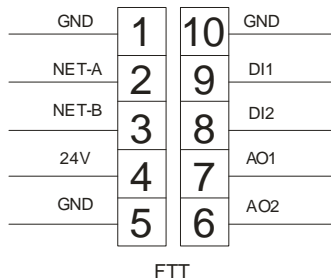


# Software Description

Subject to technical alteration

Issue 27.11.14

## WRF07



## 1 Overview

The application for the room operating unit WRF07 has implemented functions for temperature control with PI-controller for heating/cooling, temperature detection, set point adjustment, presence button with overtime function and fan stage adjustment. The defaults of the LonMark® function profiles **8500 „Space Comfort Controller“** are considered. For extended setting options, user defined configuration properties (UCPT) are used. The UCPTs used are defined in the **Thermokon Device Resource Files** from version 2.6 or higher.

**Temperature measurement:** The measurement is made by an internal sensor or by an external LON sensor via the input variable nviSpaceTemp.

### 1.1 Integration

The device can be commissioned via the Service-Pin.

#### 1.2. Inputs

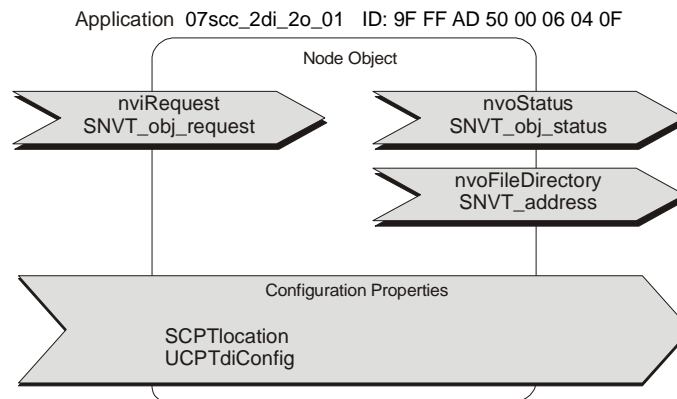
The device has 2 potential-free inputs which are free for parametrizing e.g. for

- Switching light
- Dew point, energy hold off
- room occupancy

## Node object

## 2 Node Object

The Node Object supervises and controls the functions of the individual objects in the device. The basic functions required by the LonMark® are supported, whereas general network variables and configuration properties for the control and parameterization of the device were added.



### 2.1 Input Variables Node Object:

#### nviRequest

SNVT Type: SNVT\_obj\_request, Index 92

Function: Input variable including the functions RQ\_NORMAL, RQ\_UPDATE\_STATUS and RQ\_REPORT\_MASK.

### 2.2 Output Variable Node Object:

#### nvoStatus

SNVT Type: SNVT\_obj\_status, Index 93

Function: Output variable including the requested status bits „invalid\_id“ and „invalid\_request“.

#### nvoFileDirectory

SNVT Type: SNVT\_address, Index 114

Function: The output variable makes the address data of the configuration property in the device available to the LON-integration tool.

### 2.3 Configuration Property Node Object:

#### SCPTlocation

SCPT Index: 17, SNVT\_str\_asc

Function: Additional input option to save information on the location in the device.

#### UCPTdiConfig[0]...[1]

UCPT Index: 44, typedef struct {unsigned short Byte[4]} UNVT\_str\_hex4

Function: This configuration parameter determines the key and digital inputs function.

UCPTdiConfig[0].Byte[0] configures **key 1**

UCPTdiConfig[0].Byte[1] configures **key 2**

UCPTdiConfig[0].Byte[2] configures **key 3**

UCPTdiConfig[0].Byte[3] configures **key 4**

UCPTdiConfig[1].Byte[0] configures **key 5**

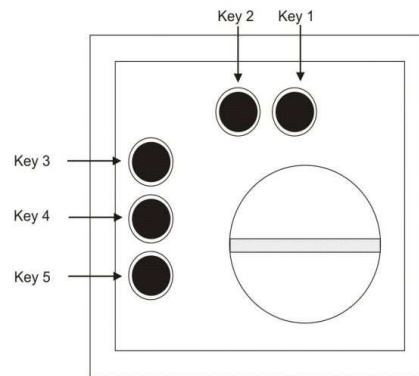
UCPTdiConfig[1].Byte[1] configures **digital input 1**

UCPTdiConfig[1].Byte[2] konfiguriert **digital input 2**

Default: [0].Byte[0] = 0x00, [0].Byte[1] = 0x00, [0].Byte[2] = 0x00, [0].Byte[3] = 0x00

[1].Byte[0] = 0x00, [1].Byte[1] = 0x00, [1].Byte[2] = 0x00, [1].Byte[3] = 0x00

## Node object



2-1 Key assignment

UCPTdiConfig[0],[1], Configuration of keys	
Byte[0...3]	Description
	<b>Without function</b>
0x00	Not used
	<b>Fan stage</b>
0x10	Plus with AUTO
0x11	Minus with AUTO
0x12	Plus without AUTO
0x13	Minus without AUTO
0x14	Plus with AUTO toggle
0x15	Minus with AUTO toggle
0x16	Plus without AUTO toggle
0x17	Minus without AUTO toggle
0x18	Only AUTO
	<b>Occupancy</b>
0x20	Bypass
0x21	Toggle function
0x22	Occupied
0x23	UnOccupied
	<b>Switching function (Output via Switch object)</b>
0x40	Make contact
0x41	Break contact
0x42	Toggle – make contact
0x43	Toggle – break contact
0x44	Command AUTO (= 0.0 –1) - make contact
0x45	Command AUTO (= 0.0 –1) - break contact
	<b>Controller function</b>
0x50	Heating HVAC_HEAT

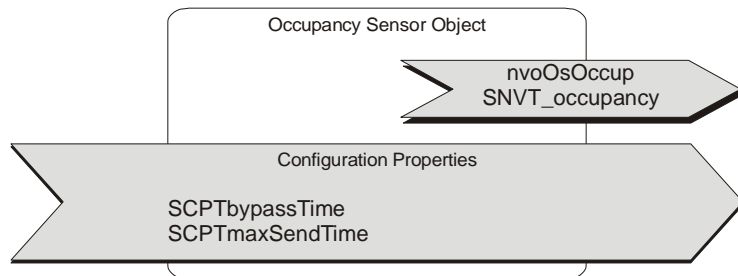
## Node object

0x51	Cooling HVAC_COOL
0x52	Automatic HVAC_AUTO
0x53	Off HVAC_OFF
0x54	Toggle auto / off

