LONMARK®
Functional Profile:
Unit Heater

SFPTUnitHeater

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 Unit Heater profile is used for equipment designed to provide compact, single unit heating capability, often used in a portable building or trailers where no additional heating source is available or needed. Unit Heaters can be electric, glycol, or gas based heating units. This profile defines the mandatory and optional network variables, configuration properties, defaults, alarms, and other items necessary to implement an interoperable Unit Heater 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.
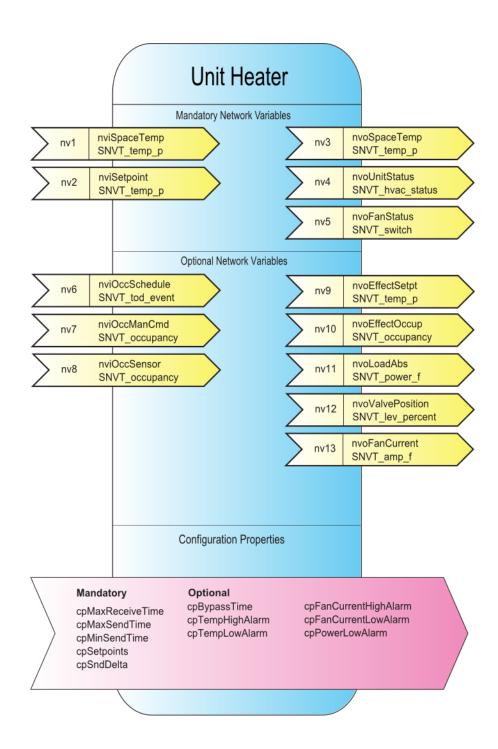
Object Details

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)	nvoSpaceTemp	SNVT_temp_p	105	Effective Space Temperature Output	+327.67°C/0x7FFF	UNACK
4 (M)	nvoUnitStatus	SNVT_hvac_status	112	Unit Status Output	see **note 1**	UNACK
5 (M)	nvoFanStatus	SNVT_switch	95	Fan Status Output	-	RPT
6 (O)	nviOccSchedule	SNVT_tod_event	128	Occupancy Scheduler Input	see **note 1**	-
7 (O)	nviOccManCmd	SNVT_occupancy	109	Occupancy Override Input	OC_NUL	-
8 (O)	nviOccSensor	SNVT_occupancy	109	Occupancy Sensor Input	OC_NUL	-
9 (O)	nvoEffectSetpt	SNVT_temp_p	105	Effective Setpoint Output	+327.67°C/0x7FFF	UNACK
10 (O)	nvoEffectOccup	SNVT_occupancy	109	Effective Occupancy Output	OC_NUL	UNACK
11 (O)	nvoLoadAbs	SNVT_power_f	27	Absolute Power Consumption Output	0.0 Watts	UNACK
12 (O)	nvoValvePosition	SNVT_lev_percent	81	Valve Position	0x7FFF	UNACK
13(O)	nvoFanCurrent	SNVT_amp_f	48	Fan Current Output	NAN	RPT

note1: nvoUnitStatus

Element	Value (default)
mode	Manufacturer defined
heat_output_primary	0X7FFF
heat_output_secondary	0X7FFF
cool_output	0X7FFF

Default Service Types [UNACK = Unacknowledged Service, ACK = Acknowledged, RPT = Repeated]

Table 2 Configuration Property (CP) 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)	nvoSpaceTemp		-	-	M	300	M	10	M	0.1	O	O	-	-
4 (M)	nvoUnitStatus		-	-	M	0	M	5	-	-	-	-	-	-
5 (M)	nvoFanStatus		-	-	M	300	M	10	M	1(%)	-	-	-	-
6 (O)	nviOccSchedule		M	300	-	-	-	-	-	-	-	-	-	-
7 (O)	nviOccManCmd		-	-	-	-	-	-	-	-	-	-	-	-
8 (O)	nviOccSensor		M	300	-	-	-	-	-	-	-	-	-	-
9 (O)	nvoEffectSetpt		-	-	M	300	-	-	-	-	-	-	-	-
10 (O)	nvoEffectOccup		-	-	M	300	-	-	-	-	-	-	-	-
11 (O)	nvoLoadAbs		-	-	M	300	M	10	M	1(%)	O	-	-	-
12 (O)	nvoValvePosition		-	-	M	300	M	10	O	1%	-	-	-	-
13(O)	nvoFanCurrent		-	-	M	30	M	10	O	-	O	O	-	-

Object Scoped Configuration Properties (applied to object)						
CP Description	M/O	Default NV Name	Type Referfence	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

Other Configuration Properties						
Elect Heat Low Power Alarm	0	cpPowerLowAlarm	SNVT_xxx (NV12)	SCPTlowLimit1	10	None

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 Unit Heater 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.

