LONMARK®
Functional Profile:
Air Velocity Sensor
Overview

This document describes the profile of an HVAC air velocity sensor. The air velocity sensor can be used to measure the velocity of air flowing in ductwork, economizers, or air handlers. The velocity in the duct can be used to calculate the flow rate given the duct area. This flow rate can be used by products that use the VAV Controller or Air Handler objects.

Example Usage

The air flow sensor interacts with one or more of the following LONMARK objects:

- VAV Controller
- Air Handler

Object Details

The following diagram details the mandatory and optional network variables as well as the configuration properties for the air velocity sensor functional profile:
### Table 1: SNVT Details

<table>
<thead>
<tr>
<th>NV # (M/O) *</th>
<th>Name</th>
<th>Send HrtBt</th>
<th>SNVT Type</th>
<th>SNVT Index</th>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (M)</td>
<td>nvoAirVelocity</td>
<td>Yes</td>
<td>SNVT_speed_mil</td>
<td>35</td>
<td>RAM</td>
<td>Air Velocity</td>
</tr>
<tr>
<td>2 (O)</td>
<td>nvoAirFlow</td>
<td>Yes</td>
<td>SNVT_flow</td>
<td>15</td>
<td>RAM</td>
<td>Duct Flow Rate</td>
</tr>
<tr>
<td>3 (O)</td>
<td>nvoAirFlowFloat</td>
<td>Yes</td>
<td>SNVT_flow_f</td>
<td>53</td>
<td>RAM</td>
<td>Flow Rate</td>
</tr>
</tbody>
</table>

* M = mandatory, O = optional

### Table 2: SCPT Details

<table>
<thead>
<tr>
<th>Config. Property # (M/O) **</th>
<th>Name</th>
<th>SCPT Index</th>
<th>SNVT Type (SNVT Index)</th>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (M)</td>
<td>nciSndHrtBt</td>
<td>49</td>
<td>SNVT_time_sec (107)</td>
<td>NVM</td>
<td>Maximum time before velocity sensor updates output variables.</td>
</tr>
<tr>
<td>2 (M)</td>
<td>nciMinOutTm</td>
<td>52</td>
<td>SNVT_time_sec (107)</td>
<td>NVM</td>
<td>Minimum time between updates of output variables.</td>
</tr>
<tr>
<td>3 (M)</td>
<td>nciSendOnDelta</td>
<td>27</td>
<td>SNVT_speed_mil (35)</td>
<td>NVM</td>
<td>Minimum Velocity change before network update occurs.</td>
</tr>
<tr>
<td>4 (O)</td>
<td>nciVelocityOffset</td>
<td>26</td>
<td>SNVT_speed_mil_bydir</td>
<td>NVM</td>
<td>Used to calibrate external hardware.</td>
</tr>
<tr>
<td>5 (O)</td>
<td>nciDuctArea</td>
<td>46</td>
<td>SNVT_area (110)</td>
<td>NVM</td>
<td>Area of duct velocity sensor is located. Used to calculate volumetric flow rate.</td>
</tr>
<tr>
<td>6 (O)</td>
<td>nciVelocityGain</td>
<td>31</td>
<td>SNVT_multiplier(82)</td>
<td>NVM</td>
<td>Multiplication constant used for calibration of system.</td>
</tr>
</tbody>
</table>

* M = mandatory, O = optional
Mandatory Network Variables

**Air Velocity Output**

network output SNVT_speed_mil nvoAirVelocity;
This output network variable reports the velocity detected by the sensor.

**Valid Range**
0..65.534 m/s (0.001m/s)

**Invalid Value**
65.535

**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 configuration nciMaxSendTime.

**Update Rate**
This value will be updated no faster than the Minimum Send Time (nciMinSendTime) configuration value.

**Default Service Type**
The Default service type is unacknowledged.

Optional Network Variables

**Air Flow Volume Output**

network output SNVT_flow nvoAirFlow;
This output network variable provides the flow volume flowing through the duct. The duct area is multiplied by the air velocity to achieve the flow volume signal.

