INSTALLATION INSTRUCTIONS

AIR HANDLERS

FEATURING EARTH-FRIENDLY R-410A REFRIGERANT: R-410A

(-)HPN Premium 18 SEER Efficiency



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠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 instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.

c UL us LISTED

Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANAB ACCREDITED

ISO 9001:2000

Certificate Number: 30164

DO NOT DESTROY THIS MANUAL

PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN

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1.0 SAFETY INFORMATION

⚠ WARNING

Duct leaks can create an unbalanced system and draw pollutants such as dirt, dust, fumes and odors into the home causing property damage. Fumes and odors from toxic, volatile or flammable chemicals, as well as automobile exhaust and carbon monoxide (CO), can be drawn into the living space through leaking ducts and unbalanced duct systems causing personal injury or death (see Figure 1).

- **If air-moving equipment or ductwork is located in garages or off-garage storage areas - all joints, seams, and openings in the equipment and duct must be sealed to limit the migration of toxic fumes and odors including carbon monoxide from migrating into the living space.**
- **If air-moving equipment or ductwork is located in spaces containing fuel burning appliances such as water heaters or boilers - all joints, seams, and openings in the equipment and duct must also be sealed to prevent depressurization of the space and possible migration of combustion byproducts including carbon monoxide into the living space.**

⚠ WARNING (SEE WARNINGS IN REGARD TO DUCTWORK)

Do not install this unit in manufactured (mobile) homes. Improper installation is more likely in manufactured housing due to ductwork material, size, location, and arrangement. Installations in manufactured housing can cause a fire resulting in property damage, personal injury or death.

EXCEPTION: Manufactured housing installations are approved only with documentation by a recognized inspection authority that the installation has been made in compliance with the instructions and all warnings have been observed.

⚠ WARNING (SEE SECTION 3.2: VERTICAL UPFLOW & HORIZONTAL LEFT)

If unit is to be installed without an indoor coil, return air duct, or plenum, it must not be installed directly over combustible material. If installed without an indoor coil with a return duct or plenum, the air plenum or duct must have a solid sheet metal bottom with no return air openings, registers or flexible air ducts located directly under the unit. Exposing combustible material to the return opening of an upflow unit without an indoor coil can cause a fire resulting in property damage, personal injury or death.

⚠ WARNING (SEE SECTION 13.7: ECM CONTROL MODULE REPLACEMENT)

Always have 240 volt power turned off to the furnace before attempting any replacement of the motor or control module. Failure to do so may result in serious equipment damage, personal injury or death.

⚠ WARNING (SEE SECTION 4.0: ELECTRICAL WIRING)

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

⚠ WARNING (SEE SECTION 4.3: GROUNDING)

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

⚠ WARNING (SEE SECTION 13.0: MAINTENANCE)

Units with circuit breaker(s) meet requirements as a service disconnect switch, however, if access is required to the line side (covered) of the circuit breaker, this side of the breaker(s) will be energized with the breaker(s) de-energized. Contact with the line side can cause electrical shock resulting in personal injury or death.

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⚠ WARNING (SEE SECTION 13.5: BLOWER ASSEMBLY REMOVAL & REPLACEMENT)

If removal of the blower assembly is required, all disconnect switches supplying power to the airhandler must be de-energized 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

PROPOSITION 65: This appliance contains fiberglass insulation. Respirable particles of fiberglass are known to the State of California to cause cancer.

All manufacturer products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain or produce any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All "new equipment" shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know "when, or if" products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

- **Glass Wool (Fiberglass) Insulation**
- **Carbon Monoxide (CO).**
- **Formaldehyde**
- **Benzene**

More details are available at the websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

⚠ WARNING (SEE SECTION 6.0: DUCTWORK)

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.

⚠ WARNING

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 (SEE SECTION 3.3: VERTICAL DOWNFLOW & HORIZONTAL RIGHT)

The RXHB-17, RXHB-21, or RXHB-24 combustible floor base is required when certain units are applied downflow on combustible flooring. Failure to use the base can cause a fire resulting in property damage, personal injury or death. See clearances for units requiring a combustible floor base. See the accessory section in this manual for combustible floor base RXHB-.

⚠ CAUTION (SEE SECTION 13.7: ECM CONTROL MODULE REPLACEMENT)

Reversing the 5-pin connector on the ECM motor causes immediate failure of the control module.

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CAUTION (SEE SECTION 3.2: VERTICAL UPFLOW & HORIZONTAL LEFT)

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

CAUTION (SEE SECTION 13.2: INDOOR COIL - DRAIN PAN - DRAIN LINE)

In compliance with recognized codes, it is recommended that an auxiliary drain pan be installed under all evaporator coils or units containing evaporator coils that are located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the coil drain pan or a stoppage in the primary condensate drain piping. See accessory section in this manual for secondary horizontal drain pan RXBM-.

CAUTION

When used on cooling applications, excessive sweating may occur when unit is installed in an unconditioned space. This can result in property damage.

⚠ NOTICE

Improper installation, or installation not made in accordance with the Underwriters Laboratory (UL) certification or these instructions, can result in unsatisfactory operation and/or dangerous conditions and are not covered by the unit warranty.

⚠ NOTICE

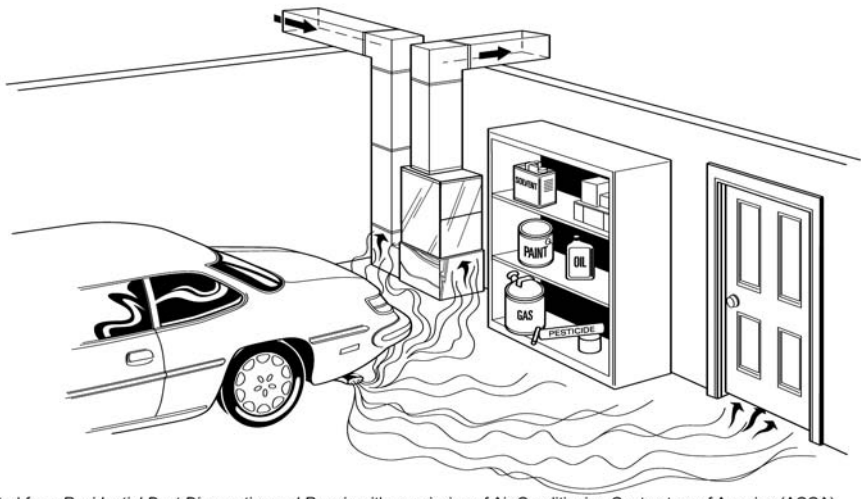
In compliance with recognized codes, it is recommended that an auxiliary drain pan be installed under all evaporator coils or units containing evaporator coils that are located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the coil drain pan or a stoppage in the primary condensate drain piping. See accessories section of these instructions for auxiliary horizontal overflow pan information (model RXBM).

2.0 GENERAL INFORMATION

2.1 IMPORTANT INFORMATION ABOUT EFFICIENCY AND INDOOR AIR QUALITY

Central cooling and heating equipment is only as efficient as the duct system that carries the cooled or heated air. To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air being supplied to each room and the air returning to the cooling and heating equipment.

FIGURE 1
MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES



Adapted from *Residential Duct Diagnostics and Repair,* with permission of Air Conditioning Contractors of America (ACCA).

Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and/or equipment is located. The manufacturer and the U.S. Environmental Protection Agency's Energy Star Program recommend that central duct systems be checked by a qualified contractor for proper balance and sealing.

⚠ WARNING

Duct leaks can create an unbalanced system and draw pollutants such as dirt, dust, fumes and odors into the home causing property damage. Fumes and odors from toxic, volatile or flammable chemicals, as well as automobile exhaust and carbon monoxide (CO), can be drawn into the living space through leaking ducts and unbalanced duct systems causing personal injury or death (see Figure 1).

- **If air-moving equipment or ductwork is located in garages or off-garage storage areas - all joints, seams, and openings in the equipment and duct must be sealed to limit the migration of toxic fumes and odors including carbon monoxide from migrating into the living space.**
- **If air-moving equipment or ductwork is located in spaces containing fuel burning appliances such as water heaters or boilers - all joints, seams, and openings in the equipment and duct must also be sealed to prevent depressurization of the space and possible migration of combustion byproducts including carbon monoxide into the living space.**

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⚠ NOTICE

In compliance with recognized codes, it is recommended that an auxiliary drain pan be installed under all evaporator coils or units containing evaporator coils that are located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the coil drain pan or a stoppage in the primary condensate drain piping. See accessories section of these instructions for auxiliary horizontal overflow pan information (model RXBM).

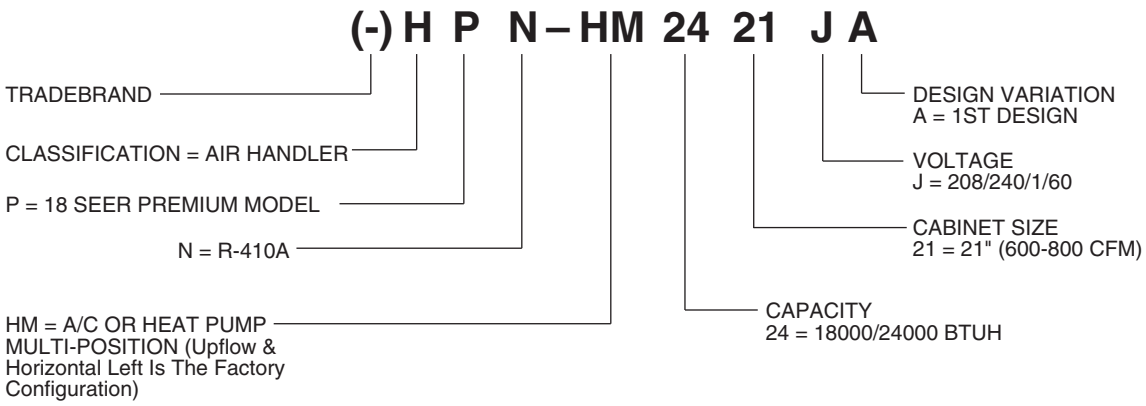
2.2 RECEIVING

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers, and a damage claim filed with the last carrier.

