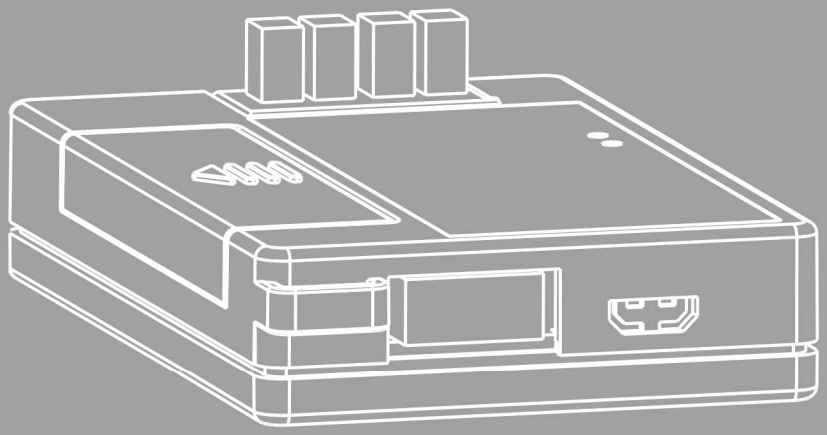
ACOND®

TECHNICAL & SERVICE MANUAL V5.0

—CONTROLLERS

Models: Control Box
B544(E)



4.4 Central Control Adaptor (B544(E))

1 Important Notice

Please read the Important Notice in these Installation Instructions supplied with the product, and perform installation in accordance with these instructions properly.

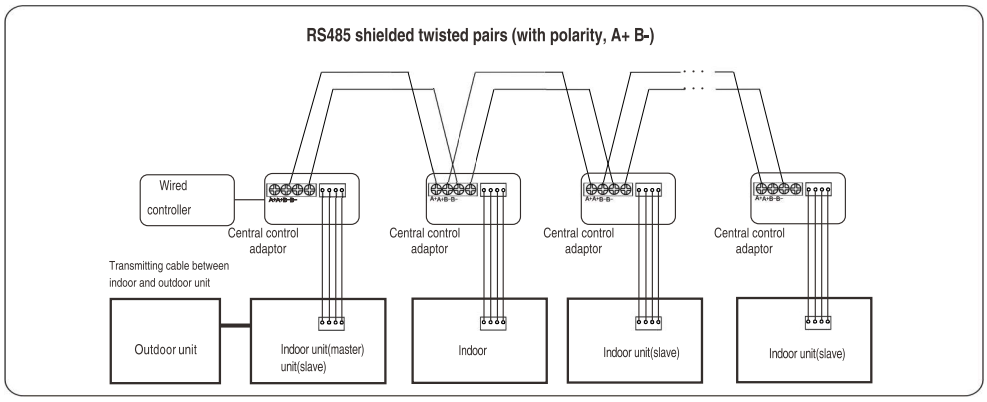
The central control adaptor is a dedicated device that can be directly connected with the indoor unit for converting communication protocols and connects the indoor unit to central control network.

Precautions for arrangement:

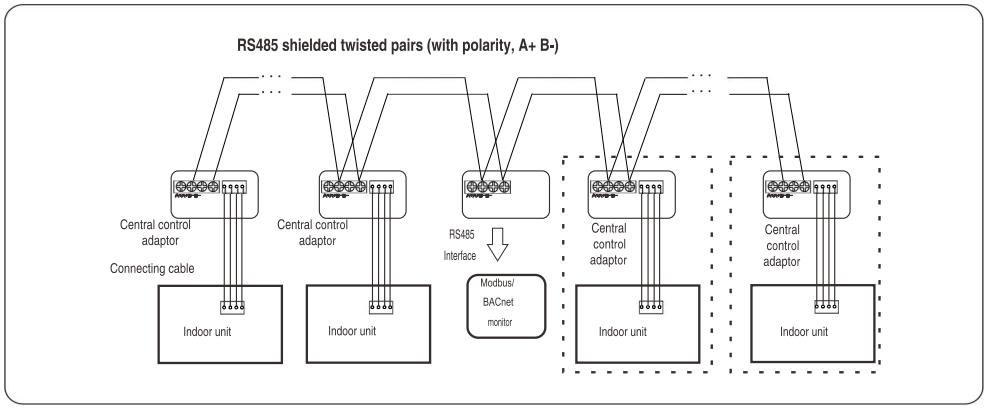
1. The design and installation of the central control adaptor should be performed under the unified planning for central control system. The installation location of the central adaptor, electrical distribution and wiring, address assignment, connection with Modbus monitor and indoor unit should be planned in advance.
2. Cables for central control and distribution lines shall not be too close to each other or routed in the same conduit. RS-485 bus should be arranged as far away from interference sources as possible, especially high voltage interference sources, such as transformer and frequency converter. For other relevant precautions, see the requirements for wiring of building automation system.
3. The equipment on either end of the group control bus must be provided with terminal-matched resistor.
4. The central control line must be configured as a daisy-chain bus topology. If a star-type or tree topology is required, it is recommended to use RS-485 hub and RS-485 repeater.
5. The central control adaptor should be installed close to the electronic control adaptor of the indoor unit.
6. The baud rate of the adaptor must be set the same with Modbus/ BACnet monitor.
7. The addresses for the central control adaptor should not be repeated.
8. The maximum allowable length of the connecting cable between the indoor unit and the central control adaptor is 40m, and the maximum allowable length of RS485 control cable is 1000m.

