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:
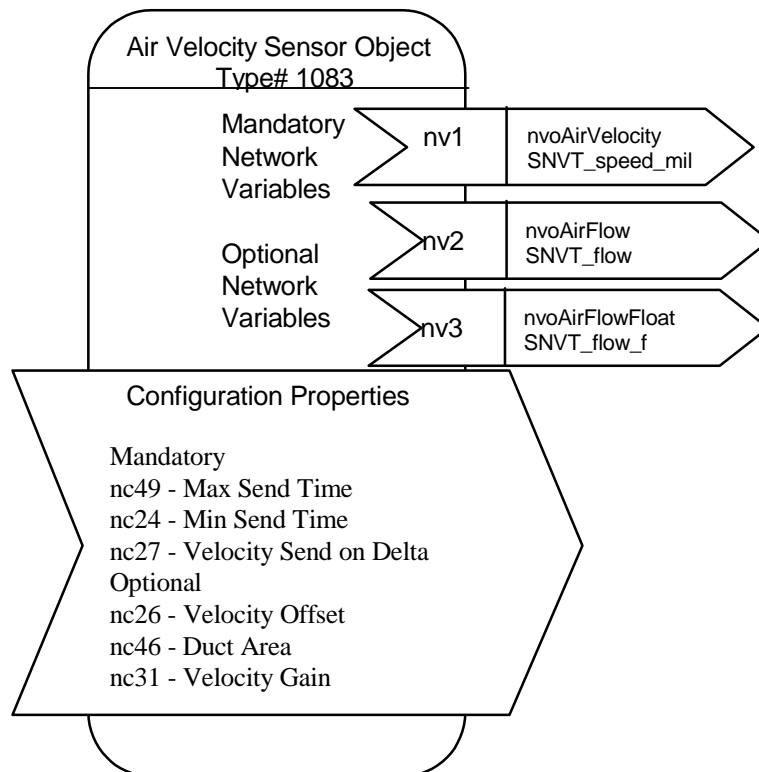

Figure 1 Object Details

Table 1 SNVT Details

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

* M = mandatory, O = optional

Table 2 SCPT Details

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

* 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.

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.

Mandatory Configuration Properties

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)

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)

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)

Optional Configuration Properties

Velocity Offset

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)

Duct Area

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 ate the same time as the velocity.

Valid Range

0-13.1068 m^2

Default Value

0 m^2

SCPT Reference

SCPTductarea (46)

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)

Data Transfer

None specified.

Power-up State

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

Boundary and Error Conditions

None specified.