- After unit has been delivered to job site, remove carton taking care not to damage unit.
- Check the unit rating plate for unit size, electric heat, coil, voltage, phase, etc. to be sure equipment matches what is required for the job specification.
- Read the entire instructions before starting the installation.
- Some building codes require extra cabinet insulation and gasketing when unit is installed in attic applications.
- If installed in an unconditioned space, apply caulking around the power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Caulking is required to pre-vent air leakage into and condensate from forming inside the unit, control box, and on electrical controls.
- Install the unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.
- Install the unit in a level position to ensure proper condensate drainage. Make sure unit is level in both directions within 1/8".
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterysmarch Park, Quincy, MA 02269." These publications are:
  - ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
  - NFPA90A Installation of Air Conditioning and Ventilating Systems.
  - NFPA90B Installation of warm air heating and air conditioning systems.
- The equipment has been evaluated in accordance with the Code of Federal Regulations, Chapter XX, Part 3280.

2.3 MODEL NUMBER EXPLANATION (SEE FIGURE 2)

FIGURE 2
MODEL NUMBER EXPLANATION

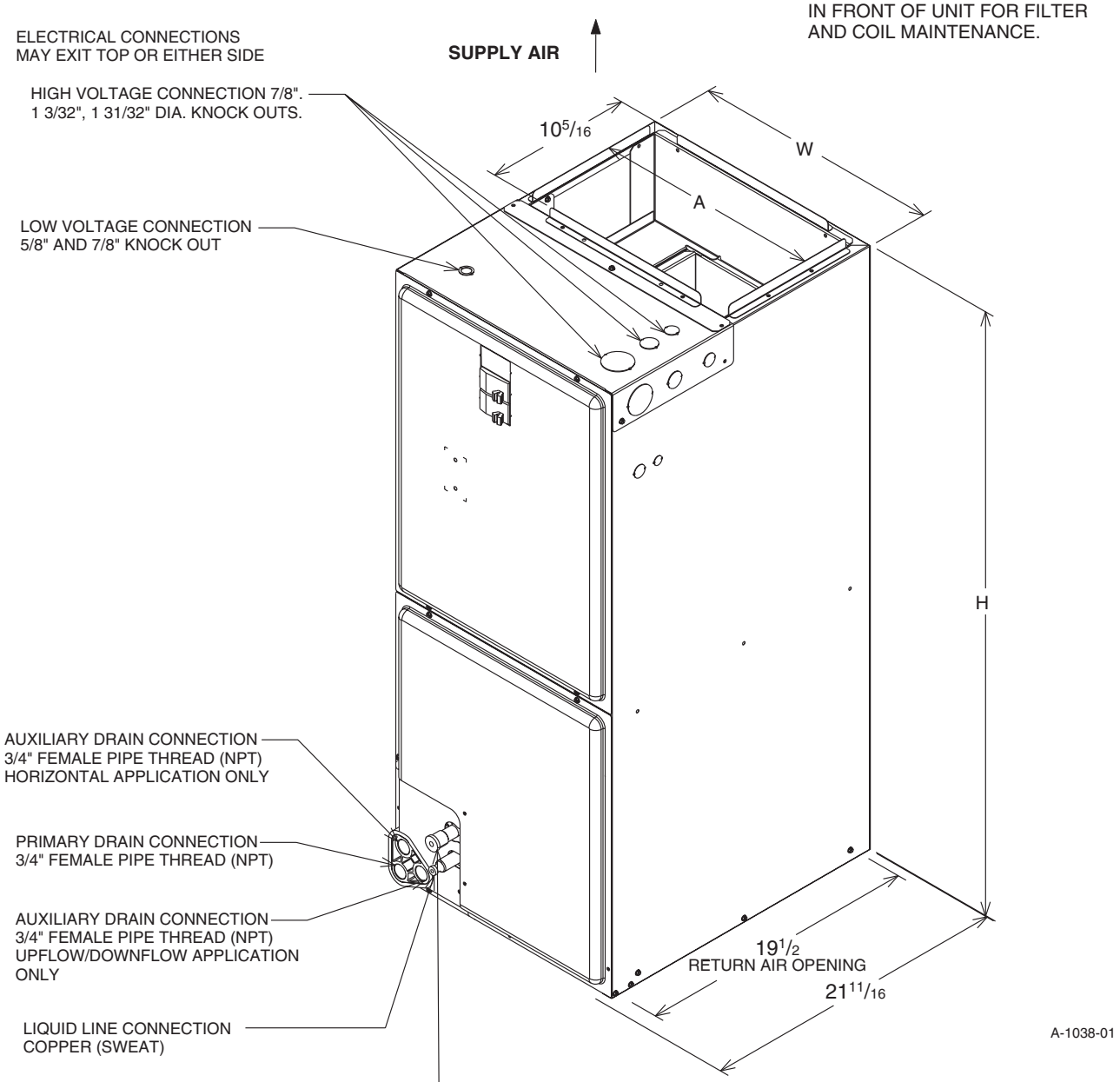


ELECTRICAL DESIGNATION & AIRFLOW PERFORMANCE INFORMATION			
MODEL	**CABINET SIZE**	**J 208/240V 1 PH 60HZ** **HEATER Kw** **CONTROL DESIGNATION** **S = CIRCUIT BREAKER(S)**	**1) MOTOR H.P.** **2) BLOWER CFM 1ST/2ND STAGE** **3) BLOWER WHEEL DIA./WIDTH** **4) TONNAGE**
2421	21 = 21.0"	05 07 10	1) 1/3 H.P. 2) 600/800 CFM 3) 10 X 8 4) 2-TON

NOTES:
1) Electrical heat designation: see electric heat electrical data for actual heater kW represented by number above.
2) Electric heater BTUH - (heater watts + motor watts) x 3.414 (see airflow table for motor watts).
3) The air handlers are shipped from the factory with the proper indoor coil installed, and cannot be ordered without a coil.
4) Electric heat elements are field-installed items.
5) The air handlers do not have an internal filter rack. An external filter rack or other means of filtration is required.

2.4 DIMENSIONS & WEIGHTS (SEE FIGURE 3)

FIGURE 3
DIMENSIONS AND WEIGHTS -- SINGLE COIL UNITS



UPFLOW UNIT SHOWN;
UNIT MAY BE INSTALLED UPFLOW, DOWNFLOW. HORIZONTAL RIGHT, OR LEFT AIR SUPPLY.

RETURN AIR OPENING DIMENSIONS

Model Cabinet Size	Return Air Opening Width (Inches)	Return Air Opening Depth/Length (Inches)
21	19 3/8	19 1/2

DIMENSIONAL DATA

(-)HPN-	UNIT WIDTH "W" IN. [mm]	UNIT HEIGHT "H" IN. [mm]	SUPPLY DUCT "A" IN. [mm]	NOMINAL COIL AIRFLOW [L/s]				UNIT WEIGHT / SHIPPING WEIGHT (LBS.) [kg]
				1ST STAGE		2ND STAGE		UNIT WITH COIL (MAX. Kw.)
				ODD*	Normal	ODD*	Normal	
2421	21 [533]	42 1/2 [1080]	19 1/2 [495]	480 [227]	575 [271]	640 [302]	775 [366]	92 / 106 [42 / 48]

*Maximum dehumidification airflow. Refer to Section 5.0 ECM Motor Interface Control Board, for more information.

2.5 CLEARANCES

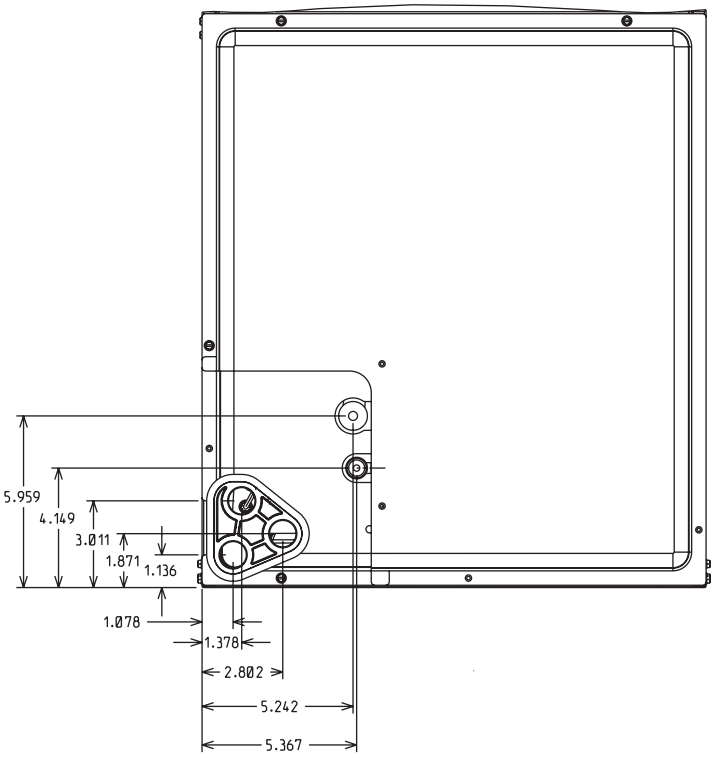
- All units are designed for “0” inches clearance to combustible material on all cabinet surfaces.

Model Cabinet Size	21
Maximum Model Designation kW	20

- Some units require supply duct clearances and combustible floor bases depending on the heating kW. The following table should be used to determine these requirements: Units with electric heating kW above that listed in the table require a one inch clearance to combustible material for the first three feet of supply plenum and ductwork. **Additionally, if these units are installed downflow, a combustible floor base is required. See Accessories for Combustible Floor Base RXHB-XX.**

  Units with electric heating kW equal to or less than the values listed in the table do not require supply ductwork clearances or combustible floor bases.
- Vertical units require clearance on at least one side of the unit for electrical connections. Horizontal units require clearance on either top or bottom for electrical connections. Refrigerant and condensate drain connections are made on the front of the unit. (See Figure 4.)
- All units require 24 inches maximum access to the front of the unit for service.
- These units may be installed in either ventilated or nonventilated spaces.

FIGURE 4
DIMENSIONS FOR FRONT CONNECT COIL



3.0 APPLICATIONS

3.1 ZONING SYSTEMS

The manufacturer does not currently provide or support zoning. However, zoning systems can be installed with a variable speed air-handler as long as the zoning equipment manufacturers specifications and installation instructions are met and followed.

The preferred zoning method is to use a “bypass” system which is properly installed for maximum efficiency. In these systems, excess air is routed back through the system to be used again – this is opposed to a “dump” system in which excess air is routed to a zone where it is expected tht the extra heat or cooling would be least noticed.

