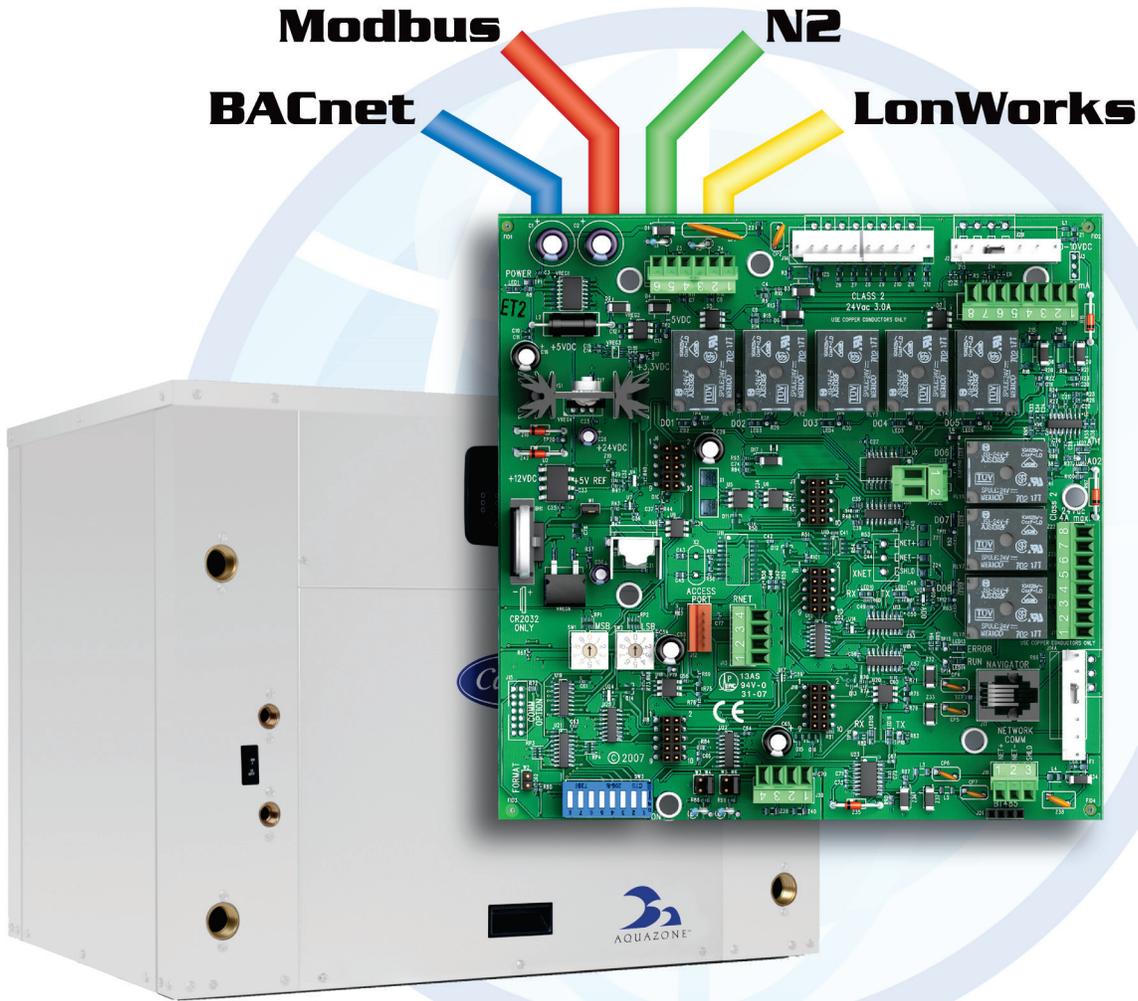




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# W2W Open Integration Guide





Verify that you have the most current version of this document from [www.hvacpartners.com](http://www.hvacpartners.com) or your local Carrier office.

Important changes are listed in **Document revision history** at the end of this document.

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## Introduction

### What is the W2W Open controller?

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The Water-to-Water (W2W) Open (part #OPN-WSHPW2WM) controller may be used standalone, or as part of an i-Vu® system, or third-party BACnet-distributed control system. The W2W Open control is designed to heat or cool the load water and to maintain the leaving water or entering water at the control setpoint. Each W2W Open controller supports up to 4 stages of capacity and up to 3 compressor stages (with compressor status feedback). You can have controller slaves for equipment or systems with up to 8 stages of control.

On board DIP switches allow you to select the baud rate and choose one of the following protocols:

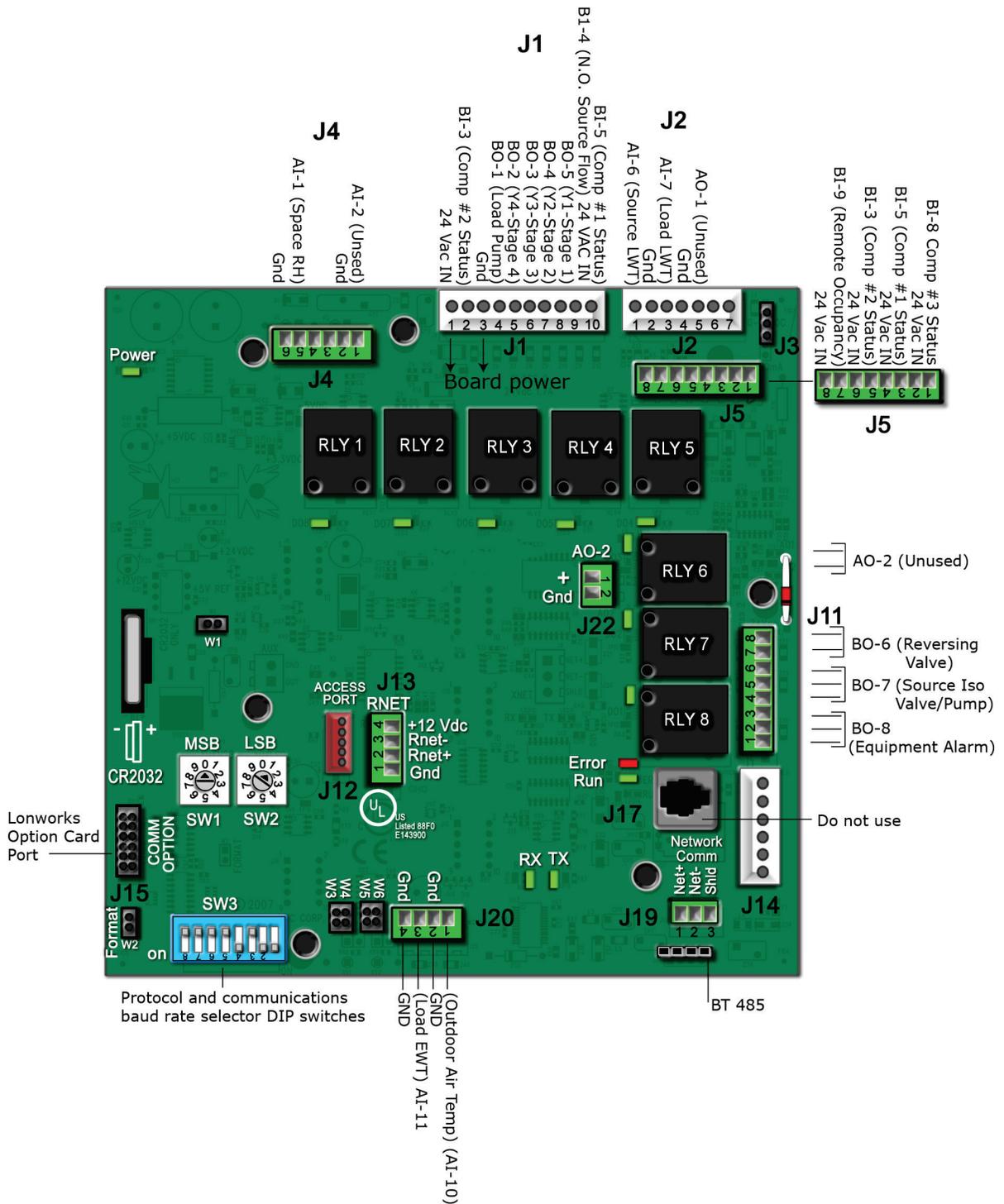
- BACnet MS/TP
- BACnet ARC156
- Modbus
- Johnson N2
- LonWorks

The Equipment Touch is a touchscreen device with a 4.3 in. color LCD display that you connect to one of the following controllers to view or change its property values, schedule equipment, view trends and alarms, and more, without having to access the system's server.

You can use Carrier's Equipment Touch user interface with the W2W Open controller using the 5-pin J12 Access Port. See illustration below.

The W2W Open's application supports detailed color graphics, status, properties, alarms, trends, performance, configuration, and Help on the Equipment Touch. In addition, the W2W Open Startup Wizard has screens to facilitate the installation technician to initially configure the W2W Open.

For more details about the Equipment Touch, see the *Equipment Touch Installation and Setup Guide*.



## Safety considerations & handling warning

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 **WARNING**

When you handle the W2W Open:

- Do not contaminate the printed circuit board with fingerprints, moisture, or any foreign material.
- Do not touch components or leads.
- Handle the board by its edges.
- Isolate from high voltage or electrostatic discharge.
- Ensure that you are properly grounded.

## Wiring inputs and outputs

**W2W Open Inputs and Outputs Table**

Input/Output Type	Part Numbers	Type of I/O	Connection Pin Numbers	I/O Channel
<b>Inputs</b>				
SPT sensors	For detailed information, see: Carrier Sensors Installation Guide (SPT)	Communicating	<b>J13</b> , 1 - 4	Rnet Port
ZS sensors	ZS Sensors Installation or Application Guide			
Wireless Adapter for wireless sensors	Wireless Sensors Installation or Application Guide			
Equipment Touch	Equipment Touch Installation and Setup Guide			
Space Relative Humidity	33ZSENSRH-02	<b>AI</b> (4-20 mA)	<b>J4</b> - 5 & 6	AI - 1
Compressor 2 Status	N/A	<b>BI</b> (Dry Contacts)	<b>J5</b> - 5 & 6 or <b>J1</b> - 2	BI - 3
Compressor 1 Status	N/A	<b>BI</b> (Dry Contacts)	<b>J5</b> - 3 & 4 or <b>J1</b> - 10	BI - 5
Leaving Source Water Temperature	10K Type II	<b>AI</b> (10K Thermistor)	<b>J2</b> - 1 & 2	AI - 6
Leaving Load Water Temperature	33ZCSENSAT	<b>AI</b> (10K Thermistor)	<b>J2</b> - 3 & 4	AI - 7
Compressor 3 Status	N/A	<b>BI</b> (Dry Contacts)	<b>J5</b> - 1 & 2	BI - 8
Remote Occupancy Contact	N/A	<b>BI</b> (Dry Contacts)	<b>J5</b> - 7 & 8	BI - 9
Outdoor Air Temperature	10K Type II	<b>AI</b> (10K Thermistor)	<b>J20</b> - 1 & 2	AI - 10
Entering Load Water Temperature	10K Type II	<b>AI</b> (10K Thermistor)	<b>J20</b> - 3 & 4	AI - 11
Safety Shutdown Input**	N/A	24 Vac	<b>J1</b> - 9	24 Vac IN
<b>Outputs</b>				
Load Pump	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J1</b> - 4	BO - 1
Y4 - Compressor 4th Stage	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J1</b> - 5	BO - 2 (Y4)
Y3 - Compressor 3rd Stage	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J1</b> - 6	BO - 3 (Y3)
Y2-Compressor 2nd Stage	N/A	<b>BO</b> Relay (24 Vac, 3A)	<b>J1</b> - 7	BO - 4 (Y2)
Y1-Compressor 1st Stage	N/A	<b>BO</b> Relay (24 Vac, 3A)	<b>J1</b> - 8	BO - 5 (Y1)
Reversing Valve (B or O)	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J11</b> - 7 & 8 (N.O.)	BO - 6 (RV)
Source Water Pump / Iso Valve	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J11</b> - 5 & 6 (N.O.)	BO - 7
Alarm Lamp	N/A	<b>BO</b> Relay (24 Vac, 3A)	* <b>J11</b> - 2 & 3 (N.O.)	BO - 8

Input/Output Type	Part Numbers	Type of I/O	Connection Pin Numbers	I/O Channel
<p>Legend</p> <p><b>AI</b> - Analog Input    <b>AO</b> - Analog Output</p> <p><b>BI</b> - Digital Input    <b>BO</b> - Digital Output</p> <p>*These outputs are configurable.</p> <p>**24 Vac required at this terminal to provide unit operation.</p>				

# Communications wiring

## Protocol overview

Protocols are the communication languages spoken by the control devices. The main purpose of a protocol is to communicate information in the most efficient method possible. Different protocols exist to provide specific information for different applications.

