Version 1.0
Chilled Ceiling Controller: 8070

LONMARK® Functional Profile: Chilled Ceiling Controller

Overview

This document describes the profile for the Chilled Ceiling Controller object. This object is used to control the zone temperature by controlling the chilled and hot water flow rates distributed to ceiling elements and heating radiators in the zone.

The Chilled Ceiling Controller Functional Profile has been prepared using the Space Comfort Controller Functional Profile Template.

Example Usage

The Chilled Ceiling Controller resides on a LonWorks network interacting with one or more of the following LonMark nodes:

- space temperature sensor
- space relative humidity sensor
- occupancy sensor
- other sensors
- wall-mounted human interface module (including setpoint, fan speed and/or mode switch)
- supervisory controller (occupancy mode, heat/cool changeover, supply energy control)
- monitoring device
- installation/service tool
- heat actuator (0..100%)
- cool actuator (0..100%)
- other nodes as required

Chilled Ceiling Controller Object Details

Table 1.1: Network Variable Inputs

NV # (M/O)**	Name	Recv HrtBt	SNVT Type	SNVT Index	Class	Description
1 (M)	nviSpaceTemp	Yes	SNVT_temp_p	105	RAM	Space Temperature Input
2 (O)	nviSetpoint	No	SNVT_temp_p	105	RAM	Temperature Setpoint Input (absolute)
3 (O)	nviSetptOffset	Yes	SNVT_temp_p	105	RAM	Setpoint Offset Input
4 (O)	nviSetptShift	Yes	SNVT_temp_setpt	106	RAM	Setpoint Shift Input
5 (O)	nviOccSchedule	Yes	SNVT_tod_event	128	RAM	Occupancy Scheduler Input
6 (O)	nviOccManCmd	No	SNVT_occupancy	109	RAM	Occupancy Override Input
7 (O)	nviOccSensor	Yes	SNVT_occupancy	109	RAM	Occupancy Sensor Input
8 (O)	nviApplicMode	Yes	SNVT_hvac_mode	108	RAM	Application Mode Input
9 (O)	nviHeatCool	Yes	SNVT_hvac_mode	108	RAM	Heat/Cool Mode Input
10 (O)	nviEnergyHoldOff	Yes	SNVT_switch	95	RAM	Energy Hold Off Input
11 (O)	nviValveOverride	No	SNVT_hvac_overid	111	RAM	Water Valve Override Input
12 (O)	nviSourceTemp	Yes	SNVT_temp_p	105	RAM	Source Temperature Input
13 (O)	nviHeatSrcTemp	Yes	SNVT_temp_p	105	RAM	Heat Source Temperature Input
14 (O)	nviCoolSrcTemp	Yes	SNVT_temp_p	105	RAM	Cool Source Temperature Input
15 (O)	nviSpaceRH	Yes	SNVT_lev_percent	81	RAM	Space Humidity Input
16 (O)	nviSpaceDewPt	Yes	SNVT_temp_p	105	RAM	Space Dew Point Temperature Input
17 (O)	nviOutdoorDewPt	Yes	SNVT_temp_p	105	RAM	Outdoor Air Dew Point Temp. Input
18 (O)	nviHeatPriSlave	Yes	SNVT_lev_percent	81	RAM	Primary Heat Input for Slave Operation
19 (O)	nviHeatSecSlave	Yes	SNVT_lev_percent	81	RAM	Secondary Heat Input for Slave Operation
20 (O)	nviCoolPriSlave	Yes	SNVT_lev_percent	81	RAM	Primary Cool Input for Slave Operation
21 (O)	nviCoolSecSlave	Yes	SNVT_lev_percent	81	RAM	Secondary Cool Input for Slave Operation

** M = mandatory, O = optional

Table 1.2: Network Variable Outputs

NV # (M/O)**	Name	Send HrtBt	SNVT Type	SNVT Index	Class	Description
22 (M)	nvoSpaceTemp	Yes	SNVT_temp_p	105	RAM	Effective Space Temperature Output
23 (M)	nvoUnitStatus	Yes	SNVT_hvac_status	112	RAM	Unit Status Output
24 (O)	nvoEffectSetpt	Yes	SNVT_temp_p	105	RAM	Effective Setpoint Output
25 (O)	nvoEffectOccup	No	SNVT_occupancy	109	RAM	Effective Occupancy Output
26 (O)	nvoHeatCool	Yes	SNVT_hvac_mode	108	RAM	Effective Heat/Cool Output
27 (O)	nvoSetpoint	No	SNVT_temp_p	105	RAM	Local Setpoint Output
28 (O)	nvoSetptShift	Yes	SNVT_temp_setpt	106	RAM	Local Setpoint Shift Output
29 (O)	nvoLoadAbs	No	SNVT_power	27	RAM	Absolute Power Consumption Output
30 (O)	nvoTerminalLoad	Yes	SNVT_lev_percent	81	RAM	Terminal Load Output
31 (O)	nvoHeatPrimary	Yes	SNVT_lev_percent	81	RAM	Primary Heat Output
32 (O)	nvoHeatSecondary	Yes	SNVT_lev_percent	81	RAM	Secondary Heat Output
33 (O)	nvoCoolPrimary	Yes	SNVT_lev_percent	81	RAM	Primary Cool Output
34 (O)	nvoCoolSecondary	Yes	SNVT_lev_percent	81	RAM	Secondary Cool Output
35 (O)	nvoSpaceRH	Yes	SNVT_lev_percent	81	RAM	Space Humidity Output
36 (O)	nvoSpaceDewPt	Yes	SNVT_temp_p	105	RAM	Space Dewpoint Temperature Output
37 (O)	nvoEnergyHoldOff	Yes	SNVT_switch	95	RAM	Energy Hold Off Output

