Installation

Variable Refrigerant Flow System

Convertible Air Handling Unit (CAHU) Controller

Models: 4TVCTRLAHU0001

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

December 2014

VRF-SVN075A-EN

Ingersoll Rand

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all PPE in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

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Table of Contents

Overview

This manual provides the following instructions for the VRF convertible air handling unit (CAHU) controller:

- Preparing for installation
- Installing
- Configuring
- Troubleshooting

Refer to the VRF Convertible *Air Handling Unit Installation, Operation and Maintenance* document, VRF-SVX038*-EN for additional information.

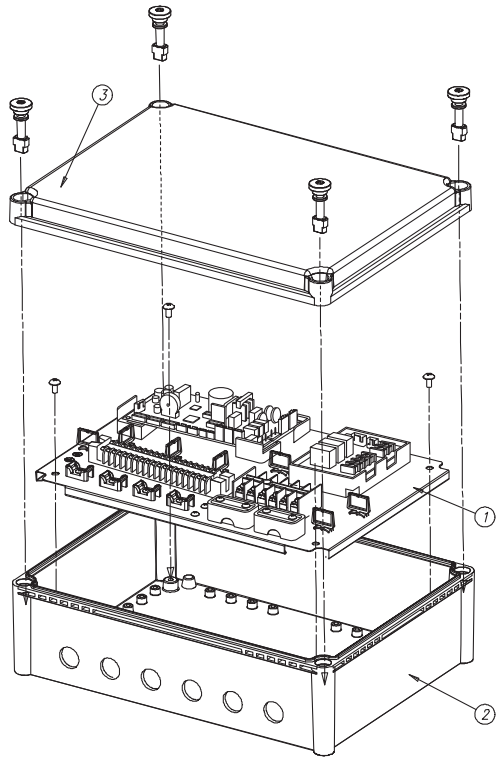
Preparing for installation

To ensure optimal efficiency and performance, verify that the correct installation option code is selected. See Table 4, digit 20.

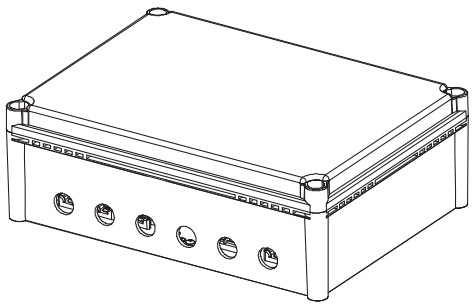
Components

See Figure 1 for a list of the components.

Figure 1. CAHU controller



No.	Components
1	Controller board
2	Box
3	Cover



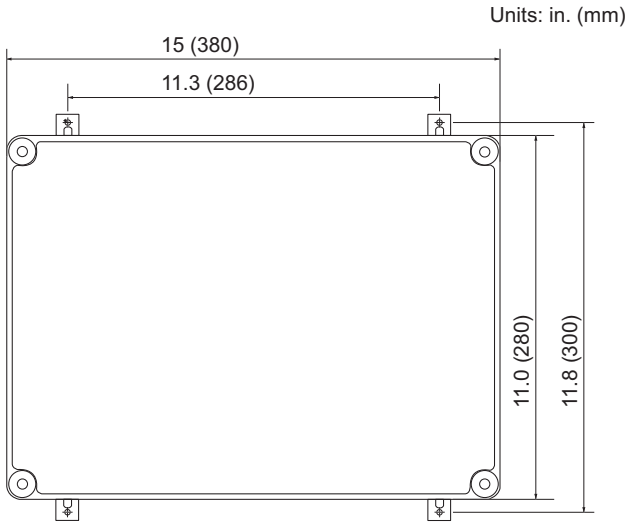
Installation

CAHU Controller

Follow all installation guidelines and procedures. Refer to the CAHU controller components, dimensions (Figure 2), and wiring diagrams.

- Install the controller no further from the CAHU than 20 ft. (6.1 m).
- Avoid installing the controller in a location that is exposed to direct sunlight or rain.

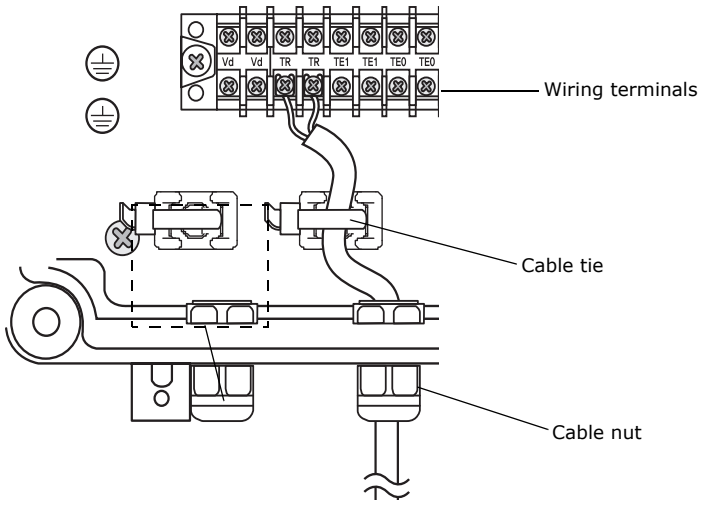
Figure 2. CAHU controller dimensions



1. Drill four holes at the correct positions in the wall and mount the controller securely to the wall with screws.
2. Open the box and connect the cables according to the wiring instructions in this manual (refer to "Wiring" p. 6).
3. Secure the cable firmly with a cable tie (see Figure 3).
4. Close the box cover and secure it with screws to ensure that the controller is fireproof.

Note: *When an external controller, a simple BAS, and a wired remote control are installed simultaneously, the CAHU kit does not have control priority; it operates according to the last request made. The simple BAS may not reflect the actual state of the CAHU if the last controller request to the CAHU was made by a true BAS or one of the other types of controllers.*

Figure 3. Wiring terminal connections



Wiring

Observe the following precautions when making electrical connections.

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

- Make all electrical connections in accordance with electrical codes and ordinances.
- Select the power cable in accordance with relevant local and national regulations.
- Wire size must comply with local and national code.
- Use grade H07RN-F or H05RN-F power cable.
- Connect the power cable into the power cable terminal and fasten it with a clamp.
- Connect the power cable to an auxiliary circuit breaker. An all-pole disconnection from the power supply must be incorporated in the field wiring (1/8 in. [3 mm]).
- Unbalanced power must be maintained within 10% of supply rating among whole indoor units.
- Significantly unbalanced power may shorten the life of the system. If the unbalanced power is greater than 10% of supply rating, the unit will stop and an error code will be generated.
- All wiring must be protected from weather and damage.
- Maintain a distance of 2 in. (50 mm) or more between power and communication cables to prevent interference.
- Maintain a voltage drop of less than 10% between the power source and the unit(s).

