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MicroTech II®
McQuay Maverick II™ Rooftop Unit Controller Protocol Information

BACnet® Networks
LonWorks® Networks

- MPS McQuay Packaged Commercial Rooftop System

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Revision History

ED15102	June 2007	Initial release.
ED15102-1	September 2008	Relocated Occ Schedule point to Occupancy section in BACnet and LON data tables. Added Discharge Air Heating Setpoint (nviDAHtSP or AV18). Added Maximum Discharge Air Heating Setpoint (nciDAHtSP or AV19) Changed Occupancy in the BACnet table from an AV to MV. It was labeled incorrectly in the table. Changed the default for the Occupied Cooling Setpoint from 75°F to 72°F. Changed the default for the Occupied Heating Setpoint from 70°F to 68°F.
ED15102-2	November, 2009	Removed Effective DAT Setpoint from BACnet table on p.19
ED15102-3	February, 2010	Corrected Max Info Frames and Max Master parameters in Table 1.

Software Revision

Keypad Menu Path Hidden.Unit Config/App Version=

This edition documents Network Protocols for version 1.10 of the standard MPS Rooftop Unit Controller application software and all subsequent versions until otherwise indicated. However, if your software is of a later version (for example, 2.0), some of the information in this document may not completely describe your application.

You can determine the revision of the application software from the MPS Rooftop Unit Controller keypad display. This information appears on the keypad when the MPS Rooftop Unit Controller is initially powered up. It can also be found on the "hidden" Unit Config menu of the keypad display, which is accessed by following these steps:

1. Press the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously.
2. If prompted for a password, enter: 4545.
3. Press the down arrow until "App Version =" appears.

Reference Documents

Company	Number	Title	Source
McQuay International	OM 843	MicroTech II® Commercial Packaged Rooftop Unit Controls, MPS Unit Controller (DAC, SCC)	www.mcquay.com
McQuay International	UM 855	MicroTech II BACnet® Communication Module Configuration Tool for McQuay MPS (Maverick II™) Rooftop Unit Controllers	www.mcquay.com
American Society of Heating, Refrigerating and Air-Conditioning Engineers	ANSI/ ASHRAE 135-2001	BACnet A Data Communication Protocol for Building Automation and Control Networks	www.ashrae.org
LonMark Interoperability Association	078-0014-01E	LonMark® Layers 1-6 Interoperability Guidelines, Version 3.4	www.lonmark.org
LonMark Interoperability Association	078-0120-01E	LonMark Application Layer Interoperability Guidelines, Version 3.4	www.lonmark.org
LonMark Interoperability Association	8500_10	LonMark Functional Profile: Space Comfort Controller, Version 1.0	www.lonmark.org
LonMark Interoperability Association	8600_10	LonMark Functional Profile: Discharge Air Controller, Version	www.lonmark.org
Echelon Corporation	078-0156-01G	LonWorks FTT-10A Free Topology Transceiver Users Guide	www.echelon.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 II MPS Rooftop Unit Controller from McQuay International into your building automation system (BAS). It lists all BACnet® properties, LONWORKS® variables, and corresponding MPS Rooftop Unit Controller data points. It also contains the BACnet Protocol Implementation Conformance Statement (PICS). BACnet and LONWORKS terms are not defined in detail. Refer to the respective specifications for more information.

MPS Rooftop Unit Controller Data Points

The MPS Rooftop Unit Controller contains data points or unit variables that are accessible from three user interfaces: the unit keypad, a BACnet network (BACnet/IP, BACnet Ethernet or BACnet MS/TP), or a LONWORKS network. Not all points are accessible from each interface. This manual lists all important data points and the corresponding path for each applicable interface. Refer to the applicable Operation Manual for keypad details (see Reference Documents section). This document contains the information necessary to incorporate the MPS Rooftop Unit Controller into a BACnet or LONWORKS network.

Protocol Definitions

The MPS Rooftop Unit Controller can be configured in either an interoperable BACnet or LONWORKS network. The corresponding MicroTech II Communication Module must be installed on the MPS Rooftop Unit Controller. There are four MicroTech II Communication Modules available:

- BACnet/IP or BACnet Ethernet
- BACnet MS/TP (Master/Slave Token Passing)
- LONWORKS SCC (Space Comfort Control*)
- LONWORKS DAC (Discharge Air Control*)

*The LONWORKS Communication Modules are in accordance with the LonMark® Space Comfort Controller functional profile and the Discharge Air Controller functional profile.

BACnet Protocol

BACnet (Building Automation and Control Network) is a standard communication protocol developed by the American National Standards Institute (ANSI) and American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) specified in ANSI/ASHRAE Standard 135-2001. BACnet provides the communication infrastructure needed to integrate products manufactured by different vendors and to integrate building services that are now independent.

LONWORKS Networks

A control network specification for information exchange using 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 MicroTech II MPS Rooftop Unit Controller is LonMark 3.4 certified.

Basic Protocol Information

Setting MPS Rooftop Unit Controller Communication Parameters

Certain parameters must be configured in order to establish communication between the MPS Rooftop Unit Controller and the MicroTech II Communication Module. These parameters are set differently depending on the type of MicroTech II Communication Module. Table 1 defines the four possible sets of parameter settings. Note that not all parameters apply to each MicroTech II Communication Module. Change parameters via the MPS Rooftop Unit Controller keypad display.

Table 1. Parameter Settings

Parameter Name	BACnet IP/Ethernet	BACnet MS/TP	LON (DAC or SCC)	No Communication Module
IP Address	**172.16.5.8**	N/A	N/A	N/A
IP Subnet Mask[1]	**16 (255.255.0.0)**	N/A	N/A	N/A
UDP Port Number[2]	**47808**	N/A	N/A	N/A
IP Router Address (Gateway)	**0.0.0.0**	N/A	N/A	N/A
MSTP MAC Address	N/A	**0**	N/A	N/A
MSTP Baud Rate	N/A	**38400**	N/A	N/A
Type	**BACnet IP or BACnet Ethernet**	**BACnet MS/TP**	**LON**	None
Device Instance Number	**3001**	**3001**	N/A	N/A
Max Master	N/A	**127**	N/A	N/A
Max Info Frames	N/A	**1**	N/A	N/A
Max APDU Length	**1472**	**480**	N/A	N/A
Device Object Name[3]	**MTIIUC_MPSXXXXXXXXX**	**MTIIUC_MPSXXXXXXXXX**	N/A	N/A

Notes:

[1]See Appendix B: Subnet Mask - CIDR Conversion Table for details on setting this parameter.

[2]UDP Port Number is not adjustable via the unit keypad. The BACnet Communication Module Configuration Tool software (and corresponding Users Manual, UM 855), available at www.mcquay.com, is required to change this parameter.

[3]The alpha portion (MTIIUC_MPS) of the Device Object Name is not adjustable via the keypad display. The numeric portion (XXXXXXXXX) is set to the keypad editable Device Instance Number value. Changing the alpha portion requires the BACnet Communication Module Configuration Tool software, available at www.mcquay.com.

BACnet Networks

Compatibility

The MPS Rooftop Unit Controller conforms to the BACnet Standard (ANSI/ASHRAE 135-2001) as stated in the Protocol Implementation and Conformance Statement (PICS). See Protocol Implementation Conformance Statement on page 57.

BACnet Objects

MPS Rooftop Unit Controllers incorporate standard BACnet object types (i.e., object types defined in the BACnet Standard). Each object has properties that control unit variables or data points. Some object types occur more than once in the MPS Rooftop Unit Controller. Each occurrence or instance has unique properties and also controls different unit variables or data points. Each instance is designated with a unique instance index. Some properties can be adjusted (read/write properties such as setpoints) from the network and others can only be interrogated (read-only properties such as status information).

Each data point accessible from a BACnet network is described with a table that gives the Object Identifier, Property Identifier, Full BACnet Reference or path, and the Name enumeration of the property.

Note: The MPS Rooftop Unit Controller has been programmed with a Receive Heartbeat function for certain BACnet variables. If BACnet has not written to these values before, the Receive Heartbeat timer expires (default=30 seconds) and the variables will revert to either the default or to the value of the attached sensor. The Receive Heartbeat timer can be changed through the keypad display or the BACnet network. Setting the Receive Heartbeat value to zero (0) disables this feature.

Example of BACnet Data Point

Keypad Menu Path Duct Pressure/1

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1021	Present Value	85
Full Reference				
MTIIUC_MPS#########.FanOutput.Present Value				

Object Identifier

Object Identifiers are each designated with an Object type as defined in the BACnet specification. The first column of the data point definition gives the object type. This object in the above example is Discharge Fan Capacity.

The object identifier is a property that can be read from the object. The name of the property is "Object_Identifier" and the property identifier is 75.

Each object in a MPS Rooftop Unit Controller has a unique identifier. BACnet object identifiers are two-part numbers of BACnet Object Identifier data type. The first part identifies the object type (the first 10 bits of the 32-bit BACnet Object Identifier (see ANSI/ASHRAE 135-2001: BACnet A Data Communication Protocol for Building Automation and Control Networks). The first column of the data point definition gives the object type. The second part identifies the instances of that particular object type (the last 22 bits of the 32-bit BACnet Object Identifier).

The object identifier is shown in the data points listing as two numbers. The first number is shown in the Type ID column and designates the Object type enumeration. The second number is shown in the Instance column and designates the instance of that particular object type.

The object identifier is a property that can be read from the object code. The name of the property is "Object_Identifier" and the property identifier is 75. The BACnet specification reserves the first 128 numbers for ASHRAE-defined objects. Manufacturers may define additional object types and assign a number above 127 as long as they conform to the requirements of the BACnet specification.

Each object also has a name. Object names are character strings. The object name is a property that can be read from the object. The name of the property is "Object_Name" and the property identifier is 77.

Objects are sometimes referred to as an object type and instance number as they are in the BACnet specification. The example object above is: Analog Value, Instance 1021.

Property Identifier

Each object has a number of properties or attributes. Each property has a unique identifier of BACnet Property Identifier data type. Property identifiers are an enumerated set; a number identifies each member. The Property Identifier enumeration number is shown in the Property ID column. In the example above the property identifier is 85.

Property Name

Each property also has a unique name. Property names are character strings and shown in the Property Name column. In the example above the property name is Present Value.

Full Reference

The full reference is the path of the property within the network where the MPS Rooftop Unit Controller resides. It is a character string equivalent to the object identifier and the property identifier. In the example above the full reference is MTIIUC_MPS#########.FanOutput.Present Value.

Enumerated Values

Some properties are standard data types and some are enumerated sets. If the property value is an enumerated set, all enumerated values and corresponding meaning are given in the Enumeration column of the data point listing.

MPS Rooftop Unit Controller Device Object

Each BACnet compatible device must contain only one BACnet Device Object.

Device Object Identifier

The MPS Rooftop Unit Controller Device Object Identifier uniquely specifies the unit within the network. The device object type for all devices is fixed by ASHRAE at 8. Therefore the device object instance number must be unique. The initial Device Object identifier is set at the factory. The device object identifier can be read from the MPS Rooftop Unit Controller. The name of the property is "Object_Identifier" and the property identifier is 75. The initial device object instance number is 3001.

⚠ CAUTION

If another device in the network already has this object identifier (instance number), you must change the instance number of one device object via the MPS Rooftop Unit Controller keypad display, so that all devices in the network have a unique device identifier.

Device Object Name

The device object name specifies a device and must be unique in the network. The device object name for the MPS Rooftop Unit Controller device is MTIIUC_MPS#########, where ######### is the device instance of the MPS Rooftop Unit Controller. The device object name must be unique throughout the entire network. If there are multiple MPS Rooftop Unit Controllers on the network, the device object name of each MPS Rooftop Unit Controller must be changed to have a unique device object name. To make the device object name unique, change the device instance, which must also be unique on the network. All objects include the device name and a period "." (MTIIUC_MPS#########.) preceding the object name.

The device object name is also available to the network in the device. The property name is "Object_Name" and property identifier is 77.

The device object name can only be made unique by changing the device instance. The MTIIUC_MPS portion of the device name can only be changed via the MicroTech II BACnet Communication Module Configuration Tool (and corresponding User Manual, UM 855) available at www.mcquay.com.

Device Object Properties

The device object contains many other informative properties as shown in Table 2.

Table 2. MPS Rooftop Unit Controller Device Object Properties

Property	Identifier	Value	Data Type
Object Identifier	75		BACnetObjectIdentifier
Object Name	77		CharacterString
Object Type	79	8	BACnetObjectType
System Status	112		
Vendor Name	121	McQuay International	CharacterString
Vendor Identifier	120	3	Unsigned16
Model Name	70	MPS Rooftop BCM	CharacterString
Firmware Version	44	variable	CharacterString
Application Software Revision	12	variable	CharacterString
Location	58		CharacterString
Description	28	variable	CharacterString
Protocol_Version	98	1	Unsigned
Protocol_Revision	139	4	Unsigned
Protocol_Services_Supported	97		BACnetServicesSupported
Object_List	76		BACnetArray[N] of BACnetObjectIdentifier
Max_APDU_Length_Accepted	62	Variable	Unsigned 16
Segmentation_Supported	107	No-Segmentation	Unsigned
Local_Time	57	variable	Time
Local_Date	56	variable	Date
UTC_Offset	119	variable	Integer
Daylight_Savings_Status	24	variable	Boolean
APDU_Timeout	11	variable	Unsigned
Number_Of_APDU_Retries	73	variable	Unsigned
Device_Address_Binding	30		List of BACnetAddressBinding
Database_Revision	155	55	Unsigned

BACnet Network Integration

Access to Properties

Object properties are accessible from the network by specifying the device object identifier, object identifier, and the property identifier. To access a property, specify the object identifier including the device object identifier or the object name including the device object name and the property identifier.

BACnet Communication Module IP Addressing Defaults

The BACnet/Internet Protocol (BACnet/IP) address of the BACnet Communication Module for the MPS Rooftop Unit Controller in a BACnet/IP network consists of the four-octet Internet Protocol address followed by the two-octet UDP (User Datagram Protocol) Port Number. The BACnet/IP address is a six-octet value analogous to a MAC (Media Access Control) address. The IP address portion of the BACnet/IP address must be unique in the BACnet/IP network segment.

MPS Rooftop Unit Controller defaults are:

- UDP Port Number: 47808 (BAC0 in hexadecimal)
- Internet Protocol Subnet Mask: 255.255.0.0
- IP Address: 172.16.5.8.
- The BACnet Communication Module does support DHCP (Dynamic Host Configuration Protocol) IP addressing. By default, this feature is disabled. To configure the BACnet Communication Module to use the DHCP feature, write 0.0.0.0 as the IP address using the keypad/display.

The MPS Rooftop Unit Controller can be incorporated into a BACnet/IP network dedicated to BACnet devices only or an Ethernet network shared with BACnet devices and other devices.

