omega
HEAT PUMPS

HRP SERIES
WATER SOURCE HI-RISE
VERTICAL STACKED HEAT PUMPS

TECHNICAL CATALOGUE

DEVELOPMENT “D”

AHRI CERTIFIED®
www.ahridirectory.org
Water Source HP
ANSI/AHRI/ASHRAE/ISO 13256

C ETL LISTED US

Conforms to UL STD 1995
Certified to CSA C22.2 NO. 236

ENERGUIDE

Conforms to
CAN/CSA-C13256-1

TABLE OF CONTENTS

SECTION 1

PRODUCT OVERVIEW

1. PRODUCT OVERVIEW

The entire Omega high rise heat pump (HRP) product line is engineered to provide the quietest vertical stacking water-source heat pump in the industry, and thousands of installed units have proven this in the field. Properly applied and installed, all of Omega units easily meet NC-36-37 within the suite.

Dependable

Our water-source heat pump systems provide user friendly and reliable year round heating and cooling to the occupants. Simply set the desired temperature and the heat pump will maintain it.

Serviceability

Each HRP unit has its own compressor and fan which are easily accessible through the return air panel. If repairs are required, a spare chassis can be inserted into the unit, allowing it to continuously operate while the damaged chassis is repaired offsite.

Energy Efficient

Unlike fan coil systems, the HRP system can transfer energy from one zone to another. During moderate weather, the sunny side of a building may require cooling while the shady side requires heating. When approximately one third of the units operate in cooling mode, external heat is not required.

Customizable

Our units can be customized to meet the specific requirements of any project. Some options include: variable height dimensions, choice of supply air discharge locations and sizes, ultra quiet return air panel and remote thermostat control.

Elegant Phased Installation

The equipment is shipped to the site in two stages to integrate seamlessly with the phases of construction, reduce on-site damage and to allows mechanical units to be installed indoors.

During the initial stages of construction, the outer casing and plenum are installed. As construction progresses, they become part of the interior wall structure. The final chassis is delivered for installation after the majority of construction is complete, and becomes fully integrated into the interior of the unit.

Testing & Quality

To maintain the highest level of quality control, each unit is checked in our state-of-the-art test facility before being shipped to the job site. Large scale production accommodates short lead-times, and economies of scale enable low costs without sacrificing quality.

State-of-the-art manufacturing and rigorous quality control systems guarantees every HRP is manufactured with the highest degree of reliability and consistency. In the chassis production line, a 6-station quality control (QC) system ensures that every stage of chassis production is tested and re-tested, and that each unit is certified by AHRI (Air-Conditioning, Heating, & Refrigeration Institute). Lean Six Sigma procedures result in efficient and cost effective manufacturing that drives a high quality—and highly competitive—product.

1.1 Key Features

Energy Efficient Design

- High efficiency compressors and blower motors
- Optimum circuited air to refrigerant coils
- Custom-sized thermal expansion systems
- Low pressure drop water coaxial coils
- Coefficient of Performance (COP)/Energy Efficiency Ratio (EER) meets or exceeds ASHRAE 90.1

Space Considerations

- Quiet operation
- Mould resistant insulation
- Heavy duty cabinet for vibrant-free operation
- Aesthetically pleasing covers and grilles
- Elastomer vibration isolators on compressors
- High quality gasket on chassis
- Easily accessible air filter
- Choice of air openings
- Riser flexibility

Acoustics

- Silver design for standard applications
- Gold series for acoustically sensitive applications, with three levels of acoustic isolation:
    - Compressor
    - Vibration rails
    - Unit base

Service

- Slide-out chassis removal and replacement
- Allows spare chassis to be kept in stock for instant replacement
- Controls components in one location
- Plug-in controls
- Capacitor in front of unit
- Service handles on chassis
- Low clog coaxial coil design
- Quick disconnecting water connections
- Schrader connections for refrigerant monitoring and servicing
- Simple LED diagnostics on control board

Reliability

- Spot welded centrifugal blower
- Rotary or scroll compressors by major manufacturers
- Cased air to refrigerant coil

Environment

- Environmentally friendly refrigerants
- All materials used in the unit are recyclable

Omega Series Heat Pumps are listed by ETL as complying with nationally recognized safety standards for heat pump units.

1.2 Engineering Design

The water loop provides both a source and a sink of energy. You can conserve energy by effectively pumping heat from the warmer areas of the building to the colder area.

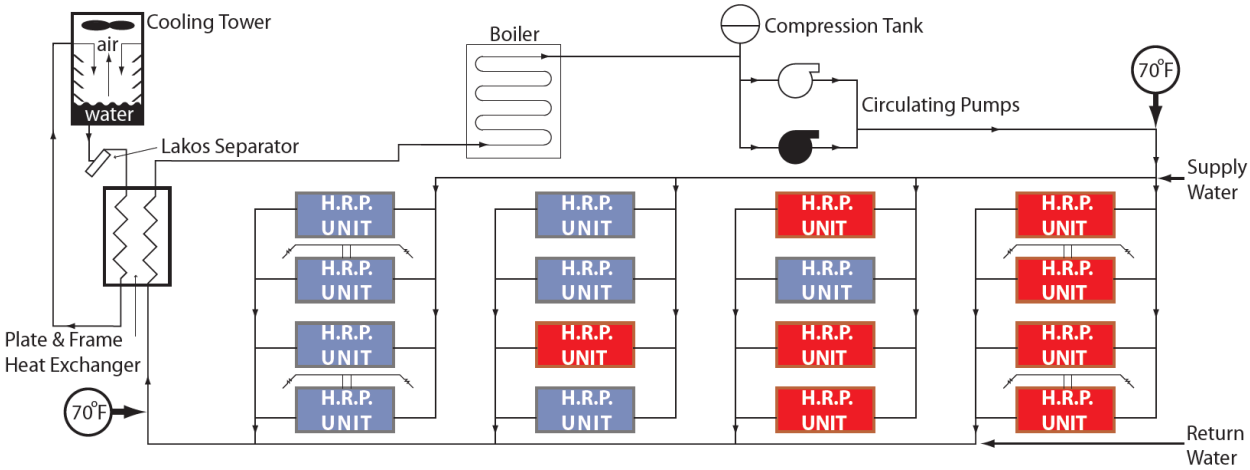


Figure 1.2.1. Consider a two-pipe closed loop water circuit, through which non-refrigerated water is circulated continuously throughout the building. In moderate weather, units serving the shady side of a building are often heating, while those serving during the summer are cooling. When approximately one third of the units in operation are cooling, they add sufficient heat to the water loop so that it is not required to add or remove heat from the water loop.

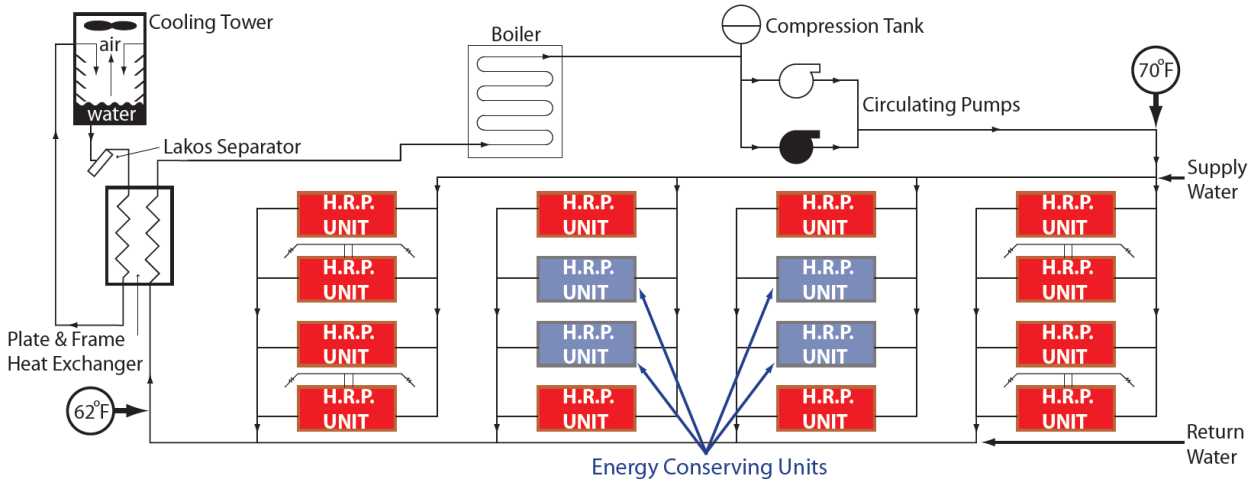


Figure 1.2.2. When heating is required, the heat pumps absorb heat from the loop circuit, whereas when cooling is required, the heat pump will reject heat to the loop circuit. It is only necessary in very cold weather —with most or all units heating— to add heat to the water with a water heater (when the temperature of the water loop falls to 65° F/18°C). Heat is reduced any time one or more units are operating on cooling. The central water heater is never larger than two thirds the size required in other systems, but is usually less due to diversity.

1.2 Engineering Design

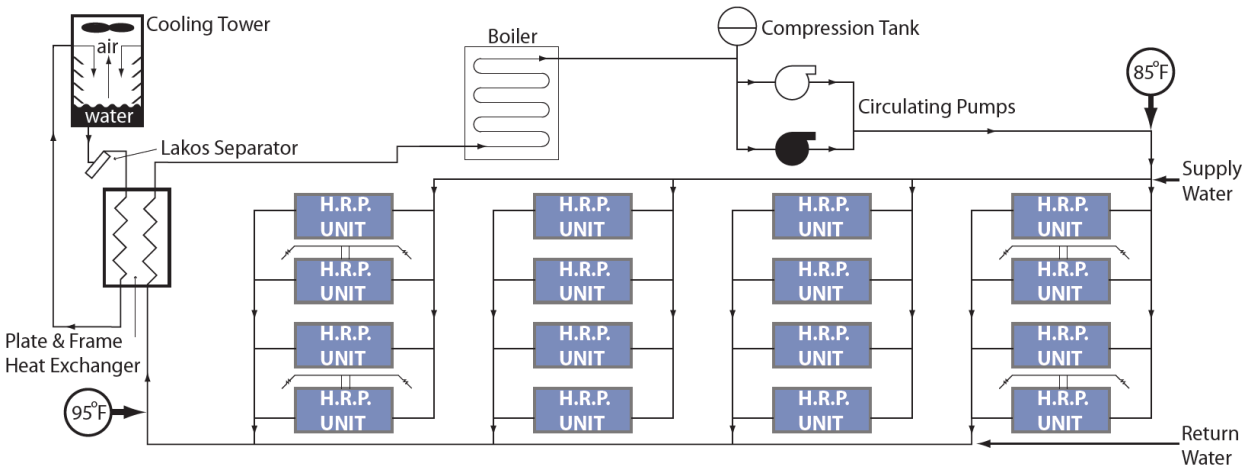


Figure 1.2.3. A vertical stacked heat pump provides the essential benefits of a centralized system, but any unit occupant may select heating, cooling, or shut off the unit without affecting conditions maintained in other spaces. During hot weather with most or all units cooling, heat removed from the air is transferred to the water loop. A water tower rejects the excess heat outdoors to maintain a maximum water temperature of approximately 95°F.