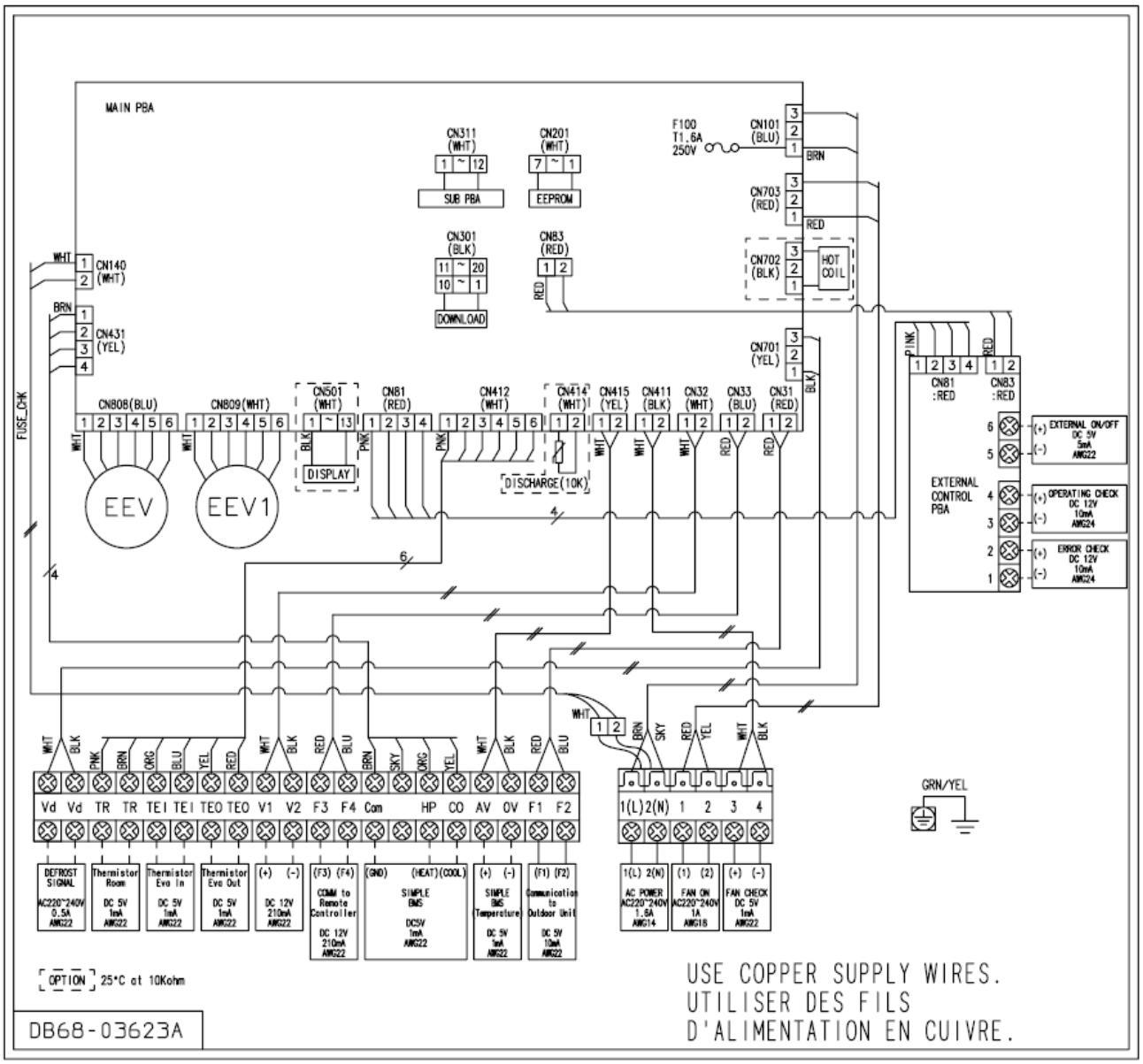
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.
- Tightening torque
  - M3 screws: 0.22–0.50 lbf·ft (3.0–7.0 kgf·cm)
  - M4 screws: 0.86–1.06 lbf·ft (12.0–14.7 kgf·cm)
- After making a knockout hole, apply rust-preventive paint to the bare metal around the hole.
- Secure the cable conduit to the outdoor knockout using the proper connector and bushing.
- Connect each CAHU to its own controller. Do not connect a CAHU controller to more than one CAHU.

CAHU Controller Wiring

Refer to Figure 4 below, Figure 5, p. 9, and Table 1, p. 10.

- Connect power cable (208–230 60 Hz) to terminals 1(L), 2(N).
- Connect the outdoor unit communication cable to terminals F1, F2.
- Connect the wired remote control to terminals F3, F4.

Figure 4. CAHU controller wiring diagram



Notes:

1. The dashed line indicates an optional device.
2. The AHU kit sensor has approximately 10 kΩ of resistance value at an indoor temperature of 77°F (25°C).

