


# BNET-5304/5310
# User's Manual v1.00

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## Document Revision

| Version | Author | Date | Description of Changes |
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| | | | |
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# 1. General Information

## 1.1 BACnet Introduction

BACnet stands for Building Automation Control network which is a data communication protocol developed by ASHRAE, BACnet is known as "ANSI/ASHRAE standard 135-2001" and now also known as the international standard "ISO 16484-5." The protocol has been designed specifically to meet the communication needs of building automation and control systems for applications such as heating, ventilating, air-conditioning control…etc. Its purpose is also to standardize communications between building automation devices from different manufacturers, allowing data to be shared and equipment to work together easily.

## 1.2 About BNET-5304 and BNET-5310

The BNET-5304 and BNET-5310 are multi-function BACnet/IP modules. The BNET-5304 provides 6 AI channels, 1 AO channel, 4 DI channels and 4 DO channels. The BNET-5310 provides 4 AI channels, 2 AO channels, 3 DI channels and 3 DO channels. The modules contain number of BACnet objects (Device, AI, AO, BI, BO) with multiple BIBBS (DS-RP-B, DS-RPM-B, DS-WP-B, DS-WPM, DS-COV-B…etc.) supported. The modules also feature a built-in web server which allows remote configuration by using a regular web browser for an easy and safe access at anytime anywhere.

## 1.3 Hardware Specification

| Model | BNET-5304 | BNET-5310 |
|---|---|---|
| System | | |
| COM1 | Reserved | |
| COM2 | No use | |
| COM3 | No use | |
| Ethernet | 10/100 Base-TX | |
| Security | ID and Password | |
| Built-in Watchdog | Yes | |
| LED Indicator | Power and Status | |
| Protocol | | |
| BACnet | BACnet/IP | |
| BACnet Objects | 1 Device, 6 AI, 1 AO, 4 BI, 4 BO | 1 Device, 4 AI, 2 AO, 3 BI, 3 BO |
| BIBB | DS-RP-B, DS-RPM-B, DS-WP-B, DS-WPM-B, DS-COV-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, DM-TS-B, DM-UTC-B, DM-RD-B | |



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| | | | |
|---|---|---|---|
| Analog Input | | | |
| Channel | | 6 | 4 |
| Wiring | | Single-Ended | Differential |
| Range | | +/- 5 V, 0 ~ +5 V | +/- 10 V |
| Resolution | | 12-bit | |
| Sampling Rate | | 4 KHz | |
| Input Impedance | | 1 M Ohm | |
| Over Voltage Protection | | +/- 30 VDC | |
| Isolation | | Non-isolated | |
| Analog Output | | | |
| Channel | | 1 | 2 |
| Range | | +/- 5V | +/- 10 V |
| Resolution | | 12-bit | |
| Output Capacity | | 20 mA | |
| Isolation | | Non-isolated | |
| Digital Input | | | |
| Channel | | 4 | 3 |
| Contact | | Dry | |
| Dry Contact | On Voltage Level | Close to GND | |
| | Off Voltage Level | Open | |
| Overvoltage Protection | | 30 VDC | |
| Digital Output | | | |
| Channel | | 4 | 3 |
| Type | | Open Collector | |
| Sink/Source (NPN/PNP) | | Sink | |
| Load Voltage | | +10 VDC ~ 40 VDC | |
| Max. Load Current | | 200 mA/channel at 25 °C | |
| Overload Protection | | 1.4 A | |
| Environmental | | | |
| Dimensions (W x L x H) | | 91mm x132mm x 52mm | |
| Operating Temp. | | -25 ~ +75 °C | |
| Storage Temp. | | -30 ~ +85 °C | |
| Humidity | | 5_90% PH, non-condesing | |
| Power Input Range | | +10V to +30+10V to +30VDC | |



