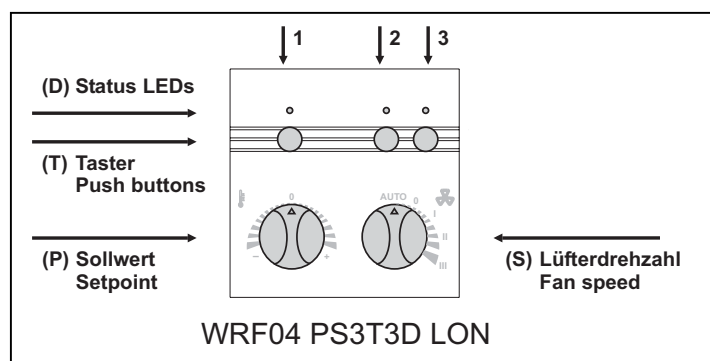


# EN – Software Description

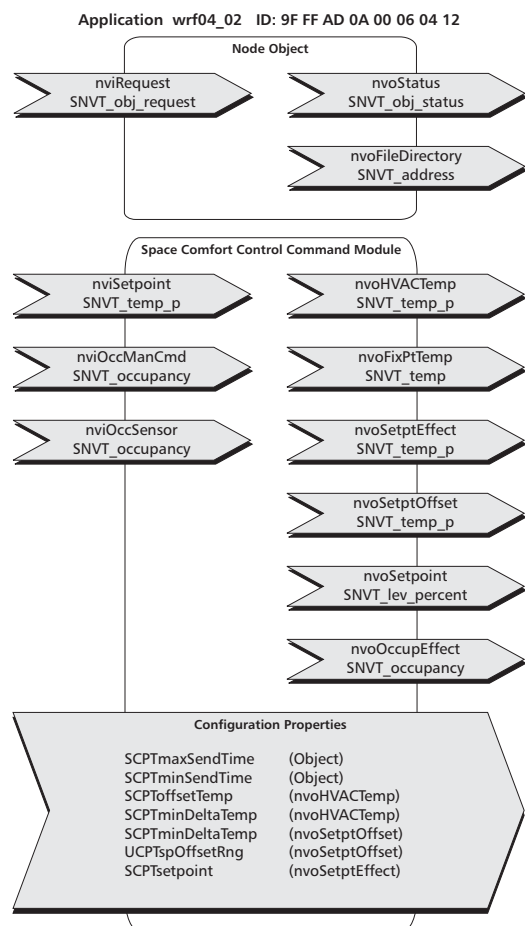
Subject to technical alteration

Version 03.03.06

16780... WRF04

16880... WRF04<sub>xxx</sub> LON with operating elements

## 1 Overview



The standard application for the sensors type WRF04...LON with operating elements includes the functions for the interpretation of the operating elements and the control of the LEDs. The application considers the latest LonMark® defaults.

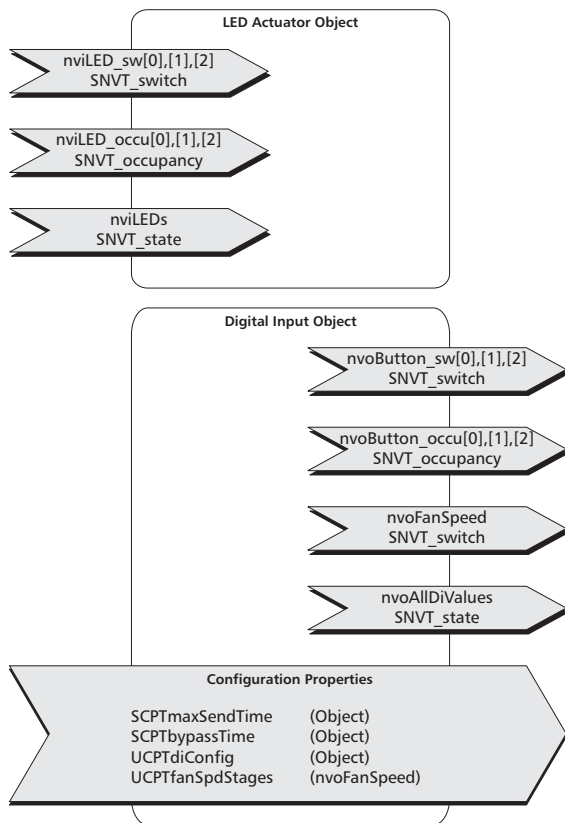
The application uses standard network variables (SNVT) and standard configuration properties (SCPT). For extended adjustment possibilities user configuration properties (UCPT) are used. The UCPTs used are defined in the **Thermokon Device Resource Files from Version 1.3** or higher and should be installed to the PC before making up the device defaults by the installation tool.

