
Version 1.1
January 2015
Profile Number : 8540



LONMARK®

Functional Profile:

Wall Unit

SFPTWallUnit

Revision History

Version	Date	Summary of Changes
1.0	4/19/2014	Initial Version
1.1	1/18/2015	Correction: "BIT_8 Manufacture Alarm 2 (optional)" deleted from the documented in_alarm element of nvoUnitStatus. BIT_8 was not in the original version 1 profile resource files and also is not defined in the underlying type definition (SNVT_HVAC_STATUS). It was determined upon review the correction to the profile document is to remove the reference to the non-existent element.

Example Usage

The Wall Unit profile is used for equipment designed to provide compact, single unit heating and cooling capability, often used in a portable building or trailers where no additional heating or cooling source is available or needed. Wall Units combine both heating and cooling capability into a single, compact unit with an integrated controller and are typically either gas or electric based. This profile defines the mandatory and optional network variables, configuration properties, defaults, alarms, and other items necessary to implement an interoperable Wall Unit using the ISO-14908 standard communication protocol and according to the LonMark Interoperability Guidelines as published by LonMark International and the standards adopted by ISO, CEN, and ANSI/CEA. Note that if optional variables are required on a specific project, the specifier must notate that in the project and equipment design specifications.

Object Details

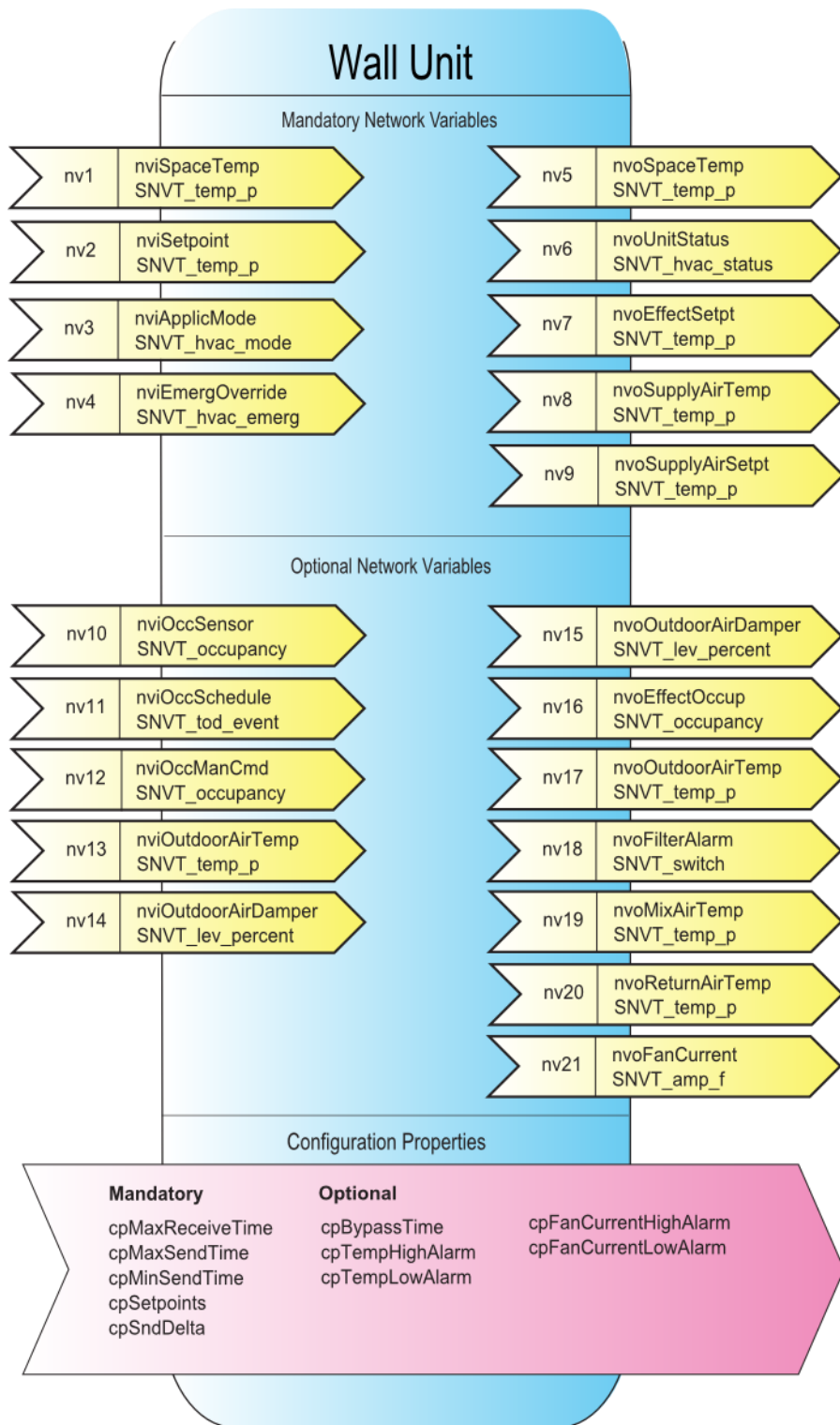


Figure 3 Object Details

Table 1 SNVT Details

NV# (M/O)	Data Point Variable Name	SNVT Name	SNVT Index	Description	SNVT Default Value	SNVT Def. Service Type
1(M)	nviSpaceTemp	SNVT_temp_p	105	Space Temperature Input	+327.67°C/0x7FFF	