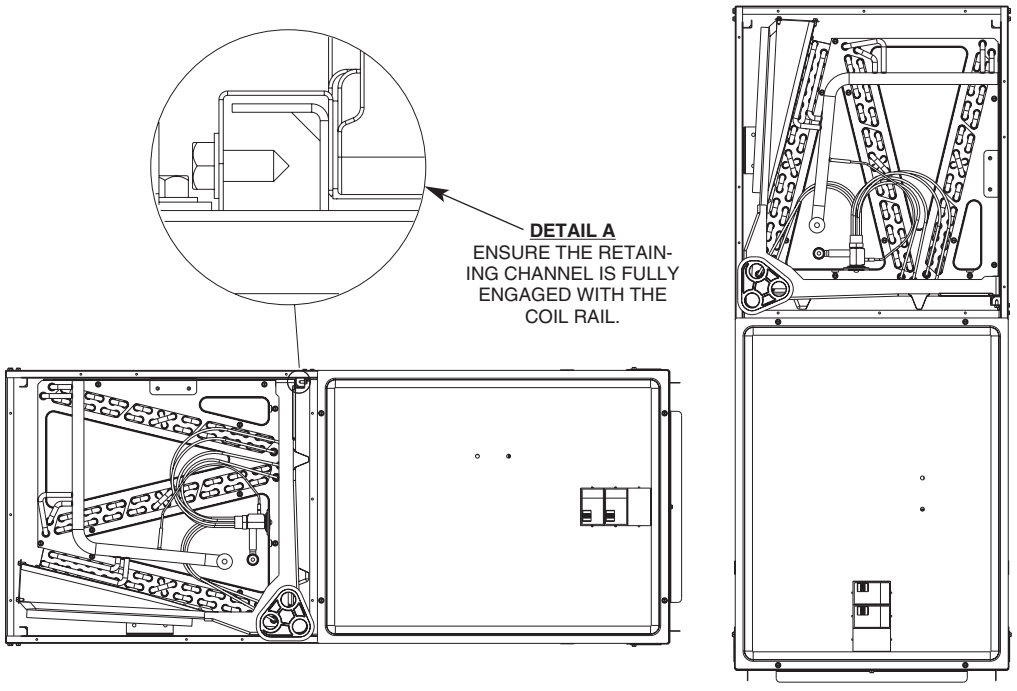
If installed as a “bypass” system, the installation must have an optional freeze stat installed to prevent the coil from icing with excess bypass cooling. Also, if the zoning equipment manufacturer provides a limit switch (usually provided by the zoning manufacturer), this limit must be installed in the system to prevent the furnace from overheating.

3.2 VERTICAL UPFLOW AND HORIZONTAL LEFT

The air handler unit is factory shipped for vertical upflow and horizontal left application.

- If return air is to be ducted, install duct flush with floor. Use fireproof resilient gasket 1/8 to 1/4 in. thick between duct, unit and floor. Set unit on floor over opening.
- Support along the length of the unit, all units installed horizontally. Do not support or suspend unit from both ends without support in the center of the cabinet. If unit is to be supported or suspended from corners, run two reinforcing rails length of unit and support or suspend from reinforcing rails.
- Secondary drain pan kits RXBM- are required when the unit is configured for the horizontal left position over a finished ceiling and/or living space. (See Section 15.0: Accessories - Kits - Parts.)

FIGURE 5
VERTICAL DOWNFLOW & HORIZONTAL RIGHT APPLICATIONS



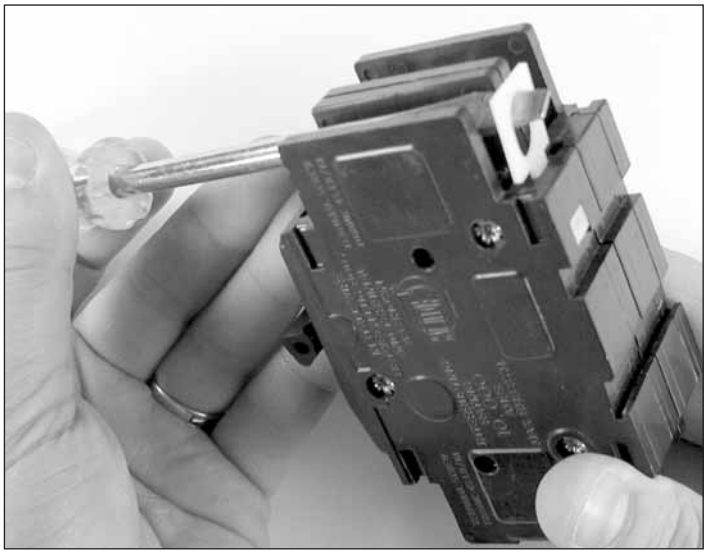
CAUTION

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

3.3 VERTICAL DOWNFLOW AND HORIZONTAL RIGHT

Conversion to Vertical Downflow/Horizontal Right: A vertical upflow unit may be converted to vertical downflow/horizontal right. (See Figure 5.)

FIGURE 6
ROTATING CIRCUIT BREAKER



- Remove the indoor coil.
- Rotate the circuit breaker(s) (if in the horizontal right position) 180° (see instructions for rotating breaker(s) that follow).

  IMPORTANT: To comply with certification agencies and the National Electric Code, units with circuit breaker(s) on vertical units must have circuit breakers installed so that the breaker switch "on" position and marking is up and, "off" position and marking is down.

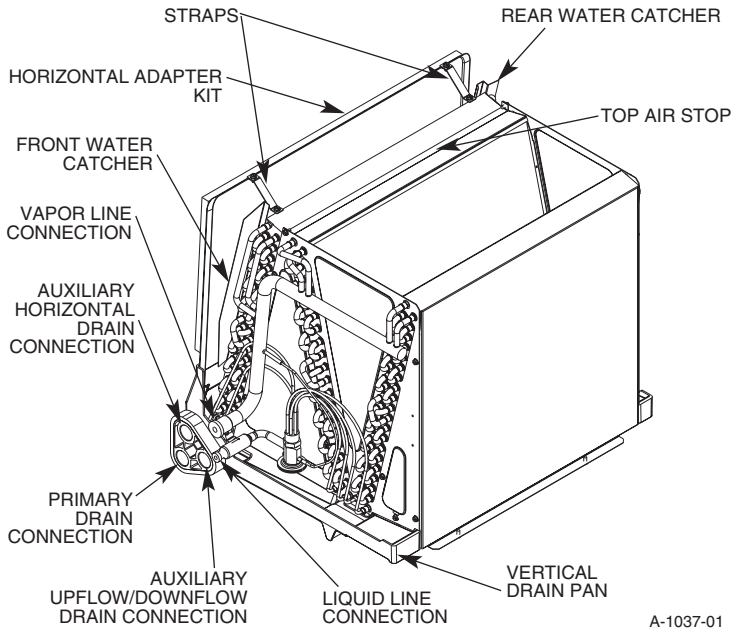
  - To turn breaker(s): Rotate one breaker pair (circuit) at a time starting with the one on the right. Loosen both lugs on the load side of the breaker. Wires are bundles with wire ties, one bundle going to the right lug and one bundle going to the left lug.
  - Using a screwdriver or pencil, lift white plastic tab with hole away from breaker until breaker releases from mounting opening (see Figure 6).
  - With breaker held in hand, rotate breaker so that "on" position is up, "off" position is down with unit in planned vertical mounting position. Insert right wire bundle into top right breaker lug, ensuring all strands of all wires are inserted fully into lug, and no wire insulation is in lug.
  - Tighten lug as tight as possible while holding circuit breaker. Check wires and make sure each wire is secure and none are loose. Repeat for left wire bundle in left top circuit breaker lug.
  - Replace breaker by inserting breaker mounting tab opposite white pull tab in opening, hook mounting tab over edge in opening.
  - With screwdriver or pencil, pull white tab with hole away from breaker while setting that side of breaker into opening. When breaker is in place, release tab, locking circuit breaker into location in opening.
  - Repeat above operation for remaining breaker(s) (if more than one is provided).
  - Replace single point wiring jumper bar, if it is used, on line side of breaker and tighten securely.
  - Double check wires and lugs to make sure all are secure and tight. Check to make sure unit wiring to circuit breaker load lugs match that shown on the unit wiring diagram.

⚠ WARNING

The RXHB-17, RXHB-21, or RXHB-24 combustible floor base is required when certain units are applied downflow on combustible flooring. Failure to use the base can cause a fire resulting in property damage, personal injury or death. See clearances for units requiring a combustible floor base. See the accessory section in this manual for combustible floor base RXHB-.

- Rotate unit into the downflow position, with the coil compartment on top and the blower compartment on bottom.
- Reinstall the indoor coil 180° from original position. Ensure the retaining channel is fully engaged with the coil rail. (See Figure 5, Detail A.)
- Secondary drain pan kits RXBM- are required when the unit is configured for the horizontal right position over a finished ceiling and/or living space. (See Section 15.0: Accessories - Kits - Parts.)

FIGURE 7
INDOOR COIL AND DRAIN PAN SET-UP



IMPORTANT: Units cannot be installed horizontally laying on or suspended from the back of the unit.

4.0 ELECTRICAL WIRING

⚠ WARNING

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

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

4.1 POWER WIRING

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

- If required, install a branch circuit disconnect of adequate size, located within sight of, and readily accessible to the unit.
- **IMPORTANT:** After the Electric Heater is installed, units may be equipped with one, two, or three 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 75°C minimum copper conductors only. See Electrical Data in this section for ampacity, wire size and circuit protector requirement. Supply circuit protective devices may be either fuses or “HACR” type circuit breakers.
- Power wiring may be connected to either the right, left side or top. Three $^{7}/_{8}$”, $1^{3}/_{32}$”, $1^{31}/_{32}$” dia. concentric knockouts are provided for connection of power wiring to unit.
- Power wiring is connected to the power terminal block(s) in unit control compartment.

4.2 CONTROL WIRING

IMPORTANT: Class 2 low voltage control wire should not be run in conduit with power wiring and must be separated from power wiring, unless Class 1 wire of proper voltage rating is used.