** M = mandatory, O = optional

Table 1.3: Configuration Properties

Config. Property # (M/O)**	Name	SCPT Index	SNVT Type (SNVT Index)	Class	Description
1 (M)	nciSndHrtBt	49	SNVT_time_sec (107)	NVM	Send Heartbeat
2 (M)	nciSetpoints	60	SNVT_temp_setpt (106)	NVM	Occupancy Temperature Setpoints
3 (O)	nciMinOutTm	52	SNVT_time_sec (107)	NVM	Minimum Send Time
4 (O)	nciRcvHrtBt	48	SNVT_time_sec (107)	NVM	Receive Heartbeat
5 (O)	nciLocation	17	SNVT_str_asc (36)	NVM	Location Label
6 (O)	nciBypassTime	34	SNVT_time_min (123)	NVM	Local Bypass Time
7 (O)	nciManualTime	35	SNVT_time_min (123)	NVM	Manual Override Time

** M = mandatory, O = optional

NVM is short for Non Volatile Memory. A configuration property belonging to this class will retain its value during power loss.

Mandatory Network Variables

Space Temperature Input

network input SNVT_temp_p nviSpaceTemp;

This input network variable is used to connect an external space temperature sensor to the node. It is mandatory to the profile, but it does not have to be bound to a sensor node if the Chilled Ceiling Controller node itself provides 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 not receiving an update within the specified receive heartbeat time.

Mandatory Network Variables

Effective Space Temperature Output

network output SNVT_temp_p nvoSpaceTemp;

This output network variable is used to monitor the effective space temperature that the Chilled Ceiling Controller is using for control. 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.

Typical Range

The typical 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 (manufacturer defined). 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.

Unit Status Output

network output SNVT_hvac_status nvoUnitStatus;

This output network variable is available to report the Chilled Ceiling Controller status. It combines the operating mode, the capacity of heating and cooling used and an indication if any alarms are present in the object. SNVT_hvac_status allows this information to be provided in one network variable.

Refer to Effective Heat/Cool Output (nvoHeatCool) for additional information regarding the value reported in the mode field. The value in the mode field will typically be the same value as the Effective Heat/Cool Output, except when the mode value is HVAC_TEST.

Valid Range

mode:	HVAC_HEAT, HVAC_MRNG_WRMUP, HVAC_COOL, HVAC_NIGHT_PURGE, HVAC_PRE_COOL, HVAC_OFF, HVAC_TEST, HVAC_EMERG_HEAT, HVAC_FAN_ONLY.
heat_output_primary:	0-100%, 0x7FFF (INVALID)
heat_output_secondary:	0-100%, 0x7FFF (INVALID)
cool_output:	0-100%, 0x7FFF (INVALID)
econ_output:	0-100%, 0x7FFF (INVALID)
fan_output:	0-100%, 0x7FFF (INVALID)
in_alarm:	0 Means there is no alarm. Not 0 Means there is an alarm. 0xFF Means that alarming is disabled.

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

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.

Optional Network Variables - Inputs

Temperature Setpoint Input (absolute)

```
network input SNVT_temp_p  nviSetpoint;
```

This input network variable is used to allow the temperature setpoints for the occupied and standby modes to be changed via the network. (Note: The unoccupied setpoints are not changed.) If a valid value is not present, either a locally wired setpoint knob or the appropriate setpoint as configured in nciSetpoints will be used.

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:

```
deadband_occupied = occupied_cool - occupied_heat
deadband_standby = standby_cool - standby_heat
```

effective_occupied_cool = nviSetpoint + 0.5 (deadband_ occupied)

effective_occupied_heat = nviSetpoint - 0.5 (deadband_ occupied)

effective_standby_cool = nviSetpoint + 0.5 (deadband_standby)

effective_standby_heat = nviSetpoint - 0.5 (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:

```
abs_setpoint_offset = nviSetpoint - (occupied_cool +
occupied_heat)/2

effective_occupied_cool = occupied_cool + abs_setpoint_offset
effective_occupied_heat = occupied_heat + abs_setpoint_offset
effective_standby_cool = standby_cool + abs_setpoint_offset
effective_standby_heat = standby_heat + abs_setpoint_offset
```

If nviSetpoint, nviSetptOffset and/or nviSetptShift are used together, the result on the effective setpoints is additive.

Valid Range

The valid range is 10°C to 35°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. This network variable input does not use the Receive Heartbeat function. When the default value is in effect, the Chilled Ceiling Controller will use the configuration property nciSetpoints.

Setpoint Offset Input

network input SNVT_temp_p nviSetptOffset;

This input network variable is used to shift the effective occupied and standby temperature setpoints by adding nviSetptOffset to the current setpoints. (Note: The unoccupied setpoints are not changed.) It is typically bound to a supervisory node or to an external wall module having a relative setpoint knob. All occupied and standby setpoints will be shifted upward (+) or downward (-) by the value of nviSetptOffset.

