

EN – Software Application

Subject to technical alteration

Version 27.10.05

16300...

WRF06TD

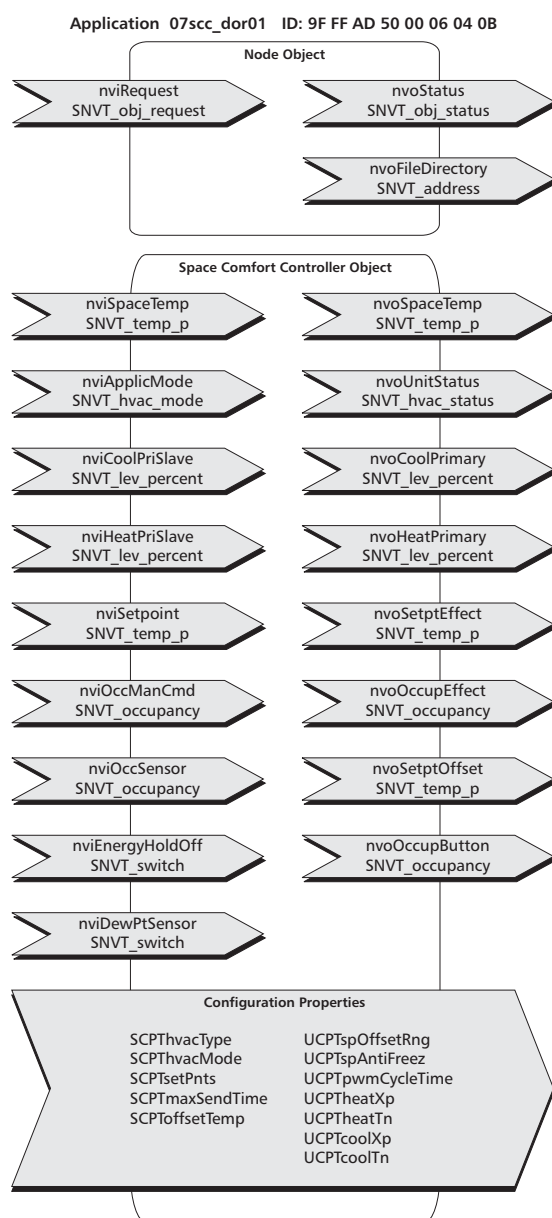
DOR LON, since October 2005

16500...

WRF07PTD

DOR LON, since October 2005

1 Overview



The application for the room operating panels WRF06...DOR and WRF07...DOR takes over the functions temperature control with PI-controller for heating/cooling, temperature detection, set point adjustment, LED for comfort operation and presence key with overtime function.

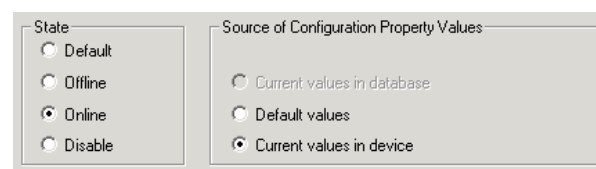
The prescriptions of the LonMark® function profile 8500 „Space Comfort Controller“ are considered. For extended adjustment possibilities user-defined configuration properties (UCPT) are used. The UCPTs used here, are defined in the **Thermokon Device Resource Files** from version 1.3 or higher.

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

!! The temperature sensor is calibrated by the !! configuration property SCPTtempOffset !! during production.

!! Thus, the device-specific values already !! adjusted must be taken over when !! integrating the device in the LON network.

Example LonMaker:



Set point default: By means of the regulator, the set point temperature in the range of UCPTspOffsetRng can be increased or reduced. Output of the offset value is made by nvoSetptOffset.

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

As a response for the user, the LED is switched-on in the operating mode "room occupied".

Temperature control: The basic set point of the control algorithm is determined by SCPTsetPnts respectively nviSetpoint as described above. The neutral (energy-free) zone around the basic set point is automatically adapted to the current room occupancy and can also be parameterized by SCPTsetPnts. The control variables of the PI-controller for heating and cooling are output by the variables of type SNVT_lev_percent.