- Low voltage control wiring should be 18 AWG color-coded (105°C minimum). For lengths longer than 100 ft., 16 AWG wire should be used.
- Low voltage control connections are made by extending wires from top of air handler using wire nuts.
- See wiring diagrams attached to indoor and outdoor sections to be connected
- Do not leave excess field control wiring inside unit, pull excess control wire to outside of unit and provide strain relief for field control wiring on inside of cabinet at point wiring penetrates cabinet.
- Make sure, after installation, separation of control wiring and power wiring has been maintained.

4.3 GROUNDING

⚠ WARNING

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

- Grounding may be accomplished by grounding metal conduit when installed in accordance with electrical codes to the unit cabinet.
- Grounding may also be accomplished by attaching ground wire(s) to ground lug(s) provided in the unit wiring compartment.
- Ground lug(s) are located close to wire entrance on left side of unit (upflow). Lug(s) may be moved to marked locations near wire entrance on right side of unit (upflow), if alternate location is more convenient.
- Use of multiple supply circuits require grounding of each circuit to lug(s) provided in unit.

4.5 BLOWER MOTOR ELECTRICAL DATA

NOMINAL COOLING CAPACITY (TONS)	HP	Voltage	Phase	Hertz	RPM	Circuit AMPS	Minimum Circuit Ampacity	Max. Circuit Protector
2	1/3	208/230	1	60	300-1100	1.7	4.0	15

4.6 ELECTRIC HEAT ELECTRICAL DATA

Installation of the UL Listed original equipment manufacturer provided heater kits listed in the table below is recommended for all auxiliary heating requirements.

Air Handler Cabinet Size/ Cooling Capacity	Manufacturer Model Number	Type Supply Circuit	Voltage	PH/HZ	Heater kW	Heater AMPS	Motor Ampacity	Maximum Circuit Protection	Minimum Circuit Ampacity
21" / 2 Ton	RXBH - 24A05J	Single	208/240	1/60	3.6/4.8	17.3/20.0	1.7	25/30	24/28
	RXBH - 24A07J	Single	208/240	1/60	5.4/7.2	26.0/30.0	1.7	35/40	35/40
	RXBH - 24A10J	Single	208/240	1/60	7.2/9.6	34.6/40.0	1.7	50/60	46/53

NOTES:
- Supply circuit protective devices may be fuses or "HACR" type circuit breakers.
- Largest motor load is included in single circuit and multiple circuit 1.
- If non-standard fuse size is specified, use next size larger fuse size.
- J Voltage (230V) signal phase air handler is designed to be used with single or three phase 230 volt electric heaters. In the case of connecting 3-phase power to the air handler terminal block without the heater, bring only two leads to the terminal block. Cap, insulate and fully secure the third lead.

5.0 ECM MOTOR INTERFACE CONTROL BOARD

5.1 ECM MOTOR INTERFACE CONTROL AND SETTINGS

The (-)HPN series air handler has an ECM blower motor, which delivers a constant level of airflow over a wide range of external static pressures (up to 1.0" W.C.). The interface board provides the required communications between the thermostat and the ECM blower motor. The (-)HPN series of air handler features:

- An automotive-style ATC blade fuse for transformer protection (3 amp).
- An on-board LED to indicate blower CFM.

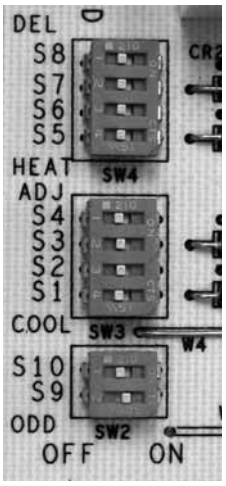
TABLE 1
SWITCH FUNCTIONS

Switch	Function
1 & 2	Cooling Airflow Settings
3 & 4	Cooling Airflow Adjustment
5 & 6	Heating Airflow Settings
7 & 8	Cooling Delay Profiles
9 & 10	On-Demand Dehumidification

There is a bank of 10 DIP switches on the interface board that define the operation of the ECM motor (see Table 1).

Refer to Figure 8 for switch identification and factory default settings.

FIGURE 8
ECM MOTOR FACTORY SETTINGS



IMPORTANT: Disconnect power to air handler when changing DIP switch positions. Even if blower is not operating, the motor will not recognize changes in DIP switch positions until unit power is removed and then restored.

5.2 USING THE ON-BOARD LED TO DETERMINE BLOWER CFM

The (-)HPN interface board LED (see Figure 9) indicates blower output by flashing one (1) second for every 100 CFM of airflow. The LED will pause 1/10 second between each flash. After the blower CFM has been displayed, the LED will illuminate dimly for 10 seconds before repeating the sequence. (See Table 2.)

NOTE: If airflow is not a multiple of 100 CFM, the last LED flash is a fraction of a second of 100 CFM.

FIGURE 9
IFC BOARD

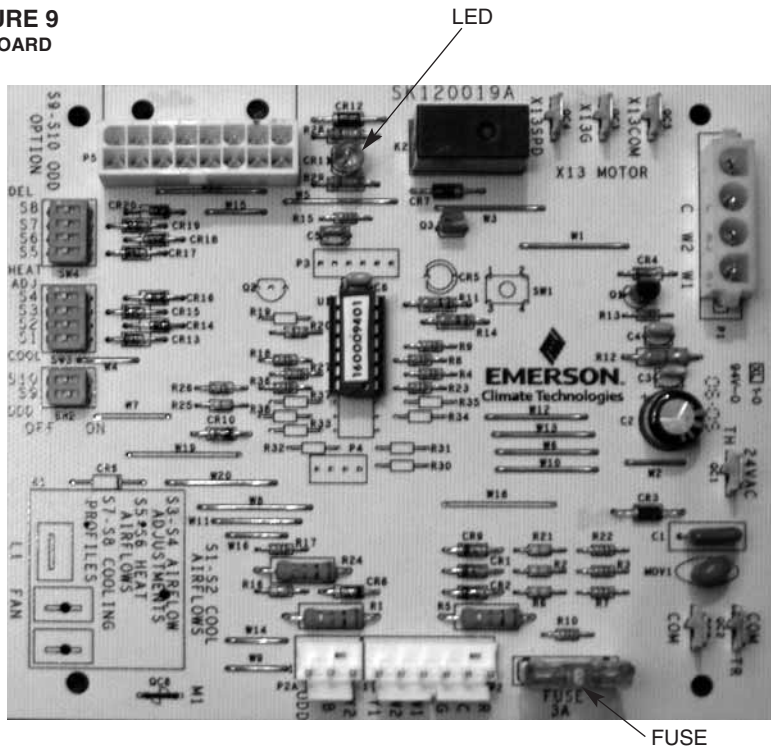


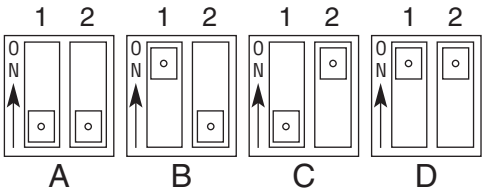
TABLE 2
LED FLASH CODES

INTERFACE BOARD DIP SWITCH SETTIINGS	LED OUTPUT
1200 CFM	• Flashes 12 times • Illuminate dimly 10 seconds, repeat sequence
600 CFM	• Flashes 6 times • Illuminate dimly 10 seconds, repeat sequence
950 CFM	• Flashes 9 times, flash once for 1/2 second • Illuminate dimly 10 seconds, repeat sequence

5.3 COOLING AIRFLOW SETTINGS (SEE FIGURE 10)

The (-)HPN-series of air handlers allow a wide range of airflow settings for cooling. Each air handler is factory programmed and shipped with the optimum airflow for cooling performance. These airflow settings are selected via DIP switches 1 & 2 on the interface board. DIP switches 1 & 2 allow the user to tailor the airflow for the particular installation.

FIGURE 10
AIRFLOW SETTINGS



SELECTION	SWITCH 1 POSITION	SWITCH 2 POSITION	COOLING AIRFLOW CABINET SIZE/COOLING CAPACITY	
			2 TON	
			Y1	Y2
A*	OFF	OFF	575	775
B	ON	OFF	550	725
C	OFF	ON	650	875
D	ON	ON	575	800

*Default setting; as-shipped from factory

5.4 COOLING AIRFLOW ADJUSTMENTS (SEE FIGURE 11)

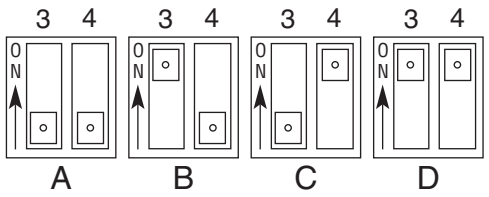
Cooling airflow may be adjusted +10% or –10% from nominal airflow using switches 3 & 4.

Refer to Figure 11 for switch positions to achieve the desired adjustments in airflow.

NOTE: Continuous fan speed is NOT affected by switches 3 & 4.

IMPORTANT: The use of On Demand Dehumidification overrides the cooling airflow adjustments when high humidity is detected by a dehumidifying thermostat or humidistat when connected to the ODD wire (See Figure 14). Refer to the Cooling Mode Dehumidification section for more information.

FIGURE 11
COOLING AIRFLOW ADJUSTMENTS



SELECTION	SWITCH 3 POSITION	SWITCH 4 POSITION	COOLING AIRFLOW ADJUSTMENT
A	OFF	OFF	NONE
B	ON	OFF	10%
C	OFF	ON	-10%
D	ON	ON	NONE

5.5 HEATING AIRFLOW ADJUSTMENTS (HEAT PUMP)

The (-)HPN air handler does not allow heating airflow adjustments.

5.6 HEATING AIRFLOW (ELECTRIC HEAT)

The (-)HPN-series of air handlers are factory programmed to provide adequate airflow for electric heat (auxiliary heat). Airflow for electric heat is fixed and cannot be field adjusted.

THERMOSTAT INPUT	ELECTRIC HEAT AIRFLOW
	2-TON
W1 OR W2	800 CFM

NOTE: When the (-)HPN-series of air handlers receives a call for electric heat, the heating airflow set by switches 5 & 6 are overridden with the airflows listed in the table above.

NOTE: Cooling airflow adjustments set with DIP switches 3 & 4 have no effect on electric heat airflow.

5.7 COOLING DELAY PROFILES

The (-)HPN air handler is shipped with a default 45 second OFF delay profile for maximum efficiency.

IMPORTANT: Blower ON delay profiles are not used in heating mode.

