



GMV BMS SERVICE MANUAL



(GC201201-I)

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General Description of BMS System

The BMS system of Gree's central air conditioner provides standard protocol interface, which can interface Gree Multi VRF system to client side building management system (BMS).

The long-distance monitoring system/BMS of Gree central air conditioner are capable of monitoring and controlling the running status of these units and raising alarms when errors occur. Thanks to BMS system, serviceman could check the running status and accomplish unit ON/OFF or temperature setting by computer instead of field setting, which greatly improves the working efficiency and reduces labor and management cost.

This system is applicable to centralized monitoring and management of GMV multi VRF system, air cooled screw chiller, water cooled screw chiller, centrifugal chiller, modular unit, duct type unit, water heater unit and fan coil unit. It is a requisite system for managing the intelligent air conditioner system in modern buildings.

Notes: Gree provides BMS interface module only, so that the user needs to integrate the building management system (BMS) by himself according to interface protocol.

BMS of GMV Multi VRF System

BMS system of GMV multi VRF system provides Modbus and BACnet interface, through which the unit can be interfaced with BMS of user.

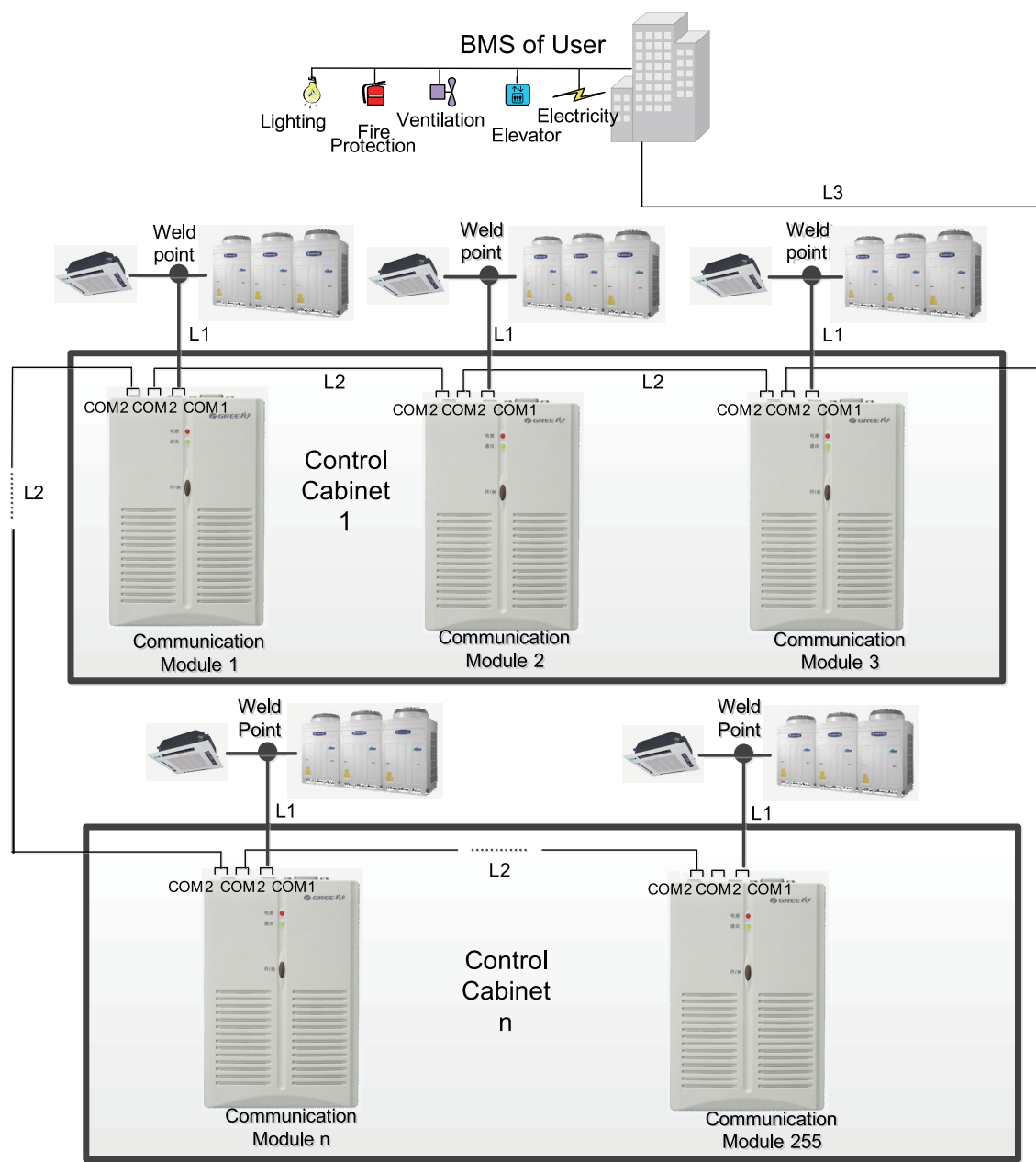
1. Modbus Interface of GMV Multi VRF System

1.1 Introduction to Modbus Interface of GMV Multi VRF System

Gree Multi VRF system adopts RS485 bus and provides Modbus interface with standard protocol, which can interface Gree Multi VRF system to client side building management system (BMS). Via this interface, the user can execute centralized management and control of 4080 indoor units under 255 sets of GMV multi VRF systems. It is an efficient system for management of the intelligent air conditioner system in modern buildings.

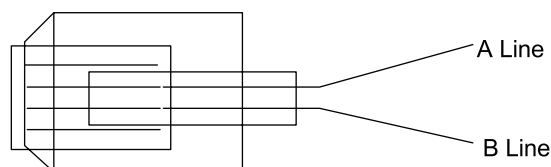
This system is applicable to the following models: GR Digital Multi VRF System (R22), GR Digital Multi VRF System (R410A), GRe Low Ambient Temperature Heat Pump Digital Multi VRF System, GRm Modular Digital Multi VRF System (R22), GRm Modular Digital Multi VRF System (R410A), GRh Heat Recovery Digital Multi VRF System, GPd DC Inverter Multi VRF System, GPdm Modular DC Inverter Multi VRF System, GPds DC Inverter Multi VRF plus Water Heater System and GPdmh Modular Heat Recovery DC Inverter Multi VRF System.

1.2 System Description
1.2.1 System Structure Diagram



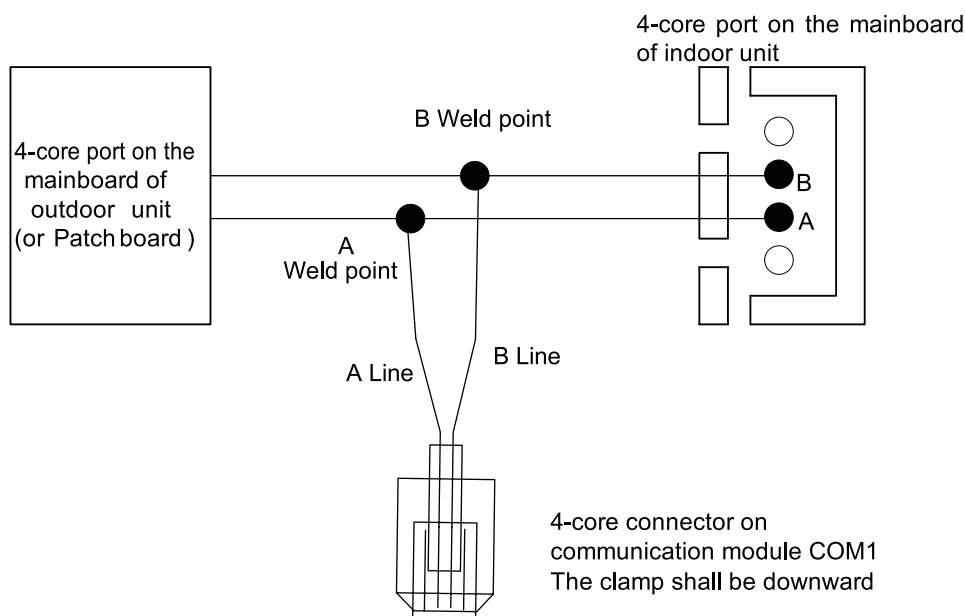
Note: As shown in the topology above, one module may include 1-16 indoor units according to actual condition and the outdoor system consists of multi modules.

Joining method for COM1/COM2 connector
The clamp shall be downward



Joining method for weld point

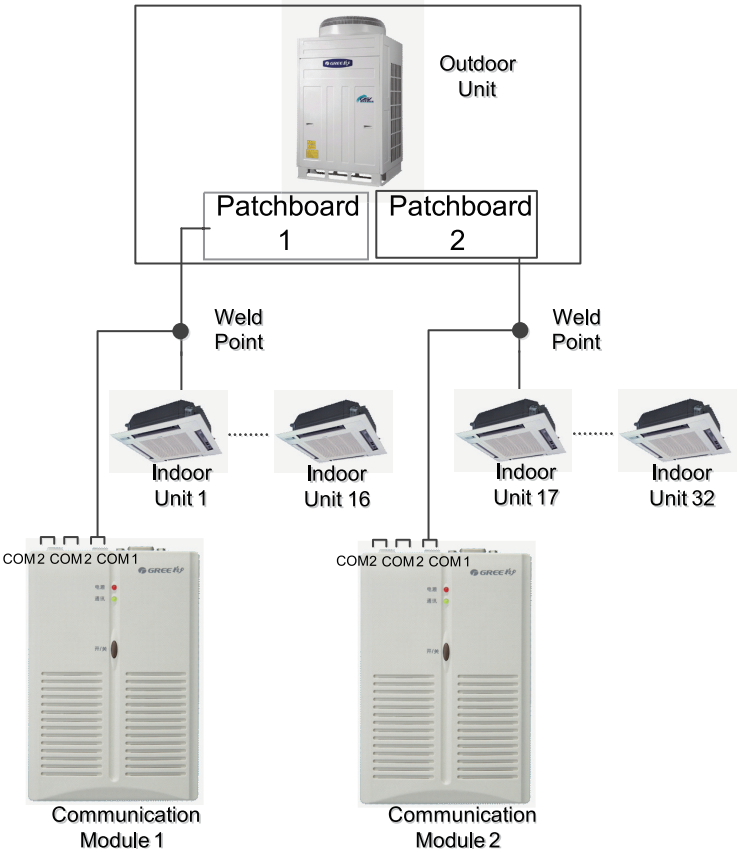
Note: The Line A/B of communication module shall correspond to Line A/B of indoor unit.



1.2.2 Notes on the Communication Line in System Structure Diagram

Line Code	Description
L1	2-core Class V twisted pair for communication, with one end as connector and another end connected to weld point (To be provided by the user)
L2	2-core Class V twisted pair for communication, with both ends as connector (Provided by Gree)
L3	2-core Class V twisted pair for communication, with one end as connector and another end connected to BMS of user (To be provided by the user)

Please take special care that every communication module can be connected to 16 indoor units in maximum. Therefore, when indoor units connected to outdoor unit exceed 16 sets, a patchboard is required (for the function and connection of Patchboard, please refer to the system instructions). Please see below for the connection of communication module.



1.2.3 Notes on the Composition of System Structure Diagram

It is seen from the diagram that the BMS system consists of 3 parts:

The first part is the building management system (BMS) in control room (BMS to be developed by the user). It also includes the user's BMS system and the converter with optical isolation that is used to convert the RS232 signal of BMS system into RS485 signal of air conditioner control network (Only used when BMS uses RS232 communication mode).

The second part refers to the connection of communication network, that is, the connection of communication lines in view of hardware.

The third part is the communication module, which is responsible for data transmission between air conditioner and control computer. It is an important part in the complete control system. Each communication module has one address (realized via 8-position DIP switch), which shall not be repeated in one system. In order to standardize the installation and make the future management easier, all the communication modules are installed in the centralized control cabinet. For the details on the installation and operation of the above equipment, please see the hardware introduction.

1.3 Hardware Introduction

1.3.1 Parts List

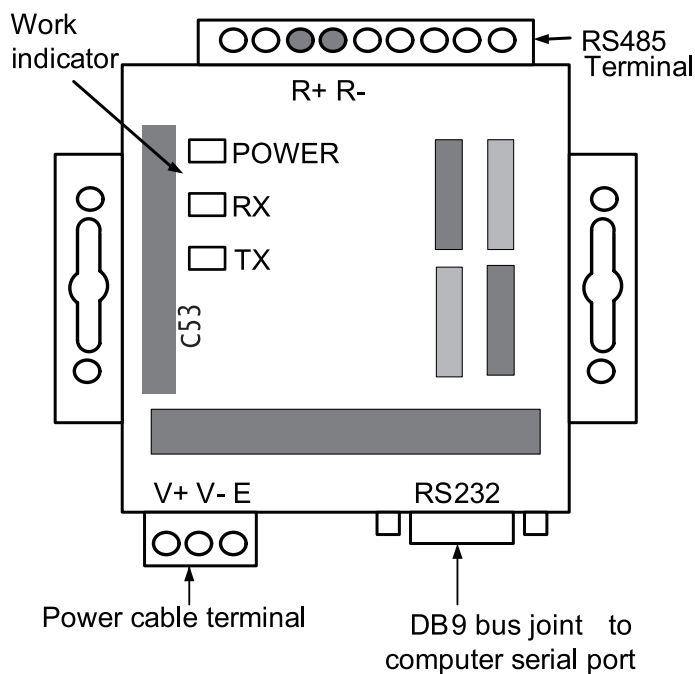
Name	Model	Material Code	Option	Remarks
Optoelectronic isolated converter	Optoelectronic isolated converter GD02	EN02200020	Optional	Optional when BMS adopts RS232 mode
Optoelectronic isolated repeater	Optoelectronic isolated repeater RS485-W	EN02200010	Optional	Add one repeater for increase of communication distance by every 800m; add one repeater also for increase of every 30 communication modules.
Communication module kit	Remote control parts ME30-00/E2	MC200030	Standard	Applicable for BMS 1). RS485 communication interface 2). Modbus RTU protocol interface Main kits: communication module, transformer, 2-core communication line, manual
Centralized control cabinet	To be provided by the user	\	Self-provided	

