



Service Manual

Modbus Gateway(Mini)

To Users

Thank you for selecting Gree's product. Please read this instruction manual carefully before installing and using the product, so as to master and correctly use the product. In order to guide you to correctly install and use our product and achieve expected operating effect, we hereby instruct as below:

- (1) This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
- (2) In order to ensure reliability of product, the product may consume some power under stand-by status for maintaining normal communication of system and preheating refrigerant and lubricant. If the product is not to be used for long, cut off the power supply; please energize and preheat the unit in advance before reusing it.
- (3) Please properly select the model according to actual using environment, otherwise it may impact the using convenience.
- (4) This product has gone through strict inspection and operational test before leaving the factory. In order to avoid damage due to improper disassembly and inspection, which may impact the normal operation of unit, please do not disassemble the unit by yourself. You can contact with the special maintenance center of our company if necessary.
- (5) For personal injury or property loss and damage caused by improper operation such as improper installation and debugging, unnecessary maintenance, violation of related national laws and rules and industrial standard, and violation of this instruction manual, etc., we will bear no liability.
- (6) When the product is faulted and cannot be operated, please contact with our maintenance center as soon as possible by providing the following information.
 - 1) Contents of nameplate of product (model, cooling/heating capacity, product No., ex-factory date).
 - 2) Malfunction status (specify the situations before and after the error occurs).
- (7) All the illustrations and information in the instruction manual are only for reference. In order to make the product better, we will continuously conduct improvement and innovation. We have the right to make necessary revision to the product from time to time due to the reason of sales or production, and reserve the right to revise the contents without further notice.
- (8) The final right to interpret for this instruction manual belongs to Gree Electric Appliances Inc. of Zhuhai.

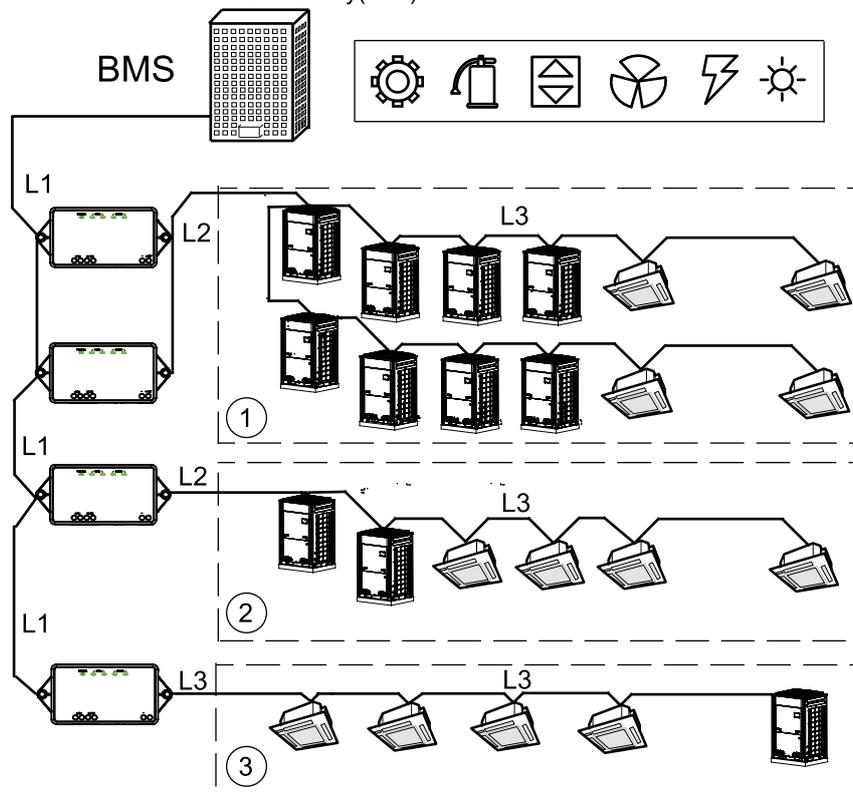
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1 Product Installation

1.1 System overview

The gateway adopts Modbus standard protocol and can be the BMS interface. Gree multi VRF units which adopt CAN protocol can be connected to the user's BMS(Building Management System) to realize BMS's control to Gree air conditioners. One bus of BMS Modbus can be connected to 255 Modbus Gateway(Mini) at most.



Modbus bus: L1 represents Modbus bus.

CAN1 network: ③ represents CAN1 network and is consisting of Modbus Gateway(Mini) and all ODU and IDUs of the system. One CAN1 network can be connected to 80 IDUs at most; the L3 bus is CAN1 bus.

CAN2 network: ①② represents CAN2 network and is consisting of Modbus Gateway(Mini) and master control ODU. One CAN2 network can be connected to 16 sets of ODU and 255 IDUs at most. When the number of ODU exceeds 16 sets or IDU exceeds 255 units, 2 CAN2 network shall be divided, the L2 bus is CAN2 bus.

System: a system is consisting of a set of ODU (a set of ODU is a modular group, consisting of 1-4 modular, namely 1-4 ODU) and the accessory IDUs.

The number of accessible units for Modbus Gateway (Mini): a Modbus Gateway (Mini) can be connected to 16 sets of ODUs and 128 IDUs at most, 2 Modbus gateways shall be needed if the number exceeds 128.

1.2 Component Introduction

1.2.1 Component List

1.2.1.1 Safety requirement for the construction of engineering installation

Name	Model	Material code	Scope of supply	Remark
Modbus Gateway (Mini)	Gateway assembly ME30-24/E6(M)	MC20001810	Standard configuration	Can connect to BMS : Protocol interface : Modbus RTU protocol and CAN protocol Hardware interface : RS485 , CAN Baud rate : 9,600 Start bit : 1 , Data bit : 8 , Parity check bit : null , Stop bit : 1 Major assembly : Modbus Gateway(Mini) and specification
Photoelectric isolation repeater	Photoelectric isolation repeater RS485	EN02200010	Optional	One repeater shall be added for every 800M accumulated for the total distance of communication cord and every 30 Modbus gateway. It's optional if the conditions are met.
Photoelectric isolation converter	Photoelectric isolation converter GD02	EN02200020	Optional	Optional is available only when BMS adopts the method of RS232.
Centralized control cabinet	The user shall prepare themselves	\	Self-configured	\

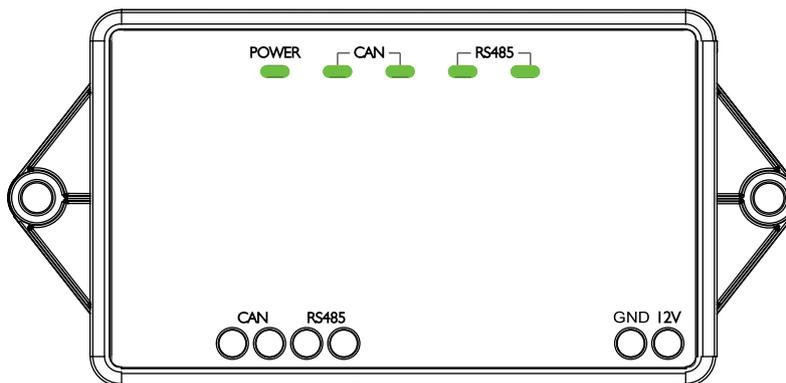
1.2.2 Detailed Introduction of Modbus Gateway(Mini)

1.2.2.1 General Functions

Gree Modbus Gateway(Mini) is intended to realize the data exchange between the air conditioner and BMS, and provides standard Modbus RTU protocol.

