

**6. BMS-MODBUS Protocol**

**6.1 MODBUS-RTU Parameter**

**6.1.1 Configuration:** Provided to the BMS management

MODBUS STYTLE	MODBUS-RTU	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>AUX ARV MODBUS-RTU</p> <p>ProtocolV1.3</p>  <p>AUX ARV MODBUS-RTU Protoc</p> </div>
Baudrate	9600	
Data-Bit	8	
Stop-Bit	1	
Check	even	
Slave-ID range	1~64	
MODBUS CODE	01,02,03,04,05,06	
SUPPORT Broadcast	NO	

**6.1.2 Input Register:** There are 14 parameters of each indoor unit can be monitored

Input Register Address	Content	Types	Notes
0	1# Indoor State	signed word	0-OFF / 1-ON / 2-Not Exist or Not Found
1	1# Indoor Type	signed word	Indoor Type ( 0,1,4,5,8,9,10,14,11,15,18,19-Cassette ) ( 2,6,20,21-ESP Duct ) ( 3,7,13,17-Ceiling & Floor ) ( 12,16-Wall-Mounted ) ( 22-Fresh Air Unit )
2	1# Indoor HP	signed word	Indoor Unit HP
3	1# Indoor Energy	signed word	Indoor Unit Energy
4	1# Indoor Mode	signed word	Control Mode( 0-Auto/ 1-Cool/ 2-Dehumi/ 3-Healthy dehumi / 4-Heat / 5-Dry / 6-Flow)
5	1# Temperature Set	signed word	16~32°C
6	1# Indoor Fan Speed	signed word	Fan Speed( 0-Stop/ 1-High/ 2-Medium/ 3-Low)
7	1# Indoor Error Code	signed word	Error Code

8	1# Indoor Tai	signed word	Display return air temperature
9	1# Indoor Tei	signed word	Display evaporator inlet temperature
10	1# Indoor Tem	signed word	Display evaporator central temperature
11	1# Indoor Teo	signed word	Display evaporator outlet temperature
12	1# Indoor Filter	signed word	0: Disable, 1: Enable
13	1# Reserved	signed word	/

**6.1.3 Coil:** There are 10 parameters of each indoor unit can be write / set ( value is 0/1 )

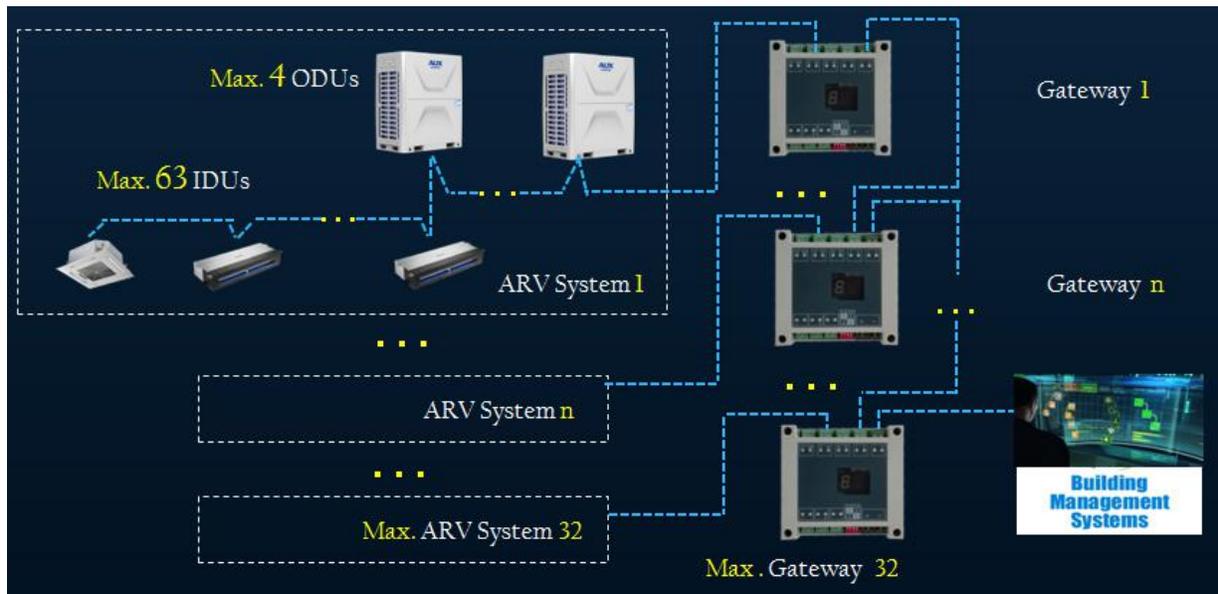
Coil Address	Content	Value/W	Data Type
0	1# Indoor ON/OFF	0	BOOL
1	1# Indoor ON/OFF Lock	0	BOOL
2	1# Indoor Control Mode Lock	0	BOOL
3	1# Indoor Temperature Set Lock	0	BOOL
4	1# Indoor Fan Speed Lock	0	BOOL
5	1# Indoor Up/Down Fixation	0	BOOL
6	1# Indoor Left/Right Fixation	0	BOOL
7	1# Indoor Sleep	0	BOOL
8	1# Indoor Healthy	0	BOOL
9	1# Indoor Filter	0	BOOL