1.3.2 Introduction of Optoelectronic Isolated Converter

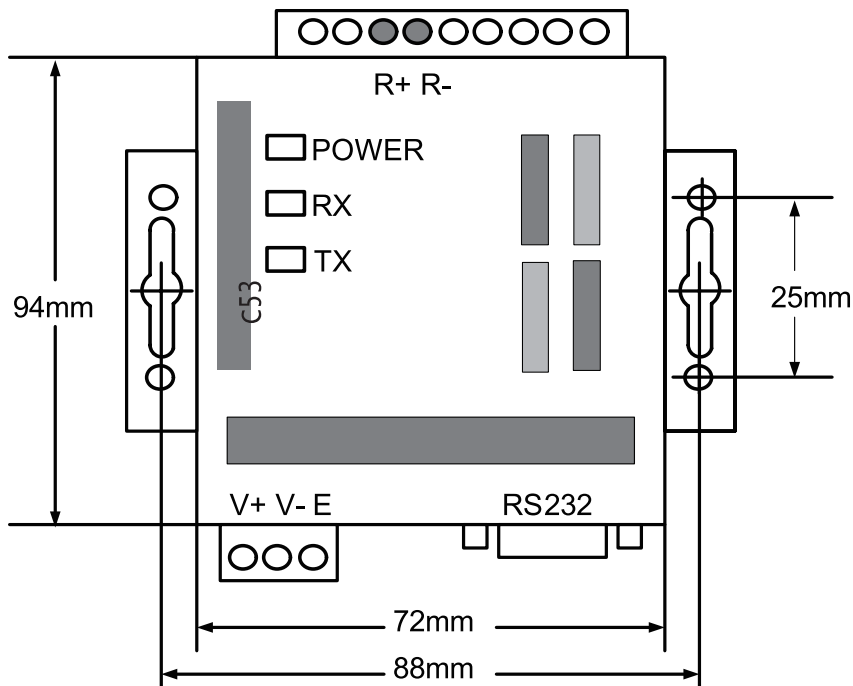
(1). Function Introduction

The optoelectronic isolated converter is designed to convert the RS232 signal from the computer serial port into RS485 signal. It is only used when the user's BMS system uses RS232 communication mode.

(2). Appearance



(3). Outline and Installing Dimension



(4). Operating Instructions

- Power interface: Input AC220V~50HZ; Output 12~30V DC 800mA
- Communication interface: Line A of RS485 connected to R+ on 485 terminal, and Line B connected to R-. RS232 port connected to RS232 on computer
- Power indicator: Normally bright when it is energizing.
- Communication indicator: TX indicator blinks during normal communication.

(5). Cautions on Installation

- ◆ It must be installed indoors. Avoid knock or exposure to sunshine or rain. It is suggested to place it in the monitoring room together with the computer.
- ◆ The manufacturer's original equipment must be used. Never use any other model or substitute product.
- ◆ Independent power supply is required. Make sure to install adequate 220V AC socket for power supply.

1.3.3 Introduction of Optoelectronic Isolated Repeater

(1). Function Introduction

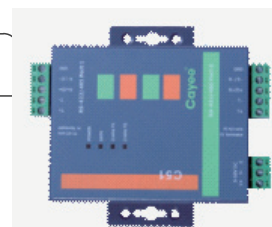
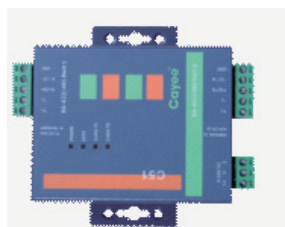
1). Function of optoelectronic isolated repeater

- To ensure the signal completeness and prevent the signal from attenuation under long distance communication when the distance of the whole communication line exceeds 800m.
- The general optoelectronic isolated converter at present can support 32 nodes and ensure completeness of their communication signals. When the communication nodes in the network exceed 32, the communication signal will become incomplete. To ensure reliable transmission and completeness of the signals, we require that repeater must be used when the number of nodes in the network exceeds 30.

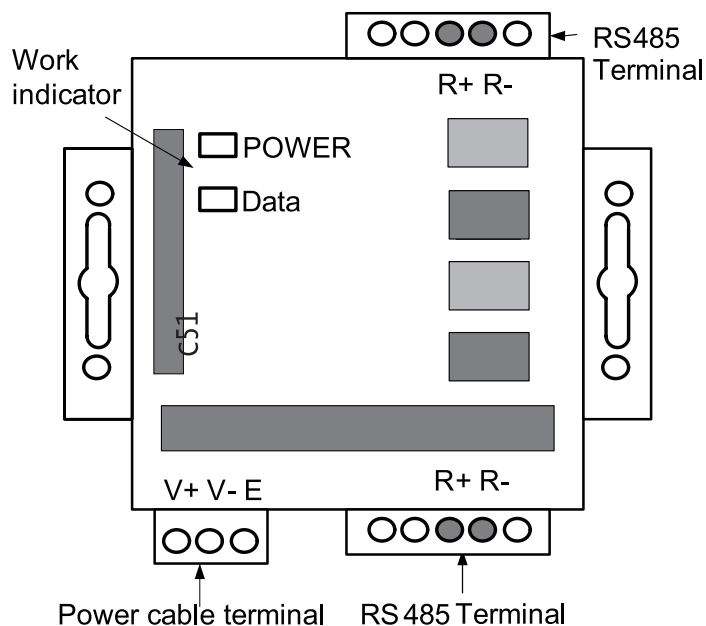
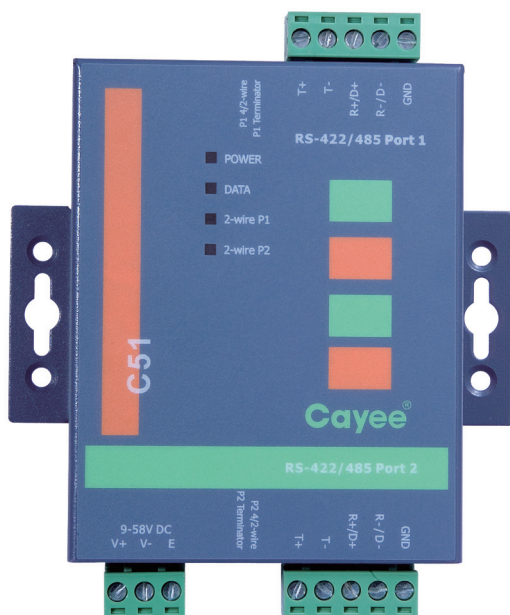
Max.30 communication modules between two repeaters



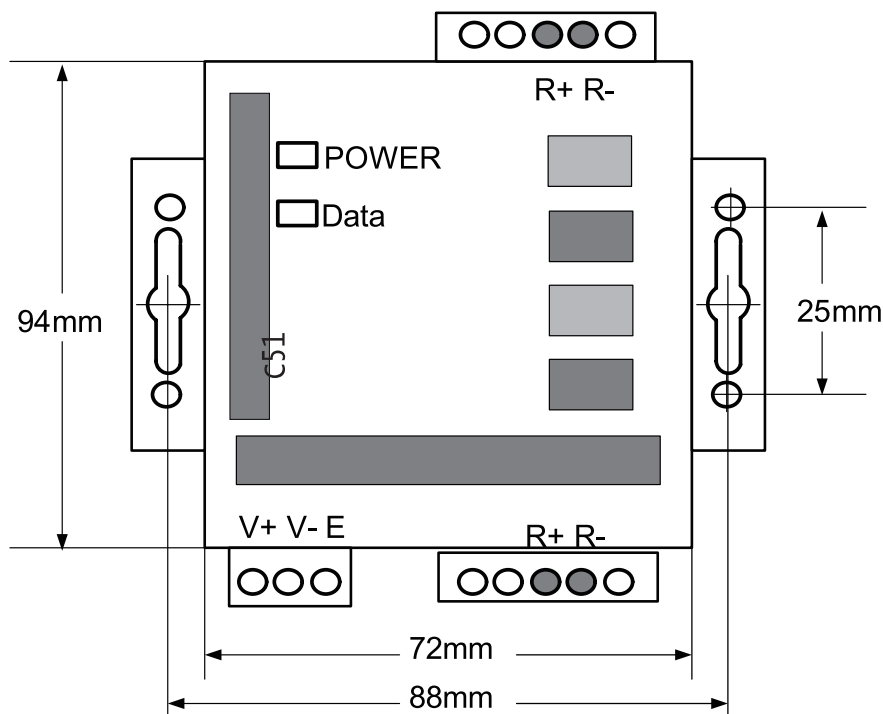
Max. distance of communication line between two repeaters is 800m



(2). Appearance



(3). Outline and Installing Dimension



(4). Operating Instructions

- Power interface: Input AC220V~50Hz; Output 12~30V DC 800mA
- Communication interface: Line A of RS485 connected to R+ on 485 terminal, and Line B connected to

R-.

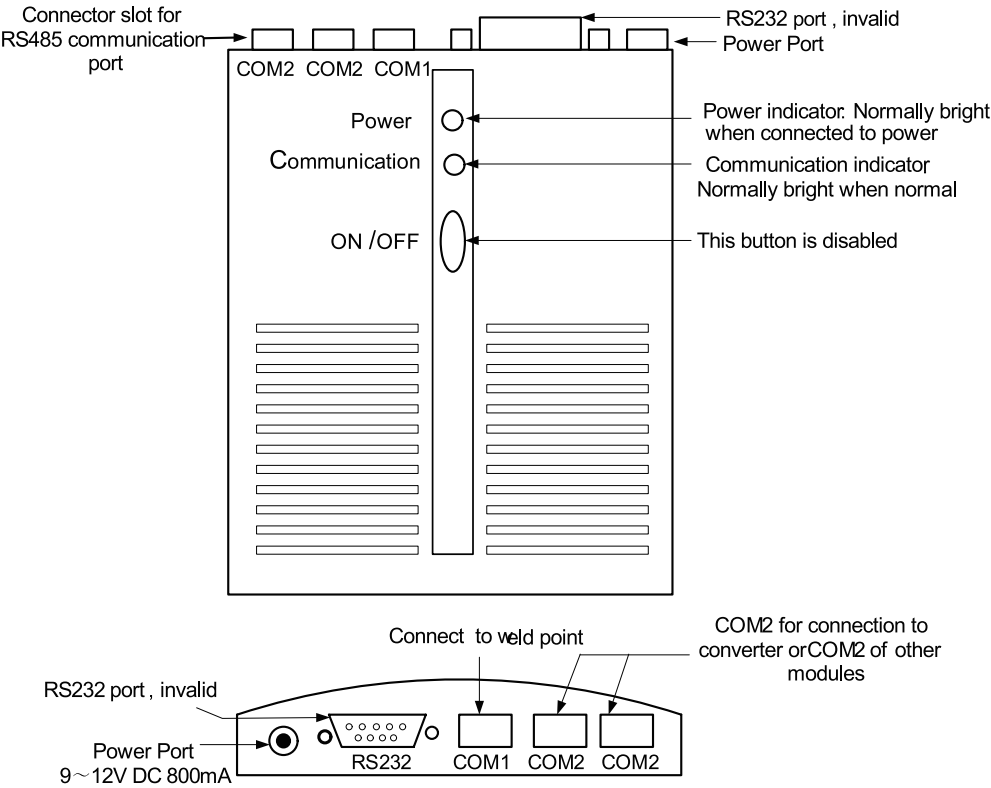
- Power indicator: Normally bright when it is energizing
 - Communication indicator: Data indicator blinks during normal communication.
 - For the methods of use, please see the Operating Instructions attached in the package of repeater.
- (5). Cautions on Installation
- ◆ It must be installed indoors. Avoid knock or exposure to sunshine or rain. It is suggested to place in the control room together with the computer.
 - ◆ The manufacturer's original equipment must be used. Never use any other model or substitute product.
 - ◆ Independent power supply is required. Make sure to install adequate 220V AC socket for power supply.

1.3.4 Introduction of Communication Module ZJ0112

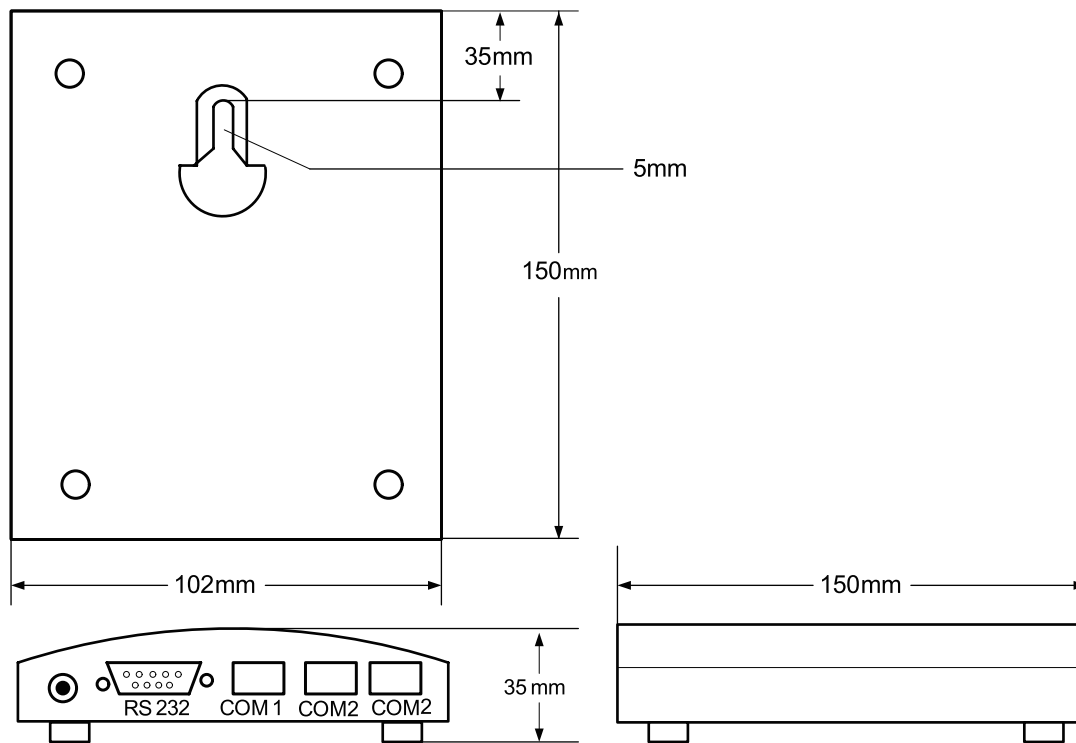
(1). Function Introduction

The communication module is to convert and transmit the information during communication between computer and air conditioner system. That is, it functions as a communication controller.

