
Version 1.0
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Fire Smoke Damper Actuator : 11001



LONMARK[®]

Functional Profile:

Fire Smoke Damper

Actuator

Overview

This document describes the profile of a Fire Smoke Damper Actuator (FSDA) object (Figure 1). Use of the standard Node object is implied. Each FSDA object can control one physical FSDA device. Applications that require multiple device control from the same LonWorks interface (node) can be accommodated by deploying multiple object instances (Figure 1).

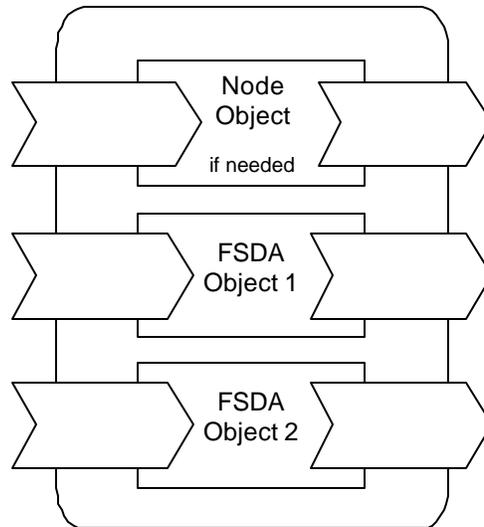


Figure 1 Node Concept

Example Usage

The services provided by this profile are intended to facilitate the interaction with one or more of the following LONWORKS[®] technology-based devices:

- Intelligent panel
- Building management system

Figure 2 depicts a typical FSDA device application. The actuator simply drives the damper to its open or closed position. These two positions permit or restrict the passage of air/smoke through the damper respectively. Generally, during a fire condition, dampers are closed to prevent the dispersion of smoke or toxic gases, or opened, to collaborate with an extractor unit to expel fumes from the building. Other applications include area pressurization, smoke purge, smoke exhaust, and area isolation. The transition from one damper position to another is represented by a path of 90°. The actuator outputs, 0° Sense and 90° Sense, reflect the limits of this path. The 0°-limit is known as the fail-safe or safety position, since the actuator always adopts this position when power is removed from its Actuator

Drive input. The action taken by the damper at this position is dictated by the type of application employed (fire/smoke prevention or extraction). The 90°-limit is known as the Normal position, since this is the damper's normal operating position.

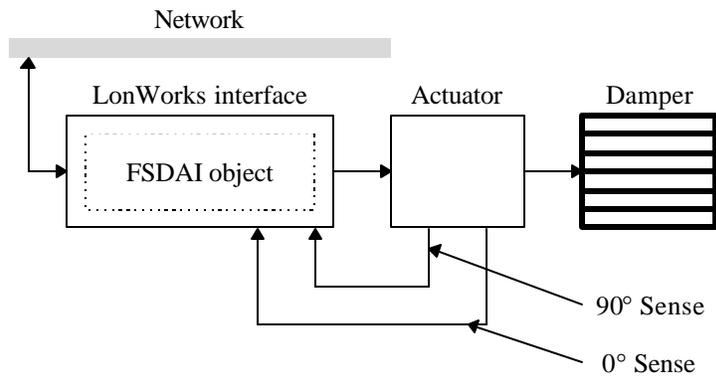


Figure 2 Example Usage of the Object

The actuator remains at the 0° position when no power is applied to its input. This condition is reflected by the active (0° Sense) and inactive (90° Sense) outputs. Applying power drives the actuator towards its 90° position. During this transition, the actuator consumes maximum current to overcome the impeding action of a restraining spring. This spring assists the actuator in adopting the fail-safe position in the event of power loss. Once the actuator departs from its 0° region, both sense outputs register inactive to indicate the traveling condition. When the actuator enters its 90° region, its 90°-Sense output becomes active, and the actuator reduces its Current demand to standby, in order to maintain this position. Figure 3 illustrates both actuator paths. Path 1 is shown as nonlinear to represent the time distortion introduced by the spring impedance. Path 2 can be linearly approximated to represent the assistance offered by the spring. The time taken to traverse path 1 is called the Drive time of the actuator. The time taken to traverse path 2 is called the Turn Off time of the actuator.