Figure 5. Controller wiring terminal connections

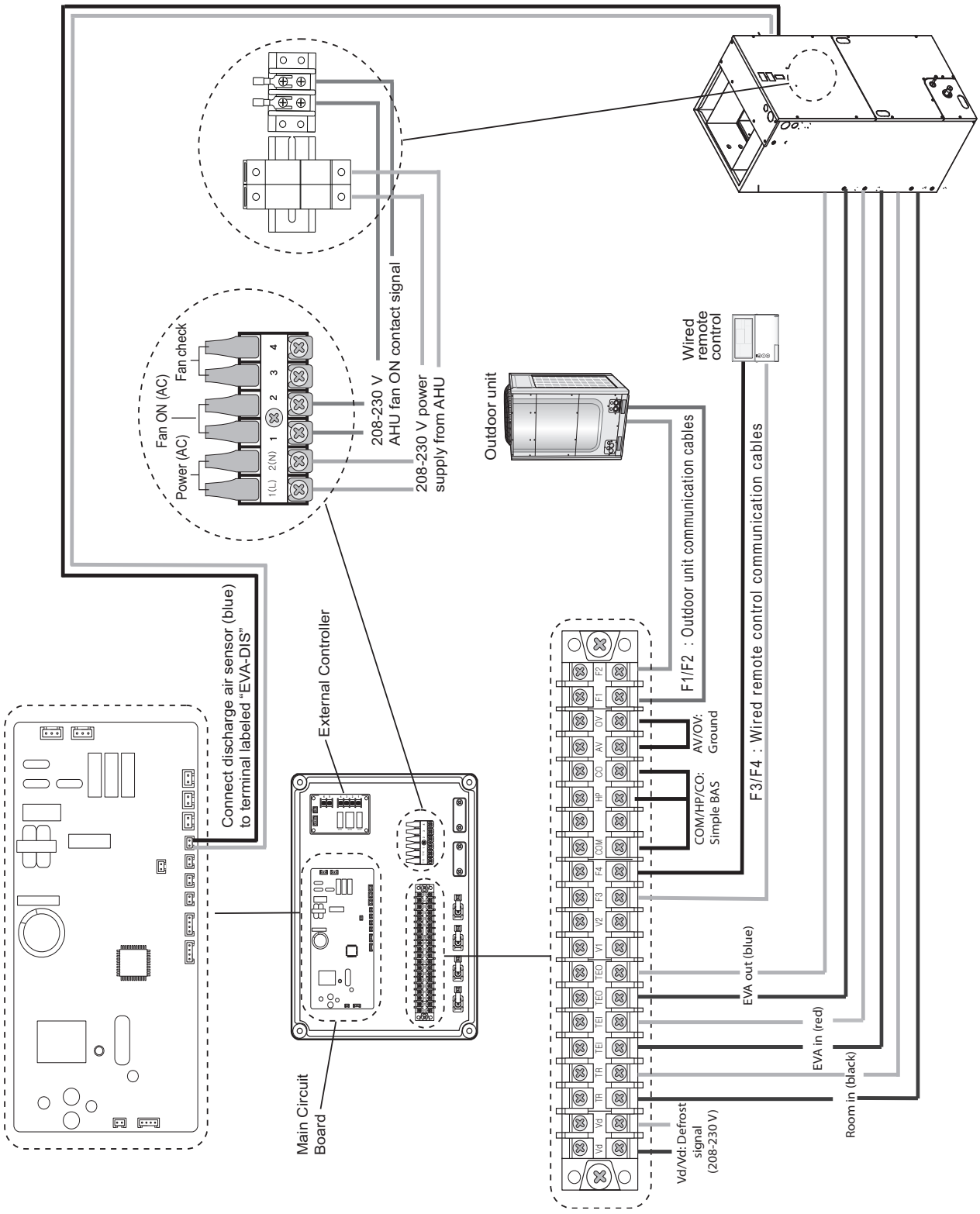


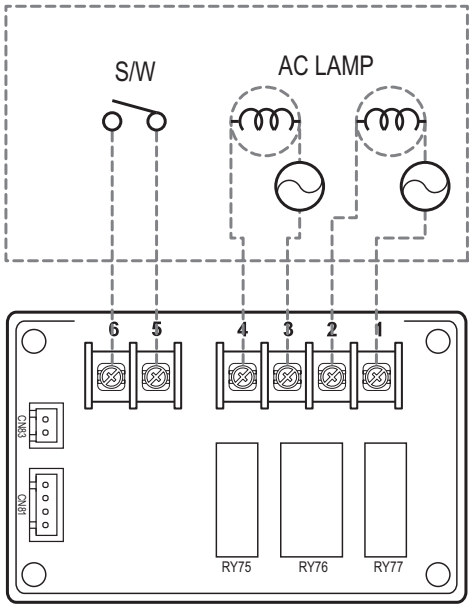
Table 1. CAHU wiring terminals

CAHU terminals	Description	Cable type	Specifications
Vd/Vd	Defrost signal	2 x 16 AWG (1.5 mm^2)	1 phase 208–230 Vac, 60 Hz
TR/TR	Thermistor, return air temperature sensor[a]	2 x 18 AWG (0.75 mm^2)	—
TEI/TEI	Thermistor, indoor coil inlet sensor (liquid pipe)[a]	2 x 18 AWG (0.75 mm^2)	—
TEO/TEO	Thermistor, indoor coil outlet sensor (liquid pipe)[a]	2 x 18 AWG (0.75 mm^2)	—
F3/F4	Communication to wired remote control	2 x 18 AWG (0.75 mm^2)	—
COM/HP/CO	Simple BAS		—
AV/0V	Simple BAS (temperature)	2 x 18 AWG (0.75 mm^2)	Simple BAS power
F1/F2	Communication to outdoor unit	2 x 18 AWG (0.75 mm^2)	—
L/N	Power supply	3 x 16 AWG (1.5 mm^2) or larger	1 phase 208–230 Vac, 60 Hz
1/2	Fan on	2 x 18 AWG (0.75 mm^2)	1 phase 208–230 Vac, 60 Hz
3/4	Fan check	2 x 18 AWG (0.75 mm^2)	Non-voltage contact signal

(a) Maximum length: 33 ft (10 m).

Figure 6 provides wiring details for the external controller, which is also shown in Figure 5.

Figure 6. External controller wiring and configuration



Terminal No.	Signal	Option (see Table 3, p. 15)
1, 2	Error check output	—
3, 4	Operation check output	Digit 15[a]
5, 6	On/Off input	Digit 14

(a) To enable the CAHU to be controlled by the external controller, digit 15 must be set to "1".

CAHU Controller Sequence of Operations

The sequence of operation for the CAHU controller is as follows:

- The controller uses an EEV to control the amount of refrigerant flow.
- The controller controls the system through the outdoor unit and the wired remote control.
- The controller operates the contact signal for CAHU fan operation. Terminals 1 and 2 operate the AHU fan ON contact signal (208–230 V) for CAHU when operating in Cool/Heat/Fan mode.

  Note: *The CAHU fan ON contact signal output cannot be used as the power supply for the motor.*
- Terminals 3 and 4: The CAHU controller receives the fan operation status through these terminals. This input signal should be a simple OPEN/CLOSE signal with no extra voltage.
  - When the fan is operating normally, terminals 3 and 4 are CLOSED.
  - When the fan is not operating, terminals 3 and 4 are OPEN.

  Note: *To use fan feedback to protect your system, set digit 21 to "1." (see Table 4, p. 17).*

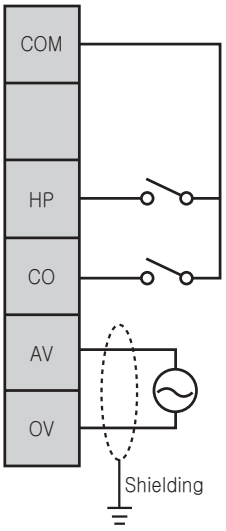
Simple BAS

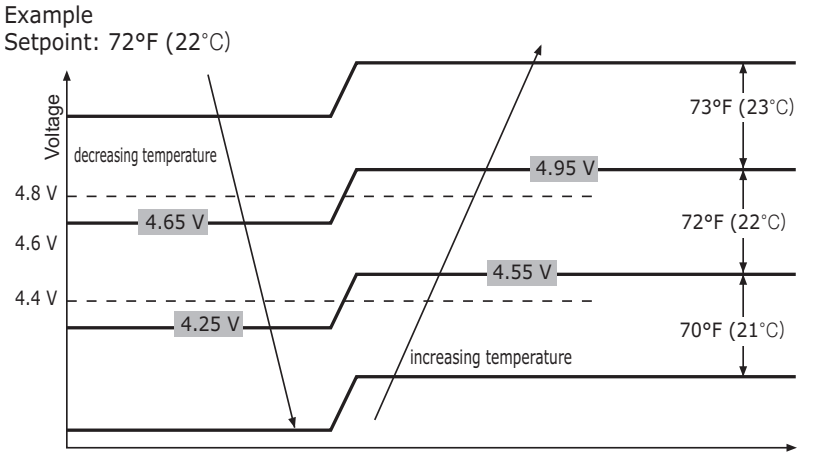
NOTICE

Equipment Damage!

A simple BAS must be connected to a DC power supply. Never connect a simple BAS to an AC power supply or the equipment will be damaged.

Figure 7. Simple BAS wiring diagram





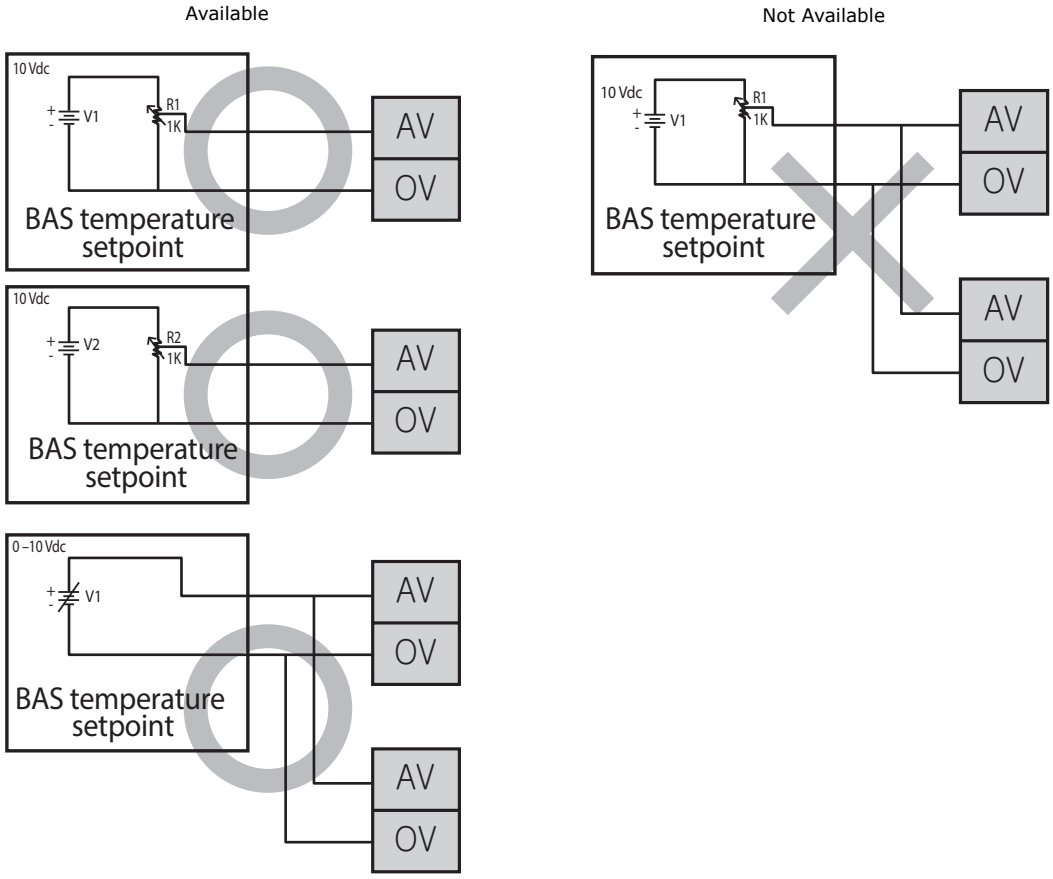
Note: Hysteresis is applied across the voltage range in order to stabilize the analog input. The amount of hysteresis: 0.15 V.

