LONMARK®
Functional Profile:
Refrigerated Display Case Controller: Defrost Object

Overview

This document describes the profile required for a refrigerated display case controller defrost object, used on a central or local plant system. In general this object will be used with other refrigerated display case controller objects either on the same node, or on external nodes in order to provide a complete control solution. The defrost object makes use of the Node Object for alarm reporting. When using the defrost object it is mandatory to use the nvoAlarm network variable of the node object.
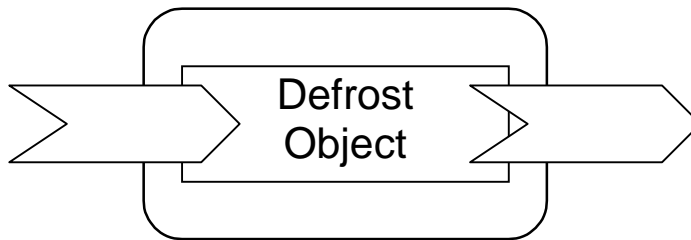

Figure 1 Defrost Object Functional Profile

Example Usage

The defrost object resides on a LONMARK device and communicates across a LONWORKS network interacting with one or more of the following LONMARK objects intended for refrigerated display case control:

- Evaporator control object.
- Thermostat control object.
- Rail heat control object.
- Fan control object.
- Schedule control object.
- Temperature sensor object.

These objects may all reside in the same node or may be distributed. In slave applications there may be many instances of the objects listed above.
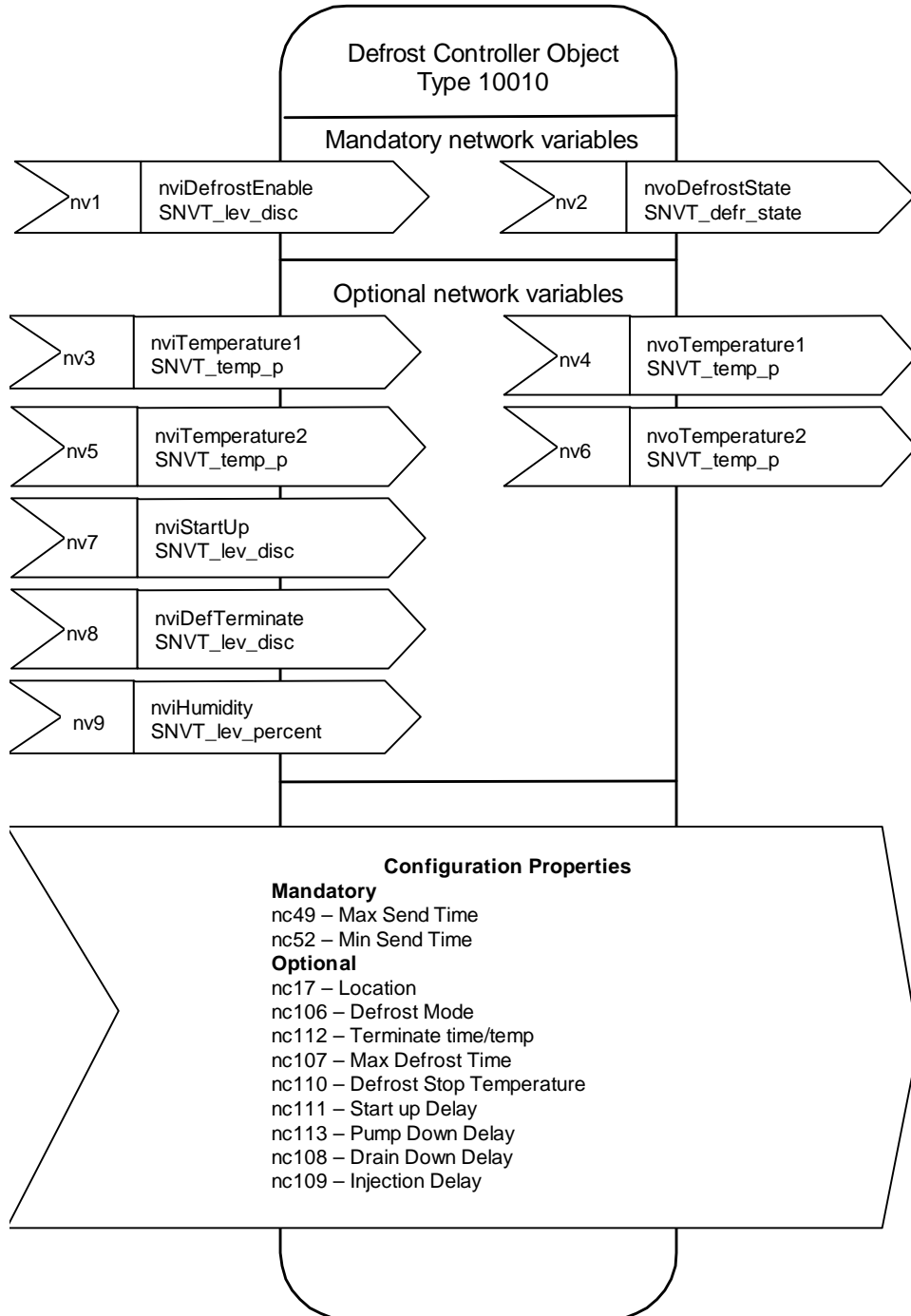
Defrost Controller Object