Shared Ethernet Network (LAN) Integration

Integrating the MPS Rooftop Unit Controller into a shared Ethernet LAN requires close cooperation with the network administrator. The steps are as follows:

- Obtain the IP Subnet Mask of the shared network from the network administrator.
- Obtain the ***static*** IP Addresses for all MPS Rooftop Unit Controllers you are integrating into the shared network. Obtain the address of an IP Router or Gateway to use for sending IP messages to and from the BACnet IP subnets.
- Once you have these, refer to Setting MPS Rooftop Unit Controller Communication Parameters in the Basic Protocol Information section of this document.
- The “Type=” variable on the Network Config hidden menu of the MPS Rooftop Unit Controller device object must be set to BACnet IP or BACnet Ethernet for BACnet communications to take place. The default value for this property is None. Refer to Setting MPS Rooftop Unit Controller Communication Parameters in the Basic Protocol Information section of this document. To access the Network Config Menu of the keypad display, do the following:
    1. Press the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously.
    2. If prompted for a password, enter: 4545.
    3. Navigate to the Network Config Menu (press the button with the right arrow icon once.)
    4. In the Type = field, select BACnet IP or BACnet Ethernet.

BACnet MS/TP Network Configuration

The BACnet MS/TP device address (MAC Address) of the MPS Rooftop Unit Controller in a BACnet Master Slave/Token Passing (MS/TP) Local Area Network (LAN) is set using the keypad display. The steps are as follows:

- The default MAC Address is 0. This address must be unique and is determined during installation.
- The default data transmission rate is set to 38,400 bps (baud). If necessary, change the baud rate to 9600, 19200, or 76800. Note that this can be done via the MPS Rooftop Unit Controller keypad display or via the BACnet Communication Module Configuration Tool software available at www.mcquay.com. Please refer to Setting MPS Rooftop Unit Controller Communication Parameters in the Basic Protocol Information section of this document. The RS485 LEDs flicker green and red when the BACnet Communication Module is receiving data from the network. If the red and green RS485 LEDs are on constantly together, then communication is not established.
- The “Type=” variable on the Network Config hidden menu of the MPS Rooftop Unit Controller, the device object must be set to BACnet MS/TP. Please refer to Setting MPS Rooftop Unit Controller Communication Parameters in the Basic Protocol Information section of this document. To access the hidden Network Config Menu of the keypad display:
    1. Press the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously.
    2. If prompted for a password, enter: 4545.
    3. Navigate to the Network Config Menu (press the button with the right arrow icon once.)
    4. In the Type = field, select BACnet MS/TP.

MPS Rooftop Unit Controller Configuration

The MPS Rooftop Unit Controller is ready to operate with the default values of the various parameters set at the factory. Default values may be changed with the MPS Unit Controller keypad or via the network (see OM 843 for default values and keypad operating instructions.)

Data Integrity

The integrity of some data depends on a valid network connection to maintain current values. The following data points require a valid network connection whether or not they are bound. If the data points shown in Table 3 do not change after a given time, the Receive Heartbeat (ReceiveHrtBt) data points shown in of the MPS Rooftop Unit Controller reverts to the default values of the variable or to the value of the attached sensor. Table 4 defines the effect on BACnet network variables if the Receive Heartbeat timer should expire without having been updated.

Table 3. Receive Heartbeat Variables - BACnet

Data Point	BACnet Variable
Occupancy Scheduler Input	OccState, NextOccState, TimeToNextOccState
Application Mode	ApplicCmd
Building Static Pressure	BldgStaticPressInput
Remote Discharge Fan Capacity Setpoint	SupFanCapInput
Remote Exhaust Fan Capacity Setpoint	ExhFanCapInput
Outdoor Air Temperature	OutdoorTempInput
Space Temperature	SpaceTempInput
Space Indoor Air Quality (IAQ)	SpaceIAQInput
Primary Cool Enable	CoolEnable
Primary Heat Enable	HeatEnable
Primary Economizer Enable	EconEnable

Table 4. Behavior of Network Variables upon Heartbeat Timer Expiration - BACnet

BACnet Network Variable	Action when Heartbeat Timer Expires Without Update
OccState, NextOccState, TimeToNextOccState	Reverts to value of attached sensor
ApplicCmd	Reverts to value of attached sensor
BldgStaticPressInput	Reverts to Normal Operation
SupFanCapInput	Reverts to value of attached sensor
ExhFanCapInput	Stays at commanded value until power is cycled
OutdoorTempInput	Stays at commanded value until power is cycled
SpaceTempInput	Reverts to value of attached sensor
SpaceIAQInput	(The next three sub-items are ncluded in nviOccSchedule menu
CoolEnable	Reverts to Normal Operation
HeatEnable	Reverts to Normal Operation
EconEnable	Reverts to Normal Operation
nviPriCoolEnable.state	Reverts to Normal Operation
nviPriHeatEnable.state	Reverts to Normal Operation
nviPriEconEnable.state	Reverts to Normal Operation

LONWORKS Networks

LONWORKS technology, developed by Echelon Corporation, is the basis for LonMark interoperable systems. This technology is independent of the communications media. The LonMark Interoperable Association has developed standards for interoperable LONWORKS technology systems. In particular, they have published standards for HVAC equipment including the Discharge Air Controller (DAC) functional profile and the Space Comfort Controller (SCC) functional profile. These profiles specify a number of mandatory and optional standard network variables and standard configuration parameters. This document defines these variables and parameters available in the MPS Rooftop Unit Controller.

Compatibility

The MPS Rooftop Unit Controller with the LONWORKS Communication Module operates in accordance with DAC functional profile or the SCC functional profile of the LonMark Interoperability standard.

LONWORKS Variables

MPS Rooftop Unit Controllers incorporate LONWORKS network variables to access unit data points. The MPS Rooftop Unit Controller uses LONWORKS Standard Network Variable Types (SNVT) from each profile. Some data points can be adjusted

(input network variables, nvi) (read/write attributes, e.g., setpoints) from the network and others can only be interrogated (output network variables, nvo) (read only attributes, e.g., status information). Configuration variables (nci) are included with the read/write attributes.

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

Example of LONWORKS Data Point

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoBldgStatPress	DAC, SCC	Yes	SNVT_press_p	113

LONWORKS Name

Each network variable has a name that you use to access the data point. This is the name of the variable from the profile. In the example above, the network variable name is nvoBldgStatPress.

Profile

This column defines the LONWORKS-designated functional profile (SCC and/or DAC) incorporated by the Communication Module for a given network variable. While the variable itself may not be a standard component of that particular profile, the LONWORKS Communication Module does implement it and it is available to the network.

Uses Heartbeat

This column defines if the network variable output uses the Send Heartbeat function or if the network variable input uses the Receive Heartbeat function.

SNVT Type

This column gives the name of the standard network variable type from the master list.

SNVT Index

This column gives the number of the standard network variable type from the master list.

SCPT Reference

This column gives the name of the Standard Configuration Parameter Type (SCPT) from the master list.

SCPT Index

This column gives the number of the Standard Configuration Parameter Type (SCPT) from the master list.

Network Considerations

Network Topology

Each LONWORKS Communication Module is equipped with an FTT-10A transceiver for network communications. This transceiver allows for (1) free topology network wiring schemes using twisted pair (unshielded) cable and (2) polarity insensitive connections at each node. These features greatly simplify installation and reduce network commissioning problems. Additional nodes may be added with little regard to existing cable routing.

Free Topology Networks

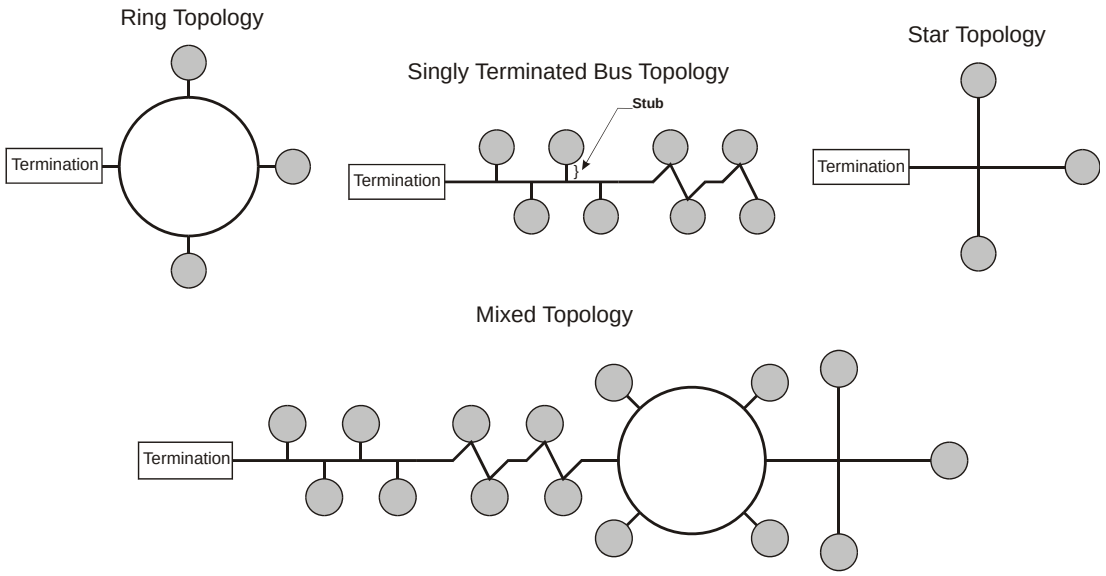
A LONWORKS "free topology network" means that devices (nodes) can be connected to the network in a variety of geometric configurations. For example, devices can be daisy-chained from one device to the next, connected with stub cables branching off from a main cable, connected using a tree or star topology, or any of these configurations can be mixed on the same network as shown in Figure 1. Free topology segments require termination for proper transmission performance. Only one termination is required. It may be placed anywhere along the segment**.** Refer to the LONWORKS FTT-10A Transceiver User's Guide.

Free topology networks may take on the following topologies:

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

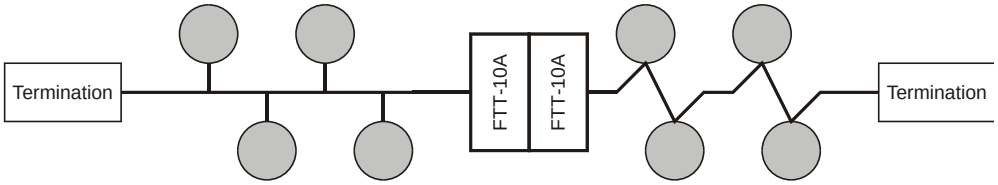
Note: Limitations to wire lengths apply and must be observed.

Figure 1. Singly Terminated Free Topology



A network segment is any part of the free topology network in which each conductor is electrically continuous. Each of the four diagrams is an illustration of a network segment. Some applications may require two or more segments; see "Free Topology Restrictions." If necessary, segments can be joined with FTT-10A-to-FTT-10A physical layer repeaters. Refer to the LONWORKS FTT-10A Transceiver User's Guide.

Figure 2. Combining Network Segments with a Repeater



Free Topology Restrictions

Although free topology wiring is very flexible, there are restrictions. A summary follows (refer to the LONWORKS FTT-10A Transceiver User's Guide.)

- The maximum number of nodes per segment is 64.
- The total length of all cable in a segment must not exceed the maximum total cable length.
- One termination is required in each segment. It may be located anywhere along the segment.
- The longest cable path between any possible pair of nodes on a segment must not exceed the maximum node-to-node distance. If two or more paths exist between a pair of nodes (e.g., a loop topology), the longest path should be considered. Note that in a bus topology, the longest node-to-node distance is equal to the total cable length.

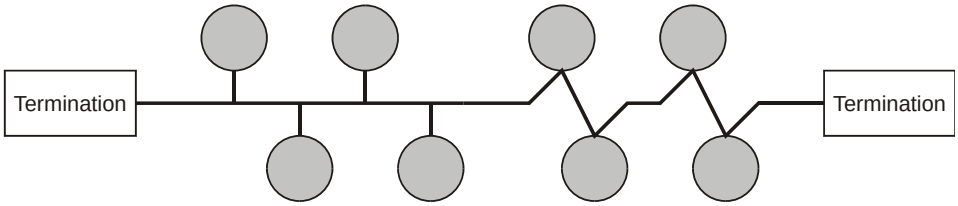
The maximum total bus length depends on the wire size:

Wire Size	Maximum Node-to-Node Length	Maximum Cable Length
24 AWG	820 ft (250 m)	1476 ft (450 m)
22 AWG	1312 ft (400 m)	1640 ft (500 m)
16 AWG	1640 ft (500 m)	1640 ft (500 m)

Doubly Terminated Networks

You can extend the maximum total cable length without using a repeater by using doubly-terminated network topology (see Figure 3.) The trade-offs are (1) this network topology must be rigorously followed during the installation and subsequent retrofits and (2) two terminations must be installed at the ends of the bus for proper transmission performance**.** Refer to the LONWORKS FTT-10A Transceiver User's Guide. Limitations to wire lengths apply and must be observed.

Figure 3. Doubly Terminated Network Topology



Doubly Terminated Topology Restrictions

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

- The maximum number of nodes per segment is 64.
- The maximum total bus length depends on the wire size:

Wire Size	Maximum Cable Length
24 AWG	2952 ft (900 m)
22 AWG	4590 ft (1400 m)
16 AWG	8855 ft (2700 m)

- The maximum stub length is 9.8 ft (3 m). The length of the LONWORKS Communication Module cable harness stub is 7.2 ft (2.19 m).
- A stub is a piece of cable that is wired between the node and the bus (see Figure 1.) Note that if the bus is wired directly to the node, there is no stub, and thus the stub length is zero. If you are wiring to a field terminal strip on a unit, be sure to account for any factory wiring between the terminal strip and the controller. This wiring is considered part of the stub.
- Two terminations are required in each segment. One must be located at each end of the bus.

Network Cable Termination

LONWORKS network segments require termination for proper data transmission performance. The type and number of terminations depend on network topology. **.** Refer to the LONWORKS FTT-10A Transceiver User's Guide.

LONWORKS Network Configuration

Every Neuron Chip has a unique 48-bit Neuron ID or physical address. This address is generally used only at initial installation or for diagnostic purposes. For normal network operation, a device address is used.

Device addresses are defined at the time of network configuration. All device addresses have three parts. The first part is the Domain ID, designating the domain. Devices must be in the same domain in order to communicate with each other. The second part is the Subnet ID that specifies a collection of up to 127 devices that are on a single channel or a set of channels connected by repeaters. There may be up to 255 subnets in a domain. The third part is the Node ID that identifies an individual device within the subnet.

A group is a logical collection of devices within a domain. Groups are assembled with regard for their physical location in the domain. There may be up to 256 groups in domain. A group address is the address that identifies all devices of the group. There may be any number of devices in a group when unacknowledged messaging is used. Groups are limited to 64 devices if acknowledged messaging is used. A broadcast address identifies all devices within a subnet or domain.

LONWORKS network variables for both the DAC and the SCC functional profiles are defined below. Variables are used in both the SCC and DAC profiles unless marked otherwise.

Commissioning the Network

Pressing the service pin, switch on the LONWORKS Communications Module, generates a service pin message, which contains the Neuron ID and the program code identification of the node. A service pin message is a network message that is generated by a node and broadcast on the network. It can be used to commission the LONWORKS network.

A network configuration tool maps device Neuron IDs to the domain/subnet/node logical addressing scheme when it creates the network image, the logical network addresses and connection information for all devices (nodes) on the network.