Table 2. Operational voltage range in relation to temperature setpoint

Simple BAS voltage range	Heating Temperature setpoint	Cooling temperature setpoint
	°F (°C)	°F (°C)
10.0–9.6 V	86.0 (30)	86.0 (30)
9.6–9.2 V	86.0 (30)	86.0 (30)
9.2–8.8 V	86.0 (30)	86.0 (30)
8.8–8.4 V	86.0 (30)	86.0 (30)
8.4–8.0 V	86.0 (30)	86.0 (30)
8.0–7.6 V	86.0 (30)	86.0 (30)
7.6–7.2 V	84.2 (29)	84.2 (29)
7.2–6.8 V	82.4 (28)	82.4 (28)
6.8–6.4 V	80.6 (27)	80.6 (27)
6.4–6.0 V	78.8 (26)	78.8 (26)
6.0–5.6 V	77.0 (25)	77.0 (25)
5.6–5.2 V	75.2 (24)	75.2 (24)
5.2–4.8 V	73.4 (23)	73.4 (23)
4.8–4.4 V	71.6 (22)	71.6 (22)
4.4–4.0 V	69.8 (21)	69.8 (21)
4.0–3.6 V	68.0 (20)	68.0 (20)
3.6–3.2 V	66.2 (19)	66.2 (19)
3.2–2.8 V	64.4 (18)	64.4 (18)
2.8–2.4 V	64.4 (18)	64.4 (18)
2.4–2.0 V	64.4 (18)	64.4 (18)
2.0–1.6 V	64.4 (18)	64.4 (18)
1.6–1.2 V	64.4 (18)	64.4 (18)
1.2–0.8 V	64.4 (18)	64.4 (18)
0.8–0.4 V	64.4 (18)	64.4 (18)
0.4–0.0 V	64.4 (18)	64.4 (18)

Setting the Temperature

- Simple BAS power supply: 10 ± 0.2 V.
- If the simple BAS uses variable resistor (VR), make the electric resistance of VR under 1 kΩ.
- Simple BAS using variable resistor (VR) needs to be connected in parallel to the CAHU kit.
- If it is necessary for one simple BAS to control several AHU kits, ensure that the simple BAS has adequate outputs.



Configuration

Use the Technician Utility T00l (TUT) to change the configuration of the CAHU according to the following procedure:

1. At the Indoor Unit Option Writer screen on the TUT, select the desired option codes by referring to Table 3, p. 15 and Table 4, p. 17.

   In addition, use the following table and notes to determine which digits can be modified.

2. For Installation Option #2, Digit 20 must be field set to identify the capacity of the unit. See Table 4, Digit 20.

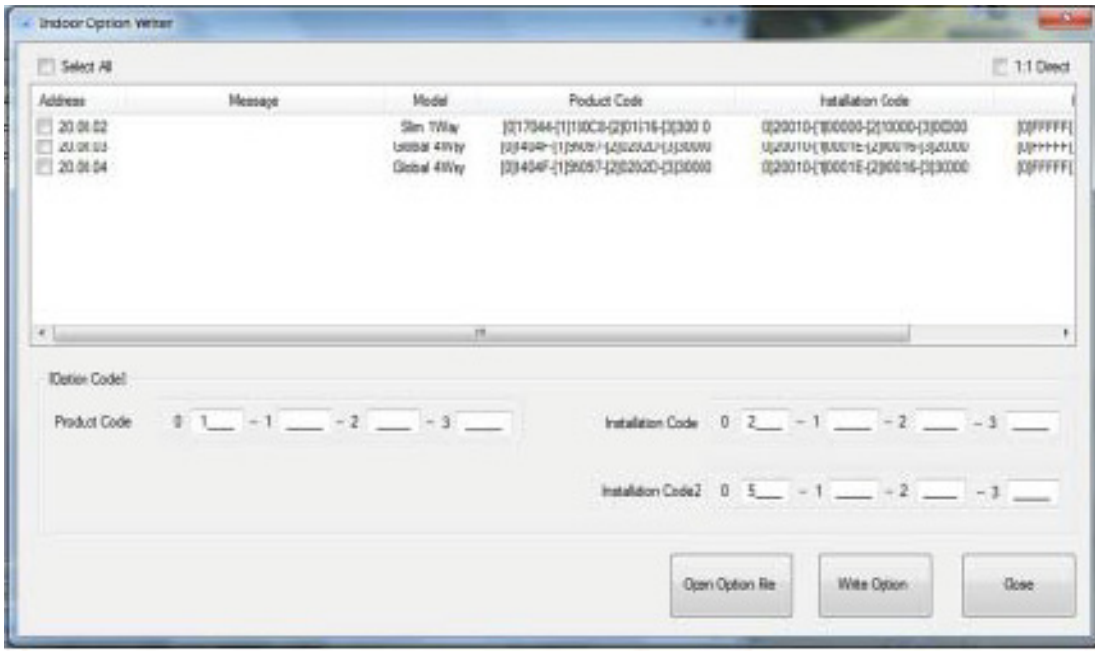
Digit	1	2	3	4	5	6	7	8	9	10	11	12
Installation Option #1	[0]	2	0	0	1	0	[1]	0	0	0	0	0
Installation Option #2	[0]	5	0	0	0	0	[1]	0	0	0	0	0

Digit	13	14	15	16	17	18	19	20	21	22	23	24
Installation Option #1	[2]	0	0	0	0	0	[3]	0	0	0	0	0
Installation Option #2	[2]	0	0	0	0	0	[3]	0	0	0	0	0

Notes:

1. Digits 1, 7, 13 and 19 (in brackets) are factory set and cannot be changed.
2. For Installation Option #1, digit 2 will always be "2". See Table 3 for the option code settings.
3. For Installation Option #2, digit 2 will always be "5". See Table 4 for the option code settings.
4. Digits shown in black boxes should always be set to "0".

3. To save your settings, select the **Write Option** button. See the figure below for an example of the Indoor Unit Option Writer screen on the TUT.



Installation Option #1

With Installation Option #1, **digit 2** is set to "**2**". The options shown in Table 3 can then be set to the values in the right column.

Table 3. Option setting mode: Digit 2 = 2

Digit	Option	Set digit to...
1	Factory set to 0.	Cannot be changed. Not seen in configuration mode.
2	Option setting mode	2
3	Robot cleaning	Not available. Factory set to 0.
4	Remote temperature sensor/ minimizing fan operation when thermostat is Off	**Remote temperature sensor** / **Minimizing fan operation when thermostat is Off** 0: Disable / Disable 1: Enable / Disable 2: Disable / Enable (a) 3: Enable / Enable (a) (a) Minimizes fan operation when thermostat is turned Off. Fan operates for 20 seconds at an interval of 5 minutes in Heat mode.
5	Central control	0: Disabled 1: Enabled
6	RPM up	0: Disabled 1: Enabled
7	Factory set to 1.	Cannot be changed. Not seen in configuration mode.
8	Drain pump	0: Disabled 1: Enabled (no delay) 2: Enabled (3-min delay)
9	Water heater	Not available. Factory set to 0.
10	Electronic heater	Not available. Factory set to 0.
11	EEV position when heating is satisfied	0: EEV step is minimum (default) 1: Reduced noise setting
12	Master/Slave unit designation[a]	0: Slave 1: Master
13	Factory set to 2	Cannot be changed. Not seen in configuration mode.
14	External controller—CAHU	0: Disabled 1: On/Off control 2: Off-only control
15	External controller output[b]	**External controller output** / **External heater On/Off signal** 0: Thermostat on / N/A 1: Operation on / N/A 2: N/A / Enable[a] (a) The fan runs continually when the external heater is On.
16	S-plasma ion	Not available. Factory set to 0.
17	Buzzer	0: Enabled 1: Disabled
18	Filter timer (hours of use)	2: 1000 6: 2000
19	Factory set to 3	Cannot be changed. Not seen in configuration mode.
20	Associating wireless remote control with indoor unit(s)	0, 1: Channel 1 2: Channel 2 3: Channel 3 4: Channel 4

Table 3. Option setting mode: Digit 2 = 2 (continued)

Digit	Option	Set digit to...
21	Heat setting compensation	**Heat setting compensation** / **Removing condensate in heating mode** 0: Default[a] / Disable 1: 3.6°F (2°C) / Disable 2: 9°F (5°C) / Disable (a) Default setting value: 3.6°F (2°C)
22	EEV step of stopped unit during oil return/defrost mode	0: EEV step is minimum 1: Oil return or reduce noise in defrost mode
23	Motion detection sensor	Not available. Factory set to 0.
24	N/A	—

(a) Digit 12: For heat pump systems, the master indoor unit controls whether the system operates in heating or cooling. If the master indoor unit calls for heating and slave indoor units calls for cooling, the master indoor unit (and any other slave indoor units that call for heating) will operate in heating mode. The slave indoor units that call for cooling will do nothing.
(b) Digit 15 requires that an external contact interface module be connected. Refer to VRF-SVN54.