Applicable product series : GMV5,GMV5C,GMV5 MAX, GMV5 Water, GMV5 Mini, GMV5 Slim, GMV5 Heat Recovery.

1.2.2.2 Appearance



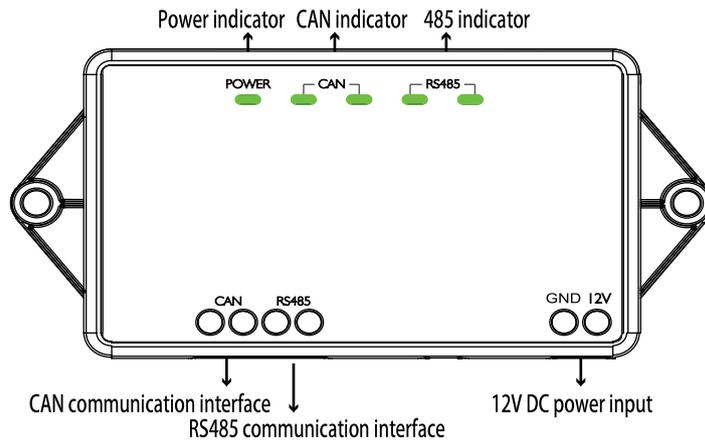
1.2.2.3 Product Composition

The product contains following items :

Modbus Gateway(Mini)	1 set
Owner's Manual	1 set

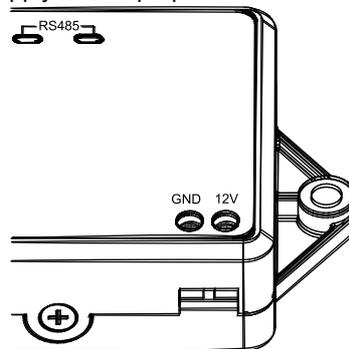
1.2.2.4 Interface

1.2.2.4.1 Interface Function Drawing



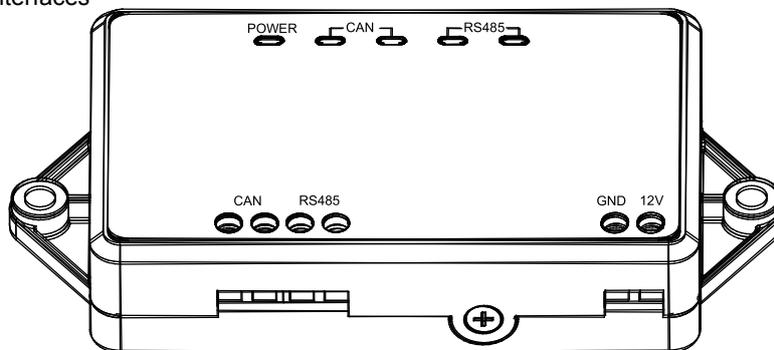
1.2.2.4.2 Power

The input power is 12V DC, external power supply can be prepared.



Note: pay attention to the polarity of power input and connect power according to the interface instruction.

1.2.2.4.3 Communication Interfaces



CAN communication interface: It is connected to air conditioner through two-core connection wire, to realize communication between Modbus Gateway(Mini) and air conditioner.

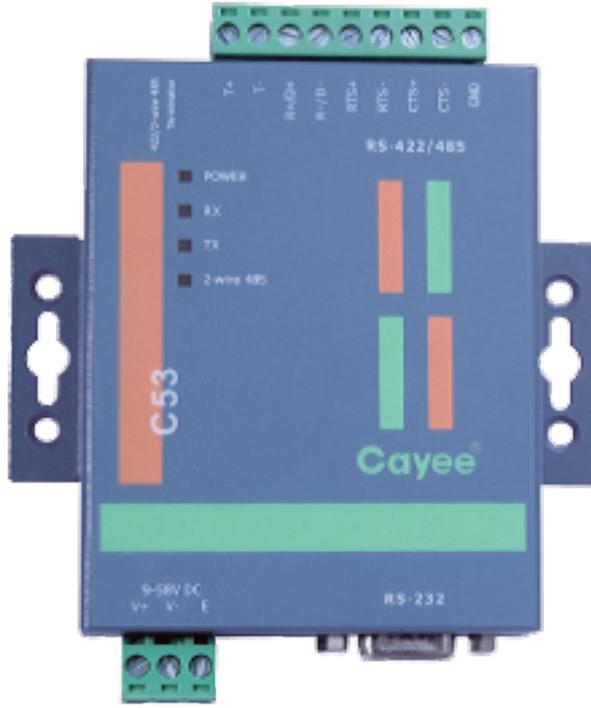
RS485 communication interface: It is connected to BMS through two-core communication cable, to realize communication between Modbus Gateway(Mini) and BMS or nearby Modbus Gateway(Mini).

1.2.3 Introduction of photoelectric isolation converter

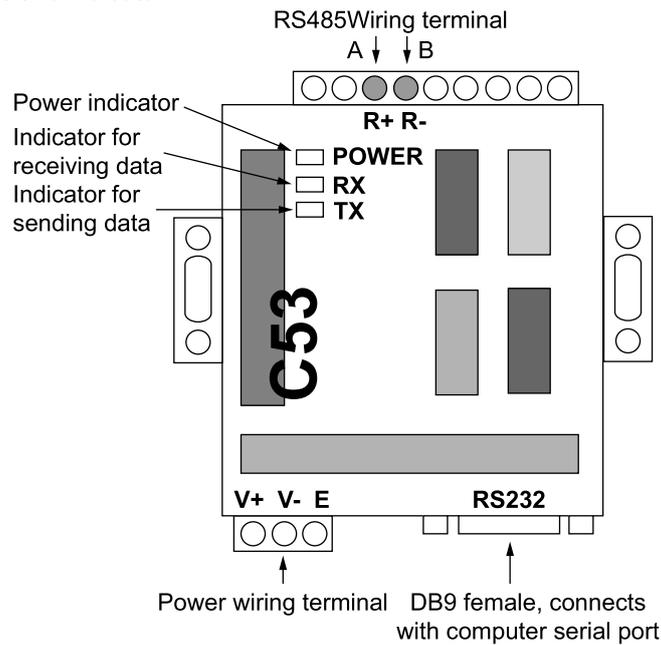
1.2.3.1 Function introduction

The function of photoelectric isolation converter is to conduct conversion to the RS232 signal of computer port and the signal of RS485 bus. It can only be adopted when the communication method of user's BMS is RS232.

