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# LONMARK<sup>®</sup>

## Functional Profile:

# Space Comfort Control Command Module

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## Overview

This document describes the profile for the Space Comfort Control Command Module object. This will also be referred to as the Command Module in the profile. A Command Module is a type of HVAC control device that provides the means for the occupant to view certain information that relates to his/her comfort and the means to provide certain input to alter the present operating conditions. A Command Module Device is a device that is connected to the communication bus and may or may not have sensors directly connected to it. Traditionally, the purpose of a Command Module Device is to provide the occupant input to modify the operating conditions of an HVAC equipment that provides the conditioned air to the zone. The Command Module Device can also control multiple identical HVAC equipment.

## Example Usage

The Command Module Device resides on a LONWORKS network interacting with one or more of the following LONMARK nodes:

- space temperature sensor (can also be hard wired to the device itself)
- space relative humidity sensor
- space CO2 sensor (can also be hard wired to the device itself)
- occupancy sensor (can also be hard wired to the device itself)
- controller (occupancy mode, heat/cool changeover, supply energy control, etc.)
- installation/service tool
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## Space Comfort Control Command Module Functional Profile Details

The following tables summarize the Network Variable Inputs, Network Variable Outputs and Configuration Properties for the Space Comfort Control Command Module Object. This object is intended for use in a one-to-one relationship with a controller type object (e.g. VAV, FCU type profiles).

**Table 1-1: Network Variable Inputs**

NV # (M/O)**	Name	Rcev HrtBt	SNVT Type (SNVT Index)	SNVT Index	Class	Description
1 (O)	nviSpaceTemp	Yes	SNVT_temp_p	105	RAM	Space Temperature Input (overrides local sensor)
2 (O)	nviUserLockout	No	SNVT_switch	95	RAM	Used to lock out the Command module user control of any setpoints, application (heat/cool) mode or fan speed commands. State =1 and Value != 0 means that the Command Module is Locked Out.
3 (O)	nviTime	Yes	SNVT_time_stamp	84	RAM	Year,month,day,hour,minute,second.
4 (O)	nviEffectSetpt	Yes	SNVT_temp_p	105	RAM	Effective Setpoint. Input from a controller object and used for display.
5 (O)	nviEffectOccup	No	SNVT_occupancy	109	RAM	Effective Occupancy. Input from a controller object and used for display.
6 (O)	nviUnitStatus	Yes	SNVT_hvac_status	112	RAM	Unit operating status. Input from a controller object and used for display.
7 (O)	nviOutdoorTemp	Yes	SNVT_temp_p	105	RAM	Outside air temperature - used for display only.
8 (O)	nviOutdoorRH	Yes	SNVT_lev_percent	81	RAM	Outside air relative humidity - used for display only.
9 (O)	nviSpaceRH	Yes	SNVT_lev_percent	81	RAM	Space relative humidity (overrides local sensor)
10 (O)	nviSpaceCO2	Yes	SNVT_ppm	29	RAM	Space CO2 (overrides local sensor)
11 (O)	nviEnergyHoldOff	Yes	SNVT_switch	95	RAM	Energy Hold Off Input

