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Magnitude™ Chiller Unit Controller Protocol Information

BACnet® Networks (MS/TP, IP, Ethernet)
LONWORKS® Networks

Daikin McQuay Magnitude™ Magnetic Bearing Centrifugal Chiller, Single-Compressor Model WME

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Revision History

ED15117 April 2010 Preliminary release.

Software Revision

This edition documents all versions of the standard Magnitude Chiller Unit Controller software and all subsequent revisions until otherwise indicated. You can determine the revision of the application software from the display. The version is located on the Service screen. BACnet can also read the software revision by reading the Application_Software_Version property of the Device Object.

Reference Documents

Company	Number	Title	Source
McQuay International	OM 1034	Magnitude™ Frictionless Centrifugal Chiller Operation and Maintenance Manual	www.mcquay.com
McQuay International	IM 963	Magnitude Frictionless Centrifugal Chiller, BACnet Communication Module (MSTP, IP/Ethernet) Installation Manual	www.mcquay.com
McQuay International	IM 965	Magnitude Frictionless Centrifugal Chiller, LONWORKS Communication Module Installation Manual	www.mcquay.com
American Society of Heating, Refrigerating and Air-Conditioning Engineers	ANSI/ ASHRAE 135-2004	BACnet® A Data Communication Protocol for Building Automation and Control Networks	www.ashrae.org
LonMark Interoperability Association	078-0120-01G	LonMark® Layers 1-6 Interoperability Guidelines, Version 3.4	www.lonmark.org
LonMark Interoperability Association	078-0120-01G	LonMark Application Layer Interoperability Guidelines, Version 3.4	www.lonmark.org
LonMark Interoperability Association	8040_10	LonMark Functional Profile: Chiller, Version 1.0	www.lonmark.org
Echelon Corporation	078-0156-01G	LONWORKS FTT-10A Free Topology Transceiver Users Guide	www.echelon.com

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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 Daikin McQuay Magnitude™ Chiller Unit Controller into a building automation system (BAS). It lists all BACnet® properties, LONWORKS® variables, and corresponding Magnitude Chiller Unit Controller data points. It also contains the BACnet Protocol Implementation Conformance Statement (PICS). BACnet and LONWORKS terms are not defined. Refer to the respective specifications for definitions and details.

Unit Controller Data Points

The Magnitude Chiller Unit Controller contains data points or unit variables that are accessible from three user interfaces: the unit controller OITS panel, a BACnet network (BACnet/IP, Ethernet, or 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 OM 1034 (available on www.mcquay.com) for display details. This document contains the network details necessary to incorporate the Magnitude Chiller Unit Controller into the network.

Protocol Definitions

The Magnitude Chiller Unit Controller can be configured in either an interoperable BACnet or LONWORKS network. The unit controller must have the corresponding communication module installed for network integration (see Reference Document section for corresponding part numbers). There are three communication modules: BACnet IP/Ethernet, BACnet MS/TP (Master/Slave Token Passing), and LONWORKS.

BACnet Protocol

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

The Magnitude Chiller Unit Controller is tested according to the BACnet Testing Laboratory (BTL) Test Plan. It is designed to meet the requirements of the BACnet Standard (ANSI/ASHRAE 135-2004) as stated in the Protocol Implementation and Conformance Statement (PICS). However, it is not BTL listed. The PICS are located at the end of this manual or the separate PICS document, ED 15119 (available on www.mcquay.com.)

LONWORKS Networks

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

LonTalk Protocol

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

LonMark® Certification

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

Basic Protocol Information

Setting Unit Controller Communications Parameters

There are 12 communication parameters involved in setting up the unit controller for proper communication with the three communication module options (BACnet IP/Ethernet, BACnet MS/TP, LONWORKS). These parameters are set differently depending on which communication module is ordered and shipped with the unit. The table below lists the three possible sets of default parameter settings. Not all the parameters apply to all the module options. All parameters, except for Receive Heartbeat, are configurable via the unit controller display. **The boldface settings can only be configured via the unit controller OITS (Operator Interface Touch Screen).** See Magnitude Chiller Unit Controller Operation Manual, OM 1034, for details. The items in parenthesis indicate whether the parameter is Read-Only (R) or Read/Write (W) from the BACnet network.

Communication Parameter Settings

Parameter Name	BACnet IP	BACnet MS/TP	BACnet Ethernet	LONWORKS
IP Address	**172.15.5.8**[2]	N/A	N/A	N/A
IP Subnet Mask	**255.255.255.0**	N/A	N/A	N/A
Default Gateway Address	**"None"**	N/A	N/A	N/A
UDP Port	**47808**	N/A	N/A	N/A
MSTP MAC Address	N/A	**1**	N/A	N/A
MSTP Baud Rate	N/A	**38400**	N/A	N/A
Device Instance Number (W)	3000[3]	3000[3]	N/A	N/A
Max APDU Length (R)	1024	480	1476	N/A
Device Object Name (W)	Magnitude[3]	Magnitude[3]	Magnitude[3]	N/A
Max Master (W)	N/A	127	N/A	N/A
Max Info Frames (W)	N/A	5	N/A	N/A
APDU Retries (W)	3	3	N/A	N/A
APDU Timeout (W)	3000	3000	N/A	N/A
Receive Heartbeat[1]	N/A	N/A	N/A	0Sec

1. All parameters, except for Receive Heartbeat, are configurable via the OITS panel.
2. If the IP Address is set to 0.0.0.0 from the unit controller OITS panel or through the network, DHCP addressing will be enabled and the IP address will be requested from the network DHCP server.
3. Device value must be unique on the BACnet network.

BACnet Networks

Compatibility

The Magnitude Chiller Unit Controller is tested according to the BACnet Testing Laboratory (BTL) Test Plan. It is designed to meet the requirements of the BACnet Standard (ANSI/ASHRAE 135-2004) as stated in the Protocol Implementation and Conformance Statement (PICS). However, it is not BTL listed. The PICS is located at the end of this manual or the separate PICS document, ED 15119 (available on www.mcquay.com.)

BACnet Objects

Magnitude Chiller Unit Controllers incorporate standard BACnet object types (i.e., object types defined in the BACnet Standard) that conform to the BACnet Standard. Each object has properties that control unit variables or data points. Some object types occur more than once in the Magnitude Chiller Unit Controller; each occurrence or instance has different properties and controls different unit variables or data points. Each instance is designated with a unique instance index. Some properties can be adjusted

(read/write properties, e.g., setpoints) from the network and others can only be interrogated (read-only properties, e.g., 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.

Example of BACnet Data Point

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Output	4	5	Present Value	85
Object Name				
AlarmDigitalOutput				

Property Values
0 = No Alarm 1 = Alarm

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 happens to be Alarm Digital Output. The object identifier is a property of the object that you can read from the object. The name of the property is "Object_Identifier" and the property identifier is 75.

Each object in the 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 135-2004 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 of the object that you can read from the object code. The name of the property is "Object_Identifier" and the property identifier is 75. The ASHRAE 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 ASHRAE BACnet specification.

Each object also has a name. Object Names are character strings. The object name is a property of the object that you can 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 would be: Binary Output, Instance 5.

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.

Object Name

The Object Name is the name of the object in the device. Object Names must be unique within each BACnet device. In the example above the object name is AlarmDigitalOutput.

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.

Magnitude Chiller Unit Controller Device Object

Each BACnet-compatible device can only have a single BACnet Device Object.

Device Object Identifier

The Magnitude Chiller 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 device object instance will be read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase.

The BACnet communication module continues to poll the device object instance parameter during run-time. If the device object instance is changed at the controller during run-time, the update will be automatically applied to the BACnet communication module as soon as the change is received. The allowable range of values for the device object instance will be 0 to 4194302. (The value 4194303 is reserved by BTL for reading a device's object id.) If a value greater than 4194302 is read from the controller, the following default value will be used:

Default device object instance: 3000 + *address**

**Address* = the last two octets of the MAC Address

For example:

BACnet MS/TP: 3023
BACnet Ethernet: 10312 (3000 + F75A)
BACnet/IP: CDB (3000 + 0123)

The device object identifier can be read from the unit controller. The name of the property is "Object_Identifier" and the property identifier is 75. Changing the device object ID may affect the operation of other BACnet devices on the network that have previously discovered the device. The object instance number can be changed via the unit controller OITS panel.

⚠CAUTION

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

Device Object Name

The Device Object Name uniquely specifies a device in the network. It must be unique in the network. The device object name will be read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module continues to poll the device object name parameter during run-time. If the device object name is changed at the controller during runtime, the update will be automatically applied to the BACnet

communication module as soon as the change is received. The allowable range of characters for the device object name will be 1 to 31 characters. If an empty string is read from the controller, the following default name will be used:

Default device object name: MTE Chiller UCA - *address**

**Address* = the MAC Address

For example:

BACnet MS/TP: MTE Chiller UCA-23

BACnet Ethernet and BACnet/IP: MTE Chiller UCA-0-176-208-13-247-90

Note: If the constructed name is longer than 31 characters, the numeric portion of the name will be shortened to fit the name into the 31 character limit.

The Device Object name is also available to the network in the device. The property name is "Object_Name" and property identifier is 77. Changing the device object name may affect the operation of other BACnet devices on the network that have previously discovered the device. The object name can be changed via the unit controller OITS panel.

Device Object Properties

The device object contains many other informative properties as shown in Table 1. **Items in bold are configurable via the BACnet network.**

Table 1. Magnitude Chiller Unit Controller Device Object Properties

Property	Identifier	Default Value	Data Type
Object Identifier	75	Device, variable	BACnetObjectIdentifier
Object Name	**77**	**Magnitude**	**Character String**
Object Type	79	8	BACnetObjectType
System Status	112		BACnetDeviceStatus
Vendor Name	121	McQuay International	Character String
Vendor Identifier	120	3	Unsigned 16
Model Name	70	WME	Character String
Firmware Revision	44	variable	Character String
Application Software Version	12	variable	Character String
Location	**58**		**Character String**
Description	**28**	**McQuay Chiller**	**Character String**
Protocol Version	98	1	Unsigned
Protocol Revision	139	4	Unsigned
Protocol Services Supported	97	readProperty, readPropertyMultiple, writeProperty, writePropertyMultiple, deviceCommunicationControl, timeSynchronization, who-Has, who-Is, utcTimeSyncronization,	BACnetServicesSupported

Property	Identifier	Default Value	Data Type
		reinitializeDevice	
Protocol Object Types Supported[1]	96	AI, AO, AV, BI, BO, BV, Device, MSI, MSO, MSV	BACnetObjectTypesSupported
Object List	76		Sequence of BACnetObjectIdentifer
Max APDU Length Accepted	62	1024 (IP) / 480 (MS/TP)	Unsigned 16
Segmentation Supported	107	None	BACnetSegmentation
APDU Timeout	**11**	**3000**	**Unsigned**
Number of APDU Retries	**73**	**3**	**Unsigned**
Max Master	**64**	**127 (Range: 1 .. 127)**	**Unsigned**
Max Info Frames	**63**	**5 (Range: 1.. 5)**	**Unsigned**
Device Address Binding	30		Sequence of BACnetAddressBinding
Database Revision	115	1	Unsigned
Local Time[2]	57	variable (read from the controller)	Time
Local Date[2]	56	variable (read from the controller)	Date
UTC Offset	**119**	**0 (Range: –720 .. 720)**	**Integer**
Daylight Savings Status	**24**	**0 (False)**	**Boolean**

1. While the Magnitude Chiller Unit Controller supports all shown object types, not all object types are used. See the Object List for details.
2. The device properties will be read-only. The controller values are writable from BACnet via the BACnet TimeSynchronization services.

Network Considerations

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, you must specify the object identifier including the device object identifier or the object name including the device object name and the property identifier.

BACnet Networks

The BACnet communication module supports three separate BACnet data link layers:

- BACnet MS/TP
- BACnet Ethernet
- BACnet/IP

Only one data link layer may be used at one time.

During initialization, the BACnet communication module reads a parameter in the Magnitude Chiller Unit Controller to select the data link layer. If the value read is not one of the supported BACnet data link layers, the BACnet communication module initialization loops in this phase of the initialization until a supported BACnet data link layer value is read from the unit controller. The BACnet communication module's active data link layer may not be changed at run-time. If the unit controller parameter is changed during run-time, the BACnet communication module requires a reset in order to re-initialize with the new data link layer selection.

The different data link layers have different parameters. All parameters that require configuration are read from the unit controller by the BACnet communication module via the unit controller OITS panel. The BACnet communication module reads only those parameters relevant to the selected data link layer. During initialization, the BACnet communication module must read a complete set of valid parameters for the BACnet network layer and selected data link layer before proceeding to build a set of BACnet objects for the device.

BACnet Ethernet Communications Parameters

None of the Ethernet Data Link Layer or Physical layer parameters require configuration.

BACnet/IP Communications Parameters

The key parameters for setting up BACnet/IP are described in the following sub-sections. The parameters are accessible and configurable via the unit controller OITS panel. They are not accessible from the BACnet network.

IP Address

The IP address is read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module can be configured for Dynamic Host Configuration Protocol (DHCP) addressing by setting the IP Address to 0.0.0.0 using the unit controller OITS panel. The BACnet communication module continues to poll the IP address parameter during run-time. If the IP address is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. The validity of the IP address is verified against the Subnet Mask. If the address is not valid, BACnet/IP communications cannot be established and the device does not initiate or respond to BACnet messages. If the IP address is changed at run-time and the IP address is not valid, BACnet/IP

communications are disabled. However, once a valid IP address is received, BACnet/IP communications are then enabled. Changing the IP address may affect the operation of other BACnet devices on the network. This parameter can only be accessed and configured via the unit controller OITS panel.