**Temperature detection:** The measurement is made by an inside sensor. The values are output by the network variables *nvoHVACTemp* and *nvoFixPtTemp*.

**!! The temperature sensor is calibrated by the !! parameter SCPTtempOffset during production. !! Thus, the device specific values adjusted !! must be taken over when integrating the !! device into the LON network.**

**Example LonMaker:**

State <input type="radio"/> Default <input type="radio"/> Offline <input checked="" type="radio"/> Online <input type="radio"/> Disable	Source of Configuration Property Values <input type="radio"/> Current values in database <input type="radio"/> Default values <input checked="" type="radio"/> Current values in device
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**Setpoint adjustment:** The setpoint correction can be raised or lowered in a range of *UCPTspOffsetRng* by the regulator. The output of the offset value is made by *nvoSetptOffset*.

The effective set point *nvoSetptEffect* is calculated in reliance of the input variable to the room occupancy (*nviOccManCmd* and *nviOccSensor*) and of the set point defaults via *SCPTsetpoint* respectively *nviSetpoint* and the adjusted set point offset.

Additionally, the position of the regulator is output in percent (0-100%) along with the output variable *nvoSetpoint*.

**LED:** Depending on the device type, up to 3 LEDs can be controlled via the input variables SNVT\_switch, SNVT\_occupancy or SNVT\_state.

**Button:** Depending on the device type up to three buttons can be output via the output variables SNVT\_switch, SNVT\_occupancy or SNVT\_state. The functions of the button can be configured and adjusted by the property *UCPTdiConfig* and *SCPTbypassTime*.

**Adjustment of fan speed stages:** The position of the regulator is output by the variables *nvoFanspeed* and *nvoAllDiValues*. The adaption to an one-/two-/ three stage rotary switch is made by the configuration property *UCPTfanSpdStages*.

## 2 Node Object

The Node Object supervises and controls the functions of the individual objects in the device. The basic functions of the LonMark® are supported.

### 2.1 Input Variable 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 for the LON integration tool.

## 3 Space Comfort Control Command Module

Object for temperature detection, set point adjustment and for detection of the effective room occupancy.

### 3.1 Input Variable Space Comfort Control Command Module

#### nviSetpoint

SNVT Type: SNVT\_temp\_p, Index 105

Function: Input variable for default of the set point temperature. It is not obligatory necessary to bind this network variable with a superior node. If no update is made for *nviSetpoint*, the initialization value 0x7FFF (=327,67°C) is maintained and the value of the configuration property *SCPTsetpoint* is used for the calculation of the effective setpoint. If no update with a valid set point is made for *nviSetpoint*, the effective setpoint can be calculated by the value of the input variable.

#### nviOccManCmd and nviOccSensor

SNVT Type: SNVT\_occupancy, Index 109

Function: Input variable for default of the room occupancy. The current room occupancy affects the calculation of the effective set point *nvoSetptEffect* (see table 1) and is made available to an external temperature controller by *nvoOccupEffect*. Initialization value for both variables: OC\_NUL