**6.1.4 Holding registers:** There are 4 parameters of each indoor unit can be write / set

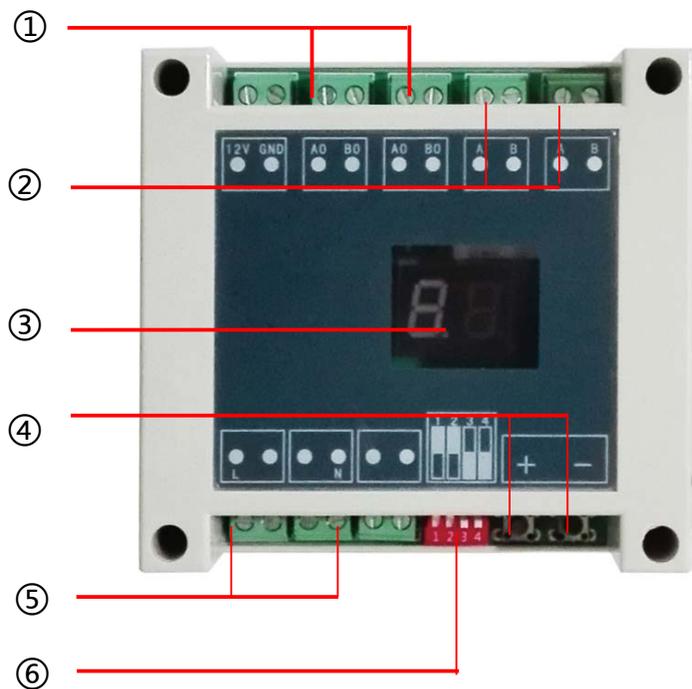
Holding Register address	Content	MIN_ Value	Default Value	MAX_ Value	Data Type	Unit	Remark
0	1# Indoor Control Mode	0	0	6	SIGNED WORD	/	0-Auto/ 1-Cool/ 2-Dry /4-Heat / 6-Fan
1	1# Indoor Temperature Set	16	24	32	SIGNED WORD	°C	16~32
2	1# Indoor Fan Speed	0	0	6	SIGNED WORD	/	1-High/ 2-Medium/ 3-Low/ 5-Auto
3	1# Indoor Reserved	0	0	6	SIGNED WORD	/	/

### 6.2 Overall structure

Each MODBUS Gateway support 1 ARV system



### 6.3 Hardware Features

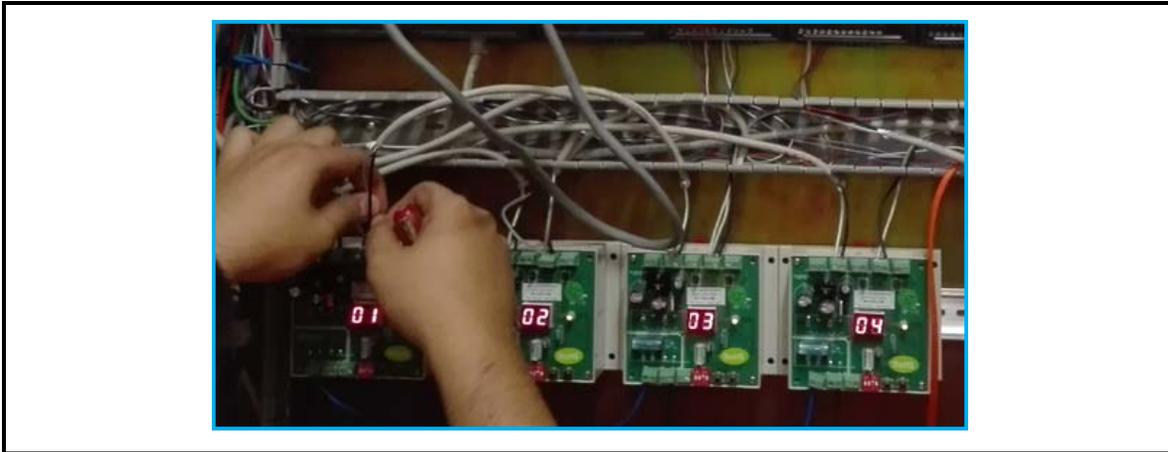


- ① To VRF system communication terminal “A.B” (2 core wire)
- ② To next Gateway & to Network work-station (2 core wire)
- ③ Display slave address/ “01”means the first system.”02”means the second system...
- ④ Setting MODBUS-RTU Slave Address/
  1. Press “+” or “-” to activate the slave address setting functions;
  2. Press “+” and “-” at the same time for 5 seconds , then the Digital Display will be Flashing every second;
  3. Press “+” to add the Slave Address , Press “-” to decrease the Slave address;
  4. After Setting Address finish , wait 5 seconds , then the Digital Display will stop Flashing and display the Slave Address.
- ⑤ Power supply 220V
- ⑥ Dip-switch setting: OFF/OFF/ON/OFF

### 6.4 Project Commissioning

6.4.1 Make sure ARV system was **commissioning** successful

6.4.2 Make sure **MODBUS Gateway** was **connected** correct

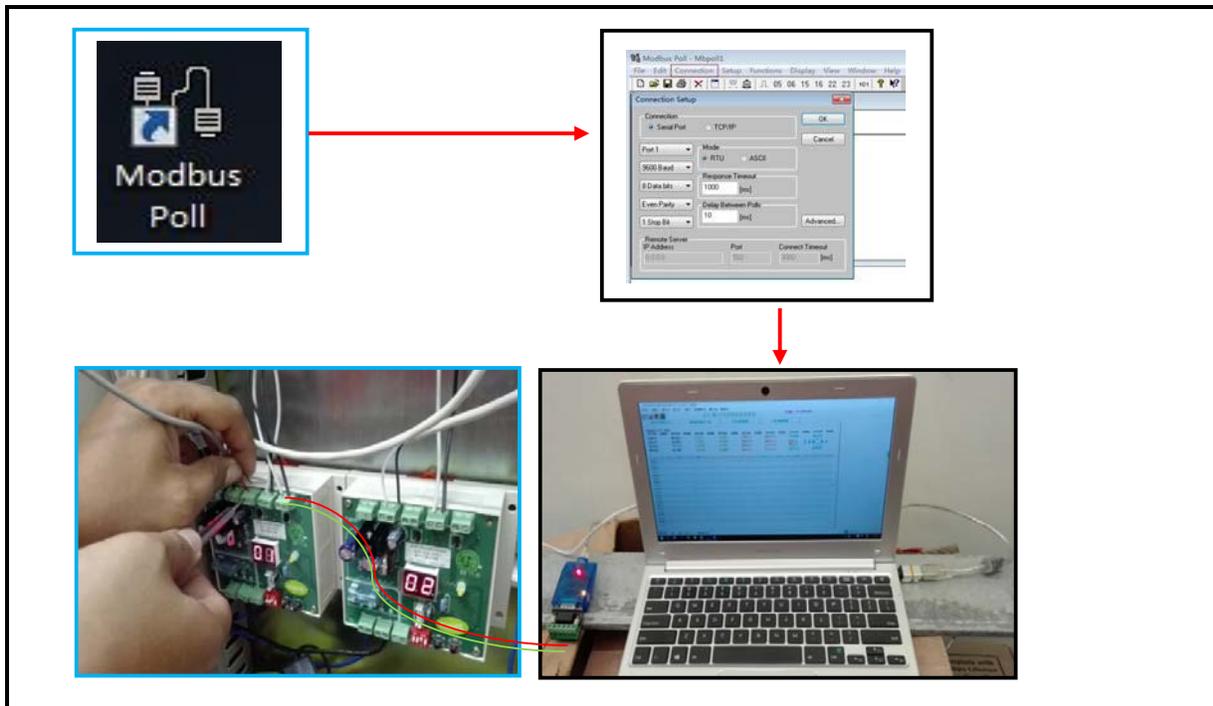


Note:

1. Each Gateway should be set **address**, For example : 4 systems , address from 01 ~ 04

2. Each Gateway (16422001000001) should be **Refresh program**(Factory setting)

6.4.3 **Check** if Gateway is working normal or not, test by a software ( MODBUS Poll)



6.4.4 Last, we can deliver the project to the BMS administrator, they will according "**AUX ARV MODBUS-RTU ProtocolV1.3**"table to do management

## 7. BMS - BACNET Protocol

### 7.1 BACNET Parameter Variable

There are 9 parameters of each indoor unit can be monitored or set.

Idx	Function	Note
1	ON/OFF	Indoor Units' ON/OFF state command and feedback.
2	Mode	Indoor Units' Mode (AUTO/COOL/DEHUMI/FAN/HEAT) command and feedback.
3	Temperature. Set	Indoor Units' ambient temperature command(range : 16°C ~32°C) and feedback.
4	Fan Set	Indoor Units' fan command (High/Medium/Low/Auto) and feedback.
5	Ambient Temperature	Indoor Units' ambient temperature.
6	Error	Indoor and outdoor Units' error.
7	ON/OFF Lock	A type of command used for forbidden users operating ON/OFF command by remote controller and wire controller.
8	Mode Lock	A type of command used for forbidden users operating Mode command by remote controller and wire controller.
9	Temperature. Lock	A type of command used for forbidden users operating Tempr. Set by remote controller and wire controller.

**Note :**

The **ON/OFF Lock, Mode Lock, Temperature Lock** is inactive after indoor units' Power-Off.

Index	Function	Object Name	Object Type	Unit	Note
1	ON/OFF	Indoor(YY_XX) On/Off	BV		1: ON 0: OFF
2	Mode	Indoor(YY_XX) Mode Setting	AV		0: Auto Mode 1: Cool Mode 2: Dehumi Mode 3: / 4: Heat Mode 5: / 6: Fan Mode
3	Temp. Set	Indoor(YY_XX) Temp. Set	AV	°C	Range: 16~32
4	Fan Set	Indoor(YY_XX) Fan Set	AV		1 : High Fan 2 : Medium Fan 3 : Low Fan

					4 : / 5 : Auto Fan
5	Ambient Temp	Indoor(YY_XX) Tai	AV	°C	
6	Error	Indoor(YY_XX) Error	AV		Error Code
7	ON/OFF Lock	Indoor(YY_XX) On/Off Lock	BV		1: Lock 0: Unlock
8	Mode Lock	Indoor(YY_XX) Mode Lock	BV		1: Lock 0: Unlock
9	Temp. Lock	Indoor(YY_XX) Temp Lock	BV		1: Lock 0: Unlock

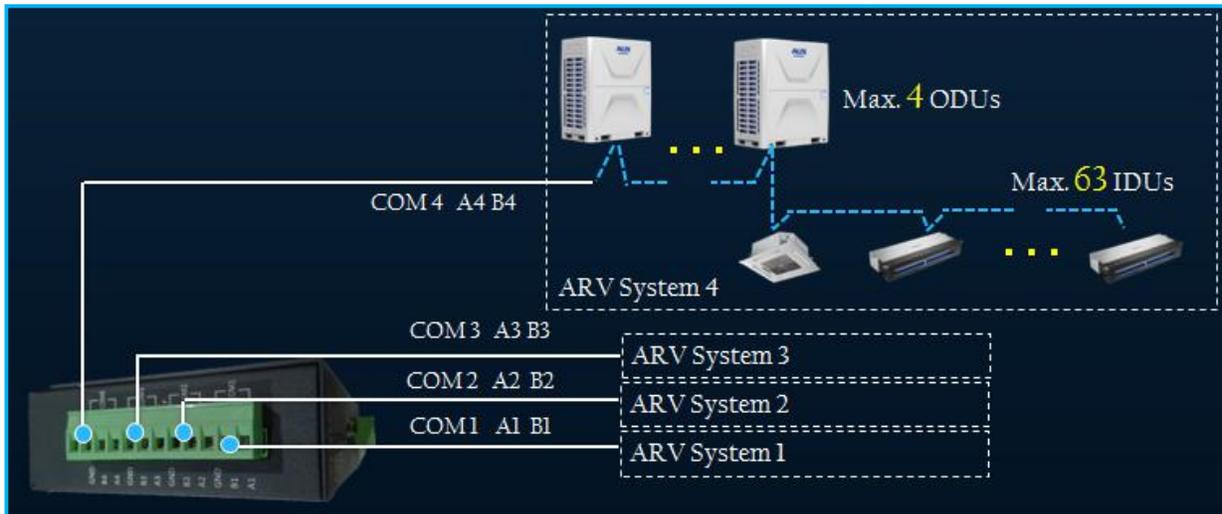
**Note :**

YY :ARV System Address(Range :01~04);    XX: ARV indoor units Address(Range :01~64);

