Installation and User Manual

HB Series
Package Units & Air Handlers

R-410A Package

- R-410A DX or Chilled Water Cooling
- Gas, Electric or Hot Water Heat
- Bottom or Side Discharge

Air Handler

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

- *EXTINGUISH ANY OPEN FLAME*
- *DO NOT TOUCH ANY ELECTRICAL SWITCH*
- *DO NOT TRY TO LIGHT ANY APPLIANCE*
- *DO NOT USE ANY PHONE IN YOUR BUILDING*
- *IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.*
- *IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.*

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

Contents

Owner should pay particular attention to the words: **NOTE**, **CAUTION**, *and* **WARNING**. **NOTES** *are intended to clarify or make the installation easier.* **CAUTIONS** *are given to prevent equipment damage.* **WARNINGS** *are given to alert owner that personal injury and/or equipment damage may result if installation is not handled properly.*

Table Index:

Figure Index

1. Description

Important Safety Information

ONLY QUALIFIED PERSONNEL SHOULD PERFORM INSTALLATION, OPERATION, AND MAINTENANCE OF EQUIPMENT DESCRIBED IN THIS MANUAL.

HB series package units are designed for safe operation when installed, operated, and maintained within design specifications, and the instructions set forth in this manual. It is necessary to follow these instructions to avoid personal injury or damage to equipment or property during equipment installation, operation, and maintenance.

⚠ NOTE

IMPORTANT!

This equipment is protected by a standard limited warranty under the condition that initial installation, service, and maintenance is performed according to the instructions set forth in this manual. This manual should be read in its entirety prior to installation, and before performing any service or maintenance work.

Units described in this manual are available with many optional accessories. If you have questions after reading this manual in its entirety, consult other factory documentation, or contact your sales representative to obtain further information before manipulating this equipment, or its optional accessories.

⚠ WARNING

RISK OF DAMAGE, INJURY, AND LOSS OF LIFE - Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, or loss of life. A qualified installer or service agency must perform installation and service.

⚠ WARNING

RISK OF ELECTRICAL SHOCK -
Before attempting to perform any service or maintenance, turn the electrical power to the unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠ WARNING

RISK OF INJURY FROM MOVING PARTS - Disconnect all power before servicing to prevent serious injury resulting from automatic starts. Unit may have multiple power supplies.

⚠ WARNING

ON 3 PHASE UNITS ONLY - Scroll compressors will be damaged by operation with the wrong rotation. THE LOW PRESSURE SWITCH HAS BEEN DISCONNECTED AFTER TESTING AT THE FACTORY. The wiring must be reconnected and proper rotation determined at the time of start-up by a qualified service technician using suction and discharge pressure gauges. Any alteration should only be made at the unit power connection.

⚠ WARNING

This equipment uses R-410A only, and operates at higher pressures than standard R-22 systems. Do not use R-22 service equipment or tools on R-410A systems. Improper use or service may result in injuries from parts under high pressure.

⚠ WARNING

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

Package Unit Orientation (Compressorized)

Service access is from the **front** of the unit.

As you face the **front** of the unit, the condensing section will be on the **right** end of the unit, and the air handling section on the **left**.

The drain connection is located on the **back**.

Figure 4a, Package Unit Orientation

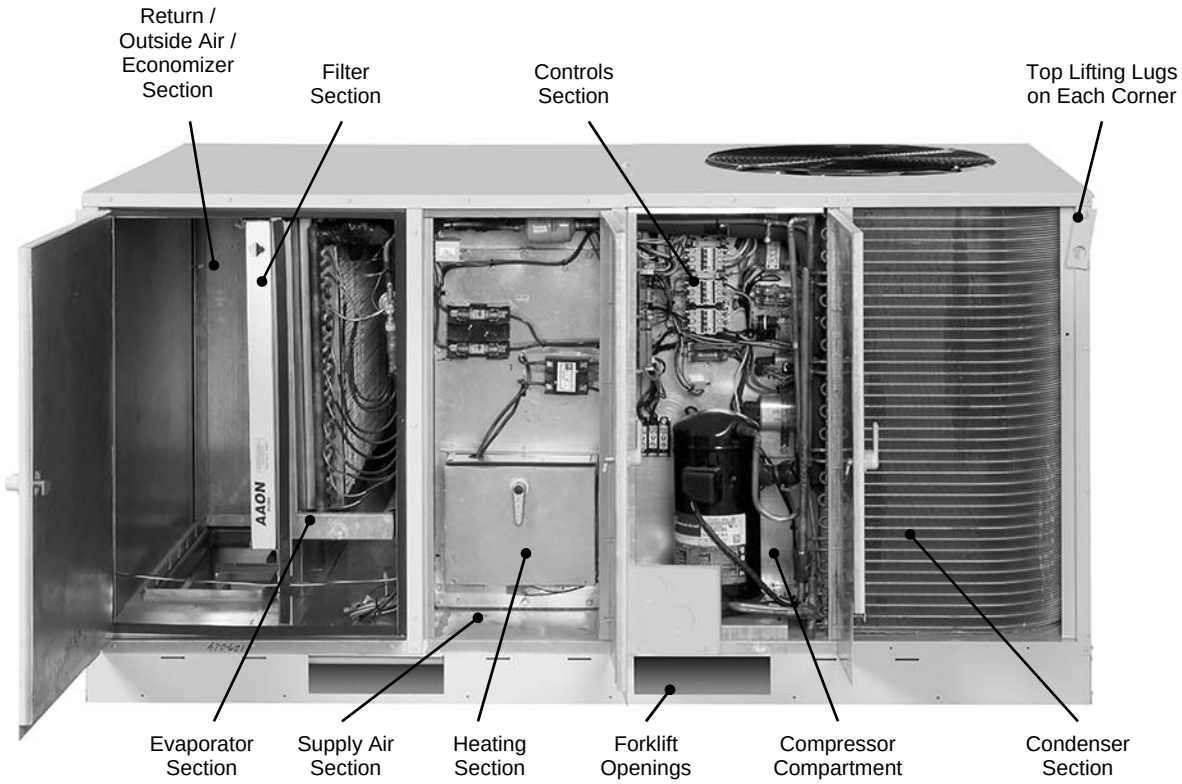


Table 4.1, Package Unit Dimensions

Model	Width	Length	Height
002 - 005	42.25”	74.25” (93.25”)*	38”

**If present, the outside air hood will increase the overall installed unit length by 19” for a total length of 93.25”.*

Air Handling Unit Orientation (Non-Compressorized)

Service access is from the **front** of the unit.

As you face the **front** of the unit, the controls section will be on the **right** end of the unit, and the air handling section on the **left**.

The drain connection is located on the **back**.

Figure 5a, Air Handler (Non-Compressorized) Unit Orientation

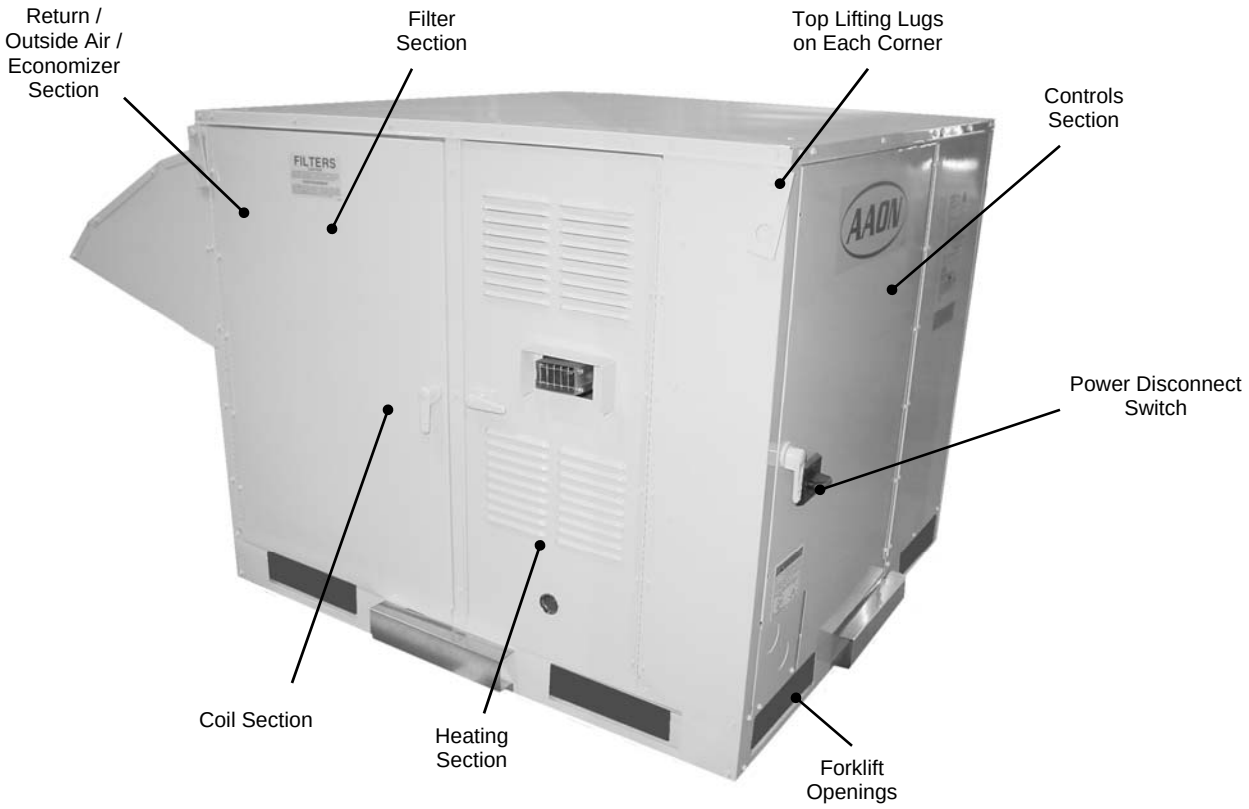


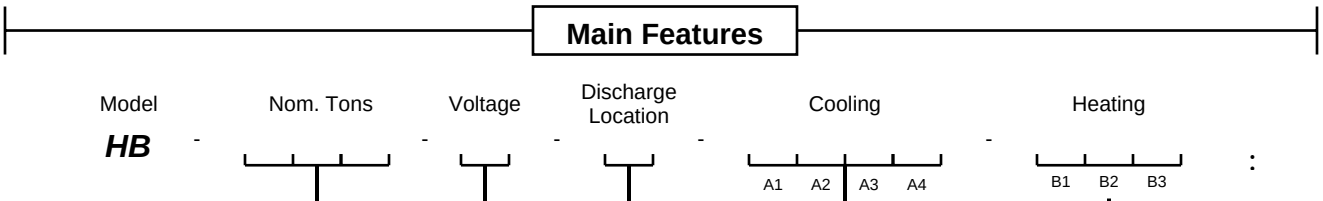
Table 5.1, AHU Dimensions

Model	Width	Length	Height
002 - 005	42.25”	44.75” (63.75”)*	38”

