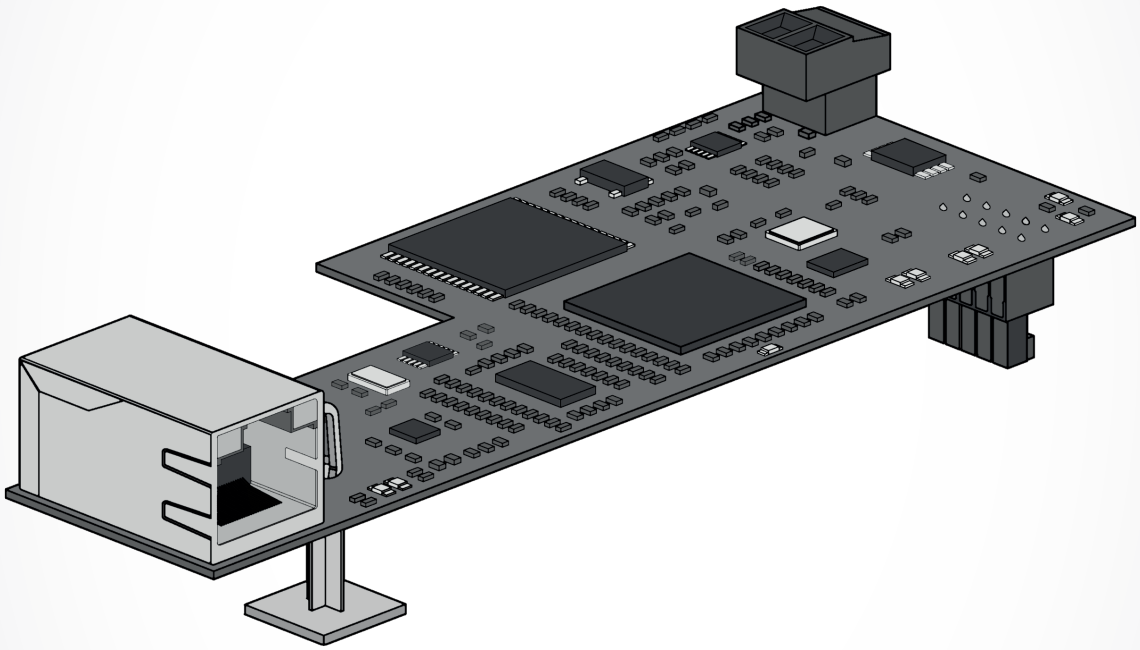
Installations Manual

ZBS

ASHRAE BACnet™



AIRZONE

AIRZONE

TABLE OF CONTENTS

OVERVIEW

OUTLINE AND FEATURES

The BACnet Interface Board allows a Building Management System to control all variables of the Airzone systems. The BACnet interface uses a standard open protocol based on ASHRAE Standard 135, and its objects are compatible with:

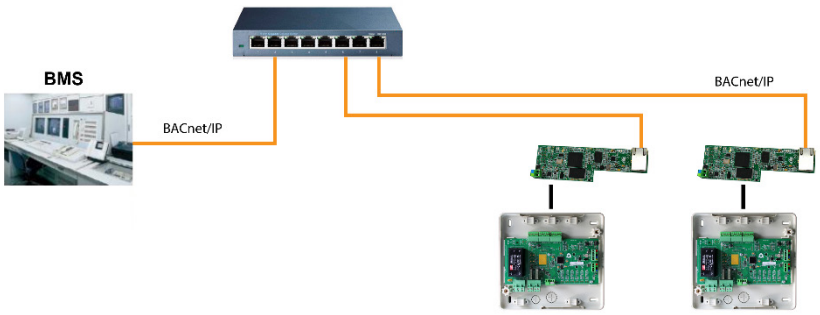
- BACnet (ANSI /ASHRAE-135)
- BACnet/IP (ISO16484-5)

The BACnet Interface is a Plug&Play device for Airzone systems, and it allows controlling and monitoring the following variables:

- Occupancy contact and window contact status of each zone.
- Radiant stage status of each zone and air and radiant demand of the system.
- On/Off control for each zone.
- Room temperature and humidity of each zone.
- Set point setting for Cooling and Heating for each zone.
- Operation Mode Control status.
- User Mode status.
- Fan status and Fan Speed.