2(M)	nviSetpoint	SNVT_temp_p	105	Temperature Setpoint Input (absolute)	+327.67°C/0x7FFF	
3(M)	nviApplicMode	SNVT_hvac_mode	108	Application Mode Input	HVAC_AUTO	
4(M)	nviEmergOverride	SNVT_hvac_emerg	103	Emergency Override Input	EMERG_NORMAL	
5(M)	nvoSpaceTemp	SNVT_temp_p	105	Effective Space Temperature Output	+327.67°C/0x7FFF	ACK
6(M)	nvoUnitStatus	SNVT_hvac_status	112	Unit Status Output	see note 1	UNACK
7(M)	nvoEffectSetpt	SNVT_temp_p	105	Effective Setpoint Output	+327.67°C/0x7FFF	UNACK
8(M)	nvoDischargeAirTemp	SNVT_temp_p	105	Discharge Air Temperature Output	+327.67°C/0x7FFF	UNACK
9(M)	nvoDischargeAirSetpt	SNVT_temp_p	105	Discharge Air Temp. Setpoint Output	+327.67°C/0x7FFF	UNACK
10(O)	nviOccSensor	SNVT_occupancy	109	Occupancy Sensor Input	OC_NUL	
11(O)	nviOccSchedule	SNVT_tod_event	128	Occupancy Scheduler Input	OC_NUL,OC_NUL,OC_NUL	
12(O)	nviOccManCmd	SNVT_occupancy	109	Occupancy Override Input	OC_NUL	
13(O)	nviOutdoorAirTemp	SNVT_temp_p	105	Outdoor Air Temperature Input	+327.67°C/0x7FFF	
14(O)	nviOutdoorAirDamper	SNVT_lev_percent	81	Outdoor Air Damper Input	163.835 %/0x7FFF	
15(O)	nvoOutdoorAirDamper	SNVT_lev_percent	81	Outdoor Air Damper Output Position	163.835 %/0x7FFF	UNACK
16(O)	nvoEffectOccup	SNVT_occupancy	109	Effective Occupancy Output	OC_NUL	UNACK
17(O)	nvoOutdoorAirTemp	SNVT_temp_p	105	Outdoor Air Temperature Output	+327.67°C/0x7FFF	UNACK
18(O)	nvoFilterAlarm	SNVT_switch	95	Filter Alarm Output	-	RPT
19(O)	nvoMixAirTemp	SNVT_temp_p	105	Mixed Air Temperature	+327.67°C/0x7FFF	RPT
20(O)	nvoReturnAirTemp	SNVT_temp_p	105	Return Air Temperature	+327.67°C/0x7FFF	RPT
21(O)	nvoFanCurrent	SNVT_amp_f	48	Fan current	-	RPT

note1: nvoUnitStatus	Element	Value
	mode	Manufacturer defined
	heat_output_primary	0X7FFF
	heat_output_secondary	0X7FFF
	cool_output	0X7FFF