**If present, the outside air hood will increase the overall installed unit length by 19” for a total length of 63.75”.*

2. Model Number Description

Unit Model Number



Nominal Tons

002 =	2 Tons
003 =	3 Tons
004 =	4 Tons
005 =	5 Tons

Voltage

3 =	460V/3∅/60HZ
A =	208-230V/1∅/60HZ
B =	208-230V/3∅/60HZ

Discharge

V =	Vertical
H =	Horizontal

A1 Style

0 =	No Refrigerant
A =	R-410A
B =	R-410A w/ 2 Step Compressor

A2 Configuration

0 =	No Cooling
2 =	Non-comp. w/ Std. DX Coil
3 =	Non-comp. w/ Std. DX Coil w/ RA Bypass
A =	Air Cooled Cond. w/ Std. DX Coil
Q =	Air Cooled Cond. w/ Std. DX Coil w/ RA Bypass
U =	Chilled Water 4 Row Coil
W =	Chilled Water 4 Row Coil w/ RA Bypass
Y =	Chilled Water 3 Row Coil w/ 1 Row Preheat
Z =	Chilled Water 3 Row Coil w/ RA Bypass & 1 Row Preheat

A3 Coating

0 =	No Coating
1 =	Phenolic Coated Coils - Evap. & Cond.
8 =	Phenolic Coated Condenser Coil Only
9 =	Phenolic Coated Evaporator Coil Only

A4 Staging

0 =	No Cooling
1 =	Single Stage
2 =	Dual Stage (w/ 2 step compressor)
M =	Single Serpentine Chilled Water
N =	Half Serpentine Chilled Water

B1 Type*

0 =	No Heat
1 =	Electric Heat
2 =	Natural Gas Aluminized
E =	Hot Water
F =	Hot Water w/ Phenolic Coating

Note: LP gas and high altitude conversion kits are available for field installation.

B2 Designation

	Gas Capacity Mbtu	Electric Capacity kW 208V	Electric Capacity kW 240-480V
0 =	No Heat	-	-
1 =	45	7.5	10
2 =	60	15	20
3 =	75	22.5	30
4 =	100	-	-
5 =	125	-	-

B3 Staging

0 =	No Heat
1 =	1 Stage (Gas or Electric)
2 =	2 Stage (Gas or Electric)
3 =	3 Stage (Electric Only)
M =	Single Serpentine (Hot Water)
N =	Half Serpentine (Hot Water)

3. User's Information

⚠ WARNING

Failure to observe the following instructions may result in premature failure of your system, and possible voiding of the warranty.

DX (Direct Expansion) Package Units and DX Units with Remote Condenser

Never cut off the main power supply to the unit, except for complete shutdown.

Always control the system from the thermostat, or control panel, and never at the main power supply (except in an emergency, or complete shutdown of the system).

During the cooling season, if the airflow is reduced due to dirty air filters, or other reasons, the cooling coils will get too cold and result in excessive liquid return to the compressor. As the liquid concentration accumulates, oil is washed out of the compressor leaving it starved for lubrication.

The compressors must be on a minimum of four minutes, and off for a minimum of five minutes. The cycle rate must not exceed eight starts per hour.

THE COMPRESSOR LIFE WILL BE SERIOUSLY SHORTENED BY RESULTING REDUCED LUBRICATION, AND THE PUMPING OF EXCESS AMOUNTS OF LIQUID OIL AND REFRIGERANT.

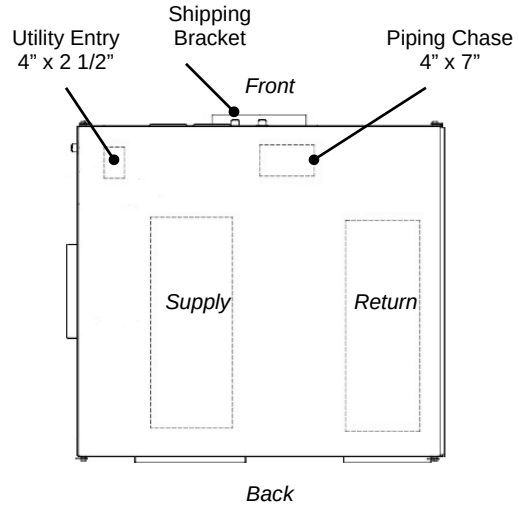
Hydronic Cooling and Heating

Non-compressorized units may contain chilled water and/or hot water coils. Units are provided with internal header connections for field piping. Vent and drain connections can be accessed within the unit.

Piping is to be run via the 4" x 7" piping chase located in the cabinet floor inside the coil compartment, accessible through the coil compartment access door on the front of the unit. Piping to coil header connections must be supported independently of the coil to prevent undue stress from weakening connections over time. Allow adequate flexibility for thermal expansion of the piping.

Use proper glycol solutions or brines to help prevent coil freezing. Consult the designer or project engineer if you have concerns about lower than normal entering air temperatures (typically air temperatures below 40°F) that could cause coils to freeze.

Figure 7a, Piping Chase Location



Gas or Electric Heating

The system is designed to heat a given amount of air each minute of operation. If the amount of air heated is greatly reduced (approximately 1/3 capacity), the heat exchanger (or heater coil if electric) temperature will increase above acceptable levels, and will result in shut down by a high temperature safety switch incorporated into either the heat exchanger, or the heater area.

⚠ WARNING

GAS HEAT UNITS – If heat shuts off due to safety switch, or gas supply shut off failure, then always close manual gas valve to unit prior to any electrical service. Prolonged overheating of the heat exchanger will shorten its life.

⚠ WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Installation and service must be performed by a qualified installer, service agency, or if gas fired units, the gas supplier. Refer to installation instructions provided with the unit, and this manual.

Multiple Unit Operation

When several units are used in conditioning the space, and any are combination heating-cooling units, all system thermostat switches must be set at either heating, cooling, or set at 'OFF'. Do not run part of a system switched to an opposite mode. Cooling only units should be switched to 'OFF' at the thermostat during the heating season.

Wiring Diagrams

A complete set of unit specific wiring diagrams in both ladder and point-to-point form are laminated in plastic and affixed to the inside of the service access door.

Condensate Piping

A drain trap must be connected to the drain connection located on the back of the unit. If codes require a condensate drain line, it should be the same pipe size as the drain nipple and should pitch downward for its entire length toward the drain.
A "P" Trap is factory supplied and shipped in the control access compartment for field installation. An air break should be used with long runs of condensate lines.

Normal Thermostat Operation

<u>For Heating</u>

- Set system switch to 'HEAT'
- Set fan switch to 'AUTO' or 'ON'
- Set the desired temperature

<u>For Cooling</u>

- Set system switch to 'COOL'
- Set fan switch to 'AUTO' or 'ON'

<u>Air Circulation</u>

- Set the system switch to 'OFF'
- Set the fan switch to 'ON'

<u>System Off</u>

- Set the system switch to 'OFF'
- Set the fan switch to 'AUTO'
- Do not change temperature setting
- With these settings the system is shut down, except for the 24-volt control system power, and the compressor crankcase heater (approx. 60W).

Night and Vacancy Operation

To reduce the operation time during low load periods, it is recommended that the temperature setting be increased by 5°F during non-occupied periods of the cooling season in commercial buildings, such as nights and weekends. Decrease the temperature by 10°F at these times during the heating season.

Gas Heating System

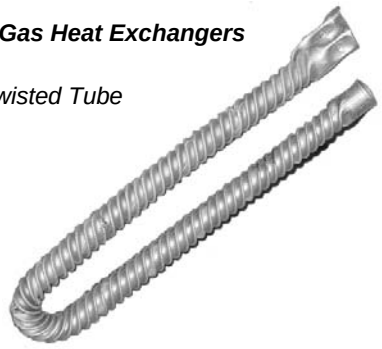
The heating section is for use with natural gas supply pressure of 6" to 10.5" w.g. The unit may also utilize propane gas (after installation of a field conversion kit) with a supply pressure to the valve of 11" to 12" w.g. The rating plate on the furnace must be inspected to make sure the unit is stamped for proper gas. A 1/8" pressure tap should be field supplied by the installer in the piping just ahead of the gas valve. The pressure tap on the outlet end of the gas valve can be checked to verify manifold pressure of 3.2" to 3.5" w.g. for natural gas or 11" to 12" w.g. for propane.

A centrifugal blower that draws in outside air through a protected opening supplies combustion air. This induced draft blower introduces the air to the blower tubes, which assures even primary and secondary airflow.

Gas heating units use AAON's patented high efficiency twisted tube, or dimpled heat exchanger. All heating system and related safety controls are 100% tested on each unit prior to shipment.

Figure 8a, HB Gas Heat Exchangers

Twisted Tube

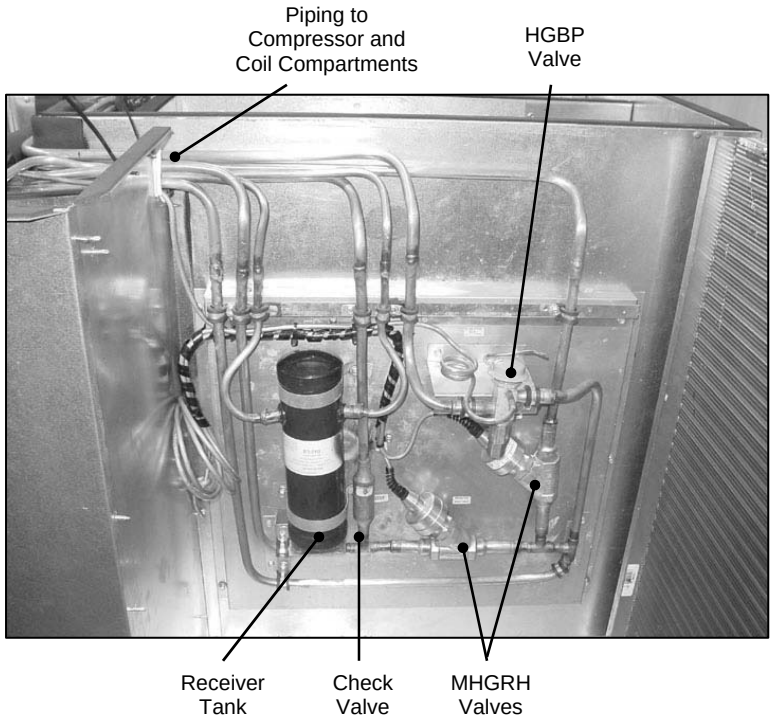


Dimpled Tube

Modulating Hot Gas Reheat and Hot Gas Bypass Systems on DX Units

Some DX cooling units may contain Modulating Hot Gas Reheat (MHGRH) and/or Hot Gas Bypass (HGBP) systems as factory installed options. Piping and valves for these systems will be located on the inside wall of the condenser section. The condenser top must be removed for access to these components.

