

Group: **Controls**

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MicroTech 2000™ Water Source Heat Pump Protocol Information

LonWorks® Networks



Unit controllers are LONMARK® certified.

Table of Contents

| | | | |
|--|-----------|--|-----------|
| Reference Documents | 2 | Compressor 2 Starts | 17 |
| Introduction | 3 | Variable Details | 17 |
| LonWorks Networks | 3 | Change Filter Timer | 18 |
| Compatibility | 3 | Variable Details | 18 |
| LonWorks Variables | 3 | Default Value | 18 |
| Field Wiring | 4 | Fan Run Hours | 18 |
| MicroTech 2000 Network Communications | 4 | Variable Details | 18 |
| Free Topology Restrictions | 5 | Optional Output 1 Configuration | 19 |
| Extending Cable Length With Special Bus Topology | 5 | Variable Details | 19 |
| Output Network Variables | 7 | Structure | 19 |
| Active Cooling Setpoint | 7 | Default Value | 19 |
| Variable Details | 7 | Optional Output 2 Configuration | 20 |
| Active Heating Setpoint | 7 | Variable Details | 20 |
| Variable Details | 7 | Structure | 20 |
| Current Compressor 1 Fault | 7 | Default Value | 20 |
| Variable Details | 7 | Optional Output 3 Configuration | 21 |
| Enumeration | 7 | Variable Details | 21 |
| Current Compressor 2 Fault | 8 | Structure | 21 |
| Variable Details | 8 | Default Value | 21 |
| Enumeration | 8 | Simple Occupancy Input | 22 |
| Current Unit Fault | 8 | Variable Details | 22 |
| Variable Details | 8 | Structure | 22 |
| Enumeration | 8 | Field Definitions | 22 |
| Discharge Air Temperature | 8 | State Enumeration | 22 |
| Variable Details | 8 | Space Temperature Input (Mandatory) | 22 |
| Lead Compressor | 9 | Default Value | 22 |
| Variable Details | 9 | Temperature Setpoint Input (Mandatory) | 23 |
| Enumeration | 9 | Valid Range | 23 |
| Leaving Water Temperature | 9 | Configuration Properties | 24 |
| Variable Details | 9 | Brownout Differential Setpoint | 24 |
| McQuay Unit Status | 10 | Default Value | 24 |
| Variable Details | 10 | Brownout Recover Setpoint | 24 |
| Enumeration | 10 | Default Value | 24 |
| Previous Unit Fault | 10 | Brownout Trip Setpoint | 24 |
| Variable Details | 10 | Default Value | 24 |
| Enumeration | 10 | Change Filter Warning Setpoint | 25 |
| Remote Room Setpoint Adjustment | 11 | Default Value | 25 |
| Variable Details | 11 | Condensate Overflow Fault Setpoint | 25 |
| Enumeration | 11 | Default Value | 25 |
| Software Identification | 11 | High Space Temperature Warning Setpoint | 25 |
| Structure | 11 | Default Value | 25 |
| Space Temperature Output (Mandatory) | 12 | Initial Delay Setpoint | 26 |
| Valid Range | 12 | Leaving Water Temperature Sensor Present | 26 |
| Tenant Override Countdown Timer | 12 | Structure | 26 |
| Variable Details | 12 | Field Definitions | 26 |
| Unit Status Output (Mandatory) | 13 | Enumeration | 26 |
| Variable Details | 13 | Default Value | 26 |
| Structure | 13 | Low Space Temperature Warning Setpoint | 27 |
| Field Definitions | 13 | Default Value | 27 |
| hvac_t Enumeration | 14 | Occupied Fan Operating Mode Setpoint | 27 |
| Warning Information | 14 | Enumeration | 27 |
| Variable Details | 14 | Default Value | 27 |
| Structure | 14 | Remote Room Setpoint Adjustment Enable/Disable | 27 |
| Input Network Variables | 15 | Default Value | 27 |
| Application Mode Input | 15 | Room Temperature Differential Setpoint | 28 |
| Variable Details | 15 | Valid Range | 28 |
| hvac_t Enumeration | 15 | Default Value | 28 |
| Clear Fault | 16 | Send Heartbeat (Mandatory) | 28 |
| Variable Details | 16 | Default Value | 28 |
| Structure | 16 | Skin Heat Temp Differential Setpoint for Optional Output 1 | 29 |
| Field Definitions | 16 | Valid Range | 29 |
| Enumeration | 16 | Default Value | 29 |
| Compressor 1 Run Hours | 16 | Skin Heat Temp Differential Setpoint for Optional Output 2 | 29 |
| Variable Details | 16 | Valid Range | 29 |
| Compressor 2 Run Hours | 17 | Default Value | 29 |
| Variable Details | 17 | Skin Heat Temp Differential Setpoint for Optional Output 3 | 30 |
| Compressor 1 Starts | 17 | Valid Range | 30 |
| Variable Details | 17 | Default Value | 30 |



LONMARK[®] Unit controllers are LONMARK[®] certified with optional LONWORKS[®] communication module.

Reivison History

| | | |
|------------|-------------------|--|
| ED 15054-0 | December 13, 2001 | Initial release. |
| ED 15054-1 | August 5, 2004 | Added LonMark 3.3 certification statement. |
| ED 15054-1 | December 22, 2004 | Minor revisions. |

Software Revision

This edition documents revision G of the standard McQuay MicroTech 2000 Water Source Heat Pump Unit Controller application software version WHPE2G and all subsequent revisions until otherwise indicated. It may be read directly from the controller from the nvoIdent network variable (See Software Identification). Please contact McQuay for a later version of this document if you encounter a software identification string other than what is shown in the above table.

Reference Documents

| Company | Number | Title | Source |
|--------------------------------------|--------|--|--|
| McQuay International | IM 660 | WSHP Installation and Maintenance Manual | www.mcquay.com |
| McQuay International | OM 128 | WSHP Operation Manual | www.mcquay.com |
| LonMark Interoperability Association | 8051 | LonMark Functional Profile: Heat Pump with Temperature Control | www.lonmark.org |

Notice

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Limited Warranty

Consult your local McQuay Representative for warranty details. Refer to Form 933-430285Y. To find your local McQuay Representative, go to www.mcquay.com.

Introduction

This document contains the information required to interface directly to MicroTech 2000™ Water Source Heat Pump Unit Controllers. If the network has already been wired and commissioned, you can skip to the section listing the LONWORKS network variables.

LONWORKS Networks

LONWORKS technology, developed by Echelon Corporation, is the basis for LONMARK interoperable systems. This technology is independent of the communications media. The LONMARK Interoperable Association has developed standards for interoperable LONWORKS technology systems. In particular they have published standards for HVAC equipment including the Water Source Heat Pump Functional Profile. These profiles specify a number of mandatory and optional standard network variables and standard configuration parameters. This manual defines these variables and parameters available in the MicroTech 2000 Water Source Heat Pump Unit Controller.

Compatibility

The MicroTech 2000 Water Source Heat Pump Unit Controllers operate in accordance with the Water Source Heat Pump (WSHP) functional profile, LONMARK Interoperability standard.

LONWORKS Variables

MicroTech 2000 Water Source Heat Pump Unit Controllers incorporate LONWORKS network variables to access unit data points. The controller uses LONWORKS Standard Network Variable Types (SNVT) from the profile. Some data points can be adjusted (input network variables, nvi and configuration variables, nci, e.g., setpoints) from the network and others can only be interrogated (output network variables, nvo, e.g., status information).