\*\* M = mandatory, O = optional

**Table 1-2: Network Variable Outputs**

NV # (M/O)**	Name	Send HrtBt	SNVT Type (SNVT Index)	SNVT Index	Class	Description
12 (M)	nvoSetpoint	No	SNVT_temp_p	105	RAM	Temperature Setpoint output (absolute) (L)
13 (M)	nvoSpaceTemp	Yes	SNVT_temp_p	105	RAM	Measured Space Temperature Output
14 (O)	nvoHeatCool	Yes	SNVT_hvac_mode	108	RAM	User Commanded Heat/Cool Application mode Output. (L)
15 (O)	nvoFanSpeed	No	SNVT_switch	95	RAM	User Commanded Fan Speed Output (L)
16 (O)	nvoOccSensor	Yes	SNVT_occupancy	109	RAM	Measured Occupancy Sensor Output
17 (O)	nvoSpaceRH	Yes	SNVT_lev_percent	81	RAM	Measured Space Humidity Output
18 (O)	nvoSpaceCO2	Yes	SNVT_ppm	29	RAM	Measured Space CO2 Sensor Output
19 (O)	nvoOccManCmd	No	SNVT_occupancy	109	RAM	User Commanded Occupancy Output
20 (O)	nvoSetptOffset	Yes	SNVT_temp_p	105	RAM	User Commanded Setpoint Offset Output (L)
21 (O)	nvoSetpoints	No	SNVT_temp_setpt	106	RAM	User Commanded Temperature setpoint Output (L)
22 (O)	nvoSpaceCO2Lim	No	SNVT_ppm	29	NVM	User Commanded Space CO2 setpoint (L)
23 (O)	nvoSpaceRHSetpt	No	SNVT_lev_percent	81	NVM	User Commanded Space RH setpoint (L)

\*\* M = mandatory, O = optional L= Locked out by a supervisory input through nviUserLockout

**Table 1-3: Configuration Properties**

<b>Config. Property # (M/O)**</b>	<b>Name</b>	<b>SCPT Index</b>	<b>SNVT Type (SNVT Index)</b>	<b>Class</b>	<b>Description</b>
1 (M)	nciSndHrtBt	49	SNVT_time_sec	NVM	Send Heartbeat
2 (M)	nciTmpOffset	70	SNVT_temp_p	NVM	Sensor field calibration. Same as Temperature sensor profile.
3 (M)	nciTmpMinDelta	64	SNVT_temp_p	NVM	Temperature Send on delta value. Same as Temperature sensor profile.
4 (O)	nciMinOutTm	52	SNVT_time_sec	NVM	Minimum Send Time. Same as Temperature sensor profile.
5(O)	nciSetpoints	60	SNVT_temp_setpt	NVM	Occupancy Setpoints of the related Controller
6 (O)	nciRcvHrtBt	48	SNVT_time_sec	NVM	Receive Heartbeat
7 (O)	nciLocation	17	SNVT_str_asc	NVM	Location Label
8(O)	nciCO2Offset	68	SNVT_ppm	NVM	CO2 Sensor field calibration
9 (O)	nciCO2MinDelta	63	SNVT_ppm	NVM	CO2 Send on delta value
10 (O)	nciRHOffset	69	SNVT_lev_percent	NVM	RH Sensor field calibration
11 (O)	nciRHMinDelta	62	SNVT_lev_percent	NVM	RH Send on delta value

\*\* M = mandatory, O = optional

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## Mandatory Network Variables

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### Temperature Setpoint Output

network output SNVT\_temp\_p nvoSetpoint;

This output network variable is used to allow the occupant to change the temperature setpoint for the occupied and standby mode from the Command Module Device (Note: The unoccupied setpoints are not changed.). The individual heat/cool setpoints for occupied and standby mode are then derived from nviSetpoint.

There are two methods that can be used by the controller to derive the actual setpoints from nviSetpoint and nciSetpoints. Method 1 is referred to as the “symmetrical method”, since the effective heat/cool setpoints are always symmetrical relative to nviSetpoint, regardless of the values defined in nciSetpoints. Method 2 is referred to as the “asymmetrical method”, since the effective heat/cool setpoints are not always symmetrical relative to nviSetpoint, based on the values defined in nciSetpoints. Either method can be used in the controller, as defined by the manufacturer.