SYSTEM OUTLINE

BACnet typical layouts is as follows:



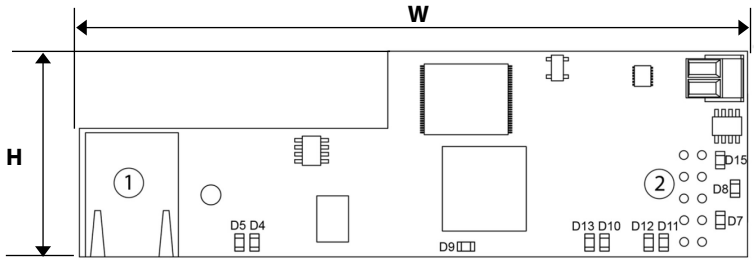
Typical VRV installation controlled through BACnet

Note: *One Airzone BACnet Interface for each Airzone System.*

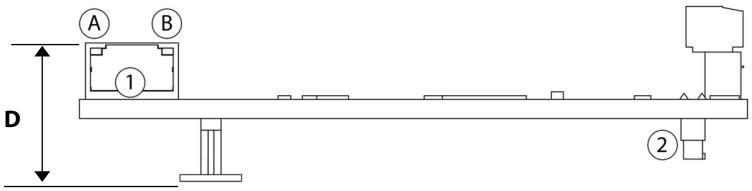
SPECIFICATIONS AND DEVICE ELEMENTS

Power supply and consumption	
Type of power supply	Vac
V max.	12 V supplied from the Control Board
I max.	200 mA
Maximum consumption	1.8 W
Operative temperatures	
Storage	-20 to 70 °C (-4 to 158 °F)
Operation	0 to 50°C (32 to 122 °F)
Operating humidity range	5 to 90% (non-condensing)

Ethernet	
Type of cable	UTP cat 6
Standard	T568B
IP address by default	DHCP
Mechanical aspects	
Dimensions (WxHxD)	130x40x39.5 mm (5.12x1.57x1.55 inch)



Meaning	
1	**Ethernet**
2	Automation bus



Meaning			
A	Ethernet connected	Blinking	Green
B	Ethernet activity	Blinking	Yellow
D7	Data transmission from automation bus	Blinking	Red
D8	Data reception from automation bus	Blinking	Green
D9	Microswitch performance	Blinking	Green
D10	Connected to the Internet	Blinking	Green
D11	Network data transmission	Blinking	Red
D12	Network data reception	Blinking	Green
D13	Configured as IP address through DHCP	On	Red
	Configured as Fixed IP address	Off	
D15	Power supply	Solid	Red

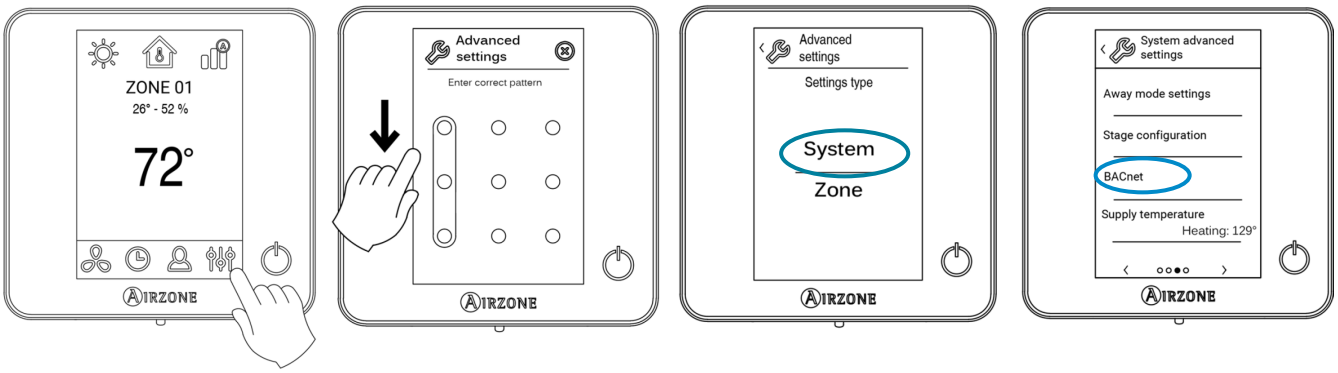
FUNCTIONAL SPECIFICATIONS

INTRODUCTION

When the BACnet Interface is used in a BACnet/IP network, it operates as a BACnet interpreter using the services defined by the BACnet to return the status of the Airzone system. It also sends configuration commands to them, in response to requests from a BACnet building management system (BMS) (i.e., BACnet client) which support the BACnet (ISO16484-5, ANSI/ASHRAE135) protocol.