1.2.3.2 Appearance

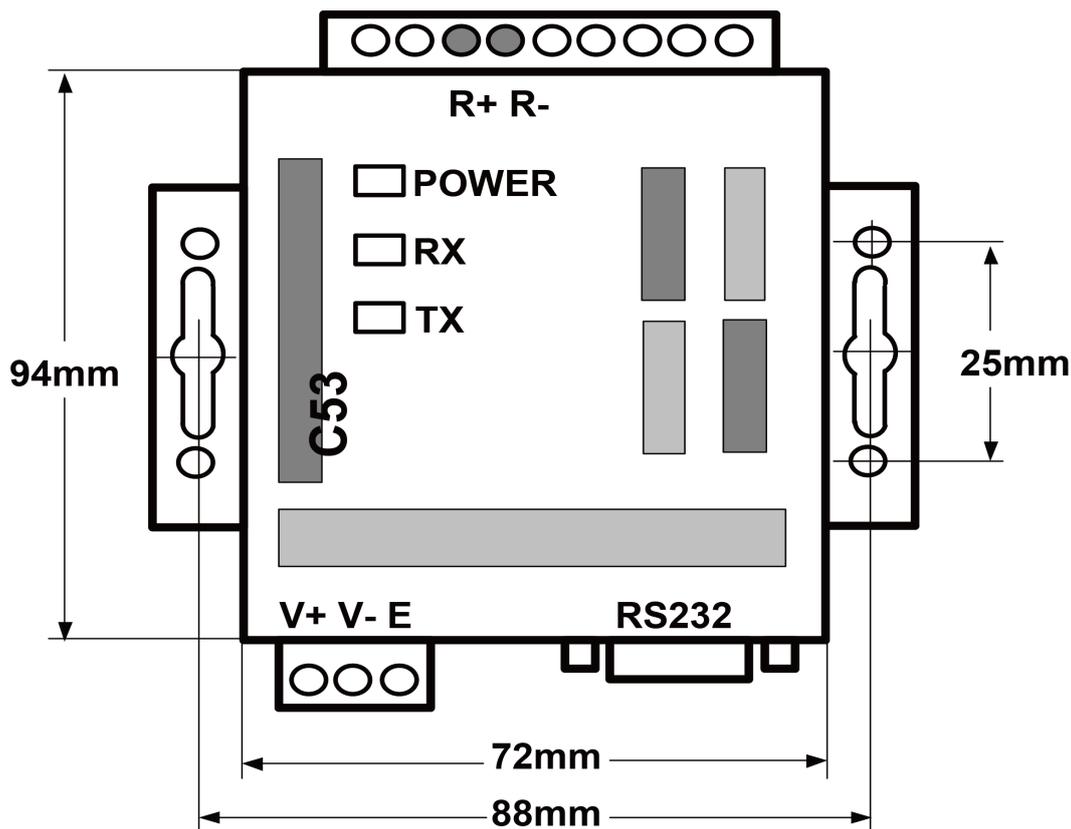


Note: the appearance shall be subject to actual object, the picture is for reference only.
 1.2.3.3 Spcification for interface and indicator



No.	Interface name	Instruction	Remark
1	Poewr interface	Input 12VDC800mA	Power of the converter is self-configured
2	Communication interface	Line A of RS485 shall be connected to R+ of wiring terminal 485 and line B to R-. Interface of RS232 shall be connected to the RS232 of the computer	Refer to the specification
3	Power indicator	Always on after energization	Refer to the specification
4	Communication indicator	TX and RX indicator is blinking during normal communication	Refer to the specification

1.2.3.4 Product size



1.2.3.5 Installation and usage notices for photoelectric isolation converter

WARNING! It must be installed inside the room, avoid collision, exposure or rain. It's suggested to be placed with the computer inside the monitor room.

WARNING! The original equipment must be used, alternative products of the other models or brands are not allowed.

WARNING! Separate power supply is required, AC socket of 220V must be installed to supply power.

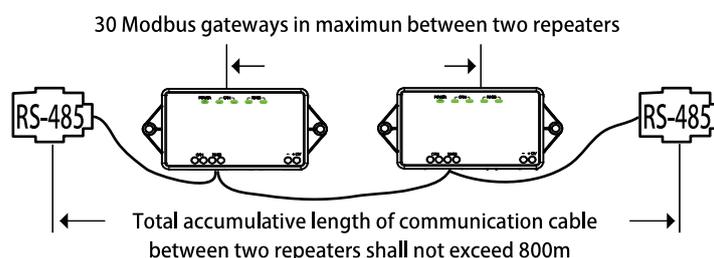
1.2.4 Introduction of photoelectric isolation repeater

1.2.4.1 Function introduction

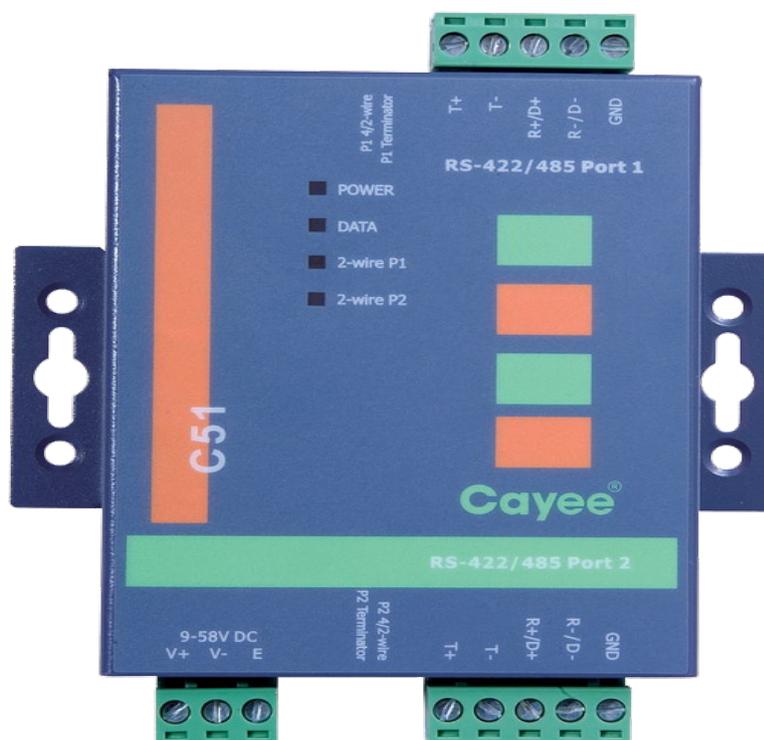
The function of photoelectric isolation repeater:

1) Ensure signal completeness when the node distance of the whole communication network exceeds 800M to prevent signal reduction in long-distance communication.

2) At present, general photoelectric isolation repeater can support the communication signal completeness for 32 nodes. When the number of communication node in network exceeds 32, the communication signal will not be complete. To ensure reliable signal transmission, we require that when the number of node in network exceeds 30, repeater must be adopted to transit signal to ensure the completeness of communication signal.

