

Group: Controls

Part Number: ED15103

Date: March 2010

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MicroTech[®] III Water Source Heat Pump Unit Controller Protocol Information

BACnet[®] Networks
LONWORKS[®] Networks



Engineering Data

ED 15103-1

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Revision History

Document name	Revision Date	Description
ED 15103	September 2008	Initial release. Changed default baud rate to 38400 (BACnet MS/TP Setup) Corrected range and descriptions of setpoint shift parameters (Protocol Point Summary)
ED 15103-1	March 2010	Moved BACnet Configuration section (BACnet Configuration) Added references to no flow control (BACnet Configuration and BACnet Terminal Settings) Changed the Type Category for all Multistate Values from Enumerated to Unsigned (Detailed Protocol Point Information) Changed BACnet PIC statement Application Version to 2.6 and Firmware Revision to 2.7

Reference Documents

Number	Company	Title	Source
078-0014-01G	LONMARK Interoperability Association	LONMARK Layers 1-6 Interoperability Guidelines, Version 3.4	www.lonmark.org
078-0120-01G	LONMARK Interoperability Association	LONMARK Application Layer Interoperability Guidelines, Version 3.4	www.lonmark.org
078-0156-01G	Echelon® Corporation	LONWORKS® FTT-10A Free Topology Transceiver Users Guide	www.echelon.com
8503	LONMARK Interoperability Association	WSHP Functional Profile	www.lonmark.org
IM 927	McQuay International	MicroTech III Water Source Heat Pump LONWORKS Communication Module Installation Manual	www.mcquay.com
IM 928	McQuay International	MicroTech III Water Source Heat Pump BACnet communication module Installation Manual	www.mcquay.com
ED 15115	McQuay International	Protocol Implementation Conformance Statement (PICS), MicroTech III Water Source Heat Pump Unit Controller, BACnet	www.mcquay.com
OM 931	McQuay International	MicroTech III Water Source Heat Pump Unit Controller Operation and Maintenance	www.mcquay.com

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 necessary information you need to incorporate a MicroTech Water Source Heat Pump (WSHP) Unit Controller from McQuay International into a building automation system (BAS). It lists all BACnet® properties, LONWORKS® variables, and corresponding MicroTech III WSHP Unit Controller data points. It also contains the BACnet Protocol Implementation Conformance Statement (PICS). BACnet and LONWORKS terms are not defined. Refer to the respective specifications for definitions and details.

Unit Controller Data Points

The MicroTech III WSHP Unit Controller contains data points or unit variables that are accessible from a BACnet MS/TP (Master/Slave Token Passing) network or a LONWORKS network. Not all points are accessible from each interface. This document contains the network details necessary to incorporate the MicroTech III WSHP Unit Controller into the network.

Protocol Definitions

The MicroTech III WSHP Unit Controller can be configured in either an interoperable BACnet MS/TP or LONWORKS network. The controller must have the corresponding MicroTech III communication module installed for network integration (see Reference Document section of this document for corresponding literature).

BACnet Protocol

BACnet is a standard communication protocol for Building Automation and Control Networks developed by the American National Standards Institute (ANSI) and American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) specified in ANSI/ASHRAE standard 135-2004. It addresses all aspects of the various systems that are applied to building control systems. BACnet provides the communication infrastructure needed to integrate products manufactured by different vendors and to integrate building services that are now independent. See following section, BACnet Configuration, for details regarding the configuration of the BACnet communication module into a BACnet network.

The MicroTech III WSHP Unit Controller Unit Controller is tested according to the BACnet Testing Laboratory (BTL) Test Plan. It is designed to meet the requirements of the BACnet Standard (ANSI/ASHRAE 135-2004) as stated in the Protocol Implementation and Conformance Statement (PICS). However, it is not BTL listed. The PICS is located at the end of this manual or the separate PICS document, ED 15115 (available on www.mcquay.com.)

LONWORKS Networks

A control network specification for information exchange built upon the use of the LonTalk protocol for transmitting data developed by the Echelon® Corporation.

LonTalk Protocol

A protocol developed and owned by the Echelon Corporation. It describes how information should be transmitted between devices on a control network.

LONMARK Certification

LONMARK certification is an official acknowledgement by the LONMARK Interoperability Association that a product communicates using the LonTalk protocol and transmits and receives data per a standard LONMARK functional profile. The LONWORKS communication module is in accordance with the LONMARK Heat Pump with Temperature Control functional profile and is LONMARK 3.4 certified.

BACnet Configuration

A BACnet communication module must be configured before it can be connected to a BACnet network. This section describes how to set BACnet parameters using the BACnet communication module's built-in configuration menu (see Figure 1). The BACnet configuration menu is accessed using an application such as Windows HyperTerminal. It is assumed that the user is familiar with such an application. Certain parameters are can also be configured via the BACnet network (BAS) and are noted as such within the detailed data section for the respective parameter.

Parameters Required for Configuration

The parameters listed below require configuration in order for the BACnet communication module to properly integrate to the BACnet network. They must be set using the BACnet communication module's configuration menu.

- Device Instance - must be set to a unique value on the BACnet network
- Device Name - must be set to a unique value on the BACnet network
- MS/TP Baud Rate - must be set according to the BACnet network requirements
- Address Switch - must be set according to the BACnet network requirements

Accessing the Configuration Menu

The BACnet communication module's configuration menu is accessed through the DB-9 serial connector on the module itself. Any serial terminal device or application (such as Windows HyperTerminal) can be used to view the menu and change the configuration parameters. Follow these steps to connect to the BACnet configuration menu (see Figure 1):

1. Verify that the terminal application COM settings are set to 19200 bps, 8 bit word, no parity, 1 stop bit, and no flow control.
2. Use a standard serial cable to connect the terminal to the BACnet communication module.
3. Once connected, press the 'Enter' key to display the following menu:

Figure 1. BACnet Configuration Menu

```
===== Configuration Menu =====
McQuay International - MTIII UC WSHP
BACnet SW ver: 2.7      Unit App ver: 2.6
===== SW PN 2506903-02-7 =====
  DEVICE
1) Instance ..... 300
2) Name ..... MTIIIUC_WSHP.0000300
3) Location .....
4) Description .....
5) Units ..... English

  MS/TP
6) Baudrate ..... 38400
7) MaxMasters ..... 127
   Address Switch ..... 3

  TERMINAL
8) EIA-232 Baudrate ... 19200

B) Backup Configuration
R) Restore Configuration
S) Save settings
-----
Enter Selection:
```

Protocol Point Summary - BACnet

Network Control Property (Attributes available as BACnet Standard Objects for network control of the unit)	Page	Read Only, Writeable, or Commandable	Object Type	Instance	Flash Value ¹	Range / Enumeration	Description
DEVICE							
Description	66	W	Dev	*	Y	32 Character String	Device description of the WSHP
Instance	66	W	Dev	*	Y	1 to 4194302 (*user assigned)	Device Instance default = 300*
Location	52	W	Dev	*	Y	32 Character String	Device Location of the WSHP
Name	65	W	Dev	*	Y	32 Character String	Device Object Name.
Software Identification	61	R	Dev	*	N	32 Character String	Firmware-revision for the BACnet module
Unit Application Version	62	R	Dev	*	N	32 Character String	Application-software-revision for the WSHP
MaxMasters	67	W	Dev	*	Y	1-127	Highest MS/TP MAC address on the segment
ANALOG INPUTS							
Local Space Temperature	31	R	AI	1	N	-17.77°C/0°F to 70°C/158°F	From local space temperature sensor
Leaving Water Temperature	28	R	AI	2	N	-17.77°C/0°F to 70°C/158°F	Leaving Water Temperature
Entering Water Temperature	25	R	AI	3	N	-17.77°C/0°F to 70°C/158°F	Entering Water Temperature
Discharge Air Temperature	21	R	AI	4	N	-17.77°C/0°F to 70°C/158°F	Discharge Air Temperature
Local Setpoint Output	29	R	AI	5	N	12.78°C/55°F to 35°C/95°F	Local Setpoint Output
Suction Temperature Compressor #1	42	R	AI	6	N	-17.77°C/0°F to 70°C/158°F	Suction temperature for compressor #1 sensor
Suction Temperature Compressor #2	43	R	AI	7	N	-17.77°C/0°F to 70°C/158°F	Suction temperature for compressor #2 sensor
Brownout (Shutdown)	17	R	AI	8	N	0-1023	Brownout Reference Voltage
ANALOG VALUES							
Occupied Cooling Setpoint	57	W	AV	1	Y	10°C/50°F to 35°C/95°F	Occupied Cooling Setpoint
Standby Cool Setpoint	57	W	AV	2	Y	10°C/50°F to 35°C/95°F	Standby Cooling Setpoint
Unoccupied Cool Setpoint	57	W	AV	3	Y	10°C/50°F to 35°C/95°F	Unoccupied Cooling Setpoint
Occupied Heat Setpoint	57	W	AV	4	Y	10°C/50°F to 35°C/95°F	Occupied Heat Setpoint
Standby Heat Setpoint	57	W	AV	5	Y	10°C/50°F to 35°C/95°F	Standby Heat Setpoint
Unoccupied Heat Setpoint	57	W	AV	6	Y	10°C/50°F to 35°C/95°F	Unoccupied Heat Setpoint
Local Bypass Time Setpoint	52	W	AV	7	Y	0, 30-120 Min	Minutes the unit will remain in Bypass mode
Cooling Interstage Timer Setpoint	47	W	AV	8	Y	0-1200 Seconds	Time between the cooling stages
Brownout Reference Setpoint	46	W	AV	9	Y	0 to 1023 counts	Brownout Reference setpoint for factory setup
Occupied setpoint differential	46	W	AV	10	Y	.55°C/1°F to 2.78°C/5°F	Occupied Setpoint Off differential
Low Temperature Protection SP (Glycol)	50	W	AV	11	Y	1.11°C/2°F to 11.12°C/20°F	Glycol low temperature protection setpoint
Low Temperature Protection Setpoint	54	W	AV	12	Y	-17.77°C/0°F to 10°C/50°F	Low temperature protection setpoint
Low Temperature Protection Differential	54	W	AV	13	Y	1.11°C/2°F to 8.34°C/15°F	Low temperature differential for hysteresis
Heating Interstage Timer Setpoint	50	W	AV	14	Y	0-1200 Seconds	Time between the heating stages
Minimum Compressor Off Timer Setpoint	55	W	AV	15	Y	0-1200 Seconds	Minimum time compressor must stay off before turning on.
Minimum Compressor On Timer Setpoint	55	W	AV	16	Y	0-1200 Seconds	Minimum time compressor must stay on before turning off.
Unoccupied setpoint differential	63	W	AV	17	Y	1.11°C/2°F to 5.56°C/10°F	Unoccupied setpoint differential
Space Temperature Input	39	C	AV	18	N	-10°C/14°F to 50°C/122°F	Network Space Temperature input
Temperature Setpoint Input	44	C	AV	19	N	10°C/50°F to 35°C/95°F	Network Temperature Setpoint Input
Receive Heartbeat	58	W	AV	20	Y	0 to 6553.4	Received message timer
Send Heartbeat	60	W	AV	21	Y	0 to 6553.4	Send timer
Effective Space Temperature	40	R	AV	22	N	-17.77°C/0°F to 70°C/158°F	Effective Space Temperature Output
Effective Setpoint Output	23	R	AV	23	N	10°C/50°F to 35°C/95°F	This will display either the Heating or Cooling setpoint depending on the unit status.
Occupied Cool Shift	30	R	AV	24	N	-1.67°C/-3°F to +1.67°C/3°F	-/+ 3°F Room Sensor Cooling Setpoint Offset
Standby Cool Shift	30	R	AV	25	N	NULL	Not Used
Unoccupied Cool Shift	30	R	AV	26	N	NULL	Not Used
Occupied Heat Shift	30	R	AV	27	N	-1.67°C/-3°F to +1.67°C/3°F	-/+ 3°F Room Sensor Heating Setpoint Offset
Standby Heat Shift	30	R	AV	28	N	NULL	Not Used
Unoccupied Heat Shift	30	R	AV	29	N	NULL	Not Used
Cooling Setpoint High Limit	48	W	AV	30	Y	10°C/50°F to 35°C/95°F	Cooling Setpoint High Limit
Cooling Setpoint Low Limit	48	W	AV	31	Y	10°C/50°F to 35°C/95°F	Cooling Setpoint Low Limit
Heating Setpoint High Limit	49	W	AV	32	Y	10°C/50°F to 35°C/95°F	Heating Setpoint High Limit
Heating Setpoint Low Limit	49	W	AV	33	Y	10°C/50°F to 35°C/95°F	Heating Setpoint Low Limit
Low Pressure Alarm Delay	53	W	AV	34	Y	0-99 Seconds	
Temperature Setpoint Offset	39	C	AV	35	N	-10°C to +10°C	Temperature Setpoint offset

Network Control Property (Attributes available as BACnet Standard Objects for network control of the unit)	Page	Read Only, Writable, or Commandable	Object Type	Instance	Flash Value	Command / Range / Enumeration	Description
BINARY INPUTS							
Binary Input Status	13	R	BI	1	N		Shows the raw value of the digital inputs in the description text
BINARY VALUES							
Clear Alarm	17	W	BV	1	N	0=Normal 1=Clear Alarm	Clears active alarms. After the alarm is cleared, this value is automatically returned to Normal (0).
Binary Output Status	15	R	BV	2	N		Shows the raw value of the digital outputs in the description text
MULTI-STATE INPUTS							
Condensate Overflow	19	R	MSI	1	N	1=Dry 2=Wet 3=NULL	Show the status of the condensate overflow sensor
Fan On/Auto Status	25	R	MSI	2	N	1=Fan On 2=Auto 3= Null	Used to monitor the fan on/auto switch.
Heat/Cool/Auto Status	28	R	MSI	3	N	1=OFF (not used) 2=Heat 3=Cool 4=Auto 5=NULL	Used to display the heat/cool/auto commands from the network.