If nviSetpoint, nviSetptOffset and/or nviSetptShift are used together, the result on the effective setpoints is additive.

Valid Range

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

Default Value

Default Value is 0°C to disable the setpoint offset. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Setpoint Shift Input

network input SNVT_temp_setpt nviSetptShift;

This input network variable is used to shift the effective heat/cool setpoints by adding the corresponding value in nviSetptShift to the current setpoints. It is typically bound to a supervisory node which provides functions such as outdoor air temperature compensation. All occupied, standby and unoccupied setpoints will be shifted upward (+) or downward (-) by the corresponding value of nviSetptShift.

If nviSetpoint, nviSetptOffset and/or nviSetptShift are used together, the result on the effective setpoints is additive.

Valid Range and Default Values

	Minimum	Maximum	Default
occupied_cool	-10°C	+10°C	0 °C
standby_cool	-10°C	+10°C	0 °C
unoccupied_cool	-10°C	+10°C	0 °C
occupied_heat	-10°C	+10°C	0 °C
standby_heat	-10°C	+10°C	0 °C
unoccupied_heat	-10°C	+10°C	0 °C

The valid range for each shift value is -10°C to +10°C. The value 0x7FFF=+327.67°C will be handled as an invalid value. The Default Value is 0°C to disable the setpoint shift. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Because nviSetptShift contains six independent values, it is possible to create combinations of values that are not functional. For example, if positive shift values are used for the heating setpoints, and negative shift values are used for the cooling setpoints simultaneously, the effective heat/cool setpoints may conflict with each other. Care should be taken in the application of nviSetptShift to avoid these potential conflicts. The following table shows some examples of valid uses of nviSetptShift.

Examples of Setpoint Shift Input

	Summer Compensation	Winter Compensation	Demand Limit
occupied_cool	+2°C	+3°C	+3°C
standby_cool	+2°C	+3°C	+3°C
unoccupied_cool	0°C	0°C	0°C
occupied_heat	0°C	+3°C	-3°C
standby_heat	0°C	+3°C	-3°C
unoccupied_heat	0°C	0°C	0°C

Occupancy Scheduler Input

```
network input SNVT_tod_event  nviOccSchedule;
```

This input network variable is used to command the Chilled Ceiling Controller into different occupancy modes. It is typically sent by a scheduler or a supervisory node. SNVT_tod_event is a structure containing three parts. The first part, current_state, is required for this network variable input. The additional parts, next_state and time_to_next_state, are optional. They can be used for control strategies that provide improved transitions between states. A scheduler node should send OC_NUL and 0, respectively, if it does not use these functions. The controller node will ignore these values if the functions are not supported by the controller.

This input is used in conjunction with nviOccManCmd and nviOccSensor (if installed) to determine the effective occupancy mode. Refer to Effective Occupancy Output (nvoEffectOccup) for more information.

Valid Range

for current_state:

0 = OC_OCCUPIED: The Chilled Ceiling Controller should operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

1 = OC_UNOCCUPIED: The Chilled Ceiling Controller should operate in the unoccupied mode as defined by the manufacturer (e.g. unoccupied setpoint).

3 = OC_STANDBY: The Chilled Ceiling Controller should operate in the standby mode as defined by the manufacturer (e.g. standby setpoint).

0xFF = OC_NUL: This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

The interpretation of all other enumerations will be manufacturer-specific.

for next_state: (optional)

0 = OC_OCCUPIED: The Chilled Ceiling Controller will operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

1 = OC_UNOCCUPIED: The Chilled Ceiling Controller will operate in the unoccupied mode as defined by the manufacturer (e.g. unoccupied setpoint).

3 = OC_STANDBY: The Chilled Ceiling Controller will operate in the standby mode as defined by the manufacturer (e.g. standby setpoint).

0xFF = OC_NUL: This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

The interpretation of all other enumerations will be manufacturer-specific.

for time_to_next_state: (optional) 0 to 65,534 minutes, 0 = not used, 65,535 (0xFFFF) = Invalid

Default Value

current_state = 0xFF = OC_NUL

next_state = 0xFF = OC_NUL

time_to_next_state = 0 minutes

These values will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Occupancy Override Input

network input SNVT_occupancy nviOccManCmd;

This input network variable is used to command the Chilled Ceiling Controller into different occupancy modes. It is typically sent by a wall-mounted occupant-interface module or a supervisory node, to manually control occupancy modes, or to override the scheduled occupancy.

If a local Bypass Input is present, it can be used in conjunction with this network variable input. The local input, when active, forces a Bypass request (equivalent to OC_BYPASS), overriding nviOccManCmd for the duration of the Local Bypass Time (determined by the configuration property nciBypassTime). When nviOccManCmd indicates OC_BYPASS, the Local Bypass Time is also used. Whenever an update of nviOccManCmd is received indicating OC_BYPASS, the bypass timer is restarted. *This network variable input should never be bound to a network variable that uses a Send Heartbeat function.*

This input is used in conjunction with nviOccSchedule and nviOccSensor (if installed) to determine the effective occupancy mode. Refer to Effective Occupancy Output (nvoEffectOccup) for more information.

Valid Range

0 = OC_OCCUPIED: The Chilled Ceiling Controller should operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

1 = OC_UNOCCUPIED: The Chilled Ceiling Controller should operate in the unoccupied mode as defined by the manufacturer (e.g. unoccupied setpoint).