UCPTdiConfig[1], Configuration of digital inputs	
Byte[0...3]	Description
	<b>Without function</b>
0x00	Not used
	<b>Occupancy</b>
0x20	Bypass
0x21	Toggle function
0x22	Occupied
0x23	UnOccupied
0x24	Motion sensor, make contact
0x25	Motion sensor, break contact
	<b>Switching function (Output via Switch-Objekt)</b>
0x40	Make contact
0x41	Break contact
0x42	Toggle – make contact
0x43	Toggle – break contact
0x44	Command AUTO (= 0.0 –1) - make contact
0x45	Command AUTO (= 0.0 –1) - break contact
	<b>Controller function</b>
0x50	Heating HVAC_HEAT
0x51	Cooling HVAC_COOL
0x52	Automatic HVAC_AUTO
0x53	Off HVAC_OFF
0x54	Toggle auto / off

## Occupancy sensor object

### 3 Occupancy Sensor Object



#### Overtime Function with Presence Button:

If a key respectively a digital input is configured as an occupancy mode key and a key is pressed, the output `nvoOsOccup` transmits the value `OCCUPIED` upon confirmation. After expiration of the `SCPTbypassTime` it is reset to the value `UNOCCUPIED`. For realization of the bypass function and for indication in the display, `nvoOsOccup` must be binded to the input

variable `nviOccSensor` of the Space Comfort Controller object.

The Occupancy Sensor Object can be switched by a conventional motion sensor. The motion sensor shall be connected to a digital input. Via `UCPTdiConfig[1]` (in `NodeObject`) the function for a motion detection is adjusted.

#### 3.1 Output Variables Occupancy Sensor Object:

##### **nvoOsOccup**

SNVT Type: SNVT\_occupancy, Index 109

Function: Output variable for presence detection in rooms. The output values are depending on the function settings. By `UCPTdiConfig[0].Byte[0...3]` and `UCPTdiConfig[1].Byte[0]` the keys are allocated to the Occupancy-Sensor-Object. Values `20hex` - `23hex` allocates a function to these buttons. Several buttons can be allocated to an Occupancy-Sensor-Object. For local occupancy detection `nvoOsOccup` can also be binded to the input variable `nviOccSensor`.

##### **UCPTdiConfig.Byte[0...3] = 20<sub>hex</sub>, Occupancy key with overtime function (Bypass)**

By key actuation the output variable `nvoOsOccup` transmits the value `OC_OCCUPIED` and the stopping time is started. After expiration of the configured `SCPTbypassTime` the output variable is reset to value `UNOCCUPIED`. Each key actuation restarts the stopping time.

##### **UCPTdiConfig.Byte[0...3] = 21<sub>hex</sub>, Occupancy key with toggle function**

By key actuation the output variable `nvoOsOccup` is toggled between the values `OC_OCCUPIED` and `OC_UNOCCUPIED`.

##### **UCPTdiConfig.Byte[0...3] = 22<sub>hex</sub>, Occupancy key OCCUPIED**

By key actuation the output variable `nvoOsOccup` transmits `OC_OCCUPIED`.

##### **UCPTdiConfig.Byte[0...3] = 23<sub>hex</sub>, Occupancy key UNOCCUPIED**

By key actuation the output variable `nvoOsOccup` transmits `OC_UNOCCUPIED`.

##### **UCPTdiConfig[].Byte[] = 24<sub>hex</sub>/25<sub>hex</sub>, motion sensor functionality (only digital inputs!)**

Output variable `nvoOsOccup` transmits value `OC_OCCUPIED`, when the motion sensor is triggered/active. Not triggered/not active motion sensor = `OC_UNOCCUPIED`.

#### 3.2 Configuration Property Occupancy Sensor Object:

##### **SCPTbypassTime**

SCPT Index: 34, SNVT\_time\_min

Function: Delay time in minutes. After expiration of `SCPTbypassTime` the output variable `nvoOsOccup` is set back to `OC_UNOCCUPIED`. (Default: 90 min)

##### **SCPTmaxSendTime**

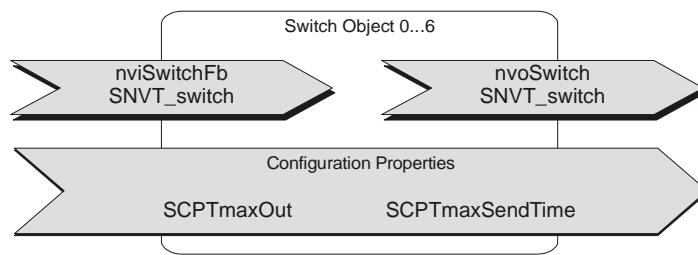
Index: 49, SNVT\_time\_sec

## Occupancy sensor object

Function: Heartbeat function. This configuration property stipulates the interval time after which the output variables are sent. By means of input values =0, the heartbeat function is deactivated.  
(Preset value: 120 s)

Fehler! Verweisquelle konnte nicht gefunden werden.

## 4 Switch objects



The status of the keys and the two potential-free digital inputs is detected and output by the output variables type SNVT\_switch, depending on the configuration (UCPTdiConfig), and transmitted using a SNVT\_switch variable.

The keys are assigned to the Switch objects 0-4 and the digital inputs to Switch objects 5 and 6!

### 4.1 Input Variable Digital Input Object:

#### nviSwitchFb\_x

SNVT Type: SNVT\_switch, Index 95

Function: Input variable for current status of the light groups controlled by nvoSwSwitch.

### 4.2 Output Variable Digital Input Object:

#### nvoSwitch\_x

SNVT Typ: SNVT\_switch, Index 95

Function: Depending on the configuration UCPTdiConfig the output variables send the current switch status of the digital inputs/key (active/inactive) or values for manual light control.

#### Standard I/O:

Potential-free contact active ==> nvoSwSwitch.state = 1

nvoSwSwitch.value = SCPTmaxOut

Potential-free contact inactive ==> nvoSwSwitch = 0.0 0

#### Toggle:

Toggle inactive ==> active ==> Each button actuation results in toggling of the variables between ON and OFF.

Lighting ON

nvoSwSwitch.state = 1

nvoSwSwitch.value = SCPTmaxOut

Lighting OFF nvoSwSwitch1/2 = 0.0 0

#### Command Automatic:

Toggle inactive ==> active ==> Upon button actuation the output variable nvoSwSwitch is sent with the value 0.0 -1. The output variables are transmitted after change of the output values, after expiration of the heartbeat time (SCPTmaxSendTime) and 1,5s- 4s after module reset.