Network Control Property (Attributes available as BACnet Standard Objects for network control of the unit)	Page	Read Only, Writable, or Commandable	Object Type	Instance	Flash Value	Command / Range / Enumeration	Description
MULTI-STATE VALUE							
Compressor Enable Input	18	C	MSV	1	N	1=Disabled 2=Enabled 3=NULL	Used to indicate proof of flow.
Current Alarm	20	R	MSV	2	N	1 = No Alarms 2 = Brownout 3 = Comp #1 High Pressure 4 = Comp #2 High Pressure 5 = Comp #1 Low Pressure 6 = Comp #2 Low Pressure 7 = Comp #1 Low SuctionTempSen Fail 8 = Comp #2 Low SuctionTempSen Fail 9 = Comp #1 Low Suction Temp 10 = Comp #2 Low Suction Temp 11 = Room Temp Sensor Fail 12 = Entering Water Temp Sensor Fail 13 = Condensation Overflow 14 = Serial EEPROM Corrupted 15 = Invalid Configuration	Current WSHP Alarm
Fan Speed Output	26	R	MSV	3	N	1 = Off 2 = Low 3 = Medium 4 = High 5 = On	Displays the current fan speed
McQuay WSHP Status	32	R	MSV	4	N	1 = Off Alarm 2 = Off 3 = Start 4 = Fan Only 5 = Prepare To Heat 6 = Heating 7 = Prepare To Cool 8 = Cooling 9 = Prepare To Dehumidify 10 = Dehumidification	indicates the operating status of the WSHP
Previous Alarm	36	R	MSV	5	N	1 = No Alarms 2 = Brownout 3 = Comp #1 High Pressure 4 = Comp #2 High Pressure 5 = Comp #1 Low Pressure 6 = Comp #2 Low Pressure 7 = Comp #1 Low SuctionTempSen Fail 8 = Comp #2 Low SuctionTempSen Fail	Previous WSHP Alarm

Network Control Property (Attributes available as BACnet Standard Objects for network control of the unit)	Page	⁴ Read Only, Writeable, or Commandable	Object Type	Instance	³ Flash Value	Command / Range / Enumeration	Description
						9 = Comp #1 Low Suction Temp 10 = Comp #2 Low Suction Temp 11 = Room Temp Sensor Fail 12 = Entering Water Temp Sensor Fail 13 = Condensation Overflow 14 = Serial EEPROM Corrupted 15 = Invalid Configuration	
Effective Occupancy Output	22	R	MSV	6	N	1=Occupied 2=Unoccupied 3=Bypass 4=Standby 5=NULL	Displays the current occupancy
Occupancy Override Input	33	C	MSV	7	N	1=Occupied 2=Unoccupied 3=Bypass 4=Standby 5=NULL	Occupancy variable with the highest priority. Used to override the local sensor or tenant override.
Occupancy Scheduler Input	34	C	MSV	8	N	1=Occupied 2=Unoccupied 3=Standby 4=NULL	Used to command the WSHP into different occupancy modes from the network
Occupancy Sensor Input	35	C	MSV	9	N	1=Occupied 2=Unoccupied 3=NULL	
Application Mode Input	11	C	MSV	10	N	1 = Auto 2 = Heat 3 = Cool 4 = Off 5 = Fan Only 6 = Dehumid 7 = Null	Commands the mode of the unit. For normal operation this value should be set to Auto or Null.
Auxiliary Heat Enable Input	12	C	MSV	11	N	1=Disabled 2=Enabled 3=NULL	Enables or Disables the Auxiliary Heat
Energy Hold Off Input	24	C	MSV	12	N	1=Normal 2=Energy Hold Off 3= Null	Stops Heating and Cooling of the space but provides protection from temperature extremes
Pump Request Output	37	R	MSV	13	N	1=No Request for Flow 2=Request for Flow 3= Null	Used to tell the LWC or BAS to turn on the loop pump
Room Sensor Setpoint Enable/Disable	59	W	MSV	14	Y	1=Disabled 2=Enabled 3=NULL	Used to Enable/Disable the room setpoint adjustments
Units (English / Metric)	66	W	MSV	15	Y	1 = English, 2 = Metric	Global conversion selection for temperatures

Protocol Point Summary - LONWORKS

This is a comprehensive list of LONWORKS variables with pertinent access data.

Network Variable Inputs				
Variable Description (nvi)	Page	LONWORKS Name	SNVT Type	SNVT Index
Application Mode Input	11	nviApplicMode	SNVT_hvac_mode	108
Auxiliary Heat Enable Input	12	nviAuxHeatEnable	SNVT_switch	95
Clear Alarm	18	nviClearAlarm	SNVT_switch	95
Compressor Enable Input	18	nviComprEnable	SNVT_switch	95
Energy Hold Off Input	24	nviEnergyHoldOff	SNVT_switch	95
Occupancy Override Input	33	nviOccManCmd	SNVT_occupancy	109
Occupancy Scheduler Input	34	nviOccSchedule	SNVT_tod_event	128
Occupancy Sensor Input	35	nviOccSensor	SNVT_occupancy	109
Setpoint Offset Input	39	nviSetptOffset	SNVT_temp_p	105
Space Temperature Input	40	nviSpaceTemp	SNVT_temp_p	105
Temperature Setpoint Input	44	nviSetpoint	SNVT_temp_p	105

Network Variable Outputs				
Variable Description (nvo)	Page	LONWORKS Name	SNVT Type	SNVT Index
Binary Input Status	13	nvoBinaryIn	SNVT_state_64	165
Binary Output Status	15	nvoBinaryOut	SNVT_state	83
Brownout (Shutdown)	17	nvoBrownout	SNVT_count	8
Condensate Overflow	20	nvoCondOverflow	SNVT_switch	95
Current Alarm	21	nvoCurrentAlarm	SNVT_str_asc	36
Discharge Air Temperature	21	nvoDischAirTemp	SNVT_temp_p	105
Effective Occupancy Output	22	nvoEffectOccup	SNVT_occupancy	109
Effective Setpoint Output	23	nvoEffectSetpt	SNVT_temp_p	105
Entering Water Temperature	25	nvoEWT	SNVT_temp_p	105
Fan On/Auto Status	26	nvoFanOnAuto	SNVT_switch	95
Fan Speed Output	26	nvoFanSpeed	SNVT_switch	95
Heat/Cool/Auto Status	28	nvoHeatCoolAuto	UNVTheatCoolAuto	8
Leaving Water Temperature	29	nvoLWT	SNVT_temp_p	105
Local Setpoint Output	29	nvoSetpoint	SNVT_temp_p	105
Local Setpoint Shift Output	30	nvoSetptShift	SNVT_temp_setpt	106
Local Space Temperature Output	31	nvoLocalSpaceTmp	SNVT_temp_p	105
McQuay WSHP Status	32	nvoMcQHPUnitStat	UNVTmcqHPUnitStat	8
Previous Alarm	36	nvoPreviousAlarm	SNVT_str_asc	36
Pump Request Output	37	nvoPumpRequest	SNVT_switch	95
Space Temperature Output	40	nvoSpaceTemp	SNVT_temp_p	105
Status ²	41	nvoStatus	SNVT_obj_status	93
Suction Temperature Compressor #1	42	nvoSuctionTemp1	SNVT_temp_p	105
Suction Temperature Compressor #2	43	nvoSuctionTemp2	SNVT_temp_p	105
Unit Status Output ²	44	nvoUnitStatus	SNVT_hvac_status	112

Configuration Properties ³						
Variable Description (nci)	Page	LONWORKS Name	SNVT/UCPT Type	UCPT Index	SCPT Index	SNVT Index
Brownout Reference Setpoint	46	nciBrownoutRef	UCPTbrownoutRef		N/A	8
Occupied differential	47	nciOccDiff	UCPToccDiff		N/A	147
Cooling Interstage Timer Setpoint	47	nciCoolIntStgTmr	UCPTcoolIntStgTmr		N/A	107
Low Temp Protection SP for Glycol	50	nciLowTempProtGL	UCPTlowTempProtGL		N/A	147
Heating Interstage Timer Setpoint	51	nciHeatIntStgTmr	UCPTheatIntStgTmr		N/A	107
HVAC Unit-Type Identifier ²	51	nciHVACType	SCPT HVAC Type	N/A	169	145
Local Bypass Time Setpoint	52	nciBypassTime	SCPTbypassTime	N/A	34	123
Location Label	53	nciLocation	SCPTlocation	N/A	17	36
Low Pressure Alarm Delay	53	nciLowPresAlmDly	UCPTlowPresAlmDly		N/A	107
Low Temperature Protection Setpoint	54	nciLowTempProt	UCPTlowTempProt		N/A	105
Low Temperature Protection Differential	54	nciLowTmpProtDif	UCPTlowTmpProtDif		N/A	147
Minimum Compressor Off Timer Setpoint	55	nciMinCompOffTmr	UCPTminCompOffTmr		N/A	107
Minimum Compressor On Timer Setpoint	56	nciMinCompOnTmr	UCPTminCompOnTmr		N/A	107
Occupancy Temperature Setpoints	58	nciSetpoints	SCPTsetPnts	N/A	60	106
Receive Heartbeat	59	nciRcvHrtBt	SCPTmaxRcvTime	N/A	48	107
Send Heartbeat	60	nciSndHrtBt	SCPTmaxSendTime	N/A	49	107
Minimum Send Time	56	nciMinOutTm	SCPTminSendTime	N/A	52	N/A
Software Identification (Major Version)	61	nciDevMajVer	SCPTdevMajVer	N/A	165	N/A
Software Identification (Minor Version) ²	61	nciDevMinVer	SCPTdevMinVer	N/A	166	N/A
Unit Application (Major Version)	62	nciUnitAppMajVer	UCPTunitAppMajVer	N/A	N/A	N/A
Unit Application (Minor Version) ²	62	nciUnitAppMinVer	UCPTunitAppMinVer	N/A	N/A	N/A
Software Jumper Configuration	63	nciSoftJumpers	UCPTsoftJumpers		N/A	83
Unoccupied Differential	63	nciUnoccDiff	UCPTunOccDiff		N/A	147
Room Sensor Setpoint Enable/Disable	60	nciLocSptEnable	UCPTlocSptEnable		N/A	N/A
Cooling Setpoint High Limit	48	nciClgSptHiLim	UCPTclgSptHiLim		N/A	N/A
Cooling Setpoint Low Limit	48	nciClgSptLoLim	UCPTclgSptLoLim		N/A	N/A
Heating Setpoint High Limit	49	nciHtgSptHiLim	UCPThtgSptHiLim		N/A	N/A
Heating Setpoint Low Limit	49	nciHtgSptLoLim	UCPThtgSptLoLim		N/A	N/A

¹ Indicates a variable needed for Master/Slave operation. LONWORKS Only

² Indicates the item is not supported in BACnet.

³ Configuration properties reside in flash memory that has a write cycle limit of approximately 10000 writes. Do not unnecessarily write to configuration properties as this can limit the life of the device.

⁴ Indicates the property is **Read Only**, **Writeable**, or **Commandable** in BACnet. Commandable means a BACnet priority array is supported.

Detailed Protocol Point Information

Application Mode Input

This input network variable coordinates the WSHP with any supervisory controller or intelligent human interface device.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	10	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.ApplicMode.Present_Value				
Property Value				
1 = Auto 2 = Heat 3 = Cool 4 = Off 5 = Fan Only 6 = Dehumid 7 = Null				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-7
Flash Memory	N
Read, Writable, Commandable	C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviApplicMode	SCC – Heat Pump	SNVT_hvac_mode	108

Measurement	hvac_t
Type Category	Enumeration
Type Size	1 byte
Valid Range (Resolution)	hvac_t Enumeration
Uses Receive Heartbeat	Yes

hvac_t Enumeration

Value	Identifier	Notes
0xFF	HVAC_NUL	Invalid
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)
12	HVAC_MAX_HEAT	Max Heat (Not Used)
13	HVAC_ECONOMY	Economy (Not Used)
14	HVAC_DEHUMID	Dehumidification
15	HVAC_CALIBRATE	Calibrate (Not Used)
16	HVAC_EMERG_COOL	Emergency Cool Mode (Not Used)
17	HVAC_EMERG_STEAM	Emergency Steam Mode (Not Used)

Default Value

0xFF = HVAC_NUL

Auxiliary Heat Enable Input

While a WSHP normally provides heating by running a compressor to transfer heat from the water loop to the space, some models have a secondary source of heat – i.e. electric heat. This input network variable is used to enable or disable auxiliary heat for models with supplemental electric heat. The default state is Null, in which case auxiliary heat is enabled. Auxiliary heat is typically used during an energy demand situation to save energy.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	11	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.AuxHeatEnable.Present_Value				
Property Value				
1 = Disabled 2 = Enabled 3 = Null				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-3
Flash Memory	N
Read, Writable, Commandable	C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviAuxHeatEnable	SCC – Heat Pump	SNVT_switch	95

Measurement	Switch
Type Category	Structure
Type Size	2 bytes
Uses Receive Heartbeat	Yes

Structure

```

typedef struct {
    unsigned Value;
    signed State;
} SNVT_switch;

```

Field Definitions

Field	Units	Valid Range	Notes
value	% of Full Scale	0, 200 (0% or 100%)	Intensity as percentage of full scale, resolution 0.5%
state	N/A	0, 1, -1	See table below.

State	Value	Equivalent Percent	Description
0	N/A	N/A	Disabled
1	0	0.0%	Disabled
1	1 to 199	0.5 to 99.5%	Partially Enabled
1	200	100.0%	Enabled
-1	N/A	N/A	Null (no action from network)

Note: Auxiliary heat is either fully enabled or it is disabled. There is no partially enabled state. If network setting is Null then network command is ignored and Aux Heat is enabled.

Default Value

State = NULL

Binary Input Status

This binary input is used to view the digital inputs of the unit controller for diagnostic purposes. The Service/Test Mode jumper position is returned as the present value.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Binary Input	3	1	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.BinaryIn.Present_Value(index)				

Measurement Present_Value
 Type Category Boolean
 Type Size 1 byte
 Valid Range BACnet Array Index 0-31. Array Index NULL returns Bit Number 0.
 Flash Memory N
 Read, Writable, Commandable R

BI1.Description

All the status bits are returned in the BI1.description property, high bit on the left and low bit on the right. For example: 000000000000000000000000000001 shows the Service/Test Mode jumper is true (closed).