External Interface File (XIF)

LonMark guidelines specify exact documentation rules so that proprietary configuration tools are not required to commission and configure LONWORKS devices. The LONWORKS Communication Module is self-documenting so that any network management tool can obtain all the information needed over the network to connect it into the system and to configure and manage it. An External Interface File (a specially formatted PC text file with an extension .XIF) is also available so that any network tool can design and configure it prior to installation. XIF files are available on www.mcquay.com.

Resource Files

Resource Files provide definitions of functional profiles, type definitions, enumerations, and formats that can be used by network tools such as the LonMaker® tool. The MPS Rooftop Unit Controller supports the standard SCC and DAC functional profiles. Additionally, certain McQuay-specific variables are defined for use with the MPS Rooftop Unit Controller. The Resource Files define the format of how these McQuay-specific variables are displayed when using a tool such as LonMaker. The McQuayDischargeAir (for use with LONWORKS DAC Communication Module) and McQuayRTU-SCC (for use with LONWORKS SCC Communication Module) Resource Files are available on www.mcquay.com.

MPS Rooftop Unit Controller Configuration

The MPS Rooftop Unit Controller with LONWORKS Communication Module is designed, programmed, and configured at the factory to be in accordance with either the LonMark DAC or LonMark SCC functional profile. The unit is ready to operate with the default values of the various parameters set at the factory. Default values may be changed with the MPS Rooftop Unit Controller keypad display or via the network. See OM 843 for default values and keypad display operating instructions (refer to Reference Documents section.)

The "Type=" property on the Network Config hidden menu of the keypad display must be set to LON for LONWORKS network communication. . To access the hidden Network Config Menu of the keypad display:

1. Press the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously.
2. If prompted for a password, enter: 4545.
3. Navigate to the Network Config Menu (press the button with the right arrow icon once.)
4. In the Type = field, select LON.

Refer to Setting MPS Rooftop Unit Controller Communication Parameters in the Basic Protocol Information section.

Data Integrity

The integrity of some data depends on a valid network connection to maintain current values. The data points shown in Table 5 require a valid network connection whether or not they are bound. If data points listed in Table 5 do not change after a given time (nciRcvHrtBt), the MPS Rooftop Unit Controller reverts to the default values of the variable or to the value of the attached sensor. Table 6 defines the effect on LONWORKS network variables if the Receive Heartbeat timer should expire without having been updated.

Table 5. Receive Heartbeat Variables - LONWORKS

Data Point	LONWORKS Variable
Occupancy Scheduler Input	nviOccSchedule
Application Mode	nviApplicMode
Building Static Pressure	nviBldgStatPress
Remote Discharge Fan Capacity Setpoint	nviSupFanCap
Remote Exhaust Fan Capacity Setpoint	nviExhFanCap
Outdoor Air Temperature	nviOutdoorTemp
Space Temperature	nviSpaceTemp
Space Indoor Air Quality (IAQ)	nviSpaceIAQ
Primary Cool Enable	nviPriCoolEnable.state
Primary Heat Enable	nviPriHeatEnable.state
Primary Economizer Enable	nviPriEconEnable.state

Table 6. Behavior of Network Variables upon Heartbeat Timer Expiration - LONWORKS

LONWORKS Network Variable	Action when Heartbeat Timer Expires Without Update
nviOutdoorTemp	Reverts to value of attached sensor
nviSpaceTemp	Reverts to value of attached sensor
nviApplicMode	Reverts to Normal Operation
nviBldgStatPress	Reverts to value of attached sensor
nviSupFanCap	Stays at commanded value until power is cycled
nviExhFanCap	Stays at commanded value until power is cycled
nviSpaceIAQ	Reverts to value of attached sensor
nviOccSchedule	(The next three sub-items are ncluded in nviOccSchedule menu
.Current_State	Reverts to Normal Operation
.Next_State	Reverts to Normal Operation
.time_to_next_state	Reverts to Normal Operation
nviPriCoolEnable.state	Reverts to Normal Operation
nviPriHeatEnable.state	Reverts to Normal Operation
nviPriEconEnable.state	Reverts to Normal Operation

Minimum Integration Requirements

This section provides general information and outlines the minimum requirements for system integration. Once the MPS Rooftop Unit Controller has been configured, you can monitor and control unit operation from your workstation. At a minimum, you can:

- Display and monitor a minimum of important data points on your workstation display
- Turn the unit on or off from your workstation
- Set the schedule from your workstation and
- Operate the unit safely

Set up the MPS Rooftop Unit Controller for Network Control

Follow the setup steps below to control the MPS Rooftop Unit Controller over the network:

1. On the unit keypad, set the Control Mode function to AUTO. The keypad password (4545) is required to edit this function. For a detailed description of how to use the keypad, refer to the appropriate Operation Manual (See Reference Documents section.) The keypad is also used to verify network operation.
2. Set "Type=" on the Network Config menu to the type of network that is connected (options shown on the keypad display are: BACnet IP, BACnet Ethernet, BACnet MS/TP, and LON). To access the Network Config Menu of the keypad display:
    1. Press the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously.
    2. If prompted for a password, enter: 4545.
    3. Navigate to the Network Config Menu (press the button with the right arrow icon once.)
    4. In the Type = field, select BACnet IP, BACnet Ethernet, BACnet MS/TP, or LON.

Display Important Data Points

A typical workstation displays MPS Rooftop Unit Controller includes the following significant data points as shown in Table 7 (page number of detailed description in parenthesis). Each data point includes a number that also identifies it in the Comprehensive Data Point Tables. These data points are also shaded in the Comprehensive Data Point Tables so that you can distinguish them from the rest of the data points in the table. References in the text of this section also identify these data points with a number and shading.

Table 7. Significant Data Points

No	Configuration	No	Temperatures/Pressures	No	Setpoints	No	Clear Alarms
1	Unit Status (52)	5	Discharge Air Temp (27)	9	Duct Static Pressure Setpoint (29)	14	Clear All Alarms (55)
2	Application Mode (22)	6	Return Air Temp (48)	10	Unoc Cooling Setpoint (52)	15	Clear One Alarm (55)
3	Occupancy (39)	7	Outdoor Air Temp (44)	11	Occ Cooling Setpoint (42)		
4	Occupancy Mode (39)	8	Duct Static Pressure (28)	12	Occ Heating Setpoint (42)		
				13	Unoc Heating Setpoint (53)		

You can display any number of additional data points based on job requirements or individual preference. See LonWorks Variables on page 19 for a comphrensive list of all LONWORKS Variables available in a LONWORKS network. See BACnet Standard Objects on page 17 for a comphrensive list of all Standard BACnet Objects available in a BACnet network. For a more detailed description of all available data points, see the Detailed Data Point Information section on page 22.

Network Off

The unit can be turned off over the network by writing to the (2) Application Mode (See page 22). Writing AUTO to Application Mode allows the MPS Rooftop Unit Controller to determine its mode of operation based on input conditions. Writing OFF to Application Mode shuts down the unit, etc.

The Emergency Override variable (See page 33) can also be used to shut down the unit from the network.

Network Occupancy Scheduling

Using the unit keypad display, set the Occupancy Mode to Auto. Schedule unit operation over the network with the Occ Scheduler input. Switching from OCC, UNOCC, BYPASS, or AUTO commands the unit into the mode you select.

Alarms

Alarms in a MPS Rooftop Unit Controller are divided into three classes: Faults, Problems, and Warnings.

- Fault Alarms have the highest priority
- Problem Alarms have medium priority
- Warning Alarms have the lowest priority

Monitoring Alarms

BACnet

Alarms within a MPS Rooftop Unit Controller can be monitored individually by using the Alarm (AV1019) attribute. This attribute displays a value that corresponds to the highest priority alarm that is active. It is possible to have multiple active alarms, but only the highest priority is displayed in this attribute. For example, if there is a simultaneous Dirty Filter Warning (value of 24) and an Emergency Fault (value of 250), then the Emergency Fault value of 250 will display in the Present_Value of AV 1019 because it is the higher priority alarm of the two. Once the Emergency Fault condition is corrected and the fault is cleared, the next priority active alarm value (in this example, value of 24 for Dirty Filter alarm) is displayed. The values for all alarms are described in the Alarms section. If the AV 1019 displays a zero in the Present_Value property, there are no active alarms.

Alarm Class may also monitor alarms, if desired. When the Present_Value of AV1019 attribute reads a value in the range of 1 to 99, a Warning Alarm is active. When the attribute reads a value in the range of 100 to 199, a Problem Alarm is active. When the attribute reads a value in the range of 200 to 255, a Fault Alarm is active.

LONWORKS

Alarms within a MPS Rooftop Unit Controller can be monitored individually by using the In Alarm attribute. The In Alarm attribute is part of the Unit Status Network Variable Output (i.e. nvoUnitStatus.in_alarm). This attribute displays a value that corresponds to the highest priority alarm that is active. It is possible to have multiple active alarms, but only the highest priority is displayed in this attribute. For example, if there is a simultaneous Dirty Filter Warning (value of 24) and an Emergency Fault (value of 250), then the Emergency Fault value of 250 will display in nvoUnitStatus.in_alarm because it is the higher priority alarm of the two. Once the Emergency Fault condition is corrected and the fault is cleared, the next priority active alarm value (in this example, value of 24 for Dirty Filter alarm) is displayed. The values for all alarms are described in the Alarms section. If the attribute nvoUnitStatus.in_alarm displays a zero, there are no active alarms.

Alarm Class may also monitor alarms, if desired. When the nvoUnitStatus.in_alarm attribute reads a value in the range of 1 to 99, a Warning Alarm is active. When the attribute reads a value in the range of 100 to 199, a Problem Alarm is active. When the attribute reads a value in the range of 200 to 255, a Fault Alarm is active.

Clearing Alarms

BACnet

Alarms can be cleared via BACnet by alarm class using two BACnet variables. To clear all active alarms, change the Present_Value property of Binary Value 4 (Clear All Alarms) to a 1. To clear one of the active alarms, change the Present_Value property of Analog Value 1029 (Clear One Alarm) to the value of the alarm you want to clear. For example, if you want to clear an Emergency Fault alarm, write 250 to Analog Value 1029.

LONWORKS

Alarms can be cleared using two Network Variable Inputs (nviClear1Alarm or nviClearAllAlarm) of type SNVT_count. To clear all active alarms, change nviClearAllAlarm to 1. To clear one active alarm, change nviClear1Alarm to the value of the alarm you want to clear. For example, if you want to clear an Emergency Fault alarm, write 250 to nviClear1Alarm.

MPS Rooftop Unit Controller Sequence of Operation

The sequence of operation for a MPS Rooftop Unit Controller depends on the control type. Refer to OM 843 for sequence of operation and keypad display details (see Reference Documents section).

Comprehensive Data Point Tables

The following comprehensive data point tables contain the significant parameters of specific data points. The shaded data points with numbers refer to data points listed in Table 7.

BACnet Standard Objects

Network Control Property (Keypad attributes available as BACnet Standard Objects for network control of the unit)	**Page**	**Read Or Read/ Write**	**Object Type**	**Instance**	**SCC**	**DAC**	**Description**
System							
Unit Status	52	R	MV	1025	✓	✓	1=Off, 2=Startup, 3=Recirc, 4=Fan Only, 5=MinDAT, 6=Heating, 7=Economizer, 8=Cooling
Cooling Capacity	25	R	AV	1016	✓	✓	Feedback of cooling capacity (%)
Primary Heating Capacity	46	R	AV	1015	✓	✓	Feedback of heating capacity (%)
Cooling Status	25	R	MV	1023	✓	✓	1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 5=Off Alarm, 6=Off Ambient
Heating Status	35	R	MV	1024	✓	✓	1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 6=Off Ambient
Economizer Status	30	R	MV	1022	✓	✓	1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 6=Off Ambient
Outdoor Air Damper Position	43	R	AV	1017	✓	✓	Feedback value (%)
Occupancy							
Occupancy	39	R	MV	1014	✓	✓	1=Occupied, 2=Unoccupied, 3=Bypass, 4=Standby**
Occupancy Scheduler Input	40	R/W			✓	✓	
Current State			MV	1011			1=Occupied, 2=Unoccupied, 4=Standby, 5=Auto**
Next State			MV	1012			1=Occupied, 2=Unoccupied, 4=Standby, 5=Auto**
Time To Next State			AV	1013			Default = 0 seconds
Temperatures							
Discharge Air Temperature	28	R	AV	10	✓	✓	Current reading of Discharge Air Temp sensor
Return Air Temperature	48	R	AV	14	✓	✓	Current reading of sensor
Space Temperature	49	R	AV	15	✓	✓	Current reading of sensor
Outdoor Air Temperature	44	R	AV	13	✓	✓	Current reading of sensor
Local Space Temperature	36				✓	✓	Current reading of the local space sensor
Local OA Temperature	36				✓	✓	Current reading of the local outdoor air temperature sensor
Duct Pressure							
Duct Static Pressure	28	R	AV	1021	N/A	✓	Current reading of sensor. If unit has two sensors the lower of the two is displayed
Discharge Fan Capacity	28	R	AV	1018	✓	✓	Current discharge fan capacity (%)
Building Pressure							
Building Static Pressure	23	R	AV	1020	✓	✓	Current reading of sensor value or network input
Building Static Pressure Setpoint	24	R/W	AV	1006	✓	✓	Default = 0.050” WC
Exhaust Fan Capacity	34	R	AV	1030	✓	✓	Current exhaust fan capacity (%)
Zone Cooling							
Minimum Discharge Air Cooling Setpoint	38	R/W	AV	2	**N/A**	✓	Default = 55°F
Effective Setpoint Output	32	R	AV	12	✓	✓	If Control Temp > (this setpoint + ½ Cool Enable Dead Band), Then cooling is enabled
Occupied Cooling Setpoint	42	R/W	AV	6	✓	✓	Default = 72°F
Unoccupied Cooling Setpoint	52	R/W	AV	7	✓	✓	Default = 85°F
Heating							
Effective Setpoint Output	32	R	AV	12	✓	✓	If Control Temp < (this setpoint – ½ Heat Enable Dead Band), Then heating is enabled
Occupied Heating Setpoint	42	R/W	AV	8	✓	✓	Default = 68°F
Unoccupied Heating Setpoint	53	R/W	AV	9	✓	✓	Default = 55°F
Max Discharge Air Heating Setpoint	37	R/W	AV	19		✓	Default = 113°F/45°C