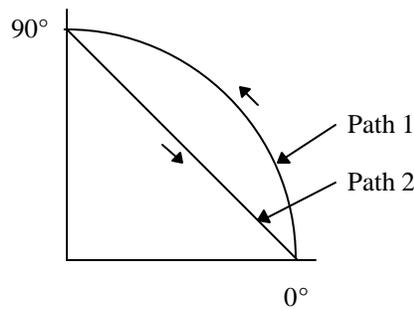


Figure 3 Actuator Path Diagram

Finally, the handling of the fail-safe action must be addressed. This type of actuator normally employs two techniques: one using software methods, the other using direct hardware control. The standard software technique employs a guard timer to monitor source object requests. Absence of a request within the guard period indicates a communications break down or source object sanity loss. The

actuator responds by adopting the fail-safe position. Recovery is achieved once communications are re-established. Hardware fail-safe action on the other hand, relies on the voltage level of an input. Once active, this input inhibits the Actuator Drive—preventing it from escaping the fail-safe position.

Object Details

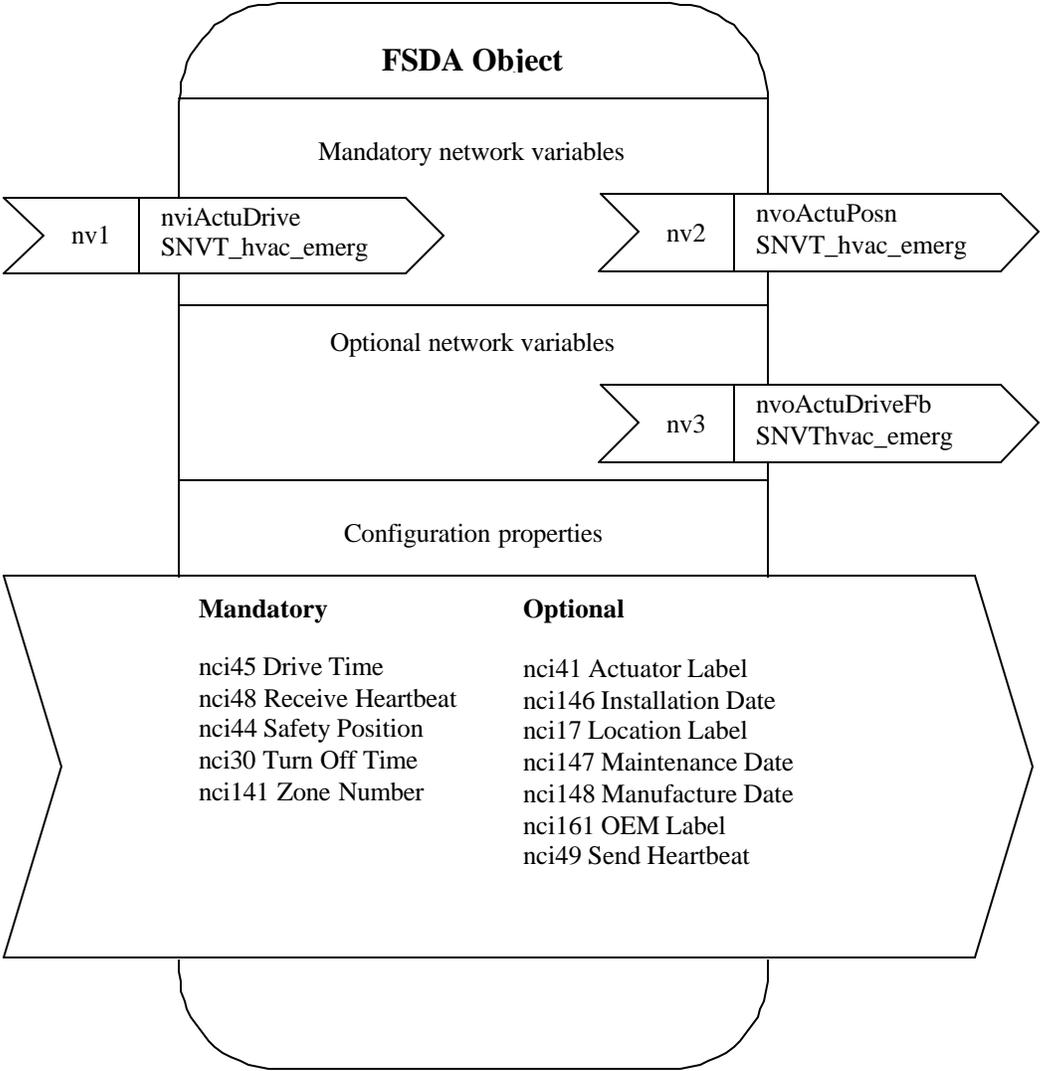


Figure 4 Object Details

Table 1 SNVT Details

NV # (M/O)*	Variable Name	SNVT Name	SNVT Index	Description
1 (M)	nviActuDrive	SNVT_hvac_emerg	103	Controls the actuator position.
2 (M)	nvoActuPosn	SNVT_hvac_emerg	103	Reflects the actuator position.
3 (O)	nvoActuDriveFb	SNVT_hvac_emerg	103	Reflects the value of nviActuDrive. Used to synchronize source objects in multiple relationships.

* M = mandatory, O = optional

Table 2 SCPT Details

Man. Opt. *	SCPT Name NV Name Type or SNVT	SCPT Index	Associated NVs **	Description
Man	SCPTdriveTime nciDriveT SVNT_time_sec (107)	45	Entire Object	Contains the Drive time for the actuator.
Man	SCPTmaxRcvTime nciRcvrHrtBt SVNT_time_sec (107)	48	nv1 (M)	Sets the maximum time that can expire before the actuator automatically goes to fail-safe.