nviOccManCmd (default via GLT): OC\_OCCUPIED, OC\_STANDBY, OC\_UNOCCUPIED

nviOccSensor (presence detection in rooms): OC\_OCCUPIED, OC\_UNOCCUPIED

nviOccManCmd	nviOccSensor	>>>	nvoOccupEffect	nvoSetptEffect
OC_NUL	OC_NUL	>>>	OCCUPIED	SCPTsetpoint + nvoSetptOffset or nviSetpoint + nvoSetptOffset
OC_OCCUPIED	****	>>>		
****	OC_OCCUPIED	>>>		
OC_STANDBY	OC_NUL OC_UNOCCUPIED	>>>	STANDBY	SCPTsetpoint + nvoSetptOffset or nviSetpoint + nvoSetptOffset
OC_UNOCCUPIED	OC_NUL OC_UNOCCUPIED	>>>	UNOCCUPIED	SCPTsetpoint or nviSetpoint

Table 1: Occupancy and effective set point

### 3.2 Output Variable Space Comfort Control Command Module

#### nvoHVACTemp

SNVT Type: SNVT\_temp\_p, Index 105

Function: Output variable for the measured temperature value (resolution 1/100 °C). Data output is made depending on the parameter *SCPTmaxSendTime*, *SCPTminSendTime* and *SCPTminDeltaTemp*, 1,5 to 4 s after reset.

#### nvoFixPtTemp

SNVT Type: SNVT\_temp, Index 39

Function: Output variable for the measured temperature value (resolution 1/10 °C). Data output is made analog to *nvoHVACTemp*.

#### nvoSetptEffect

SNVT Type: SNVT\_temp\_p, Index 105

Function: Output variable for the effective setpoint. The effective setpoint is calculated via the defaults of *nviSetpoint* respectively *SCPTsetpoint* and the setpoint offset adjusted at the device (see table 1). Data output is made depending on the parameter *SCPTmaxSendTime*, *SCPTminSendTime*, *SCPTminDeltaTemp* as well as with a change of the room occupancy and 1,5 to 4 s after reset.

## Space Comfort Control Command Module

### nvoSetptOffset

SNVT Type: SNVT\_temp\_p, Index 105

Function: Output variable for set point correction, which can be set by the set point adjuster. The range is lying by default between -3 and +3k and can be adjusted by the *UCPTspOffsetRng*. Data output is made analog to *nvoSetptEffect*.

### nvoSetpoint

SNVT Type: SNVT\_lev\_percent, Index 81

Function: Output variable for the position of the set point regulator (0-100%). Data output is made analog to *nvoSetptEffect*.

### nvoOccupEffect

SNVT Type: SNVT\_occupancy, Index 109

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

## 3.3 Configuration Property Space Comfort Control Command Module

### SCPTmaxSendTime, Sending interval

SCPT Index: 49, SNVT\_time\_sec

Function: *SCPTmaxSendTime* defines the interval time after which all output variables of the object are sent independently of a value change (heartbeat). By input values = 0, the heartbeat function is deactivated. (Standard value: 300,0 s).

### SCPTminSendTime, Minimum sending interval for temperature and set point

SCPT Index: SNVT\_time\_sec

Function: *SCPTminSendTime* defines the smallest sending interval of the output variables for temperature and set point. An update is made after expiration of *SCPTminSendTime*, if the temperature value of the output variables changes by more than *SCPTminDeltaTemp*. By input values = 0, the function is deactivated (Standard value: 5 sec)

### SCPToffsetTemp (nvoHVACTemp), Calibration temperature sensor

SCPT Index: 70, SNVT\_temp\_p

Function: By this parameter a software calibration of the inside temperature sensor is possible. Please note the remarks for flush-mounting room sensors with transmitter.