Wiring diagram

Wiring diagram for twin system



Wiring diagram for centralized control system (BACnet/ModBus)



NOTE: Be sure to insert the connecting cable into the wired controller port of indoor unit PCB board.
If you still have any trouble, please contact local service center of our company for further information.

4. Control BOX (B544(E))

❷ Checking accessories

Check and confirm that in addition to the central control adaptor product the following accessories are included in the packaging box.

Installation instructions	Connecting cable	Clamp	Double-sided tape
			
Qty.: 1	Qty.: 1	Qty.: 2	Qty.: 1

❸ How to install

1. Selecting the location where the appliance is to be installed.
Please install it in the ceiling and close to the electrical control adaptor of indoor unit.

2. Wiring connection

①Connection with indoor unit by connecting cable. As shown in Fig.1.

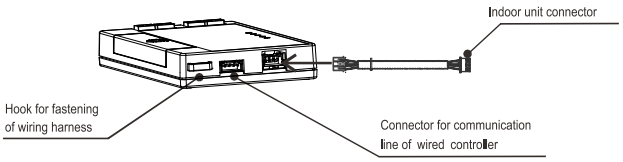


Fig. 1 Connection with indoor unit by connecting cable

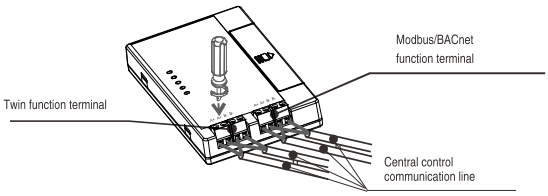


Fig. 2 Connection of central control communication line

② Connection of central control communication line, as shown in Fig. 2.

————	Type	Minimum Specifications
Central control communication line	Shielded twisted pairs	Cross-sectional area: $2\times0.75\ mm^2$

NOTE:
1. The above requirement for wiring is the minimum;
2. The central control communication line should be provided by users;
3. Correct polarity of the cable should be ensured during connection;
4. The cable should be reliably secured after connection is completed.

3. Setting of DIP Switches

Please set DIP switches according to the actual conditions. Settings after power on will not take effect.
Methods for setting DIP switches:
Before setting, slide down the cover on the central control adaptor. After setting, reinstall the cover to adaptor. As shown in Fig.3.

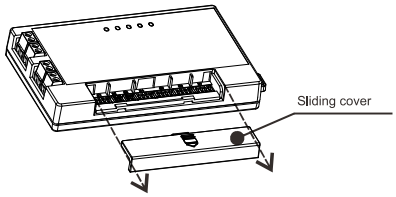
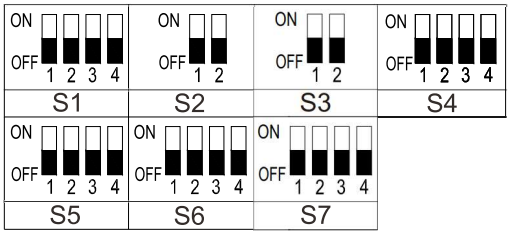


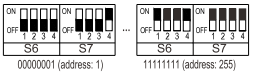
Fig. 3 Methods for setting DIP switches



Note: Symbol "■" indicates the position of the DIP switch.