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoBinaryIn	McQuaySCC_WSHP	SNVT_state_64	165

Measurement State Vector
 Type Category Structure
 Type Size 4 bytes
 Service Type Unackd_rpt
 Uses Send Heartbeat No

Structure

```

Typedef struct {
    unsigned bit0
    unsigned bit1
    ...
    unsigned bit63
} SNVT_state_64;
  
```

Bit Description

Bit Number	Bit Description	Jumper Setting	Model Option Description
Main Board Jumpers			
0	Service/Test Mode	Jumper 1 = Open (0) Jumper 1 = Closed (1)	Normal Operation Service/Test Mode
1	Continuous/Cycling Fan	Jumper 2 = Open (0)	Continuous Fan, ignored if room sensor fan switch is present
		Jumper 2 = Closed (1)	Cycling Fan, ignored if room sensor fan switch is present
2	Water/Glycol	Jumper 3 = Open (0) Jumper 3 = Closed (1)	Water Glycol
3	Future Spare	Jumper 4	
4	Setpoint Potentiometer Range	Jumper 5 = Open (0) Jumper 5 = Closed (1)	-3° to +3° F 55° to 95° F
5	Thermostat/Room Sensor	Jumper 6 = Open (0) Jumper 6 = Closed (1)	Thermostat Room Sensor
6	Spare	Jumper 7	
7	Spare	Jumper 8	

Main Board Inputs			
8	Low Pressure Switch Compressor #1	Closed (1)	No low-pressure alarm is present.
		Open (0)	Low pressure is detected in the primary refrigerant circuit.
9	High Pressure Switch Compressor #1	Closed (1)	High Pressure Switch for Compressor #1 is normal.
		Open (0)	High Pressure Switch for Compressor #1 is in alarm.
10	Emergency Shutdown	Open (0)	Unit shuts down.
11	Occupancy	Switch Open (0)	Unoccupied ¹
		Switch Closed (1)	Occupied
12	Timed Override (O on thermostat)	Switch Closed (1)	In the unoccupied mode, if the timed override switch is pressed for more than 3 seconds but less than 10 seconds, the unit will go into the “timed override mode” (Thermostat has a pushbutton for timed override)
13	Fan (G on thermostat)	Switch Closed (1)	Fan operation is requested.
14	Cool Stage 1 (Y1 on thermostat)	Switch Closed (1)	First stage of cooling is requested.
15	Cool Stage 2 (Y2 on thermostat)	Switch Closed (1)	Second stage of cooling is requested. Fan (G), and Cool 1 (Y1) inputs are ignored.
16	Heat Stage 1 (W1 on thermostat)	Switch Closed (1)	First stage of heating is requested. Fan (G), Cool 1 (Y1), Cool 2 (Y2) inputs are ignored.
17	Heat Stage 2 (W2 on thermostat)	Switch Closed (1)	Second stage of heating is requested. Fan (G), Cool 1 (Y1), Cool 2 (Y2), Heat 1 (W1) inputs are ignored.
Expansion Board Jumpers			
18	Number of Compressors	Jumper 1 = Open (0)	Single Compressor
		Jumper 1 = Closed (1)	Dual Compressor
19	Hot Gas/Water Reheat	Jumper 2 = Open (0)	None
		Jumper 2 = Closed (1)	Hot Gas/Water Reheat
20 & 21	Supplemental Electric Heat & Boilerless Electric Heat	Jumper 3 = Open (0) Jumper 4 = Open (0)	None
		Jumper 3 = Closed (1) Jumper 4 = Open (0)	Supplemental Electric Heat
		Jumper 3 = Open (0) Jumper 4 = Closed (1)	Boilerless Electric Heat (Future)
		Jumper 3 = Closed (1) Jumper 4 = Closed (1)	Invalid Setting
22 & 23	Fan Speed Selection (2 Jumpers)	Jumper 5 = Open (0) Jumper 6 = Open (0)	Single speed fan.
		Jumper 5 = Closed (1) Jumper 6 = Open (0)	Two speed fan.
		Jumper 5 = Open (0) Jumper 6 = Closed (1)	Three speed fan.
		Jumper 5 = Closed (1) Jumper 6 = Closed (1)	Invalid Setting
24	Spare	Jumper 7	
25	Spare	Jumper 8	
Expansion Board Inputs			
26	Low Pressure Switch Compressor #2	Closed (1)	No low pressure alarm is present for circuit two.
		Open (0)	Low pressure is detected in the second circuit of two compressor, tow circuit models.
27	High Pressure Switch Compressor #2	Closed (1)	High Pressure Switch for Compressor #2 is normal.
		Open (0)	High Pressure Switch for Compressor #2 is in alarm.
28	Dehumidification Request (humidistat)	Closed (1)	Dehumidification is required.
		Open (0)	Dehumidification is not required.
29	Spare	N/A	N/A
30	Spare	N/A	N/A
31 ²	Unit Heat/Cool/Dehumid Mode	Provided by Unit Controller	0=Heating, 1=Cooling or Dehumidification. Provides Mode awareness in Fan Only State.

¹ This switch is effective only when the network scheduling is not in use.

² msb = Most Significant Bit

Default Value

All bits = 0

Binary Output Status

This binary output is used to view the digital outputs of the unit controller for diagnostic purposes. Compressor #1 state is returned in the present value.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Binary Value	5	2	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.BinaryOut.Present_Value(index)				

Measurement	Present_Value
Type Category	Boolean
Type Size	1 byte
Valid Range	BACnet Array Index 0-15. Array Index NULL returns Bit Number 0.
Flash Memory	N
Read, Writable, Commandable	R

BO1.Description

All the status bits are returned in the BO1.description property, high bit on the left and low bit on the right. For example: 0000000000000001 shows Compressor#1 is on. Fan On/Low is indicated in the next bit. Etc.

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoBinaryOut	McQuaySCC_WSHP	SNVT_state	83

Measurement	State
Type Category	Structure
Type Size	2 bytes
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Structure

```

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

Bit Description

Bit Number	Bit Description	Value	Description
0	Compressor #1	On	Compressor #1 request ON
		Off	Compressor #1 request OFF
1	Fan or Fan Low Speed	On	Fan request ON. (Single speed fan)
		Off	Fan request LOW (multispeed fan)
2	Reversing Valve #1	On	Heating position
		Off	Cooling position
3	Pump Request or Isolation Valve	On	Water flow is required
4	Alarm on Thermostat (thermostat only)	On	Alarm light is energized when there is no fault
		Off	Alarm light is energized when there is a fault: High Pressure, Low Pressure, Low Suction Temperature, Condensate Overflow, Brownout or Emergency Shutdown.
5	Red LED (remote LED board for circuit #1)	On	Used in combination with Green LED, Yellow LED and Thermostat Alarm Light Output to determine the unit mode
		Off	
6	Green LED (remote LED board for circuit #1)	On	Used in combination with Red LED, Yellow LED and Thermostat Alarm Light Output to determine the unit mode
		Off	

Bit Number	Bit Description	Value	Description
7	Yellow LED (remote LED board for circuit #1)	On Off	Used in combination with Green LED, Red LED and Thermostat Alarm Light Output to determine the unit mode
8	Status LED (room sensor)	On Off	This output tells you the status of the WSHP. If closed continuously, the unit mode is occupied or occupied load shed. If the output is closed for 0.5 sec and open for 5.5 sec, the unit mode is unoccupied. If the output is closed for 5.5 sec and open for 0.5 sec, the unit mode is in tenant override or override load shed. If the output is closed for 0.1 sec and open for 0.1 sec, the unit mode is alarm (Condensate Overflow, Brownout or Compressor Fault).
<i>Following From Expansion Board</i>			
9	Compressor #2 or Fan Medium Speed	On	Second compressor operation is desired or medium fan speed operation is required.
10	Reversing Valve #2 or Electric Heat	On	RV Output or electric heat on. See specification
		Off	RV Output or electric heat off. See specification
11	Hot Gas Reheat, Water Side Economizer or Hot Water Reheat	On	Hot Gas reheat or water side economizer is required.
12	Fan High Speed	On	High speed fan operation is required.
		Off	High speed fan operation is not required.
13	Red LED (remote LED board for circuit #2)	On Off	Used in combination with Green LED, Yellow LED and Thermostat Alarm Light Output to determine the unit mode for circuit #2.
14	Green LED (remote LED board for circuit #2)	On Off	Used in combination with Green LED, Yellow LED and Thermostat Alarm Light Output to determine the unit mode for circuit #2.
15 (MSB) ¹	Yellow LED (remote LED board for circuit #2)	On Off	Used in combination with Green LED, Yellow LED and Thermostat Alarm Light Output to determine the unit mode for circuit #2.

1. MSB = Most Significant Bit

Default Value

All bits = 0

Brownout (Shutdown)

Brownout Reference voltage is measured during the manufacturing process and entered into the unit controller as the Brownout Reference Setpoint as a number between zero and 1023. If during operation, the voltage measured in Brownout goes below 80% of the unit's Brownout Reference Setpoint, the controller will go into brownout mode by changing the unit status to Off Alarm. The controller will then remain in brownout mode until voltage goes above 90% of the unit's Brownout Reference Setpoint.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	8	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.Brownout.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	0 to 1023 counts (1 count)
Flash Memory	N
Read / Write	R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoBrownout	McQuaySCC_WSHP	SNVT_count	8

Measurement	Analog to digital converter raw count
Type Category	Fixed Point Scalar - unsigned long
Type Size	2 bytes
Valid Range (Resolution)	0 to 1023 counts (1 count)
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Default Value

500

Clear Alarm

This input network variable is used to clear the Current Alarm. The alarm that is cleared moves to the Previous Alarm buffer and the alarm that was in the Previous Alarm buffer will disappear.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Binary Value	5	1	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.ClearAlarm.Present_Value				
Property Value				
0 = Normal 1 = Clear Alarm				

Measurement	Present_Value
Type Category	Boolean
Type Size	1 byte
Valid Range (Resolution)	0-1
Flash Memory	N
Read, Writable, Commandable	W

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nviClearAlarm	McQuaySCC_WSHP	SNVT_switch	95

Measurement Switch
 Type Category Structure
 Type Size 2 bytes
 Uses Receive Heartbeat No

Structure

```

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

Field Definitions

Field	Units	Valid Range (Resolution)	Notes
value	Percent of Full Scale	0 to 100 (.05)	See table below*
State	N/A	0, 1, -1	Must be 1 to clear the alarm. See table below*

State	Value	Description
0	any	Normal
1	0	Normal
1	>0	Clear Alarm
-1	Any	Invalid (NULL)

* The controller automatically returns both the state and value parameters to 0 once the alarm is cleared.

Default Value

-1 (Null or Invalid)

Compressor Enable Input

This input network variable is used to indicate proof of flow. A WSHP provides either heating or cooling by running a compressor to transfer heat from the space to the water loop (cooling mode) or running a compressor to transfer heat from the water loop to the space (heating mode). The loop pump must be operating and there must be flow at the WSHP so that the compressor can operate safely inside the compressor envelope. The WSHP interacts with any loop water management system or BAS (i.e. system controller) by requesting that the system controller turn on the loop pump (request for flow). The system controller reacts to the request by turning on the pump, proving flow and telling the WSHP that it is OK to operate the compressor (proof of flow). If the value is Null (Invalid) then flow is assumed to be true. The input is ignored. A value of Off (Disabled) indicates “No Flow” and the compressor will not start. A value of On (Enabled) indicates “Flow” and the compressor is allowed to run.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	1	Present Value	85

Full Reference

MTIIIUC_WSHP.#####.ComprEnable.Present_Value

Enumeration

1 = Disabled
 2 = Enabled
 3 = Null

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 bytes
 Valid Range (Resolution) 1-3
 Flash Memory N
 Read, Writable, Commandable C

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nviComprEnable	SCC – Heat Pump	SNVT_switch	95

Measurement Switch
 Type Category Structure
 Type Size 2 byte
 Service Type Unackd_rpt
 Uses Send Heartbeat Yes

Structure

```

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

Field Definitions

Field	Units	Valid Range	Notes
value	Percent of Full Scale	0 to 200 (0-100%)	See table below.
state	N/A	0, 1, -1	See table below

State	Value	Description
0	0	Disabled(0; 1)
1	0	Disabled(0; 1)
1	> 0	Enabled (200; 1)
-1	(any)	Enabled(NULL)

Default Value

State = NULL (Enabled)

Condensate Overflow

This output network variable is used to show the status of the condensate overflow sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Input	13	1	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.CondOverflow.Present_Value				
Enumeration				
1 = Dry				
2 = Wet				
3 = Null				

Measurement Present_Value
 Type Category Enumeration
 Type Size 1 byte
 Valid Range (Resolution) 1-3
 Flash Memory N
 Read, Writable, Commandable R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoCondOverflow	McQuaySCC_WSHP	SNVT_switch	95

Measurement Switch
 Type Category Structure
 Type Size 2 bytes
 Service Type Unackd_rpt
 Uses Send Heartbeat No

Structure

```

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

Field Definitions

Field	Units	Valid Range	Notes
value	Percent of Full Scale	0, 200	See table below.
State	N/A	0, 1, -1	See table below

State	Value	Description
0	0	Dry
1	200	Wet
-1	0..200 (any)	Invalid (NULL)

Default Value

State = -1, Value = 0

Current Alarm

This output network variable is used to display the alarm text for the current alarm.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	2	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.CurrentAlarm.Present_Value				

Property Value
1 = No Alarms
2 = Brownout
3 = Comp #1 High Pressure
4 = Comp #2 High Pressure
5 = Comp #1 Low Pressure
6 = Comp #2 Low Pressure
7 = Comp #1 Low Suction TempSen Fail
8 = Comp #2 Low Suction TempSen Fail
9 = Comp #1 Low Suction Temp
10 = Comp #2 Low Suction Temp
11 = Room Temp Sensor Fail
12 = Entering Water Temp Sensor Fail
13 = Condensation Overflow
14 = Serial EEPROM Corrupted
15 = Invalid Configuration

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 byte
 Valid Range (Resolution) 1-12
 Flash Memory N
 Read, Writable, Commandable R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoCurrentAlarm	McQuaySCC_WSHP	SNVT_str_asc	36

Measurement	Character String
Type Category	Structure
Type Size	31 bytes
Valid Range (Resolution)	ASCII character
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Alarm	Alarm String
No Alarm	No Alarms
Brownout	Brownout
Comp #1 High Pressure	Comp#1 High Pressure
Comp #2 High Pressure	Comp#2 High Pressure
Comp #1 Low Pressure	Comp#1 Low Pressure
Comp #2 Low Pressure	Comp#2 Low Pressure
Comp #1 Low Suction Temp Sensor Fail	Comp#1 Low SuctionTempSen Fail
Comp #2 Low Suction Temp Sensor Fail	Comp#2 Low SuctionTempSen Fail
Comp #1 Low Suction Temp	Comp#1 Low Suction Temp
Comp #2 Low Suction Temp	Comp#2 Low Suction Temp
Room Temp Sensor Fail	Room Temp Sensor Fail
Entering Water Temp Sensor Fail	Entering Water Temp Sensor Fail
Condensation Overflow	Condensate Overflow
Serial EEPROM Corrupted	Serial EEPROM Corrupted
Invalid Jumper Configuration	Invalid Configuration

Default Value

“No Alarms”

Discharge Air Temperature

This output network variable indicates the discharge air temperature.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	4	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.DischAirTemp.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C).
Flash Memory	N
Read / Write	R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoDischAirTemp	SCC – Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar – signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C).
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

Default Value

0x7FFF

Effective Occupancy Output

This network output variable is used to indicate which occupancy mode is being used by the WSHP. This variable will also include the effective occupancy when a Netware 2 handset is used for time scheduling. The mode that the WSHP will operate in depends on Occupancy Schedule, Occupancy Schedule Override and/or an Occupancy Sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	6	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.EffectOccup.Present_Value				
Property Value				
1 = Occupied 2 = Unoccupied 3 = Bypass 4 = Standby 5 = Null				

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 byte
 Valid Range (Resolution) 1-5
 Flash Memory N
 Read, Writable, Commandable R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoEffectOccup	SCC – Heat Pump	SNVT_occupancy	109