In the BAS, many different protocols might be used, depending on manufacturer. Different protocols do not change the function of the controller, but they typically require the owner to change systems or components in order to change from one protocol to another. communicates different types of protocols.

The W2W Open can communicate 1 of 5 different protocols:

- *BACnet MS/TP* (page 7)
- *BACnet ARC156* (page 11)
- *Modbus* (page 13)
- *Johnson N2* (page 16)
- *LonWorks* (page 18)

The default setting is BACnet MS/TP. You set the protocol and baud rate using the **SW3** DIP switches. The rotary switches **MSB (SW1)** and **LSB (SW2)** set the board's network address. See table below for specific switch settings. The third party connects to the controller through port **J19** for BACnet MS/TP, BACnet ARC156, Modbus, and N2, and through **J15** for the LonWorks Option Card.

**NOTE** You must cycle power after changing the rotary switches or after connecting the LonWorks Option Card to **J15**.

### SW3 DIP switch settings

		Unused	Comm Option port	Protocol				Baud rate	
		8	7	6	5	4	3	2	1
<b>BACnet MS/TP</b> (Default)	Master	N/A	Off	Off	Off	On	Off	Select Baud	Select Baud
<b>BACnet ARC156</b>		N/A	Off	Off	Off	Off	Off	N/A	N/A
<b>Modbus</b>	Slave	N/A	Off	Off	On	On	Off	Select Baud	Select Baud
<b>N2</b>	Slave	N/A	Off	Off	Off	On	On	Off	Off
<b>Lonworks</b>		N/A	On	On	Off	On	Off	Off	On

**Baud DIP switch settings**

Baud Rate	DIP switch 2	DIP switch 1
9,600 bps	Off	Off
19.2 kbps	On	Off
38.4 kbps	Off	On
76.8 kbps (Default)	On	On

## BACnet MS/TP

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### To set up the W2W Open for BACnet MS/TP

Refer to *Appendix B* (page 43) for the Protocol Implementation Conformance Statement, or download the latest from *BACnet International* <http://www.bacnetinternational.net/catalog/index.php?m=28>.

**NOTE** This controller counts as a full load on the MS/TP bus.

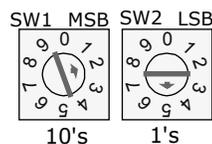
- 1 Turn **off** the W2W Open's power.

**NOTE** Changes made to the switches when the controller is on will not take effect until the power is cycled!

- 2 Using the rotary switches **MSB (SW1)** and **LSB (SW2)**, set a unique BACnet MS/TP MAC address for the W2W Open. Set the **MSB (SW1)** switch to the tens digit of the address, and set the **LSB (SW2)** switch to the ones digit. Valid addresses are 01-99.

**NOTE** The rotary switches also determine the BACnet device instance of the controller on the BACnet network. The BACnet device instance is automatically generated based on the scheme 16101xx, where "16" is the BACnet vendor ID for Carrier Corporation, and xx equals the rotary switch address.

**EXAMPLE** To set the controller's MS/TP MAC address to 01, point the arrow on the **MSB (SW1)** switch to 0 and the arrow on the **LSB (SW2)** switch to 1. Internally, the BACnet device instance is automatically generated as 1610101.



- 3 Set the **SW3** DIP switches **1** and **2** for the appropriate communications speed (9600, 19.2k, 38.4k, or 76.8k bps).

**NOTE** Use the same baud rate and communication settings for all controllers on the network segment. The W2W Open is fixed at 8 data bits, No Parity, and 1 Stop bit for this protocol's communications.

**Baud DIP switch settings**

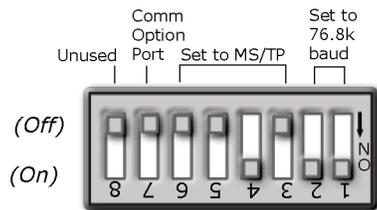
Baud rate	2	1
9,600 bps	Off	Off
19.2 kbps	On	Off
38.4 kbps	Off	On
76.8 kbps	On	On

- 4 Set the remaining DIP switches as follows:

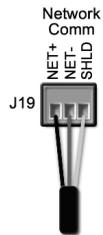
**BACnet MS/TP DIP switch settings**

8	7	6	5	4	3
Off	Off	Off	Off	On	Off

The following example shows the DIP switches set for 76.8k (Carrier default), and BACnet MS/TP.



- 5 Connect the BACnet MS/TP network to the controller's **J19 Network Comm** port. Connect to **Net+**, **Net-**, and **SHLD**.



**Wire specifications**

- A dedicated 22 AWG shielded twisted pair wire (EIA 485)
- Maximum wire length 2000 feet (610 meters) or 32 nodes
- Devices should be daisy-chained and not star-wired
- Attach the drain/shield wire to both ends of the network segment and through every controller

**NOTE** Use the same polarity throughout the network segment.

- 6 Turn **on** the W2W Open's power.

## Troubleshooting BACnet MS/TP communication

For detailed troubleshooting and a list of supported objects, get the controller's BACnet PICS from the *Carrier BACnet PICS website* <http://www.bacnetinternational.net/catalog/index.php?m=28>. You must get your BACnet Object list from the manufacturer.

The most common communication problems are the result of not properly following the configuration steps outlined in this manual. Review all of the steps and use the following list to check your settings.

### Verify accuracy of the following:

**Hardware settings** for BACnet MS/TP (8 Data bits, No Parity, and 1 Stop bit):

- Baud rate DIP switches DS2 and DS1
- BACnet MS/TP protocol DIP switches DS3 - DS6
- Jumper set to EIA-485
- Proper connection wiring
- Unique rotary address switches 1 – 99. If controllers have duplicate addresses, network communication can be lost.
- Unique BACnet Device Instance numbers. Default is 16101XX, with the rotary address switches defining XX. If controllers have duplicate device instance numbers, network communication can be lost.

### NOTES

- The controller recognizes physical changes (DIP switches, rotary switches, and jumpers) upon power up.
- If RX LED is solid, then the terminations are incorrect.
- If the network has greater than 32 devices or exceeds 2,000 feet, a Repeater should be installed.
- If a controller begins or ends a network segment, a terminating resistor may be needed.

## Adjusting BACnet MS/TP properties using an Equipment Touch

You may need to adjust the following BACnet MS/TP protocol timing settings using the Equipment Touch.

**Max Masters** - defines the highest MS/TP Master MAC address on the MS/TP network.

For example, if there are 3 master nodes on an MS/TP network, and their MAC addresses are 1, 8, and 16, then Max Masters would be set to 16 (since this is the highest MS/TP MAC address on the network).

This property optimizes MS/TP network communications by preventing token passes and “poll for master” requests to non-existent Master nodes.

In the above example, MAC address 16 knows to pass the token back to MAC address 1, instead of counting up to MAC address 127. Each MS/TP master node on the network must have their Max Masters set to this same value. The default is 127.

**Max Info Frames** - defines the maximum number of responses that will be sent when the W2W Open receives the token. Any positive integer is a valid number. The default is 10 and should be ideal for the majority of applications. In cases where the W2W Open is the target of many requests, this number could be increased as high as 100 or 200.

## NOTES

- BACnet MS/TP networks can be comprised of both master and slave nodes. Valid MAC addresses for master nodes are 0 - 127 and valid addresses for Slave nodes are 0 - 254.
- If the third party attempts to communicate to the controller but does not get a response, make sure the controller is set as a BACnet MS/TP (m) master. The BACnet software asks the controllers, "Who Is?" This is to auto-locate devices on the network. Only controllers set as masters will answer this request.
- See Appendix A for Network Points List.
- See *Appendix B* (page 43) for the BACnet Protocol Implementation Conformance Statement (PICS).

### To set the Device Instance number or adjust the Max Masters or Max Info Frames using an Equipment Touch

- 1 In the Equipment Touch interface, navigate to the **Properties Menu** screen and click **Login**.

**NOTE** The following graphic is generic and not specific to your system.

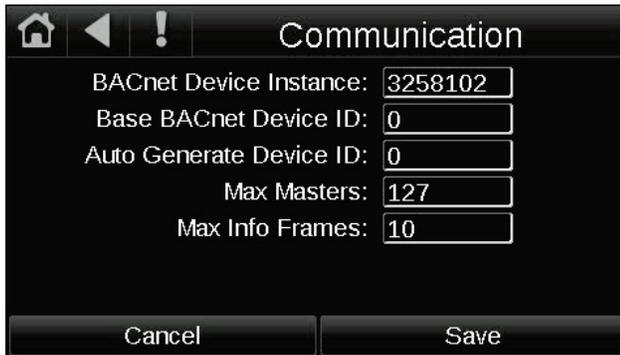


- 2 Type **Touch** for the password and click **Done**.



- 3 On the **Properties Menu** screen, scroll to the bottom of the list and click **ET System**.
- 4 On the **ET System** screen, click **Setup**.
- 5 On the **Setup** screen, click **Module Setup**.

- 6 On the **Module Setup** screen, click **Communication**.



On the **Communication** screen, edit the fields as needed:

- 7 Click the property box next to **BACnet Device Instance**, type the new number, and click **Done**.
- 8 Click the property box next to **Max Masters** and/or **Max Info Frames**, type a new value (1-127), and click **Done**.
- 9 Click **Save**.

## BACnet ARC156

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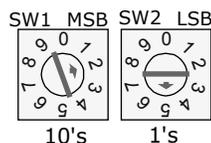
### To set up the W2W Open for BACnet ARC156

The W2W Open's latest supported function codes and capabilities are listed on the associated Protocol Implementation Conformance Statement (PICS), *Carrier BACnet PICS website*  
<http://www.bacnetinternational.net/catalog/index.php?m=28>.