The BACnet Interface is a plug and play device, which, when connected to the Main Control Board and to a BACnet network, it configures itself and configures the main board to work with the BACnet network.

When the Airzone BACnet Interface is connected to the Main Control Board, a new item appears in the installer configuration menu, as follows. From the main screen, press and hold the icon until the "Enter pattern" screen is displayed. Enter the sequence below to access the configuration menu, select the System settings and then select the BACnet setting.



Available services

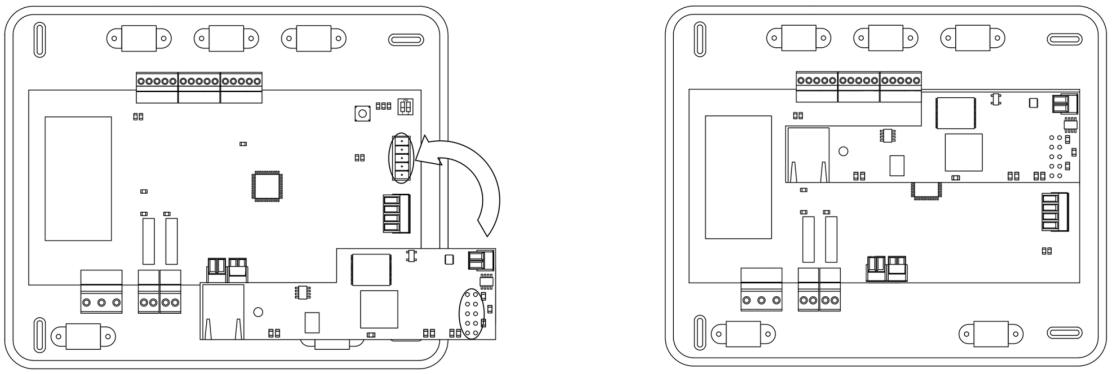
- Read Property.
- Read Property Multiple.
- Write Property.
- Write Property Multiple.
- COV (Change of Value).
- Dynamic Device Binding (who-is, i-am, who-has, i-have).
- DCC (Device Communication Control).
- Time synchronization.
- UTC Time synchronization.

Note: *The values of the parameters are updated every second.*

INSTALLATION AND CONFIGURATION

INSTALLATION ON THE CONTROL BOARD

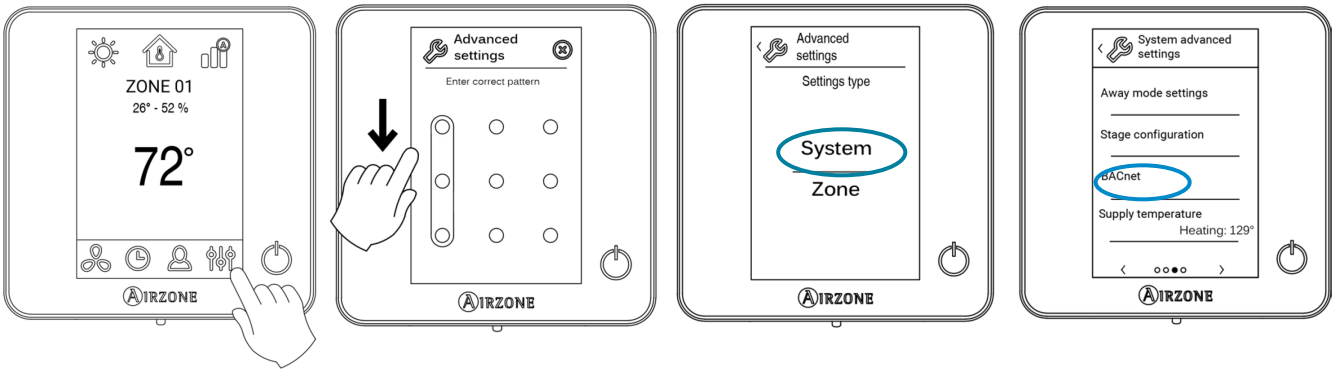
The BACnet Interface connects to the Airzone Main Control Board using the automation bus.



The Ethernet cable should be connected to the BACnet Interface gently. Once the control board has the interface connected, it will auto-detect the presence of the BACnet Interface and automatically set the parameters to enable the BACnet operation.

