

# Bosch BVA 2.0 Series Air Handler

2-3-4-5 Ton Capacity

R410A



**BOSCH**

## Installation Instructions





## Table of Contents

<b>1 Key to Symbols and Safety Instructions</b>	<b>4</b>
1.1 Key to Symbols	4
1.2 Safety	4
<b>2 General</b>	<b>6</b>
2.1 Installations in High Humidity Environments	6
2.2 Unit Dimensions	9
<b>3 Applications</b>	<b>10</b>
3.1 Vertical Upflow	10
3.2 Vertical Downflow	10
3.3 Horizontal	10
3.4 Installation in an Unconditioned Space	12
<b>4 Electrical wiring</b>	<b>13</b>
4.1 Power Wiring	13
4.2 Control Wiring	13
4.3 Grounding	13
4.4 Electrical Data	13
4.5 Electric Heat Kit MCA/MOP Data	14
<b>5 Airflow Performance</b>	<b>15</b>
5.1 Indoor Fan Motor Function	16
<b>6 Ductwork</b>	<b>17</b>
<b>7 Refrigerant Connections</b>	<b>18</b>
7.1 Condensate Drain Connection	18
<b>8 Air Filter (Not Factory-Installed)</b>	<b>19</b>
<b>9 Filter Installation Dimensions</b>	<b>20</b>
<b>10 Maintenance</b>	<b>21</b>
10.1 Cleaning Precautions	21
10.2 Regular Maintenance	21
11 Wiring Diagrams	22

## 1 Key to Symbols and Safety Instructions

### 1.1 Key to Symbols

#### Warnings



Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- ▶ **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- ▶ **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- ▶ **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- ▶ **NOTICE** is used to address practices not related to personal injury.

#### Important information



This symbol indicates important information where there is no risk to people or property.

### 1.2 Safety

Please read before proceeding



#### WARNING:

- ▶ These instructions are intended as an aid to qualified, licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instruction may lead to improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.



This document is customer property and is to remain with this unit. These instructions do not cover all the different variations of systems nor does it provide for every possible contingency to be met in connection with installation.



#### WARNING: FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH

- ▶ All phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES. If additional information is required please contact your local distributor.



#### WARNING: ELECTRICAL SHOCK

- ▶ Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to deenergize the equipment. Hazardous voltage can cause severe personal injury or death.



#### WARNING: ELECTRICAL SHOCK

- ▶ If removal of the blower assembly is required, all disconnect switches supplying power to the equipment must be deenergized and locked (if not in sight of unit) so the field power wires can be safely removed from the blower assembly. Failure to do so can cause electrical shock resulting in personal injury or death.



#### WARNING: FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH

- ▶ Because of possible damage to equipment or personal injury, installation, service, and maintenance should be performed by trained, qualified service personnel. Consumer service is recommended only for filter cleaning / replacement. Never operate the unit with the access panels removed.

**WARNING:**

- ▶ This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**WARNING: ELECTRICAL SHOCK**

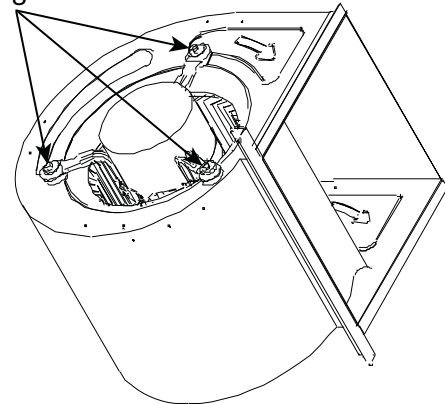
- ▶ The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.

**CAUTION: FIRE HAZARD**

- ▶ The material of plenum and ductwork must meet the latest edition of the NFPA 90B standard.

**NOTICE:**

- ▶ Make sure the blower motor support is tight (3-motor mounting bolts - Fig. 1). Then check if wheel is tightly secured to motor shaft before operating unit.

**Blower Motor  
Mounting Bolt***Figure 1*

## 2 General

The unit can be positioned for bottom air return in the upflow position, left and right air return in the horizontal position and top air return in downflow position.

This air handler provides the flexibility for installation in any upflow, downflow or horizontal application. Adjust the motor speed tap through the DIP switch (located on the Air Handler's control board) to select correct air flow according to airflow performance table in Section 5. Please refer to wiring diagram for Dip Switch settings.

Please refer to Figure 8 for high and low voltage wiring connections.

To ensure the proper installation, select a solid and level site. Ensure enough clearance is maintained for installation and maintenance.

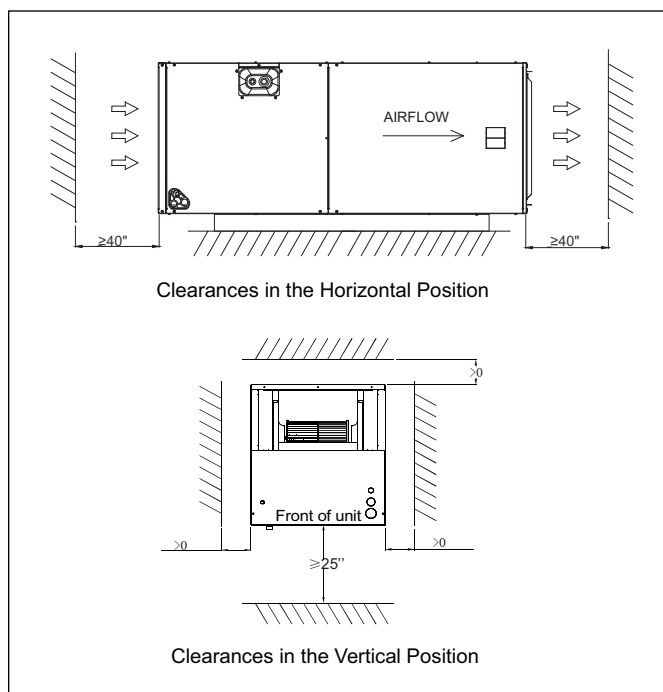


Figure 2 Required Clearances

### NOTICE:

- ▶ The installed unit must have the required clearances as shown in Figure 2. Failure to follow these instructions may result in equipment damage and/or premature equipment failure.



### WARNING: FIRE HAZARD

- ▶ Keep flammable material and vapors, such as gasoline, away from the air handler. Failure to follow these instructions can result in death, explosion, or fire.

## 2.1 Installations in High Humidity Environments

When the unit is installed in a hot and humid place, if the humidity inside the installation space exceeds 86°F and RH 80%, it is recommended to insulate the cabinet exterior. Use glass wool or polyethylene foam as insulation; the thickness should be more than 2 in. and it must fit inside the installation space opening.

Condensation may come from the surface of the insulation. Be sure to use insulation that is designed for use with HVAC Systems. Condensation may be produced on surface during cooling operation. It is also recommended to use auxiliary drain pan and secure the unit firmly to prevent it from falling. See Figures 3, 4, 5, & 6.



Refer to local code requirements for usage of auxiliary drain pans.

