Enhanced control function of the LON application suitable for all LON VAV-Compact D3 and ..ALON actuators

- **Temperature controller for the comfort zone**
- **CO2-controlled ventilation**

Note

This document is restricted to the control function of the LON application. The description of the functional profiles "Damper Actuator" and "Open Loop Sensor" can be found in the technical documentation of the LON actuators.

Product features

Application

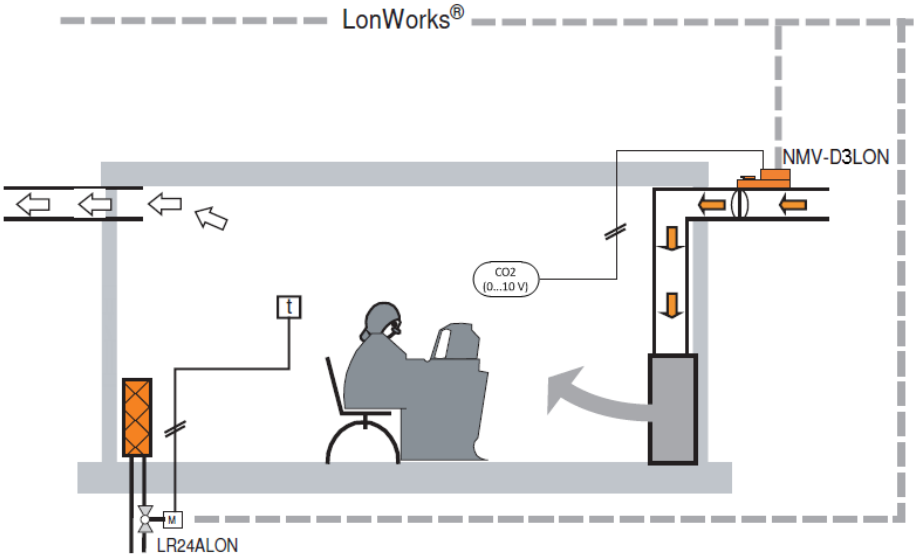
Temperature control for the comfort zone
The temperature controller is realized using the Thermostat object #8060 according to the LonMark functional profile. It supports the operating modes Comfort, Pre-Comfort and Building Protection. The controller provides heating and cooling sequences as well as a combined heating-cooling sequence, which can be used to control the 6-way characterised control valves (thermal ceiling).

CO_2-controlled ventilation
The Thermostat object #8060 provides an additional input for a CO2 signal in ppm (nviSpaceCO2). The resulting air demand 0…100% is calculated based on the CO2 pollution and the control limits nciSpaceCO2Low and nciSpaceCO2High. The air demand is provided on the cooling sequence (nvoCoolOutput).

Combination of the control loops
In the case that both control loops are active, that is that the temperature value as well as the CO2 value are bound, the value of the output variable nvoCoolOutput is the maximum of the cooling sequence (temperature controller) and the air demand (CO2 controller).

Typical Application

The typical application consists of a supply air VAV unit with optional radiator heating. The CO2 sensor provides a 0…10V signal, which is converted to a ppm value by the Sensor object of the NMV-D3LON. The value is transmitted to the internal CO2 controller. Optionally, the space temperature can be read in via the valve actuator LR24ALON and can be processed by the temperature controller of the NMV-D3LON.



Functional Profile as per LONMARK®

Thermostat Object #8060

nviSetPoint SNVT_temp_p
Setpoint specification for the controller from the higher-level system or the room control unit. If this variable is not linked, then the local setpoints of the controller object apply (can be adjusted via plug-in). The setpoint specification from the higher-level system influences the setting on the controller as follows:

Example: Comfort setpoint for heating = 21°C and Comfort setpoint for cooling = 23°C. The median point between heating and cooling is thus 22°C. Now, if the external setpoint (nviSetPoint) is 23°C, then the heating setpoint will shift to 22°C and the cooling set point to 24°C. The setpoints for Pre-Comfort heating and cooling will also be shifted accordingly.