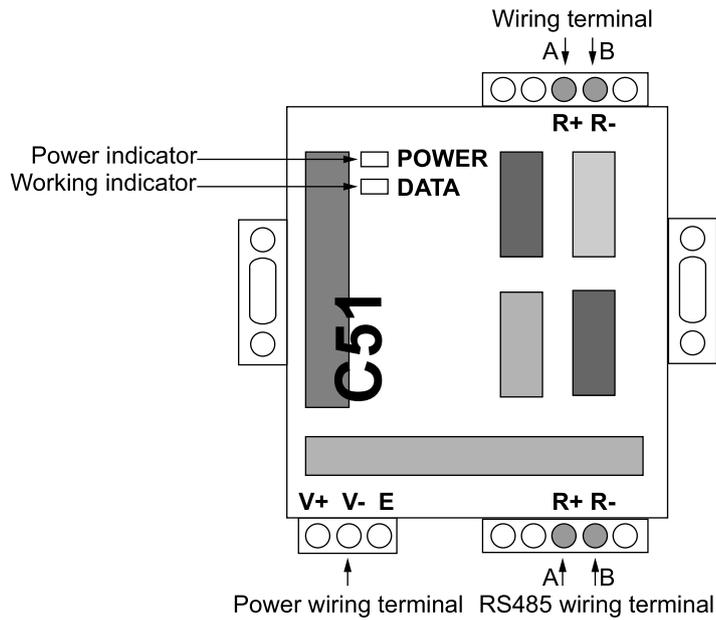


1.2.4.2 Appearance



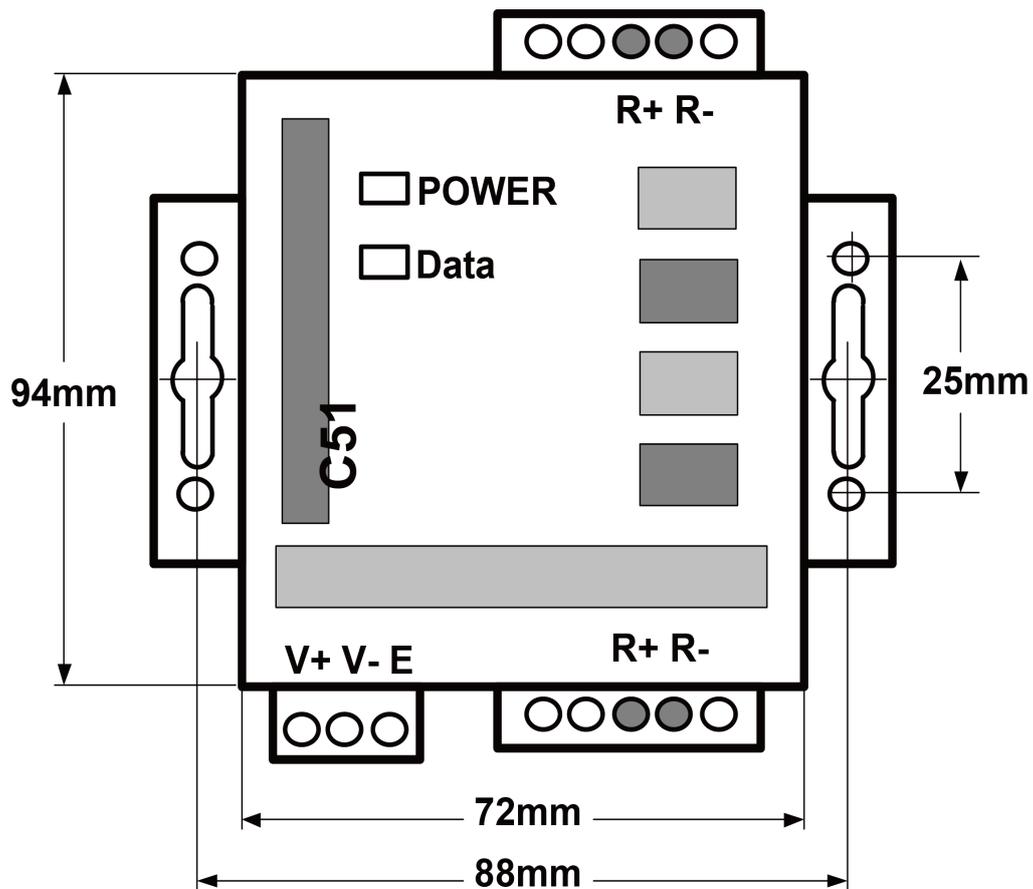
Note: the appearance shall subject to actual objects, the picture is for reference only.

1.2.4.3 Instruction for interface and indicator



No.	Interface name	Direction for use	Remark
1	Power interface	Input 12VDC/800mA	Power of the repeater shall be self-configured
2	Communication interface	Line A of RS485 shall be connected to R+ of wiring terminal 485 and line B shall be connected to R-	Refer to the specification
3	Power indicator	It is always ON after connecting to power	Refer to the specification
4	Communication indicator	Data LED will flash during normal communication	Refer to the specification

1.2.4.4 Product size



1.2.4.5 Notices for installation and usage

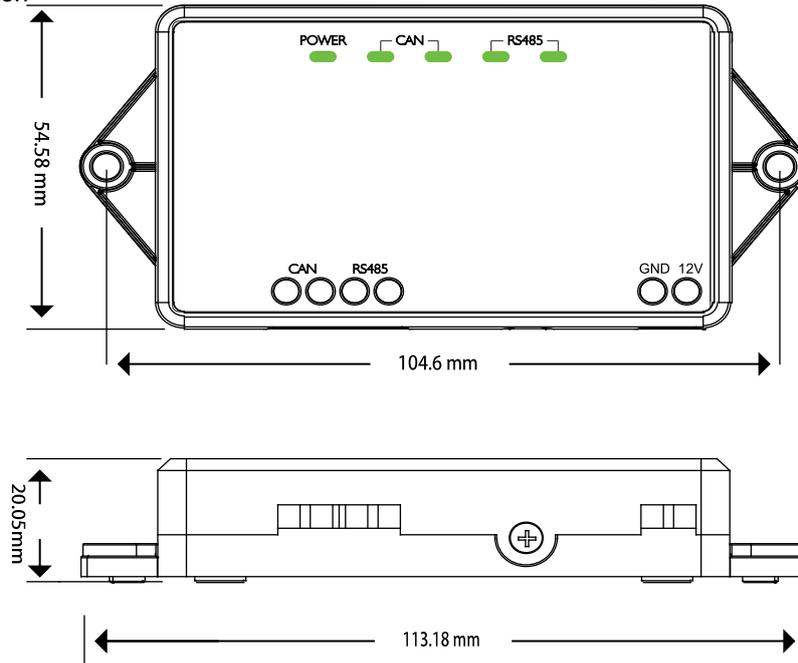
 It must be installed inside the room, avoid collision, exposure or rain. It's suggested to be placed with the computer inside the monitor room.

 The original equipment must be used, alternative products of the other models or brands are not allowed. Separate power supply is required, AC socket of 220V must be installed to supply power.

1.3 Device Installation

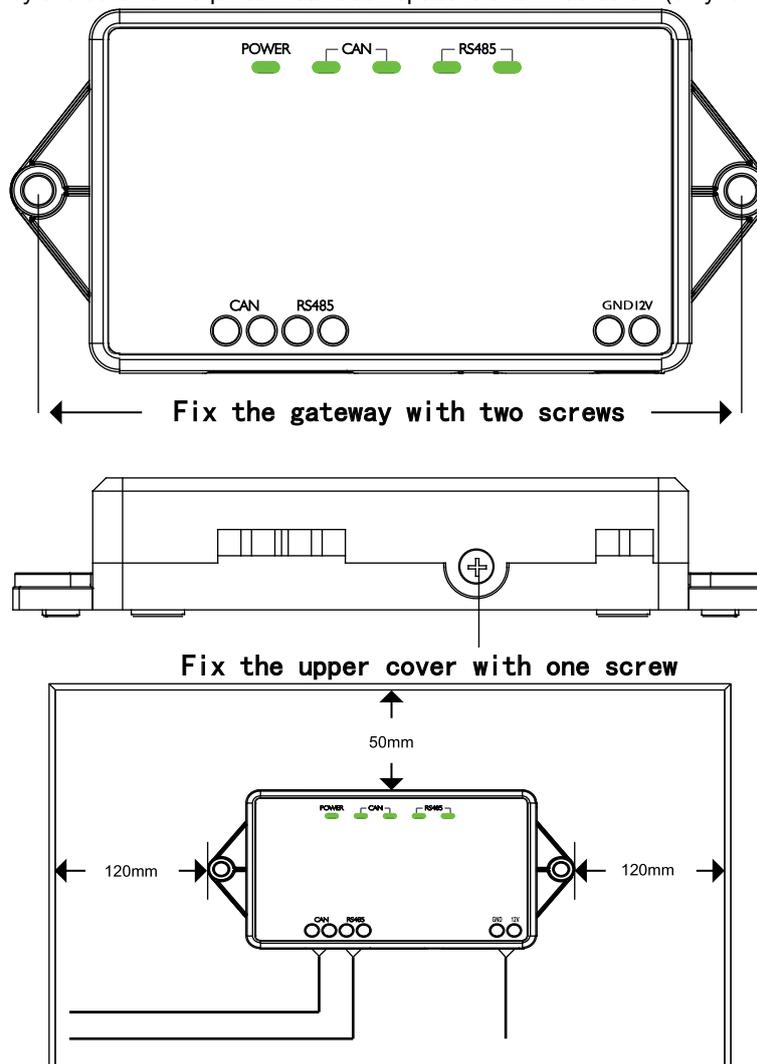
1.3.1 Product Dimension and Installation Space of Electric Control Cabinet