- 1 Turn **off** the W2W Open's power.  
**NOTE** Changes made to the switches when the controller is on will not take effect until the power is cycled!
- 2 Using the rotary switches **MSB (SW1)** and **LSB (SW2)**, set a unique BACnet MS/TP MAC address for the W2W Open. Set the **MSB (SW1)** switch to the tens digit of the address, and set the **LSB (SW2)** switch to the ones digit. Valid addresses are 01-99.

**NOTE** The rotary switches also determine the BACnet device instance of the controller on the BACnet network. The BACnet device instance is automatically generated based on the scheme 16101xx, where "16" is the BACnet vendor ID for Carrier Corporation, and xx equals the rotary switch address.

**EXAMPLE** To set the controller's MAC address to 01, point the arrow on the **MSB (SW1)** switch to 0 and the arrow on the **LSB (SW2)** switch to 1. Internally, the BACnet device instance is automatically generated as 1610101.

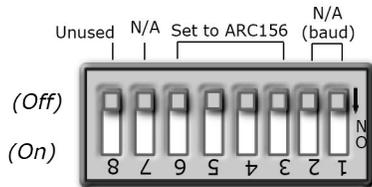


- 3 Set the remaining DIP switches as follows:

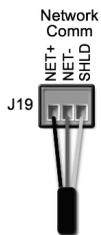
**BACnet ARC156 DIP switch settings**

8	7	6	5	4	3
Off	Off	Off	Off	N/A	N/A

The following example shows the DIP switches set for BACnet ARC156.



- 4 Connect the BACnet ARC156 network to the controller's **J19 Network Comm** port. Connect to **Net+**, **Net-**, and **SHLD**.



**Wire specifications**

- A dedicated 22 AWG shielded twisted pair wire (EIA 485)
- Maximum wire length 2000 feet (610 meters) or 32 nodes
- Devices should be daisy-chained and not star-wired
- Attach the drain/shield wire to both ends of the network segment and through every controller

**NOTE** Use the same polarity throughout the network segment.

- 5 Turn **on** the W2W Open's power.

## Troubleshooting ARC156 communication

The most common communication problems result from not properly following the configuration steps outlined above in this manual. Review all of the steps and use the following list to check your settings.

### Verify accuracy of the following:

- Protocol DIP switches DS3 - DS6
- Proper connection wiring
- Unique rotary address switches 1 – 99. If controllers have duplicate addresses, network communication can be lost.
- Unique BACnet Device Instance numbers. Default is 16101XX, with the rotary address switches defining XX. If controllers have duplicate device instance numbers, network communication can be lost.

### NOTES

- The controller recognizes physical changes (DIP switches, rotary switches, and jumpers) upon power up.
- If RX LED is solid, then the terminations are incorrect.
- If the network has greater than 32 devices or exceeds 2,000 feet, a Repeater should be installed.
- If a controller begins or ends a network segment, a terminating resistor may be needed.

**Software settings** defined through the Equipment Touch device. To confirm settings, obtain a Modstat of the device. On the Equipment Touch, click the link to the Modstat.

## Modbus

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### To set up the W2W Open for Modbus

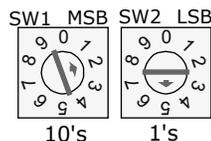
Refer to *Appendix C* (page 44) for the Modbus Protocol Implementation Conformance Statement (PICS).

- 1 Turn **off** the W2W Open's power.

**NOTE** Changes made to the switches when the controller is on will not take effect until the power is cycled!

- 2 Using the rotary switches, set a unique Modbus slave address for the W2W Open. Set the **MSB (SW1)** switch to the tens digit of the address, and set the **LSB (SW2)** switch to the ones digit. Valid Modbus slave addresses are 01-99.

**EXAMPLE** To set the controller's Modbus slave address to 01, point the arrow on the **MSB (SW1)** switch to 0 and the arrow on the **LSB (SW2)** switch to 1.



- Set the **SW3** DIP switches **1** and **2** for the appropriate communications speed (9600, 19.2k, 38.4k, or 76.8k bps).

**NOTE** Use the same baud rate and communication settings for all controllers on the network segment. The W2W Open is fixed at 8 data bits, No Parity, and 1 Stop bit for this protocol's communications.

**Baud DIP switch settings**

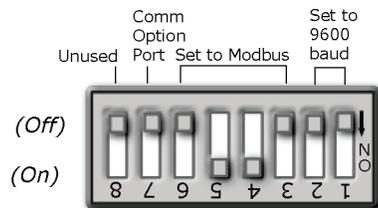
Baud rate	2	1
9,600 bps	Off	Off
19.2 kbps	On	Off
38.4 kbps	Off	On
76.8 kbps	On	On

- Set the remaining DIP switches as follows:

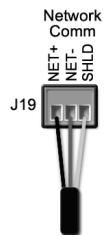
**Modbus DIP switch settings**

8	7	6	5	4	3
Off	Off	Off	On	On	Off

The following example shows the DIP switches set for 9600 baud and Modbus.



- Connect the Modbus EIA-485 network to the W2W Open's **J19 Network Comm** port. Connect to **Net+**, **Net-**, and **SHLD**.



**Wire specifications**

- A dedicated 22 AWG shielded twisted pair wire (EIA 485)
- Maximum wire length 2000 feet (610 meters) or 32 nodes
- Devices should be daisy-chained and not star-wired
- Attach the drain/shield wire to both ends of the network segment and through every controller

**NOTE** Use the same polarity throughout the network segment.

- 6 Turn **on** the W2W Open's power.

## Troubleshooting Modbus

**Check the following to troubleshoot your W2W Open:**

- 1 Verify that the BAS and controller are both set to speak the Modbus RTU protocol on the Comm Selector DIP switches **DS3 - DS6**.
  - 2 The BAS and the controller are both set for the same baud rate:
    - Baud rate DIP switches DS2 and DS1
    - Obtain a Modstat of the controller. Scroll to the bottom of the page to **Network Communications** to view the active protocol and baud rate.
  - 3 The BAS is configured to speak 2-wire EIA-485 to the controller. The BAS may have to configure jumper or DIP switches on their end.
  - 4 The BAS and the controller have the same communication settings (8 data bits, No Parity, and 1 stop bit).
    - Proper connection wiring between the BAS and the controller.
- 1 Verify that the rotary address switches are set for the controller's unique slave address.
  - 2 BAS must be reading or writing to the proper point addresses on the controller.
  - 3 BAS is sending requests to the proper slave address of the controller.

**NOTE** Refer to *Appendix C* (page 44) for the Protocol Implementation Conformance Statement.

**Modbus Exception Codes that might be returned from this controller**

Codes	Name	Description
01	Illegal Function	The Modbus function code used in the query is not supported by the controller.
02	Illegal Data Address	The register address used in the query is not supported by the controller.
04	Slave Device Failure	The Modbus Master has attempted to write to a non-existent register or a read-only register in the controller.

## Johnson N2

### To set up the W2W Open for N2

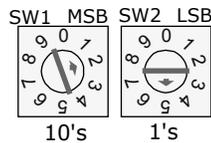
Refer to *Appendix D* (page 46) for the N2 Protocol Implementation Conformance Statement (PICS).

- 1 Turn **off** the W2W Open's power.

**NOTE** Changes made to the switches when the controller is on will not take effect until the power is cycled!

- 2 Using the rotary switches, set a unique N2 slave address for the W2W Open. Set the **MSB (SW1)** switch to the tens digit of the address, and set the **LSB (SW2)** switch to the ones digit. Valid N2 slave addresses are 01-99.

**EXAMPLE** To set the N2 slave address to 01, point the arrow on the **MSB (SW1)** switch to 0 and the arrow on the **LSB (SW1)** switch to 1.



- 3 Set the DIP switches **1** and **2** for 9600 baud.

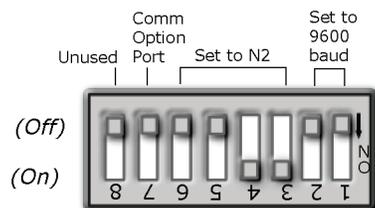
**NOTE** Use the same baud rate and communication settings for all controllers on the network segment. The W2W Open is fixed at 9600 bps baud, 8 data bits, No Parity, and 1 Stop bit.

- 4 Set the remaining DIP switches as follows:

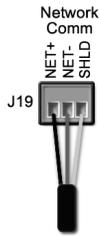
#### N2 DIP switch settings

8	7	6	5	4	3	2	1
Off	Off	Off	Off	On	On	On	On

The following example shows the DIP switches set for 9600 baud and N2.



- 5 Connect the N2 EIA-485 network to the controller's **J19 Network Comm** port. Connect to **Net+**, **Net-**, and **SHLD**.



#### Wire specifications

- A dedicated 22 AWG shielded twisted pair wire (EIA 485)
- Maximum wire length 2000 feet (610 meters) or 32 nodes
- Devices should be daisy-chained and not star-wired
- Attach the drain/shield wire to both ends of the network segment and through every controller

**NOTE** Use the same polarity throughout the network segment.

- 6 Turn **on** the W2W Open's power.

## Troubleshooting N2

### Check the following to troubleshoot your W2W Open:

- 1 Verify that the BAS and controller are both set to speak N2 protocol on the Comm Selector DIP switches **DS3 - DS6**.
  - 2 The BAS and the controller are both set for the same baud rate:
    - 9600 for N2
    - Baud rate DIP switches DS2 and DS1
    - Obtain a Modstat of the controller. Scroll to the bottom of the page to **Network Communications** to view the active protocol and baud rate.
  - 3 The BAS is configured to speak 2-wire EIA-485 to the controller. The BAS may have to configure jumper or DIP switches on their end.
  - 4 The BAS and the controller have the same communication settings (8 data bits, No Parity, and 1 stop bit).
    - Proper connection wiring between the BAS and the controller.
- 1 Verify that the rotary address switches are set for the controller's unique slave address.
  - 2 BAS must be reading or writing to the proper point addresses on the controller.
  - 3 BAS is sending requests to the proper slave address of the controller.

### NOTES

- Refer to *Appendix A* (page 35) for the Network Points list.
- Refer to *Appendix D* (page 46) for the Protocol Implementation Conformance Statement.

## LonWorks

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 **WARNING**

When you handle the LonWorks Option Card:

- Do not contaminate the printed circuit board with fingerprints, moisture, or any foreign material.
- Do not touch components or leads.
- Handle the board by its edges.
- Isolate from high voltage or electrostatic discharge.
- Ensure that you are properly grounded.

Refer to Appendix E for the LonWorks Protocol Implementation Conformance Statement (PICS).



### To set up the W2W Open for the LonWorks Option Card (Part #LON-OC)

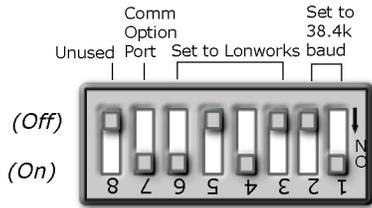
- 1 Turn **off** the W2W Open's power.

#### NOTES

- Changes made to the switches when the controller is on will not take effect until the power has been cycled!
- The controller's rotary address switches are not used when the LON-OC is installed. That's because each LON-OC has a 48-bit Neuron ID that makes it unique on the LonWorks network.