Installation Option #2

With Installation Option #2, **digit 2** is set to "**5**". The options shown in Table 4 can then be changed to the values in the right column.

Table 4. Option setting mode: Digit 2 = 5

Digit	Option	Set digit to...
1	Factory set to 0	Cannot be changed. Not seen in configuration mode.
2	Option setting mode	5
3	Auto-changeover (HR only)	0: Disabled 1: Enabled
4	Heating deadband ***Note:*** *Applies only when digit 3 is set to "1" (auto-changeover mode is enabled). See Figure 8.*	0: Disabled 1: 0.9°F (0.5°C) 2: 1.8°F (1°C) 3: 2.7°F (1.5°C) 4: 3.6°F (2°C) 5: 4.5°F (2.5°C) 6: 5.4°F (3°C) 7: 6.3°F (3.5°C)
5	Cooling deadband ***Note:*** *Applies only when digit 3 is set to "1" (auto-changeover mode is enabled). See Figure 8.*	0: Disabled 1: 0.9°F (0.5°C) 2: 1.8°F (1°C) 3: 2.7°F (1.5°C) 4: 3.6°F (2°C) 5: 4.5°F (2.5°C) 6: 5.4°F (3°C) 7: 6.3°F (3.5°C)
6	Standard for auto-changeover (heating to cooling) ***Note:*** *Applies only when digit 3 is set to "1" (auto-changeover mode is enabled). See Figure 8.*	0: 1.8°F (1°C) 1: 2.7°F (1.5°C) 2: 3.6°F (2°C) 3: 4.5°F (2.5°C) 4: 5.4°F (3°C) 5: 6.3°F (3.5°C) 6: 7.2°F (4°C) 7: 8.1°F (4.5°C)
7	Factory set to 1	Cannot be changed. Not seen in configuration mode.
8	Standard for auto-changeover (cooling to heating) ***Note:*** *Applies only when digit 3 is set to "1" (auto-changeover mode is enabled). See Figure 8.*	0: 1.8°F (1°C) 1: 2.7°F (1.5°C) 2: 3.6°F (2°C) 3: 4.5°F (2.5°C) 4: 5.4°F (3°C) 5: 6.3°F (3.5°C) 6: 7.2°F (4°C) 7: 8.1°F (4.5°C)
9	Time required for mode change **Note:** Applies only when digit 3 is set to "1" (auto-changeover mode is enabled).	0: 5 minutes 1: 7 minutes 2: 9 minutes 3: 11 minutes 4: 13 minutes 5: 15 minutes 6: 20 minutes 7: 30 minutes
10	Compensation option for height or pipe length difference between indoor units	0: Use default value 1: Use when height or pipe length difference is as specified.[a] 2: Use when height or pipe length difference is as specified.[b]
11–17	N/A	

Table 4. Option setting mode: Digit 2 = 5

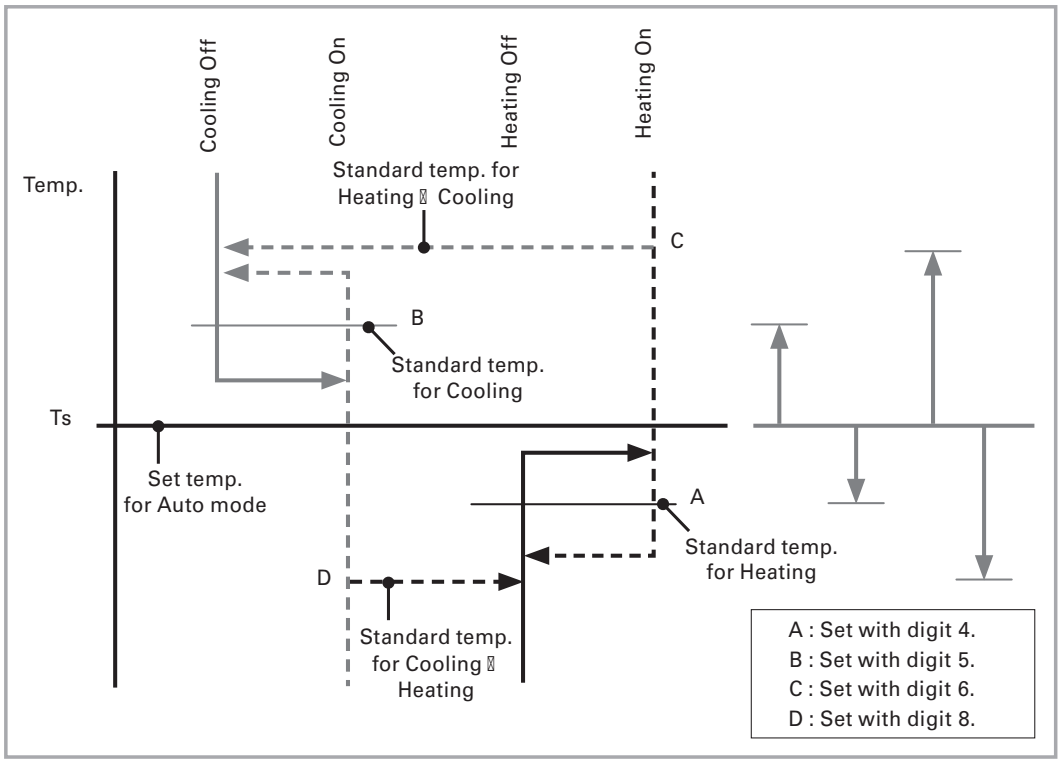
<table>
<tr><th>Digit</th><th>Option</th><th>Set digit to...</th></tr>
<tr><td>18[c]</td><td>Controller variables for auxiliary heater</td><td>
<table>
<tr><th></th><th>Set temperature for auxiliary heat On</th><th>Time delay for auxiliary heat On</th></tr>
<tr><td>0:</td><td>No temperature offset</td><td>No delay</td></tr>
<tr><td>1:</td><td>No temperature offset</td><td>10 minutes</td></tr>
<tr><td>2:</td><td>No temperature offset</td><td>20 minutes</td></tr>
<tr><td>3:</td><td>2.7°F (1.5°C)</td><td>No delay</td></tr>
<tr><td>4:</td><td>2.7°F (1.5°C)</td><td>10 minutes</td></tr>
<tr><td>5:</td><td>2.7°F (1.5°C)</td><td>20 minutes</td></tr>
</table>
Note: If further temperature offsets are desired, please contact technical support.
</td></tr>
<tr><td>20</td><td>CAHU capacity setting</td><td>
<table>
<tr><th></th><th>CAHU model</th><th>Value (MBh)</th></tr>
<tr><td rowspan="3">0:</td><td>4TVM0024B100NB</td><td>24</td></tr>
<tr><td>4TVM0030B100NB</td><td>30</td></tr>
<tr><td>4TVM0036B100NB</td><td>36</td></tr>
<tr><td rowspan="3">2:</td><td>4TVM0042B100NB</td><td>42</td></tr>
<tr><td>4TVM0048B100NB</td><td>48</td></tr>
<tr><td>4TVM0060B100NB</td><td>60</td></tr>
</table>
</td></tr>
<tr><td>21</td><td>Fan feedback</td><td>0: Disabled
1: Enabled</td></tr>
<tr><td>22</td><td>Defrost signal</td><td>0: Disabled
1: Enabled</td></tr>
<tr><td>23</td><td>Cold wind prevention</td><td>0: Disabled
1: Enabled</td></tr>
</table>

(a) Height difference between the indoor unit being configured and the lowest indoor unit is > 98.4 ft (30 m), or pipe length difference between the outdoor unit and the furthest indoor unit and the outdoor unit and the indoor unit being configured is > 360.9 ft (110 m).