**Defrost Controller Object
Type 10010**

Mandatory network variables

nv1 — nviDefrostEnable SNVT_lev_disc

nv2 — nvoDefrostState SNVT_defr_state

Optional network variables

nv3 — nviTemperature1 SNVT_temp_p

nv4 — nvoTemperature1 SNVT_temp_p

nv5 — nviTemperature2 SNVT_temp_p

nv6 — nvoTemperature2 SNVT_temp_p

nv7 — nviStartUp SNVT_lev_disc

nv8 — nviDefTerminate SNVT_lev_disc

nv9 — nviHumidity SNVT_lev_percent

Configuration Properties
Mandatory
nc49 – Max Send Time
nc52 – Min Send Time
Optional
nc17 – Location
nc106 – Defrost Mode
nc112 – Terminate time/temp
nc107 – Max Defrost Time
nc110 – Defrost Stop Temperature
nc111 – Start up Delay
nc113 – Pump Down Delay
nc108 – Drain Down Delay
nc109 – Injection Delay

Figure 3 Defrost Object Details

Table 1 SNVT Details

NV # (M/O)[1]	Name	In Out	SNVT Type (SNVT Index)		Class	Description
1 (M)	nviDefrostEnable	In	SNVT_lev_disc	(22)	I/O	Begin defrost switch
2 (M)	nvoDefrostState	Out	SNVT_defr_state	(122)	I/O	Defrost progress indicator
3 (O)	nviTemperature1	In	SNVT_temp_p	(105)	I/O	Monitored temperature
4 (O)	nvoTemperature1	Out	SNVT_temp_p	(105)	I/O	Processed temperature
5 (O)	nviTemperature2	In	SNVT_temp_p	(105)	I/O	Monitored temperature
6 (O)	nvoTemperature2	Out	SNVT_temp_p	(105)	I/O	Processed temperature
7 (O)	nviStartUp	In	SNVT_lev_disc	(22)	I/O	Begin sequence after defrost switch
8 (O)	nviDefTerminate	In	SNVT_lev_disc	(22)	I/O	Auxiliary defrost termination input
9 (O)	nviHumidity	In	SNVT_lev_percent	(81)	I/O	Humidity sensor input
17 (O)	Location label	-	SNVT_str_asc	(36)	config	Location text
49 (M)	Max send time	-	SNVT_time_sec	(107)	config	Max time before updating outputs
52 (M)	Min send time	-	SNVT_time_sec	(107)	config	Min time between output updates
106 (O)	Defrost mode	-	SNVT_defr_mode	(122)	config	Type of defrost
112 (O)	Terminate time / temp	-	SNVT_defr_term	(121)	config	How to finish first part of the cycle
107 (O)	Max defrost time	-	SNVT_time_sec	(107)	config	Maximum defrost duration
110 (O)	Defrost stop temperature	-	SNVT_temp_p	(105)	config	Defrost termination temperature
111 (O)	Start up delay	-	SNVT_time_sec	(107)	config	Max time before start up after defrost
113 (O)	Pump down delay	-	SNVT_time_sec	(107)	config	Pump down duration
108 (O)	Drain down delay	-	SNVT_time_sec	(107)	config	Duration for draining
109 (O)	Injection delay	-	SNVT_time_sec	(107)	config	Time before restarting refrigeration