### 4.3 Configuration Parameter Digital Input Object:

#### SCPTmaxOut

SCPT Index: 93, SNVT\_lev\_cont

Function: Configuration parameter to determine the maximal output value of the variable nvoSwitch.value. (Present Value: 100 %)

#### SCPTmaxSendTime

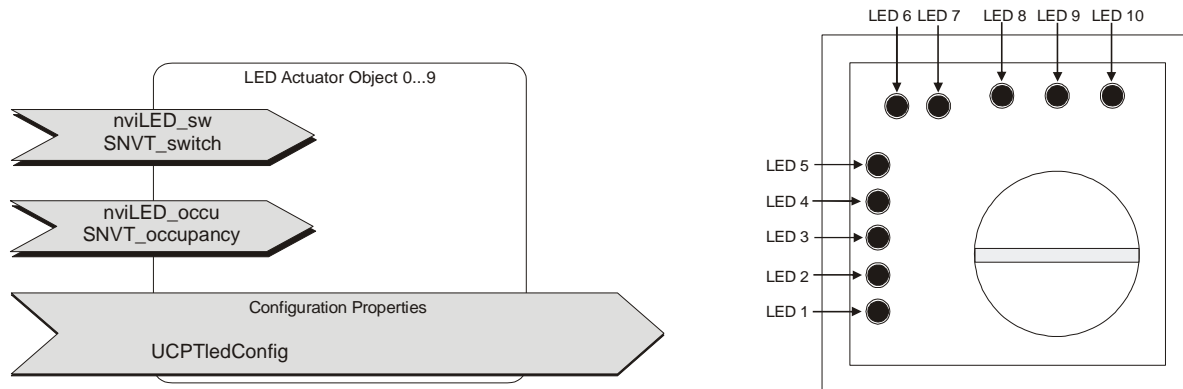
SCPT Index: 49, SNVT\_time\_sec

Function: Heartbeat interval. After expiration of the time SCPTmaxSendTime the digital input is polled and the output variables are updated. By input values = 0 the heartbeat function is deactivated. (Preset value: 0)

Fehler! Verweisquelle konnte nicht gefunden werden.

## 5 LED Objects

The functionality of the LED's is configurable. The LED's can be triggered in dependency of internal states, like Occupancy mode, Fan stage etc.. or externally by triggering the two input variables.



LED Actuator Object 0 = LED 1  
 LED Actuator Object 1 = LED 2  
 :  
 :  
 LED Actuator Object 9 = LED 10

### 5.1 Input variables LED Object

#### nviLED\_sw

SNVT Typ: SNVT\_switch, Index 95

Function: Input variable of type SNVT\_switch for triggering the LED if configured as "External trigger".

	LED nviLED_sw
ON	100.0 1
OFF	0.0 0

#### nviLED\_occu

SNVT Typ: SNVT\_occupancy, Index 109

Function: Input variable of type SNVT\_occupancy for triggering the if configured as "External trigger".

	LED nviLED_occu
ON	OC_OCCUPIED
OFF	OC_UNOCCUPIED



## 5.2 Configuration parameter LED Object:

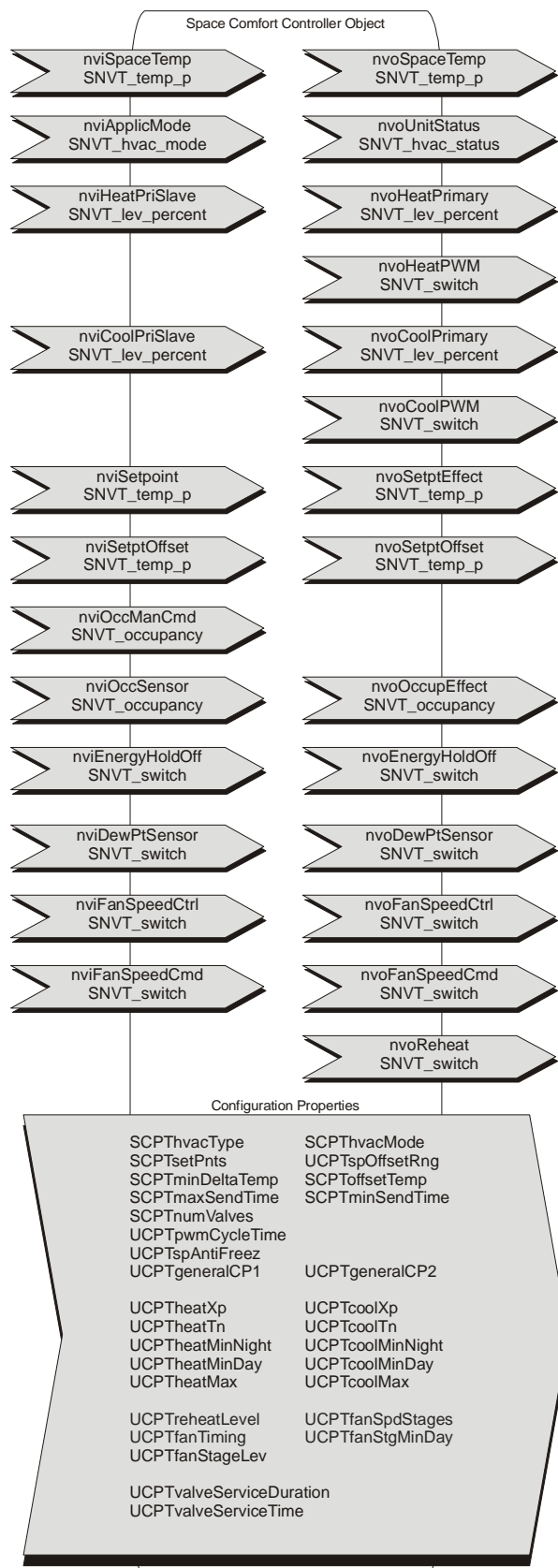
UCPTledConfig[0]...[10]

UCPT Index: 82, unsigned short

Funktion: Configures the functionality of the LED.