1.3.1.1 Product Dimension



1.3.1.2 Installation Dimension of Electric Control Cabinet

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



1.3.2 Communication Connection

Communication system of Modbus Gateway(Mini) includes:

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

1.3.2.1 Material Selection of Communication Cable

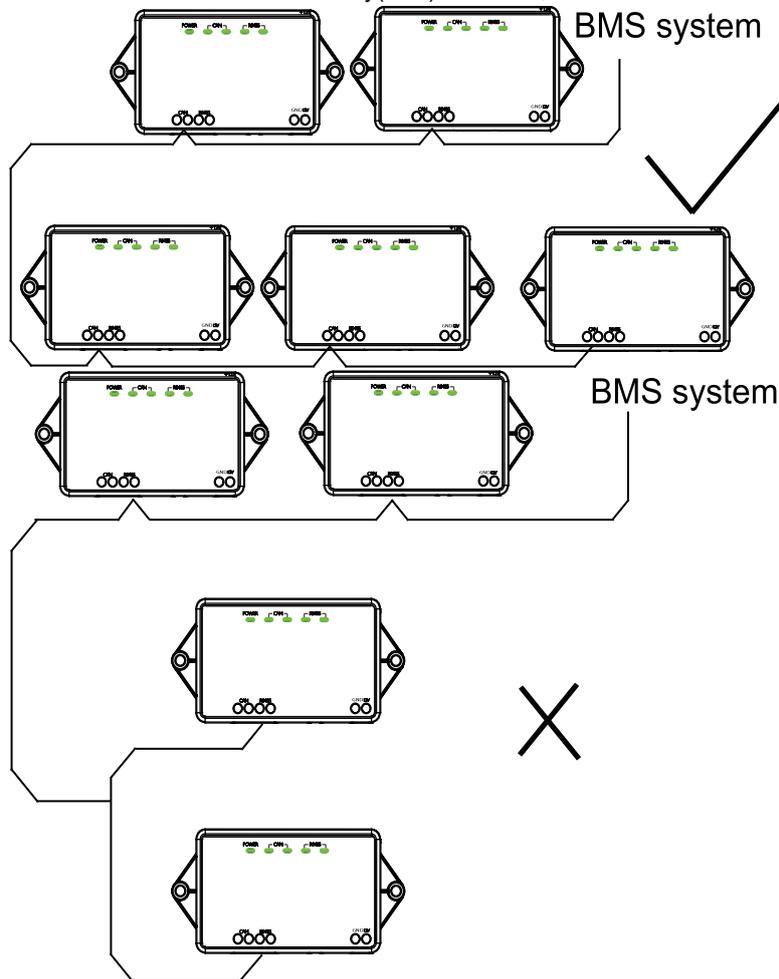
Communication system	Material of cable	Communication cable L(m)	Cable diameter (mm ²)	Material standard	Remark
Communication between Modbus Gateway(Mini) and BMS	Light/Ordinary PVC sheathed twisted pair copper wire(RVV)	L≤800	≥2×0.75	IEC60227-5:2007	When communication distance exceeds 800m, photoelectric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

1.3.2.2 Communication Connection Way

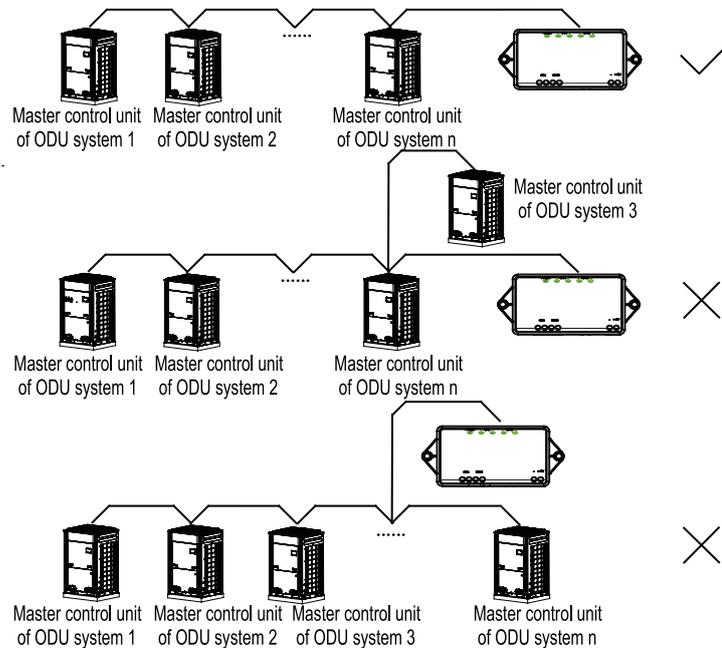


Notice! All communication cables of Modbus Gateway(Mini) must be connected in series instead of in star mode.

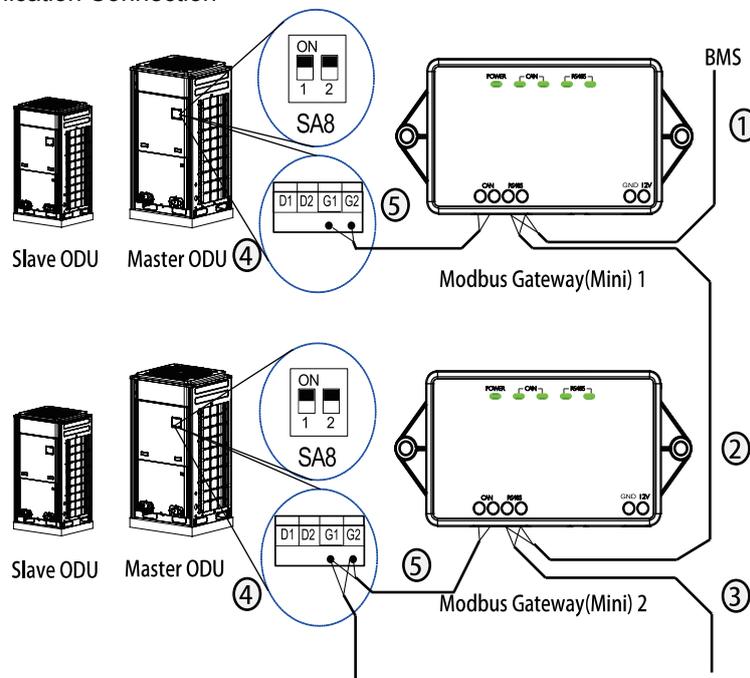
- (1) Communication connection between Modbus Gateway(Mini) and BMS;



- (2) Communication connection between Modbus Gateway(Mini) and air conditioner (n is air conditioner quantity, n≤16);



1.3.2.3 Setting of Communication Connection



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

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

Step 2: Connect the RS485 communication port of Modbus Gateway(Mini) (Modbus Gateway(Mini)1) with the RS485-communication port of the second Modbus Gateway(Mini) (Modbus Gateway(Mini)2 as shown in the figure) with communication cable; as shown in step ② in the figure.