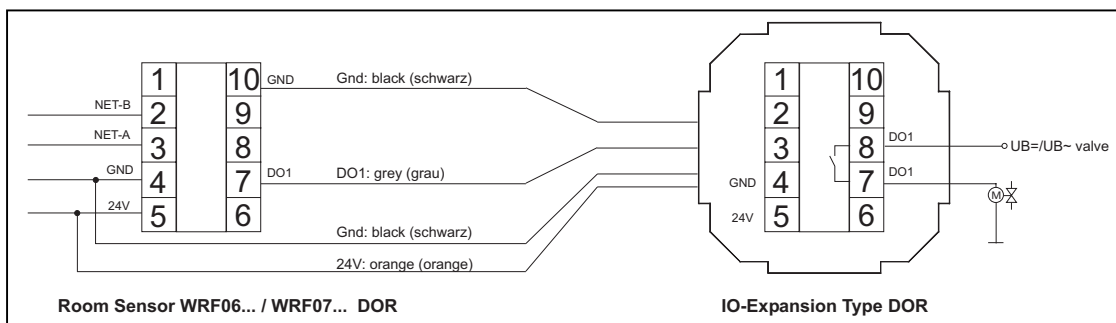
For a direct control of an actuator in a 2-pipe-system the device has an I/O-extension with relais output.

The control parameter proportional range and reset time can be individually adapted to room layouts. The monitoring of window contacts or dew point detectors is made by the input variables nviEnergyHoldOff and nviDewPtSensor.

Overtime function with presence key:

By actuating the presence key the output variable nvoOccupButton receives the value OCCUPIED. After expiration of the delay time of 90 min. which is fixed, the same is reset to the value UNOCCUPIED. For the realization of the overtime function, nvoOccupButton must be bound to the input variable nviOccSensor.