System	DIP switch	Description	Setting method
Twin system	S1-1 S1-2	Indoor unit setting (hardware)	00: Slave Indoor 11: Master Indoor
	S1-3	Setting for terminal resistor	Be sure to set the position of the switch on either end of the central control system to "ON".
	S1-4	Setting when fuse is fail to work	Set the position of the switch to "ON" to restore the fuse.
	S4-1	Setting for specific products	Set the position of the switch to "ON" when using the following products: HCWA21NEHH HCWA22NEHH
	S4-2	Indoor unit setting (software)	0: Slave Indoor 1: Master Indoor
	S5	Slave indoor address/Number of slave indoors	When the central control adaptor is set as slave, S5 is set as slave address, which range is 1-15; When the central control adaptor is set as master, S5 is set as slaves' number, which range is 1- 15.

Note: 1. The slave indoor address must be incremented form1.
2. When the twin system is not used, set S4-2 and S5 off.

System	DIP switch	Description	Setting method
Centralized control system	S2-1	Setting for terminal resistor	Be sure to set the position of the switch on either end of the central control system to "ON".
	S2-2	Setting when fuse is fail to work	Set the position of the switch to "ON" to restore the fuse
	S3	Setting of baud rate	00: 9600bps(by default). 01: 19200bps; 10: 38400bps.
	S4-3 S4-4	Protocol selection	00: Not connected to centralized control syestem (default setting); 01: BACnet; 10: ModBus.
	S6 S7	Setting of BACnet/ ModBus addresses	S6: for setting high address(reserve); S7: for setting low addresses. Range of addresses: 1~255.  00000001 (address: 1) 11111111 (address: 255)

Note: 1. If the system is connected to C01T, the address should not be greater than16.
2. When the centralized control system is not used, set S4-3, S4-4, S6 and S7 off.

4. Securing the central control box

If necessary, use double-sided tape to secure the central control box onto the indoor unit after installation.

❹ MODEBUS Protocol

1.Function code

Address code: The address code is set by the DIP switch.

Function code: The function code is as follows:

Code	Function
01	Read Coils
02	Read Discrete Inputs
03	Read Holding Registers
04	Read Input Registers
05	Write Single Coil
06	Write Single Holding Register

2. Definition of registers

(1) Instruction of the registers

Coil and Hold Registers are for setting air conditioner parameters.

Discrete Inputs and Input Registers are for reading air conditioner status.

(2) Definition of registers as follows:

Read Discrete Inputs (Code 0x02)

No.	Object	Type	Addr	Value	Comment
00001	ON/OFF status	BI	0000	0-OFF/1-ON	
00002	Sleep status	BI	0003	0-OFF/1-ON	
00003	Electric heater status	BI	0004	0-OFF/1-ON	
00004	Energy-saving status	BI	0009	0-OFF/1-ON	
00005	Defrost status	BI	0010	0-No/1-Yes	
00006	Compressor status	BI	0011	0-OFF/1-ON	
00007	Super mode	BI	0014	0-No/1-Yes	
00008	Mute mode	BI	0015	0-No/1-Yes	

Read Input Registers (0x04)

No.	Object	Type	Reg Addr	Value	Comment
00001	Indoor temperature	AI	0001	-20-79	
00002	The setting temperature	AI	0002	18-32	
00003	Mode	MI	0007	FAN=00; HEAT=01; COOL=02; DRY=03; AUTO CODE=05; AUTO HEAT=06 AUTO FAN=07;	
00004	Fan speed	MI	0008	AUTO=00; HIGH=01 MIDDLE=03; LOW=02	
00005	Swing	MI	0009	NO SWING=0; LEFT/RIGHT=1; UP/DOWN=2; UP/DOWN/LEFT/RIGHT=3	
00006	Fault	MI	0012	1-255	See Error Code table
00007	Outlet air temperature	AI	0015	-20-79	

4. Control BOX (B544(E))

Write Coil (Code 0x05)

No.	Object	Type	Addr	Value	Comment
00001	ON/OFF setting	BV	0000	0-OFF/1-ON	
00002	Sleep setting	BV	0003	0-No/1-Yes	
00003	Electric heater setting	BV	0004	0-No/1-Yes	
00004	Energy-saving mode	BV	0009	0-No/1-Yes	
00005	Super mode	BV	0013	0-No/1-Yes	
00006	Mute mode	BV	0014	0-No/1-Yes	

Write Holding Registers (0x06)