- 2 Set the SW3 DIP switches for LonWorks as follows:

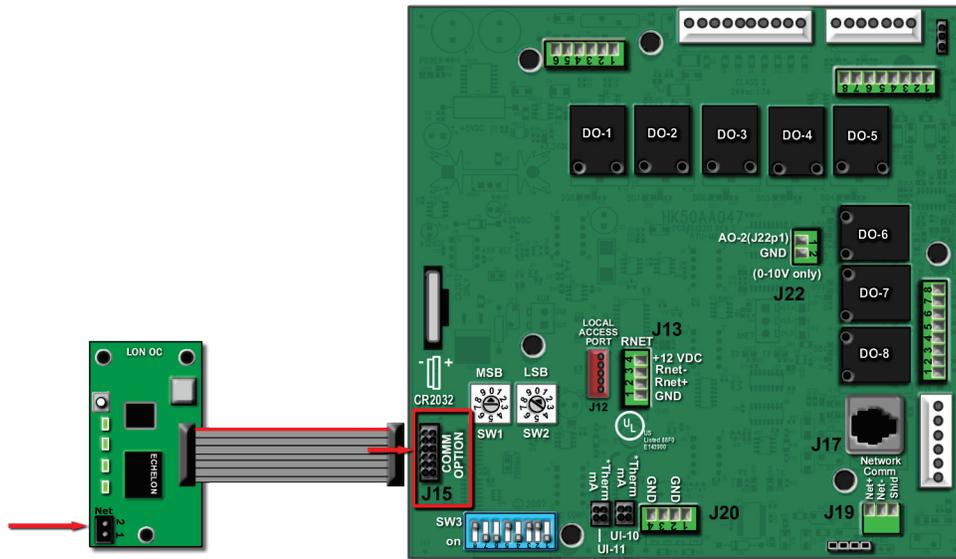
8	7	6	5	4	3	2	1
Off	On	On	Off	On	Off	Off	On



- 3 Plug the LonWorks Option Card's ribbon cable into Comm Option port **J15** on the controller. See illustration below.



**CAUTION!** The controller must be **OFF** before being connected.



- 4 Connect the LonWorks network to the LonWorks Option Card via the 2-pin **Net** port.

**NOTE** The 2-pin **Net** port provides TP/FT-10 channel compatibility. The TP/FT-10 or "Free Topology" network type is **polarity insensitive**. Use 24 to 16 AWG twisted pair wire.

- 5 Turn **on** the W2W Open's power.  
 6 Commission the controller for LonWorks communication. See instructions below.

## Commissioning the controller for LonWorks communication

Before a device can communicate on a LonWorks network, it must be commissioned. Commissioning allows the system integrator to associate the device hardware with the LonWorks system's network layout diagram. This is done using the device's unique Neuron ID.

A network management tool such as Echelon's LonMaker is used to commission each device, as well as, to assign addressing. Specific instructions regarding the commissioning of LonWorks devices should be obtained from documentation supplied with the LonWorks Network Management Tool.

When a new device is first commissioned onto the LonWorks network, the system integrator must upload the device's External Interface File (XIF) information. LonWorks uses the XIF to determine the points (network variables) that are available from a device. The W2W Open has a set of predefined network variables. These variables can be bound or accessed by the Network Management Tool.

The **Browse** feature of the Network Management Tool allows you to read real-time values from the W2W Open. The Network Management Tool allows you to test integration prior to binding the controller's network variables to other LonWorks nodes.

## Troubleshooting LonWorks

### Check the following to troubleshoot your W2W Open:

- 1 Verify that the BAS and controller are both set to speak the LonWorks protocol by the Comm Selector DIP switches **DS3 - DS6**.
- 2 The BAS and the controller are both set for the same baud rate:
  - o 38.4k for LonWorks
  - o Baud rate DIP switches DS2 and DS1
  - o Obtain a Modstat of the controller. Scroll to the bottom of the page to **Network Communications** to view the active protocol and baud rate.
- 3 BAS must be reading or writing to the proper point addresses on the controller.
- 4 Verify that the Comm Option Port is enabled on the controller. The Comm Option Port setting must be set via **SW3** (switch **DS7**). It should be in the ON position to enable LonWorks communication.
- 5 Verify that controller has been properly commissioned onto the LonWorks network. See *Commissioning the controller for LonWorks communication* (page 20).
- 6 Use the **Browse** feature of the network management tool to verify that you can communicate and get real-time values from the controller before connecting the BAS.
- 7 Once you have confirmed communications with the controller using the network management tool, connect the BAS.
- 8 Verify that the BAS is connected properly to the LonWorks Option Card's 2-wire TP/FT-10 Net port, which is polarity insensitive. The BAS may have to configure jumper or DIP switches on their end to support TP/FT-10.

## Start-up

Use one of the following interfaces to start up, access information, read sensor values, and test the controller.

This interface...	Provides a...
<b>Field Assistant</b> application - Runs on a laptop that connects to controller's Local Access port <sup>1</sup>	Temporary interface
<b>Equipment Touch</b> device - Connects to controller's Rnet port <sup>2</sup>	Temporary or permanent interface
<b>I-Vu®</b> application Available for BACnet systems only	Permanent interface
<b>System Touch</b> device Available only for BACnet MS/TP systems. Wire to a BACnet MS/TP network connector and a 24 Vac power supply <sup>3</sup>	Temporary or permanent interface

<sup>1</sup> Requires a USB Link (Part #USB-L).

<sup>2</sup> See the *Equipment Touch Installation and Setup Guide* for detailed instructions.

<sup>3</sup> See the *System Touch Installation and Setup Guide* for detailed instructions.



**CAUTION** If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller's ground and the computer's AC power ground could damage the USB Link and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link. Purchase a USB isolator online from a third-party manufacturer.

## Sequence of Operation

The W2W Open may be used standalone, or as part of an i-Vu® system, or third-party BACnet control system. The control is designed to heat or cool the load water and to maintain the leaving or entering water at the control setpoint. Each controller supports up to 4 stages of capacity and up to 3 compressor stages (with compressor status feedback). Also, you can have controllers that are slaves if you have equipment or systems with up to 8 stages of control.

The following sections describe the multi-protocol controller's functions. All point objects mentioned in this sequence of operation reference the touchscreen interface. Points in Field Assistant and the i-Vu® application are the same or similar.

## Occupancy

Occupancy settings are used to start and stop the unit, based on a time period. When occupied, the leaving water temperature or entering water temperature is controlled to the specified heating or cooling setpoints. By default, the control is continuously occupied and is enabled to maintain the water temperature at the water supply setpoint. During unoccupied periods, no heating or cooling operation is allowed.

You can determine occupancy using any of the 4 methods defined below:

- **Local Time Schedules** - Each controller has local time schedules. Time schedules are configured using an Equipment Touch, Field Assistant, or the i-Vu® application. See the product's documentation for instructions. Note that the controller's local time and date must be set for these functions to operate properly.
- **System Occupancy** - System Occupancy provides a means for W2W controls, installed as part of an i-Vu® Control System, to have their occupancy determined by another controller on the controls network. A Binary Network input (BNI2) object reads the present\_value of the Occupancy Status variable of another controller. You must setup System Occupancy in Field Assistant or the i-Vu® application.
- **BAS (Building Automation System) On/Off** - BAS On/Off provides a means for the control, installed as part of a third-party BACnet system, to have their occupancy determined by another device on the controls network. A Network Visible, BACnet Multi-state Value object may be written to by the third-party device to set the control's occupied state, as required. Determining the occupancy using this method takes precedence over all others. No special configuration is necessary to use this function. Object address information is also described in this Integration Guide
- **Remote Occupancy Contact** - The control can use an external dry contact closure to determine the occupancy status of the unit. The external contact may be normally closed or normally opened. Assuming a normally open contact, the controller is unoccupied when the remote contact is open, and occupied when the contact is closed. A normally closed contact is unoccupied when the remote contact is closed, and occupied when the remote contact is open.

## Cooling

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When configured for Single/Slave Unit operation, the control operates up to 4 stages to maintain the desired chilled water setpoint. The control point can be selected by setting the Control Type to either the leaving water temperature sensor (default) or the entering water temperature sensor. While in the cooling mode, the compressor outputs are controlled by the PI (Proportional-integral) cooling loop and cooling stages capacity algorithm. The algorithms calculate the desired number of stages needed to satisfy the load water setpoint by comparing the actual water temperature sensor value to the chilled water setpoint.

An independent leaving load water temperature safety check is included to verify that sufficient load water flow is provided. Regardless of the control type, as the leaving load water temperature exceeds the configured Chilled Water Supply Setpoint, the compressor stages start to be reduced as required.

The following conditions must be true in order for the cooling algorithm to run:

- Unit is occupied (see *Occupancy* (page 22))
- The lockout temperature (OAT, SPT, or T1) is greater than the Cooling lockout temperature setpoint
- Cooling mode is set to Enable
- Heat mode is not active and the compressor time guard has expired
- The Changeover time guard has elapsed
- Load water temp is above the Chilled Water Supply Setpoint

If all the above conditions are met, the compressor(s) is energized as required to satisfy the cooling requirements. While cooling, the reversing valve output is held in the cooling position (either type B or O, as configured) even after compression is stopped. The valve does not switch position until the heating mode is required.

During cooling operation, the control employs a 5 minute time delay before each subsequent stage of compression is energized to allow the leaving water temperature (LWT) to achieve a stable temperature and avoid overshoot. Once energized, a stage of compression will have to run for at least 180 seconds before being staged off, to avoid short-cycling. Once a compressor is staged off, it may not be restarted again until a 5-minute time guard delay period expires.

The controller provides 3 binary compressor status inputs to monitor compressor operation. These inputs are monitored to determine if the compressor status matches its commanded state. These inputs determine if a refrigerant safety switch or other safety device has tripped and has caused the compressor to stop operating normally. If this occurs, an alarm is generated to indicate the faulted compressor condition. The Compressor Status Alarm includes a 6 minute delay to avoid nuisance alarms.

## Additional cooling functions

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**Cooling Setpoint OA Reset** - You can configure the control to reset the chilled water setpoint, proportionally based upon OAT. You can configure the amount of reset and the reset range. This feature can provide energy savings by operating the unit at a higher load water temperature setpoint when the minimum chilled water temperature is not required. You can also use it to better match the chilled water temperature to the cooling load requirements.

The following conditions must be true in order for the Cooling Setpoint OA Reset algorithm to run:

- The preconditions for cooling operation have been met
- The controller has a valid Outdoor Air Temperature
- Cooling Setpoint OA Reset is Enabled

**RH Cooling Setpoint Reset** - When the OAT Cooling Setpoint Reset function is enabled, the control can limit the (OAT) chilled water setpoint reset, based on the difference between the High RH setpoint and the measured RH value (Space RH or Outdoor Air RH).

The RH Cooling Setpoint reset override uses a PI function to determine the limit applied to the Cooling Setpoint OA Reset function.

The following conditions must be true in order for the RH Cooling Setpoint Reset algorithm to run:

- The preconditions for cooling operation have been met
- The preconditions for Cooling Setpoint OA Reset operation have been met
- The controller has a valid Relative Humidity value
- RH Cooling Setpoint OA Reset is Enabled

## Heating

---

When configured for Single/Slave Unit operation, the control operates up to 4 stages of compression to maintain the desired hot water supply setpoint. You select the control point by setting the Control Type to the leaving water temperature sensor (default) or the entering water temperature sensor. While in the heating mode, the compressor outputs are controlled by the PI (Proportional-integral) heating loop and heating stages capacity algorithm. The algorithms calculate the number of stages needed to satisfy the load water setpoint by comparing the actual water temperature sensor value to the hot water supply setpoint.