2 = OC_BYPASS: The Chilled Ceiling Controller should operate in the occupied mode for a period of time defined by nciBypassTime.

3 = OC_STANDBY: The Chilled Ceiling Controller should operate in the standby mode as defined by the manufacturer (e.g. standby setpoint).

0xFF = OC_NUL: This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid, unused or to cancel a previous command.

Default Value

The default value OC_NUL = 0xFF. This value will be adopted at power-up. This network variable input does not use the Receive Heartbeat function.

Occupancy Sensor Input

network input SNVT_occupancy nviOccSensor;

This input network variable is used to indicate the presence of occupants in the controlled space. It is typically sent by an occupancy sensor. In cases where an occupancy sensor is hardwired to the Chilled

Ceiling Controller, a valid value for nviOccSensor will take precedence over the hardwired input.

This input is used in conjunction with nviOccSchedule and nviOccManCmd (if installed) to determine the effective occupancy mode. Refer to Effective Occupancy Output (nvoEffectOccup) for more information.

Valid Range

0 = OC_OCCUPIED: The occupancy sensor is indicating that there ARE occupants in the space.

1 = OC_UNOCCUPIED: The occupancy sensor is indicating that there are NO occupants in the space.

0xFF = OC_NUL: This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused. OC_NUL is equivalent to OC_OCCUPIED.

All other enumerations are handled as equivalent to OC_NUL.

Default Value

The default value is OC_NUL. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Application Mode Input

network input SNVT_hvac_mode nviApplicMode;

This network variable input is used to coordinate the Chilled Ceiling Controller with any supervisory controller. If a mode is requested that is not supported by the unit controller, the unit controller will use a manufacturer-defined default mode.

nviApplicMode overrides nviHeatCool, unless nviApplicMode is HVAC_AUTO, HVAC_TEST, or HVAC_NUL. If nviApplicMode is HVAC_AUTO or HVAC_NUL, then nviHeatCool determines the effective mode of the unit. If nviApplicMode is HVAC_TEST, then the effective mode is manufacturer-defined. Refer to Effective Heat/Cool Output (nvoHeatCool) for more information.

Valid Range

0 = HVAC_AUTO (Mode determined by unit)

1 = HVAC_HEAT (Use heat setpoints)

2 = HVAC_MRNG_WRMUP (Morning warmup)

3 = HVAC_COOL (Use cool setpoints)

4 = HVAC_NIGHT_PURGE (Free cooling)

5 = HVAC_PRE_COOL (Morning cooldown)

6 = HVAC_OFF (No unit operation allowed)

7 = HVAC_TEST (Special test mode, manufacturer-defined)

8 = HVAC_EMERG_HEAT (Emergency heat)

9 = HVAC_FAN_ONLY (No heating or cooling allowed)

0xFF = HVAC_NUL (same as HVAC_AUTO)

All other enumerations will be interpreted as manufacturer-defined.

Default Value

The default value is HVAC_AUTO. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Heat/Cool Mode Input

network input SNVT_hvac_mode nviHeatCool;

This network variable input is used to coordinate the Chilled Ceiling Controller with any node that may need to control the heat/cool changeover of the unit. For example, one Chilled Ceiling Controller node may coordinate it’s heat/cool mode with another Chilled Ceiling Controller node serving the same area, or the heat/cool mode could be manually selected from a human interface device. If a mode is requested that is not supported by the unit controller, the unit controller will use a manufacturer-defined default mode.

This input is overridden by nviApplicMode, unless nviApplicMode is HVAC_AUTO, HVAC_TEST, or HVAC_NUL. If nviApplicMode is HVAC_AUTO or HVAC_NUL, then nviHeatCool determines the effective mode of the unit. If nviApplicMode is HVAC_TEST, then the effective mode is manufacturer-defined. Refer to Effective Heat/Cool Output (nvoHeatCool) for more information.

Valid Range

0 = HVAC_AUTO (Mode determined by unit)

1 = HVAC_HEAT (Use heat setpoints)

2 = HVAC_MRNG_WRMUP (Morning warmup)

3 = HVAC_COOL (Use cool setpoints)

4 = HVAC_NIGHT_PURGE (Free cooling)

5 = HVAC_PRE_COOL (Morning cooldown)

6 = HVAC_OFF (No unit operation allowed)

7 = HVAC_TEST (Special test mode, manufacturer-defined)

8 = HVAC_EMERG_HEAT (Emergency heat)

9 = HVAC_FAN_ONLY (No heating or cooling allowed)

0xFF = HVAC_NUL (same as HVAC_AUTO)

All other enumerations will be interpreted as manufacturer-defined.

Default Value

The default value is HVAC_AUTO. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Energy Hold Off Input

network input SNVT_switch nviEnergyHoldOff;

This input is used to stop heating and cooling while allowing the unit to protect the space from temperature extremes. When the unit is in Energy Hold Off, the unit will not operate unless the space temperature exceeds manufacturer-defined limit setpoints. This input is usually associated with a device such as a window contact sensor. If a physical sensor is connected *and* the network variable is present, either input can initiate Energy Hold Off.

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 not receiving an update within the specified receive heartbeat time.