Subnet Mask

The Subnet Mask is read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module continues to poll the Subnet Mask parameter during run-time. If the Subnet Mask is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. The validity of the Subnet Mask is verified against the IP address. If the Subnet Mask is not valid, the BACnet communication module does not enable BACnet/IP communications and the device does not initiate or respond to BACnet messages. If the Subnet Mask is changed at run-time and is not valid, the BACnet/IP communications are disabled. However, once a valid Subnet Mask is received, BACnet/IP communications are then enabled. Changing the Subnet Mask may affect the operation of other BACnet devices on the network. This parameter can only be accessed and configured via the unit controller OITS panel.

UDP Port

The UDP Port is read from the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module continues to poll the UDP Port parameter during run-time. If the UDP Port is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. Changing the UDP Port may affect the operation of other BACnet devices on the network. This parameter can only be accessed and configured via the unit controller OITS panel.

Default Gateway Address

The default gateway address is read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module continues to poll the default gateway address parameter during run-time. If the default gateway address is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. Modifying the default gateway address may affect the operation of other BACnet devices on the network. This parameter can only be accessed and configured via the unit controller OITS panel.

BBMD Address

The BBMD address is read from the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. If the BBMD address is not 0.0.0.0, the BACnet communication module sends a Register-Foreign-Device message to the address. If the result code returned is X'0000', the BACnet communication module renews the registration at the period defined by the Foreign Device Time-To-Live value. The BACnet communication module continues to poll the BBMD address parameter during run-time. If the BBMD address is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. If the new value is 0.0.0.0, a Delete-Foreign-Device-Table-Entry message is sent to the BBMD address. If the new value is non-zero, a Register-Foreign-Device message is sent to the BBMD address. Changing the BBMD address may affect the operation of other BACnet devices on the network. This parameter can only be accessed and configured via the unit controller OITS panel.

Foreign Device Time-To-Live

The Foreign Device Time-To-Live (FDTTL) value is read from the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The BACnet communication module continues to poll the FDTTL parameter during run-time. If the FDTTL is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. If the new value is different from the existing value, a Register-Foreign-Device message is sent to the BBMD address. This parameter can only be accessed and configured via the unit controller OITS panel.

BACnet MS/TP Communication Parameters

The BACnet MS/TP communication setup parameters consist of: the Device Object Name, Device Object Identifier, Max Master, Max_Info_Frames, MAC Address and Baud Rate. These parameters can only be accessed and configured via the unit controller OITS panel. Both the MAC Address and the Baud Rate settings require configuration prior to establishing communication from the unit controller to the BACnet network.

MAC Address

The MAC address is read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. This parameter can only be accessed and configured via the unit controller OITS panel. It is not accessible from the BACnet network interface (i.e. Building Automation System workstation). The BACnet communication module continues to poll the MAC address parameter during run-time. If the MAC address is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. Changing the MAC address may affect the operation of other BACnet devices on the network.

The allowable range of values for the MAC address is: 0-127. Since the BACnet communication module is always configured as an MS/TP master, only addresses 0-127 are valid. If a value greater than 127 is read from the unit controller, the BACnet communication module defaults to a MAC address of 127. The MAC address must be unique on the BACnet MS/TP network.

Baud Rate

The baud rate is read from a parameter in the Magnitude Chiller Unit Controller during the BACnet communication module's initialization phase. The Baud Rate must match the other devices on the same MS/TP network and requires configuration prior to establishing communications from the unit controller to the BACnet network. This parameter can only be accessed and configured via the unit controller OITS panel. It is not accessible from the BACnet network interface (i.e. Building Automation System workstation).

The BACnet communication module continues to poll the baud rate parameter during run-time. If the baud rate is changed at the unit controller during run-time, the update is automatically applied to the BACnet communication module as soon as the change is received. Baud rates supported are as follows: 9600, 19200, 38400 (default) and 76800 bps.

BACnet Device Management

The following functions are specific to the BACnet device. These functions are used for maintenance and testing. A network management tool such as VTS is typically used to issue the network commands.

DeviceCommunicationControl - Disable

The purpose of this command is to reduce network traffic for diagnostic testing of the BACnet network. When the BACnet communication module receives a network command to Disable communications it stops communicating information to the network. An optional time may be specified for how long to

suspend communications. The unit continues to operate during the Disabled state. A password of 1234 is required.

DeviceCommunicationControl - Enable

When the BACnet Communication module receives a network command to Enable, the chiller unit controller communication to BACnet is restored. A password of 1234 is required.

ReinitializeDevice (Reset)

When the BACnet Communication module is capable of receiving a network ReinitializeDevice command to reboot itself (cold start or warm start). The functionality of a cold and warm start are the same and simply reboot the BACnet Communication module. The chiller controller can never be reset via the BACnet network. Reinitialize Device is implemented with a non-changeable password of 1234.

Configuring the Unit Controller

The Magnitude Chiller Unit Controller can operate with the default values of the various parameters. However, certain communication parameters must be configured appropriately (see the appropriate Magnitude Communication Module Installation Manual for details). Default values may be changed using the unit controller OITS panel or via the BACnet network (see the Magnitude Chiller Unit Controller Operation & Maintenance Manual, OM 1034 for details).

LONWORKS Networks

LONWORKS technology, developed by Echelon Corporation, is the basis for LONMARK Interoperable Systems. This technology is independent of the communication media. The LONMARK Interoperable Association has developed standards for interoperable LONWORKS technology systems. In particular they have published standards for HVAC equipment including the Chiller Functional profile. This profile specifies a number of mandatory and optional standard network variables and standard configuration parameters. This manual defines the variables and parameters available in the Magnitude Chiller Unit Controller.

Compatibility

The Magnitude Chiller Unit Controller, along with the LONWORKS Communication Module, operates in accordance with the Chiller Functional profile of the LONMARK Interoperability Association.

LONWORKS Variables

The Magnitude Chiller Unit Controller incorporates LONWORKS network variables to access unit data points. The controller uses LONWORKS Standard Network Variable Types (SNVT) from the profile. Some data points can be adjusted (input network variables, nvi) (read/write attributes, e.g., setpoints) from the network and others can only be interrogated (network variables, nvo) (read only attributes, e.g., status information). Configuration variables (nci) are included with the input network variables. 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 (Standard Configuration Parameter Type) Reference and the SCPT Index.

Example of LONWORKS Data Point

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoSuctionTemp	McQuayChiller	SNVT_temp_p	105	two bytes

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 name of the variable is nvoSuctionTemp.

Profile

The profile column designates whether the variable is defined in the LONMARK Chiller functional profile or is a McQuay proprietary variable. The variable itself may not be a standard component of the profile, but the unit controller implements it and it is available to the network. The Profile column indicates “Chiller” for LONMARK standard network variables or “McQuayChiller” for proprietary variables.

SNVT Type

This column gives the name of the standard network variable type from the master list. In the example above, the SNVT is SNVT_temp_p.

SNVT Index

This column gives the Index of the standard network variable type from the master list. In the example above, the SNVT Index is 105.

SNVT Size

This column gives the size of the standard network variable type in number of bytes. In the example above, the SNVT Size is two bytes.

SCPT Reference

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

SCPT Index

This column gives the Index 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 communication. 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

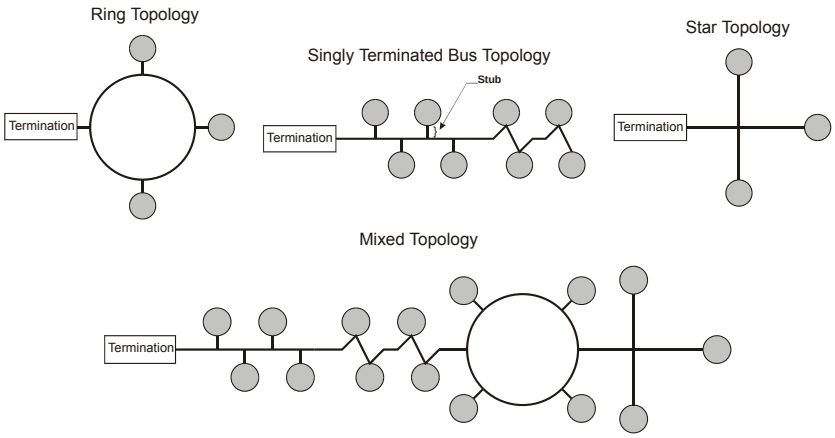
A LONWORKS "free topology network" means that devices (nodes) can be connected to the network in a variety of geometric configurations. For example, devices can be daisy-chained from one device to the next, connected with stub cables branching off from a main cable, connected using a tree or star topology, 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 Echelon 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

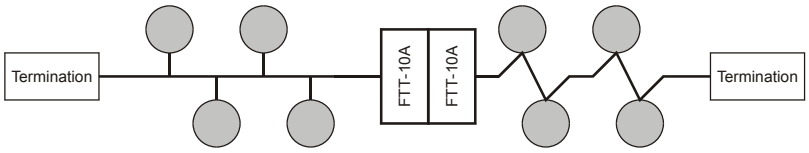
Limitations to wire lengths apply and must be observed.

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 in is a 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. See Figure 2.

Figure 2. Combining Network Segments with a Repeater



Free Topology Restrictions

Although free topology wiring is very flexible, there are restrictions. A summary follows:
The maximum number of nodes per segment is 64.

The maximum total bus length depends on the wire size:

Wire Size	Maximum Length	Node-to-Node	Maximum Length	Cable
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)	

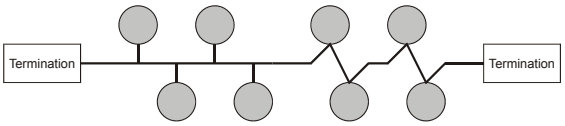
The longest cable path between any possible pair of nodes on a segment must not exceed the maximum node-to-node distance. If two or more paths exist between a pair of nodes (e.g., a loop topology), the longest path should be considered. Note that in a bus topology, the longest node-to-node distance is equal to the total cable length. The 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.

Doubly Terminated Networks

You can extend the maximum total cable length without using a repeater by using doubly-terminated network topology. 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.

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 Length	Cable
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). 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.

LONWORKS Network Addressing

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 a 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.

Commissioning the Network

Pressing the service pin, switch on the LONWORKS Communication 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 Chiller 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 available so that any network tool can design and configure it prior to installation. XIFs are available on www.mcquay.com or www.lonmark.org.

Resource Files

The Magnitude Chiller Unit Controller supports variables defined by the LONMARK Chiller functional profile as well as McQuay proprietary variables. The variable itself may not be a standard component of the profile, but the unit controller implements it and it is available to the network. Resource Files provide definitions of functional profiles, type definitions, enumerations, and formats that can be used by network configuration tools such as Echelon's LonMaker® program. Refer to the Detailed Data Section for each variable to determine if it is supported by the standard LONMARK Chiller functional profile or is a proprietary variable. Within the Detailed Data Section, each parameter includes a LONWORKS table with a Profile column. The Profile column indicates "Chiller" for a LONMARK standard network variable or "McQuayChiller" for a proprietary variable. The Resource Files define the format of how these McQuay-specific variables are displayed when using a tool such as LonMaker. The Resource Files are available on www.mcquay.com or www.lonmark.org.

Unit Controller Default Values

The Magnitude Chiller Unit Controller and the LONWORKS Communication Module are designed in accordance with the LONMARK chiller functional profile. The unit can operate with the default values of the various parameters. However, the Protocol Type must be set to LONWORKS. Additional configuration may be necessary for optimal unit performance and network integration. Default values may be changed via the unit controller OITS panel and/or the BACnet network. Refer to the appropriate operation manual for default values and unit controller operating instructions (see Reference Documents section for details.)

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. If a data point listed in Table 2 does not change after a given time (receive heartbeat), the controller reverts to the value contained in the corresponding network configuration variable (nci). The receive heartbeat feature is only applicable when nciDefaults is set to 0.

Table 2. Receive Heart Beat Variables

Data Point	LONWORKS Variable
Capacity Limit Setpoint	nviCapacityLim
Chiller Enable Setpoint	nviChillerEnable
Cool Setpoint	nviCoolSetpt
Heat Setpoint	nviHeatSetpt
Ice Setpoint	nviIceSpt
Chiller Mode Setpoint	nviMode

Typical Application: Minimum Integration

This section gives you the basic information required for integrating the Magnitude Chiller Unit Controller to a BAS and outlines a procedure to set up the unit for network control.

Set up the Unit Controller for Network Control

From the unit controller OITS panel, follow the steps below:

1. Set the Control Source on the SET/UNIT screen to USER.
2. Change the BAS Network Protocol default to the appropriate BAS Protocol on the SET/BAS screen.
3. Verify with the chiller/control company technician that the chiller is operational on the BAS.
4. Set the Control Source on the SET/UNIT screen to BAS.

Display Important Data Points

Typical workstation displays of Magnitude Chiller Unit Controller attributes include the following significant data points (page number of detailed description in parenthesis). Each data point is identified with a number that also identifies it in the respective BACnet or LONWORKS Protocol Point Summary tables. These data points are also shaded in the comprehensive 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 3. Significant Data Points

No.	Configuration	No.	Temperatures	No.	Setpoints	No.	Alarms
1	Chiller Status (37)	5	Evaporator Entering Water Temperature (50)	9	Cool Setpoint – Network (49)	11	Alarm Digital Output (29)
2	Chiller Mode Set-point (36)	6	Evaporator Leaving Water Temperature (51)	10	Capacity Limit Setpoint – Network (30)	12	Clear Alarm Network (38)
3	Actual Capacity (28)	7	Condenser Entering Water Temperature (45)				
4	Chiller Enable Setpoint (32)	8	Condenser Leaving Water Temperature (46)				

You can display any number of additional data points based on job requirements or individual preference. See Protocol Point Summary section (Tables 4-7) for a complete list of all LONWORKS variables or BACnet points available to the network. For a detailed description of all available data points, see the Detailed Data Point Information section.

Alarms

Alarms in a Magnitude Chiller 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.

Notification

BACnet

Magnitude Chiller Unit Controllers may have their alarms monitored by one of two methods: 1) a BACnet Binary Output indicating whether any alarms exist, or 2) Alarm value using three BACnet Analog Value objects.