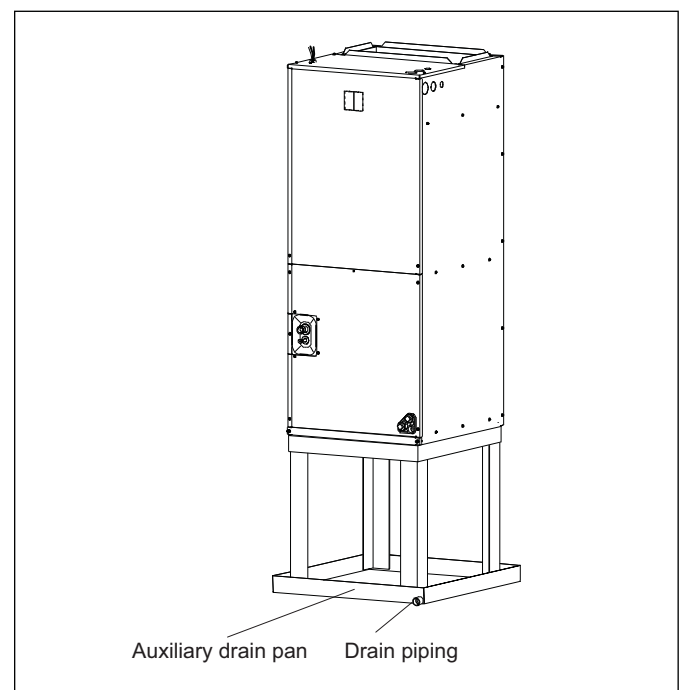


Figure 3 Installed Vertical Upflow

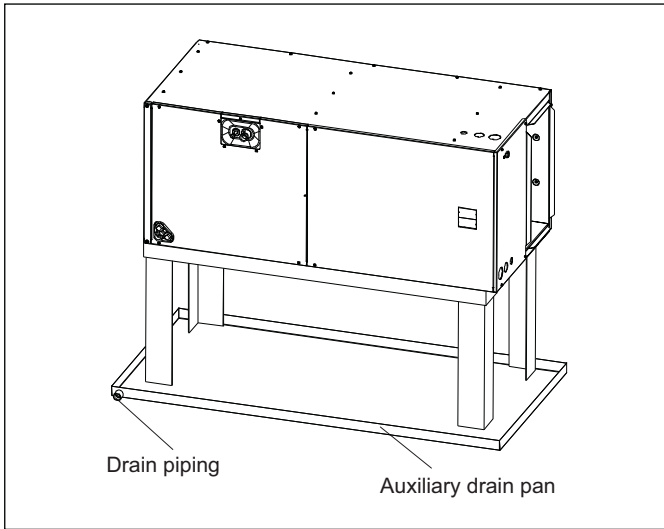


Figure 4 Installed Horizontal Right

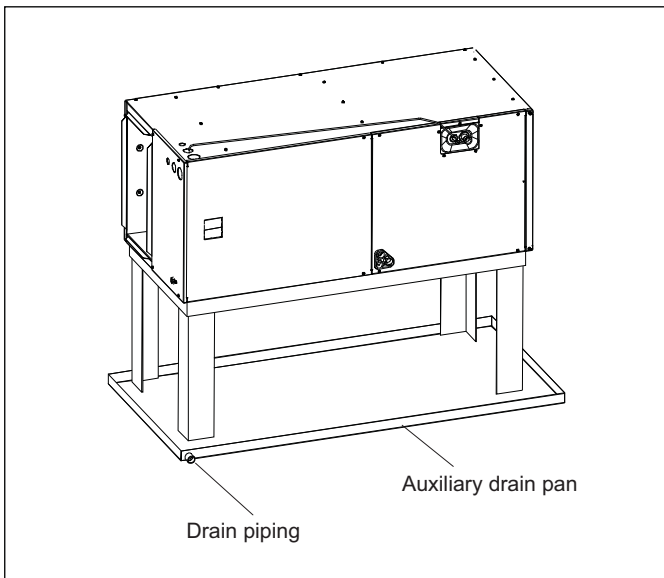


Figure 5 Installed Horizontal Left

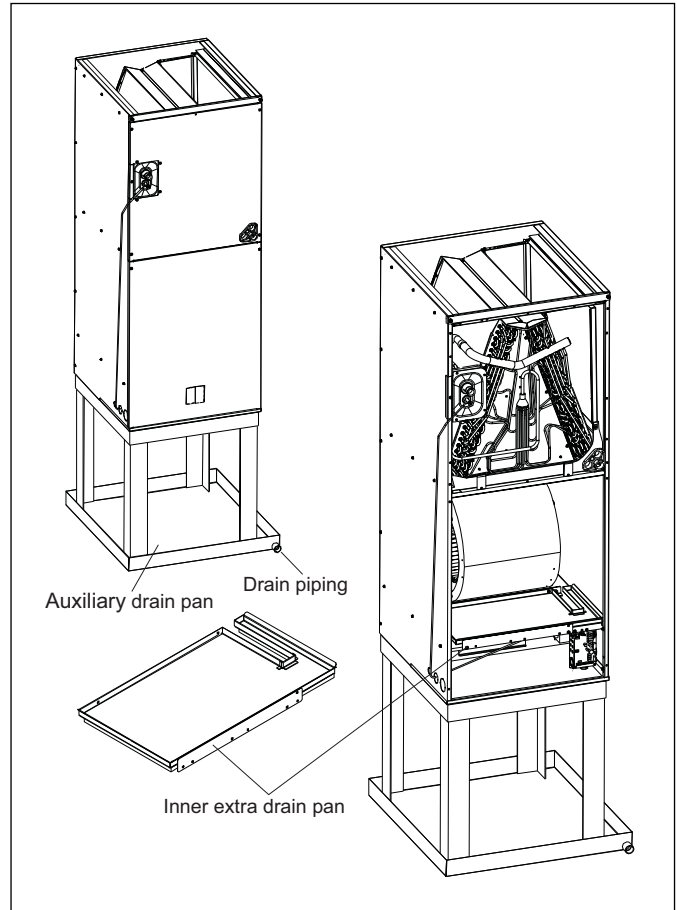


Figure 6 Installed Vertical Downflow

**NOTICE:**

- ▶ Inner extra drain pan is recommended to be installed for 4 and 5 ton vertical downflow applications installed in high humidity environments. This inner extra drain pan can be ordered from the manufacturer as a spare part. Refer to Figure 6.

**NOTICE:**

- ▶ For high humidity installations which include electric heat strips, it is recommended to install spacing brackets (available as a spare part from the manufacturer) between the heater and the heater collar to prevent condensation from forming on the collar.

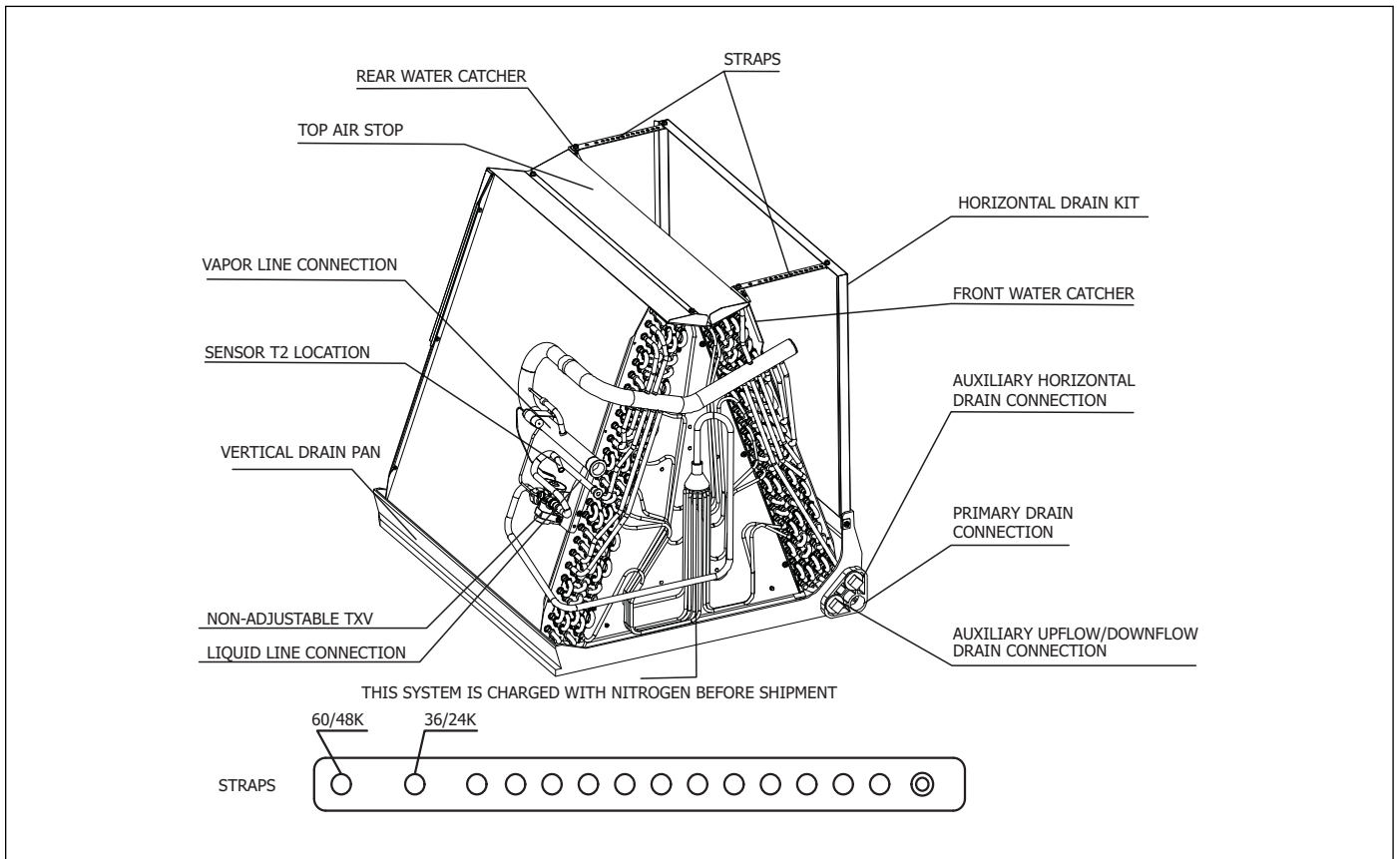


Figure 7 Indoor Coil and Drain Pan Set-Up



2.2 Unit Dimensions

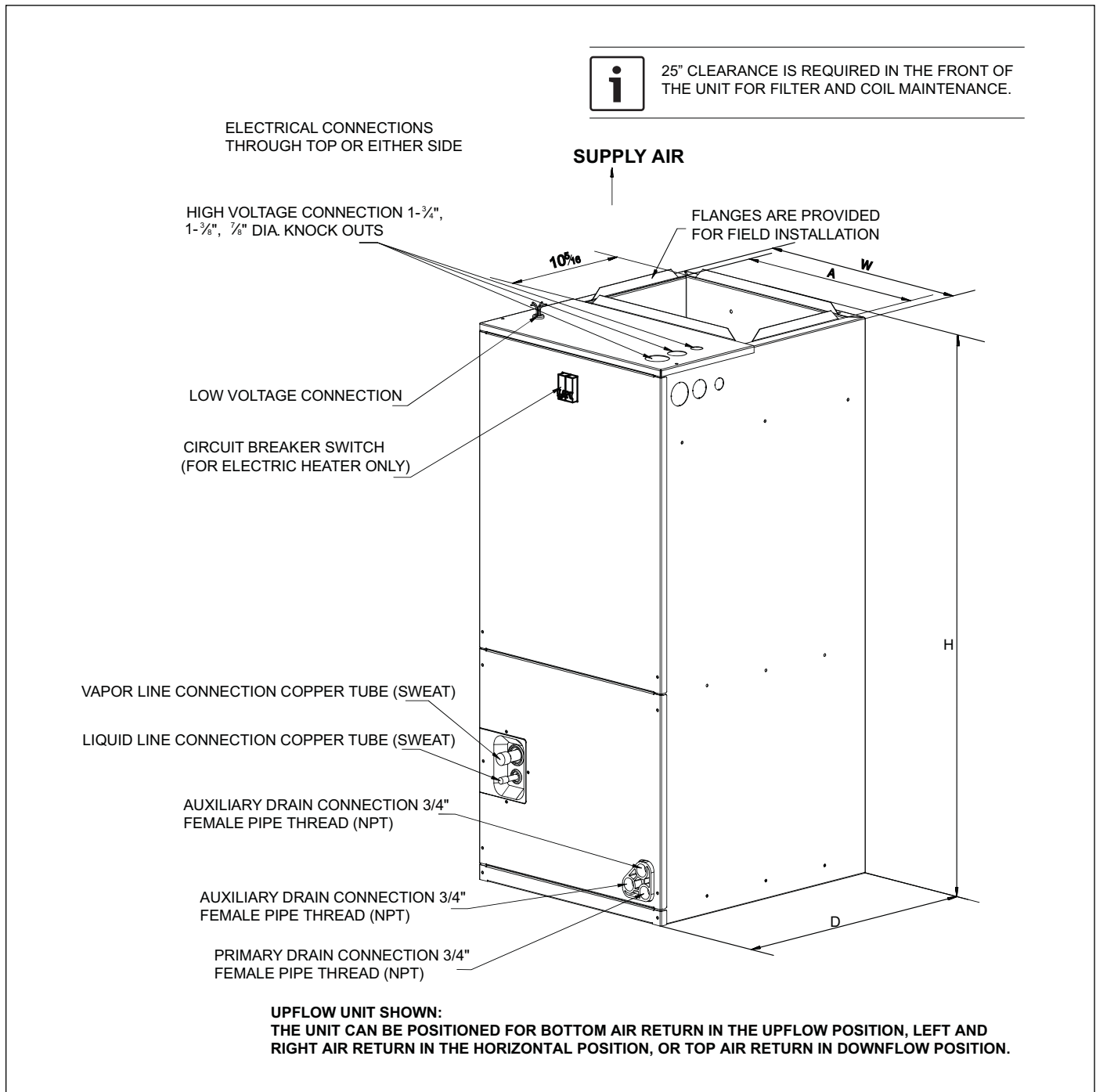


Figure 8

Model Size	Dimensions Inch [mm]				
	Unit Height "H"	Unit Width "W"	Unit Length "D"	Supply Duct "A"	Liquid Line / Vapor Line
24	46-1/2 [1180]	19-5/8 [500]	21-5/8 [550]	18 [456]	3/8 / 3/4 [9.5]/[19]
36	46-1/2 [1180]	19-5/8 [500]	21-5/8 [550]	18 [456]	3/8 / 3/4 [9.5]/[19]
48	54-1/2 [1385]	22 [560]	24 [610]	19-1/2 [496]	3/8 / 7/8 [9.5]/[22]
60	54-1/2 [1385]	22 [560]	24 [610]	19-1/2 [496]	3/8 / 7/8 [9.5]/[22]

Table 1

### 3 Applications

#### 3.1 Vertical Upflow

- ▶ Vertical Upflow configuration is the factory default on all models (see Figure 8).
- ▶ If return air is to be ducted, install duct flush with floor. Use fireproof resilient gasket 1/8 to 1/4 in. thick between the ducts, unit and floor. Set unit on floor over opening.

