



Service Manual

Modbus Gateway(Pro)

Safety Notices

Dear customer,

Please read this manual carefully prior to installation and operation and strictly observe all installation and operation instructions covered in the manual.

Special attentions shall be paid to the following marks:

Please read this manual carefully before installation and operation and strictly observe the installation and operation instructions covered in this manual.



WARNING.

This mark indicates operation, which if improperly performed, might lead to the death or serious injury of the users.



CAUTION.

This mark indicates operation, which if improperly performed, might possibly result in damage to the device.



WARNING

1. Installation shall be performed by the qualified personnel; otherwise it would result in a fire hazard or electric shock.

2. Do not place the plug of the power supply into the socket before it is dried and cleaned.

3. Cut off the power supply before touching the electric element.

4. Do not touch this device with wet hands; otherwise it would result in electric shock.

5. Do use the power cable specified in this manual; otherwise it would result in a fire hazard.

6. When the power cable is reversely connected or the power supply is beyond the rated range, it would result in a fire hazard or even damages to this device.

7. Do install this device inside the electric control cabinet which is located indoor and then is locked.

8. Do install this device where it will not be subject to the electromagnetic interference or heavy dust.



CAUTION

1. Be sure the specified adaptor is used; otherwise this device would work improperly or even be damaged.

2. Be sure this device is setup in place; otherwise it would result in communication fault.

3. Be sure the communication line is connected to the correct interface; otherwise it would result in communication fault.

4. After connection, lines should be protected with insulating tape to avoid oxidation and short circuits.

5. Normal working conditions for Modbus Gateway(Pro): ①Temperature: -20~+60°C,② Humidity: less than 85%; ③Location: install this product in the electric control cabinet, not subject to direct sunlight, rain and snow etc.

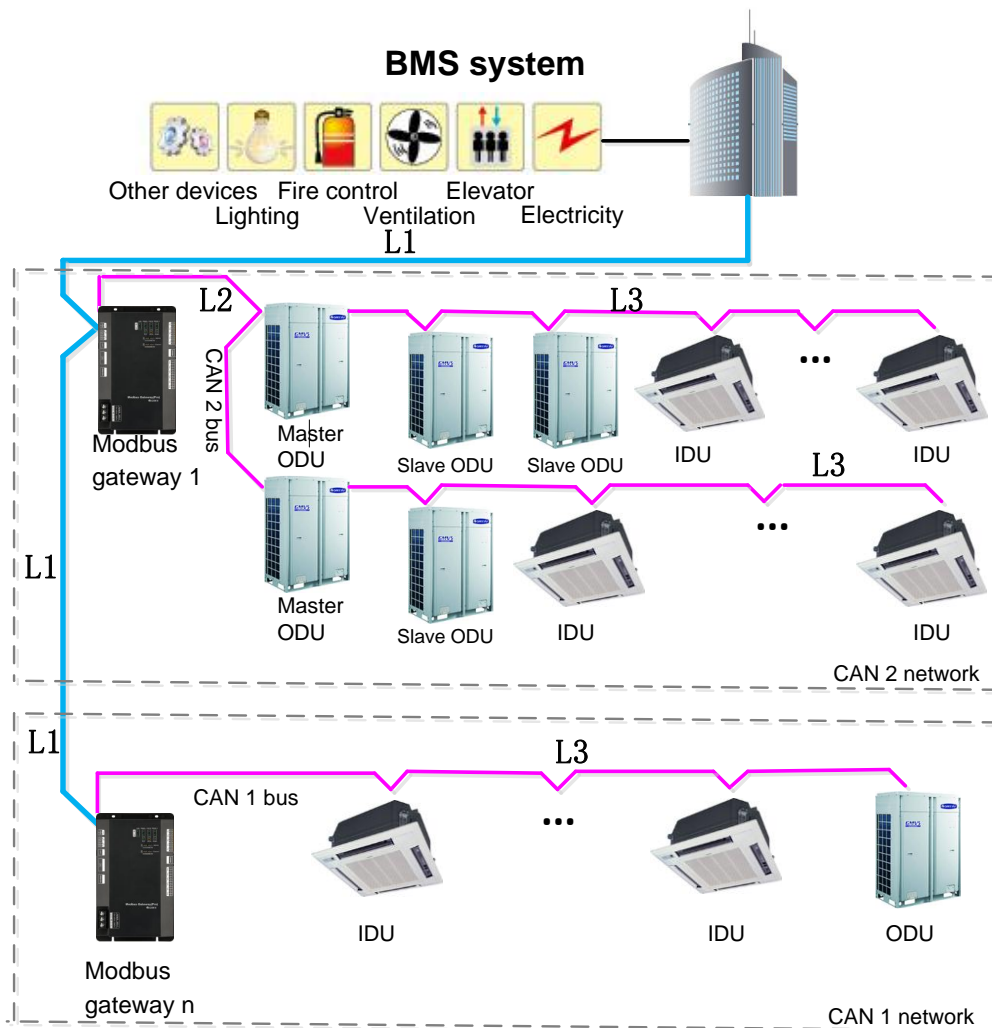
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Chapter 1 Installation

1. System Introduction

Gree Modbus Gateway(Pro) can achieve data exchange between air conditioner and BMS. This gateway is applicable for Gree multi VRF which adopts CAN protocol. Modbus Gateway(Pro) can collect, monitor and control operation data of multi VRF remotely and give out alarm when the unit occurs error. Maintenance personnel doesn't need to set each unit on site. They can check the operation status, control startup and shutdown and set temperature of the air conditioning system through computer, which greatly improves work efficiency and reduces human cost and management cost.



Topology Introduction:

Modbus bus: L1 shown in the figure is the Modbus bus.

CAN1 network: which is consist of Modbus Gateway(Pro) and all IDUs and ODUs of the system. One CAN1 network can be connected to maximum 80 IDUs.

CAN2 network: which is consist of Modbus Gateway(Pro) and main control ODU of the

system. One CAN2 network can be connected to maximum 16 systems and 255 IDUs.

System: One system consists of one set of outdoor unit (one set of outdoor unit is a module group consisting of 1~4 modules, that is 1~4 outdoor units) and it's connected indoor units.

Connectable unit quantity of Modbus Gateway(Pro): one Modbus Gateway(Pro) can be connected with 16 outdoor units and 255 indoor units in maximum.

2.Component Introduction

2.1 Component List

2.1.1 Safety Requirements for Engineering Installation

Name	Model	Material code	Supply range	Remark
Modbus Gateway(Pro) Kits	Gateway component ME30-24/E5(M)	MC20001680	Standard equipped	Connectable to BMS system: Protocol interface: Modbus RTU protocol, CAN protocol Hardware interface: RS485, CAN Baud rate: 9600, Starting bit: 1, Data bit: 8, Parity bit: without, Stopping bit: 1 Main components: Modbus Gateway(Pro), User's Manual.
Photoelectric isolation repeater	Photoelectric isolation repeater RS485	EN02200010	Optional	A repeater shall be added for every excessive 800m length of communication wire. A repeater shall be added for every excessive 30 Modbus gateway. The repeater is optional when these conditions are met
Photoelectric isolation converter	Photoelectric isolation converter GD02	EN02200020	Optional	The converter is optional when BMS adopts RS232 way
Central control cabinet	User prepared	\	User prepared	\

2.2 Gateway ME30-24/E5(M)

2.2.1 General Functions

Gree Modbus Gateway(Pro) are intended to realize the data exchange between the air conditioner and BMS, and provides ten I/Os (five inputs are DI1, DI2, DI3, DI4, DI5 and five outputs are DO1, DO2, DO3, DO4, DO5). DI1 is the fire alarm interface (when there is fire alarm signal input, Modbus gateway will order all air conditioners to stop operation immediately). The status of other I/Os is mapped to the specific objects of the Modbus bus and is defined by the user. This gateway is applicable for Gree multi VRF system which adopts CAN protocol.