Network Control Property (Keypad attributes available as BACnet Standard Objects for network control of the unit)	**Page**	**Read Or Read/ Write**	**Object Type**	**Instance**	**SCC**	**DAC**	**Description**
Discharge Air Heating Setpoint	27	R/W	AV	18		✓	
Discharge Cooling							
Effective Discharge Air Temperature Setpoint	32	R	AV	11	✓	✓	Current discharge air cooling setpoint the unit controller is using.
Min OA Damper							
Outdoor Air Damper Minimum Position Input	43	R/W	AV	1009	✓	✓	Default = 10%
Space CO_2	48	R	AV	1031	✓	✓	
Economizer Enable	29	R/W	AV BV	1028 3	✓	✓	
Unit Configuration							
Application Version	23	R	AV	1032	✓	✓	
Remote Discharge Fan Capacity Setpoint	47	R/W	AV	1007	N/A	✓	Default = 0%
Network Config							
Application Mode	22	R/W	MV	1002	✓	✓	1=Off, 2=HeatOnly, 3=CoolOnly, 4=FanOnly, 5=Auto,
Occupancy Mode	39	R/W	MV	1001	✓	✓	1=Occupied, 2=Unoccupied, 3=Bypass, 4=Standby, 5=Auto
Emergency Override	33	R/W	AV	1003	✓	✓	0=Normal, 4=Shutdown (Shuts unit off via a network signal, puts Unit Status = OffNet)
Duct Static Pressure Setpoint	29	R/W	AV	1004	N/A	✓	Default = 1.00” WC
Space Temperature Input	50	R/W	AV	4	✓	✓	
Outdoor Air Temperature Input	44	R/W	AV	3	✓	✓	
Discharge Air Cooling Setpoint	27	R/W	AV	1	N/A	✓	Default = 32767
Building Static Pressure Input	24	R/W	AV	1005	✓	✓	Default = 32767
Exhaust Fan Capacity Input	34	R/W	AV	1008	✓	✓	
Primary Heat Enable	45	R/W	BV AV	2 1027	✓	✓	
Primary Cool Enable	45	R/W	BV AV	1 1026	✓	✓	
Space IAQ Input	49	R/W	AV	1010	✓	✓	
Receive Heartbeat	47	R/W	AV	5	✓	✓	
Active Alarms							
Current Alarm	26	R	AV	1019	✓	✓	0 = No Active Alarm, 24 = Dirty Filter Warning, 158 = Low Pressure – Circuit 2 Problem, 159 = Low Pressure – Circuit 1 Problem, 166 = High Pressure – Circuit 2 Problem, 167 = High Pressure – Circuit 1 Problem, 182 = Return Air Sensor Problem, 185 = Space Sensor Problem, 188= Outdoor Air Sensor Problem, 208 = Airflow Fault, 212 = Low Supply Air Temp Fault, 216 = High Supply Air Temp Fault, 220 = High Return Air Temp Fault, 224 = Duct High Limit Fault, 228 = Discharge Sensor Fail Fault, 244 = Control Temp Fault, 250 = Emergency Stop Fault
Clear All Alarms	55	R/W	BV	4	✓	✓	Clears all active alarms.
Clear One Alarm	55	R/W	AV	1029	✓	✓	Clears the alarm that corresponds to the value entered.
Non-Keypad Variables							
Exhaust Fan Status	35	R	BV	5	✓	✓	

** If Standby is selected, the unit will operate in Occupied mode.

Note: For variables that use the Receive Heartbeat feature (see Table 3), the MPS Rooftop Unit Controller assumes network communication is lost and will revert to the last written value or the value of the local sensor if the network has not written a value within the Receive Heartbeat time (default=30 seconds). The Receive Heartbeat time can be changed using the keypad display or through the BACnet network. Setting Receive Heartbeat to 0 causes the value to remain at the network default if communications is lost, which is not recommended.

LONWORKS Variables

Network Control Property Keypad attributes available as LONWORKS Variables for network control of the unit	Variable Name	Page	SNVT/SCPT Index	SCC	DAC	Description
System						
Unit State - LON	nvoUnitStatus	50	112	✓	✓	Mode 1=HEAT, 2=MRNG_WRMUP, 3=COOL, 6=OFF, 7=TEST, 9=FAN_ONLY, 10=FREE_COOL (Economizer)
McQuay RTU Unit State	nvoMcQRTUStatus	52	N/A	✓	✓	Unit_Mode 1=Off, 2=Startup, 3=Recirc, 4=Fan Only, 5=MinDAT, 6=Heating, 7=Economizer, 8=Cooling
Cooling Capacity	nvoUnitStatus	25	112	✓	✓	Cool_Output Feedback of cooling capacity (%)
Primary Heating Capacity	nvoUnitStatus	46	112	✓	✓	Heat_Output Feedback of primary heating capacity (%)
Cooling Status	nvoMcQRTUStatus	25	N/A	✓	✓	Cooling Status 1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 5=Off Alarm, 6=Off Ambient
Heating Status	nvoMcQRTUStatus	35	N/A	✓	✓	Heating Status 1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 6=Off Ambient
Economizer Status	nvoMcQRTUStatus	30	N/A	✓	✓	Econo Status 1=Enabled, 2=None, 3=Off Manual, 4=Off Net, 6=Off Ambient
Occupancy						
Occupancy	nvoEffectOccup	39	109	✓	✓	0=OCCUPIED, 1=UNOCCUPIED, 2=BYPASS, 3=STANDBY, 0xFF=NUL
Occupancy Scheduler Input	nviOccSchedule	40	128	✓	✓	Network schedule
Temperatures						
Discharge Air Temperature	nvoDischAirTemp	27	105	✓	✓	Current reading of Discharge Air Temp sensor
Return Air Temperature	nvoRATemp	48	105	✓	✓	Current reading of sensor
Space Temperature	nvoSpaceTemp	49	105	✓	✓	Current reading of sensor
Outdoor Air Temperature	nvoOutdoorTemp	44	105	✓	✓	Current reading of sensor
Local Space Temperature	nvoLocalSpaceTmp	36	105	✓	✓	Current reading of the local space sensor
Local OA Temperature	nvoLocalOATemp	36	105	✓	✓	Current reading of the local outdoor air temperature sensor
Duct Pressure						
Duct Static Pressure	nvoDuctStatPress	28	113		✓	Current reading of sensor. If unit has two sensors the lower of the two is displayed
Duct Static Pressure Setpoint	nviDuctStaticSP	29	113		✓	Default = 1.00” WC
Discharge Fan Capacity	nvoUnitStatus	28	112	✓	✓	Fan_Output Current discharge fan capacity (%)
Bld Pressure Control						
Exhaust Fan Capacity	nvoExhFanStatus	34	95	✓	✓	Current exhaust fan capacity (%)
Building Static Pressure Input	nviBldgStatPress	24	113	✓	✓	Network input of Building Static Pressure
Building Static Pressure	nvoBldgStatPress	23	113	✓	✓	Current reading of sensor value
Building Static Pressure Setpoint	nviBldgStaticSP	24	113	✓	✓	Default = 0.050” WC
Zone Cooling						
Minimum Discharge Air Cooling Setpoint	nciDAClSP	38	105		✓	Used to set the discharge air cooling setpoint via the network.
Effective Setpoint Output	nvoEffectSetpt	32	105	✓	✓	Current cooling enable setpoint which the unit will use in the cooling mode
Occupied Cooling Setpoint	nciSetpoints SCPTsetPnts	42	106/60	✓	✓	Occupied_Cool Default = 72°F
Unoccupied Cooling Setpoint	nciSetpoints SCPTsetPnts	52	106/60	✓	✓	Unnoccupied_Cool Default = 85°F
Heating						
Effective Setpoint Output	nvoEffectSetpt	32	105	✓	✓	Current heating enable setpoint which the unit will use in the heating mode
Occupied Heating Setpoint	nciSetpoints SCPTsetPnts	42	106/60	✓	✓	Occupied_Heat Default = 68°F
Unoccupied Heating Setpoint	nciSetpoints SCPTsetPnts	53	106/60	✓	✓	Unoccupied_Heat Default = 55°F
Max Discharge Air Heating Setpoint	nciDAHtSP	37	1050/184		✓	Default = 113°F/45°C

Network Control Property Keypad attributes available as LONWORKS Variables for network control of the unit	**Variable Name**	**Page**	**SNVT/SCPT Index**	**SCC**	**DAC**	**Description**
Discharge Air Heating Setpoint	nviDAHtSP	27	105		✓	
Discharge Cooling						
Minimum Discharge Air Cooling Setpoint	nciDAClSP	38	183		✓	Used to set the discharge air cooling setpoint via the network.
Effective Discharge Air Temperature Setpoint	nvoEffDATempSp	32	105	✓	✓	Current discharge air setpoint which the unit will use in the cooling mode
Discharge Air Cooling Setpoint	nviDAClSP	27	105		✓	Default = 55°F
Min OA Damper						
Outdoor Air Damper Position	nvoUnitStatus	43	112	✓	✓	Economizer_Output Feedback value (%)
Outdoor Air Damper Minimum Position Input	nviOAMinPos	43	81	✓	✓	Current OA damper min position setpoint (%)
Economizer Enable	nviEconEnable	29	95	✓	✓	Enables or disables economizer via two properties: State=0, economizer disabled Value=0 and State=1, economizer disabled Value>0 and State=1, economizer enabled
Space CO_2	nvoSpaceCO2	48	29	✓	✓	0-5000ppm
Discharge Heating						
Effective Discharge Air Temperature Setpoint	nvoEffDATempSp	32	105	✓	✓	Current discharge air setpoint which the unit will use in the heating mode
Maximum Discharge Air Heating Setpoint	nciDAHtSP	37	105/184		✓	
Unit Configuration						
Application Version	nvoAppVersion	23	8	✓	✓	
Remote Discharge Fan Capacity Setpoint	nviSupFanCap	47	81		✓	Default=0%. Sets the discharge air VFD speed when Discharge Fan Capacity Control Flag is set to Speed.
Alarms						
Current Alarm	nvoUnitStatus	26	112	✓	✓	In_Alarm 0 = No Active Alarm, 24 = Dirty Filter Warning, 158 = Low Pressure – Circuit 2 Problem, 159 = Low Pressure – Circuit 1 Problem, 166 = High Pressure – Circuit 2 Problem, 167 = High Pressure – Circuit 1 Problem, , 182 = Return Air Sensor Problem, 185 = Space Sensor Problem, 188 = Outdoor Air Sensor Problem, 208 = Airflow Fault, 212 = Low Supply Air Temp Fault, 216 = High Supply Air Temp Fault, 220 = High Return Air Temp Fault, 224 = Duct High Limit Fault, 228 = Discharge Sensor Fail Fault, 244 = Control Temp Fault, 250 = Emergency Stop Fault
Clear All Alarms	nviClearAllAlarm	55	8	✓	✓	Clears all alarms.
Clear One Alarm	nviClear1Alarm	55	8	✓	✓	Clears the alarm that corresponds to the value entered.
Network Config						
Application Mode	nviApplicMode	22	108	✓	✓	0=AUTO, 1=HEAT, 3=COOL, 6=OFF, 9=FAN_ONLY
Occupancy Mode	nviOccManCmd	39	109	✓	✓	0=OCCUPIED, 1=UNOCCUPIED, 2= BYPASS, 3=STANDBY, 0xFF=NUL
Exhaust Fan Capacity Input	nviExhFanCap	34	81	✓	✓	
Primary Heat Enable	nviPriHeatEnable	45	95	✓	✓	
Primary Cool Enable	nviPriCoolEnable	45	95	✓	✓	
Space IAQ Input	nviSpaceIAQ	49	29	✓	✓	0-5000ppm
Emergency Override	nviEmergOverride	33	103	✓	✓	0=NORMAL, 4=SHUTDOWN
Space Temperature Input	nviSpaceTemp	50	105	✓	✓	Network input of Space Temperature
Outdoor Air Temperature Input	nviOutdoorTemp	44	105	✓	✓	Network input of Outdoor Air Temperature
Minimum Send Time	nciMinOutTm SCPTminSendTime	38	107/52	✓	✓	Defines min period of time between automatic network variable output time (reducing traffic on network)

Network Control Property Keypad attributes available as LONWORKS Variables for network control of the unit	**Variable Name**	**Page**	**SNVT/SCPT Index**	**SCC**	**DAC**	**Description**
Receive Heartbeat	nciRcvHrtBt SCPTmaxRcvTime	47	107/48	✓	✓	Default is 30 seconds
Send Heartbeat	nciSndHrtBt SCPTmaxSendTime	48	107/49	✓	✓	Default is 60 seconds
Temperature Setpoint Input	nviSetpoint	50	105	✓	✓	Adjusts effective heat enable and effective cool enable setpoint via the network. Effective Heat SP = nviSetpoint – 0.5 (Occupied_Cool – Occupied_Heat). Effective Cool SP = nviSetpoint + 0.5 (Occupied_Cool – Occupied_Heat).

Note: For variables that use the Receive Heartbeat feature, see Table 5. The MPS Rooftop Unit Controller assumes network communication is lost and will revert to the last written value or the value of the local sensor if the network has not written a value within the Receive Heartbeat time (default=30 seconds). The Receive Heartbeat time can be changed using the keypad display or through the LONWORKS network. Setting Receive Heartbeat to 0 causes the value to remain at the network default if communications is lost, which is not recommended.

Detailed Data Point Information

The following section defines the data points or properties (attributes) generated by the MPS Rooftop Unit Controller.

Application Mode

Keypad Menu Path System/Appl Mode=

This read/write attribute sets the MPS Rooftop Unit Controller in an Application Mode (auto, off, heat only, cool only, or fan only). This attribute has no effect unless Control Mode is set to Auto. Control Mode is only set at the keypad display.

Measurement	Units	Data Type	Valid Range	Default Value
Mode	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1002	Present Value	85
Full Reference				
MTIIUC_MPS#########.ApplicCmd.Present Value				

Enumeration
1 = Off
2 = Heat Only
3 = Cool Only
4 = Fan Only
5 = Auto (Heat/Cool)

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviApplicMode	DAC, SCC	Yes	SNVT_hvac_mode	108

LONWORKS Enumeration Definitions

Value	Identifier	Notes
0	HVAC_AUTO	Controller automatically changes between application modes
1	HVAC_HEAT	Heating only
2	HVAC_MRNG_WRMUP	Not supported – reverts to HVAC_AUTO
3	HVAC_COOL	Cooling only
4	HVAC_NIGHT_PURGE	Not supported – reverts to HVAC_AUTO
5	HVAC_PRE_COOL	Not supported – reverts to HVAC_AUTO
6	HVAC_OFF	Controller not controlling outputs
7	HVAC_TEST	Not supported – reverts to HVAC_AUTO
8	HVAC_EMERG_HEAT	Not supported – reverts to HVAC_AUTO
9	HVAC_FAN_ONLY	Air not conditioned, fan turned on
10	HVAC_FREE_COOL	Not supported – reverts to HVAC_AUTO
11	HVAC_ICE	Not supported – reverts to HVAC_AUTO
12	HVAC_MAX_HEAT	Not supported – reverts to HVAC_AUTO
13	HVAC_ECONOMY	Not supported – reverts to HVAC_AUTO
14	HVAC_DEHUMID	Not supported – reverts to HVAC_AUTO
15	HVAC_CALIBRATE	Not supported – reverts to HVAC_AUTO
16	HVAC_EMERG_COOL	Not supported – reverts to HVAC_AUTO
17	HVAC_EMERG_STEAM	Not supported – reverts to HVAC_AUTO
0xFF	HVAC_NUL	Value not available

Enumeration Correspondence

BACnet		LONWORKS	
5	Auto	0	HVAC_AUTO
2	Heat Only	1	HVAC_HEAT
2	Heat Only	2	HVAC_MRNG_WRMUP (not used)
3	Cool Only	3	HVAC_COOL
3	Cool Only	4	HVAC_NIGHT_PURGE (not used)
3	Cool Only	5	HVAC_PRE_COOL (not used)
1	Off	6	HVAC_OFF
5	Auto	7	HVAC_TEST (not used)
2	Heat Only	8	HVAC_EMERG_HEAT (not used)
4	Fan Only	9	HVAC_FAN_ONLY
3	Cool	10	HVAC_FREE_COOL (not used)
5	Auto	11	HVAC_ICE (not used)
5	Auto	12	HVAC_MAX HEAT (not used)
5	Auto	0xFF	HVAC_NUL

Application Version

Keypad Menu Path Hidden.Unit Config/App Version=

This read only attribute reflects the current Application Version of the MPS Rooftop Unit Controller. You must divide this number by 100 to get the version number.