(2). Appearance



(3). Outline and Installing Dimension



(4). Operating Instructions

- Power interface: Input AC220V~50HZ; Output 9~12V DC 800mA
- Communication port: COM1 for connection to air conditioner system; the other two COM2 ports have the same function, used for connection to BMS system or for connection between two communication modules.
- Power indicator (Red): Power indicator is normally bright when the communication module is energized.
- Communication indicator (Green): Normally bright when the communication is normal. If blinking every 2 seconds, it indicates communication fault between communication module and BMS system. If blinking twice every 2 seconds, it indicates the communication fault between communication module and air conditioner system. If normally dark, it indicates the communication module has communication fault with both the air conditioner system and BMS system.

Key: This key is provided for backup and has no function at present.

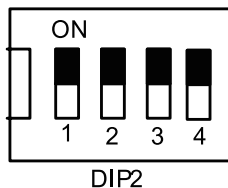
(5). DIP Switch Schematics

Note: After resetting of DIP switch, the communication module shall be de-energized and energized again before the new address goes into effect.

In the DIP switch schematics, the black part represents the toggle switch.

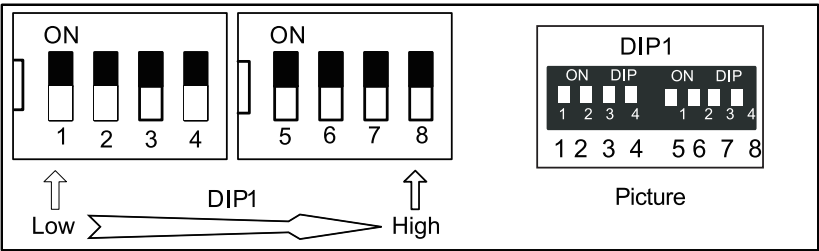
• Setting of DIP 2

DIP2 corresponds to SA1 located on the communication module. As shown below, when the DIP2 is set to be reserved, toggle switch should be set to the side "ON" which represents "0" of the binary system.

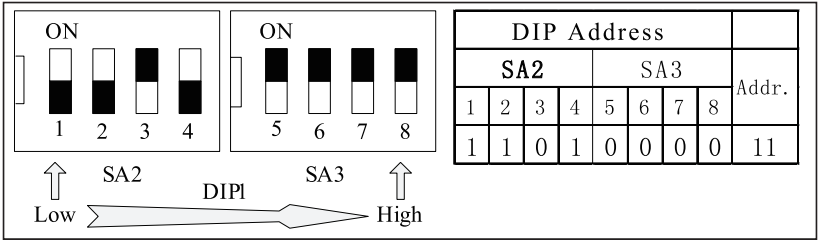


• Setting of DIP1

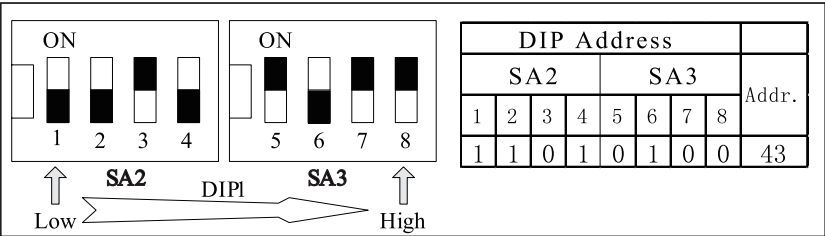
Inside the communication module there is 8-position switch among which the SA2 and SA3 are used to set the device address. In the actual application, when the DIP switch is set to the side "ON", it represents "0" of the binary system and "1" on the opposite end. Address range is 1 thru 255. The setting of DIP1 switch at low and high position is shown below with the real image picture of DIP switch for reference.



Example of address setting:
Setting method of address 11 is shown below:



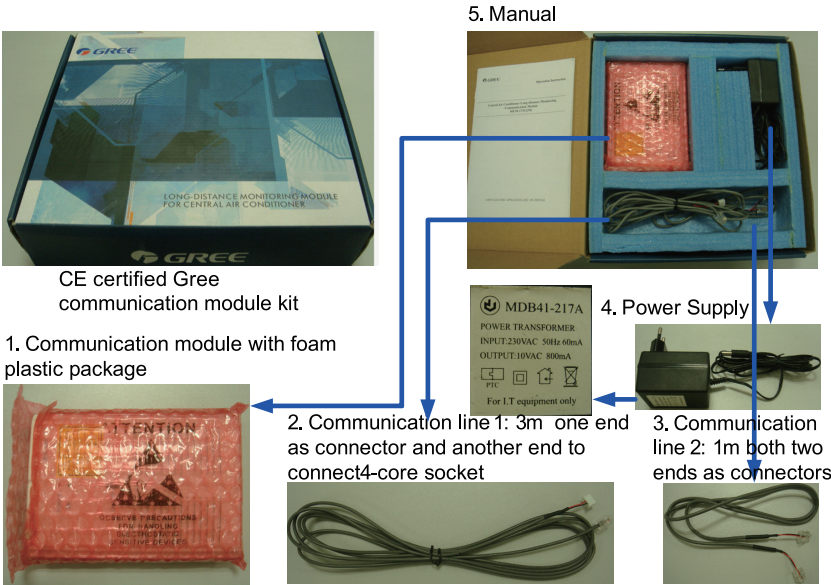
Setting method of address 43 is shown below:



(6). Cautions on Installation and Operation

- Ensure that the rating of power adaptor is correct; otherwise the communication module cannot work normally, or it will be even damaged.
- Please ensure that the setting address of each communication module is unique in the whole project; otherwise the communication fault will be caused.
- Please ensure that the communication wire is connected to correct interface; otherwise communication fault may be caused.
- Do not put the communication module under direct sunshine or in an environment of high temperature and high humidity. Please place the communication module in the centralized control cabinet.

(7). Kit Picture



Communication module kit ZJ0112 includes 5 parts:

	Part Name	Quantity	Remark
1	Communication module	1	
2	Communication line L1	1	3m, one end as connector and another end to connect the 4-core socket (2-core line inside)
3	Communication line L2	1	1m, both two ends as connectors
4	Power supply	1	Output: 10VAC, 800mA
5	Manual	1	

1.3.5 Centralized Control Cabinet

(1). Function Introduction

The centralized control cabinet can accommodate all the communication modules for centralized management and ensuring reliable operation.

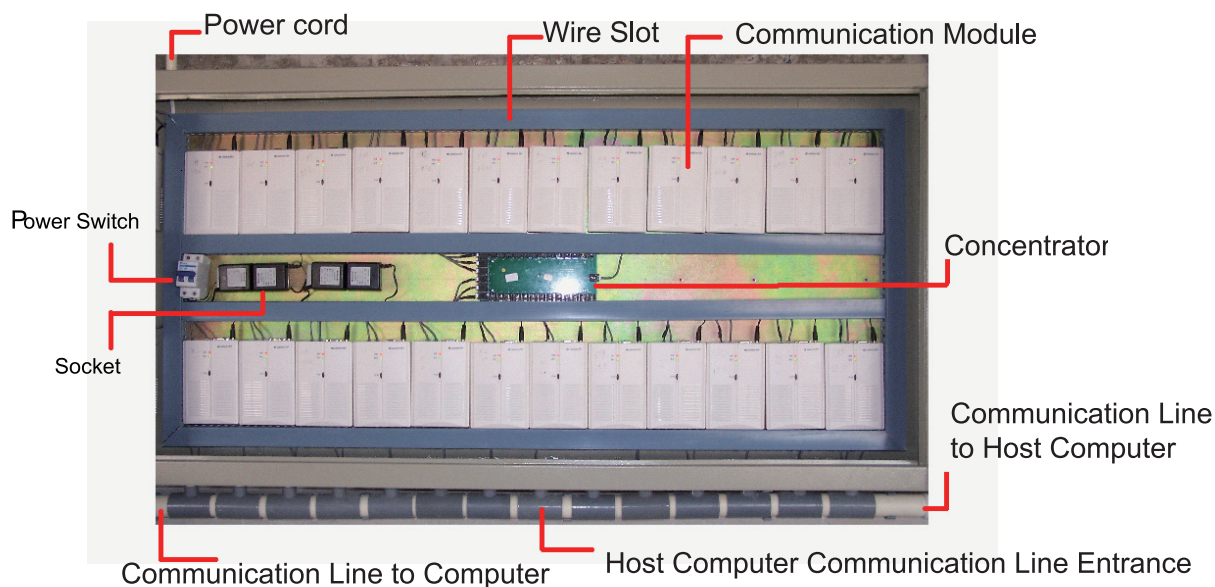
(2). Appearance

The centralized control cabinet is fabricated by the user as needed according to this service manual. The picture provided below is for reference only and is not the unique standard.

Project Example 1:

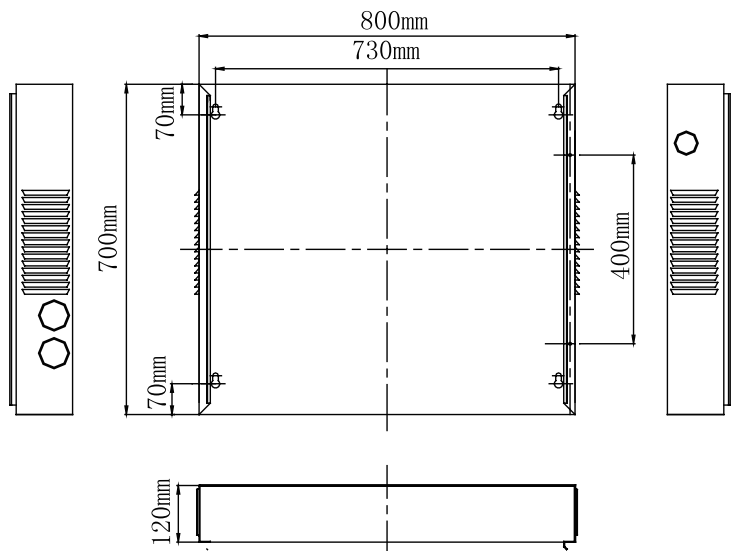


Project Example 2:



(3). Outline and Installing Dimension

The dimension below is provided for reference only. It is designed according to the dimension of centralized control cabinet that can accommodate 10 communicate modules. To accommodate over 10 communication modules, the control cabinet must be redesigned according to corresponding scale. Meanwhile, the internal space of the control cabinet shall also be designed by the user in reference to the size of communication module and cabling requirements of the project.



(4). Cautions on Installation and Operation

- Before fabrication, the centralized control cabinet shall be designed according to the quantity, arrangement and position of the communication modules.
- Each communication module shall be provided with an independent power supply. Therefore, the centralized control cabinet shall be installed with adequate 220V AC sockets for providing the power supply. It is not allowed to connect multiple communication modules to one power transformer.
- The communication line must be separated at least 15cm from the HV line. Never bundle them together. If unable to separate them by 15cm, shield steel pipe must be added, so as to avoid generating electromagnetic interference and causing communication fault.
- The control cabinet shall be installed indoors to prevent sunshine or rain. It shall also be locked to avoid touch by non-professional management people.

1.4 Introduction of Communication Line

(1). Cautions on Installation and Operation

- Ensure that each communication line is in good conductivity. The communication line must be subjected to conductivity test.
- Communication signal line shall not be put in the same duct with other high-voltage electrical cable or high-frequency signal cable, nor shall it be bundled with similar signal cables generating strong interference. The communication line shall be maintained at least 15cm away from the high-voltage electrical cable. The minimum distance from other high-frequency signal cables shall be calculated according to the frequency and voltage of the signal. In event that it has to be in parallel with such signal cables of strong interference, the contractor must be required to add shield steel pipe.
- The communication line is required to run along the refrigerant pipeline in special cable duct.
- For communication lines that connector head shall be fabricated, firstly pass them through the pipe and then fabricate the connector head. During construction, if the communication line must be through the pipe with its connector head, be sure to take measures to protect the connector head properly and prevent it from wire loosening, wearing or damage when passing through the pipe.
- The method for fabrication of the connector: Firstly, the connector shall be 4-core connector. Put the wire clamp of connector head downward. Use a wire presser to remove the insulating sheath of the communication line for an appropriate length. Cut the end of signal line flat (Note: Do not remove the signal line sheath). Then, insert the signal cable line-A and line-B of 4-core or 2-core twisted pair communication cable into the middle two cords of the 4-core connector. Use wire presser to press the connector tight. Finally, use an instrument to test the communication line for its conductivity.

- Welding of communication line: Remove the insulating sheath of twisted pair communication line on the two ends and expose the copper cord for 2cm or more. Then, twist the copper cords mutually and fix the twisted section by soldering. To avoid oxidization, take special care to protect the joint with insulating adhesive or insulating sheath after soldering.

- Connection of communication line to optoelectronic isolated converter, Remove the insulating sheath of twisted pair communication line on the two ends and expose the copper cord for 0.5 cm or more. Connect the A-terminal of communication line to R+ stud and B-terminal to R- stud. Then, tighten the screws on two studs, just letting the screws compress the terminal tight.

- Connection of communication line to optoelectronic isolated repeater, Same as the connection to the converter described above.