2.2.2 Appearance



2.2.3 Composition

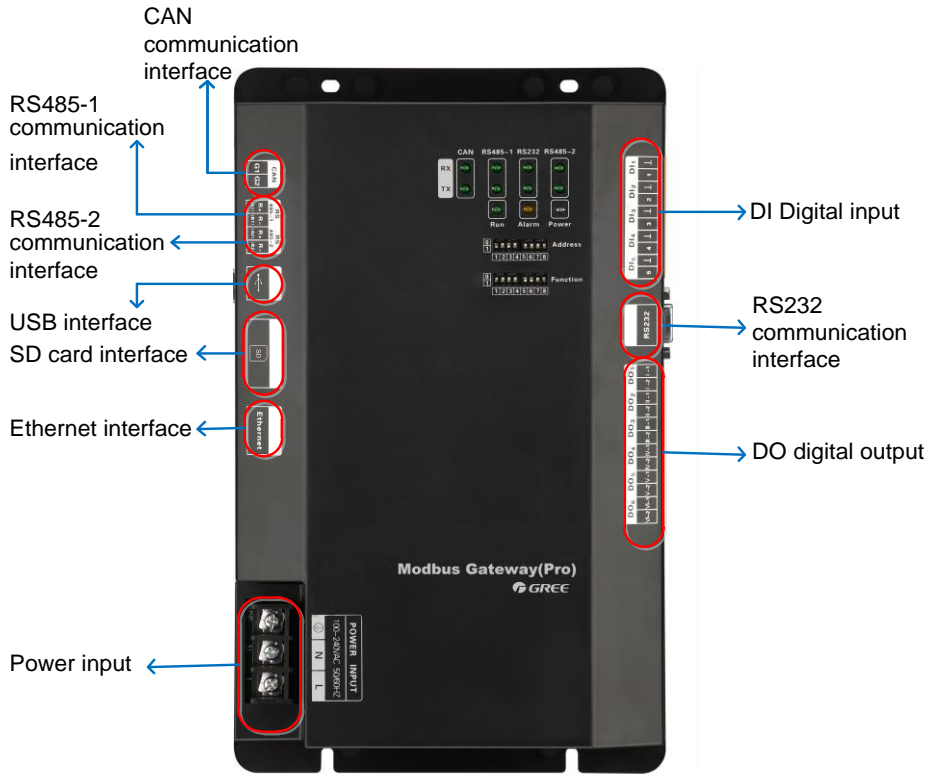
GMV gateway ME30-24/E5(M) contains the following parts:

Modbus Gateway(Pro)	1 set
User's manual	1 piece




2.2.4 Interface

1) Diagram of interface



2) Power Supply

Power supply should be 100VAC-240VAC, 50/60Hz.

 Warning! Protective grounding of power input must be connected, otherwise a hazard may happen; in addition, do not touch the power input when the gateway is energized.



Notice: Power cord should be secured with the equipped wire clip, as shown in the figure.

3) Communication Interfaces



CAN communication interface: It is connected to air conditioner through two-core

connection wire, to realize communication between Modbus Gateway(Pro) and air conditioner.

RS485-1 communication interface:It is connected to BMS through two-core connection wire, to realize communication between Modbus Gateway(Pro) and BMS.

RS485-2 communication interface: This device doesn't use this communication interface currently.

Interface of USB or SD card: This device doesn't use this interface currently.

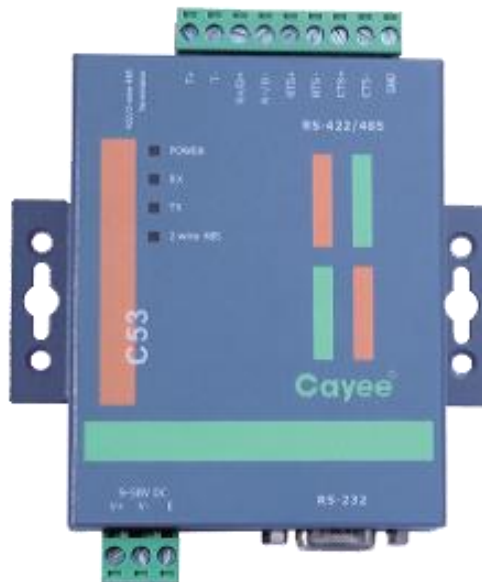
Ethernet interface: This device doesn't use this interface currently.

2.3 Introduction of Photoelectric Isolation Converter

2.3.1 Functions

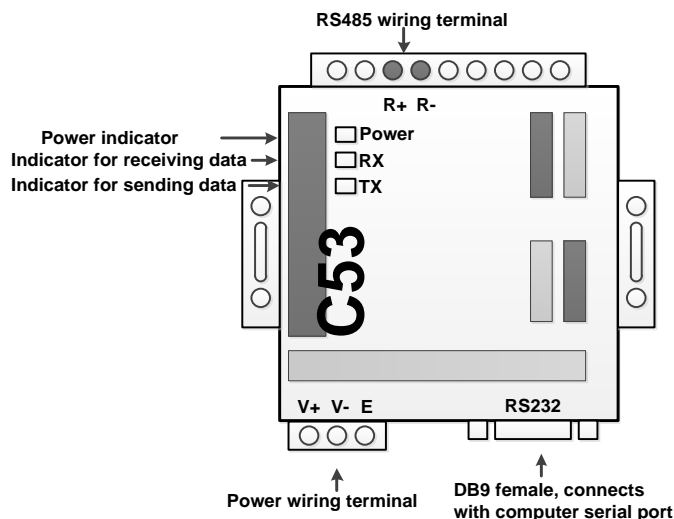
Photoelectric isolation converter is used for converting RS232 signal and RS485 signal. It shall be used only when user's BMS system adopts RS232 communication way.

2.3.2 Appearance



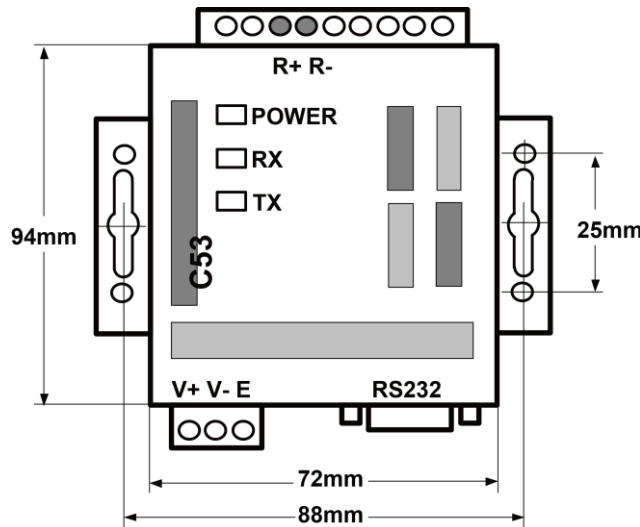
Note: Please refer to the actual product; the picture is only for reference.

2.3.3 Instructions of Interfaces and Indicators



No.	Interface name	Usage instructions	Remark
1	Power interface	Input 12VDC800mA	Converter equipped with power supply
2	Communication interface	Wire A of RS485 connects with R+ of 485 wiring terminal, wire B connects with R-. RS232 interface connects with RS232 of computer.	For more details, please refer to the user's manual
3	Power indicator	It is always bright when power supply is put through	For more details, please refer to the user's manual
4	Communication indicator	TX and RX lights are blinking when communication is normal	For more details, please refer to the user's manual

2.3.4 Product Dimension



2.3.5 Notices for Installation and Operation



Warning! It must be installed indoors, to avoid impact, direct sunlight or rain. It is suggested to put it in the monitoring room with computer.



Warning! The devices provided by the manufacturer must be applied. Do not apply the products of other models or brands.



Warning! Independent power supply shall be used. Sufficient 220V AC socket must be installed to supply power.

2.4 Introduction of Photoelectric Isolation Repeater

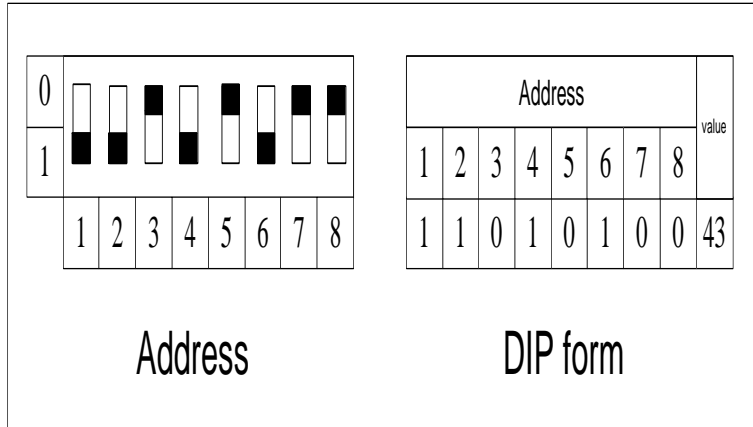
2.4.1 Functions

Functions of photoelectric isolation repeater

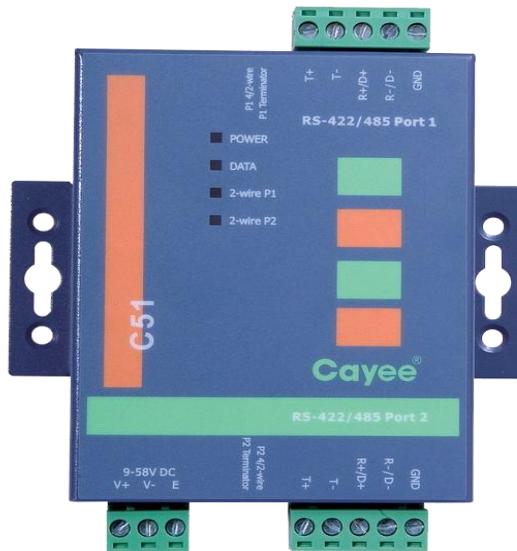
1) When the distance of the whole communication network node exceeds 800m, it shall be used to ensure the integrality of signal and avoid attenuation of signal in long communication distance.