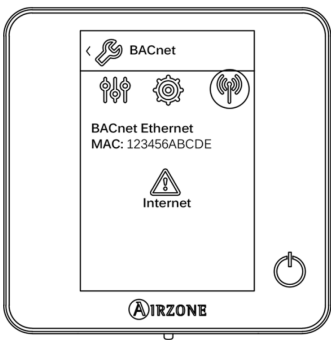
BACNET INTERFACE CONFIGURATION

From the main screen, press and hold the icon until the "Enter pattern" screen is displayed. Enter the sequence below to access the configuration menu, select the System settings and then select the BACnet setting.



Keep in mind: *For proper operation, Airzone systems must be powered up before the indoor unit.*

Status Menu

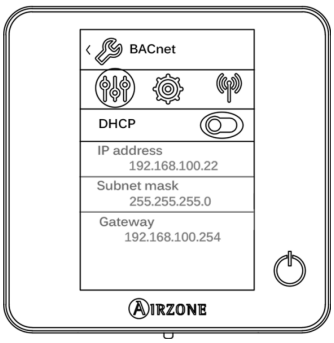


The status menu , gives information about the MAC and PIN of the device, as well as the connection status.

The internet connection is correct.

⚠ There is no internet connection, check the connection between the BACnet interface and the router and the status of the router.

Settings Menu

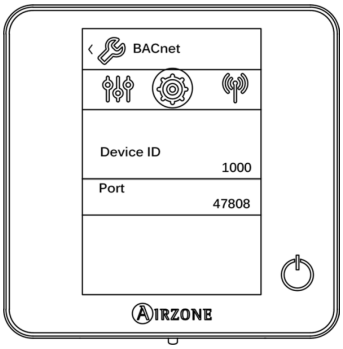


For the correct identification at the BACnet/IP network and the correct functioning of the Airzone BACnet Interface, it may be necessary the modification of the following configuration parameters.

- IP Address (by default 192.168.0.100)
- Subnet Mask (by default 255.255.255.0)
- Gateway (by default 192.168.0.1)

***Note**: The gateway is set as DHCP by default.*

Device ID and Port



For the correct identification at the BACnet/IP network and the correct functioning of the Airzone BACnet Interface, it may be necessary the modification of the following configuration parameters:

- Device ID (by default 1000).
- Port (by default 47808).

These properties can only be modified locally from the Master Contrôleur.

OBJECTS

SUPPORTED OBJECT TYPE

Supported Airzone System monitoring/control items are mapped to the standard object types defined by the BACnet.

Object Type		Supported	Airzone management point
Accumulator	23		
Analog-Input	0	√	Measured room temperature and humidity of the zones
Analog-Output	1		
Analog-Value	2	√	Zone Set point
Averaging	18		
Binary-Input	3	√	Alarms (window and occupancy contact)
Binary-Output	4	√	Radiant stage and air and radiant demand
Binary-Value	5	√	On and off of the zone
Calendar	6		
Command	7		
Device	8	√	
Event-Enrollment	9		
File	10		
Group	11		
Life-Safety-Point	21		
Life-Safety-Zone	22		
Loop	12		
Multistate-Input	13		
Multistate-Output	14	√	Operating mode (setting) and user mode (setting)
Multistate-Value	19	√	Fancoil Speed (setting)
Notification-Class	15		
Program	16		
Schedule	17		
Trend-Log	20		

OBJECTS LIST

Below is the full list of objects available in the Airzone BACnet Interface. The availability of the communication objects depends on the Airzone system configuration, and on the number of zones in the system.

The availability of the communication object in the Airzone system is indicated in the parameter "out of service" of each communication object indicating whether it is available or not in the system.

The communication object will only have correct/valid values when the "out of service" is FALSE.