Table 2 SCPT Details

NV #	Data Point Variable Name	Point Network Transaction - SCPT's								Pt Alarm SCPT			
		max Rcv Time	max Rcv Time def	max Send Time	max Send Time def	min Send Time	min Send Time default	snd Delta	snd Delta default	low Limit1	high Limit1	Occ Temp Setpoints	Local Bypass Time
1(M)	nviSpaceTemp	M	300	-	-	-	-	-	-	-	-	-	-
2(M)	nviSetpoint	M	0	-	-	-	-	-	-	-	-	-	-
3(M)	nviApplicMode	M	0	-	-	-	-	-	-	-	-	-	-
4(M)	nviEmergOverride	-	-	-	-	-	-	-	-	-	-	-	-
5(M)	nvoSpaceTemp	-	-	M	90	M	10	M	0.1	O	O	-	-
6(M)	nvoUnitStatus	-	-	M	90	M	5	-	-	-	-	-	-
7(M)	nvoEffectSetpt	-	-	M	90	-	-	-	-	-	-	-	-
8(M)	nvoDischargeAirTemp	-	-	M	90	M	5	M	0.1	-	-	-	-
9(M)	nvoDischargeAirSetpt	-	-	M	90	M	5	M	0.1	-	-	-	-
10(O)	nviOccSensor	M	300	-	-	-	-	-	-	-	-	-	-
11(O)	nviOccSchedule	M	300	-	-	-	-	-	-	-	-	-	-
12(O)	nviOccManCmd	-	-	-	-	-	-	-	-	-	-	-	-
13(O)	nviOutdoorAirTemp	M	300	-	-	-	-	-	-	-	-	-	-
14(O)	nviOutdoorAirDamper	M	300	-	-	-	-	-	-	-	-	-	-
15(O)	nvoOutdoorAirDamper	-	-	M	90	M	60	M	1(%)	-	-	-	-
16(O)	nvoEffectOccup	-	-	M	90	-	-	-	-	-	-	-	-
17(O)	nvoOutdoorAirTemp	-	-	M	90	M	10	M	0.1	-	-	-	-
18(O)	nvoFilterAlarm	-	-	M	90	-	-	-	-	-	-	-	-
19(O)	nvoMixAirTemp	-	-	M	90	M	5	M	1	-	-	-	-
20(O)	nvoReturnAirTemp	-	-	M	90	M	10	M	1	-	-	-	-
21(O)	nvoFanCurrent	-	-	M	90	M	10	M	0.1 A	O	O	-	-

Additional Object Scoped Configuration Properties						
CP Description	M/O	Default NV Name	Type Reference	SCPT Reference	Index	Default Value
Occupancy Temp Setpoints	M	cpSetpoints	SNVT_temp_setpt	SCPTsetPnts	60	See profile
Local Bypass Time	O	cpBypassTime	SNVT_time_min	SCPTbypassTime	34	0

Mandatory Network Variables

Space Temperature Input

```
network input sd_string("@p|1") 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 Wall Unit 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.

Configuration Considerations

See Table 2

Temperature Setpoint Input (absolute)

```
network input sd_string("@p|2") 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 cpSetpoints.

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. 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 powerup. This network variable input does not use the Receive Heartbeat function. When the default value is in effect, the Wall Unit will use the configuration property nciSetpoints.