Measurement occup_t
 Type Category Enumeration
 Type Size 1 byte
 Valid Range occup_t
 Service Type Unackd_rpt
 Uses Send Heartbeat Yes

Valid Range

0 = OC_OCCUPIED The WSHP will operate in the occupied mode using the occupied setpoint
 1 = OC_UNOCCUPIED The WSHP will operate in the unoccupied mode using the unoccupied setpoint
 2 = OC_BYPASS The WSHP will operate in the occupied mode for a period of time defined by nciBypassTime.
 3 = OC_STANDBY The WSHP will operate in the standby mode using the standby setpoint
 0xFF = OC_NUL This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

Effective Occupancy Output (example application):

nviOccManCmd	nviOccSchedule ⁴	nviOccSensor ²	nvoEffectOccup	
OC_OCCUPIED	Don't Care ⁵	Don't Care	OC_OCCUPIED	
OC_UNOCCUPIED	Don't Care	Don't Care	OC_UNOCCUPIED	
OC_BYPASS ¹	OC_OCCUPIED	Don't Care	OC_OCCUPIED	
	OC_UNOCCUPIED	Don't Care	OC_BYPASS ¹	
	OC_STANDBY	Don't Care	OC_BYPASS ¹	
	OC_NUL	OC_OCCUPIED ³	OC_OCCUPIED	
OC_STANDBY	Don't Care	OC_UNOCCUPIED	OC_BYPASS ¹	
		OC_STANDBY	OC_STANDBY	
OC_NUL	OC_OCCUPIED	OC_OCCUPIED	OC_OCCUPIED	
		OC_UNOCCUPIED	OC_STANDBY	
	OC_STANDBY	OC_UNOCCUPIED	Don't Care	OC_OCCUPIED
		OC_NUL	Don't Care	OC_STANDBY
OC_NUL	OC_OCCUPIED ³	OC_OCCUPIED	OC_OCCUPIED	
		OC_UNOCCUPIED	OC_UNOCCUPIED	

Notes:

1. OC_BYPASS can be initiated by either nviOccManCmd or a local input. NvoEffectOccup will only be OC_BYPASS for the duration of the Local Bypass Time (nciBypassTime), until reinitiated by either a transition of the local input or an update to nviOccManCmd.
2. The occupancy sensor can be either a local input or a network input. If a valid value for the network input is present, it has precedence over a local input.
3. For the occupancy sensor, OC_NUL (and no local input) is interpreted as OC_OCCUPIED.
4. For nviOccSchedule, this refers to the “current state” field.
5. “Don’t Care” = Any State

Default Value

0xFF = OC_NUL

Effective Setpoint Output

This output network variable is used to monitor the effective temperature setpoint. This output depends on the following: nciSetpoints, nvoEffectOccup, nviSetpoint, nviSetptOffset, nviHeatCool, nvoSetpoint, nvoSetptShift and nciLocSetptEnable. The WSHP calculates effective heating and cooling setpoints by applying the LonMark symmetrical method to nviSetpoint + nviSetptOffset if nciLocSetptEnable is disabled. If nciLocSetptEnable is enabled, then nvoSetpoint (for Long Range) or nvoSetptShift (for Short Range) is used to determine effective heating and cooling setpoints from nciSetpoints using nvoEffectOccup to select the appropriate setpoint. The Effective Heating and Cooling Setpoints are then compared to the Effective Space Temperature to control the fan and compressor(s) to maintain the occupied, unoccupied or standby heating and cooling setpoints.

The WSHP first looks at the Effective Occupancy to determine if it should maintain an occupied, unoccupied or standby setpoints. Then it looks at the control mode to determine if it should maintain a heating setpoint or a cooling setpoint. It combines the two variables to calculate the Effective Setpoint. As an example, the WSHP looks at the Effective Occupancy and determines that it is occupied. Then it looks at the control mode to determine that it should maintain a heating setpoint. It then looks at nviSetptOffset, if applicable. In this scenario, the result is that nvoEffectSetpt = occupied heating setpoint + nviSetptOffset.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	23	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.EffectSetpt.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C) 0x7FFF represents invalid data.
Usable Range (Resolution)	10°C/50°F to 35°C/95°F (0.01°C)
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoEffectSetpt	SCC - Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar – signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C) 0x7FFF represents invalid data.
Usable Range (Resolution)	10°C/50°F to 35°C/95°F (0.01°C)
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

Default Value

The default value is the invalid value of 0x7FFF which equals 327.67°C (621.806°F). This value is adopted at power up and remains in effect until an update is received from the unit controller.

Energy Hold Off Input

The WSHP can be commanded to sit in an idle state where it is off, but able to operate if the space temperature gets too low or too high. The WSHP will use the standby heating and cooling temperature setpoints during Energy Hold Off. This is typically a signal from a window contact sensor. When enabled, it has priority over unoccupied mode.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	12	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.EnergyHoldOff.Present_Value				
Property Value				
1 = Normal 2 = Energy Hold Off 3 = Null				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-3
Flash Memory	N
Read, Writable, Commandable	C

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nviEnergyHoldOff	SCC – Heat Pump	SNVT_switch	95

Measurement	Switch
Type Category	Structure
Type Size	2 bytes
Resolution	1
Uses Receive Heartbeat	Yes

Structure

```

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

Field Definitions

Field	Units	Valid Range	Notes
value	% of Full Scale	0 to 200 (0-100%)	See table below
state	N/A	0, 1, -1	See table below
State	Value	Description	
0	N/A	Normal	
1	0	Normal	
1	1-200	Energy Hold Off	
-1	N/A	Normal (Null)	

Default Value

State = NULL (Normal)

Entering Water Temperature

This output network variable is used to display the value of the entering water temperature sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	3	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.EWT.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 70°C/158°F (0.01°C).
 Flash Memory N
 Read / Write R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoEWT	McQuaySCC_WSHP	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 70°C/158°F (0.01°C).
 Service Type Unackd_rpt
 Uses Send Heartbeat No

Default Value

0x7FFF (Invalid)

Fan On/Auto Status

This output network variable is used to monitor the Fan On/Auto switch. If a local device is provided, it has priority over Jumper #2 (fan operation; continuous/cycling). In other words, the setting of the jumper is ignored if a local sensor is present.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Input	13	2	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.FanOnAuto.Present_Value				
Property Value				
1 = Fan On 2 = Auto 3 = Null				

Measurement Present_Value
 Type Category Enumeration
 Type Size 1 byte
 Valid Range (Resolution) 1-3
 Flash Memory N
 Read, Writable, Commandable R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoFanOnAuto	McQuaySCC_WSHP	SNVT_switch	95

Measurement Switch
 Type Category Structure
 Type Size 2 bytes
 Service Type Unackd_rpt
 Uses Send Heartbeat No

Structure

```

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

Field Definitions

Field	Units	Valid Range	Notes
value	% of Full Scale	0 to 200 (0-100%)	See table below.
state	N/A	0, 1, -1	See table below.
State	Value	Interpretation	
0	0	Fan On	
1	200	Auto	
-1	0 - 200 (any)	Invalid (NULL)	

Default Value

State = -1, Value = 0

Fan Speed Output

This output network variable is used to monitor the actual fan speed. Software jumpers #5 and #6 on the expansion board are set at the factory to match the type of fan motor applied. If a multi-speed fan is installed, the WSHP will automatically control the speed of the fan depending on the occupancy and control mode.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	3	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.FanSpeed.Present_Value				
Property Value				
1 = Off 2 = Low 3 = Medium 4 = High 5 = On				

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 byte
 Valid Range (Resolution) 1-4
 Flash Memory N
 Read, Writable, Commandable R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoFanSpeed	SCC - Heat Pump	SNVT_switch	95

Measurement Switch
 Type Category Structure
 Type Size 2 bytes
 Service Type Unackd_rpt
 Uses Send Heartbeat Yes

Structure

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

Field Definitions

Field	Units	Valid Range	Notes
value	% of Full Scale	0 to 200 (1-100%)	See table below.
State	N/A	0, 1	See table below.

Single Speed Fan			
State	Value	Equivalent Percent	Interpretation
0	0	0%	Off
1	1 to 200	0.5 to 100% (100%)	On
1	201-255	Out of range	N/A
Two Speed Fan			
State	Value	Equivalent Percent	Interpretation
0	0	0%	Off
1	1 to 100	0.5 to 50% (33)	Low
1	101 to 200	50.5 to 100.0% (95)	High
1	201 to 255	Out of range	N/A
Three Speed Fan			
State	Value	Equivalent Percent	Interpretation
0	0	0%	Off
1	1 to 66	0.5 to 33.0% (33)	Low
1	67 to 133	33.5 to 66.5% (66)	Medium
1	134 to 200	67.0 to 100.0% (95)	High
1	201 to 255	Out of range	N/A

Default Value

State = 0, Value = 0

Heat/Cool/Auto Status

This output network variable is used to display the heat/cool/auto commands from the network.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Input	13	3	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.HeatCoolAuto.Present_Value				
Property Value				
1 = Off (not used) 2 = Heat 3 = Cool 4 = Auto 5 = Null				

Measurement	Present_Value
Type Category	Enumeration
Type Size	1 byte
Valid Range (Resolution)	1-4
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nvoHeatCoolAuto	McQuaySCC_WSHP	UNVTheatCoolAuto	8

Measurement	Event Count
Type Category	Fixed Point Scalar - unsigned long
Type Size	1 Byte
Valid Range (Resolution)	0 to 255 Enumeration
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Enumeration

Value	Identifier	Notes
0	HCA_OFF	The unit turns off (Not Used)
1	HCA_HEAT	The unit operates in the heating mode only.
2	HCA_COOL	The unit operates in the cooling mode only.
3	HCA_AUTO	The unit operates in either the heating mode or cooling mode.
-1 (0xFF)	HCA_NUL	Invalid (Null) - No room sensor mode switch connected.

Default Value

-1, Null

Leaving Water Temperature

This output network variable is used to display the value of the leaving water temperature sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	2	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.LWT.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C). 0x7FFF represents invalid data.
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoLWT	McQuaySCC_WSHP	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar – signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C).
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Default Value

0x7FFF (Invalid)

Local Setpoint Output

This output network variable is the value of the local, hardwired space temperature setpoint if the jumper is in the closed position. . This variable is invalid if the Jumper #5 is open. See “Local Setpoint Shift Output.”

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	5	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.localSetpt.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range	12.78°C/55°F to 35°C/95°F (0.01°C).
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoSetpoint	SCC – Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range	12.78°C/55°F to 35°C/95°F (0.01°C).
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

Default Value

The default value is the invalid value of 0x7FFF, which equals 327.67°C (621.806°F). This value is adopted at power up and remains in effect until an update is received from the unit controller.

Local Setpoint Shift Output

This output network variable is the value of the local, hardwired space temperature setpoint if jumper #5 is in the “Short Range” (open) position. This value is used to adjust Occupied Cool and Occupied Heat setpoints only. The amount of adjustment is plus or minus 3°F. This variable is invalid if the Jumper #5 is in the “Long Range” (closed) position.

BACnet (Occupied_CoolShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	24	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.Occupied_CoolShift.Present_Value				

BACnet (Standby_CoolShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	25	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.Standby_CoolShift.Present_Value				

BACnet (Unoccupied_CoolShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	26	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.Unoccupied_CoolShift.Present_Value				

BACnet (Occupied_HeatShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	27	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.OccupiedHeatShift.Present_Value				

BACnet (Standby_HeatShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	28	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.Standby_HeatShift.Present_Value				

BACnet (Unoccupied_HeatShift)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	29	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.UnoccupiedHeatShift.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-10°C/14°F to +10°C/50°F (0.056°C/.1°F).
Usable Range (Resolution)	-1.67°C/3°F to +1.67°C/3°F (0.056°C/.1°F).
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoSetptShift	SCC - Heat Pump	SNVT_temp_setpt	106

Measurement	Temperature Setpoints
Type Category	Structure
Type Size	12 bytes
Valid Range (Resolution)	-10°C/14°F to +10°C/50°F (0.056°C/.1°F).
Usable Range (Resolution)	-1.67°C/3°F to +1.67°C/3°F (0.056°C/.1°F).
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

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	0x7FFF means data unavailable
standby_cool	SNVT_temp_p	0x7FFF means data unavailable
unoccupied_cool	SNVT_temp_p	0x7FFF means data unavailable
occupied_heat	SNVT_temp_p	0x7FFF means data unavailable
standby_heat	SNVT_temp_p	0x7FFF means data unavailable
unoccupied_heat	SNVT_temp_p	0x7FFF means data unavailable

Valid Range and Default Values

Setpoint	Minimum	Maximum	Size
occupied_cool	-1.67°C	+1.67°C	2 Bytes
standby_cool	0°C	0°C	2 Bytes
unoccupied_cool	0°C	0°C	2 Bytes
occupied_heat	-1.67°C	+1.67°C	2 Bytes
standby_heat	0°C	0°C	2 Bytes
unoccupied_heat	0°C	0°C	2 Bytes

Note: The LonMark SCC Profile specifies a range of -10°C to +10°C. McQuay restricts nvoSetptShift as shown in the table above.

Default Value

All setpoints = 0 (no shift)

Local Space Temperature Output

This output network variable is the value of the hardwired space temperature sensor installed either in the return air or the space. *(Or future SLM temperature sensor or the Netware 2 temperature sensor)*

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	2	1	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.LocalSpaceTmp.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C) 0x7FFF represents invalid data.
Valid Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C)
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoLocalSpaceTmp	SCC – Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C) 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C)
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

Default Value

The default value is the invalid value of 0x7FFF=+327.67°C. This value is used as an invalid value in case of a sensor failure.