Figure 9a, MHGRH and HGBP System



Filter Sizes

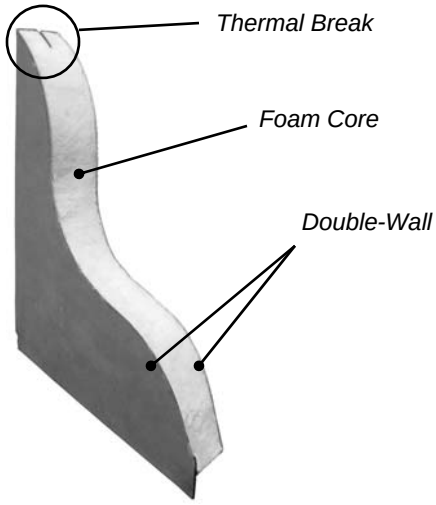
Table 9.1, Pleated Filter Sizes

All 2-5 Ton HB Packaged Units	
Qty.	Size
2	20" x 25" x 2"

Cabinet Construction

All HB units are insulated with closed-cell polyurethane foam, which has twice the R-value of fiberglass insulation. All cabinet walls and roof use double-wall G90 galvanized steel. The solid core foam interior provides a rigid, impact resistant surface. All panels have a thermal break with no metal-to-metal contact from outside to inside.

Figure 9b, High Performance Composite Panel



4. Delivery

ALL SHIPMENTS ARE F.O.B. THE FACTORY. IT IS THE RESPONSIBILITY OF THE RECEIVING PARTY TO INSPECT THE EQUIPMENT UPON ARRIVAL.

Receipt & Inspection

The unit should be inspected for damage that may have occurred in transit. Do the following upon receipt:

1. Inspect all items for internal, external, and concealed damage before accepting
2. Assure carrier is in compliance with Bill of Lading instructions

If damage is found:

1. Note all damage on Bill of Lading immediately
   - **Photograph damage if possible**
   - Do not move or discard damaged packaging materials
2. Call carrier immediately to file a freight claim, and to schedule a freight inspection
3. When damage is repairable, contact the factory for replacement parts: 918-583-2266
4. With permission of carrier, make the repairs
5. Stay in contact with carrier to ensure payment of your claim

If repairs must be made to damaged goods, the factory must be notified before any repair action is taken. Equipment alteration, repair, or unauthorized manipulation of damaged equipment without the manufacturer's consent will void all product warranties. Contact the AAON Warranty Department for assistance with handling damaged goods, repairs, and freight claims: 918-583-2266.

Verify the equipment against the order documents upon delivery. If what you received does not match your order exactly, then notify your Sales Representative at once.

Storage

This equipment is designed for outdoor use. However, if installation will not occur immediately following delivery, then store equipment in a protected area, and in the proper orientation as marked on the packaging with all internal packaging in place. Secure all loose-shipped items.

5. Installation

General

DX models of this unit use R-410A refrigerant only, and should not be used with any other refrigerant. HB package units are for outdoor installation only.

Codes & Ordinances

System should be sized in accordance with National Warm Air Heating and Air Conditioning Association Literature, or the Guide of American Society of Heating, Refrigeration and Air Conditioning Engineers. The installation must conform with local building codes, or in the absence of local codes, with (United States) National Fuel Gas Code "ANSI-Z223.1", (Canada) current CAN/CGA-B149.1 or B149.2. Installation codes for Gas Burning Appliances and Equipment, current C.S.A. Standard C22.1, Canadian Electrical Code Part 1, and C.S.A. Standard B52 Mechanical Refrigeration Code, and Local Plumbing or Waste Water Codes.

⚠ WARNING

It is the responsibility of the installing contractor to comply with codes, ordinances, local and municipal building laws, and manufacturer's instructions. Personal injury and/or equipment damage may result if proper procedures are not followed.

Handling

Be aware of what is contained in the equipment!

Dependent upon the optional accessories that were ordered, this equipment may contain fragile components and delicate electronics. Although the unit is constructed of sturdy materials, avoid impacts and handling methods that may damage internal apparatus and structure, or the exterior painted surfaces of the unit. Take care not to apply destructive force to coils, or other parts protruding beyond the extents of the unit casing. Always handle the unit by its exterior casing.

Keep equipment free from debris, and construction waste during installation. Foreign materials may adversely affect unit operation resulting in premature failures that will not be covered by the manufacturer's

warranty. Attach all service panels, and cover all exposed equipment when work is not being performed. Leave unit protected from other construction until start-up is to occur.

⚠ WARNING

Always wear hand and eye protection when handling, installing, servicing, or maintaining equipment. Sharp or pointed edges, moving parts, and flying debris may cause personal injury.

Heating & Cooling Systems

GAS HEATING SYSTEM

The units are equipped with a direct spark ignition system that proves the burner operation with each call for heat. Power to the ignition control is 24V to reduce hazards. Burner ignition is by a high intensity spark.

When heat is called for, the cooling system is inoperable except for the indoor blower motor. Heating is accomplished by firing gas into the heat exchanger assembly.

⚠ WARNING

Those sensitive to odors or gases from trace amounts of residual oils should NOT be present in the conditioned space during the start-up of a gas-fired installation.

IMPORTANT NOTICE - All gas-fired heat exchangers are completely tested at the factory before shipment. This will remove nearly all of the oils that have been used in the manufacturing process, however trace amounts may remain. When performing the initial start-up at the jobsite it is highly recommended that people, or any other living animals, that may be sensitive to the residual odors or gases, NOT be present in the conditioned space during start-up. In all cases, including the initial factory firing and testing, all of the gases will be under the minimum acceptable level of concentration for human occupancy.

ELECTRIC HEATING SYSTEM

Heating is accomplished by passing electrical current through a specified amount of resistance heaters that produce the required heat. The indoor blower motor energizes at the same time as the heaters.

DX COOLING SECTION

All direct expansion refrigeration systems are factory assembled, charged with refrigerant, tested, and operated. These systems include liquid line filter driers, expansion valves, and fully hermetic scroll compressors. Compressors are equipped with a positive pressure forced lubrication system. The air-cooled condenser coil is constructed of copper tubes and mechanically bonded aluminum fins, and air is pulled through by a propeller fan. The evaporator coil is draw through type constructed of copper tubes and mechanically bonded aluminum fins.

These appliances have been found acceptable with applicable provisions of “ANSI/UL 1995” and current “C.S.A. Standard C22.2” by E.T.L.

CHILLED WATER or NON-COMPRESSORIZED COOLING SECTION

Chilled water, or non-compressorized units, have factory-installed coils. Systems are provided with internal header connections for field piping.

Coils are constructed of copper tubes and mechanically bonded aluminum fins.

⚠ CAUTION

DO NOT DRILL OR PUNCH HOLES IN THE UNIT – The walls of this unit are foam insulated. Field modifications to the unit casing may compromise the unit’s superior insulating capability, in which case excessive leakage, or condensation may occur.

⚠ WARNING

Very high temperatures can damage foam core insulation. High heat may cause off gassing of harmful fumes. Do not apply direct flame to unit cabinet.

Service & Installation Clearances

Before setting the unit into place, caution must be taken to provide clearance for unit panels/doors that must be accessible for periodic service. These areas contain the controls, safety devices, refrigerant, shut-off valves and filter access.

HB package units have minimum service and airflow clearance requirements.

Service Clearance Minimums:

- 36 inches to the front
- 10 inches to the back
- 20 inches to right and left ends

Airflow Clearance Minimums:

- 20 inches around the entire condenser intake
- 24 inches between condenser and obstructions
- 48 inches of clearance over the condenser air discharge, and from adjacent condenser intakes

Figure 12a, Service Clearance Minimums

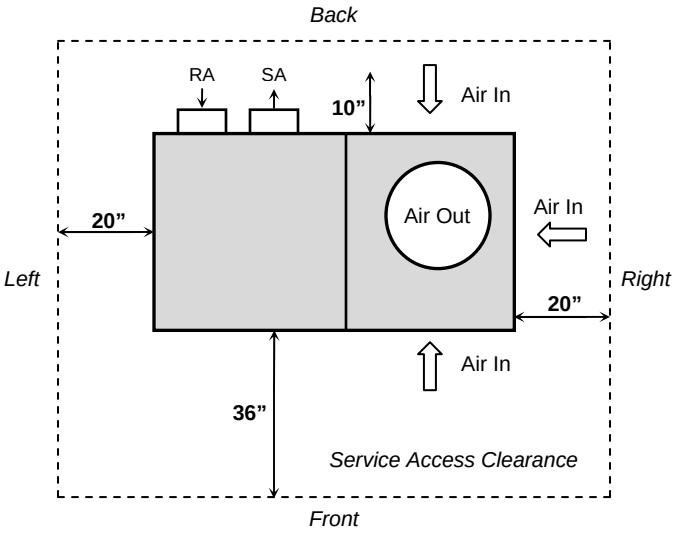


Figure 12b, Airflow Clearance Minimums

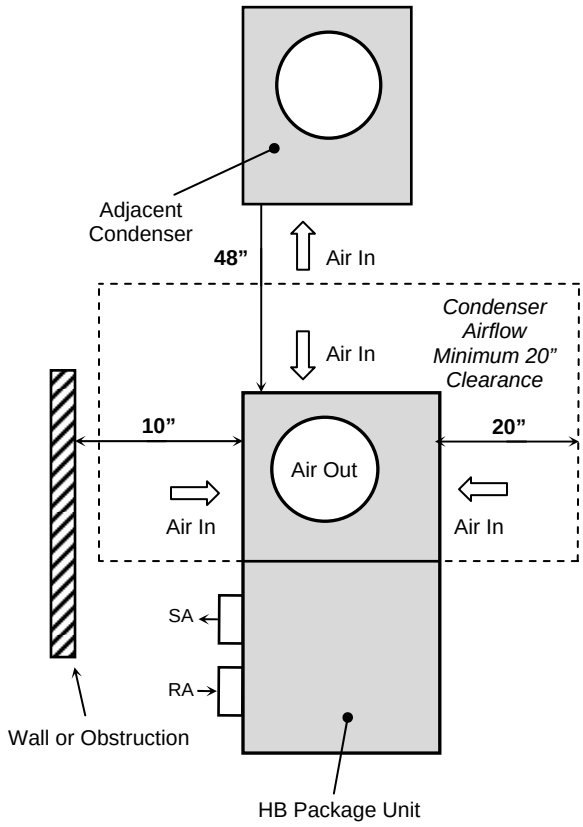
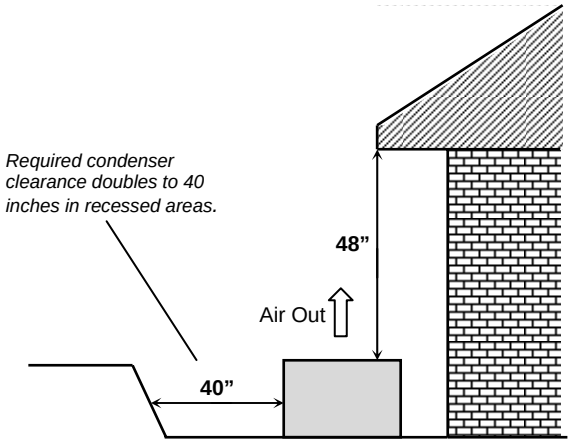


Figure 12c, Other Airflow Clearance Minimums



Airflow to and from the condensing unit must not be restricted. Obstruction to airflow will result in decreased performance and efficiency. The installation position must provide at least 20 inches of condenser clearance for proper airflow into the condenser coil. When the unit's condenser is positioned adjacent to another condenser, 48 inches of clearance is required between air intakes for proper airflow and operation.