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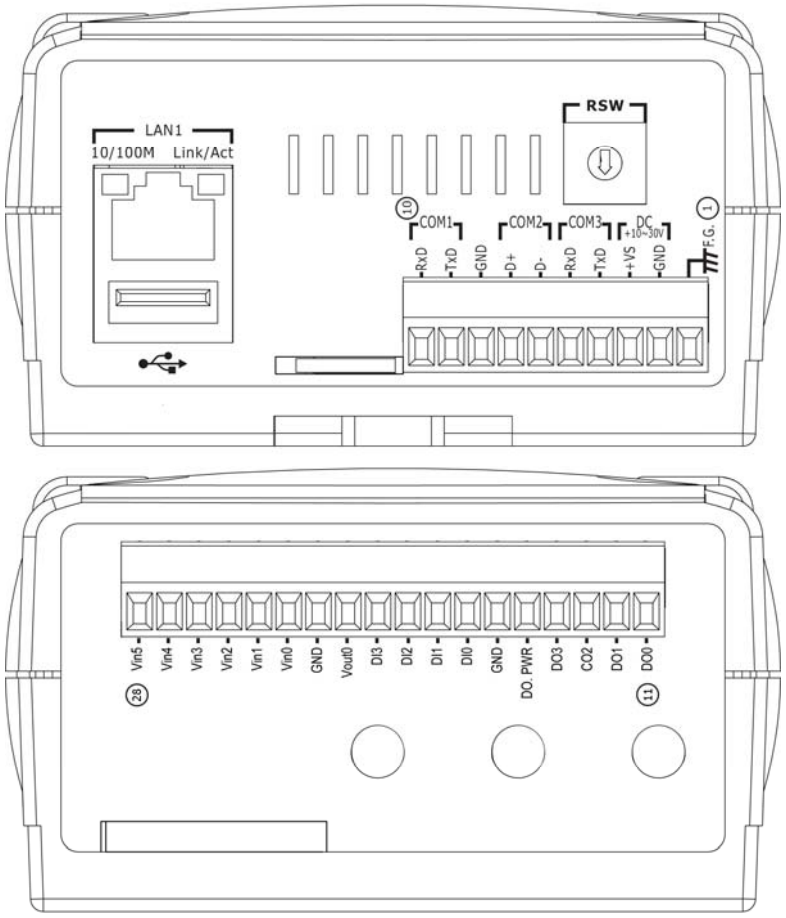
| | | |
|---|---|---|
| Power Consumption | 4.8W (0.2A @ 24VDC) | 5.4W (0.2A @ 24VDC) |



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# 2. Hardware

## 2.1 BNET-5304 Pin Assignment and Wire Connection



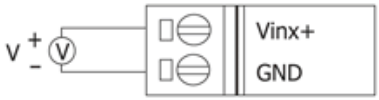

| BNET-5304 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pin | Description | Pin | Description | Pin | Description | Pin | Description |
| 1 | F.G. | 8 | GND | 15 | DO.PWR | 22 | GND |
| 2 | GND | 9 | TxD | 16 | GND | 23 | Vin0 |
| 3 | +VS | 10 | RxD | 17 | DI0 | 24 | Vin1 |
| 4 | -- | 11 | DO0 | 18 | DI1 | 25 | Vin2 |
| 5 | -- | 12 | DO1 | 19 | DI2 | 26 | Vin3 |
| 6 | -- | 13 | DO2 | 20 | DI3 | 27 | Vin4 |
| 7 | -- | 14 | DO3 | 21 | Vout0 | 28 | Vin5 |



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# XW304 Wire Connection

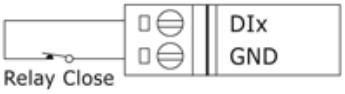
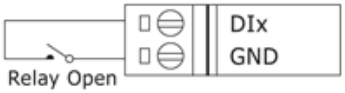
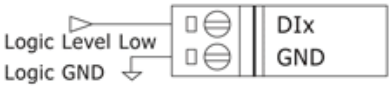
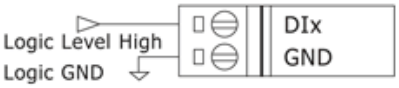
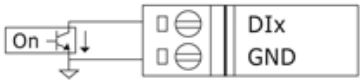
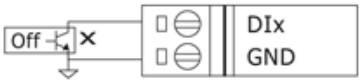
## Voltage Input Wire Connection

| | |
|---|---|
| Input Type |   |

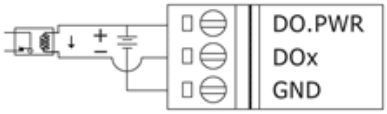
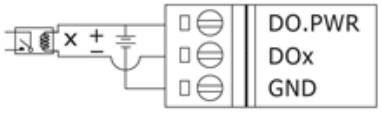
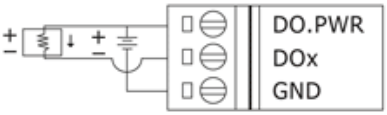
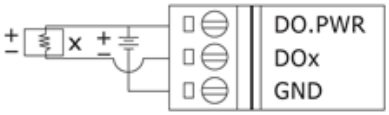
## Voltage Output Wire Connection

| | |
|---|---|
| Output Type |   |

## Digital Input Wire Connection

| Input Type | DI Value as 0 | DI Value as 1 |
|---|---|---|
| Relay Contact | Relay On | Relay Off |
| |   |   |
| TTL/CMOS Logic | Voltage < 1V | Voltage > 3.5V |
| |   |   |
| Open Collector | Open Collector On | Open Collector Off |
| |   |   |