1.5 Model Selection

1.5.1 Rules for Model Selection

(1). Scope of Supply

Part Name	Option	Remarks
Remote control parts ME30-00/E2	Standard	Including communication module ZJ0112, transformer and the communication line
Optoelectronic isolated repeater RS485-W	Optional	Add one repeater for increase of communication distance by every 800m; add one repeater also for increase of every 30 communication modules.
Optoelectronic isolated converter GD02	Optional	Used when BMS interface is RS232.
4-core (or 2-cord) Class V twisted pair	Self-provided	The length and quantity of the line shall depend on project needs.

(2). Quantity and Model Selection for Components

Model	Patchboard	Communication module	Repeater
GMV multi VRF system (Capacity lower than 300)	Not required	One outdoor unit connects one communication module. Select corresponding model as for export or for domestic user. Max. 16 sets of indoor units are connected under one communication module.	Add one repeater for increase of communication distance by every 800m; add one repeater also for increase of every 30 communication modules.
GMV multi VRF system (Capacity higher than 300)	For 1-32 or 1-64 system, please select according to the system installation instructions.	One communication module is connected under each patchboard. Select corresponding model as for export or for domestic user.	

1.5.2 Example of Model Selection

(1). Example 1

One project has 10 sets of GMV-Pdm280W/NaB-M, requiring 10 communication modules. The communication distance between communication modules is within 800m and the user's BMS adopts RS232 communication mode, so that one converter is required.

Part Name	QTY
	Outdoor unit
	GMV-Pdm280W/NaB-M
Air conditioning unit (set)	10
Optoelectronic isolated converter GD02 (optional)	1
Remote control parts ME30-00/E2	10

(2). Example 2

One project has 29 sets of GMV-Pdm280W/NaB-F and one set of GMV-Pdm615W2/NaB-F (that is made up of GMV-Pdm280W/NaB-F and GMV-Pdm335W/NaB-F) with more than 16 indoor units, which requires 29 communication modules and 2 communication modules respectively. Therefore, 31 communication modules in total are required. One repeater shall be added for increase of communication modules by every 30. One communication distance exceeds 800m, which requires one repeater. The user's BMS communication mode is RS485.

Part Name	QTY
	Outdoor unit
	GMV-Pdm280W/NaB-F 29 sets GMV-Pdm615W2/NaB-F (made up of GMV-Pdm280W/NaB-F and GMV-Pdm335W/NaB-F) 1 set (indoor units over 16)
Air conditioning unit (set)	30
Remote control parts ME30-00/E2	31
Optoelectronic isolated repeater RS485-W	2

(3). Example 3

One project has 35 sets of GMV-Pdm280W/NaB-H, requiring 35 communication modules. One communication distance exceeds 800m, which requires 1 repeater. One repeater shall be added for increase of communication modules by every 30. The user's BMS communication mode is RS485.

Part Name	QTY
	Outdoor unit
	GMV-Pdm280W/NaB-H
Air conditioning unit (set)	35
Remote control parts ME30-00/E2	35
Optoelectronic isolated repeater RS485-W	2

1.6 Installation

1.6.1 Installation Specifications

- Before installation, please firstly read this service manual thoroughly and understand the purpose, characteristics and installation methods for each component.
- Before installation, it is needed to make planning and design according to project conditions, and issue standard design drawings.
- The construction team shall have the required installation qualifications and have good knowledge in this system.
- Before installation, make sure to select the model and purchase the materials according to the methods as specified in the Service Manual. Never purchase the other components or materials outside the scope as specified in this Service Manual.
- During installation, make sure to carry out construction and wiring according to the methods as specified in this service manual. Never carry out construction or wiring by using the methods rather than those specified in this service manual.
- After installation, the system must be subjected to test, acceptance and validation by relevant departments. Never deliver the system to the user before acceptance.

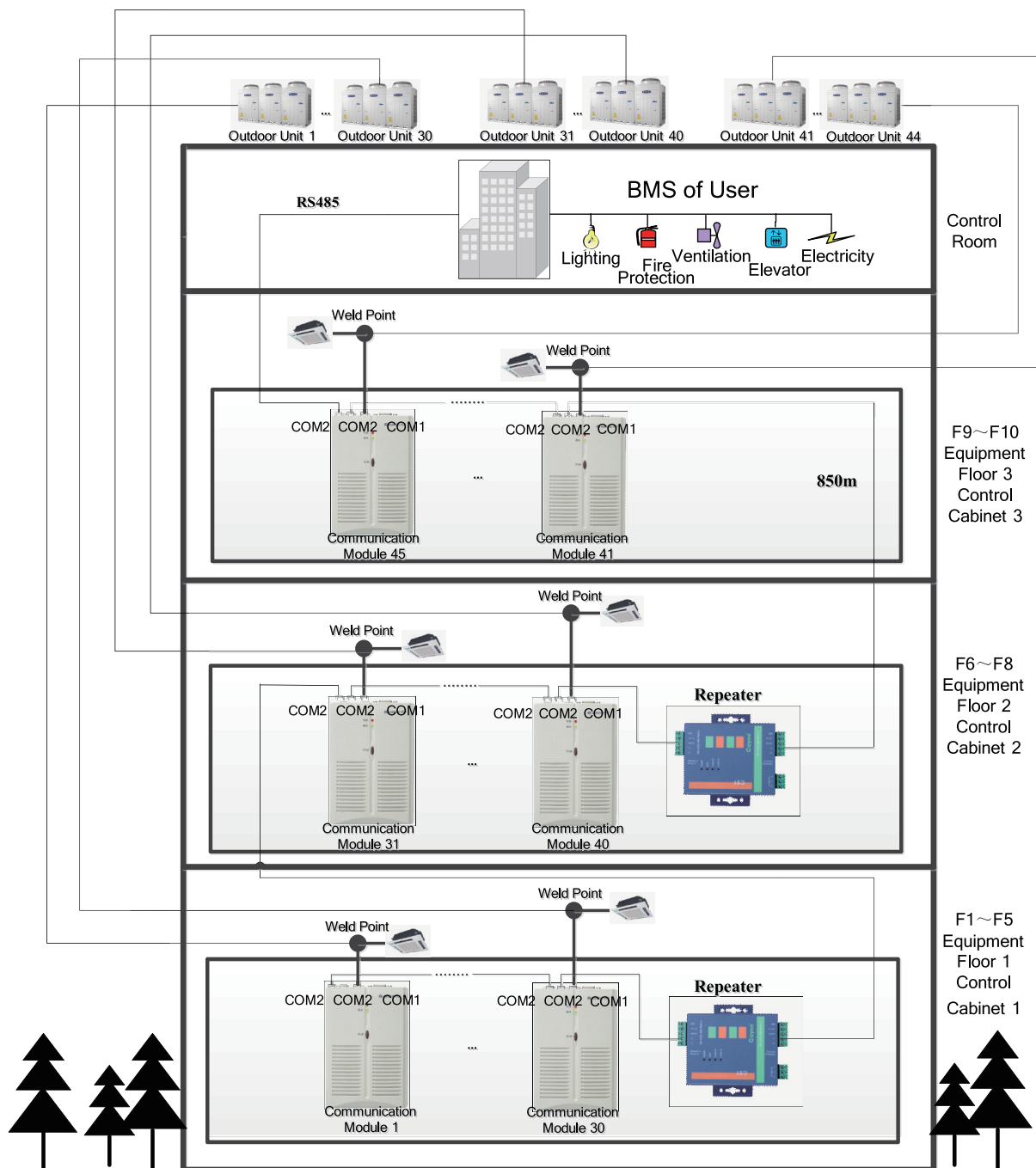
1.6.2 Applications

(1). Description of Applications

We will take one project as example to make further explanation of the installation. This is a project for connection of GMV multi VRF system into the BMS system of 10-storery office building. There are 44 sets

of Heat Recovery GMV units, including one set with over 16 indoor units (Two patchboards on its outdoor unit). Therefore, this project shall need 45 communication modules in total (Two communication modules are required for over 16 indoor units. And for other 43 units, one unit is only needed to connect 1 communication module). According to the project conditions, we firstly divide 10 floors into 3 equipment floors. That is, F1~F5 is Equipment Floor 1, where there are 30 communication modules in total, wholly placed in the central control cabinet 1 on this equipment floor 1; F6~8 is Equipment Floor 2, where there are 10 communication modules, wholly placed in the central control cabinet 2 on the equipment floor 1; and F9~10 is Equipment Floor 3, where there are 5 communication modules, wholly placed in the central control cabinet 3 on the equipment floor 1. For the wiring work, the cable length between equipment floor 2 and equipment floor 3 exceeds 850m. Finally, the user agrees to integrate the air conditioner into BMS system for control according to Gree's modbus protocol. The user's BMS system uses RS485 mode; See below for the site conditions of the project.

(2). Project Conditions



(3). Explanation of Applications

Next we will make further explanation of the steps and methods for the wiring, installing and commissioning of this project.

The first step is integral design. In this step, focus shall be put on integral consideration of the building structure and system installation characteristics. We divide the building into several equipment floors and determine the equipment required for each equipment floor as well as the quantity and position of the equipment. For example, this project uses Gree's digital GMV systems on all the floors from F1 to F10. The span between the floors is large and the quantity of units is high. Therefore, we divide the building into 3 equipment floors. For easy connection and management, the centralized control cabinets for 3 equipment floors are placed in different floors.

The second step is measuring and design. In this step, it is needed to measure the routing distance of each communication line and high-voltage electric cable as well as the installing dimension of each equipment. It is also needed to design the drawings correctly. In this project, the distance to be determined includes:

- The distance from each weld point to corresponding communication module in centralized control cabinet.
- The connection distance between each centralized control cabinet.
- The connection distance from the farthest control cabinet to the BMS system in control room.
- Fabricating size and design drawings of centralized control cabinet. Special care shall be taken to the prior providing of 220V power sockets and the design of cabling duct for high-voltage electric cable and communication line.

The third step is installation. In this step, the installation shall be carried out strictly in accordance with the installation specifications. In this project, the installation is started from equipment floor 1.

Firstly, install the control cabinet and lead the high-voltage electric cables and power sockets. Then, install the communication modules. Finally, lead the communication lines. After completion of the cabling and equipment installation, the final step is connection to BMS system and connection of optoelectronic isolated converter. The installation is then basically completed.

The fourth step is testing and acceptance. This step is focused on validating the communication and installation reliability of the whole system. The test and acceptance procedures for this project are as follows:

- Run BMS system and check if the units added on the software comply with those in the project. Focus shall be put on checking whether the address, naming and grouping of the units are correct.
- Check if each air conditioner under BMS system is under correct state and if there is alarm message for communication fault.
- Use BMS system to control the units and check if the result of control is correct.
- Keep the system running continuously for 3~7 days and check whether the communication and control remains normal or not.

2 BACNET INTERFACE OF GMV MULTI VRF SYSTEM

2.1 Introduction to BACnet Interface of GMV Multi VRF System

GMV multi VRF system with standard BACnet/IP interface can be connected to the BMS from the user side and supports Web Server function. Via BMS user can centralized manage and control the GMV multi VRF system, which helps to fulfill Internet monitoring with high-speed. Every gateway can support 64 indoor units under 4 sets of GMV multi VRF system.

This system is applicable to the following models: GR Digital Multi VRF System (R22), GR Digital Multi VRF System (R410A), GRe Low Ambient Temperature Heat Pump Digital Multi VRF System, GRm Modular Digital Multi VRF System (R22), GRm Modular Digital Multi VRF System (R410A), GRh Heat Recovery Digital Multi VRF System, GPd DC Inverter Multi VRF System, GPdm Modular DC Inverter Multi VRF System, GPds DC Inverter Multi VRF plus Water Heater System, GPdmh Modular Heat Recovery DC Inverter Multi VRF System.

IP Address: 192.168.1.150.
Subnet Mask: 255.255.255.0.
Default Router: 192.168.1.1.

Under the condition that the Web server is put into use, when visiting the BACnet gateway through the Internet browser:

Web Server Default Login Address: http:// 192.168.1.150.
Web Server Default Login Username: admin.
Web Server Default Login Password: null.

After logging in the Web page, these properties listed above are allowed to be modified.

Note: When visiting the BACnet gateway, it is required to adjust the TCP/IP properties of the client-side equipment (like, PC) to be compatible with that of the BACnet gateway. Refer to 2.3.2 BACnet Web Sever Configuration of TCP/IP for more details.

BACnet/IP BAS interface and BACnet Web server are two major functions for the BACnet gateway. See the followings for more details.

2.3.1 BACnet/IP BAS Interface

This BTL certificated BACnet gateway supports the standard BACnet/IP interface protocol which complies with the ANSI ASHRA standard 135-2008 (BACnet2008). See installation and operation manual or Help document on the Web Sever page for PICS of the BACnet gateway and more detailed protocol content.

Parameters of the Supported Air Conditioning Units.

AC Type	Parameter Name	AC Type	Parameter Name
GMV Indoor Units (Note: "Remote temp/ mode/On/Off shield mark" indicates the parameter of "temp/mode/On/ Off" is disabled to be set through the unit controller but the remote monitoring system; while "Remote lock mark" indicates all parameter are disabled to be set through the unit controller but the remote monitoring system.)	Indoor unit general error mark	GMV Outdoor Units	Outdoor unit general error mark
	Indoor unit error code		Outdoor unit error code
	Indoor unit environment Temp		Outdoor unit environment Temp
	Indoor unit Temp (setting)		Compressor running status
	Indoor unit mode (status)	GMV Water Heater	Specific error mark for GMV water heater
	Indoor unit mode (setting)		Specific error code for GMV water heater
	ON/OFF(status)		Water tank Temp (status)
	ON/OFF(setting)		Water tank Temp (setting)
	Fan speed (status)		Water tank (status)
	Fan speed (setting)		Water tank (setting)
	Swing (setting)		Water tank mode (status)
	Energy saving (setting)		Water tank mode (setting)
	Remote temp shield mark (setting)		Double-tube supply water temp
	Remote mode shield mark (setting)		Floor heating supply water setting temp
	Remote ON/OFF shield mark (setting)		Disinfecting
	Remote lock mark (all shield) (setting)		GMV water heater floor heating (status)
	Water tank control shielding code (setting)		

Note: Please check the BACnet Protocol Builder for latest parameters. GREE provides software of BACnet Protocol Builder, which helps the sales engineer to set the unit via actual working condition, as a result, related protocol content will be given to the BMS supplier to complete the integration. For more detailed steps, please refer to Help document of the BACnet Protocol Builder software.