2) Currently, normal photoelectric isolation repeater can support the integrality of communication signal of 32 nodes. When communication node quantity in the network exceeds 32 nodes, communication signal will not be integral. To ensure reliable transmission of signal,

photoelectric isolation repeater must be used to transmit signals when node quantity in the network exceeds 30, so as to ensure the integrity of communication signal.

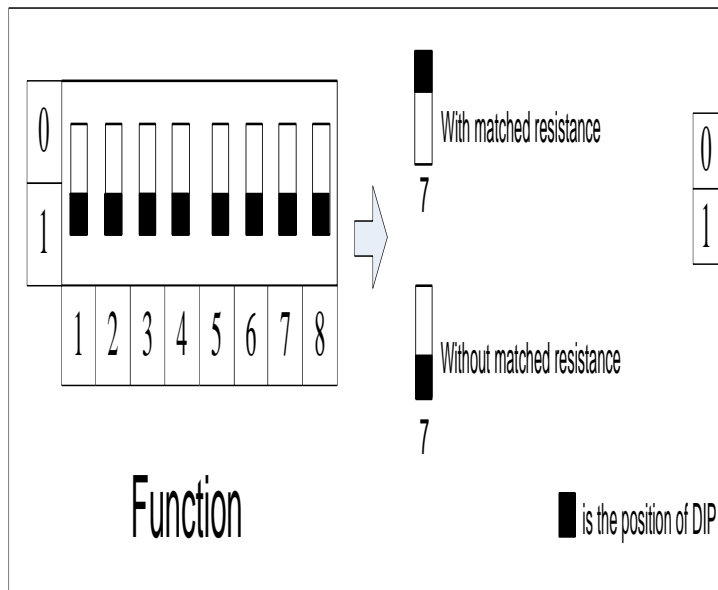


2.4.2 Appearance



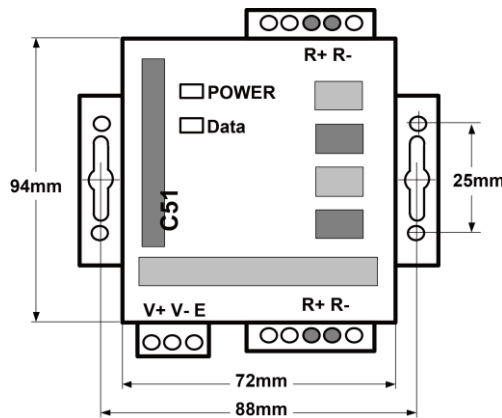
Note: Please refer to the actual product; the picture is only for reference.

2.4.3 Instructions of Interfaces and Indicators



No.	Interface name	Usage instructions	Remark
1	Power interface	Input 12VDC/800mA	Repeater equipped with power supply
2	Communication interface	Wire A of RS485 connects with R+ of 485 wiring terminal, wire B connects with R-	For more details, please refer to the user's manual
3	Power indicator	It is always bright when power supply is put through	For more details, please refer to the user's manual
4	Communication indicator	Data light is blinking when communication is normal	For more details, please refer to the user's manual

2.4.4 Product Dimension



2.4.5 Notices for Installation and Operation



Warning! It must be installed indoors, to avoid impact, direct sunlight or rain. It is suggested to put it in the monitoring room with computer.

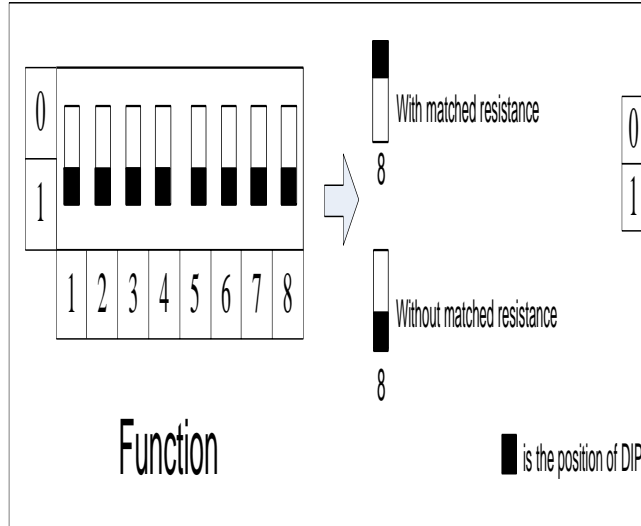


Warning! The devices provided by the manufacturer must be applied. Do not apply the products of other models or brands. Independent power supply shall be used. Sufficient 220V AC socket must be installed to supply power.

3.Device Installation

3.1 Product Dimension and Installation Space of Electric Control Cabinet

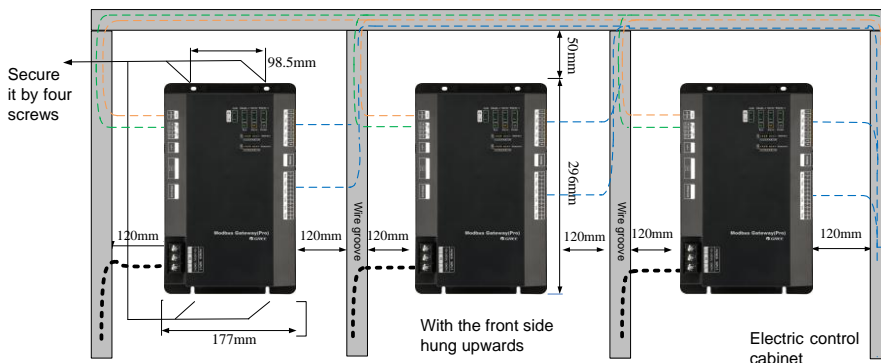
3.1.1 Product Dimension



L x W x H: 296x177x56 (mm)

3.1.2 Installation Space of Electric Control Cabinet

Modbus Gateway(Pro) shall be installed in the electric control cabinet. The front side of gateway shall be hung upwards and secured by four screws. Required installation space is shown as below (only for reference).



CAUTION.

① It is suggested to install Modbus Gateway(Pro) near the air conditioner to reduce the communication distance between Modbus Gateway(Pro) and air conditioner. As the communication distance between Modbus Gateway(Pro) and air conditioner shall be within 500m (please refer to 3.2 Communication Connection for more details). Communication distance between Modbus Gateway(Pro) and BMS system can be expanded through 485 repeater.

② The power cord and communication cable of Modbus Gateway(Pro) shall be wired separately. Otherwise, Modbus Gateway(Pro) may have errors! Fine dash line in the figure is the communication cable and thick dash line in the figure is the heavy current wire. The wiring in the figure is only for reference.

③ Before making central control cabinet, please design according to the quantity and

arrangement way of Modbus Gateway(Pro) and the placement status.

④ Each Modbus Gateway(Pro) shall have independent power supply. Therefore, sufficient 220V AC socket for power supply must be installed in the central control cabinet.

⑤ Keep the distance between communication cable and heavy current wire for more than 15cm and do not bind them together. If they cannot be kept away from 15cm, please apply shielding steel pipe to avoid communication error caused by electromagnetic interference.

⑥ The control cabinet shall be installed indoors to avoid direct sunlight and rain. It shall be locked to keep it away from the reach of people other than management personnel.

3.2 Communication Connection

Communication system of Modbus Gateway(Pro) includes:

- (1) Communication between Modbus Gateway(Pro) and BMS;
- (2) Communication between Modbus Gateway(Pro) and air conditioner.