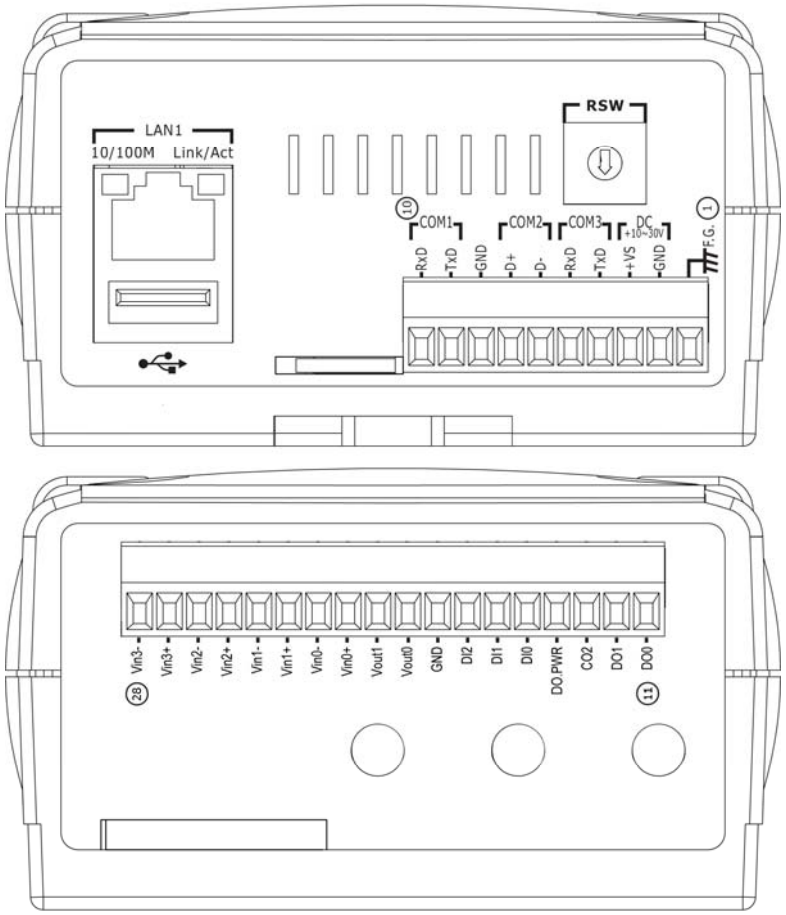
## Digital Output Wire Connection

| Output Type | DO Command as 1 | DO Command as 0 |
|---|---|---|
| Drive Relay | Relay ON | Relay Off |
| |   |   |
| Resistance Load | | |
| |   |   |



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## 2.2 BNET-5310 Pin Assignment and Wire Connection



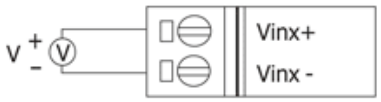

| BNET-5310 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pin | Description | Pin | Description | Pin | Description | Pin | Description |
| 1 | F.G. | 8 | GND | 15 | DI0 | 22 | Vin0- |
| 2 | GND | 9 | TxD | 16 | DI1 | 23 | Vin1+ |
| 3 | +VS | 10 | RxD | 17 | DI2 | 24 | Vin1- |
| 4 | -- | 11 | DO0 | 18 | GND | 25 | Vin2+ |
| 5 | -- | 12 | DO1 | 19 | Vout0 | 26 | Vin2- |
| 6 | -- | 13 | DO2 | 20 | Vout1 | 27 | Vin3+ |
| 7 | -- | 14 | DO.PWR | 21 | Vin0+ | 28 | Vin3- |



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# XW310 Wire Connection

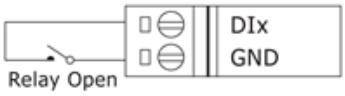
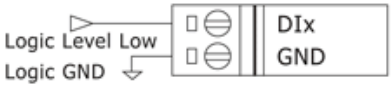
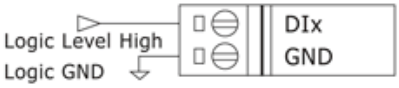
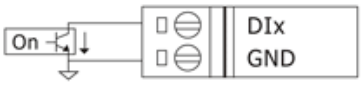
## Voltage Input Wire Connection

| Input Type | |
|---|---|
| |   |

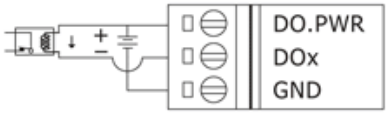
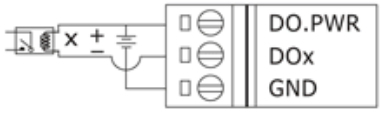
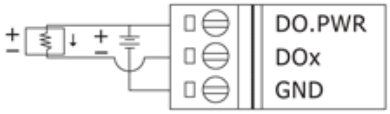
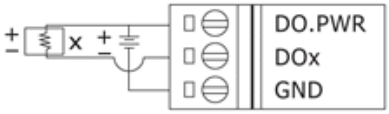
## Voltage Output Wire Connection

| Output Type | |
|---|---|
| |   |

## Digital Input Wire Connection

| Input Type | DI Value as 0 | DI Value as 1 |
|---|---|---|
| Relay Contact | Relay On | Relay Off |
| |   |   |
| TTL/CMOS Logic | Voltage < 1V | Voltage > 3.5V |
| |   |   |
| Open Collector | Open Collector On | Open Collector Off |
| |   |   |