#### Method #1: (also known as the symmetrical method)

The effective heat/cool setpoints for the occupied and standby modes are derived from nviSetpoint plus/minus half the occupied and standby deadbands calculated from nciSetpoints:

$$\text{deadband\_occupied} = \text{occupied\_cool} - \text{occupied\_heat}$$
$$\text{deadband\_standby} = \text{standby\_cool} - \text{standby\_heat}$$
$$\text{effective\_occupied\_cool} = \text{nviSetpoint} + 0.5 (\text{deadband\_occupied})$$
$$\text{effective\_occupied\_heat} = \text{nviSetpoint} - 0.5 (\text{deadband\_occupied})$$
$$\text{effective\_standby\_cool} = \text{nviSetpoint} + 0.5 (\text{deadband\_standby})$$
$$\text{effective\_standby\_heat} = \text{nviSetpoint} - 0.5 (\text{deadband\_standby})$$

#### Method #2: (also known as the asymmetrical method)

The effective heat/cool setpoints for the occupied and standby modes are derived from nciSetpoints plus the absolute setpoint offset, calculated as the difference between nviSetpoint and the mean of the occupied\_heat and occupied\_cool setpoints defined in nciSetpoints:

$$\text{abs\_setpoint\_offset} = \text{nviSetpoint} - (\text{occupied\_cool} + \text{occupied\_heat})/2$$
$$\text{effective\_occupied\_cool} = \text{occupied\_cool} + \text{abs\_setpoint\_offset}$$
$$\text{effective\_occupied\_heat} = \text{occupied\_heat} + \text{abs\_setpoint\_offset}$$
$$\text{effective\_standby\_cool} = \text{standby\_cool} + \text{abs\_setpoint\_offset}$$
$$\text{effective\_standby\_heat} = \text{standby\_heat} + \text{abs\_setpoint\_offset}$$

### *Valid Range*

The valid range is 10°C to 35°C.

### *When Transmitted*

The variable is transmitted immediately when its value has changed significantly.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## **Space Temperature Output**

network output SNVT\_temp\_p nvoSpaceTemp;

This output network variable is used to transmit the space temperature that is hard wired to the Command Module Device. If the input nviSpaceTemp has a valid value, this output will echo the value of the input. If a valid value for nviSpaceTemp does not exist, the locally wired sensor value is used. If neither value is available, the output will send the invalid value.

### *Valid Range*

The valid range is -10°C to 50°C. The value 0x7FFF=+327.67°C will be used as an invalid value in case of a sensor failure.

### *When Transmitted*

The variable is transmitted immediately when its value has changed significantly (nciTmpMinDelta). Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

### *Update Rate*

This value will be updated no faster than the Minimum Send Time (nciMinOutTm) configuration value, if used (manufacturer-defined).

### *Default Service Type*

The default service type is unacknowledged.

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## *Optional Network Variables*

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### **Space Temperature Input**

network input SNVT\_temp\_p nviSpaceTemp;

This input network variable is used to display the value of an external space temperature sensor. The unit can also have a locally wired space temperature sensor. In any case, the nviSpaceTemp has priority if a valid value is present.

### *Valid Range*

The valid range is -10°C to 50°C. The value 0x7FFF(=+327.67°C) will be handled as an invalid value.

### *Default Value*

Default Value is 0x7FFF (=+327.67°C). This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **User Lockout Input**

network input SNVT\_switch nviUserLockout;

This input network variable is used by the supervisory device to restrict the occupant from making certain changes. The occupant will not be able to change setpoints, application mode (heat/cool), or fan speed. These restrictions are due to the operation of critical high level programs such as Electrical Demand, Chiller Reset, etc. which the occupant should not override. The specific variables that are Locked Out are indicated in the table 1-2.

### *Valid Range*

The valid range is explained in the following table:

State	Value	Equivalent Percent	Requested Action
0	n/a	n/a	Unlocked
1	0	0%	Unlocked
1	1 to 255	0.5 to 100.0%	Locked
0xFF	n/a	n/a	Unlocked

### *Default Value*

Default value is Unlocked (state = 0xFF ).

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## **Time Input**

network input SNVT\_time\_stamp nviTime;

This input network variable is used to display the local time in the Command Module Device (year, month, day, hour, minute, second).

### *Valid Range*

The valid range is per SNVT definition.