***Note:** R: Read and W: Write*

Binary-Input				
0	Z1 Window warning	R	0 à Deactivated	1 à Activated
1	Z1 Occupancy warning	R	0 à Deactivated	1 à Activated
2	Z2 Window warning	R	0 à Deactivated	1 à Activated
3	Z2 Occupancy warning	R	0 à Deactivated	1 à Activated
4	Z3 Window warning	R	0 à Deactivated	1 à Activated
5	Z3 Occupancy warning	R	0 à Deactivated	1 à Activated
6	Z4 Window warning	R	0 à Deactivated	1 à Activated
7	Z4 Occupancy warning	R	0 à Deactivated	1 à Activated
8	Z5 Window warning	R	0 à Deactivated	1 à Activated
9	Z5 Occupancy warning	R	0 à Deactivated	1 à Activated
10	Z6 Window warning	R	0 à Deactivated	1 à Activated
11	Z6 Occupancy warning	R	0 à Deactivated	1 à Activated
12	Z7 Window warning	R	0 à Deactivated	1 à Activated
13	Z7 Occupancy warning	R	0 à Deactivated	1 à Activated
14	Z8 Window warning	R	0 à Deactivated	1 à Activated
15	Z8 Occupancy warning	R	0 à Deactivated	1 à Activated
16	Z9 Window warning	R	0 à Deactivated	1 à Activated
17	Z9 Occupancy warning	R	0 à Deactivated	1 à Activated
18	Z10 Window warning	R	0 à Deactivated	1 à Activated
19	Z10 Occupancy warning	R	0 à Deactivated	1 à Activated
Binary-output				
0	Z1 Radiant on/off	R	0 à Off	1 à On
1	Z2 Radiant on/off	R	0 à Off	1 à On
2	Z3 Radiant on/off	R	0 à Off	1 à On
3	Z4 Radiant on/off	R	0 à Off	1 à On
4	Z5 Radiant on/off	R	0 à Off	1 à On
5	Z6 Radiant on/off	R	0 à Off	1 à On
6	Z7 Radiant on/off	R	0 à Off	1 à On
7	Z8 Radiant on/off	R	0 à Off	1 à On
8	Z9 Radiant on/off	R	0 à Off	1 à On
9	Z10 Radiant on/off	R	0 à Off	1 à On
10	Cooling demand	R	0 à Deactivated	1 à Activated
11	Heating demand	R	0 à Deactivated	1 à Activated
12	Radiant cooling demand	R	0 à Deactivated	1 à Activated
13	Radiant heating demand	R	0 à Deactivated	1 à Activated
Binary-value				
0	Z1 On/Off	R/W	0 à Off	1 à On
1	Z2 On/Off	R/W	0 à Off	1 à On
2	Z3 On/Off	R/W	0 à Off	1 à On
3	Z4 On/Off	R/W	0 à Off	1 à On
4	Z5 On/Off	R/W	0 à Off	1 à On
5	Z6 On/Off	R/W	0 à Off	1 à On
6	Z7 On/Off	R/W	0 à Off	1 à On
7	Z8 On/Off	R/W	0 à Off	1 à On
8	Z9 On/Off	R/W	0 à Off	1 à On
9	Z10 On/Off	R/W	0 à Off	1 à On

Analog-Input			
0	Z1 Room Temperature	R	10 -35 °C / 50-95 °F
1	Z1 Humidity	R	0 -100
2	Z2 Room Temperature	R	10 -35 °C / 50-95 °F
3	Z2 Humidity	R	0 -100
4	Z3 Room Temperature	R	10 -35 °C / 50-95 °F
5	Z3 Humidity	R	0 -100
6	Z4 Room Temperature	R	10 -35 °C / 50-95 °F
7	Z4 Humidity	R	0 -100
8	Z5 Room Temperature	R	10 -35 °C / 50-95 °F
9	Z5 Humidity	R	0 -100
10	Z6 Room Temperature	R	10 -35 °C / 50-95 °F
11	Z6 Humidity	R	0 -100
12	Z7 Room Temperature	R	10 -35 °C / 50-95 °F
13	Z7 Humidity	R	0 -100
14	Z8 Room Temperature	R	10 -35 °C / 50-95 °F
15	Z8 Humidity	R	0 -100
16	Z9 Room Temperature	R	10 -35 °C / 50-95 °F
17	Z9 Humidity	R	0 -100
18	Z10 Room Temperature	R	10 -35 °C / 50-95 °F
19	Z10 Humidity	R	0 -100
Analog-value			
0	Z1 Heat Set point	R/W	15-30 °C / 59-86 °F
1	Z1 Cool Set point	R/W	15-30 °C / 59-86 °F
2	Z2 Heat Set point	R/W	15-30 °C / 59-86 °F
3	Z2 Cool Set point	R/W	15-30 °C / 59-86 °F
4	Z3 Heat Set point	R/W	15-30 °C / 59-86 °F
5	Z3 Cool Set point	R/W	15-30 °C / 59-86 °F
6	Z4 Heat Set point	R/W	15-30 °C / 59-86 °F
7	Z4 Cool Set point	R/W	15-30 °C / 59-86 °F
8	Z5 Heat Set point	R/W	15-30 °C / 59-86 °F
9	Z5 Cool Set point	R/W	15-30 °C / 59-86 °F
10	Z6 Heat Set point	R/W	15-30 °C / 59-86 °F
11	Z6 Cool Set point	R/W	15-30 °C / 59-86 °F
12	Z7 Heat Set point	R/W	15-30 °C / 59-86 °F
13	Z7 Cool Set point	R/W	15-30 °C / 59-86 °F
14	Z8 Heat Set point	R/W	15-30 °C / 59-86 °F
15	Z8 Cool Set point	R/W	15-30 °C / 59-86 °F
16	Z9 Heat Set point	R/W	15-30 °C / 59-86 °F
17	Z9 Cool Set point	R/W	15-30 °C / 59-86 °F
18	Z10 Heat Set point	R/W	15-30 °C / 59-86 °F
19	Z10 Cool Set point	R/W	15-30 °C / 59-86 °F