UCPTledConfig[], Configuration of LED's	
Value	Description
0x00	External trigger by nviLed_sw resp. nviLed_occ
0x01	Fan stage AUTO
0x02	Fan stage 1
0x03	Fan stage 2
0x04	Fan stage 3
0x05	Controller ACTIVE
0x06	Controller Heating ON
0x07	Controller Cooling ON
0x08	Occupied

## 6 Space Comfort Controller



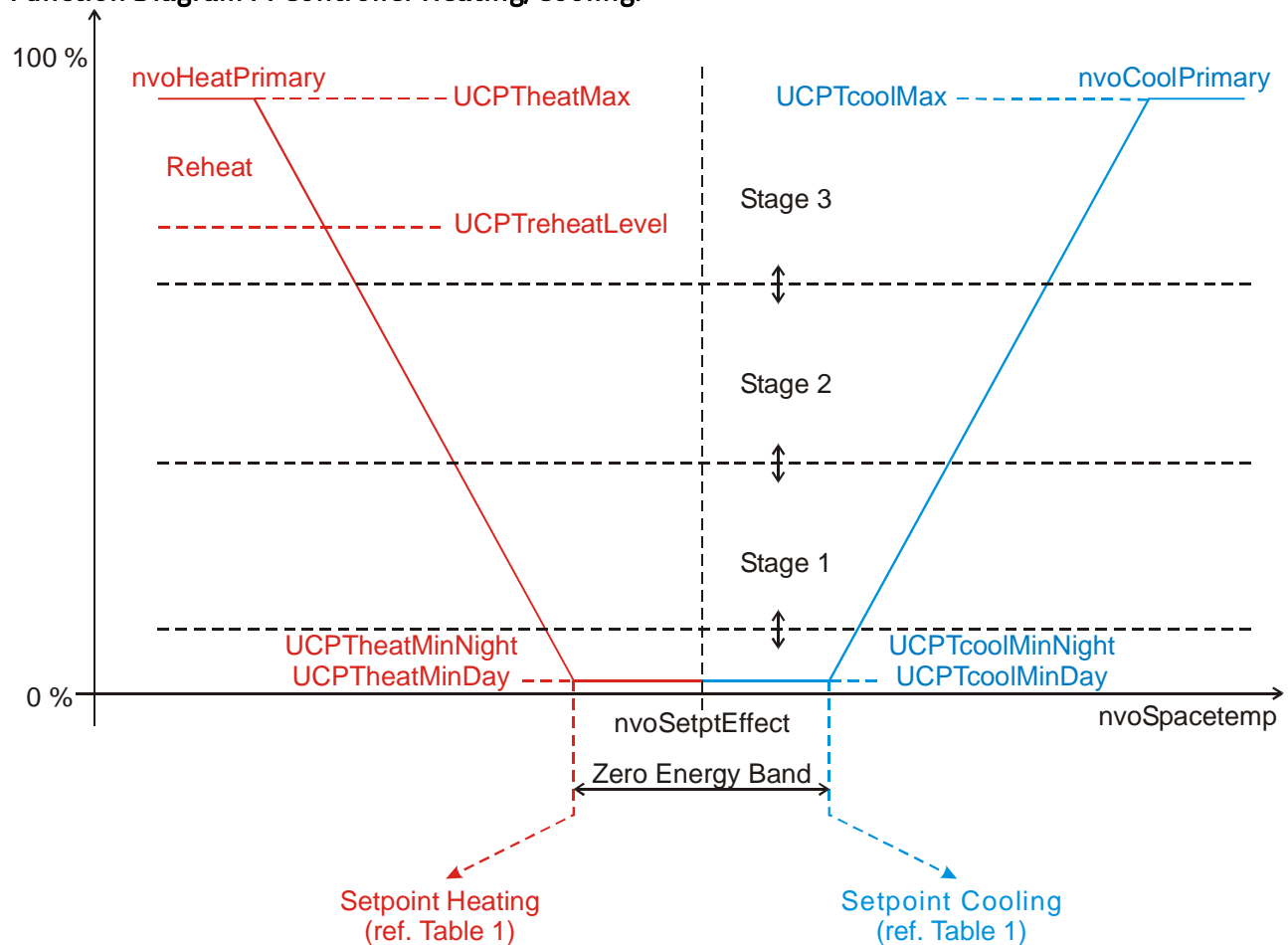
The Object includes the functions temperature measuring and PI-control for heating and cooling. Output of the control variables is made via the network variables. The sampling period for the calculation of the control variables corresponds to the sending interval (SCPTmaxSendTime) of the output variables.

**Set point adjustment:** The set point temperature can be increased/lowered in the range of UCPTspOffsetRng via the potentiometer. Output of the offset value is made by nvoSetptOffset.

The effective set point (basic set point) nvoSetptEffect is calculated in dependency of the input variables and room occupancy (nviOccManCmd and nviOccSensor), of the set point defaults SCPTsetPnts respectively nviSetpoint and the set point offset.

**Temperature Control:** The basic set point used by the control algorithm is determined by SCPTsetPnts respectively nvSetpoint. The neutral (energy-free) zone around the basic set point adapts itself automatically to the current room occupancy and is parameterizable via SCPTsetPnts. The control variables of the PI-controller for heating and cooling are output by variables of type SNVT\_lev\_percent.

The control properties for the proportional range and reset time can be individually adapted to the room conditions. The monitoring of window contacts and dew point detector are made by the input variables nviEnergyHoldOff and nviDewPtSensor.



## 6.1 Input Variables Space Comfort Controller Object

### nviSpaceTemp

SNVT Type: SNVT\_temp\_p, Index 105

Function: Input variable for connection of an external LON temperature sensor. The external value is taken over, if the initialisation value 0x7FFF (=327,67 °C) was changed by a NV-Update after reset. As long as the initialisation value is not changed after reset, the internal temperature sensor remains active.

### nviApplicMode

SNVT Type: SNVT\_hvac\_mode, Index 108

Function: Input variable for selection of the controller operating mode.

HVAC\_AUTO ==> automatic toggling between heating and cooling

HVAC\_HEAT ==> only heating

HVAC\_COOL ==> only cooling

HVAC\_OFF ==> control switched-off

The initialization status after reset is determined by the configuration property SCPT HVACMode.

### nviEnergyHoldOff

SNVT Type: SNVT\_switch, Index 95

Function: Input variable of e.g. window or door contact for activation of the energy-saving function. By  $nviEnergyHoldOff = 100.0$  the function is activated and the control variables heating/cooling are reset to their minimum values. With an active energy-saving function the antifreeze function is switched on (see UCPTspAntiFreez). After deactivation of the energy-hold-off function the temperature control is restarted.

## Space Comfort Controller

**nviDewPtSensor**

SNVT Type: SNVT\_switch, Index 95

Function: Input variable for evaluation of a dew point detector in the operating mode cooling. By nviDewPtSensor = 100.0 1 the control variable cooling is reset to its minimum value. After deactivation of this function, the temperature control is restarted.