1.3 System Flow Options

Constant Flow

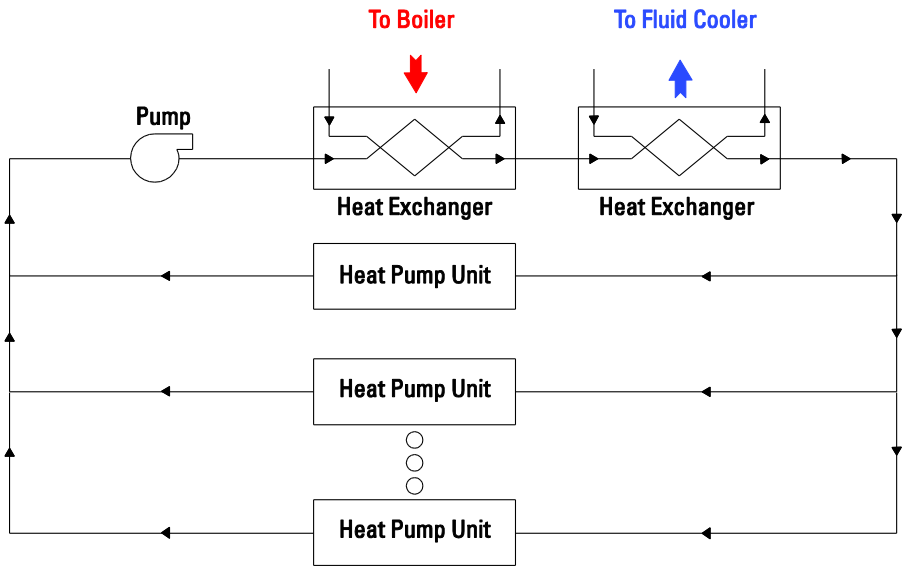


Figure 1.3.1 - Constant Flow HRP System

Variable Flow

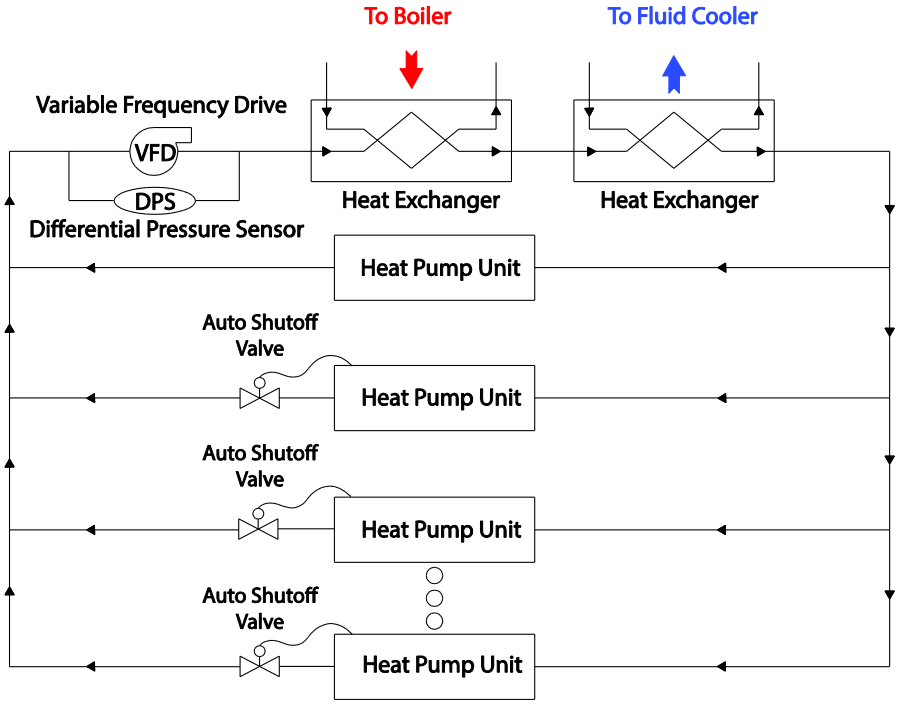
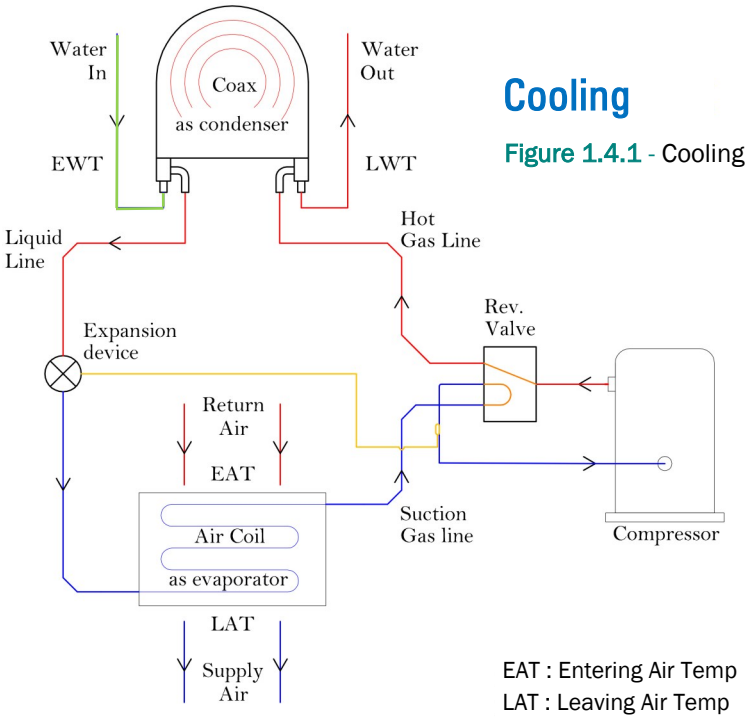


Figure 1.3.2 - Variable Flow HRP System

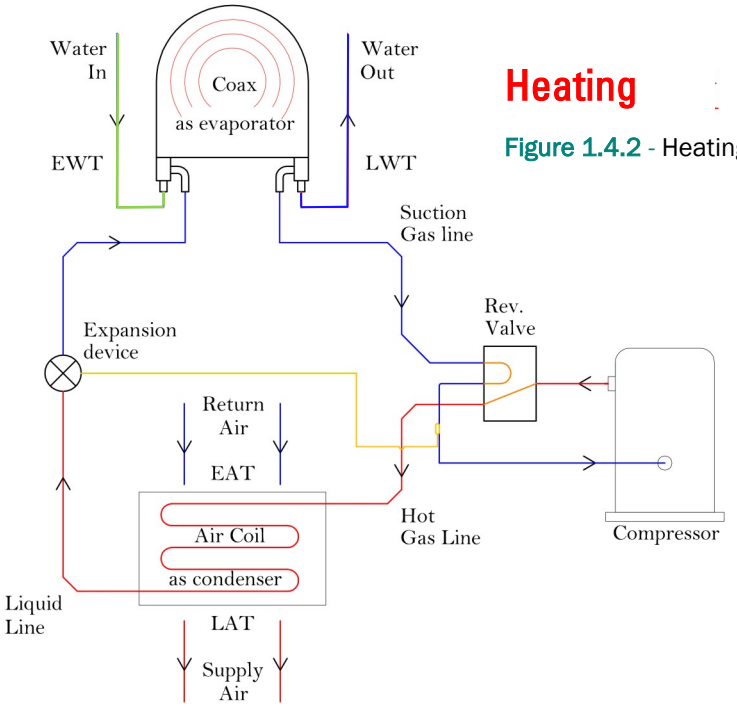
1.4 Flow Direction Details



Cooling

Figure 1.4.1 - Cooling Mode Flow Diagram

EAT : Entering Air Temp
LAT : Leaving Air Temp
EWT : Entering Water Temp
LWT : Leaving Water Temp



Heating

Figure 1.4.2 - Heating Mode Flow Diagram

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SECTION 2

PRODUCT DETAILS

2. PRODUCT DETAILS

2.1 Cabinet Design

Omega offers two distinct cabinet options for high rise heat pumps, the Silver and Gold series (shown below). Each cabinet is designed to meet customized design requirements.

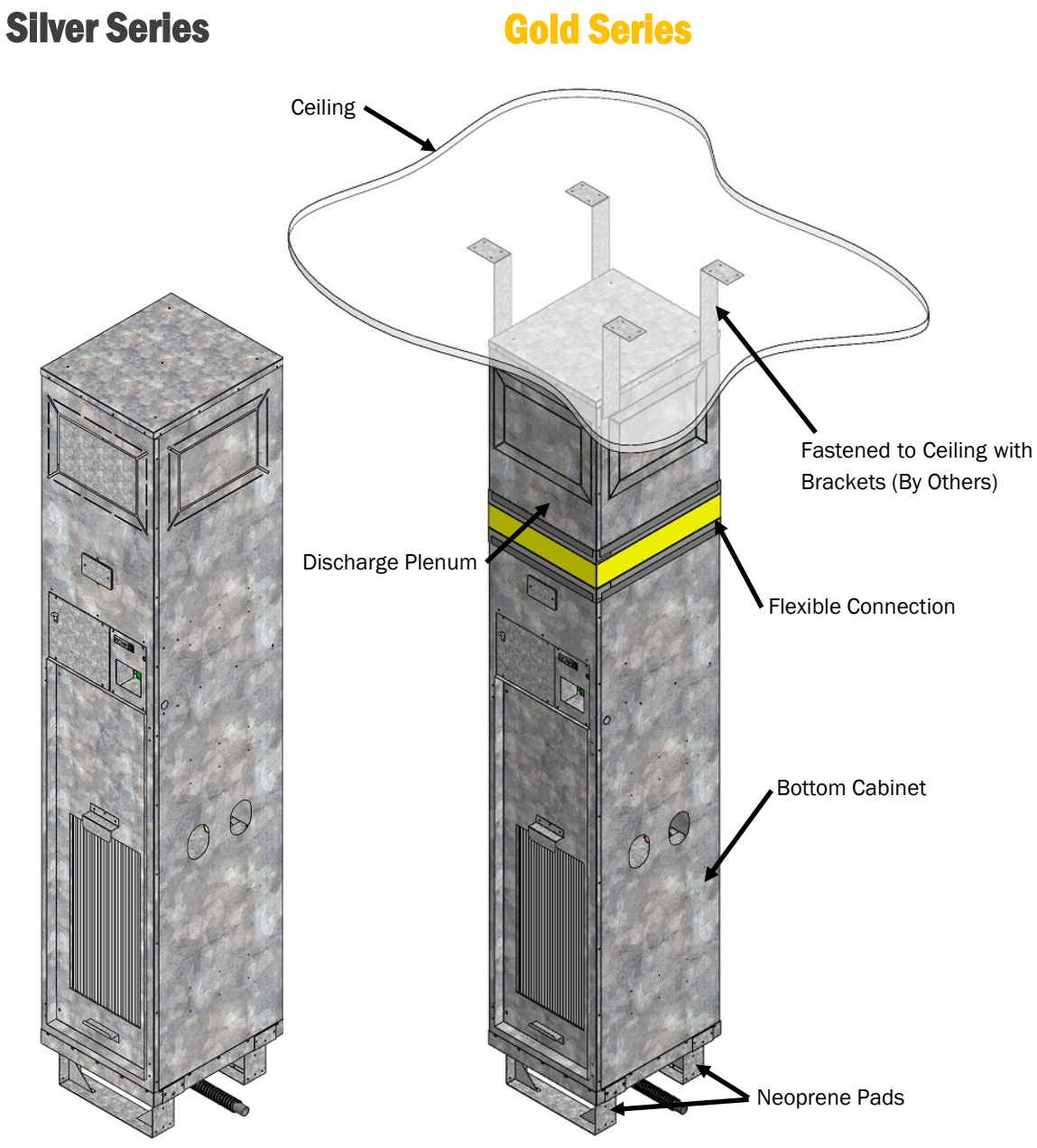


Figure 2.1 - Side-by-Side Comparison of Silver and Gold Series Cabinets

2.2 Unit Details

Air Discharge

Air discharge can be configured as left, right, front, back, and top combinations to meet the desired application. Both “punch-out” and “Knockout” style discharge holes available.

Control Panel

Controls and contactors are mounted on a single control board with factory wiring to connect plugs; this enables the board to be removed in seconds. The board is mounted on the front of the unit for easy diagnostics.

Drain Pan

Drain pans come in two options to choose from. Choose from Stainless steel and painted cold rolled carbon steel. Drain pans are insulated.

Air Filter

Air filters are provided as disposable for standard installation.

Supply /Return /Condensate Riser

Custom lengths can be provided to meet the exact floor to floor dimension of the project. Risers are available in type L, M as standard options, contact factory for K type Copper. Factory installed risers are piped to isolation ball valves within the cabinet.

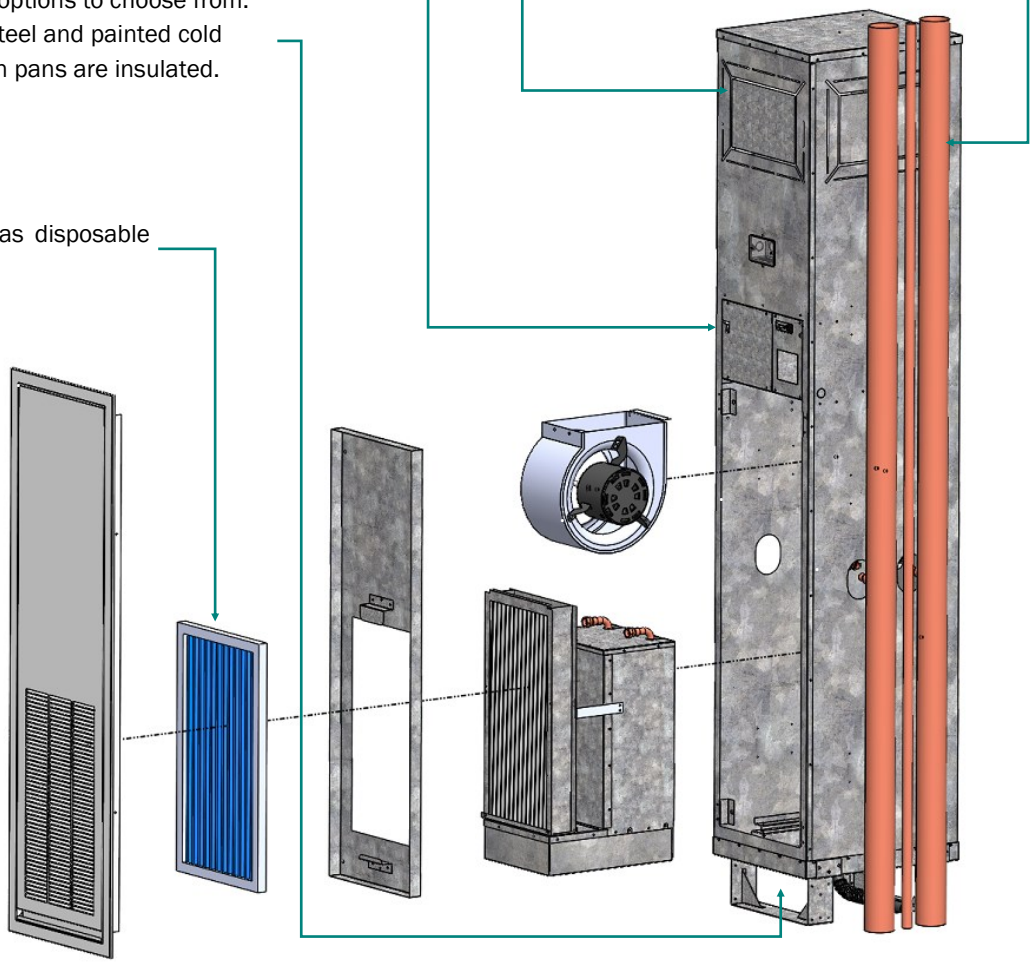


Figure 2.2.1 - Breakdown of Internal Components of an HRP Unit

2.2 Unit Details

Insulated Cabinet

The sheet metal casing is designed for strength, reliability and functionality. The height may be specified to allow vertically stacked installations. Made of galvanized sheet metal with a mould resistant acoustic/thermal insulation, the unit is tightly fabricated to prevent rattling and vibrations.