The HB package unit has a vertical air discharge. There must be at least 48 inches of clearance above the vertical air discharge. There must not be any obstruction above the equipment that may deflect discharge air back into the unit's air inlets. It is advisable to never place the unit directly under an overhang. Condensing units should not be installed in an enclosure or pit that is deeper than the height of the unit. When the unit is installed in a recessed area the coil side clearance is doubled to 40 inches for inlet air.

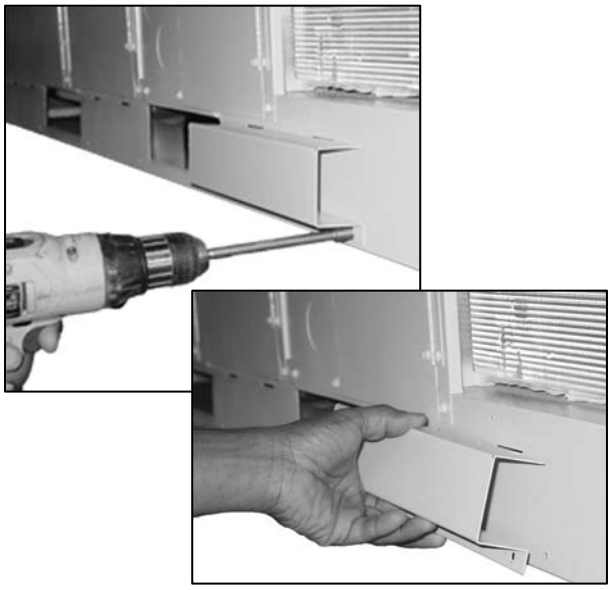
Setting the Unit

Units should always be installed level, and above water drainage routes. Unit operation can be affected by wind. It is good practice to position unit condensing sections away from prevailing winds.

Protective Shipping Brackets

Before setting the unit into its final position on the slab or curb, be sure to remove the protective shipping brackets, or "bumpers" from the perimeter of the unit's base.

Figure 13a, Removing Shipping Brackets



Ground Setting

Set the unit on a solid slab high enough above the soil grade to allow water to drain away from the base of the unit. The unit should be set on a slab that has been placed over compact, level earth. A poured concrete (permanent) slab is recommended.

Roof Setting w/ Curb

Mount roof curbs first, and locate so duct connections will clear any structural members of the building. When using the factory curb, make openings in roof decking large enough to allow for duct penetrations and workspace only. Do not make openings larger than necessary. Set the curb to coincide with the openings. CURB MUST BE LEVEL.

⚠ NOTE

PRIOR TO SETTING UNIT ON CURB – To ensure proper isolation and seal between the unit and the curb, gasket material MUST BE APPLIED to the curb on ALL SURFACES meeting with the unit.

Hoisting

Lifting lugs are provided on each corner of the top of the unit.

If cables or chains are used to hoist the unit, they must be the same length, and care should be taken to prevent damage to the unit.

It is recommended that the unit be hoisted with the outside air hood (if present) in the shipped position. However, the unit may be hoisted with the outside air hood in an open position.
Before lifting unit, be sure that all shipping material is removed. Secure hooks and cables at all lifting points/lugs provided on the unit.

Prior to setting the unit onto the roof curb, be sure that the gasket material has been applied to all curb surfaces meeting with the unit.

Hoist unit to a point directly above the curb and duct openings. Carefully lower and align the unit's utility and duct openings so the unit perimeter fits around the curb. Make sure the unit is properly seated on the curb and is level.

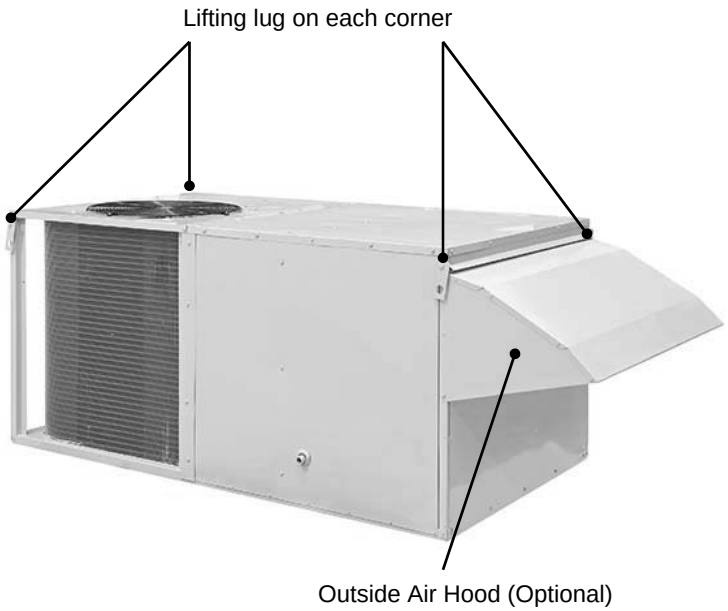
Outside Air Hood (Optional)

Units equipped with outside air intake will have an outside air hood. The outside air hood must be opened prior to unit operation.

Remove shipping screws from each side of the hood in the "closed" position. Lift hood to the "open" position, seal flange, and secure with sheet metal screws.

Outdoor air intake adjustments should be made according to building ventilation, or local code requirements.

Figure 14a, Lifting Lugs and Outside Air Hood



⚠ CAUTION

If the supply or warm air duct passes through a combustible roof, a clearance of one inch must be maintained between the outside edges of the duct and combustible material in accordance with National Fire Protection Association Standard No. 90A. Provide flashings or enclosure between structure, and roof. All joints must be sealed with mastic to ensure a watertight seal.

All roofing work should be performed by qualified roofing contractors.

⚠ WARNING

Install gas fired units so that the flue discharge vent is located a minimum of 120" from openings through which combustion products can enter the building. Never point flue discharge in direction of air intake for other equipment. Unit location must assure combustion and ventilation airflows are never obstructed.

Electrical

Check the unit data plate to make sure it matches the power supply. Connect power to the unit according to the wiring diagram provided with the unit. The power and control wiring may be brought in through the utility entry. Do not run power and control wires in the same conduit.

Protect the branch circuit in accordance with code requirements. The units must be electrically grounded in accordance with the National Electric Code, ANSI / NFPA No. 70. In Canada use current C.S.A. Standard C22.1, Canadian Electric Code Part 1.

Connect power wiring to the terminal block, or optional disconnect switch. The manufacturer has done all wiring beyond this point, and cannot be modified without affecting the unit's agency and/or safety certification, and warranty.

Power can be applied to the unit after the control wiring is connected.

Standard Control Board

This printed circuit board is the central control point for all the electrical components in the unit. Low voltage terminals are provided for connection to the wall mounted thermostat of the customer's selection, or as furnished by AAON.

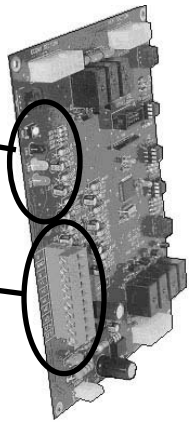
Confirm the optional features that were specified and purchased with the HB conditioner. This will allow proper selection of the number of control options listed below that may need additional wiring.

Figure 15a, Power and Control Wiring

Standard Control Board

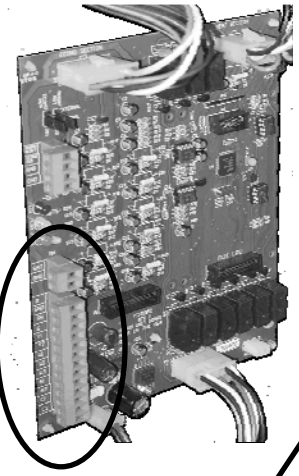
Red, yellow and green LEDs for fault, mode, and power indicators.

Standard Control Board has low voltage terminals for R, G, Y1, Y2, W1, W2, W3 & GND. GND is the ground, or "C" side of the low voltage power supply transformer.



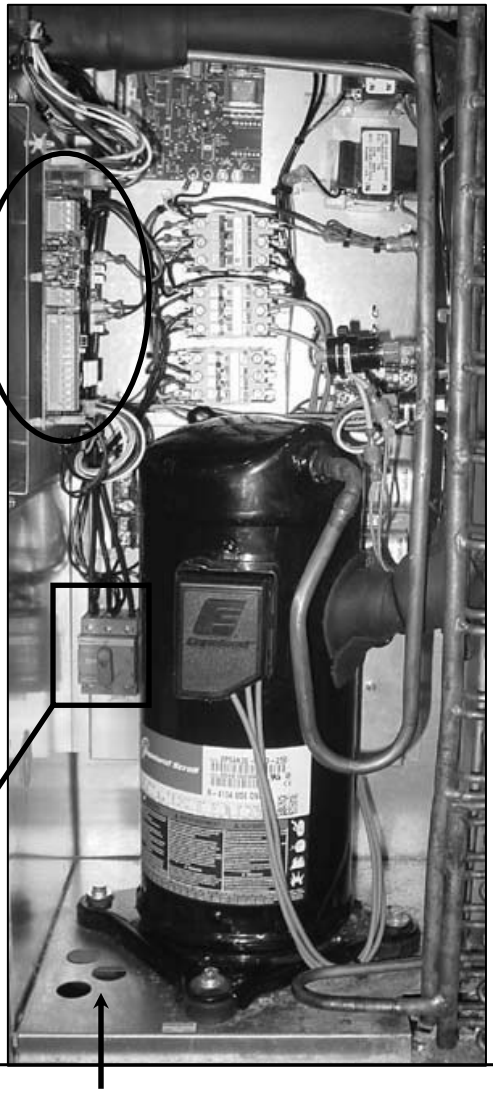
Optional Control Board

Optional Control Board has expanded capability to support optional unit features.