**i** Torque applied to drain connections should not exceed 15 ft.lbs. For vertical upflow and horizontal right installations, dimensions for refrigerant and drain pipes may be found in Figure 9.

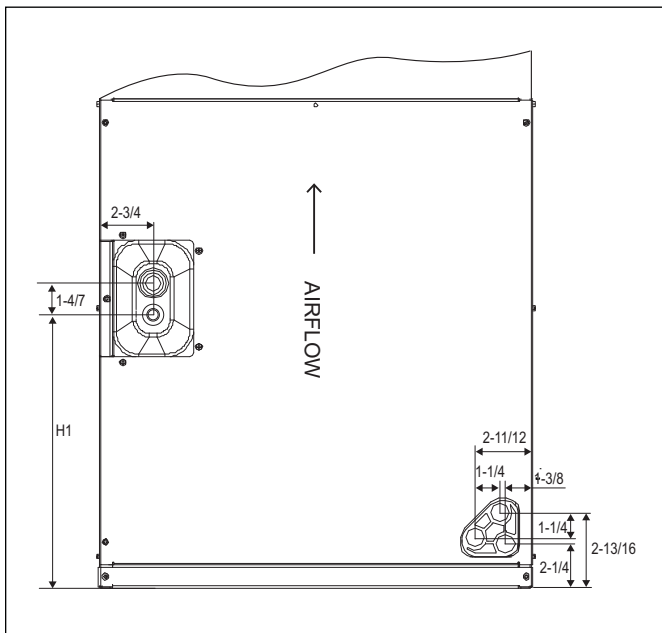


Figure 9 Dimensions For Air Handler (Coil Section)

Model Size	"H1" Inch [mm]
24/36	13-1/5 [335.5]
48/60	13-7/8 [352.8]

Table 2

#### 3.2 Vertical Downflow

##### Conversion to Vertical Downflow:

A vertical upflow unit may be converted to vertical downflow. Remove the coil access panel and indoor coil and reinstall 180° from original position. See Figure 10 and Figure 11.

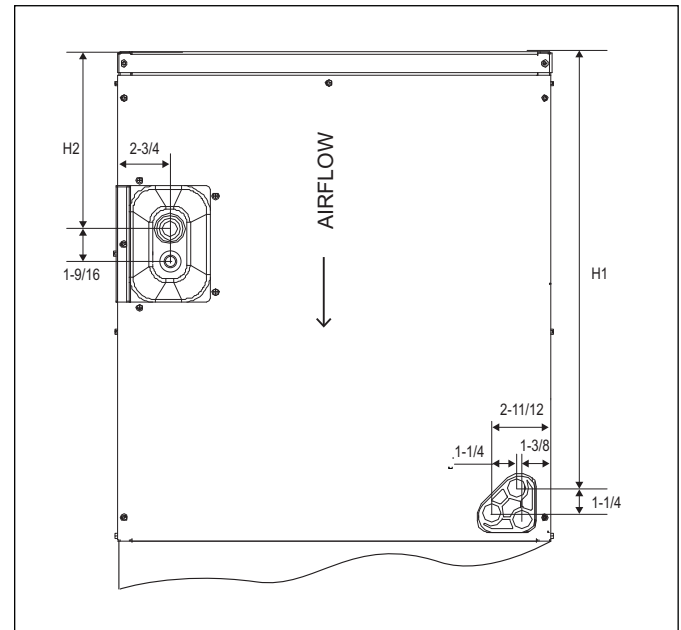


Figure 10 Dimensions For Air Handler (Coil Section)

Model Size	"H1" Inch [mm]	"H2" Inch [mm]
24/36	17-2/5 [441.5]	6-2/5 [162.5]
48/60	22-1/6 [563.5]	10-1/2 [267.2]

Table 3

#### 3.3 Horizontal

Horizontal right is the default factory configuration for all models.

##### Conversion to Horizontal Left:

A vertical upflow unit may be converted to horizontal left by removing indoor coil assembly and reinstalling coil as shown for left hand air supply. See Figure 11.

- ▶ Rotate the unit 90° into the horizontal left position, with the coil compartment on the right and the blower compartment on the left.
- ▶ Reinstall the indoor coil 180° from original position. Ensure the retaining channel is fully engaged with the coil rail. See Figures 11 and 12.
- ▶ An additional field supplied drain pan kit is recommended when the unit is configured for the horizontal position over a finished ceiling and/or living space.

### Steps for Changing Cabinet Orientation to Vertical Downflow OR Horizontal Left Orientation

1. Remove the screws and front panel and disconnect the T2 sensor wire's molex plug from the board (Figure 10, Step 1).
2. Pull out the coil with the sensor wire attached (do not disconnect the T2 sensor from the liquid pipe on the A coil). Pull the sensor wire through the liquid line hole in the cabinet cover (see 2A on Figure 10, Step 2).
3. Replace the coil in the correct orientation and secure in place. Remove the knockout (labeled 3A in Figure 10, Step 3) in the side of the cabinet, and add the rubber grommet from the included accessory bag. Connect the molex plug end of the sensor wire to the control board (insert wire through the knockout in the cabinet). (Figure 10, Step 3).

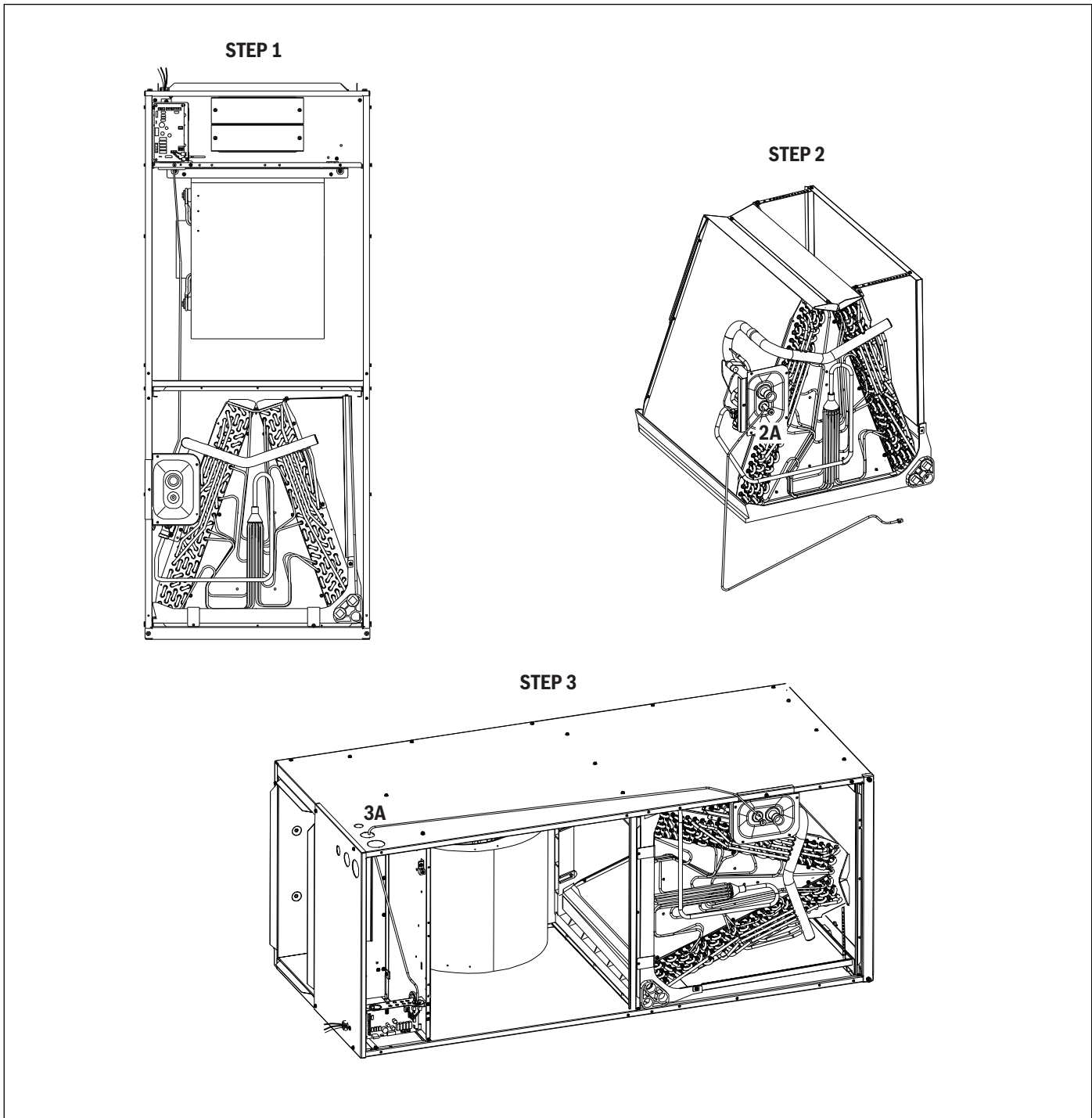


Figure 11 Vertical Downflow & Horizontal Left Applications Conversion

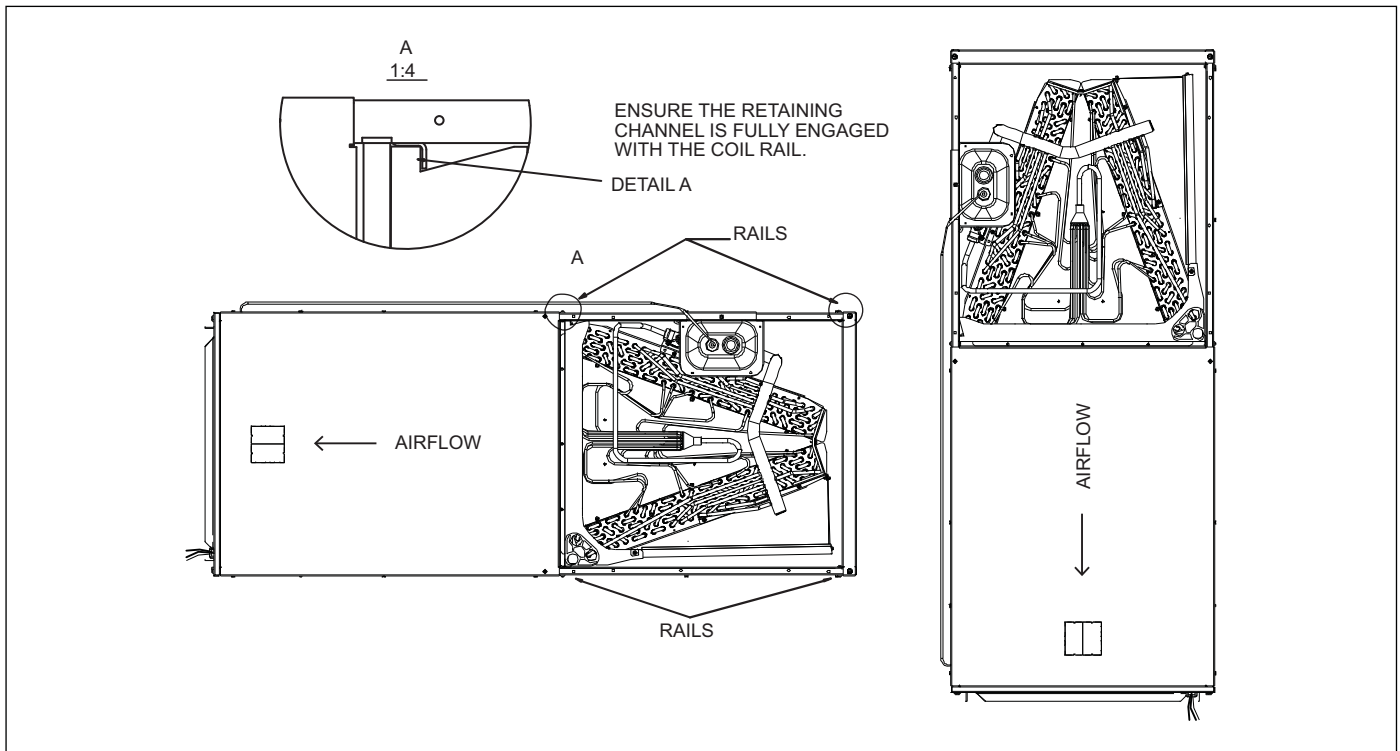


Figure 12 Vertical Downflow & Horizontal Left Applications

**NOTICE:**

- ▶ Horizontal units must be configured for right hand air supply or left hand air supply. Horizontal drain pan must be located under indoor coil. Failure to use the drain pan can result in property damage.