### *Default Value*

Default Value is 0 in every field. This value will be adopted at power-up. In case of a bound input not receiving an update within the specified receive heartbeat time the behavior is manufacturer defined.

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## Effective Temperature Setpoint Input

network input SNVT\_temp\_p nviEffectSetpt;

This input network variable is from a controller object and is used to display in the Command Module Device the controller's Effective Setpoint. The controller's effective temperature setpoint may depend on the controller object's nciSetpoints, nvoEffectOccup, nviSetpoint, nviSetpointOffset, nviHeatCool, and any local setpoint adjustment. For example, if the occupancy state is unoccupied and the heat/cool state is heat, then the effective setpoint would be equal to the unoccupied heating setpoint defined in nciSetpoints.

### *Valid Range*

The valid range is 10°C to 35°C.

### *Default Value*

Default Value is 0x7FFF (= +327.67°C). This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## Effective Occupancy Input

network input SNVT\_occupancy nviEffectOccup;

This input network variable is used to indicate the associated controller object's actual occupancy mode. This information is to be displayed in the Command Module Device.

### *Valid Range*

The valid range is OC\_OCCUPIED, OC\_UNOCCUPIED, OC\_BYPASS, OC\_STANDBY

### *Default Value*

Default Value is OC\_NUL. This value will be adopted at power-up.

---

## Unit Status Input

network input SNVT\_hvac\_status nviUnitStatus;

This input network variable is transmitted from the Controller object to inform the occupant of the status of the associated HVAC equipment, to be displayed in the Command Module Device. It has the operating mode, the capacity of heating and cooling used, fan status and an indication if any alarms are present in the object.

### *Valid Range*

mode: HVAC\_HEAT, HVAC\_COOL HVAC\_OFF, HVAC\_FAN\_ONLY,  
HVAC\_NUL (INVALID)  
other enumerations are optional

heat\_output\_primary: 0-100%, 0xFFFF (INVALID)

heat\_output\_secondary: 0-100%, 0xFFFF (INVALID)

cool\_output: 0-100%, 0xFFFF (INVALID)

fan\_output: 0-100%, 0xFFFF (INVALID)  
in\_alarm: 0 Means there is no alarm  
Not 0 Means there is an alarm. 0xFF means alarm notification disabled  
(INVALID).

A filter alarm will also be indicated using this field.

### *Default Value*

The default value is INVALID for all the fields. This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **Outdoor Air Temperature Input**

network input SNVT\_temp\_p nviOutdoorTemp;

This input network variable represents information from an outdoor air temperature sensor. This value is typically generated from either a communicating sensor or a supervisory controller.

### *Valid Range*

The valid range is -40°C to 60°C. The value 0x7FFF = +327.67°C will be handled as an invalid value in case of a sensor failure.

### *Default Value*

Default Value is 0x7FFF (= +327.67°C). This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **Outdoor Air Humidity Input**

network input SNVT\_lev\_percent nviOutdoorRH;

This input network variable is used to display outdoor humidity in percent. This input is typically sent from either a supervisory controller or a communicating humidity sensor.

### *Valid Range*

The valid range is 0 to 100 %. The value 0x7FFF = +163.835 % will be handled as an invalid value in case of a sensor failure.

### *Default Value*

Default Value is 0x7FFF. This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **Space Humidity Input**

network input SNVT\_lev\_percent nviSpaceRH;

This input network variable is used to display space humidity in percent. This input is typically sent from a communicating humidity sensor or from a sensor that is connected to the controller. The unit can also have a locally wired relative humidity sensor. Valid values of nviSpaceRH have priority over local sensor values.

### *Valid Range*

The valid range is 0 to 100 %. The value 0x7FFF = +163.835 % will be handled as an invalid value in case of a sensor failure.