No.	Object	Type	Addr	Value	Comment
00001	Temperature setting	AV	0000	18-32	
00002	Mode setting	MO	0002	FAN=00; HEAT=01; COOL=02; DRY=03; AUTO=04	
00003	Fan speed setting	MO	0003	AUTO=00; HIGH=01 MIDDLE=03; LOW=02	
00004	Swing setting	MO	0004	NO SWING=0; UP/DOWN=1 LEFT/RIGHT=2 UP/DOWN/LEFT/RIGHT=3	

❺ BACnet MSTP Protocol

1. Introduction

This document contains the Protocol Implementation Conformance Statement (PICS) and BACnet® Interoperability Building Blocks (BIBBs) for B544(E) as required by the American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ ASHRAE) Standard 135-2004, BACnet protocol.

The PICS is a written document created by the manufacturer of a device to identify the particular options specified in the BACnet standard and implemented in the device.

BACnet interoperability building blocks are collections of one or more BACnet services. This document includes a listing of the BIBBs currently.

2. Annex A - Protocol Implementation Conformance Statement (Normative)

Table 1: BACnet Protocol Implementation Conformance Statement

Vendor Name	ACOND Air-conditioning Corporation
Product Name	Central Control Adaptor
Product Model Numbers	B544(E)
Applications Software Version	1.0.0
Firmware Version	0.5.2
BACnet Protocol Revision	Version 1, Revision 4

Product Description

The B544(E) centrl control adaptor provides functionality to allow other BACnet devices to read and write properties of BACnet-enabled ACOND devices and objects.

BACnet Standardized Device Profile (Annex L)

- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **BACnet Building Controller (B-BC)**
- ☐ **BACnet Advanced Application Controller (B-AAC)**
- ☒ **BACnet Application Specific Controller (B-ASC)**
- ☐ **BACnet Smart Sensor (B-SS)**
- ☐ **BACnet Smart Actuator (B-SA)**

Note: Note:For a complete listing of the additional BIBBs supported (Annex K), see the *Annex K - BACnet Interoperability Building Blocks (BIBBs) (Normative) section of this document.*

Segmentation Capability

☐**Segmentation Requests Supported**	Window Size	127
☐**Segmentation Responses Supported**	Window Size	127

Standard Object Types Supported

The following is a list of the standard object types as defined by ASHRAE. Refer to the section of the supported object type for details.

☒ **Analog Input**	☐ **Life**
☒ **Analog Output**	☐ **Safety Point**
☒ **Analog Value**	☐ **Life Safety Zone**
☐ **Averaging**	☐ **Loop**
☒ **Binary Input**	☐ **Multistate Input**
☒ **Binary Output**	☐ **Multistate Output**
☒ **Binary Value**	☐ **Multistate Value**
☐ **Calendar**	☐ **Notification Class**
☐ **Command**	☐ **Program**
☒ **Device**	☐ **Schedule**
☐ **Event Enrollment**	☐ **Trend Log**
☐ **File**	
☐ **Group**	

4. Control BOX (B544(E))

Analog Input

Table 1: Analog Input

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Analog Output

Table 2: Analog output

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Analog Value

Table 3: Analog Value

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Binary Input

Table 4: Binary Input

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Binary Output

Table 5: Binary Output

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Binary Value

Table 6: Binary Value

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		Present Value

Device

Table 7: Device

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
☐	☐		

4. Control BOX (B544(E))

Data Link Layer Option

☐ ACnet Internet Protocol (IP) (Annex J)

☐ BACnet IP (Annex J), Foreign Device

☐ ISO 8802-3, Ethernet (Clause 7)

☐ ANSI/ATA 878.1, 2.5 MB ARCNET® network (Clause 8)

☐ ANSI/ATA 878.1, RS-485 ARCNET network (Clause 8), baud rates:

☒ Master-Slave/Token-Passing (MS/TP) master (Clause 9), baud rates: 9600,19200,38400

☐ MS/TP slave (Clause 9), baud rates: 9600,19200,38400

☐ Point-To-Point, EIA 232 (Clause 10), baud rates:

☐ Point-To-Point, modem (Clause 10), baud rates:

☐ LonTalk® protocol (Clause 11), medium:

☐ Other:

Device Address Binding

☐ Yes ☒ No **Is static device binding supported?** (required for two-way communication between MS/TP slaves and other devices) Networking Options