Configuration Considerations

See Table 2

Application Mode Input

```
network input sd_string("@p|3") SNVT_hvac_mode  
nviApplicMode;
```

This network variable input is used to coordinate the Wall Unit 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 defines the mandatory control of the unit from an external controller. The following defines the required functionality:

HVAC_AUTO – put the unit into normal operational mode, local control

HVAC_OFF – Overrides the local control mode and turns the unit off (example: a fire alarm input requires the unit to turn off in the event of a fire).

HVAC_FAN_ONLY – Overrides the local control and turns the fan on.

All other modes are manufacturer defined options.

Valid Range

0 = HVAC_AUTO (Mode determined by unit) - Mandatory

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) - Mandatory

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

8 = HVAC_EMERG_HEAT (Emergency heat)

9 = HVAC_FAN_ONLY (No heating or cooling allowed) - Mandatory

12 = HVAC_MAX_HEAT (Maximum heating - VAV)

13 = HVAC_ECONOMY

14 = HVAC_DEHUMID (Dehumidification)

15 = HVAC_CALIBRATE (Calibration mode - manufacturer defined)

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.

Configuration Considerations

See Table 2

Emergency Override Input

```
network input sd_string("@p|4") SNVT_hvac_emerg
nviEmergOverride;
```

This input network variable is used to command the device into different emergency modes. It is typically set by a supervisory node. The response to each mode is manufacturer-specific, based on the equipment type. An example of a possible application is given below.

Valid Range

The valid range is described in the table below:

0 = EMERG_NORMAL: Normal operation

1 = EMERG_PRESSURIZE: Start the PRESSURIZE operation

2 = EMERG_DEPRESSURIZE: Start the DEPRESSURIZE operation

3 = EMERG_PURGE: Start the PURGE operation

4 = EMERG_SHUTDOWN: SHUTDOWN all unit functions

0xFF = EMERG_NUL: Invalid mode (same as EMERG_NORMAL).

Example: Typical usage of these modes is shown in the table below.

	Supply Fan	Outdoor Air Damper	Exhaust Fan	Exhaust Damper
Pressurize	On	Open	Off	Closed
Depressurize	Off	Closed	On	Open
Purge	On	Open	On	Open
Shutdown	Off	Closed	Off	Closed

Default Value

The default value is EMERG_NORMAL. This value will be adopted at power-up, until an update is received. This network variable input does not use the Receive Heartbeat function.

Configuration Considerations

None specified.

Effective Space Temperature Output

```
network output sd_string("@p|5") SNVT_temp_p  
nvoSpaceTemp;
```

This output network variable is used to monitor the effective space temperature that the Wall Unit is using for control. If the input nviSpaceTemp has a valid value, this output will relay 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.

Default Value

The value 0x7FFF=+327.67°C will be used as an invalid value in case of a sensor failure.

Configuration Considerations

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

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is acknowledged.

Unit Status Output

```
network output sd_string("@p|6") SNVT_hvac_status  
nvoUnitStatus;
```

This output network variable is available to report the Wall Unit 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.

Valid Range

mode: 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)
- 12 = HVAC_MAX_HEAT (Maximum heating - VAV)
- 13 = HVAC_ECONOMY
- 14 = HVAC_DEHUMID (Dehumidification)
- 15 = HVAC_CALIBRATE (Calibration mode - manufacturer defined)
- 16 = HVAC_EMERG_COOL (Emergency cool mode)
- 17 = HVAC_EMERG_STEAM (Emergency steam mode)
- 18 = HVAC_MAX_COOL
- 19 = HVAC_HVC_LOAD
- 20 = HVAC_NO_LOAD

The value of 'mode' is determined by the values of nviApplicMode, and logic in the controller as manufactory defined.

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.

Alarm Value

The SNVT_hvac_status.in_alarm byte will be used in the Wall Unit as Bit-fields to identify various simultaneously occurring alarms:

BIT_0: TEMP HIGH: An alarm output is triggered when space temperature exceeds cpHighTempAlarm value (physical alarm from temp sensor). Space temperature is the temperature reflected by the value of nvoSpaceTemp.