Step 3: The other Modbus Gateway(Mini) shall be connected in series; as shown in step ③ in the figure.

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

Step 1: Confirm the master ODU that each Modbus Gateway(Mini) shall be connected (set master ODU with SA8 DIP). Please refer to “Communication connection between Modbus Gateway(Mini) 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(Mini) and the G1 and G2 port of wiring board of corresponding master ODU with communication cable, as shown in step ⑤ in the figure.

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

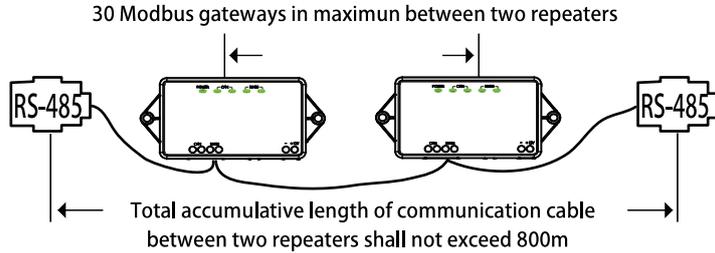
(3) Modbus Gateway(Mini) DIP setting:

Step one: Set address DIP of Modbus Gateway(Mini);

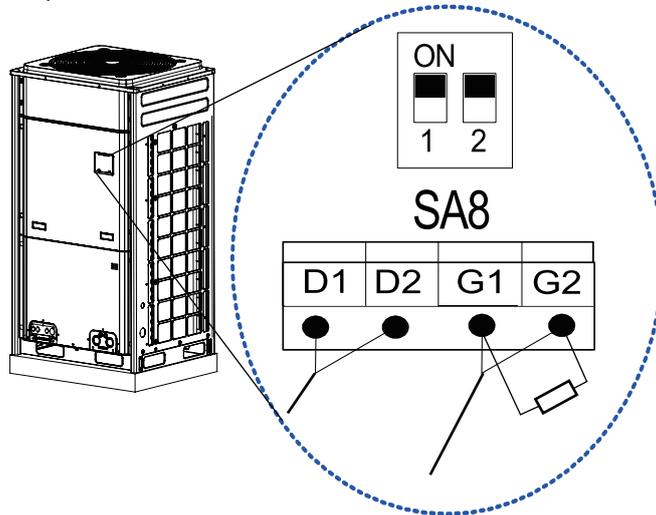
Step two: Refer to Chapter to set matching resistance of Modbus Gateway(Mini);

Note:

1. In Modbus bus, if the connected Modbus Gateway(Mini) 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 communication port of nearby Modbus Gateway(Mini).



2. In “The fourth switch of DIP switch S3——setting of CAN2 bus matched resistance”, the setting method of matched resistance of Modbus Gateway(Mini) 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 GMV5 DC inverter multi VRF are taken as example.



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

2 Debugging

2.1 Hardware Debugging

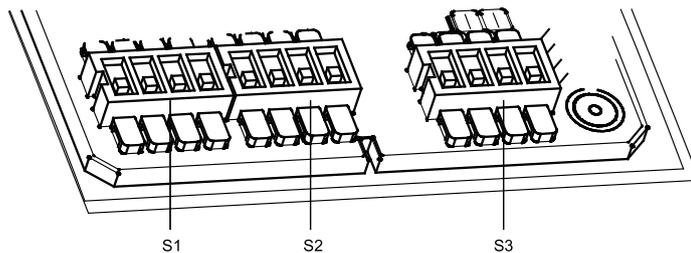
2.1.1 DIP Switches



Notice! Please set DIP switches before using this gateway. Re-energize the device after setting DIP switches.

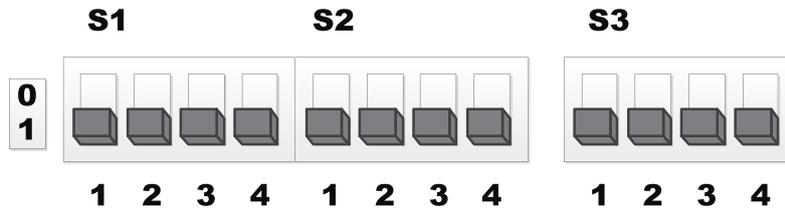
Otherwise this device cannot operate normally!

Setting area of Modbus gateway DIP switch is located inside the product, including address DIP switch and function DIP switch.



2.1.1.1 Setting of Address DIP Switch

(1) Address DIP switch consists of S1 and S2. S3 is function DIP switch.



2.1.1.2 Address DIP Switch S1,S2—Address Setting of Modbus Gateway

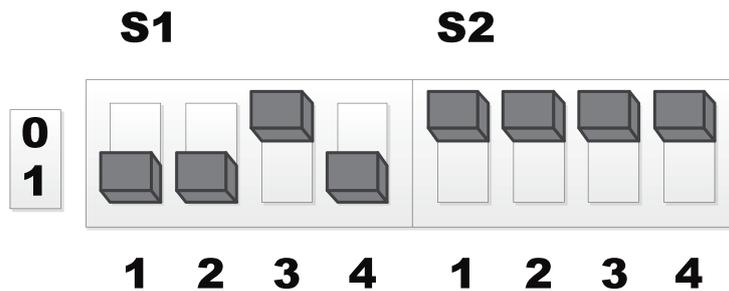


Notice! Please set the address DIP switches before using this gateway. The network DIP switch address of the same bus cannot be repeated, otherwise communication error may happen.

Modbus Gateway(Mini) address setting range: 1~255. Detailed DIP value please refer to the Address DIP Form.

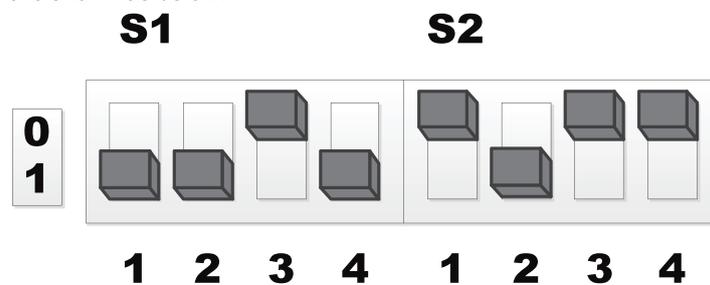
Address setting example:

Setting method of address 11 is shown as below:



Address DIP form								Value
Address								
1	2	3	4	5	6	7	8	
1	1	0	1	0	0	0	0	11

Setting method of address 43 is shown as below:



Address DIP form								Value
Address								
1	2	3	4	5	6	7	8	
1	1	0	1	0	1	0	0	43

2.1.1.3 The Fourth Switch of Function DIP Switch S3 - Setting of CAN2 Bus Matched Resistance



Notice!