## Digital Output Wire Connection

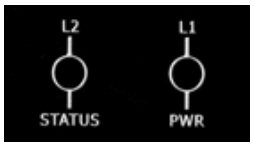
| Output Type | DO Command as 1 | DO Command as 0 |
|---|---|---|
| Drive Relay | Relay ON | Relay Off |
| |   |   |
| Resistance Load | | |
| |   |   |



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## 2.3 LED Indication

BNET-5304/BNET-5310 provides two LEDs to indicate what situation is in the module. They are described as follows.




### 2.3.1 Power LED

The BNET-5304/BNET-5310 needs +10 ~ +30 VDC power input and consumes 4.8W and 5.4W. The PWR LED (Power LED) will be turn on after applying power and it will be flashing two times per second.

### 2.3.2 Module Status indicator LED

The STATUS LED indicates the communication status of the BNET-5304/BNET-5310. The following description shows the conditions of error status.

- Green light flashes: BACnet/IP Client is communicating with BNET-5304/BNET-5310.
- Red light flashes: Time out or unknown Object/Service error.
- Red light on: BNET-5304/BNET-5310 initial error.



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# 3. Web Based Configuration Tool

This chapter is to describe the web structure and software operating interfaces.

BNET-5304/BNET-5310 provides Web-based configuration for the BACnet devices and objects settings. The functions include:

- System information and configuration
- Network settings
- BACnet objects configuration and management

## 3.1 Device Selection

- BNET-5304: BACnet/IP Multi-function I/O Module with 6 AI, 1 AO, 4 BI, and 4 BO.
- BNET-5310: BACnet/IP Multi-function I/O Module with 4 AI, 2 AO, 3 BI, and 3 BO

## 3.2 Using Web-based Configuration Tool

Connect the BNET-5304/BNET-5310 to network, and use standard web browser (Internet Explorer, Mozilla Firefox) to launch the user interface. The default link and network settings are as followed:

**Web Address:** http://192.168.255.1

**IP Address:** 192.168.255.1

**Subnet Mask:** 255.255.0.0

**Gateway:** 192.168.0.254

For security reason, user will have to login with user name and password before entering the configuration pages. The default user name and password are **admin** and **admin**.



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**Figure 1. Logon screen**

Screen opened as image shown in Figure 2, if success login. Select a hardware to enter a correspond page.




**Figure 2. Module or Device selection page**



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## 3.3 Tab menu of Configuration Tool

The configuration tool had divided into four sections System, Modbus, BACnet, and Modbus/BACnet Mapping. Please refer to the following clause for detail information.

### 3.3.1 System

System information and settings consist of

- BACnet Firmware status and operations (start or stop)
- Network settings
- Firmware Updating
- User name and password configuration

### 3.3.2 Modbus

The section is only available for GW-549x series.

### 3.3.3 BACnet

BACnet Server Configuration consists of

- BACnet/IP Port Setting
- Management of the BACnet basic information
- Instance Table (shows the number of object on the device)

### 3.3.4 BACnet Object

Definition and management of BACnet Objects



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## 3.4 System tab

As shown in Figure 3, the system tab provides an operation mode, a network setting, firmware updating, and user account settings.

1. System Process: Monitors the BACnet Firmware running status, and operate its' state (start or stop)
2. Network Settings: LANs are provided for BACnet/IP protocol.
3. Upload and Updating Firmware: Uploading and updating firmware.
4. Change User Names & Password: Modify the current user name and password.