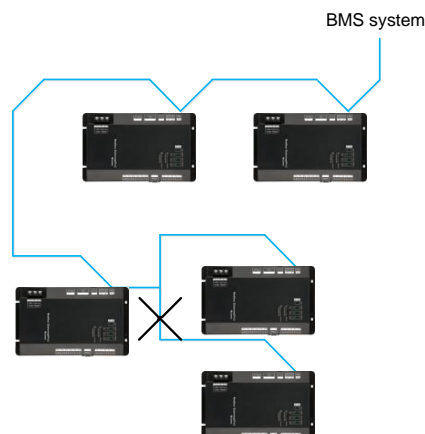
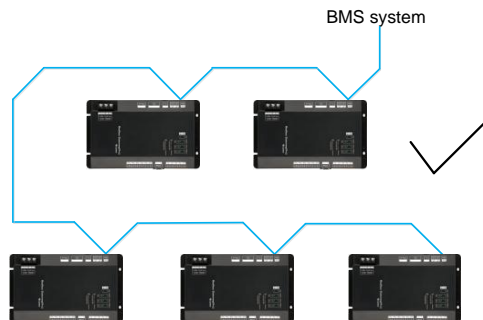
3.2.1 Material Selection of Communication Cable

Communication system	Material of cable	Communication cable L(m)	Cable diameter (mm ²)	Material standard	Remark
Modbus Ga Communication between Modbus Gateway(Pro) and BMS	Light/Ordinary PVC sheathed twisted pair copper wire(60227 IEC52/60227 IEC53)	L≤800	≥2×0.75	IEC60227-5:2007	When communication distance exceeds 800m, photoelectric isolation repeater shall be added
Communication between Modbus Gateway(Pro) and air conditioner	Light/Ordinary PVC sheathed twisted pair copper wire(60227 IEC52/60227 IEC53)	L≤500	≥2×0.75	IEC60227-5:2007	The length of communication cable shall not exceed 500m

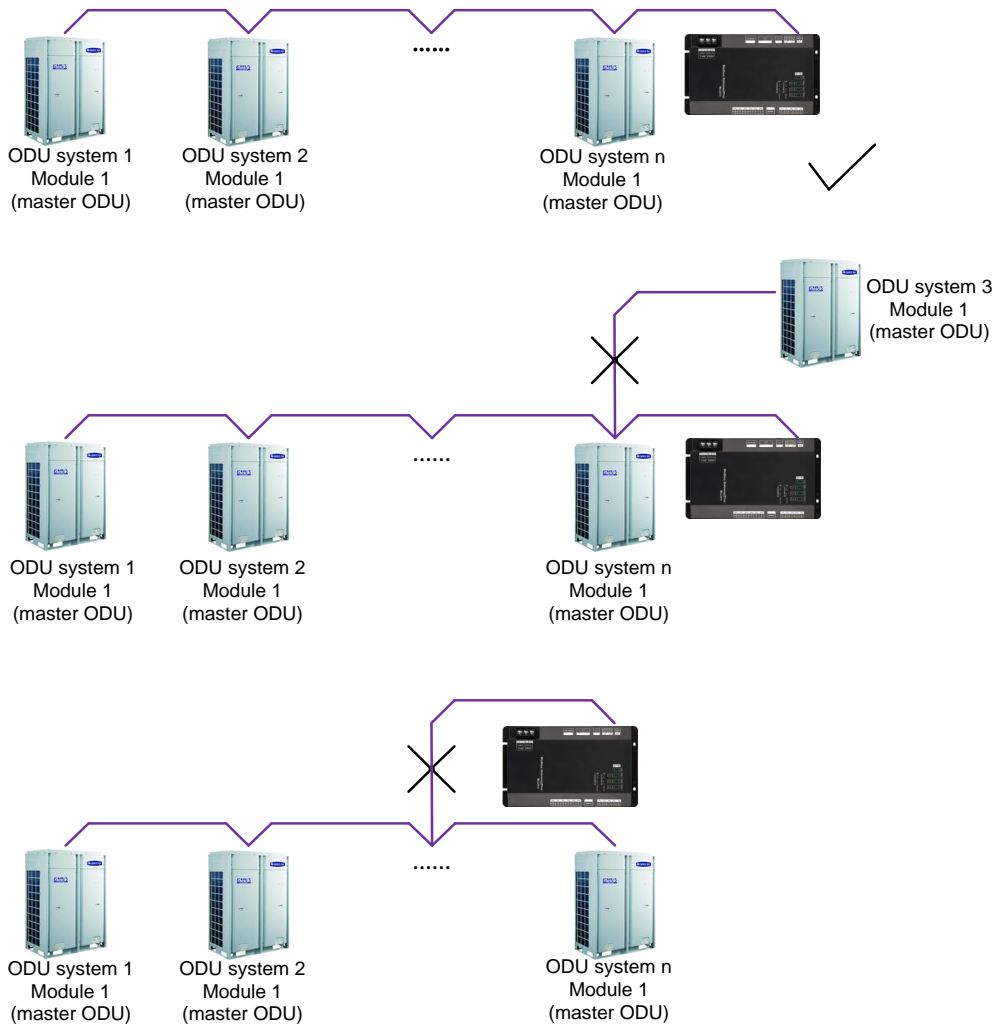
3.2.2 Communication Connection Way


! CAUTION! All communication cables of Modbus Gateway(Pro) must be connected in series instead of in star mode.

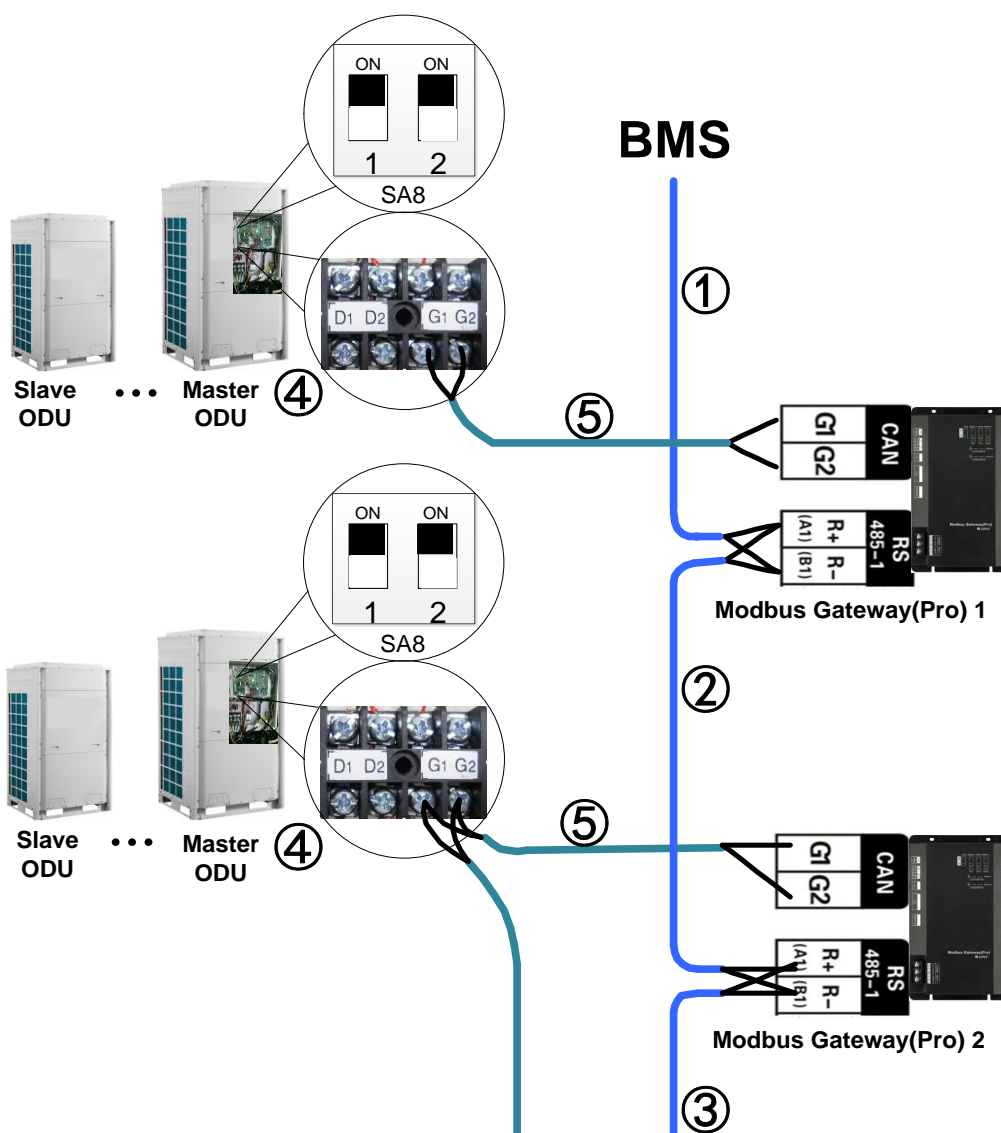
- (1) Communication connection between Modbus and BMS;



(2) Communication connection between Modbus Gateway(Pro) and air conditioner (n is air conditioner quantity, $n \leq 255$);



 **CAUTION!** All communication cables of Modbus Gateway(Pro) must be connected in series instead of in star mode.



3.2.3 Communication Connection Steps

(1) Communication wire connection between Modbus Gateway(Pro) and BMS:

Step 1: Confirm the first Modbus Gateway(Pro) (Modbus Gateway(Pro)1 as shown in the figure) that needs to be connected to BMS. Connect the R+ and R- port of RS485-1 communication interface of this gateway and the BMS with communication cable, as shown in step ① in the figure.