Each data point accessible from a LONWORKS network is described with a table that gives the LONWORKS Name, Profile, SNVT Type, and SNVT Number. If the variable is a standard configuration variable, the table also includes the SCPT Reference and the SCPT Number.

Field Wiring

Following are descriptions of the various field wiring requirements and options. All possible field-wiring connections are shown in Figure 1.

Note: Wiring must comply with the National Electrical Code and all local codes and ordinances. The warranty is void if the field wiring is not in accordance with these instructions.

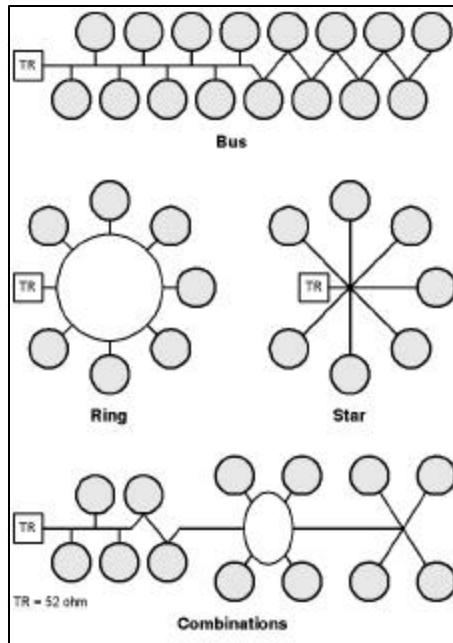
MicroTech 2000 Network Communications

All MicroTech 2000 controllers communicate on the LON via an FTT-10 transceiver. This transceiver allows for (1) *free topology* network wiring schemes using twisted pair (unshielded) cable and (2) polarity insensitive terminations at each node. These features greatly simplify installation and reduce network commissioning problems. You can also add nodes in the future with little regard for existing cable routing. The communications rate on an FTT-10 network is 78 kbps.

As shown in Figure 1, free topology means that the following network topologies are possible:

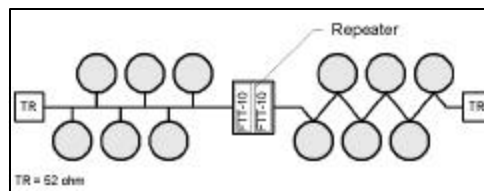
- ? Bus
- ? Ring
- ? Star
- ? Any combination of Bus, Ring, and Star

Figure 1. Free Topology Networks



A *network segment* is any part of the free topology network where each conductor is electrically continuous. Each of the four diagrams in Figure 1 is a segment. Some applications may require two or more segments; see Free Topology Restrictions. If necessary, segments can be joined with FTT-10-to-FTT-10 physical layer repeaters, which are available from third-party vendors (See Figure 2.)

Figure 2. Combining Network Segments with a Repeater



Free Topology Restrictions

Although free topology wiring is very flexible, there are a few restrictions:

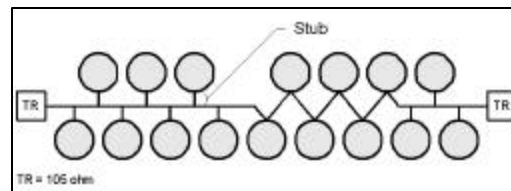
1. The maximum number of nodes per segment is 64.
2. The maximum node-to-node distance is 1312 ft (400m).
3. The longest cable path between any possible pair of nodes on a segment must not exceed the maximum node-to-node distance. If two or more paths exist between a pair of nodes (e.g., a loop topology), the longest path should be considered. Note that in a bus topology, the longest node-to-node distance is equal to the total cable length.
4. The maximum total cable length is 1640 ft (500m).
5. The total length of all cable in a segment must not exceed the maximum total cable length.
6. One 52.3-ohm (0.25 W, 1%) termination resistor is required in each segment.

If you install a repeater and another segment, you must obtain and install a termination resistor in that segment. The termination resistor can be located anywhere in the segment.

Extending Cable Length With Special Bus Topology

You can extend the maximum total cable length without using a repeater by using *doubly-terminated bus topology* instead of free topology (see Figure 3.) The trade-offs are (1) this special *bus* topology must be rigorously adhered to during the installation and subsequent retrofits and (2) two termination resistors must be obtained and installed at the ends of the bus.

Figure 3. Doubly-Terminated Bus Topology Network



The restrictions on doubly-terminated bus topology are as follows:

1. The maximum number of nodes per segment is 64.
2. The maximum total bus length depends on the wire size (see Cable Specification below):

| Wire Size | Maximum Cable Length |
|-----------|----------------------|
| 22 AWG | 4590 ft. (1400 m) |
| 16 AWG | 8855 ft. (2700 m) |

3. The maximum stub length is 9.8 ft (3 m).

A *stub* is a piece of cable that is wired between the node and the bus. See Figure 3. If the bus is wired directly to the node, there is no stub, and thus the stub length is zero. If you are wiring to a field terminal strip on a unit (e.g., WSHP), be sure to account for any factory wiring between the terminal strip and the MicroTech 2000 controller. This wiring is considered part of the stub.

4. Two 105-ohm (0.25 W, 1%) termination resistors are required in each segment. One resistor must be located at each end of the bus.

Qualified Cables

Echelon has qualified three twisted-pair network communications cables that are available from a large number of different sources. Some local codes or applications may require the use of plenum rated cable. The following cables meet this specification.

1. TIA568A Category 5 cable (24AWG/0.51mm)
2. NEMA Level IV cable (22AWG/0.65mm)
3. Generic 16AWG (1.3mm) (similar to Belden 85102)

Do not install the cable in the same conduit with power wiring. The temperature of the cable must not exceed 131°F (55°C).

Note: Ideally, one continuous piece of cable should connect any two controllers. This reduces the risk of communications errors. If the cable must be spliced, use crimp-type butt connectors (better) or solder (best). Do not use wire nuts.

Wiring Instructions

Wiring a MicroTech 2000 network is simplified by the following:

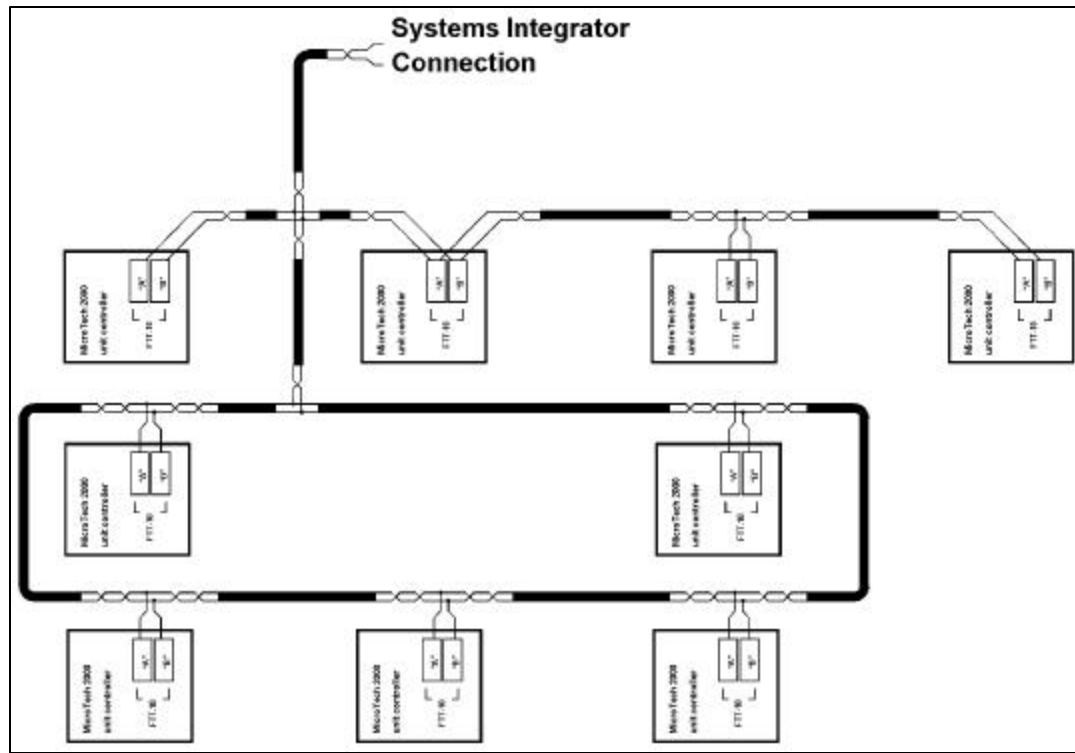
1. Free topology may be used.
2. Only two terminations are required at each node.
3. Those terminations may be made without regard for polarity.