**nviCoolPriSlave**

SNVT Type: SNVT\_lev\_percent, Index 81

Function: Control variable for network variables nvoCoolPrimary and nvoCoolPWM.  
 nviCoolPriSlave = 0x7FFF (163,835 %) ==> internal controller cooling ON (initialisation value after reset).  
 nviCoolPriSlave = 0...100 % ==> internal controller cooling OFF  
 ==> nviCoolPriSlave determines the output variables.  
**!! The external override has top priority, thus also a concurrent control of the heating and cooling valve is possible.**

**nviHeatPriSlave**

SNVT Type: SNVT\_lev\_percent, Index 81

Function: Control variable for network variable nvoHeatPrimary and nvoHeatPWM.  
 nviHeatPriSlave = 0x7FFF (163,835 %) ==> internal controller heating ON (initialisation value after reset)  
 nviHeatPriSlave = 0 ... 100 % ==> internal controller heating OFF  
 ==> nviHeatPriSlave determines the output quantities  
**!! The external override has top priority, thus also a concurrent control of the heating and cooling valve is possible.**

**nviFanSpeedCmd**

SNVT Type: SNVT\_switch, Index 95

Function: Input variable for external default value of the internal fan stage value . The range fits the range of output variable nvoFanSpeed.

**nviFanSpeedCtrl**

SNVT Type: SNVT\_switch, Index 95

Function: The input variable nviFanSpeedCtrl enables the display of the current fan speed if the externally connected controller selects the fan speed autonomously by nvoFanSpeedCmd 0,0 -1. Therefore, the output variable of the controller (e.g. nvoFanSpeedCmd) must be connected with the input variable nviFanSpeedCtrl.  
 Example: nviFanSpeedCmd = 0,0 -1 (Automatic mode) and nviFanSpeedCtrl = 33,0 1 => LED's show Stage 1. The output variable nvoFanSpeedCtrl outputs 33,0 1.=

=

**nviSetpoint**

SNVT Type: SNVT\_temp\_p, Index 105

Function: Input variable for default of the basic set point temperature . It is obligatory necessary to bind these network variables with a higher node. If no update is made for nviSetpoint, the initialisation value 0x7FFF (=327,67°C) is maintained and the values of the configuration properties SCPTsetPnts are used for the calculation of the effective set point (basic set point + Offset). If nviSetpoint receives an update with a valid set point, the effective set point is calculated by the value of the input variables.

**nviSetptOffset**

SNVT Type: SNVT\_temp\_p, Index 105

Function: Input variable for default of an offset value for the offset of the basic set point temperature in the mode OCCUPIED or STANDBY (see table 1).

## Space Comfort Controller

**nviOccManCmd und nviOccSensor**

SNVT Type: SNVT\_occupancy, Index 109

Function: Input variable for default of the room occupancy. The current room occupancy determines the values of the control parameter „effective set point“ and „neutral zone“ and thus the set points for heating and cooling (see table 1). Initialisation value for both variables: OC\_NUL  
 nviOccManCmd: default via building control technology: OC\_OCCUPIED, OC\_BYPASS, OC\_STANDBY, OC\_UNOCCUPIED  
 nviOccSensor: presence status message in rooms: OC\_OCCUPIED, OC\_UNOCCUPIED  
 Via the configuration property *UCPTgeneral/CP1* the behaviour of the device can be determined if nviOccManCmd = OC\_UNOCCUPIED is switched.

nviOccManCmd	nviOccSensor		room occupancy nvoOccupEffect	Set Point Heat nvoSetptEffect (nvoUnitStatus.mode = HVAC_HEAT)	Set Point Cool nvoSetptEffect (nvoUnitStatus.mode = HVAC_COOL)
OC_NUL	OC_NUL	>>>	OCCUPIED	SCPTsetPnts.occupied_heat + nviSetptOffset	SCPTsetPnts.occupied_cool + nviSetptOffset
OC_OCCUPIED	****	>>>		or nviSetptOffset + nviSetpoint - ( SCPTsetPnts.occupied_cool - SCPTsetPnts.occupied_heat ) / 2	or nviSetptOffset + nviSetpoint + ( SCPTsetPnts.occupied_cool - SCPTsetPnts.occupied_heat ) / 2
****	OC_OCCUPIED	>>>			
OC_STANDBY	OC_NUL OC_UNOCCUPIED	>>>	STANDBY	SCPTsetPnts.standby_heat + nviSetptOffset  or nviSetptOffset + nviSetpoint - ( SCPTsetPnts.standby_cool - SCPTsetPnts.standby_heat ) / 2	SCPTsetPnts.standby_cool + nviSetptOffset  or nviSetptOffset + nviSetpoint + ( SCPTsetPnts.standby_cool - SCPTsetPnts.standby_heat ) / 2
OC_UNOCCUPIED	OC_NUL OC_UNOCCUPIED	>>>	UNOCCUPIED	SCPTsetPnts.unoccupied_heat	SCPTsetPnts.unoccupied_cool

Table 1: Control porperty depending on the room occupancy

## 6.2 Output Variables Space Comfort Controller Object

**nvoSpaceTemp**

SNVT Type: SNVT\_temp\_p, Index 105

Function: Output variable for measured temperature value. Measuring range 0 - 50°C, resolution 1/100 °C. Data output is made depending of SCPTmaxSendTime, and approx. 1,5s - 4,0s after reset.

**nvoEnergyHoldOff**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable for status message of the energy-saving function.

nvoEnergyHoldOff = 0.0 0 ==&gt; window contact inactive

nvoEnergyHoldOff = 100.0 1 ==&gt; window contact active

Data output is made depending on SCPTmaxSendTime, upon value change and 1,5s- 4s after reset.

**nvoDewPtSensor**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable for status message of the dew point detector.

nvoDewPtSensor = 0.0 0 ==&gt; dew point detector inactive

## Space Comfort Controller

nvoDewPtSensor = 100.0 1 ==> dew point

Data output is made depending on SCPTmaxSendTime, upon and 1,5s- 4s after reset.

**nvoUnitStatus**

SNVT Type: SNVT\_hvac\_status, Index 112

Function: Output variable for operating mode and the control variables heating/cooling of the controller.