Man	SCPTdirection nciSafetyPosn SNVT_state (83)	44	Entire Object	Defines the actuator application.
Man	SCPToffDely nciTurnOffT SNVT_elapsed_tm (87)	30	Entire Object	Contains the Turn Off time for the actuator.
Man	SCPTzoneNum nciTurnOffT unsigned long (2 bytes)	141	Entire Object	Contains the zone number for the actuator device.
Opt	SCPTactuatorType nciActuLabel SNVT_str_asc (36)	41	Entire Object	Used to describe the actuator.
Opt	SCPTinstallDate nciInstallDate SNVT_time_stamp(84)	146	Entire Object	Date of installation.
Opt	SCPTlocation nciLocation SNVT_str_asc (36)	17	Entire Object	Used to provide physical location of the FSDA or node.
Opt	SCPTmaintDate nciMaintDate SNVT_time_stamp(84)	147	Entire Object	Date of last maintenance.
Opt	SCPTmanfDate nciManfDate SNVT_time_stamp(84)	148	Entire Object	Date of manufacture.
Opt	SCPToemType nciOEMLLabel SNVT_str_asc (36)	61	Entire Object	Manufacturer-specific details of the FSDA or node (16 bytes).
Opt	SCPTmaxSendTime nciMaxSendTime SNVT_time_sec (107)	49	nv2 (O)	Maximum period of time that expires before the object will automatically update an NV.

* Man = mandatory, Opt = optional

** List of NVs to which this configuration property applies.

Mandatory Network Variables

Actuator Drive

```
network input sd_string("@p|1") SNVT_hvac_emerg
nviActuDrive;
```

This input network variable controls the actuator position.

Valid Range

nviActuDrive	Actuator Position
EMERG_NORMAL (0)	90° position
EMERG_FIRE (5)	0° position

Default Value

EMERG_FIRE

Configuration Considerations

Receive Heartbeat (nci48) is Mandatory for this NV.