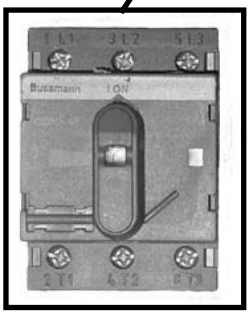
Connect control wiring to low voltage terminal block.

Compressor and Control Compartment



Power Terminal Block

Connect power wiring to terminal block, or the optional disconnect switch next to compressor.



Utility Entry

Run power supply wiring in conduit through utility entry to terminal block. Low voltage control wiring must run through separate conduit from power wiring.

Each HB has a standard Cooling Lock-out feature that prevents the compressor cooling mode when the outdoor temperature is below 55°F. Each unit also has a condenser fan cycle feature that delays the start of the condenser fan until there is satisfactory compressor discharge pressure.

Three colored LEDs are furnished on the circuit board immediately above the low voltage terminals to provide status information as listed in the Table 14.1.

Every unit is furnished with a high and low pressure sensor, as well as an outdoor air temperature sensor. These sensors provide a signal to the control board that also present a fault condition or Mode indicator at the LEDs with a blink rate code.

Blink Rate:

1 second ON and 1 second OFF.
3 seconds OFF before repeating.

Table 16.1, Standard Control Board Blink Codes

Standard Control Board Blink Codes

Red LED	
Fault Condition	**Blinks**
Hi Pres Lockout	2
Lo Pres Lockout	3
Bad Outdoor Air Temp Sensor	5
Clogged Filter	7

When no fault exists, red LED is off.
Lowest number is highest priority.

Yellow LED	
Mode Indicator	**Blinks**
Vent Mode	1
Heating Mode	2
Cooling Mode	3

When unit is off, yellow LED is off.

Green LED
Power Status Only – Blinking Indicates Communications

Optional Control Board

This Control Board is supplied within the HB Model when it has been furnished with certain optional features specified by the customer. Among these are an Economizer, Return Air Bypass, and Hot Gas Reheat.

Table 16.2, Optional Control Board Blink Codes

Optional Control Board Blink Codes

Red LED	
Fault Condition	**Blinks**
Hi Safety Lockout	1
Hi Pres Lockout	2
Lo Pres Lockout	3
Bad Supply Air Temp Sensor	4
Bad Outdoor Air Temp Sensor	5
Clogged Filter	7

When no fault exists, red LED is off.
Lowest number is highest priority.

Yellow LED	
Mode Indicator	**Blinks**
Vent Mode	1
Heating Mode	2
Cooling Mode	3
Economizer Cooling	4
Dehumidification Mode	5
Economizer Dehumidification Mode	6

When unit is off, yellow LED is off..

Green LED
Power Status Only – Blinking Indicates Communications

Thermostat

The low voltage room thermostat should be located on an inside wall 4 to 5 feet above the floor where it will not be subjected to drafts, sun exposure or heat from electrical fixtures or appliances. The control wire size must be large enough to prevent excess voltage drop that may cause improper operation of the equipment. The HB control board has approximately a 1/2 amp current flow through the thermostat. Follow the thermostat manufacturer's instructions to set the heat anticipator.

Table 16.3, Low Voltage Thermostat Field Wiring Size

	Length of Wire Run		
T-stat Load Amps	**50 Ft.**	**100 Ft.**	**150 Ft.**
HB - Less than 1.0	18ga.	18ga.	16ga.

Single Stage Heating & Cooling
The R, G, Y & W terminals on a single stage thermostat should be connected to the similarly labeled terminals on the Control Board in the HB unit.

2 Step Compressor Cooling Models

- The HB models with a 2 step cooling compressor may use a 2 step cooling thermostat with the R, G, Y1, Y2 & W terminals connected to the similarly labeled terminals on the Control Board in the HB unit.

- These HB models can also be connected to a single step cooling thermostat with the Y terminal on the thermostat connected to the Y2 terminal on the Control Board in the HB unit. A built-in time delay in the Control Board will cycle the 2 stages of cooling as required.

Multiple Stage Heating

- HB models with 2 or 3 stage heating should have the W1, W2 and W3 terminals on the thermostat connected to the similarly labeled terminals on the Control Board in the HB unit.

- These models can also be connected to a single step heating thermostat with the W terminal on the thermostat connected to the W2 terminal on the Control Board in the HB unit for 2 step heating or the W3 terminal for 3 step heating. A built-in time delay in the Control Board will cycle the stages of heating as required.

Programmable Thermostats

If a programmable thermostat be used, then the C terminal on the thermostat should be connected to the C or GND terminal on the Control Board.

Economizer Option

The economizer option is used to provide cooling at lower outdoor air temperatures and to provide a quantity of ventilation air to the occupied space. The economizer option can be selected with either a sensible outdoor air temperature sensor or an enthalpy sensor that measures the heat content in the outdoor air. The economizer controller can be field installed or factory installed by AAON as selected by the customer.

Supply Air Temperature Sensor

A supply air temperature sensor is factory wired and provided within the equipment at the end of a coil of wire. This sensor must be installed in the downstream supply air ductwork at a sufficient distance from the equipment to provide a correctly mixed supply air temperature back to the unit control board.

Factory Installed

When factory installed the control board will use the outdoor air sensor and the cooling signal from the thermostat to provide a first stage of cooling using the outside air when possible before starting the compressor and mechanical cooling cycle. The thermostat wiring to the control board with single or multi-stages should be wired as listed previously.

Field Installed

When the control is field installed the 2 to 10 VDC signal for the economizer damper motor must be wired to the Control Circuit Board in the HB unit. See Figure 18a. Note that the jumper must be moved to the “external” position and the signal wired to the ECONO POS and GND terminals on the control board.

Return Air Bypass Option

The Return Air Bypass option is used to provide additional moisture removal capacity to the HB unit. For this application a humidistat must also be installed in the conditioned space to provide a signal to initiate the dehumidification. The humidistat may be purchased from AAON or from others.

A return air bypass control system by others may be field installed as selected by the customer instead of factory installed by AAON.

Factory Installed

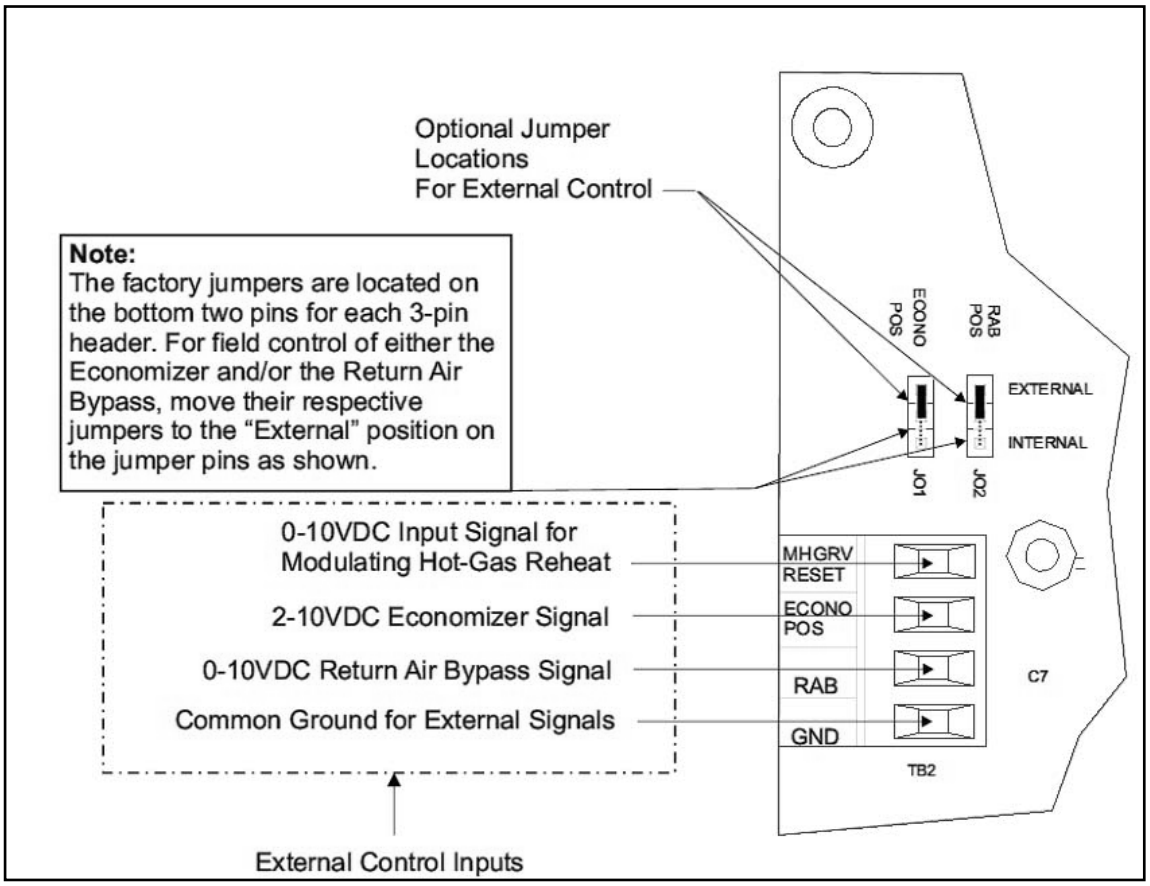
The control board in the HB unit must be wired to the humidistat in the occupied space at the R and RH terminals. The thermostat wiring to the control board with single or multi-stages should be installed as listed previously.

When the Humidistat is calling for moisture removal from the occupied space, the compressor will operate with the return air bypass damper in the open position and the supply fan running in the low speed mode. If the Thermostat calls for cooling, the bypass damper will close and the fan will operate at high speed until the thermostat is satisfied.

Field Installed

When the control is field installed, the 0 to 10 VDC signal for the return air bypass damper motor must be wired to the Control Circuit Board in the HB unit. See Figure 16a. Note that the jumper must be moved to the “external” position and the signal wired to the RAB and GND terminals on the control board.