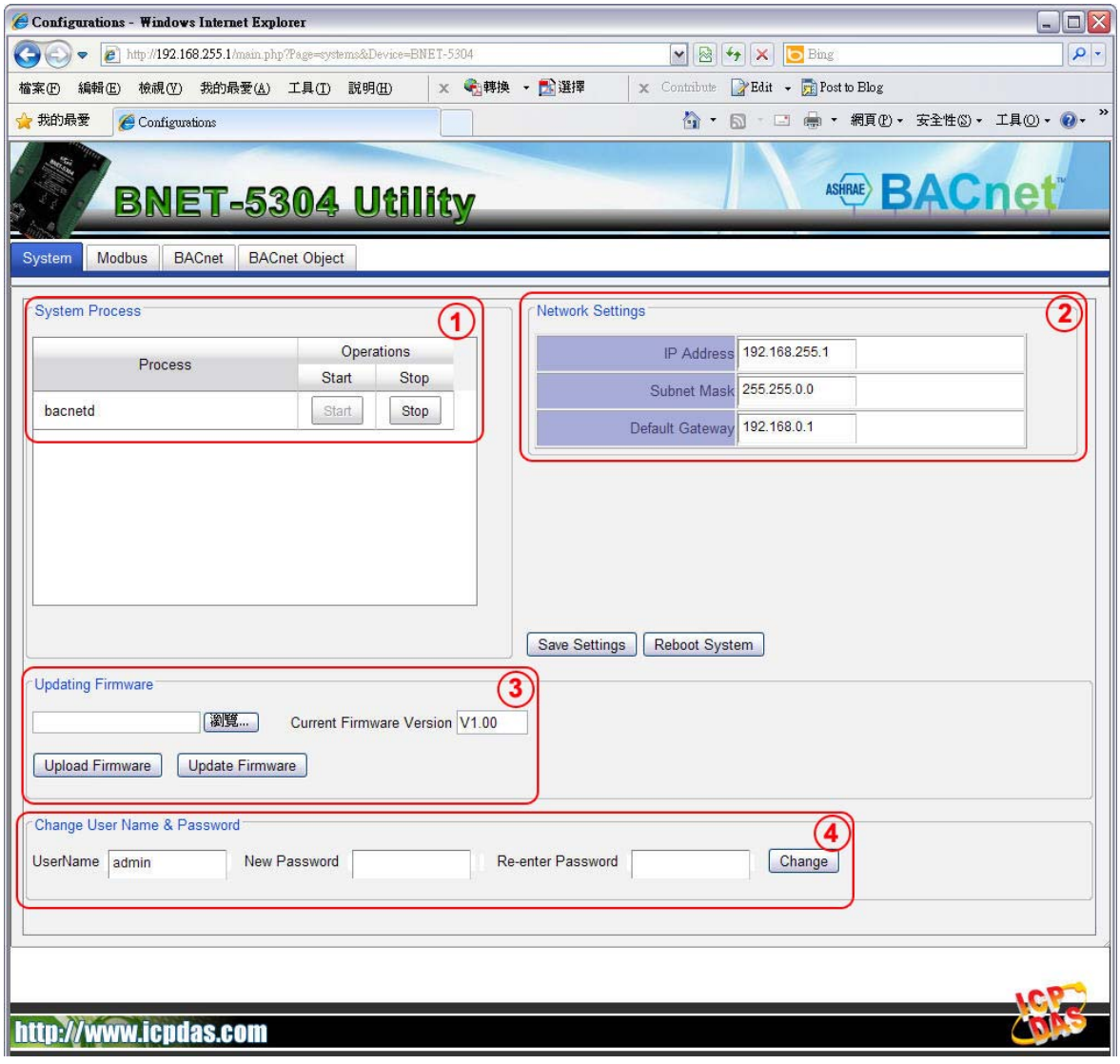



**Figure 3. System tab**



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### 3.4.1 System Process

Figure 4 shows the System Process frame. The Process column shows the firmware name and the Operations column shows the firmware status. The Start/Stop buttons are able to start/stop the firmware by clicking the buttons.




**Figure 4. System Process**

### 3.4.2 Network Settings

Network Settings consists an Ethernet LAN settings provided for BACnet/IP protocol. All information isn't saved until clicking the **Save Settings** button. User will need to reboot the system or restart it to apply the changes. After hardware rebooted, user will also need to re-open the web user interface.

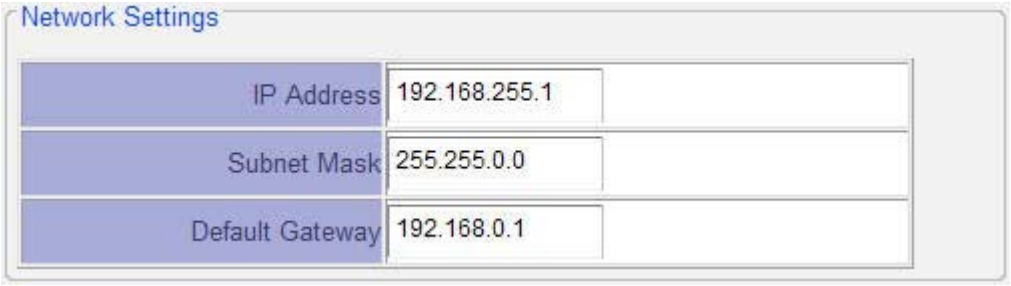



**Figure 5. Network Settings**

### 3.4.3 Uploading and Updating Firmware

Figure 6 shows the Upload and Update Firmware tool. The current firmware version is showed. The firmware can also be updated from a .fw file downloaded from ICP DAS by choosing the file path and click "Upload Firmware" to upload file to device. After .fw file uploaded, click "Update Firmware" button to update firmware. After firmware updated, please restart the BNET-5304/BNET-5310 and User Interface.