In addition, an independent leaving load water temperature safety check is included to verify that sufficient load water flow is provided. Regardless of the control type, as the leaving load water temperature exceeds the configured Hot Water Supply Setpoint, the compressor stages are reduced as required.

The following conditions must be true in order for the heating algorithm to run:

- Unit is occupied (see *Occupancy* (page 22))
- The lockout temperature (OAT, SPT, or T1) is less than the Heating lockout temperature setpoint
- Heat Enable is set to Enable
- Cool mode is not active and the compressor time guard has expired
- The Changeover time guard has elapsed
- Load water temp is below the Hot Water Supply Setpoint

If all the above conditions are met, the compressors satisfy the heating requirements. While heating, the reversing valve output is held in the heating position (type B or O, as configured), even after compression stops. The valve does not switch position until the cooling mode is required.

During heating operation, the control employs a 5 minute time delay before each subsequent stage of compression, to allow the leaving water temperature (LWT) to achieve a stable temperature and avoid overshoot. Once energized, a stage of compression has to run for at least 180 seconds before being staged off, to avoid short-cycling.

Once a compressor is staged off, it may not be restarted again until a 5 minute time guard delay period expires.

The controller provides 3 binary compressor status inputs to monitor compressor operation. These inputs are monitored to determine if the compressor status matches its commanded state. These inputs are used to determine if a refrigerant safety switch or other safety device has tripped and caused the compressor to stop operating normally. If this happens, an alarm is generated to indicate the faulted compressor condition. The Compressor Status Alarms include a 6 minute delay to avoid nuisance alarms.

## Additional heating functions

---

**Heating Setpoint OA Reset** - You can configure the control to reset the hot water supply setpoint, proportionally based upon OAT. You can configure the amount of reset and the reset range. This feature provides energy savings by operating the unit at a lower load water temperature setpoint when the maximum hot water supply temperature is not required. It can also be used to more closely match the hot water temperature to the heating load requirements.

The following conditions must be true in order for the Heating Setpoint OA Reset algorithm to run:

- The preconditions for heating operation have been met (see *Heating* (page 24))
- The controller has a valid Outdoor Air Temperature
- Heating Setpoint OA Reset is Enabled

## Control modes

---

The following control modes are available for unit operation. Any mode may be selected by the installer or by an authorized operator using an Equipment Touch, Field Assistant, or the i-Vu® application.

**Manual Cool** - Configuring the Control Mode Selection for Manual Cool places the control in a cooling-only mode and the machine operates as a chiller. When you enable Manual Cool, the controller operates as described in *Cooling* (page 23). The Outdoor Air and Relative Humidity Cooling setpoint reset functions are available if the preconditions are met.

When the Control Mode Selection is set to Manual Cool, the lockout temperature (OAT, SPT, or T1) is overridden, even when the input is available. The control operates as required to maintain the Chilled Water Supply Temperature setpoint, regardless of any previously configured lockout temperature.

The following conditions must be true in order for the cooling algorithm to run in Manual Cool:

- Control Mode Selection is set to Manual Cool
- Cool Enable is set to Enable
- Unit is occupied (see *Occupancy* (page 22))
- Load water temp is above the Chilled Water Supply Setpoint

**Manual Heat** - Configuring the Control Mode Selection for Manual Heat places the control in a heating-only mode. When you enable Manual Heat, the controller operates as described in *Heating* (page 24). The Heating Setpoint OA Reset function is available if the preconditions are met.

When the Control Mode Selection is set to Manual Heat, the lockout temperature (OAT, SPT, or T1) is overridden, even when the input is available. The control operates as required to maintain the Hot Water Supply Temperature setpoint, regardless of any previously configured lockout temperature.

The following conditions must be true in order for the heating algorithm to run in the Manual Heat control mode:

- Control Mode Selection is set to Manual Heat
- Heat Enable is set to Enable
- Unit is occupied (see *Occupancy* (page 22))
- Load water temp is below the Hot Water Supply Setpoint

**OAT** - Configuring the Control Mode Selection for OAT sets the control to change modes between heating and cooling automatically, based on the Outdoor Air Temperature (OAT). The control compares the OAT to the configured lockout temperatures for heating and cooling and selects the appropriate operating mode. This mode requires a valid outdoor air temperature reading (hardware or network). Once enabled, equipment control is as described for heating & cooling.

When conditions require cooling, the controller operates as described in *Cooling* (page 23). The Outdoor Air and Relative Humidity Cooling setpoint reset functions are available if the preconditions are met.

The following conditions must be true in order for the cooling algorithm to run in the OAT control mode:

- A valid Outdoor Air Temperature is present
- Control Mode Selection is set to OAT
- Cool Enable is set to Enable
- Unit is occupied (see *Occupancy* (page 22))
- The OAT is greater than the Cooling lockout temperature setpoint
- Heat mode is not active and the compressor time guard has expired
- The Changeover time guard has elapsed
- Load water temp is above the Chilled Water Supply Setpoint

**SPT** - Configuring the Control Mode Selection for SPT sets the control to change modes between heating and cooling based on the Space Temperature sensor located in the space or return air plenum (SPT). The control will compare the SPT to the configured lockout temperatures for heating and cooling and select the appropriate operating mode. For this mode, a valid space temperature reading (hardware or network) is required. Once enabled, equipment control is as described for heating & cooling.

When conditions require cooling, the controller operates as described in *Cooling* (page 23). The Outdoor Air and Relative Humidity Cooling setpoint reset functions are available if the preconditions are met.

The following conditions must be true in order for the cooling algorithm to run in the SPT control mode:

- A valid SPT is present
- Control Mode Selection is set to SPT
- Cool Enable is set to Enable
- Unit is occupied (see *Occupancy* (page 22))
- The SPT is greater than the Cooling lockout temperature setpoint
- Heat mode is not active and the compressor time guard has expired
- The Changeover time guard has elapsed
- Load water temp is above the Chilled Water Supply Setpoint

**System T1 Temp** - Configuring the Control Mode Selection for System T1 Temp sets the control to change modes between heating and cooling, based on a network temperature. The control compares the network temperature to the configured lockout temperatures for heating and cooling and selects the appropriate operating mode. The System T1 Temperature network input object must be addressed to read the desired temperature and communicate for this mode. Once enabled, equipment control is as described for heating and cooling.

When conditions require cooling, the controller operates as described in *Cooling* (page 23). The Outdoor Air and Relative Humidity Cooling setpoint reset functions are available if the preconditions are met.

The following conditions must be true in order for the cooling algorithm to run in the T1 control mode:

- A valid network T1 temperature is present
- Control Mode Selection is set to T1
- Cool Enable is set to Enable
- Unit is occupied (see *Occupancy* (page 22))
- The T1 Temperature is greater than the Cooling lockout temperature setpoint
- Heat mode is not active and the compressor time guard has expired
- The Changeover time guard has elapsed
- Load water temp is above the Chilled Water Supply Setpoint

## Pump/Valve control functions

---

**Load Pump** - There is a dedicated binary output to control a load pump. The load pump output is energized when the unit is occupied. When power is first applied to the control, or reapplied after a power outage, the pump output is energized after the *Power Fail Restart Delay* (page 28) expires.

The pump control includes a configurable Pump Stop Delay. The stop delay defines the time the pump continues to operate after heating or cooling stops, if the unit transitions to unoccupied. The Pump Stop Delay default value is 45 seconds and may be adjusted between 0 and 180 seconds. Note that on a request for unit shutdown, the pump continues to operate until all compression is disabled and the configured pump delay expires.

**Source Water Isolation Valve/Source Water Pump Output** - There is a dedicated binary output to control a source water isolation valve or dedicated source water pump. The output is energized prior to starting any compression stage.

The output includes a configurable close/off delay. The delay defines the time the isolation valve remains open or the pump continues to operate after the last stage of compression stops. The Iso Valve Close Delay default value is 45 seconds and may be adjusted between 0 and 180. Note that on a request for unit shutdown, the valve remains open until all compression is disabled and the configured valve close delay expires.

## Changeover Timeguard

---

The control uses a fixed 5 minute Changeover Timeguard to protect the equipment, in the event of any immediate mode change between heating and cooling. The timeguard stops compressor operation for 5 minutes to allow water temperatures and refrigerant pressures to normalize before restarting the compressor. You can see the status (Inactive / Active) of the Changeover Timeguard in the controller's Maintenance expander.

## Shutdown

---

The control includes a unit shutdown function. Shutdown is a software switch that allows an operator to stop unit operation. Shutdown is a BACnet binary value (object name **shutdown**) and is accessed in the Status expander via the Shutdown variable. Setting Shutdown to **Active** immediately stops compressor operation. The pump and valve outputs remain energized until their off-delays have expired (see Pump/Valve control functions).

The equipment remains off as long as Shutdown is active. Shutdown's default state is inactive. Shutdown may be enabled from the UI, or accessed via the network, when the controller is part of a BACnet MS/TP network.

## Power fail restart delay

---

The control includes an adjustable Power Fail Restart Delay (PFRD). The PFRD holds off the equipment startup until the configured delay time has expired and may be used to stagger equipment starts after a power outage. The PFRD default value is 60 seconds, but may be adjusted from 0 to 600 seconds.

## Demand limiting

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The control has the ability to accept a demand limit signal from the network. The demand limit function provides a means for W2W Open controls, installed as part of an i-Vu® Control System, to have their heating and chilled water setpoints expanded (lowered and raised) to lower the equipment's electricity consumption. You can adjust the setpoint for each of the 3 demand levels for both heating and cooling. The configured demand level values are cumulative. A level 3 demand limit incorporates the reset values of demand level 1 + demand level 2 + demand level 3.

If both outdoor air setpoint reset and demand level limiting are simultaneously active, the reset value applied is the greater of the 2 individual reset functions that are in effect, but NOT the cumulative total of both.

## Equipment alarm

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The control provides an alarm output that illuminates an equipment-mounted alarm lamp, and generates a generic Equipment Alarm, under certain alarm conditions configured by an operator. See *Alarms* (page 30) for configuration instructions related to Equipment Alarm.

## Service Test

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There is a built-in Service Test function to test the controller's outputs independently.

- The Isolation Valve Test energizes the control's Isolation Valve Binary Output.
- The Water Pump Test energizes the control's Water Pump Binary Output.
- The Compressor Test energizes the control's Compressor Binary Outputs.
- The Alarm Indicator Test energizes the control's Alarm Indicator Binary Output.

Using Service Test disables normal equipment operation. Service Test operates in accordance with the control's configuration. For example, initiating the Compressor Test function of Service Test on a 2-stage heat pump, that is configured to provide both heating and cooling, energizes the stages of compression by staging up in Cooling, then changing the reversing valve, before staging down in Heating. Although the isolation valve and water pump outputs may be tested independently, they are automatically energized when the Compressor Test is enabled.

Service Test times out (disables) automatically after 60 minutes if the technician does not disable it after completing the test.

## Multi-unit master

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On installations having multiple W2W Opens serving a common load, the heat pumps may be controlled as a single heating or cooling source, utilizing the Multi-unit Master Operating Mode.

For these installations, the controllers are networked together. One of the installed heat pumps operates as a Master control, with the remaining controllers operating as Slaves. The number of stages required to meet load conditions are determined by the Master control. Slave controllers receive the number of stages required from the Master and energize their compressor outputs appropriately, in sequence.

