Installation

Variable Refrigerant Flow System

Air Handling Unit (AHU) Application Kit

Models: **4EEVAKA40K1025**
4EEVAKA40K1050
4EEVAKA64K1075
4EEVAKA64K1100

⚠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.

February 2015

VRF-SVN44B-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

Preparing for installation

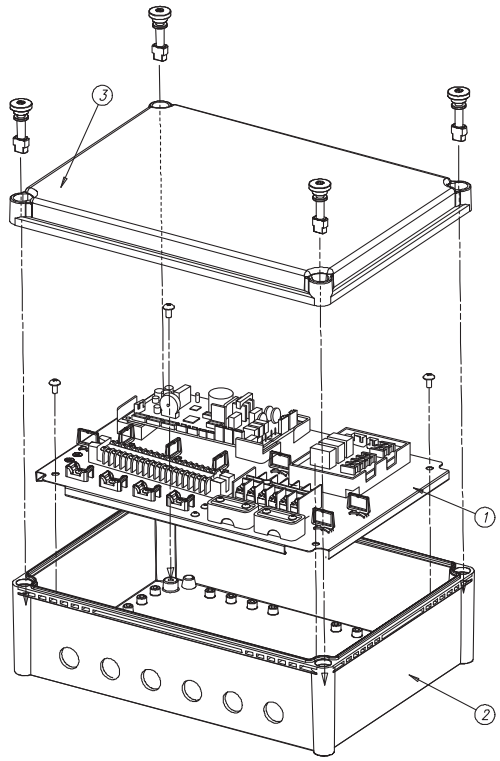
Recommended AHU Sizes

For optimal efficiency and system performance, verify that the correct AHU unit is installed to meet capacity needs.

AHU Kit model	AHU capacity (MBH)		AHU internal heat exchanger volume in^3 (cm^3)	
	Minimum	Maximum	Minimum	Maximum
4EEVAKA40K1025	24	30	73 (1200)	92 (1500)
4EEVAKA40K1050	48	60	131 (2150)	164 (2688)
4EEVAKA64K1075	72	90	189 (3100)	236 (3875)
4EEVAKA64K1100	96	119	244 (4000)	305 (5000)
Note: Evaporating temperature: 45°F (7°C); superheat: 1.8°F (1°C); air temperature: 81°F_{db}/66°F_{wb} (27°C_{db}/19°C_{wb})				

Components

Figure 1. AHU controller



No.	Parts and components
1	Control board
2	Case
3	Cover

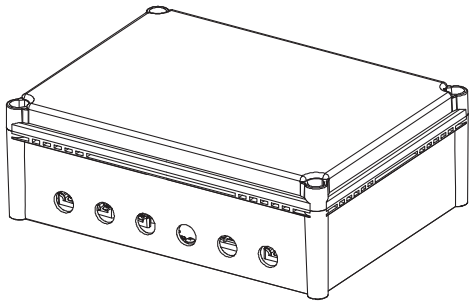
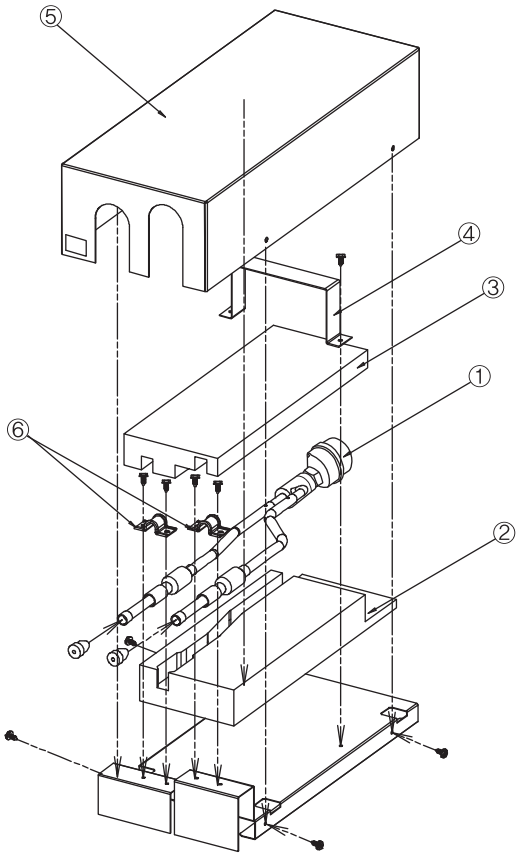


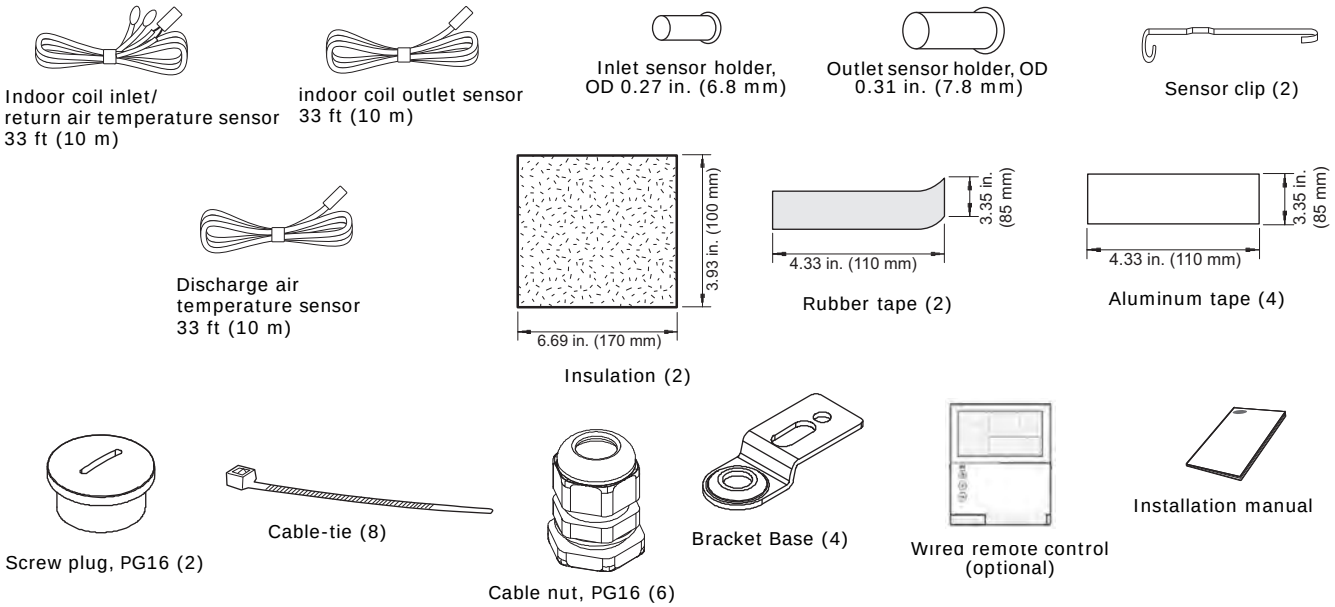
Figure 2. AHU Electronic expansion valve (EEV)



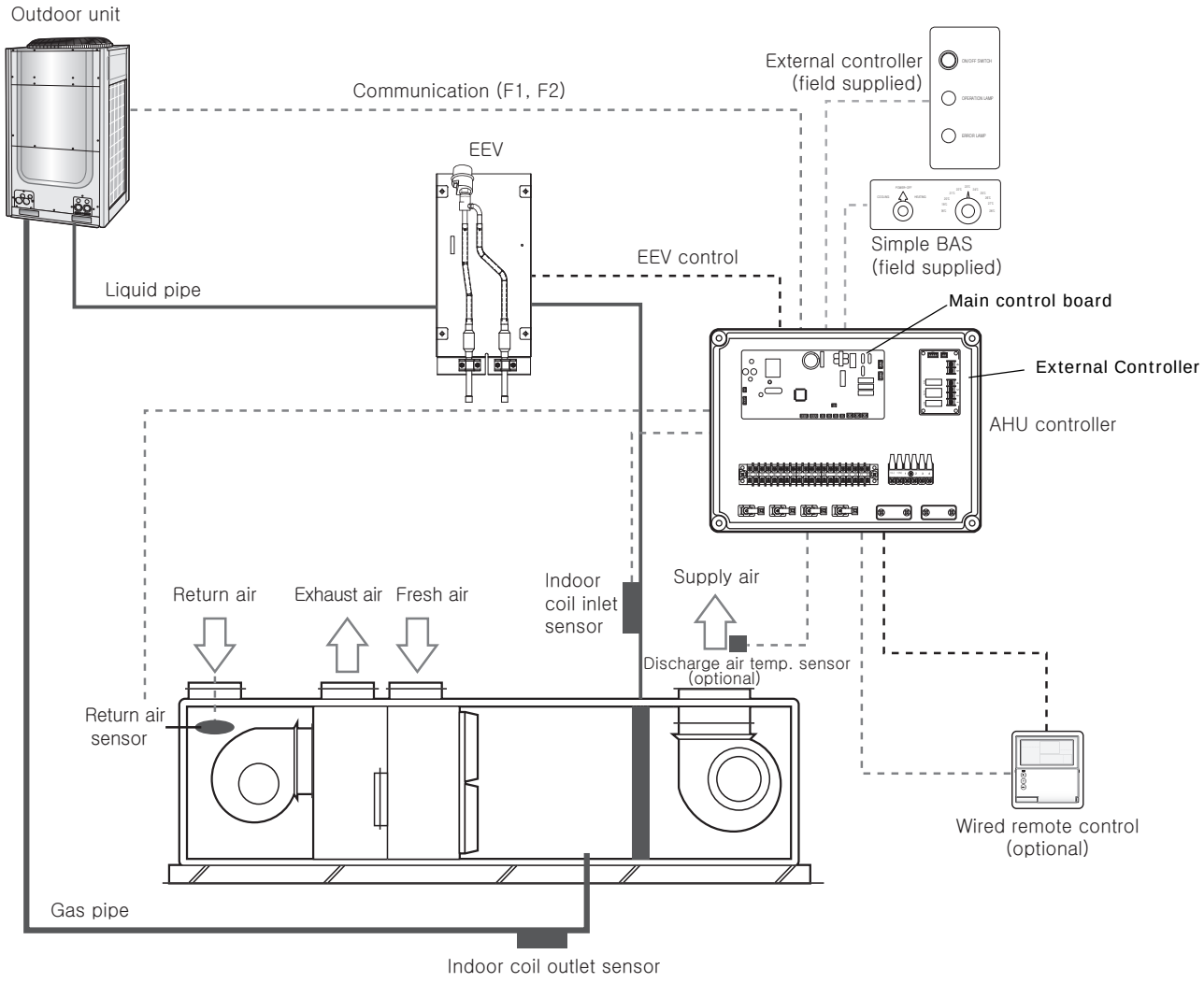
No.	Parts
1	EEV(1)
2	Lower insulation
3	Upper insulation
4	Holder
5	Cover
6	Clamps