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**Figure 6. Import/Export/Updating Firmware**

### 3.4.4 Change User Name & Password

The section provides an interface which allows user to modify the user name and password. User will need to reboot the system or restart it to apply the changes.




**Figure 7. Change User Name & Password**



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## 3.5 BACnet tab

The Figure 8 shows the BACnet Device configuration. The detail description as follows:

1. BACnet basic information and configuration
2. BACnet Object Types and max instance information

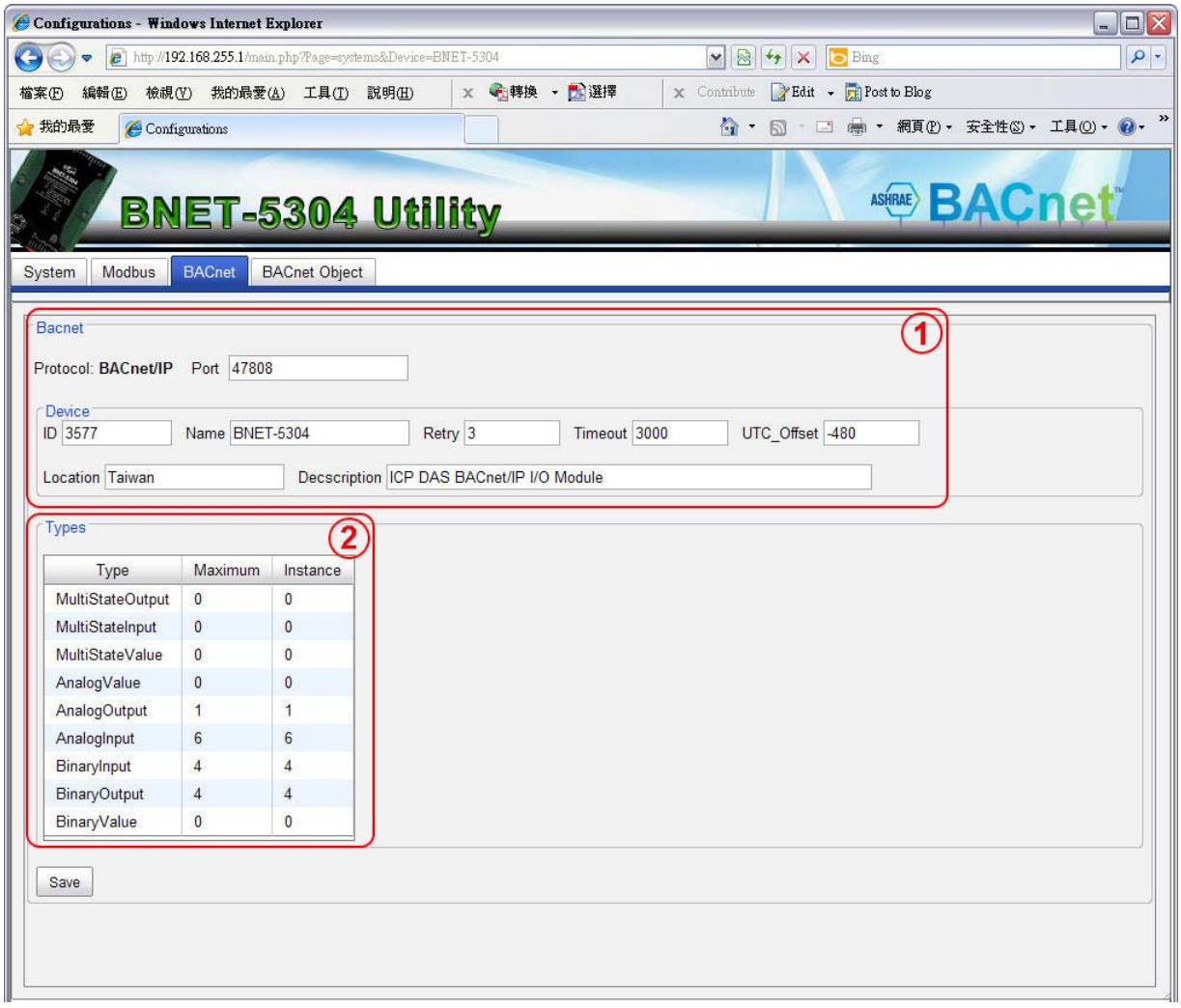



**Figure 8. BACnet tab**

### 3.5.1 BACnet basic information configuration

Figure 9 shows the BACnet basic information, consisting of Protocol, Communication and Device Object properties settings.