(b) Height difference between the indoor unit being configured and the lowest indoor unit is 49.2–98.4 ft (15–30 m), or pipe length difference between the outdoor unit and the furthest indoor unit and the outdoor unit and the indoor unit being configured is 164–360.9 ft (50–110 m).
Example: If the unit being configured is 60 ft away from the outdoor unit, and the furthest indoor unit is 300 ft from the outdoor unit, the pipe length difference is 240 ft (300-60=240), so Digit 10 should be set to "2."

(c) Heater operation when digit 9 (Mode 2: digit 2=2) is set to water heater enabled or when digit 15 (Mode 2: digit 2=2) is set to enable external heater.
Example 1: In Mode 2 (digit 2=2), set digit 9 to "1"; in Mode 5 (digit 2=5), set digit 18 to "0": Hot water is turned On when the heating thermostat is On, and likewise, hot water turns Off when the heating thermostat is Off.
Example 2: In Mode 2 (digit 2=2), set digit 15 to "2"; in Mode 5 (digit 2=5), set digit 18 to "A":
- Room temperature ≤ temperature setpoint + f (heating compensation temperature). External heater is turned On if the temperature is maintained at 8.1°F (4.5°C) for 10 minutes.
- Room temperature > temperature setpoint + f (heating compensation temperature). External heater is turned Off if the temperature is maintained at 8.1°F (4.5°C) + 1.8°F (1°C). [1.8°F (1°C) is the hysteresis for On/Off selection.]

Figure 8. Heat recovery unit operating in auto-changeover mode



Note: Minimum compressor off time for heating or cooling is set by digit 9.

Troubleshooting

Initial Checks

Verify that:

- Power voltage is 187–253 Vac.
- All wiring connections are made according to the instructions in this manual.
- The following voltage ranges are:
  - CN32: 11–13 Vdc (both ends)
  - IC02 G/O: 4.5–5.5 Vdc (both ends)
  - TRANS Output: 16–18 Vac

EEPROM Error

Outdoor unit and wired remote control display	E462
Cause	Communication error between CAHU EEPROM and the outdoor unit controller board.
Explanation/Resolution	Replace CAHU main controller board.

Sensor Errors

Indoor coil inlet sensor detachment error

Outdoor unit and wired remote control display	E128 <—> A XXX[a] has been generated.
Cause	Indoor coil inlet sensor is detached or is installed in the wrong location.
Verification	Run a test operation in cooling mode by pressing K2 twice on the outdoor unit.[b] During cooling operation, verify that the following conditions are met: • $T_{condenser\ out\ temperature\ sensor}$[c] – $T_{OA\ temperature\ sensor}$[c] > 3°C • $T_{return\ air}$ - $T_{indoor\ coil\ inlet\ sensor}$ ≤ 4°C • $T_{return\ air}$ - $T_{indoor\ coil\ outlet\ sensor}$ > 4°C • Compressor is running.
Resolution	Re-attach/relocate the sensor.

(a) "XXX" = address of indoor unit with error.
(b) See the outdoor unit installation manual for more details regarding the test operation.
(c) Located on the outdoor unit.

Indoor coil outlet sensor detachment error

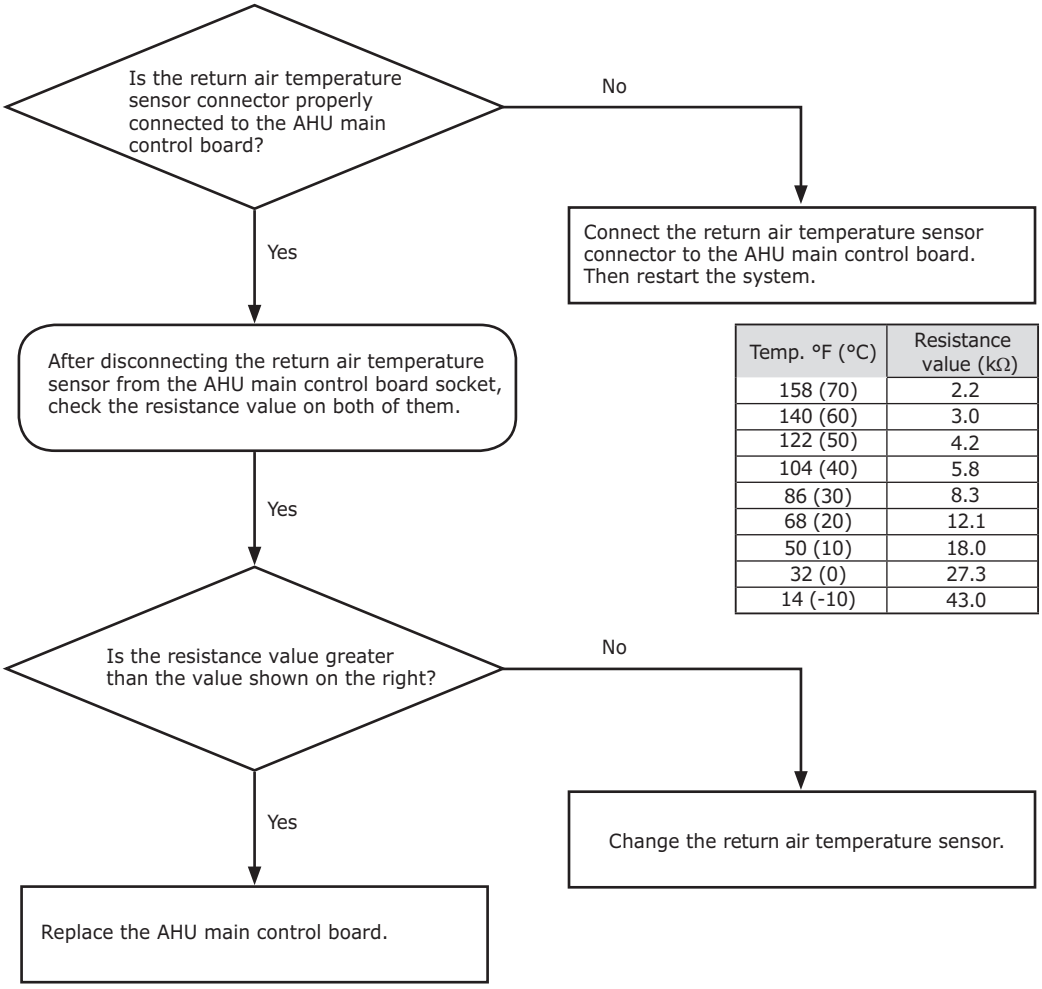
Outdoor unit and wired remote control display	E129 <—> A XXX[a] has been generated.
Cause	Indoor coil outlet sensor is detached or is installed in the wrong location.
Investigation/Verification	Run a test operation in cooling mode by pressing K2 twice on the outdoor unit.[b] During cooling operation, verify that the following conditions are met: • $T_{condenser\ out\ temperature\ sensor}$[c] – $T_{OA\ temperature\ sensor}$[c] > 3°C • $T_{return\ air}$ - $T_{indoor\ coil\ inlet\ sensor}$ > 4°C • $T_{return\ air}$ - $T_{indoor\ coil\ outlet\ sensor}$ ≤ 4°C • Compressor is running.
Resolution	Re-attach/relocate the sensor.