1. To monitor whether or not any alarms exist, monitor the Alarm Digital Output variable. If the Present_Value property is a 1, an alarm is active. A value of 0 for the Present_Value property indicates that there are no active alarms.
2. To monitor alarms by alarm value, read the Present_Value property of the three Alarm Analog Value objects (Fault Alarm, Problem Alarm and Warning Alarm). The Present_Value displays a value that corresponds to the highest numbered alarm that is active. It is possible to have multiple active alarms, but only the highest numbered is displayed. The values for all alarms are described in the Alarms section tables. If the Present_Value displays a zero, there are no active alarms.

LONWORKS

Magnitude Chiller Unit Controllers may have their alarms monitored by one of two methods: 1) by using the In_alarm attribute of nvoChillerstat or 2) by reading nvoAlarmDescr.

1. The In Alarm attribute of the Chiller Status Network Variable Output (i.e. nvoChillerstat.in_alarm) indicates whether any alarm is active (1). If the attribute nvoChillerStat.in_alarm displays a zero, there are no active alarms.
2. To monitor which alarms are currently active, read nvoAlarmDescr. The unit controller can accommodate 15 simultaneous alarms. Alarm messages are sent sequentially one every five seconds.

Clearing

BACnet

Magnitude Chiller Unit Controllers has one Binary Value object that can be used to clear alarms; ClearAlarms Network. A value of 1 will attempt to clear all alarms. Once the alarms are cleared, the Present_Value of this object goes back to 0.

LONWORKS

Magnitude Chiller Unit Controllers have one variable that can be used to clear alarms; nviClearAlarm. Changing the State portion of this SNVT_switch to a value of 1 will attempt to clear all alarms. Once the alarms are cleared, the Present_Value of this object goes back to 0. The Value portion of this SNVT_switch is not used.

Protocol Point Summary - BACnet

The following section defines the parameters for all BACnet objects available from the unit controller to the network (see Table 4 below). The shaded data points with numbers are the data points listed in Table 3.

Table 4. Comprehensive List of BACnet Objects

Network Control Property	Page	Read, Write[1]	Object Type	Instance	Description
Application Version	29	R	Device	*	Application version software running in the chiller.
Chiller Location	34	W	Device	*	Defines where the chiller is physically located. By default, this is blank.
Chiller Model	36	R	Device	*	This defines the model of the chiller.
Active Setpoint	28	R	AV	5	15.08 to 149.9°F (-9.4 to 65.5°C)
***Actual Capacity**	**28**	**R**	**AV**	**2**	**0–100%**
***Active Capacity Limit (Output)**	**30**	**R**	**AV**	**1**	**0–100%**
***Capacity Limit Setpoint - Network**	**30**	**W**	**AV**	**3**	**0 to 100%; Default=100%**
***Chiller Enable Output**	**31**	**R**	**BI**	**7**	**0=Disable, 1=Enable**
***Chiller Enable Setpoint**	**32**	**W**	**BV**	**2**	**0=Disable, 1=Enable**
Chiller Capacity Limited	32	R	BI	6	0=Not Limited, 1=Limited
Chiller Local/Network	34	R	BI	3	0=Network, 1=Local
Chiller Mode Output	35	R	MSV	2	1=Ice, 2=Cool, 3=Heat
Chiller Mode Setpoint – Network	36	W	MSV	3	1=Ice, 2=Cool, 3=Heat, Default=Cool
Chiller On Off	36	R	BI	4	0=Chiller Off, 1=Chiller On
***Chiller Status BACnet**	**37**	**R**	**MSV**	**1**	**1=Off, 2=Start, 3=Run, 4=Preshutdown, 5=Service**
Compressor Average Current	40	R	AI	9	0–2000 amps (less for some models)
Compressor Discharge Refrigerant Pressure	40	R	AI	81	0 to 410.0217 PSI
Compressor Discharge Refrigerant Temperature	41	R	AI	63	-40°F to 257°F (-40°C to 125°C)
Compressor Discharge Saturated Refrigerant Temperature	41	R	AV	26	-15 to 185°F (-26.2 to 85°C)
Compressor Percent RLA	42	R	AV	8	0% - 150% RLA
Compressor Power	42	R	AI	45	0 –600 kW
Compressor Run Hours	42	R	AV	74	0 –999,999
Compressor Starts	43	R	AV	92	0 –65,535
Compressor Suction Refrigerant Temperature	44	R	AI	105	-40°F to 257°F (-40°C to 125°C)
Compressor Average Voltage	40	R	AI	27	0–10,000 volts
***Condenser Entering Water Temperature**	**45**	**R**	**AI**	**3**	**-40 to 257°F (-40 to 125°C)**
Condenser Flow Switch Status	45	R	BI	1	0=No Flow, 1=Flow
***Condenser Leaving Water Temperature**	**46**	**R**	**AI**	**4**	**-40 to 257°F (-40 to 125°C)**
Condenser Pump #1 Run Hours	46	R	AV	110	0 –999,999
Condenser Pump #2 Run Hours	46	R	AV	111	0 –999,999
Condenser Refrigerant Pressure	47	R	AI	99	0 to 410.0217 PSI (-140 to 2827 kPA)
Condenser Saturated Refrigerant Temperature	47	R	AV	44	-15.16 to 185°F (-26.2 to 85°C)
Compressor Suction Refrigerant Pressure	44	R	AI	123	0-131.9988 psi
Compressor Suction Saturated Refrigerant Temperature	44	R	AV	50	-15.16 to 104°F (-26.2 to 40°C)
Condenser Water Flow Rate	47	R	AI	147	0 to 10,001.55 GPM (0 to 631 L/s)
Condenser Pump #1 Status	48	R	BI	11	0=Pump Off Request, 1=Pump On Request
Condenser Pump #2 Status	48	R	BI	12	0=Pump Off Request, 1=Pump On Request

Network Control Property	Page	Read, Write[1]	Object Type	Instance	Description
***Cool Setpoint - Network**	**49**	**W**	**AV**	**4**	**35 – 80°F (1.7°C to 26.7°C); Default=44°F**
***Evaporator Entering Water Temperature**	**50**	**R**	**AI**	**1**	**-40 to 257°F (-40 to 125°C)**
Evaporator Flow Switch Status	50	R	BI	2	0=No Flow, 1=Flow
***Evaporator Leaving Water Temperature**	**51**	**R**	**AI**	**2**	**-40 to 257°F (-40 to 125°C)**
Evaporator Pump #1 Run Hours	52	R	AV	112	0 –999,999
Evaporator Pump #2 Run Hours	52	R	AV	113	0 –999,999
Evaporator Water Flow Rate	53	R	AI	148	0 to 10,001.55 GPM (0 to 631 L/s)
Evaporator Pump #1 Status	52	R	BI	8	0=Pump Off Request, 1=Pump On Request
Evaporator Pump #2 Status	52	R	BI	9	0=Pump Off Request, 1=Pump On Request
Heat Recovery Entering Water Temperature	53	R	AI	149	-40 to 257°F (-40 to 125°C)
Heat Recovery Leaving Water Temperature	54	R	AI	150	-40 to 257°F (-40 to 125°C)
Heat Setpoint - Network	54	W	AV	6	100.04 to 150.08°F (37.8 to 65.6°C); Default=134.96°F
Ice Setpoint - Network	55	W	AV	7	14.9 to 35.06°F (-9.5 to 1.7°C), Default=25°F
Outdoor Air Temperature	59	R	AI	5	-40°F to 212°F (-40°C to 100°C)
Run Enabled	60	R	BI	5	0=OFF, 1=Run Allowed
Units	61	W	MSV	4	1=English(IP), 2=Metric(SI); Default=English
Alarm Digital Output	29	R	BI	10	0=No Alarm, 1=Alarm
Alarm Faults	64	R	AV	901	32=Cmp1LowEvapPress 33=Cmp1HiCondPress 34=Cmp1Tmr Exp No Strt 35=Cmp1LowMotorCurrent 36=Cmp1HiDischTemp 37=Cmp1MechHiPress 38=Cmp1HiMotorTemp 39=Cmp1HiMotorGapTemp 40=Cmp1LoRotorPumpSuperHt 41=Cmp1SurgeTemp 42=Cmp1SurgeSwitch 43=Cmp1MotorStartFailure 44=Cmp1NoCmpStop 45=Cmp1VFDFault 46=Cmp1VFDRefFault 47=Cmp1VFDLossofMotorSync 48=Cmp1VFDMotorStall 49=Cmp1VFDSpdCommandFault 50=Cmp1VFDOverspeed(Hardware) 51=Cmp1VFDOverspeed(Software) 52=Cmp1VFDOverspdMonitorFault 53=Cmp1VFDInputVoltageHigh 54=Cmp1VFDPrechargeFault 55=Cmp1VFDLowDCBusVolt 56=Cmp1VFDHiDCBusVltRunning 57=Cmp1VFDHiDCBusVltRegen 58=Cmp1VFDHiSteeringBrVltPrechrg 59=Cmp1VFDHiSteeringBrVltRunning 60=Cmp1VFDMotorOverload 61=Cmp1VFDHiCurrentBridge1 62=Cmp1VFDHiCurrentBridge2 63=Cmp1VFDHiCurrentChopper1 64=Cmp1VFDHiCurrentChopper2 65=Cmp1VFDInputPhaseLoss 66=Cmp1VFDOutputPhaseLoss 67=Cmp1VFDHiTempSide1 68=Cmp1VFDHiTempSide2 69=Cmp1VFD IGBT FltBridge1 70=Cmp1VFD IGBT FltBridge2 71=Cmp1VFD IGBT FltChopper1 72=Cmp1VFD IGBT FltChopper2 73=Cmp1VFDTherm1Flt 74=Cmp1VFDTherm2Flt 75=Cmp1VFDTherm3Flt 76=Cmp1VFDTherm4Flt

Network Control Property	Page	Read, Write[1]	Object Type	Instance	Description
					77=Cmp1VFDHiPwrSupTemp 78=Cmp1VFDHiPwrSupVolt 79=Cmp1VFDClgFanFlt 80=Cmp1VFDProcessorFlt 81=Cmp1VFDMaintenanceMode 82=Cmp1SuctPressSenFlt 83=Cmp1DishPressSenFlt 84=Cmp1CondRfrCkt1PressSenFlt 85=Cmp1CondRfrCkt2PressSenFlt 86=Cmp1SuctTempSenFlt 87=Cmp1DischTempSenFlt 88=Cmp1MotorGapTempSenFlt 89=Cmp1RotorPmpTempSenFlt 90=Cmp1BearingOrbitSurgeFlt 91=Cmp1CommunicationsFlt 92=Cmp1EvapLvgWtrTempSenFlt 93=Cmp1CondLvgWtrTempSenFlt 94=Cmp1SoftwareFlt 95=Cmp1EvapWtrFlwLoss 96=Cmp1CondWtrFlwLoss
Alarm Problems	63	R	AV	900	11=Cmp1LoEvapPressInhibitLoading 12=Cmp1EvapFreezeProtect 13=Cmp1CondFreezeProtect 14=Cmp1HiDischTemp 27=ChillerEvapPmp1Flt 28=ChillerEvapPmp2Flt 29=ChillerCondPmp1Flt 30=ChillerCondPmp2Flt 31=ChillerEvapEntWtrTempSenFlt
Alarm Warnings	63	R	AV	902	1=Cmp1SoftwareProbWarn 5=ChillerEvapEntTempSenWarn 6=ChillerCondEntTempSenWarn 7=ChillerCondLvgTempSenWarn 8=ChillerLiqLn1RefTempSenWarn 9=ChillerLiqLn2RefTempSenWarn 10=ChillerSoftwareProbWarn
Clear Alarm Network	38	W	BV	8	0= Normal (Default), 1=Clear Alarm

*Boldface denotes data points for typical minimum integration.

[1] This column refers to whether or not the Present Value property of the object is Read Only (R) or read/write (W).

Protocol Point Summary - LONWORKS

The following section defines the comprehensive list of LONWORKS variables available from the unit controller to the network. The properties are displayed as Network Output Variables, Network Input Variables, and Network Configuration Parameters (see Tables 5-7 below). The shaded data points with numbers are the data points listed in Table 3.