Blower Fan & Motor

A centrifugal forward curve fan with a duct drive motor is used in the design. The blower fan assembly is designed for east removal and servicing.

High efficiency, three-speed permanent split capacitor (PSC) type motors are standard. The motor is permanently lubricated and factory wired with a terminal plug to allow for easy disconnection. Electronically Commutated Motors (ECM) are also an available option to further increase fan operating efficiency.

Chassis

Omega offers chassis in 1/2 ton to 3 ton sizes.

HRP Insert Cover

This removable cover allows access to control panel, chassis, piping and other internal components.

Return Air Panel

Omega offers 2 standard type of panels, acoustic and perimeter. Both panels can be easily removed to access the air filter behind.

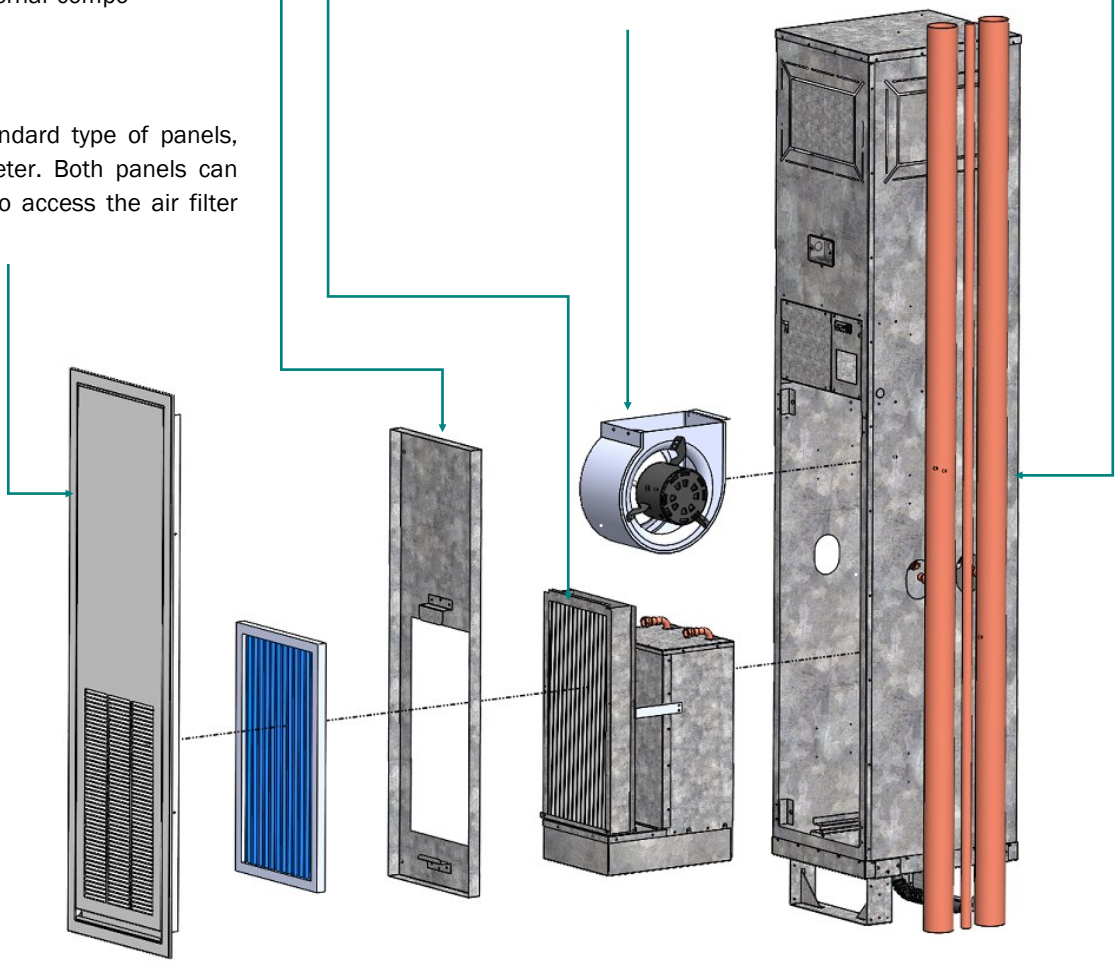
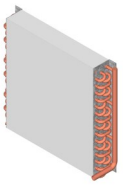


Figure 2.2.2 - Breakdown of Additional Components of HRP Unit

2.3 Chassis Details

DX Coil

The air to refrigerant coil is a multi row coil with copper tubes and aluminum fins. The fin is designed to provide optimum heat transfer. The fins are mechanically bonded to the tubes. The coils are fully cased with a handy grip point for chassis removal.



Compressor

The state-of-the-art R410 rotary (HRP 020-060) and scroll (HRP 080-120) design delivers high energy efficiency ratio (EER) and superior reliability. Compressors are mounted to the chassis frame with an elastomer vibration isolator to minimize vibration transfer to the building floor.

Coax-Coil

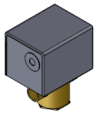
The coaxial fluid to refrigerant coil is a custom made heat transfer device consisting of a copper outer tube, and a patented fluted copper inner tube. The coaxial heat exchanger is a flat design which fits into the base of the chassis. The coils are designed for minimum pressure drop, and are noted for their low fouling characteristics (note that thorough system flushing and condenser water filtering is still required). The coils are selected for optimum sub-cooling in the cooling mode.

Reversing Valve

A high quality four-way reversing valve is installed in the heat pump to change refrigerant flow direction (depending on whether heating or cooling is required). Omega units are designed as “energized to cool” reversing valve.

Water Shutoff Valve

A shutoff valve is an optional item which will cut off water flow to the unit which is not in use. This will reduce the pressure on the water pump, which will result in reduced power consumption and increased cost savings.



Thermal Expansion Valve

Omega heat pumps have a unique assembly of two piston flow-check thermal expansion devices. The piston flow-check devices are precision machined brass assemblies consisting of a high pressure housing and piston metering device. The piston is free to move, and allows free flow of refrigerant when it is moving in the reverse direction.

Water Flow Regulator

The flow regulator is an optional item which will help to balance water flow throughout the system.

2.4 Vibrational Isolation

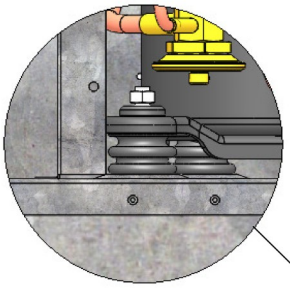
Omega Heat Pump units offer up to 5 separate methods of vibrational isolation (Shown below).

Flex Isolator

In the HRP Gold Series units, a flexible duct connector is installed to isolate the discharge from the rest of the cabinet.

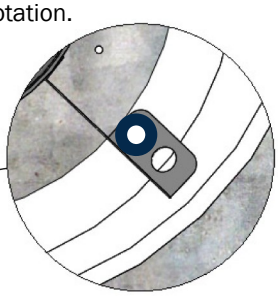
Compressor Mounts

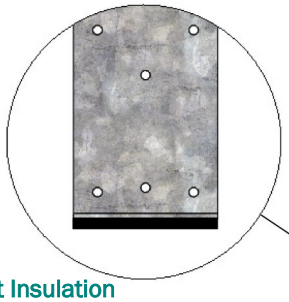
All compressors are mounted to the chassis using vibrational dampening inserts, adding another layer of isolation within the chassis assembly.



Motor Mount Isolators

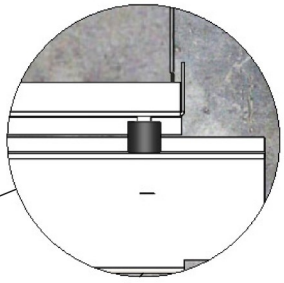
Motors are attached to fan units with rubber isolation mounts, which reduce the vibrations produced by the motor's rotation.





Unit Foot Insulation

Neoprene padding is installed to the bottom of the unit's feet to isolate the unit from the floor.



Vibrational Rail

Chassis are installed on vibrational rails, which utilize rubberized dampeners to isolate the chassis from the cabinet.

Figure 2.4 - Details of Various Vibrational Dampening Systems

SECTION 3

CABINET DIMENSIONAL INFORMATION

3. CABINET DIMENSIONAL INFORMATION

3.1 GOLD SERIES - Fan Cabinet with Acoustic Plenum

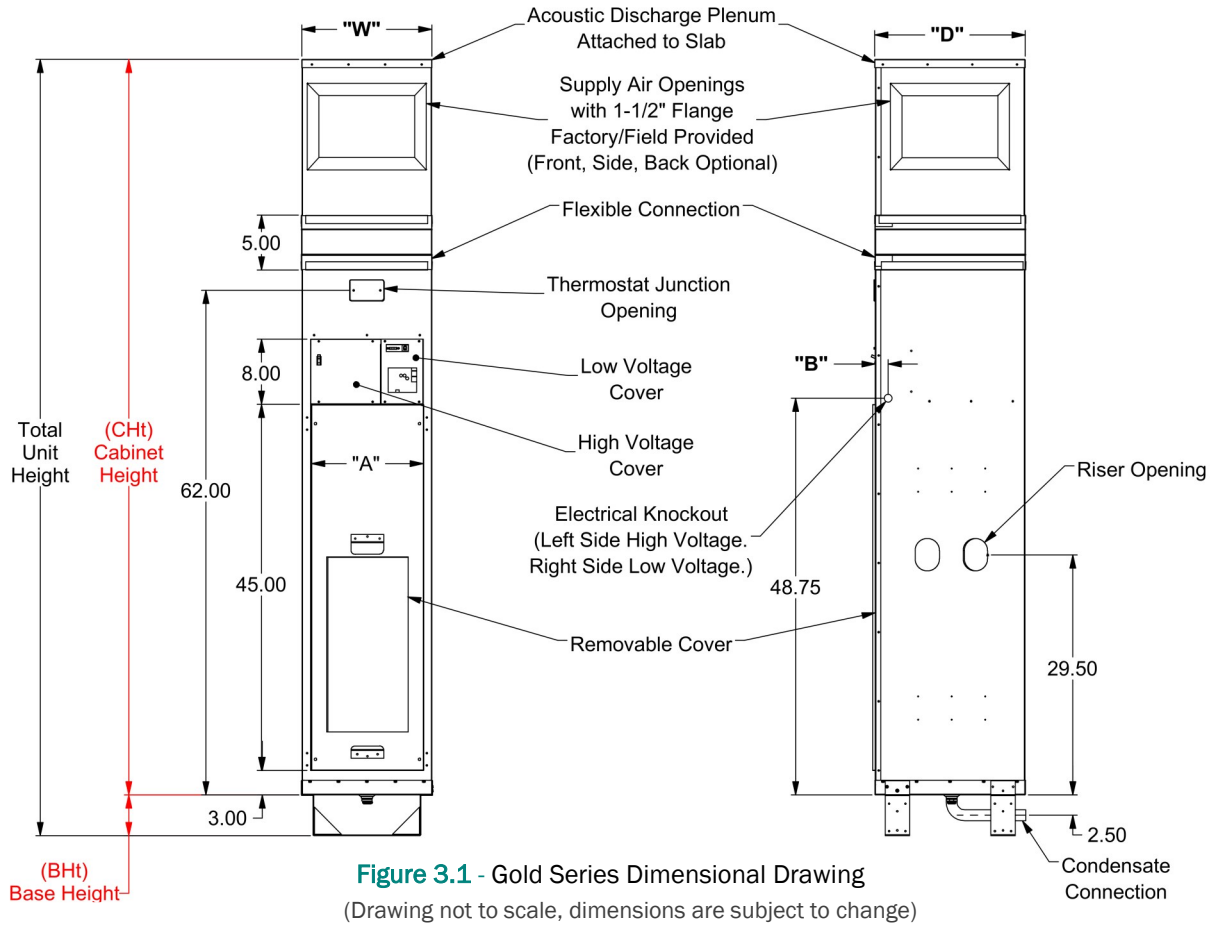


Figure 3.1 - Gold Series Dimensional Drawing

(Drawing not to scale, dimensions are subject to change)

Table 3.1 - Gold Series Dimensional Data

Model	Cabinet Size	A "in"	B "in"	W "in"	D "in"
HRP 020	X	13.80	1.50	16.00	18.50
HRP 030					
HRP 040					
HRP 050	Y	16.00	2.00	18.00	21.50
HRP 060					
HRP 080	Z	20.00	1.75	22.00	25.50
HRP 100					
HRP 120					

Additional Notes:

- Temporary riser supports provided. (Contractor to supply riser clamps to support risers in multi-storey applications)
- Return air opening is on the front of the unit
- Unit includes hose kits and shut off valves
- Optional risers are made with type M or L or K copper, expanded connections are provided
- Contractor to provided couplings where the piping is not swagged.