MicroTech 2000 controllers are equipped with field terminals for the network communications terminations, which are summarized in Table 1. Internal factory wiring connects the node to the field terminals. Refer to Figure 4 for a typical wiring schematic.

Table 1: Network Communications Field Wiring Terminals

| MicroTech 2000 Controller | Terminal "A" | Terminal "B" |
|---------------------------|--------------|--------------|
| WSHP | 5 on TB1 | 6 on TB1 |

Figure 4. Typical Field Wiring Schematic (Free Topology shown)



Note: Network wiring is completely independent of controller addressing. Therefore, the networked controllers can be wired in any order. This allows, for example, an electrician to perform the wiring and a technician—who has no knowledge of the wiring—to perform the addressing later during the commissioning process.

Use the following guidelines as you wire the network:

- ? Observe the topology restrictions described above.
- ? Use care to assure that no shorts or opens exist in the network.

Note: The resistance across the conductors from the termination resistor(s) should be approximately 52 ohms, *but this resistance can only be measured on an ohmmeter when all nodes are disconnected from the network cable*. This is true because the impedance across an unpowered FTT10 transceiver is approximately 6 ohms. Because disconnecting all nodes may be difficult and time consuming, we recommend not doing it unless communications problems arise during the commissioning process.

- ? When making wire splices and multiple-wire terminations, always match wire color to reduce the risk of shorts. This precaution is especially important when wiring ring topologies.
- ? Although free topology allows for very flexible, ad hoc wiring, it is recommended that the installing contractor record the physical positions of the cable runs and the controllers on a floor plan. This facilitates troubleshooting any network communications problems that may occur during installation or later.
- ? By looking at the internal factory wiring, assure that each node is connected to the network. The connection at a MicroTech 2000 controller is typically an insulation-displacement type (IDC) plug-in connector. These connectors should be connected to their controllers. Since controller addressing can be done remotely, this eliminates the need for a technician to return to each unit during the commissioning process.

Output Network Variables

Active Cooling Setpoint

This output network variable indicates the active cooling setpoint to which the unit is controlling.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|-------------|-------------|
| nvoActiveClgSpt | Proprietary | SNVT_temp_p | 105 |

Measurement: Temperature
Type Category: Fixed Point Scalar - signed long
Type Size: 2 bytes
Valid Range (Resolution): -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Active Heating Setpoint

This output network variable indicates the active heating setpoint to which the unit is controlling.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|-------------|-------------|
| nvoActiveHtgSpt | Proprietary | SNVT_temp_p | 105 |

Measurement: Temperature
Type Category: Fixed Point Scalar - signed long
Type Size: 2 bytes
Valid Range (Resolution): -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Current Compressor 1 Fault

This output network variable indicates the current fault condition for compressor number one. A compressor fault disables the compressor until you clear the fault.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|------------|-------------|
| nvoCompFaults1 | Proprietary | SNVT_count | 8 |

Measurement: Even Count
Type Category: Fixed Point Scalar - unsigned long
Type Size: 2 bytes
Valid Range (Resolution): 0 .. 65,535 counts (1 count)

Enumeration

| Value (Decimal) | Binary | Hexadecimal | Definition |
|-----------------|----------|-------------|--------------|
| 205 | 11001101 | CD | Low Temp |
| 206 | 11001110 | CE | Low Pressure |
| 207 | 11001111 | CF | Hi Pressure |
| 255 | 11111111 | FF | None |

Current Compressor 2 Fault

This output network variable indicates the current fault condition for the second compressor in a dual compressor unit. A compressor fault disables the compressor until you clear the fault.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|------------|-------------|
| NvoCompFaults2 | Proprietary | SNVT_count | 8 |

| | |
|--------------------------|------------------------------------|
| Measurement | Even Count |
| Type Category | Fixed Point Scalar - unsigned long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | 0 .. 65,535 counts (1 count) |

Enumeration

| Value (Decimal) | Binary | Hexadecimal | Definition |
|-----------------|----------|-------------|--------------|
| 205 | 11001101 | CD | Low Temp |
| 206 | 11001110 | CE | Low Pressure |
| 207 | 11001111 | CF | Hi Pressure |
| 255 | 11111111 | FF | None |

Current Unit Fault

This output network variable indicates the current unit fault for the heat pump. A fault disables the unit until you clear the fault.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|------------|-------------|
| nvoCurrentFault | Proprietary | SNVT_count | 8 |

| | |
|--------------------------|------------------------------------|
| Measurement | Even Count |
| Type Category | Fixed Point Scalar - unsigned long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | 0 .. 65,535 counts (1 count) |

Enumeration

| Value (Decimal) | Binary | Hexadecimal | Definition |
|-----------------|----------|-------------|------------------|
| 204 | 11001100 | CC | Room Sensor Fail |
| 205 | 11001101 | CD | Low Temp |
| 206 | 11001110 | CE | Low Pressure |
| 207 | 11001111 | CF | Hi Pressure |
| 255 | 11111111 | FF | None |

Discharge Air Temperature

This output network variable indicates the discharge air temperature.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|-------------|-------------|
| nvoDischAirTemp | Proprietary | SNVT_temp_p | 105 |

| | |
|--------------------------|--|
| Measurement | Temperature |
| Type Category | Fixed Point Scalar - signed long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data. |

Lead Compressor

This output network variable indicates which compressor is acting as the lead compressor in a dual compressor unit. The controller handles lead/lag control of the compressors based on compressor run time (see input network variable nviComp1Hours [Compressor 1 Run Hours] and nviComp2Hours [Compressor 2 Run Hours]). The compressor with the fewest run hours is selected as the lead compressor when there is a call for cooling or heating.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nvoLeadComp | Proprietary | SNVT_count | 8 |

Measurement Even Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count)

Enumeration

| Value | Definition |
|-------|--------------|
| 0 | Compressor 1 |
| 1 | Compressor 2 |

Leaving Water Temperature

This output network variable indicates the temperature of the leaving water.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|-------------|-------------|
| nvoLvgWtrTemp | Proprietary | SNVT_temp_p | 105 |