(1) EEV wire length:
4EEVAKA40K1025/1050 = 6.6 ft (2 m)
4EEVAKA40K1075/1100 = 23.0 ft (7 m)

Figure 3. Additional components and materials



Example of VRF System with AHU Kit



Note: *When the controllers (the External Controller, a simple BAS, and a wired remote control) are installed simultaneously, the AHU 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 AHU if the last control request to the AHU was made by a true BAS or one of the other types of controllers.*

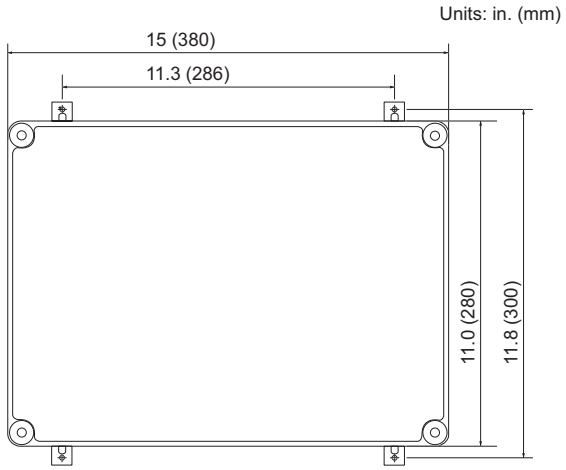
Installation

AHU Controller

Follow all installation guidelines and procedures. Refer to the AHU controller components (Figure 1, p. 4), dimensions (Figure 4), and wiring diagrams.

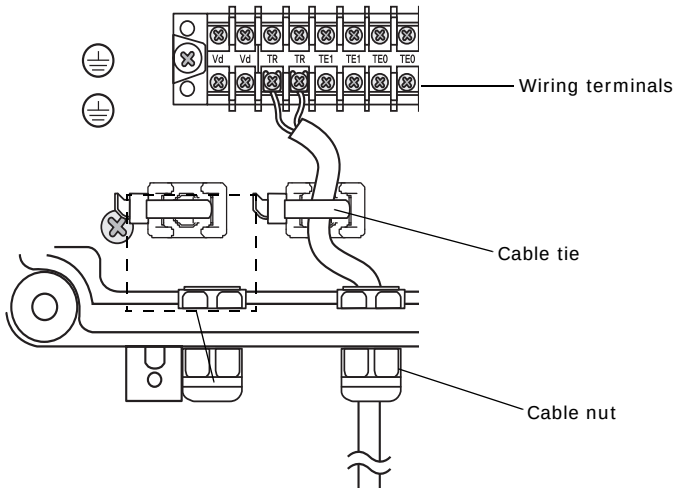
- Install the controller no further from the EEV kit than 6.6 ft (2 m) for 4EEVAKA40K1025/1050 and 23 ft (7 m) for 4EEVAKA40K1075/1100.
- Avoid installing the controller in a location that is exposed to direct sunlight or rain.

Figure 4. AHU 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. 8).
3. Secure the cable firmly with a cable tie (see Figure 5).

Figure 5. Wiring terminal connections



4. Close the box cover and secure it with screws to ensure that the controller is fireproof.

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 for 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.
- Do not connect the power cable from one indoor unit to more than one AHU kit.

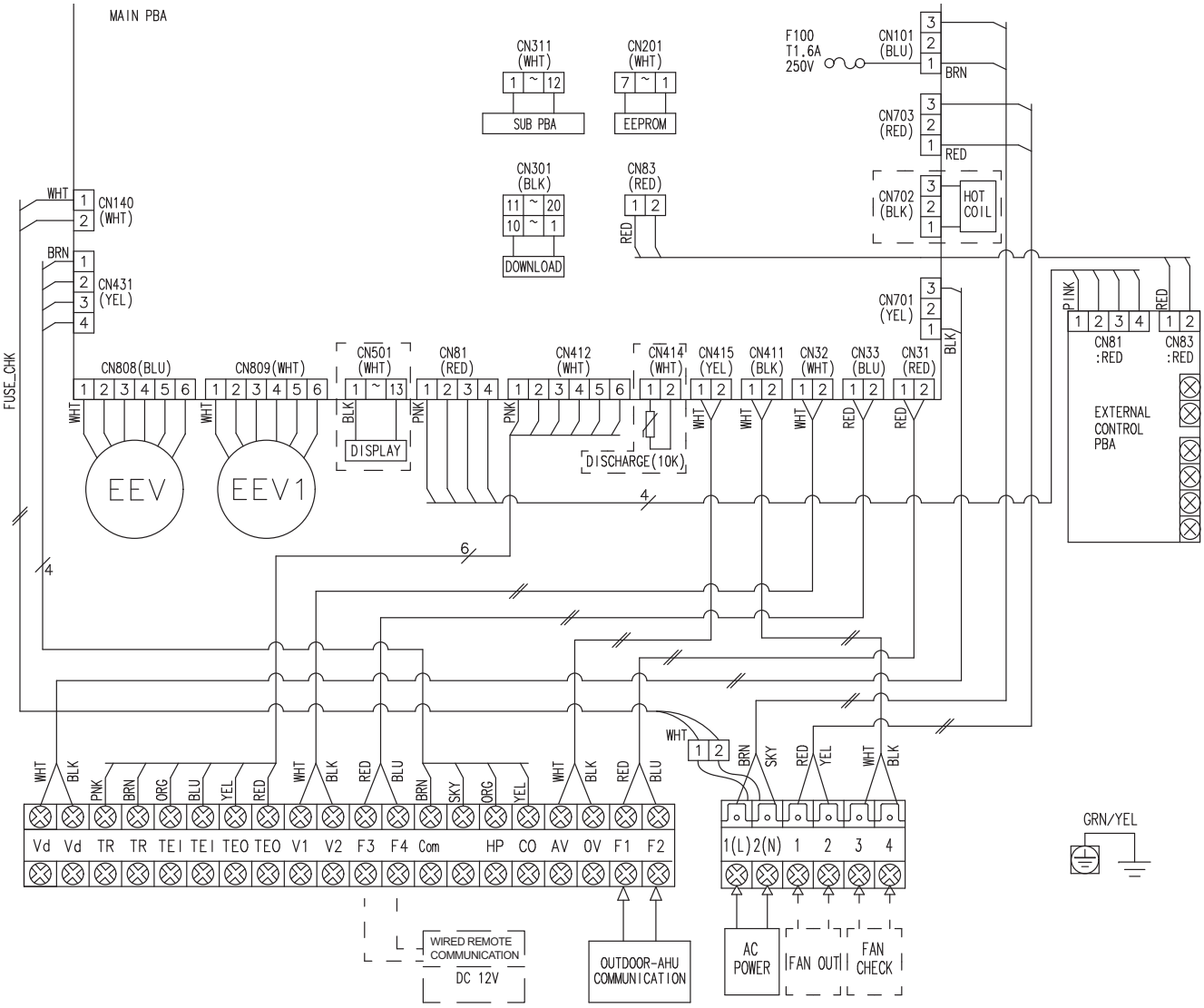
AHU Controller Wiring

Connect power cable (208–230 Vac, 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 6. AHU 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).