BIT_1: TEMP LOW: An alarm output is triggered when a space temperature drops below cpLowTempAlarm value. (physical alarm from temp sensor)

BIT_2: COMPRESSOR ALARM: This alarm is triggered from any compressor in the system

BIT_3: FAN CURRENT ALARM: An alarm output is triggered when the fan current or fan on/off state is in alarm as defined by the cpLow/HighFanCurrentAlarm limit or fan on/off alarm state is defined (physical alarm from fan current sensor or hard wired point)

BIT_4: FAN COMMAND FAILURE: An alarm output is triggered when the fan change of state command has failed as defined by the manufacturer (logical alarm)

BIT_5: Manufacturer Defined Alarm 1 (optional)

BIT_6: SAFETY INTERLOCK ALARM: An alarm output is triggered when the request for heating/cooling command is not activated by the wall unit (logical alarm)

BIT_7: FILTER ALARM

Default Value

mode: manufacturer defined.

heat_output_primary: 0x7FFF (INVALID)

heat_output_secondary: 0x7FFF (INVALID)

cool_output: 0x7FFF (INVALID)

econ_output: 0x7FFF (INVALID)
fan_output: 0x7FFF (INVALID)
in_alarm: 0 Means there is no alarm.

Configuration Considerations

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

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Effective Setpoint Output

```
network output sd_string("@p|7") SNVT_temp_p  
nvoEffectSetpt;
```

This output network variable is used to monitor the effective temperature setpoint which may depend on nciSetpoints, nvoEffectOccup, nviSetpoint, nviApplicMode, 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.

Default Value

The default value of SNVT_temp_p.

Configuration Considerations

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

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable `cpMaxSendTime`.

Default Service Type

The default service type is unacknowledged.

Discharge Air Temperature Output

```
network output sd_string("@p|8") SNVT_temp_p  
nvoDischargeAirTemp;
```

This output network variable is used to monitor the temperature of the discharge air that leaves the Wall Unit, if the unit controller provides a hardwired temperature sensor for this purpose.

Typical Range

The typical range is 0°C to 100°C. The value 0x7FFF=+327.67°C will be sent as an invalid value in case of a sensor failure.

Default Value

The default value of `SNVT_temp_p`.

Configuration Considerations

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

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable `cpMaxSendTime`.

Default Service Type

The default service type is unacknowledged.

Discharge Air Temperature Setpoint Output

```
network output sd_string("@p|9") SNVT_temp_p  
nvoDischargeAirSetpt;
```

This output network variable is used to monitor the discharge air temperature setpoint.

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 WALL UNIT failure.

Default Value

The default value of SNVT_temp_p.

Configuration Considerations

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

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Optional Network Variables

Occupancy Sensor Input

```
network input sd_string("@p|10") 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 Wall Unit 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.

Configuration Considerations

See Table 2

Occupancy Scheduler Input

```
network input sd_string("@p|11") SNVT_tod_event
nviOccSchedule;
```

This input network variable is used to command the Wall Unit 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 Wall Unit Controller should operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

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

3 = OC_STANDBY: The Wall Unit 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 Wall Unit Controller will operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

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

3 = OC_STANDBY: The Wall Unit 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.

Configuration Considerations

See Table 2

Occupancy Override Input

```
network input sd_string("@p|12") SNVT_occupancy
nviOccManCmd;
```

This input network variable is used to command the Wall Unit Controller into different occupancy modes. It is typically sent by a wall-mounted occupantinterface-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 Wall Unit Controller should operate in the occupied mode as defined by the manufacturer (e.g. occupied setpoint).

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

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

3 = OC_STANDBY: The Wall Unit 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.

Configuration Considerations

See Table 2

Outdoor Air Temperature Input

```
network input sd_string("@p|13") SNVT_temp_p  
nviOutdoorAirTemp;
```

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. The unit may also have a locally wired outdoor air temperature sensor. Valid values of nviOutdoorAirTemp 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 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.

Configuration Considerations

See Table 2

Outdoor Air Damper Position Input