Measurement Even Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

McQuay Unit Status

This output network variable indicates the operating status of the heat pump. It is an extension of the information found in the heat pump functional profile's unit status network variable output.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|------------|-------------|
| nvoUnitStatMcQ | Proprietary | SNVT_count | 8 |

| | |
|--------------------------|------------------------------------|
| Measurement | Even Count |
| Type Category | Fixed Point Scalar - unsigned long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | 0 .. 65,535 counts (1 count) |

Enumeration

| Value (Decimal) | Binary | Hexadecimal | Definition |
|-----------------|-----------|-------------|---------------------------|
| 0 | 00000000 | 00 | Unoccupied |
| 1 | 00000001 | 01 | Occupied |
| 2 | 00000010 | 02 | Override |
| 6 | 00000110 | 06 | Fan and Compressor Diable |
| 9 | 00001001 | 09 | Fan Only |
| 12 | 00001100 | 0C | Can't Heat |
| 16 | 00010000 | 10 | Can't Cool |
| 190 | 101111110 | BE | Condenser Overflow |
| 191 | 10111111 | BF | Brownout |
| 204 | 11001100 | CC | Room Sensor Failure |
| 205 | 11001101 | CD | Low Temperature |
| 206 | 11001110 | CE | Low Pressure |
| 207 | 11001111 | CF | High Pressure |

Previous Unit Fault

This output network variable indicates the previous unit fault for the heat pump.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nvoPrevFault | Proprietary | SNVT_count | 8 |

| | |
|--------------------------|------------------------------------|
| Measurement | Even Count |
| Type Category | Fixed Point Scalar - unsigned long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | 0 .. 65,535 counts (1 count) |

Enumeration

| Value (Decimal) | Binary | Hexadecimal | Definition |
|-----------------|----------|-------------|------------------|
| 204 | 11001100 | CC | Room Sensor Fail |
| 205 | 11001101 | CD | Low Temp |
| 206 | 11001110 | CE | Low Pressure |
| 207 | 11001111 | CF | Hi Pressure |
| 255 | 11111111 | FF | None |

Remote Room Setpoint Adjustment

This output network variable indicates the current temperature offset based on the space temperature sensor slide potentiometer. The slide potentiometer must be available on the space temperature sensor and the network variable nciRmSptAdjSpan (see Remote Room Setpoint Adjustment Enable/Disable) must be enabled in order to read a valid value from this variable. If the slide potentiometer is not present or the nciRmSptAdjSpan is not enabled, nvoRoomTSptAdj displays a value of 32°F.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|-------------|-------------|
| nvoRoomTSptAdj | Proprietary | SNVT_temp_p | 105 |

Measurement Even Count
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes

Enumeration

- 29 = -3°F setpoint adjustment
- 30 = -2°F setpoint adjustment
- 31 = -1°F setpoint adjustment
- 32 = No setpoint adjustment
- 33 = +1°F setpoint adjustment
- 34 = +2°F setpoint adjustment
- 35 = +3°F setpoint adjustment

Note: Values on left represent format modifiers set to #US. Values on right represent format modifiers set to #US_diff. Since nvoRoomTSptAdj is an offset, the SNVT_temp_p#US_diff format is preferred.

Software Identification

This output network variable indicates the current software identification in the unit. The identification is six characters long.

Note: Verify that the software identification is compatible with information in this document. See Software Revision.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|-------------|-------------|
| nvoldent | Proprietary | SNVT_temp_p | 36 |

Measurement Character string
Type Category Structure
Type Size 31 bytes

Structure

```
Typedef struct {  
    unsigned char ascii[31]; // 0..30 chars  
} SNVT_str_asc;           // NUL terminator
```

Enumeration

| Position | Definition | Example |
|-----------|--------------------------------------|---------|
| Byte 0 | Program identification 1st character | W |
| Byte 1 | Program identification 2nd character | H |
| Byte 2 | Program identification 3rd character | P |
| Byte 3 | Program identification 4th character | E |
| Byte 4 | Program identification 5th character | 2 |
| Byte 5 | Program identification 6th character | E |
| Byte 6-30 | Not Used | Example |

Space Temperature Output (Mandatory)

This output network variable indicates the value of the controlled space temperature from the locally connected space temperature sensor. It is mandatory to the profile.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|-------------|-------------|
| nvoSpaceTemp | Proprietary | SNVT_temp_p | 105 |

| | |
|--------------------------|--|
| Measurement | Temperature |
| Type Category | Fixed Point Scalar - signed long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | -273.17 .. +327.66 °C (0.01 °C). The value 0x7FFF represents invalid data. |

Valid Range

10°C (50°F) to 35°C (95°F)

Tenant Override Countdown Timer

This output network variable indicates the time remaining in tenant override. The unit must have a sensor with the tenant override option for this to have a non-zero value.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|---------------|-------------|
| nvoTenOvrTimer | Proprietary | SNVT_time_min | 123 |

| | |
|--------------------------|------------------------------------|
| Measurement | Minutes |
| Type Category | Fixed Point Scalar - unsigned long |
| Type Size | 2 bytes |
| Valid Range (Resolution) | 0 .. 65,535 minutes (1 minute) |

Unit Status Output (Mandatory)

This output network variable reports the unit status. It combines the operating mode, the capacity of heating and cooling used and an indication if any alarms are present in the object. It is mandatory to the profile.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|---------|------------------|-------------|
| nvoUnitStatus | WSHP | SNVT_hvac_status | 112 |

Measurement HVAC Status
 Type Category Structure
 Type Size 12 bytes

Structure

Typedef struct {

| | | |
|-------------|------------------------|---------------------------|
| hvac_t | mode; | See hvac_t Enumeration |
| signed long | heat_output_primary; | 0% - 100% |
| signed long | heat_output_secondary; | (Not Used) |
| signed long | cool_output; | 0% - 100% |
| signed long | econ_output; | (Not Used) |
| signed long | fan_output; | 0% - 100% |
| unsigned | in_alarm; | 0 = No Alarm 1 = Alarm |

} SNVT_hvac_status;

Field Definitions

| Field | Units | Range | Notes |
|-----------------------|------------------|--|--------------------------------|
| Mode | hvac_t | | compatible with SNVT_hvac_mode |
| heat_output_primary | SNVT_lev_percent | -163.83 .. +163.83% (percentage of full scale) | primary heat output |
| heat_output_secondary | SNVT_lev_percent | -163.83 .. +163.83% (percentage of full scale) | secondary heat output |
| cool_output | SNVT_lev_percent | -163.83 .. +163.83% (percentage of full scale) | cooling output |
| Econ_output | SNVT_lev_percent | -163.83 .. +163.83% (percentage of full scale) | economizer output |
| fan_output | SNVT_lev_percent | -163.83 .. +163.83% (percentage of full scale) | fan output |
| in_alarm | Boolean | 0 .. 1 | 1 means unit is in alarm |
| Field | Units | Range | Notes |

hvac_t Enumeration

| Value | Identifier | Notes |
|-------|------------------|---|
| 0 | HVAC_AUTO | Controller automatically changes between application modes (Not Used) |
| 1 | HVAC_HEAT | Heating only |
| 2 | HVAC_MRNG_WRMUP | Application-specific morning warm-up (Not Used) |
| 3 | HVAC_COOL | Cooling only |
| 4 | HVAC_NIGHT_PURGE | Application-specific night purge (Not Used) |
| 5 | HVAC_PRE_COOL | Application-specific pre-cool (Not Used) |
| 6 | HVAC_OFF | Controller not controlling outputs |
| 7 | HVAC_TEST | Equipment being tested (Not Used) |
| 8 | HVAC_EMERG_HEAT | Emergency heat mode (heat pump) (Not Used) |
| 9 | HVAC_FAN_ONLY | Air not conditioned, fan turned on |
| 10 | HVAC_FREE_COOL | Cooling with compressor not running (Not Used) |
| 11 | HVAC_ICE | Ice-making mode (Not Used) |
| 0xFF | HVAC_NUL | Value not available |

Warning Information

This output network variable indicates warning information for the unit. Warnings do not disable the unit.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|------------|-------------|
| nvoWarn_Request | Proprietary | SNVT_state | 83 |

Measurement State
Type Category Structure
Type Size 2 bytes

Structure

```
Typedef struct {  
    unsigned bit0  
    unsigned bit1  
    ...  
}                      unsigned bit5  
SNVT_str_asc;
```

Field Definitions

Each bit indicates the state of the Boolean.