Step 2: Connect the R+ and R- port of RS485-1 communication interface of Modbus Gateway(Pro)(Modbus Gateway(Pro)1) and the R+ and R- port of RS485-1 communication interface of the second Modbus Gateway(Pro)(Modbus Gateway(Pro)2 as shown in the figure) with communication cable, as shown in step ② in the figure. If several Modbus Gateways(Pro) shall be connected, please connect them in this way.

(2) Communication wire connection between Modbus Gateway(Pro) and air conditioner:

Step 1: Confirm the master ODU that each Modbus Gateway(Pro) shall be connected. Please refer to “3.2.2(2) Communication connection between Modbus Gateway(Pro) and air conditioner” and adopt series connection, as shown in step ④ in the figure.

Step 2: Connect the G1 and G2 port of CAN communication interface of Modbus Gateway(Pro) and the G1 and G2 port of wiring board of corresponding master ODU with communication cable, as shown in step ⑤ in the figure.

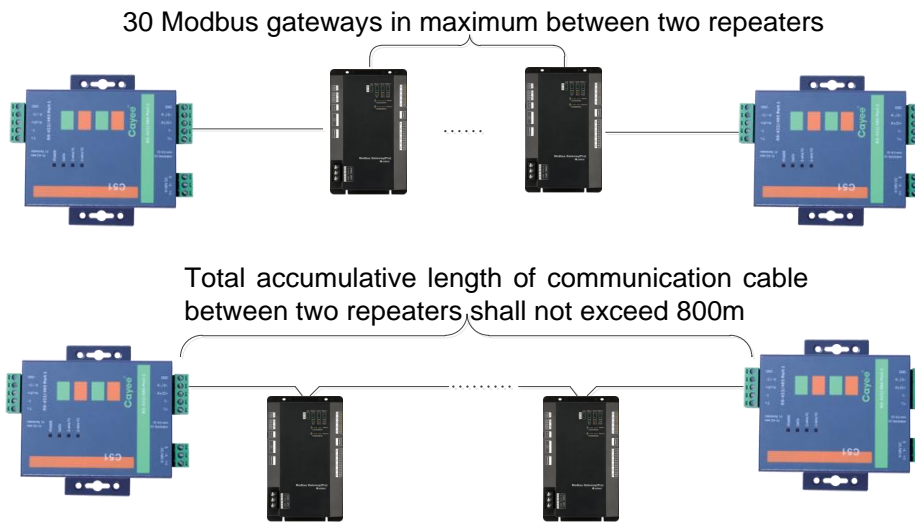
(3) DIP switch of Modbus Gateway(Pro):

Step 1: Set address DIP switch of Modbus Gateway(Pro) by referring to chapter II.

Step 2: Set matched resistance of Modbus Gateway(Pro) by referring to chapter II.

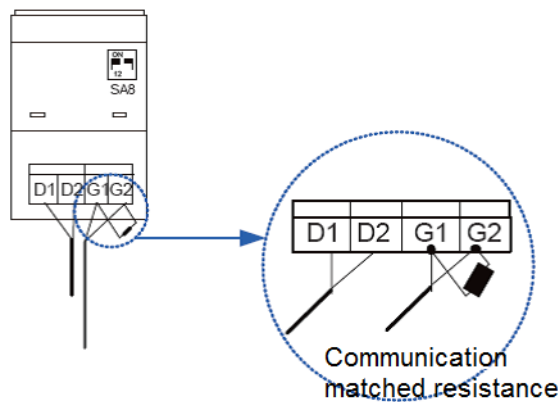
Note:

①. In Modbus bus, if the connected Modbus Gateway(Pro) exceeds 30 or communication distance exceeds 800m, one photoelectric isolation repeater shall be added. Connect the R+ and R- port of photoelectric isolation repeater with the R+ and R- port of RS485-1 communication interface of nearby Modbus Gateway(Pro).



②. In “The eighth switch of function DIP switch – setting of CAN2 bus matched resistance”, the setting method of matched resistance of Modbus Gateway(Pro) is introduced. Meanwhile, the master ODU in the first and end systems of CAN2 bus shall be set as with matched resistance. In the following, the detailed setting position and method of matched resistance of GMV 5 DC inverter multi VRF are taken as example.

Master ODU



※CAN2 bus: Detailed meaning please refer to topology introduction.

Chapter II Debugging and Operation

1. Hardware Debugging

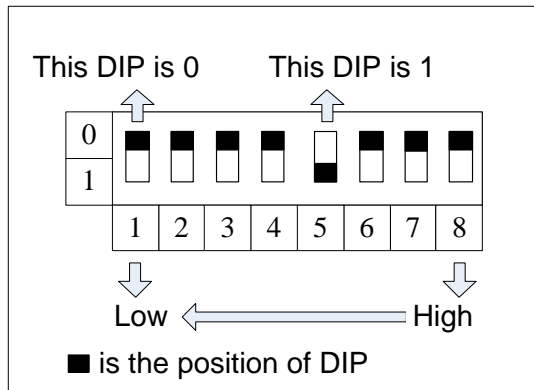
1.1 DIP Switches

! CAUTION! Please set DIP switches before using this device, otherwise this device cannot operate normally!

This gateway includes two kinds of DIP switches, address DIP switch and function DIP switch.



1) Diagram of DIP Switches



2) Address DIP Switch - Address Setting of Modbus Gateway(Pro)

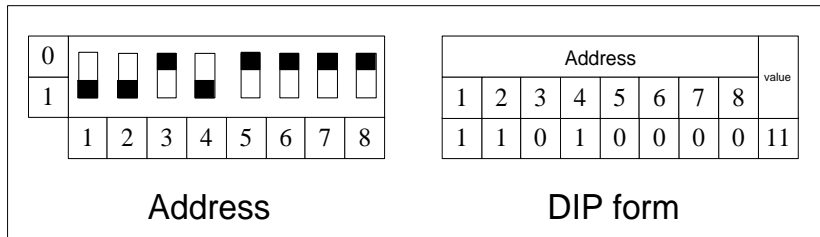
Address DIP switch is used for setting the device address of Modbus Gateway(Pro).

! CAUTION! Please set the address DIP switches before using this gateway. The network DIP switch address of the same bus cannot be repeated, otherwise communication error may happen.

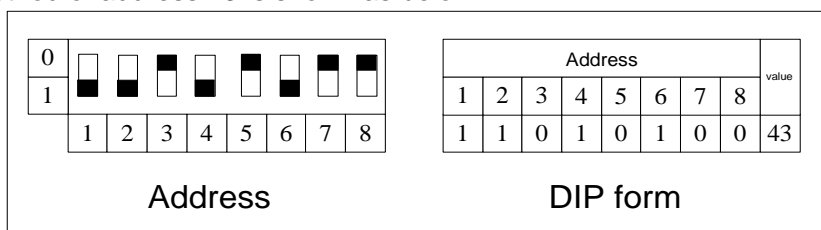
Address setting range: 1~255.

Address setting example:

Setting method of address 11 is shown as below:



Setting method of address 43 is shown as below:



3) The Seventh Switch of Function DIP Switch-Setting of Modbus Bus Matched Resistance

! CAUTION! Master outdoor unit or gateway of the system which is at the end of Modbus bus must be set as with the matched resistance, otherwise communication will be abnormal!