Network Output Variables

Table 5. LONWORKS Network Output Variables

Network Control Property	Variable Name	Page	SNVT Reference	SNVT Index	Description
Active Setpoint	nvoActiveSetpt	28	SNVT_temp_p	105	15.08 to 149.9°F (-9.4 to 65.5°C)
***Actual Capacity**	**nvoActCapacity**	**28**	**SNVT_lev_percent**	**81**	**0–100%**
Alarm Digital Output	nvoChillerstat	29	SNVT_chlr_stat	127	0=No Alarm, 1=In Alarm
Active Capacity Limit (Output)	nvoCapacityLim	30	SNVT_lev_percent	81	0–100%
Chiller Capacity Limited	nvoChillerstat	32	SNVT_chlr_stat	127	0=Not Limited, 1=Limited
Chiller Mode Output	nvoChillerstat	35	SNVT_chlr_stat	127	1=Ice, 2=Cool, 3=Heat
Chiller Local/Network	nvoChillerstat	34	SNVT_chlr_stat	127	0=Network (Remote), 1=Local
Chiller On Off	nvoOnOff	36	SNVT_switch	95	0=Chiller Off, 1=Chiller On
***Chiller Status**	**nvoChillerstat**	**37**	SNVT_chlr_stat	**127**	**Chiller Run Mode: 0=CHLR_OFF, 1= CHLR_START, 2=CHLR_RUN, 3=CHLR_PRESHUTDN, 4=CHLR_SERVICE**
Compressor Average Current	nvoCurrent	40	SNVT_amp	1	0-2000 Amperes (less on some models)
Compressor Discharge Refrigerant Pressure	nvoCmpDisRefPres	40	SNVT_press	30	0 to 410 PSI (0 to 2827 kPA)
Compressor Discharge Refrigerant Temperature	nvoCompDisTemp	41	SNVT_temp_p	105	-40°F to 257°F (-40°C to 125°C)
Compressor Discharge Saturated Refrigerant Temperature	nvoCmpDisSRefTmp	41	SNVT_temp_p	105	-15.16 to 185°F (-26.2 to 85°C)
Compressor Percent RLA	nvoCompPercRLA	42	SNVT_lev_percent	81	0-150%
Compressor Power	nvoKiloWatts	42	SNVT_power_kilo	28	0-600 kiloWatts
Compressor Run Hours	nvoCompHrs	42	SNVT_count_f	51	0 –999,999
Compressor Starts	nvoCompStarts	43	SNVT_count	8	0 –65,535
Compressor Suction Refrigerant Temperature	nvoSuctionTemp	44	SNVT_temp_p	105	-40°F to 257°F (-40°C to 125°C)
Compressor Average Voltage	nvoVoltage	40	SNVT_volt_ac	138	0–10,000
***Condenser Entering Water Temperature**	**nvoEntCndWTemp**	**45**	**SNVT_temp_p**	**105**	**-40 to 257°F (-40 to 125°C)**
Condenser Flow Switch Status	nvoChillerStat	45	chlr_status	127	0=No Flow, 1=Flow nvoChillerStat. cond_flow
***Condenser Leaving Water Temperature**	**nvoLvgCndWTemp**	**46**	**SNVT_temp_p**	**105**	**-40 to 257°F (-40 to 125°C)**
Condenser Pump Run Hours	nvoCondPumpHrs	46	SNVT_count_f	51	0 –999,999
Compressor Suction Refrigerant Pressure	nvoSuctRefPress	44	SNVT_press	30	0-132 psi (0-910.1 kPa)
Compressor Suction Saturated Refrigerant Temperature	nvoSatSuctRefTmp	44	SNVT_temp_p	105	-15.16 to 104°F (-26.2 to 40°C)

Network Control Property	Variable Name	Page	SNVT Reference	SNVT Index	Description
Condenser Refrigerant Pressure	nvoCondRefPres	47	SNVT_press	30	0 to 410 PSI (0 to 2827 kPA)
Condenser Saturated Refrigerant Temperature	nvoCondSatRefTmp	47	SNVT_temp_p	105	-15.16 to 185°F (-26.2 to 85°C)
Condenser Water Flow Rate	nvoCondFlowRate	47	SNVT_flow	15	0 to 1337.01 CFM (0 to 631 L/s)
Condenser Pump Status	nvoCndWPump	48	SNVT_switch	95	0= Pump Commanded Off, 1= Pump Commanded On
***Evaporator Entering Water Temperature**	**nvoEntChWTemp**	**50**	**SNVT_temp_p**	**105**	**-40 to 257°F (-40 to 125°C)**
Evaporator Flow Switch Status	nvoChillerStat	50	chlr_status	127	0=No Flow, 1=Flow nvoChillerstat.chw_flow
***Evaporator Leaving Water Temperature**	**nvoLvgChWTemp**	**51**	**SNVT_temp_p**	**105**	**-40 to 257°F (-40 to 125°C)**
Evaporator Pump Run Hours	nvoEvapPumpHrs	52	SNVT_count_f	51	0 –999,999
Evaporator Water Flow Rate	nvoEvapFlowRate	53	SNVT_flow	15	0 to 1337.01 CFM (0 to 631 L/s)
Evaporator Pump Status	nvoChWPump	52	SNVT_switch	95	0= Pump Off Request, 1= Pump On Request
Heat Recovery Entering Water Temperature	nvoEntHRWTemp	53	SNVT_temp_p	105	-40 to 257°F (-40 to 125°C)
Heat Recovery Leaving Water Temperature	nvoLvgHRWTemp	54	SNVT_temp_p	105	-40 to 257°F (-40 to 125°C)
Outdoor Air Temperature	nvoOutdoorTemp	59	SNVT_temp_p	105	-40°F to 212°F (-40°C to 100°C)
Run Enabled	nvoChillerstat	60	SNVT_chlr_stat	127	0=Off, 1=Run Allowed
Current Alarm	nvoAlarmDescr	67	SNVT_str_asc	36	31 Character Alarm Descriptor
Object Status	nvoStatus	57	SNVT_obj_status	93	
***Chiller Enable Output**	**nvoChillerEnable**	**31**	**SNVT_switch**	**95**	**0=Disable, 1=Enable**
File directory Address	nvoFileDirectory	53	**SNVT_address**	114	Address for the file directory containing descriptors for configuration files.

*Boldface denotes data/ points for typical minimum integration.

[1]The first register in this comma separated list is for compressor 1, the second is for compressor 2, the third is for compressor 3 and the fourth is for compressor 4. You must look at nviCompSelect to determine which compressor's register is displayed in this network variable.

[2]The first register in this comma separated list is for pump 1, the second is for pump 2. You must look at nviPumpSelect to determine which pump's register is displayed in this network variable.

Network Input Variables

Table 6. LONWORKS Network Input Variables

Network Control Property	Variable Name	Page	SNVT Reference	SNVT Index	Description
***Capacity Limit Setpoint**	**nviCapacityLim**	**30**	SNVT_lev_percent	**81**	**0 to 100%; Default=100%**
***Chiller Enable Setpoint**	**nviChillerEnable**	**32**	**SNVT_switch**	**95**	**0=Disable, 1=Enable**
Chiller Mode Setpoint	nviMode	36	SNVT_hvac_mode	108	1=HVAC_HEAT, 3=HVAC_COOL, 11=HVAC_ICE; Default=Cool
Compressor Select	nviCompSelect	43	SNVT_count	8	1=Comp 1/Circuit 1, 2=Comp 2/Circuit 2, 3=Comp 3, 4=Comp4

Network Control Property	Variable Name	Page	SNVT Reference	SNVT Index	Description
***Cool Setpoint**	**nviCoolSetpt**	**49**	SNVT_temp_p	**105**	**35 – 80°F (1.7°C to 26.7°C); Default=6.6°C**
Heat Setpoint	nviHeatSetpt	54	SNVT_temp_p	105	100 to 150°F (37.8 to 65.6°C); Default=57.2°C
Ice Setpoint	nviIceSpt	55	SNVT_temp_p	105	14.9 to 35.06°F (-9.5 to 1.7°C); Default=-3.9°C
***Clear Alarm Network**	**nviClearAlarm**	**38**	**SNVT_switch**	**95**	**0= Inactive,1=Clear Alarm; Default=0**
Current Date & Time	nviActTime	49	SNVT_time_stamp	84	
Pump Select	nviPumpSelect	59	SNVT_switch	95	0=Pump No. 1, 1=Pump No. 2; Default=0
Object Request	nviRequest	58	SNVT_obj_request	92	

*Boldface denotes data points for typical minimum integration.

Network Configuration Parameters

Table 7. LONWORKS Network Configuration Parameters

Network Control Property	Variable Name	Page	SCPT_Reference	SCPT Index	Description	Default Value
Capacity Limit	nciCapacityLim	29	SCPTlimitChlrCap	81	0% to 100%.	100%
Chiller Enable	nciChillerEnable	31	SCPTpwrUpState	73	0=Request Chiller Off, 1=Request Chiller Auto (run)	0
Cool Setpoint	nciCoolSetpt	49	SCPTCoolSetpoint	75	1.6– 26.6°C	6.6°C
Default Values	nciDefaults	50	SCPTdefltBehave	71	0=Use Default (nci) Values, 1=Use Last Valid Values	0
Heat Setpoint	nciHeatSetpt	55	SCPTHeatSetpoint	78	37.7–65.5°C	57.2° C
Ice Setpoint	nciIceSetpt	55	UCPTiceSetpt	---	-9.4°-1.7°C	-3.9°C
Chiller Location	nciLocation	34	SCPTlocation	17	Any NUL terminated ASCII string up to 31 bytes.	
Maximum Send Time	nciMaxSendTime	56	SCPTmaxSendTime	49	0–6553.4 sec	0 sec
Minimum Send Time	nciMinSendTime	56	SCPTminSendTime	52	0–6553.4 sec	0 sec
***Chiller Mode**	**nciMode**	**35**	**SCPTHVACmode**	**74**	**1=HVAC_HEAT, 3=HVAC_COOL, 11=HVAC_ICE**	**3**
Receive Heartbeat	nciRCvHrtBt	60	SCPTmaxRcvTime	48	0.0 – 6553.4 sec (0.1 sec)	0
Software Identification (Major Version)	nciDevMajVer	61	SCPTdevMajVer	165	0-255	1
Software Identification (Minor Version)	nciDevMinVer	61	SCPTdevMinVer	166	0-255	0

*Boldface denotes data points for typical minimum integration.

Detailed Data Point Information

This section lists the information (i.e. data) that is available to the BAS via BACnet or LONWORKS communication protocols. This information is used to safely operate and log the performance of the chiller. The systems integrator also uses this information when creating custom graphics.

Note: Data points are referred to as "properties in the BACnet protocol and "network variables" or "configuration parameters" in the LONWORKS protocol. In this document, the text refers to this information as a "data point." In general, the data point is applicable to both BACnet and LONWORKS. When a data point is specific to the BACnet protocol, the text refers to a "property." When a data point is specific to the LONWORKS protocol, the text refers to a "network variable" or "configuration parameter."

Active Setpoint

This read only network variable indicates the current setpoint used to control the chiller. The setpoint that is used is based on the operating mode (Ice, Cool or Heat) of the chiller and any "LWT reset" functions that are in effect. See "Chiller Mode Output" and "Chiller Mode Setpoint – Network". The default mode is Cool. There are three possible setpoints. See "Cool Setpoint – Network", "Heat Setpoint – Network" and "Ice Setpoint – Network".

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	15.08 to 149.9°F -9.4 to 65.5°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	5	Present Value	85
Object Name				
ActiveLvgWaterTarget				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoActiveSetpt	Chiller	temp_p	105	two bytes

Actual Capacity

This read only network variable indicates the percent of maximum capacity the chiller is producing under the present operating conditions. At 100%, the chiller may be producing more or less than its nominal rating due to variations in operating conditions.

Measurement	Units	Data Type	Usable Range	Default Value
Percent of chiller capacity	NA	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0–100%	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	2	Present Value	85
Object Name				
ChillerCapacity				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoActCapacity	Chiller	lev_percent	81	two bytes

Alarm Digital Output

This read only network variable indicates whether an alarm condition has occurred. This variable must be polled for alarm notification.

Measurement	Units	Data Type	Usable Range	Default Value
NA	NA	Integer	Enumerated	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Binary Input	3	10	Present Value	85
Object Name				
AlarmDigitalOutput				

Property Values
0 = No Alarm 1 = Alarm

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerstat.in_alarm	Chiller	SNVT_chlr_status	127	1 byte

Valid Range

0 No Alarm Condition

1 In Alarm

Application Version

This read-only property identifies the version of application software loaded into the unit controller.

Measurement	Units	Data Type	Usable Range	Default Value
N/A	N/A	CharacterString	N/A	N/A

BACnet

Object Identifier			Property	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Device	8	Variable	Application_Software_Version	12
Object Name				
<Device Object Name>				

Capacity Limit

Capacity Limit is a measure of the ratio of operating capacity to full capacity expressed as a percentage. Unless the configuration parameter nciDefaults = 1, the chiller object uses the optional configuration value of nciCapacityLim on unit controller power-up or loss of communication. Loss of communications is determined by Receive Heartbeat (nciRCvHrtBt). If Receive Heartbeat is greater than zero, then communication is lost if nviCapacityLim has not been written to prior to the Receive Heartbeat timer expiring. Each time nviCapacityLim is written, the Receive Heartbeat timer is reset. If Receive Heartbeat is set to 0, then this function is disabled and communication loss is never detected.

Refer to the appropriate Operation Manual for suitable variable values.

Measurement	Units	Data Type	Usable Range	Default Value
Percent of maximum	%	Fixed-Point Scalar signed	0% to 100%.	100%

capacity		long		

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciCapacityLim (configuration)	Chiller	SNVT_lev_percent	81	two bytes	SCPTlimitChlrCap	81

Active Capacity Limit Output

This read only network variable is a measure of the ratio of operating capacity limit to full capacity expressed in percent. This value is the lowest of all limits specified by the operator, analog Demand Limit input, or Network Capacity Limit Setpoint.

Measurement	Units	Data Type	Usable Range	Default Value
Percent of maximum capacity	%	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0% to 100%.	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Value	2	1	Present Value	85
Object Name				
ActiveCapacityLimit				

LonWorks

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nvoCapacityLim (output)	Chiller	lev_percent	81	two bytes	NA	NA

Capacity Limit Setpoint - Network

This read/write network variable sets the maximum capacity level of the chiller. This level may be adjusted via the BAS workstation or other network device, but cannot be adjusted above a factory-specified limit. The default is 100%.

Measurement	Units	Data Type	Usable Range	Default Value
Percent of maximum capacity	%	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0% to 100%	100%

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Value	2	3	Present Value	85
Object Name				
NetworkCapacityLimitPct				

LonWorks

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nviCapacityLim (input)	Chiller	lev_percent	81	two bytes	NA	NA

Chiller Enable

This mandatory LONWORKS configuration variable sets the default power-up and restart mode of the chiller, unless the configuration parameter nciDefaults = 1 (See Default Values). If nciDefaults = 1, the default values are the values specified during manufacturing. Refer to the appropriate Operating Manual for suitable variable values.

Measurement	Units	Data Type	Usable Range	Default Value
Chiller State	NA	structure	Enumerated	0 = Disable

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT_ Index
nciChillerEnable	Chiller	switch	95	two bytes	SCPTpwrUpState	73

The chiller object uses the configuration value of nciChillerEnable on power-up or loss of communication unless the configuration parameter nciDefaults =1 (See Default Values).

Valid Range

State	Value	Chiller Enable
0	unused	Request Chiller Off
1	unused	Request Chiller Auto (run)
-1 (0xff)	unused	Invalid

Chiller Enable Output

This read only network variable indicates if operation of the chiller is disabled or enabled. If the chiller is disabled, it cannot run. If it is enabled, it is allowed to run.