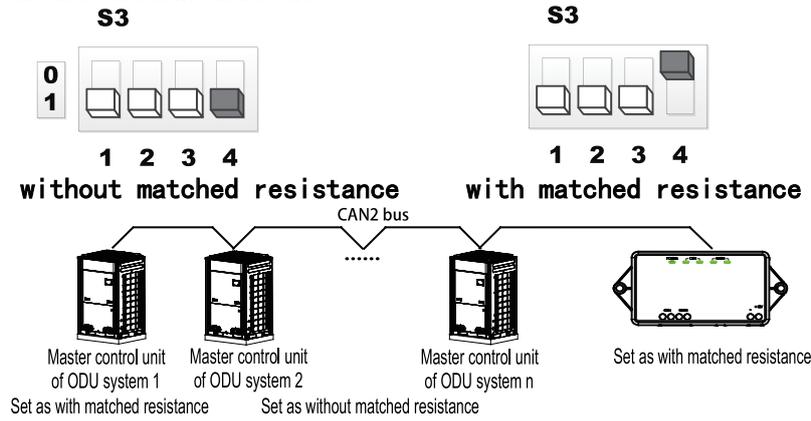
Notice! Master outdoor unit or gateway of the system which is at the end of CAN2 bus must be set as with the matched resistance, otherwise communication will be abnormal!

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

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

If the Modbus gateway is not at the end of CAN2 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:



n is ODU system quantity, $n \leq 16$.

2.1.1.4 The Third Switch of Function DIP Switch S3 - Setting of Modbus Bus Matched Resistance

! Notice! The third switch of function DIP switch is used for setting the matched resistance of this gateway in Modbus bus. Modbus bus: Detailed meaning please refer to topology introduction.

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

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

If the Modbus 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:



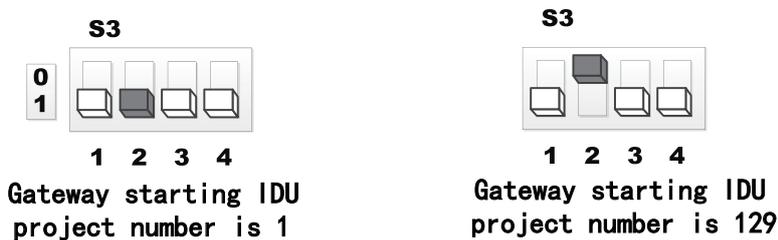
2.1.1.5 The Second Switch of Function DIP Switch S3 - Setting of gateway starting IDU project number

Gateway starting IDU project number means the IDU range that this gateway can be handled. The second switch of function DIP switch is used for setting the gateway starting IDU project number.

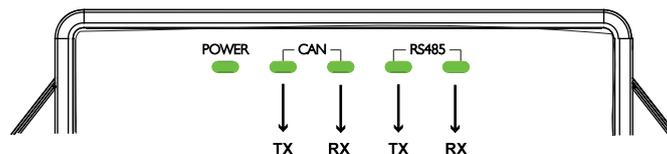
Gateway starting IDU project number is 1: this gateway can handle the IDU with project number from 1~128.

Gateway starting IDU project number is 129: this gateway can handle the IDU with project number from 129~255.

Setting diagram of gateway starting IDU project number DIP switch:



2.1.2 LED Display



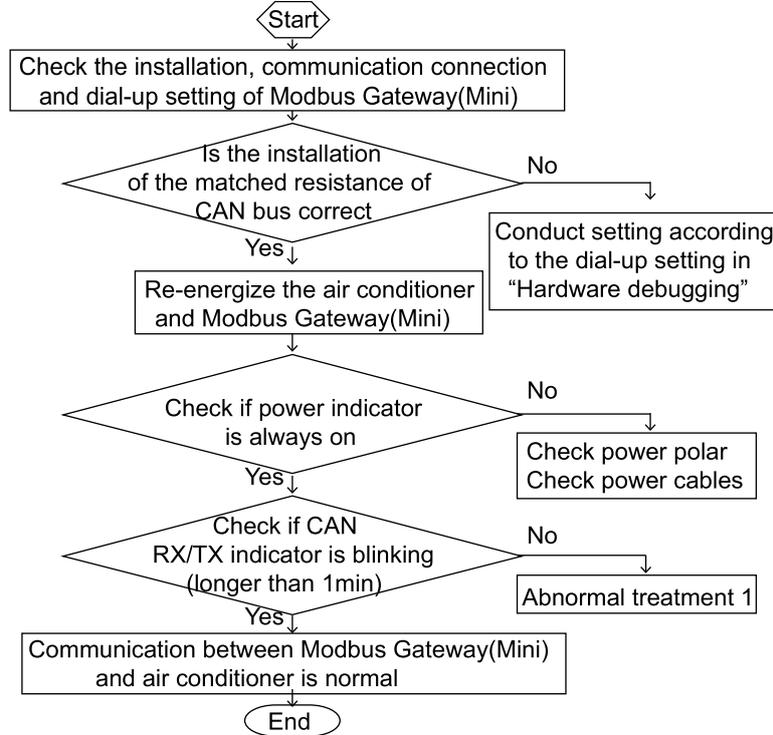
LED indicators shown in the above figure are divided into two parts: status indicators (power) and communication indicators (CAN, RS485). Operation status of each indicator is shown in the following table.

CAN	TX	When the data is transferred to the equipment (e.g. air conditioner) connected with Modbus Gateway(Mini), it will flash.
	RX	When the data from the equipment (e.g. air conditioner) connected with Modbus Gateway(Mini) is received, it will flash.

RS485	TX	When the data is transferred to the Modbus bus, it will flash.
	RX	When the data from the Modbus bus is received, it will flash.
Power		When power supply of Modbus Gateway(Mini) is normal, it will be always on.