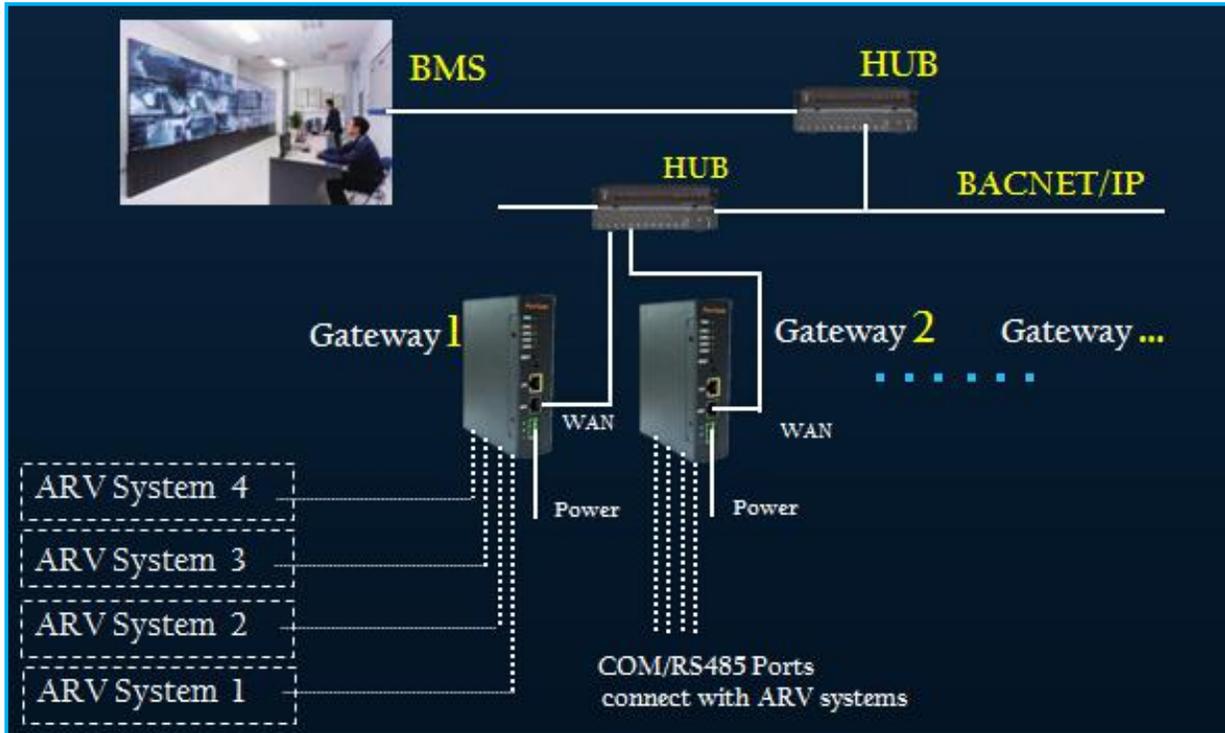
**7.2 Overall structure**

Each BACNET/IP Gateway has 4 RS-485 ports which can support 4 ARV systems

The COM Ports of ARV BACNET Gateway is connect with the ARV ODU/IDU Network



Any client device that support the BACNET/IP Protocol can integrate to BMS system by HUB



### 7.3 Hardware Features



Power

DC24 , 7W

Convenient Wiring

LAN(Reserve)、WAN、4 RS485 Ports

Dimension

115x35x135 mm

Installation Type

Slide-way Type

## 7.4 Web Configure

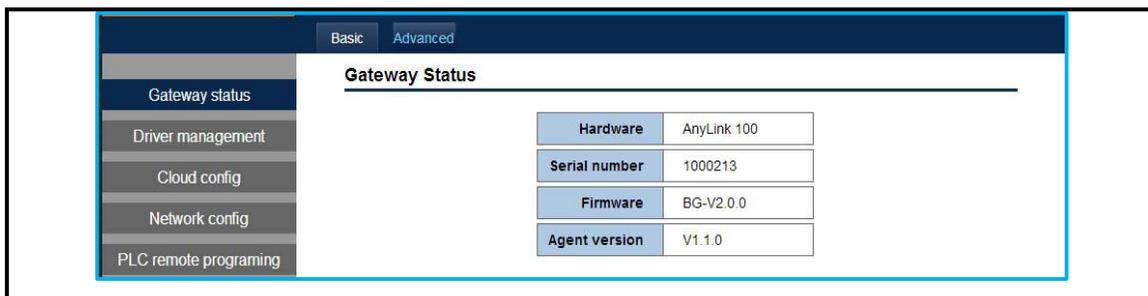
### 7.4.1 The BACNET Gateway IP and Computer IP should in the same network Segment

1. Power on, connect the RJ45 Port at the computer with the 'WAN' Port at BACNET Gateway.
2. Set the computer IP at Internet Protocol (TCP/IPv4):
  - IP Address: 192.168.100.x (x range: 2~252);
  - Subnet Mask: 255.255.255.0;
  - Default Gateway: 192.168.100.1;Click 'OK'.
3. Open the Google Chrome or Firefox explorer, input '**192.168.100.126**', then the '**login**' Page will be shown. Input name: admin, password: admin, click 'Login', then go into the Configure Page.



### 7.4.2 Configure the Driver Management

1. Go into the '**Driver Management**' Page. Click '**Advanced**'–'Driver Management':



2. Add ARV Driver

The screenshot shows the 'Driver management' interface with a sidebar on the left containing 'Gateway status', 'Driver management', 'Cloud config', and 'Network config'. The main area has tabs for 'Basic' and 'Advanced', with 'Advanced' selected. Below the tabs is a '+ Add driver' button and a table with columns: 'Driver type', 'Device name', 'Driver name', and 'Operation'. A red arrow points from the '+ Add driver' button to a text box labeled '1. Click Add Driver'. Below this is a modal dialog box titled 'Add driver' with a close button (X). It contains a 'Device type' dropdown menu set to 'VRF' and a 'Driver name' text input field. A red arrow points from the input field to a text box labeled '2. Input Driver name'. At the bottom of the dialog are 'Add' and 'Cancel' buttons. A red arrow points from the 'Add' button to a text box labeled '3. Click Add'.

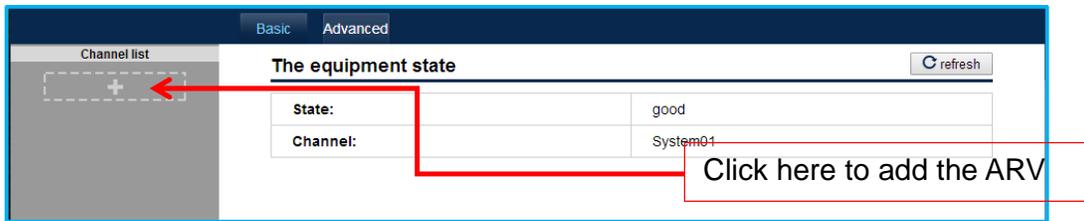
3. When finish these steps, the content is shown as follows.