Actuator Position

```
network output sd_string("@p|2") bind_info(ackd)
SNVT_hvac_emerg nvoActuPosn;
```

This output network variable reflects the actuator position.

Valid Range

nviActuDrive	Actuator Position
EMERG_NORMAL (0)	90° position
EMERG_NUL (0xFF)	Traveling
EMERG_FIRE (0)	0° position

Default Value

Actual position.

Configuration Considerations

Send Heartbeat (nci49) is Optional for this NV.

When Transmitted

The output variable is transmitted immediately, when its value has changed significantly.

Default Service Type

The default service type is acknowledged.

Optional Network Variables

Actuator Drive Feedback

```
network output sd_string("@p|3") bind_info(ackd)
SNVT_hvac_emerg nvoActuDriveFb;
```

This output network variable reflects the value of nviActuDrive. It is used to synchronize source objects in multiple relationships.

Valid Range

Defined by nviActuDrive.

Default Value

The actual value of nviActuDrive.

Configuration Considerations

None.

When Transmitted

The output variable is transmitted immediately when nviActuDrive is updated.

Default Service Type

The default service type is acknowledged.

Configuration Properties

Drive Time (Mandatory)

```
network input config sd_string("&1,p,0\x80,45")
SNVT_time_sec nciDriveT;
```

This configuration property contains the Drive time for the actuator. It is a Mandatory CP for the Object.

Valid Range

Defined by SNVT_time_sec.

Default Value

Manufacturer-defined (SCPT default value is 150 seconds).

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTdriveTime (45)

Receive Heartbeat (Mandatory)

```
network input config sd_string("&2,i,0\x80,48")
SNVT_time_sec nciRcvrHrtBt;
```

This input configuration property sets the maximum period of time that can expire before the actuator device automatically adopts the fail-safe position. It is Mandatory for nv1.

Valid Range

Defined by SNVT_time_sec.

Default Value

The default value is 0.0 (Receive Heartbeat disabled).

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTmaxRcvTime (48)

Safety Position (Mandatory)

```
network input config sd_string("&1,p,0\x80,44")
SNVT_state nciSafetyPosn;
```

This configuration property defines the actuator application: Fail-safe position open or closed. It is Mandatory for the Object.

Valid Range

Bit 0 and 2-15	Bit 1	Application
N/A	0	Closed
N/A	1	Open

Default Value

Manufacturer-defined (SCPT default values are: Bit 0 = 0, Bit 1 = 0).

Configuration Requirements/Restrictions

None. Write access can be disabled by the manufacturer, is desired.

SCPT Reference

SCPTdirection (44)

Turn Off Time (Mandatory)

```
network input config sd_string("&1 ,p,0\x80,30")
SNVT_elapsed_tm nciTurnOffT;
```

This configuration property contains the Turn Off time for the actuator, as described in the Overview section. It is Mandatory for the Object.

Valid Range

Defined by SNVT_elapsed_tm and SCPToffDely.

Default Value

Manufacturer-defined (SCPT default values are all zeroes, Turn Off Delay Inactive).

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPToffDely (30)

Zone Number (Mandatory)

```
network input config sd_string("&1 ,p,0\x80,141")
unsigned long nciTurnOffT;
```

This configuration property contains the zone number for the actuator device. It is Mandatory for the Object.

Valid Range

0 .. 65,534 (resolution of 1). Value 0xFFFF indicates NULL.

Default Value

Manufacturer-defined.

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTzoneNum (141)

Actuator Label (Optional)

```
network input config sd_string("&1,p,0\x80,41")
SNVT_str_asc nciActuLabel;
```

This configuration property can be used to describe the actuator.

Valid Range

Any NULL-terminated ASCII string up to 31 bytes of total length (including NULL).

Default Value

Manufacturer-defined, or an ASCII string containing all NULLs (0x00).