2.3.2 BACnet Web Server

The BACnet is capable of supporting the controller Web server in the form the HTML Web pages so as to control, monitor and display the data of the air conditioning unit, meanwhile supporting the multi-user visit at a time. For detailed information see the Help document on the Web Sever page.

Note: Before using the Web Server of BACnet gateway, please refer to chapter 2.4.2 Introduction of BACnet Gateway and chapter 2.6 about the correct installation of BACnet gateway, so as to ensure the normal operation of the BACnet gateway.

BACnet gateway is connected to LAN and Internet which is shown as below.

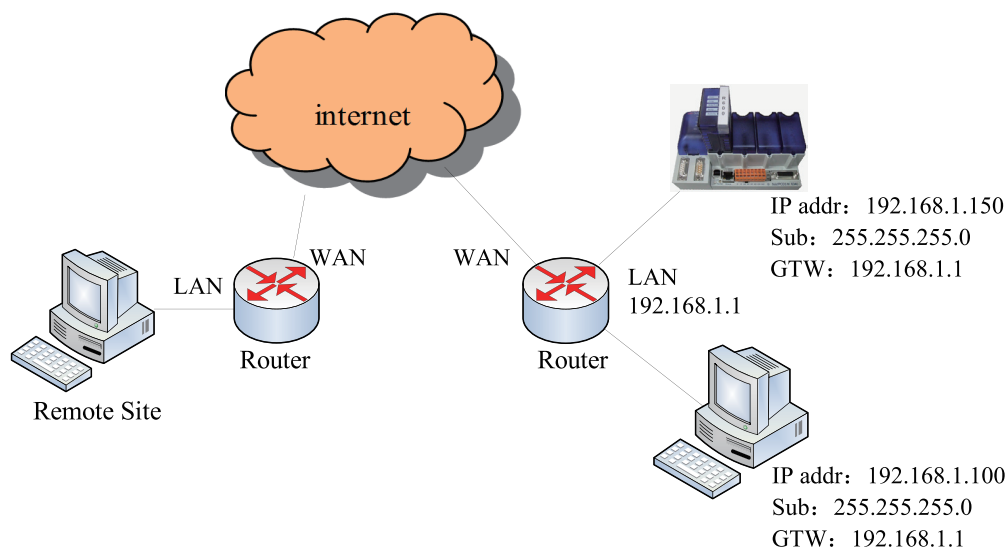
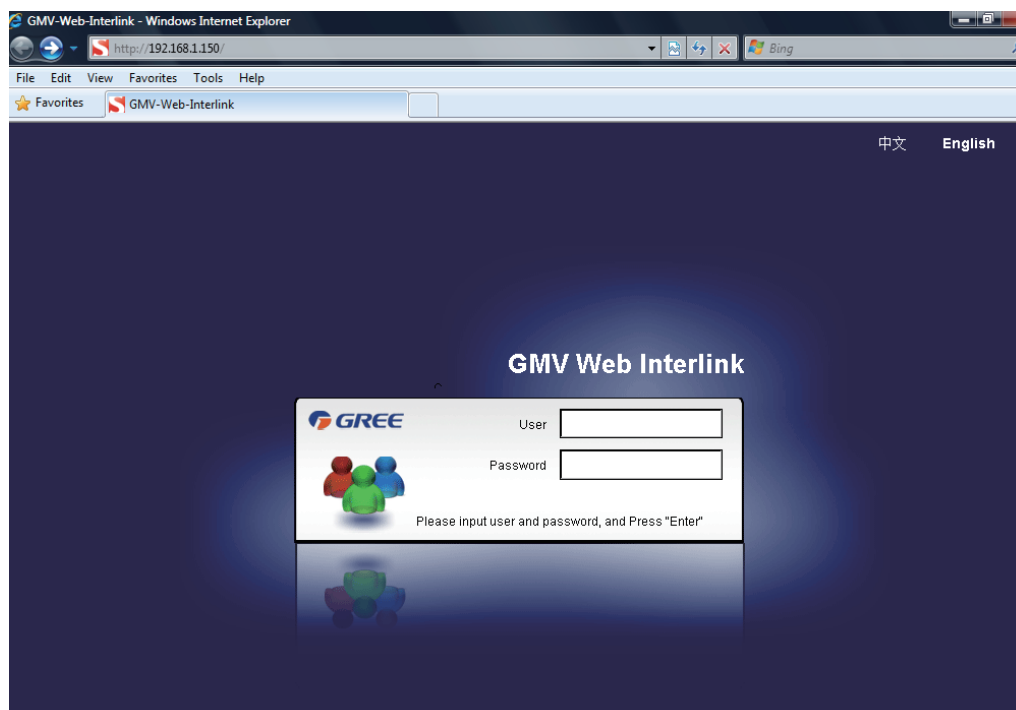


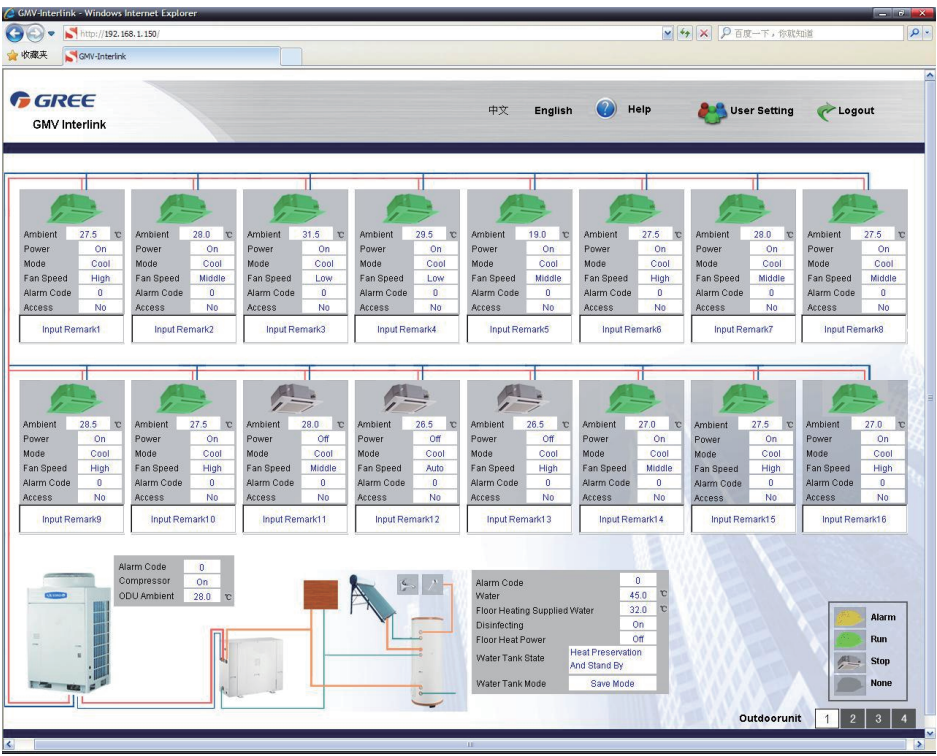
Diagram for Connection of Web Server Function of BACnet Gateway

(1). Application Conditions:

- 1). Operation System: Windows, Mac, LINUX/UNIX.
- 2). Browser: Browsers which support JAVA, like, IE, CHROME, NETSCAPE, FIREFOX, etc.
- 3). Supportive Language: Simplified Chinese and English.
- 4). Installation of the JAVA virtual machine: when the browser fails to access to the web page, please download the JAVA virtual machine at first from the official website: www.java.com, then install it properly, after that the normal use is available.
- 5). Minimum Requirements on the Hardware:
 - CPU: Pentium 400 MHz.
 - RAM: 128MB.
 - Hard Disc: 10GB.

(2). Login and Main Interface (Always see the actual running interface)

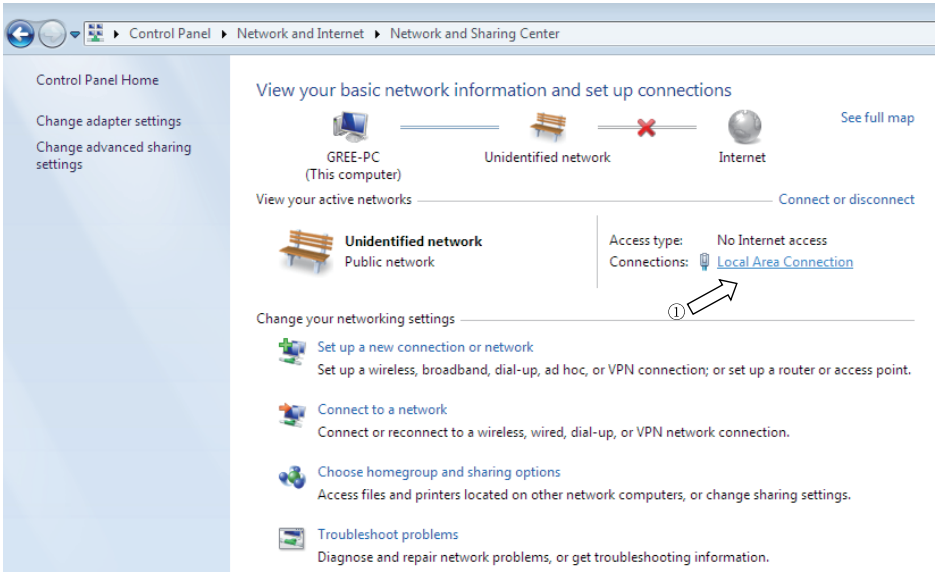


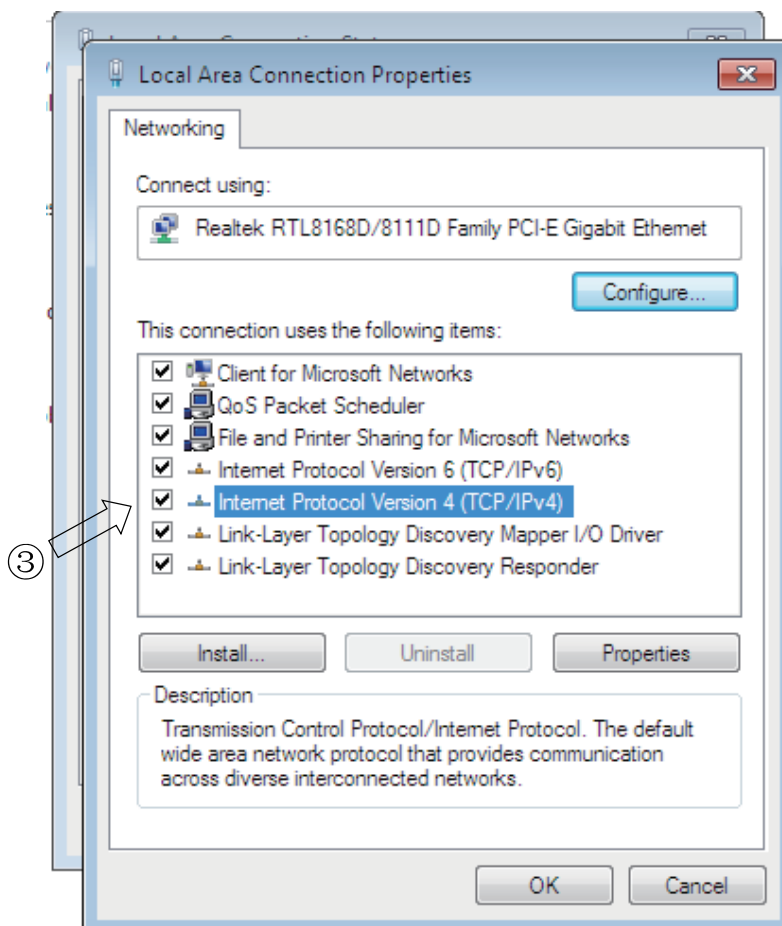
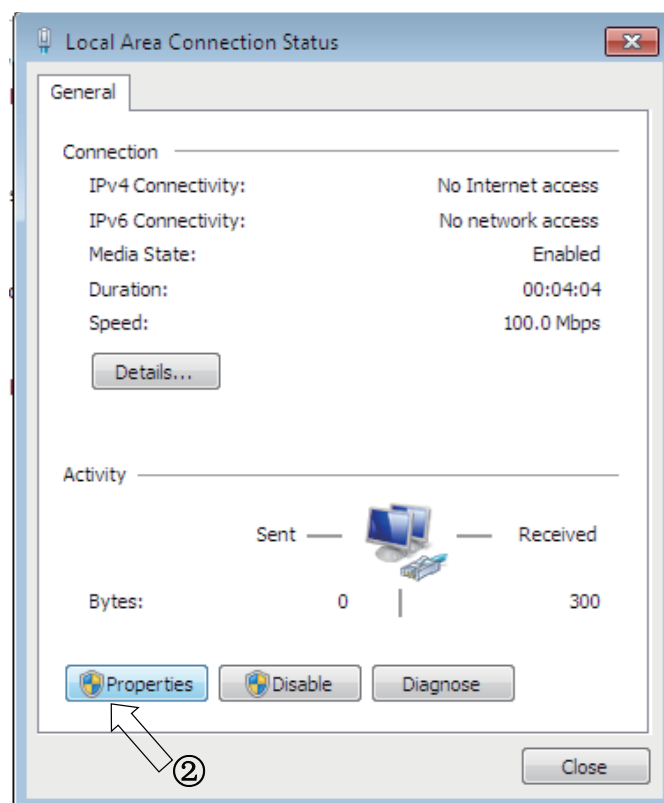


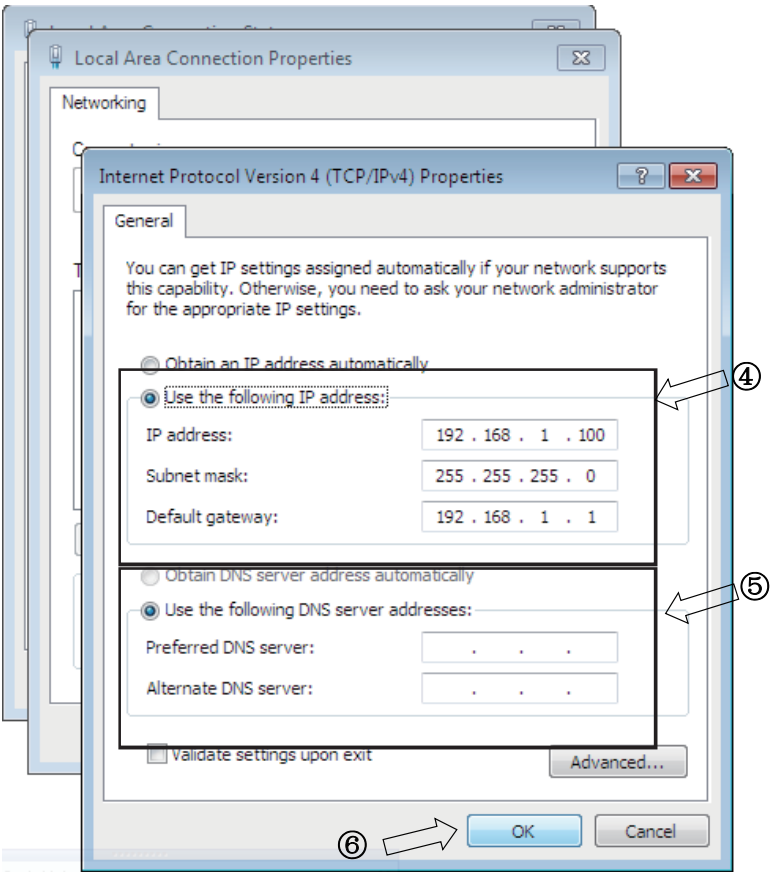
(3). Configuration of TCP/IP

Before visiting the BACnet gateway, it is required to adjust the TCP/IP properties of the client-side equipment (like, PC) to be compatible with that of the BACnet gateway. Specific steps are shown as below.