TABLE 3
ODD TERMINAL

INDOOR AMBIENT CONDITION	INPUT TO "ODD" TERMINAL (FROM HUMIDISTAT)
HIGH HUMIDITY	Ø VAC
LOW HUMIDITY	24 VAC

5.8 THERMOSTAT USAGE

IMPORTANT: To take full advantage to the features available with the (-)HPN-series of air handlers, a thermostat designed for two stages of cooling, three stages of heat, and dehumidification is recommended.

NOTE: The use of a single stage thermostat with the (-)HPN-series of air handlers is not recommended.

NOTE: The use of a single stage thermostat with the (-)HPN-series of air handlers may cause unnecessary power consumption.

5.9 COOLING MODE DEHUMIDIFICATION

"On Demand Dehumidification", ODD, terminal input allows the user to have automatic dehumidification in the cooling mode that is controlled by the user's dehumidifying thermostat or humidistat setting. When the humidity exceeds the humidistat setting, the airflow is decreased by a preprogrammed amount. This results in higher latent capacity and increases the level of comfort.

Use of the On Demand Dehumidification feature is important with the (-)HPN air handlers. These systems typically have a latent capacity between 23% to 25% of total system capacity. On Demand Dehumidification drops cooling airflow to boost latent capacity and minimizes the impact on total system capacity.

The interface board "ODD" terminal input is designed to be used with a dehumidifying thermostat or a traditional humidistat (see Table 3). For proper operation, the dehumidifying thermostat or humidistat must conform to these conditions:

IMPORTANT: Do not use a dehumidistat. Dehumidistats are not compatible with the interface board. Typical dehumidistats apply a 24V signal when humidity is high and are incompatible with the interface board.

Refer to the typical thermostat wiring section (See Figures 12-15) for recommended dehumidifying thermostats.

5.10 TYPICAL THERMOSTAT WIRING DIAGRAMS

The following figures show the typical wiring diagrams with (-)HPN air handler. These figures include a quick start guide for initial DIP switch settings. The quick start DIP switch settings are intended as a guide for initial system operation. Cooling and heat pump airflows may need to be adjusted for homeowner comfort once the system is operational.

WIRE COLOR CODE			
BK – BLACK	G – GREEN	PR – PURPLE	Y – YELLOW
BR – BROWN	GY – GRAY	R – RED	
BL – BLUE	O – ORANGE	W – WHITE	

FIGURE 12
TYPICAL 2-STAGE THERMOSTAT: (-)HPN AIR HANDLER WITH ELECTRIC HEAT

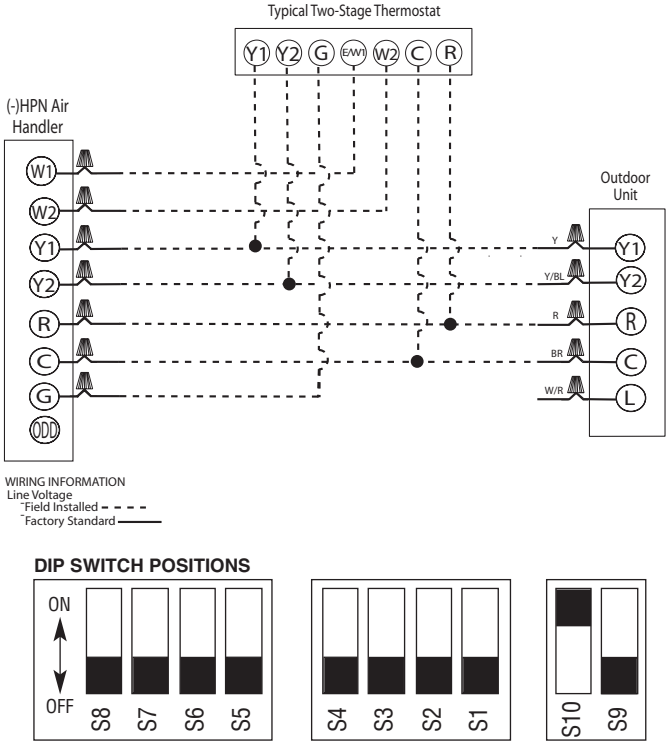


FIGURE 13
TYPICAL TWO-STAGE THERMOSTAT: (-)HPN AIR HANDLER WITH ELECTRIC HEAT USING A HUMIDISTAT FOR DEHUMIDIFICATION*.

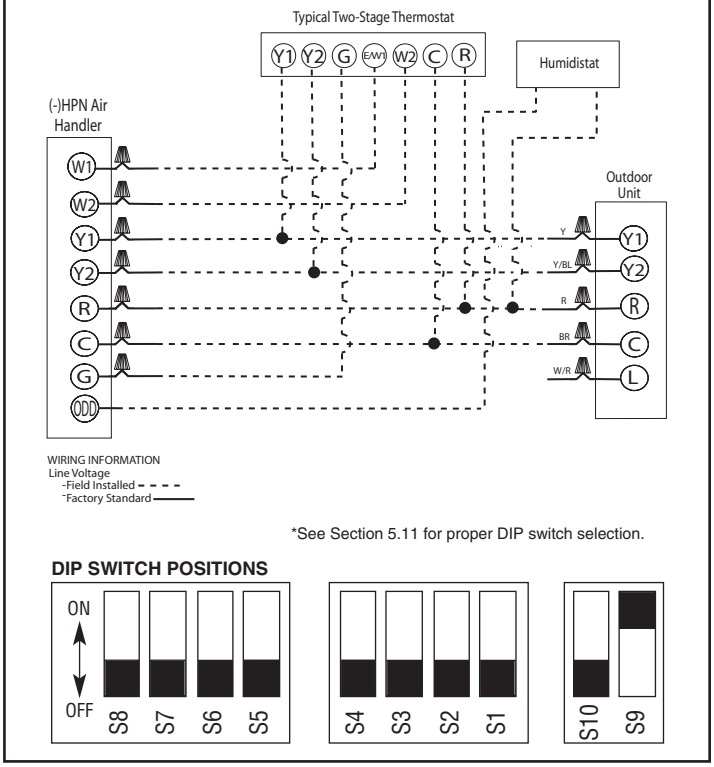


FIGURE 14
TYPICAL TWO-STAGE THERMOSTAT: (-)HPN AIR HANDLER WITH ELECTRIC HEAT USING A TWO-STAGE THERMOSTAT WITH DEHUMIDIFICATION*

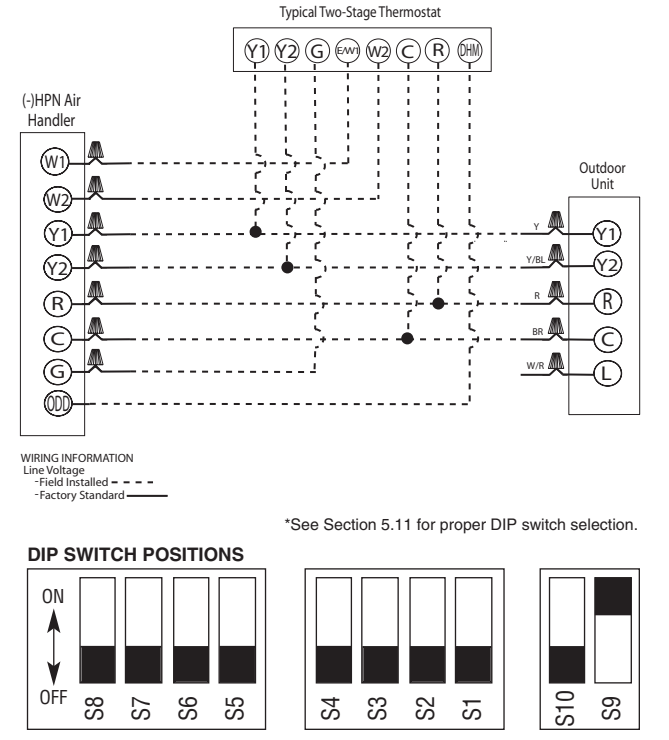
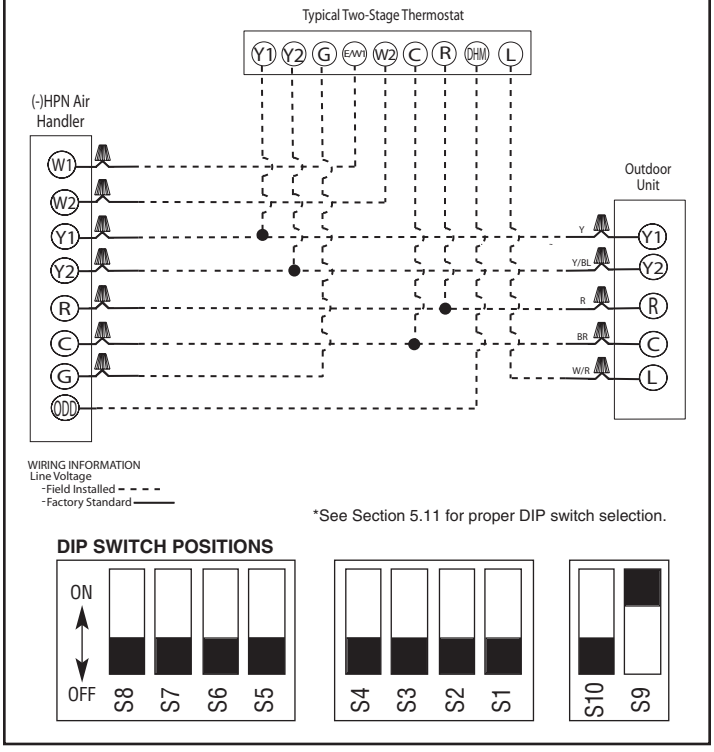


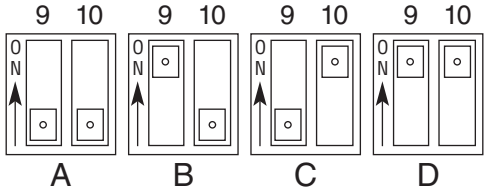
FIGURE 15
(-)HPN AIR HANDLER WITH ELECTRIC HEAT USING A TWO-STAGE THERMOSTAT WITH DEHUMIDIFICATION* AND A MALFUNCTION LIGHT



5.11 ON DEMAND DEHUMIDIFICATION AIRFLOW ADJUSTMENT

Use switches 9 & 10 to lower cooling airflow as defined in Figure 16:

FIGURE 16
ON DEMAND DEHUMIDIFICATION AIRFLOW ADJUSTMENT



SELECTION	SWITCH 9 POSITION	SWITCH 10 POSITION	COOLING AIRFLOW ADJUSTMENT
A	OFF	OFF	MAXIMUM LATENT REMOVAL (WITHOUT ODD INPUT)
B	ON	OFF	NONE (FACTORY SETTING)
C	OFF	ON	ON DEMAND DEHUMIDIFICATION1 (WITH ODD INPUT)
D	ON	ON	NONE

IMPORTANT: Selection A turns off the input of the ODD terminal. DO NOT USE SELECTION A WITH A DEHUMIDIFYING THERMOSTAT OR HUMIDISTAT (refer to Figure 16).