**Valid Range**
0-65,534 liters/sec (1 l/sec)

**Invalid Value**
65,535

**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 configuration nciMaxSendTime.
**Update Rate**
This value will be updated no faster than the Minimum Send Time (nciMinSendTime) configuration value.

**Default Service Type**
The Default service type is unacknowledged.

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**Air Flow Float Volume Output**

network output SNVT_flow_f nvoAirFlowFloat;

This output network variable provides the flow volume flowing through the duct. The duct area is multiplied by the air velocity to achieve the flow volume signal. This is used in occasions when the flow volume is large such as in air handler system.

**Valid Range**
0-1E38 liters/sec (1 l/sec)

**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 configuration nciMaxSendTime.

**Update Rate**
This value will be updated no faster than the Minimum Send Time (nciMinSendTime) configuration value.

**Default Service Type**
The Default service type is unacknowledged.

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**Mandatory Configuration Properties**

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**Max Send Time**

network input config SNVT_time_sec nciMaxSendTime;

Indicates the maximum period of time that expires before the sensor object automatically updates all its output variables:

- nvoAirVelocity,
- nvoAirFlow,
- nvoAirFLowFloat

**Valid Range**
The valid range is any value between 0.0 sec and 6553.4 sec. Setting nciMaxSendTIme =0 disables the automatic update mechanism.

**Default Value**

300 Seconds

**SCPT Reference**

SCPTmaxSendTime (49)

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**Min Send Time**

network input config SNVT_time_sec nciMinSendTime;
Indicates the minimum period between output network variable transitions for
- nvoAirVelocity,
- nvoAirFlow,
- nvoAirFlowFloat.

**Valid Range**

The valid range is any value between 0.0 sec and 6553.4 sec. Setting nciMaxSendTIme =0 allows maximum refresh according to nciMinDelta.

**Default Value**

5 Seconds

**SCPT Reference**

SCPTminSendTime (59)

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**Send on Delta**

network input config SNVT_speed_mil nciSendOnDelta;
Indicates the minimum velocity level change required to update the output network variables.

- nvoAirVelocity,
- nvoAirFlow,
- nvoAirFlowFloat.
Since the flow is calculated from the velocity it is outputted at
the same time as the velocity.

**Valid Range**

0..65.534 m/s (0.001m/s)

**Default Value**

.05 m/s

**SCPT Reference**

SCPTsndDelta (27)

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**Optional Configuration Properties**

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**Velocity Offset**

```c
network input config SNVT_speed_mil_bydir nciVelocityOffset;
```

This configuration property is used to calibrate the external hardware by specifying the level that the nvoAirVelocity output should adopt based on the current data from the hardware. This offset applies after the use of any translation table or gain factor.

**Valid Range**

-32.768 - +32.767 m/s (0.001 m/s)

**Default Value**

0 m/s

**SCPT Reference**

SCPToffset (26)

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**Duct Area**

```c
network input config SNVT_area nciDuctArea;
```

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

- nvoAirVelocity,
nvoAirFlow.
Since the flow is calculated from the velocity it is outputted at the same time as the velocity.

**Valid Range**
0-13.1068 m²

**Default Value**
0 m²

**SCPT Reference**
SCPTductarea (46)

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**Calibration Multiplier**

network input config SNVT_multiplier nciVelocityGain;
Multiplier used for calibration of the output. The velocity will be multiplied by this value before it is outputted.

**Valid Range**
0-32.7675 (.0005)

**Default Value**
1.0000

**SCPT Reference**
SCPTgain (31)

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**Data Transfer**
None specified.

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**Power-up State**
All configuration properties which are stored are recalled during power up. The output variables are set to the measured velocity.

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**Boundary and Error Conditions**
None specified.