- ① . Choose the “Local Area Connection” on PC.
- ② . Click the “Properties”.
- ③ . Choose the option Internet Protocol Version 4(TCP/IPv4).
- ④ . Choose the “Use the following IP address” and set the TCP/IP properties.
- ⑤ . DNS server addresses is not required to be set but keeps the default setting.
- ⑥ . Click OK and the setting is finished.



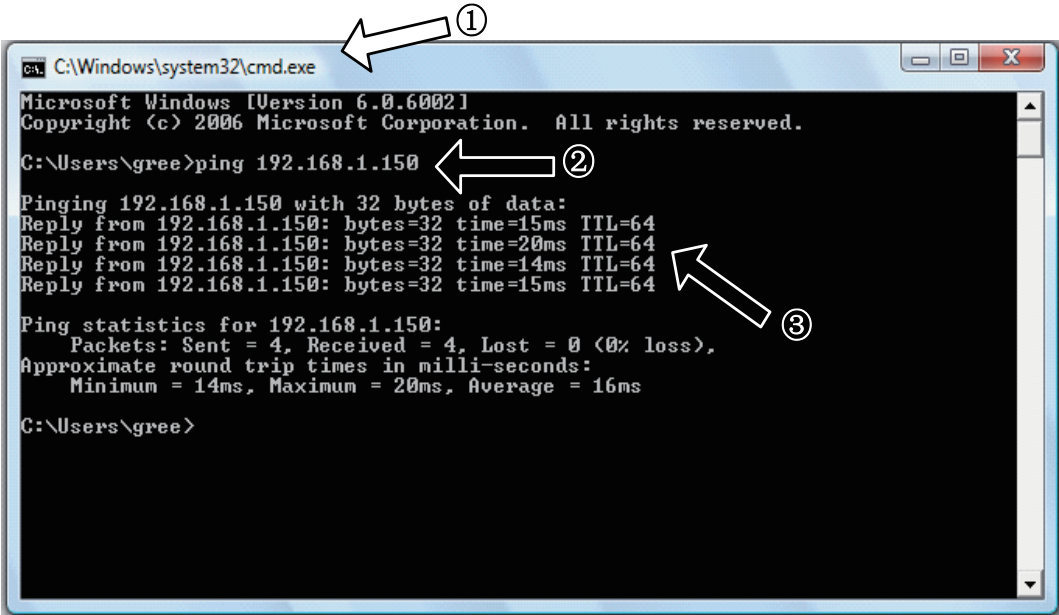




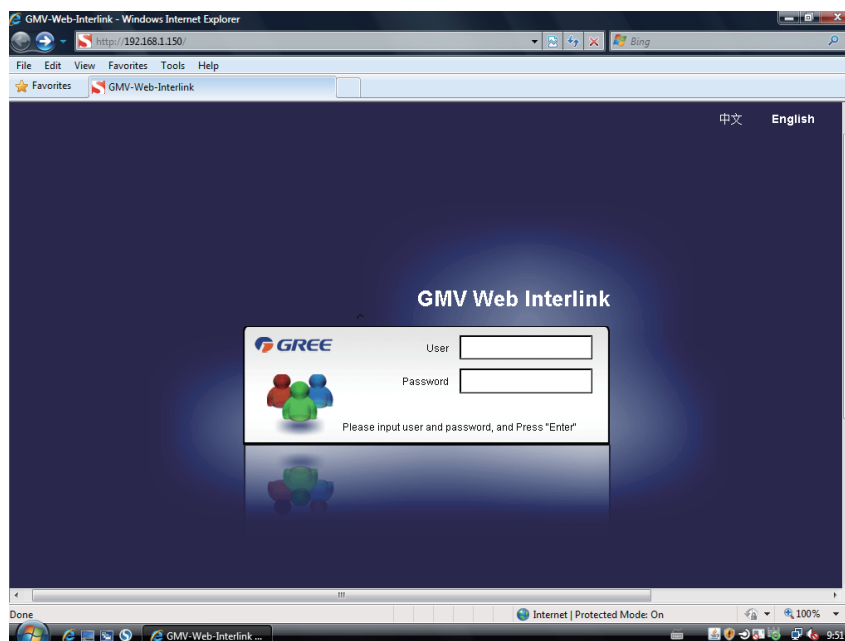
(4). Local Visit

BACnet gateway can realize local accessing when the TCP/IP property of the client-side equipment (like, PC) is adjusted to be compatible with that of the BACnet gateway in the same network domain. Specific steps are shown as below.

- 1). According to DOS command ping IP address helps to test if the network has been connected
- ① . Entering DOS command forms as per specific operation system.
- ② . Input command: ping 192.168.1.150.
- ③ . After receiving data response from target address, PC can be normally connected to the BACnet gateway.



- 2). Adopt browser that is supported by BACnet gateway Web Server.
 BACnet Gateway Default Login Address: [http:// 192.168.1.150](http://192.168.1.150).
 Login interface is shown as below.



(5). Long-distance Visit

BACnet gateway has the function of Web Server, which helps to long-distance visit to BACnet gateway through Internet.

Note: We only support one plan here for your reference. Please consult local internet service supplier for more details.

Web Server of BACnet gateway can be visited through internet by port mapping. This example selects TP-LINK router which supports dynamic domain name service on [www. Oray. net](http://www.Oray.net).

Some routers support port mapping function (a sort of NAT function) which is used to connect multi BACnet gateways on the same router. On WAN side according to address multi UDP ports, transfer the message to the PCD on LAN side. Note: Not every router supports port mapping function.

Port mapping can realize visit from Internet to specific router port on LAN side. See the following connection example:

1). Dynamic DNS Service

Get access to setting interface of TP-LINK router and please refer to following steps to accomplish the router setting.

Remark:

a. Different routers might have different Web interface. Please operate with specific interface.

b. Different routers might support different dynamic DNS service suppliers. Apply corresponding domain name for the service supplier.

- Setting of Dynamic DNS

Select “dynamic DNS” from the list that located on the left side of TP-LINK setting interface.

① . Select “[www. Oray.net](http://www.Oray.net)” in the pull-down menu for dynamic domain name service.

② . Input user name and password which is registered on [www. Oray. net](http://www.Oray.net).

③ . Select DDNS

④ . Domain name information that applied on the [www. Oray.net](http://www.Oray.net) will be shown on the page after successful login.

⑤ . Click “Save” to complete setting of dynamic DNS.

- Transfer rule——virtual server

Select “Virtual Server” from the list that located on the left side of TP-LINK setting interface.

① . Input service port number and select Web Server port 80. If port 80 is occupied, other service port number can be set and taken to use. Port 81 is used in this example.

② . Input local IP address of BACnet gateway:192.168.1.150.

③ . Select“TCP”protocol.

④ . Select “valid” status.

⑤ . Click “Save” to complete the setting of virtual server.

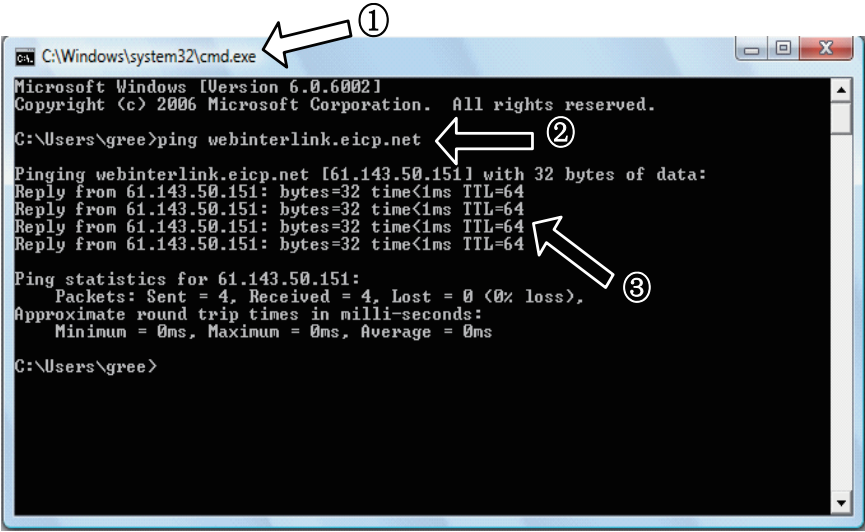
• WAN port setting

Select “Network parameter—setting of WAN port” from the list that located on the left side of TP-LINK setting interface.

- ① . Select automatic connection (auto connection after booting and breaking).
- ② . Click “Save” to complete setting of WAN connection mode.

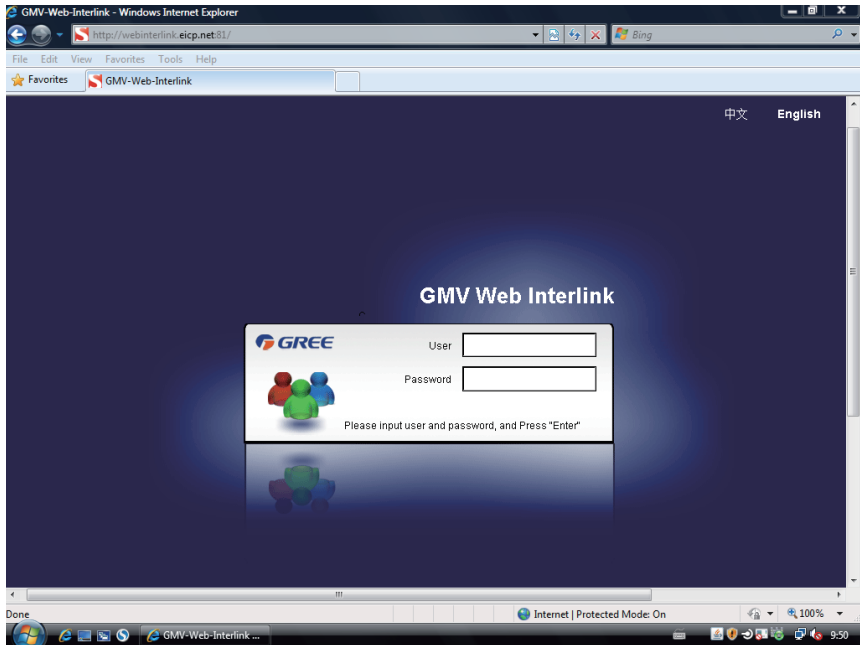
2). According to DOS command:ping IP address helps to test if the network has been connected
IP address is shown as domain name. Through setting of domain name, IP address of public network of which the subnet router BACnet gateway can be known.

- ① . Entering DOS command forms as per specific operation system.
- ② . Input: ping webinterlink.eicp.net (Corresponding to customer applied domain name).
- ③ . Receiving data response from target address represents successful setting of dynamic domain name service.



3). Adopt internet browser that is supported by Web Server of BACnet gateway. Input internet domain name and port number.

BACnet Gateway Login Address: [http:// webinterlink.eicp.net:81](http://webinterlink.eicp.net:81).
Login interface is shown as below.



2.4 Hardware Introduction

Please refer to the operation manual of the CAC BACnet Gateway Kit for more detailed information.

2.4.1 Parts List of BACnet Gateway Kit

Name	Model	Material No.	Option	Remark
CAC BACnet Gateway Kit	MG30-24/D1(B)	MC200054	Standard	Every BACnet gateway can be matched with 4 communication modules in maximum. Add one repeater for increase of communication distance by every 800m. Main spare parts: BACnet gateway (show below), operation manual Power Supply is input through wiring terminal. Power specification: 24VDC -20/+25% incl. 5% ripples, which conforms to EN/IEC 61131-2, 175Ma/4.2W normal and 500Ma/12W maximum.
Switch Mode Power Supply	S8JC-Z05024C	LN04000630	Optional	Transfer 200~240V AC to DC and supply 24V DC power to the BACnet gateway.