**Conversion in Horizontal Direction:**

Horizontal right-hand supply can be changed to horizontal left-hand supply by removing the indoor coil and reinstalling 180° from original.

**3.4 Installation in an Unconditioned Space**

**NOTICE:**

- ▶ There are two pairs of coil rails in the air handler for upflow and downflow application. If the air handler is installed in an unconditioned space, the two unused coil rails should be removed to minimize air handler surface sweating. The coil rails can be easily removed by unscrewing the 6 mounting screws from both sides of the cabinet.

## 4 Electrical wiring

Field wiring must comply with the National Electric Code (C.E.C. in Canada) and any applicable local ordinances.



### WARNING: ELECTRICAL SHOCK

- ▶ Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to deenergize the equipment. Hazardous voltage can cause severe personal injury or death.

### 4.1 Power Wiring

It is important that proper electrical power is available for connection to the unit being installed. See the unit nameplate, wiring diagram, and electrical data in the installation instructions for more detailed requirements.

- ▶ If required, install a branch circuit disconnect of adequate size, located within sight, and readily accessible from the unit.



When the Electric Heater is installed, units may be equipped with one or two 30-60 amp. circuit breakers. These breaker(s) protect the internal wiring in the event of a short circuit and serve as a disconnect. Circuit breakers installed within the unit do not provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

- ▶ Supply circuit power wiring must be 221°F minimum copper conductors only. See Electrical Data in this section for ampacity, wire size and circuit protector requirements. Supply circuit protection devices may be either fuses or "HACR" type circuit breakers.
- ▶ High voltage wiring may be run through knockout holes on the right, left or top of the unit.
- ▶ Three 7/8", 1-3/8", 1-3/4" dia. concentric knockouts are provided for running high voltage wiring to the unit.
- ▶ High voltage wiring must be connected to the red and black wiring in the control section of the air handler.

### 4.2 Control Wiring



Low voltage control wiring should not be run in conduit with high voltage wiring. Keep distance between the two conduits per local codes.

- ▶ 18 AWG. color-coded low voltage wire should be used for lengths less than 100ft. For wire lengths longer than 100 ft., 16 AWG. wire should be used.
- ▶ For low voltage wire connection location, see Figure 8.

- ▶ See wiring diagram located on inside of blower access panel of air handler for proper wiring instruction.
- ▶ After installation, ensure separation of low voltage and high voltage wiring is maintained.

### 4.3 Grounding



### DANGER: ELECTRICAL SHOCK

- ▶ The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.

- ▶ The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.
- ▶ Grounding may also be accomplished by attaching ground wire(s) to ground lug provided in the unit wiring compartment.
- ▶ Use of multiple supply circuits require grounding of each circuit to lug provided in unit.
- ▶ Ground lug is located on the upper right side of the cabinet.

### 4.4 Electrical Data

Model	Voltage	Hertz	HP	Speeds	Circuit Amps	Maximum Circuit Protector
24	208/230	60	1/3	5	2.6	15(A)
36	208/230	60	1/2	5	3.0	15(A)
48	208/230	60	3/4	5	4.5	15(A)
60	208/230	60	3/4	5	4.5	15(A)

Table 4

#### 4.5 Electric Heat Kit MCA/MOP Data

Heat Kit Model	Air Handler Model	(kW) Electric Heat	MIN. Circuit Ampacity		MAX. Fuse or Breaker (HACR) Ampacity		Fan speed				
			240 VAC	208 VAC	240 VAC	208 VAC	1	2	3	4	5
EHK-05B	24	5	29.4	25.9	30	30	●	●	●	●	●
EHK-08B		7.5	42.4	37.2	45	40	X	X	●	●	●
EHK-10B		10	55.4	48.5	60	50	X	X	●	●	●
EHK-05B	36	5	29.9	26.4	30	30	●	●	●	●	●
EHK-08B		7.5	42.9	37.7	45	40	X	●	●	●	●
EHK-10B		10	55.9	49	60	50	X	X	●	●	●
EHK-15B		15	55.9/26.1	49/22.6	60/30	50/25	X	X	●	●	●
EHK-05B	48	5	31.8	28.3	35	30	●	●	●	●	●
EHK-08B		7.5	44.8	39.6	45	40	●	●	●	●	●
EHK-10B		10	57.8	50.9	60	60	X	●	●	●	●
EHK-15B		15	57.8/26.1	50.9/22.6	60/30	60/25	X	X	●	●	●
EHK-20B		20	57.8/52.1	50.9/45.2	60/60	60/50	X	X	X	●	●
EHK-05B	60	5	31.8	28.3	35	30	X	X	●	●	●
EHK-08B		7.5	44.8	39.6	45	40	X	X	●	●	●
EHK-10B		10	57.8	50.9	60	60	X	X	●	●	●
EHK-15B		15	57.8/26.1	50.9/22.6	60/30	60/25	X	X	●	●	●
EHK-20B		20	57.8/52.1	50.9/45.2	60/60	60/50	X	X	X	●	●
EHK-20B		20	57.8/52.1	50.9/45.2	60/60	60/50	X	X	X	●	●

Table 5 Suitable heat kits for AHU multi position installation

- Heat kit suitable for AHU 4-way position installation.
- Ampacities for MCA and Fuse/breaker including the blower motor
- Heat pump systems require a specified airflow. Each ton of cooling requires between 350 and 450 cubic feet of air per minute (CFM), or 400 CFM nominally.

#### Heater Kit Accessories

Model	Description	24	36	48	60
EHK05B	5 kW Heat Kit, Double Pole Breaker	●	●	●	●
EHK08B	7.5 kW Heat Kit, Double Pole Breaker	●	●	●	●
EHK10B	10 kW Heat Kit, Double Pole Breaker	●	●	●	●
EHK15B	15 kW Heat Kit, Double Pole Breaker	X	●	●	●
EHK20B	20 kW Heat Kit, Double Pole Breaker	X	X	●	●

Table 6

[ ● means available, X means not available ]

## 5 Airflow Performance

Airflow performance data is based on cooling performance with a coil and no filter in place. Check the performance table for appropriate unit size selection. External static pressure should stay within the minimum and maximum limits

shown in the table below in order to ensure proper operation of both cooling, heating, and electric heating operation.

Air Handler Model Size	Motor Speed		SCFM								
			External Static Pressure-Inches W.C. [kPa]								
			0[0]	0.1[.02]	0.2[.05]	0.3[.07]	0.4[.10]	0.5[.12]	0.6[.15]	0.7[.17]	0.8[.20]
24	Tap(5)	SCFM	1181	1144	1104	1063	1021	991	961	919	902
		Watts	263	274	283	289	298	304	314	323	328
	Tap(4)-Default High Stage Setting	SCFM	961	913	872	826	792	748	717	673	638
		Watts	146	151	160	166	175	180	190	195	205
	Tap(3)	SCFM	852	797	760	708	674	626	589	535	500
		Watts	109	114	122	127	137	142	150	155	157
	Tap(2)-Default Low Stage Setting	SCFM	755	711	653	615	563	505	499	413	382
		Watts	81	98	94	103	108	112	119	125	133
	Tap(1)	SCFM	712	647	604	548	490	481	452	427	368
		Watts	71	75	84	88	93	98	101	109	114
36	Tap(5)	SCFM	1460	1420	1371	1329	1228	1224	1195	1093	1041
		Watts	283	294	301	311	322	327	340	356	367
	Tap(4)-Default High Stage Setting	SCFM	1269	1213	1170	1121	1085	996	911	867	810
		Watts	191	197	207	213	223	238	247	255	266
	Tap(3)	SCFM	1152	1093	1046	988	895	829	764	717	707
		Watts	147	152	161	167	181	192	198	207	208
	Tap(2)-Default Low Stage Setting	SCFM	925	879	808	700	623	573	516	495	442
		Watts	87	96	100	111	116	125	129	134	143
	Tap(1)	SCFM	889	727	456	225	/	/	/	/	/
		Watts	74	66	51	44	/	/	/	/	/
48	Tap(5)	SCFM	2051	2006	1961	1914	1867	1819	1777	1735	1695
		Watts	454	471	487	503	518	531	545	559	572
	Tap(4)	SCFM	1914	1875	1831	1782	1735	1691	1649	1611	1581
		Watts	384	401	416	430	442	455	467	480	492
	Tap(3)-Default High Stage Setting	SCFM	1714	1661	1611	1560	1513	1469	1424	1380	1314
		Watts	273	289	304	317	330	343	353	366	386
	Tap(2)	SCFM	1499	1451	1398	1340	1288	1247	1188	1058	993
		Watts	198	212	224	234	243	256	271	290	303
	Tap(1)-Default Low Stage Setting	SCFM	1363	1307	1250	1181	1134	1062	938	875	835
		Watts	151	163	175	181	193	206	224	232	243
60	Tap(5)	SCFM	2029	1988	1947	1900	1858	1815	1771	1716	1671
		Watts	466	482	498	514	528	541	553	565	572
	Tap(4)-Default High Stage Setting	SCFM	1881	1843	1800	1754	1708	1666	1626	1590	1558
		Watts	391	407	423	438	449	462	474	487	498
	Tap(3)	SCFM	1677	1633	1586	1543	1499	1449	1409	1370	1281
		Watts	281	297	311	325	338	346	358	370	386
	Tap(2)-Default Low Stage Setting	SCFM	1491	1439	1380	1334	1285	1246	1180	1047	988
		Watts	205	217	226	238	250	259	269	292	300
	Tap(1)	SCFM	1348	1280	1227	1180	1130	1042	933	871	825
		Watts	157	165	176	187	196	206	225	233	245

Table 7

**█** Bold outlined areas represent airflow outside of the required 300-450 cfm/ton range.

NOTES:

1. The high stage airflow must be used as the rated airflow for the full load operation of machine.
2. The rated airflow of systems without electric heater kits requires between 300 and 450 cubic feet of air per minute (CFM).
3. The rated airflow of systems with electric heater kits requires between 350 and 450 cubic feet of air per minute (CFM).
4. The air distribution system has the greatest effect on airflow. Therefore, the contractor should use only industry-recognized procedures.
5. Duct design and construction should be carefully done. System performance can be lowered dramatically through poor design or workmanship.
6. Air supplier ducts should be located along the perimeter of the conditioned space and properly sized. Improper location or insufficient air flow may cause drafts or noise in the ductwork.
7. Installers should balance the air distribution system to ensure proper quiet airflow to all rooms in the home. An air velocity meter or airflow hood can be used to balance and verify branch and system airflow (CFM).