```
network input sd_string("@p|14") SNVT_lev_percent  
nviOutdoorAirDamper;
```

This input network variable is used to provide an outdoor air damper position.

Valid Range

The valid range is 0% to 100%. The value 0x7FFF = +163.84 % 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.

Configuration Considerations

See Table 2

Outdoor Air Damper Output Position

```
network output sd_string("@p|15") SNVT_lev_percent  
nvoOutdoorAirDamper;
```

This output network variable reflects the current position of the outdoor supply air damper controlled by the Wall Unit controller.

Valid Range

The valid range is 0% to 100% outdoor air damper position. The value 0x7FFF = +163.835 % will be sent as an invalid value to indicate that no outdoor air damper is used.

Default Value

0x32767.

Configuration Considerations

See Table 2.

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Effective Occupancy Output

```
network output sd_string("@p|16") 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 Unit Heater 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	nviOccSensor ²	nviOccSchedule ^{4 6}	nvoEffectOccup
OC_OCCUPIED	Don't Care	Don't Care	OC_OCCUPIED
OC_UNOCCUPIED	Don't Care	Don't Care	OC_UNOCCUPIED
OC_STANDBY	Don't Care	Don't Care	OC_STANDBY
OC_BYPASS ¹	Don't Care	OC_OCCUPIED	OC_OCCUPIED
	OC_OCCUPIED ³	Don't Care	OC_OCCUPIED
	any other case		OC_BYPASS
OC_NUL	Don't Care	OC_OCCUPIED	OC_OCCUPIED
	OC_UNOCCUPIED	OC_UNOCCUPIED	OC_UNOCCUPIED
	OC_UNOCCUPIED	OC_STANDBY	OC_STANDBY
	OC_UNOCCUPIED	OC_NUL	OC_UNOCCUPIED
	OC_OCCUPIED	OC_UNOCCUPIED	OC_OCCUPIED ⁷
	OC_OCCUPIED	OC_STANDBY	OC_OCCUPIED
	OC_OCCUPIED ³	OC_NUL	OC_OCCUPIED
	OC_BYPASS ¹	OC_UNOCCUPIED ⁶	OC_BYPASS ⁷
	OC_BYPASS ¹	OC_STANDBY	OC_BYPASS
	OC_BYPASS ¹	OC_NUL	OC_BYPASS

Notes:

- 1 - OC_BYPASS can be initiated by either nviOccManCmd, nviOccSensor or a local input. nvoEffectOccup will only be OC_BYPASS for the duration of the Local Bypass Time (cpBypassTime), until reinitiated 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_UNOCCUPIED.
- 4 - For nviOccSchedule, this refers to the “current state” field.
- 5 - “Don't Care” = Any State
- 6 - Since OC_BYPASS does not make sense for a schedule input, it is interpreted as OC_OCCUPIED.
- 7 - Can be interpreted as OC_UNOCCUPIED to prevent off-hours occupancy detection (optional/manufacture specific).

Valid Range

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

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

2 = OC_BYPASS: The Unit Heater should operate in the occupied mode for a period of time defined by cpBypassTime.

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

Default Value

0xFF = OC_NUL.

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.

Default Service Type

The default service type is unacknowledged.

Outdoor Air Temperature Output

```
network output sd_string("@p|17") SNVT_temp_p
nvoOutdoorAirTemp;
```

This output network variable is used to monitor the outdoor air temperature if the unit controller provides a hardwired temperature sensor for this purpose.

Typical Range

The typical range is -50°C to 70°C. The value 0x7FFF = +327.67°C will be handled as an invalid value in case of a sensor failure.

Default Value

0x7FFF.

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is unacknowledged.

Filter Alarm Output

```
network output sd_string("@p|18") bind_info(ackd)
SNVT_switch nvoFilterAlarm;
```

This output network variable is used to report an filter alarm.

Valid Range

The valid range of SNVT_switch.

Default Value

No default value

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.

- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is repeated.

Mixed Air Temperature Output

```
network input sd_string("@p|19") SNVT_temp_p  
nvoMixAirTemp;
```

This output network variable is used to monitor the mixed air temperature if the unit controller provides a hardwired temperature sensor for this purpose.

Valid Range

The valid range is -40°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).

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is repeated.

Return Air Temperature Output

```
network input sd_string("@p|20") SNVT_temp_p
nvoReturnAirTem;
```

This output network variable is used to monitor the return air temperature if the unit controller provides a hardwired temperature sensor for this purpose.

Valid Range

The valid range is -40°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).

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable cpMaxSendTime.

Default Service Type

The default service type is repeated.

Fan Current Output

```
network output sd_string("@p|21") bind_info(ackd)
SNVT_amp_f nvoFanCurrent;
```

This output network variable is used to report the actual current of the fan.

Valid Range

The valid range of SNVT_amp_f.

Default Value

No default value

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

- Upon node reset, after obtaining valid data.
- When the 'value' has changed.
- Regularly at the interval defined by the configuration variable `cpMaxSendTime`.

Default Service Type

The default service type is repeated.

Configuration Properties

Receive Heartbeat (Mandatory)

```
network input config sd_string("&2,i.j.k,0\x80,48")
SNVT_time_sec cpMaxRcvTime;
```

This input configuration property sets the maximum period of time that can expire before the functional block will use the default values for the following network variables:

nv1 – nviSpaceTemp

nv2 - nviSetpoint

nv3 - nviApplicMode

nv10 – nviOccSensor

nv11 – nviOccSchedule

nv13 – nviOutdoorAirTemp

nv14 - nviOutdoorAirDamper

i,j,k are the indices of the NVs in relation to their declaration order within the device, when implemented.

Valid Range

The valid range is 1.0 to 3600.0 seconds.

Default Value

The default value is: see Table 2

Setting SCPTmaxRcvTime to zero disables the receive failure detect mechanism.

Configuration Requirements/Restrictions

This CP has no modification restrictions (no_restrictions). It can be modified at any time.

SCPT Reference

SCPTmaxRcvTime (48)

Send Heartbeat (Mandatory)

```
network input config sd_string("&2,i.j.k,0\x80,49")
SNVT_time_sec cpMaxSendTime;
```

This input configuration property sets the maximum period of time that can expire before the Object will automatically update the following network variables:

- nv5 - nvoSpaceTemp
- nv6 - nvoUnitStatus
- nv7 - nvoEffectSetpt
- nv8 – nvoDischargeAirTemp
- nv9 – nvoDischargeAirSetpt
- nv15 – nvoOutdoorAirDamper
- nv16- nvoEffectOccup
- nv17 – nvoOutdoorAirTemp
- nv18- nvoFilterAlarm
- nv19 - nvoMixAirTemp
- nv20- nvoReturnAirTemp
- nv21 - nvoFanCurrent

i,j,k are the indices of the NVs in relation to their declaration order within the device, when implemented.

Valid Range

The valid range is 1.0 to 3600.0 seconds.

Values outside this range are invalid and will disable the automatic update mechanism. A value of zero (0) will be used for the internal timer in cases where configured values are above 3600.0 seconds.

Default Value

The default value is: see Table 2

Configuration Requirements/Restrictions

This CP has no modification restrictions (no restrictions). It can be modified at any time.

SCPT Reference

SCPTmaxSendTime (49)

Send Throttle (Mandatory)

```
config network input sd_string("&2,i.j.k,0\x80,52")
SNVT_time_sec cpMinSendTime;
```

This input configuration property sets the minimum period of time that must expire before the functional block will allow updates of the following network variables to propagate across the network:

nv5 - nvoSpaceTemp

nv6 - nvoUnitStatus

nv8 – nvoDischargeAirTemp

nv9 – nvoDischargeAirSetpt

nv15 - nvoOutdoorAirDamper

nv17 - nvoOutdoorAirTemp

nv19 - nvoMixAirTemp

nv20 - nvoReturnAirTemp

nv21 – nvoFanCurrent

i,j,k are the indices of the NVs in relation to their declaration order within the device, when implemented.