**!! The sensor is calibrated during production. A change of the value overwrites !! the manufacturer's settings.**

### SCPTminDeltaTemp (nvoHVACTemp), Minimum value for temperature changes

SCPT Index: 64, SNVT\_temp\_p

Function: If the temperature respectively the setpoint is changed by the adjusted value *SCPTminDeltaTemp*, the new temperature values are transmitted. The function is depending on the adjustment of the parameter *SCPTminSendTime*. (range  $\geq 0$  °C; standard value: 0,30 °C)

### SCPTsetpoint (nvoSetptEffect), Basic set point

SCPT Index: 213, SNVT\_temp\_p

Function: Default of the basic set point for calculation of the effective set point (table 1). (Standard value: 22,00 °C)

## LED Actuator Object

**SCPTminDeltaTemp** (nvoSetptOffset), Minimum value for set point changes

SCPT Index: 64, SNVT\_temp\_p

Function: If the setpoint temperature is changed by the adjusted value *SCPTminDeltaTemp* the new setpoints are transmitted. The function is depending of the adjusted parameter *SCPTminSendTime*.  
(Range  $\geq 0$  °C; standard value : 0,10 °C)

**UCPTspOffsetRng** (nvoSetptOffset), Adjustable range set point

UCPT Index: 12, SNVT\_temp\_p

Function: Configuration property for the value range of the adjustable set point correction, i.e. the given set point can be changed by the temperature range +/- *UCPTspOffsetRng* by the user. (standard value: 3,00)

## 4 LED Actuator Object

The object includes the functions for the control of the LEDs by different network variables.

### 4.1 Input Variable LED Actuator Object

**nviLED\_sw[0], [1], [2]**

SNVT Type: SNVT\_switch, Index 95

Function: Input variable of type SNVT\_switch for control of LEDs.

	LED 1 nviLED_sw[0]	LED 2 nviLED_sw[1]	LED 3 nviLED_sw[2]
ON	100.0 1	100.0 1	100.0 1
OFF	0.0 0	0.0 0	0.0 0

**nviLED\_occu [0], [1], [2]**

SNVT Type: SNVT\_occupancy, Index 109

Function: Input variable of type SNVT\_occupancy for control of LEDs.

	LED 1 nviLED_occu[0]	LED 2 nviLED_occu[1]	LED 3 nviLED_occu[2]
ON	OC_OCCUPIED	OC_OCCUPIED	OC_OCCUPIED
OFF	OC_UNOCCUPIED	OC_UNOCCUPIED	OC_UNOCCUPIED

**nviLEDs**

SNVT Type: SNVT\_state, Index 83

Function: Input variable of type SNVT\_state for control of LEDs.

	LED 1 nviLEDs.bit0	LED 2 nviLEDs.bit1	LED 3 nviLEDs.bit2
ON	1	1	1
OFF	0	0	0

## 5 Digital Input Object

The object includes the functions for the interpretation of the three buttons and the rotary switch.

### 5.1 Output Variable Digital Input Object

#### nvoButton\_sw[0], [1], [2]

SNVT Type: SNVT\_switch, Index 95

Function: Output variables of the buttons type SNVT\_switch. The function of the button is configurable by *UCPTdiConfig*.

#### Configuration Status Output:

	Button 1 nvoButton_sw[0]	Button 2 nvoButton_sw[1]	Button 3 nvoButton_sw[2]
pressed	100.0 1	100.0 1	100.0 1
not pressed	0.0 0	0.0 0	0.0 0

#### Configuration Toggle-Button:

With each button actuation the output values are changing between 0.0 0 and 100.01

The output variables are sent after change of button status, after expiration of the sending interval (*SCPTmaxSendTime*) and 1,5 - 4 s after module reset.

#### nvoButton\_occu[0], [1], [2]

SNVT Type: SNVT\_occupancy, Index 109

Function: Output variable of the button of type SNVT\_occupancy. The interpretation logic can be affected by the configuration property *SCPTbypassTime*.

By **SCPTbypassTime = 0** the value OC\_OCCUPIED is sent with each button actuation. A reset to OC\_UNOCCUPIED is not made.

By **SCPTbypassTime = 1** the button status is output:

Button pressed ==> OC\_OCCUPIED, button not pressed ==> OC\_UNOCCUPIED

By **SCPTbypassTime = 2** the toggle function is activated. Each button actuation leads to a change between the output values OC\_OCCUPIED and OC\_UNOCCUPIED.