The screenshot shows the 'Driver management' interface after adding a driver. A text box above the table contains the text: 'If you want to remove the driver information, then click .'. A red arrow points from this text box to the 'Operation' column of the table row. The table has columns: 'Driver type', 'Device name', 'Driver name', and 'Operation'. The row contains: 'VRF', 'ARV', 'AUX', and a row of icons (edit and delete). Below the table, it says 'Total: 1'.

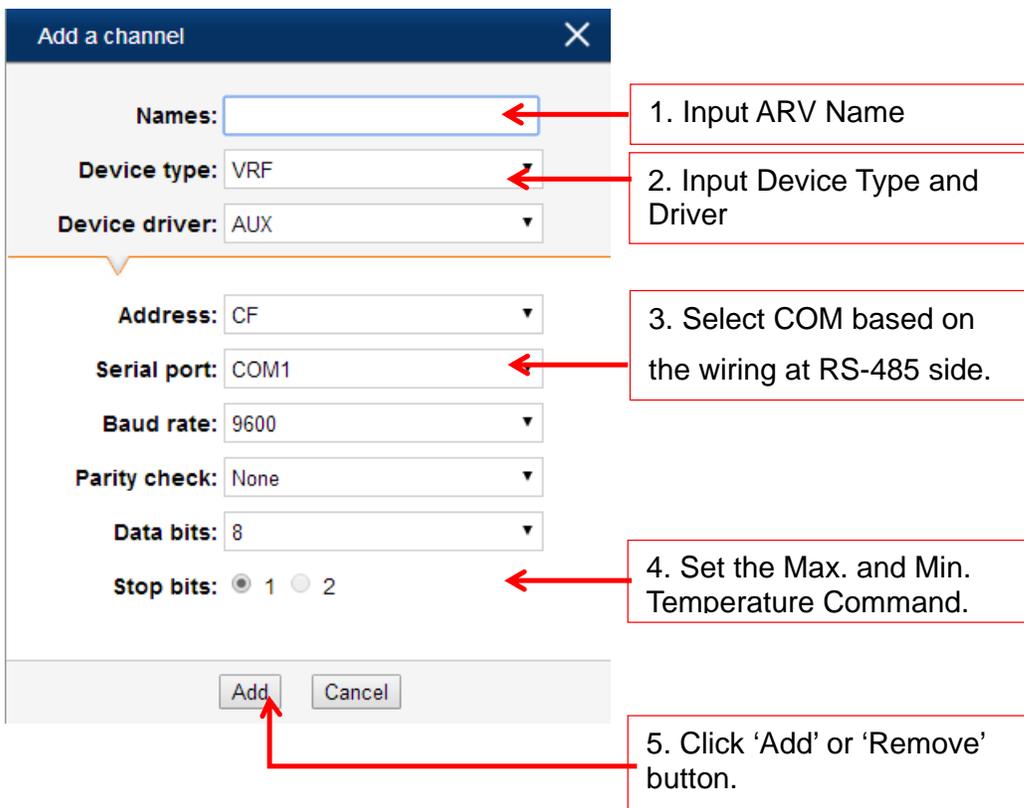
Before removing the driver information, you should make sure all of the indoor/outdoor information has been removed.