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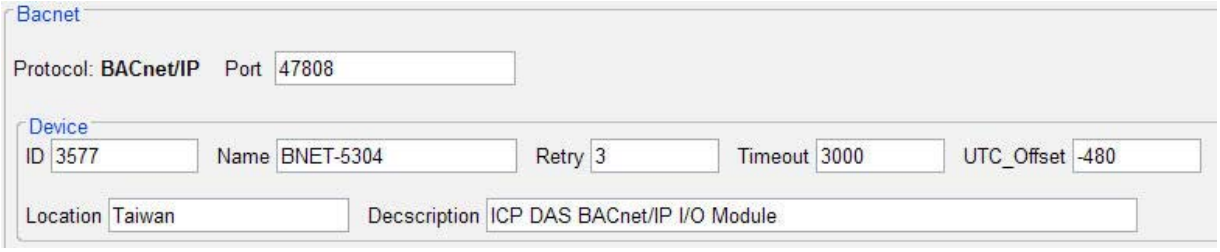



**Figure 9. BACnet basic information**

- Port: BACnet Port. Default port is 47808 (0xBAC0)
- ID: Device_Identifier property, range from 0 to 4194302
- Name: The device name showed on BACnet network.
- Retry: Number_Of_APDU_Retries property
- Timeout: APDU_Timeout property
- UTC_Offset: The time offset from Coordinated Universal Time
- Location: Location property
- Description: Object Description property

### 3.5.2 BACnet Object Types and instance settings

The BNET-5304/BNET-5310 supports several types of standard BACnet Objects including Analog Input, Analog Output, Binary Input, Binary Output and Device. Figure 10 shows the 9 types of BACnet Objects, the 3-column sub fame consisting of Type, Maximum, and Instance number.

Types

| Type | Maximum | Instance |
|---|---|---|
| MultiStateOutput | 0 | 0 |
| MultiStateInput | 0 | 0 |
| MultiStateValue | 0 | 0 |
| AnalogValue | 0 | 0 |
| AnalogOutput | 1 | 1 |
| AnalogInput | 6 | 6 |
| BinaryInput | 4 | 4 |
| BinaryOutput | 4 | 4 |
| BinaryValue | 0 | 0 |

**Figure 10. BACnet Object list**



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## 3.6 BACnet Object tab

The BACnet Object tab provides a list of BACnet Objects, as shown in Figure 16.