Valid Range

The valid range is 1.0 to 3600.0 seconds.

Default Value

The default value is: see Table 2

Setting SCPTminSendTime to zero disables the throttling mechanism.

Configuration Requirements/Restrictions

This CP has no modification restrictions (no_restrictions). It can be modified at any time.

SCPT Reference

SCPTminSendTime (52)

Send on Delta (Mandatory)

```
config network input sd_string("&2,i.j.k,0\x80,27")
SNVT_time_sec cpMinSendTime;
```

This input configuration property sets the minimum change required to force transmission of the output value to propagate across the network:

nv5 - nvoSpaceTemp

nv6 - nvoUnitStatus

nv8 – nvoDischargeAirTemp

nv9 – nvoDischargeAirSetpt

nv15 - nvoOutdoorAirDamper

nv17 - nvoOutdoorAirTemp

nv19 - nvoMixAirTemp

nv20 - nvoReturnAirTemp

nv21 – nvoFanCurrent

i.j.k are the indices of the NVs in relation to their declaration order within the device, when implemented.

Valid Range

The valid range for this configuration property is any value within the defined limits of the data type in question.

Default Value

The default value is: see Table 2

Setting SCPsndDelta to zero disables the sending mechanism.

Configuration Requirements/Restrictions

This CP has no modification restrictions (no_restrictions). It can be modified at any time.

SCPT Reference

SCPTsndDelta (27)

Occupancy Temperature Setpoints (Mandatory)

```
network input config sd_string("&1,p,0\x80,60")
SNVT_temp_setpt cpSetpoints;
```

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.

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

Configuration Requirements/Restrictions

None

SCPT Reference

SCPTsetPnts (60)

Local Bypass Time (Optional)

```
network input config sd_string("&1,p,0\x80,34")
SNVT_time_min cpBypassTime;
```

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 cpBypassTime = 0 disables the Bypass function.

Typical Default Value

0 (no bypass allowed)

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTbypassTime (34)

Temp High Limit Alarm (Optional)

```
network input config sd_string("&1,p,0\x80,9")
SNVT_xxx cpTempHighLimitAlarm;
```

This configuration property defines the maximum temperature when an alarm in the SNVT_hvac_status.in_alarm BIT_0 will be generated.

Typical Range

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

Typical Default Value

None

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPT highLimit1 (9)

Temp Low Limit Alarm (Optional)

```
network input config sd_string("&1,p,0\x80,10")
SNVT_xxx cpTempLowLimitAlarm;
```

This configuration property defines the minimum temperature when an alarm in the SNVT_hvac_status.in_alarm BIT_1 will be generated.

Typical Range

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

Default Value

None

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPT lowLimit1 (10)

Fan Current High Limit Alarm (Optional)

```
network input config sd_string("&1,p,0\x80,9")
SNVT_xxx cpHighCurrentFanAlarm;
```

This configuration property defines the maximum fan current when an alarm in the SNVT_hvac_status.in_alarm BIT_3 will be generated.

Typical Range

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

Typical Default Value

None

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPT highLimit1 (9)

Fan Current Low Limit Alarm (Optional)

```
network input config sd_string("&1,3,0\x80,10")
SNVT_xxx cpLowCurrentFanAlarm;
```

This configuration property defines the minimum current when an alarm in the SNVT_hvac_status.in_alarm BIT_3 will be generated.

Typical Range

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

Default Value

None

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPT lowLimit1 (10)

Key for Unresolved References

i,j,k are the indices of the CP-associated NVs in relation to their declaration order within the node, when implemented.

p is this Object's index relative to the node sd_string declaration, when implemented.

Power-up State

There is no immediate network action on Power-up State.

Boundary and Error Conditions

None specified.

Additional Considerations

None specified.

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