.mode = HVAC\_HEAT ==> heating  
 HVAC\_COOL ==> cooling  
 HVAC\_OFF ==> controller switched-off  
 .heat\_output\_primary 0...100 % ==> control variable heating  
 .cool\_output\_primary 0...100 % ==> control variable cooling

**nvoHeatPrimary**

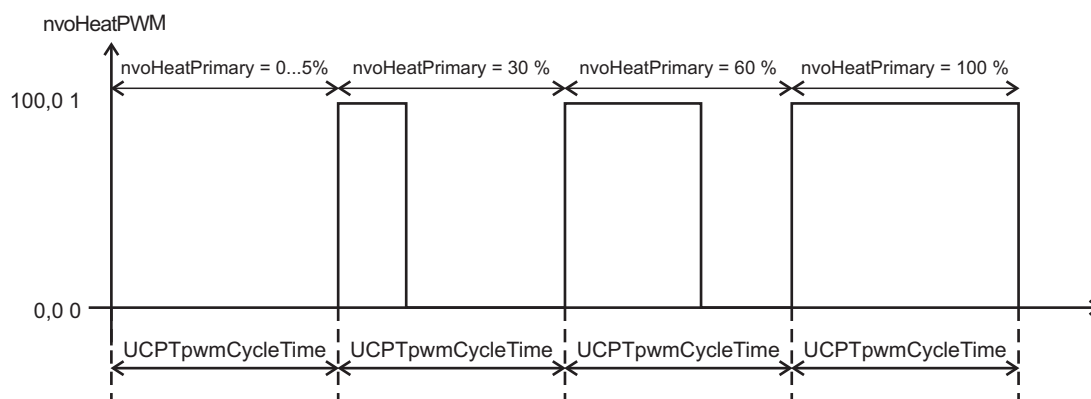
SNVT Type: SNVT\_lev\_percent, Index 81

Function: Output variable including the control variable of the PI-controller for heating to control a continuous actuator. Data output is made depending on SCPTmaxSendTime and 1,5s- 4s after reset.

**nvoHeatPWM**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable including the control variable of the PI-controller for heating to control a thermic two-point actuator pulse width modulated. Data output is made immediately with a waiting switch command and otherwise depending on SCPTmaxSendTime and 1,5s- 4s after reset.

**nvoReheat**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable for display of reheating active/

nvoReheat = 0.0 0 ==> reheating inactivated

nvoReheat = 100.0 1 ==> reheating activated

Data output is made after value change depending on SCPTmaxSendTime and 1,5s- 4s after reset.

**nvoCoolPrimary**

SNVT Type: SNVT\_lev\_percent, Index 81

Function: Output variable including the control variable of the PI-controller for cooling. Data output is made analogue to nvoHeatPrimary.

**nvoCoolPWM**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable including the control variable of the PI-controller for heating for a pulse width modulated control of a thermic two-point actuator. Data output is made analogue to nvoHeatPWM.

## Space Comfort Controller

**nvoSetptEffect**

SNVT Type: SNVT\_temp\_p, Index 105

Function: The output variable sends the set point used by the control algorithm. Output is depending on the operating mode of the controller:

nvoUnitStatus.mode = HVAC\_HEAT ==&gt; nvoSetptEffect = set point heating

nvoUnitStatus.mode = HVAC\_Cool ==&gt; nvoSetptEffect = set point cooling

The effective set point is calculated depending on nviSetpoint, nviOccManCmd, nviOccSensor, SCPTsetPnts and nviSetptOffset (see table 1). Data output is made depending on SCPTmaxSendTime, upon value change and 1,5s- 4s after reset.

**nvoSetptOffset**

SNVT Type: SNVT\_temp\_p, Index 105

Function: Output variable for set point correction, which can be prescribed by nviSetptOffset. Data output is made analogue to nvoSetptEffect.

**nvoOccupEffect**

SNVT Type: SNVT\_occupancy, Index 109

Function: Output variable for effective room occupancy (see table 1). Data output is made depending on SCPTmaxSendTime, upon value change and 1,5s- 4s after reset.

**nvoFanSpeedCtrl**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable for adjusted fan speed. The number of the fan speed stages is adjusted by the configuration property UCPTfanSpdStages. The indication in the display shows the currently adjusted fan speed and whether the controller is in the automatic mode.

r`mqñ~âpéÇpí~ÖËë-Z=N== = =

Lüfterstufe	nvoFanSpeedCtrl .value	nvoFanSpeedCtrl .state
0	0 %	0
1	100 %	1

r`mqñ~âpéÇpí~ÖËë-Z=0== = =

Lüfterstufe	nvoFanSpeedCtrl .value	nvoFanSpeedCtrl .state
0	0 %	0
1	50 %	1
2	100 %	1

r`mqñ~âpéÇpí~ÖËë-Z=P=

Lüfterstufe	nvoFanSpeedCtrl .value	nvoFanSpeedCtrl .state
0	0 %	0
1	33,0 %	1
2	66,5 %	1
3	100 %	1

!! The acutation of the buttons is only evaluated with nvoEffectOccup = OC\_OCCUPIED. Otherwise, button !!actuations are ignored.

UCPTdiConfig.Byte[0...3] = 10hex - 18hex (in Node Object) allocates a function for fan speed adjustment to the menu buttons.

**UCPTdiConfig.Byte[0...3] = 10hex, increase fan stage by AUTO**By button actuation the output variable *nvoFanSpeed* is increased.**UCPTdiConfig.Byte[0...3] = 11hex, reduce fan stage by AUTO**By button actuation the output variable *nvoFanSpeed* is reduced.**UCPTdiConfig.Byte[0...3] = 12hex, increase fan stage without AUTO**By button actuation the output variable *nvoFanSpeed* is increased.**UCPTdiConfig.Byte[0...3] = 13hex, reduce fan stage without AUTO**By button actuation the output variable *nvoFanSpeed* is reduced.**UCPTdiConfig.Byte[0...3] = 14hex, increase fan stage with AUTO toggling**By button actuation the output variable *nvoFanSpeed* is increased. A button actuation at max. fan stage resets the fan stage to AUTO.**UCPTdiConfig.Byte[0...3] = 15hex, reduce fan stage by AUTO toggling**By button actuation the output variable *nvoFanSpeed* is reduced. A button actuation with AUTO resets to the maximal stage.**UCPTdiConfig.Byte[0...3] = 16hex, increase fan stage without AUTO toggling**By button actuation the output variable *nvoFanSpeed* is increased. A button actuation with max. fan stage resets to „0“. The value AUTO is skipped.**UCPTdiConfig.Byte[0...3] = 17hex, reduce fan stage without AUTO toggling**By button actuation the output variable *nvoFanSpeed* is reduced. A button actuation with „0“ resets to the maximal stage. The value AUTO is skipped.**UCPTdiConfig.Byte[0...3] = 18hex, fan stage only AUTO**By button actuation the output variable *nvoFanSpeed* is toggled to the value 0.0-1.