Enumeration

For Byte 0:

| Bit | Definition |
|-----|--|
| 0 | (MSB) Request Loop Flow (0 = No call for loop flow, 1 = Request Loop Flow) |
| 1 | Unused (Always 0) |
| 2 | Bad Leaving Water Temp Sensor (0= Sensor ok, 1 = Bad Leaving Water Temp Sensor) |
| 3 | Bad Discharge Air Temp Sensor (0 = Sensor ok, 1 = Bad Discharge Air Temp Sensor) |
| 4 | Unused (Always 0) |
| 5 | Change Filter (0 = Filter ok, 1 = Change Filter) |
| 6 | Room Too Cool (0 = Room temp ok, 1 = Room Too Cool) |
| 7 | Room Too Warm (0 = Room temp ok, 1 = Room Too Warm) |

Where MSB = Most Significant Bit

Byte 1 not used.

Input Network Variables

Application Mode Input

This input network variable coordinates the Heat Pump with any supervisory controller or intelligent human interface device. This network variable is required for Water Source Heat Pumps that do not have another way of detecting water flow to the unit. This network variable is used to lock out compressor operation when a supervisory controller determines that water is not being provided to the unit. In this case, the HVAC_FANONLY state is necessary to provide ventilation to the space and disable compressor operation at the same time.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|---------|----------------|-------------|
| nviApplicMode | WSHP | SNVT_hvac_mode | 108 |

| | |
|--------------------------|--------------------|
| Measurement | HVAC Mode |
| Type Category | Enumeration Scalar |
| Type Size | 1 byte |
| Valid Range (Resolution) | hvac_t Enumeration |

hvac_t Enumeration

| Value | Identifier | Notes | |
|-------|------------------|--|------------|
| 0 | HVAC_AUTO | Controller automatically changes between application modes | |
| 1 | HVAC_HEAT | Heating only | |
| 2 | HVAC_MRNG_WRMUP | Application-specific morning warm-up | (Not Used) |
| 3 | HVAC_COOL | Cooling only | |
| 4 | HVAC_NIGHT_PURGE | Application-specific night purge | (Not Used) |
| 5 | HVAC_PRE_COOL | Application-specific pre-cool | (Not Used) |
| 6 | HVAC_OFF | Controller not controlling outputs | |
| 7 | HVAC_TEST | Equipment being tested | (Not Used) |
| 8 | HVAC_EMERG_HEAT | Emergency heat mode (heat pump) | (Not Used) |
| 9 | HVAC_FAN_ONLY | Air not conditioned, fan turned on | |
| 10 | HVAC_FREE_COOL | Cooling with compressor not running | (Not Used) |
| 11 | HVAC_ICE | Ice-making mode | (Not Used) |

Clear Fault

This input network variable clears a unit fault. Investigate the cause of the fault before resetting the unit. The control application immediately resets this value to zero after a one (1) is written to it.

Note: The value portion of the clear fault SNVT_switch is not used.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|-------------|-------------|
| nviClearFault | Proprietary | SNVT_switch | 95 |

Measurement Switch
Type Category Structure
Type Size 2 bytes

Structure

```
Typedef struct {  
    unsigned                      value;  
    signed                              state;  
} SNVT_switch;
```

Field Definitions

| Field | Units | Valid Range | Notes |
|-------|------------------|--------------|--|
| value | 8 bit percentage | 0 .. 100% | intensity as percentage of full scale, resolution 0.5% |
| state | state | 0 .. 1, 0xFF | 0 means off, 1 means on, 0xFF means undefined |

Enumeration

0 No Clear Fault
1 Clear Fault (Changes Back To 0 Immediately)

Compressor 1 Run Hours

This input network variable records the number of run hours for the first compressor. This variable should be monitored only by the systems integrator. Reset this value when you install a new compressor.

Note: The value of nviComp1Hours is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's compressor run hours are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nviComp1Hours | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 1 hour)

Compressor 2 Run Hours

This input network variable records the number of run hours for the second compressor in a dual compressor unit. This variable should be monitored-only by the systems integrator. Reset this value when you install a new compressor.

Note: The value of nviComp2Hours is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's compressor run hours are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nviComp2Hours | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 1 hour)

Compressor 1 Starts

This input network variable indicates the number of starts for the first compressor. This variable should be monitored-only by the systems integrator. Reset this value when you install a new compressor.

Note: The value of nviCompStarts1 is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's compressor starts are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|------------|-------------|
| nviCompStarts1 | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 1 hour)

Compressor 2 Starts

This input network variable indicates number of starts for the second compressor in a dual compressor unit. This variable should be monitored-only by the systems integrator. Reset this value when you install a new compressor.

Note: The value of nviCompStarts2 is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's compressor starts are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|----------------|-------------|------------|-------------|
| NviCompStarts2 | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 1 hour)

Change Filter Timer

This input network variable indicates the current countdown status of the filter before a change filter warning is generated. It is based upon the unit's fan run hours. After this counts down to zero and a warning is generated, it needs to be reset to restart the countdown. This value cannot be greater than the maximum filter hours setpoint. The Change Filter Timer is set by the Change Filter Warning Setpoint. See Change Filter Warning Setpoint.

Note: The value of nviFilterStatus is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's filter hours are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|-----------------|-------------|------------|-------------|
| nviFilterStatus | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 8 hours)

Default Value

75

Fan Run Hours

This input network variable records the number of run hours for the fan. This variable should be monitored-only by the systems integrator. This variable should be reset when you install a new fan.

Note: The value of nviFanHours is written and stored in the controller's non-volatile EEPROM memory once every 24 hours. If power is lost, that day's fan run hours are not stored.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nviFan Hours | Proprietary | SNVT_count | 8 |

Measurement Event Count
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count = 1 hour)

Optional Output 1 Configuration

This input network variable is used to configure the heat pump unit controller’s spare output. The heat pump unit controller has one spare output that can be set up to control a motorized water valve, a fresh air damper, or auxiliary heat device. Caution: The information contained in nviOptOut1 is stored in the controller’s EEPROM memory so the number of writes to this variable should be limited.

Note: If the spare output is configured to control a motorized water valve, the spare output mimics the operation of the compressor. When the compressor is energized/de-energized, the spare output energizes/de-energizes. If the spare output is configured to control a freshair damper, the spare output follows the occupancy of the unit. When the unit is in Occupied mode, the spare output energizes and de-energizes when the unit enters the Unoccupied mode. Finally, if the spare output is configured to control an auxiliary heat device, the spare output energizes when the space temperature reaches the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut1Temp (See Variable Details for a description of the nciOptOut1Temp configuration network variable).