In this fashion, a Multi-unit Master system can provide up to 8 total stages of control. A Multi-unit Master system provides coordinated heat pump operation with the same feature set and sequences of operation as a Single Unit configuration.

In this configuration, an independent leaving load water temperature safety check at each unit is included to verify that sufficient load water flow is provided. Should the leaving load water temperature fall below the configured **Chilled Water Setpoint** in cooling or the **Hot Water Setpoint** in heating, the compressor stages for any unit (master or slave) are reduced as needed without reducing the system staging requirements.

**IMPORTANT** Be sure to configure each slave unit for standalone operation as a fail-safe. Many individual configuration parameters that are not required or used during slave operation, such as the chilled water and hot water setpoints, are hidden once the slave is linked to a master unit.

## Alarms

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**Equipment Alarm** – The Alarm Lamp binary output sets to the alarm state when any point, specified to initiate an Equipment Alarm, is currently in alarm.

**Compressor Status** – Indicates an alarm when any Compressor Alarm is active. The control generates a compressor failure alarm if the compressor status input detects the compressor is OFF after the associated compressor output has been energized. A 6 minute alarm delay is used to allow the compressor to start (prevents alarms due to timeguard operation) before an alarm condition is detected. The control monitors the compressor output and, if the compressor output is energized, the compressor status input must detect the compressor operation.

**SPT Sensor** (if SPT sensor was active) – The control generates an SPT sensor failure alarm if the SPT sensor fails to communicate with the control for 5 minutes or longer. The update status is monitored and, if it fails to be updated, then an SPT sensor alarm is generated.

**System T1 Sensor** (if System T1 Temperature was active) – The control generates a T1 Sensor failure alarm if the value of the T1 sensor fails to be updated through the network after once being active. The update status is monitored and, if it fails to be updated, then a T1 sensor alarm is generated. There is an alarm delay (approximately 10 minutes) to prevent alarms, while minimizing the required update rate.

**NOTE** You can reset this alarm by momentarily setting the Shutdown point to Active.

**Leaving Load Water Temperature** – Indicates an alarm if the Leaving Load Water Temp falls below the low, or exceeds the high, alarm limits for more than 1 minute. The equipment (load pump) must be operating for more than 3 minutes before the load water conditions above are evaluated. A 2° F hysteresis is applied after an alarm condition is detected.

**Leaving Load Water Temperature Sensor** – The control generates an alarm if the value of Leaving Load Water Temp fails to be updated through the network after once being active, or if the local sensor fails (measures a sensor temperature greater than 200° or less than -50° F, indicating a shorted or open sensor). The update status is monitored and, if it fails to be updated, a Leaving Load Water Temp Sensor alarm is generated. There is an alarm delay of approximately 10 minutes for network sensors to prevent false alarms, while minimizing the required update rate. Local sensors connected directly to the controller have a 1 minute alarm delay.

**NOTE** You can reset this alarm by momentarily setting the Shutdown point to Active.

**Entering Load Water Temperature** – Indicates an alarm if the Entering Load Water Temp falls below the low, or exceeds the high, alarm limits for more than 1 minute. The equipment (load pump) must be operating for more than 3 minutes before the load water conditions above are evaluated. A 2° F hysteresis is applied after an alarm condition is detected.

**Entering Load Water Temperature Sensor** – The control generates an alarm if the value of Entering Load Water Temp fails to be updated through the network after once being active, or if the local sensor fails (measures a sensor temperature greater than 200° or less than -50° F, indicating a shorted or open sensor). The update status is monitored and if it fails to be updated, then a Entering Load Water Temp Sensor alarm is generated. There is an alarm delay (approximately 10 minutes for network sensors) to prevent false alarms, while minimizing the required update rate. Local sensors connected directly to the controller have a 1 minute alarm delay.

**NOTE** You can reset this alarm by momentarily setting the Shutdown point to Active.

**Source Water Temperature** – Indicates an alarm if the Source Water Temp falls below the minimum, or exceeds the maximum heating or cooling limits. The control has 4 configurable alarm limits for source water temperature. The control verifies that the water temperature is within operating range (between high and low limits) for the specific operating mode (heating or cooling) before energizing the compressor. Once the compressor is started, the source water temperature is further monitored to verify that it is within limits to ensure sufficient water is flowing through the coil. If the leaving source water temperature rises above or falls below the appropriate limits, an alarm is generated and the compressors shut down immediately.

**Leaving Source Water Temp Sensor** – Indicates an alarm if the Leaving Source Water Temp sensor fails (measures a local sensor temperature greater than 200° or less than -50° F, indicating a shorted or open sensor).

**System Entering Source Water Temp Fail** (if System Entering Source Water Temperature was active) – The control generates an alarm if the value of System Entering Source Water Temp fails to be updated through the network after once being active. The update status is monitored and if it fails to be updated, then a System Entering Source Water Temp Fail alarm is generated. There is an alarm delay (approximately 10 minutes) to prevent false alarms, while minimizing the required update rate. (BACnet Only)

**NOTE** You can reset this alarm by momentarily setting the Shutdown point to Active.

**Outdoor Air Temperature** – Indicates an alarm if the outdoor air temperature falls below the low, or exceeds the high, alarm limits for more than 1 minute and the controller is receiving a valid OAT value. If the controller is operating as a slave unit, this alarm is not generated. A 1° F hysteresis is applied after an alarm condition is detected.

**Outdoor Air Temp Sensor** (if System Outdoor Air Temperature was active) – The control generates an OAT Sensor failure alarm if the value of OAT fails to be updated through the network after once being active. The update status is monitored, and if it fails to be updated, then an OAT sensor alarm is generated. There is an alarm delay (approximately 1 hour) to prevent false alarms, while minimizing the required update rate for OAT.

**NOTE** You can reset this alarm by momentarily setting the Shutdown point to Active.

**Space Relative Humidity** – The control can generate an alarm when the space relative humidity exceeds the alarm setpoint. There are separate occupied and unoccupied high humidity alarm setpoints. The control has a 5 minute alarm delay during unoccupied periods. During occupied periods, the controller uses the occupied high RH alarm limit. When an occupancy transition from unoccupied to occupied occurs, or the occupied high alarm limit is lowered, causing an alarm condition to occur, the control automatically calculates an alarm delay (equivalent to the configured delay time in minutes/% RH, times the humidity error condition that occurred, plus 15 minutes). This prevents nuisance alarms when an occupancy change occurs and allows time for the unit to correct an alarming humidity condition.

**Source Water Linkage** (if Source Water Linkage was active) – The control generates a Source Water Linkage failure alarm if Linkage fails after once being active. The Linkage status is monitored and if it fails to be updated from the Loop controller, then a Source Water Linkage alarm is generated. There is a 6 minute alarm delay to prevent false alarms.

**NOTE** You can reset this alarm only by re-establishing Linkage and correcting the condition that caused the Linkage failure, or by momentarily setting the Shutdown point to Active (BACnet Only).

## Troubleshooting the W2W Open

The W2W Open controller acts as an intelligent embedded thermostat to the water source heat pump, but can be monitored and controlled from a third party network.

You must determine which of the following needs troubleshooting:

- The W2W Open controller
- The mechanical systems of the WSHP unit
- The third party connected network

The W2W Open controller can troubleshoot itself with Service Test, communicating LED's, and built-in alarms. See the unit's Controls and Troubleshooting instructions.

Disconnecting the W2W Open from the unit control inputs can be valuable in determining whether the problem is related to the unit/equipment, the controller/equipment, or the controller/network. When disconnected from the unit control inputs, you can use simple 24V signals to activate G, Y1, Y2, W1, W2, etc. to verify proper unit operation. If the problem occurs without the W2W Open connected, then you should begin troubleshooting the unit/equipment rather than the W2W Open or network.

### LED's

The LED's indicate if the controller is speaking to the other devices on the network. The LED's should reflect communication traffic based on the baud rate set. The higher the baud rate, the more solid the LED's will appear.

The LED's on the show the status of certain functions.

If this LED is on...	Status is...
<b>Power</b>	The W2W Open has power.
<b>Rx</b>	The W2W Open is receiving data from the network segment
<b>Tx</b>	The W2W Open is transmitting data over the network segment
<b>BO#</b>	The binary output is active

**NOTE** If Tx is not lit, the MS/TP token is not being passed between controllers.

The **Run** and **Error** LED's indicate controller and network status.

If Run LED shows...	And Error LED shows...	Status is..
2 flashes per second	Off	Normal
2 flashes per second	2 flashes, alternating with <b>Run</b> LED	Five minute auto-restart delay after system error
2 flashes per second	3 flashes, then off	Controller has just been formatted

<b>If Run LED shows...</b>	<b>And Error LED shows...</b>	<b>Status is..</b>
2 flashes per second	On	Two or more devices on this network have the same network address
2 flashes per second	On	Firmware halted after frequent system errors or control programs halted
5 flashes per second	Off	Firmware transfer in progress, Boot is running
7 flashes per second	7 flashes per second, alternating with <b>Run LED</b>	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating with <b>Run LED</b>	Brownout
On	On	Failure. Try the following solutions: <ul style="list-style-type: none"> <li>• Turn the W2W Open off, then on.</li> <li>• Replace the W2W Open.</li> </ul>

## Compliance

### FCC Compliance

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



**CAUTION** Changes or modifications not expressly approved by the responsible party for compliance could void the user's authority to operate the equipment.

### CE Compliance

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**WARNING** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

### BACnet Compliance

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Compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL® is a registered trademark of BACnet International.

## Appendix A: Network Points List for W2W Open

### Network points list for BACnet and Modbus

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
Active Compressor Stages	R	no units		comp_stages	AV:2020	Input Register (Float)	31
Chilled Water Supply Setpoint	R/W	°F	44	chws_setpoint	AV:3024	Holding Register (Float)	1
Compressor Capacity	R	%		comp_cap	AV:5001	Input Register (Float)	165
Cooling Lockout Temperature	R/W	°F	45	oat_cl_lockout	AV:9002	Holding Register (Float)	43
Effective Cool Setpoint	R	°F		eff_cl_stpt	AV:3005	Input Register (Float)	55
Effective Heat Setpoint	R	°F		eff_ht_stpt	AV:3006	Input Register (Float)	57
Entering Load Water Temp	R	°F		ent_load_wtr_temp	AV:1019	Input Register (Float)	35
Heating Lockout Temperature	R/W	°F	65	oat_ht_lockout	AV:9003	Holding Register (Float)	69
Leaving Load Water Temp	R	°F		lvg_load_wtr_temp	AV:1020	Input Register (Float)	39
Maximum OA CHW Reset	R/W	°F	10	max_cw_reset	AV:9037	Holding Register (Float)	49
Outdoor Air Temperature	R	°F		oa_temp	AV:1003	Input Register (Float)	87
Power Fail Restart Delay	R/W	seconds	5	start_delay	AV:9007	Holding Register (Float)	127
Space Relative Humidity	R	%rh		space_rh	AV:1011	Input Register (Float)	103
System Entering Load Water Temp	R/W	deg	-999	system_elwt	AV:1910	Holding Register (Float)	79
System Entering Source Water Temp	R/W	deg	-999	system_ecwt	AV:1911	Holding Register (Float)	77