Table 1. AHU wiring terminals

AHU 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(1)	2 x 18 AWG (0.75 mm^2)	—
TEI/TEI	Thermistor, indoor coil inlet sensor (liquid pipe)(1)	2 x 18 AWG (0.75 mm^2)	—
TEO/TEO	Thermistor, indoor coil outlet sensor (liquid pipe)(1)	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

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

Figure 7. Controller wiring terminal connections

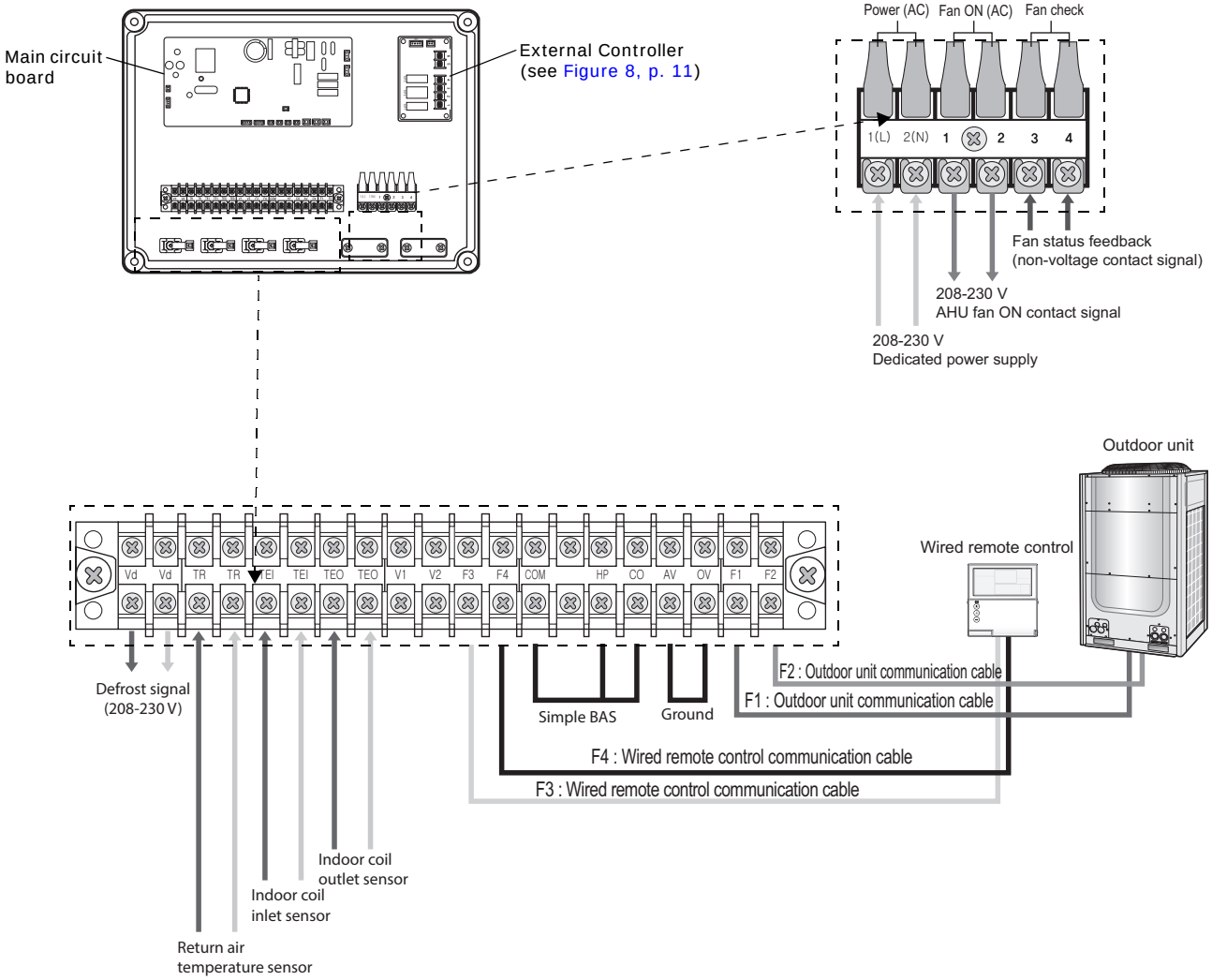
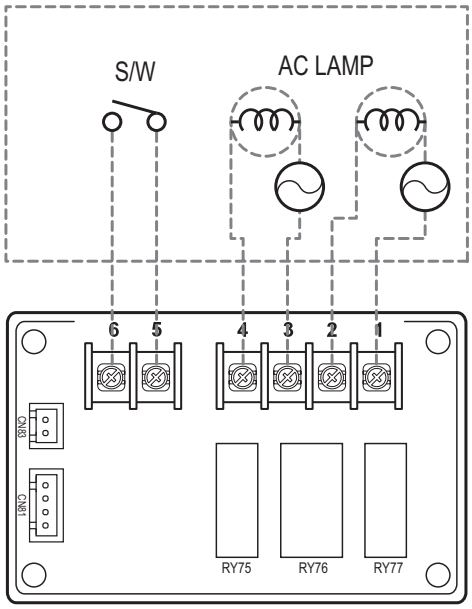


Figure 8. External Controller wiring and configuration



Terminal No.	Signal	Option (see Table 3, p. 21)
1, 2	Error check output	—
3, 4	Operation check output	Digit 15(1)
5, 6	On/Off input	Digit 14

(1) To enable the AHU kit to be controlled by the External Controller, digit 15 must be set to "1".

AHU Controller Sequence of Operations

The sequence of operation for the AHU 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 controller.
- The controller operates the contact signal for AHU fan operation. Terminals 1 and 2 operate the AHU fan ON contact signal (208–230 V) for AHU when operating in Cool/Heat/Fan mode.

  Note: *The AHU fan ON contact signal output cannot be used as the power supply for the motor.*
- Terminals 3 and 4: The AHU 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. 23).*

Simple BAS

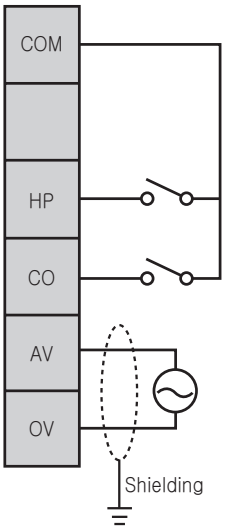
Wiring

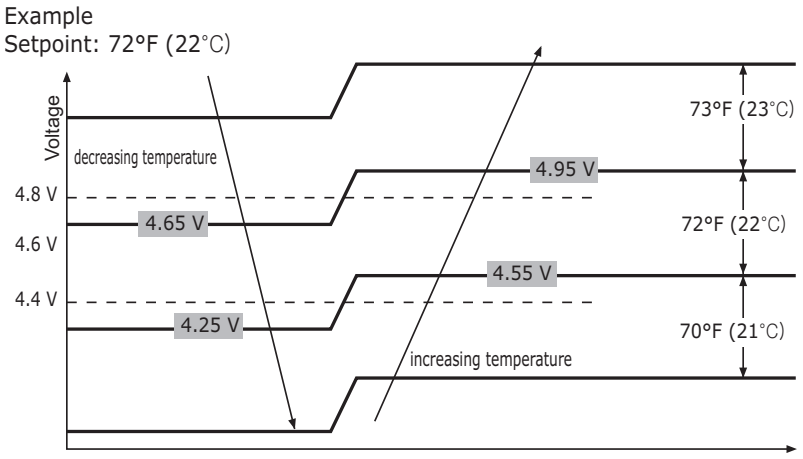
NOTICE

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 9. 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

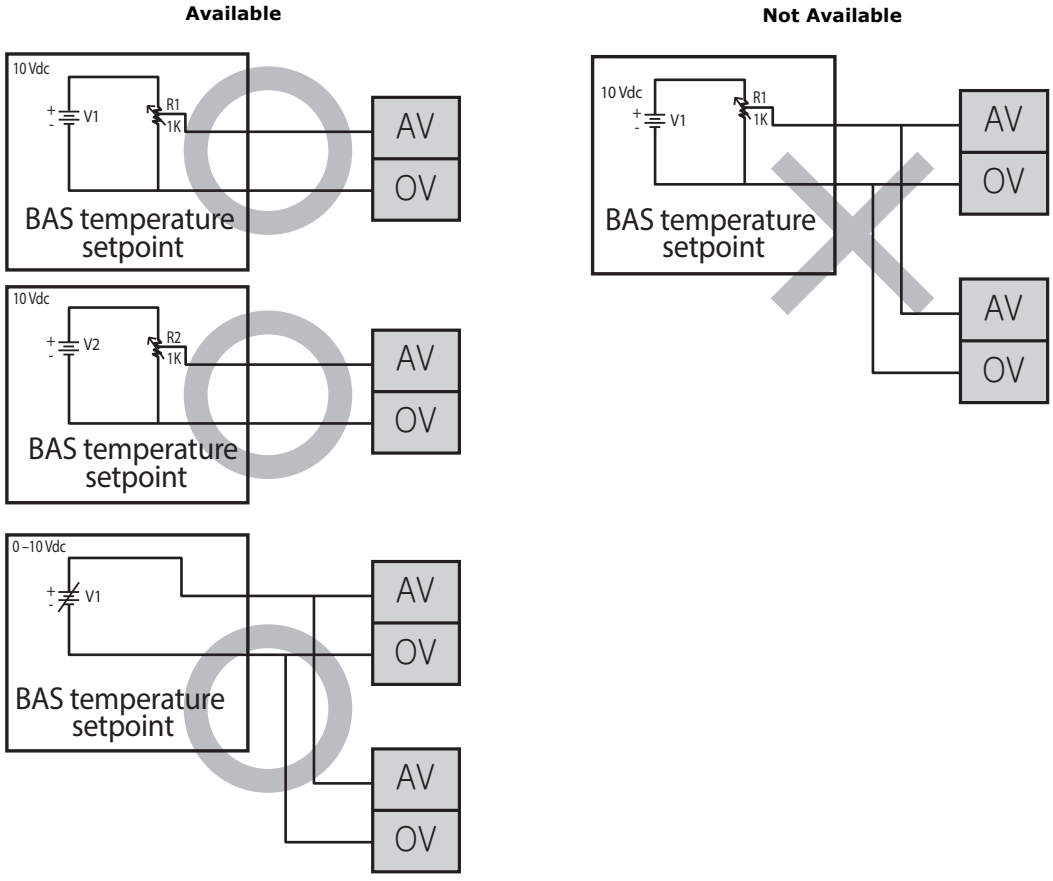
Simple BAS voltage range	Heating Temperature setpoint °F (°C)	Cooling temperature setpoint °F (°C)
10.0–9.6 V	86.0 (30)	86.0 (30)
9.6–9.2 V	86.0 (30)	86.0 (30)
9.2–8.8 V	86.0 (30)	86.0 (30)
8.8–8.4 V	86.0 (30)	86.0 (30)
8.4–8.0 V	86.0 (30)	86.0 (30)
8.0–7.6 V	86.0 (30)	86.0 (30)
7.6–7.2 V	84.2 (29)	84.2 (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)

Table 2. Operational Voltage Range in Relation to Temperature Setpoint (continued)

Simple BAS voltage range	Heating Temperature setpoint °F (°C)	Cooling temperature setpoint °F (°C)
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 AHU kit.
- If it is necessary for one simple BAS to control several AHU kits, ensure that the simple BAS has adequate outputs.