## 5.1 Indoor Fan Motor Function

### System operation and function

#### Two Stage Fan Control

The IDS 2.0 IDU supports two stage fan control which requires a two stage thermostat (Y1&Y2). When there is a call for Y2, the blower motor will turn to high speed setting. When there is a call for Y1, the blower motor will turn to low speed setting. Unit will run at low speed setting when there is only G call. It will run in high speed setting when there is W/W1/W2 signal (when the electric heat kit is on).

The X13 ECM motor supports 5 speeds. Customer can select the suitable speed by adjusting the SW6-1 and SW6-2 dip switches. Refer to Airflow Performance Table (Table 7) for reference airflow. Refer to figure 23 for dip switches settings.

If 2 stage thermostat is not available, single stage thermostat may be used, please refer to Wiring Diagram section for wiring instructions. If Y1 and Y2 are jumped, the unit will only run in high stage fan speed.

#### Anti-Cold Air Fan Delay

The Anti-Cold Air Fan Delay function utilizes a sensor (T2) located on the indoor coil, which prevents the blower from turning on until the coil has reached a certain temperature. This feature prevents cold air blow during heating operation.

1. When SW6-3 dip switch is set to the "ON" position and the unit is in heating mode, the Anti-Cold Air Fan Delay function will activate based on the following entry conditions (all 3 conditions must be met):
  - a. Indoor Coil Temperature (T2) < 82.4°F
  - b. Electric heat kit is turned off
  - c. There is a call for Y1 from thermostat to indoor unit
2. This function will deactivate if ONE OF the following exit conditions are met OR the system has been operating in heating mode for 15 minutes.
  - a. T2 ≥ 89.6°F
  - b. Heater kit is turned on
  - c. The system is NOT running Heat mode
3. During the heating mode, if one of the exit conditions of Anti-Cold Air is satisfied, the blower motor will turn on in first stage fan speed.
4. During the heating mode, if all of the entry conditions of Anti-Cold Air are met and maintained for 120s, the blower motor will change to first stage speed.

#### Heating Fan Delay

If SW6-3 dip switch is set to the "OFF" position and the unit is in heating mode, the blower will operate with a 90 second delay with the fan speed dictated by Y1 or Y2 signal.

#### Passive Dehumidification (Optional)

IDS 2.0 IDU has a Passive Dehumidification function which lowers the fan speed (first stage) with a DH call from the thermostat. This function requires proper DH wiring from the indoor unit to the thermostat (with a humidistat).



If DH wire is not connected, the unit will still function normally.

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## 6 Ductwork

Field ductwork must comply with the National Fire Protection Association NFPA 90A, NFPA 90B and any applicable local ordinance(s).



### WARNING: FIRE HAZARD AND CARBON MONOXIDE

- ▶ Do not, under any circumstances, connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

Sheet metal ductwork run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Ductwork must comply with National Fire Protection Association as tested by U/L Standard 181 for Class I Air Ducts. Check local codes for requirements on ductwork and insulation.

- ▶ Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grills, special filters, accessories, etc. are accounted for in total resistance. See airflow performance tables in Section 5 of this manual.
- ▶ Design the duct system in accordance with "ACCA" Manual "D" Design for Residential Winter and Summer Air Conditioning and Equipment Selection. Latest editions are available from: "ACCA" Air Conditioning Contractors of America, 1513 16th Street, N.W., Washington, D.C. 20036. If duct system incorporates flexible air duct, be sure pressure drop information (straight length plus all turns) shown in "ACCA" Manual "D" is accounted for in system.
- ▶ Supply plenum should be attached to the 3/4" duct flanges supplied with the unit. Attach flanges around the blower outlet.



If an elbow is included in the plenum close to the unit, it must not be smaller than the dimensions of the supply duct flange on the unit.



The front flange on the return duct (if connected to the blower casing) must not be screwed into the area where the power wiring is located. Drills or sharp screw points can damage insulation on wires located inside unit.

- ▶ Secure the supply and return ductwork to the unit flanges, using proper fasteners for the type of duct used and tape the duct-to-unit joint as required to prevent air leaks.

## 7 Refrigerant Connections

Keep the coil connections sealed until refrigerant connections are made. Refer to the BOVA Installation, Operation, and Maintenance Manual for details on line sizing, tubing installation, and charging information.

Coil is factory charged with Nitrogen. Evacuate the system before charging with refrigerant.

Install refrigerant lines so that they do not block service access to the front of the unit.

Nitrogen should flow through the refrigerant lines while brazing.

Use a brazing shield to protect the cabinet's paint and a wet rag to protect the rubber grommet and input pipe's piston seal ring from being damaged by torch flames. Use a wet rag or an approved heat paste to protect the TXV sensing bulb during the brazing process. Refer to Figure 13.

After the refrigerant line connections are made, seal the gap around the connections with pressure sensitive gasket.

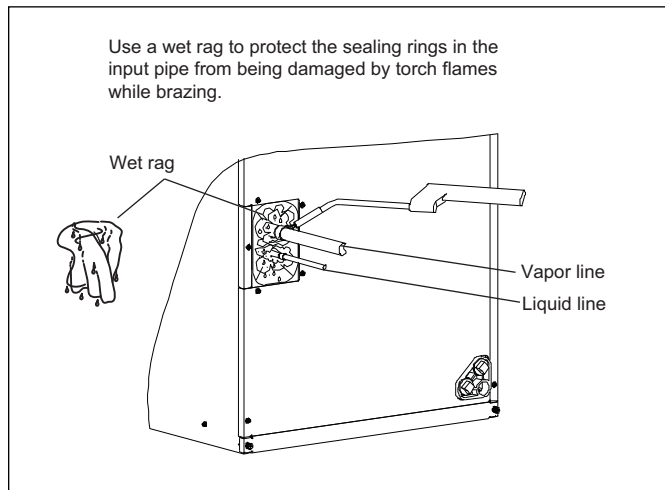


Figure 13

After the brazing work is finished, make sure to check that there is no refrigerant leakage. After checking for vapor leaks, be sure to insulate the pipe connections, refer to Figure 14.

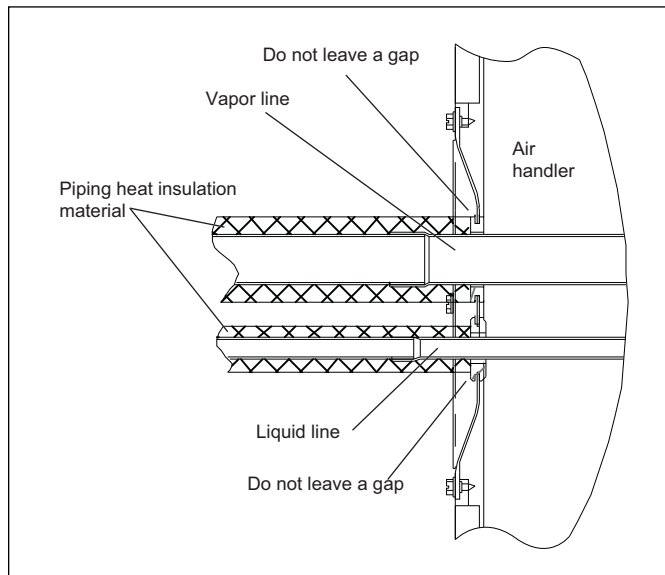


Figure 14

### 7.1 Condensate Drain Connection

Consult local codes for specific requirements.

Refer to Figure 15 and the information below for required condensate drain trap installation.

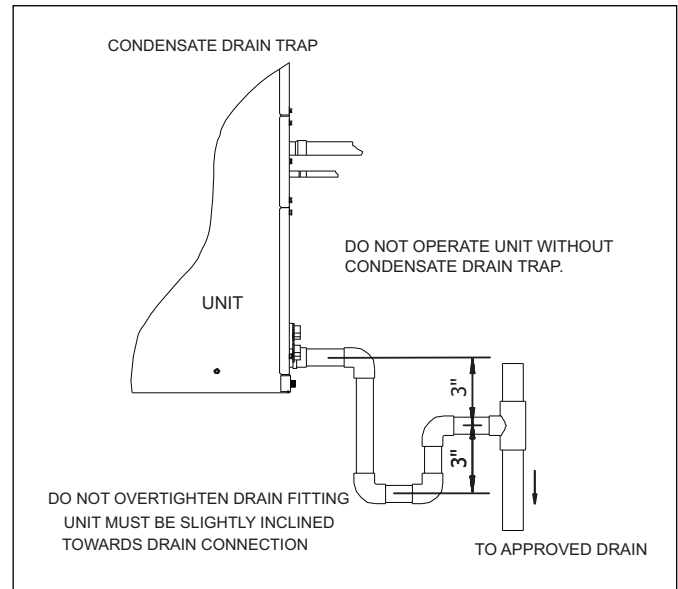


Figure 15



1. When making drain fitting connections to the drain pan, use a thin layer of Teflon paste, silicone or Teflon tape and install by hand tightening.
2. When making drain fitting connections to drain pan, do not overtighten. Over tightening fittings can split pipe connections on the drain pan.

- ▶ Ensure drain lines do not block access to front of the unit. Minimum clearance of 24 inches is required for filter, coil or blower removal and service access.
- ▶ Make sure unit is leveled or pitched slightly toward primary drain connection so that water will drain completely from the pan.
- ▶ Do not reduce drain line size to less than connection size provided on condensate drain pan.
- ▶ All horizontal drain lines must be pitched downward away from the unit at a minimum of 1/8" per foot of line to ensure proper drainage.
- ▶ Do not connect condensate drain line to a closed or open sewer pipe. Run condensate to an open drain or run line to a safe outdoor area.
- ▶ The drain line should be insulated where necessary to prevent sweating and damage due to condensate forming on the outside surface of the line.
- ▶ Make provisions for disconnecting and cleaning of the primary drain line should it become necessary. Install a 3 inch trap in the primary drain line as close to the unit as possible. Make sure that the top of the trap is below connection to the drain pan to allow complete drainage of pan (See Figure 15).

- ▶ Auxiliary drain line should be run to a place where condensate will be noticeable. Homeowner should be warned that a problem exists if water should begin running from the auxiliary drain line.
- ▶ Plug the unused drain connection with the plugs provided in the parts bag provided with the unit. Use a thin layer of teflon paste, silicone or teflon tape to form a water tight seal.
- ▶ Test condensate drain pan and drain line after installation is complete. Pour water into drain pan, enough to fill drain trap and line. Check to ensure drain pan is draining completely, no leaks are found in drain line fittings, and water is draining from the termination of the primary drain line.