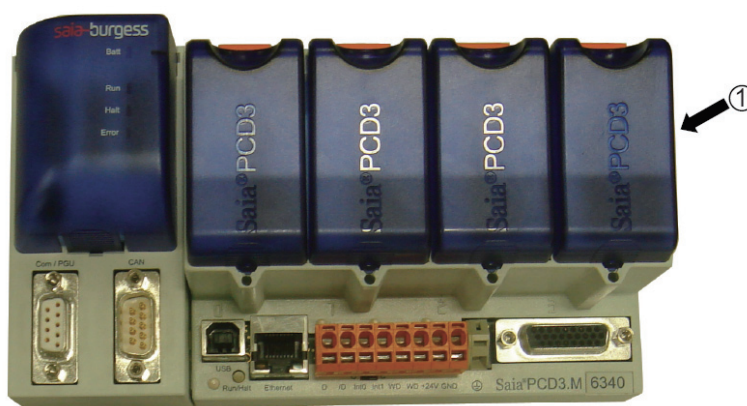
Name	Model	Material No.	Option	Remark
Optoelectronic isolated repeater	Optoelectronic isolated repeater RS485-W	EN02200010	Optional	Add one repeater for increase of communication distance by every 800m.
Communication module kit	Remote control parts ME30-00/E2	MC200030	Standard	Main kits: communication module, transformer, 2-core communication line, manual.

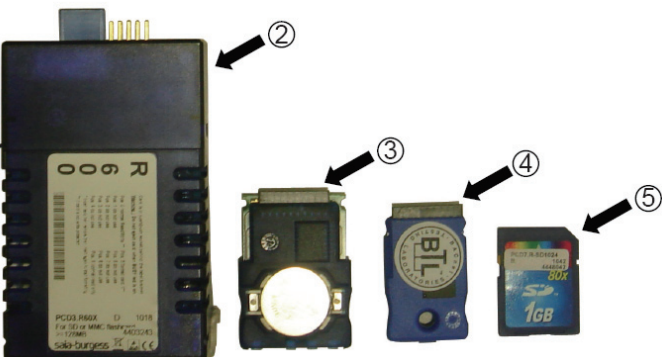
2.4.2 BACnet Gateway Introduction

(1). Function

BACnet gateway kit MG30-24/D1(B) is capable of realizing the data exchange between the air conditioning unit and BAS, supporting the Web server, providing remote monitoring and control to the air conditioning unit, and also enabling the internet to monitor the information related to the air conditioning unit at high speed.

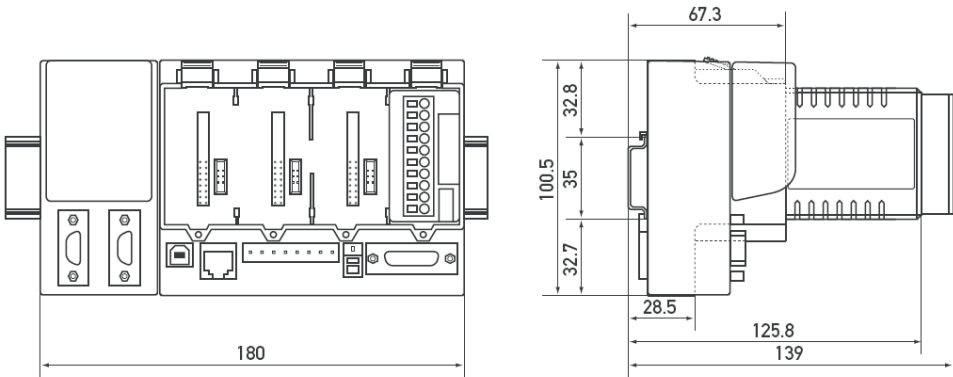
(2). Product Picture





- ① . CPU Module PCD3.M6340
- ② . Web Server Module PCD3.R600
- ③ . Battery Module (incl. button cell with the positive electrode outward)
- ④ . BACnet Module PCD 7.R560
- ⑤ . SD Card PCD 7.R-SD1024

(3). Dimension Drawing



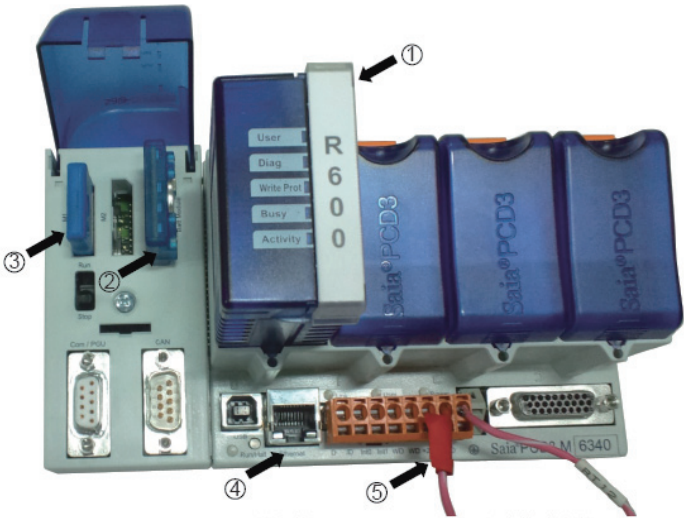
Unit:mm

Type	Description	Weight
PCD3.M6340	Main control from BACnet gateway supports Web server function. Data protection 1~3 years with button cell	560g

(4). Installation Drawing

See the following drawing for the installation of each module of the BACnet Gateway MG30-24/D1(B)

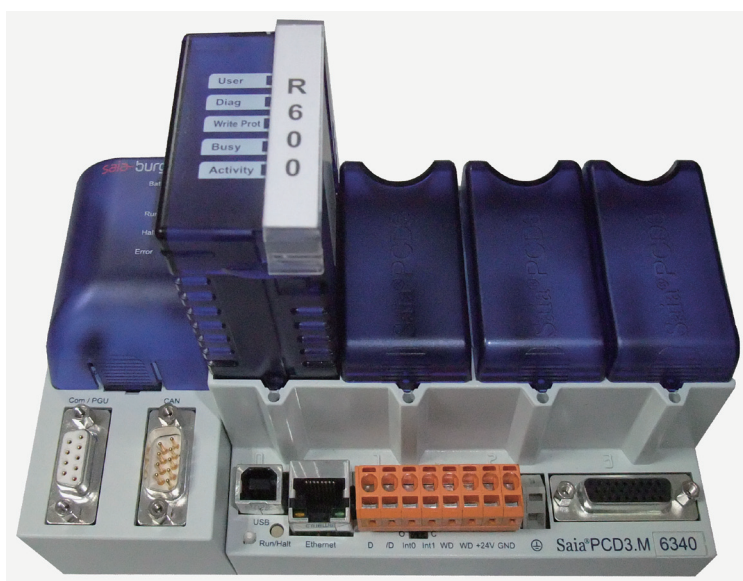
- Install the Web server PCD3.R600 at slot0.
- Install the battery module at the battery module special slot.
- Install the BACnet module PCD7.R560 at M1.
- Standard RJ45 interface, 10M/100M self-adaptive to the Ethernet, linked to the BAS through the communication line.
- +24VDC GND, used to connect the power cord.



Note: See the following drawing for how to install the SD card into the Web server module PCD3. R600.



General Drawing:



(5). Operation Instructions

1). Interface

◆ Power Supply Interface

Power Supply: 24VDC -20/+25% incl. 5% ripples as per EN/IEC 61131-2, 175mA/4.2W normal, 500mA/12W maximum.

Note: the power cord mustn't be connected reversely and the power supply mustn't be beyond the specified I, otherwise the BACnet gateway would be damaged.

Printed Mark	Terminal	Pin	Description
+24V GND	Wiring terminal	+24VDC	24V DC input

◆ Module Installation Interface

When the left cover is opened, the interfaces of M1, M2 and Batt Module can be seen; when the right cover is opened, the interfaces from left to right are Slot0, Slot1, Slot2 and Slot3.

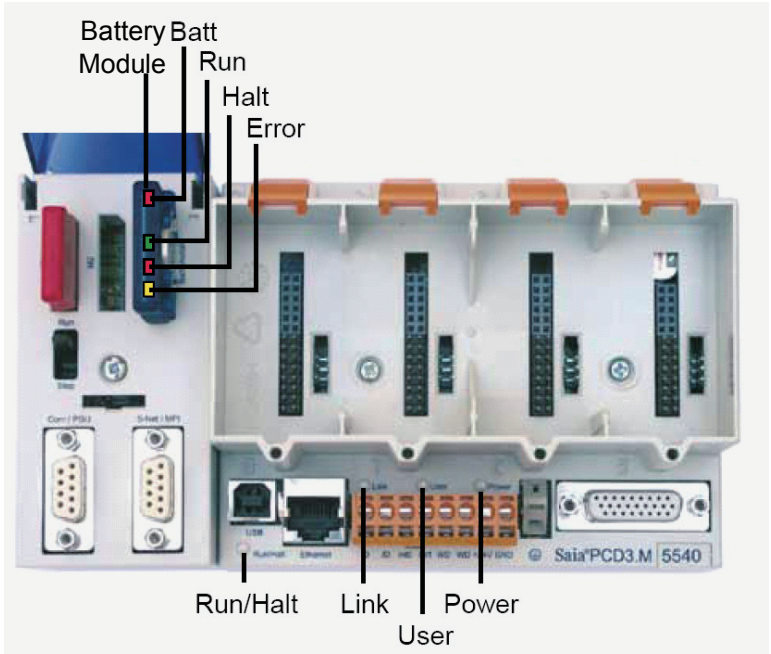
Printed Mark	Terminal	Pin	Description
M1, M2	Socket	Socket M1 or Socket M2 Choose any one of the terminals to insert in BACnet slot.	It's used to connect BACnet module PCD7.R560.
Batt Module	Socket	It is used to connect battery module PCD3.M6340.	It's used to connect battery module including button cell.
Slot0 Slot1 Slot2 Slot3	Socket	Slot0 (at the side of the nearest USB interface) is used to connect the Web server module PCD3.R600 into which PCD7.R-SD1024 is inserted.	Slot0 is used to connect the Web server module PCD3.R600.

◆ Communication Interface

The printed marks D, /D, O, and C can be seen in the front of the wiring terminals of the BACnet gateway, and the RJ45 standard interface is prepared.

Printed Mark	Terminal	Pin	Description
D /D	Wiring Terminal	P1:485 B	RS485 Interface, it is used to connect the Modbus device and of no polarity. D——R+/D+(or 485+); /D——R-/D-(or 485-) .
		P2:485 A	
O C	DIP Switch	Switch Setting “0”(Left)—without the matched resistance “C”(Right)—with the matched resistance	It is used to set if the matched resistance is connected or not. It is defaulted to be set to “C”.
Ethernet	Standard RJ45 Network Interface	Ethernet	Communication Interface, used for the communication line which connects the BACnet gateway and the BAS.

2). Indicating LEDs



◆ Power Indicating LED

The printed mark “Power” represents the power indicating LED. When it turned to red, it indicates the BACnet gateway is powered on; when it turns off, it indicates the BACnet gateway is powered off.

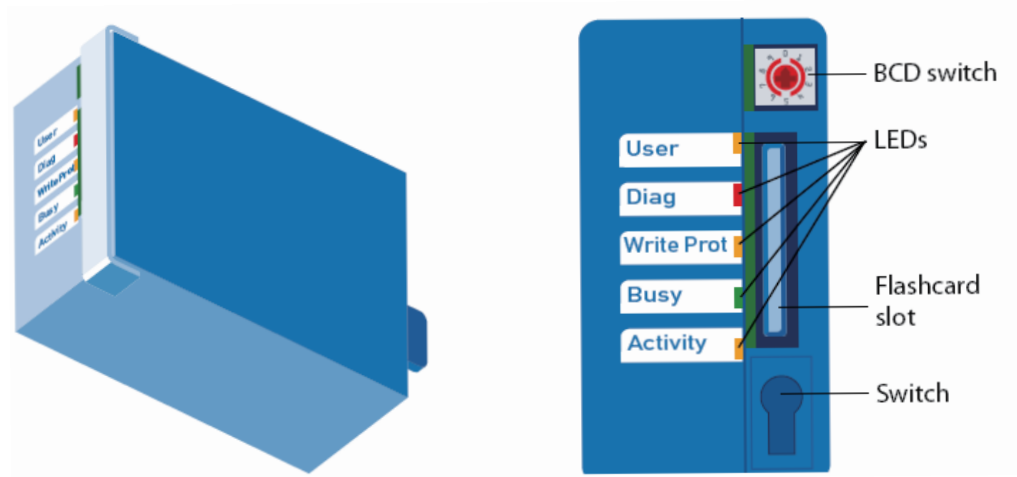
◆ CPU Module PCD3.M6340 Indicating LED

CPU Type	PCD3.Mxxxx Power Module			
LED	Power	Run	Halt	Error
Colour	Red	Green	Red	Yellow
Run	○	●	○	○
Run Cond.	○	●/○	○	○
Run with Error	○	●	○	●
Run Cond. with Error	○	●/○	○	●
Stop	○	○	○	○
Stop with Error	○	○	○	●
Halt	○	○	●	○
System Diagnosis	○	●/○	●/○	●/○
Batt./Voltage Absent	●	○	○	○

○ LED off ● LED on ●/○ LED flashing

Start	Self-diagnosis for approx. 1 sec. after switching on or after a restart
Run	Normal processing of the user program after Start. Where a programming unit is connected via a PCD8.K11x in PGU mode (e.g. PG5 in PGU mode), the CPU automatically goes into the Stop state and not the Run state; this is for safety reasons.
Conditional Run	Conditional Run state. A condition has been set in the debugger (Run until...), which has not yet been met.
Run with error	Same as Run, but with an error message
Run Cond. with Error	Same as conditional Run, but with an error message
Stop	The Stop state occurs in the following cases: • Programming unit in PGU mode connected when the CPU was switched on • PGU stopped by programming unit • Condition for a COND.RUN has been met
Stop with Error	Same as Stop, but with an error message
Halt	The Halt state occurs in the following cases: • Halt instruction processed • Serious error in user program • Hardware fault • No program loaded • No communication module on an S-Bus PGU or gateway master port
System Diagnostics	If the PLC doesn't go to RUN after 2 minutes, you have to send it for repair
Reset	The RESET state has the following causes: • Supply voltage is too low • Firmware doesn't run

◆ WEB Server Module Indicating LED



LED	Description
User	User LED, set by the user program with the base address of the module (SET = off; RES = on)
Diag	Flashes when there is an error message
Write Prot	Active when a "write-protected" condition is detected (read-only SD switch, BCD switch or software)
Busy	Do not remove the module when this LED is on.
Activity	Works as with a hard disk drive; flashes when data being processed

(6). Precautions

- Be sure the adaptor is proper; otherwise the BACnet gateway would function improperly or even be damaged.
- Be sure the communication equipments are located at the proper place; otherwise it would lead to communication error.
- Be sure the communication line is connected to the correct interface; otherwise it would lead to communication error.
- After secured through soldering, the communication line should be protected with the insulating tape so as to avoid oxidization and short-circuiting.
- Working Conditions for BACnet gateway:
Temperature: 0~55;
Humidity: equal to or less than 95%;
Located in the room (esp. the electric control cabinet) to avoid direct sunlight, ran and snow etc.
WARNING: If the working conditions are beyond what stated above, then BACnet would function improperly!
- In order to protect the user's access authority, when the user is visiting the Web server of the BACnet gateway, it is strongly advised to modify the login passwords.
- GREE keeps the right to update the products without advanced notice.