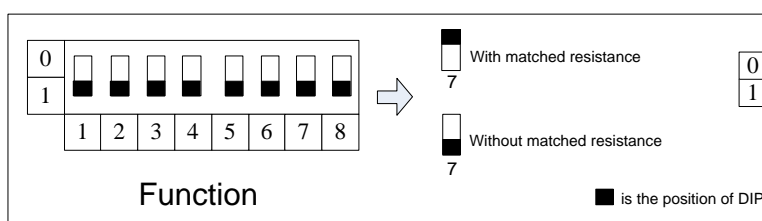
Modbus bus: Detailed meaning please refer to topology introduction.

The seventh switch of function DIP switch is used for setting the Modbus bus matched resistance of this gateway.

If the gateway is at the end of Modbus bus, the gateway shall be set as with the matched resistance, which means set the seventh DIP switch to 0;

If the gateway is not at the end of Modbus bus, the gateway shall be set as without the matched resistance, which means set this DIP switch to 1.

DIP switch of matched resistance is shown as below:



4) The Eighth Switch of Function DIP Switch - Setting of CAN2 Bus Matched Resistance

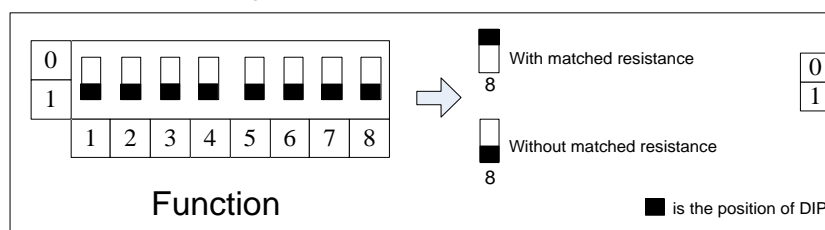
! CAUTION! Master outdoor unit or gateway of the system which is at the end of CAN2 bus must be set as with the matched resistance, otherwise communication will be abnormal!

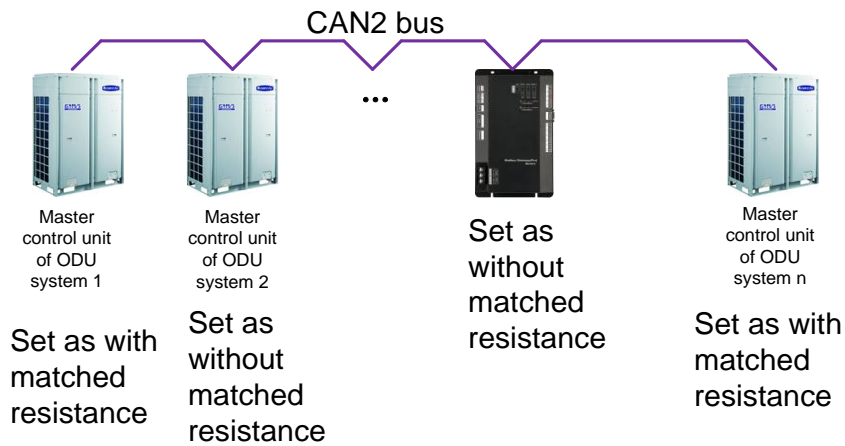
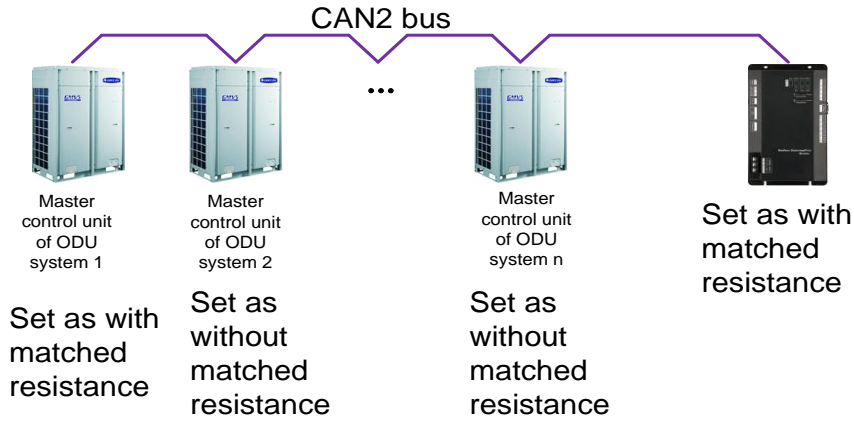
※CAN2 bus: Detailed meaning please refer to topology introduction.

The eighth switch of function DIP switch is used for setting the CAN2 bus matched resistance of this gateway.

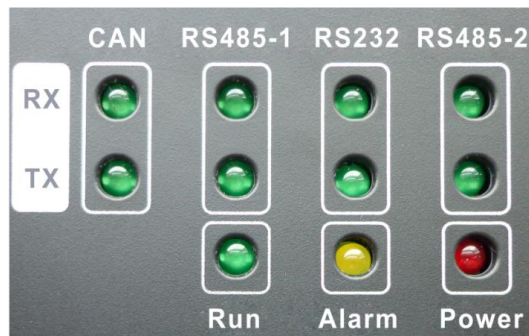
If the gateway is at the end of CAN2 bus, the gateway shall be set as with the matched resistance, which means set the eighth DIP switch to 0;

If the gateway is not at the end of CAN2 bus, the gateway shall be set as without the matched resistance, which means set the eighth DIP switch to 1.





1.2 LED Display



LED indicators shown in the above figure are divided into two parts: status indicators (operation, alarm, power) and communication indicators(CAN, RS485, RS232). Operation status of each indicator is shown in the following table.

CAN	RX	When the data from the equipment (e.g. air conditioner) connected with Modbus Gateway(Pro) is received, it will flash.
CAN	TX	When the data is transferred to the equipment (e.g. air conditioner) connected with Modbus Gateway(Pro), it will flash.
RS485-1	RX	When the data from the Modbus bus is received, it will flash.
RS485-1	TX	When the data is transferred to the Modbus bus, it will flash.
RS232	RX	This device does not use this LED indicator.
RS232	TX	This device does not use this LED indicator.
RS485-2	RX	This device does not use this LED indicator.

RS485-2	TX	This device does not use this LED indicator.
Power		When power supply of Modbus Gateway(Pro) is normal, it will be always on..
Run		When Modbus Gateway(Pro) works normally, it will blink.
Alarm		This device doesn' t use this LED indicator.

1.3 DI/DO



This gateway supports 5 DIs(digital inputs) and 5 DOs(digital outputs); DO6 is reserved.

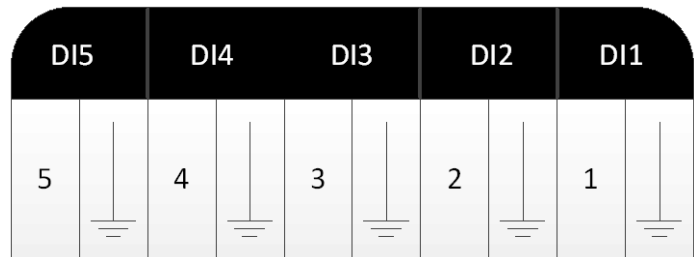
DI1...DI5

Digital inputs: 0/1 digital signals(binary system), applicable for those with power supply

DI1: in CAN2 network, fire alarm signal, connect “1” to the power of 12V, input fire alarm signal “1” in DI 1 port, then Modbus gateway(Pro) will give out control, all units stop operation immediately;disconnect “1” or connect to “0” , input signal “0” in DI 1 port, resume operation of all ODUs.

In CAN1 network, fire alarm signal, connect “1” to the power of 12V, input fire alarm signal “1” in DI 1 port, then Modbus gateway(Pro) will give out control, all units stop operation immediately;disconnect “1” or connect to “0” , input signal “0” in DI 1 port, resume operation of IDUs manually.

DI2...DI5: Defined by the user.