Networking Options

☐ Router, Clause 6: _____ Annex

☐ H, BACnet Tunneling Router over IP

☐ BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? ☐ Yes ☒ No

Character Sets Supported

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☒ ANSI X3.4	☐ IBM®/Microsoft® Double-Byte Character Set (DBCS)	☐ ISO 8859-1 Japanese
☐ ISO 10646 Universal Character Set-2 (UCS-2)	☐ ISO 10646 (UCS-4)	☐ Industrial Standard (JIS) C 6226

If this product is a communication gateway, describe the types of non BACnet equipment/network(s) that the gateway supports:

_____

2. Annex K - BACnet Interoperability Building Blocks (BIBBs)

(Normative)
Table 1 lists all the BIBBs which, per ANSI/ASHRAE Standard 135-2004, could be supported by a BACnet Specific Controller (B-ASC). The checked BIBBs are supported by B544(E).

Table 1: B544(E) BIBBs Support

Application Service (B-SS)	Designation	Support
Data Sharing - Read Property - A	DS-RP-A	☐
Data Sharing - Read Property - B	DS-RP-B	☒
Data Sharing - Read Property Multiple - A	DS-RPM-A	☐
Data Sharing - Read Property Multiple - B	DS-RPM-B	☐
Data Sharing - Write Property - A	DS-WP-A	☐
Data Sharing - Write Property - B	DS-WP-B	☒
Data Sharing - Write Property Multiple - A	DS-WPM-A	☐
Data Sharing - Write Property Multiple - B	DS-WPM-B	☐
Data Sharing - COV - Unsolicited - A	DS-COVU-A	☐
Data Sharing - COV - Unsolicited - B	DS-COVU-B	☒
Alarm and Event - Notification Internal - B	AE-N-I-B	☐
Alarm and Event - ACK - B	AE-ACK-B	☐
Alarm and Event - Information - B	AE-INFO-B	☐
Alarm and Event - Enrollment Summary - B Scheduling -	AE-ESUM-B	☐
External - B	SCHED-E-B	☐
Trending - Viewing and Modifying Trends Internal - B	T-VMT-I-B	☐
Trending - Automated Trend Retrieval - B	T-ATR-B	☐
Device Management - Dynamic Device Binding - A	DM-DDB-A	☐
Device Management - Dynamic Device Binding - B	DM-DDB-B	☒
Device Management - Dynamic Object Binding - A	DM-DOB-A	☐
Device Management - Dynamic Object Binding - B	DM-DOB-B	☒
Device Management - Device Communication Control - B	DM-DCC-B	☐
Device Management - Time Synchronization - B	DM-TS-B	☒
Device Management - UTC Time Synchronization - B	DM-UTC-B	☐
Device Management - Reinitialize Device - B Device	DM-RD-B	☐
Management - Backup and Restore - B	DM-BR-B	☐

Network Management - Connection Establishment - A NM-CE-A ☐

Figure 2 lists all the BACnet standard application services. The checked services are supported by B544(E).

Table 2: BACnet Standard Application Services Support (Part 1 of 2)

Application Service	Initiates Requests	Executes Requests
AcknowledgeAlarm	☐	☐
AddListElement	☐	☐
AtomicReadFile	☐	☐
AtomicWriteFile	☐	☐
ConfirmedCOVNotification	☒	☐
ConfirmedEventNotification	☐	☐
ConfirmedPrivateTransfer	☐	☐
ConfirmedTextMessage CreateObject	☐	☐
DeleteObject	☐	☐
DeviceCommunicationControl	☐	☐
Disconnect-Connection-To-Network	☐	☐
Establish-Connection-To-Network	☐	☐
GetAlarmSummary	☐	☐
GetEnrollmentSummary	☐	☐
GetEventInformation	☒	☐
I-Am	☐	☒
I-Am-Router-To-Network	☐	☐
I-Could-Be-Router-To-Network	☐	☐
I-Have	☐	☐
Initialize-Routing-Table	☐	☐
Initialize-Routing-Table-Ack	☐	☐
LifeSafetyOperation ReadProperty	☐	☒
ReadPropertyConditional	☐	☐
ReadPropertyMultiple ReadRange	☐	☐

Network Management - Connection Establishment - A	NM-CE-A	☐

Figure 2 lists all the BACnet standard application services. The checked services are supported by B544(E).