## 8 Air Filter (Not Factory-Installed)

Filters are not included with the unit and must be field supplied.

An external filter or other means of filtration must be properly sized for a maximum of 300 feet/min. air velocity or what is recommended for the type of filter installed.

Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system's major components, such as motor, elements, heat relays, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. For systems without a return air filter grill, multiple filter grills can be installed at each of the return air openings.

If adding high efficiency filters or electronic air filtration systems, it is very important that the air flow is not reduced. If air flow is reduced the overall performance and efficiency of the unit will be reduced. It is strongly recommended that a professional installation technician is contacted to ensure such filtration systems are installed correctly.



Do not double filter the return air duct system. Do not filter the supply air duct system. This will change the performance of the unit and reduce airflow.



### WARNING: FIRE HAZARD

- ▶ Do not operate the system without filters. A portion of the dust suspended in the air may temporarily lodge in the duct runs and at the supply registers. Any circulated dust particles could be heated and charred by contact with the air handler elements. This residue could soil ceilings, walls, drapes, carpets and other articles in the house. Soot damage may occur with filters in place, when certain types of candles, oil lamps or standing pilots are burned.

## 9 Filter Installation Dimensions

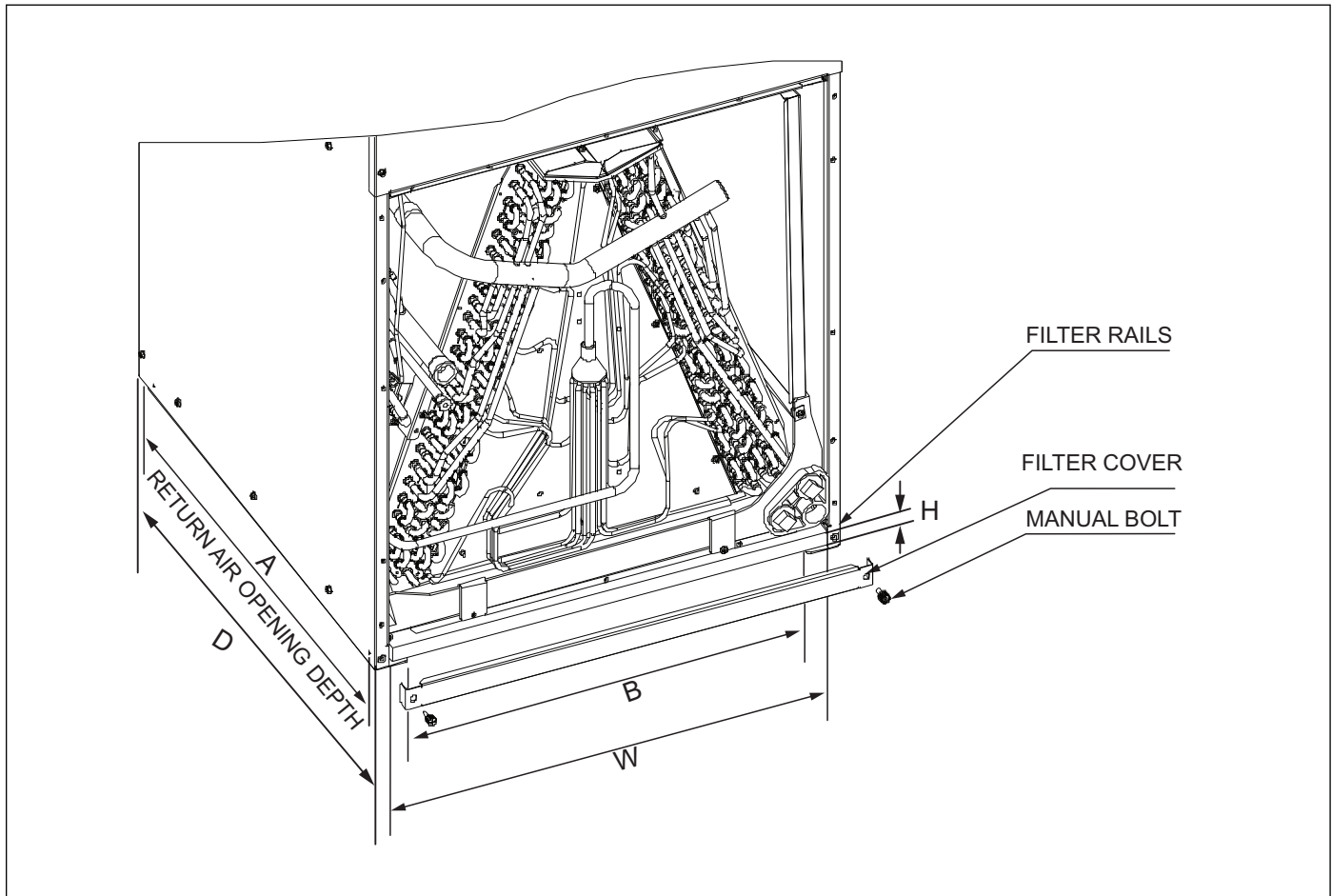


Figure 16 Filter Installation



Filters are not included with the unit and must be field supplied.

### Dimensional data

Model	Filter Size In. [mm]	"W" In. [mm]	"D" In. [mm]	"H" In. [mm]	Return width "A" In. [mm]	Return length "B" In. [mm]
24/36	18x20 [457x508]	18.3 [466]	21.6 [548]	1 [25.4]	20.8 [528]	16.3 [414]
48/60	20x22 [508x559]	20.7 [526]	23.9 [608]	1 [25.4]	23 [584]	18.8 [478]

Table 8

### Air filter removal / installation

- ▶ Remove bolts manually, remove air filter cover, see Figure 16.
- ▶ Hold the edge of the air filter and pull out.
- ▶ Install new filter so that the arrow on the filter is in the same direction as airflow.
- ▶ If reusable filter is being used, please clean according to the manufacturer's specification prior to re-installation.

## 10 Maintenance



For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

### 10.1 Cleaning Precautions



**WARNING:**

- ▶ Any unit repairs must be performed by qualified service personnel only.



**WARNING: BEFORE CLEANING AND MAINTENANCE**

- ▶ Always turn off your heat pump and disconnect its power supply before cleaning or maintenance.



**CAUTION:**

- ▶ When removing filter, do not touch metal parts in the unit. The sharp metal edges can cut you.



**NOTICE:**

- ▶ Do not use chemicals or chemically treated cloths to clean the unit .
- ▶ Do not use benzene, paint thinner, polishing powder or other solvents to clean the unit.
- ▶ Do not operate the system without a filter in place

### 10.2 Regular Maintenance

Your heat pump must be inspected regularly by a qualified service technician. Your annual system inspection must include:

1. Inspect the air filter every ninety days or as often as needed. If blocked or obstructed, clean or replace at once.
2. Inspection and/or cleaning of the blower wheel housing and motor.
3. Inspection and cleaning of indoor and outdoor coils as required.
4. Inspection and/or cleaning of the indoor coil drain pan and drain lines, as well as auxiliary drain pan and lines.
5. Check all electrical wiring and connections. Correct as needed, referring to the wiring diagram.

## 11 Wiring Diagrams



**WARNING: ELECTRICAL SHOCK**

- ▶ Disconnect all power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.



**DANGER: ELECTRICAL SHOCK**

- ▶ This unit must be properly grounded and protected by a circuit breaker or fuse.



**WARNING: ELECTRICAL SHOCK**

- ▶ These units must be wired and installed in accordance with all National and Local Safety Codes.

- ▶ To avoid electrical shock, please ensure:
  - The heat pump is properly grounded
  - The main power plug to the heat pump has been joined with the ground wiring (DO NOT ALTER THIS).
- ▶ Do not strain the power wiring.



Dashed lines in the following thermostat wiring diagrams refer to optional wiring (wiring for Passive Dehumidification Function and/OR Electric Heat). For thermostat wiring please refer to the Owner's Manual of the thermostat.



Dh wiring is optional and requires a thermostat with a humidistat. Dh functions as Passive Dehumidification and will downstage the indoor fan to first stage. System will operate according to normal sequence of operations if Dh wiring is absent.