## Space Comfort Controller

**nvoFanSpeedCmd**

SNVT Type: SNVT\_switch, Index 95

Function: Output variable for adjusted fan speed and for concatenation of devices. The number of fan stages is adjustable by means of the configuration property UCPTfanSpdStages. The indication in the display shows the current fan stage adjusted and whether the controller is working in the automatic module.

r`mqñ~âpéÇpí~ÖÉë=Z=N= =

Lüfterstufe	nvoFanSpeedCmd .value	nvoFanSpeedCmd .state
AUTO	0 %	-1
0	0 %	0
1	100 %	1

r`mqñ~âpéÇpí~ÖÉë=Z=0= =

Lüfterstufe	nvoFanSpeedCmd .value	nvoFanSpeedCmd .state
AUTO	0 %	-1
0	0 %	0
1	50 %	1
2	100 %	1

r`mqñ~âpéÇpí~ÖÉë=Z=P=

Lüfterstufe	nvoFanSpeedCmd .value	nvoFanSpeedCmd .state
AUTO	0 %	-1
0	0 %	0
1	33,0 %	1
2	66,5 %	1
3	100 %	1

!! Actuation of the buttons is **is only evaluated** with nvoEffectOccup = OC\_OCCUPIED.

!! Otherwise the button actuation is ignored.

## 6.3 Configuration Property Space Comfort Controller Object - General:

**SCPTtempOffset**

Index: 272, SNVT\_temp\_diff\_p

Function: Offset for the temperature value. By this parameter a software calibration is possible.

**SCPTminSendTime**

Index: 52, SNVT\_time\_sec

Function: Stipulates the smallest update interval of the output variable nvoSpaceTemp. An update is made after expiration of „SCPTminSendTime“, if the temperature value of the output variable has changed by more than „SCPTminDeltaTemp“. By means of the input values = 0 the function is deactivated. (Preset value: 5,0 sec)

**SCPTminDeltaTemp**

Index: 64, SNVT\_temp\_p

Function: If the temperature has changed by the adjusted value „SCPTminDeltaTemp“ the new temperature value is transmitted. The function is depending on the adjustment of the property „SCPTminSendTime“. (Range >= 0 °C; preset value: 0,30 °C)

**UCPTgeneralCP1**

Index: 7, SNVT\_state

Function: The configuration property determines the behaviour of the node nviOccManCmd = OC\_UNOCCUPIED is switched.

UCPTgeneralCP1.bit[0] = 1	==> reset <b>nviOccSensor</b> to „OC_NUL“
UCPTgeneralCP1.bit[0] = 0*	==>no reset of <b>nviOccSensor</b>
UCPTgeneralCP1.bit[1] = 1	==> reset <b>nvoOsOccup</b> to „OC_NUL“
UCPTgeneralCP1.bit[1] = 0*	==>no reset of <b>nvoOsOccup</b>
UCPTgeneralCP1.bit[2] = 1	==>reset <b>Set point offset</b>
UCPTgeneralCP1.bit[2] = 0*	==> no reset of <b>Set point offset</b>
UCPTgeneralCP1.bit[3] = 1	==>reset <b>fan stage</b> to „AUTO“
UCPTgeneralCP1.bit[3] = 0*	==>no reset of <b>fan stage</b>
UCPTgeneralCP1.bit[4] = 1	==>set <b>fan stage</b> to „Off“
UCPTgeneralCP1.bit[4] = 0*	==> no reset of <b>fan stage</b>
UCPTgeneralCP1.bit[5] = 1	==>reset <b>nvoSwitch[0]</b> to „Off“
UCPTgeneralCP1.bit[5] = 0*	==>no reset of <b>nvoSwitch[0]</b>
UCPTgeneralCP1.bit[6] = 1	==> reset <b>nvoSwitch[1]</b> to „Off“
UCPTgeneralCP1.bit[6] = 0*	==>no reset of <b>nvoSwitch[1]</b>
UCPTgeneralCP1.bit[7] = 1	==>set <b>nvoSwitch[2]</b> to „Off“



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UCPTgeneralCP1.bit[7] = 0*	==>no reset of nvoSwitch[2]
UCPTgeneralCP1.bit[8] = 1	==> reset nvoSwitch[3] to „Off“
UCPTgeneralCP1.bit[8] = 0*	==>no reset of nvoSwitch[3]
UCPTgeneralCP1.bit[9] = 1	==> reset nvoSwitch[4] to „Off“
UCPTgeneralCP1.bit[9] = 0*	==>no reset of nvoSwitch[4]
UCPTgeneralCP1.bit[10] = 1	==> reset nvoSwitch[5] to „Off“
UCPTgeneralCP1.bit[10] = 0*	==>no reset of nvoSwitch[5]
UCPTgeneralCP1.bit[11] = 1	==> reset nvoSwitch[6] to „Off“
UCPTgeneralCP1.bit[11] = 0*	==>no reset of nvoSwitch[6]
* = default values	

**UCPTgeneralCP2**

Index: 8, SNVT\_state

Function: Inversion of digital outputs (if available).

UCPTgeneralCP2.bit[0] = 1	==> <b>Digital output 1</b> inverted
UCPTgeneralCP2.bit[0] = 0*	==> <b>Digital output 1</b> not inverted
UCPTgeneralCP2.bit[1] = 1	==> <b>Digital output 2</b> inverted
UCPTgeneralCP2.bit[1] = 0*	==> <b>Digital output 2</b> not inverted
UCPTgeneralCP2.bit[2] = 1	==> <b>Belimo 6-way valve</b>
	Set SCPTnumValves = 1 (4-tube system)
UCPTgeneralCP2.bit[2] = 0*	==> <b>Continuous output 0-10V</b>
* = default values	

## 6.4 Configuration parameters Space Comfort Controller Object – Setpoint

**SCPTsetPnts**

Index: 60, SNVT\_temp\_setpt

Function: Configuration property for default of the set points for heating and cooling depending on the room occupancy. By nviSetpoint the values can be overwritten by nvoOccupEffect = OCCUPIED respectively STANDBY. When having nvoOccupEffect = UNOCCUPIED, nviSetpoint is not considered, however.

Preset values: .occupied\_heat 21,00 °C .occupied\_cool 23,00 °C  
 .standby\_heat 19,00 °C .standby\_cool 25,00 °C  
 .unoccupied\_heat 16,00 °C .unoccupied\_cool 28,00 °C

**UCPTspAntiFreez**

Index: 18, SNVT\_temp\_p

Function: Set point for heating for antifreeze function with window contact opened, i.e. with an active energy-saving function. (Preset value: 10°C).