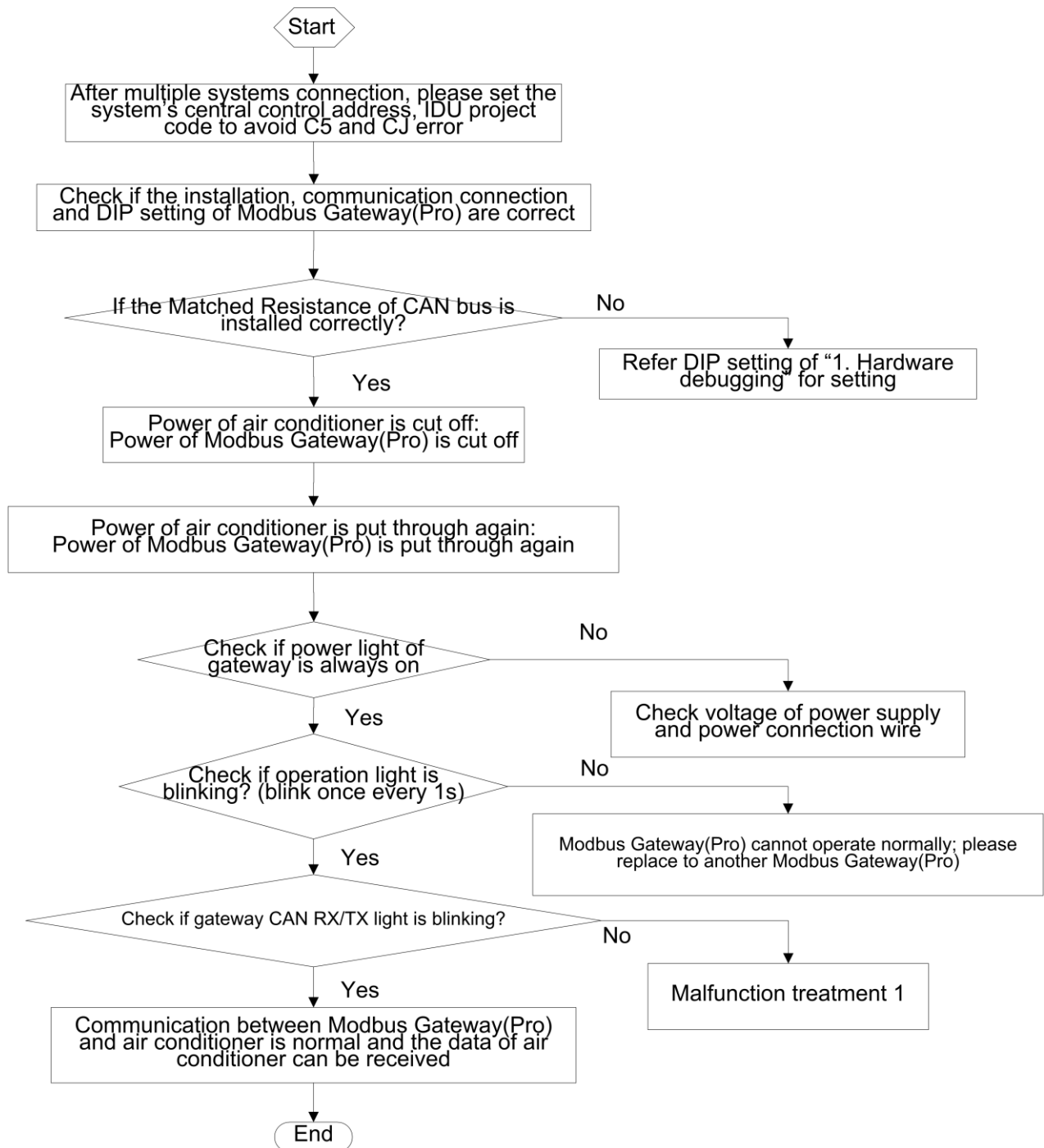
DO1...DO5 digital outputs: Relay output, normally-open contact

Max admissible power: 250VAC, 3A; 30VDC, 3A

Example: write “1” into DO5 of Modbus protocol and the two contacts of DO5 relay will be closed; write “0” into DO5 of Modbus protocol and the two contacts of DO5 relay will be cut off.