Configuration Requirements/Restrictions

Typically not changed in the field.

SCPT Reference

SCPTactuatorType (41)

Installation Date (Optional)

```
network input config sd_string("&1,p,0\x80,146")
SNVT_time_stamp nciInstallDate;
```

This configuration property contains the date of installation.

Valid Range

Defined by SNVT_time_stamp.

Default Value

Not specified.

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTinstallDate (146)

Location Label (Optional)

```
network input config sd_string("&1,p,0\x80,17")
SNVT_str_asc nciLocation;
```

This configuration property can be used to provide the location of the FSDA/node, where *p* is the FSDA index. The above code declaration is for providing the location of the FSDA. If it is preferred, the location of the node can be represented with the following code declaration:

```
network input config sd_string("&0,,0\x80,17")
SNVT_str_asc nciLocation;
```

Valid Range

Any NULL-terminated ASCII string up to 31 bytes of total length (including NULL).

Default Value

The default value is an ASCII string containing all NULLs (0x00).

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTlocation (17)

Maintenance Date (Optional)

```
network input config sd_string("&1 ,p,0\x80,146")
SNVT_time_stamp nciMaintDate;
```

This configuration property contains the last maintenance date.

Valid Range

Defined by SNVT_time_stamp.

Default Value

Not specified.

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTmaintDate (147)

Manufacturer Date (Optional)

```
network input config sd_string("&1 ,p,0\x94,146")
SNVT_time_stamp nciManfDate;
```

This configuration property contains the date of manufacture.

Valid Range

Defined by SNVT_time_stamp.

Default Value

Manufacturer-defined.

Configuration Requirements/Restrictions

Factory set. Write access disabled.

SCPT Reference

SCPTmanfDate (148)

OEM Label (Optional)

```
network input config sd_string("&1,p,0\x94,61")
SNVT_str_asc nciOEMLabel;
```

This configuration property can be used to provide manufacturer-specific details of the FSDA/node, where *p* is the FSDA index. The above code declaration is for providing OEM information about the FSDA. If it is preferred, OEM information about the node can be represented with the following code declaration:

```
network input config sd_string("&0,,0\x94,61")
SNVT_str_asc nciOEMLabel;
```

Valid Range

Any NULL-terminated ASCII string up to 16 characters, and NULL characters in the 17th to 31st bytes.

Default Value

Manufacturer-defined, however, only 16 characters are allowed. The remaining 15 characters should be all zeroes (0), NULLs.

Configuration Requirements/Restrictions

Factory set. Write access disabled.

SCPT Reference

SCPToemType (61)

Send Heartbeat (Optional)

```
network input config sd_string("&2,j,0\x80,49")
SNVT_time_sec nciMaxSendTime;
```

This input configuration property sets the maximum period of time that can expire before the Object will automatically update nvoActuPosn.

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.

Default Value

The default value is 0.0 (no automatic update).

Configuration Requirements/Restrictions

None.

SCPT Reference

SCPTmaxSendTime (49)

Key for Unresolved References

$i . j$ 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.

Data Transfer

None supported, unless needed for configuration.

Power-up State

The configuration properties are adopted. `nvoActuPosn` and `nvoAlarm` are transmitted immediately.

Boundary and Error Conditions

None specified.

Additional Considerations

The Node Object (0) is required.

The Valid Range for Object Status (`nvoStatus`) is:

Status	Description
<code>invalid_id</code>	Mandatory
<code>invalid_request</code>	Mandatory
<code>disabled</code>	Application specific
<code>feedback_failure</code>	<code>nciDriveT</code> or <code>nciOffT</code> has expired
<code>comm_failure</code>	<code>nciRcvrHrtBt</code> has expired
<code>locked_out</code>	Lock Out active

The Valid Range for Alarm Output (nvoAlarm) is:

Status	Description
AL_FIR_TRBL	Defined by SNVT_alarm

Priority	Description
PR_4	Defined by SNVT_alarm