[1] **M – Mandatory 0 – Optional**

Mandatory Network Variables

Defrost Enable

```
network input SNVT_lev_disc nviDefrostEnable;
```

If nviDefrostEnable = ST_ON, defrosts are permitted. Once set to on the defrost object will begin a defrost cycle. Upon completion of the cycle the object will not perform another cycle until an ST_OFF to ST_ON transition has occurred.

The defrost cycle can be prematurely interrupted by setting nviDefrostEnable to ST_OFF thus forcing the object into the 'start up after defrost' phase.

Valid Range

The valid range is ST_OFF or ST_ON. Any other value will be interpreted as ST_OFF.

Default Value

The default value is ST_OFF.

Defrost State

```
network output SNVT_defr_state nvoDefrostState;
```

The nvoDefrostState indicates the current state of the defrost object.

Valid Range

0 DF_STANDBY

1 DF_PUMPDOWN

2 DF_DEFROST

3 DF_DRAINDOWN

4 DF_INJECT_DLY

Default Value

0 DF_STANDBY.

Optional Network Variables

Day Night Indication

```
network input SNVT_temp_p nviTemperature1;
```

nviTemperature1 is to be assigned to inlet or outlet of the evaporator as required. An error on the sensor is indicated with a value outside the valid range.

Valid Range

The valid range is -100°C to + 150°C.

Default Value

The default value is 0.

Temperature 2

```
network input SNVT_temp_p nviTemperature2;
```

The nviTemperature2 is to be assigned to inlet or outlet of the evaporator as required. An error on the sensor is indicated with a value outside the valid range.

Valid Range

The valid range is -100ºC to +150ºC

Default Value

The default value is 0

Start Up

```
network input SNVT_lev_disc nviStartUp;
```

If synchronised defrost is selected as the control strategy, this network variable indicates that the defrost object can begin the 'after defrost' sequence.

Valid Range

The valid range is `ST_OFF(0)` or `ST_ON(4)`. A value other than `ST_ON` indicates that other cases in the circuit are still in defrost.

Default Value

The default value is `ST_OFF`.

Defrost Terminate

```
network input SNVT_defr_term nviDefrostTerminate;
```

`nviDefrostTerminate` can be used as an input from some external sensor e.g. ice sensor to indicate the level of defrosting.

Valid Range

The valid range is any value within the SNVT concerned.

Default Value

The default value is manufacturer specific.

Humidity

```
network input SNVT_lev_percent nviHumidity;
```

The `nviHumidity` can be used to provide humidity information for the defrost algorithm.

Valid Range

The valid range is 0 - 100%

Default Value

The default value is 0

Configuration Properties

Location Label

```
network input config SNVT_str_asc nciLocationLabel;
```

The Location Label can be used as a descriptive physical location description.

Valid Range
Any NULL terminated ASCII string.

Default Value
The default value is an ASCII string containing all zeroes.

SCPT Reference
SCPT_location #17

Max Send Time

```
network input config SNVT_time_sec nciMaxSendTime;
```

Indicates the maximum period of time that expires before the defrost object automatically updates its output network variables. A setting of 0 (zero) will force the defrost object to only update its output variables when a change occurs.

Valid Range
The valid range of the SNVT.

Default Value
10 seconds.

SCPT Reference
SCPTmaxSendTime #49

Defrost Mode

```
network  input config SNVT_defr_mode nciDefrostMode;
```

The `nciDefrostMode` indicates the type of defrost to perform.