2.Communication Debugging

2.1 Communication Debugging with Air Conditioning Equipment EQUIPMENT



2.2 Communication Debugging with BMS System Equipment

Protocol interface: Modbus RTU Protocol

Hardware interface: RS485

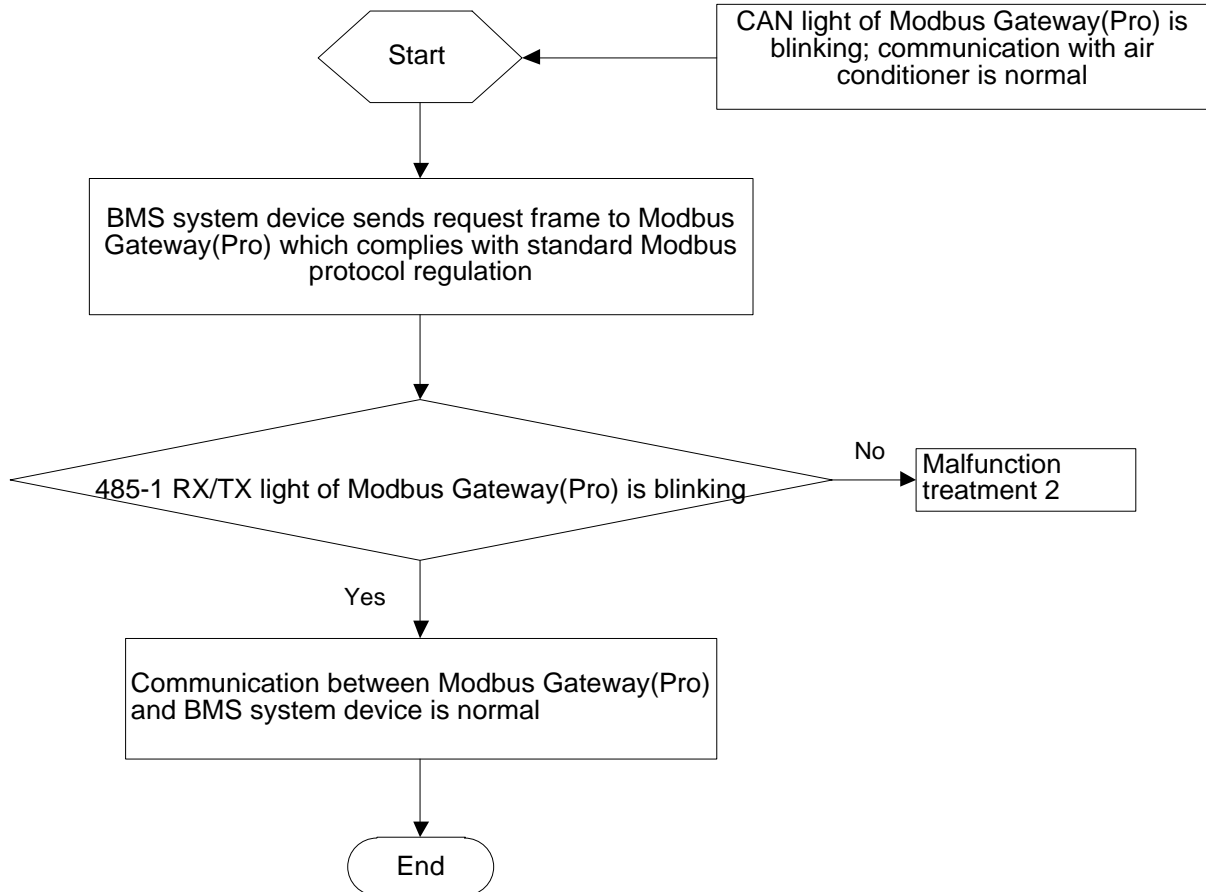
Baud rate: 9600

Starting bit: 1

Data bit: 8

Parity bit: without

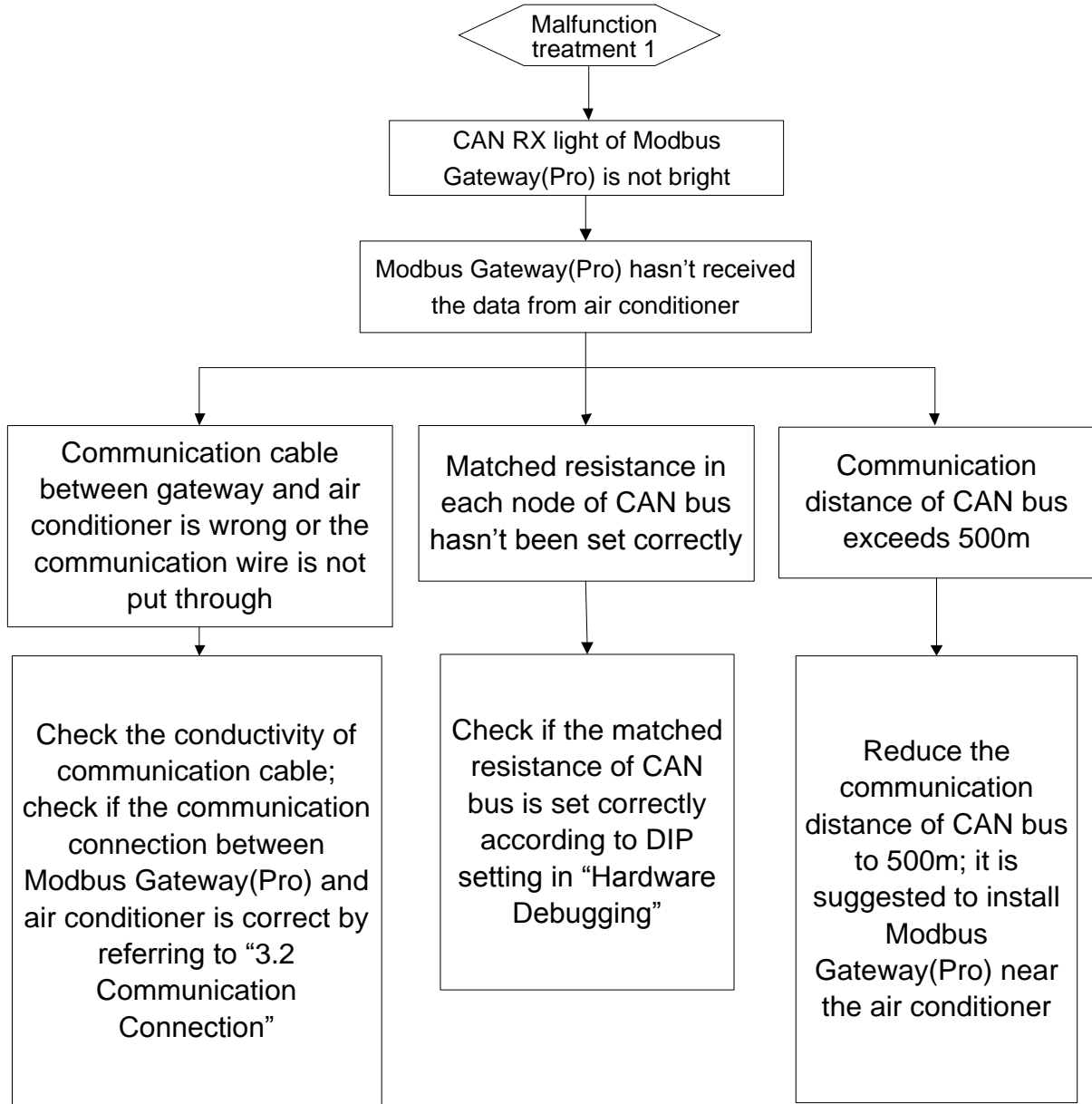
Stopping bit: 10

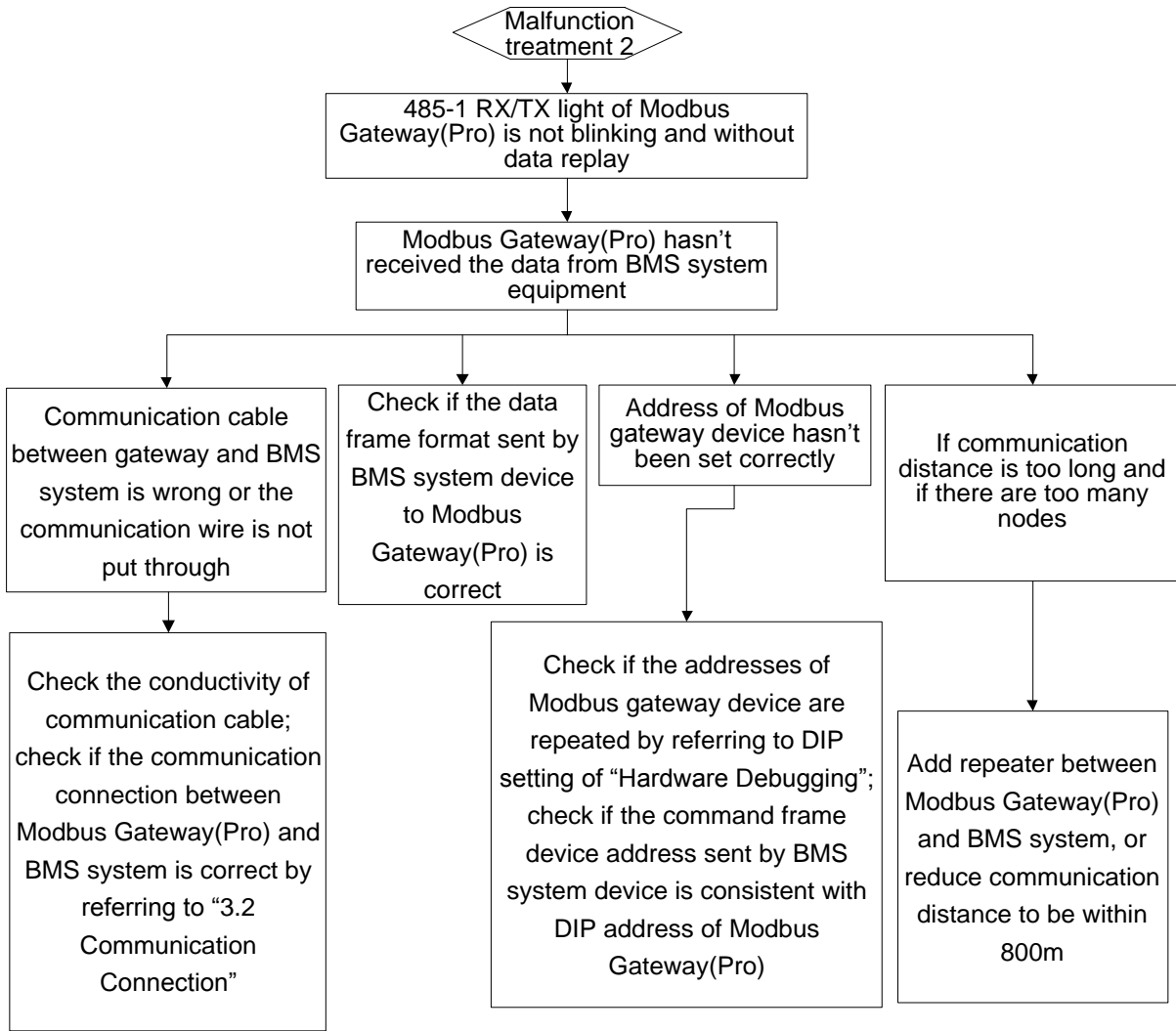


For BMS communication protocol, please make application from Gree Electric Appliances, Inc. of Zhuhai.

2.3 Malfunction Treatment

Note: In malfunction treatment, several kinds of causes and troubleshooting methods are provided. If the malfunction cannot be solved, please contact relevant professionals from Gree.





Chapter III Maintenance

1. Troubleshooting of BMS System

Malfunction phenomenon	Possible causes	Troubleshooting
BMS system displays communication error warning according to the provided protocol; the operation status of some or all units cannot be displayed and cannot be controlled	Communication cable is not twisted-pair communication cable	Change to twisted-pair communication cable
	Modbus Gateway(Pro) is broken	Replace Modbus Gateway(Pro)
	There is breakage in the communication cable	Weld the broken circuit
	Communication cable is short-circuited	Repair the short-circuited part
	Twisted-pair cable is too closed to power cord (less than 15cm), which leads to communication error caused by big interference	Wire the communication cable and power cord separately; if they cannot be kept away from 15cm, please apply shielding steel pipe
	Wrong connection of communication interface	Connect communication interface according to the instructions in this manual
The circuit is normal after checking, but all units or some units don't have information display and the software still has communication error	Haven't de-energized and then energized the outdoor unit after replacing chip or reset DIP switch	Re-energize outdoor unit
	Matched resistance hasn't been connected	Set the matched resistance correctly
	The serial port that communication software used doesn't match with the serial port no. that computer connected	Replace the serial port or change the serial port setting of the software
	Unit address added in the software doesn't match with the address of actual unit	Change unit address setting of software
	The unit hasn't been energized	Energize the unit
	Chip hasn't been inserted in the outdoor unit or indoor unit, or the inserting direction of chip is wrong	Reinsert the chip according to the indentation direction on the PCB and then re-energize it
	Unit address is wrong or repeated	Change the wrong unit address setting
Circuit, device and engineering installation are normal, but there still is communication error in the software	Use the wrong display or controller which doesn't match with actual unit	Check the controller and wired controller models of current unit; contact after-sales service center if the models are wrong
Circuit and other device layer are normal, while only a certain device layer doesn't have information display completely	Relay shall be installed. If relay is installed, the wire connection of relay may be wrong	Install the relay correctly



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