(a) "XXX" = address of indoor unit with error.
(b) See the outdoor unit installation manual for more details regarding the test operation.
(c) Located on the outdoor unit.

Sensor OPEN/SHORTED Error

Outdoor unit and wired remote control display	One of the following error codes has been generated: E121 (Return air temperature sensor OPEN/SHORTED) E122 (Indoor coil inlet sensor OPEN/SHORTED) E123 (Indoor coil outlet sensor OPEN/SHORTED) E126 (Discharge air temperature sensor OPEN/SHORTED)
Cause	Bad connection between the return air temperature sensor and the CAHU main controller board, or the sensor is damaged/corroded.
Investigation	Refer to Figure 9 for troubleshooting procedure.
Resolution	Depending on the cause, either repair the connection or replace the sensor.

Figure 9. Troubleshooting procedure for sensor OPEN/SHORTED error



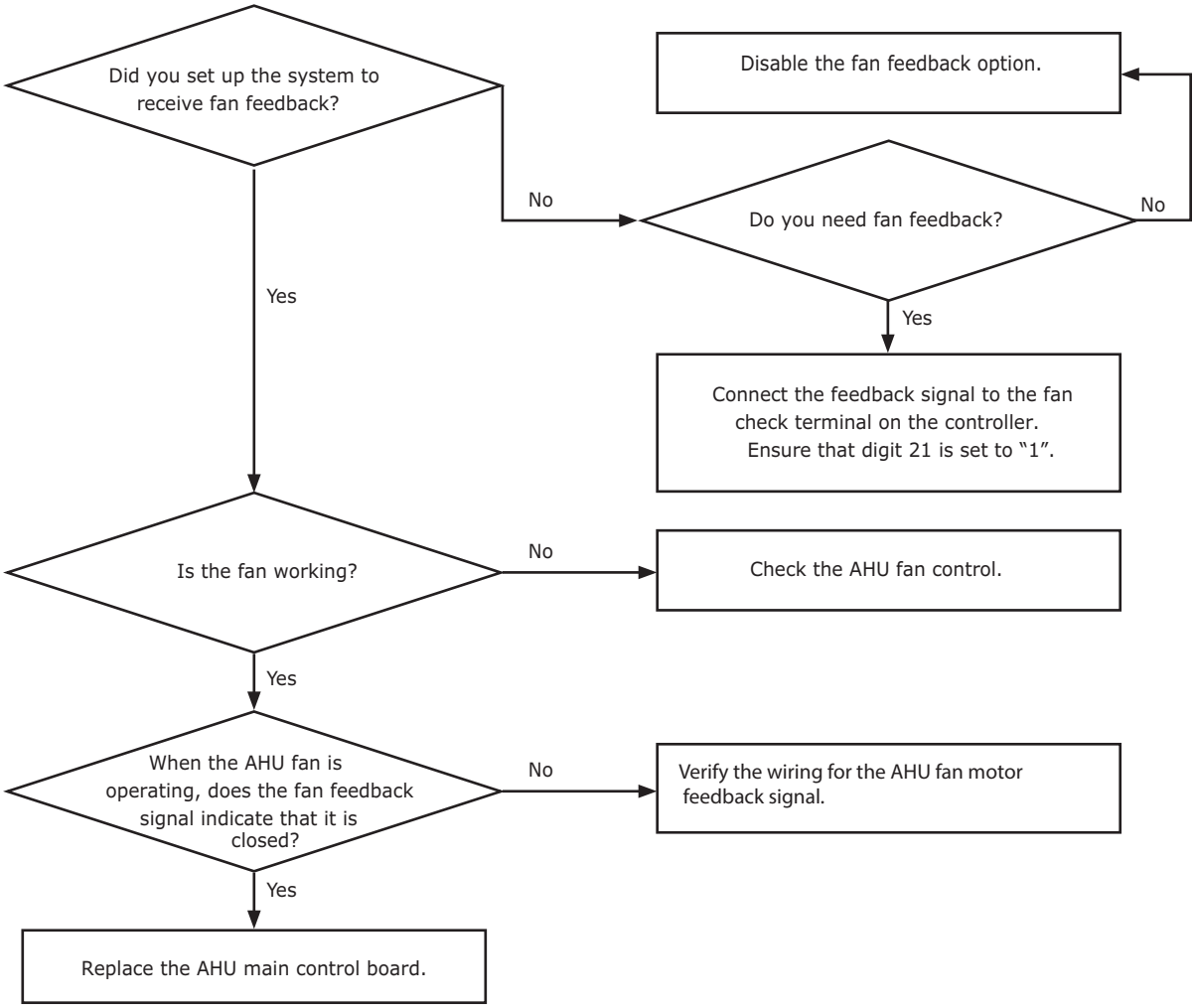
Temp. °F (°C)	Resistance value (kΩ)
158 (70)	2.2
140 (60)	3.0
122 (50)	4.2
104 (40)	5.8
86 (30)	8.3
68 (20)	12.1
50 (10)	18.0
32 (0)	27.3
14 (-10)	43.0

Fan Error

Outdoor unit and wired remote control display	E154 has been generated.
Cause	• Faulty CAHU fan operation • Missing or incorrect circuit system for fan feedback check.
Investigation	The CAHU controller sends a fan operation status signal and the fan feedback signal stays OPEN for more than 10 seconds (CAHU kit only). (a) Refer to Figure 10 for troubleshooting procedure.
Resolution	Depending on the cause, either replace the CAHU main controller board, or verify the wiring for the CAHU fan motor feedback signal.

(a) The fan feedback check terminal should receive the OPEN/CLOSE contact signal without voltage. If the fan feedback check terminal receives the signal with voltage, the CAHU controller may be damaged.