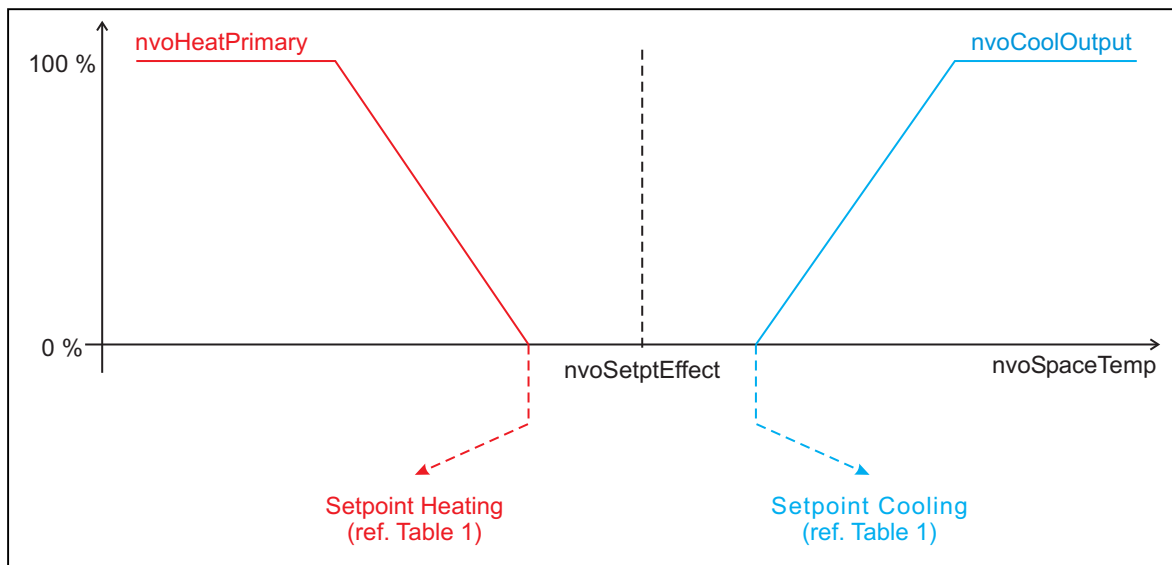
Terminal Connection



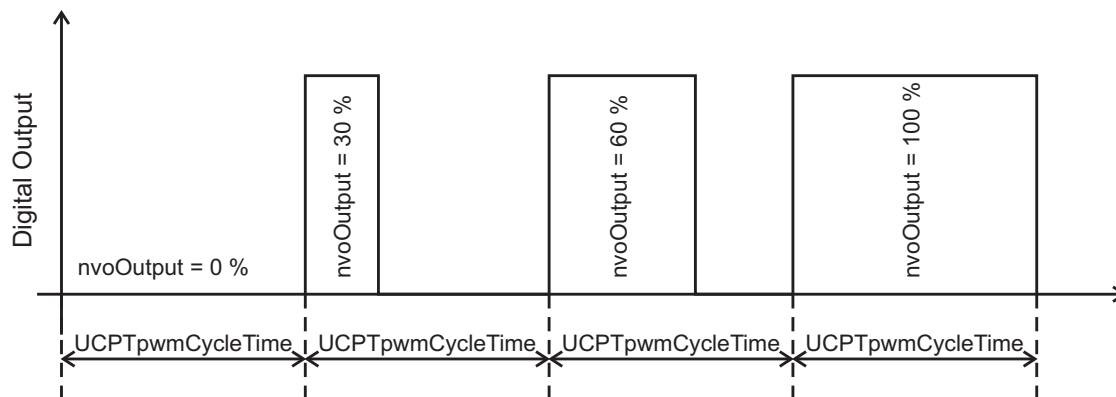
2 Space Comfort Controller Object

The object includes temperature measurement, set point adjustment and PI-controller for heating and cooling. The scanning time for temperature detection and control variable calculation amounts to 30 sec.

Function Diagram PI-Controller Heating/Cooling:



Pulse Width Modulated Control Of Relais Outputs:



2.1 Input Variable Space Comfort Controller Object

nviSpaceTemp

SNVT Type: SNVT_temp_p, Index 105

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

nviApplicMode

SNVT Type: SNVT_hvac_mode, Index 108

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

HVAC_AUTO ==> automatic switching over between heating and cooling
 HVAC_HEAT ==> only heating
 HVAC_COOL ==> only cooling
 HVAC_OFF ==> controller switched-off

The initialization status after reset is determined by the configuration parameter *SCPT hvacMode*.

nviHeatPriSlave

SNVT Type: SNVT_lev_percent, Index 81

Function: Variable for external override of the control variable *nvoHeatPrimary*.

nviHeatPriSlave = 0x7FFF (163,835 %):

==> internal controller heating ON (initialization value after reset)

nviHeatPriSlave = 0 ... 100 %:

==> internal controller heating OFF and *nviExtHeatOut* determines the output variable (0 - 100%)

!! The external override has top priority, thus a parallel control of the heating and cooling valve is also possible.

nviCoolPriSlave

SNVT Type: SNVT_lev_percent, Index 81

Function: Variable for external override of the control variable *nvoCoolPrimary*.

nviCoolPriSlave = 0x7FFF (163,835 %):

==> internal controller cooling ON (initialization value after reset)

nviCoolPriSlave = 0 ... 100 %:

==> internal controller cooling OFF and *nviExtCoolOut* determine the output variable

!! The external override has top priority, thus a parallel control of heating and cooling valve is also possible.

nviSetpoint

SNVT Type: SNVT_temp_p, Index 105

Function: Input variable for external default of a basic set point temperature.

It is not mandatory necessary to bind this network variable to a higher-graded node. If no update is made for *nviSetpoint*, the initialization 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 setpoint + offset). If *nviSetpoint* receives an update with a valid set point, the effective set point is calculated by the value of the input variable.

nviOccManCmd und nviOccSensor

SNVT Type: SNVT_occupancy, Index 109

Function: Input variable for default of the room occupancy. The current room occupancy determines the variables of the control parameter “effective set point” and “zero energy band” and thus the set points for heating and cooling (see table 1).