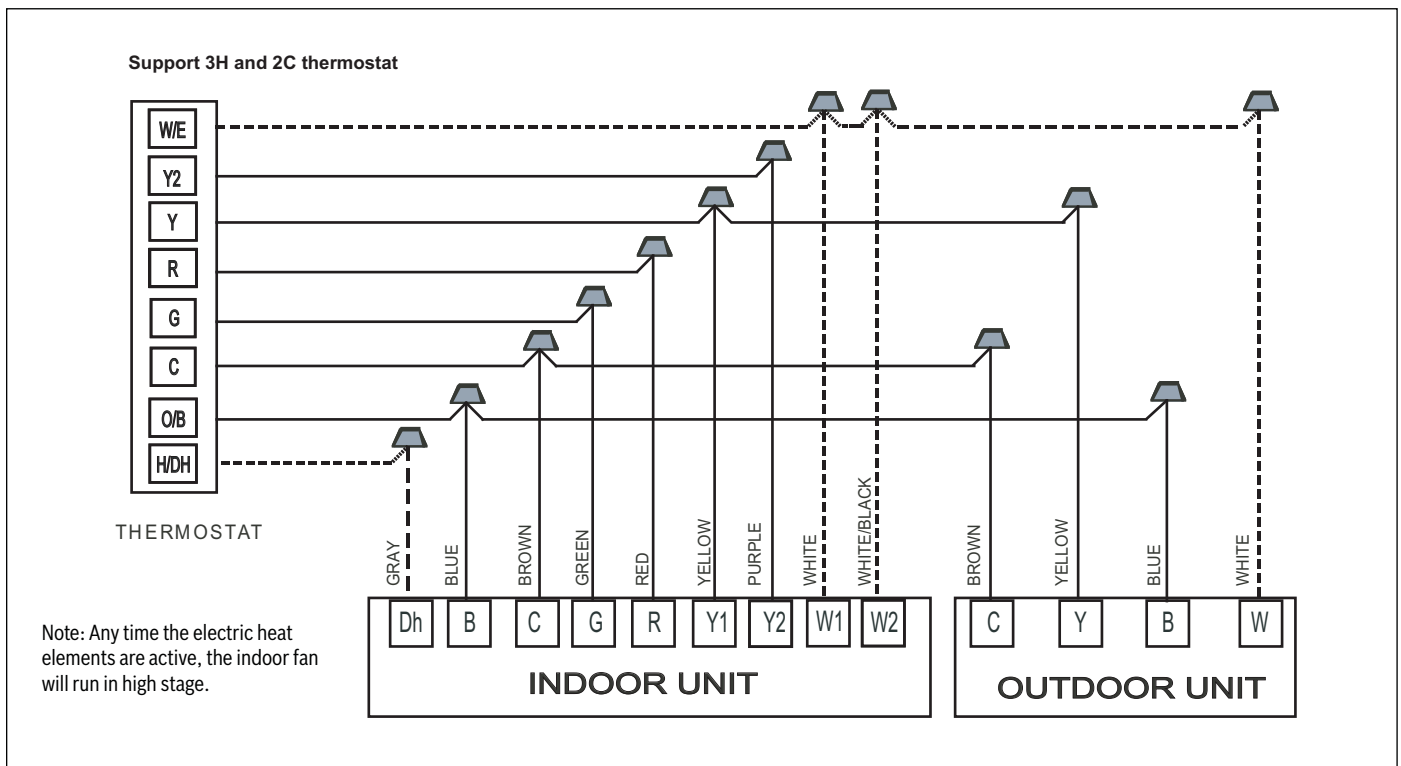


Figure 17 Control Wiring For HP Systems

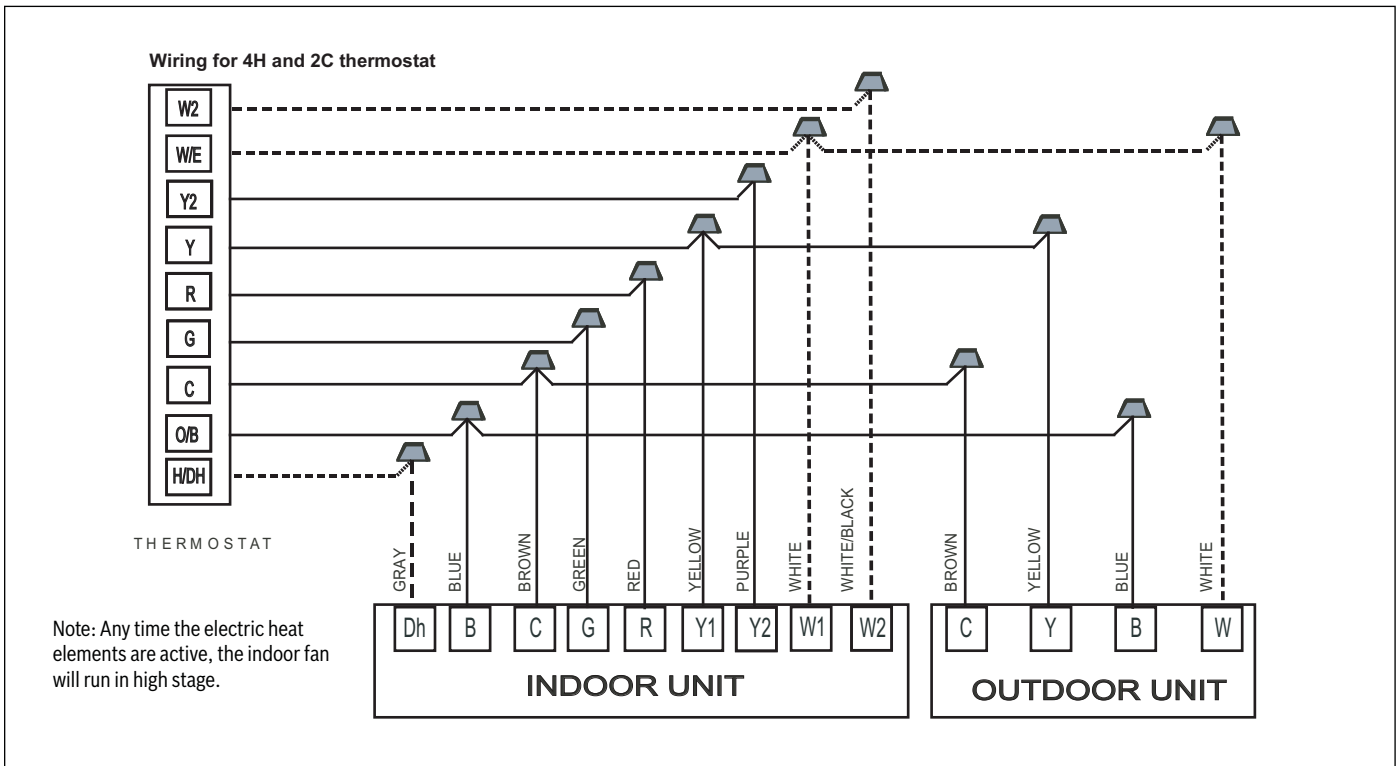


Figure 18 Control Wiring For HP Systems

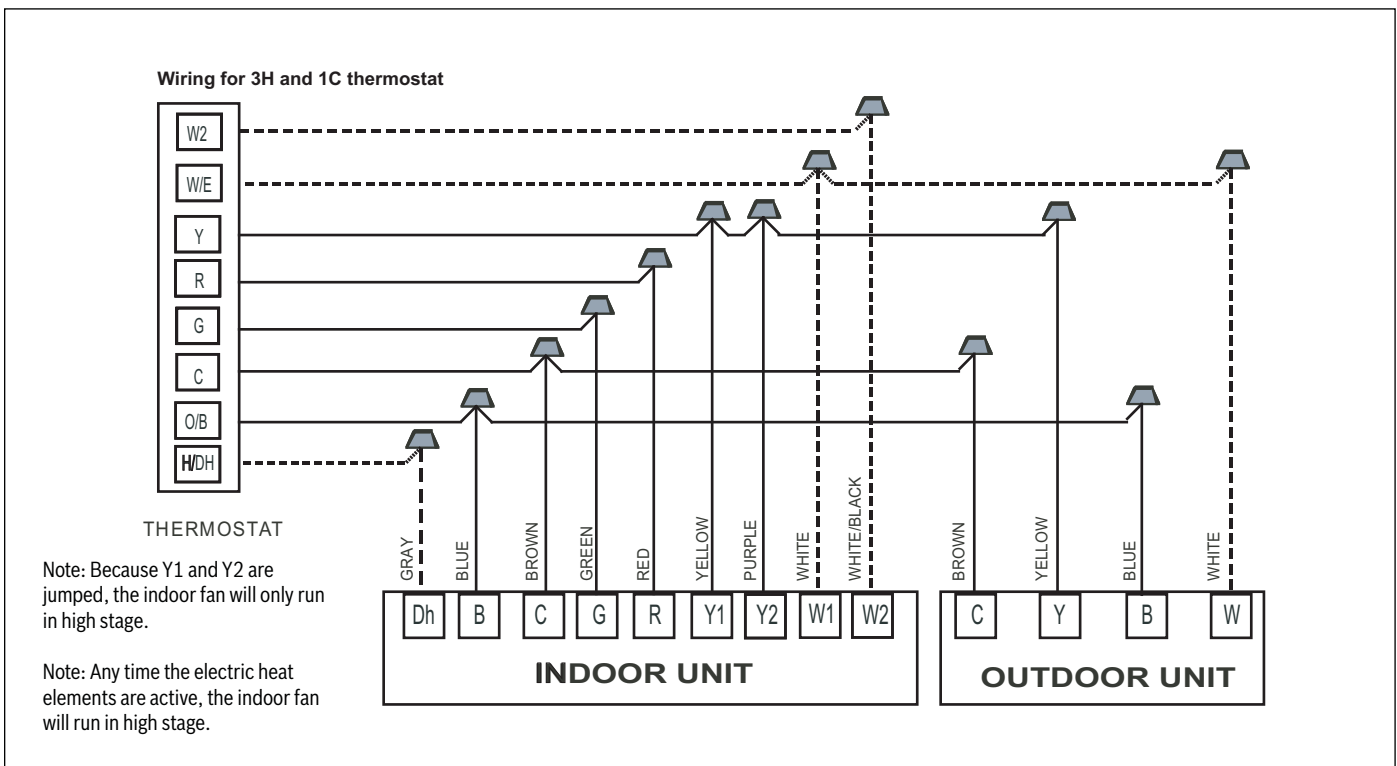


Figure 19 Control Wiring For HP Systems

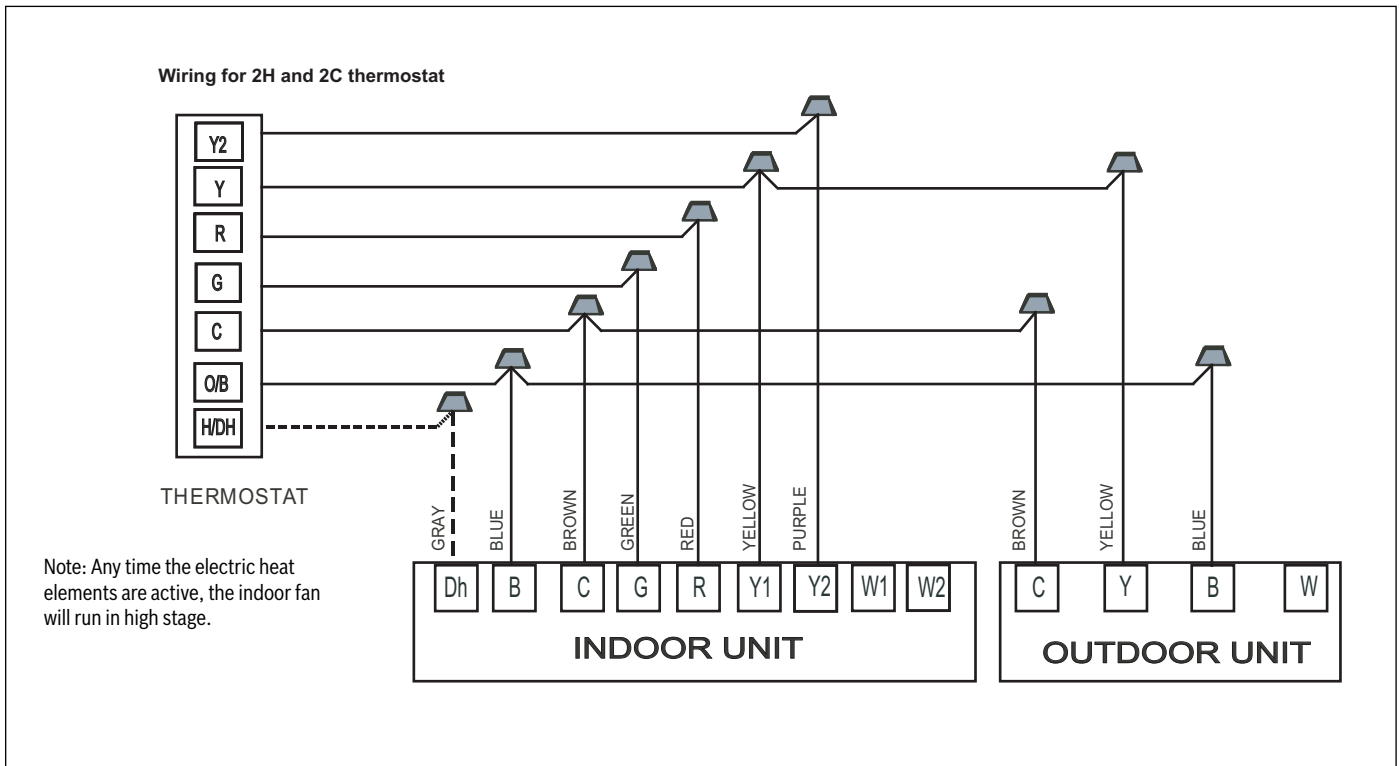


Figure 20 Control Wiring For HP Systems

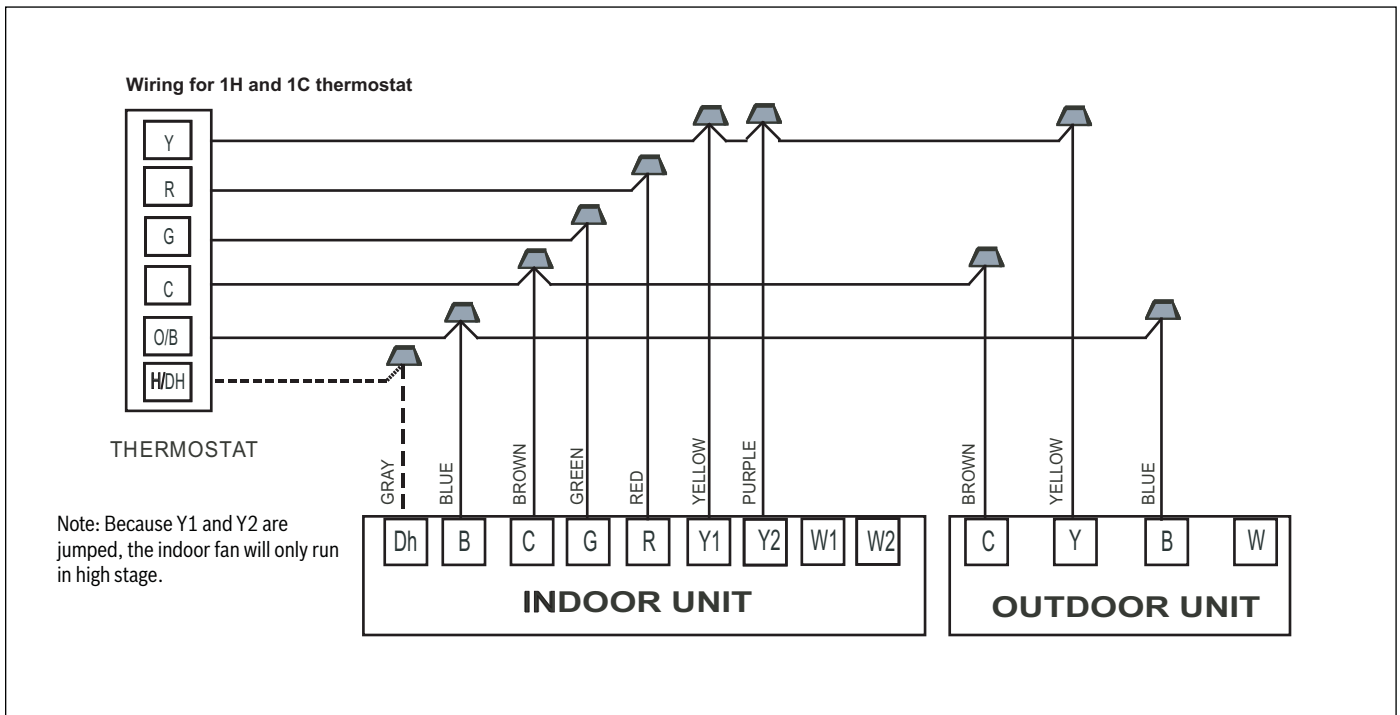


Figure 21 Control Wiring For HP Systems



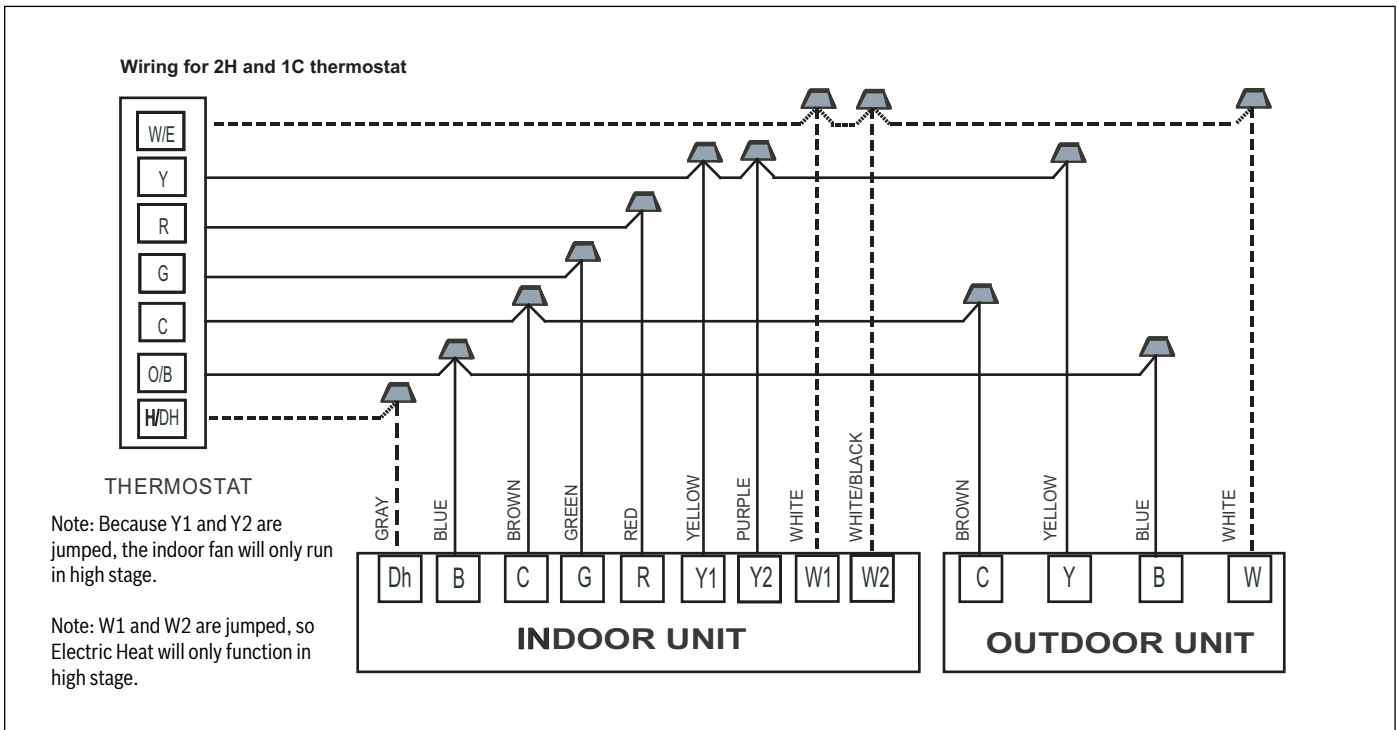


Figure 22 Control Wiring For HP Systems

**Electric wiring gauge for H/P systems**

Model(Btu/h)		24	36	48	60	
Power	Phase	Single				