### *Default Value*

Default Value is 0x7FFF. This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **Space CO2 Sensor Input**

network input SNVT\_ppm nviSpaceCO2;

This input network variable is used to display the space CO2 levels in PPM. The unit can also have a locally wired CO2 sensor. Valid values of nviSpaceCO2 have priority over local sensor values.

### *Valid Range*

The valid range is 0 to 5000 PPM. The value 0xFFFF = 65,535 will be handled as an invalid value in case of a sensor failure.

### *Default Value*

Default Value is 0xFFFF. This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## **Energy Hold Off Input**

network input SNVT\_switch nviEnergyHoldOff;

This input is from a space comfort controller device which monitors inputs such as a window contact sensor. This input is used to display the EnergyHoldOff status of the controller.

### *Valid Range*

State	Value	Energy Hold Off
0	n/a	Normal
1	0	Normal
1	1-255	Energy Hold Off
0xFF	n/a	Normal (Invalid)

### *Default Value*

Default Value is Normal (State = 0xFF). This value will be adopted at power-up and in case of a bound input not receiving an update within the specified receive heartbeat time.

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## *Optional Network Variables*

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### **Heat/Cool Output**

network output SNVT\_hvac\_mode nvoHeatCool

This output network variable from the Command Module Device is used to transmit the user's command to the controller of the HVAC equipment.

When this network variable indicates COOL, the HVAC equipment controller will be allowed to cool if required to maintain space conditions, but cannot heat. When this network variable indicates HEAT, the HVAC equipment controller will be allowed to heat if required to maintain space conditions, but cannot cool. When the network variable indicates HVAC\_FAN\_ONLY the HVAC equipment will allow only the fan to operate and no heating or cooling will take place. HVAC\_EMERG\_HEAT is used to start emergency heat.

#### *Valid Range*

- 0 = HVAC\_AUTO (Mode determined by the controller)
- 1 = HVAC\_HEAT (Use heat setpoints)
- 3 = HVAC\_COOL (Use cool setpoints)
- 6 = HVAC\_OFF
- 8 = HVAC\_EMERG\_HEAT
- 9 = HVAC\_FAN\_ONLY (Disables heating and cooling while the fan is running)

All other enumeration are optional.

#### *When Transmitted*

This variable is transmitted immediately when its value has changed significantly. Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

#### *Update Rate*

There is no maximum update rate.

#### *Default Service Type*

The default service type is unacknowledged.

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### **Fan Speed Output**

network output SNVT\_switch nvoFanSpeed;

This output network variable reflects the requested speed of a remote fan.

#### *Valid Range*

The valid range is described below:

state = 0 or 1 (OFF or ON)

value = as defined below [n>= m]:

state	value	fan speed
0 (OFF)	0 %	OFF
1 (ON)	(1/n) 100%	fan speed #1
1 (ON)	(2/n) 100%	fan speed #2
1 (ON)	(m/n) 100%	fan speed #m
1 (ON)	100%	fan speed #n

NOTE: Truncation should be used when computing the above values.

### *When Transmitted*

The variable is transmitted immediately when its value has changed.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## **Occupancy Sensor Output**

```
network output SNVT_occupancy nvoOccSensor;
```

The Command Module Device object conveys to the network the occupancy state of a hard wired occupancy sensor.

### *Valid Range*

The valid range is described in the table below:

OC_OCCUPIED:	The Command Module Device	reports occupancy mode.
OC_UNOCCUPIED:	The Command Module Device	reports unoccupied mode.
OC_NUL:	This is the initial value	after power-up.

### *When Transmitted*

Whenever the state changes significantly. Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

### *Update Rate*

This value will be updated no faster than the Minimum Send Time (nciMinOutTm) configuration value, if used (manufacturer-defined).

### *Default Service Type*

The default service type is unacknowledged.

## Space Humidity Output

network output SNVT\_lev\_percent nvoSpaceRH;

This output network variable is used to transmit the space relative humidity that is hard wired to the Command Module Device. If the input nviSpaceRH has a valid value, this output will echo the value of the input. If a valid value for nviSpaceRH does not exist, the locally wired sensor value is used. If neither value is available, the output will send the invalid value.