Water Valve Override Input

network input SNVT_hvac_overid nviValveOverride;

This input network variable is used for commanding the controller into a manual mode for overriding water valves controlled by the unit (most commonly when water balancing the system). This input would typically be initiated from a supervisory controller or service tool. It can be used to override all water valves, heating valves only or cooling valves only. A product manufacturer can implement an optional time limit for this input, as defined by the Manual Time Limit (nciManualTime) configuration property. The response to unused or invalid values is manufacturer-defined.

Valid Range

for state:

0 = HVO_OFF: Normal control.

1 = HVO_POSITION: Set all valves to the value in the percent field.

2 - 3 = Not used.

4 = HVO_OPEN: Fully open all valves.

5 = HVO_CLOSE: Fully close all valves.

6 - 16 = Not used.

17 = HVO_POSITION_1: Set all heating valves to the value in the percent field.

18 - 19 = Not used.

20 = HVO_OPEN_1: Fully open all heating valves.

21 = HVO_CLOSE_1: Fully close all heating valves.

22 – 32 = Not used.

33 = HVO_POSITION_2: Set all cooling valves to the value in the percent field.

34 - 35 = Not used.

36 = HVO_OPEN_2: Fully open all cooling valves.

37 = HVO_CLOSE_2: Fully close all cooling valves.

38 – 48 = Not used.

0xFF = NUL: INVALID (same as 0 = HVO_OFF).

for percent: 0 to 100%

for flow: 0 liters/sec (Not used)

Default Value

The default value is 0 = HVO_OFF. This value will be adopted at power-up. This network variable input does not use the Receive Heartbeat function. Optionally, a manufacturer can choose to use the default value if an update is not received within the Manual Time Limit (nciManualTime).

Source Temperature Input

network input SNVT_temp_p nviSourceTemp;

This input network variable is used to indicate the temperature of the air or water being supplied to the unit for heating and/or cooling capacity. This value can be used for unit protection, control mode switching and/or to enable/disable certain functions. This value is typically sent from a supervisory controller or temperature sensor node. The unit may also have a locally wired source temperature sensor. Valid values of nviSourceTemp have priority over local sensor values.

Valid Range

The valid range is 0°C to 100°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 not receiving an update within the specified receive heartbeat time.

Heat Source Temperature Input

network input SNVT_temp_p nviHeatSrcTemp;

This input network variable is used to indicate the temperature of the air or water being supplied to the unit for heating capacity. This value can be used for unit protection, control mode switching and/or to enable/disable certain functions. This value is typically sent from a supervisory controller or temperature sensor node. The unit may also have a locally wired source temperature sensor. Valid values of nviHeatSrcTemp have priority over local sensor values.

Valid Range

The valid range is 0°C to 100°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 not receiving an update within the specified receive heartbeat time.

Cool Source Temperature Input

network input SNVT_temp_p nviCoolSrcTemp;

This input network variable is used to indicate the temperature of the air or water being supplied to the unit for cooling capacity. This value can be used for unit protection, control mode switching and/or to enable/disable certain functions. This value is typically sent from a supervisory controller or temperature sensor node. The unit may also have a locally wired source temperature sensor. Valid values of nviCoolSrcTemp have priority over local sensor values.

Valid Range

The valid range is 0°C to 50°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 not receiving an update within the specified receive heartbeat time.

Space Humidity Input

network input SNVT_lev_percent nviSpaceRH;

This input network variable is the measured space humidity in percent. This input is typically sent from a communicating humidity sensor. Valid values of nviSpaceRH have priority over local sensor values.

ValidRange

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 not receiving an update within the specified receive heartbeat time.

Space Dew Point Temperature Input

network input SNVT_temp_p nviSpaceDewPt;

This input network variable is the measured space dew point temperature. This input is typically sent from either a supervisory controller or communicating sensor. Valid values of nviSpaceDewPt have priority over local sensor values.

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. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Outdoor Air Dew Point Temperature Input

network input SNVT_temp_p nviOutdoorDewPt;

This input network variable is the measured outdoor dew point temperature. This input is typically sent from either a supervisory controller or communicating sensor. Valid values of nviOutdoorDewPt have priority over local sensor values.

Valid Range

The valid range is -40°C to 50°C. The value 0x7FFF=+327.67°C will be handled as an invalid value.

Default Value

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

Primary Heat Input for Slave Operation

network input SNVT_lev_percent nviHeatPriSlave;

This input network variable is intended for slave operation. It is typically bound to the output nvoHeatPrimary of a master controller. When the controller is in slave mode the value of nviHeatPriSlave will be used to control the primary heat source i.e. any control algorithm in the slave controller is bypassed.

The mechanism for enabling of slave mode is manufacturer dependent.

Valid Range

The valid range is 0% to 100%. The value 0x7FFF = +163.835 % will be handled as an invalid value.

Default Value

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

Secondary Heat Input for Slave Operation

network input SNVT_lev_percent nviHeatSecSlave;

This input network variable is intended for slave operation. It is typically bound to the output nvoHeatSecondary of a master controller. When the controller is in slave mode the value of nviHeatSecSlave will be used to control the secondary heat source i.e. any control algorithm in the slave controller is bypassed.

The mechanism for enabling of slave mode is manufacturer dependent.

Valid Range

The valid range is 0% to 100%. The value 0x7FFF = +163.835 % will be handled as an invalid value.