Installing the Electronic Expansion Valve (EEV) Kit

Observe the following precautions when connecting the electronic expansion valve (EEV) kit to the refrigerant piping.

⚠WARNING

Hazard of Explosion and Deadly Gases!

Failure to follow all proper safe refrigerant handling practices could result in death or serious injury. Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids.

NOTICE:

System Component Damage!

Do not remove the seal caps from refrigerant connections, or open the service valves until prepared to braze refrigerant lines to the connections. Excessive exposure to atmosphere (> 5 min.) may allow moisture or dirt to contaminate the system, damaging valve seals and causing ice formation in system components.

Notes:

- *Install the EEV kit no further from the AHU controller than 6.6 ft (2 m) for 4EEVAKA40K1025/1050 and 23 ft (7 m) for 4EEVAKA40K1075/1100.*
- *Install the EEV kit no further from the heat exchanger than 16.4 ft (5 m).*
- *Refer to Figure 10, p. 15 for an illustration of EEV kit parts.*

1. Open the EEV cover by unscrewing the four screws on the side of the box.
2. Drill four holes in the correct positions on the wall (see Figure 11, p. 15) and securely attach the EEV kit. Make sure that the kit is installed as vertically as possible. The range of tolerance is ±15 degrees from vertical, as shown in Figure 12, p. 16.
3. Remove the holder by removing one screw.
4. Remove the upper and lower insulation. The clamp does not need to be loosened.)
5. Connect the piping, ensuring that the IN/OUT connections are correct.

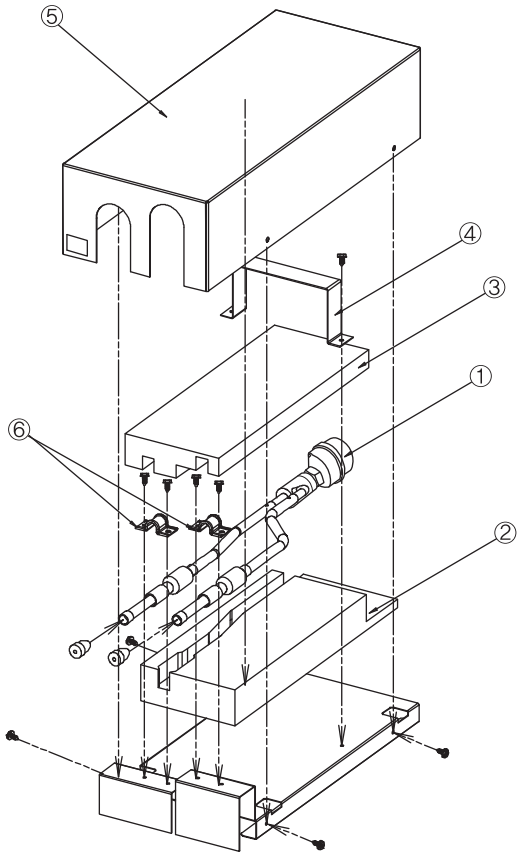
NOTICE

Avoid Unit Damage!

While brazing pipe connections, always performing nitrogen flushing. Use a pressure regulator to maintain a flow rate of 1.76 ft3/h (0.05 m3/h) or more. Failure to perform this procedure will damage the unit, resulting in capacity loss and reduced long-term reliability.

6. Braze the pipe connections. While brazing, flush the piping with nitrogen gas. Use a pressure regulator to maintain a flow rate of 1.76 (ft3/h (0.05 m3/h) or more.
7. When the pipe becomes cool enough, put the upper and lower insulation back in place.
8. Attach the upper and lower insulation together by peeling the protective layer from the upper insulation.
9. Re-attach the holder by replacing the screw. Replace the cover and the four cover screws.

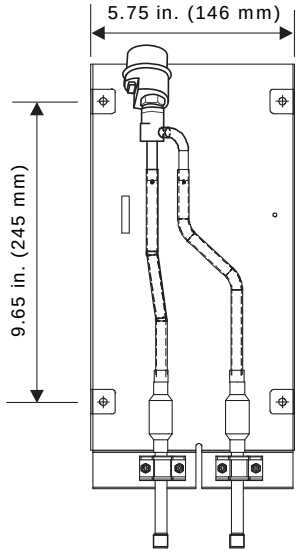
Figure 10. EEV kit

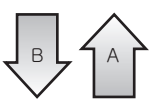


No.	Parts
1	EEV(1)
2	Lower insulation
3	Upper insulation
4	Holder
5	Cover
6	Clamps

(1) EEV wire length:
4EEVAKA40K1025/1050 = 6.6 ft (2 m)
4EEVAKA40K1075/1100 = 23.0 ft (7 m)

Figure 11. EEV dimensions

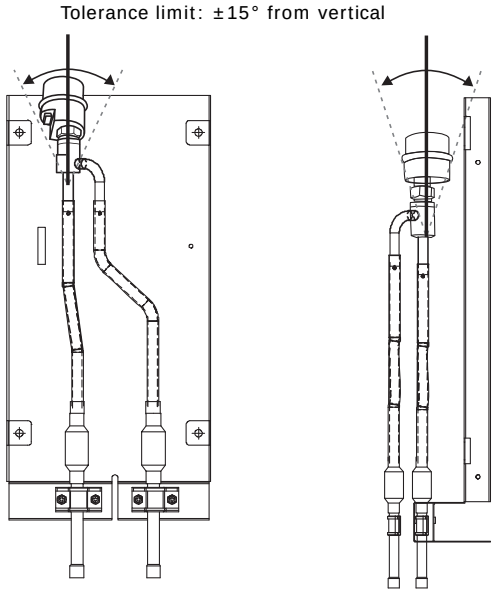




Refrigerant flow in cooling mode

A: High-pressure pipe from outdoor unit (IN): OD 3/8 in. (9.52 mm)
B: High-pressure pipe to AHU heat exchanger (OUT): OD 3/8 in. (9.52 mm)

Figure 12. EEV vertical tolerance limit



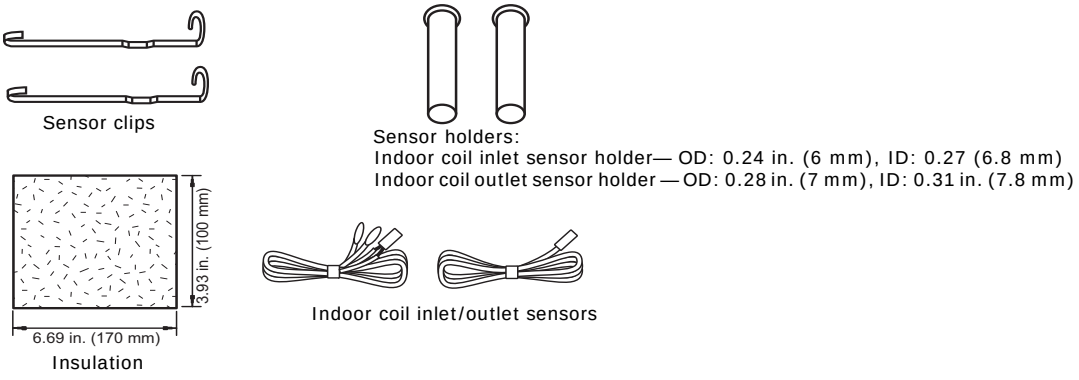
Installing Indoor Coil Inlet/Outlet Sensors

Important: *Install correct sensor; check sensor usage on label.*

When installing indoor coil inlet/outlet sensors, follow the precautions given at the beginning of this section ("Installing the Electronic Expansion Valve (EEV) Kit" p. 14).