Appendix A: Network Points List for W2W Open

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
System OAT Master	R	°F		mstr_oa_temp	AV:80001	Input Register (Float)	91
System Outdoor Air Temperature	R/W	°F	-999	system_oat	AV:1901	Holding Register (Float)	119
System T1 Temperature	R/W	°F	-999	system_t1_temp	AV:1909	Holding Register (Float)	95
Total System Cmpr Capacity	R	%		total_comp_cap	AV:5002	Input Register (Float)	113
Cool Enable	R/W	(0) Disable (1) Enable	Active (1)	cl_enable	BV:1011	Coil	36
Cooling Setpoint OA Reset	R/W	(0) Disable (1) Enable	Inactive (0)	clg_stpt_oa_rst_ena	BV:1023	Coil	2
Entering Load Water Temp Sensor	R	(0) Normal (1) Alarm		ent_lwt_fail	BV:7041	Discrete Input	11
Entering Load Water Temperature	R	(0) Normal (1) Alarm		elwt_alarm	BV:7040	Discrete Input	10
Heat Enable	R/W	(0) Disable (1) Enable	Active (1)	ht_enable	BV:1012	Coil	37
Heating Setpoint OA Reset	R/W	(0) Disable (1) Enable	Inactive (0)	htg_stpt_oa_rst_ena	BV:1024	Coil	3
Leaving Load Water Temperature	R	(0) Normal (1) Alarm		llwt_alarm	BV:7043	Discrete Input	15
Leaving Source Water Temp Sensor	R	(0) Normal (1) Alarm		lvg_cwt_fail	BV:7042	Discrete Input	14
Load Water Pump	R	(0) Off (1) On		load_pump	BV:1019	Discrete Input	8
Occupancy Status	R	(0) Unoccupied (1) Occupied		occ_status	BV:2008	Discrete Input	18
Outdoor Air Temperature	R	(0) Normal (1) Alarm		oat_alarm	BV:7036	Discrete Input	19
RH Cooling Setpoint Reset	R/W	(0) Normal (1) Alarm	Inactive (0)	rh_clg_stpt_rst	BV:1020	Coil	5
Shutdown	R/W	(0) Normal (1) Alarm	Inactive (0)	shutdown	BV:9001	Coil	1
Source Water Pump	R	(0) Off/Close (1) On/Open		pump_iso_vlv	BV:1021	Discrete Input	3
Source Water Temperature	R	(0) Normal (1) Alarm		cwt_alarm	BV:7027	Discrete Input	61
Space Relative Humidity	R	(0) Normal (1) Alarm		sprh_hi_alarm	BV:7018	Discrete Input	34
Space Relative Humidity Sensor	R	(0) Normal (1) Alarm		sprh_sensor_fail	BV:7022	Discrete Input	45
SPT Sensor	R	(0) Normal (1) Alarm		spt_sensor_fail	BV:7032	Discrete Input	38
System T1 Sensor	R	(0) Normal (1) Alarm		t1_fail	BV:7046	Input Register (Signed)	28
BAS On / Off	R/W	(1) Inactive (2) Occupied (3) Unoccupied	2	keypad_ovrde	MSV:1001	Holding Register (Signed)	133

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
System Mode	R	(1) Off (2) Fan Only (3) Economize (4) Cooling (5) Heating (6) Cont Fan (7) Test (8) Start Delay (9) Temer SAT (10) Safety Shutdown (11) Shutdown (12) IAQ Override (13) Dehumidify (15) Pump Only		run_status	MSV:2002	Input Register (Signed)	1
Hot Water Supply Setpoint	R/W	°F	120	hws_setpoint	AV:3023	Holding Register (Float)	3
System Leaving Load Water Temp	R/W	deg	-999	system_llwt	AV:1912	Holding Register (Float)	81
Leaving Load Water Temp Sensor	R	(0) Normal (1) Alarm		lvg_lwt_fail	BV:7044	Discrete Input	16
Leaving Source Water Temp	R	°F		cwl_temp	AV:1017	Input Register (Float)	167
Outdoor Air Temp Sensor	R	(0) Normal (1) Alarm		oat_fail	BV:7029	Discrete Input	27
Maximum OA HW Reset	R/W	°F	20	max_hw_reset	AV:9038	Holding Register (Float)	59
System Space RH	R/W	%	-999	system_rh	AV:1904	Holding Register (Float)	151
Water Temperature Setpoint	R	°F		eff_stpt	AV:3016	Input Register (Float)	115
Occ Relative Humidity Setpoint	R/W	%rh	60	occ_dehum_stpt	AV:3011	Holding Register (Float)	83
Total Req Sys Comp Stgs	R	no units		total_comp_stg	AV:88001	Input Register (Float)	111
ZS Sensor Configuration	R	(0) Normal (1) Alarm		zs_config_fail	BV:7055	Discrete Input	63
Compressor Status	R	(0) Normal (1) Alarm		comp_alarm	BV:7013	Discrete Input	30
Loop Pump Status	R	(0) Off (1) On		loop_pump	BV:2702		
Source Water Flow	R	(0) Normal (1) Alarm		sw_flow_alarm	BV:7049	Discrete Input	65
Load Water Flow	R	(0) Normal (1) Alarm		load_flow_alarm	BV:7057	Discrete Input	64

Appendix A: Network Points List for W2W Open

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
System Entering Source Water Temp Fail	R	(0) Normal (1) Alarm		sys_ecwt_fail	BV:7045		
System Cooling Demand Level	R	no units		cool_demand_level	AV:9006		
System Heating Demand Level	R	no units		heat_demand_level	AV:9036		
Demand Level 1 Heat Adj	R/W	°F	3	h_dmd1_adj	AV:3020		
Source Water Linkage	R	(0) Inactive (1) Active		cw_link_status	BV:2701		
Demand Level 1 Cool Adj	R/W	°F	3	c_dmd1_adj	AV:3017		
Demand Level 2 Cool Adj	R/W	°F	3	c_dmd2_adj	AV:3018		
Demand Level 3 Cool Adj	R/W	°F	4	c_dmd3_adj	AV:3019		
Communications with Master	R	(0) Normal (1) Alarm		mr_comm_fail	BV:7047		
Demand Level 2 Heat Adj	R/W	°F	5	h_dmd2_adj	AV:3021		
Water Loop Temp	R	°F		link_cwt	AV:2701		
Source Water Linkage	R	(0) Normal (1) Alarm		cond_water_linkage_fail	BV:7031		
Demand Level 3 Heat Adj	R/W	°F	7	h_dmd3_adj	AV:3022		
Load Water Flow Comm	R	(0) Normal (1) Alarm		load_pmp_comm_fail	BV:7056		
Loop Pump Request	R	no units		loop_request	AV:2024		
Source Water Flow Comm	R	(0) Normal (1) Alarm		src_pmp_comm_fail	BV:7058		
Equipment Alarm	R	(0) Normal (1) Alarm		equip_alarm	BV:7048	Discrete Input	12
Safety	R	(0) Normal (1) Alarm		safety_alarm	BV:7024	Discrete Input	43
Fan / Speed	R	(1) Off (2) Low (3) Med (4) High (5) On		fan_run	MSV:2004	Input Register (Signed)	175
Optimal Start Type	R/W	(1) None (2) Temp Compensated (3) Learning Adaptive	(2) Temp Compensated	start_type	MSV:2009	Holding Register (Signed)	154

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
Space Temp Source	R	(1) Sensor Failure (2) SPT Sensor (3) RAT / T55 (4) Network (5) Airside Linkage (6) Locked Value (7) T-Stat Linkage (8) ZS Sensor		spt_status	MSV:2003		
System Mode	R	(1) Off (2) Fan Only (3) Economize (4) Cooling (5) Heating (6) Cont Fan (7) Test (8) Start Delay (9) Temper SAT (10) Fire Shutdown (11) Shutdown (12) IAQ Override (13) Pre-Occ Purge		run_status	MSV:2002	Input Register (Signed)	1

## Network points list for N2 and LonWorks

Point Name	Point Access	Units	Default Value	N2		LonWorks	
				N2 Network Point Type	N2 Network Point Address	SNVT Type	SNVT Name
Active Compressor Stages	R	no units		ADF	10	SNVT_count_inc(9)	nvoCmpStages
Chilled Water Supply Setpoint	R/W	°F	44	ADF	1	SNVT_temp_p(105)	nviChilWtrSP
Compressor Capacity	R	%		ADF	72	SNVT_lev_percent(81)	nvoCmpCap
Cooling Lockout Temperature	R/W	°F	45	ADF	16	SNVT_temp_p(105)	nviClLckTemp
Effective Cool Setpoint	R	°F		ADF	22	SNVT_temp_p(105)	nvoEffCoolSP
Effective Heat Setpoint	R	°F		ADF	23	SNVT_temp_p(105)	nvoEffHeatSP
Entering Load Water Temp	R	°F		ADF	25	SNVT_temp_p(105)	nvoEntLdWtr
Heating Lockout Temperature	R/W	°F	65	ADF	29	SNVT_temp_p(105)	nviHtLckTmp
Leaving Load Water Temp	R	°F		ADF	27	SNVT_temp_p(105)	nvoLvgLdWtr
Maximum OA CHW Reset	R/W	°F	10	ADF	34	SNVT_temp_p(105)	nviMxOaCWRst
Outdoor Air Temperature	R	°F		ADF	38	SNVT_temp_p(105)	nvoOAT
Power Fail Restart Delay	R/W	seconds	5	ADF	58	SNVT_time_sec(107)	nviUntStrDly
Space Relative Humidity	R	%rh		ADF	46	SNVT_lev_percent(81)	nvoSpaceRH
System Entering Load Water Temp	R/W	deg	-999	ADF	52	SNVT_temp_p(105)	nviEntLdWtr
System Entering Source Water Temp	R/W	deg	-999	ADF	51	SNVT_temp_p(105)	nviSyEntCdWt
System OAT Master	R	°F		ADF	55	SNVT_temp_p(105)	nvoOATMstr
System Outdoor Air Temperature	R/W	°F	-999	ADF	54	SNVT_temp_p(105)	nviSysOAT
System T1 Temperature	R/W	°F	-999	ADF	57	SNVT_temp_p(105)	nviSysT1Temp
Total System Cmpr Capacity	R	%		ADF	65	SNVT_lev_percent(81)	nvoSysCmpCap
Cool Enable	R/W	(0) Disable (1) Enable	Active (1)	BO	36	SNVT_switch(95)	nviClEnb
Cooling Setpoint OA Reset	R/W	(0) Disable (1) Enable	Inactive (0)	BO	2	SNVT_switch(95)	nviClSpOARst
Entering Load Water Temp Sensor	R	(0) Normal (1) Alarm		BI	11	SNVT_switch(95)	nvoELWtmpSen