Default Value

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

Primary Cool Input for Slave Operation

network input SNVT_lev_percent nviCoolPriSlave;

This input network variable is intended for slave operation. It is typically bound to the output nvoCoolPrimary of a master controller. When the controller is in slave mode the value of nviCoolPriSlave will be used to control the primary cool source i.e. any control algorithm in the slave controller is bypassed.

The mechanism for enabling of slave mode is manufacturer dependent.

Valid Range

The valid range is 0% to 100%. The value 0x7FFF = +163.835 % will be handled as an invalid value.

Default Value

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

Secondary Cool Input for Slave Operation

network input SNVT_lev_percent nviCoolSecSlave;

This input network variable is intended for slave operation. It is typically bound to the output nvoCoolSecondary of a master controller. When the controller is in slave mode the value of nviCoolSecSlave will be used to control the secondary cool source i.e. any control algorithm in the slave controller is bypassed.

The mechanism for enabling of slave mode is manufacturer dependent.

Valid Range

The valid range is 0% to 100%. The value 0x7FFF = +163.835 % will be handled as an invalid value.

Default Value

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

Optional Network Variables - Outputs

Effective Setpoint Output

network output SNVT_temp_p nvoEffectSetpt;

This output network variable is used to monitor the effective temperature setpoint which may depend on 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.

Typical Range

The typical range is 10°C to 35°C.

When Transmitted

The 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

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.

Effective Occupancy Output

network output SNVT_occupancy nvoEffectOccup;

This output network variable is used to indicate the actual occupancy mode of the unit. This information is typically reported to a supervisory controller, or provided to another Chilled Ceiling Controller to coordinate the operation of multiple units. The occupancy mode is determined by a combination of optional input network variables and logic in the controller, as defined by the controller manufacturer. An example of how the Effective Occupancy Output could be determined from various inputs is shown in the table below.

Effective Occupancy Output (example application)

nviOccManCmd	nviOccSchedule[4]	nviOccSensor[2]	nvoEffectOccup
OC_OCCUPIED	Don't Care	Don't Care	OC_OCCUPIED
OC_UNOCCUPIED	Don't Care	Don't Care	OC_UNOCCUPIED
OC_BYPASS[1]	OC_OCCUPIED	Don't Care	OC_OCCUPIED
	OC_UNOCCUPIED	Don't Care	OC_BYPASS[1]
	OC_STANDBY	Don't Care	OC_BYPASS[1]
	OC_NUL	OC_OCCUPIED[3]	OC_OCCUPIED
		OC_UNOCCUPIED	OC_BYPASS[1]
OC_STANDBY	Don't Care	Don't Care	OC_STANDBY
OC_NUL	OC_OCCUPIED	OC_OCCUPIED[3]	OC_OCCUPIED
		OC_UNOCCUPIED	OC_STANDBY
	OC_UNOCCUPIED	Don't Care	OC_UNOCCUPIED
	OC_STANDBY	Don't Care	OC_STANDBY
	OC_NUL	OC_OCCUPIED[3]	OC_OCCUPIED
		OC_UNOCCUPIED	OC_UNOCCUPIED

Notes:

1 OC_BYPASS can be initiated by either nviOccManCmd or a local input. nvoEffectOccup will only be OC_BYPASS for the duration of the Local Bypass Time (nciBypassTime), until re-initiated by either a transition of the local input or an update to nviOccManCmd.

2 The occupancy sensor can be either a local input or a network input. If a valid value for the network input is present, it has precedence over a local input.

3 For the occupancy sensor, OC_NUL (and no local input) is interpreted as OC_OCCUPIED.

4 For nviOccSchedule, this refers to the " current state" field.

5 " Don't Care" = Any State

Valid Range

0 = OC_OCCUPIED: The Chilled Ceiling Controller should operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

1 = OC_UNOCCUPIED: The Chilled Ceiling Controller should operate in the unoccupied mode as defined by the manufacturer (e.g. unoccupied setpoint).

2 = OC_BYPASS: The Chilled Ceiling Controller should operate in the occupied mode for a period of time defined by nciBypassTime.

3 = OC_STANDBY: The Chilled Ceiling Controller should operate in the standby mode as defined by the manufacturer (e.g. standby setpoint).

When Transmitted

The variable is transmitted immediately when its value has changed. Additionally, this network variable may also (as defined by the manufacturer) 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.

Effective Heat/Cool Output

network output SNVT_hvac_mode nvoHeatCool

This output network variable is used to indicate the actual heat/cool mode of the unit. This information is typically reported to a supervisory controller, or provided to another Chilled Ceiling Controller to coordinate the operation of multiple units. The heat/cool mode is determined by a combination of optional input network variables and logic in the controller. The “ mode” value reported in nvoUnitStatus is typically the same as nvoHeatCool, except when nviApplicMode is HVAC_TEST.

Valid Range

The valid range is described in the table below:

1 = HVAC_HEAT (Controller is using heat setpoints)

2 = HVAC_MRNG_WRMUP (Morning warmup)

3 = HVAC_COOL (Controller is using cool setpoints)

4 = HVAC_NIGHT_PURGE (Free cooling)

5 = HVAC_PRE_COOL (Morning cooldown)

6 = HVAC_OFF (No unit operation allowed)

7 = HVAC_TEST (Special test mode, manufacturer-defined)

8 = HVAC_EMERG_HEAT (Emergency heat)

9 = HVAC_FAN_ONLY (No heating or cooling allowed)

The value of nvoHeatCool is determined by the values of nviApplicMode, nviHeatCool and logic in the controller, as described in the following table.