### *Valid Range*

The valid range is 0 % to 100 %. The value 0x7FFF = +163.835 % will be sent as an invalid value to indicate that the locally wired humidity sensor is failed.

### *When Transmitted*

This variable is transmitted immediately when its value has changed significantly (nciRHMinDelta). Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

### *Update Rate*

This value will be updated no faster than the Minimum Send Time (nciMinOutTm) configuration value, if used (manufacturer-defined).

### *Default Service Type*

The default service type is unacknowledged.

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## Space CO<sub>2</sub> Sensor Output

network output SNVT\_ppm nvoSpaceCO2;

This output network variable is used to transmit the space CO<sub>2</sub> sensor value that is hard wired to the Command Module Device. If the input nviSpaceCO<sub>2</sub> has a valid value, this output will echo the value of the input. If a valid value for nviSpaceCO<sub>2</sub> does not exist, the locally wired sensor value is used. If neither value is available, the output will send the invalid value.

This output network variable indicates the space CO<sub>2</sub> concentration in PPM.

### *Valid Range*

The valid range is 0 to 5000 PPM. The value 0x7FFF = 65,535 is reserved to indicate an invalid value, such as a failed sensor.

### *When Transmitted*

This variable is transmitted immediately when its value has changed significantly (nciCO<sub>2</sub>MinDelta). Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

### *Update Rate*

This value will be updated no faster than the Minimum Send Time (nciMinOutTm) configuration value, if used (manufacturer-defined).

### *Default Service Type*

The default service type is unacknowledged.

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## **Occupancy Manual Command Output**

network output SNVT\_occupancy nvoOccManCmd;

The Command Module Device object conveys to the network the occupancy state as it is modified by the occupant.

### *Valid Range*

The valid range is OC\_OCCUPIED, OC\_UNOCCUPIED, OC\_BYPASS, OC\_STANDBY,

OC\_NUL:                    This is the initial value after power-up and it remains until another manual value is received. It is also used to terminate a command.

### *When Transmitted*

Whenever the state changes significantly.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## **Temperature Setpoint Offset Output**

network output SNVT\_temp\_p nvoSetptOffset;

This output network variable is used to shift the temperature setpoint via the network, by adding nviSetPtOffset to the current setpoint. It is typically bound to a controller unit object. This setpoint shifting operates only on occupied and standby setpoints and does not affect the unoccupied setpoint.

### *Valid Range*

The valid Range is -10°C to +10°C. Default Value is 0°C.

### *When Transmitted*

This variable is transmitted immediately when its value has changed significantly. Additionally, this network variable will also be transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is unacknowledged.

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## **Occupancy Temperature Setpoints Output**

network output SNVT\_temp\_setpt nvoSetpoints;

This output defines the occupancy temperature setpoints for heat and cool mode. The setpoint will have an assigned upper and lower limit for each state defined below within the min. and max. range. This is used for synchronization of the setpoints in the command module with the setpoints in the controller.

### *Valid Range*

	Minimum	Maximum	Default
occupied_cool	10 °C	35 °C	23 °C
standby_cool	10 °C	35 °C	25 °C
unoccupied_cool	10 °C	35 °C	28 °C
occupied_heat	10 °C	35 °C	21 °C
standby_heat	10 °C	35 °C	19 °C
unoccupied_heat	10 °C	35 °C	16 °C

### *When Transmitted*

This variable is transmitted immediately when its value has changed significantly.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## **Space CO2 Limit Output**

network output eeprom SNVT\_ppm nvoSpaceCO2Lim;

This network output property defines a high limit CO2 setpoint as requested by the occupant for ventilation functions. The value is transmitted to the controller via the network.

### *Valid Range*

100 to 3000 PPM. The value 0x7FFF = 65,535 is reserved to indicate an invalid value.