Point Name	Point Access	Units	Default Value	N2		LonWorks	
				N2 Network Point Type	N2 Network Point Address	SNVT Type	SNVT Name
Active Compressor Stages	R	no units		ADF	10	SNVT_count_inc(9)	nvoCmpStages
Entering Load Water Temperature	R	(0) Normal (1) Alarm		BI	10	SNVT_switch(95)	nvoLdWtrAlm
Heat Enable	R/W	(0) Disable (1) Enable	Active (1)	BO	37	SNVT_switch(95)	nviHtEnb
Heating Setpoint OA Reset	R/W	(0) Disable (1) Enable	Inactive (0)	BO	3	SNVT_switch(95)	nviHtSPOARst
Leaving Load Water Temperature	R	(0) Normal (1) Alarm		BI	15	SNVT_switch(95)	nvoLvgLwtAlm
Leaving Source Water Temp Sensor	R	(0) Normal (1) Alarm		BI	14	SNVT_switch(95)	nvoLvgCWTFI
Load Water Pump	R	(0) Off (1) On		BI	8	SNVT_switch(95)	nvoLdWtrPmp
Occupancy Status	R	(0) Unoccupied (1) Occupied		BI	18	SNVT_switch(95)	nvoOccStatus
Outdoor Air Temperature	R	(0) Normal (1) Alarm		BI	19	SNVT_switch(95)	nvoOatAlm
RH Cooling Setpoint Reset	R/W	(0) Normal (1) Alarm	Inactive (0)	BO	5	SNVT_switch(95)	nviRHCSPRst
Shutdown	R/W	(0) Normal (1) Alarm	Inactive (0)	BO	1	SNVT_switch(95)	nviShutdown
Source Water Pump	R	(0) Off/Close (1) On/Open		BI	3	SNVT_switch(95)	nvoCndWtrPmp
Source Water Temperature	R	(0) Normal (1) Alarm		BI	61	SNVT_switch(95)	nvoCWTempAlm
Space Relative Humidity	R	(0) Normal (1) Alarm		BI	34	SNVT_switch(95)	nvoHiSPRHAlm
Space Relative Humidity Sensor	R	(0) Normal (1) Alarm		BI	45	SNVT_switch(95)	nvoSpRHSenr
SPT Sensor	R	(0) Normal (1) Alarm		BI	38	SNVT_switch(95)	nvoSptSnsFI
System T1 Sensor	R	(0) Normal (1) Alarm		BI	28	SNVT_switch(95)	nvoSysT1Fail
BAS On / Off	R/W	(1) Inactive (2) Occupied (3) Unoccupied	2	ADI	1	SNVT_count_inc(9)	nviBASOnOff
System Mode	R	(1) Off (2) Fan Only (3) Economize (4) Cooling (5) Heating (6) Cont Fan (7) Test (8) Start Delay (9) Temper SAT (10) Safety Shutdown (11) Shutdown		ADI	13	SNVT_count_inc(9)	nvoOpMode

Appendix A: Network Points List for W2W Open

Point Name	Point Access	Units	Default Value	N2		LonWorks	
				N2 Network Point Type	N2 Network Point Address	SNVT Type	SNVT Name
Active Compressor Stages	R	no units		ADF	10	SNVT_count_inc(9)	nvoCmpStages
		(12) IAQ Override (13) Dehumidify (14) Pump Only					
Hot Water Supply Setpoint	R/W	°F	120	ADF	2	SNVT_temp_p(105)	nviHotWtrSP
System Leaving Load Water Temp	R/W	deg	-999	ADF	53	SNVT_temp_p(105)	nviLvgLdWtr
Leaving Load Water Temp Sensor	R	(0) Normal (1) Alarm		BI	16	SNVT_switch(95)	nvoLvgLwtFl
Leaving Source Water Temp	R	°F		ADF	73	SNVT_temp_p(105)	nvoLvgCWTemp
Outdoor Air Temp Sensor	R	(0) Normal (1) Alarm		BI	27	SNVT_switch(95)	nvoOatFail
Maximum OA HW Reset	R/W	°F	20	ADF	35	SNVT_temp_p(105)	nviMxOaHWRst
System Space RH	R/W	%	-999	ADF	40	SNVT_lev_percent(81)	nviSysSpRH
Water Temperature Setpoint	R	°F		ADF	66	SNVT_temp_p(105)	nvoWtrTempSP
Occ Relative Humidity Setpoint	R/W	%rh	60	ADF	36	SNVT_lev_percent(81)	nviOcrHSP
Total Req Sys Comp Stgs	R	no units		ADF	64	SNVT_temp_p(105)	nvoTIRqCpStg
ZS Sensor Configuration	R	(0) Normal (1) Alarm		BI	63	SNVT_switch(95)	nvoZsCfgFail
Compressor Status	R	(0) Normal (1) Alarm		BI	30	SNVT_switch(95)	nvoCmpSafety
Source Water Flow	R	(0) Normal (1) Alarm		BI	65	SNVT_switch(95)	nvoSWFlowAlm
Load Water Flow	R	(0) Normal (1) Alarm		BI	64	SNVT_switch(95)	nvoLWFlowAlm
Equipment Alarm	R	(0) Normal (1) Alarm		BI	12	SNVT_switch(95)	nvoEquipAlm
Safety	R	(0) Normal (1) Alarm		BI	43	SNVT_switch(95)	nvoSftyChain

## Appendix B: BACnet Protocol Implementation Conformance Statement

The PIC statements are updated regularly. Please refer to the *BACnet website*  
<http://www.bacnetinternational.net/catalog/index.php?m=28> for the latest information.

## Appendix C: Modbus Protocol Implementation Conformance Statement

Date: 11/12/2013

Vendor Name: **Carrier**

Product Names: **W2W Open**

Product Model Number: **#OPN-WSHPW2WM**

### Protocol Description:

The W2W Open controller speaks the Modicon Modbus RTU/ASCII Protocol as described in the *Modicon Modbus Protocol Reference Guide, PI-MBUS-300 Rev.J.* Further details on the Modbus implementation are described below.

### Product Description:

The W2W Open is a factory-installed rooftop controller that is capable of speaking multiple protocols.

Serial Transmission Mode:	Supported?
RTU	Slave only
ASCII	Not supported

Communication Types:	Baud rates:	Data Bits:	Parity:	Stop Bits:
2-wire EIA-485,	9600, 19200, 38400, 76800	8	None	1

Function Codes:	Purpose:	Used with Register Numbers:
01 – Read Coil Status	Read Discrete Outputs	00001 - 65535
02 – Read Input Status	Read Discrete Inputs	00001 - 65535
03 – Read Holding Registers	Read Holding Registers	00001 - 65535
04 – Read Input Registers	Read Input Registers	00001 - 65535
05 – Force Single Coil	Write Discrete Outputs (single)	00001 - 65535
06 – Preset Single Register	Write Holding Registers (single)	00001 - 65535
15 – Force Multiple Coils	Write Discrete Outputs	00001 - 65535
16 – Preset Multiple Coils	Write Holding Registers	00001 - 65535

<b>Register Type:</b>	<b>Range:</b>	<b>Function Codes Used with this Register Type:</b>
Float Value (FLOAT)	Single-Precision IEEE floating point value	3 - Read Holding Register 6 - Preset Single Register 16 - Preset Multiple Register
Unsigned Integer (UINT)	0 - 65535	3 - Read Holding Register 6 - Preset Single Register 16 - Preset Multiple Register
Signed Integer (SINT)	-32768 - 32767	3 - Read Holding Register 6 - Preset Single Register 16 - Preset Multiple Register
Discrete Input (DI)	0 = Off, 1 = On	2 - Read Input Status
Discrete Output (DO)	0 = Off, 1 = On	1 - Read Coil Status 5 - Force Single Coil 15 - Force Multiple Coils

# Appendix D: Johnson N2 Protocol Implementation Conformance Statement

Vendor Name: **Carrier**

Product Names: **W2W Open**

Product Model Number: **#OPN-WSHPW2WM**

### Protocol Description:

N2 is not a standard protocol, but one that was created by Johnson Controls, Inc. that has been made open and available to the public. The speed of N2 network is limited to only 9600 baud. The N2 slave address can be set from 01 to 99.

### Product Description:

The W2W Open is a factory-installed rooftop controller that is capable of speaking multiple protocols. The W2W Open controller speaks the Johnson N2 Open Protocol as described in the *Metasys N2 System Protocol Specification (for Vendors) document*, revision 6/13/96. Further details on the N2 supported implementation are described below.

<b>Communication Types:</b>	<b>Baud rates:</b>	<b>Data Bits:</b>	<b>Parity:</b>	<b>Stop Bits:</b>
2-wire EIA-485	9600	8	None	1

<b>Network Point Types:</b>
Analog Inputs (AI)
Binary Inputs (BI)
Analog Outputs (AO)
Binary Outputs (BO)
Internal Floats (ADF)
Internal Integers (ADI)
Internal Bytes (BD)

<b>Protocol Commands:</b>
Identify Device Type
Sync Time
Poll Without Acknowledge
Poll With Acknowledge
Read Analog Input
Read Binary Input
Read Analog Output
Read Binary Output
Read Internal Parameter
Write Analog Input
Write Binary Input

Write Analog Output
Write Binary Output
Write Internal Parameter
Override Analog Input
Override Binary Input
Override Internal Parameter
Override Release Request

## Appendix E: LonWorks Protocol Implementation Conformance Statement

Date: 10/09/2012

Vendor Name: **Carrier**

Product Names: **W2W Open**

Product Model Number: **#OPN-WSHPW2WM**

### Product Description:

The W2W Open is a factory-installed rooftop controller that is capable of speaking multiple protocols. When the LonWorks Option Card (LON-OC), is installed in the field, it enables the W2W Open to communicate over a LonTalk network. The W2W Open does not conform to a standard LonWorks profile, but is self-documenting and any network management tool can manage and configure it over the network. An external interface file (.XIF), is also available so that any network management tool can design and configure the W2W Open prior to installation. Contact your Carrier representative for this .XIF file.

LonWorks is an open protocol that requires the use Echelon's Neuron microprocessor to encode and decode the LonWorks packets. In order to reduce the cost of adding the Echelon chip to every controller, a separate LonWorks Option Card (LON-OC) was designed to connect to the W2W Open.

This accessory card must be ordered separately and is connected by attaching its ribbon cable into the **J15** connector on the W2W Open. The W2W Open's baud rate (**1** and **2** on **SW3**) must be set to 38.4k to communicate with the LON-OC. The address switches (**SW1** and **SW2**) are not used with LonWorks.

**Tranceiver Type:** TP/FT 10

## Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

<b>Date</b>	<b>Topic</b>	<b>Change description</b>	<b>Code*</b>
5/22/18	Troubleshooting BACnet MS/TP Troubleshooting ARC156	Corrected BACnet Device Instance number	C-TS-RD-F
1/9/18	Network points list for N2 and LonWorks	Updated	C-AE-BR-E
2/8/17	Wiring inputs and outputs	Added Wireless sensors and references to appropriate sensor guides.	C-AE-WB-O
	Sequence of operation - Linkage air source mode determination	Clarified reason and method for generating a particular mode. Evacuation/Shutdown changed to Evacuation.	C-AE-WB-E
	BACnet ARC156	Added instructions	C-D
	All Troubleshooting sections	Reformatted and information on Static Binding removed since we only use Dynamic Binding now.	C-D
2/23/16	Start-up	Added USB Link wiring caution	C-TS-RD-E-JH
5/27/15	To wire inputs and outputs	Correction - added ZS sensors	C-TS-RD-E-WB
3/10/15	Start-up	Removed BACview and added Equipment Touch and System Touch	C-AE-BR-O-WB
	Adjusting MS/TP properties using an Equipment Touch	New topic	C-AE-BR-O-WB
	Appendix A: Network points list for W2W Open	Network points list updated for BACnet, Modbus, N2, and LonWorks	C-AE-BR-O-WB
	Entire document	All references to BACview removed and Equipment Touch added.	C-AE-BR-O-WB
6/5/14	Configuring for BACnet MS/TP	Added note that controller counts as a full load on the MS/TP bus.	C-TS-RD-E

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