Table 2: BACnet Standard Application Services Support (Part 2 of 2)

Application Service	Initiates Requests	Executes Requests
ReinitializeDevice	☐	☐
RemoveListElement	☐	☐
SubscribeCOV	☐	☒
SubscribeCOVProperty	☐	☒
TimeSynchronization	☐	☒
UnconfirmedCOVNotification	☐	☐
UnconfirmedEventNotification	☐	☐
UnconfirmedPrivateTransfer	☐	☐
nconfirmedTextMessage	☐	☐
TCTimeSynchronization	☐	☐
VT-Close	☐	☐
VT-Data	☐	☐
VT-open	☐	☐
Who-Has	☐	☐
Who-Is	☐	☒
Who-Is-Router-To-Network	☐	☐
WriteProperty	☐	☒
WritePropertyMultiple	☐	☐

4. Control BOX (B544(E))

6 Object List

Device Instance: 10000 + Set address

Device MSTP MAC address:16+ Set address

Set address: Set at B544 dip switch

For example:

If the B544(E) dip switch address set to 2, this B544(E) in BACnet MSTP

Device Instance should be 10002, and the MAC address should be 18.

Alog input object

No.	Object	Type	Object Instance	Value	Comment
1	Indoor Temperature	AI	000001	-20-79	
2	Set Temperature	AI	000002	18-32	

Binary input object

No.	Object	Type	Object Instance	Value	Comment
1	ON/OF Status	BI	000000	0-Off/1-On	
2	SLEEP Status	BI	000003	0-No/1-Yes	
3	ELECTRICAL	BI	000004	0-No/1-Yes	

Multistate input object

No.	Object	Type	Object Instance	Value	Comment
1	Mode	MI	000001	FAN=00 HEAT=01 COOL=02 DRY=03 AUTO=04	
2	Fan	MI	000002	AUTO=00 HIGH=01 MIDDLE=03 LOW=02	
3	Swing	MI	000003	NO SWING=0 UP/DOWN=1 LEFT/RIGHT=2 UP/DOWN/LEFT/RIGHT=3	
4	Error	MI	000006	1-255	See Error

Analog valve object

No.	Object	Type	Object Instance	Value	Comment
1	Set Temperature	AV	000000	18-32	
2	SetHumiduty	AV	000001	0-100%	Reserved

4. Control BOX (B544(E))

Binary value object

No.	Object	Type	Object Instance	Value	Comment
1	ON/OFF	BV	000000	0-OFF/1-ON	
2	NET RESET	BV	000002	0-NO/1-YES	
3	SLEEP	BV	000003	0-NO/1-YES	
4	ELECTRICAL HEAT	BV	000004	0-NO/1-YES	

Multistate output object

No.	Object	Type	Object Instance	Value	Comment
1	MODE	MO	000000	FAN=00 HEAT=01 COOL=02 DRY=03 AUTO=04	
2	FAN	MO	000001	AUTO=00 HIGH=01 MIDDLE=03 LOW=02	
3	SWING	MO	000002	NO SWING=0 UP/DOWN=1 LEFT/RIGHT=2 UP/DOWN/LEFT/RIGHT=3	

5. Trouble Shooting

Please refer to the table below for the troubleshooting of the controller.

Error code	Error description	Possible reasons	How to deal with	Remarks
F0(240)	EEPROM communicating failure	Communication between EEPROM and MCU fails.	Change the wired controller	The unit can run.
F1(241)	Wired controller temperature sensor failure	Communication between temperature sensor and MCU fails.	Change the wired controller	The unit can run.
F2(242)	Wired controller clock IC failure	Communication between Clock IC and MCU fails.	Change the wired controller	The unit can run.
F3(243)	Wired controller humidity sensor failure	Communication between humidity sensor and MCU fails.	Change the wired controller	The unit can run.
F4(244)	Wired controller EEPROM data error	1.EE components fail; 2.EE components control circuit fails; 3.EE components are inserted incorrectly.	Change the wired controller	The unit can run.
FA	Brand error between indoor unit and wired controller	Connected to different brand wired controller.	Change the wired controller to the same brand with indoor unit	The unit will stop.
Fb	Error between slave indoor unit and simplified central controller	Communication Error between Slave IDU and simplified central controller	1. Reconnect the connection cable referring to the wiring diagram; 2. Reconnect the communication cable; 3. Replace the communication cable; 4. Replace the indoor control board; 5. Check the communication circuit, adjust the DIP switch	1. Only for simplified central controller 2. The unit will stop.
FC	Unbalanced distribution warming	Coil temperature difference between the master indoor unit and slave indoor unit is too big.	1. Check the installation height difference 2. Check the branch connection pipe. 3. Check the pipe lengh difference of each indoor unit.	1. Only for simplified central controller 2. The unit will stop.
Fd	Central controller communicating failure	Central controller can not find the wired controller or central control box correctly.	1. Reconnect the connection cable referring to the wiring diagram; 2. Reconnect the communication cable; 3. Replace the communication cable; 4. Replace the indoor control board; 5. Check the communication circuit, adjust the DIP switch	1. Only for central controller 2. The unit will stop.