2.4.3 Introduction of Optoelectronic Isolating Repeater

Please refer to the chapter 1.3.3 Modbus interface about the introduction of repeater with optical isolation.

2.4.4 Introduction to Communication Module ZJ0112

Please refer to chapter 1.3.4 Modbus Interface about the introduction of communication module ZJ0112.

Note: When interfacing to the BACnet gateway, address range from address 1 thru 4.

2.4.5 Introduction to Communication Line

Please refer to chapter 1.4 Modbus Interface about the introduction of communication line.

2.5 Model Selection

2.5.1 Rules for Model Selection

Part Name	Type	Remark
Gree CAC BACnet gateway kit MG30-24/D1(B)	Standard	Every BACnet gateway can match with 4 communication modules in maximum. Add one repeater for increase of communication distance by every 800m. Main spare parts: BACnet gateway and operation manual
Switch mode power supply S8JC-Z05024C	Optional	Transfer 200~240V AC to DC and provide 24V DC to BACnet gateway.
Remote control parts ME30-00/E2	Standard	Include communication module ZJ0112, transformer and communication line .
Optoelectronic isolated repeater RS485-W	Optional	Add one repeater for increase of communication distance by every 800m; add one repeater also for increase of every 30 communication modules.
4-core (or 2-cord) Class V twisted pair	Self-provided	The length and quantity of the line shall depend on project needs.
Communication Line RJ45	Self-provided	

2.5.2 Model Selection Example

Example 1

One project installs 10 sets of GMV-Pdm280W/NaB-M AC units, which requires 10 communication modules. Every 4 communication modules needs one set of BACnet gateway and the distance between every communication module should be within 800m. The whole system should be connected to the BMS of user.

Part Name	Code	Quantity
AC unit (set)	MC200016	10 GMV-Pdm280W/NaB-M
Communication module kit ME30-00/E2	MC200030	10
CAC BACnet gateway MG30-24/D1(B)	MC200054	3

Example 2

One project has 29 sets of GMV-Pdm280W/NaB-F and one set of GMV-Pdm615W2/NaB-F (that is made up of GMV-Pdm280W/NaB-F and GMV-Pdm335W/NaB-F) with more than 16 indoor units, which requires 29 communication modules and 2 communication modules respectively. Therefore, 31 communication modules in total are required. Every 4 communication modules needs one set of BACnet gateway and one converter is needed as the communication distance exceeds 800m. BMS from client is taken to be used.

Part Name	Code	Quantity
AC unit (set)	\	29 GMV-Pdm280W/NaB-F 1 GMV-Pdm615W2/NaB-F(made up of GMV-Pdm280W/NaB-F and GMV-Pdm335W/NaB-F) indoor units over 16
CAC BACnet gateway kit MG30-24/D1(B)	MC200054	8
Communication module kit ME30-00/E2	MC200030	31
Optoelectronic isolated repeater RS485-W	EN02200010	1

2.6 Installation Instruction

2.6.1 Installation of BACnet Gateway

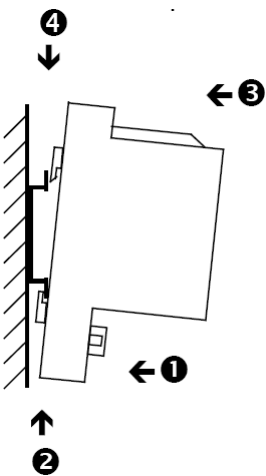
(1). Side View of the Installation and Removal of the BACnet Gateway

The PCD3 CPUs and module holders can be snapped onto a 35 mm Top-hat rail according to DIN EN60715 TH35 (formerly DIN EN50022).

Mounting the PCD3 on the top-hat rail

- ① . Press bottom of housing onto the mounting surface
- ② . Press upwards against the top-hat rail
- ③ . Press top of housing against the mounting surface and snap into place
- ④ . Push the housing down onto the top-hat rail to ensure that it is secure

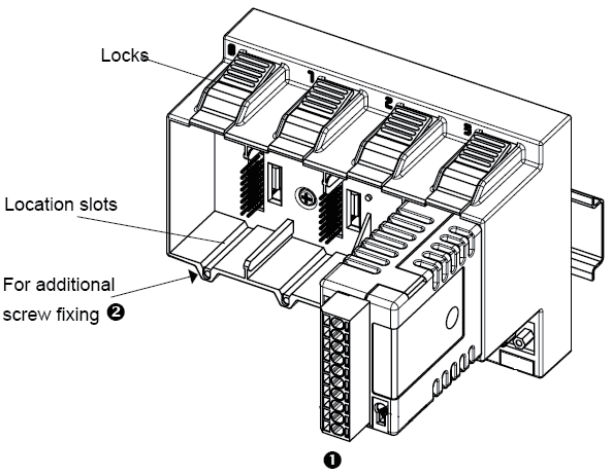
Removal: To remove the housing, push upwards and pull out.



(2). Front View of the Installation and Removal of the BACnet Gateway

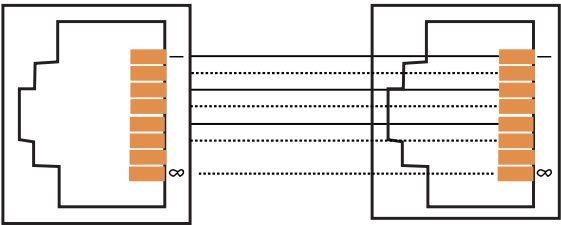
① . Insert the module into the appropriate module location and press down to the bottom of the CPU or module holder housing;

② . For security, a guide way is provided to prevent the module being inserted the wrong way round. In awkward positions, the modules can also be secured with a screw. Screw type: self-tapping 3x8mm, standard type obtainable from hardware stores.

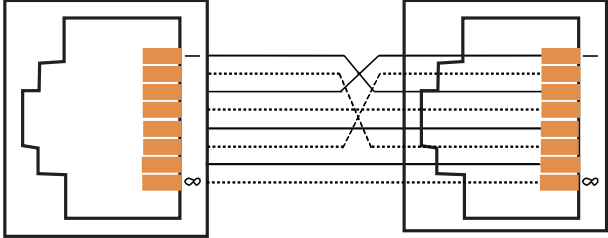


2.6.2 Connection between the BACnet Gateway and the Upper Communication Device

(1). Interface Connection

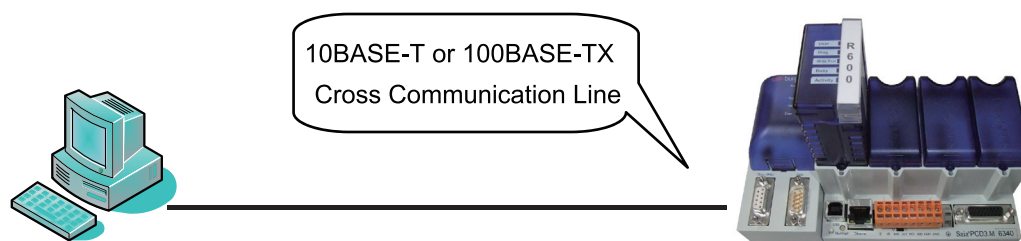


• RJ45 Interface Connection with Parallel Line

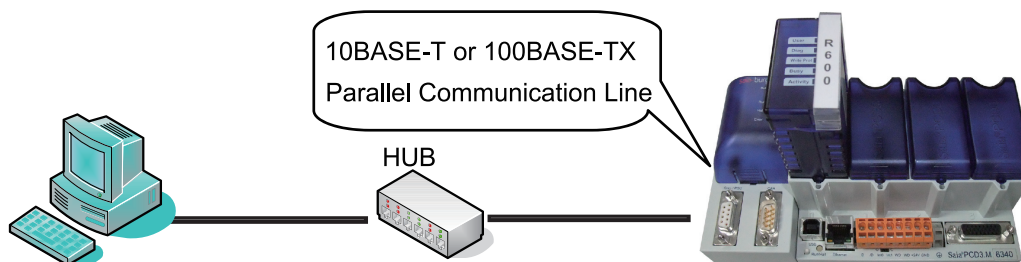


• RJ45 Interface Connection with Cross Line

(2). Connection between the BACnet Gateway and the Client-Side PC

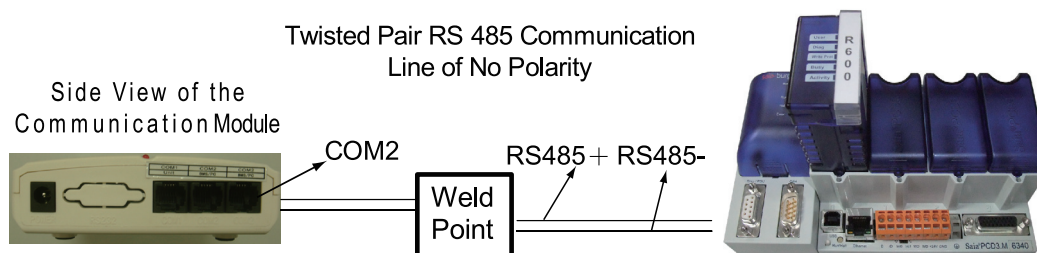


• Direct Connection with the Cross Communication Line



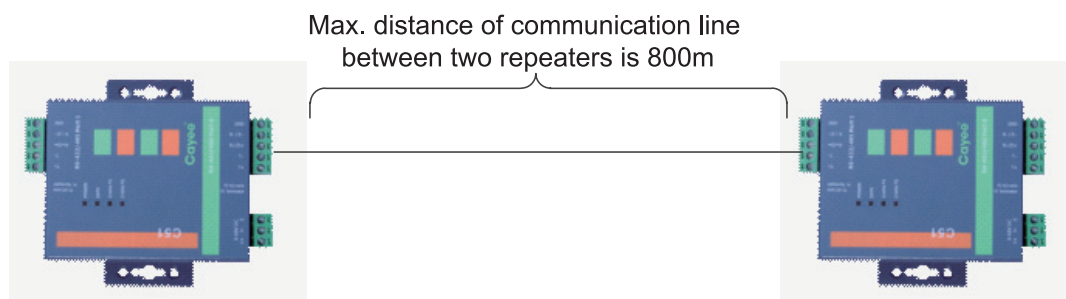
2.6.3 Connection between the BACnet Gateway and the Lower Communication

(1). Take a communication module as an example, however, always see the real interfaces located at the communication module for actual connection.



(2). Optional Repeater Kit

A RS-422/485 repeater (isolated) is required to amplify the communication signal when the communication distance exceeds 800m.



(3). Connection for communication module and unit device

Please check the chapter MODBUS interface of Gree multi VRF system for more reference.

Common Troubles of BMS System and How to Eliminate

Symptom	Possible Cause	How to Eliminate
BMS system displays communication fault alarm according to the furnished protocol; BMS system can neither display the working state of some or all units, nor execute control over them.	Some communication lines are not twisted pair	Change them into twisted pair communication line
	The connector of communication line is not correctly jointed, or the phase A and B is reversed	Fabricate the connector again according to the instructions herein
	The communication module is damaged	Replace the communication module
	The communication line between indoor unit and outdoor unit is disconnected	Weld the disconnected line properly
	The communication line is somewhere broken	Weld the disconnected line properly
	The snap spring in the pin holder of connector cannot snap out, or it is pushed to the end, causing that it cannot contact with the connector	Repair the connector pin holder or replace
	The connector does not use the middle two cords	Use the middle two cords
	The communication line is short circuited	Repair the short circuited section
	The twisted pair is too close to the power cable (less than 15cm), so that the interference is too high and causes communication fault.	Separate them. If unable to separate them by over 15cm, please add shield steel pipe.
	Communication port connection error is displayed	Connect according to the instructions herein.
The line is normal, but there is no message display for some or all units and communication fault remains on the software.	The outdoor unit is not de-energized before re-energization after replacing the chip or resetting the DIP switch.	Re-energize
	The serial port adopted by the communication software is incompatible with the serial port connected on computer.	Replace the serial port or change the serial port setting on software
	The unit address added on software is inconsistent to the actual address of the unit	Change the address setting on software
	The unit is not energized	Energize the unit
	The outdoor unit or indoor unit is not inserted with chip, or the inserting direction of chip is reverse to the required direction.	Check the chip again and insert as per the notch direction on PCB. Energize again.
	The unit address is wrong or repeated	Correct the wrong address setting
The line is normal and the other equipment floors are normal, but only there is no message display for the whole of an equipment floor	Repeater might be needed. If repeater has been installed, it might be that the repeater connection is wrong.	Install the repeater correctly
There is no message display for all units; there is communication fault display on software, and the TX indicator on converter is normally bright (not blink).	The communication line A and B is connected in reverse direction, or the communication line is connected to wrong position.	Check the line and connect the communication line with Line A to Line A and Line B to Line B.
The line, equipment and installation are normal, but there is still communication fault on software	Display or controller incompatible to the unit is used.	Check the model of controller and wired controller for current unit. If wrong, require the client service center to replace.



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