McQuay WSHP Status

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

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	4	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.McQWSHPStatus.Present_Value				
Property Value				
1 = Off Alarm 2 = Off 3 = Start 4 = Fan Only 5 = Prepare To Heat 6 = Heating 7 = Prepare To Cool 8 = Cooling 9 = Prepare To Dehumidify 10 = Dehumidification				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-10
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoMcQHPUnitStat	McQuaySCC_WSHP	UNVTmcqHPUnitStat	8

Measurement	Even Count
Type Category	Fixed Point Scalar – unsigned long
Type Size	1 byte
Valid Range (Resolution)	0 to 9 Enumeration, 0xFF (Invalid)
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Enumeration

Value	Identifier	Notes
0	MUS_OFF_ALARM	Unit Status is Off Alarm
1	MUS_OFF	Unit Status is Off
2	MUS_START	Unit Status is Start
3	MUS_FAN ONLY	Unit Status is Fan Only
4	MUS_PREPARE TO HEAT	Unit Status is Prepare To Heat
5	MUS_HEATING	Unit Status is Heating
6	MUS_PREPARE TO COOL	Unit Status is Prepare To Cool
7	MUS_COOLING	Unit Status is Cooling
8	MUS_PREPARE TO DEHUMIDIFY	Unit Status is Prepare To Dehumidify
9	MUS_DEHUMIDIFICATION	Unit Status is Dehumidification
0xFF	MUS_NUL	Invalid

Default Value

Null (Invalid)

Occupancy Override Input

This input network variable is used to override the Occupancy Schedule that the WSHP is using. Occupancy Schedule Override has priority over the Occupancy Schedule and Remote Occupancy Sensor. It is also the place where a local timed override hardwired input is monitored and used to place the WSHP in the Occupied mode during the amount of time declared in Timed Override Setpoint.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	7	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.OccManCmd.Present_Value				
Property Value				
1 = Occupied 2 = Unoccupied 3 = Bypass 4 = Standby 5 = Null				

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 byte
 Valid Range (Resolution) 1-5
 Flash Memory N
 Read, Writable, Commandable C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviOccManCmd	SCC – Heat Pump	SNVT_occupancy	109

Measurement occup_t
 Type Category Enumeration
 Type Size 1 byte
 Valid Range (Resolution) occup_t (1)
 Uses Receive Heartbeat No

Valid Range

0 = OC_OCCUPIED
 1 = OC_UNOCCUPIED
 2 = OC_BYPASS
 3 = OC_STANDBY
 0xFF = OC_NUL

occup_t Enumeration

Value	Identifier	Notes
0	OC_OCCUPIED	The WSHP will operate in the occupied mode using the occupied setpoint
1	OC_UNOCCUPIED	The WSHP will operate in the unoccupied mode using the unoccupied setpoint
2	OC_BYPASS	The WSHP will operate in the occupied mode.
3	OC_STANDBY	The WSHP will operate in the standby mode using the standby setpoint
0xFF	OC_NUL	This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

Default Value

The default value is OC_NUL=0xFF. This is the initial value after power-up. This network variable input does not use the Receive Heartbeat function.

Occupancy Scheduler Input

This input network variable is used to schedule a group of WSHPs that are coupled to one time schedule. For example, an entire floor of office space could be rented to one tenant and all the WSHPs could be tied to the same Occupied/Unoccupied time schedule. The BAS could also send a “Standby” command to a group of heat pumps. For example, an application of Standby operation is a group of WSHPs set to operate using standby heating and cooling setpoints for vacant space.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	8	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.OccSchedule.Present_Value				

Property Value
1 = Occupied
2 = Unoccupied
3 = Standby
4 = Null

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-5
Flash Memory	N
Read, Writable, Commandable	C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviOccSchedule	SCC - Heat Pump	SNVT_tod_event	128

Measurement	Time of day event
Type Category	Structure
Type Size	4 bytes
Uses Receive Heartbeat	Yes

Structure

```

Typedef struct {
    occup_t      current_state;
    occup_t      next_state;
    Unsigned long time_to_next_state;
} SNVT_tod_event;

```

Field Definitions

Field	Units	Valid Range	Notes
current_state	N/A	occup_t	Current Occupancy State
next_state	N/A	occup_t	Not Used
time_to_next_state	Minute of Hour	0-65,535	Not Used

Valid Range

0 = OC_OCCUPIED
 1 = OC_UNOCCUPIED
 3 = OC_STANDBY
 0xFF = OC_NUL

occup_t Enumeration

Value	Identifier	Notes
0	OC_OCCUPIED	The WSHP will operate in the occupied mode using the occupied setpoint
1	OC_UNOCCUPIED	The WSHP will operate in the unoccupied mode using the unoccupied setpoint
2	OC_BYPASS	This is not a valid state for this object.
3	OC_STANDBY	The WSHP will operate in the standby mode using the standby setpoint
0xFF	OC_NUL	This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

Default Value

Current_state = 0xFF = OC_NUL
 Next_state is not used.
 Time_to_next_state is not used.

Occupancy Sensor Input

This input network variable is used to indicate the presence of occupants in the space (motion detection).

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	9	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.OccSensor.Present_Value				
Property Value				
1 = Occupied 2 = Unoccupied 3 = Null				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-5
Flash Memory	N
Read, Writable, Commandable	C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviOccSensor	SCC – Heat Pump	SNVT_occupancy	109

Measurement	occup_t
Type Category	Enumeration
Type Size	1 byte
Valid Range (Resolution)	occup_t (1)
Uses Receive Heartbeat	Yes

Valid Range

0 = OC_OCCUPIED
 1 = OC_UNOCCUPIED
 0xFF = OC_NUL
 All other enumerations are handled as equivalent to OC_NUL.

occup_t Enumeration

Value	Identifier	Notes
0	OC_OCCUPIED	The WSHP will operate in the occupied mode using the occupied setpoint
1	OC_UNOCCUPIED	The WSHP will operate in the unoccupied mode using the unoccupied setpoint
2	OC_BYPASS	This is not a valid state for this object. Handled as equivalent to OC_NUL.
3	OC_STANDBY	This is not a valid state for this object. Handled as equivalent to OC_NUL.
0xFF	OC_NUL	This is the initial value after power-up and it remains until another value is received. It is used to indicate that this network variable input is invalid or unused.

Default Value

The default value is OC_NUL. This value will be adopted at power-up and in case of not receiving an update within the specified receive heartbeat time.

Previous Alarm

This output network variable indicates the previous unit fault for the WSHP.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	5	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.PreviousAlarm.Present_Value				

Property Value

- 1 = No Alarms
- 2 = Brownout
- 3 = Comp #1 High Pressure
- 4 = Comp #2 High Pressure
- 5 = Comp #1 Low Pressure
- 6 = Comp #2 Low Pressure
- 7 = Comp #1 Low Suction Temp Sensor Fail
- 8 = Comp #2 Low Suction Temp Sensor Fail
- 9 = Comp #1 Low Suction Temp
- 10 = Comp #2 Low Suction Temp
- 11 = Room Temp Sensor Fail
- 12 = Entering Water Temp Sensor Fail
- 13 = Condensation Overflow
- 14 = Serial EEPROM Corrupted
- 15 = Invalid Configuration

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-12
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoPreviousAlarm	McQuaySCC_WSHP	SNVT_str_asc	36

Measurement	Character String
Type Category	Structure
Type Size	31 bytes
Valid Range (Resolution)	ASCII Character
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Structure

```

Typedef struct {
    Unsigned char    ASCII[31];
} SNVT_str_asc
    
```

Alarm	Alarm String
No Alarm	No Alarms
Brownout	Brownout
Comp #1 High Pressure	Comp#1 High Pressure
Comp #2 High Pressure	Comp#2 High Pressure
Comp #1 Low Pressure	Comp#1 Low Pressure
Comp #2 Low Pressure	Comp#2 Low Pressure
Comp #1 Low Suction Temp Sensor Fail	Comp#1 Low SuctionTempSen Fail
Comp #2 Low Suction Temp Sensor Fail	Comp#2 Low SuctionTempSen Fail
Comp #1 Low Suction Temp	Comp#1 Low Suction Temp
Comp #2 Low Suction Temp	Comp#2 Low Suction Temp
Room Temp Sensor Fail	Room Temp Sensor Fail
Entering Water Temp Sensor Fail	Entering Water Temp Sensor Fail
Condensation Overflow	Condensate Overflow
Serial EEPROM Corrupted	Serial EEPROM Corrupted
Invalid Jumper Configuration	Invalid Configuration

Default Value

“No Alarms”

Pump Request Output

This output network variable is used to tell the loop water management system controller to turn on the loop pump. A WSHP provides either heating or cooling by running a compressor to transfer heat from the space to the water loop (cooling mode) or running a compressor to transfer heat from the water loop to the space (heating mode). The loop pump must be operating and there must be flow at the WSHP so that the compressor can operate safely inside the compressor envelope. The WSHP interacts with a loop water management system or BAS (i.e. system controller) by requesting that the system controller turn on the loop pump (request for flow). The system controller reacts to the request by turning on the pump, proving flow and allowing the WSHP to operate the compressor (proof of flow).

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	13	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.PumpRequest.Present_Value				
Property Value				
1 = No Request for Flow 2 = Request for Flow 3 = Null				

Measurement	Present_Value
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-3
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoPumpRequest	McQuaySCC_WSHP	SNVT_switch	95

Measurement	Switch
Type Category	Structure
Type Size	2 bytes
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Structure

```

typedef struct {
    unsigned value;
    signed state;
} SNVT_switch

```

Field Definitions

Field	Units	Valid Range	Notes
value	% of Full Scale	0 to 200 (1-100%)	See table below.
state	N/A	0, 1, -1	See table below.

State	Value	Description
0	0	No Request for Flow
1	200	Request for Flow
-1	0 to 200 (any)	Invalid (NULL)

Default Value

State = -1, Value = 0

Request

This output network variable is part of the Node Object and requests a particular mode for a particular function block in the device.

BACnet – not supported

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviRequest	Node Object	SNVT_obj_request	92

Measurement
Type Category
Type Size
Uses Receive Heartbeat

Object Request
Structure
2 bytes
No

Structure

```
typedef struct {
    unsigned long    object_id;
    object_request_t object_request;
} SNVT_obj_request
```

Field Definitions

Field	Units	Valid Range	Notes
object_id	unsigned long	0 to 65,535	
object_request	object_request_t	0-17, 0xFF	See table below.

object_request_t Enumeration

Value	Identifier	Notes
0xFF	RQ_NUL	Invalid value (Not Used)
0	RQ_NORMAL	Enable object and remove override
1	RQ_DISABLED	Disable object (Not Used)
2	RQ_UPDATE_STATUS	Report object status
3	RQ_SELF_TEST	Perform object self-test (Not Used)
4	RQ_UPDATE_ALARM	Update alarm status (Not Used)
5	RQ_REPORT_MASK	Report status bit mask
6	RQ_OVERRIDE	Override object (Not Used)
7	RQ_ENABLE	Enable object (Not Used)
8	RQ_RMV_OVERRIDE	Remove object override (Not Used)
9	RQ_CLEAR_STATUS	Clear object status (Not Used)
10	RQ_CLEAR_ALARM	Clear object alarm (Not Used)
11	RQ_ALARM_NOTIFY_ENABLED	Enable alarm notification (Not Used)
12	RQ_ALARM_NOTIFY_DISABLED	Disable alarm notification (Not Used)
13	RQ_MANUAL_CTRL	Enable object for manual control (Not Used)
14	RQ_REMOTE_CTRL	Enable object for remote control (Not Used)
15	RQ_PROGRAM	Enable programming of special configuration properties (Not Used)
16	RQ_CLEAR_RESET	Clear reset-complete flag (reset_complete) (Not Used)
17	RQ_RESET	Execute reset-sequence of object (Not Used)

Setpoint Offset Input

This input network variable is used to shift the occupied and standby effective setpoints via the network. The unoccupied effective setpoints are not adjusted. This is typically the relative setpoint knob on a remote networked room sensor. If communication to the networked device is lost the WSHP will use the last valid value until communication is re-established. Finally, this variable is invalid if you are using a +/-3°F setpoint adjustment (i.e., the Jumper #5 is open).

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	0	35	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.SetptOffset.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C)
 Usable Range (Resolution) -10°C to +10°C. 0x7FFF represents invalid data. *
 Flash Memory N
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviSetptOffset	SCC - Heat Pump	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C/621.806°F (0.01°C).
 Usable Range (Resolution) -10°C to +10°C. 0x7FFF represents invalid data. *
 Uses Receive Heartbeat Yes
 * The LonMark SCC profile specifies nviSetptOffset to be of type SNVT_temp_p. The default range for SNVT_temp_p#US is therefore 14°F to 50°F. In order to see the correct value, the Plug-In forces the standard format type to SNVT_temp_p #US_diff. A BAS can do a similar conversion to obtain the proper value or use 14°F to 50°F and subtract 32 before displaying the result.

Default Value

The default value is 0 as defined in the LonMark SCC Heat Pump profile. This value is adopted at power up and remains in effect until an update is received over the network.

Space Temperature Input

This input network variable is the value of a remote, networked space temperature sensor. If communication to the networked device is lost, the WSHP uses the Local Space Temperature until communication is re-established.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	18	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.NetworkSpaceTemp.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
 Usable Range (Resolution) -10°C/14°F to 50°C/122°F (0.01°C).
 Flash Memory N
 Read, Writable, Commandable C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviSpaceTemp	SCC - Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-10°C/14°F to 50°C/122°F (0.01°C). (per LonMark SCC profile)
Uses Receive Heartbeat	Yes

Default Value

The default value is the invalid value of 0x7FFF, 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.

Effective Space Temperature Output

This output network variable monitors the actual space temperature that the WSHP is using for control. If a Remote Space Temperature sensor has been integrated to the WSHP, the value of the Effective Space Temperature is the Remote Space Temperature. If communication is lost or there is no Remote Space Temperature sensor installed, the value of the Effective Space Temperature is the Local Space Temperature. If neither value is available, the output will send a defined “invalid” value. In addition, the WSHP will shut down and there will be a “Space Temperature Sensor Failed” alarm.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	0	22	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.EffectSpaceTemp.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Valid Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C).
Flash Memory	N
Read, Writable, Commandable	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoSpaceTemp	SCC - Heat Pump	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (0.01°C).
Service Type	Unackd_rpt
Uses Send Heartbeat	Yes

Default Value

0x7FFF (Invalid)

Status

This output network variable is part of the Node Object and reports the status of the requested functional block in the device. This variable is available via LONWORKS only.