*Allowed values may be limited based on the user mode selected on the Airzone system:

Comfort. Heating: 15 to 30˚C / 59 to 86˚F. Cooling: 18 to 30˚C / 64 to 86 ˚F.

Eco. Heating: 15 to 30˚C / 59 to 86 ˚ F. Cooling: 18 to 30˚C / 64 to 86 ˚F.

Unoccupied. Heating: 15 to 22˚C / 59 to 72˚F. Cooling: 24 to 30˚C / 75 to 86 ˚F.

Vacation. Heating: 10 to 16˚C / 50 to 61˚F. Cooling: 29 to 35,5˚C / 84 to 96 ˚F.

Multi-state-Output				
0	ZS Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
1	Z1 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
2	Z2 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
3	Z3 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
4	Z4 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
5	Z5 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
6	Z6 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
7	Z7 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
8	Z8 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
9	Z9 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
10	Z10 Operation Mode	R/W	1 à Auto 2 à Cold 3 à Heat	4 à Dry 5 à Emergency heat
11	User Mode	R/W	1 à Stop 2 à Comfort 3 à Unoccupied	4 à Night time 5 à Eco 6 à Vacation

Multi-state-value				
0	ZS Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
1	Z1 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
2	Z2 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
3	Z3 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
4	Z4 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
5	Z5 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
6	Z6 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
7	Z7 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
8	Z8 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
9	Z9 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3
10	Z10 Fancoil Speed	R/W	0 à Stop 1 à Speed 1	2 à Speed 2 3 à Speed 3

DETAILED DESCRIPTION OF THE OBJECTS

COMMON TO ALL OBJECTS

For each Airzone system:

1. When the indoor unit is communicating normally, a communication can be established between the Airzone BACnet Interface and the indoor unit. The BACnet building management system will then have access to the Airzone unit's objects.
2. If the communication between the Airzone BACnet Interface and the system is not correct, or if a request for information related to a communication object that is not present in the Airzone system the object's property "Out of service" is activated.

Z# ALARM INPUT

This object represents the state of alarm input available to the Airzone main board (normally closed contact), indicating whether this input is active or inactive. When this input is active, the system remains in STOP. This is a Read only object.

Z# RADIANT STAGE

This object displays if the radiant stage is activated or deactivated in each zone. This is a Read only object.

AIR/RADIANT DEMAND

This object displays if there is cooling or heating demand in air or radiant stage. This is a Read only object.

Z# ON/OFF

The Airzone BACnet Interface will report the status of each zone. Using the BACnet platform, any zone may be configured as on/off. These are Read/Write objects.

Z# ROOM TEMPERATURE

The BACnet platform can obtain the actual room temperature for any zone. These are read only objects.

Z# HUMIDITY

The BACnet platform can obtain the actual humidity for each zone. These are read only objects.

Z# HEAT AND COOL SET POINTS

Each controller can be configured for a heat and cool set point, and those values are reported to the BACnet platform, and can be changed from it. These are Read/Write objects.

Z# AIRZONE OPERATION MODE

The Airzone BACnet Interface will report the operation mode of the system or the operation mode of each zone (depending on the connected system), represented by a number. These are Read/Write objects. These modes are:

1 à Auto

2 à Cold

3 à Heat

4 à Dry

5 à Emergency heat

Important: *The ZS Operation Mode object will modify the operation mode to all the zones of the installation*.

In VRV Heat Pump installations, all the indoor units must work in supported/compatible operation modes, the operation mode of the Airzone connected to a slave indoor unit could be restricted or limited by the operation mode selected in the Airzone connected to the master indoor unit.