5.11A Explanation of Selections:

Selection A: Maximum Latent Removal (See Table 4)

This selection lowers cooling airflow to maximize latent removal anytime there is a call for cooling. This selection can be used in environments where there is always a high latent load as in coastal and southern regions of the USA.

NOTE: Use of selection A in excessively dry environments is not necessary and may cause unnecessary power consumption.

TABLE 4
SELECTION A EXPLANATION: MAXIMUM LATENT REMOVAL

SWITCH POSITIONS				COOLING CAPACITY - CFM	
				2-TON	
SWITCH 1 POSITION	SWITCH 2 POSITION	SWITCH 9 POSITION	SWITCH 10 POSITION	Y1	Y2
OFF	OFF	OFF	OFF	500	675
ON	OFF	OFF	OFF	475	625
OFF	ON	OFF	OFF	550	750
ON	ON	OFF	OFF	500	675

Selection B: Factory Setting

This is the factory setting and provides cooling airflows as defined in the COOLING AIRFLOWS section.

Selection C: On Demand Dehumidification (See Table 5)

This selection allows On Demand Dehumidification when using a dehumidifying thermostat or humidistat connected to the ODD wire (as shown in Figure 14). Nominal airflow is reduced by a preprogrammed amount to maximize latent removal.

TABLE 5
SELECTION C EXPLANATION: ON DEMAND DEHUMIDIFICATION

SWITCH POSITIONS				ODD INPUT	COOLING CAPACITY - CFM	
					2-TON	
SWITCH 1 POSITION	SWITCH 2 POSITION	SWITCH 9 POSITION	SWITCH 10 POSITION		Y1	Y2
OFF	OFF	OFF	ON	NONE	500	675
				24VAC	575	800
ON	OFF	OFF	ON	NONE	475	625
				24VAC	550	725
OFF	ON	OFF	ON	NONE	550	750
				24VAC	650	875
ON	ON	OFF	ON	NONE	500	675
				24VAC	600	800

IMPORTANT: A humidistat or dehumidifying thermostat MUST be connected to the ODD terminal when using this setting.

Selection D: No Adjustment

This selection is the same as the factory setting and provides cooling airflows as defined in the NOMINAL AIRFLOW ADJUSTMENT section.

6.0 DUCTWORK

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

⚠ WARNING

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 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 is attached to the 3/4” duct flanges supplied on the unit around the blower outlet. Flanges are flat for shipping purposes and must be bent up along perforated edge around blower opening. Be sure to bend flanges completely up so they do not interfere with air being discharged from blower.

IMPORTANT: Flanges around blower opening for attaching supply duct must be up out of blower discharge even if not used so they do not restrict airflow from blower.

IMPORTANT: 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.

- Some units with electric heaters require 1 in. clearance to supply plenum and branch ducts to combustible material for the first 3 feet from the unit. See CLEARANCES.
- A 3/4” return duct flange is supplied on all sides of the air inlet opening of the unit coil casing. If the unit is to be installed without a coil casing (no indoor coil), a 3/4”flange is supplied on the back and sides of the air inlet opening of the blower casing. No flange is provided on the front of the opening to the blower casing. If return duct is attached to the inlet of the blower casing, the front flange of the duct should be run up into the opening or 90° brake made on the front flange to tape to the front of the blower casing.
- **IMPORTANT:** 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.
- Return duct flanges on blower or coil casing are flat for shipping purposes and must be bent out along perforated edge around opening.
- 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.

7.0 REFRIGERANT CONNECTIONS

Keep the coil connections sealed until refrigerant connections are to be made. See the Installation Instructions for the outdoor unit for details on line sizing, tubing installation, and charging information.

Coil is shipped with a low (5 - 10 PSIG) pressure charge of dry nitrogen. Evacuate the system before charging with refrigerant.

Install refrigerant tubing so that it does 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 from being damaged by torch flames.

After the refrigerant connections are made, seal the gap around the connections with pressure sensitive gasket. If necessary, cut the gasket into two pieces for a better seal.

7.1 TEV SENSING BULB

IMPORTANT: DO NOT perform any soldering with the TEV bulb attached to any line.

After soldering operations have been completed, clamp the TEV bulb securely on the suction line at the 10 to 2 o'clock position with the strap provided in the parts bag.

Insulate the TEV sensing bulb and suction line with the provided pressure sensitive insulation (size 4" x 7") and secure with provided wire ties.

IMPORTANT: TEV sensing bulb should be located on a horizontal section of suction line, just outside of coil box.

7.2 CONDENSATE DRAIN TUBING

Consult local codes or ordinances for specific requirements.

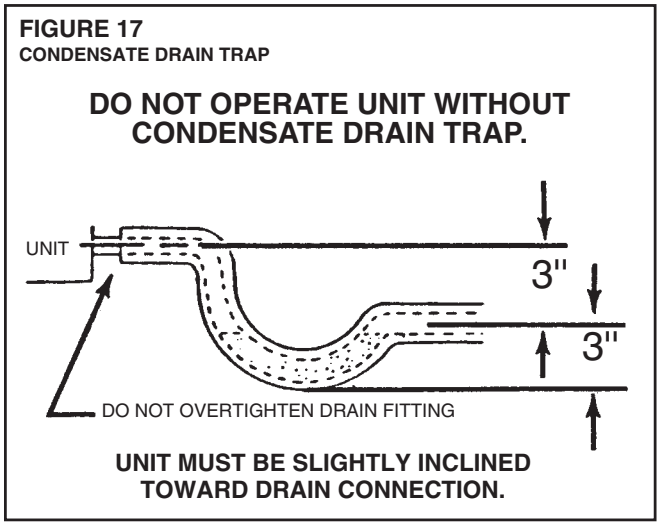
IMPORTANT: When making drain fitting connections to the drain pan, use a thin layer of Teflon paste, silicone or Teflon tape and install hand tight.

IMPORTANT: When making drain fitting connections to drain pan, do not overtighten. Overtightening fittings can split pipe connetions on the drain pan.

- Install drain lines so they do not block service 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 level or pitched slightly toward primary drain connection so that water will drain completely from the pan. (See Figure 17.)
- Do not reduce drain line size less than connection size provided on condensate drain pan.
- All drain lines must be pitched downward away from the unit 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 outdoors.
- 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 in. 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 17).

FIGURE 17
CONDENSATE DRAIN TRAP



- Auxiliary drain line should be run to a place where it will be noticeable if it becomes operational. Occupant 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, using 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 make sure 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.

7.3 DUCT FLANGES

Field-installed duct flanges (4 pieces) are shipped with units. Install duct flanges as needed on top of the unit. (See Figure 3.)

8.0 AIR FILTER (Not Factory-Installed)

If a remote filter is installed, it should be sized for a maximum of 300 feet/min. air velocity for the CFM required.

IMPORTANT: Do not operate system without a filter. A filter is required to protect the coil, blower and internal parts from excessive dirt and dust.

9.0 AIRFLOW PERFORMANCE

Airflow performance data is based on cooling performance with a coil and no filter in place. Select performance table for appropriate unit size, voltage and number of electric heaters to be used. Make sure external static applied to unit allows operation within the minimum and maximum limits shown in table below for both cooling and electric heat operation. For optimum blower performance, operate the unit in the .1 [3 mm] to 1.00 inches [25 mm] W.C. external static range. Units with coils should be applied with a minimum of .1 inch [3 mm] W.C. external static.

9.1 AIRFLOW PERFORMANCE DATA

Nominal Cooling Capacity	Cabinet Size	Blower Size / Motor HP	Blower Thermostat at Input	Nominal Airflow CFM	CFM RPM WATTS	External Static Pressure - In. W.C. 230 Volts									
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
2-ton	21	10x8 1/3	Y1	575		570	571	572	573	574	575	576	577	578	579
						459	525	591	657	724	790	856	922	988	1054
						37	54	71	88	105	123	140	157	174	191
			Y2	775		772	778	783	788	794	799	805	810	816	821
						486	550	615	679	744	809	873	938	1003	1067
						56	80	104	128	151	175	199	223	247	271

IMPORTANT: Observe airflow operating limits. Do not operate above 1.0 in. W.C. system external static.

10.0 SEQUENCE OF OPERATION

10.1 Cooling (cooling only or heat pump)

- When the thermostat "calls for cooling," the circuit between R, G and Y is completed, causing the blower to energize. This circuit also closes the contactor (CC) in the outdoor unit starting the compressor (COMP) and outdoor fan motor (OFM).

10.2 Heating (electric heat only)

- When the thermostat "calls for heat," the circuit between R and W_1 is completed, and the heater sequencer (HR_1) is energized. A time delay will follow then: The heating elements (HE) and the indoor blower motor (IBM) will come on. Units with a second heater sequencer (HR_2) can be connected with the first sequencer (HR_1) to W on the thermostat sub-base or connected to a second stage W_2 on the sub-base. W_1 on the furnace board MUST be connected for heating blower operation.

10.3 EMERGENCY HEAT (electric backup heat)

- If selector switch on thermostat is set to the emergency heat position, the heat pump will be locked out of the heating circuit, and all heating will be electric heat. Jumper should be placed between W_2 and E on the thermostat sub-base so that the electric heat control will transfer to the first stage heat on the thermostat. This will allow the indoor blower to cycle on and off with the electric heat when the fan switch is in the auto position.

10.4 ROOM THERMOSTAT (ANTICIPATOR SETTING)

See instructions with outdoor section, condensing unit or heat pump for recommended room thermostats.

- On units with one electric heat sequencer (HR_1) (see wiring diagram on unit), heat anticipator setting should be .16.
- On units with two electric heat sequencers (HR_1 & HR_2) (see wiring diagram on unit), heat anticipator setting should be .32 if both are connected to same stage on thermostat. Setting should be .16 if (HR_1 &HR_2) are connected to separate stages.