BACnet – not supported

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoStatus	Node Object	SNVT_obj_status	93

Measurement
Type Category
Type Size
Service Type
Uses Send Heartbeat

Object Status
Structure
6 bytes
Unackd_rpt
No

Structure

```
typedef struct {  
    unsigned long    object_id;  
    unsigned         invalid_id;  
    unsigned         invalid_request;  
    unsigned         disabled;  
    unsigned         out_of_limits;  
    unsigned         open_circuit;  
    unsigned         out_of_service;  
    unsigned         mechanical_fault;  
    unsigned         feedback_failure;  
    unsigned         over_range;  
    unsigned         under_range;  
    unsigned         electrical_fault;  
    unsigned         unable_to_measure;  
    unsigned         comm_failure;  
    unsigned         fail_self_test;  
    unsigned         self_test_in_progress;  
    unsigned         locked_out;  
    unsigned         manual_control;  
    unsigned         in_alarm;  
    unsigned         in_override;  
    unsigned         report_mask;  
    unsigned         programming_mode;  
    unsigned         programming_fail;  
    unsigned         alarm_notify_disabled;  
    unsigned         reset_complete;  
    unsigned         reserved2;  
} SNVT_obj_status
```

Field Definitions

Field	Units	Valid Range	Notes
object_id	unsigned long	0 to 65,535	2 bytes
invalid_id	unsigned	0, 1	1 bit (offset 0)
invalid_request	unsigned	0, 1	1 bit (offset 1)
Disabled	unsigned	0, 1	1 bit (offset 2) - Not Used
out_of_limits	unsigned	0, 1	1 bit (offset 3) - Not Used
open_circuit	unsigned	0, 1	1 bit (offset 4) - Not Used
out_of_service	unsigned	0, 1	1 bit (offset 5) - Not Used
mechanical_fault	unsigned	0, 1	1 bit (offset 6) - Not Used
feedback_failure	unsigned	0, 1	1 bit (offset 7) - Not Used
over_range	unsigned	0, 1	1 bit (offset 0) - Not Used
under_range	unsigned	0, 1	1 bit (offset 1) - Not Used
electrical_fault	unsigned	0, 1	1 bit (offset 2) - Not Used
unable_to_measure	unsigned	0, 1	1 bit (offset 3) - Not Used
comm_failure	unsigned	0, 1	1 bit (offset 4) - Not Used
fail_self_test	unsigned	0, 1	1 bit (offset 5) - Not Used
Self_test_in_progress	unsigned	0, 1	1 bit (offset 6) - Not Used
locked_out	unsigned	0, 1	1 bit (offset 7) - Not Used
manual_control	unsigned	0, 1	1 bit (offset 0) - Not Used
in_alarm	unsigned	0, 1	1 bit (offset 1) - Not Used
in_override	unsigned	0, 1	1 bit (offset 2) - Not Used
report_mask	unsigned	0, 1	1 bit (offset 3)
programming_mode	unsigned	0, 1	1 bit (offset 4) - Not Used
programming_fail	unsigned	0, 1	1 bit (offset 5) - Not Used
Alarm_notify_disabled	unsigned	0, 1	1 bit (offset 6) - Not Used
reset_complete	unsigned	0, 1	1 bit (offset 7) - Not Used
reserved2	unsigned	0 to 0	8 bits (offset 0) - Not Used

Suction Temperature Compressor #1

This output network variable is used to display the value of the suction temperature for compressor #1 sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	6	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.SuctionTemp1.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C/621.806°F (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (.01°C)
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoSuctionTemp1	McQuaySCC_WSHP	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C/621.806°F (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (.01°C)
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Default Value

0x7FFF (Invalid)

Suction Temperature Compressor #2

This output network variable is used to display the value of the suction temperature for compressor #2 sensor.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Input	0	7	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.SuctionTemp2.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C/621.806°F (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (.01°C)
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoSuctionTemp2	McQuaySCC_WSHP	SNVT_temp_p	105

Measurement	Temperature
Type Category	Fixed Point Scalar - signed long
Type Size	2 bytes
Valid Range (Resolution)	-273.17 to +327.66°C/621.806°F (0.01°C). The value 0x7FFF represents invalid data.
Usable Range (Resolution)	-17.77°C/0°F to 70°C/158°F (.01°C)
Service Type	Unackd_rpt
Uses Send Heartbeat	No

Default Value

0x7FFF (Invalid)

Temperature Setpoint Input

This input network variable is used to allow the temperature setpoints for the occupied and standby setpoints to be changed via the network. Unoccupied setpoints are not affected. Local setpoint operation must be disabled (nciLocSptEnable). This network variable is typically bound to the knob on a remote networked thermostat or a value from the building automation system.

If communication to the networked device is lost and a local sensor is provided, the WSHP uses the Local Space Temperature Setpoint via Long-Range value until communication is re-established. If no local sensor is provided, the WSHP uses the last valid value until communication is re-established (if available). Otherwise, the WSHP uses the appropriate setpoint as configured in nciSetpoints.

The symmetrical method is used to determine the effective setpoints and is calculated as follows:

The effective heat/cool setpoints for the occupied and standby modes are derived from nviSetpoint plus/minus half the occupied and standby deadbands calculated from nciSetpoints:

$$\begin{aligned} \text{Deadband_occupied} &= \text{occupied_cool} - \text{occupied_heat} \\ \text{Deadband_standby} &= \text{standby_cool} - \text{standby_heat} \\ \text{Effective_occupied_cool} &= \text{nviSetpoint} + 0.5 (\text{deadband_occupied}) \\ \text{Effective_occupied_heat} &= \text{nviSetpoint} - .5 (\text{deadband_occupied}) \\ \text{Effective_standby_cool} &= \text{nviSetpoint} + 0.5 (\text{deadband_standby}) \\ \text{Effective_standby_heat} &= \text{nviSetpoint} - .5 (\text{deadband_standby}) \end{aligned}$$

If nviSetpoint, nviSetptOffset and/or nvoSetptShift are used together, the result on the effective setpoints is additive.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	0	19	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.Setpoint.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C) 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Flash Memory N
 Read, Writable, Commandable C

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nviSetpoint	SCC - Heat Pump	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). The value 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Uses Receive Heartbeat No
 Note: The McQuay room sensor range is 55°F to 90°F. LonMark profile is 50°F to 95°F.

Default Value

$nciSetpoints.occupied_cool - ((nciSetpoints.occupied_cool - nciSetpoints.occupied_heat) / 2)$

Note: If nviSetpoint is set to NULL by the network, the unit controller continues to operate on an internally calculated default value.

Unit Status Output

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. The in_alarm member reports the current alarm index. See nvoCurrentAlarm for the alarm index definition.

BACnet – Not Supported

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Number
nvoUnitStatus	SCC - Heat Pump	SNVT_hvac_status	112

Measurement HVAC Status
 Type Category Structure
 Type Size 12 bytes
 Service Type Unackd_rpt
 Uses Send Heartbeat Yes

Structure

Typedef struct {

hvac_t	mode;	See hvac_t Enumeration
signed long	heat_output_primary;	(Not Used in Phase I)
signed long	heat_output_secondary;	(Not Used in Phase I)
signed long	cool_output;	(Not Used in Phase I)
signed long	econ_output;	(Not Used)
signed long	fan_output;	0% - 100%
unsigned	in_alarm;	Alarm #, 0 = No Alarm

} SNVT_hvac_status

Field Definitions

Field	Units	Range	Notes
Mode	hvac_t		compatible with SNVT_hvac_mode
heat_output_primary	SNVT_lev_percent	0 to +100% , 0x7FFF (Invalid)	primary heat output
heat_output_secondary	SNVT_lev_percent	0 to +100% , 0x7FFF (Invalid)	secondary heat output
cool_output	SNVT_lev_percent	0 to +100% , 0x7FFF (Invalid)	cooling output
Econ_output	SNVT_lev_percent	0 to +100% , 0x7FFF (Invalid)	economizer output
fan_output	SNVT_lev_percent	0 to +100% , 0x7FFF (Invalid)	fan output
in_alarm	Boolean	0, 1	1 means unit is in alarm

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 (factory test procedure)
8	HVAC_EMERG_HEAT	Emergency heat mode (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)
12	HVAC_MAX_HEAT	Max Heat (Not Used)
13	HVAC_ECONOMY	Economy (Not Used)
14	HVAC_DEHUMID	Dehumidification
15	HVAC_CALIBRATE	Calibrate (Not Used)
16	HVAC_EMERG_COOL	Emergency Cool Mode (Not Used)
17	HVAC_EMERG_STEAM	Emergency Steam Mode (Not Used)
0xFF	HVAC_NUL	Value not available

Default Value

HVAC_NUL

Configuration Properties

Brownout Reference Setpoint

This configuration property is used for the Brownout Reference Setpoint. It is reserved for factory calibration of the brownout detection threshold. A password is required to unlock the value for writing.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	9	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpBrownoutRef.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 1023 counts (1 count)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciBrownoutRef	McQuaySCC_WSHP	UCPTbrownoutRef	N/A	SNVT_count	8

Measurement Event Count
 Type Category Fixed Point Scalar - unsigned long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 65,535 counts (1 count)
 Usable Range 0 to 1023 counts (1 count)
 Service Type Unackd_rpt
 Uses Send Heartbeat No

Default Value

500

Occupied Setpoint Differential

This configuration property is used to set the occupied setpoint hysteresis.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	10	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpOccDiff.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -327.68 to 327.66°C (0.01°C) 0x7FFF represents invalid data.
 Usable Range (Resolution) .5°C/1°F to 2.78°C/5°F (.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciOccDiff	McQuaySCC_WSHP	UCPToccDiff	N/A	SNVT_temp_diff_p	147

Measurement Temp Difference
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) -327.68 to 327.66°C (0.01°C) 0x7FFF represents invalid data.
 Usable Range (Resolution) .5°C/1°F to 2.78°C/5°F (.01°C)

Default Value

0.55°C (1°F)

Cooling Interstage Timer Setpoint

This configuration property is a countdown timer that defines the minimum period of time between cooling stages.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	8	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpCoolIntStgTmr.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (0.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciCoolIntStgTmr	McQuaySCC_WSHP	UCPTcoolIntStgTmr	N/A	SNVT_time_sec	107

Measurement Elapsed Time
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (0.1 sec)

Default Value

300 seconds.

Heating/Cooling Temperature Setpoint Limits

Limits to temperature setpoint adjustment are designed into the networked setpoints (value ranges of 40°F to 95°F). Additionally, limits are designed into the local sensor (55°F to 95°F). There may be a desire to further limit the amount of adjustment that the user can make. Consequently, cooling and heating, high and low limits are available to further limit the amount of adjustment that the controller will accept.

BACnet - Cooling Setpoint High Limit

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	30	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpClgSptHiLim.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LonWORKS - Cooling Setpoint High Limit

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciClgSptHiLim	McQuaySCC_WSHP	UCPTclgSptHiLim	N/A	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)

Default Value

32.23°C (90°F)

BACnet - Cooling Setpoint Low Limit

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	31	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpClgSptLoLim.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LonWORKS - Cooling Setpoint Low Limit

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciClgSptLoLim	McQuaySCC_WSHP	UCPTclgSptLoLim	N/A	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)

Default Value

10°C (50°F)

BACnet - Heating Setpoint High Limit

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	32	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpHtgSptHiLim.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LonWORKS - Heating Setpoint High Limit

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciHtgSptHiLim	McQuaySCC_WSHP	UCPThtgSptHiLim	N/A	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)

Default Value

29.45°C (85°F)

BACnet - Heating Setpoint Low Limit

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	33	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpHtgSptLoLim.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LonWORKS - Heating Setpoint Low Limit

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciHtgSptLoLim	McQuaySCC_WSHP	UCPThtgSptLoLim	N/A	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar - signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) 10°C/50°F to 35°C/95°F (0.01°C)

Default Value

10°C (50°F)

Low Temperature Protection SP for Glycol

This configuration property is used in combination with the Low Temperature Protection Differential and low suction temperature alarm when the Water/Glycol (Jumper #3) is in the Glycol (closed) position.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	11	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpLowTempProtGL.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 10°C/50°F (0.01°C).
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciLowTempProtGL	McQuaySCC_WSHP	UCPTlowTempProtGL	N/A	SNVT_temp_p	147

Measurement Temperature
 Type Category Fixed Point Scalar – signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 10°C/50°F (0.01°C).

Default Value

-14.17°C (6.5°F)

Heating Interstage Timer Setpoint

This configuration property is a countdown timer that defines the minimum period of time between heating stages.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	14	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpHeatIntStgTmr.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Valid Range (Resolution) 0 to 1200 sec (.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciHeatIntStgTmr	McQuaySCC_WSHP	UCPTheatIntStgTmr	N/A	SNVT_time_sec	107

Measurement Elapsed Time
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (0.1 sec)

Default Value

300 seconds.

HVAC Unit-Type Identifier

This read-only configuration property defines primary application and equipment type for the space comfort controller device.

BACnet – Not Supported

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciHVACType	SCC - Heat Pump	SCPTvacType	169	SNVT_hvac_type	145

Measurement hvac_hvt_t
 Type Category Enumeration
 Type Size 1 byte
 Valid Range (Resolution) hvac_hvt_t (1)

hvac_hvt_t Enumeration

Value	Identifier	Notes
0	HVT_GENERIC	Generic
1	HVT_FAN_COIL	Fan Coil
2	HVT_VAV	Variable Air Volume Terminal
3	HVT_HEAT_PUMP	Heat Pump
4	HVT_ROOFTOP	Rooftop Unit
5	HVT_UNIT_VENT	Unit Ventilator
6	HVT_CHILL_CEIL	Chilled Ceiling
7	HVT_RADIATOR	Radiator
8	HVT_AHU	Air Handling Unit
9	HVT_SELF_CONT	Self-Contained Unit

Default Value

3 = HVT_HEAT_PUMP = WSHP

Local Bypass Time Setpoint

This configuration property is used to define the amount of time that the WSHP can be in the Timed Override position. Additional bypass requests (pressing the Timed Override button) resets the Timed Override timer to the maximum value. A value of 0 disables the bypass feature.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	7	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpBypassTime.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	0 to 65,535 (1 Minute) The value 0x7FFF represents invalid data.
Usable Range (Resolution)	0 or 30 to 120 Minutes (1 Minute). A value of 0 disables the bypass feature.
Flash Memory	Y
Read, Writable, Commandable	W

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciBypassTime	SCC - Heat Pump	SCPTbypassTime	34	N/A	N/A

Measurement	SNVT_time_min
Type Category	unsigned long
Type Size	2 bytes
Valid Range (Resolution)	0 to 65,535 (1 Minute) The value 0x7FFF represents invalid data.
Usable Range (Resolution)	0 or 30 to 120 Minutes (1 Minute). A value of 0 disables the bypass feature.
Units	Minutes

Default Value

120 Minutes

Location Label

This configuration property can be used to provide more descriptive physical location information for the WSHP. For convenience, Location can also be changed using the integrated configuration menu as described on page 65.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device Object	8	any	location	58
Full Reference				
MTIIIUC_WSHP.#####.Location				

Measurement	location
Type Category	Character string
Type Size	48 bytes
Valid Range (Resolution)	N/A
Flash Memory	Y
Read / Write	R/W

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciLocation	SCC - Heat Pump	SCPTlocation	17	SNVT_str_asc	36

Measurement SNVT_str_asc
 Type Category Structure
 Type Size 31 bytes
 Valid Range (Resolution) ASCII Character String

Structure

```

Typedef struct {
    Unsigned char    ASCII[31];
} SNVT_str_asc
  
```

Default Value

Blank

Low Pressure Alarm Delay

This configuration property is used to adjust the amount of delay between a low-pressure input and the generation of a low-pressure alarm for Compressor #1 or Compressor #2.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	34	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpLowPresAlmDly.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Valid Range (Resolution) 0 to 99 sec (.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciLowPresAlmDly	McQuaySCC_WSHP	UCPTlowPresAlmDly	N/A	SNVT_time_sec	107

Measurement Elapsed Time
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 99 sec (0.1 sec)

Default Value

30 seconds.