3.2 SILVER SERIES - Single Unit Fan Cabinet

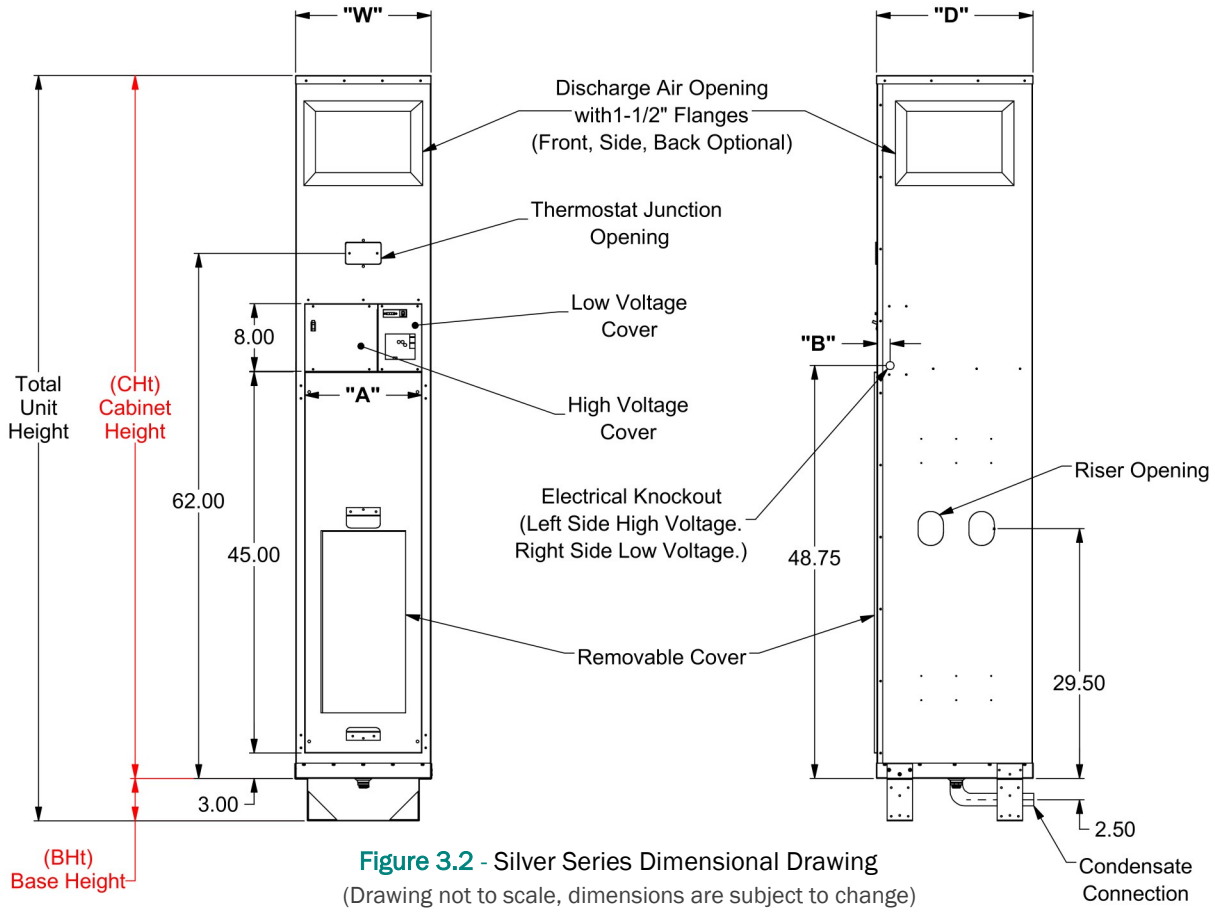


Figure 3.2 - Silver Series Dimensional Drawing
(Drawing not to scale, dimensions are subject to change)

Table 3.2- Silver Series Dimensional Data

Model	Cabinet Size	A "in"	B "in"	W "in"	D "in"
HRP 020	X	13.80	1.50	16.00	18.50
HRP 030					
HRP 040					
HRP 050	Y	16.00	2.00	18.00	21.50
HRP 060					
HRP 080	Z	20.00	1.75	22.00	25.50
HRP 100					
HRP 120					

Additional Notes:

- Temporary riser supports provided. (Contractor to supply riser clamps to support risers in multi-storey applications)
- Return air opening is on the front of the unit
- Unit includes hose kits and shut off valves
- Optional risers are made with type M or L or K copper, expanded connections are provided
- Contractor to provided couplings where the piping is not swagged.

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SECTION 4

RISER DIMENSIONAL INFORMATION

4. RISER DIMENSIONAL INFORMATION

4.1 Riser Handing Conventions

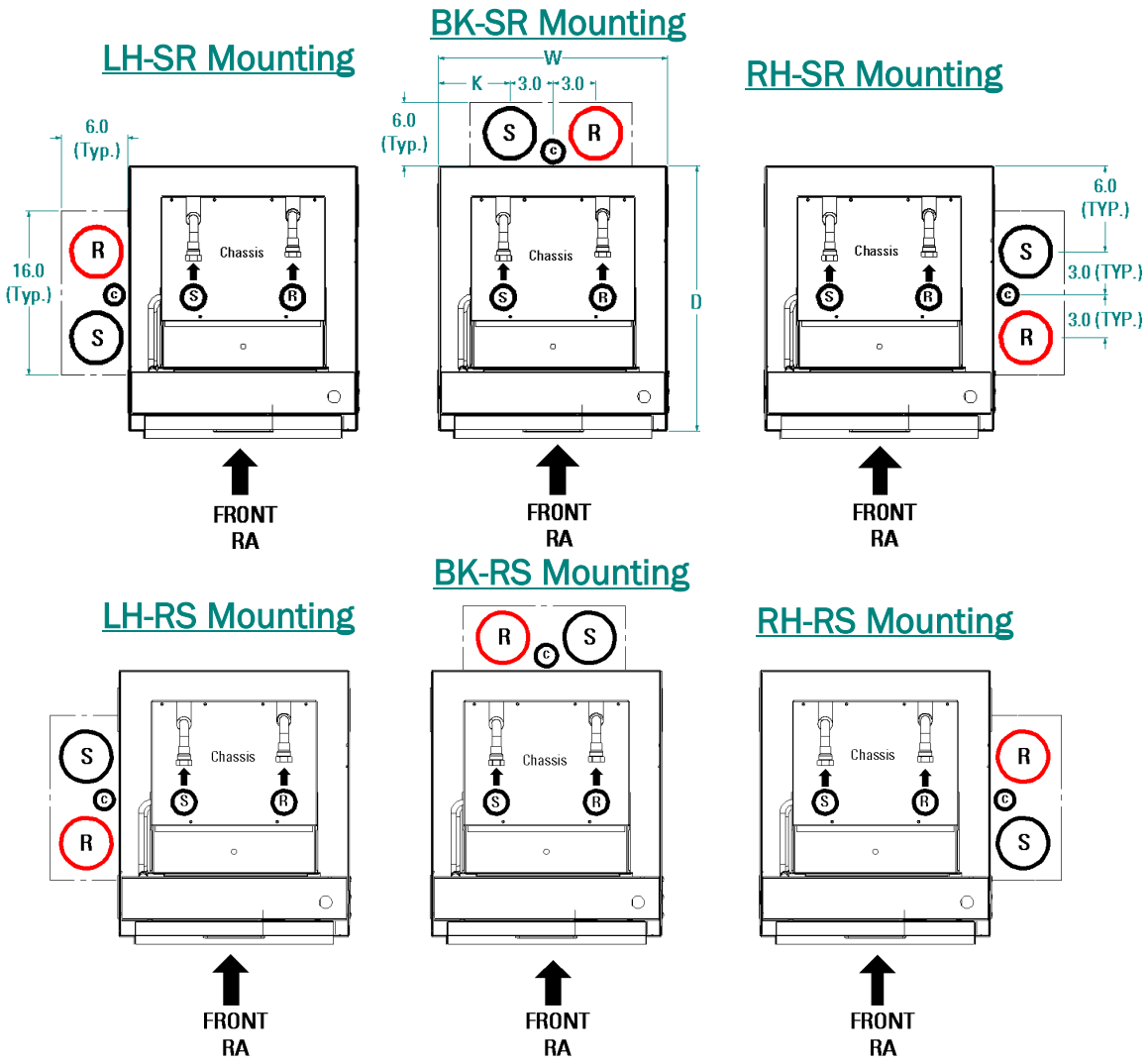


Figure 4.1 - Riser Handing Configurations and Nomenclature.

Legend: S = Supply Riser C = Condensate Riser R = Return Riser

Table 4.1 - Riser Location Dimensional Data

Model	HRP 020	HRP 030	HRP 040	HRP 050	HRP 060	HRP 080	HRP 100	HRP 120
W x D "in"	16.0 x 18.5	16.0 x 18.5	16.0 x 18.5	18.0 x 21.5	18.0 x 21.5	22.0 x 25.5	22.0 x 25.5	22.0 x 25.5
K "in"	5.0	5.0	5.0	6.0	6.0	8.0	8.0	8.0

Additional Notes:

- Temporary riser supports are provided; contractor to supply riser clamps for multistory applications
- Riser couplings are not provided; expanded connections are provided on one end of riser only
- Riser Size, 0.75" to 3.00"
- All handings determined by facing front of the unit.

4.2 Riser Sizing Reference

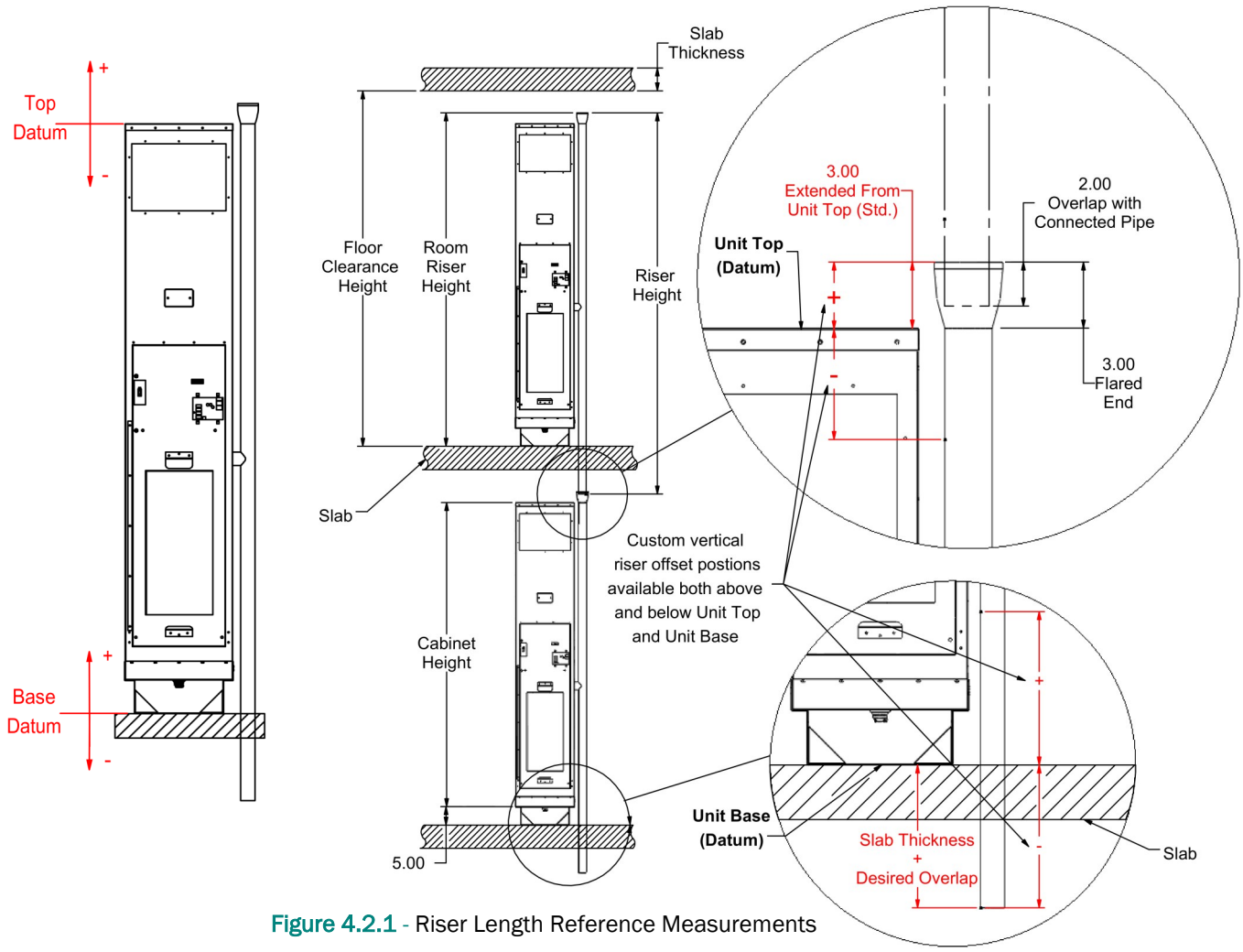


Figure 4.2.1 - Riser Length Reference Measurements

Notes:

- Risers are sized using a “Top” and “Base” Datum reference. A specified Top Datum Offset indicates where top of riser will be located relative to top of cabinet. A Base Datum indicates where bottom of riser will be located relative to floor
- Risers overlap by 2” when connected
- Riser Length = Floor Clearance Height + Slab Thickness + 2”(overlap) (Rounded up to 120” or 144”)
- Omega supplies two standard riser lengths, 120” (10’) and 144” (12’), to be field cut on-site
- Omega does not supply extension tailpieces
- Risers available in Type L and Type M copper (Type K copper available as special order)
- Omega can supply insulation to the supply, return and condensate drain risers

4.2 Riser Sizing Reference

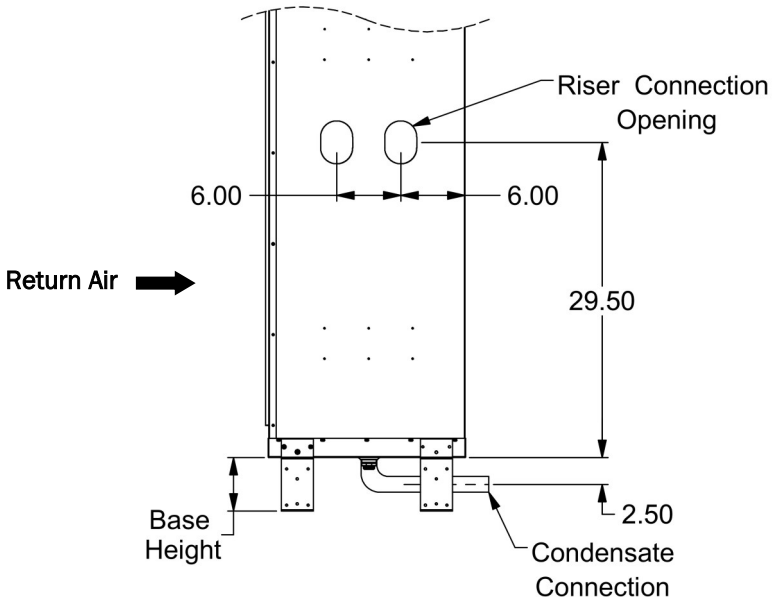


Figure 4.2.2 - Riser Knock Out Opening Detail (Side View)
(Note: Back Risers are centered to the cabinet)

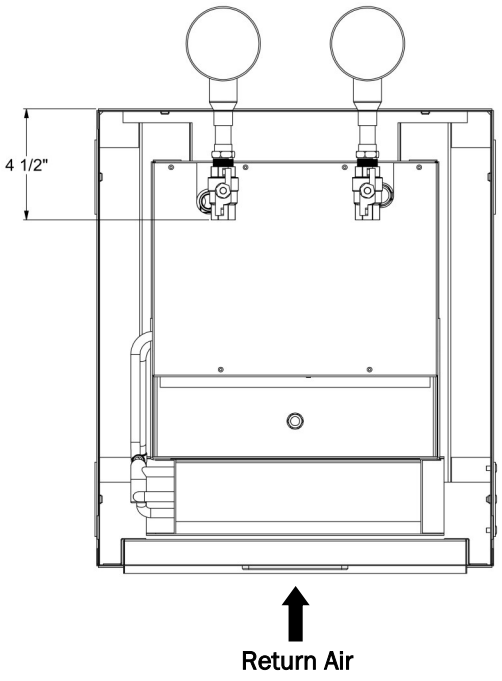
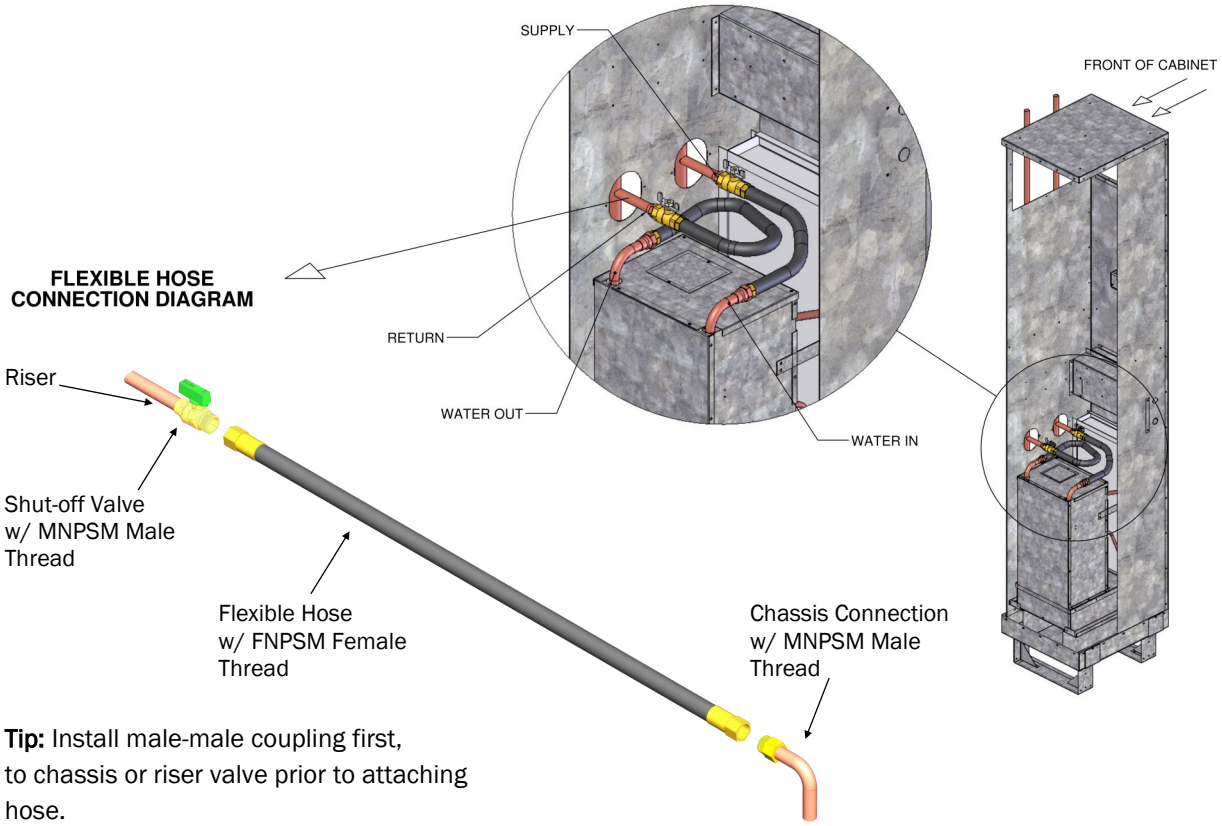


Figure 4.2.3 - Maximum Riser Stub Distance from Unit Wall

4.3 Hose Kit Configurations

Omega can supply various sizes of hose kit. These hose kit configurations vary in length, tube diameter and are applicable to the available unit sizes (Shown in figure 4.3.1 below).



Tip: Install male-male coupling first, to chassis or riser valve prior to attaching hose.

Figure 4.3.1 - Riser Hose Kit Details

Table 4.3 - Standard Hose Kit Configuration	
Model	Hose Kit (Nominal Diameter, Length)
HRP 020	1/2", 24"
HRP 030	1/2", 24"
HRP 040	1/2", 24"
HRP 050	1/2", 24"
HRP 060	1/2", 24"
HRP 080	3/4", 30"
HRP 100	3/4", 30"
HRP 120	3/4", 30"

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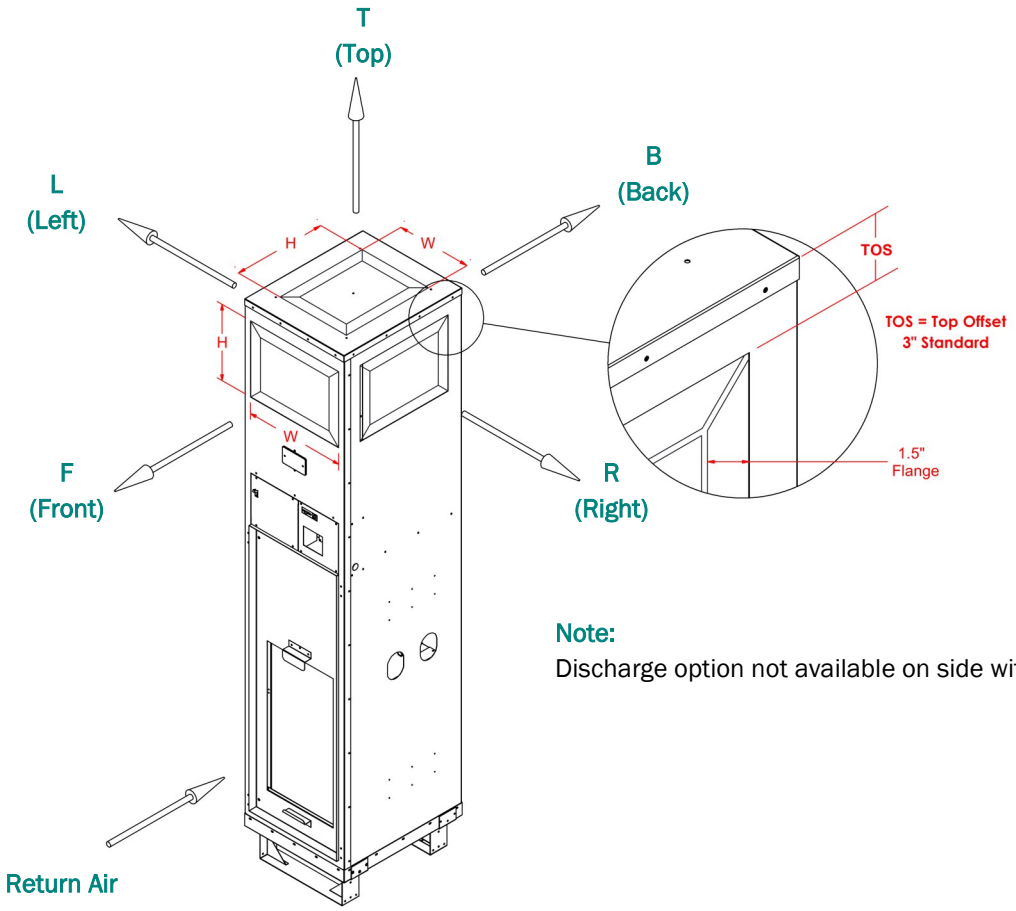
SECTION 5

DISCHARGE & RETURN AIR DETAILS

5. DISCHARGE & RETURN AIR DETAILS

5.1 Discharge Arrangements



Note:
Discharge option not available on side with riser.

Figure 5.1.1 - Unit Discharge Arrangements

Table 5.1 - Recommended Discharge Opening Dimensional Data								
Model	HRP 020	HRP 030	HRP 040	HRP 050	HRP 060	HRP 080	HRP 100	HRP 120
	W x H	W x H	W x H	W x H	W x H	W x H	W x H	W x H
Discharge Opening	14x8	14x8	14x10	16x12	16x12	18x14	18x16	18x16
Top Discharge	12x12	12x12	12x12	14x12	14x12	14x14	16x14	16x16

Additional Notes:

- Any combination of discharge arrangements are available
- Line of Site Baffles (LSB) available when two or more horizontal discharge openings on a unit have a direct line of sight
- Discharge flanges are 1.5“ deep. **Do not attach grill or duct work to the flange on the silver units.**
- All handings determined by facing return air opening
- Discharge option is not available on the side with the riser

5.1 Discharge Arrangements

Omega offers knockout style discharge openings. The knockout style allows for opening to be created on-site to accommodate any required configuration. Figure 5.1.2 shows how the knockout should prepared on site.

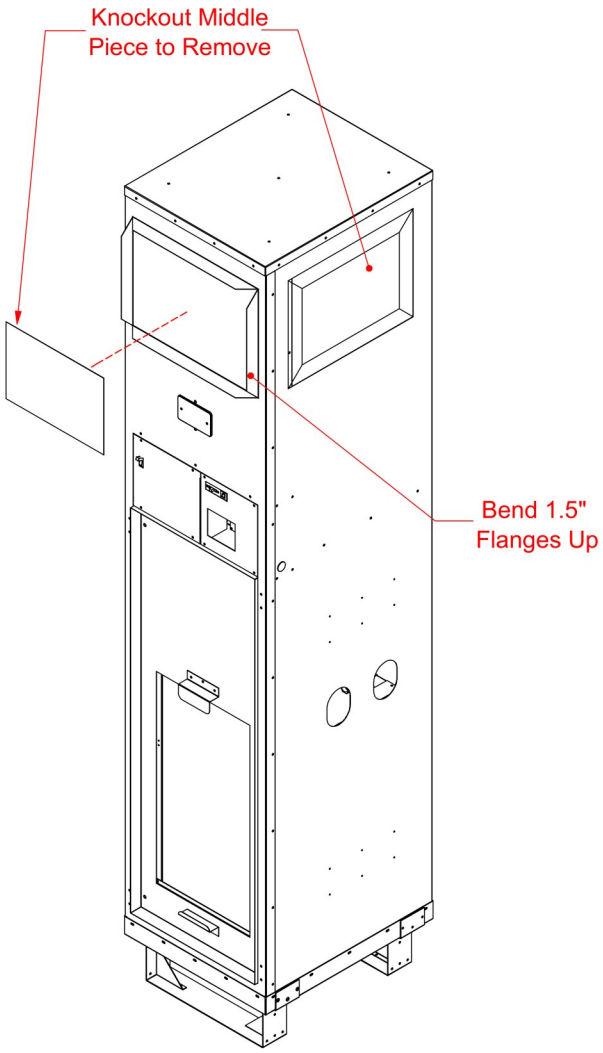


Figure 5.1.2 - Unit Discharge Opening

5.2 Line of Sight Baffle

Line of Sight Baffles (LSB) can be supplied within units with two or more horizontal discharge openings. The LSB inhibits the occupants of a room from looking through the discharge openings of an HRP fan cabinet, and into an adjacent room. Two configurations of LSB are available (shown below), depending on which sides of the unit have discharge openings.