If in the same VRV Heat Pump installation, an Airzone unit is connected to a slave indoor unit and another indoor unit is configured as the master (with or without Airzone connected to):

- When the master IU is operating in Fan mode, the Airzone system will send the current mode (cool, heat or dry) to the BACnet interface, if a cooling or heating demand exits.
- If no cooling or heating demand exits, the Airzone system will report STOP to the BACnet Interface.

USER MODE

The Airzone BACnet Interface will report the user mode of the system, represented by a number. This is a Read/Write object. The modes are:

1 à Stop

2 à Comfort

3 à Unoccupied

4 à Night time

5 à Eco

6 à Vacation

Z# FANCOIL UNIT SPEED

This parameter refers to the Fancoil Unit fan speed. The Airzone BACnet Interface will report the system speed of each zone (depending on the connected system), represented by a number. These are Read/Write objects:

0 à Stop

1 à Speed 1

2 à Speed 2

3 à Speed 3

Important: *The ZS Fancoil Speed object will modify the speed on all the zones which have the speed parameter.*

TROUBLESHOOTING

THE AIRZONE SYSTEM DOES NOT DETECT THE AIRZONE BACNET INTERFACE

Verify the correct connection between the Airzone BACnet Interface in the Airzone main control board (*see section Specifications and device elements*):

- Verify that the D9 LED (Microswitch performance) is blinking.
- Verify that D7 and D8 LEDs are alternately blinking.

If the above does not verify, check the correct connection of the Airzone BACnet Interface on the main control board, verifying the 5-pin connector.

THE AIRZONE BACNET INTERFACE CANNOT BE CONNECTED (I)

Verify that LEDs “A” and “B” (see section *Specifications and device elements*) are blinking, and those in the Ethernet connector are active. If the above is not true, check that the Ethernet cable is properly connected.

THE AIRZONE BACNET INTERFACE CANNOT BE CONNECTED (II)

Check the following possible causes:

1. Using the Ethernet (LAN)

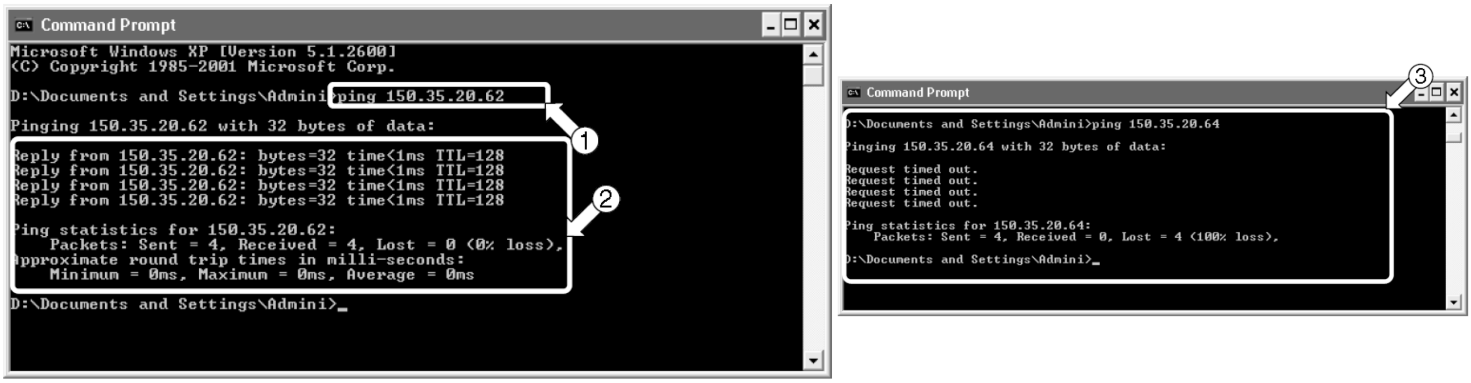
- Check the state of the LEDs of the Airzone BACnet Interface. If all of them are blinking at the same time, it means the IP selected for the Airzone BACnet Interface is already being used by another device. Access settings (*see section IP configuration*) and change the parameter IP address.
- Verify that the IP address set for the PC is correct.
- Verify the Ethernet cable connection:
  - Verify if connecting via the hub: straight cable.
  - Verify communication with the Interface for use in BACnet® by testing the operation from the PC directly: Use a crossover cable.
- Verify that the PC's LAN communication port is active.
- If using the hub, verify that the hub is powered on.
- Do a PING to the Airzone BACnet Interface from the PC to verify the Ethernet Link (See below).

  [How to execute a PING to the BACnet Interface].