### *Default Value*

Invalid value.

### *When transmitted*

This variable is transmitted immediately when its value has changed significantly.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## **Space Humidity Setpoint Output**

```
network output eeprom SNVT_lev_percent nvoSpaceRHSetpt;
```

This network output property defines the high limit humidity setpoint for the controlled space. The value is transmitted to the controller via the network.

### *Valid Range*

30 to 60%. A value of 0x7FFF = 163.835 % will disable the dehumidification functions in the controller.

0x7FFF is invalid value.

### *Default Value*

Invalid value.

### *When transmitted*

This variable is transmitted immediately when its value has changed significantly.

### *Update Rate*

There is no maximum update rate.

### *Default Service Type*

The default service type is acknowledged.

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## *Mandatory Configuration Properties*

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### **Send Heartbeat**

```
network input config SNVT_time_sec nciSndHrtBt;
```

This configuration property defines the maximum period of time that expires before the specified network variable outputs will automatically be updated. The specific method for sending heartbeat updates is manufacturer-defined.

Network variable outputs can be defined in 2 categories for the use of send heartbeat, based upon whether they are specified for send heartbeat in Table 2.2, as shown below:

Network Variable	Specified for Send Heartbeat	Result: Use Send
------------------	------------------------------	------------------

<b>Output</b>	<b>in Table 2.2?</b>	<b>Heartbeat?</b>
Category 1	Yes	Yes
Category 2	No	Manufacturer-defined

The following output variables use the send Heartbeat.

nvoSpaceTemp	nvoOccSensor	nvoSpaceRH
nvoSpaceCO2	nvoSetptOffset	nvoHeatCool

### *Valid Range*

The valid range is any value between 0.0 sec and 6,553.4 sec. Setting nciSndHrtBt = 0 disables the automatic update mechanism.

### *Default Value*

0 (no automatic update)

### *SCPT Reference*

SCPTmaxSendTime (49)

## **Temperature Offset**

```
network input config SNVT_temp_p nciTmpOffset;
```

This configuration property is used to calibrate the internal temperature sensor. This offset applies after the use of any translation table or gain factor.

### *Valid Range*

The valid range is -10 °C to +10°C.

### *Default Value*

The default value is manufacturer specific.

### *SCPT Reference*

SCPToffsetTemp(70)

## **Temperature Send on Delta**

```
network input config SNVT_temp_p nciTmpMinDelta;
```

Indicates the minimum temperature change required to update the output network variables.

### *Valid Range*

The valid range is -10 °C to +10°C.

### *Default Value*

The default value is manufacturer specific.

### *SCPT Reference*

SCPTminDeltaTemp(64)

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## *Optional Configuration Properties*

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### **Minimum Send Time**

```
network input config SNVT_time_sec nciMinOutTm;
```

This configuration property defines the minimum period of time between automatic network variable output transmissions. The specific use of `nciMinOutTm` is manufacturer-defined. For example, it can be applied to some network variable outputs (such as sensor values) but not to all network variable outputs.

Although this configuration property is optional, it must be provided if the minimum send time function is used in the controller. If this configuration property is not present, the controller cannot use the minimum send time function.

The following Output Variables are controlled by this configuration property.

```
nvoSpaceTemp      nvoOccSensor          nvoSpaceRH
nvoSpaceCO2
```

### *Valid Range*

The valid range is any value between 0.0 sec and 6,553.4 sec.

### *Default Value*

0

### *SCPT Reference*

SCPTminSendTime (52)

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### **Occupancy Temperature Setpoints**

```
network input config SNVT_temp_setpt nciSetPnts;
```

This configuration property defines the space temperature setpoints for the various heat, cool and occupancy modes. The occupied and standby setpoints are defaults which can be modified by various input variables, such as `nviSetpoint` and `nviSetpointOffset`. The unoccupied setpoints are always valid.