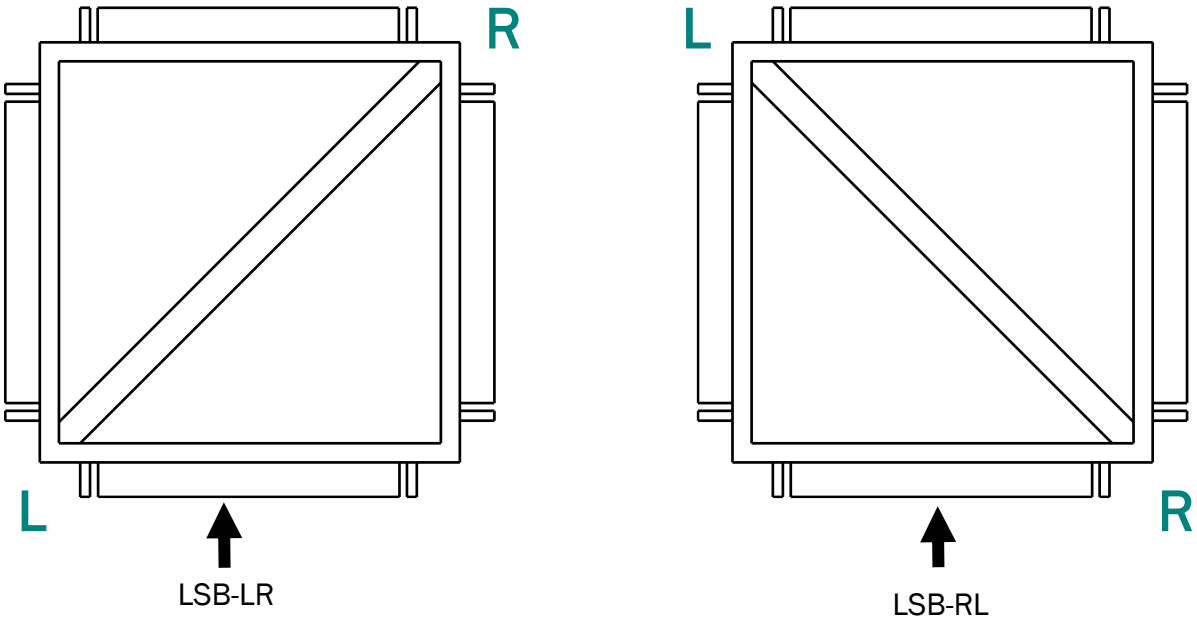


Figure 5.2.1 - Line of Sight Baffle Configurations

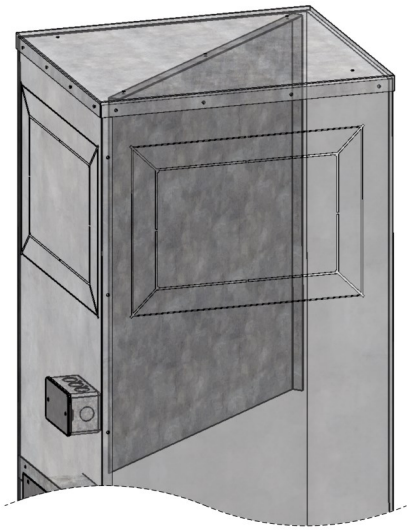


Figure 5.2.2 - 3D Rendering of Line of Sight Baffling Unit

5.3.1 Acoustic Return Air Front Panel Details

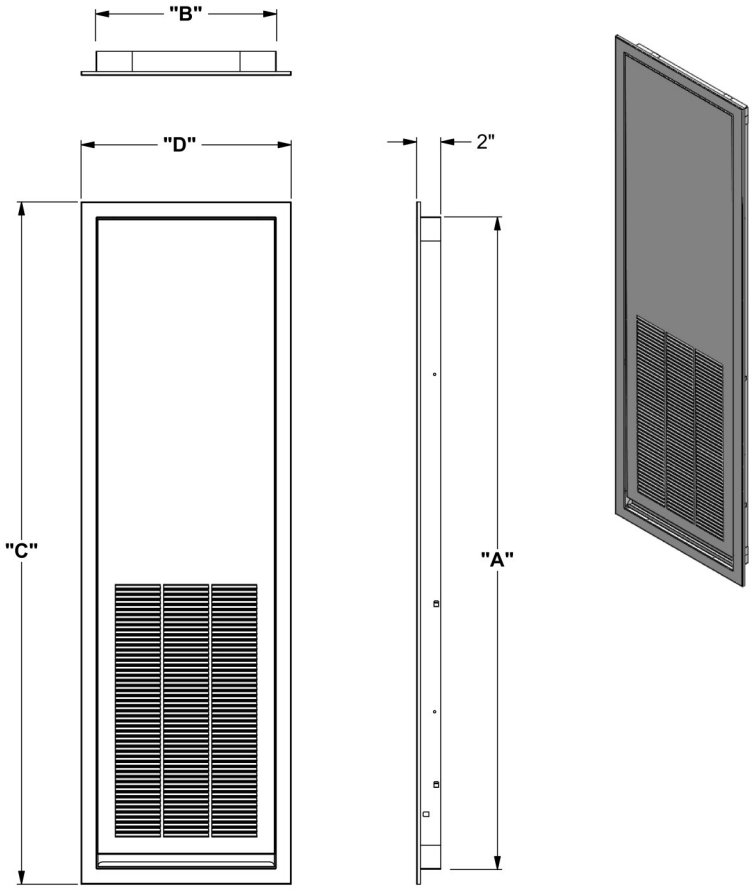


Figure 5.3.1- Acoustic Panel Dimensional Drawings

Table 5.3.1 - Acoustic Panel Dimensional Data

Model	Cabinet Size	A	B	C	D
HRP 020	X	54 - 1/16"	15 - 3/16"	56 - 1/2"	17 - 5/8"
HRP 030					
HRP 040					
HRP 050	Y	54 - 1/16"	17 - 3/16"	56 - 1/2"	19 - 5/8"
HRP 060					
HRP 080	Z	54 - 1/16"	21 - 3/16"	56 - 1/2"	23- 5/8"
HRP 100					
HRP 120					

5.3.2 Acoustic Return Air Front Panel Furring Details

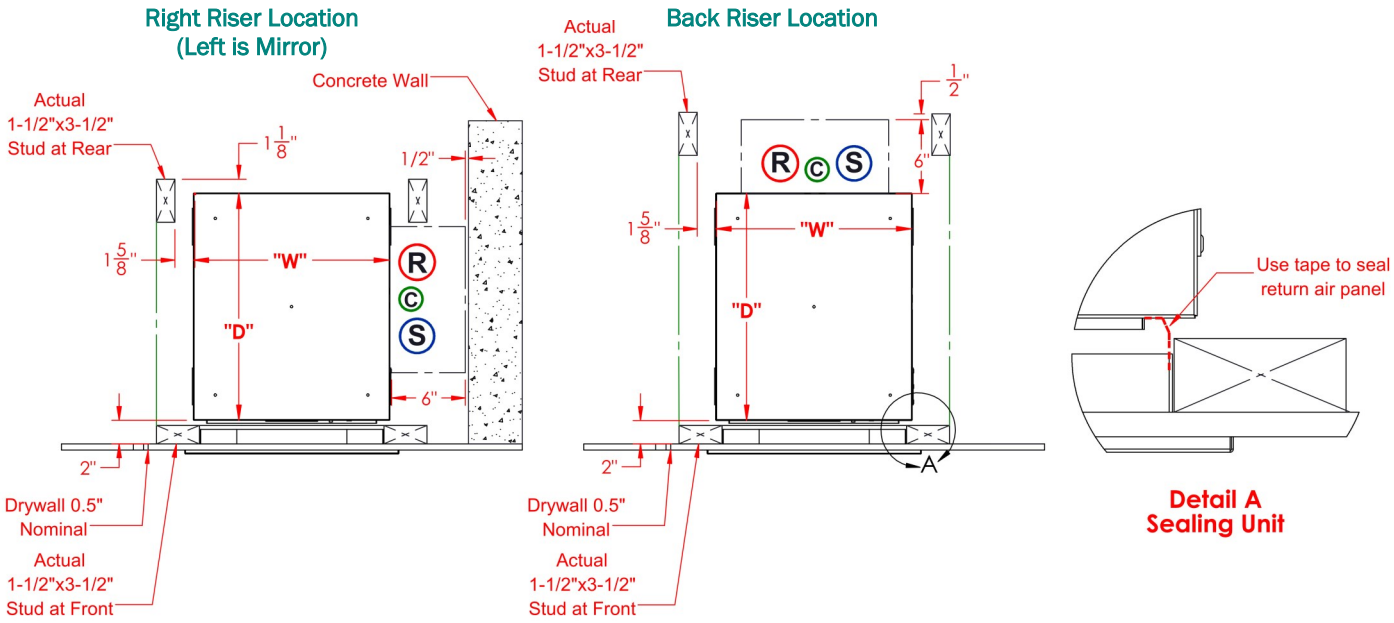


Figure 5.3.2 - Acoustic Furring Dimensional Drawing

Table 5.3.2 - Acoustic Furring Dimensional Data			
Model	Cabinet Size	W	D
HRP 020	X	16.00″	18.50″
HRP 030			
HRP 040			
HRP 050	Y	18.00″	21.50″
HRP 060			
HRP 080	Z	22.00″	25.50″
HRP 100			
HRP 120			

Additional Notes:

- Return air panel supplied in standard powder coat white finish (custom finishes available)
- Drywall frame is to be mounted such that there is 0.5” maximum clearance between the heat pump return air flange and the return air panel. Mount the return air panel centered in front of the return air opening
- For rear/side risers, allow an additional 5” clearance at the back/side of the units
- Installing contractor must insulate the drywall enclosure with lined or coated acoustical insulation suitable for plenum use

5.3.3 Acoustic Return Air Front Panel Vertical Furring Details

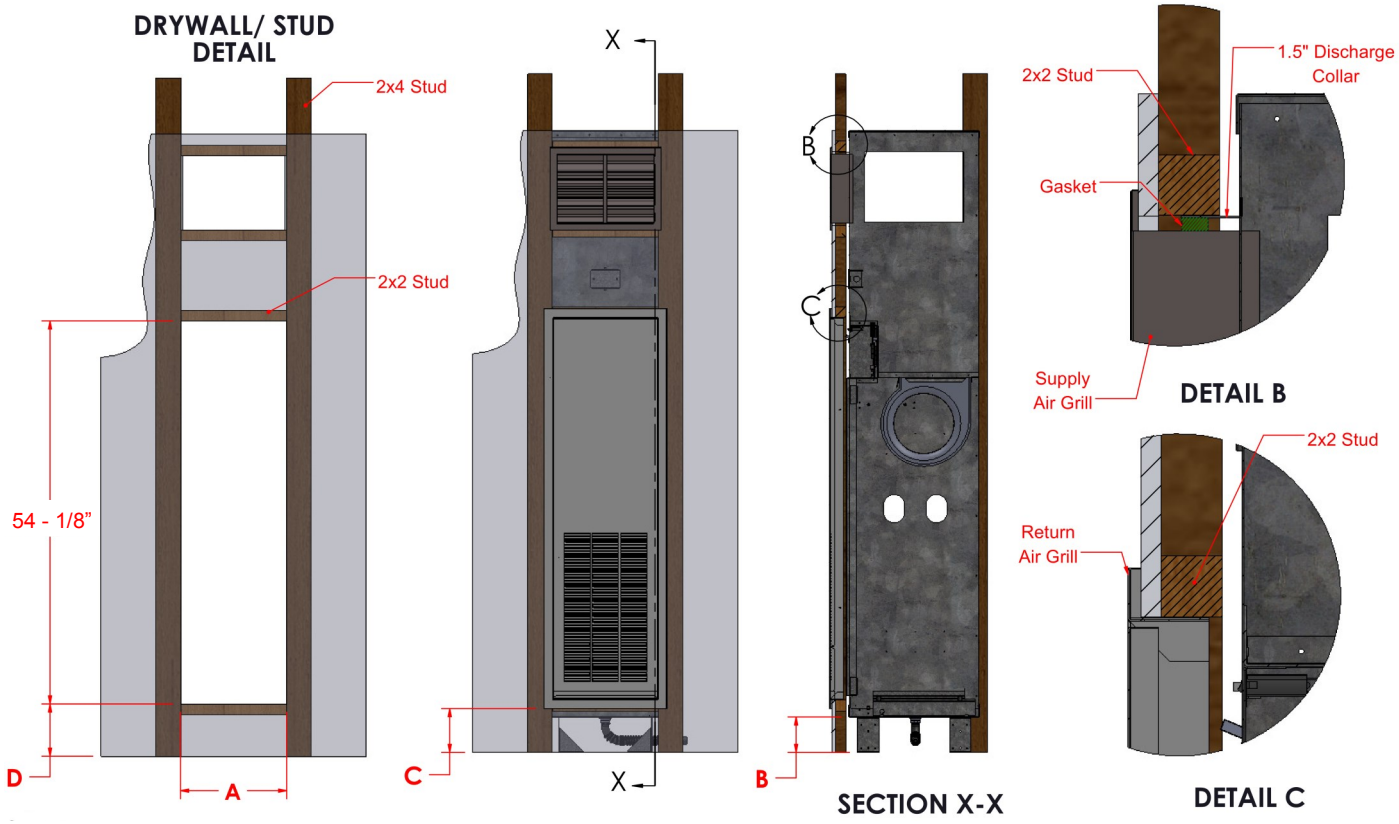


Figure 5.3.3 - Acoustic Panel Vertical Furring Drawing

Table 5.3.3- Acoustic Panel Vertical Furring Dimensional Data		
Model	Cabinet Size	A "in"
HRP 020	X	15 - 1/4"
HRP 030		
HRP 040		
HRP 050	Y	17 - 1/4"
HRP 060		
HRP 080	Z	21 - 1/4"
HRP 100		
HRP 120		