Measurement	Units	Data Type	Usable Range	Default Value
Chiller State	NA	BACnet: Enumerated LONWORKS: structure	See Below	0 = Disabled

BACnet

This read only property indicates if operation of the chiller is disabled or enabled.

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Binary Input	3	7	Present Value	85
Object Name				
ChillerEnable				

Property Values
0 = Disable (Inactive) 1 = Enable (Active)

LonWorks

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerEnable	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Chiller Enable
0	unused	Request Chiller Off
1	unused	Request Chiller Auto (run)
-1 (0xff)	unused	Invalid

Chiller Enable Setpoint

This read/write network variable is used to disable or enable chiller operation over the network. The default is Disable. This point is only applicable if Control Source is set to the BAS.

Measurement	Units	Data Type	Usable Range	Default Value
Chiller State	NA	BACnet: Enumerated LONWORKS: structure	See Below	0 = Disabled

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Value	5	2	Present Value	85
Object Name				
ChillerEnableStp				

Property Values
0 = Disable (Inactive)
1 = Enable (Active)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT_Index
nviChillerEnable	Chiller	Switch	95	two bytes	NA	NA

Valid Range

State	Value	Chiller Enable
0	unused	Request Chiller Off
1	unused	Request Chiller Auto (run)
-1(0xff)	unused	Invalid

Chiller Capacity Limited

This read only network variable indicates whether conditions may exist that prevent the chiller from reaching full capacity.

Measurement	Units	Data Type	Usable Range	Default Value
Status	NA	BACnet: Enumerated LonWorks: Structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	6	Present Value	85
Object Name				
ChillerLimited				

Property Values
0 = Not Limited (Inactive)
1 = Limited (Active)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerStat.Limited	Chiller	chlr_status	127	3 bytes

Property Values (Limited)
0 = Not Limited (Inactive)
1 = Limited (Active)

Structure

```
typedef struct {
    chiller_t chlr_run_mode;
```

```
        hvac_t chlr_op_mode;
        struct{
                unsigned in_alarm :1;           // offset 0
                unsigned run_enabled :1;        // offset 1
                unsigned local :1;              // offset 2
                unsigned limited :1;            // offset 3
                unsigned chw_flow :1;           // offset 4
                unsigned condw_flow :1;         // offset 5
        /* The last two bits (offset 6) are not defined */
        } chlr_state;
} SNVT_chlr_status;
```

Chiller Local/Network

This read only network variable indicates whether the chiller is in local control or allowed to be controlled remotely over the network. The value can only be changed via the unit controller OITS panel.

Measurement	Units	Data Type	Usable Range	Default Value
Mode	NA	BACnet: Enumerated LonWorks: Structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	3	Present Value	85
Object Name				
ChillerLocalNetwork				

Property Values
0 = Network 1= Local

LonWorks

The LONWORKS equivalent of this data point is part of the Chiller Status network variable.

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	Data Type
nvoChillerStat.local	Chiller	chlr_status	127	3 bytes	Structure

Property Values (local)
0 = Remote 1= Local

Structure

```
typedef struct {
    chiller_t   chlr_run_mode;
        hvac_t   chlr_op_mode;
        struct{
                unsigned   in_alarm :1;                 // offset 0
                unsigned   run_enabled :1;     // offset 1
                unsigned   local :1;                    // offset 2
                unsigned   limited :1;                  // offset 3
                unsigned   chw_flow :1;                 // offset 4
                unsigned   condw_flow :1;     // offset 5
        /* The last two bits (offset 6) are not defined */
        } chlr_state;
} SNVT_chlr_status;
```

Chiller Location

This optional configuration network parameter provides a description of the location.

Measurement	Units	Data Type	Usable Range	Default Value
NA	NA	Structure	Any NUL terminated ASCII string up to 31 bytes.	ASCII string of zeros + NUL

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Device	8	Variable	Location	58
Object Name				
Location				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciLocation	Chiller	str_asc	36	31 bytes max	SCPT_location	17

Chiller Mode

Chiller Mode Setpoint – Unless the configuration parameter nciDefaults =1 Network (nviMode) is set to match the configuration value (nciMode) upon unit controller power-up or loss of communication.

Loss of communications is determined by Receive Heartbeat (nciRCvHrtBt). If Receive Heartbeat is greater than zero, then communication is lost if nviMode is not written to prior to expiration of the Receive Heartbeat timer. Each time nviMode is written, the Receive Heartbeat timer is reset. If Receive Heartbeat is set to 0, then this function is disabled and communication loss is never detected.

Measurement	Units	Data Type	Usable Range	Default Value
HVAC Mode	NA	Unsigned Integer	Enumerated	3 = Cool

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT Reference	SCPT Index
nciMode	Chiller	hvac_mode	108	one byte	SCPT_HVACmode	74

Property Values
1 = Heat Mode
3 = Cool Mode
11 = Ice Mode

Chiller Mode Output

This read only network variable indicates the current operating mode of the chiller.

Measurement	Units	Data Type	Usable Range	Default Value
HVAC Mode	NA	BACnet: Unsigned Integer LONWORKS: Fixed Point Scalar - unsigned long	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Multi-state Value	19	2	Present Value	85
Object Name				
ActiveMode				

Property Values
1 = ICE
2 = COOL
3 = HEAT

LONWORKS

The LONWORKS equivalent of this data point is part of the Chiller Status network variable.

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerStat	Chiller	chlr_status	127	3 bytes

Chiller Mode Setpoint - Network

This read/write network variable is used to change the operating mode of the chiller. The default is Cool.

Measurement	Units	Data Type	Usable Range	Default Value
HVAC Mode	NA	BACnet: Unsigned Integer LONWORKS: Fixed Point Scalar - unsigned long	See Below	Cool

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Multi-state Value	19	3	Present Value	85
Object Name				
ChillerOperationMode				

Property Values
1 = ICE 2 = COOL 3 = HEAT

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT Reference	SCPT Index
nviMode	Chiller	hvac_mode	108	one byte	NA	NA

hvac_mode

All enumerations are not used for this data point. Only the following enumerations are used. If a value other than those listed below is written, the LONWORKS communication module writes HVAC_COOL to the unit controller.

Value	Identifier	Notes
1	HVAC_HEAT	Heating only
3	HVAC_COOL	Cooling only
11	HVAC_ICE	Ice-making mode

Chiller Model

This BACnet read-only network variable indicates the model of the chiller.

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Device	8	Variable	Model Name	70
Object Name				
<Device Object Name>				

Chiller On Off

This network variable indicates the current state of the chiller. The OFF state is represented by state = FALSE and value = 0. The other discrete states are represented by state = TRUE and value > 0.

Measurement	Units	Data Type	Valid Range	Default Value
Chiller State	NA	BACnet: Enumerated LONWORKS: structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	4	Present Value	85
Object Name				
UnitOFF				

Property Values
0 = Off
1 = Run Allowed

LONWORKS

The LONWORKS equivalent of this data point is part of the Chiller Status network variable output.

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoOnOff	Chiller	switch	95	two bytes

Chiller Status

This read only network variable indicates the unit status of the chiller.

Measurement	Units	Data Type	Usable Range	Default Value
State	NA	Unsigned Integer	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Multi-state Value	19	1	Present Value	85
Object Name				
UnitStatus				

Property Values
1 = Off
2 = Start
3 = Run
4 = Pre-shutdown
5 = Service

LONWORKS

Chiller Status includes the Run Mode. The Run Mode is defined as Off, Start, Run, Pre-shutdown and Service. This network variable indicates the main running mode and states of the chiller. The Run Mode provides the primary running states of a chiller and the state provides an indicator of other conditions present (see Structure section below for details.)

Measurement	Units	Data Type	Usable Range	Default Value
Chiller Status	NA	Structure	See Below	NA

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerstat	Chiller	chlr_status	127	3 bytes

Chiller Run Mode (chiller_t [25])

All enumerations are not used for this data point. Only the following enumerations are used.

Value	Identifier	Notes
0	CHLR_OFF	Chiller off
1	CHLR_START	Chiller in start mode
2	CHLR_RUN	Chiller in run mode
3	CHLR_PRESHUTDN	Chiller in pre shutdown mode
4	CHLR_SERVICE	Chiller in service mode

Chiller Operating Mode (hvac_t [14])

All enumerations are not used for this data point. Only the following enumerations are used.

Value	Identifier	Notes
1	HVAC_HEAT	Heating only
3	HVAC_COOL	Cooling only
11	HVAC_ICE	Ice-making mode

Chiller State

In_Alarm	1= Chiller is in an alarm condition. This condition may also be observed in the Node Object's status. 0= No alarm condition.
Run_Enabled	1= Chiller starts if operating conditions are satisfied. 0= Chiller not permitted to run. Chiller may be in local mode or placed in an disabled condition and can't be run via a remote request.
Local	1= Chiller has been placed in a locally controlled mode of operation and cannot respond to remote requests. 0= Chiller is not in local mode and network visible values maybe changed or monitored remotely.
Limited	1= Chiller conditions may exist that prevents the Chiller from reaching setpoint. 0= Chiller is not restricted from attempting to reach setpoint.
CHW_flow	1= Chiller Water flow is detected. 0= No chilled water flow present.
CONDW_flow	1= Condenser Water flow has been detected 0= No condenser water flow is observed.

Clear Alarm Network

This read/write network variable clears all active alarms. The following alarms cannot be cleared over the network. They can only be cleared via the unit controller OITS panel:

- Low Evaporator Pressure
- High Condenser Pressure
- Evaporator Freeze Protect
- Condenser Freeze Protect
- High Motor Temperature
- High Motor Gap Temperature
- Mechanical High Pressure

Measurement	Units	Data Type	Usable Range	Default Value
NA	NA	Integer	Enumerated	0=Normal

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Value	5	8	Present Value	85
Object Name				
ClearAlarm				

Property Values
0 = Normal
1 = Clear Alarm

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviClearAlarm	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Clear Alarm
0	unused	No Alarm
1	unused	Clear Alarm

Compressor Average Current

This read only network variable indicates the average current of the compressor motor. BACnet uses a separate variable for each compressor. LONWORKS uses the Compressor Select variable for compressor selection.

Measurement	Units	Data Type	Usable Range	Default Value
Electric Current	Amperes	BACnet: Real LONWORKS: Fixed Point Scalar signed long	0-2000	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	9	Present Value	85
Object Name				
C1Comp1Current				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCurrent	McQuayChiller	SNVT_amp	1	two bytes

Compressor Average Voltage

This read only network variable indicates the average voltage of the compressor motor. There is a separate output for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Electric Voltage	VAC	BACnet: Real LONWORKS: Fixed Point Scalar unsigned long	0-10,000	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	27	Present Value	85
Object Name				
C1Comp1Voltage				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoVoltage	McQuayChiller	SNVT_volt_ac	138	two bytes

Compressor Discharge Refrigerant Pressure

This read only network variable indicates the current refrigerant pressure discharged from the compressor. There is a separate output for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Pressure (gauge)	psi / kPa	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0-410.0217 PSI	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	81	Present Value	85
Object Name				
C1Comp1DischRefPressure				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCmpDisRefPres	McQuayChiller	SNVT_press	30	two bytes

*Note: The units for SNVT_press#US is inches of water column. To display units in psi the format must be changed to SNVT_press#US_psi.

Compressor Discharge Refrigerant Temperature

This read only network variable indicates the current refrigerant temperature discharged from the compressor. For BACnet, there is a separate variable for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40°–257°F -40°-125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	63	Present Value	85
Object Name				
C1Comp1DischargeTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCompDisTemp	McQuayChiller	SNVT_temp_p	105	two bytes

Compressor Discharge Saturated Refrigerant Temperature

This read only network variable indicates the current saturated refrigerant temperature discharged from the compressor. There is a separate output for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-15°–185°F -26.2°–85°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	26	Present Value	85
Object Name				
C1Comp1DischSatRefTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCmpDisSRefTmp	McQuayChiller	SNVT_temp_p	105	two bytes

Compressor Percent RLA

This read only network variable indicates the current percent RLA for the compressor motor of the compressor. BACnet uses a separate variable for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Percent RLA	Percent RLA	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0-150%	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	0	8	Present Value	85
Object Name				
C1Comp1MotorCurrentPercent				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCompPercRLA	McQuayChiller	SNVT_lev_percent	81	two bytes

Compressor Power

This read only network variable indicates the current power of the compressor motor. BACnet uses a separate variable for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Power	kiloWatts	BACnet: Real LONWORKS: Unsigned Long	0-600	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	45	Present Value	85
Object Name				
C1Comp1Kilowatts				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoKilowattts	McQuayChiller	SNVT_power_kilo	28	2 bytes

Compressor Run Hours

This read only network variable indicates the number of hours that the compressor motor has been turned on. BACnet uses a separate variable for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	Hours	BACnet: Real LONWORKS: Float Type unsigned long	0 –999,999	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	74	Present Value	85
Object Name				
C1Comp1Hours				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCompHrs	McQuayChiller	SNVT_count_f	51	two bytes

Compressor Select

This LONWORKS-only network variable selects the compressor/circuit (number 1, 2) that is interrogated. The unit controller returns the information for the selected compressor/circuit. You must first select a compressor/circuit prior to interrogation. This variable selects a compressor/circuit for the following variables:

Name	Page
Compressor Average Current	40
Compressor Discharge Refrigerant Pressure	40
Compressor Discharge Refrigerant Temperature	41
Compressor Discharge Saturated Refrigerant Temperature	41
Compressor Percent RLA	42
Compressor Power	42
Compressor Run Hours	42
Compressor Starts	43
Compressor Suction Refrigerant Temperature	44
Compressor Average Voltage	40
Compressor Suction Refrigerant Pressure	44
Compressor Suction Saturated Refrigerant Temperature	44

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	NA	LONWORKS: Fixed Point Scalar-unsigned long	1=Comp/Circuit No. 1 2=Comp/Circuit No. 2	1=Comp No. 1

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviCompSelect	McQuayChiller	SNVT_count	8	two bytes

Compressor Starts

This read only network variable indicates the number of times the compressor motor has been started. BACnet uses a separate variable for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	NA	BACnet: Real LONWORKS: Fixed Point Scalar - unsigned long	0 –65,535	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	92	Present Value	85
Object Name				
C1Comp1Starts				

LonWorks

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCompStarts	McQuayChiller	SNVT_count	8	two bytes

Compressor Suction Saturated Refrigerant Temperature

This read only network variable indicates the current saturated refrigerant temperature discharged from the compressor. There is a separate output for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-15.16°–104°F -26.2°–40°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	50	Present Value	85
Object Name				
C1Comp1SuctSatTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoSatSuctRefTmp	McQuayChiller	SNVT_temp_p	105	two bytes

Compressor Suction Refrigerant Pressure

This read only network variable indicates the current refrigerant pressure entering the compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Pressure (gauge)	psi / kPa	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0-131.9988 psi 0-910.1 kPa	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	123	Present Value	85
Object Name				
C1Comp1SuctionPressure				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoSuctRefPress	McQuayChiller	SNVT_press	30	two bytes

*Note: The units for SNVT_press#US is inches of water column. To display units in psi the format must be changed to SNVT_press#US_psi.