1. BACnet Object type list
2. BACnet Object list

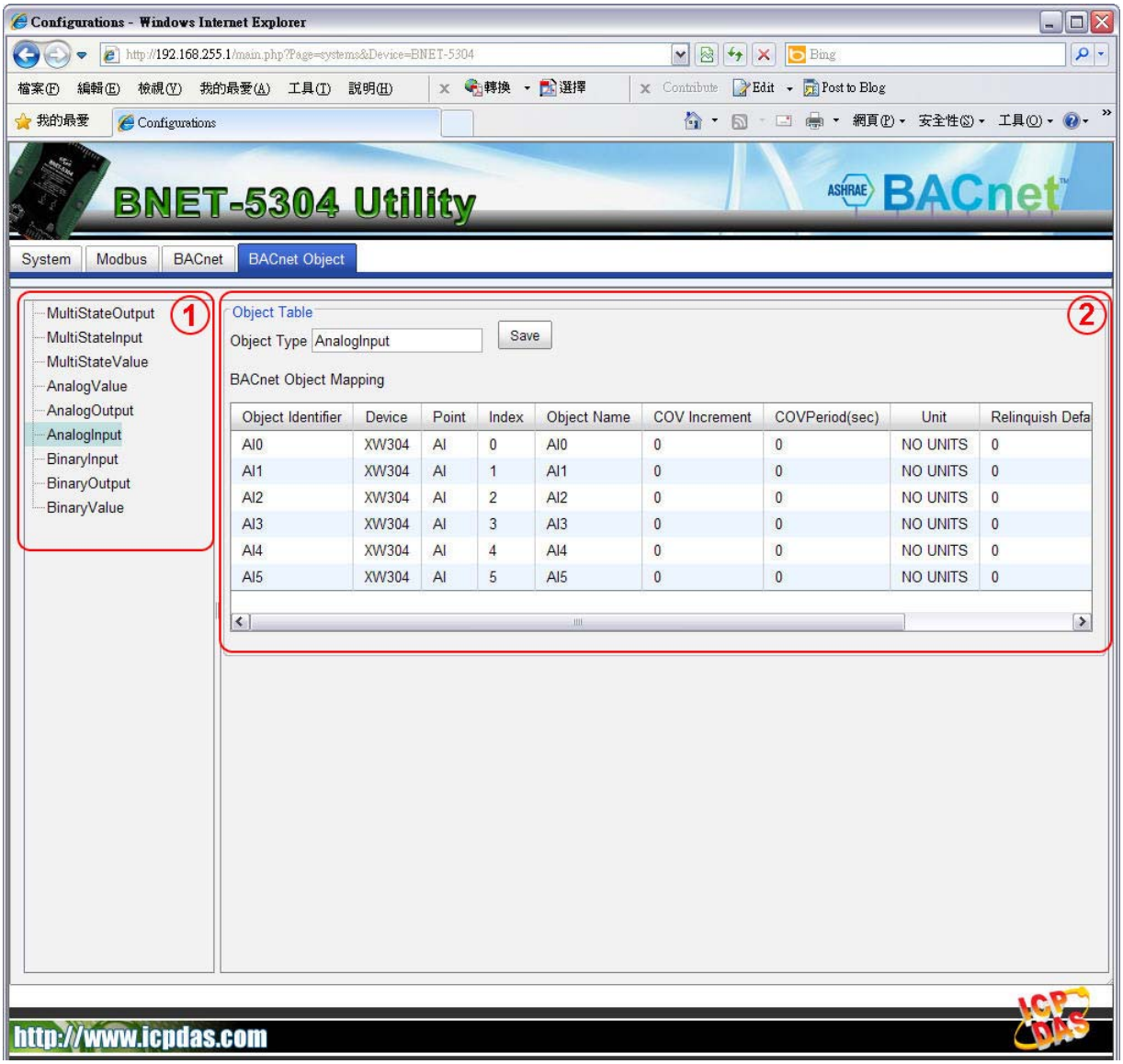



**Figure 11. BACnet Object tab**



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### 3.6.1 BACnet Object Type List

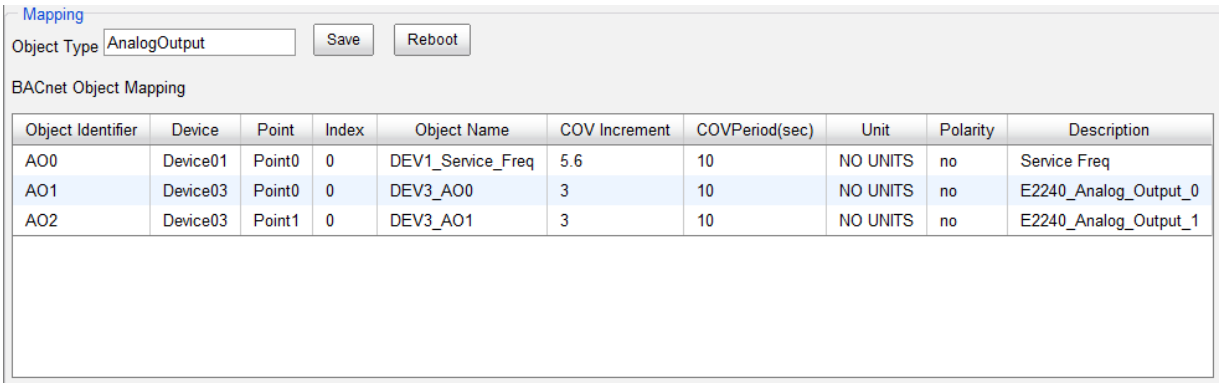
Select an object type from Object Type list to show the corresponding BACnet object in the Object Table. After object type selected , it should be showed in the textbox.

### 3.6.2 BACnet Object Type List

The Object Table consists varies BACnet object properties which allow user to modify it. Please refer to description below about each column in the table.

BACnet Object Table:

- Object Identifier: BACnet Object_Identifier property
- Device: Modbus Device name
- Point: Indicates the channel type of the module.
- Index: Indicates the channel number of the module.
- Object Name: BACnet Object_Name property
- COV Increment: COV_Increment property. For the Analog object type only.
- COVPeriod: The period time of COVNotification required service.
- Unit: BACnet Unit property. For the Analog object type only.
- Polarity: BACnet Polarity property mode. For the Binary object type only.
- Description: BACnet Description property




| Object Identifier | Device | Point | Index | Object Name | COV Increment | COVPeriod(sec) | Unit | Polarity | Description |
|---|---|---|---|---|---|---|---|---|---|
| AO0 | Device01 | Point0 | 0 | DEV1_Service_Freq | 5.6 | 10 | NO UNITS | no | Service Freq |
| AO1 | Device03 | Point0 | 0 | DEV3_AO0 | 3 | 10 | NO UNITS | no | E2240_Analog_Output_0 |
| AO2 | Device03 | Point1 | 0 | DEV3_AO1 | 3 | 10 | NO UNITS | no | E2240_Analog_Output_1 |

**Figure 20. Mapping**



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