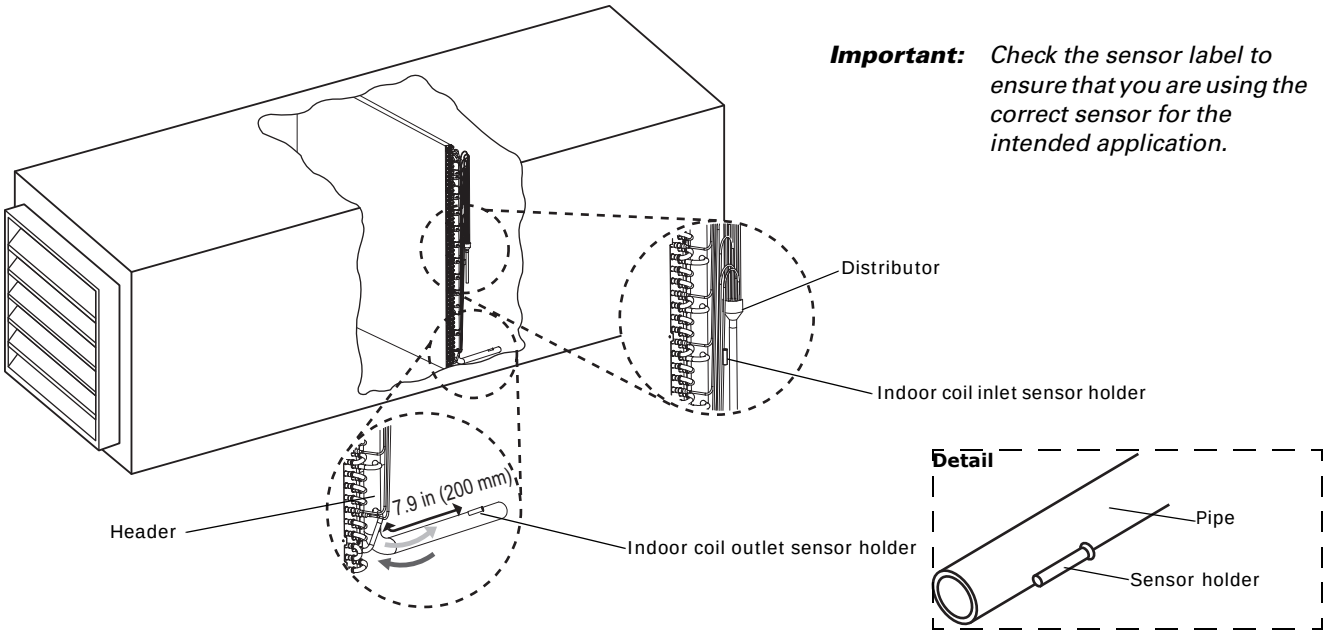
Example 1: Installation with sensor holders

1. Locate the following sensors and accessories, noting the difference between the indoor coil inlet and outlet sensor holder sizes:



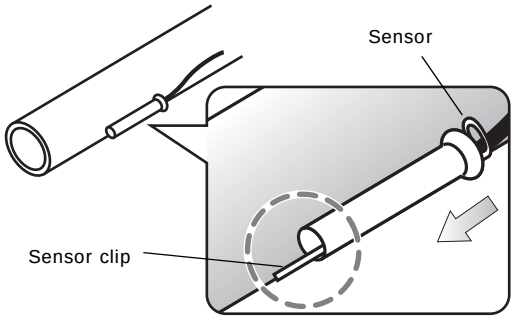
2. Choose a location for the indoor coil outlet sensor that is approximately 7.9 in. (200 mm) behind the header of the AHU heat exchanger. Choose a location for the indoor coil inlet sensor that is below the distributor, on the coldest part of the heat exchanger pipe. (Refer to Figure 13.)

Figure 13. Indoor coil inlet/outlet sensor installation location

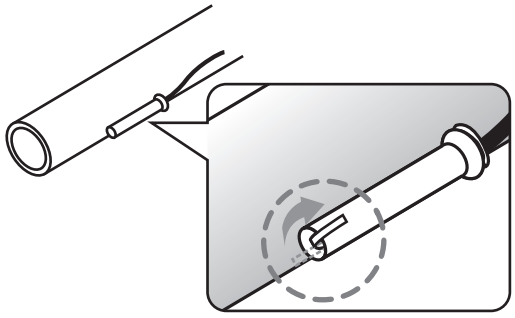


Important: *Check the sensor label to ensure that you are using the correct sensor for the intended application.*

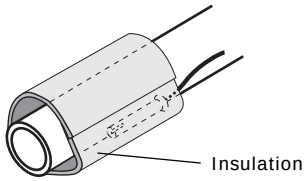
3. Braze the sensor holders at the selected locations.
4. Insert the correct indoor coil sensor (inlet or outlet) and a sensor clip in the sensor holder.



5. Bend the end of the sensor clip to hold the sensor in place.



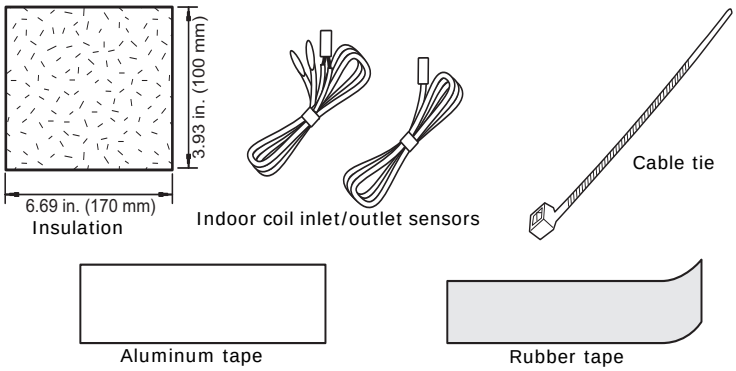
6. Wrap the insulation around the sensor holder and pipe.



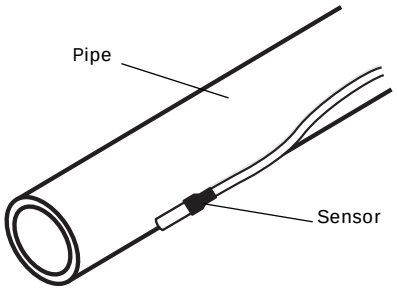
7. Repeat Step 4 – Step 6 with the other indoor coil (inlet or outlet) sensor.

Example 2: Installation with tape

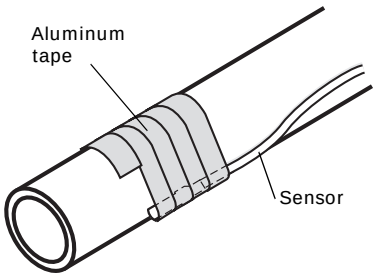
1. Locate the following sensors and accessories:



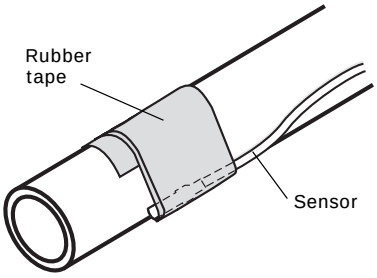
2. Choose a location for the indoor coil outlet sensor that is approximately 7.9 in. (200 mm) behind the header of the AHU heat exchanger. Choose a location for the indoor coil inlet sensor that is below the distributor, on the coldest part of the heat exchanger pipe. (Refer to Figure 13, p. 17.)
3. Hold the sensor against the pipe at the chosen location.



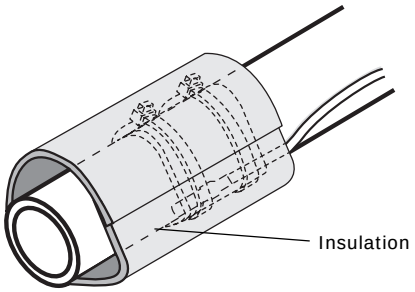
4. Wrap the sensor and pipe with aluminum tape to hold the sensor in place.



5. Wrap rubber tape around the aluminum tape.



6. Use cable ties to secure the sensor and the tape.
7. Wrap the insulation around the sensor holder and pipe.



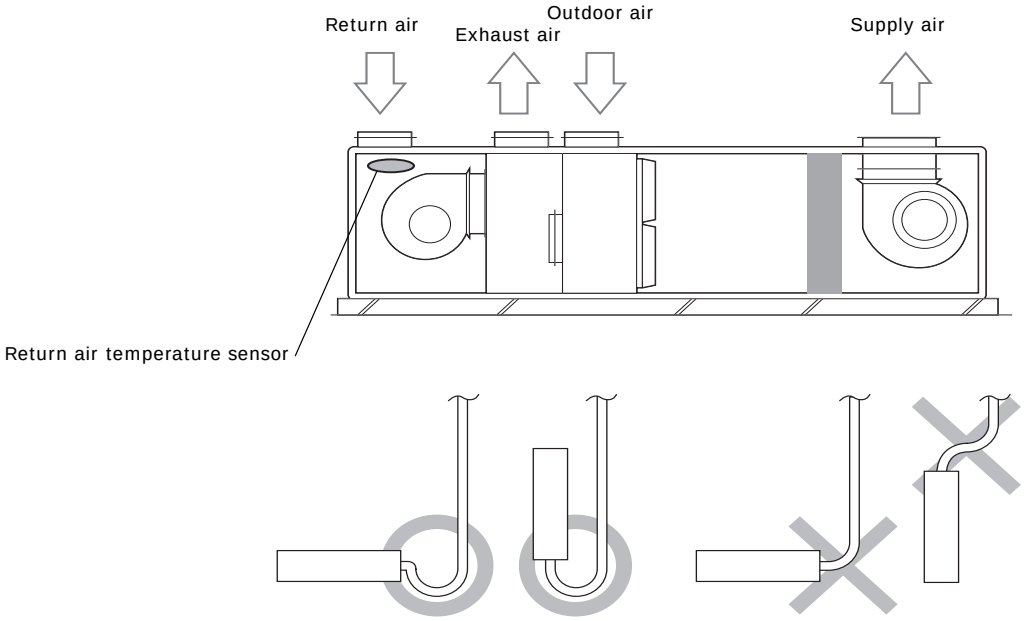
8. Repeat Step 3 through Step 6 with the other (inlet or outlet) sensor.

Installing the Return Air Temperature Sensor

Important: *Install correct sensor; check sensor usage on label.*

Refer to Figure 14 for choosing the installation location for the return air temperature sensor.

Figure 14. Return air temperature sensor location



Configuration

Use the Technician Utility Tool (TUT) to change the configuration of the AHU kit 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. 21 and Table 4, p. 23.

   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, p. 23, Digit 20.