5. Trouble Shooting

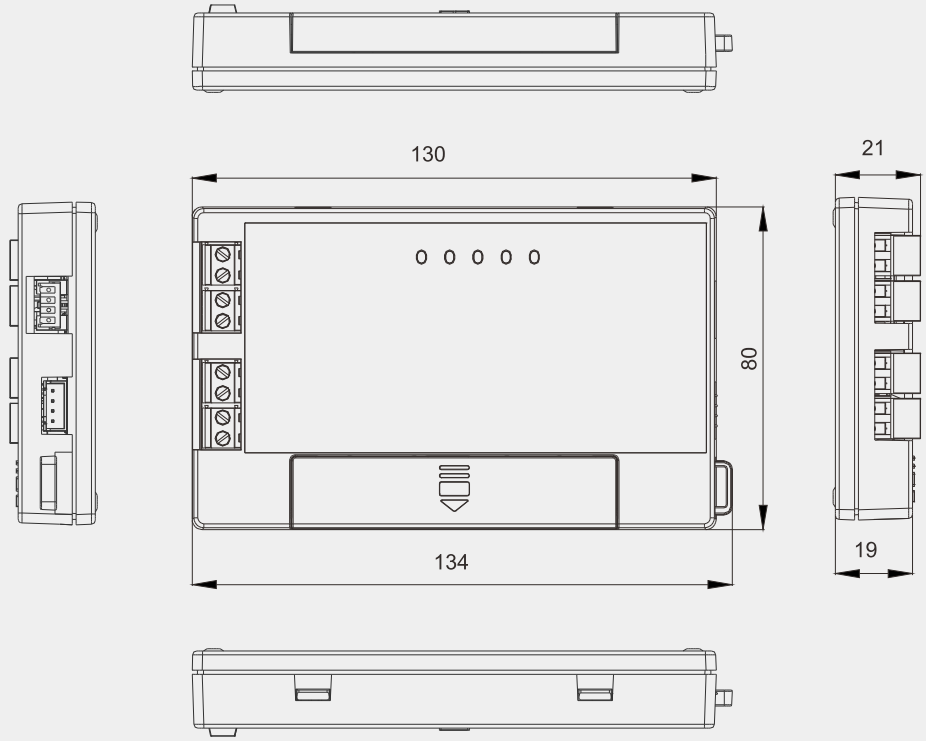
Error code	Error description	Possible reasons	How to deal with	Remarks
FE(254)	Communication between main control board &Wiring remote controller Fault (display on wiring remote controller)	1. The wiring between the wiring controller to the indoor control board connect loose; 2. The sequence of the wiring between the wiring controller to the indoor control board is wrong; 3. The wiring between the wiring controller to the indoor control board is failure; 4. The wiring controller is failure; 5. The indoor control board is abnormally.	1. Reconnect the wiring between the wiring controller to the indoor control board; 2.Replace the wiring between the wiring controller to the indoor control board; 3. Replace the wiring between the wiring controller to the indoor control board; 4. Replace the wiring controller; 5. Replace the indoor control Board.	The unit can run.
ER	Communication between main control board &display board Fault (displays on display board)	1. The wiring between the display board to the indoor control board connect loose; 2. The sequence of the wiring between the display board to the indoor control board is wrong; 3. The wiring between the display board to the indoor control board is failure; 4. The display board is failure; 5. The indoor control board is failure.	1.Reconnect the between the display board to the indoor control board; 2.Replace the wiring between the display board to the indoor control board; 3.Replace the wiring between the display board to the indoor control board; 4.Replace the display board; 5.Replace the indoor control board.	The unit can run.

Please check the relevant content in the TECHNICAL & SERVICE MANUAL for indoor&outdoor unit troubleshooting.

6. Outlines and Dimensions

B544(E)

(Unit: mm)



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Product improvement, specifications and appearance in this manual are subject to change without prior notice.