Measurement	Units	Data Type	Valid Range	Default Value
Event Count	NA	Unsigned long	0-65,535	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1032	Present Value	85
Full Reference				
MTIIUC_MPS#########.AppVersion.Present Value				

LONWORKS

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoAppVersion	McQuayDischargeAir, McQuayRTU-SCC	No	UNVTAppVersion	N/A

Building Static Pressure

Keypad Menu Path Bldg Pressure/Bldg Press=

This read only property reflects the current Building Static Pressure.

Note: If you are using BACnet with English units, divide the property by 1000 to get IWC (inches of water column) when the property is read. For example, 0.050 IWC appears over BACnet as 50.

Measurement	Units	Data Type	Valid Range	Default Value
Pressure (gauge)	BACnet: IWC / Pa LONWORKS: Pa	Real	-0.250 – +0.250 IWC -100 .. 100 Pa	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1020	Present Value	85

Full Reference
MTIIUC_MPS#########.EffectBldgStaticP.Present Value

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoBldgStatPress	DAC	Yes	SNVT_press_p	113

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoBldgStatPress	McQuayRTU-SCC	Yes	UNVTBldgStatPressOut	N/A

Building Static Pressure Input

Keypad Menu Path Hidden.Network Config/nviBSP

This read/write property connects a network building static pressure sensor or network output from another device. When a building static pressure sensor is locally wired to the controller, this variable has priority if a valid value is present.

If the Present Value is set beyond the valid range from the network, the value from the network is ignored.

Note: Using BACnet with English units requires that you divide the variable by 1000 to get IWC when the property is read. For example, 0.050 IWC appears over BACnet as 50.

Measurement	Units	Data Type	Valid Range	Default Value
Pressure (gauge)	BACnet: IWC / Pa LONWORKS: Pa	Real	-0.50 – +0.50 WC -125 .. 125 Pa	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	1005	Present Value	85
Full Reference				
MTIIUC_MPS#########.BldgStaticPressInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviBldgStatPress	DAC	Yes	SNVT_press_p	113

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nviBldgStatPress	McQuayRTU-SCC	Yes	UNVTBldgStatPress	N/A

Building Static Pressure Setpoint

Keypad Menu Path Bldg Pressure/BldgSP Spt=

This read/write property sets the Building Static Pressure Setpoint used for controlling the exhaust fan VFD. The VFD is modulated to maintain the building static pressure sensor input at this Setpoint.

If the Present Value is set beyond the valid range from the network, the value written from the network is ignored.

Note: If you are using BACnet with English units, divide the variable by 1000 to get IWC when the property is read. For example, 0.050 IWC appears over BACnet as 50.

Measurement	Units	Data Type	Valid Range	Default Value
Pressure (gauge)	BACnet: IWC / Pa LONWORKS: Pa	Real	-0.250 – +0.250 IWC -100 ..100 Pa	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	1006	Present Value	85
Full Reference				
MTIIUC_MPS#########.BldgStaticSPInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviBldgStaticSP	DAC	No	SNVT_press_p	113

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nviBldgStaticSP	McQuayRTU-SCC	No	UNVTBldgStaticSP	N/A

Cooling Capacity

Keypad Menu Path System/Clg Capacity

This read-only property indicates the current percentage of unit maximum cooling capacity.

The BACnet property only applies to the subject data point. The LONWORKS variable covers six other data points: Unit Status (see page 50), Primary Heating Capacity (see page 46), Secondary Heating Capacity (not used), Discharge Fan Capacity (see page 28), Outdoor Air Damper Position (see page 43), and In Alarm (see page 26).

Measurement	Units	Data Type	Valid Range	Default Value
Percent	NA	BACnet: Real LONWORKS: Structure	0-100%	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	1016	Present Value	85
Full Reference				
MTIIUC_MPS#########.CoolOutput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus.cool_output	DAC, SCC	Yes	SNVT_hvac_status	112

Cooling Status

Keypad Menu System/Clg Status=

This read-only attribute indicates whether or not cooling is currently enabled. If cooling is disabled, the reason is indicated.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Multistate Value	19	1023	Present Value	85
Full Reference				
MTIIUC_MPS#########.CoolStatus.Present Value				

Enumeration
1 = Enabled
2 = None
3 = Off_Manual
4 = Off_Net
5 = Off_Alarm
6 = Off_Ambient

LONWORKS

LonWorks Name	Profile	UNVT Type	SNVT Number
nvoMcQRTUStatus.CoolStatus	McQuayDischargeAir, McQuayRTU-SCC	UNVTmcqRTUStatus	N/A

Enumeration
1 = Enabled
2 = None
3 = Off Manual
4 = Off Net
5 = Off Alarm
6 = Off Ambient

Current Alarm

Keypad Menu Path Active Alarm

This read-only attribute indicates the highest active alarm.

The BACnet property reads only the subject attribute and only applies to the subject data point.

The LONWORKS variable is only a part of the LONWORKS Unit Status network variable. See Unit Status on page 50 for details of LONWORKS network variable. The LONWORKS variable covers six other data points: Unit Status (See page 50), Primary Heating Capacity (See page 46), Secondary Heating Capacity (not used), Discharge Fan Capacity (See page 28), and Outdoor Air Damper Position (See page 43).

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1019	Present Value	85
Full Reference				
MTIIUC_MPS#########.Alarm.Present Value				

Enumeration
0 = No Active Alarm
24 = Dirty Filter Warning
158 = Low Pressure – Circuit 2 Problem
159 = Low Pressure – Circuit 1 Problem
166 = High Pressure – Circuit 2 Problem
167 = High Pressure – Circuit 1 Problem
182 = Return Air Sensor Problem
185 = Space Sensor Problem
188 = Outdoor Air Sensor Problem
208 = Airflow Fault
212 = Low Supply Air Temp Fault
216 = High Supply Air Temp Fault
220 = High Return Air Temp Fault
224 = Duct High Limit Fault
228 = Discharge Sensor Fail Fault
244 = Control Temp Fault
250 = Emergency Stop Fault

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus.in_alarm	DAC, SCC	Yes	SNVT_hvac_status	112

Property Value
0 = No Active Alarm
24 = Dirty Filter Warning
158 = Low Pressure – Circuit 2 Problem
159 = Low Pressure – Circuit 1 Problem
166 = High Pressure – Circuit 2 Problem
167 = High Pressure – Circuit 1 Problem
182 = Return Air Sensor Problem
185 = Space Sensor Problem
188 = Outdoor Air Sensor Problem
208 = Airflow Fault
212 = Low Supply Air Temp Fault
216 = High Supply Air Temp Fault
220 = High Return Air Temp Fault
224 = Duct High Limit Fault
228 = Discharge Sensor Fail Fault
244 = Control Temp Fault
250 = Emergency Stop Fault

Discharge Air Cooling Setpoint

Keypad Menu Path Hidden.Network Config/2=

This read/write property sets the Discharge Air Cooling Setpoint. This setpoint is set to this value when it is not being set by a reset schedule. Clg Reset on the Disch Cooling menu must be set to Network. If it is not set to Network, the MPS Rooftop Unit Controller ignores this value.

If the Present Value is set beyond the valid range from the network, the value from the network is set back to invalid.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	32.0–86.0 °F 0°–30°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1	Present Value	85
Full Reference				
MTIIUC_MPS#########.DAClgSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviDAClSP	DAC	No	SNVT_temp_p	105

Discharge Air Heating Setpoint

Keypad Menu Path Heating/DAT Htg Spt= or Hidden.Network Config/12=

This read/write property sets the Discharge Air Heating Setpoint. The the MPS Rooftop Unit Controller will not allow this value to be set greater than the Max Discharge Air Heating Setpoint (nciDAHtSP). If a value greater than nciDAHtSP is written, the controller ignores this value and continues using the last valid value.

If the Present Value is set beyond the valid range from the network, the value from the network is set back to nciDAHtSP.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	50.0–158.0 °F 10°–70°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	18	Present Value	85

Full Reference
MTIIUC_MPS#########.DAHtgSetpt.Present Value

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviDAHtSP	DAC	No	SNVT_temp_p	105

Discharge Air Temperature

Keypad Menu Path Temperatures/Disch Air=

This read-only property indicates the current reading of the discharge air temperature sensor.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45.0–212.0°F -42°–100°C	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	10	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectDATemp.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoDischAirTemp	DAC, SCC	Yes	SNVT_temp_p	105

Discharge Fan Capacity

Keypad Menu Path Duct Pressure/1

This read-only attribute indicates the current Discharge Fan Capacity.

The BACnet property reads only the subject attribute and only applies to the subject data point.

The LONWORKS variable is only a part of the LONWORKS Unit Status network variable. See Unit Status on page 50 for details of LONWORKS network variable. The LONWORKS variable covers six other data points: Unit Status (See page 50), Primary Heating Capacity (See page 46), Outdoor Air Damper Position (See page 43), In Alarm (See page 26) and Secondary Heating Capacity (not used).

Measurement	Units	Data Type	Valid Range	Default Value
Discharge Fan Capacity	Percent	BACnet: Real LONWORKS: Structure	BACnet: 0-100% LONWORKS: 0-100%	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	1018	Present Value	85
Full Reference				
MTIIUC_MPS#########.FanOutput.Present Value				

LonWorks

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus.fan_output	DAC, SCC	Yes	SNVT_hvac_status	112

Duct Static Pressure

Keypad Menu Path Duct Pressure/Duct Press=

This read-only attribute indicates the current reading of the duct static pressure sensor.

Note: If you are using BACnet with English units, multiply it by 100 to get the desired IWC value when writing this property. For example, write 10 for a desired value of 0.10 IWC.

Measurement	Units	Data Type	Valid Range	Default Value
Pressure (gauge)	BACnet: IWC / Pa LONWORKS: Pa	Real	0–5.0 IWC 0–1250 Pa	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1021	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectDuctStaticP.Present Value				

LonWorks

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoDuctStatPress	DAC	Yes	SNVT_press_p	113

Duct Static Pressure Setpoint

Keypad Menu Path Duct Pressure/DuctSP Spt=

This read/write property sets the Duct Static Pressure Setpoint used to control the discharge air fan VFD.

Note: If you are using BACnet with English units, multiply it by 100 to get the desired IWC value when writing this variable. For example, write 100 for a desired value of 1.00 IWC.

If the Present Value is set beyond the valid limits from the network, the value written from the network is ignored.

Measurement	Units	Data Type	Valid Range	Default Value
Pressure (gauge)	BACnet: IWC / Pa LONWORKS: Pa	Real	0.00–5.00 IWC 0–1250 Pa	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1004	Present Value	85
Full Reference				
MTIIUC_MPS#########.DuctStaticSPInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviDuctStaticSP	DAC	No	SNVT_press_p	113

Economizer Enable

Keypad Menu Path Hidden.Network Config/nviEconState & Hidden.Network Config/nviEconValue=

This read/write configuration property enables or disables the economizer. In BACnet, if EconEnable is 0, then the economizer is disabled. If it is 1 and EconEnaPercent is 0, the economizer is disabled. If EconEnable is 1 and EconEnaPercent is greater than 0, the economizer is enabled. The LONWORKS point nviEconEnable has two properties; a State and a Value. When the State = 0, economizer control through the network is disabled. When State = 1, the Economizer can be controlled through the network. When the Value = 0 and the State = 1, the economizer is disabled through the LONWORKS network. When the Value is greater than 0 and the State = 1, the economizer is enabled through the LONWORKS network.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1028	Present Value	85
Full Reference				
MTIIUC_MPS#########.EconEnaPercent.Present Value				

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Binary Value	5	3	Present Value	85
Full Reference				
MTIIUC_MPS#########.EconEnable.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nviEconEnable	DAC, SCC	Yes	NA	NA	SNVT_switch	95

Structure

typedef struct {

unsigned	value;	Enumerated
signed	state;	0=Disabled 1=Enabled

} SNVT_switch;

Valid Range

State	Value	Economizer
0	N/A	Disabled
1	0	Disabled
1	1-255	Enabled
0xFF	N/A	Auto (invalid)

Economizer Status

Keypad Menu Path System/Econo Status=

This read-only network variable output displays whether the economizer is enabled or disabled.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1022	Present Value	85
Full Reference				
MTIIUC_MPS#########.EconStatus.Present Value				

Enumeration
1 = Enabled
2 = None
3 = Off Manual
4 = Off Net
6 = Off Ambient

LONWORKS

LonWorks Name	Profile	UNVT Type	SNVT Number
nvoMcQRTUStatus.EconEnable	McQuayDischargeAir, McQuayRTU-SCC	UNVTmcqRTUStatus	N/A

Enumeration
1 = Enabled
2 = None
3 = Off Manual
4 = Off Net
6 = Off Ambient

Effective Discharge Air Temperature Setpoint

Keypad Menu Path Economizer/DAT Clg Spt=

This read-only attribute displays the Effective Discharge Air Temperature Cooling Setpoint.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	°C	Fixed Point Scalar - signed long	0 .. 30°C.	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	11	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectDATSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoEffDATempSp	DAC	Yes	SNVT_temp_p	105

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoEffDATempSp	McQuayRTU-SCC	Yes	UNVTeffDATempSP	N/A

Effective Setpoint Output

Keypad Menu Path No Keypad Equivalent

This read-only attribute monitors the effective temperature setpoint. It is always set equal to the current controlling setpoint depending on the current unit operating state (i.e. cooling or heating).

The Effective Setpoint Output depends on the Occupied Cooling Setpoint, (see page 42) the Occupied Heating Setpoint, (see page 42) and Temperature Setpoint Input (see page 50.) If the Temperature Setpoint Input (nviSetpoint) is set to a ***valid*** value:

Effective Cooling Enable Setpoint = Temperature Setpoint Input
+½(Occupied Cooling Enable Setpoint–Occupied Heating Enable Setpoint)

Effective Heating Enable Setpoint = Temperature Setpoint Input
-½(Occupied Cooling Enable Setpoint–Occupied Heating Enable Setpoint)

The Effective Setpoint Output (nvoEffectSetpt) equals Effective Heating Enable Setpoint when the control temperature is less than Occupied Heating setpoint + [1/2(Occupied Cooling Enable Setpoint–Occupied Heating Enable Setpoint)]. It is set equal to the Effective Cooing Enable Setpoint when the control temperature is greater than the Occupied Cooling Enable Setpoint – [1/2(Occupied Cooling Enable Setpoint–Occupied Heating Enable Setpoint)].

If the Temperature Setpoint Input (nviSetpoint) is set to a ***invalid*** value:

Effective Cooling Enable Setpoint = Occupied Cooling Enable Setpoint

Effective Heating Enable Setpoint = Occupied Heating Enable Setpoint

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	40.0°-95.0°F 5.0°-35.0°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	12	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	Number
nvoEffectSetpt	SCC	Yes	SNVT_temp_p	105

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoEffectSetpt	McQuayDischargeAir	Yes	UNVTnvoEffectSetpt	N/A

Emergency Override

Keypad Menu Path System/Emerg Mode=

This read/write property shuts off the MPS Rooftop Unit Controller. If this property is set to Shutdown, the MPS Rooftop Unit Controller cannot start based on a time clock or any other means. The only way to start the MPS Rooftop Unit Controller is to change the value to Normal.