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 Unit Heater will use the configuration property nciSetpoints.

Configuration Considerations

See Table 2.

Effective Space Temperature Output

```
network output sd_string("@p|3") SNVT_temp_p
nvoSpaceTemp;
```

This output network variable is used to monitor the effective space temperature that the Unit Heater 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.

Default Value

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

Configuration Considerations

See Table 2

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 (cpMaxSendTime) configuration value.

Default Service Type

See Table 1.

Unit Status Output

```
network output sd_string("@p|4") SNVT_hvac_status
nvoUnitStatus;
```

This output network variable is available to report the Unit Heater status. It combines the operating mode, the capacity of heating 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: HVAC_HEAT, HVAC_MRNG_WRMUP, HVAC_NIGHT_PURGE, , HVAC_OFF, HVAC_TEST, HVAC_EMERG_HEAT, HVAC_FAN_ONLY, HVAC_MAX_HEAT.

heat_output_primary: 0-100%, 0x7FFF (INVALID)

heat_output_secondary: 0-100%, 0x7FFF (INVALID)

cool_output: 0-100%, 0x7FFF (INVALID)

should be always set to the invalid value

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.

==*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.

in_alarm will: See the Alarm Value on the next page

Alarm Value

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

BIT_0: TEMP HIGH: An alarm output is triggered when a high temperature cpTempHighAlarm is reached (physical alarm from temp sensor)

BIT_1: TEMP LOW: An alarm output is triggered when a low temperature cpTempLowAlarm is reached (physical alarm from temp sensor)

BIT_2: FLAME ROLLOUT: An alarm output is triggered when a gas unit heater flame is out (physical alarm from flame out detector)

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 cpFanCurrentLow/HighAlarm 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: ELECTRIC HEATER CURRENT TOO LOW: An alarm output is triggered when the current of the electric heating element is too low as defined by the manufacturer (cpPowerLowAlarm or physical alarm from element sensor)

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

BIT_7: Manufacturer Defined Alarm 1 (optional)

Configuration Considerations

See Table 2.

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 (cpMaxSendTime) configuration value.

Default Service Type

See Table 1.

Fan Status Output

```
network output sd_string("@p|5") bind_info(ackd)
SNVT_switch nvoFanStatus;
```

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

Valid Range

The valid range of SNVT_switch.

Default Value

No default value

Configuration Considerations

This value will be updated no faster than specified by the Send Throttle (nciMinSendTime) configuration property, if used.

When Transmitted

The output variable is transmitted:

· Upon node reset, after obtaining valid data.

· See Table 2.

Default Service Type

See Table 1.

Optional Network Variables

Occupancy Scheduler Input

```
network input sd_string("@p|6") SNVT_tod_event
nviOccSchedule;
```

This input network variable is used to command the UnitHeater 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 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).

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

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

3 = OC_STANDBY: The Unit Heater 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|7") SNVT_occupancy
nviOccManCmd;
```

This input network variable is used to command the Unit Heater 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 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).

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

Occupancy Sensor Input

```
network input sd_string("@p|8") 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 Unit Heater, 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

Effective Setpoint Output

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

This output network variable is used to monitor the effective temperature setpoint which may depend on nciSetpoints, nvoEffectOccup, nviSetpoint and any local setpoint adjustment. For example, if the occupancy state is unoccupied and the heat 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. (See Table 1.)

Configuration Considerations

See Table 2

When Transmitted

The output variable is transmitted:

 • Upon node reset, after obtaining valid data.

 • See Table 2

Default Service Type

See Table 1.