	Voltage/frequency	208/230VAC, 60Hz				
Line Gauge	Input Current Fuse	Indoor unit (A)				
		15A	15A	15A	15A	
	Indoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter (AWG)	14	14	14	14
	Outdoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter (AWG)	14	12	10	10
	Outdoor -Indoor Signal Line	Line Quantity	4	4	4	4
		Line Diameter (AWG)	18	18	18	18
	Thermostat Signal Line	Line Quantity	5	5	5	5
		Line Diameter (AWG)	18	18	18	18

Table 9

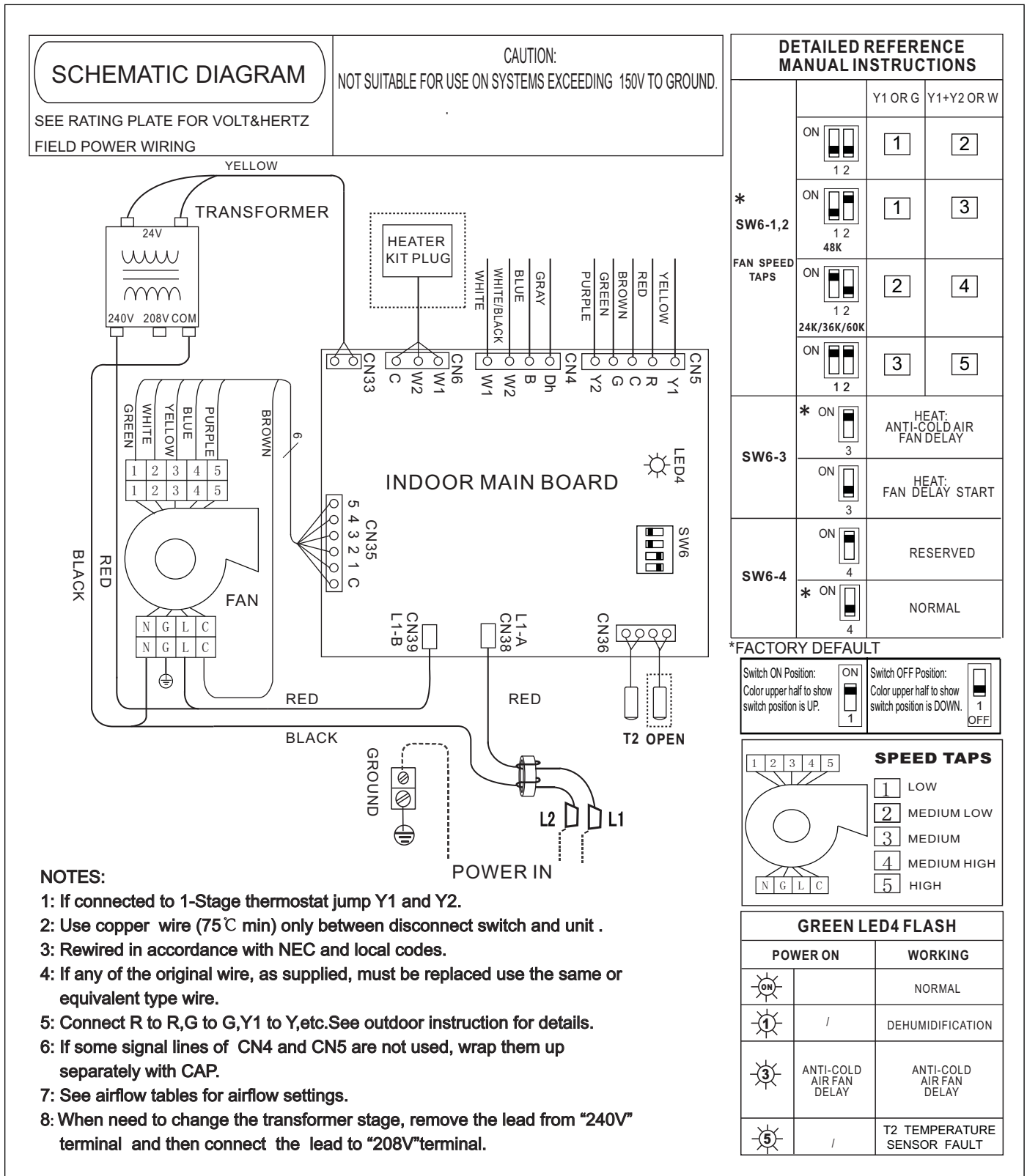


Figure 23 Indoor Unit Wiring Diagram



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