Compressor Suction Refrigerant Temperature

This read only network variable indicates the current refrigerant temperature entering the compressor. There is a separate output for each compressor. LONWORKS uses the Compressor Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40°–257°F -40°–125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	105	Present Value	85
Object Name				
C1Comp1SuctionTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoSuctionTemp	McQuayChiller	SNVT_temp_p	105	two bytes

Condenser Entering Water Temperature

This read only network variable indicates the current temperature of the water entering the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40 to 257°F -40 to 125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	3	Present Value	85
Object Name				
EntCondWaterTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoEntCndWTemp	Chiller	temp_p	105	two bytes

Condenser Flow Switch Status

This read only network variable indicates the status of the water flowing through the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Flow State	NA	BACnet: Enumerated LONWORKS: Structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	1	Present Value	85
Object Name				
CondWaterFlowStatus				

Property Values
0 = No Flow (Inactive)
1 = Flow (Active)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerStat.cond_flow	Chiller	chlr_status	127	3 bytes
Property Values (Limited)				
0 = No Flow 1 = Flow				

Structure

```
typedef struct {
      chiller_t chlr_run_mode;
            hvac_t chlr_op_mode;
            struct{
                  unsigned in_alarm :1;                  // offset 0
                  unsigned run_enabled :1;       // offset 1
                  unsigned local :1;             // offset 2
                  unsigned limited :1;                   // offset 3
                  unsigned chw_flow :1;          // offset 4
                  unsigned condw_flow :1;        // offset 5
            /* The last two bits (offset 6) are not defined */
            } chlr_state;
} SNVT_chlr_status;
```

Condenser Leaving Water Temperature

This read only network variable indicates the current temperature of the water leaving the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LonWorks: Fixed Point Scalar signed long	-40 to 257°F -40 to 125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	4	Present Value	85
Object Name				
LvgCondWaterTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoLvgCndWTemp	Chiller	temp_p	105	two bytes

Condenser Pump Run Hours

This read only network variable indicates the number of hours that the pump motor has been turned on (see Pump Select).

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	NA	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0 –999,999	NA

BACnet

Pump #1

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	110	Present Value	85

Object Name
CondPump1RunHours

Pump #2

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Value	2	111	Present Value	85
Object Name				
CondPump2RunHours				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCondPumpHrs	McQuayChiller	SNVT_count_f	51	two bytes

Condenser Refrigerant Pressure

This read only network variable indicates the current condenser refrigerant pressure.

Measurement	Units	Data Type	Usable Range	Default Value
Pressure (gauge)	psi / kPa	BACnet: Real LONWORKS: Fixed-Point Scalar signed long	0-410.0297 psi -140 to 2827 kPa	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Input	0	99	Present Value	85
Object Name				
Cond1RefPressure				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCondRefPres	McQuayChiller	SNVT_press	30	two bytes

*Note: The units for SNVT_press#US is inches of water column. To display units in psi the format must be changed to SNVT_press#US_psi.

Condenser Saturated Refrigerant Temperature

This read only network variable indicates the current saturated refrigerant temperature of the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-15.16°–185°F -26.2°–85°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Value	2	44	Present Value	85
Object Name				
Cond1SatRefTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCondSatRefTmp	McQuayChiller	SNVT_temp_p	30	two bytes

Condenser Water Flow Rate

This read only network variable indicates the rate of water flow through the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Flow Volume	BACnet: GPM or L/s LONWORKS: CFM OR L/S	BACnet: Real LONWORKS: Fixed Point Scalar unsigned long	BACnet:0-10,001.55 GPM 0-631 L/S LONWORKS: 0 to 1337.01 CFM (0 to 631 L/s)	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	147	Present Value	85
Object Name				
CondWaterFlowRate				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCondFlowRate	McQuayChiller	SNVT_flow	15	two bytes

Condenser Pump Status

This read only network variable indicates if the pump has been commanded On or Off. See Pump Select.

Measurement	Units	Data Type	Usable Range	Default Value
Flow State	NA	BACnet: Enumerated LONWORKS: Structure	See Below	NA

BACnet

Pump #1

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	11	Present Value	85
Object Name				
CondPump1State				

Property Values
0 = Pump Off Request
1 = Pump On Request

Pump #2

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	12	Present Value	85
Object Name				
CondPump2State				

Property Values
0 = Pump Off Request
1 = Pump On Request

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoCndWPump	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Pump Status
0	unused	Pump Commanded Off
1	unused	Pump Commanded On

Cool Setpoint - Network

This read/write network variable is used to change the Cooling setpoint from the network. It sets the temperature of the Leaving Chilled Water when the chiller is operating in the Cooling Mode. It cannot be set below the local Cool Setpoint.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	35°-80°F 1.7°-26.7°C	44°F/6.6°C

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	4	Present Value	85
Object Name				
NetworkCoolTempSetpoint				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nviCoolSetpt	Chiller	temp_p	105	two bytes	NA	NA

Cool Setpoint

Unless the configuration parameter nciDefaults =1, the Cool Setpoint Network variable (nviCoolSetpt) is set to this configuration value (nciCoolSetpt) upon unit controller power-up or loss of communication. If nciDefaults = 1, then nviCoolSetpt retains the last valid value at the time power is restored. Refer to the Magnitude Chiller Unit Controller Operation Manual for suitable variable values. Loss of communications is determined by Receive Heartbeat (nciRCvHrtBt). If Receive Heartbeat is greater than zero, then communications is lost when nviCoolSetpt is not written to again prior to the expiration of the Receive Heartbeat timer. Each time nviCoolSetpt is written, the Receive Heartbeat timer is reset. If Receive Heartbeat is set to 0, then this function is disabled and communication loss is never detected.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	Fixed Point Scalar signed long	LONWORKS: 1.6°-26.6°C	6.6°C

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciCoolSetpt	Chiller	temp_p	105	two bytes	SCPT_CoolSetpoint	75

Current Date & Time

This network variable is used to synchronize the chiller's internal time clock with the BAS.

Measurement	Units	Data Type	Valid Range	Default Value
Alarm Timestamp	NA	Structure	See Below	NA

BACnet

No equivalent value. BACnet should use DM-TS-B and DM-UTC-B services.

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviActTime	McQuayChiller	SNVT_time_stamp	84	7 bytes

Default Values

This configuration network parameter determines which set of values is used on power up and communication failure. The choice is the stated default value (nci) or a last valid value. This is used for the following configuration network variables:

- Chiller Enable
- Capacity Limit
- Cool Setpoint
- Heat Setpoint
- Mode

Measurement	Units	Data Type	Usable Range	Default Value
Chiller State	NA	structure	Enumerated	0 = Use Default Values

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciDefaults	Chiller	switch	95	two bytes	SCPT_DefaultBehavior	71

Valid Range

State	Value	Default Values
0	unused	Use Default (nci) Values
1	unused	Use Last Valid Values

Evaporator Entering Water Temperature

This read only network variable indicates the temperature of the water entering the evaporator.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40 to 257°F -40 to 125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Input	0	1	Present Value	85
Object Name				
EntEvapWaterTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoEntChWTemp	Chiller	temp_p	105	two bytes

Evaporator Flow Switch Status

This read only network indicates the status of the water flowing through the evaporator.

Measurement	Units	Data Type	Usable Range	Default Value
Flow State	NA	BACnet: Enumerated LONWORKS: Structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	2	Present Value	85
Object Name				
EvapWaterFlowStatus				

Property Values
0 = No Flow (Inactive) 1 = Flow (Active)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerStat.chw_flow	Chiller	chlr_status	127	3 bytes

Property Values (Limited)
0 = No Flow 1 = Flow

Structure

```
typedef struct {
    chiller_t chlr_run_mode;
        hvac_t chlr_op_mode;
        struct{
                unsigned in_alarm :1;          // offset 0
                unsigned run_enabled :1;       // offset 1
                unsigned local :1;             // offset 2
                unsigned limited :1;           // offset 3
                unsigned chw_flow :1;          // offset 4
                unsigned condw_flow :1;        // offset 5
        /* The last two bits (offset 6) are not defined */
        } chlr_state;
} SNVT_chlr_status;
```

Evaporator Leaving Water Temperature

This read only network variable indicates the current temperature of the water leaving the evaporator.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40 to 257°F -40 to 125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	2	Present Value	85
Object Name				
LvgEvapWaterTempUnit				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoLvgChWTemp	Chiller	temp_p	105	two bytes

Evaporator Pump Run Hours

This read only network variable indicates the number of hours that the pump motor has been turned on. There is a separate output for each pump. LONWORKS uses the Pump Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	NA	BACnet: Real LONWORKS: Fixed-Point unsigned long	0 –999,999	NA

BACnet

Pump #1

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	112	Present Value	85
Object Name				
EvapPump1OperHours				

Pump #2

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	113	Present Value	85
Object Name				
EvapPump2OperHours				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoEvapPumpHrs	McQuayChiller	SNVT_count_f	51	two bytes

Evaporator Pump Status

This read only network variable indicates if the pump has been commanded On or Off. LONWORKS uses the Pump Select variable.

Measurement	Units	Data Type	Usable Range	Default Value
Flow State	NA	BACnet: Enumerated LONWORKS: Structure	See Below	NA

BACnet

Pump #1

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	8	Present Value	85
Object Name				
EvapPump1State				

Property Values
0 = Pump Off Request 1 = Pump On Request

Pump #2

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Input	3	9	Present Value	85
Object Name				
EvapPump2State				

Property Values
0 = Pump Off Request 1 = Pump On Request

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChWPump	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Pump Status
0	unused	Pump Off Request
1	unused	Pump On Request

Evaporator Water Flow Rate

This read only network variable indicates the rate of water flow through the evaporator.

Measurement	Units	Data Type	Usable Range	Default Value
Flow Volume	BACnet: GPM or L/s LONWORKS: CFM OR L/S	BACnet: Real LONWORKS: Fixed Point Scalar unsigned long	BACnet:0-10,001.55 GPM 0-631 L/S LONWORKS: 0 to 1337.01 CFM (0 to 631 L/s)	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Input	0	148	Present Value	85
Object Name				
EvapWaterFlowRate				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoEvapFlowRate	McQuayChiller	SNVT_flow	15	two bytes

File Directory Address

This read only network variable reports the starting address of the configuration-file directory on a Neuron hosted device. It is used when configuration properties are implemented within configuration files accessed by ANSI/EIA/CEA-709.1- Read Memory and Write Memory Network-Management Messages.

Measurement	Units	Data Type	Usable Range	Default Value
Neuron Chip Address	16-bit address value	LONWORKS: unsigned long	16,384…64,767	NA

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoFileDirectory	Node	SNVT_address	114	two bytes

Heat Recovery Entering Water Temperature

This read only network variable indicates the temperature of the water entering the heat recovery section of the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar	-40 to 257°F -40 to 125°C	NA

		signed long		

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	149	Present Value	85
Object Name				
HeatRecEntWaterTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoEntHRWTemp	McQuayChiller	SNVT_temp_p	105	two bytes

Heat Recovery Leaving Water Temperature

This read only network variable indicates the current temperature of the water leaving the heat recovery section of the condenser.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40°–257°F -40°–125°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	150	Present Value	85
Object Name				
HeatRecLvgWaterTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoLvgHRWTemp	McQuayChiller	SNVT_temp_p	105	two bytes

Heat Setpoint - Network

This read/write network variable is used to change the Heating setpoint from the network. It sets the temperature of the Leaving Condenser Water when the chiller is operating in the Heating Mode. The value is ignored if the unit controller is in cooling mode.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	100.04 to 150.08°F 37.8-65.6°C	134.96°F/57.2°C

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	6	Present Value	85
Object Name				
NetworkHeatTempSetpoint				

LONWORKS

LonWorks Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nviHeatSetpt	Chiller	SNVT_temp_p	105	two bytes	NA	NA

Heat Setpoint

Unless the configuration parameter nciDefaults =1, the Heat Setpoint Network variable (nviHeatSetpt) is set to this configuration value (nciHeatSetpt) upon unit controller power-up or loss of communication. If nciDefaults = 1, nviHeatSetpt retains the last valid value at the time power is restored. Refer to the Magnitude Unit Controller Operation Manual for suitable variable values. Loss of communications is determined by Receive Heartbeat (nciRCvHrtBt). If Receive Heartbeat is greater than zero, then communications is lost when nviCoolSetpt is not written to prior to the expiration of the Receive Heartbeat timer. The Receive Heartbeat timer is reset each time nviHeatSetpt is written. If Receive Heartbeat is set to 0, then this function is disabled and communication loss is never detected.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	LonWorks: Fixed Point Scalar signed long	37.7-65.5°C	57.2°C

LonWorks

LonWorks Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciHeatSetpt	Chiller	SNVT_temp_p	105	two bytes	SCPT_HeatSetpoint	78

Ice Setpoint - Network

This read/write network variable is used to change the Ice setpoint from the network. It sets the temperature of the Leaving Chilled Water when the chiller is operating in the Ice Mode.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LonWorks: Fixed Point Scalar signed long	14.9 to 35.06°F -9.5 to 1.7°C	24.98°F/-3.9°C

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Analog Value	2	7	Present Value	85
Object Name				
NetworkIceTempSetpoint				

LonWorks

LonWorks Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviIceSpt	McQuayChiller	SNVT_temp_p	105	two bytes

Ice Setpoint

Unless the configuration parameter nciDefaults =1, the Ice Setpoint Network variable (nviIceSpt) is set to this configuration value (nciIceSetpt) upon unit controller power-up or loss of communication. If nciDefaults = 1, nviIceSpt retains the last valid value at the time power is restored. Refer to the Magnitude Chiller Unit Controller Operation Manual for suitable variable values. Loss of communications is determined by Receive Heartbeat (nciRCvHrtBt). If Receive Heartbeat is greater than zero, then communication is lost if nviIceSpt has not been written to prior to the expiration of the Receive Heartbeat timer. The Receive Heartbeat timer is reset each time nviIceSpt is written. If Receive Heartbeat is set to 0, then this function is disabled and communication loss is never detected.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	LonWorks: Fixed Point Scalar signed long	-9.4°-1.7°C	-3.9°C

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciIceSetpt	McQuayChiller	SNVT_temp_p	105	two bytes	UCPTiceSetpt	N/A

Maximum Send Time

This configuration network parameter controls the maximum period of time that expires before the following network variables are transmitted.