Figure 10. Troubleshooting procedure for fan error

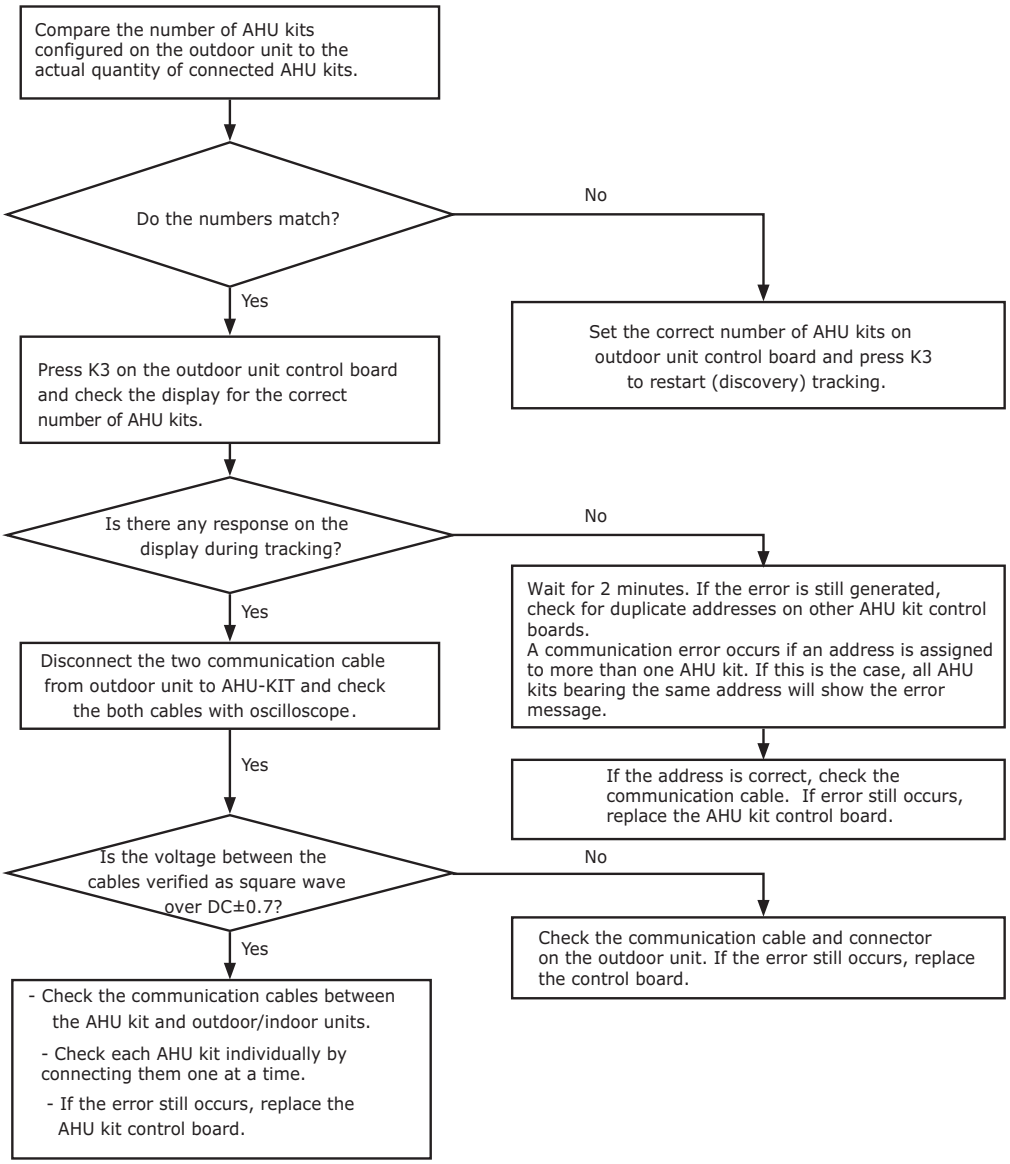


Communication Errors

Between the CAHU and the Outdoor Unit Prior to Link Discovery

Outdoor unit and wired remote control display	E20 1 has been generated.
Cause	Communication error between the CAHU and the outdoor unit prior to link discovery.
Investigation	Refer to Figure 11 for troubleshooting procedure.
Resolution	Depending on the cause, either replace the CAHU main controller board or the outdoor unit controller board.

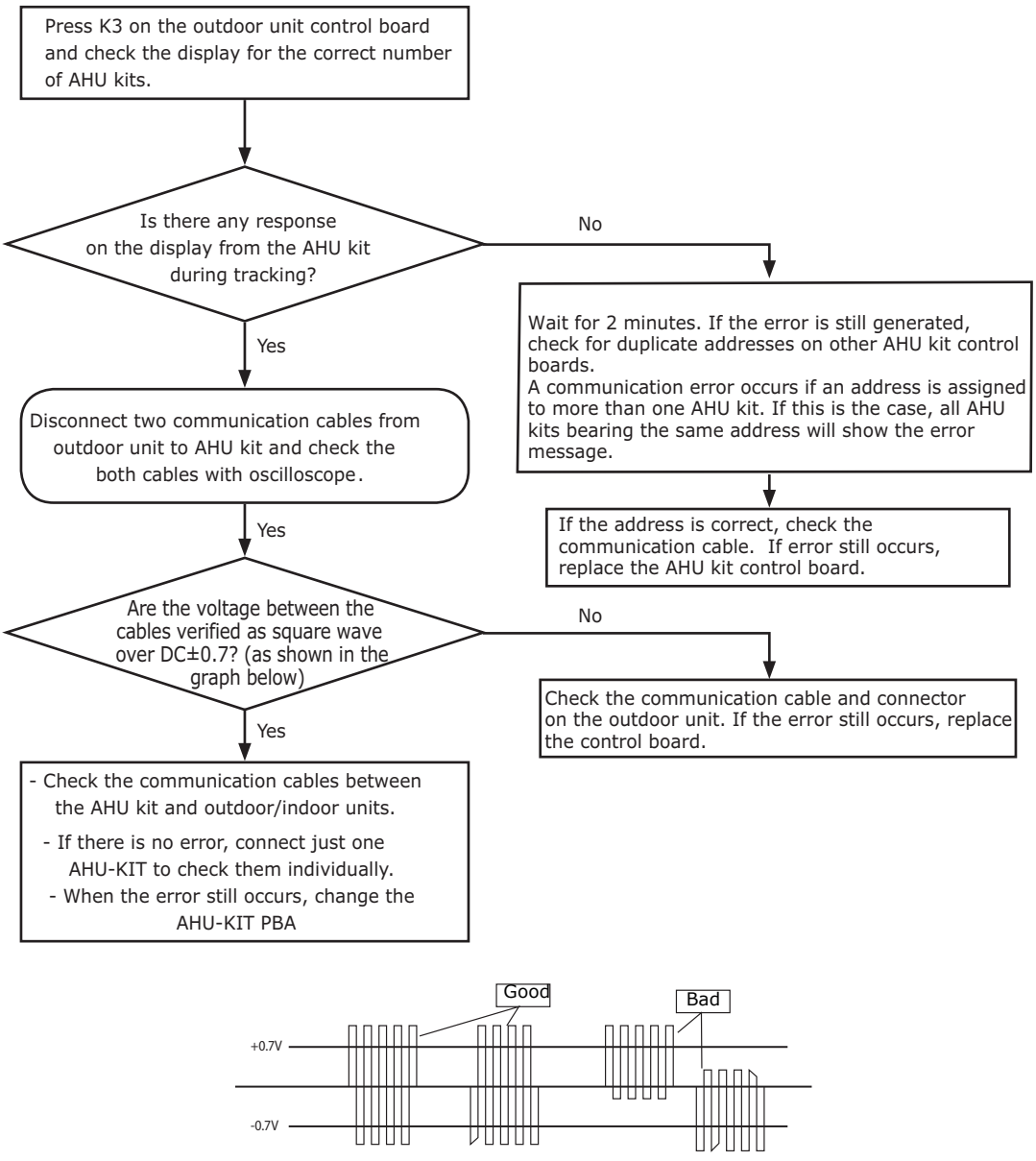
Figure 11. Troubleshooting Process for Communication Error Prior to Link Discovery



Communication Error Between the CAHU kit and the Outdoor Unit After Link Discovery

Outdoor unit and wired remote control display	E202
Cause	Communication error between the CAHU kit and the outdoor unit after link discovery.
Investigation	Refer to Figure 12 for troubleshooting process.
Resolution	Depending on the cause, either replace the CAHU main controller board or the outdoor unit controller board.

Figure 12. Troubleshooting Process for Communication Error After Link Discovery



Pre-start Checks

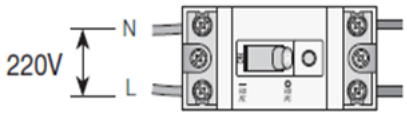
After installation, perform the following pre-start checks:

NOTICE

Avoid Damage to the Communication Circuit!

Do not measure the communication terminal with an insulation tester. Doing so will damage the communication circuit.

1. Ensure that the power and communication cables are properly connected.
2. Before supplying power, use a 500 Vdc insulation resistance tester to measure the power terminal (L,N) and the CAHU kit grounding. The resistance value should be over 30 MΩ .
3. Before supplying power, use a voltmeter and phase tester to check the voltage and the phase between wires.



4. Check the list below and make sure the CAHU kit components are functioning properly:

- Installation environment (resistance level, etc.)
- Refrigerant leak test
- Power cable
- Insulation on refrigerant pipe
- Drainage
- Circuit breaker connection and grounding
- Normal system operation

Pre-Start Checklist

- Ensure that the CAHU controller is correctly installed.
  - Ensure that the controller cables are correctly connected.
  - Ensure that the controller is fireproofed (the cover is tightly secured with screws).
  - Ensure that the controller is not exposed to direct sunlight or rain.
  - Do not install the controller in or on the CAHU.
- Ensure that the optional discharge air temperature sensor is correctly attached (see Figure 5, p. 9).
  - The discharge air temperature sensor should be located downstream (> 39.4 in. [1 m]) from the heat exchanger.
  - The wired remote control installation manual contains an explanation of the discharge air temperature setting.
  - Enable the heat setting compensation: Use the option setting mode 2 (Digit 2 = "2") and set digit 21 to "1."

    Note: *See the "Configuration" section of the indoor unit manual for detailed information on setting options.*

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