2.2 Communication Debugging

2.2.1 Communication debugging with air conditioning equipment



2.2.2 Communication debugging for BMS system

Protocol interface : Modbus RTU protocol

Hardware interface : RS485

Baud rate : 9600

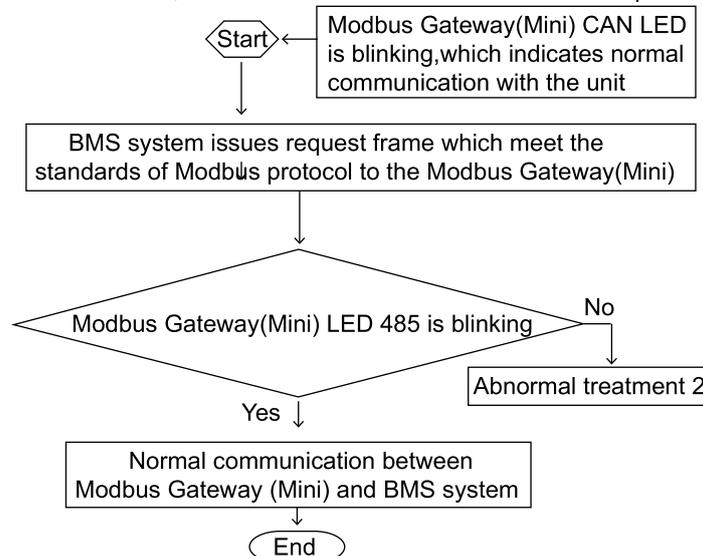
Start bit : 1

Data not : 8

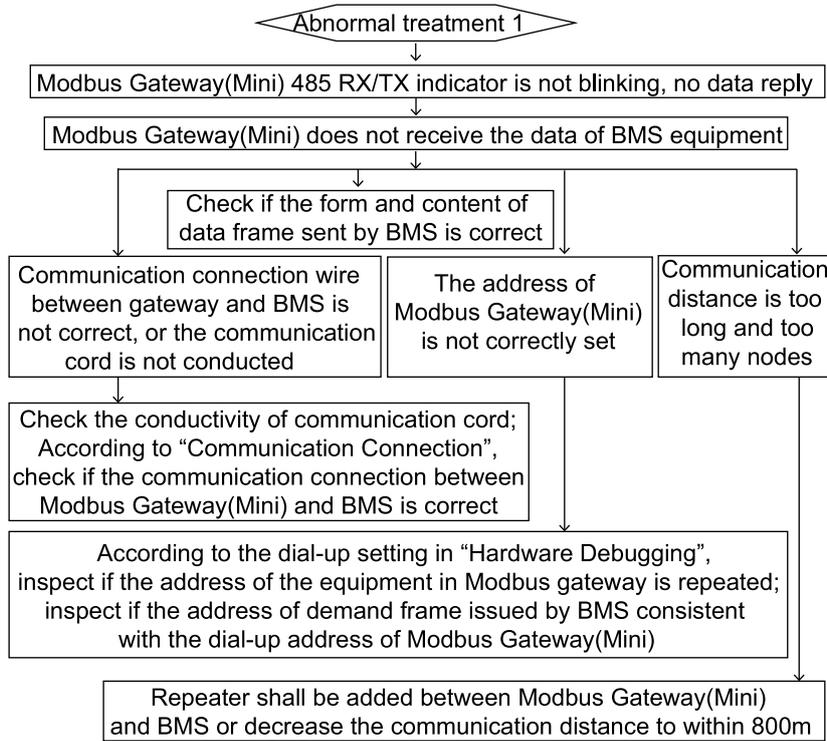
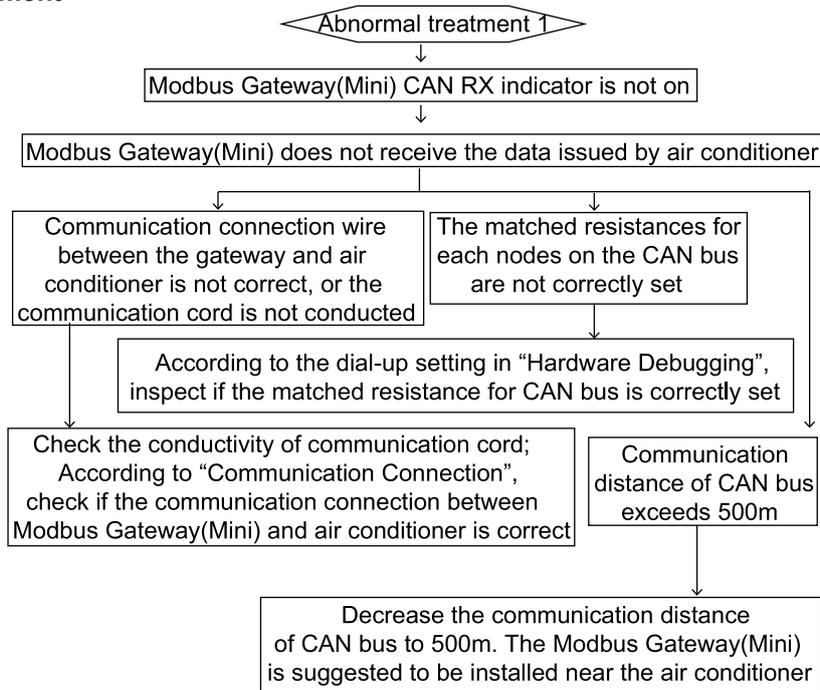
Parity check bit : None

Stop bit : 1

Please ask GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI for BMS communication protocol



2.2.3 Abnormal treatment



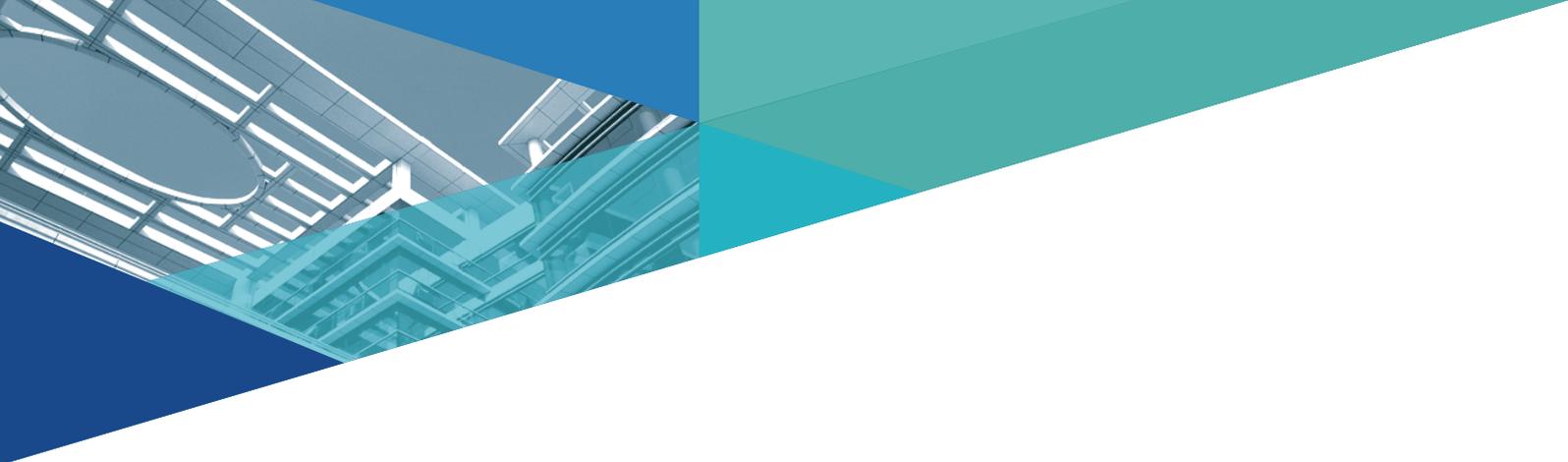
Note: For the above possible reasons and troubleshooting methods under abnormal treatment, if the problem is not solved, please contact related professionals of Gree.

3 Malfunction Treatment

3.1 Common troubleshooting for BMS

Malfunction	Possible reason	Troubleshooting
Communication error alarm occurs in BMS based on the provided protocol, operation status for some or all units is not demonstrated or controller	The communication cord is not twisted pair	Change the communication cord to twisted pair
	Modbus Gateway(Mini) is damaged	Replace the Modbus Gateway(Mini)
	Disconnection in communication cord	Weld the disconnected circuit
	Communication cord short circuit	Repair the short circuit
	The twisted pair is too close to the power cord (less than 15CM), communication error occur due to big disturbance	Conduct wiring separately for these two wires, shielded steel tube shall be added if the separation distance can't be more than 15CM

	Wrong connection in communication interface	Connect it according to the instruction of this manual
Circuit inspection is passed, but no information indication for all units or some units, communication error still exist in the software	Not energized after replacing chips for ODU or dial-up again	Re-energize it
	No matched resistance is connected	Conduct correct setting to the matched resistance
	Serial port number used for communication software is inconsistent with that connected to the computer	Replace the serial port or revise the serial port setting of the software
	Unit address added to the software is inconsistent with that of actual unit	Revise address setting for the software unit
	The unit is not energized	Energize the unit
	Chips are not inserted for ODU or IDU, or the insertion direction is opposite with actual direction	Re-check the inserted chips and re-insert it according to gap direction in PCB and re-energize it
	Wrong or repeated unit address	Revise the wrong unit address setting
Inspection for circuit, equipment and engineering installation is passed, however communication error still exist after energization.	Inconsistent displayer or controller is used	Check the controller and wired controller model of current unit, any inconsistent (if any) please ask the customer service staff for replacement



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