Effective Occupancy Output

```
network output sd_string("@p|10") 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_UNOCCUPED to prevent off-hours occupancy detection (optional/manufacturer 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

See Table 1.

Configuration Considerations

See Table 2.

When Transmitted

See Table 2.

Default Service Type

See Table 1.

Absolute Power Consumption Output

```
network output sd_string("@p|11") SNVT_power_f
nvoLoadAbs;
```

This output network variable can used to indicate the current power consumption of the Unit Heater that uses Electrical Energy.

Valid Range

The valid range of SNVT_power_f.

Default Value

See Table 1.

Configuration Considerations

See Table 2.

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When Transmitted

The output variable is transmitted:

• Upon node reset, after obtaining valid data.

• See Table 2.

Default Service Type

See Table 1.

Valve Position Output

```
network output sd_string("@p|12") bind_info(unackd)
SNVT_lev_percent nvoValvePosition;
```

This output network variable provides the calculated position relative to the maximum stroke length. This network variable is for the Unit Heater uses Glycol or Steam as the heating source.

Valid Range

0 .. 100.00% (0.005% or 50 ppm). The value 0x7FFF represents invalid data.

Default Value

See Table 1.

Configuration Considerations

See Table 2.

When Transmitted

See Table 2.

Default Service Type

The default service type is unacknowledged.

Fan Current Output

```
network output sd_string("@p|13") 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

See Table 1.

Configuration Considerations

See Table 2.

Default Service Type

See Table 1.

Configuration Properties

Receive Heartbeat (Mandatory)

```
network input config sd_string("&2,i,j,k,l,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

nv6 - nviOccSchedule

nv8 – nviOccSensor

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

See Table 2.

Setting SCPTmaxRcvTime to zero disables the receive failure detect mechanism.

Configuration Requirements/Restrictions

See Table 2.

SCPT Reference

SCPTmaxSendTime (49)

Send Heartbeat (Mandatory)

```
network input config
sd_string("&2,i,j,k,l,m,n,o,p,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:

nv3 - nvoSpaceTemp

nv4 – nvoUnitStatus

nv5 - nvoFanStatus

nv9 – nvoEffectSetpt

nv10 – nvoEffectOccup

nv11 – nvoLoadAbs

nv12 - nvoValvePosition

nv13 - 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 0.0 (no automatic update).

Configuration Requirements/Restrictions

None.

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:

nv3 – nvoSpaceTemp

nv4 – nvoUnitStatus

nv5 – nvoFanStatus

nv11- nvoLoadAbs

nv12 – nvoValvePosition

nv13 - 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 30.0

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:

nv3 – nvoSpaceTemp

nv5 – nvoFanStatus

nv11- nvoLoadAbs

nv12 – nvoValvePosition

nv13 - 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 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_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 Alarm (Optional)

```
network input config sd_string("&2,i,0\x80,9")
SNVT_xxx cpTempHighAlarm;
```

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 Alarm (Optional)

```
network input config sd_string("&2,i,0\x80,10")
SNVT_xxx cpTempLowAlarm;
```

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 Alarm (Optional)

```
network input config sd_string("&2,i,0\x80,9")
SNVT_xxx cpFanCurrentHighAlarm;
```

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 Alarm (Optional)

```
network input config sd_string("&2,i,0\x80,10")
SNVT_xxx cpFanCurrentLowAlarm;
```

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)

Electric Heater Low Power Alarm (Optional)

```
network input config sd_string("&2,i,0\x80,9")
SNVT_xxx cpPowerLowAlarm;
```

This configuration property defines the minimum power when an alarm in the
SNVT_hvac_status.in_alarm BIT_5 will be generated. This is to detect an
element burn out.

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 represent the indices of the CP-associated NVs in relation to their declaration order within the node, when implemented. For example, if the NV at index

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

Data Transfer

None specified.

(This section allows for a description of any required method of exchanging data with another node, or repository. For example, if this Functional Profile definition was for a data collection device, this section may define how the collected data should be transferred to a recording device.)

Power-up State

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

(This section allows for defining such things as the safety value for hardware (like the positions of dampers), or the initial values of network outputs, or a default operating state while initializing the start-up conditions in the device.)

Boundary and Error Conditions

None specified.

(This section allows for the specification of how to handle values that are out of range, if more restrictive than that defined by the SNVT or SCPT definitions. It also allows for the specification of how to handle errors with the device.)

Additional Considerations

None specified.

(This section can be used to specify any other important factors that would require being made common among all devices implementing this Functional Profile. These include, but are not limited to: industry safety specifications; operation with multiple instances of this Object in one device; and intentions of operation with other Objects.)

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