21	2 Byte
22	Input, humidity control, increase setpoint	Setpoint	5/2/22	1 bit
23	Input, humidity control decrease setpoint	Setpoint	5/2/23	1 bit
24	Output, humidity control setpoint	Setpoint	5/2/24	2 Byte
25	Input, lock humidity control	Lock	5/2/25	1 bit
26	Input, humidity control upper limit	Limit value	5/2/26	2 Byte
27	Input, humidity control lower limit	Limit value	5/2/27	2 Byte
28	Output, dewpoint temperatur	Calculated dewpoint ...	5/2/28	2 Byte
29	Input, activate dewpoint alarm	Activate	5/2/29	1 bit
30	Output, dewpoint alarm	Alarm	5/2/30	1 bit
31	Output, absolut humidity	Calculated absolute ...	5/2/31	2 Byte
32	Output, Enthalpy	Calculated Enthalpy	5/2/32	2 Byte
33	Input, reference value	Setpoint adjustment	5/2/33	2 Byte
34	Output, comfort range string	Deviation	5/2/34	14 Byte
35	Output, secondary temperature	Measured value	5/2/35	2 Byte
36	Input, lock secondary temperature control	Lock	5/2/36	1 bit
37	Output, secondary temperature control	Control output	5/2/37	1 bit
38	Input, secondary temperature setpoint	Setpoint	5/2/38	2 Byte

Table of Datapoints: Double Temperature Humiditiy Climate Sensor, SK0X-XXXX

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