Figure 18a, External Control Inputs to Control Board



Modulating Hot Gas Reheat

The modulating hot gas reheat option is used to provide additional moisture removal capacity to the HB unit. Hot refrigerant gas discharged from the compressor is sent as needed to a reheat coil mounted immediately after the cooling coil.

For this application a humidistat must also be installed in the conditioned space to provide a signal to initiate the dehumidification by operating the hot gas reheat to deliver dehumidified air at a specified temperature into the occupied space. The humidistat may be purchased from AAON or from others. The thermostat wiring to the control board with single or multi-stages should be installed as listed previously.

Supply Air Temperature Sensor

A supply air temperature sensor is factory wired and provided within the equipment at the end of a coil of wire. This must be installed in the downstream supply air ductwork at a sufficient distance from the equipment to provide a correct mixed air temperature to the unit control board.

Reheated Supply Air Temperature

The desired discharge air temperature setpoint can be preset and later adjusted by using the DIP switch labeled SETPOINT on the circuit board. See Figure 18a for the location and DIP switch setting instructions. The controller will allow the user to set a Supply Air Temperature Setpoint between 50°F and 100°F. If a value of less than 50°F is set, then the controller will default to a 50°F Supply Air Temperature Setpoint. A value greater than 100° F will cause the unit to default to a 100°F Supply Air Temperature Setpoint.

Supply Air Temperature Reset Limit

The controller will also allow a reset of the temperature by a 0 to 10 VDC signal from an outside source to the terminal as shown in Figure 18a. The reset range is determined by the setting configured on the DIP switch labeled RESET LIMIT. The controller will reset the supply air temperature setpoint from the value set on the SETPOINT DIP switch to the value set on the RESET LIMIT DIP switch, as the Reset Input (MHGRV RSET) signal is increased from 0 Volts to 10 Volts.

Example:
We want the Discharge Air Temperature Setpoint to increase from 55°F when the Reset Input signal is at 0 Volts, to 75°F when the Reset Input signal is at 10 Volts.

- Set the SETPOINT DIP Switch to 55°F
- Set the RESET LIMIT DIP Switch to 75°F

The discharge air temperature will now increase from 55°F to 75°F as the Reset Input voltage signal ramps from 0 Volts to 10 Volts.

Note: It is possible to create a “reverse acting” control sequence. Using the temperatures from the example above by setting the SETPOINT DIP Switch to 75°F and the RESET LIMIT DIP Switch to 55°F the reset would be reverse acting. In this case the controller will maintain a 75°F discharge temperature when the Reset Input signal is at 0 Volts and will reduce it to 55°F when the Reset Input signal is at 10 Volts.

Lockout Modes

Gas Heating

The heating mode will be locked out if the ignition system safety monitors trip 3 times during a call for heating.

Electric Heating

The heating mode will be locked out if the high temperature limit switch trips 3 times during a call for heating.

Cooling

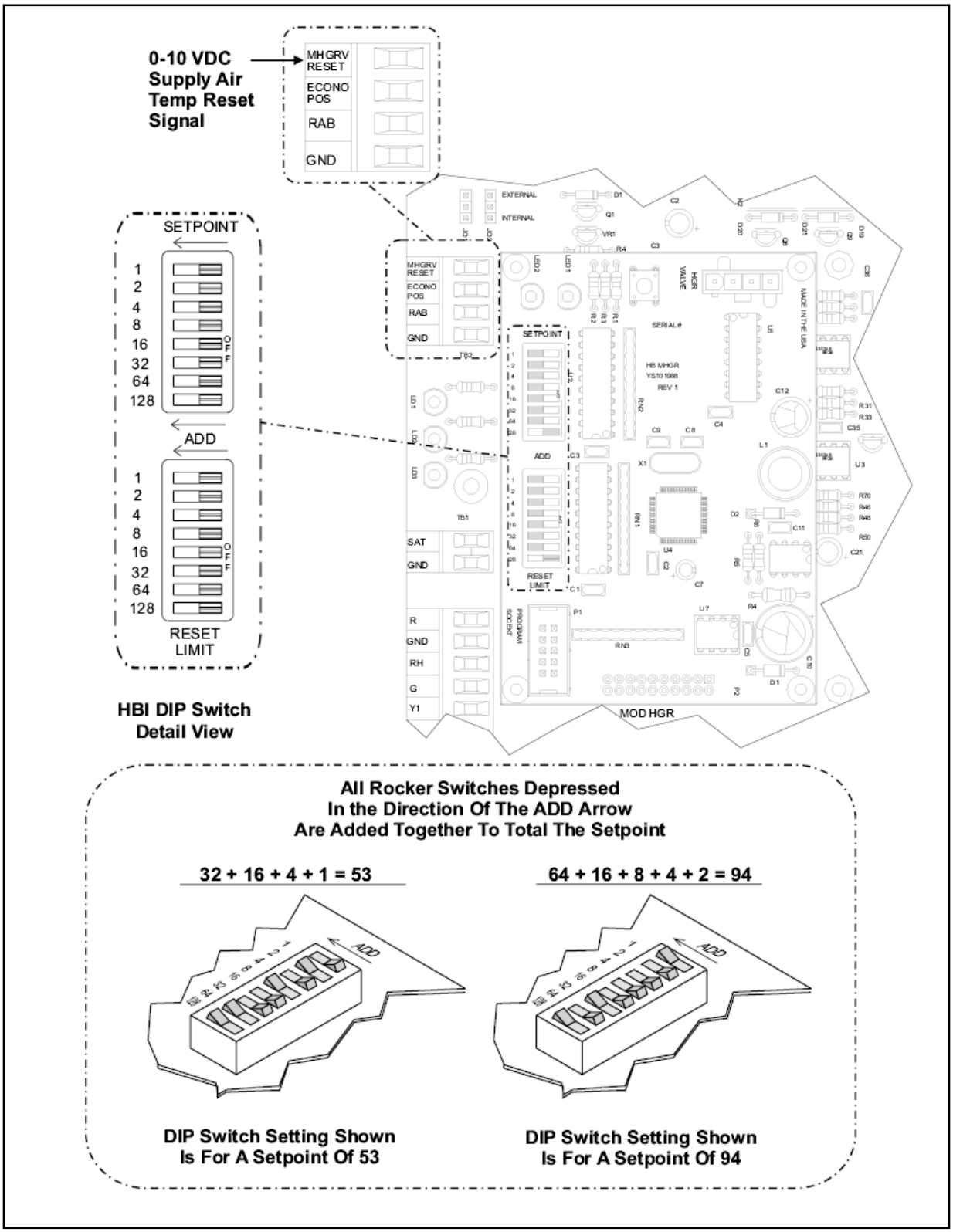
The cooling mode will be locked out if the low pressure switch safety switch trips 3 times during a call for cooling or dehumidification.

Cooling operation will be locked out if the Outside Air Sensor is missing or defective.

The economizer and reheat operation during dehumidification will be locked out if the Supply Air Sensor is missing or defective.

To reset the lockout condition, either remove the call for heating, cooling, dehumidification, or cycle the power to the HB unit.

Figure 20a, Reheated Supply Air Temperature



Gas Piping

Size gas piping to supply the unit with 6" to 10.5" water column (w.g.) pressure for natural gas, or 11" w.g. for propane (when a natural gas to propane conversion kit has been field installed) when all gas consuming devices in the building connected to the same gas system are operating. Install piping in accordance with local codes, the piping must conform with the latest ANSI-Z223.1 National Fuel Gas Code; in Canada, Current Standard CAN/CGA-B149, Installation for Gas Burning Appliances and Equipment.

Gas piping MUST BE supported DIRECTLY AT CONNECTION TO UNIT, and must not be strained or bent, and must be supported by metal straps, blocks, or hooks at intervals not to exceed that shown in Table 21.2.

Pipe joint compounds used on all gas piping connections must be resistant to the action of petroleum gases. A 1/8" NPT plugged tap is required immediately ahead of the unit gas control valve.

All piping connections should be checked for gas leaks before operating the unit. The furnace must be isolated by closing the manual shut off valve, or disconnected from the gas supply during pressure testing of the piping system with pressures in excess of 1/2 PSIG.

Gas Pressure Regulator & Over-Pressure Protection Device (Optional)

On applications where gas service to the unit is greater than 10.5" w.g., and less than 2 PSI, a gas pressure regulator must be installed.

In compliance with the ANSI Z21.80 Line Regulator Standard, installations with gas supply pressures in excess of 2 PSI, and less than 5 PSI require a tested and approved over-pressure protection device (OPD) for use with the regulator as a means to limit the downstream pressure to 2 PSI maximum in the event of regulator failure.

For proper heating operation, pressure to the regulator MUST NOT BE greater than 5 PSI.

Table 21.1, Minimum Gas Piping Sizes

Unit Size (Tons)	Input (MBH)	Pipe Size (In.)
2 – 5	45 – 120	3/4

Note: Some utility companies will require pipe sizes larger than the minimum listed above. Local codes may require the use of a manual main gas shut-off valve and union (field furnished), installed in the gas line external to the unit.

Table 21.2, Gas Piping Support Intervals

Pipe Size (In.)	Intervals (Ft.)
3/4 or 1 (horizontal or vertical)	8
1 1/4 or larger (horizontal)	10
1 1/4 or larger (vertical)	Every floor level

⚠ WARNING

DO NOT USE OPEN FLAME OR OTHER SOURCE OF IGNITION FOR LEAK TESTING. When pressure testing the gas supply piping, the furnace must be isolated, or disconnected by closing the individual manual shut-off valve from the gas supply. Gas valves can be damaged if subjected to more than 0.5 PSIG pressure.

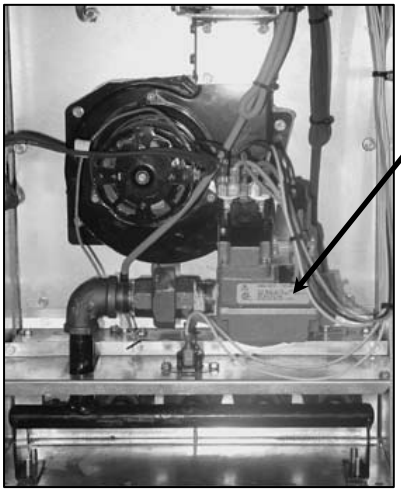
⚠ CAUTION

Some soaps commonly used for leak detection are corrosive to certain metals. If you leak test with soap, then thoroughly rinse soap from piping after leak checks are completed.

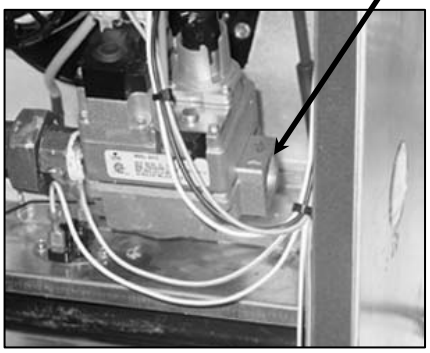
⚠ WARNING

Those sensitive to odors or gases from trace amounts of residual oils should NOT be present in the conditioned space during the start-up of a gas fired installation.