If a value other than EMERG_SHUTDOWN (4), is written, this variable reverts back to 0.

Measurement	Units	Data Type	Valid Range	Default Value
NA	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	1003	Present Value	85
Full Reference				
MTIIUC_MPS#########.EmergOverride.Present Value				

Enumeration
0 = Normal
4 = Shutdown

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviEmergOverride	DAC, SCC	No	SNVT_hvac_emerg	103

Enumeration Definitions

Value	Identifier	Notes
0	EMERG_NORMAL	No emergency mode
1	EMERG_PRESSURIZE	Emergency pressurize mode (not used)
2	EMERG_DEPRESSURIZE	Emergency depressurize mode (not used)
3	EMERG_PURGE	Emergency purge mode (not used)
4	EMERG_SHUTDOWN	Emergency shutdown mode
5	EMERG_FIRE	(not used)
0xFF	EMERG_NUL	Value not available

Enumeration Correspondence

BACnet		Lon	
0	Normal	0	EMERG_NORMAL
0	Normal	1	EMERG_PRESSURIZE
0	Normal	2	EMERG_DEPRESSURIZE
0	Normal	3	EMERG_PURGE
4	Shutdown	4	EMERG_SHUTDOWN
		5	EMERG_FIRE
0	Normal	0xFF	EMERG_NUL

Exhaust Fan Capacity

Keypad Menu Path Bldg Pressure/Exh Fan Cap= or Stgd Exh Fans/Exh Fan Cap=

This read-only property indicates the current capacity of the exhaust fans.

Measurement	Units	Data Type	Valid Range	Default Value
Fan Status	NA	BACnet: Real LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1030	Present Value	85
Full Reference				
MTIIUC_MPS#########.ExhFanCap.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoExhFanStatus	DAC	Yes	SNVT_switch	95

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoExhFanStatus	McQuayRTU-SCC	Yes	UNVTExhFanStatus	N/A

Structure

```
typedef struct {
    unsigned    value;    0–100% - This indicates the capacity.
    signed      state;    0=Off, 1=On – This indicates the state.
} SNVT_switch;
```

Exhaust Fan Capacity Input

Keypad Menu Path Bldg Pressure/Remote EF Cap=

This read/write property is used to override the local exhaust fan capacity control. EF Cap Ctrl on the Bldg Pressure menu must be set to Speed for the MPS Rooftop Unit Controller to use this remote capacity for control.

Measurement	Units	Data Type	Valid Range	Default Value
Fan Status	NA	BACnet: Real LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1008	Present Value	85
Full Reference				
MTIIUC_MPS#########.ExhFanCapInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviExhFanCap	DAC	Yes	SNVT_lev_percent	81

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nviExhFanCap	McQuayRTU-SCC	Yes	UNVTExhFanCap	N/A

Exhaust Fan Status

Keypad Menu Path No Keypad Equivalent

This read-only property indicates whether the MPS Rooftop Unit Controller is commanding the exhaust fan.

Measurement	Units	Data Type	Valid Range	Default Value
Fan Status	NA	BACnet: Real LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Binary Value	5	5	Present Value	85
Full Reference				
MTIIUC_MPS#########.ExhFanOn_Off.Present Value				

Enumeration
0 = Off 1 = On

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoExhFanStatus	DAC	Yes	SNVT_switch	95

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoExhFanStatus	McQuayRTU-SCC	Yes	UNVTExhFanStatus	N/A

Structure

```
typedef struct {
    unsigned    value;    0–100% - This indicates the capacity.
    signed      state;    0=Off, 1=On – This indicates the state.
} SNVT_switch;
```

Heating Status

Keypad Menu System/Htg Status=

This read-only attribute indicates whether or not heating is currently enabled. If heating is disabled, the reason is indicated.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1024	Present Value	85
Full Reference				
MTIIUC_MPS#########.HeatStatus.Present Value				

Enumeration
1 = Enabled 2 = None 3 = Off_Manual 4 = Off_Net 5 = Off_Alarm (not used) 6 = Off_Ambient

LONWORKS

LonWorks Name	Profile	UNVT Type	SNVT Number
nvoMcQRTUStatus	McQuayDischargeAir, McQuayRTU-SCC	UNVTmcqRTUStatus	N/A

Enumeration
1 = Enabled
2 = None
3 = Off Manual
4 = Off Net
6 = Off Ambient

Local OA Temperature

Keypad Menu Path No Keypad Equivalent

This read-only attribute indicates the current outdoor air temperature from the local outdoor air temperature sensor.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45°–212°F -42°-100°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	16	Present Value	85
Full Reference				
MTIIUC_MPS#########.LocalOAT.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoLocalOATmp	DAC	Yes	SNVT_temp_p	105

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoLocalOATmp	McQuayRTU-SCC	Yes	UNVTLocalOATemp	N/A

Local Space Temperature

Keypad Menu Path No Keypad Equivalent

This read-only attribute indicates the current space air temperature from the local space air temperature sensor.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45°–212°F -42°-100°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	17	Present Value	85
Full Reference				
MTIIUC_MPS#########.LocalSpaceT.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoLocalSpaceTmp	SCC	Yes	SNVT_temp_p	105

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoLocalSpaceTmp	McQuayDischargeAir	Yes	UNVTLocalSpaceTmp	N/A

Maximum Discharge Air Heating Setpoint

Keypad Menu Path Heating/Max DAT Spt= or Hidden/Network Config/12

This read/write configuration property sets the Maximum Discharge Air Heating Setpoint.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Signed Long	N/A	113°F / 45°C

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	19	Present Value	85
Full Reference				
MTIIUC_MPS#########. MaxDATHtgSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SCPT Reference	SCPT Index
nciDAHtSP	DAC	SNVT_temp_p	105	SCPTdischargeAirHeatingSetpoint	184

McQuay RTU Unit State

Keypad Menu Path System/Unit Status= , System/Clg Status=, System/Htg Status= & System/Econo Status=

This output network variable indicates the operating status of the MPS Rooftop Unit Controller. It is an extension of the information found in the rooftop functional profile's unit status network variable output.

LONWORKS

LonWorks Name	Profile	UNVT Type	SNVT Number
nvoMcQRTUStatus	McQuayDischargeAir, McQuayRTU-SCC	UNVTmcqRTUStatus	N/A

Measurement	UNVTmcqRTUStatus
Type Category	Structure
Type Size	2 bytes
Valid Range (Resolution)	-163.840 .. 163.830% (0.005). The value 0x7FFF=+163.835% represents invalid value.
Uses Receive Heartbeat	Yes

Structure

Typedef struct {

unsigned	EconEnable;	1 = Enabled 2 = None 3 = Off Manual 4 = Off Net 6 = Off Ambient
unsigned	CoolEnable;	1 = Enabled 2 = None 3 = Off Manual 4 = Off Net 6 = Off Ambient
unsigned	HeatEnable;	1 = Enabled 2 = None 3 = Off Manual 4 = Off Net 6 = Off Ambient
mode_t	mode	6 = Off 7 = Startup 8 = Recirc 9 = Fan Only 10 = Min DAT

11 = Heating
12 = Economizer
13 = Cooling

} UNVTmcqRTUStatus;

mode_t Enumeration

Value	Identifier
-1	NUL
1	Off
2	Startup
3	Recirc
4	Fan Only
5	Min DAT
6	Heating
7	Economizer
8	Cooling

Minimum Discharge Air Cooling Setpoint

Keypad Menu Path Zone Cooling/Min DAT Setpt=

This read/write configuration property sets the Discharge Air Cooling Setpoint.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Signed Long	32-86°F / 0-30°C	55°F

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	2	Present Value	85
Full Reference				
MTIIUC_MPS#########.MinDATClgSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SCPT Reference	SCPT Index
nciDAClSP	DAC	SNVT_temp_p	105	N/A	N/A

Minimum Send Time

Keypad Menu Path No Keypad Equivalent

This read/write LONWORKS configuration property defines the minimum period of time between automatic network variable output transmissions.

Measurement	Units	Data Type	Valid Range	Default Value
Time	Seconds	Fixed Point Scalar - unsigned long	0.0–6553.4 sec (0.1 sec).	NA

BACnet

No BACnet equivalent.

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SCPT Reference	SCPT Index
nciMinOutTm	DAC, SCC	SNVT_time_sec	107	SCPTminSendTime	52

Occupancy

Keypad Menu Path Occupancy/Occupancy=

This read-only property indicates whether the MPS Rooftop Unit Controller is currently in an occupied, unoccupied, or bypass mode of operation.

Measurement	Units	Data Type	Valid Range	Default Value
Occupancy	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1014	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectOcc.Present Value				

Enumeration
1 = Occupied
2 = Unoccupied
3 = Bypass
4 = Standby

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	Number
nvoEffOccup	DAC, SCC	Yes	SNVT_occupancy	109

LONWORKS Enumeration Definitions

Value	Identifier	Notes
0	OC_OCCUPIED	Area is occupied
1	OC_UNOCCUPIED	Area is unoccupied
2	OC_BYPASS	Area is temporarily occupied for the bypass period
3	OC_STANDBY	Area is temporarily unoccupied
0xFF	OC_NUL	Value not available

Enumeration Correspondence

BACnet		LONWORKS	
1	Occupied	0	OC_OCCUPIED
2	Unoccupied	1	OC_UNOCCUPIED
3	Bypass	2	OC_BYPASS
1	Occ	3	OC_STANDBY
		0xFF	OC_NUL

Occupancy Mode

Keypad Menu Path Occupancy/Occ Mode=

This read/write property sets the MPS Rooftop Unit Controller Occupancy Mode. It is typically sent by a wall-mounted occupant-interface module or a supervisory node to manually control occupancy modes, or to override the scheduled occupancy.

If a local Bypass Input is present, it can be used with this network variable input. The local input, when active, forces a Bypass request (equivalent to OC_BYPASS). When nviOccManCmd indicates OC_BYPASS, the Local Bypass Time is also used. Whenever an update of nviOccManCmd is received, indicating OC_BYPASS, the bypass timer is restarted. This network variable input should never be bound to a network variable that uses a Send Heartbeat function.

This input is used with nviOccSchedule to determine the Effective Occupancy Mode. Refer to Occupancy (see nvoEffectOccup on page 39) for more information.

Measurement	Units	Data Type	Valid Range	Default Value
Mode	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1001	Present Value	85
Full Reference				
MTIIUC_MPS#########.OccManCmd.Present Value				

Enumeration
1 = Occupied
2 = Unoccupied
3 = Bypass
4 = Standby
5 = Auto

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviOccManCmd	DAC, SCC	No	SNVT_occupancy	109

LONWORKS Enumeration Definitions

Value	Identifier	Notes
0	OC_OCCUPIED	Area is occupied
1	OC_UNOCCUPIED	Area is unoccupied
2	OC_BYPASS	Area is temporarily occupied for the bypass period
3	OC_STANDBY	Area is temporarily unoccupied
0xFF	OC_NUL	Value not available

Enumeration Correspondence

BACnet		LONWORKS	
1	Occupied	0	OC_OCCUPIED
2	Unoccupied	1	OC_UNOCCUPIED
3	Bypass	2	OC_BYPASS
1	Occupied	3	OC_STANDBY
5	Auto	0xFF	OC_NUL

Occupancy Scheduler Input

Keypad Menu Path Hidden.Network Config/nviCurrrSched=, Hidden.Network Config/nviNextSched & Hidden.Network Config/nviTimeToNext

This read/write property commands the occupancy function of the MPS Rooftop Unit Controller when Occupancy Mode is set to Auto (see page 39). It is typically sent by a scheduler or a supervisory node. SNVT_tod_event is a structure containing three parts.

- Current_state, (required)
- Next_state (optional)
- Time_to_next_state (optional)

This network variable is used in conjunction with Optimal Start. If time_to_next_state is not valid, the MPS Rooftop Unit Controller uses an internal calculation to determine when the unit will start. Consequently, if time_to_next_state is valid, the MPS Rooftop Unit Controller uses this time to determine when the unit will start. This input is used in conjunction with nviOccManCmd (Occupancy Mode) to determine the effective occupancy mode. Refer to Occupancy Mode on page 39 for more information.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	Real	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1011	Present Value	85
Full Reference				
MTIIUC_MPS#########.OccState.Present Value				

Enumeration
1 = Occupied
2 = Unoccupied
4 = Standby
5 = Auto

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1012	Present Value	85
Full Reference				
MTIIUC_MPS#########.NextOccState.Present Value				

Enumeration
1 = Occupied
2 = Unoccupied
4 = Standby
5 = Auto

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1013	Present Value	85
Full Reference				
MTIIUC_MPS#########.TimeToNextOccState.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviOccSchedule	DAC, SCC	Yes	SNVT_tod_event	128

Structure

```
typedef struct {
    occup_t          current_state;      See Below
    occup_t          next_state;         See Below
    unsigned long    time_to_next_state;
}SNVT_tod_event
```

Field Definitions

Field	Data Point Reference	Units	Valid Range	Notes
current_state	Occupancy Scheduler Input	occup_t		current scheduled occupancy state
next_state	Occupancy Scheduler Next	occup_t		next scheduled occupancy state
time_to_next_state	Occupancy Scheduler Time	minutes	0 to 1440	

Enumeration Definitions (occup_t)

Value	Identifier	Notes
0	OC_OCCUPIED	Area is occupied
1	OC_UNOCCUPIED	Area is unoccupied
2	OC_BYPASS	Area is temporarily occupied for the bypass period
3	OC_STANDBY	Area is temporarily unoccupied
0xFF	OC_NUL	Value not available

Enumeration Correspondence

BACnet		LONWORKS	
1	Occupied	0	OC_OCCUPIED
0	Unoccupied	1	OC_UNOCCUPIED
		2	OC_BYPASS
1	Occupied	3	OC_STANDBY
5	Auto	0xFF	OC_NUL

Occupied Cooling Setpoint

Keypad Menu Path Zone Cooling/Cooling Spt=

This read/write configuration property sets the Occupied Cooling Setpoint.

If the Present Value is set beyond the valid limits from the network, the value from the network is ignored.

The BACnet property only applies to the subject data point. The LONWORKS variable is a structure that covers three other data points: Unoccupied Cooling Setpoint (See page 52), Occupied Heating Setpoint (See page 42), and Unoccupied Heating Setpoint (See page 53).