Initialization value for both variables: OC_NUL

nviOccManCmd for global default of the occupancy status via the building control technique by:

OC_OCCUPIED, OC_STANDBY and OC_UNOCCUPIED

nviOccSensor for presence detection in the room by OC_OCCUPIED and OC_UNOCCUPIED.

nviOccManCmd	nviOccSensor	>>>	room_occupancy nvoOccupEffect	nvoSetptEffect	setpoint heating	Setpoint cooling
OC_NUL	OC_NUL	>>>	OCCUPIED	$\begin{aligned} &(\text{SCPTsetPnts.occupied_heat} \\ &+ \\ &\text{SCPTsetPnts.occupied_cool})/2 \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.occupied_heat} \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.occupied_cool} \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$
OC_OCCUPIED	****	>>>		$\begin{aligned} &\text{nvoSetptOffset} \\ &\text{or} \\ &\text{nviSetpoint} + \text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{nvoSetptOffset} + \text{nviSetpoint} \\ &- \\ &(\text{SCPTsetPnts.occupied_cool} \\ &- \\ &\text{SCPTsetPnts.occupied_heat})/2 \end{aligned}$	$\begin{aligned} &\text{nvoSetptOffset} + \text{nviSetpoint} \\ &+ \\ &(\text{SCPTsetPnts.occupied_cool} \\ &- \\ &\text{SCPTsetPnts.occupied_heat})/2 \end{aligned}$
****	OC_OCCUPIED	>>>				
OC_STANDBY	OC_NUL OC_UNOCCUPIED	>>>	STANDBY	$\begin{aligned} &(\text{SCPTsetPnts.standby_heat} \\ &+ \\ &\text{SCPTsetPnts.standby_cool})/2 \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.standby_heat} \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.standby_cool} \\ &+ \\ &\text{nvoSetptOffset} \end{aligned}$
				$\begin{aligned} &\text{nvoSetptOffset} + \text{nviSetpoint} \\ &\text{or} \\ &\text{nviSetpoint} + \text{nvoSetptOffset} \end{aligned}$	$\begin{aligned} &\text{nvoSetptOffset} + \text{nviSetpoint} \\ &- \\ &(\text{SCPTsetPnts.standby_cool} \\ &- \\ &\text{SCPTsetPnts.standby_heat})/2 \end{aligned}$	$\begin{aligned} &\text{nvoSetptOffset} + \text{nviSetpoint} \\ &+ \\ &(\text{SCPTsetPnts.standby_cool} \\ &- \\ &\text{SCPTsetPnts.standby_heat})/2 \end{aligned}$
OC_UNOCCUPIED	OC_NUL OC_UNOCCUPIED	>>>	UNOCCUPIED	$\begin{aligned} &(\text{SCPTsetPnts.unoccupied_heat} \\ &+ \\ &\text{SCPTsetPnts.unoccupied_cool})/2 \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.unoccupied_heat} \end{aligned}$	$\begin{aligned} &\text{SCPTsetPnts.unoccupied_cool} \end{aligned}$

Table 1: Control parameter depending on room occupancy

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 1 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, temperature control is restarted.

nviDewPtSensor

SNVT Type: SNVT_switch, Index 95

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

2.2 Output Variable Space Comfort Controller Object

nvoSpaceTemp

SNVT Type: SNVT_temp_p, Index 105

Function: Output variable for measured temperature value (resolution 1/100 °C).
Data output is made depending on SCPTmaxSendTime, with value changes $\geq 0,3$ K and 4 s after reset.

nvoUnitStatus

SNVT Type: SNVT_hvac_status, Index 112

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

.mode = HVAC_AUTO ==> automatic switching over between heating and cooling

HVAC_HEAT ==> only heating

HVAC_COOL ==> only 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. Data output is made depending on SCPTmaxSendTime, with value changes ≥ 5 % and 4 s after module 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 analog to nvoHeatPrimary.