- nvoActCapacity
- nvoActiveSetpt
- nvoChillerstat
- nvoCompPercRLA
- nvoCurrent
- nvoEntCndWTemp
- nvoEntChWTemp
- nvoLvgChWTemp
- nvoLvgCndWTemp

Measurement	Units	Data Type	Usable Range	Default Value
Elapsed Time	seconds	BACnet: Unsigned Integer LONWORKS: Fixed Point Scalar - unsigned long	0–6553.4 sec	0 (no automatic update)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciMaxSendTime	Chiller	SNVT_time_sec	107	two bytes	SCPT_maxSendTime	49

Minimum Send Time

This configuration network parameter controls the minimum period of time that expires before objects can be retransmitted. The variables that use Minimum Send Time are:

- nvoActCapacity
- nvoCapacityLim
- nvoCmpDisRefPres
- nvoCmpDisSRefTmp
- nvoCompDisTemp
- nvoCompPercRLA
- nvoCondFlowRate
- nvoCondRefPres
- nvoCondSatRefTmp
- nvoCurrent
- nvoEntChWTemp
- nvoEntCndWTemp
- nvoEntHRWTemp
- nvoEvapFlowRate
- nvoKiloWatts

- nvoLvgChWTemp
- nvoLvgCndWTemp
- nvoLvgHRWTemp
- nvoOutdoorTemp
- nvoSatSuctRefTmp
- nvoSuctionTemp
- nvoSuctRefPress
- nvoVoltage

Measurement	Units	Data Type	Usable Range	Default Value
Elapsed Time	seconds	BACnet: Unsigned Integer LONWORKS: Fixed Point Scalar - unsigned long	0–6553.4 sec	0 (no automatic update)

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciMinSendTime	Chiller	time_sec	107	two bytes	SCPT_minSendTime	52

Object Status

This network variable reports the status for any functional block on a device. It is also used to report the status of the entire device and all functional blocks on the device. A status update consists of an object ID (the **object_id** field) and multiple status fields. The object ID is the functional block index as described under **nviRequest**. If the object ID is zero, the status of the device itself and all functional blocks on the device is reported. The status fields are one-bit bitfields. The only supported status fields are the **report_mask**, **invalid_id**, and **invalid_request** fields; all other status fields are not supported.

- **invalid_request -** Set to one if an unsupported request code is received on the **nviRequest** input network variable.
- **invalid_id -** Set to one if a request is received for a functional block index that is not defined in the device. No further checking of the request code is required when set to one.
- **report_mask** Set to one if an **RQ_REPORT_MASK** request is received by the **nviRequest** input network variable, and the **nvoStatus** network variable is set to contain the status mask. The *status mask* is an **nvoStatus** value that describes the status bits that are supported beyond the three mandatory status bits. The status mask consists of all fields in the **nvoStatus** network variable, with the exception of the **report_mask**, **invalid_id**, and **invalid_request** fields. A one bit in the mask means that the functional block may set the corresponding bit in the **nvoStatus** network variable when the condition defined for that bit occurs. A zero bit means that the functional block may never set the bit.

Measurement	Units	Data Type	Valid Range	Default Value
Object Status	N/A	Structure	N/A	N/A

BACnet

No BACnet equivalent

LONWORKS

LonWorks Name	Profile	Uses Heartbeat	SNVT Type	SNVT Number
nvoStatus	Node Object	No	SNVT_obj_request	92

Field Definitions

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

Object Request

This input network variable provides the mechanism to request an operation or a mode for a functional block within a device. A request consists of an object ID (the **object_id** field) and an object request (the **object_request** field). The object ID is the functional block index for a functional block on the device. The Node Object functional block is index zero. The remaining functional blocks are numbered sequentially, starting with one. The following functions are supported:

- **RQ_NORMAL** - If the specified functional block was in the disabled or overridden state, this request cancels that state, and returns the functional block to normal operation. If the functional block was already in the normal state, a request to enter the normal state is not an error. After device reset, the state of functional blocks on the device is application-specific. An **RQ_NORMAL** request that specifies the Node Object functional block index is a request for all functional blocks in the device to leave the disabled and overridden states.
- **RQ_UPDATE_STATUS -** Requests the status of the specified functional block to be sent to the **nvoStatus** network variable. The state of the functional block is unchanged. An **RQ_ UPDATE_STATUS** request that specifies the Node Object functional block is a request for the status of the device and all functional blocks on the device. The status bits of the Node Object (with the exception of **invalid_request** and **invalid_id**) are defined to be the inclusive-OR of the status bits of all the other functional blocks in the device; with the possible addition of error conditions and other conditions attributed to the device as a whole, rather than to any individual functional block. For example, if **comm_failure** is supported for the Node Object, then it should be set when reporting the Node Object functional block status whenever any of the functional blocks in the device reports communications failure, as well as when there is a communications failure at the device level.
- **RQ_REPORT_MASK -** Requests a *status mask* reporting the status bits that are supported by the specified functional block to be sent to the **nvoStatus** network variable. A one bit in the status mask means that the device may set the corresponding bit in the object status when the condition defined for that bit occurs. A zero bit in the status mask means that the bit is never set by the device.

Measurement	Units	Data Type	Valid Range	Uses Heartbeat	Default Value
Object Request	N/A	Structure	N/A	No	N/A

BACnet

No BACnet equivalent

LONWORKS

LonWorks Name	Profile	Uses Heartbeat	SNVT Type	SNVT Number
nviRequest	Node Object	No	SNVT_obj_status	93

Enumeration Definitions (object_request_t)

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

Outdoor Air Temperature

This read only network variable indicates the current outdoor air temperature.

Measurement	Units	Data Type	Usable Range	Default Value
Temperature	°F/°C	BACnet: Real LONWORKS: Fixed Point Scalar signed long	-40° to 212°F -40° to 100°C	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Input	0	5	Present Value	85
Object Name				
OutdoorAirTemp				

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoOutdoorTemp	McQuayChiller	SNVT_temp_p	105	two bytes

Pump Select

This LONWORKS-only read/write network variable selects which pump (#1 or # 2) supplies the data. The unit controller returns the information for the appropriate Condenser or Evaporator pump. You must first select a pump and then interrogate the selected pump. See Condenser Pump Run Hours and Evaporator Pump Run Hours.

Measurement	Units	Data Type	Usable Range	Default Value
Event Count	NA	LONWORKS: structure	See Below	0 = Pump No. 1

LONWORKS

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviPumpSelect	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Pump Select
0	unused	Pump No. 1
1	unused	Pump No. 2

Receive Heartbeat

This read/write configuration property defines the maximum time that elapses after the last update to a specified network variable input before the unit starts to use the value contained in the corresponding network configuration variable (nci). This variable is only applicable when nciDefaults is set to 0. If nciDefaults is set to 1, the nvi's remain as the value written from the network regardless of the receive heartbeat time.

The variables that use Receive Heartbeat are:

- nviCapacityLim
- nviChillerEnable
- nviCoolSetpt
- nviHeatSetpt
- nviIceSpt
- nviMode

Measurement	Units	Data Type	Usable Range	Default Value
Elapsed Time	seconds (0,1)	BACnet: Unsigned Integer LONWORKS: Fixed Point Scalar - unsigned long	0.0 – 6553.4 sec (0.1 sec). 0xFFFF represents invalid data	0 Seconds

LonWorks

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size	SCPT_Reference	SCPT Index
nciRCvHrtBt	Chiller	time_sec	107	two bytes	SCPT_maxRcvTime	48

Run Enabled

This read only network variable indicates the running mode of the Chiller. The Run Enabled network variable indicates that the chiller can start if operating conditions are met.

Measurement	Units	Data Type	Usable Range	Default Value
Chiller Status	NA	BACnet: Enumerated LONWORKS: Structure	See Below	NA

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Binary Input	3	5	Present Value	85
Object Name				
UnitOFF				

Property Values
0 = Off (Inactive)
1 = Run Allowed (Active)

LONWORKS

The LONWORKS equivalent of this data point is part of the Chiller Status network variable.

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoChillerStat	Chiller	chlr_status	127	3 bytes

Property Values (run_enabled)
0 = Off (Inactive)
1 = Run Allowed (Active)

Structure

```
typedef struct {
        chiller_t       chlr_run_mode;
                hvac_t   chlr_op_mode;
                struct{
                        unsigned   in_alarm :1;                         // offset 0
                        unsigned   run_enabled :1;          // offset 1
                        unsigned   local :1;                            // offset 2
                        unsigned   limited :1;                          // offset 3
                        unsigned   chw_flow :1;                         // offset 4
                        unsigned   condw_flow :1;           // offset 5
                /* The last two bits (offset 6) are not defined */
                } chlr_state;
} SNVT_chlr_status;
```

Software Identification (Major Version)

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

Measurement	Units	Data Type	Usable Range	Default Value
Version Number	NA	Structure	0-255	1

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SCPT Size
nciDevMajVer	Node Object	SCPTdevMajVer	165	1 byte

Software Identification (Minor Version)

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

Measurement	Units	Data Type	Usable Range	Default Value
Version Number	NA	Structure	0-255	0

LONWORKS

LonWorks Name	Profile	SCPT Reference	SCPT Number	SCPT Size
nciDevMinVer	Node Object	SCPTdevMinVer	166	1 byte

Units

This binary value allows you to select the units of measure that are being passed through BACnet.

Measurement	Units	Data Type	Usable Range	Default Value
Unit Type	NA	Unsigned Integer	See Below	1 = English

BACnet

Object Identifier			Property Identifier	
Object Type	Type Enumeration	Instance	Property Name	Property Enumeration
Multi-state Value	19	4	Present Value	85

Object Name
Units

Property Values
1 = English (Inactive)
2 = Metric (Active)

Alarms-BACnet

Alarm Classes

BACnet alarms in a Magnitude Chiller Unit Controller are divided into three classes: Faults, Problems, and Warnings. Fault alarms have the highest severity level. Problem alarms have medium severity level. Warning alarms have the lowest severity level.

Fault Alarms

Fault alarms require an acknowledgment from the operator. These alarms indicate that the compressor is shut down.

Problem Alarms

Problem alarms do not cause compressor shutdown but limit operation of the chiller in some way.

Warning Alarms

A warning is enunciated whenever an abnormal condition exists which does not affect chiller operation.

BACnet Alarm Handling

The BACnet Communication Module has two methods for handling BACnet alarms: Monitor by Alarm Class, and Alarm Digital Output.

Monitor by Alarm Class

The Monitor by Alarm Class method requires that three Analog Value objects in the BACnet Communication Module be polled for alarm notification. One object indicates Warning Alarms, one indicates Problem Alarms, and one indicates Fault Alarms. The Analog Value objects return a number for an alarm condition. The number is found in the Index column of Table 8.

Alarm Warnings

This BACnet object indicates the index number of warning alarms. If the present value is zero, no alarm has occurred. See Table 8.

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

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	902	Present Value	85
Object Name				
AVWarningAlarm				

Alarm Problems

This BACnet object indicates the index number of problem alarms. If the present value is zero, no alarm has occurred. See Table 8.

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

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	900	Present Value	85
Object Name				
AVProblemAlarm				

Alarm Faults

This BACnet object indicates the index number of fault alarms. If the present value is zero, no alarm has occurred. See Table 8.

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

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Analog Value	2	901	Present Value	85
Object Name				
AVFaultAlarm				

Alarm Digital Output

The Alarm Digital Output method requires that one Binary Output object in the BACnet Communication Module be polled for alarm notification. This object indicates whether an alarm condition has occurred. The unit controller OITS panel displays the alarm text.

Measurement	Units	Data Type	Usable Range	Default Value
NA	NA	Integer	Enumerated	NA

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Output	4	5	Present Value	85
Object Name				
AlarmDigitalOutput				

Property Values
0 = No Alarm 1 = Alarm

Clearing Alarms-BACnet

This read/write network variable clears all active alarms. The following alarms cannot be cleared over the network. They can only be cleared at the chiller (i.e. via the unit controller OITS panel).

- Low Evaporator Pressure
- High Condenser Pressure (by pressure sensor)
- High Condenser Pressure (by pressure switch)
- Freeze Protection
- High Motor Temperature

Measurement	Units	Data Type	Usable Range	Default Value
NA	NA	Integer	Enumerated	0=Normal

BACnet

Object Identifier			Property Identifier	
Object Type	**Type Enumeration**	**Instance**	**Property Name**	**Property Enumeration**
Binary Value	5	42	Present Value	85
Object Name				
ClearAlarm				

Property Values
0 = Normal
1 = Clear Alarm

BACnet Alarm Messages

The following table identifies each alarm number, class, and the alarm text.