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| nviOptOut1 | Proprietary | SNVT_state | 83 |

Measurement State
 Type Category Structure
 Type Size 2 bytes

Structure

```

Typedef struct {
    unsigned bit0
    unsigned bit1
    ...
    unsigned bit15
}
  
```

SNVT_state;

Field Definitions

Each bit indicates the state of the Boolean.

Byte 0 used; Byte 1 unused

Enumeration

For Byte 0:

| Bit | Definition |
|---------|--|
| 0 (MSB) | Available for use (0 = N/A, 1 = Avail.) |
| 1 | Valve control (Set bit 1 of byte 0 to 1 for valve control) |
| 2 | Damper control (Set bit 2 of byte 0 to 1 for damper control) |
| 3 | Skin heat control (Set bit 3 of byte 0 to 1 for aux. Heat control) |

All bits clear No control

Where MSB = Most Significant Bit

Default Value

{1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0} (defaulted to Motorized Water Valve)

Optional Output 2 Configuration

This input network variable is used to configure the heat pump auxiliary controller's spare outputs if an auxiliary controller is provided. The optional auxiliary controller offers two spare outputs that can be configured to control a motorized water valve, a fresh air damper, or auxiliary heat device. This input network variable is used to configure the first of those two spare outputs. Caution: The information contained in nviOptOut2 is stored in the controller's EEPROM memory so the number of writes to this variable should be limited.

Note: If the first spare output is configured to control a motorized water valve, the spare output mimics the operation of the compressor. When the compressor is energized/de-energized, the spare output energizes/de-energizes. If the spare output is configured to control a fresh air damper, the spare output follows the occupancy of the unit. When the unit is in Occupied mode, the spare output energizes and de-energizes when the unit enters Unoccupied mode. Finally, if the spare output is configured to control an auxiliary heat device, the spare output energizes when the space temperature reaches the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut2Temp (see Variable Details for a description of the nciOptOut2Temp configuration network variable).

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| NviOptOut2 | Proprietary | SNVT_state | 83 |

Measurement State
Type Category Structure
Type Size 2 bytes

Structure

```
Typedef struct {  
    unsigned bit0  
    unsigned bit1  
    ...  
    unsigned bit15  
}
```

SNVT_state;

Field Definitions

Each bit indicates the state of the Boolean.

Byte 0 used; Byte 1 unused

Enumeration

For Byte 0:

| Bit | Definition |
|---------|--|
| 0 (MSB) | Available for use (0 = N/A, 1 = Avail.) |
| 1 | Valve control (Set bit 1 of byte 0 to 1 for valve control) |
| 2 | Damper control (Set bit 2 of byte 0 to 1 for damper control) |
| 3 | Skin heat control (Set bit 3 of byte 0 to 1 for aux. heat control) |

All bits clear No control

Where MSB = Most Significant Bit

Default Value

{1,0,0,0,0,0,0,0,0,0,0,0,0,0,0}

Optional Output 3 Configuration

This input network variable is used to configure the heat pump auxiliary controller’s spare outputs if an auxiliary controller has been provided. The optional auxiliary controller provides two spare outputs that can be configured to control a motorized water valve, a fresh air damper, or auxiliary heat device. This input network variable is used to configure the second of those two spare outputs. Caution: The information contained in nviOptOut3 is stored in the controller’s EEPROM memory so the number of writes to this variable should be limited.

Note: If the second spare output is configured to control a motorized water valve, the spare output mimics the operation of the compressor. When the compressor is energized/de-energized, the spare output energizes/de-energizes. If the spare output is configured to control a freshair damper, the spare output follows the occupancy of the unit. When the unit is in Occupied mode, the spare output energizes and de-energizes when the unit enters the Unoccupied mode. Finally, if the spare output is configured to control an auxiliary heat device, the spare output energizes when the space temperature reaches the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut3Temp (see Variable Details for a description of the nciOptOut3Temp configuration network variable).

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|------------|-------------|
| NviOptOut3 | Proprietary | SNVT_state | 83 |

Measurement State
 Type Category Structure
 Type Size 2 bytes

Structure

```

Typedef struct {
    unsigned bit0
    unsigned bit1
    ...
    unsigned bit15
}
  
```

SNVT_state;

Field Definitions

Each bit indicates the state of the Boolean.

Byte 0 used; Byte 1 unused

Enumeration

For Byte 0:

| Bit | Definition |
|---------|--|
| 0 (MSB) | Available for use (0 = N/A, 1 = Avail.) |
| 1 | Valve control (Set bit 1 of byte 0 to 1 for valve control) |
| 2 | Damper control (Set bit 2 of byte 0 to 1 for damper control) |
| 3 | Skin heat control (Set bit 3 of byte 0 to 1 for aux. heat control) |

All bits clear No control

Where MSB = Most Significant Bit

Default Value

{1,0,0,0,0,0,0,0,0,0,0,0,0,0,0}

Simple Occupancy Input

This input network variable changes the occupancy mode of the unit from Occupied to Unoccupied by setting the state portion of the switch from 1 to 0. The value portion of the switch network variable is not used.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|-------------|-------------|-------------|
| nviOccupSw | Proprietary | SNVT_switch | 95 |

Measurement Switch
Type Category Structure
Type Size 2 bytes

Structure

```
Typedef struct {  
    unsigned                      value;  
    signed                              state;  
} SNVT_switch;
```

Field Definitions

| Field | Units | Valid Range | Notes |
|-------|------------------|--------------|--|
| value | 8 bit percentage | 0 .. 100% | intensity as percentage of full scale, resolution 0.5% |
| state | state | 0 .. 1, 0xFF | 0 means off, 1 means on, 0xFF means undefined |

A SNVT_switch network variable with state=TRUE is interpreted as the ON state if value > 0, and as the OFF state if value = 0. A SNVT_switch input network variable with state=FALSE should be interpreted as the OFF state, whether or not value = 0.

A state value of 0xFF indicates the switch value is undefined.

State Enumeration

0 Unoccupied
1 Occupied
-1 Invalid (Default)

Space Temperature Input (Mandatory)

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. The heat pump can have a locally wired space temperature sensor. Valid values of nviSpaceTemp have priority over locally wired space sensor values.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|---------|-------------|-------------|
| nviSpaceTemp | WSHP | SNVT_temp_p | 105 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Default Value

The default value is the invalid value of 0x7FF which equals 327.67°C (621.806°F). This value is adopted at power up and remains in effect until an update is received over the network.

Temperature Setpoint Input (Mandatory)

This input network variable can change the temperature setpoint for the occupied mode via the network. It is mandatory to the profile. The individual internal heat/cool setpoints for occupied are then calculated using this network input and the setpoint configuration properties using the following formulas:

$$occupiedheat = \frac{nviSetPoint + occupiedcoolconfig + occupiedheatconfig}{2}$$

$$occupiedcool = \frac{nviSetPoint + occupiedcoolconfig + occupiedheatconfig}{2}$$

Although this network variable input is mandatory to the profile, it does not have to be bound to any setpoint node. If a valid setpoint value is written to nviSetPoint, it is used as the center setpoint. If an invalid setpoint is written to nviSetPoint, either a locally wired setpoint knob or the appropriate setpoint as configured in nciTempSetPnts is used.