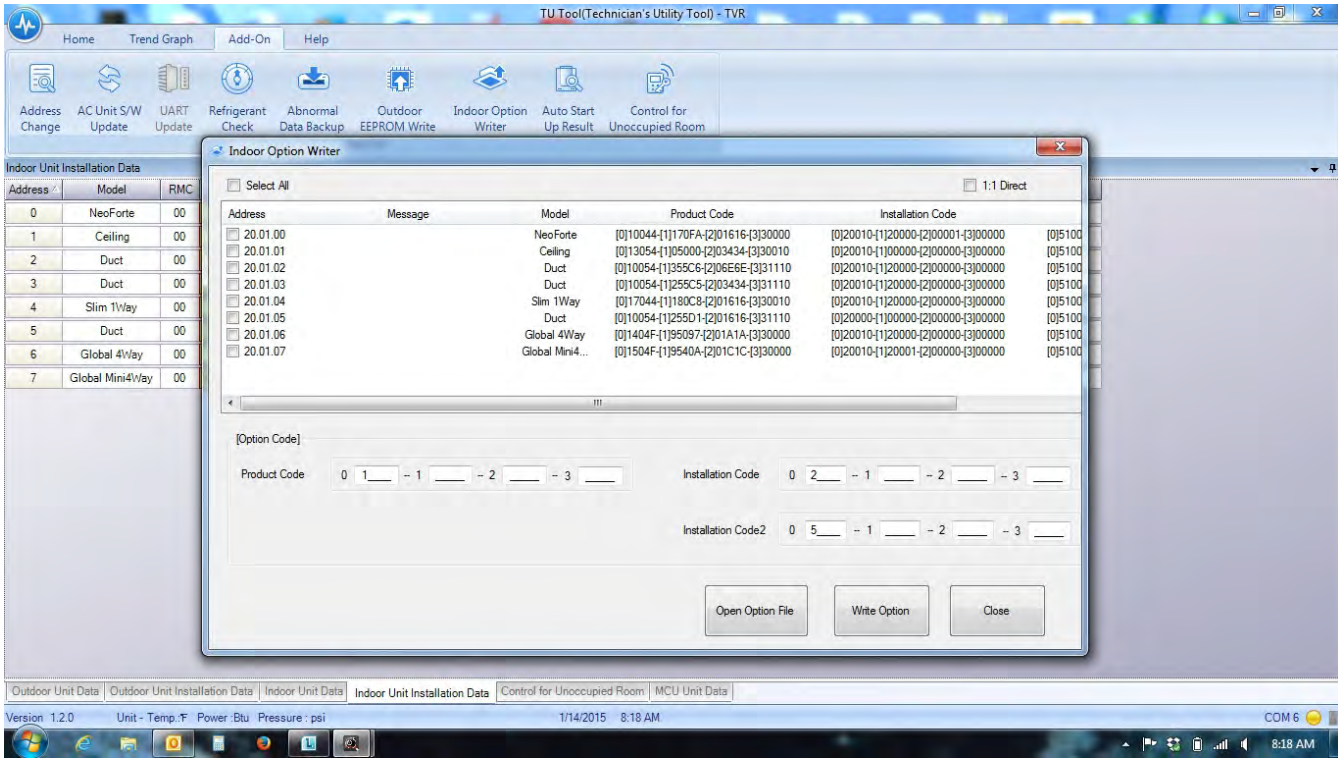
Digit	1	2	3	4	5	6	7	8	9	10	11	12
Installation Option #1	[0]	2	0	0	1	0	[1]	0	0	0	0	0
Installation Option #2	[0]	5	0	0	0	0	[1]	0	0	0	0	0

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 at the bottom of the **Indoor Unit Option Writer** screen. See the example below.



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. Installation Option #1: Digit 2 = 2

Digit	Option	Set digit to...
1	Factory set to 0.	Cannot be changed. Not seen in configuration mode.
2	Installation option #1	2
3	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	Not available.	Factory set to 0.
10	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 is designated automatically by wired remote control.(1)	0: Slave 1: Master
13	Factory set to 2	Cannot be changed. Not seen in configuration mode.
14	External controller—AHU	0: Disabled 1: On/Off control 2: Off-only control
15	External controller output(2)	**External controller output** / **External heater On/Off signal** 0: Thermostat on / N/A 1: Operation on / N/A 2: N/A / Enable(1) (1) The fan runs continually when the external heater is On.
16	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. Installation Option #1: Digit 2 = 2 (continued)

Digit	Option	Set digit to...
21	Heat setting compensation	**Heat setting compensation** / **Removing condensate in heating mode** 0: Default(1) / Disable 1: 3.6°F (2°C) / Disable 2: 9°F (5°C) / Disable (1) 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	Not available.	Factory set to 0.
24	N/A	—

(1) 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.
(2) 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. Installation Option #2: Digit 2 = 5

Digit	Option	Set digit to...
1	Factory set to 0	Cannot be changed. Not seen in configuration mode.
2	Installation option #2	5
3	Auto-changeover (HR only)	0: Disabled 1: Enabled (see Figure 15, p. 24)
4	Heating deadband ***Note:*** *Applies only when digit 3 is set to "1" (auto-changeover mode is enabled). See Figure 15.*	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 15.*	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 15.*	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 15.*	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.(1) 2: Use when height or pipe length difference is as specified.(2)

Table 4. Installation Option #2: Digit 2 = 5

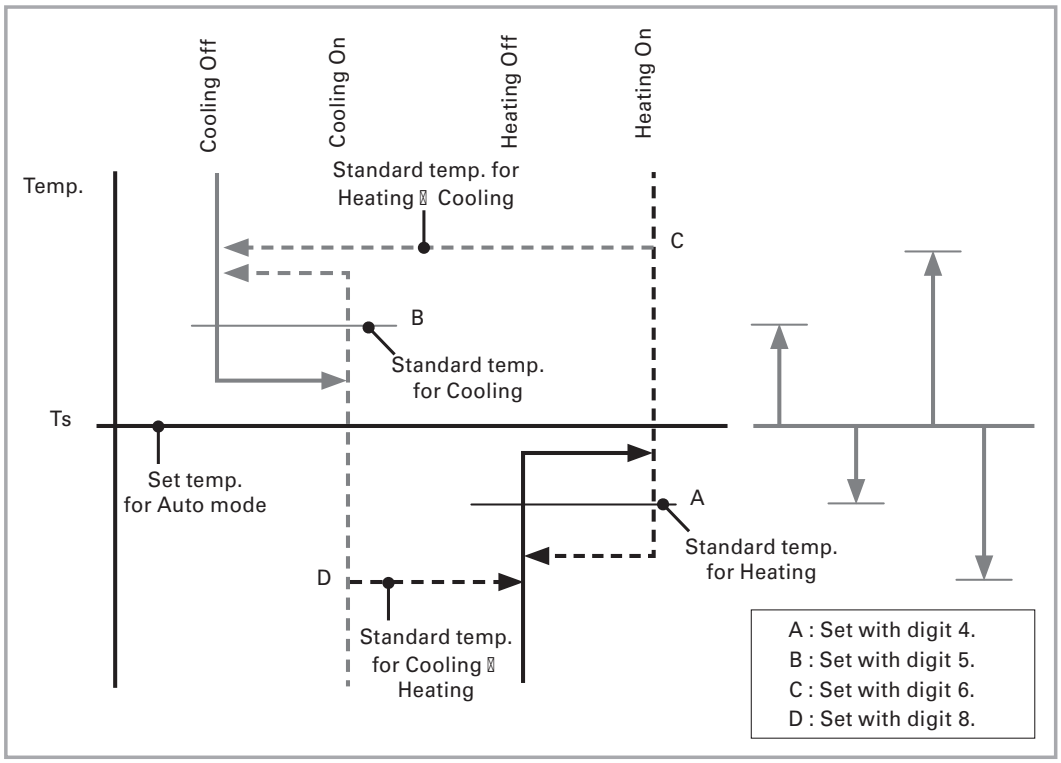
Digit	Option	Set digit to...
11–17	N/A	
18(3)	Controller variables for auxiliary heater ***Important:*** *See fire hazard warning (at the top of this table) regarding improper installation location of an electric auxiliary heater in ducted indoor units.*	**Set temperature for auxiliary heat On** / **Time delay for auxiliary heat On** 0: No temperature offset / No delay 1: No temperature offset / 10 minutes 2: No temperature offset / 20 minutes 3: 2.7°F (1.5°C) / No delay 4: 2.7°F (1.5°C) / 10 minutes 5: 2.7°F (1.5°C) / 20 minutes ***Note:*** *If further temperature offsets are desired, please contact technical support.*

(1) 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).

(2) 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."

(3) Heater operation when digit 9 (Installation Option#1) is set to water heater enabled or when digit 15 (Installation Option #1) is set to enable external heater.
Example 1: In Installation Option#1, set digit 9 to "1"; in Installation Option#2, 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 Installation Option#1, set digit 15 to "2"; in Installation Option#2, 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 15. Heat recovery unit operating in auto-changeover mode



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

Discharge Air Temperature Control

When using discharge air temperature control:

- The target discharge air temperature setpoint can be set using the wired remote controller (refer to the wired remote controller installation guide: VRF-SVN59).
- The discharge air temperature adjusts to meet the discharge air temperature setpoint only when the indoor unit is enabled. The indoor unit is enabled by the remote temperature sensor and is based on the space temperature setpoint.
- External conditions and or protective controls may prevent the discharge air temperature control from satisfying the discharge air temperature setpoint.