Low Temperature Protection Setpoint

This configuration property is used in combination with the Low Temperature Protection Differential and low suction temperature alarm when the Water/Glycol (Jumper #3) is in the Water (open) position.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	12	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpLowTempProt.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 10°C/50°F (0.01°C).
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciLowTempProt	McQuaySCC_WSHP	UCPTlowTempProt	N/A	SNVT_temp_p	105

Measurement Temperature
 Type Category Fixed Point Scalar – signed long
 Type Size 2 bytes
 Valid Range (Resolution) -273.17 to +327.66°C (0.01°C). 0x7FFF represents invalid data.
 Usable Range (Resolution) -17.77°C/0°F to 10°C/50°F (0.01°C).

Default Value

-2.22°C (28°F)

Low Temperature Protection Differential

This configuration property is used in combination with the Low Temperature Protection Setpoint and low suction temperature alarm.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	13	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpLowTmpProtDif.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 1.11°C/2°F to 8.34°C/15°F (0.01°C)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciLowTmpProtDif	McQuaySCC_WSHP	UCPTlowTmpProtDif	N/A	SNVT_temp_diff_p	147

Measurement Temp Difference
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) -327.68 to 327.66°C (0.01°C) 0x7FFF represents invalid data
 Usable Range (Resolution) 1.11°C/2°F to 8.34°C/15°F (0.01°C).

Default Value

4.44°C (8°F)

Minimum Compressor Off Timer Setpoint

This configuration property is a countdown timer that defines the minimum period of time the compressor needs to be off before it is turned on again. This countdown timer is started when the compressor is turned off.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	15	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpMinCompOffTmr.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciMinCompOffTmr	McQuaySCC_WSHP	UCPTminCompOffTmr	N/A	SNVT_time_sec	107

Measurement Elapsed Time
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (.1 sec)

Default Value

180 Seconds

Minimum Compressor On Timer Setpoint

This configuration property is a countdown timer that defines the minimum period of time the compressor needs to be on before it is shut off. This countdown timer is started when the compressor is turned on.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	16	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpMinCompOnTmr.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciMinCompOnTmr	McQuaySCC_WSHP	UCPTminCompOnTmr	N/A	SNVT_time_sec	107

Measurement Elapsed Time
 Type Category signed long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) The value 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 1200 sec (.1 sec)

Default Value

180 Seconds

Minimum Send Time

This configuration property defines the minimum period of time between automatic network variable output transmissions. It serves to limit network traffic when output network variables are changing too often. A value of zero disables the timer.

BACnet

Not implemented. The current version of the BACnet communication module does not initiate transmissions.

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciMinOutTm	SCC – Heat Pump	SCPTminSendTime	52	SNVT_time_sec	107

Measurement SNVT_time_sec
 Type Category unsigned long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 6553.4 sec (0.1 sec)

The following network variables are limited by nciMinOutTm if the timer is greater than zero:

- nvoDischAirTemp
- nvoLWT
- nvoEWT
- nvoSpaceTemp
- nvoLocalSpaceTmp
- nvoSuctionTemp1
- nvoSuctionTemp2
- nvoBrownout

Default Value

0 seconds = Minimum Send Time Disabled.

Occupancy Temperature Setpoints

This configuration property defines the space temperature setpoints for the various heat, cool, and occupancy modes. The values of the individual setpoints must be kept in ascending order as follows: unoccupied_heat <= standby_heat <= occupied_heat <= occupied_cool <= standby_cool <= unoccupied_cool

BACnet (Occupied_Cool_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	1	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpOccupied_Cool_Setpt.Present_Value				

BACnet (Standby_Cool_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	2	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpStandby_Cool_Setpt.Present_Value				

BACnet (Unoccupied_Cool_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	3	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpUnoccupied_Cool_Setpt.Present_Value				

BACnet (Occupied_Heat_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	4	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpOccupied_Heat_Setpt.Present_Value				

BACnet (Standby_Heat_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	5	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpStandby_Heat.Present_Value				

BACnet (Unoccupied_Heat_Setpt)

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	6	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpUnoccupied_Heat_Setpt.Present_Value				

Measurement	Present_Value
Type Category	Float
Type Size	2 bytes
Valid Range (Resolution)	10.0°C/50°F to 35°C/95°F (0.01°C)
Flash Memory	Y
Read, Writable, Commandable	W

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciSetpoints	SCC – Heat Pump	SCPTsetPnts	60	N/A	N/A

Measurement SNVT_temp_setpt
 Type Category Structure
 Type Size 12 bytes
 Valid Range (Resolution) 10.0°C to 35.0°C (0.01°C) 0x7FFF represents invalid data.
 Usable Range (Resolution) 10.0°C/50°F to 35°C/95°F (0.01°C)

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	Notes
Occupied_cool	Occupied Cooling Setpoint
Standby_cool	Standby Cooling Setpoint
Unoccupied_cool	Unoccupied Cooling Setpoint
Occupied_heat	Occupied Heating Setpoint
Standby_heat	Standby Heating Setpoint
Unoccupied_heat	Unoccupied Heating Setpoint

Default Value

Occupied_cool = 23.89°C (75°F)
 Standby_cool = 23.34°C (74°F)
 Unoccupied_cool = 29.45°C (85°F)
 Occupied_heat = 21.11°C (70°F)
 Standby_heat = 21.66°C (71°F)
 Unoccupied_heat = 15.55°C (60°F)

Receive Heartbeat

This configuration property is used to control the maximum time that elapses after the last update to a specified network variable input before the WSHP starts to use its default values.

On occasion, communication between the WSHP and a networked room sensor, or the WSHP and the BAS, has failed. When this happens, the WSHP must continue to operate safely. The WSHP acknowledges that communication has failed because it no longer receives a heartbeat from the network.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	20	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpRcvHrtBt.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data
 Usable Range (Resolution) 0 to 6553.4 sec (0.1 sec)
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

There are three Network Variable Input categories that define whether or not the WSHP uses the Receive Heartbeat function. The three categories are based on 1) the network variable input being specified in the Receive Heartbeat table, and 2) if the network variable input is bound. The WSHP uses Category 1 (the network variable input is specified in the table and it is also bound).

Network Variable Input	Specified for Receive Heartbeat in Table?	Bound?	Result: Use Receive Heartbeat?
Category 1	Yes	Yes	Yes
Category 2	Yes	No	Manufacture Defined
Category 3	Yes	Don't Care	No

The only network input variables that will be listed in the Receive Heartbeat table will be those that are used by the WSHP and listed in the SCC Profile. They are:

- nviApplicMode
- nviAuxHeatEnable
- nviComprEnable
- nviCoolPriSlave (future)
- nviCoolSecSlave (future)
- nviEnergyHoldOff
- nviHeatCool (future)
- nviHeatPriSlave (future)
- nviHeatSecSlave (future)
- nviOccSensor
- nviOccSchedule
- nviSetptOffset
- nviSpaceTemp

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciRcvHrtBt	SCC – Heat Pump	SCPTmaxRcvTime	48	SNVT_time_sec	107

Measurement	SNVT_time_sec
Type Category	unsigned long
Type Size	2 bytes
Valid Range (Resolution)	0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data
Usable Range (Resolution)	0 to 6553.4 sec (0.1 sec)

Default Value

0 seconds = Disabled.

Room Sensor Setpoint Enable

This configuration property is used to Enable/Disable local hardwired setpoint adjustment. If nciLocSptEnable is enabled, then the room sensor potentiometer is used. If nciLocSptEnable is disabled, then the Remote Space Temperature Setpoint is used.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	14	Present_Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpLocSptEnable.Present_Value				
Property Value				
1 = Disabled				
2 = Enabled				
3 = Null (Same as Enabled)				

Measurement Present_Value
 Type Category Unsigned
 Type Size 1 byte
 Valid Range (Resolution) 1-3
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciLocSptEnable	McQuaySCC_WSHP	UCPTlocSptEnable			

Measurement Boolean_t
 Type Category Structure
 Type Size 1 byte
 Valid Range (Resolution) 0 or 1 (1)
 Uses Receive Heartbeat No

```

Typedef enum {
    0  BOOL_FALSE,
    1  BOOL_TRUE,
    -1 BOOL_NUL
} boolean_t
  
```

Valid Range

0 = Disabled
 1 = Enabled
 -1 = NULL (Same as Enabled)

Default Value

Enabled.

Send Heartbeat

This LONWORKS-only 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. It is possible that the BAS could receive a heartbeat from the WSHP, declare that communication is lost, and possibly take corrective action.

LONWORKS

The ability to send a heartbeat is required for LONWORKS applications. The Send Heartbeat function is determined by whether or not the network variable output is specified in the Send Heartbeat table (see below) The WSHP uses Category 1.

Network Variable Output	Specified for Send Heartbeat in Table?	Result: Use Send Heartbeat?
Category 1	Yes	Yes
Category 2	No	Manufacture Defined

The only network input variables that will be listed in the Send Heartbeat table will be those that are used by the WSHP and listed in the SCC Profile. They are:

- nvoCoolPrimary (future)
- nvoCoolSecondary (future)
- nvoDischAirTemp
- nvoEffectOccup
- nvoEffectSetpt
- nvoFanSpeed
- nvoHeatCool (future)
- nvoHeatPrimary (future)
- nvoHeatSecondary (future)
- nvoLocalSpaceTmp
- nvoSetpoint
- nvoSetptShift
- nvoSpaceTemp
- nvoUnitStatus

A value of 0 disables the auto update.

LonWorks Name	Profile	SCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciSndHrtBt	SCC – Heat Pump	SCPTmaxSendTime	49	SNVT_time_sec	107

Measurement SNVT_time_sec
 Type Category unsigned long
 Type Size 2 bytes
 Valid Range (Resolution) 0 to 6553.4 (0.1 sec) 0x7FFF represents invalid data.
 Usable Range (Resolution) 0 to 6553.4 sec (0.1 sec)

Default Value

0 seconds = Send Heartbeat Disabled.

Software Identification (Major Version)

This property displays the major revision number for the communication module firmware.

BACnet

BACnet uses the single property ‘firmware-version’ to display the software version.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device	8	any	firmware-version	44
Full Reference				
MTIIIUC_WSHP.#####.firmware-version				

Measurement firmware-version
 Type Category Character string
 Type Size 32 bytes
 Valid Range (Resolution) N/A
 Flash Memory N
 Read / Write R

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number
nciDevMajVer	Node Object	SCPTdevMajVer	165

Measurement Version Number
 Type Category Unsigned short
 Type Size 1 bytes
 Valid Range (Resolution) 0-255 (1)
 Usable Range (Resolution) 0-255 (1)

Software Identification (Minor Version)

This configuration property displays the minor revision number for the communication module firmware.

BACnet

BACnet combines major and minor version into one variable. See Software Identification (Major Version)

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number
nciDevMinVer	Node Object	SCPTdevMinVer	166

Measurement Version Number
 Type Category Unsigned short
 Type Size 1 bytes
 Valid Range (Resolution) 0-255 (1)

Unit Application (Major Version)

This property displays the revision number for the WSHP unit controller application software version.

BACnet

BACnet uses the single property 'Application-software-version' to display the unit controller application version.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device	8	any	Application-software-version	12
Full Reference				
MTIIIUC_WSHP.#####.Application-software-version				

Measurement	Application-software-version
Type Category	Character string
Type Size	7 bytes
Valid Range (Resolution)	ASCII "0.0" – "255.255"
Flash Memory	N
Read / Write	R

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number
nciUnitAppMajVer	McQuaySCC_WSHP	UCPTUnitAppMajVer	

Measurement	Version Number
Type Category	Unsigned short
Type Size	1 bytes
Valid Range (Resolution)	0-255 (1)
Usable Range (Resolution)	0-255 (1)

Unit Application (Minor Version)

This property displays the revision number for the WSHP unit controller application software version.

BACnet

BACnet combines major and minor version into one variable. See Unit Application (Major Version)

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number
nciUnitAppMinVer	McQuaySCC_WSHP	UCPTUnitAppMinVer	

Measurement	Version Number
Type Category	Unsigned short
Type Size	1 bytes
Valid Range (Resolution)	0-255 (1)
Usable Range (Resolution)	0-255 (1)

Software Jumper Configuration

This configuration property is used to define the software jumper configuration. Bit 0 (Jumper #1) is reserved to define the WSHP as a master or slave unit in the future. The other bits are unused.

BACnet

Master/Slave functions are not implemented with the BACnet communications option. Therefore no software jumpers are implemented at this time.

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Reference	SNVT Number
nciSoftJumpers	McQuaySCC_WSHP	UCPTsoftJumpers	N/A	SNVT_state	83