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	50°–95.0°F 10°–35.0°C	72°F

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	6	Present Value	85
Full Reference				
MTIIUC_MPS#########.OccCoolSP.Present Value				

LONWORKS

LONWORKS Name	Profile	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nciSetpoints.occupied_cool	DAC, SCC	SCPTsetPnts	60	SNVT_temp_setpt	106

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;
```

Occupied Heating Setpoint

Keypad Menu Path Heating/Heating Spt=

This read/write configuration property sets the Occupied Heating Setpoint.

If the Present Value is set beyond the valid limits from the network, the value from the network is ignored.

The BACnet property only applies to the subject data point. The LONWORKS variable covers three other data points: Occupied Cooling Setpoint (See page 42), Unoccupied Cooling Setpoint (See page 52), and Unoccupied Heating Setpoint (See page 53).

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	50.0°–95.0 °F 10.0°–35.0°C	68°F

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	8	Present Value	85
Full Reference				
MTIIUC_MPS#########.OccHeatSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nciSetpoints.occupied_heat	DAC, SCC	SCPTsetPnts	60	SNVT_temp_setpt	106

Structure

```
typedef struct {
    Signed long     occupied_cool;
    Signed long     standby_cool;       Not Used
    signed long     unoccupied_cool;
    signed long     occupied_heat;
    signed long     standby_heat;       Not Used
    signed long     unoccupied_heat;
} SNVT_temp_setpt;
```

Outdoor Air Damper Minimum Position Input

Keypad Menu Path Hidden.Network Config/nviOAMinPos=

This read/write configuration property sets the Outdoor Air Damper Minimum Position setpoint for the MPS Rooftop Unit Controller. The Minimum Outdoor Air Damper Position Input setpoint uses this value when it is not being set by any other function and when the Min OA Type on the Min OA Damper menu is set to Network.

If the Present Value is set beyond the valid limits from the network, the value from the network is ignored.

Measurement	Units	Data Type	Valid Range	Default Value
Position	Percent	Real	0–110%	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1009	Present Value	85
Full Reference				
MTIIUC_MPS#########.OAMinPos.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nviOAMinPos	DAC, SCC	No	SCPTminRnge	23	SNVT_lev_percent	81

Outdoor Air Damper Position

Keypad Menu Path System/OA Damper Pos=

This read-only attribute indicates the current outdoor air damper position.

The BACnet property reads only the subject attribute and only applies to the subject data point.

The LONWORKS variable is only a part of the LONWORKS Unit Status network variable. See Unit Status on page 50 for details of LONWORKS network variable. The LONWORKS variable covers six other data points: Unit Status (See page 50), Primary Heating Capacity (See page 46), Secondary Heating Capacity (not used), Discharge Fan Capacity(See page 28), and In Alarm (See page 26).

Measurement	Units	Data Type	Valid Range	Default Value
Percent	NA	BACnet: Real LONWORKS: Structure	0-100%	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1017	Present Value	85
Full Reference				
MTIIUC_MPS#########.EconOutput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus.econ_output	DAC, SCC	Yes	SNVT_hvac_status	112

Outdoor Air Temperature

Keypad Menu Path Temperature/OA Temp=

This output network variable indicates the current value of the Outdoor Air Temperature for monitoring purposes. This value reflects the network input nviOutdoorTemp (if valid) or the value from a locally wired sensor.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45°–212°F -42°–100°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	13	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectOAT.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoOutdoorTemp	DAC, SCC	Yes	SNVT_temp_p	105

Outdoor Air Temperature Input

Keypad Menu Path Hidden.Network Config/nviOAT=

This input network variable is the measured Outdoor Air Temperature. Either a network sensor or a supervisory controller typically provides the value. When an outdoor air temperature sensor is locally wired to the unit controller, the nviOutdoorTemp has priority if a valid value is present.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-40°–122°F -40°–50°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	3	Present Value	85
Full Reference				
MTIIUC_MPS#########.OutdoorTempInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviOutdoorTemp	DAC, SCC	Yes	SNVT_temp_p	105

Primary Cool Enable

Keypad Menu Path Hidden.Network Config/nviCoolState= & Hidden.Network Config/nviCoolValue=

This read/write configuration property enables or disables the primary cooling.

In BACnet, if CoolEnable is 0, then the primary cooling is disabled. If it is 1 and CoolEnaPercent is 0, the primary cooling is disabled. If CoolEnable is 1 and CoolEnaPercent is greater than 0, the primary cooling is enabled. When cooling is enabled, CoolEnaPercent reflects the percentage of cooling that is enabled.

The LONWORKS variable nviPriCoolEnable has two properties; a State and a Value. When the State = 0, primary cooling control is disabled through the network. When State = 1, the primary cooling can be controlled through the network. When the Value = 0 and the State = 1, the primary cooling is disabled through the LONWORKS network. When the Value is greater than 0 and the State = 1, the primary cooling is enabled through the LONWORKS network.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Binary Value	5	1	Present Value	85
Full Reference				
MTIIUC_MPS#########.CoolEnable.Present Value				

Enumeration
0 = Off 1 = Enable

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1026	Present Value	85
Full Reference				
MTIIUC_MPS#########.CoolEnaPercent.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nviPriCoolEnable	DAC	Yes	NA	NA	SNVT_switch	95

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nviPriCoolEnable	McQuayRTU-SCC	Yes	UNVTPriCoolEnable	N/A

Structure

typedef struct {

unsigned	value;	0-100. This indicates the percentage of cooling that is enabled when state equals 1.
signed	state;	0=Disabled 1=Enabled

} SNVT_switch;

Valid Range

State	Value	Economizer
0	N/A	Disabled
1	0	Disabled
1	1-255	Enabled
0xFF	N/A	Auto (invalid)

Primary Heat Enable

Keypad Menu Path Hidden.Network Config/nviHeatState= & Hidden.Network Config/nviHeatValue=

This read/write configuration property enables or disables the primary heating.

In BACnet, if HeatEnable = 0, then the primary heating is disabled. If it HeatEnable = 1 and HeatEnaPercent = 0, the primary heating is disabled. If HeatEnable = 1 and HeatEnaPercent is greater than 0, the primary heating is enabled. When heating is enabled, HeatEnaPercent reflects the percentage of heating that is enabled.

The LONWORKS variable nviPriHeatEnable has two properties; a State and a Value. When the State = 0, primary heating control is disabled through the network. When State = 1, the primary heating can be controlled through the network. When the Value = 0 and the State = 1, the primary heating is disabled through the LONWORKS network. When the Value is greater than 0 and the State = 1, the primary heating is enabled through the LONWORKS network.

Measurement	Units	Data Type	Valid Range	Default Value
State	NA	LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Binary Value	5	2	Present Value	85
Full Reference				
MTIIUC_MPS#########.HeatEnable.Present Value				

Enumeration
0 = Off 1 = Enable

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1027	Present Value	85
Full Reference				
MTIIUC_MPS#########.HeatEnaPercent.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nviPriHeatEnable	DAC, SCC	Yes	NA	NA	SNVT_switch	95

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nviPriHeatEnable	McQuayRTU-SCC	Yes	UNVTPriHeatEnable	N/A

Structure

typedef struct {

unsigned	value;	0-100. This indicates the percentage of heating that is enabled when state equals 1.
signed	state;	0=Disabled 1=Enabled

} SNVT_switch;

Valid Range

State	Value	Economizer
0	N/A	Disabled
1	0	Disabled
1	1-255	Enabled
0xFF	N/A	Auto (invalid)

Primary Heating Capacity

Keypad Menu Path System/Htg Capacity=

This read-only attribute indicates the current percentage of unit maximum heating capacity.

The BACnet property reads only the subject attribute and only applies to the subject data point.

The LONWORKS variable is only a part of the LONWORKS Unit Status network variable. See Unit Status on page 50 for details of LONWORKS network variable. The LONWORKS variable covers six other data points: Unit Status (See page 50), Discharge Fan Capacity (See page 28), Secondary Heating Capacity (not used), Outdoor Air Damper Position (See page 43), and In Alarm (See page 26).

Measurement	Units	Data Type	Valid Range	Default Value
Heating Capacity	Percent	BACnet: Real LonWorks: Structure	0.0–100.0%	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1015	Present Value	85
Full Reference				
MTIIUC_MPS#########.HeatOutput.Present Value				

LONWORKS

LonWorks Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus.heat_output_primary	DAC, SCC	Yes	SNVT_hvac_status	112

Receive Heartbeat

Keypad Menu Path Hidden.Network Config/RcvHrtBt=

This read/write configuration property defines the maximum time that elapses after the last update to a specified network variable input before the MPS Rooftop Unit Controller begins using its default values. Refer to Table 3 for the list of BACnet Receive Heartbeat Variables or

Table 5 for the list of LONWORKS Receive Heartbeat Variables. Refer to Table 4 or Table 6 (BACnet and LONWORKS respectively) for a description of the effect on specific network variables when RcvHrtBt timer has expired with having been updated.

Measurement	Units	Data Type	Valid Range	Default Value
Time	Seconds	Fixed Point Scalar - unsigned long	0.0–6553.4 sec (0.1 sec).	30

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	5	Present Value	85
Full Reference				
MTIIUC_MPS#########.ReceiveHrtBt.Present Value				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SCPT Reference	SCPT Index
nciRcvHrtBt	DAC, SCC	SNVT_time_sec	107	SCPTmaxRcvTime	48

Remote Discharge Fan Capacity Setpoint

Keypad Menu Path Duct Pressure/Remote SF Cap=

This read/write property sets the discharge air VFD (Variable Frequency Drive) speed. Remote SF Cap on the Duct Pressure menu must be set to Speed for the MPS Rooftop Unit Controller to use this point for control.

If the Present Value is set beyond the valid limits from the network, the value from the network is ignored.

Measurement	Units	Data Type	Valid Range	Default Value
Fan Capacity	Percent	Real	0–110 %	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1007	Present Value	85
Full Reference				
MTIIUC_MPS#########.SupFanCapInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviSupFanCap	DAC	Yes	SNVT_lev_percent	81

Return Air Temperature

Keypad Menu Path Temperature/Return Air=

The BACnet property is a read-only attribute that indicates the current reading from the MPS Rooftop Unit Controller return air temperature sensor.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45°–212°F -42°–100°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	14	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectRAT.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoRATemp	DAC	Yes	SNVT_temp_p	105

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoRATemp	McQuayRTU-SCC	Yes	UNVTraTemp	N/A

Send Heartbeat

Keypad Menu Path No Keypad Equivalent

This read/write configuration property defines maximum period of time that expires before the specified network variable output is automatically updated.

Measurement	Units	Data Type	Valid Range	Default Value
Time	Seconds	Fixed Point Scalar - unsigned long	0.0–6553.4 sec (0.1 sec).	NA

BACnet

No BACnet equivalent.

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SCPT Reference	SCPT Index
nciSndHrtBt	DAC, SCC	SNVT_time_sec	107	SCPTmaxSendTime	49

Space CO_2

Keypad Menu Path Min OA Damper/IAQ PPM=

This read-only attribute indicates the current space CO_2 level from the optional space CO_2 sensor. This value reflects the network input nviSpaceIAQ (if valid) or the value from a locally wired sensor if Min OA Type on the Min OA Damper menu is set to IAQ.

Measurement	Units	Data Type	Valid Range	Default Value
Concentration	BACnet: ppm LONWORKS: ppm	Real	0-5000	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1031	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectSpaceCO2.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoSpaceCO2	SCC	Yes	SNVT_ppm	29

LonWorks Name	Profile	Uses Heartbeat	UNVT Type	SNVT Number
nvoSpaceCO2	McQuayDischargeAir	Yes	UNVTSpaceCO2	N/A

Space IAQ Input

Keypad Menu Path Hidden.Network Config/nviSpaceIAQ=

This read/write attribute indicates the current space CO_2 level from the network. This value takes priority over a locally wired sensor. Min OA Type on the Min OA Damper menu must be set to IAQ. If it is not set to IAQ, the MPS Rooftop Unit Controller ignores this value.

Measurement	Units	Data Type	Valid Range	Default Value
Concentration	BACnet: ppm LONWORKS: ppm	Real	0-5000	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1010	Present Value	85
Full Reference				
MTIIUC_MPS#########.SpaceIAQInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviSpaceIAQ	DAC, SCC	Yes	SNVT_ppm	29

Space Temperature

Keypad Menu Path Temperature/Space Temp=

This read-only attribute indicates the current value of the Space Temperature for monitoring purposes. This value reflects the network input nviSpaceTemp (if valid) or the value from a locally wired sensor.

Note: If the optional space temperature sensor is not installed, the Space Temperature sensor attribute in the Setup menu of the MPS Rooftop Unit Controller keypad display should be set to No. Doing so disables the alarm function associated with an open circuit at the space temperature sensor input.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	-45°–212°F -42°–100°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	15	Present Value	85
Full Reference				
MTIIUC_MPS#########.EffectSpaceT.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoSpaceTemp	DAC, SCC	Yes	SNVT_temp_p	105

Space Temperature Input

Keypad Menu Path Hidden.Network Config/nviSpaceT=

This input network variable is used to connect a network space temperature sensor or network output from another controller. When a space temperature sensor is locally wired to the MPS Rooftop Unit Controller, this variable has priority if a valid value is present.

Note: If the optional space temperature sensor is not installed, the Space Sensor attribute in the Unit Configuration menu of the MPS Rooftop Unit Controller keypad display should be set to No. Doing so disables the alarm function associated with an open circuit at the space temperature sensor input.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	14°–122°F -10°–50°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	4	Present Value	85
Full Reference				
MTIIUC_MPS#########.SpaceTempInput.Present Value				

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviSpaceTemp	DAC, SCC	Yes	SNVT_temp_p	105

Temperature Setpoint Input

Keypad Menu Path Hidden.Network Config/2

This read/write property is used only in LONWORKS networks. It determines the Effective Setpoint Output (see page 32.) If the value is valid, it determines the Effective Setpoint Output (see page 32) provided no other network variables (such as the keypad or nciSetpoints) are changing Effective Setpoint Output. If the value is not valid, the Effective Setpoint Output does not depend on this value (see page 32.)

Note: The unoccupied setpoints are not changed.

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	°C	Fixed Point Scalar - signed long	10°–35°C	NA

BACnet

No BACnet equivalent.

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nviSetpoint	DAC, SCC	No	SNVT_temp_p	105

Unit State - LONWORKS

Keypad Menu Path System/Unit Status=, System/Htg Capacity=, System/Clg Capacity=, System/OA Damper Pos= & Active Alarm

This read-only property indicates the current unit operating status information.

Measurement	Units	Data Type	Valid Range	Default Value
Unit Status	NA	BACnet: Real LONWORKS: Structures	Enumerated	NA

LONWORKS

LONWORKS Name	Profile	Uses Heartbeat	SNVT Type	SNVT Index
nvoUnitStatus	DAC, SCC	Yes	SNVT_hvac_status	112

Structure