B = Base Height (Min 5", increases in 1" increments)
C = Base Height + 1.250"
D = Base Height + 2.375"

Notes:

- "B" is specified by customer based on base board height
- Base board must be at least 0.5" smaller than "C"

5.4.1 Perimeter Return Air Front Panel Details

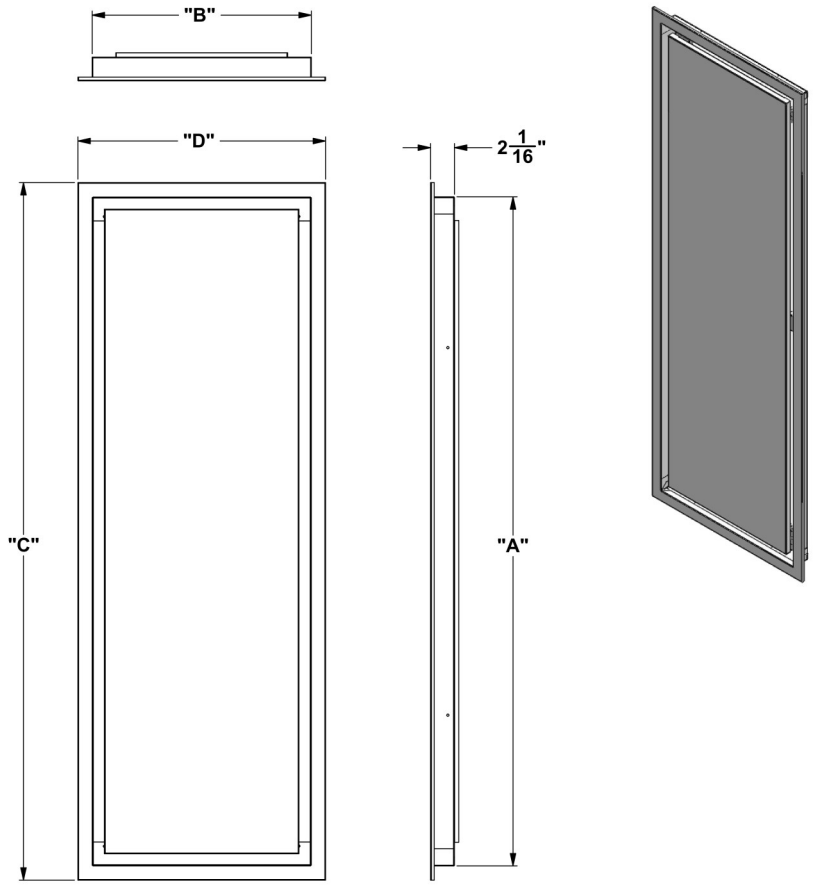


Figure 5.4.1 - Perimeter Panel Dimensional Drawing

Table 5.4.1 - Perimeter Panel Dimensional Data

Model	Cabinet Size	A	B	C	D
HRP 020	X	58 - 1/4"	19 - 1/8"	60 - 3/4"	21 - 5/8"
HRP 030					
HRP 040					
HRP 050	Y	58 - 1/4"	21 - 1/8"	60 - 3/4"	23 - 5/8"
HRP 060					
HRP 080	Z	58 - 1/4"	25 - 1/8"	60 - 3/4"	27 - 5/8"
HRP 100					
HRP 120					

5.4.2 Perimeter Return Air Front Panel Furring Details

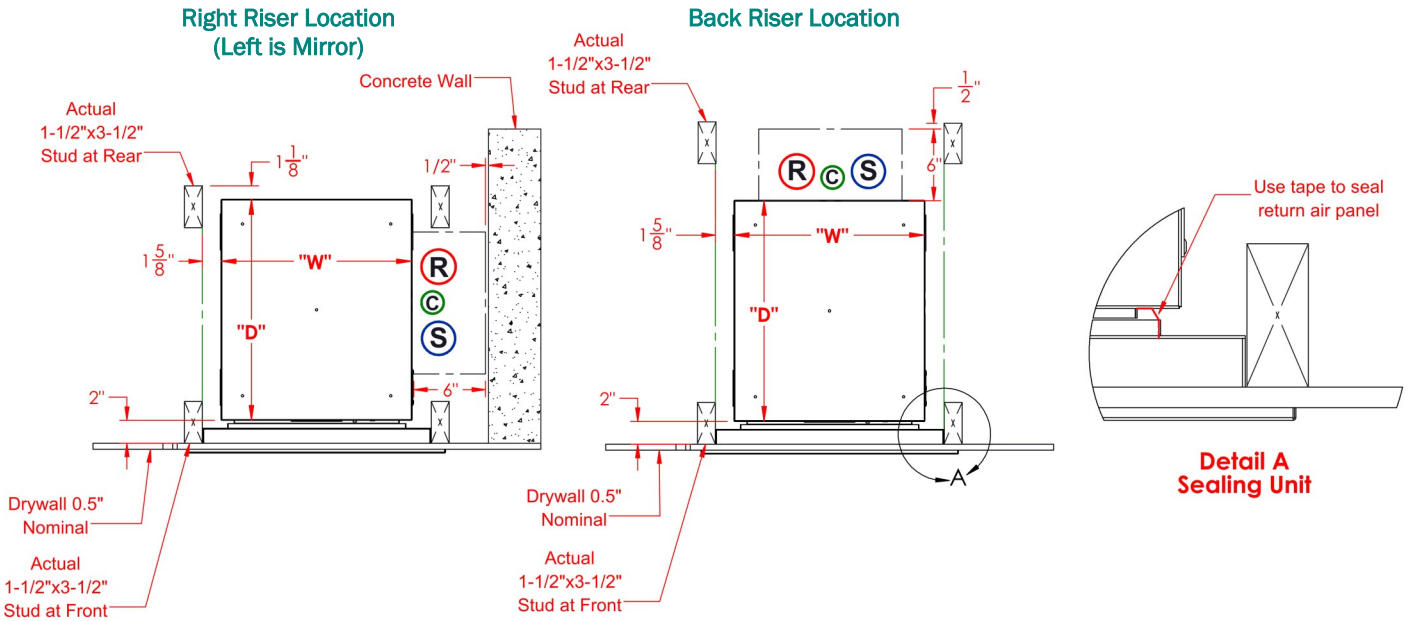


Figure 5.4.2 - Perimeter Panel Furring Drawing

Table 5.4.2 - Perimeter Furring Dimensional Data

Model	Cabinet Size	W	D
HRP 020	X	16.00″	18.50″
HRP 030			
HRP 040			
HRP 050	Y	18.00″	21.50″
HRP 060			
HRP 080	Z	22.00″	25.50″
HRP 100			
HRP 120			

Additional Notes:

- Return air panel supplied in standard powder coat white finish (custom finishes available)
- Drywall frame is to be mounted such that there is 0.5” maximum clearance between the heat pump return air flange and the return air panel. Mount the return air panel centered in front of the return air opening
- For rear/side risers, allow an additional 5” clearance at the back/side of the units
- Installing contractor must insulate the drywall enclosure with lined or coated acoustical insulation suitable for plenum use

5.4.3 Perimeter Return Air Front Panel Vertical Furring Details

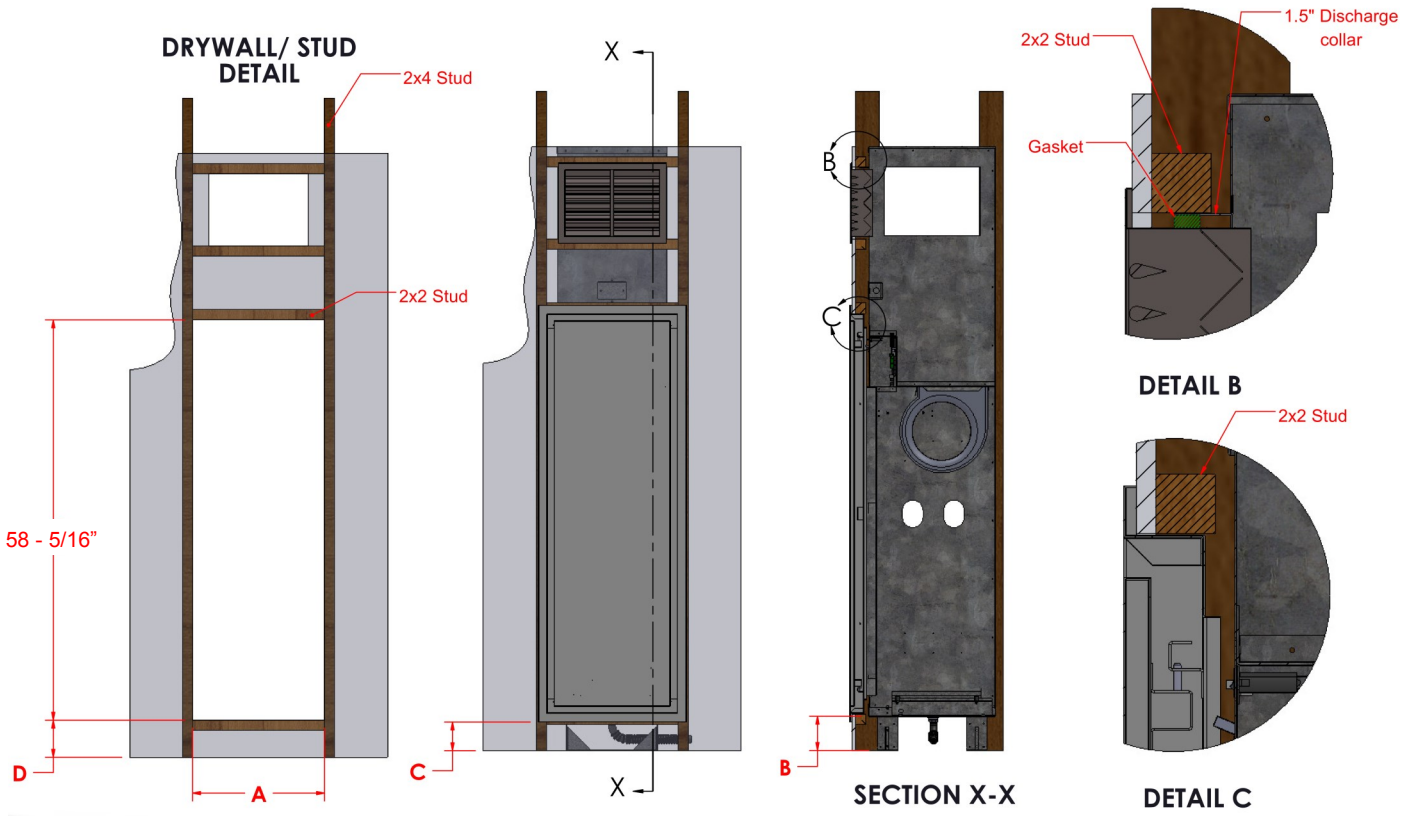


Figure 5.4.3 - Perimeter Panel Vertical Furring Drawing

Table 5.3.3- Acoustic Panel Vertical Furring Dimensional Data

Model	Cabinet Size	A "in"
HRP 020	X	19 - 3/16"
HRP 030		
HRP 040		
HRP 050	Y	21 - 3/16"
HRP 060		
HRP 080	Z	25 - 3/16"
HRP 100		
HRP 120		

B = Base Height (Min 5", increases in 1" increments)
C = Base Height - 0.875"
D = Base Height + 0.375"

Notes:

- "B" is specified by customer based on base board height
- Base board must be at least 0.5" smaller than "C"

5.5 Baseboard Height Detail

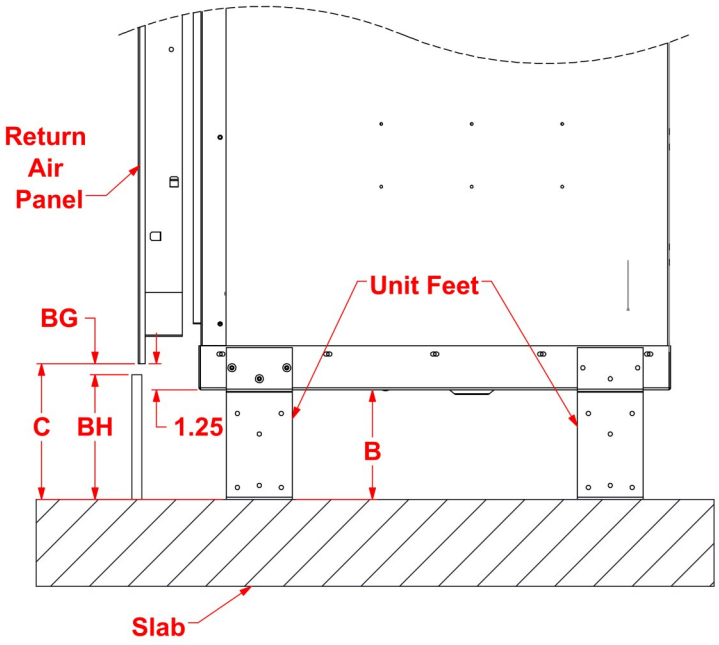


Figure 5.5.1 - Acoustic Panel Baseboard Height Detail

Acoustic Return Air Panel
Baseboard Selection

C = Cabinet Base Height + 1.25"
BH = Baseboard Height
BG = Baseboard Gap (min 0.5")
B = Cabinet Base Height
(Min 5", increases in 1" increments)

B = BH + BG - 1.25

Example:
If using a 6" baseboard with 0.5" gap
B= 6+0.5-1.25 = 5.25"
As such a **6"** base is required.