The unoccupied setpoints are not affected by this input.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number |
|---------------|---------|-------------|-------------|
| nviSetPoint | WSHP | SNVT_temp_p | 105 |

Measurement: Temperature
 Type Category: Fixed Point Scalar - signed long
 Type Size: 2 bytes
 Valid Range (Resolution): -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Valid Range

10°C (50°F) to 35°C (95°F)

Configuration Properties

Brownout Differential Setpoint

This configuration property is the factory set limit that is the difference before a change occurs in relation to the brownout setpoints. **This value is set at the factory. Record this value so that you can reset it when you replace the controller or download new code.**

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|-----------------|-------------|--------------------|-------------|
| nciBrnoutAdjSpt | Proprietary | Unsigned Long | 8 |

Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1) - (1 count=0.00488 VDC)

Default Value

22

Brownout Recover Setpoint

This configuration property is the factory set limit above which the unit recovers and enables the compressor to run. **This value is set at the factory. Record this value so that you can reset it when you replace the controller or download new code.**

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|-----------------|-------------|--------------------|-------------|
| nciBrnoutRecSpt | Proprietary | Unsigned Long | 9 |

Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1) - (1 count=0.00488 VDC)

Default Value

643

Brownout Trip Setpoint

This configuration property is the factory set limit below which the compressor is disabled due to low power to the controller. **This value is set at the factory. Record this value so that you can reset it when you replace the controller or download new code.**

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|-----------------|-------------|--------------------|-------------|
| nciBrnoutTrpSpt | Proprietary | Unsigned Long | 10 |

Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1) - (1 count=0.00488 VDC)

Default Value

586

Change Filter Warning Setpoint

This configuration property sets the number of fan run hours before the filter needs to be changed on the unit. The factory default is 600 hours and rarely needs to be changed. Once the fan run hours reaches this value, a Change Filter warning is generated (see Warning Information.)

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|-----------------|-------------|--------------------|-------------|
| nciMaxFilterHrs | Proprietary | Unsigned Long | 17 |

Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1) - (1 count=0.00488 VDC)

Default Value

75

Condensate Overflow Fault Setpoint

This configuration property serves as the setpoint at which a condensate overflow condition turns off the compressor. **This value is set at the factory. Record this value so that you can reset it when you replace the controller or download new code.**

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|------------------|-------------|--------------------|-------------|
| nciCondSenTripPt | Proprietary | Unsigned Long | 14 |

Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1) - (1 count=0.00488 VDC)

Default Value

639

High Space Temperature Warning Setpoint

This configuration property indicates the limit above which a unit warning is activated (see Warning Information.)

Variable Details

| LonWorks Name | Profile | SCPT Reference | SCPT Number | SNVT Type | SNVT Number |
|---------------|-------------|-----------------|-------------|-------------|-------------|
| nciHiTWarnSpt | Proprietary | SCPTHighLimTemp | 123 | SNVT_temp_p | 105 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Default Value

35°C (95°F)

Initial Delay Setpoint

This configuration property is used to set the unit's initial start-up delay, therefore providing staggered start control in the event of power loss.

Variable Details

| LonWorks Name | Profile | SCPT Reference | SCPT Number | SNVT Type | SNVT Number |
|-----------------|-------------|----------------|-------------|---------------|-------------|
| nciInitialDelay | Proprietary | SCPTstrtpDelay | 111 | SNVT_time_sec | 107 |

Measurement Elapsed Time
Type Category Signed long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 6553.4 sec (0.1 sec) The value 0x7FFF represents invalid data.

Default Value

5.0 sec

Leaving Water Temperature Sensor Present

This configuration property is factory set to indicate whether or not a leaving water temperature sensor is present. Do not adjust.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|------------------|-------------|-------------|-------------|-------------|
| nciLWTSenPresent | Proprietary | SNVT_switch | 95 | 16 |

Measurement Switch
Type Category Structure
Type Size 2 bytes

Structure

```
Typedef struct {  
    unsigned value;  
    signed state;  
} SNVT_switch;
```

Field Definitions

| Field | Units | Valid Range | Notes |
|-------|------------------|--------------|--|
| value | 8 bit percentage | 0 .. 100% | intensity as percentage of full scale, resolution 0.5% |
| state | state | 0 .. 1, 0xFF | 0 means off, 1 means on, 0xFF means undefined |

Enumeration

0 No
1 Yes

Default Value

200, True

Low Space Temperature Warning Setpoint

This configuration property specifies the limit below which a unit warning is activated (see Warning Information.)

Variable Details

| LonWorks Name | Profile | SCPT Reference | SCPT Number | SNVT Type | SNVT Number |
|----------------|-------------|----------------|-------------|-------------|-------------|
| nciLowTWarnSpt | Proprietary | SCPTlowLimTemp | 128 | SNVT_temp_p | 105 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Default Value

12.8°C (55°F)

Occupied Fan Operating Mode Setpoint

This configuration property allows the end user to select the desired fan operation in Occupied mode. The default setting is for the fan to be ON continuously in Occupied mode.

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|----------------|-------------|--------------------|-------------|
| nciOccFan Mode | Proprietary | Unsigned Short | 15 |

Type Category Unsigned short
Type Size 2 bytes

Enumeration

- 0= Fan cycles with compressor
- 1= Fan ON continuously
- 2= Fan cycles in heating, On in cooling

Default Value

1 = Fan ON continuously

Remote Room Setpoint Adjustment Enable/Disable

This configuration property is used to enable/disable the optional tenant setpoint adjustment potentiometer on the space temperature sensor. If a space temperature sensor is purchased with the tenant setpoint adjustment option, adjust the nciRmSptAdjSpan to any value other than the default (32×F) to enable the potentiometer.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|-----------------|-------------|-------------|-------------|-------------|
| nciRmSptAdjSpan | Proprietary | SNVT_temp_p | 105 | 24 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Default Value

32.054°F (When format modifier set to #US)
0.054°F (When format modifier set to #US_diff)

Room Temperature Differential Setpoint

This configuration property sets the change of room temperature necessary to enable the lag compressor in a two-compressor unit in order to satisfy the heating/cooling requirement. The default value enables the second compressor in a dual compressor unit when the space temperature exceeds the cooling setpoint + 2°F and/or the heating setpoint - 2°F.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|----------------|-------------|-------------|-------------|-------------|
| nciStgDiffTSpt | Proprietary | SNVT_temp_p | 105 | 26 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Valid Range

32.98°F - 41.98°F (When format modifier set to #US)

1°F - 10°F (When format modifier set to #US_diff)

Default Value

33.98°F (When format modifier set to #US)

1.98°F (When format modifier set to #US_diff)

Note: Since this configuration property is used to set a temperature differential, the preferred format for nciStgDiffTSpt is SNVT_temp_p#US_diff.

Send Heartbeat (Mandatory)

This configuration property is mandatory to the profile. It defines the maximum period of time that elapses before the following network variable outputs are automatically updated:

- ? nvoSpaceTemp
- ? nvoUnitStatus
- ? nvoEffectSetPt (Not Used)

A value of 0 disables the auto update.

Variable Details

| LonWorks Name | Profile | SCPT Reference | SCPT Number | SNVT Type | SNVT Number |
|---------------|---------|-----------------|-------------|---------------|-------------|
| nciSndHrtBt | WSHP | SCPTMaxSendTime | 49 | SNVT_time_sec | 107 |

Measurement Elapsed Time
Type Category Fixed Point Scalar - unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 6553.4 sec (0.1 sec) The value 0x7FFF represents invalid data.