nvoSetptEffect

SNVT Type: SNVT_temp_p, Index 105

Function: Output variable for effective set point. The effective set point is calculated depending on nviSetpoint, nviOccManCmd, nviOccSensor, SCPTsetPnts and nvoSetptOffset (see table 1). Data output is made depending on SCPTmaxSendTime, with value changes and 4s after module reset.

nvoSetptOffset

SNVT Type: SNVT_temp_p, Index 105

Function: Output variable for set point correction, which can be adjusted by the regulator of the WRF07. Data output is made analog to nvoSetptEffect. The adjusting range (e.g. ± 3 K) is set by the parameter UCPTspOffsetRng. When using a WRF06 (room sensor without set point adjuster), the adjusting range must be fixed to 0,0K by UCPTspOffsetRng.

nvoOccupEffect

SNVT Type: SNVT_occupancy, Index 109

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

nvoOccupButton

SNVT Type: SNVT_occupancy, Index 109

Function: Output variable for presence detection in the room. nvoOccupButton = OC_Occupied is output after actuation of the presence button. The variable is reset to OC_Unoccupied after expiration of the delay time of 90 minutes. Each button actuation restarts the time. **For realization of the overtime function nvoOccupButton must be bound to the input variable nviOccSensor.**
 Data output is made depending on SCPTmaxSendTime, with value changes and 4 s after module reset.

2.3 Configuration Properties Space Comfort Controller Object**SCPTHvacType**

Index: 169, SNVT_hvac_type

Function: Configuration property for identification marking of the controller type.
 Adjusted value: nciHvacType = HVT_GENERIC

SCPTHvacMode

Index: 74, SNVT_hvac_mode

Function: The configuration property determines the initialization status of the input variable *nviApplicMode* and thus also the start configuration of the temperature controller. Preset value: HVAC_HEAT

SCPTmaxSendTime

Index: 49, SNVT_time_sec

Function: The configuration property defines the sending interval of the output variables. By means of the value 0 s data output is deactivated. (Preset value: 30s). Newly adjusted values only become valid after expiration of the last adjusted sending interval.

SCPTtempOffset

Index: 272, SNVT_temp_diff_p

Function: Offset for the temperature value. By means of this property a software calibration of the temperature sensor is possible.
!! During production the sensor is calibrated at this value. A change of the value !! overwrites the adjustment of the manufacturer. The production setting is !! marked on the device label.

UCPTpwmCycleTime

Index: 35, SNVT_time_min

Function: The configuration property determines the cycle time for a pulse width modulated control of the actuator with the relais output. (Preset: 15 min)

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 with *nvoOccupEffect* = OCCUPIED respectively STANDBY can be overwritten.
 By *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: Heating set point for antifreeze function with opened window contact, i.e. with active energy-saving function. (Preset value: 10°C)

UCPTspOffsetRng

Index: 12, SNVT_temp_p

Function: Configuration property for value range of adjustable set point correction, i.e. the preset set point can be changed by the user by means of the value UCPTspOffsetRng.

(Value range: 0 - 10, Preset value: 3)

!! When using a WRF06 (room sensor without set point adjuster) the adjusting range must be fixed to 0,0 K by means of UCPTspOffsetRng.

UCPTheatXp

Index: 19, SNVT_temp_p

Function: Property for adjustment of the proportional range. By UCPTheatXp = 0 the controller for heating is deactivated. (Preset value: 44 K, value range: 0-10 K)

UCPTheatTn

Index: 20, SNVT_time_min

Function: Property for adjustment of reset time of I-proportion. (Scanning time Ta = 30 s). By input values = 0 the I-proportion is deactivated. (Preset value: 100 min)

UCPTcoolXp

Index: 22, SNVT_temp_p

Function: Property for adjustment of the proportional range. By UCPTcoolXp = 0 the controller for cooling is deactivated. (Preset value: 4 K, value range: 0-10 K)

UCPTcoolTn

Index: 23, SNVT_time_min

Function: Property for adjustment of reset time of the I-proportion (scanning time Ta = 30 s). By input values = 0 the I-proportion is deactivated. (Preset value: 100 min)