nviSpaceTemp SNVT_temp_p
Room temperature from external room sensor. It is imperative that this variable is linked in order to activate the temperature controller.

nviOccCmd SNVT_occupancy
Occupancy specification from the command centre (for the function, see the table entitled "Functions Inputs Occupancy" page 3).

nviEnergyHoldOff SNVT_switch
In the case of active EnergyHoldOff, the themperature controller will be set to the Building Protection setpoints and the CO2 controller will be deactivated.

nviSetPtOffset SNVT_temp_p
Shifting of the room control unit. If the nviSetPoint is linked, then this input has an influence on the variable value of nviSetPoint, i.e. it corrects it. Otherwise, the Comfort and Pre-Comfort setpoints for heating and cooling will be adjusted directly by the amount of the shift (compare example with nviSetPoint).

nviDewpointAlarm SNVT_switch
In the case of active DewpointAlarm, the temperature controller will be set to the building protection setpoints. The cooling sequence is deactivated and consequently the CO2 controller deactivated as well.

nviSenOccCmd SNVT_occupancy
Occupancy specification from the local occupancy switch (for the function, see the table entitled «Functions Inputs Occupancy» page 3).

nviSpaceCO2 SNVT_ppm
CO2 pollution in ppm from external CO2 sensor. It is imperative that this variable is linked in order to activate the CO2 controller.

nvoHeatOutput SNVT_lev_percent
Control signal for heating; defined by temperature controller only

nvoCoolOutput SNVT_lev_percent
Control signal for cooling; value corresponds to maximum of cooling sequence (temperature controller) and air demand (CO2 controller)

nvoSpaceTemp SNVT_temp_p
Displays the room temperature of the nviSpaceTemp. If nviSpaceTemp is not linked, then the variable will display the value 0x7FFF.

nvoUnitStatus SNVT_HVAC_Status
Displays the operating mode of the controller (in accordance with Functional Profile #8060).

nvoHeatCoolOut SNVT_lev_percent
Depicts the heating and cooling sequence for controlling the 6-way characterised control valves (see illustration, page 4). The value is calculated by the temperature controller only.
This outlet runs parallel to the nvoCoolOutput or the nvoHeatOutput, respectively.
Cooling = 33 … 0%
Valve closed =33 … 66%
Heating = 66 … 100%

nvoEffectSetpt SNVT_temp_p
Shows the actual setpoint of the controller.

Functional Profile as per LONMARK® *Continued*

Configuration Properties

nciMaxRcvTime SCPT_maxRcvTime
This value defines the maximum time in seconds for the update of the input variables before the variables are reset to the default value.
(Default: 0 s --> no monitoring)

nciMaxSndTime SCPT_maxSndTime
This value defines the maximum time in seconds before the output variables are updated.
(Default: 0 s --> Update upon change of value only)

nciBypassTime SCPT_bypassTime
Switching back and forth between the Comfort and Pre-Comfort modes is accomplished by means of the local occupancy input (nviSenOccCmd). The Bypass Time (switch-back delay) parameter makes it possible to have a time delay when switching back from Comfort to Pre-Comfort. (Range: 1..120 min, Default: 60 min)

Benefit: The Comfort mode stays active during short absence (e. g. breaks)

nciSetPnts SCPT_setPnts
Setpoints for heating (default: 23, 26, 35 °C) and cooling (default: 21, 18, 14 °C) used for the occupancy states Comfort, Pre-Comfort and Building Protection.

nciPiConfig UCPT_piConfig
The parameters of the temperature controller are:
- P-Band for heating (default: 4 K) and cooling (default: 2 K)
- Integral time for heating (default: 600 s) and cooling (default: 600 s)
- Controller mode: P or PI (default: PI)

nciSensitivity UCPT_sensitivity
The parameter adjusts the sensitivity of the variable nviSpaceTemp (Default: STS_Low):
- Low: prevent or reduce short-term interferences which affect the sensor.
- High: Deactivate filter function, for system testing, etc.