### 8.4.3 Add ARV System Information

1. Click 'Basic', then click the  at channel list to add the ARV system.



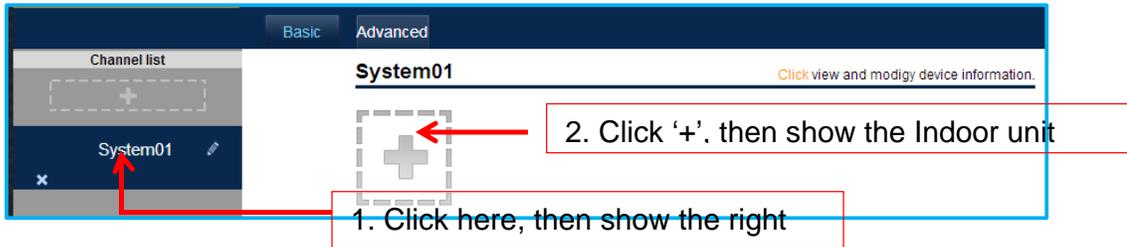
2. A dialogue will be shown



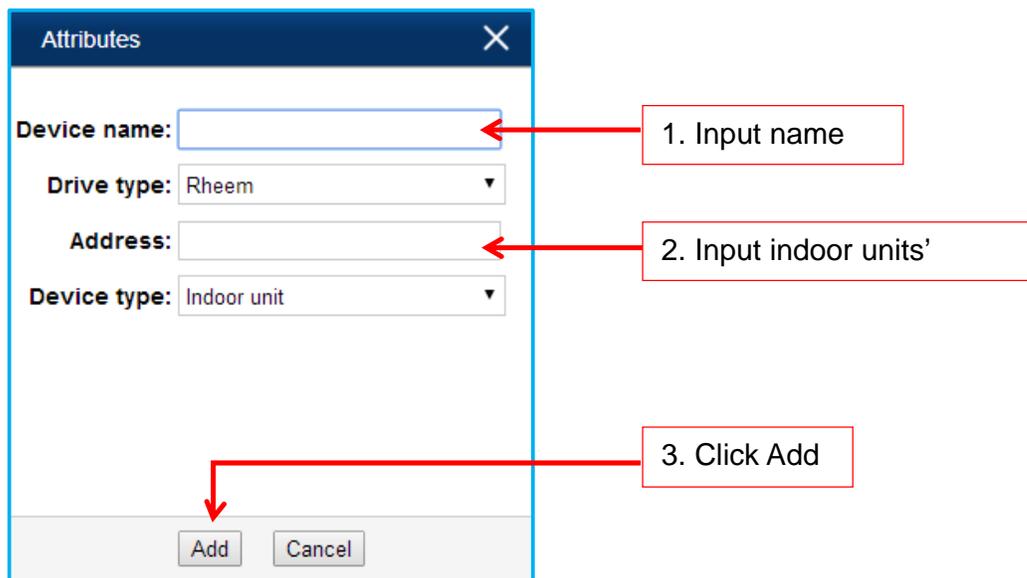
### 7.4.4 Add indoor units' information

We should select the ARV system before Add the indoor unit,

1. Select the ARV System.



2. Add indoor units as follows.



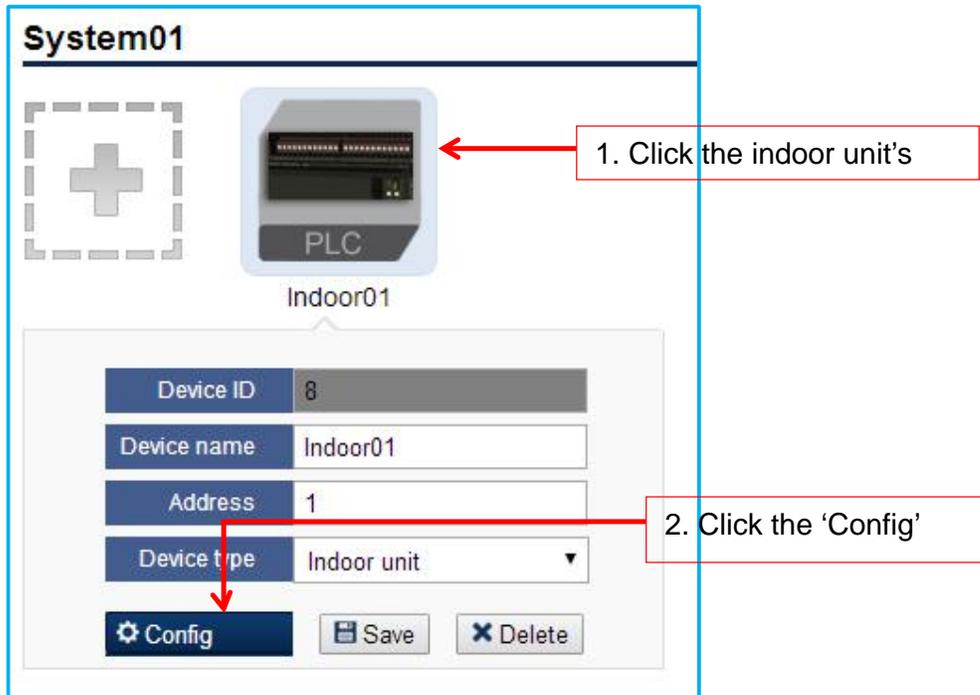
3. After finished, it is shown as follows.



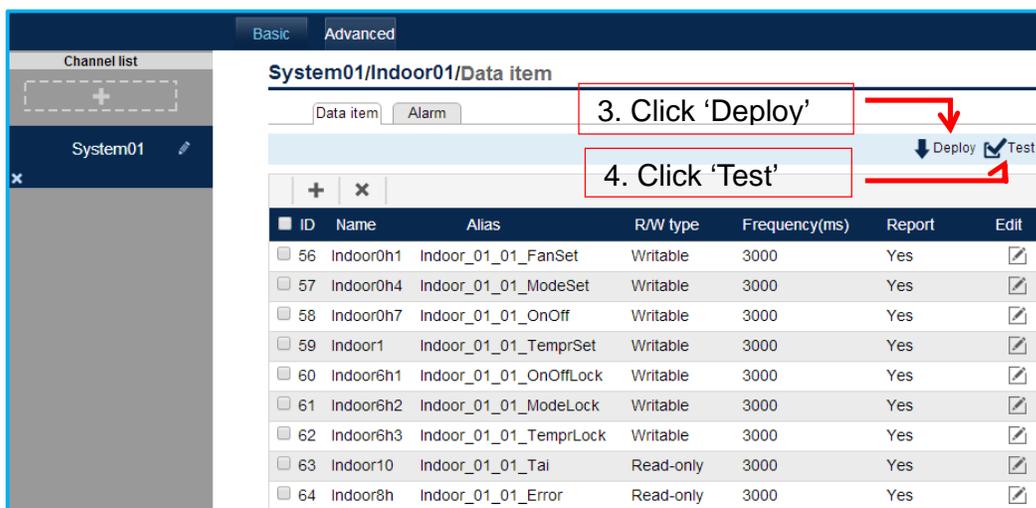
### 7.4.5 Download the Indoor units' information

After finish adding the indoor units' information, we should **download** the information to **activate** the BACNET side.

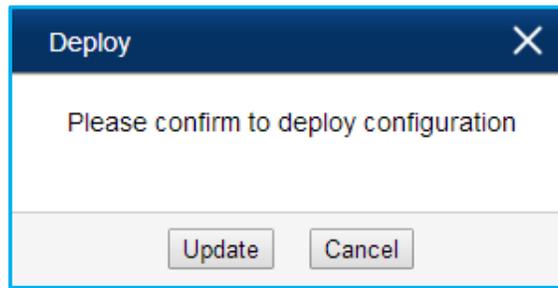
1. Click the indoor unit's icon, then shown the dialogue as follows;



2. Click the 'Config' button, the BACNET information will be shown as follows,



3. Click 'Deploy' button, then shown the dialogue as follows. Click 'Update.



4. After Update, click the '**Test**' Button to make sure all the indoor units' BACNET information is right

名称	别名	设备ID	数据项ID	值	状态
Indoor0h1	Indoor_01_01_FanSet	0	undefined	1	good
Indoor0h4	Indoor_01_01_ModeSel	0	undefined	1	good
Indoor0h7	Indoor_01_01_OnOff	0	undefined	0	good
Indoor1	Indoor_01_01_TempRSe	0	undefined	16	good
Indoor6h1	Indoor_01_01_OnOffLo	0	undefined	0	good
Indoor6h2	Indoor_01_01_ModeLox	0	undefined	0	good
Indoor6h3	Indoor_01_01_TempRc	0	undefined	0	good
Indoor10	Indoor_01_01_Tai	0	undefined	21.4	good
Indoor8h	Indoor_01_01_Error	0	undefined	0	good

Note, if the indoor unit's state is Bad, it will be shown as follow.

**Test** ✕

This section displays the acquisition data of the device, which is used to verify that the configured data item is correct.