```
typedef struct {
    hvac_t          mode;
    signed long     heat_output_primary;
    signed long     heat_output_secondary;   Not Used
    signed long     cool_output;
    signed long     econ_output;
    signed long     fan_output;
    unsigned        in_alarm;
} SNVT_hvac_status;
```

Field Definitions

Field	Data Point Reference	Valid Range	Notes
mode	See below	Enumerated	compatible with SNVT_hvac_mode
heat_output_primary	Primary Heating Capacity	-163.83 .. +163.83% (percentage of full scale)	primary heat output
heat_output_secondary	Secondary Heating Capacity	-163.83 .. +163.83% (percentage of full scale)	secondary heat output – not used
cool_output	Cooling Capacity	-163.83 .. +163.83% (percentage of full scale)	cooling output
econ_output	Out Door Air Damper Position	-163.83 .. +163.83% (percentage of full scale)	economizer output
fan_output	Discharge Fan Capacity	-163.83 .. +163.83% (percentage of full scale)	fan output
in_alarm	In Alarm	0 = No Alarm 1-99 = Warning 100-199 = Problem 200-255 = Fault	Any non-zero value means unit is in alarm[1]

[1]The value assigned to each alarm is the same for both BACnet and LONWORKS applications. For these enumerations, refer to Current Alarm section.

LONWORKS (Mode) Enumeration Definitions

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

Unit Status

Keypad Menu Path System/Unit Status=

This read-only property indicates the current unit operating state.

The BACnet property only applies to the subject data point. The LONWORKS variable covers three other data points: Economizer Status (see page 30), Heating Status (see page 35) and Cooling Status (see page 25).

Measurement	Units	Data Type	Valid Range	Default Value
Unit Status	NA	BACnet: Real LONWORKS: Structures	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Multistate Value	19	1025	Present Value	85
Full Reference				
MTIIUC_MPS#########.UnitStatus.Present Value				

Enumeration
1 = Off
2 = Startup
3 = Recirc
4 = Fan Only
5 = Min DAT
6 = Heating
7 = Economizer
8 = Cooling

LONWORKS

LonWorks Name	Profile	UNVT Type	SNVT Number
nvoMcQRTUStatus.Unit Mode	McQuayDischargeAir, McQuayRTU-SCC	UNVTmcqRTUStatus	N/A

Enumeration
1 = Off
2 = Startup
3 = Recirc
4 = Fan Only
5 = Min DAT
6 = Heating
7 = Economizer
8 = Cooling

Unoccupied Cooling Setpoint

Keypad Menu Path Cooling Setup/Unocc Clg Spt=

This read/write configuration property sets the temperature above which the MPS Rooftop Unit Controller starts and provides cooling (night setup) during unoccupied periods. An optional space temperature sensor is required for unoccupied cooling operation. If the Present Value is set beyond the valid limits from the network, the value from the network is ignored. The BACnet property only applies to the subject data point. The LONWORKS variable is a structure that covers three other data points: Unoccupied Cooling Setpoint (See page 52), Occupied Heating Setpoint (See page 42), and Unoccupied Heating Setpoint (See page 53).

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	50.0°–95.0 °F 10°–35°C	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	7	Present Value	85

Full Reference
MTIIUC_MPS#########.UnoccCoolSetpt.Present Value

LonWorks

LONWORKS Name	Profile	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nciSetpoints.unoccupied_cool	DAC, SCC	SCPTsetPnts	60	SNVT_temp_setpt	106

Structure

```
typedef struct {
    signed long     occupied_cool;
    signed long     standby_cool;       Not Used
    signed long     unoccupied_cool;
    signed long     occupied_heat;
    signed long     standby_heat;       Not Used
    signed long     unoccupied_heat;
} SNVT_temp_setpt;
```

Unoccupied Heating Setpoint

Keypad Menu Path Heating Setup/Uocc Htg Spt=

This read/write configuration property sets the temperature above which the MPS Rooftop Unit Comptroller starts up and provides unoccupied heating (night setback). An optional space temperature sensor is required for unoccupied heating.

If the Present Value is set beyond the valid limits from the network, the value from the network is ignored.

The BACnet property only applies to the subject data point. The LONWORKS variable is a structure that covers three other data points: Unoccupied Cooling Setpoint (See page 52), Occupied Heating Setpoint (See page 42), and Unoccupied Heating Setpoint (See page 53).

Measurement	Units	Data Type	Valid Range	Default Value
Temperature	BACnet: °F / °C LONWORKS: °C	Real	50.0°–95.0°F 10°–35°C	NA

BACnet

Object Identifier			Property	
Object Type	Type ID	Instance	Name	ID
Analog Value	2	9	Present Value	85
Full Reference				
MTIIUC_MPS#########.UnoccHeatSetpt.Present Value				

LONWORKS

LONWORKS Name	Profile	SCPT Reference	SCPT Index	SNVT Type	SNVT Index
nciSetpoints.unoccupied_heat	DAC, SCC	SCPTsetPnts	60	SNVT_ temp_setpt	106

Structure

```
typedef struct {
    signed long     occupied_cool;
    signed long     standby_cool;       Not Used
    signed long     unoccupied_cool;
    signed long     occupied_heat;
    signed long     standby_heat;       Not Used
    signed long     unoccupied_heat;
} SNVT_temp_setpt;
```

Alarms

MPS Rooftop Unit Controller alarms are divided into three classes: Faults, Problems, and Warnings. Fault alarms have the highest priority. Problem alarms have the next priority. Warning alarms have the lowest priority. The alarms within each class are also prioritized. Refer to the appropriate Operation Manual for a description of each alarm (see Reference Documents section). Alarms can be cleared by the network in two ways; by clearing each alarm individually or by clearing all alarms at the same time. The following section describes the alarm classes, alarm monitoring, and alarm clearing.

Alarm Classes

Fault Alarms (Highest Priority)

Table 8. Fault Alarms in Order of Priority

Alarm Message	Indication	Clear
Emergency Stop Fault	Either the Emergency Stop Input is in the alarm (open) position or nviEmergMode is set via LONWORKS or BACnet.	Manual
Control Temperature Fault	Control Temperature failure	Manual
Discharge Air Sensor Fault	DAT sensor failure	Manual
Duct Hi Limit	Excessive discharge compartment pressure sensed by DHL sensor	Manual
Hi Return Tmp	RAT exceeded the Hi Return Tmp setting	Manual
Hi Disch Tmp	DAT exceeded the Hi Disch Tmp setting	Manual
Lo Disch Tmp	DAT fell below the Lo Disch Tmp setting	Manual
Airflow Fault	Airflow not sensed by the airflow switch and duct static pressure is less than half of the setpoint after SAF was started	Manual

Problem Alarms (Medium Priority)

Table 9. Problem Alarms in Order of Priority

Alarm Message	Indication	Clear
OAT Sensor	OAT sensor failure when Control Temperature Source parameter not set to OAT	Automatic
Space Sensor	Space temp sensor failure on unit with RAT sensor	Automatic
Return Sensor	RAT sensor failure when Control Temperature Source parameter not set to Return	Automatic
Hi Pres-Ckt1	HP1 or HP3 open indicating ckt # 1 high refrigerant pressure	Manual
Hi Pres-Ckt2	HP2 or HP4 open indicating ckt # 2 high refrigerant pressure	Manual
Lo Pres-Ckt1	LP1 remained opened after compressor on the circuit had started	Automatic[1]
Lo Pres-Ckt2	LP2 remained opened after compressor on the circuit had started	Automatic[1]

[1] This alarm must be manually cleared if this alarm occurs three times between 2:00 AM of one day and 2:00 AM of the next day.

Warning Alarms (Lowest Priority)

Table 10. Warning Alarms in Order of Priority

Alarm Message	Indication	Clear
Dirty Filter	The filter switch is in the alarm (Open) position.	Manual

Alarm Monitoring

BACnet

Alarms within a MPS Rooftop Unit Controller can be monitored individually by using the Alarm (AV1019) attribute. This attribute displays a value that corresponds to the highest priority alarm that is active. It is possible to have multiple active alarms, but only the highest priority is displayed in this attribute. For example, if there is a simultaneous Dirty Filter Warning (value of 24) and an Emergency Fault (value of 250), then the Emergency Fault value of 250 will display in the Present_Value of AV 1019 because it is the higher priority alarm of the two. Once the Emergency Fault condition is corrected and the fault is cleared, the next priority active alarm value (in this example, value of 24 for Dirty Filter alarm) is displayed. The values for all alarms are described in the Alarms section. If the AV 1019 displays a zero in the Present_Value property, there are no active alarms.

Alarm Class may also monitor alarms, if desired. When the Present_Value of AV1019 attribute reads a value in the range of 1 to 99, a Warning Alarm is active. When the attribute reads a value in the range of 100 to 199, a Problem Alarm is active. When the attribute reads a value in the range of 200 to 255, a Fault Alarm is active.

LONWORKS

Alarms within a MPS Rooftop Unit Controller can be monitored individually by using the In Alarm attribute. The In Alarm attribute is part of the Unit Status Network Variable Output (i.e. nvoUnitStatus.in_alarm). This attribute displays a value that corresponds to the highest priority alarm that is active. It is possible to have multiple active alarms, but only the highest priority is displayed in this attribute. For example, if there is a simultaneous Dirty Filter Warning (value of 24) and an Emergency Fault (value of 250), then the Emergency Fault value of 250 will display in nvoUnitStatus.in_alarm because it is the higher priority alarm of the two. Once the Emergency Fault condition is corrected and the fault is cleared, the next priority active alarm value (in this example, value of 24 for Dirty Filter alarm) is displayed. The values for all alarms are described in the Alarms section. If the attribute nvoUnitStatus.in_alarm displays a zero, there are no active alarms.

Alarm Class may also monitor alarms, if desired. When the nvoUnitStatus.in_alarm attribute reads a value in the range of 1 to 99, a Warning Alarm is active. When the attribute reads a value in the range of 100 to 199, a Problem Alarm is active. When the attribute reads a value in the range of 200 to 255, a Fault Alarm is active.

Alarm Clearing

BACnet

MPS Rooftop Unit Controller alarms can be cleared via BACnet by alarm class using two BACnet Analog Values. To clear alarms all active alarms, change the Present_Value property Binary Value 4 to a 1. To clear one of the active alarms, change the Present_Value property Analog Value 1029 to the value of the alarm you want to clear. For example, if you want to clear an Emergency Fault alarm, write 250 to Analog Value 1029.

LONWORKS

MPS Rooftop Unit Controller alarms can be cleared by alarm class using one of two LONWORKS Network Variable Inputs (nviClear1Alarm or nviClearAllAlarms) of type SNVT_count. To clear all active alarms, change nviClearAllAlarm to 1. To clear one active alarm, change the value of nviClear1Alarm to the value of the alarm you want to clear. For example, if you want to clear an Emergency Fault alarm, write 250 to nviClear1Alarm.

Objects

Clear All Alarms

Keypad Menu Path No Direct Keypad Equivalent

This read/write property clears all active alarms. Writing 1 to this variable clears all active alarms. This variable reverts back to 0 when the alarms clear.

Measurement	Units	Data Type	Valid Range	Default Value
Alarms	NA	BACnet: Real LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Binary Value	5	4	Present Value	85
Full Reference				
MTIIUC_MPS#########.ClearAllAlarms.Present Value				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nviClearAllAlarm	DAC, SCC	SNVT_count	8

Clear One Alarm

Keypad Menu Path No Direct Keypad Equivalent

This read/write property clears one active alarm. To clear a particular alarm, write the value corresponding to that alarm to this variable. This variable reverts back to 0 when the alarm clears.

Measurement	Units	Data Type	Valid Range	Default Value
Alarms	NA	BACnet: Real LONWORKS: Structure	Enumerated	NA

BACnet

Object Identifier			Property	
Object Type	**Type ID**	**Instance**	**Name**	**ID**
Analog Value	2	1029	Present Value	85
Full Reference				
MTIIUC_MPS#########.ClearOneAlarm.Present Value				

Property Value
0 = Normal
24 = Dirty Filter Warning
158 = Low Pressure – Circuit 2 Problem
159 = Low Pressure – Circuit 1 Problem
166 = High Pressure – Circuit 2 Problem
167 = High Pressure – Circuit 1 Problem
182 = Return Air Sensor Problem
185 = Space Sensor Problem
188 = Outdoor Air Sensor Problem
208 = Airflow Fault
212 = Low Supply Air Temp Fault
216 = High Supply Air Temp Fault
220 = High Return Air Temp Fault
224 = Duct High Limit Fault
228 = Discharge Sensor Fail Fault
244 = Control Temp Fault
250 = Emergency Stop Fault

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Number
nviClear1Alarm	DAC, SCC	SNVT_count	8

Appendix A: Protocol Implementation Conformance Statement (PICS)

This section contains the Protocol Implementation Conformance Statement (PICS) for the MicroTech II MPS (Maverick II) Rooftop Unit Controller from McQuay International as required by ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 135-2001, BACnet; A Data Communication Protocol for Building Automation and Control Networks.

Protocol Implementation Conformance Statement

Date:	September, 2008
Vendor Name:	McQuay International
Product Name:	MicroTech II MPS Rooftop Unit Controller
Product Model Number:	MPS Rooftop BCM
Applications Software Version:	1.10
Firmware Revision:	AmRBCM-2-BmRBCM-485-15 (MS/TP)
	AeRBCM-2-BeRBCM-1.1.5-rc2 (IP)
BACnet Protocol Revision:	Version 1 Revision 2

Product Description

The MicroTech II MPS (Maverick II) Rooftop Unit Controller with optional BACnet Communication Module is a microprocessor-based controller designed to operate McQuay Packaged System (MPS) Rooftop 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
Data Sharing – COV – B	DS-COV-B
Data Sharing – COVP – B	DS-COVP-B
Device Management – Dynamic Device Binding – A	DM-DDB-A
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
Device Management –TimeSynchronization – B	DM-TS-B
Device Management – UTCTimeSynchronization – B	DM-UTC-B

Standard Object Types Supported

Object-Type	Createable	Deleteable	Optional Properties Supported	Writeable Properties Not Required To Be Writeable
Analog Value	☐	☐	COV_Increment Description Reliability	Present_Value COV_Increment
Binary Value	☐	☐	Active_Text Description Inactive_Text Reliability	Present_Value
Multistate Value	☐	☐	Description Reliability State_Text	Present_Value
Device	☐	☐	Active_COV_Subsriptions Description Location Local_Time Local_Date UTC_Offset Daylight_Savings_ Status Max_Master (MS/TP Only) Max_Info_Frames (MS/TP Only)	APDU_Timeout Description Daylight_Savings_Status Location (Limit 64 Chars) Max_Master (MS/TP Only) Max_Info_Frames (MS/TP Only) Number_Of_APDU_Retries UTC_Offset

Data Link Layer Options

☒ BACnet IP, (Annex J)

☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800 bps

Segmentation Capability

☐ Segmented requests supported Window Size: 127

☐ Segmented responses supported Window Size: 127

Device Address Binding

Static Device Binding ☐ Yes

☒ No

Character Sets Supported

☒ ANSI X3.4 ☐ IBM™/Microsoft™ DBCS ☐ ISO 8859-1

☐ ISO 10646 (UCS-2) ☐ ISO 10646 (UCS-4) ☐ JIS C 6226

Note: Support for multiple character sets does not imply they can be supported simultaneously.

Appendix B: Subnet Mask - CIDR Conversion Table

CIDR	Subnet Mask
32	255.255.255.255
31	255.255.255.254
30	255.255.255.252
29	255.255.255.248
28	255.255.255.240
27	255.255.255.224
26	255.255.255.192
25	255.255.255.128
24	255.255.255.0
23	255.255.254.0
22	255.255.252.0
21	255.255.248.0
20	255.255.240.0
19	255.255.224.0
18	255.255.192.0
17	255.255.128.0
16	255.255.0.0
15	255.254.0.0
14	255.252.0.0
13	255.248.0.0
12	255.240.0.0
11	255.224.0.0
10	255.192.0.0
9	255.128.0.0
8	255.0.0.0
7	254.0.0.0
6	252.0.0.0
5	248.0.0.0
4	240.0.0.0
3	224.0.0.0
2	192.0.0.0
1	128.0.0.0

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