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

Sensor Errors

Indoor coil inlet sensor detachment error

Outdoor unit and wired remote controller display	E128 <—> A XXX(1) 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.(2) During cooling operation, verify that the following conditions are met: • $T_{condenser\ out\ temperature\ sensor}$(3) – $T_{OA\ temperature\ sensor}$(3) > 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.

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

Indoor coil outlet sensor detachment error

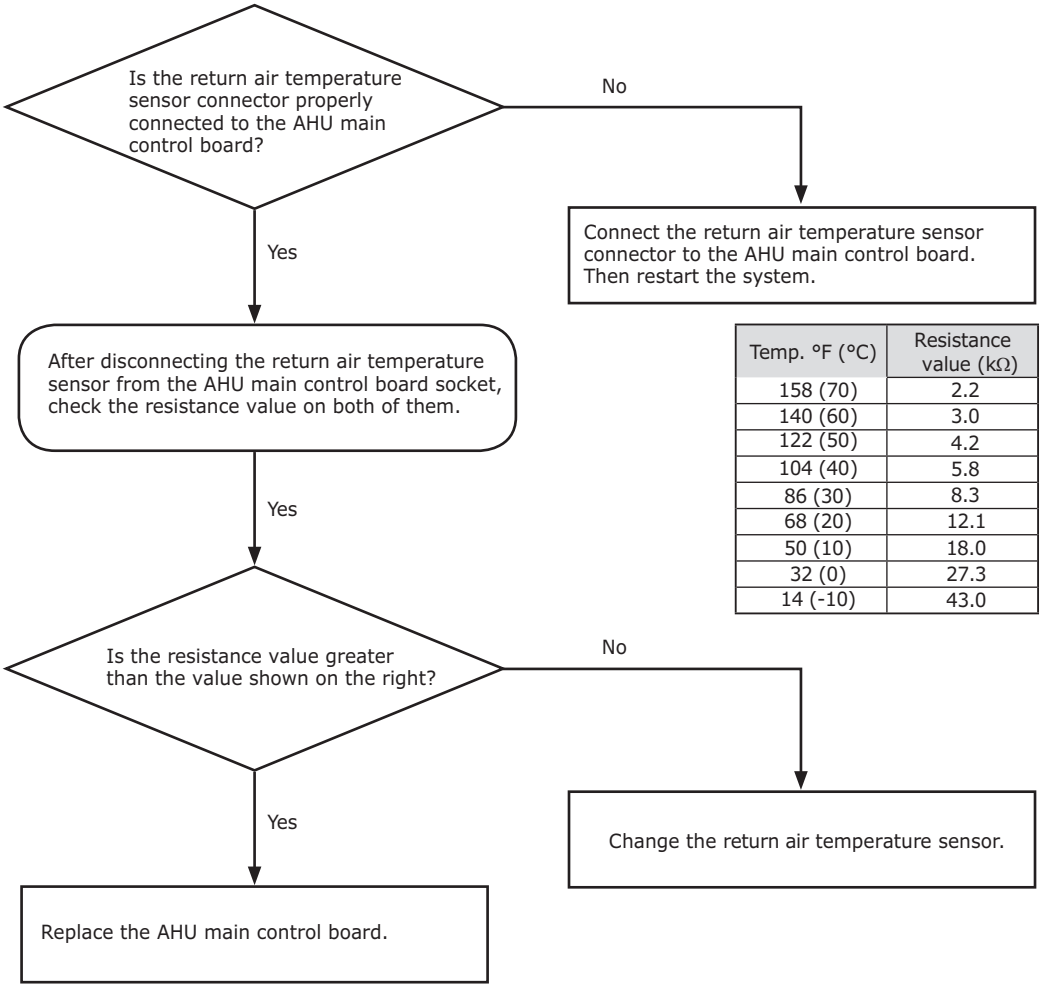
Outdoor unit and wired remote controller display	E129 <—> A XXX(1) has been generated.
Cause	Indoor coil outlet sensor is detached or is installed in the wrong location.
Investigation/Verification	Run a test operation in cooling mode by pressing K2 twice on the outdoor unit.(2) During cooling operation, verify that the following conditions are met: • $T_{condenser\ out\ temperature\ sensor}$(3) – $T_{OA\ temperature\ sensor}$(3) > 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.

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

Sensor OPEN/SHORTED Error

Outdoor unit and wired remote controller 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 AHU main control board, or the sensor is damaged/corroded.
Investigation	Refer to Figure 16 for troubleshooting procedure.
Resolution	Depending on the cause, either repair the connection or replace the sensor.

Figure 16. Troubleshooting procedure for sensor OPEN/SHORTED error



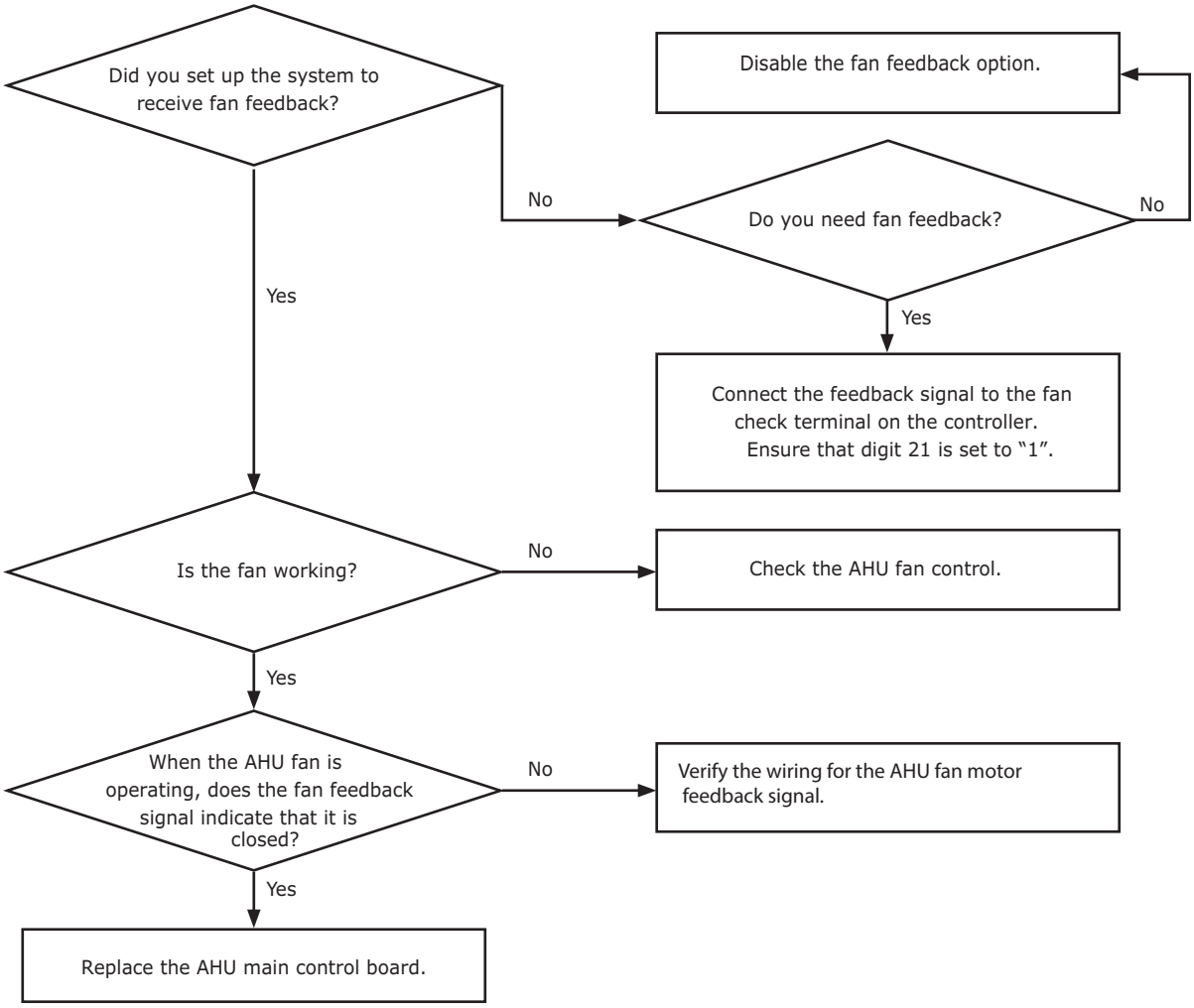
Temp. °F (°C)	Resistance value (kΩ)
158 (70)	2.2
140 (60)	3.0
122 (50)	4.2
104 (40)	5.8
86 (30)	8.3
68 (20)	12.1
50 (10)	18.0
32 (0)	27.3
14 (-10)	43.0

Fan Error

Outdoor unit and wired remote controller display	E154 has been generated.
Cause	• Faulty AHU fan operation • Missing or incorrect circuit system for fan feedback check.
Investigation	The AHU controller sends a fan operation status signal and the fan feedback signal stays OPEN for more than 10 seconds (AHU kit only). (1) Refer to Figure 17 for troubleshooting procedure.
Resolution	Depending on the cause, either replace the AHU main control board, or verify the wiring for the AHU fan motor feedback signal.

(1) 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 AHU controller may be damaged.