**UCPTspOffsetRng**

Index: 12, SNVT\_temp\_p

Function: Configuration property for the value range of the adjusted set point correction, i.e. the prescribed set point can be changed by the user by means of the value +/- UCPTspOffsetRng. (Preset value: 3,0 K)

## 6.5 Configuration Property Space Comfort Controller Object - Fan Coil Unit:

**UCPTfanSpdStages**

Index: 13, SNVT\_count

Function: Configuration property for default of fan stages.  
 (Preset value: 3 ==> AUTO, OFF, Stage 1, Stage 2, Stage 3)

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**UCPTfanTiming**

Index: 33, UNVT\_fan\_timing

Function: Configuration property for default of minimal switch-in, advance and tracking time of fan  
 UNVT\_fan\_timing.RunUpTime: advance time of fan (initialisation value: 0 sec)  
 UNVT\_fan\_timing.OverrunTime: tracking time of fan (initialisation value: 0 sec)  
 UNVT\_fan\_timing.MinOnTime: minimal switch-on time of fan coil (initialisation value: 120 sec.)  
 UNVT\_fan\_timing.MinOffTime: minimal switch-off time of a fan coil (Initialisation value: 0 sec.)

**UCPTfanStgMinDay**

Index: 37, SNVT\_count

Function: Configuration property for default of minimal fan stage for the operating modes STANDBY and OCCUPIED. (Preset value Wert: 0, i.e. fan OFF)

**UCPTfanStageLev**

Index: 36, UNVT\_fan\_stg\_lev

Function: Configuration property for default of switch value of fan stages for heating and cooling. (see function diagram controller)

Preset value:

- .CoolFirstStage 0,000 %
- .CoolSecondStage 33,000 %
- .CoolThirdStage 66,500 %
- .HeatFirstStage 0,000 %
- .HeatSecondStage 33,000 %
- .HeatThirdStage 66,500 %

## 6.6 Common Configuration parameter Space Comfort Controller Object - PI-Controller :

**SCPTHvacType**

Index: 169, SNVT\_hvac\_type

Function: Configuration property for identification of a controller type.  
 Preset value: nciHvacType = HVT\_GENERIC

**SCPTHvacMode**

Index: 74, SNVT\_hvac\_mode

Function: The configuration property determines the initialisation status of the input variable nviApplicMode and thus also the start configuration of the temperature controller. Preset value: HVAC\_AUTO

**SCPTmaxSendTime**

Index: 49, SNVT\_time\_sec

Function: The configuration property defines the interval time for the calculation of new control variables for the temperature control and the sending time of the output variable. By input values = 0, data output is deactivated. (Preset value: 30 s)

**UCPTpwmCycleTime**

Index: 35, SNVT\_time\_min

Function: The configuration property determines the cycle time for a pulse width modulated control of the control variables by nvoHeatPWM and nvoCoolPWM. (Preset value: 15 min)

**SCPTnumValves**

Index: 59, SNVT\_count

Function: The configuration property is designed for the selection of 2 or 4 tube systems. If a 2 tube system is operated (1 valve), the output variables including the control variables for heating and cooling receive the same values.

**SCPTnumValves = 1: ==> 2-tube-system**

Mode heating: nvoHeatPrimary = nvoCoolPrimary = control variable heating

Mode cooling: nvoHeatPrimary = nvoCoolPrimary = control variable cooling

**SCPTnumValves = 2: ==> 4-tube-system (standard value)**

Mode heating: nvoHeatPrimary = control variable heating

Mode cooling: nvoCoolPrimary = control variable cooling

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**UCPTvalveServiceTime – Maintenance Interval**

Index: 68, SNVT\_time\_hour

Function: The configuration property determines the maintenance interval for the valve. After expiration of the maintenance interval the valve is fully opened and closed again thus protecting the valve and preventing lime deposit.

**UCPTvalveServiceDuration – Period of Maintenance Interval**

Index: 69, SNVT\_time\_min

Function: The configuration property determines the period of time i.e. how long the valve should be opened for the protection of deposit. The time in question should at least guarantee a full opening of the valve.

## 6.7 Configuration Property Space Comfort Controller Object - PI-Controller Heating:

**UCPTheatXp**

Index: 19, SNVT\_temp\_p

Function: Property for adjusting the proportional range. By UCPTheatXp = 0 the controller for heating is deactivated. (Preset value: 4K, range: 0-10 K)

**UCPTheatTn**

Index: 20, SNVT\_time\_min

Function: Property for adjusting the reset time of I-proportion (scanning time Ta= SCPTmaxSendTime). By input values = 0, the I-proportion is deactivated. (Preset value: 100 min)

**UCPTheatMinNight**

Index: 26, SNVT\_lev\_percent

Function: Control variable limit downwards in the operation mode UNOCCUPIED. (Preset value: 0 %)

**UCPTheatMinDay**

Index: 27, SNVT\_lev\_percent

Function: Control variable limit downwards in the operation mode OCCUPIED and STANDBY. (Preset value: 0 %)

**UCPTheatMax**

Index: 28, SNVT\_lev\_percent

Function: Control variable limit upwards. (Preset value: 100 %)

**UCPTreheatLevel**

Index: 32, SNVT\_lev\_percent

Function: Limiting value for switching-on/-off the electrical reheater. If the control variable nvoHeatPrimary exceeds the value UCPTreheatLevel, the reheater is switched-on (see function diagram controller). (Preset value: 80%)

## 6.8 Configuration Property Space Comfort Controller Object - PI-Controller Cooling:

**UCPTcoolXp**

Index: 22, SNVT\_temp\_p

Function: Property adjusting the proportional range. By UCPTheatXp = 0 the controller for heating is deactivated. (Preset value: 4 K, range: 0-10 K)

**UCPTcoolTn**

Index: 23, SNVT\_time\_min

Function: Property for adjusting the reset time of the I-proportion (scanning time Ta = SCPTmaxSendTime). By input values = 0, the I-proportion is deactivated. (Preset value: 100 min)

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## **UCPTcoolMinNight**

Index: 29, SNVT\_lev\_percent

Function: Control variable limit downwards in the operation mode UNOCCUPIED.  
(Preset value: 0 %)

## **UCPTcoolMinDay**

Index: 30, SNVT\_lev\_percent

Function: Control variable limit downwards in the operation mode OCCUPIED and STANDBY.  
(Preset value: 0 %)

## **UCPTcoolMax**

Index: 31, SNVT\_lev\_percent

Function: Control variable limit upwards.(Preset value: 100 %)