Effective Heat/Cool Output

nviApplicMode	nviHeatCool	nvoHeatCool[1]
HVAC_AUTO	HVAC_AUTO	Determined by Controller
HVAC_NUL	HVAC_HEAT	HVAC_HEAT
	HVAC_MRNG_WRMUP	HVAC_MRNG_WRMUP
	HVAC_COOL	HVAC_COOL
	HVAC_NIGHT_PURGE	HVAC_NIGHT_PURGE
	HVAC_PRE_COOL	HVAC_PRE_COOL
	HVAC_OFF	HVAC_OFF
	HVAC_TEST	HVAC_TEST
	HVAC_EMERG_HEAT	HVAC_EMERG_HEAT
	HVAC_FAN_ONLY	HVAC_FAN_ONLY
	HVAC_NUL	Determined by Controller
HVAC_HEAT	Don't Care	HVAC_HEAT
HVAC_MRNG_WRMUP[3]	Don't Care[3]	HVAC_MRNG_WRMUP[3]
HVAC_COOL	Don't Care	HVAC_COOL
HVAC_NIGHT_PURGE	Don't Care	HVAC_NIGHT_PURGE
HVAC_PRE_COOL	Don't Care	HVAC_PRE_COOL
HVAC_OFF	Don't Care	HVAC_OFF
HVAC_TEST[1]	Don't Care	Manufacturer Defined[2]
HVAC_EMERG_HEAT	Don't Care	HVAC_EMERG_HEAT
HVAC_FAN_ONLY	Don't Care	HVAC_FAN_ONLY

Notes:

1 The " mode" field of nvoUnitStatus will typically report the same value as nvoHeatCool, unless nviApplicMode is HVAC_TEST. (See note 2)

2 The " mode" field of nvoUnitStatus will report HVAC_TEST. Only the value of nvoHeatCool is manufacturer-defined.

3 If nviApplicMode = HVAC_MRNG_WRMUP and nviHeatCool = HVAC_EMERG_HEAT, then nvoHeatCool = HVAC_EMERG_HEAT.

4 " Don't Care" = Any State

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

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.

Local Setpoint Output

network output SNVT_temp_p nvoSetpoint;

This output network variable is used to monitor the space temperature setpoint if a setpoint device is locally wired. If this setpoint is not locally wired, the output will send the invalid value.

Typical Range

The typical range is 10°C to 35°C. The value 0x7FFF=+327.67°C will be sent as an invalid value in case of a setpoint device failure.

When Transmitted

The variable is transmitted immediately when its value has changed significantly (manufacturer defined). Additionally, this network variable may also (as defined by the manufacturer) 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.

Local Setpoint Shift Output

network output SNVT_temp_setpt nvoSetptShift;

This output network variable is used to report a locally-determined shift of the effective heat/cool setpoints. For example, if the controller uses local outdoor air temperature compensation logic to shift the heat/cool setpoints, the amount of that shift (for each setpoint) is reported by nvoSetptShift. (Note: This output only reports a locally-calculated shift, and is not affected by nviSetptShift.) It is typically bound to a supervisory node for monitoring, or to nviSetptShift on another controller node to provide an equivalent setpoint shift in that controller.

Valid Range

	Minimum	**Maximum**
occupied_cool	-10°C	+10°C
standby_cool	-10°C	+10°C
unoccupied_cool	-10°C	+10°C
occupied_heat	-10°C	+10°C
standby_heat	-10°C	+10°C
unoccupied_heat	-10°C	+10°C

The valid range for each shift value is -10°C to +10°C. A value of 0°C indicates that there is no local shift in effect for the corresponding setpoint.

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

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.

Absolute Power Consumption Output

network output SNVT_power nvoLoadAbs;

This output network variable can used to indicate the current power consumption of the unit. Since this value is unsigned, the Terminal Load output (nvoTerminalLoad) must be used to determine if the power consumption is currently being used for heating or cooling. The determination of this value is manufacturer-defined, based on the type of unit and its application.

A manufacturer can choose to provide either nvoLoadAbs or nvoLoadAbsK (or both), based on the range required for the application.

Typical Range

The typical range is 0.0 to 6553.5 Watts.

When Transmitted

The variable is transmitted immediately when its value has changed significantly (manufacturer defined). Additionally, this network variable may also (as defined by the manufacturer) 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.

Terminal Load Output

network output SNVT_lev_percent nvoTerminalLoad;

This output indicates the current heat/cool energy demand of the unit. Positive values indicate that cooling energy is required (or in use) by the Chilled Ceiling Controller, while negative values indicate that

heating energy is required (or in use) by the Chilled Ceiling Controller.

The actual determination of the value of nvoTerminalLoad is manufacturer-defined. One typical method is to report the output of the heating/cooling control algorithm. Another method is to report only the heating/cooling energy required from a central source, such as a water loop or air handling unit.

Typical Range

The typical range is -100.0% to 100.0%.

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

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.

Primary Heat Output

network output SNVT_lev_percent nvoHeatPrimary;

This output network variable reflects the current level of the primary heat output (if hardwired) or can be used to control a remote primary heat source (valve, compressor, etc.).