  1. *From the PC's desktop, select "Start", "Program", "Accessories", and "Command Prompt". The dialog box shown below opens.*
  2. *Use the PC's key board; enter the BACnet gateway IP address in [1]. Ex. When Interface for use in BACnet®'s IP address is "150.35.20.62", enter "ping 150.35.20.62" and press the Return key.*

2. If you can see information as shown in [2], the LAN connection is established. Start the test operation program and try connection again.

If you see information as shown in [3], the LAN connection is not established for some reason. Check the PC's settings, etc. again.



HOW TO SET THE PC'S IP ADDRESS

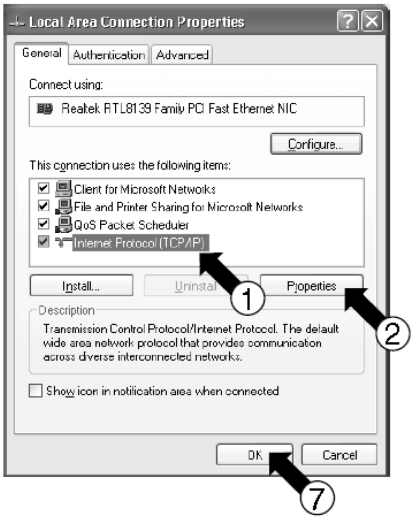
1. Take a note of the test operation PC's current IP address. (Be sure to take a note of the current IP address because this address needs to be restored after the test operation)

1.1. Start the test operation PC. (The screens shown below are Windows XP's examples, and the actual screens differ depending on the OS used).

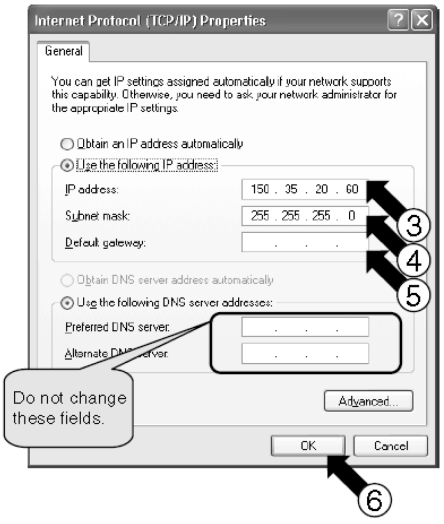
1.2. On Windows XP, double-click the Network Connections icon on the Control Panel. Click the Local Area Connection and right-click to choose "Properties". The dialog box 1 below opens.

1.3. For newer OS, click start and enter "ncpa.cpl" on the search bar to see the network connections window. Right click over "local area connection" and select "properties".

1.4. Select "Internet Protocol (TCP / IP)" [1] and click the Properties button [2]. The dialog box 2 opens. This dialog box shows the test operation PC's current IP address [3], subnet mask [4], and default gateway address [5]. Take a note of this information in Table 1.



Dialog box 1. Local Area Connection Properties



Dialog box 2. Internet Protocol (TCP / IP) Properties

[3] IP Address		Ex. 150.35.20.60
[4] Subnet mask		Ex. 255.255.255.0
[5] Default gateway address		Ex. 15.35.20.254

[Table 1: Test Operation PC's Current Address]

2. Change the test operation PC's IP address. **Use one of the following IP address depending on the current status of the Interface for use in BACnet®.** If the Interface for use in BACnet®'s IP address **has not been changed from the factory setting, use the following:**

- Port: 47808
- IP Address: DHCP
- Subnet Mask: 255.255.255.0
- Gateway IP: 192.168.0.1

  If the Interface for use in BACnet®'s IP address **has been changed from the factory setting at the site, use the following:**

- IP address shown in the table in "[6]-2. IP address temporarily used for the test service operation" on P.12.

2.1. Enter the information above in "IP address" [3], "subnet mask" [4], and "default gateway" [5] in the dialog box 2 of Step 1-3, and press the OK button [6]. The dialog box 1 reappears. Click the OK or Cancel button [7].

2.2. Reboot the PC as required by the PC. (Reboot may not be necessary depending on the Windows version. Reboot the PC only when requested).

3. Return the IP address to the original address after the test operation. (Be sure to return the test operation PC's IP address to the original address).

3.1. Return the test operation PC's IP address to the original address recorded in Step 1-3, as instructed in Steps 2-1 and 2-2.

Parque Tecnológico de Andalucía

C/ Marie Curie, 21 – 29590

Campanillas – Málaga - España

Phone: +34 902 400 445

Fax: +34 902 400 446

http://www.myzone.airzoneusa.com