Measurement State
 Type Category Structure
 Type Size 2 bytes

Structure

```

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

Bit Description

Bit	Definition
0	Master (future)
1-14	Future
15 (MSB)	Future

Where MSB = Most Significant Bit

Default Value

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

Unoccupied Setpoint Differential

This configuration property is used to set the unoccupied setpoint hysteresis.

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Analog Value	2	17	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.cpUnoccDiff.Present_Value				

Measurement Present_Value
 Type Category Float
 Type Size 2 bytes
 Valid Range (Resolution) -327.68 to 327.66°C (0.01°C)
 Usable Range (Resolution) 1.11°C/2°F to 5.56°C/10°F
 Flash Memory Y
 Read, Writable, Commandable W

LONWORKS

LonWorks Name	Profile	UCPT Reference	SCPT Number	SNVT Type	SNVT Number
nciUnoccDiff	McQuaySCC_WSHP	UCPTunOccDiff	N/A	SNVT_temp_diff_p	147

Measurement Temp Difference
Type Category signed long
Type Size 2 bytes
Valid Range (Resolution) -327.68 to 327.66°C (0.01°C)
Usable Range (Resolution) 1.11°C/2°F to 5.56°C/10°F

Default Value

1.11°C (2°F)

BACnet Device Properties

The following section describes the following BACnet Device Properties: Instance, Name, Location, Description, and Units.

Instance

A unique instance number or object-identifier assigned by the network integrator as defined by clause 12 of the BACnet Standard. The valid range is 1 to 4194302. The default value is 300.

Note: The Device Instance must be set using the BACnet communication module’s configuration menu.

Name

This is the BACnet Device object-name property. The maximum length is 32 characters. If a period “.” is entered (using the service tool menu) as the first character then the name is set to “MTIIIUC_WSHP.0000000” and the zeros are set to the device instance. If a space character is entered as the first character then the Device Instance is automatically filled in at the first 0 (zero) character in the name. For example: Assume the Instance has been changed to 321. If the name was previously “WSHP.0000300” and a space is entered at the name prompt, the new name automatically fills in as “WSHP.0000321”. If a period is entered at the name prompt, the new name changes to “MTIIIUC_WSHP.0000321”. This property can be changed by either the BACnet configuration menu or through the BACnet network.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device Object	8	any	Object-name	77
Full Reference				
MTIIIUC_WSHP.#####.object-name				

Measurement	Object-name
Type Category	Character string
Type Size	32 bytes
Valid Range (Resolution)	N/A
Flash Memory	Y
Read / Write	R/W

Location

The location property is a text string with a maximum length of 32 characters. The default value is blank. .This property can be changed by either the BACnet configuration menu or through the BACnet network.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device Object	8	any	location	58
Full Reference				
MTIIIUC_WSHP.#####.location				

Measurement	location
Type Category	Character string
Type Size	32 bytes
Flash Memory	Y
Read / Write	R/W

Description

The description property is a text string with a maximum length of 32 characters. The default value is blank. This property can be changed by either the BACnet configuration menu or through the BACnet network.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device Object	8	any	Description	28
Full Reference				
MTIIIUC_WSHP.#####.description				

Measurement	Description
Type Category	Character string
Type Size	32 bytes
Valid Range (Resolution)	N/A
Flash Memory	Y
Read / Write	R/W

Units (English/Metric)

The BACnet communication module supports English and Metric units for temperature conversion. This menu selection changes the units for all the appropriate properties in the device. This property can be changed by either the BACnet configuration menu or through the BACnet network. From the network, MSV15.presentvalue changes it. From the configuration menu, select “E” for English or “M” for Metric units.

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Multistate Value	19	15	Present Value	85
Full Reference				
MTIIIUC_WSHP.#####.units				
Property Value				
1 = English (E)				
2 = Metric (M)				

Measurement	DegF/DegC
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1 or 2
Flash Memory	Y
Read / Write	W

BACnet MS/TP Settings

The following section describes the following BACnet MS/TP settings: Baud rate, Max Masters, and Address Switch. These parameters must be set according to the BACnet network requirements to which the WSHP is being connected.

Baud rate

Set the MS/TP Baud rate to match the speed of the BACnet network to which the BACnet communication module is connected. Valid values are 9600, 19200, 38400, or 76800. The default value is 38400. Speeds above 38400 require carefully engineered networks and should therefore be avoided unless the network wiring has been tested to the required speed.

Note: The Baud rate must be set using the BACnet communication module's configuration menu.

Max Masters

Max Masters is a BACnet MS/TP parameter that should be set to highest address of a MS/TP master on the network segment. The default value is 127 for maximum compatibility. Setting this to the highest address of an MS/TP master device on the network reduces the MS/TP token traffic and decreases the response time of the WSHP unit controller. Max Masters can be set via the BACnet communication module's configuration menu or from the BACnet network. The following information is used for setting Max Masters from a BACnet network:

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Name	Enumeration
Device Object	8	any	MaxMasters	64
Full Reference				
MTIIIUC_WSHP.#####.MaxMasters				
Property Value				
1 – 127 MS/TP Master address range				

Measurement	MS/TP Master device address range
Type Category	Unsigned
Type Size	1 byte
Valid Range (Resolution)	1-127
Flash Memory	Y
Read / Write	R/W

Address Switch

This read-only value shows the value of the MS/TP address switches on the BACnet communication module. The address is shown in decimal form.

BACnet Terminal Settings

The default Baud rate for serial connection to the terminal used for configuring the BACnet communication module is 19200 bps. Other serial settings are fixed at 8 bits, no parity, 1 stop bit, and no flow control. The only changeable parameter is EIA-232 Baud rate.

EIA-232 Baud Rate

The default value of 19200 is appropriate for most terminal programs and should rarely have to be changed. The Baud rate may be changed to any of the following values: 9600, 19200, 57600, or 115200. When a new value is selected, it takes affect immediately and communication with the terminal program will be lost. Change the Baud rate of the terminal program to match the Baud rate that was selected here.

Note: The EIA-232 Baud rate must be set using the BACnet communication module's configuration menu.

LONWORKS Device Management

The following functions are specific to the LONWORKS device (in this case, the LONWORKS communication module). These functions are used for maintenance and testing. A network management tool such as Echelon's LonMaker® is typically used to issue the network commands.

Offline

When the LONWORKS Communication Module receives a network command to go Offline, the Unit Controller continues to operate but LONWORKS communication is suspended except for network management messages.

Online

When the LONWORKS Communication Module receives a network command to go Online, LONWORKS network messaging is restored.

Reset

When the LONWORKS Communication Module receives a network command Reset command, it performs the following:

1. Send a command to the Unit Controller to perform a warm reset, maintaining non-volatile memory.
2. Reset the Neuron processor.

Wink

The “Wink” unit identification function allows verification of an individual unit network address without opening the unit access panels. The compressor shuts off during this period and the Minimum Compressor Off Countdown Timer must expire before the compressor is allowed to run again. The Minimum Fan On and Fan Off Countdown Timers are ignored during the wink period. The Wink function operates during all operating and non-operating modes (example: Alarms) – except Brownout mode.

Upon receiving a “wink” command from a network management node, the WSHP exhibits the following identification sequence (Status LED and fan sequences occur simultaneously):

- Room Sensor or SLM/Netware2 Status LED: Flashes (on 0.5 sec, off 0.5 sec) for 15 seconds.
- Fan: The WSHP fan turns off for 5 seconds, turns on for 5 seconds, then off again for 5 seconds.

BACnet Device Management

The following functions are specific to a BACnet device (in this case, the BACnet communication module). These functions are used for maintenance and testing. A network management tool such as VTS is typically used to issue the network commands.

DeviceCommunicationControl - Disable

The purpose of this command is to reduce network traffic for diagnostic testing of the MS/TP network. When the BACnet communication module receives a network command to Disable communication, it stops communicating WSHP information to the network. An optional time may be specified for how long to suspend communications. The unit continues to operate during the Disabled state.

DeviceCommunicationControl - Enable

When the BACnet communication module receives a network command to Enable communication, WSHP communication is restored.

ReinitializeDevice (Reset)

When the BACnet communication module receives a network ReinitializeDevice command, it performs the following:

1. Send a command to the WSHP unit controller to perform a warm reset, maintaining non-volatile memory.
2. Reset the BACnet communication module.

If a warm reset is requested, the non-volatile memory is maintained. If a cold reset is requested, then the non-volatile memory is set to the factory default values.

Note: The password for both cold and warm reset is “McQuay”.

A cold reset can also be performed by the following button sequence on the BACnet communication module.

1. Press and hold the button labeled “Default”
2. Momentarily press the “Reset” button.
3. The four LED indicators will flash briefly and then begin sequencing on starting with LED D1.
4. Release the “Default” button when all four LED indicators are on.
5. The BACnet communication module will then clear the memory to default settings and reset.

ReinitializeDevice (Wink)

The BACnet communication module implements a unit identification mode command to the WSHP Unit Controller by using the BACnet ReinitializeDevice request with a password of “wink” (all lower case).

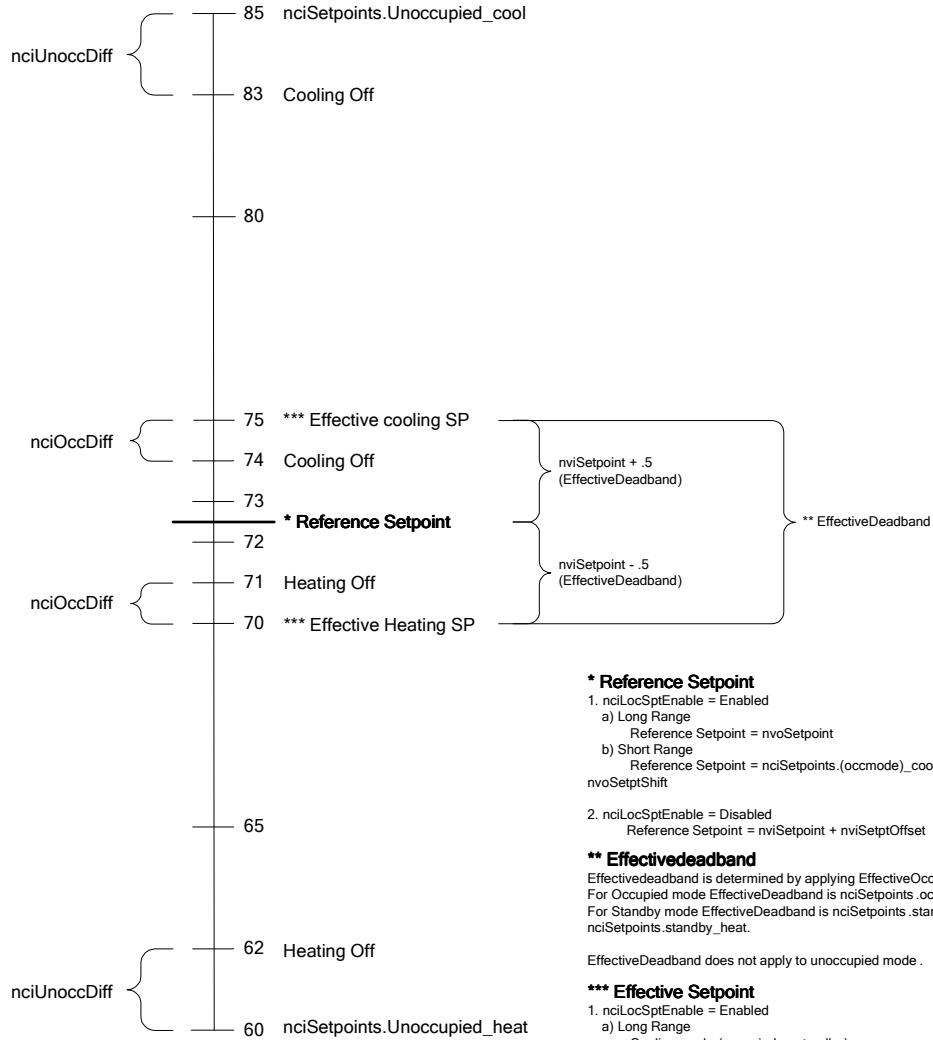
The unit identification function allows verification of an individual unit network address without opening the unit access panels. The compressor shuts off during this period and the Minimum Compressor Off Countdown Timer must expire before the compressor is allowed to run again. The Minimum Fan On and Fan Off Countdown Timers are ignored during the wink period. The Wink function also functions during the initial start-up delay time.

Upon receiving a wink command from a network management node, the WSHP exhibits the following identification sequence (Status LED and fan sequences occur simultaneously):

- Room Sensor Status LED: Flashes (on 0.5 sec, off 0.5 sec) for 15 seconds.
- Fan: The WSHP fan turns off for 5 seconds, turns on for 5 seconds, then off again for 5 seconds.

Appendix A: Setpoint Detail

MTIIIUC_WSHP Room Sensor Space Temperature Setpoint operation



* Reference Setpoint

- nciLocSptEnable = Enabled
 - Long Range
Reference Setpoint = nvoSetpoint
 - Short Range
Reference Setpoint = nciSetpoints.(occmode)_cool - .5(EffectiveDeadband) + nvoSetptShift
- nciLocSptEnable = Disabled
Reference Setpoint = nviSetpoint + nviSetptOffset

** EffectiveDeadband

Effectivedeadband is determined by applying EffectiveOccupancy to nciSetpoints .
For Occupied mode EffectiveDeadband is nciSetpoints.occ_cool - nciSetpoints.occ_heat.
For Standby mode EffectiveDeadband is nciSetpoints.standby_cool - nciSetpoints.standby_heat.

EffectiveDeadband does not apply to unoccupied mode .

*** Effective Setpoint

- nciLocSptEnable = Enabled
 - Long Range
 - Cooling mode (occupied or standby)
 $nvoEffectSetpt = nvoSetpoint + .5(EffectiveDeadband)$
 - Heating mode (occupied or standby)
 $nvoEffectSetpt = nvoSetpoint - .5(EffectiveDeadband)$
 - Short Range
 - Cooling mode (occupied or standby)
 $nvoEffectSetpt = nciSetpoints.(occmode)_cool + nvoSetptShift$
 - Heating mode (occupied or standby)
 $nvoEffectSetpt = nciSetpoints.(occmode)_heat + nvoSetptShift$
- nciLocSptEnable = Disabled
 - Cooling mode (occupied or standby)
 $nvoEffectSetpt = nviSetpoint + .5(EffectiveDeadband) + nviSetptOffset$
 - Heating mode (occupied or standby)
 $nvoEffectSetpt = nviSetpoint - .5(EffectiveDeadband) + nviSetptOffset$
- Unoccupied (all cases)
 - Cooling mode
 $nvoEffectSetpt = nciSetpoints.unoccupied_cool$
 - Heating mode
 $nvoEffectSetpt = nciSetpoints.unoccupied_heat$

General Notes

- Jumper #5 (Long/Short Range) does not effect Networked Setpoint operation
- Use LonMark SCC profile symmetrical method for effective setpoint calculation .
 Deadband_occupied = nciSetpoints.occupied_cool - nciSetpoints.occupied_heat
 Deadband_standby = nciSetpoints.standby_cool - nciSetpoints.standby_heat
 Effective_occupied_cool = nviSetpoint + .5 (deadband_occupied)
 Effective_occupied_heat = nviSetpoint - .5 (deadband_occupied)
 Effective_standby_cool = nviSetpoint + .5 (deadband_standby)
 Effective_standby_heat = nviSetpoint - .5 (deadband_standby)
- nviSetpoint defaults to the midpoint between the effective nciSetpoints heating and cooling setpoints. nviSetptOffset defaults to 0 deg C.

Appendix B: BACnet PICS

This section contains the Protocol Implementation Conformance Statement (PICS) for the MicroTech III Unitary Controller WSHP (MTIIIUC_WSHP) from McQuay International as required by ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 135-2004, BACnet; A Data Communication Protocol for Building Automation and Control Networks.

Protocol Implementation Conformance Statement

Date: March 17, 2010
Vendor Name: McQuay International
Product Name: MTIIIUC_WSHP
Product Model Number:
Application Software Version: 2.6
Firmware Revision: 2.7
BACnet Protocol Revision: Version 1
Revision 4

Product Description

The MicroTech III WSHP Unit Controller with optional BACnet communication module is a microprocessor-based controller designed to operate McQuay Water Source Heat Pump units and be integrated into BACnet building automation systems.

BACnet Standardized Device Profile

- BACnet Operator Workstation (B-OWS)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Specific Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

BACnet Interoperability Building Blocks (BIBBs) Supported

BIBB Name	Designation
Data Sharing – ReadProperty – B	DS-RP-B
Data Sharing – ReadPropertyMultiple – B	DS-RPM-B
Data Sharing – WriteProperty – B	DS-WP-B
Data Sharing – WritePropertyMultiple – B	DS-WPM-B
Device Management – Dynamic Device Binding – B	DM-DDB-B
Device Management – Dynamic Object Binding – B	DM-DOB-B
Device Management – ReinitializeDevice – B	DM-RD-B
Device Management – Dynamic Communication Control – B	DM-DCC-B