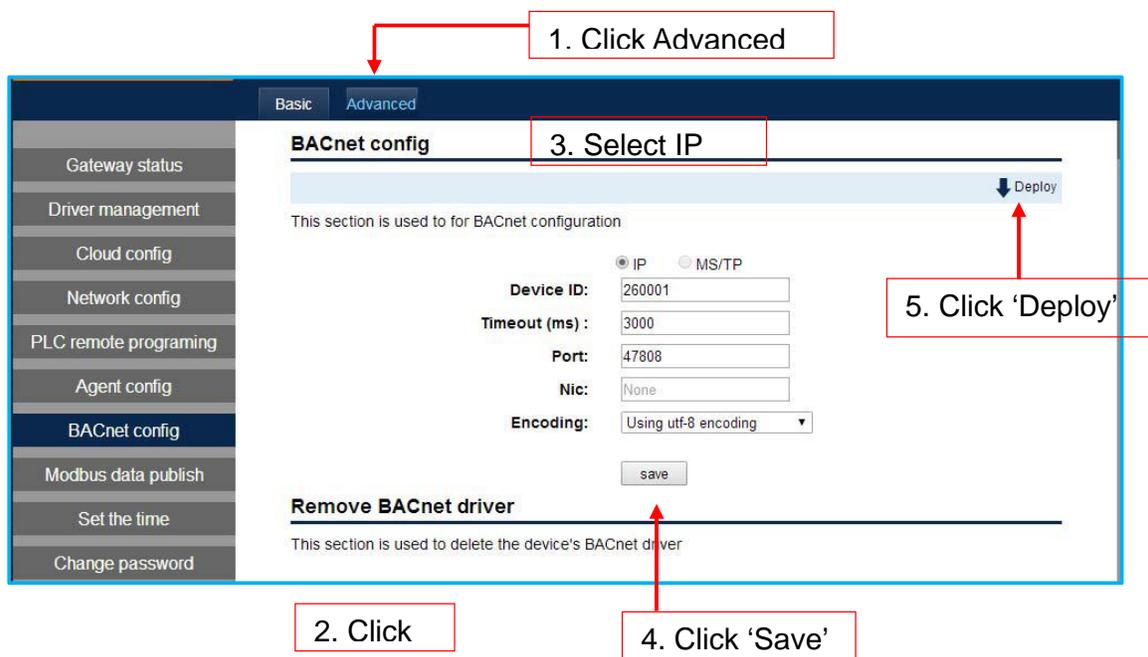
Name	Alias	Device ID	Data item ID	Value	State
Indoor0h1	Indoor_01_01_FanSet	0	undefined	-1	bad
Indoor0h4	Indoor_01_01_ModeSel	0	undefined	-1	bad
Indoor0h7	Indoor_01_01_OnOff	0	undefined	0	bad
Indoor1	Indoor_01_01_TempRSe	0	undefined	-1	bad
Indoor6h1	Indoor_01_01_OnOffLo	0	undefined	0	bad
Indoor6h2	Indoor_01_01_ModeLox	0	undefined	0	bad
Indoor6h3	Indoor_01_01_TempRc	0	undefined	0	bad
Indoor10	Indoor_01_01_Tai	0	undefined	-1	bad
Indoor8h	Indoor_01_01_Error	0	undefined	-1	bad

For the bad state, we can solve it by follow steps:

- **Check** if the indoor unit set in the **BACNET** Gateway is **exist**. In other words, the indoor unit's address must **match** with the exist one, Or the indoor unit setting in the BACNET Gateway doesn't make sense.
- **Communication** error between the Indoor unit and Outdoor unit side at RS-485 port.

#### 7.4.6 Download the BACNET Gateway Configure

1. Click 'Advanced'–'**BACnetConfig**' , select '**IP**', click '**Deploy**'.



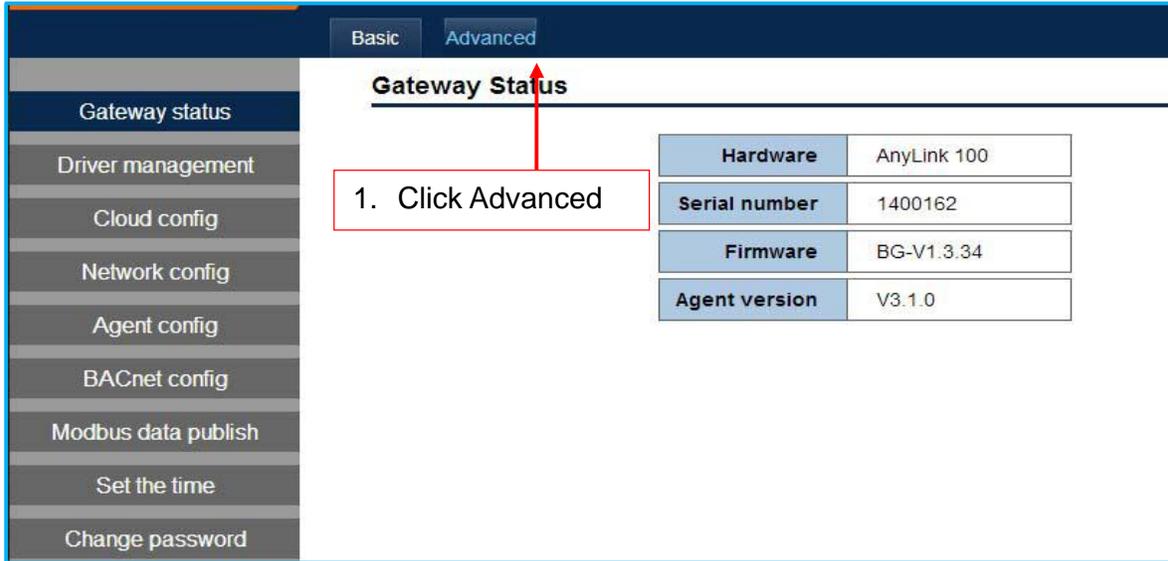
2. After Finished, all configuration success.