Valid Range

0	DF_MODE_AMBIENT	no forced heating required to clear ice from the case
1	DF_MODE_FORCED	used for non synchronised forced systems
2	DF_MODE_SYNC	used for hot/cold gas or secondary systems

Default Value

```
1  DF_MODE_FORCED.
```

SCPT Reference

SCPTdefrostMode #106

Start up delay

```
network input config SNVT_time_sec nciStartUpDelay;
```

Indicates the maximum period of time that expires before the defrost object automatically starts the start up sequence after defrost. It is a safety timer used if the monitoring equipment fails to update the nviStartUp variable.

Valid Range

The valid range of the SNVT.

Default Value

900 seconds (15 minutes).

Note: The defrost object will not wait for the start up signal with a value of 0.

SCPT Reference

SCPTstrtupDelay #111

Terminate time temp

```
network input config SNVT_defr_term nciTerminateTimeTemp;
```

Indicates whether the defrost should terminate on time, temperature or a combination. If the defrost was started by a schedule object the duration is indicated in the start / stop times.

Should a termination condition occur which is not the selected termination condition the object will generate an alarm.

Valid Range

0	DF_TERM_TEMP	Terminate on temperature.
1	DF_TERM_TIME	Terminate on time.
2	DF_TERM_FIRST	Terminate on first occurring time / temperature.
		No alarms generated.
3	DF_TERM_LAST	Terminate on last occurring time / temperature.
		No alarms generated.

Default Value

```
0  DF_TERM_TEMP.
```

SCPT Reference

SCPTtermTimeTemp #112

Max defrost time

```
network input config SNVT_time_sec nciMaxDefrostTime;
```

Indicates the maximum defrost time for defrost objects configured to terminate on temperature. If terminate on time is selected, it indicates the defrost time. If terminate on temperature is selected and this timer expires, an alarm will be generated by the defrost object.

Valid Range

The valid range of the SNVT.

Default Value

3600 seconds (1 hour).

SCPT Reference

SCPTmaxDefrstTime #107

Defrost stop temperature

```
network input config SNVT_temp_p nciDefrostStopTemp
```

Indicates the temperature at which to terminate defrost for objects configured to terminate on temperature. If the object is set to terminate on time & this temperature is exceeded then an alarm is generated.

Valid Range

The valid range is -100°C to +150°C.

Default Value

The default value is manufacturer specific.

SCPT Reference

SCPTmaxDefrstTemp #110

Pump down delay

```
network input config SNVT_time_sec nciPumpDownDelay;
```

nciPumpDownDelay indicates the delay to use before defrost starts.

Valid Range

The valid range of the SNVT.

Default Value

The default value is manufacturer specific.

SCPT Reference

SCPTpumpdownDelay #113

Drain delay

```
network  input config SNVT_time_sec nciDrainDelay;
```

`nciDrainDelay` indicates the delay to use after defrost has terminated. This is the first step in the start after defrost sequence.

Valid Range

The valid range of the SNVT.

Default Value

The default value is manufacturer specific.

SCPT Reference

SCPTdrainDelay #108

Injection delay

```
network  input config SNVT_time_sec nciInjectionDelay;
```

`nciInjectionDelay` indicates the delay to use after defrost has terminated. This is the second step in the start after defrost sequence.

Valid Range

The valid range of the SNVT.

Default Value

The default value is manufacturer specific.

SCPT Reference

SCPTinjDelay #109

Data Transfer

The configuration variables are shown as network variables in the examples. These could be implemented in any form & access made via file transfer or direct memory read / write.

The type of data transfer supported can be found by looking at the node object network variables. If `nvoFileDirectory` is present then direct memory read / write is supported. If `nviFileReq` & `nviFileStat` are present then file transfer is supported. Otherwise look

for configuration network variables.

Power-up State

The defrost object should power up in a benign state with network inputs set to default values. Network outputs should be updated to their default values & transmitted onto the network.

Boundary and Error Conditions

None specified.

Additional Considerations

None specified.