NOTE: Some thermostats contain a fixed, non-adjustable heat anticipator. Adjustment is not permitted.

- The thermostat should be mounted 4 to 5 feet above the floor on an inside wall of the living room or a hallway that has good air circulation from the other rooms being controlled by the thermostat. It is essential that there be free air circulation at the location of the same average temperature as other rooms being controlled. Movement of air should not be obstructed by furniture, doors, draperies, etc. The thermostat should not be mounted where it will be affected by drafts, hot or cold water pipes or air ducts in walls, radiant heat from fireplace, lamps, the sun, T.V. or an outside wall. See instruction sheet packaged with thermostat for mounting and installation instructions.

NOTE: Some thermostats, particularly solid-state digital types, contain fixed, non-adjustable heat anticipators and adjustment is not permitted.

11.0 CALCULATIONS

11.1 CALCULATING TEMPERATURE RISE

- The formula for calculating air temperature rise for electric resistance heat is:

$$\text{Temperature Rise °F} = \frac{3.16 \times \text{Watts}}{\text{CFM}}$$

Where: 3.16 = Constant, CFM = Airflow

11.2 CALCULATING BTUH HEATING CAPACITY

- The formula for calculating BTUH heating capacity for electric resistance heat is:

BTUH Heating = Watts x 3.412

Where: 1 kW = 1000 Watts, 3.412 = Btuh/Watt

11.3 CALCULATING AIRFLOW CFM

- The formula for calculating airflow using temperature rise and heating BTUH for units with electric resistance heat is:

$$\text{CFM} = \frac{\text{Heating BTUH}}{1.08 \times \text{Temp. Rise}}$$

11.4 CALCULATING CORRECTION FACTOR

- For correction of electric heat output (kW or BTUH) or temperature rise at voltages other than rated voltage multiply by the following correction factor:

$$\text{Correction Factor} = \frac{\text{Applied Voltage}^2}{\text{Rated Voltage}^2}$$

12.0 PRE-START CHECKLIST

PRE-START CHECKLIST	
❍ YES ❍ NO	Is unit properly located, level, secure and serviceable?
❍ YES ❍ NO	Has auxiliary pan been provided under the unit with separate drain? (Units installed above a finished ceiling).
❍ YES ❍ NO	Is condensate line properly sized, run, trapped, pitched and tested?
❍ YES ❍ NO	Is ductwork correctly sized, run, taped and insulated?
❍ YES ❍ NO	Have all cabinet openings and wiring been sealed with caulking?
❍ YES ❍ NO	Is the filter clean, in place and of adequate size?
❍ YES ❍ NO	Is the wiring tight, correct and to the wiring diagram?
❍ YES ❍ NO	Is the unit properly grounded and protected (fused)?
❍ YES ❍ NO	Is the thermostat heat anticipator been set properly?
❍ YES ❍ NO	Is the unit circuit breaker(s) rotated properly “on” up - “off” down?
❍ YES ❍ NO	Are the unit circuit breaker(s) line lug cover(s) in place?
❍ YES ❍ NO	Are all access panels in place and secure?
Refer to outdoor unit installation instructions for system start-up instructions and refrigerant charging instructions.	

13.0 MAINTENANCE

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your local dealer as to the proper frequency of maintenance and the availability of a maintenance contract.

IMPORTANT: Before performing any service or maintenance procedures, read all “WARNINGS” listed in these installation instructions.

⚠ WARNING

Units with circuit breaker(s) meet requirements as a service disconnect switch, however, if access is required to the line side (covered) of the circuit breaker, this side of the breaker(s) will be energized with the breaker(s) de-energized. Contact with the line side can cause electrical shock resulting in personal injury or death.

13.1 AIR FILTER (Not Factory Installed)

Check the system filter every ninety days or as often as found to be necessary and if obstructed, clean or replace at once.

IMPORTANT: Do not operate the system without a filter in place.

13.2 INDOOR COIL - DRAIN PAN - DRAIN LINE

Inspect the indoor coil once each year for cleanliness and clean as necessary. It is necessary to remove the filter and check the return air side of the coil for debris.

IMPORTANT: Do not use caustic household drain cleaners, such as bleach, in the condensate pan or near the indoor coil. Drain cleaners will quickly damage the indoor coil.

CAUTION

In compliance with recognized codes, it is recommended that an auxiliary drain pan be installed under all evaporator coils or units containing evaporator coils that are located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the coil drain pan or a stoppage in the primary condensate drain piping. See accessory section in this manual for secondary horizontal drain pan RXBM-ABXX.

13.3 BLOWER MOTOR AND WHEEL

Inspect the blower motor and wheel for cleanliness. With the system air filter in place, it should be several years before it would become necessary to clean the blower motor and wheel.

- If it becomes necessary to remove the blower assembly from the unit, see instructions on removal and disassembly of motor, blower and heater parts.
- The blower motor and wheel may be cleaned by using a vacuum with a soft brush attachment. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb the balance weights (clips) on the blower wheel blades. Do not drop or bend wheel as balance will be affected.

13.4 LUBRICATION

The blower motor sleeve bearings are pre-lubricated by the motor manufacturer and do not have oiling ports. Motor should be run for an indefinite period of time without additional lubrication.

13.5 BLOWER ASSEMBLY REMOVAL AND REPLACEMENT

Removing the blower assembly is not required for normal service and maintenance. Removal is necessary for replacement of components such as motor, blower wheel. After extended use, removal of the blower assembly may become necessary for a thorough cleaning of the blower motor and wheel.

⚠ WARNING

If removal of the blower assembly is required, all disconnect switches supplying power to the airhandler must be de-energized 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.

- Mark field power supply wiring (for replacement) attached to terminal block or circuit breaker(s) on blower assembly. Remove wiring from terminal block or circuit breaker(s).
- Mark low voltage control wiring (for replacement) where attached to unit control terminals on left side of blower housing.
- Remove a screw holding blower assembly to front channel of cabinet and pull blower assembly from cabinet.
- To replace blower assembly, slide blower assembly into blower deck. Make sure blower assembly engages lances in deck properly. If assembly hangs up, check to make sure top and bottom are lined up in proper locations.
- Slide blower assembly to back of cabinet and make sure it is completely engaged.
- Replace two screws holding blower assembly to front channel of cabinet. Take care not to strip screws, just snug into place.
- Replace low voltage control wiring with wire nuts and make sure wiring is to wiring diagram and a good connection has been made.
- Replace field power wiring to terminal block or circuit breaker(s) on control area of blower assembly. Make sure wires are replaced as they were, check wiring diagram if necessary. Tighten supply power wiring securely to terminals lugs.
- Make sure wiring is within cabinet and will not interfere with access door. Make sure proper separation between low voltage control wiring and field power wiring has been maintained.
- Replace blower assembly control access panel before energizing equipment.

13.6 MOTOR REPLACEMENT

With the blower assembly removed, the indoor blower motor can be removed and replaced using the following procedure:

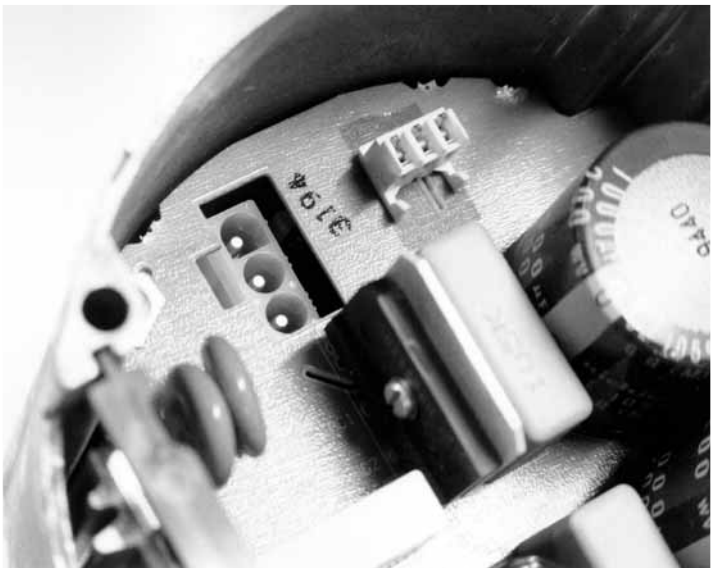
- Remove motor leads from the motor high and low voltage plugs. Note the lead locations for ease of re-assembly.
- Loosen the set screw holding the blower wheel onto the motor shaft. The shaft extends through the blower hub so that a wrench can be used on the extended shaft to break the shaft loose if necessary. Be careful not to damage the shaft. Use a wheel puller on the groove in the hub if necessary.
- Loosen the bolt holding the wire motor band around the motor shell and pull the motor from the motor mount. Note the motor position in the mount for re-assembly.
- To re-assemble, insert the motor shaft through the hub in the blower wheel and orient the motor to original position.
- For proper motor cooling, it is important that the motor be mounted the same as the original, as far into the blower as practical.
- The dimension from the face of the motor end plate (shaft end) to the first wire on the motor mount band around the shell should be:

DIMENSION	TONNAGE	CABINET SIZE
1 1/2"	2	21

- With motor held to above position and motor lead plugs oriented to the original position (the wire connectors on the motor must point straight to the supply air end of the unit and away from the return air [filter] end of the unit). Securely tighten the bolt on the mount band to the motor shell.
- Turn the motor shaft so that the flat on the shaft is located under blower wheel setscrew, and the blower wheel is centered in the blower housing with the same distance on each side between the inlet venturi and the outside of the blower wheel.
- Re-assemble the motor wiring (high and low voltage plugs) into the motor.

  IMPORTANT: DO NOT FORCE POWER PLUG INTO THE MOTOR CONNECTOR BACKWARDS. The A.C. power plug to the motor has locking tabs. It has been proven that by applying excessive force to the A.C. cable half of the connector it is possible to force the connector in backwards. It will not seat and “click” properly but will make connection. If A.C. power is applied with the connector reversed the motor will be immediately destroyed.

FIGURE 18
INTERNAL MOTOR PLUG AND SOCKET



13.7 ECM CONTROL MODULE REPLACEMENT

Always take the following steps before replacing the control module on the end of the ECM indoor blower motor.