#### 7.4.7 Set BACnet Gateway WANIP Address

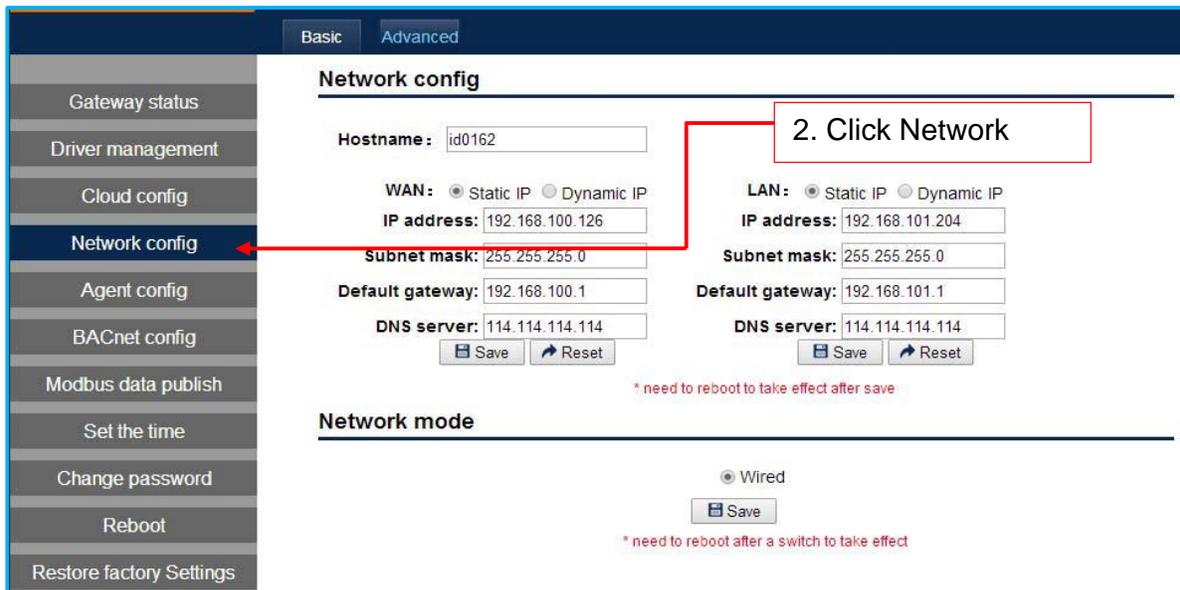
The last work is set BACnet WAN IP address, so it can be accessed by other BACnet devices.

Suppose the Network Segment is 192.168.1.x, and the BACnet gateway WANIP Address is Set as 192.168.1.4, the default gateway is 192.168.1.1. It will be set as follows:

a. Click 'Advanced'



b. Click 'Network Config'



c. Set WAN IP;

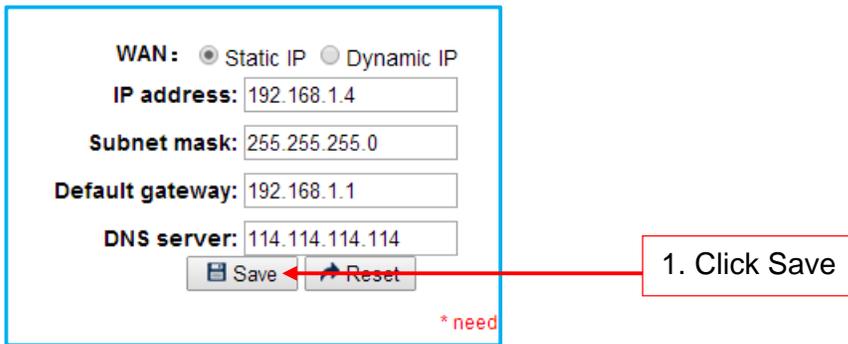
'IP address' set as 192.168.1.4;

'Subnet mask' set as 255.255.255.0;

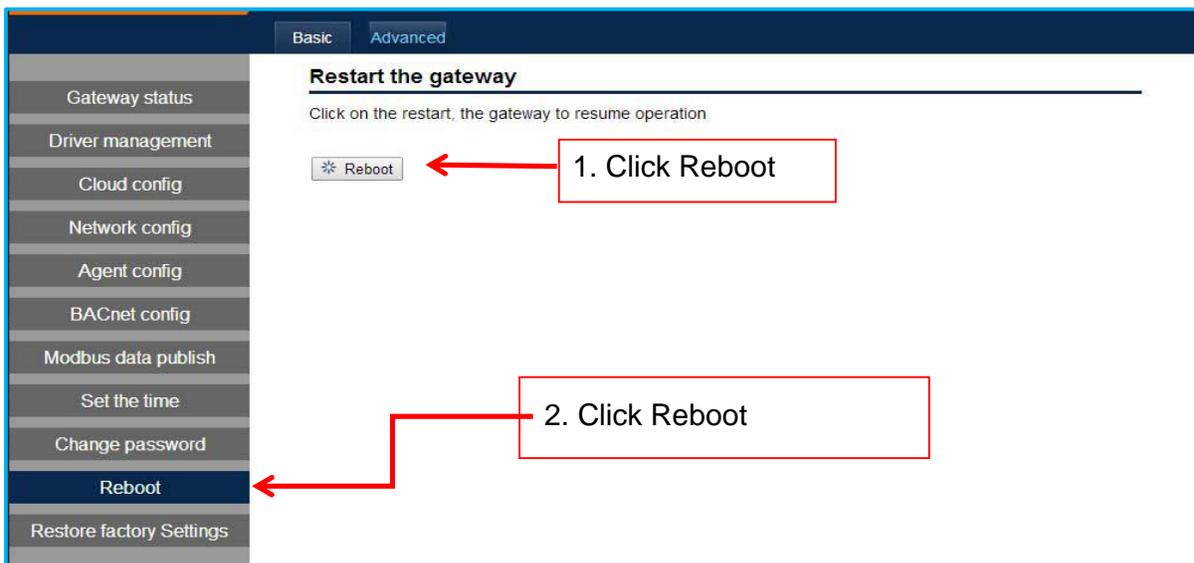
'Default Gateway' set as 192.168.1.1;

'DNS Server' should be the same as the DNS server IP in the project;

After finished Setting IP Address above, click ‘**Save**’ button.



d. Restart the BACnet gateway, enable the new IP address



**Note:**

Now the final IP address is 192.168.1.4. If you want to access the gateway web page, we should use 192.168.1.4 replace of 192.168.100.126.