Valid Range

The valid range is 0% to 100% of primary heat capacity. The value 0x7FFF = +163.835 % will be sent as an invalid value to indicate that no primary heat is used.

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

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.

Examples of Primary and Secondary Heat

Unit Type	Primary Heat	Secondary Heat
Fan Coil	Hydronic	Electric
Heat Pump	Compressor	Electric
VAV	Source Air	Electric/Hydronic
Rooftop	Electric/Gas	n/a

Secondary Heat Output

network output SNVT_lev_percent nvoHeatSecondary;

This output network variable reflects the current level of the secondary heat output (when present) or can be used to control a remote secondary heat source (valve, electric heat, etc.).

Valid Range

The valid range is 0% to 100% of secondary heat capacity. The value 0x7FFF = +163.835 % will be sent as an invalid value to indicate that no secondary heat is used.

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

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.

Primary Cool Output

network output SNVT_lev_percent nvoCoolPrimary;

This output network variable reflects the current level of the primary mechanical cooling output (if hardwired) or can be used to control a remote mechanical cooling source.

Valid Range

The valid range is 0% to 100% of primary cooling capacity. The value 0x7FFF = +163.835 % will be sent as an invalid value to indicate that no cooling is used.

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

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.

Secondary Cool Output

network output SNVT_lev_percent nvoCoolSecondary;

This output network variable reflects the current level of the secondary mechanical cooling output (if hardwired) or can be used to control a remote mechanical cooling source.

Valid Range

The valid range is 0% to 100% of secondary cooling capacity. The value 0x7FFF = +163.835% will be sent as an invalid value to indicate that no cooling is used.

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

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 indicates the space humidity in percent, if the Chilled Ceiling Controller Device has a locally wired humidity sensor.

Typical Range

The typical 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. 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 Dewpoint Temperature Output

network output SNVT_temp_p nvoSpaceDewPt;

This output network variable indicates the space dew point temperature. This value can be measured or calculated by the Chilled Ceiling Controller.

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

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
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.

Energy Hold Off Output

network output SNVT_switch nvoEnergyHoldOff;

This output indicates the state of an Energy Hold Off device that is hardwired to the controller. Refer to the Energy Hold Off Input.

Valid Range

State	Value	Energy Hold Off
0	n/a	Normal
1	200	Energy Hold Off
0xFF	n/a	Invalid

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
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.

Mandatory Configuration Properties

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 the Network Variable Outputs Table, as shown below:

Network Variable Output	Specified for Send Heartbeat in Table?	Result: Use Send Heartbeat?
Category 1	Yes	Yes
Category 2	No	Manufacturer-defined

Valid Range

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

Typical Default Value

0 (no automatic update)

SCPT Reference

SCPTmaxSendTime (49)

Occupancy Temperature Setpoints

network input config SNVT_temp_setpt nciSetpoints;

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.

Typical Range and Default Values

	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

SCPTsetPnts (60)

Optional Configuration Properties

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.

Valid Range

The valid range is any value between 0.0 sec and 6,553.4 sec. Setting nciMinOutTm = 0.0 disables the Minimum Send Time mechanism.

Typical Default Value

0 (no minimum send time)

SCPT Reference

SCPTminSendTime (52)

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 a specified network variable input before the Chilled Ceiling Controller 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 in the Network Variable Inputs Table and whether they are bound, as shown below:

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

Valid Range

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

Typical 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.

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

SCPT Reference
SCPTlocation (17)

Local Bypass Time

network input config SNVT_time_min nciBypassTime;

This configuration property defines the maximum amount of time that the controller can be in the Bypass (occupancy) mode following a single Bypass request from either a local (hardwired) bypass switch or nviOccManCmd. Additional Bypass requests can restart the timer.

Typical Range
The typical range is 0 to 240 minutes (4 hours). Setting nciBypassTime = 0 disables the Bypass function.

Typical Default Value
0 (no bypass allowed)

SCPT Reference
SCPTbypassTime (34)

Manual Override Time

network input config SNVT_time_min nciManualTime;

This configuration property is used to set the maximum time that the controller will stay in a manual mode that was requested by a network variable input, without receiving an update on that network variable. For example, if a override request is received on nviValveOverride, and an update is not received within the Manual Override Time, the controller will go back to the default value. Updates to the network variable input will restart the timer. The specific network variable inputs that this timer is used for is manufacturer-defined.

Typical Range

The typical range is 0 to 240 minutes (4 hours). Setting nciManualTime = 0 disables the timer function.

Typical Default Value

0 (no timer function)

SCPT Reference

SCPTmanovrTime (35)

Data Transfer

None specified.

Power-up State

Upon power-up the input network variables are set to their default values.

The output network variables are set to their initial values:

nvoSpaceTemp: 327.67 °C

nvoEffectOccup: OC_OCCUPIED

nvoSetpoint: 327.67 °C

nvoLoadAbs: 0 W

nvoTerminalLoad: 0%

nvoHeatPrimary: 0%

nvoHeatSecondary: 0%

nvoCoolPrimary: 0%

nvoCoolSecondary: 0%

nvoSpaceRH 163.84%

nvoSpaceDewPt: 327.67 °C

nvoEnergyHoldOff: State = 0xFF, Value = 0

Boundary and Error Conditions

None specified.