nciSpaceCO2Low UCPT_spaceCO2Low
Lower control limit for CO2 controller (default: 400 ppm)

nciSpaceCO2High UCPT_spaceCO2High
Higher control limit for CO2 controller (default: 800 ppm)

Functions Inlets Occupancy

Note

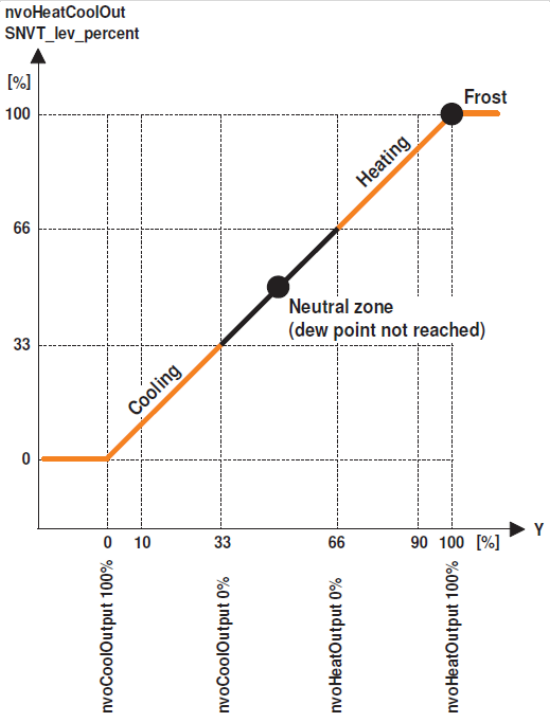
The function nviOccCmd has higher priority than the function nviSenOccCmd.

Occupancy specification from command centre nviOccCmd	Occupancy switch nviSenOccCmd	Room operating status	Comfort extension
OC_OCCUPIED	OC_OCCUPIED	Comfort	
	OC_UNOCCUPIED	Comfort	
	OC_NUL (default)	Comfort	
OC_STANDBY	OC_OCCUPIED	Bypass	Occupied time is delayed by the amount of the bypass time (comfort time)
	OC_UNOCCUPIED	Pre-Comfort	
	OC_NUL (default)	Pre-Comfort	
OC_UNOCCUPIED	OC_OCCUPIED	Building Protection	
	OC_UNOCCUPIED	Building Protection	
	OC_NUL (default)	Building Protection	
OC_NUL (default)	OC_OCCUPIED	Comfort	
	OC_UNOCCUPIED	Pre-Comfort	
	OC_NUL (default)	Comfort	

The occupancy states influence the temperature controller only. The CO2 controller is independent from the occupancy states.

Functional Profile as per LONMARK® *Continued*

Function nvoHeatCoolOut



Typical application

Heating / cooling with Belimo 6-way characterised control valve.

Note chilled ceiling application

The nvoHeatCoolOutput is set into the neutral zone (50%) in the event that the temperature does not reach the dew point. The cooling sequence is deactivated.

Installation and parameterisation

Upgrade of LON application

The LON application has the version information V4.0 and consists of XIF-, APB-, NXE- and XFB-file. The identification is: Name: Mod_4_0.xif, Program-ID: 90:00:61:51:0A:86:04:C1

All LON actuators are shipped with version 3.0. The application upgrade to V4.0 has to be done manually. Consult the manuals of the used tools for further information on the application upgrade.

Installation of interface definition

The interface definition consists of the XIF-file and the resource files. The files are installed by the Belimo Plug-Ins setup routine (Belimo Plug-Ins V1.0.0.4 or higher).

Parameterisation

The parameterisation of Damper Actuator, Sensor Object and Controller Object is done using the Belimo Plug-Ins. The CO2 control limits (nciSpaceCO2Low, nciSpaceCO2High) can be set using the Controller Plug-In.

The instructions below must be followed in order to use the Belimo Plug-Ins with the LON application V4.0:

1. Install the Belimo Plug-Ins
2. Create LNS project
3. Create a device template for LON actuator V4.0 (Mod_4_0.xif)
4. Reregister the Belimo Plug-ins manually