1. **HAVE THE CORRECT REPLACEMENT MODULE.** These controls are factory programmed for specific operating modes. Even though they look alike, different modules may have different CFM characteristics.

IMPORTANT: Using the wrong control module voids all product warranties and may produce unexpected results.

⚠ WARNING

Always have 240 volt power turned off to the furnace before attempting any replacement of the motor or control module. Failure to do so may result in serious equipment damage, personal injury or death.

2. Turn off power to the equipment. Wait at least 5 minutes after disconnecting AC power before opening the motor.
3. While not necessary, it may prove easier to remove the complete blower assembly from the furnace. Unplug the two cable connectors to the motor. There are latches on each connector. DO NOT PULL ON THE WIRES. TO REMOVE THE 16 PIN PLUG, SQUEEZE THE PIN LATCH. The plugs remove easily when properly released.

FIGURE 19
ECM MOTOR COMPONENTS

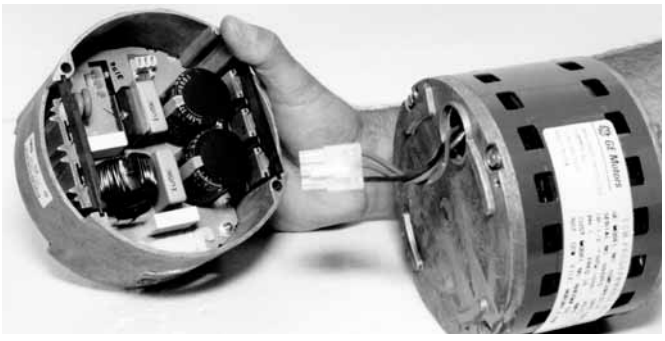


FIGURE 20
MOTOR ALIGNMENT PIN



4. Locate the two standard 1/4" hex head bolts on the flat end of the motor control module casting. Remove these bolts from the motor while holding the control module. DO NOT REMOVE TWO SCREWS WITH TORX HEADS.
5. The control module is still connected to the motor by a plug and cable. Carefully rotate the control so as to gain access to the plug on the cable end. Squeeze the release latch and gently pull the plug out of the control module. DO NOT PULL ON THE WIRES. GRIP THE PLUG ONLY.
6. The control module is now completely detached from the motor. Use an ohmmeter to measure the resistance from each motor lead (in the motor plug just removed) to the motor shell. This resistance must be greater than 100K ohms. Always measure to the unpainted motor end plate. If any motor lead fails this test DO NOT INSTALL THE NEW CONTROL MODULE.
7. Verify that the replacement control module is correct. Place the new module next to the motor and carefully insert the plug that was removed in step 5. BE SURE THE PLUG LATCHES. IT SHOULD CLICK INTO PLACE.
8. Install the new control module back on the motor. Carefully engage the alignment pin into the appropriate mating motor hole.
9. Replace the two 1/4" hex head bolts. Tighten the bolts snugly. DO NOT OVER TIGHTEN.

IMPORTANT: Before replacing the blower motor assembly, check the installation for any application fault that might have caused the motor or control module to fail. Water damage could show as corrosion on the inside or outside of the casting. If so, run a Moisture Check.

10. Install the blower motor assembly back into the furnace. Follow the manufacturer's suggested procedures.
11. Plug the **16 pin connector** into the motor. The connector is keyed. Be sure the connector is properly seated and latched.
12. Plug the **5 pin connector** into the motor. The connector is keyed. Be sure the connector is properly seated and latched. OBSERVE THE PROPER ORIENTATION. DO NOT FORCE THE CONNECTOR. It plugs in very easily when properly oriented.

⚠ CAUTION

Reversing the 5-pin connector on the ECM motor causes immediate failure of the control module.

13. Final installation check. Be sure the motor is installed as follows.
    a. Set the motor into the blower housing as originally provided from the manufacturer.
    b. Do not allow the motor mount to cover the motor vent openings.
    c. Do not attach the motor mount to the motor electronics compartment.
    d. The motor connectors should be straight down.
    e. Have appropriate drip loops formed in the harnesses.
14. Restore 230 volt power to the system. Verify that the new motor control module works properly.

13.8 BLOWER WHEEL REPLACEMENT

With the blower assembly removed and the motor assembly removed (see above instructions), remove the two screws holding the blower wrap (cutoff) to the blower sides.

IMPORTANT: It is not necessary to remove heating element(s), if provided, to remove the blower wheel.

- With wrap (cutoff) screws removed, cut off end of blower wrap will spring up. Lifting wrap blower wheel is removed through the discharge opening in the blower housing.

- To replace, make sure wheel is oriented properly with hub to the opposite side from the motor. Lift blower wrap and insert blower wheel through discharge opening in the blower housing.
- Hold blower wrap down into position and replace two screws holding blower wrap to blower sides.
- See motor replacement and blower assembly instructions for remaining assembly procedure.

14.0 REPLACEMENT PARTS

Any replacement part used to replace parts originally supplied on equipment must be the same as or an approved alternate to the original part supplied. The manufacturer will not be responsible for replacement parts not designed to physically fit or operate within the design parameters the original parts were selected for.

These parts include but are not limited to: Circuit breakers, heater controls, heater limit controls, heater elements, motor, motor capacitor, blower relay, control transformer, blower wheel, filter, indoor coil and sheet metal parts.

When ordering replacement parts, it is necessary to order by part number and include with the order the complete model number and serial number from the unit data plate. (See parts list for unit component part numbers).

15.0 ACCESSORIES - KITS - PARTS

- **Combustible Floor Base RXHB-21 (for standard units)** for downflow applications, see section of this manual covering combustible floor base.

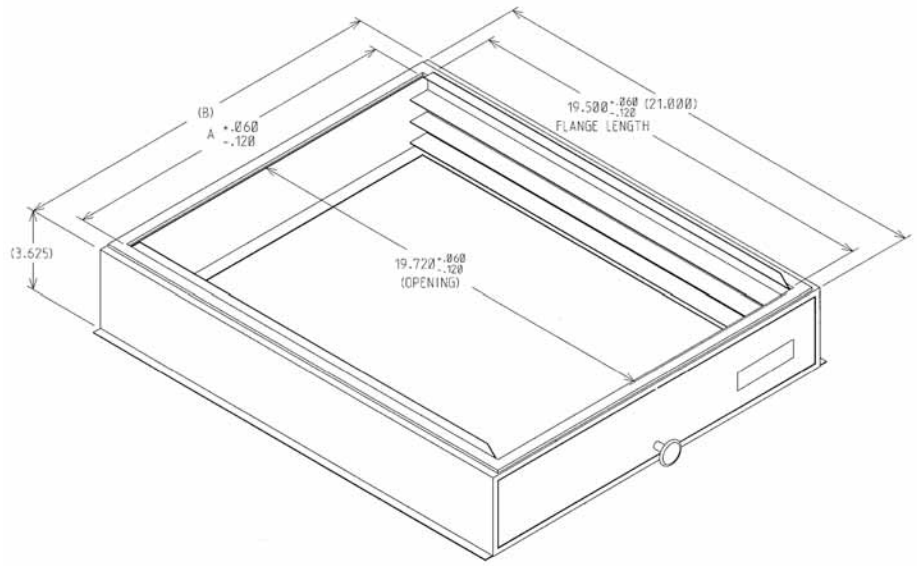
Model Cabinet Size	Combustible Floor Base Model Number
21	RXHB-21

- **Jumper Bar Kit 3 Ckt. to 1 Ckt. RXBJ-A31** is used to convert single phase multiple three circuit units to a single supply circuit. Kit includes cover and screw for line side terminals.
- **Jumper Bar Kit 2 Ckt. to 1 Ckt. RXBJ-A21** is used to convert single phase multiple two circuit units to a single supply circuit. Kit includes cover and screw for line side terminals.

  NOTE: No jumper bar kit is available to convert three phase multiple two circuit units to a single supply circuit.
- **External Filter Base RXHF- (See Figure 21)**

Model Cabinet Size	Filter Size	Part Number	A	B
21	20 x 20 [508 x 508]	RXHF-21 Accommodate 1" or 2" filter	19.20	21.00

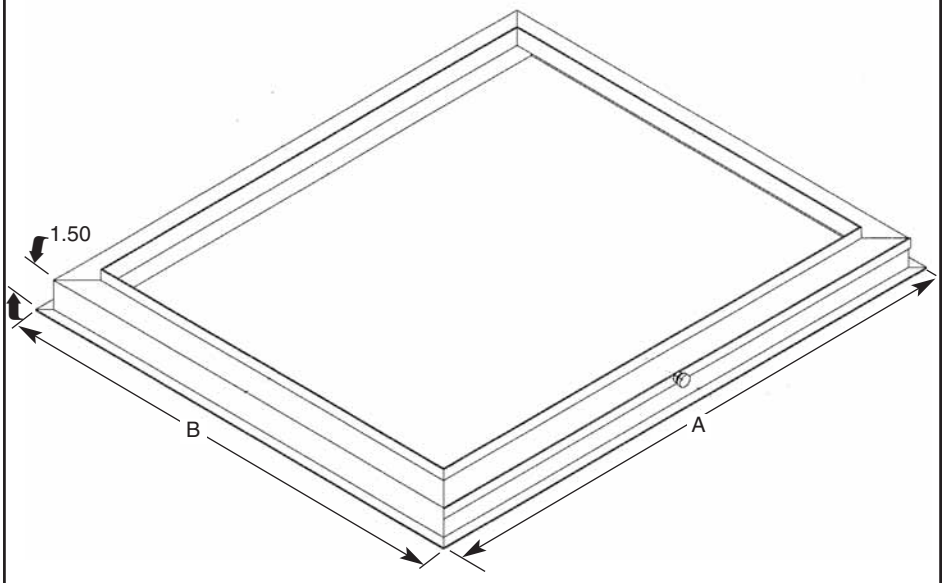
FIGURE 21
EXTERNAL FILTER BASE: RXHF-



- **External Filter Rack: RXHF-B (See Figure 22)**

Model Cabinet Size	Filter Size	Part Number	A	B
21	20 x 20	RXHF-B21 Accommodate 1" filter	20.40	20.77

FIGURE 22
EXTERNAL FILTER RACK: RXHF-B21



- **Auxiliary Horizontal Unit Overflow Pan Accessory RXBM-**

Nominal Cooling Capacity Ton	Auxiliary Horizontal Overflow Pan Accessory Model Number
2 - 3	RXBM-AC48