Figure 17. Troubleshooting procedure for fan error

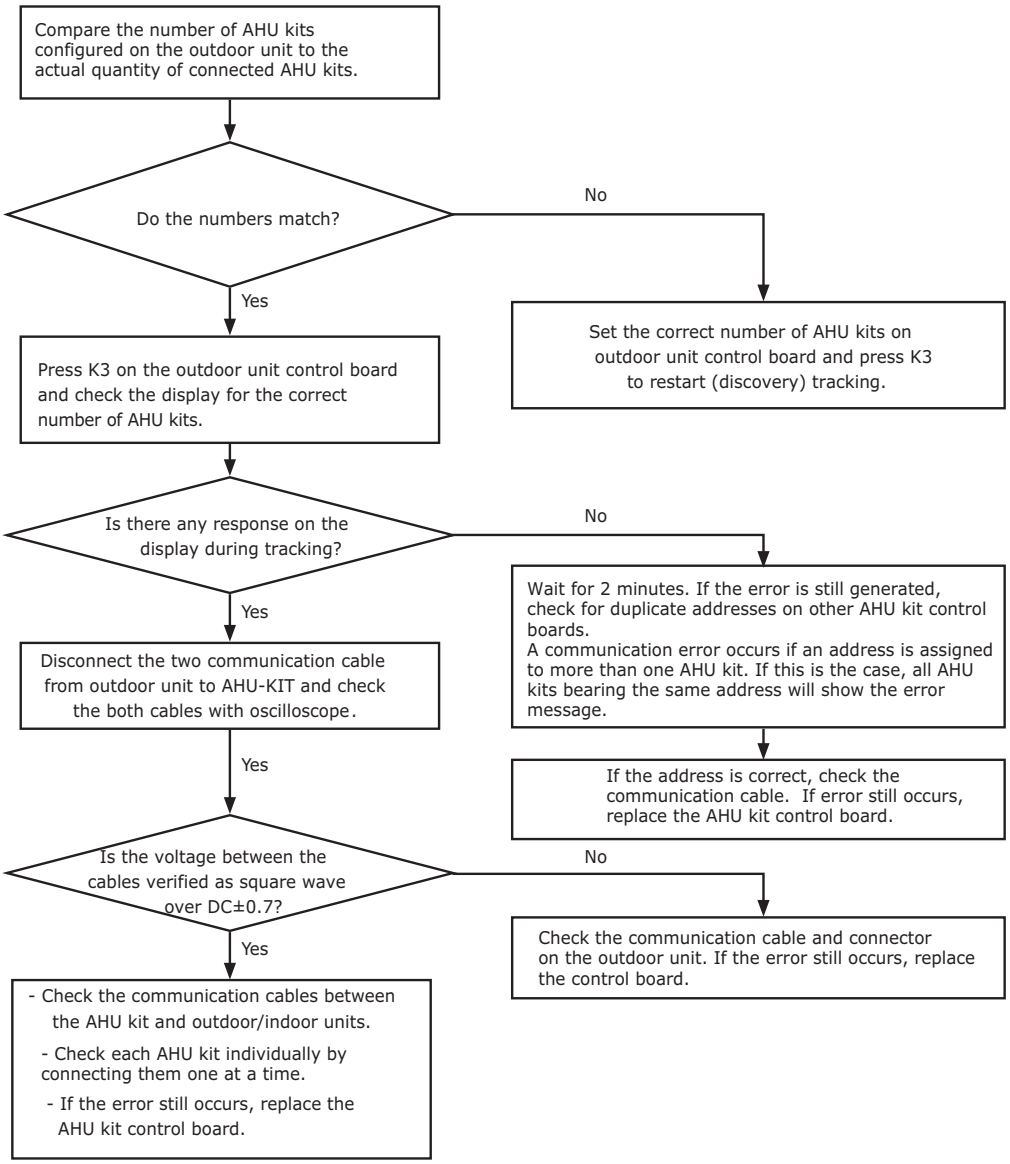


Communication Errors

Between the AHU kit and the Outdoor Unit Prior to Link Discovery

Outdoor unit and wired remote controller display	E201 has been generated.
Cause	Communication error between the AHU kit and the outdoor unit prior to link discovery.
Investigation	Refer to Figure 18 for troubleshooting procedure.
Resolution	Depending on the cause, either replace the AHU main control board or the outdoor unit control board.

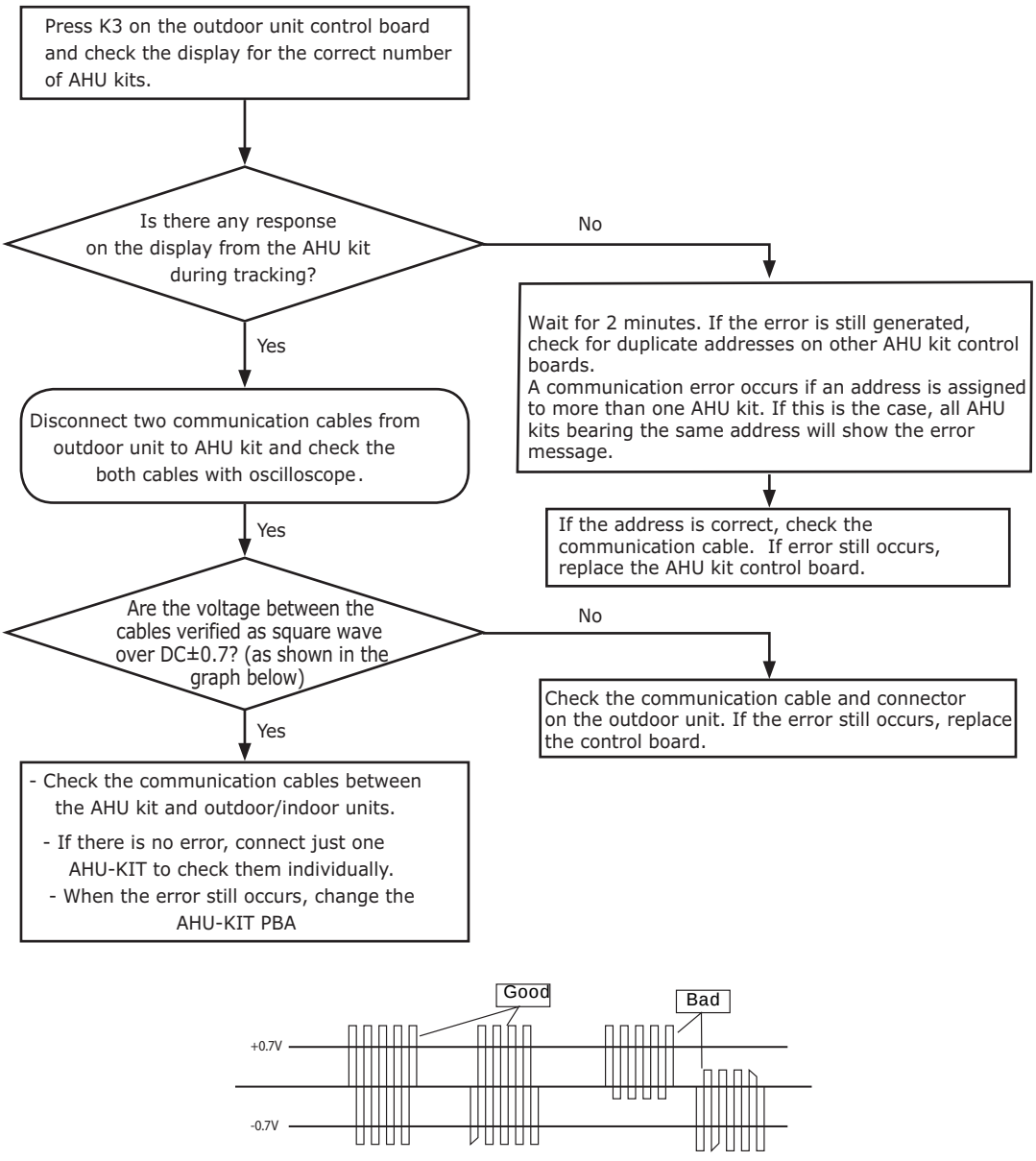
Figure 18. Troubleshooting Process for Communication Error Prior to Link Discovery



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

Outdoor unit and wired remote controller display	E202
Cause	Communication error between the AHU kit and the outdoor unit after link discovery.
Investigation	Refer to Figure 19 for troubleshooting process.
Resolution	Depending on the cause, either replace the AHU main control board or the outdoor unit control board.

Figure 19. Troubleshooting Process for Communication Error After Link Discovery



Pre-start Checks

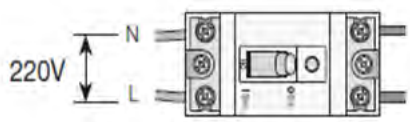
After installation, perform the following pre-start checks:

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 AHU 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 AHU 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 AHU 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 outdoor unit.
- Ensure that EEV kit is correctly installed.
  - The EEV kit can be installed either indoors or outdoors. Avoid installing it in residential areas.
  - If the EEV kit is installed separately, outside of the AHU, insulate the pipe to prevent the condensation.
  - Ensure that IN/OUT pipes are correctly connected.
  - Ensure that the body of EEV kit is installed in a level position.
  - Make sure that EEV kit is installed so that condensate can drain properly.
  - Do not install the EEV kit in or on the outdoor unit.
- Ensure that indoor coil inlet and outlet sensors are correctly attached.
  - The indoor coil inlet sensor should be attached below the distributor, on the coldest part of the heat exchanger piping. Ensure that the sensor is insulated.
  - The indoor coil outlet sensor should be installed approximately 7. 9 in. (200 mm) behind the header of AHU heat exchanger.

- Ensure that the optional discharge air temperature sensor is correctly attached (see "Example of VRF System with AHU Kit" p. 6).
  - The discharge air temperature sensor should be located downstream (> 39.4 in. [1 m]) from the heat exchanger.
  - The wired remote controller installation manual contains an explanation of the discharge air temperature setting.
  - Enable the heat setting compensation: Use Installation Option #1 (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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