Table 8. BACnet Alarms

Alarm Number	Alarm Message Text	Alarm Number	Alarm Message Text
Warnings			
1	Cmp1SoftwareProbWarn	8	ChillerLiqLn1RefTempSenWarn
5	ChillerEvapEntTempSenWarn	9	ChillerLiqLn2RefTempSenWarn
6	ChillerCondEntTempSenWarn	10	ChillerSoftwareProbWarn
7	ChillerCondLvgTempSenWarn		
Problems			
11	Cmp1LoEvapPressInhibitLoading	28	ChillerEvapPmp2Flt
12	Cmp1EvapFreezeProtect	29	ChillerCondPmp1Flt
13	Cmp1CondFreezeProtect	30	ChillerCondPmp2Flt
14	Cmp1HiDischTemp	31	ChillerEvapEntWtrTempSenFlt
27	ChillerEvapPmp1Flt		
Faults			
32	Cmp1LowEvapPress	65	Cmp1VFDInputPhaseLoss
33	Cmp1HiCondPress	66	Cmp1VFDOutputPhaseLoss
34	Cmp1Tmr Exp No Strt	67	Cmp1VFDHiTempSide1
35	Cmp1LowMotorCurrent	68	Cmp1VFDHiTempSide2
36	Cmp1HiDischTemp	69	Cmp1VFD IGBT FltBridge1
37	Cmp1MechHiPress	70	Cmp1VFD IGBT FltBridge2
38	Cmp1HiMotorTemp	71	Cmp1VFD IGBT FltChopper1
39	Cmp1HiMotorGapTemp	72	Cmp1VFD IGBT FltChopper2
40	Cmp1LoRotorPumpSuperHt	73	Cmp1VFDTherm1Flt
41	Cmp1SurgeTemp	74	Cmp1VFDTherm2Flt
42	Cmp1SurgeSwitch	75	Cmp1VFDTherm3Flt
43	Cmp1MotorStartFailure	76	Cmp1VFDTherm4Flt
44	Cmp1NoCmpStop	77	Cmp1VFDHiPwrSupTemp
45	Cmp1VFDFault	78	Cmp1VFDHiPwrSupVolt
46	Cmp1VFDRefFault	79	Cmp1VFDClgFanFlt
47	Cmp1VFDLossofMotorSync	80	Cmp1VFDProcessorFlt
48	Cmp1VFDMotorStall	81	Cmp1VFDMaintenanceMode
49	Cmp1VFDSpdCommandFault	82	Cmp1SuctPressSenFlt

Alarm Number	Alarm Message Text	Alarm Number	Alarm Message Text
50	Cmp1VFDOverspeed(Hardware)	83	Cmp1DishPressSenFlt
51	Cmp1VFDOverspeed(Software)	84	Cmp1CondRfrCkt1PressSenFlt
52	Cmp1VFDOverspdMonitorFault	85	Cmp1CondRfrCkt2PressSenFlt
53	Cmp1VFDInputVoltageHigh	86	Cmp1SuctTempSenFlt
54	Cmp1VFDPrechargeFault	87	Cmp1DischTempSenFlt
55	Cmp1VFDLowDCBusVolt	88	Cmp1MotorGapTempSenFlt
56	Cmp1VFDHiDCBusVltRunning	89	Cmp1RotorPmpTempSenFlt
57	Cmp1VFDHiDCBusVltRegen	90	Cmp1BearingOrbitSurgeFlt
58	Cmp1VFDHiSteeringBrVltPrechrg	91	Cmp1CommunicationsFlt
59	Cmp1VFDHiSteeringBrVltRunning	92	Cmp1EvapLvgWtrTempSenFlt
60	Cmp1VFDMotorOverload	93	Cmp1CondLvgWtrTempSenFlt
61	Cmp1VFDHiCurrentBridge1	94	Cmp1SoftwareFlt
62	Cmp1VFDHiCurrentBridge2	95	Cmp1EvapWtrFlwLoss
63	Cmp1VFDHiCurrentChopper1	96	Cmp1CondWtrFlwLoss
64	Cmp1VFDHiCurrentChopper2		

Alarms-LONWORKS

Two LONWORKS network variables indicate alarm conditions and one network variable clears alarms. The Chiller Status network output variable indicates that the unit controller is in alarm, but it does not identify the alarm condition. The Current Alarm network output variable indicates the alarm condition.

Current Alarm

This network output variable indicates the current alarm. The type of alarm is included in the text string. Alarm messages are listed in Table 9. The unit controller can accommodate 15 simultaneous alarms. Alarm messages are sent sequentially one every five seconds.

Measurement	Units	Data Type	Valid Range	Default Value
Alarm Message	NA	Structure	0–30 characters plus a NUL terminator	NA

Variable Details

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nvoAlarmDescr	Chiller	str_asc	36	31 bytes max

Clearing Alarms - LONWORKS

This read/write network variable clears all active alarms. The following alarms cannot be cleared over the network. They can only be cleared at the chiller (i.e. via the unit controller OITS panel).

- Low Evaporator Pressure
- High Condenser Pressure (by pressure sensor)
- High Condenser Pressure (by pressure switch)
- Freeze Protection
- High Motor Temperature

In addition to the Current Alarm network variable, nvoChillerStat indicates whether or not the chiller is in an alarm condition, but it does not describe the alarm condition.

Measurement	Units	Data Type	Valid Range	Default Value
N/A	N/A	Structure	See Below	N/A

Variable Details

LONWORKS Name	Profile	SNVT Type	SNVT Index	SNVT Size
nviClearAlarm	McQuayChiller	SNVT_switch	95	two bytes

Valid Range

State	Value	Clear Alarm
0	unused	No Alarm
1	unused	Clear Alarm

LONWORKS Alarm Messages

Table 9. LONWORKS Alarm Messages

Alarm Number	Alarm Message Text	Alarm Number	Alarm Message Text
Warnings			
1	Cmp1SoftwareProbWarn	8	ChillerLiqLn1RefTempSenWarn
5	ChillerEvapEntTempSenWarn	9	ChillerLiqLn2RefTempSenWarn
6	ChillerCondEntTempSenWarn	10	ChillerSoftwareProbWarn
7	ChillerCondLvgTempSenWarn		
Problems			
11	Cmp1LoEvapPressInhibitLoading	28	ChillerEvapPmp2Flt
12	Cmp1EvapFreezeProtect	29	ChillerCondPmp1Flt
13	Cmp1CondFreezeProtect	30	ChillerCondPmp2Flt
14	Cmp1HiDischTemp	31	ChillerEvapEntWtrTempSenFlt
27	ChillerEvapPmp1Flt		
Faults			
32	Cmp1LowEvapPress	65	Cmp1VFDInputPhaseLoss
33	Cmp1HiCondPress	66	Cmp1VFDOutputPhaseLoss
34	Cmp1Tmr Exp No Strt	67	Cmp1VFDHiTempSide1
35	Cmp1LowMotorCurrent	68	Cmp1VFDHiTempSide2
36	Cmp1HiDischTemp	69	Cmp1VFD IGBT FltBridge1
37	Cmp1MechHiPress	70	Cmp1VFD IGBT FltBridge2
38	Cmp1HiMotorTemp	71	Cmp1VFD IGBT FltChopper1
39	Cmp1HiMotorGapTemp	72	Cmp1VFD IGBT FltChopper2
40	Cmp1LoRotorPumpSuperHt	73	Cmp1VFDTherm1Flt
41	Cmp1SurgeTemp	74	Cmp1VFDTherm2Flt
42	Cmp1SurgeSwitch	75	Cmp1VFDTherm3Flt
43	Cmp1MotorStartFailure	76	Cmp1VFDTherm4Flt
44	Cmp1NoCmpStop	77	Cmp1VFDHiPwrSupTemp
45	Cmp1VFDFault	78	Cmp1VFDHiPwrSupVolt
46	Cmp1VFDRefFault	79	Cmp1VFDClgFanFlt
47	Cmp1VFDLossofMotorSync	80	Cmp1VFDProcessorFlt
48	Cmp1VFDMotorStall	81	Cmp1VFDMaintenanceMode

Alarm Number	Alarm Message Text	Alarm Number	Alarm Message Text
49	Cmp1VFDSpdCommandFault	82	Cmp1SuctPressSenFlt
50	Cmp1VFDOverspeed(Hardware)	83	Cmp1DishPressSenFlt
51	Cmp1VFDOverspeed(Software)	84	Cmp1CondRfrCkt1PressSenFlt
52	Cmp1VFDOverspdMonitorFault	85	Cmp1CondRfrCkt2PressSenFlt
53	Cmp1VFDInputVoltageHigh	86	Cmp1SuctTempSenFlt
54	Cmp1VFDPrechargeFault	87	Cmp1DischTempSenFlt
55	Cmp1VFDLowDCBusVolt	88	Cmp1MotorGapTempSenFlt
56	Cmp1VFDHiDCBusVltRunning	89	Cmp1RotorPmpTempSenFlt
57	Cmp1VFDHiDCBusVltRegen	90	Cmp1BearingOrbitSurgeFlt
58	Cmp1VFDHiSteeringBrVltPrechrg	91	Cmp1CommunicationsFlt
59	Cmp1VFDHiSteeringBrVltRunning	92	Cmp1EvapLvgWtrTempSenFlt
60	Cmp1VFDMotorOverload	93	Cmp1CondLvgWtrTempSenFlt
61	Cmp1VFDHiCurrentBridge1	94	Cmp1SoftwareFlt
62	Cmp1VFDHiCurrentBridge2	95	Cmp1EvapWtrFlwLoss
63	Cmp1VFDHiCurrentChopper1	96	Cmp1CondWtrFlwLoss
64	Cmp1VFDHiCurrentChopper2		

Appendix A: Protocol Implementation Conformance Statement (PICS)

This section contains the Protocol Implementation Conformance Statement (PICS) for the Magnitude Chiller Unit Controller of McQuay International as required by ANSI/ASHRAE Standard 135-2004, BACnet: A Data Communication Protocol for Building Automation and Control Networks.

BACnet Protocol Implementation Conformance Statement

Date:

Vendor Name:	McQuay International
Product Name:	Magnitude Chiller Unit Controller
Product Model Number:	WME
Application Software Version:	4.11.5
Firmware Revision:	1.50
BACnet Protocol Revision:	Version 1 Revision 4

Product Description

The Magnitude Chiller Unit Controller with optional BACnet Communication Module is a microprocessor-based controller designed to operate McQuay International chillers 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[1]
Data Sharing – WriteProperty – B	DS-WP-B
Data Sharing – WritePropertyMultiple – B	DS-WPM-B[1]
Device Management – Dynamic Device Binding – B	DM-DDB-B
Device Management – Dynamic Object Binding – B	DM-DOB-B
Device Management – DeviceCommunicationControl – B	DM-DCC-B
Device Management – TimeSynchronization – B	DM-TS-B[2]
Device Management – UTCTimeSynchronization – B	DM-UTC-B

BIBB Name	Designation
Device Management – ReinitializeDevice – B	DM-RD-B[3]

[1] This BIB is not required for B-ASC but is highly desirable for optimum performance on the network.

[2] DM-TS-B is not required for B-ASC.

[3] DB-RD-B will be implemented such that the BACnet card is reset without resetting the chiller controller. The chiller controller can never be reset via the BACnet network. Reinitialize Device will be implemented with a non-changeable password of 1234.

Standard Object Types Supported

Object-Type[1]	Dynamically Creatable	Dynamically Deleteable	Optional Properties Supported	Writable Properties not Required to be Writable
Analog Input	☐	☐	Description Reliability Min_Pres_Value Max_Pres_Value	
Analog Output	☐	☐	Description Reliability Min_Pres_Value Max_Pres_Value	Relinquish Default
Analog Value	☐	☐	Description Reliability Priority_Array Relinquish_Default	Present_Value[2] Relinquish_Default
Binary Input	☐	☐	Description Reliability Inactive_Text Active_Text	
Binary Output	☐	☐	Description Reliability Inactive_Text Active_Text	Relinquish_Default
Binary Value	☐	☐	Description Reliability Inactive_Text Active_Text Priority_Array Relinquish_Default	Present_Value[2] Relinquish_Default
Device	☐	☐	Description Location Local_Time Local_Date UTC_Offset Daylight_Savings_Status Max_Master Max_Info_Frames	Object_Identifier Object_Name Description Location UTC_Offset Max_Master Max_Info_Frames APDU_Timeout Number_of_APDU_Retries
Multi-state Input	☐	☐	Description Reliability State_Text	
Multi-state Output	☐	☐	Description Reliability State_Text	Relinquish_Default

Object-Type[1]	Dynamically Creatable	Dynamically Deleteable	Optional Properties Supported	Writable Properties not Required to be Writable
Multi-state Value	☐	☐	Description Reliability State_Text Priority_Array Relinquish_Default	Present_Value[2] Relinquish_Default

[1] Though the BACnet communication module supports the following object types, not all objects types are currently used.

[2] This property will be writable only if defined writable in the CSV file which is downloaded into the unit controller.

Data Link Layer Options

☒ BACnet IP, (Annex J)

☒ ISO 8802-2, Ethernet (Clause 7)

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

Segmentation Capability

☐ Segmented requests supported Window Size:

☐ Segmented responses supported Window Size:

Device Address Binding

Static Device Binding ☐ Yes

☒ No

Networking Options

☐ Router, Clause 6

Routing Configurations:

☐ Annex H, BACnet Tunneling Router over IP

☐ BACnet/IP Broadcast Management Device (BBMD)

Registrations by Foreign Devices? ☐ 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.

Non-BACnet Equipment/Network(s) Support

☐ Communication Gateway

Non-BACnet equipment/networks(s):

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