By **SCPTbypassTime >= 3** The overtime function is activated. By button actuation the output variable receives the value OC\_OCCUPIED. After expiration of the delay time *SCPTbypassTime* it is set back to the value OC\_UNOCCUPIED. Each button actuation restarts the timer.

Button 1	Button 2	Button 3
nvoButton_occu [0]	nvoButton_occu [1]	nvoButton_occu [2]

## Digital Input Object

**nvoFanSpeed**

SNVT Type: SNVT\_switch, Index 95

Function: The output variable *nvoFanSpeed* is used for the interpretation of the rotary switch for the fan speed adjustment, whereas the number of fan speed stages is adapted by *UCPTfanSpdStages*.

UCPTfanSpdStages = 1			UCPTfanSpdStages = 2			UCPTfanSpdStages = 3		
Fan-Stage	nvoFanSpeed .value	nvoFanSpeed .state	Fan-Stage	nvoFanSpeed .value	nvoFanSpeed .state	Fan-Stage	nvoFanSpeed .value	nvoFanSpeed .state
AUTO	0 %	-1	AUTO	0 %	-1	AUTO	0 %	-1
0	0 %	1	0	0 %	1	0	0 %	1
I	100 %	1	I	50 %	1	I	33,0 %	1
			II	100 %	1	II	66,5 %	1
						III	100,0 %	1

**nvoAllDiValues**

SNVT Type: SNVT\_state, Index 83

Function: Output variable of type SNVT\_state for all digital values. The position of the rotary switch and the status of the buttons (pressed / not pressed) is output. Data output is made analog to *nvoButton\_sw*.

Button 1	nvoAllDiValues.bit0
Button 2	nvoAllDiValues.bit1
Button 3	nvoAllDiValues.bit2
Switch AUTO	nvoAllDiValues.bit3
Switch „0“	nvoAllDiValues.bit4
Switch „I“	nvoAllDiValues.bit5
Switch „II“	nvoAllDiValues.bit6
Switch „III“	nvoAllDiValues.bit7



## 5.2 Configuration Property Digital Input Object

### SCPTmaxSendTime, Sending interval

SCPT Index: 49, SNVT\_time\_sec

Function: *SCPTmaxSendTime* defines the interval time, after which all output variables of the object are sent independently of a value change (heartbeat). By input values = 0, the heartbeat function is deactivated. (Standard value: 0,0 s)

### UCPTfanSpdStages (nvoFanSpeed), Number of fan speed stages of rotary switch

UCPT Index: 13, SNVT\_count

Function: Configuration property for default of the fan speed stages  
(Standard value: 3 ==> OFF, 33,0 %, 66,5 %, 100,0 %, AUTO)

### SCPTbypassTime, Tracking time and configuration of nvoButton\_occu[..]

SCPT Index: 34, SNVT\_time\_min

Function: Configuration property for output variables *nvoButton\_occu[..]* of the buttons.

By **SCPTbypassTime = 0** the value OC\_OCCUPIED is sent with each button actuation. A reset to OC\_UNOCCUPIED is not made.

By **SCPTbypassTime = 1** the button status is output:  
button pressed ==> OC\_OCCUPIED, button not pressed ==> OC\_UNOCCUPIED

By **SCPTbypassTime = 2** the toggle function is activated. Each button actuation leads to a toggling between the output values OC\_OCCUPIED and OC\_UNOCCUPIED.

By **SCPTbypassTime >= 3** the overtime function is activated. By button actuation the output variable receives the value OC\_OCCUPIED. After expiration of the delay time *SCPTbypassTime* it is reset to the value OC\_UNOCCUPIED. Each button actuation restarts the timer. (Standard value: 90min)

### UCPTdiConfig, Configuration of Button for nvoButton\_sw[...]

UCPT Index: 44, UNVT\_str\_hex4

Function: By UCPTdiConfig the function of the output variable for each button can be adjusted.

	Button 1 UCPTdiConfig.Byte[0]	Button 2 UCPTdiConfig.Byte[1]	Button 3 UCPTdiConfig.Byte[2]
Button Status	1	1	1
Button Toggle	0	0	0