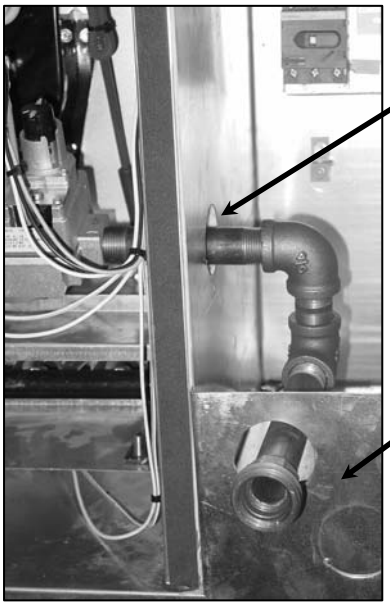
Figure 22a, Gas Piping



Gas valve installed at factory.

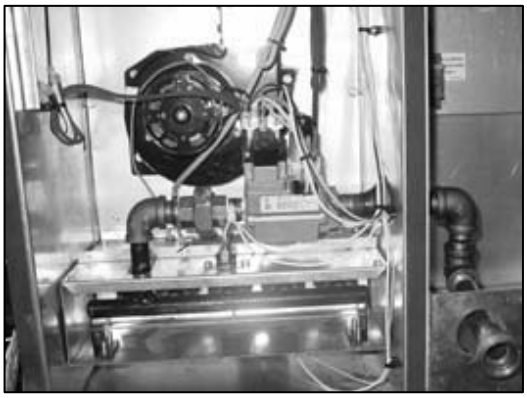


Piping to gas valve inlet must be completed in field.



Run piping through utility entry in front of unit, or through entry in floor of unit located next to the compressor. Then run piping through sidewall into heating cabinet.

Remember to seal around all exterior cabinet penetrations at utility entries.



Piping assembly ready to connect to field supplied gas line.

Condensate Piping

HB package units are equipped with a condensate drain connection, and 'P' traps are furnished with the equipment. The drain connection must be used and individually trapped to ensure a minimum amount of condensate accumulation in the drain pans.

Although drainage of condensate directly onto the roof may be acceptable in certain areas, is not recommended as it can damage some types of roofing, and roofing materials. Refer to local codes for legalities concerning condensate drainage.

Condensate can be piped to a gutter system, or away from the building into other drainage. Ideally, condensate will be piped into the building drainage system, in which case the drainpipe may need to penetrate the roof external to the unit itself.

The drain line should be pitched away from the unit with at least 1/8" of slope per foot. On longer runs, an air break should be used to ensure proper drainage.

Drain pans in air conditioning equipment have moisture present and require periodic cleaning to remove build up of algae, and/or bacteria. Cleaning the drain pans reduces the probability of plugged drain lines and overflow of the pan itself. All cleaning of the drain pans and inside of the equipment should be done by qualified personnel.

6. Start-Up

General

ONLY QUALIFIED, AUTHORIZED PERSONNEL SHOULD POWER ON, OR START-UP THIS EQUIPMENT.

The use of common sense, and good practice in the installation, and start-up of equipment will prevent many potential problems with the system in the future.

Before starting up the equipment, building construction should be complete, and start-up personnel should:

- Have a working knowledge of general HVAC and mechanical commissioning procedures and practices;
- Be familiar with unit functions, features, optional unit accessories, and all control sequences;
- Have appropriate literature on hand for consultation.

Procedures

⚠ CAUTION

Equipment operation during construction is not recommended. Construction site pollution can affect unit operation, and seriously degrade performance. Operation during construction will void all manufacturer's warranties.

Before the structure is occupied, the installation, and/or start-up personnel must take three essential steps:

1. Pre-Startup Check Out
2. Start-Up
3. Commissioning

<u>Pre-Startup Check Out</u>

All equipment should be thoroughly checked for loose wiring, free spinning condenser fan and blower wheel, and well fitting access panels. Unit should not be operated without proper ductwork, and access panels installed, except as required during start-up and air balancing.

Install gauges, voltmeter, and ammeter before start-up. Observe refrigerant pressures during initial operation. Note, and determine the cause of any

excessive sound, or vibration. Follow procedures outlined below to start each piece of equipment.
Before powering on, or starting the unit:

1. Check the unit for external damage.
2. Note all accessories installed.
3. Ensure all field and factory high and low voltage electrical connections are correct, and tight.
4. Check all terminal blocks, fuses, fuse blocks, and contactors for correctness
5. Open all access panels, and remove all shipping screws, or restraints.
6. Remove any debris that may have been left.
7. Ensure electrical supply matches the unit nameplate.
8. Ensure condensate lines are connected and glued.
9. Install air filters of the proper size and type.
10. Check local codes for any special provisions.
11. Replace, and/or close all access panels.
12. Ensure that return, and/or supply dampers in ductwork are open.
13. Check all equipment, ductwork, and piping to verify that all work is complete, and equipment is properly installed and mounted.

Start-Up

⚠ NOTE

Failure to adhere to the following start-up procedures will void all manufacturer's warranties.

⚠ NOTE

Completed factory test sheets are in the equipment literature packet shipped inside the unit. Factory run-test readings recorded on the test sheets may be helpful to reference during start-up.

⚠ CAUTION

IMPORTANT FOR 3 PHASE UNITS ONLY!

CHECK COMPRESSOR FOR PROPER ROTATION BY STARTING UNIT ONLY AFTER CONNECTING PRESSURE GAUGES TO SUCTION AND DISCHARGE LINES. SCROLL COMPRESSORS WILL BE DESTROYED IF OPERATED IN THE WRONG DIRECTION.

DX Cooling:

1. Ensure that drain P-trap is installed.
2. Turn the unit power on.
3. Turn the unit blower on, and check for correct rotation.
4. If correct, take blower amp readings, and compare to see if the amp draw is within the safety factor area of the motor.
5. Check and record ambient temperature.
6. Start the first stage cooling circuit, and blower circuit.
7. After all stages of cooling have been on for at least five minutes, record the return air temperature, and supply air temperature.
8. Check the temperature difference across the evaporator coil.
9. If equipped with an economizer, after testing of cooling circuits is complete, turn cooling circuits off, and leave blower running.
10. Call for the economizer circuit to operate.
11. Check for economizer blades to open fully with no binding.

Gas Heating:

1. Ensure that gas lines have been purged of air – wait 5 minutes after purging to allow gas to clear before continuing with startup.
2. Turn the unit power on.
3. Turn the unit blower on, and check for correct rotation.
4. If correct, take blower amp readings, and compare to see if the amp draw is within the safety factor area of the motor. Once correct, turn blower off.
5. Check gas input and manifold pressure, and adjust if necessary.
6. Turn on the first stage of heating.
7. Check to see that induced draft motor starts.
8. Check to see that main burner lights within 5 seconds of the heating call.
9. Ensure blower started after burner ignition.
10. Observe burner flames for light blue color, and even flames across burner (propane flames will have yellow tips).
11. Check temperature rise across heating section while all stages are on.
12. If temperature rise is within range, turn all heating calls off.
13. Check that blower stops after heat turns off

Electric Heating:

1. Turn the unit power on.
2. Turn the unit blower on, and check for correct rotation.
3. If correct, take blower amp readings, and compare to see if the amp draw is within the safety factor area of the motor. Once correct, turn blower off.
4. Turn on the first stage of heating.
5. Check amp draw of each element of each stage.
6. Ensure blower started with heat.
7. Check temperature rise across heating section while all stages are on.
8. If temperature rise is within range, turn all heating calls off.
9. Check to see that blower stops.

Optional Equipment

Operation of each of the following, if equipped in the unit, must be checked according to that item's manufacturer's specifications:

- Clogged filter switch
- Supply air smoke detector
- Return air smoke detector
- Modulating Hot gas reheat
- Hot gas bypass

Commissioning

The commissioning of an HVAC system is the process of achieving, verifying, and **documenting** the performance of that system to meet the operational needs of the building. This may not be a formal process in smaller structures, such as a normal residence, but some form of owner acceptance will occur. Adjustments made during the commissioning phase may include air balancing, or configuration of controls, and operational sequences.

Air Balancing

High performance systems commonly have complex air distribution and fan systems. Unqualified personnel should not attempt to adjust fan operation, or air circulation, as all systems have unique operating characteristics. Professional air balance specialists should be employed to establish actual operating conditions, and to configure the air delivery system for optimal performance.

Water Balancing

A hydronic specialist with a complete working knowledge of water systems, controls, and operation must be employed to properly balance the entire system. Unqualified personnel should not attempt to manipulate temperatures, pressures, or flow rates, as all systems have unique operating characteristics, and improper balancing can result in undesirable noises and operation.

Controls

A variety of controls and electrical accessories may be provided with the equipment. Identify the controls on each unit by consulting appropriate submittal, or order documents, and operate according to the control manufacturer's instructions. If you cannot locate installation, operation, or maintenance information for the specific controls, then contact your sales representative, or the control manufacturer for assistance.

⚠ WARNING

Do not alter factory wiring. Deviation from the supplied wiring diagram will void all warranties, and may result in equipment damage or personal injury. Contact the factory with wiring discrepancies.

7. Operation & Maintenance

General

Immediately following building occupancy, the air conditioning system requires a maintenance schedule to assure continued successful operation. A maintenance program similar to the example given below should be scheduled for routine maintenance of this equipment in order to provide continued efficient and reliable operation for the owner.

Maintenance Schedule

One week after start-up:

- Check heating and cooling functions.
- Check cycling of compressor and fan. Correct unusual cycling.

Monthly:

- Inspect evaporator, and condenser coils. Clean if dirty, or obstructed in any way.
- Inspect air filters. Replace if required.

Annually:

- Clean the condenser, and evaporator coils with steam, or a non-corrosive coil cleaner.
- Check refrigerant pressures and temperatures every spring, and correct unusual operation.

Cooling

Coils should be inspected and cleaned at least once per year to ensure there is no obstruction to airflow.

Evaporator Coil

Dirty evaporator coils will eventually freeze up, and often result in a time consuming, and expensive service call. Clean filters will help to prevent dirt from accumulating on the evaporator; however the evaporator should be cleaned annually with a soft bristled brush, and/or a non-corrosive coil cleaning solution.