Default Value

0 seconds = No Update.

Skin Heat Temperature Differential Setpoint for Optional Output 1

This configuration property sets the temperature differential for when the spare output on the main controller is to de-energize if it has been configured to control an auxiliary heat device. If configured to control an auxiliary heat device, the spare output energizes when the space temperature drops to the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut1Temp.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|----------------|-------------|-------------|-------------|-------------|
| nciOptOut1Temp | Proprietary | SNVT_temp_p | 105 | 19 |

Measurement: Temperature
Type Category: Fixed Point Scalar - signed long
Type Size: 2 bytes
Valid Range (Resolution): -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Valid Range

33.06°F - 35.06°F (When format modifier set to #US)

1°F - 3°F (When format modifier set to #US_diff)

Default Value

35.06°F (When format modifier set to #US)

3°F (When format modifier set to #US_diff)

Note: Since this configuration property is used to set a temperature differential, the preferred format for nciOptOut1Temp is SNVT_temp_p#US_diff.

Skin Heat Temperature Differential Setpoint for Optional Output 2

This configuration property sets the temperature differential for when the first spare output on the auxiliary controller (if one has been provided) is to de-energize if it has been configured to control an auxiliary heat device. If configured to control an auxiliary heat device, the first spare output energizes when the space temperature drops to the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut2Temp.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|----------------|-------------|-------------|-------------|-------------|
| NciOptOut2Temp | Proprietary | SNVT_temp_p | 105 | 19 |

Measurement: Temperature
Type Category: Fixed Point Scalar - signed long
Type Size: 2 bytes
Valid Range (Resolution): -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Valid Range

33.06°F - 35.06°F (When format modifier set to #US)

1°F - 3°F (When format modifier set to #US_diff)

Default Value

35.06°F (When format modifier set to #US)

3°F (When format modifier set to #US_diff)

Note: Since this configuration property is used to set a temperature differential, the preferred format for nciOptOut2Temp is SNVT_temp_p#US_diff.

Skin Heat Temperature Differential Setpoint for Optional Output 3

This configuration property sets the temperature differential for when the second spare output on the auxiliary controller (if one has been provided) is to de-energize if it has been configured to control an auxiliary heat device. If configured to control an auxiliary heat device, the second spare output energizes when the space temperature drops to the heating setpoint and de-energizes when the space temperature reaches the heating setpoint + nciOptOut3Temp.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|----------------|-------------|-------------|-------------|-------------|
| NciOptOut3Temp | Proprietary | SNVT_temp_p | 105 | 23 |

Measurement Temperature
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) -273.17 .. +327.66°C (0.01°C). The value 0x7FFF represents invalid data.

Valid Range

33.06°F - 35.06°F (When format modifier set to #US)

1°F - 3°F (When format modifier set to #US_diff)

Default Value

35.06°F (When format modifier set to #US)

3°F (When format modifier set to #US_diff)

Note: Since this configuration property is used to set a temperature differential, the preferred format for nciOptOut3Temp is SNVT_temp_p#US_diff.

Temperature Setpoints (Mandatory)

This configuration property defines the occupancy temperature setpoints for heat and cool mode. It is mandatory to the profile.

Variable Details

| LonWorks Name | Profile | SCPT Reference | SCPT Number | SNVT Type | SNVT Number |
|---------------|---------|----------------|-------------|-----------------|-------------|
| nciTempSetPts | WSHP | SCPTsetPnts | 60 | SNVT_temp_setpt | 106 |

Measurement Temperature Setpoints
 Type Category Structure
 Type Size 12 bytes

Structure

```

Typedef struct {
    signed long    occupied_cool
    signed long    standby_cool
    signed long    unoccupied_cool
    signed long    occupied_heat
    signed long    standby_heat
    signed long    unoccupied_heat
} SNVT_temp_setpt;
  
```

Field Definitions

| Field | Units | Notes |
|-----------------|-------------|---|
| occupied_cool | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |
| standby_cool | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |
| unoccupied_cool | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |
| occupied_heat | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |
| standby_heat | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |
| unoccupied_heat | SNVT_temp_p | resolution 0.01 degC; 0x7FFF means data unavailable |

Valid Range and Default Values

| | Minimum | Maximum | Default | |
|-----------------|-------------|-------------|---------------|------------|
| occupied_cool | 10°C (50°F) | 35°C (95°F) | 23°C (73.4°F) | |
| standby_cool | 10°C (50°F) | 35°C (95°F) | 25°C (77°F) | (not used) |
| unoccupied_cool | 10°C (50°F) | 35°C (95°F) | 28°C (82.4°F) | |
| occupied_heat | 10°C (50°F) | 35°C (95°F) | 21°C (69°F) | |
| standby_heat | 10°C (50°F) | 35°C (95°F) | 19°C (66.2°F) | (not used) |
| unoccupied_heat | 10°C (50°F) | 35°C (95°F) | 16°C (60°F) | |

Tenant Override First Press Setpoint

This configuration property sets the duration the unit runs in tenant override mode from the first press of the tenant override button, located on the space temperature sensor. When this time has elapsed, assuming the tenant override button has only been pressed once, the unit returns to Unoccupied mode.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|-----------------|-------------|---------------|-------------|-------------|
| nciTenOvrDTSpt1 | Proprietary | SNVT_time_sec | 106 | 28 |

Measurement Elapsed Time
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 6553.4 sec (0.1 sec) The value 0x7FFF represents invalid data.

Default Value

3600.0 seconds

Tenant Override Second Press Setpoint

This configuration property sets the time the unit runs in tenant override mode after a second press of the tenant override button. When this time has elapsed, the unit returns to Unoccupied mode. The default value of 0 seconds means that pressing the tenant override button a second time puts the unit back into Unoccupied mode.

Variable Details

| LonWorks Name | Profile | SNVT Type | SNVT Number | UCPT Number |
|-----------------|-------------|---------------|-------------|-------------|
| NciTenOvrDTSpt2 | Proprietary | SNVT_time_sec | 106 | 28 |

Measurement Elapsed Time
Type Category Fixed Point Scalar - signed long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 6553.4 sec (0.1 sec) The value 0x7FFF represents invalid data.

Default Value

0.0 seconds

Unit Type

This configuration property indicates whether the unit type as a single or dual compressor system.

CAUTION

This value is set at the factory. Changing this value could damage the unit!

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|---------------|-------------|--------------------|-------------|
| nciUnitType | Proprietary | Unsigned Long | 29 |

Type Category Unsigned long
Type Size 2 bytes
Valid Range (Resolution) 0 .. 65,535 counts (1 count)

Enumeration

| Count | Definition |
|-------|---|
| 1 | Single Compressor |
| 2 | Dual Compressor |
| 3 | Console Unit (Single Compressor) Enables start/stop switch. |

Default Value

Single Compressor

Unoccupied Fan Operating Mode Setpoint

This configuration property allows the end user to select the desired fan operation in Unoccupied mode. The default setting is for the fan to cycle with the compressor in Unoccupied mode.

Variable Details

| LonWorks Name | Profile | Data Type Category | UCPT Number |
|-----------------|-------------|--------------------|-------------|
| nciUnoccFanMode | Proprietary | Unsigned Short | 15 |

Type Category Unsigned long
Type Size 2 bytes

Enumeration

| | |
|----|----------------------------|
| 0= | Fan cycles with compressor |
| 1= | Fan ON continuously |

Default Value

0= Fan cycles with compressor



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