The values of the individual setpoints within `nciSetpoints` must be kept in ascending order as follows: `unoccupied_heat` ≤ `standby_heat` ≤ `occupied_heat` ≤ `occupied_cool` ≤ `standby_cool` ≤ `unoccupied_cool`.

### *Valid Range and Default Value*

	Minimum	Maximum	Default
occupied_cool	10 °C	35 °C	23 °C
standby_cool	10 °C	35 °C	25 °C
unoccupied_cool	10 °C	35 °C	28 °C
occupied_heat	10 °C	35 °C	21 °C
standby_heat	10 °C	35 °C	19 °C
unoccupied_heat	10 °C	35 °C	16 °C

### *SCPT Reference*

SCPTsetPtns(60)

---

## **Receive Heartbeat**

```
network input config SNVT_time_sec nciRcvHrtBt;
```

This configuration property is used to control the maximum time that elapses after the last update to an input network variable before the Command Module Device starts to use its default values. Network variable inputs can be defined in 3 categories for use of receive heartbeat, based upon whether they are specified for receive heartbeat and whether they are bound, as shown below:

Network Variable Input	Specified for Receive Heartbeat in Table 2.1?	Bound?	Result: Use Receive Heartbeat?
Category 1	Yes	Yes	Yes
Category 2	Yes	No	Manufacturer-defined
Category 3	No	Don't Care	No

The following input network variables are controlled by this configuration property:

nviSpaceTemp	nviTime	nviEffectTmpSetpt
nviEnergyHoldOff	nviUnitStatus	nviOutdoorTemp
nviOutdoorRH	nviSpaceRH	nviSpaceCO2

### *Valid Range*

The valid range is any value between 0.0 sec and 6,553.4 sec. Setting nciRcvHrtBt = 0 disables the Receive Heartbeat mechanism.

### *Default Value*

0 (no failure detect)

### *SCPT Reference*

SCPTmaxRcvTime (48)

## **Location Label**

```
network input config SNVT_str_asc nciLocation;
```

This configuration property can optionally be used to provide more descriptive physical location information than can be provided by the Neuron Chip's 6 byte location string. The location relates to the object and not to the node.

### *Valid Range*

Any NULL terminated ASCII string of 31 bytes total length.

### *Default Value*

The default value is an ASCII string containing all zeros (" \0" ).

### *SCPT Reference*

SCPT\_location (17)

## **CO2 Offset**

```
network input config SNVT_ppm nciCO2offset;
```

This configuration property is used to calibrate the internal CO2 sensor. This offset applies after the use of any translation table or gain factor.

### *Valid Range*

The valid range is any value within the defined limits of the SNVT\_ppm.

### *Default Value*

The default value is manufacturer specific.

### *SCPT Reference*

SCPToffsetCO2 (68)

---

## **CO2 Send on Delta**

```
network input config SNVT_ppm nciCO2MinDelta;
```

Indicates the minimum CO2 level change required to update the output network network variables.

### *Valid Range*

Valid range is 0-300 ppm.

### *Default Value*

Manufacture specific.

### *SCPT Reference*

SCPTminDeltaCO2 (66)

---

## **RH Offset**

```
network input config SNVT_lev_percent nciRHOffset;
```

This configuration property is used to calibrate the internal RH sensor. This offset applies after the use of any translation table or gain factor.

### *Valid Range*

The valid range is any value within the defined limits of the SNVT\_lev\_percent.

### *Default Value*

The default value is manufacturer specific.

### *SCPT Reference*

SCPToffsetRH(69)

---

## **RH Send on Delta**

```
network input config SNVT_lev_percent nciRHMinDelta;
```

Indicates the minimum relative humidity change required to update the output network network variables.

*Valid Range*

Valid range is 0-10%.

*Default Value*

Manufacture specific.

*SCPT Reference*

SCPTminDeltaRH (62)

---

**Data Transfer**

None specified.

---

**Power-up State**

None specified.

---

**Boundary and Error Conditions**

None specified.

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