Condenser Coil

One of the most overlooked maintenance requirements is the need to keep air moving freely across air-cooled condensing coils. Dirty condensers, like evaporators, can significantly increase cooling costs during the year. As a minimum, clean the condenser coil at the beginning of each cooling season. It is preferable to use a medium pressure water spray from the inside of the condenser cabinet with a non-corrosive coil cleaning solution. TURN OFF all power to the unit before cleaning.

Comb out any visible exterior fin damage to help maintain unit efficiency.

Condenser Fan

Always check condenser fan blades to ensure unobstructed, free rotation after manipulating the unit cabinet in any way, and before turning power back on to the condenser. Clean the fan blades if they are dirty.

Blower Assembly

HB package units use direct drive, backward inclined airfoil blower wheels that are non-overloading, very efficient, and very easy to clean. There are no fan belts or fan bearings to maintain.

Clean blower wheels are necessary to reduce electrical use, maintain capacity and reduce stress on the unit. The blower wheel and blower section need to be inspected periodically, and cleaned of dust, or debris.

To inspect and clean the blower; set thermostat to the “OFF” position; turn the electrical power to the unit to the “OFF” position at the disconnect switch.

Figure 26a, Blower Section

Heating Sequence

On a call for heating, the supply fan will go to high speed, and the first stage of heating will be energized. The unit will go through a 5 second pre-purge of air in the heat exchanger, then it will come on, or ignite if gas heat. If the unit has a second heating stage, then stage two will come on with a call for W2 after the stage up delay. If W2 is called for before W1, then heat stage one will come on first, then heat stage two will follow after the stage up delay.

High Temperature Cut-off

If the supply air temperature (SAT) rises above the 150°F limit, then the heating will stage off, but the supply fan will continue to operate on low speed until the SAT falls below 80°F, at which point the heat will come back on. If the SAT rises above the limit a second time (consecutively) during a heating call, then the heat will lock out. To restore normal operation, remove the call for heating, or cycle the power.

Low Temperature Cut-off

If the supply air temperature (SAT) falls below the 40°F limit, then the outside air damper will close. If the SAT remains below the low limit for 15 minutes, then the heating, and supply fan will be locked out. To restore normal operation, remove the call for heating, or cycle the power.

Safety Lock Out

The standard heating safety devices used as part of the Heat Safety Monitor are MLS, ALS, ROS, and DPS. If any of these devices trip 3 times during a heating call, then the heating will be locked out. To restore normal operation, remove the call for heating, or cycle the power.

Chilled Water

Check remote chiller operations as per the manufacturer's instructions. Check coolant flow valves for correct operation and settings.

Filters

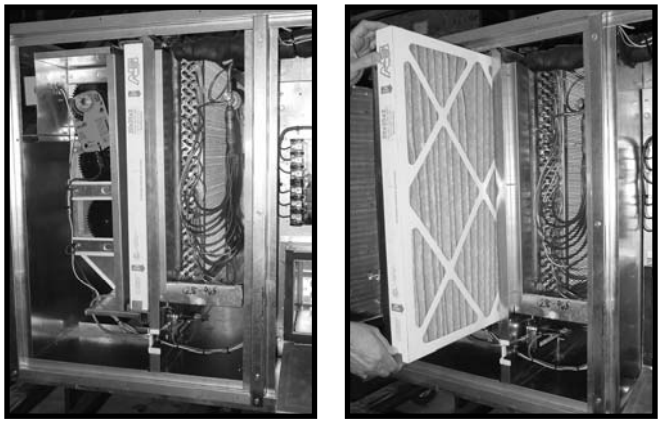
Open the filter access door. Slide filters towards you to inspect. Replace old filters with the size indicated on each filter. Be sure arrow points toward the blower. Filters should be checked every 30 days and replaced or cleaned as necessary.

IT IS IMPORTANT TO KEEP FILTERS, COILS, AND BLOWERS CLEAN!

Table 27.1, Filter Sizes

Unit Size (Tons)	Size	Depth
2 – 5	20" x 25"	2"

Figure 27a, Filter Section



Cleaning

Inspect and clean unit interior at the beginning of each heating and cooling season and as operating conditions require.

Service

In the event the unit is not functioning correctly and a service company is required, only a company with service technicians qualified and experienced in both heating and air conditioning should be permitted to service the systems in order to keep warranties in effect. The service tech may call the factory if assistance is required.

BEFORE CALLING, THE MODEL AND SERIAL NUMBER OF THE UNIT WILL BE NEEDED FOR THE WARRANTY SERVICE DEPARTMENT TO HELP ANSWER QUESTIONS REGARDING THE UNIT.

AAON Warranty Department: 918-583-2266

8. Hot Gas Bypass

The purpose of external hot gas bypass (HGBP) is to prevent coil freeze-up and compressor damage from liquid slugging during periods of low airflow operation, or with low entering air temperatures.

HGBP is useful when the air conditioning system is subject to variations in load caused by varying air volume or large proportions of outside air. The HGBP valve meters discharge refrigerant gas to the distributor downstream of the expansion valve, and at the entrance to the evaporator distributor tubes. The quantity of gas varies to control a constant suction pressure, allowing more gas to flow as suction pressure decreases.

HGBP is available as a factory installed option on HB package units, in order to meet various design conditions.

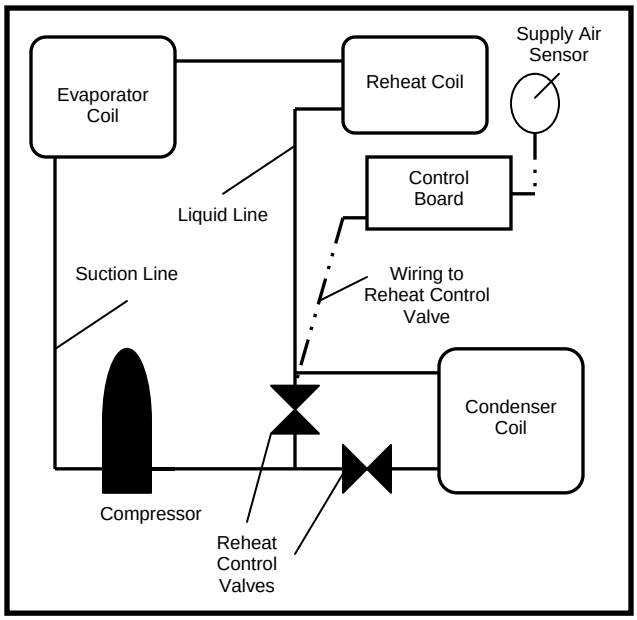
9. Hot Gas Reheat (Modulating)

Although the evaporator reduces moisture content from warm, moist air being conditioned, the space thermostat is a dry bulb device and will not call for refrigeration if outdoor and space temperatures are mild but very humid and the space temperature is satisfied. However, the humidity level may cause the space to be uncomfortable. A reheat system is used to correct this condition. To prompt operation of the air conditioning system, a humidistat is required and to avoid cooling the space excessively while removing moisture, a coil which accepts discharge gas from the compressor is located downstream of the evaporator. The function of this coil is to heat the air that has been cooled by the evaporator to approximate room temperature. A reheat valve is installed in the compressor discharge line to divert discharge gas to the reheat coil when the humidistat calls for dehumidification but returns all discharge gas to the condenser when cooling is required.

After the room temperature thermostat is satisfied and the humidistat continues to call for moisture removal, the modulating valve will allow a controlled amount of hot gas to enter the reheat coil. A discharge air temperature sensor mounted within the unit provides input to an electronic control board. The valve position is controlled to provide a specific supply air temperature set point that is set on the control board, or sent to the control board by a remote 0 to 10 VDC signal.

The modulating hot gas valve is factory mounted and wired. The control board is shipped with a default setting for a neutral discharge air temperature of 75°F. The factory setting can be overridden by connection to a 0 to 10 VDC signal from another control system.

Figure 28a, AAON's Modulating Reheat System



Pressure – Temperature Chart
R-410A

(°F)	PSIG	(°F)	PSIG	(°F)	PSIG	(°F)	PSIG	(°F)	PSIG
20	78.3	**50**	142.2	**80**	234.9	**110**	364.1	**140**	540.1
21	80.0	**51**	144.8	**81**	238.6	**111**	369.1	**141**	547.0
22	81.8	**52**	147.4	**82**	242.3	**112**	374.2	**142**	553.9
23	83.6	**53**	150.1	**83**	246.0	**113**	379.4	**143**	560.9
24	85.4	**54**	152.8	**84**	249.8	**114**	384.6	**144**	567.9
25	87.2	**55**	155.5	**85**	253.7	**115**	389.9	**145**	575.1
26	89.1	**56**	158.2	**86**	257.5	**116**	395.2	**146**	582.3
27	91.0	**57**	161.0	**87**	261.4	**117**	400.5	**147**	589.6
28	92.9	**58**	163.8	**88**	265.4	**118**	405.9	**148**	596.9
29	94.9	**59**	166.7	**89**	269.4	**119**	411.4	**149**	604.4
30	96.8	**60**	169.6	**90**	273.5	**120**	416.9	**150**	611.9
31	98.8	**61**	172.5	**91**	277.6	**121**	422.5		
32	100.9	**62**	175.4	**92**	281.7	**122**	428.2		
33	102.9	**63**	178.4	**93**	285.9	**123**	433.9		
34	105.0	**64**	181.5	**94**	290.1	**124**	439.6		
35	107.1	**65**	184.5	**95**	294.4	**125**	445.4		
36	109.2	**66**	187.6	**96**	298.7	**126**	451.3		
37	111.4	**67**	190.7	**97**	303.0	**127**	457.3		
38	113.6	**68**	193.9	**98**	307.5	**128**	463.2		
39	115.8	**69**	197.1	**99**	311.9	**129**	469.3		
40	118.1	**70**	200.4	**100**	316.4	**130**	475.4		
41	120.3	**71**	203.6	**101**	321.0	**131**	481.6		
42	122.7	**72**	207.0	**102**	325.6	**132**	487.8		
43	125.0	**73**	210.3	**103**	330.2	**133**	494.1		
44	127.4	**74**	213.7	**104**	334.9	**134**	500.5		
45	129.8	**75**	217.1	**105**	339.6	**135**	506.9		
46	132.2	**76**	220.6	**106**	344.4	**136**	513.4		
47	134.7	**77**	224.1	**107**	349.3	**137**	520.0		
48	137.2	**78**	227.7	**108**	354.2	**138**	526.6		
49	139.7	**79**	231.3	**109**	359.1	**139**	533.3		

AAON, Inc.
2425 S. Yukon
Tulsa, Oklahoma 74107

Tel 918-583-2266
Fax 918-583-6094

Download this manual,
and others from:
www.aaon.com

Effective June 2006
Supercedes December 2005

R33010 (06-06)