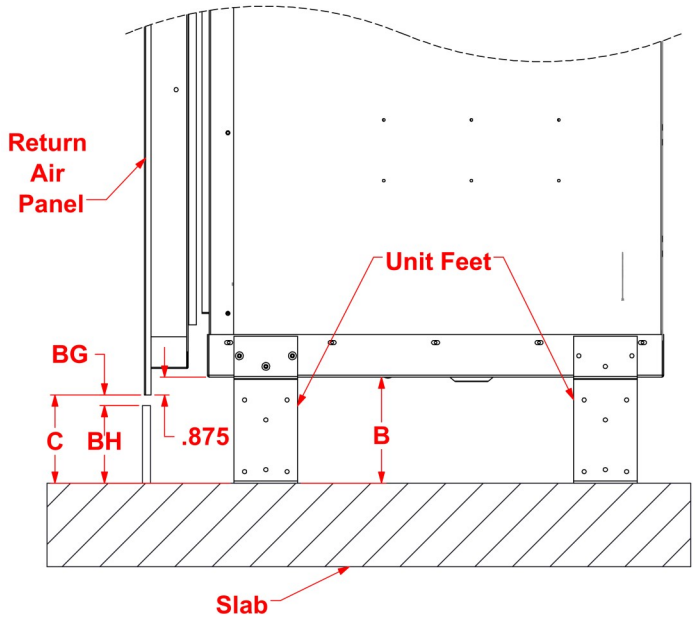


Figure 5.5.2 - Perimeter Panel Baseboard Height Detail

Perimeter Return Air Panel
Baseboard Selection

C = Cabinet Base Height - 0.875"
BH = Baseboard Height
BG = Baseboard Gap (min 0.5")
B = Cabinet Base Height
(Min 5", increases in 1" increments)

B = BH + BG + 0.875

Example:
If using a 6" baseboard with 0.5" gap
B= 6 + 0.5 + 0.875 = 7.375"
As such a **8"** base is required.

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SECTION 6

ELECTRICAL DATA & CONTROLS

6. ELECTRICAL DATA & CONTROLS

6.1 Electrical Data

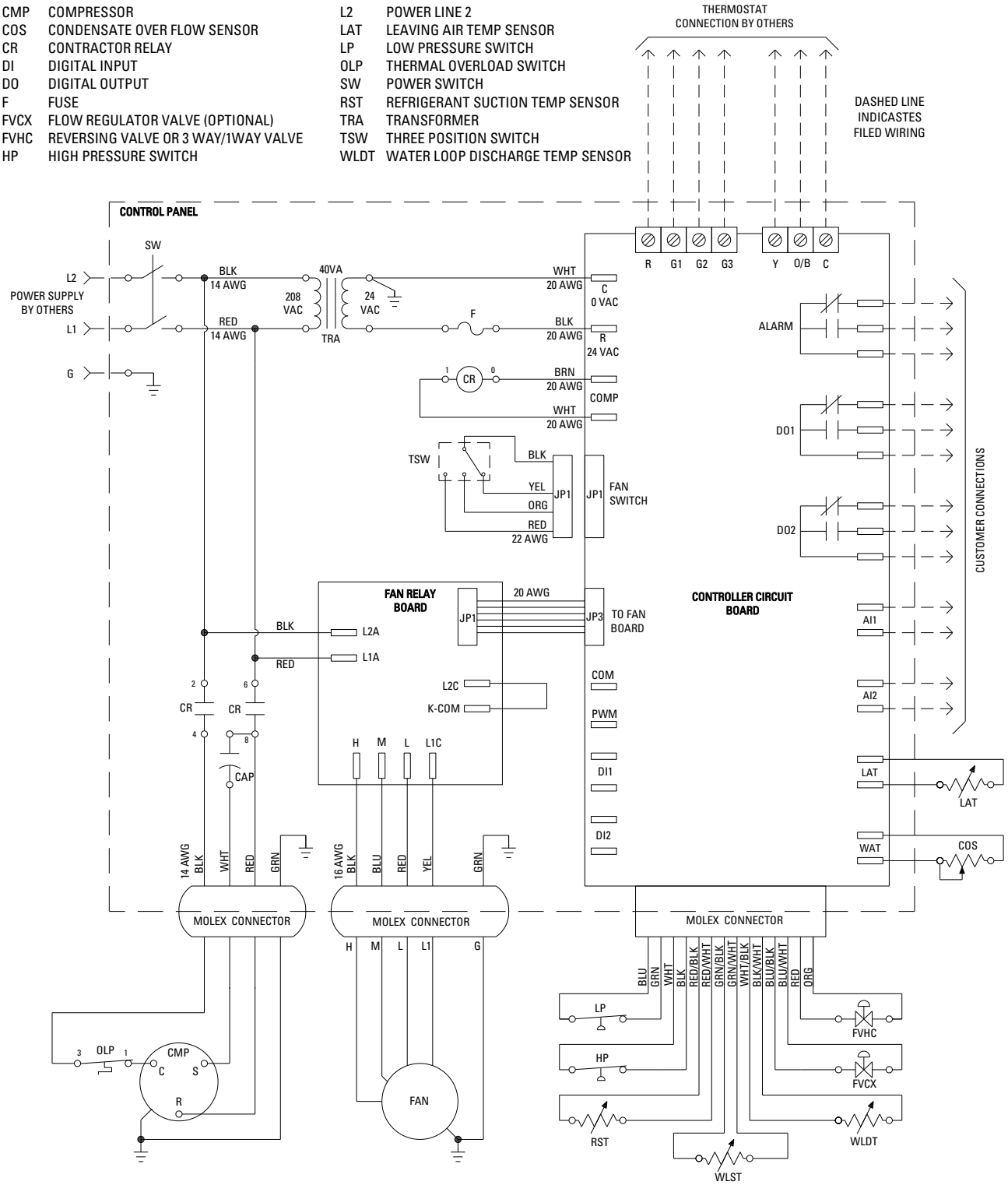
MODEL SIZE	COMPRESSOR RLA	COMPRESSOR LRA	FAN MOTOR FLA	MINIMUM CIRCUIT AMPS	MAXIMUM FUSE SIZE
HRP 020	3.0 A	15.0 A	1.5 A	5.3 A	15.0 A
HRP 030	3.7 A	22.0 A	1.5 A	6.1 A	15.0 A
HRP 040	4.7 A	25.0 A	1.5 A	7.4 A	15.0 A
HRP 050	5.5 A	26.0 A	1.5 A	8.4 A	15.0 A
HRP 060	7.4 A	33.0 A	1.5 A	10.8 A	20.0 A
HRP 080	11.5 A	58.0 A	2.8 A	17.2 A	25.0 A
HRP 100	13.9 A	73.0 A	4.3 A	21.7 A	30.0 A
HRP 120	17.8 A	79.0 A	6.0 A	28.3 A	35.0 A

Additional Notes:

- Minimum voltage 200 V. Operating voltage 208-230 V, single phase
- Adhere to all applicable electrical codes
- RLA - Rated load amps
- LRA - Locked rotor amps
- FLA - Full load amps

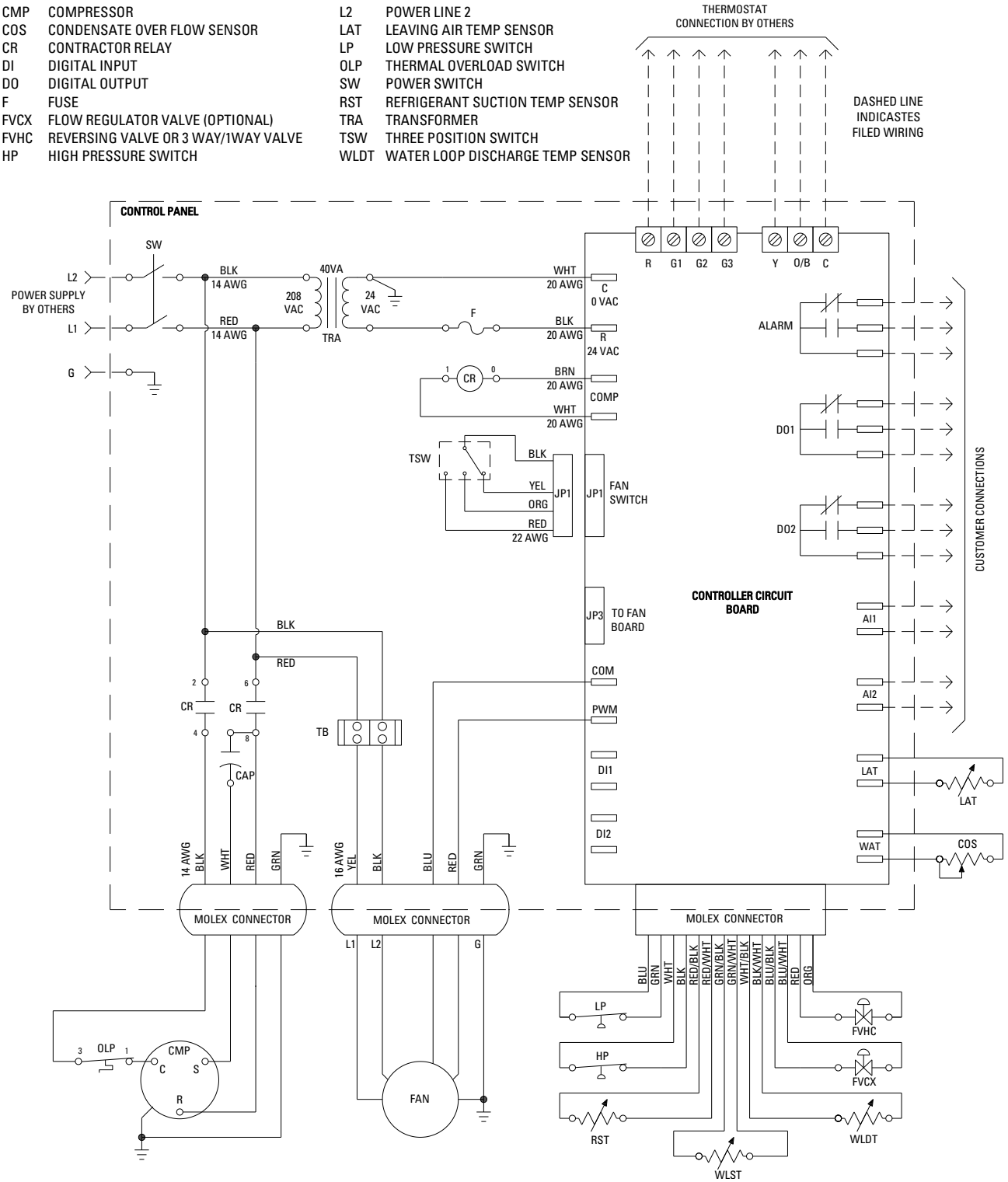
6.2.1 Wiring Diagram - PSC Motor

AI	ANALOG INPUT
CMP	COMPRESSOR
COS	CONDENSATE OVER FLOW SENSOR
CR	CONTRACTOR RELAY
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
F	FUSE
FVCX	FLOW REGULATOR VALVE (OPTIONAL)
FVHC	REVERSING VALVE OR 3 WAY/1WAY VALVE
HP	HIGH PRESSURE SWITCH
L1	POWER LINE 1
L2	POWER LINE 2
LAT	LEAVING AIR TEMP SENSOR
LP	LOW PRESSURE SWITCH
OLP	THERMAL OVERLOAD SWITCH
SW	POWER SWITCH
RST	REFRIGERANT SUCTION TEMP SENSOR
TRA	TRANSFORMER
TSW	THREE POSITION SWITCH
WLDT	WATER LOOP DISCHARGE TEMP SENSOR



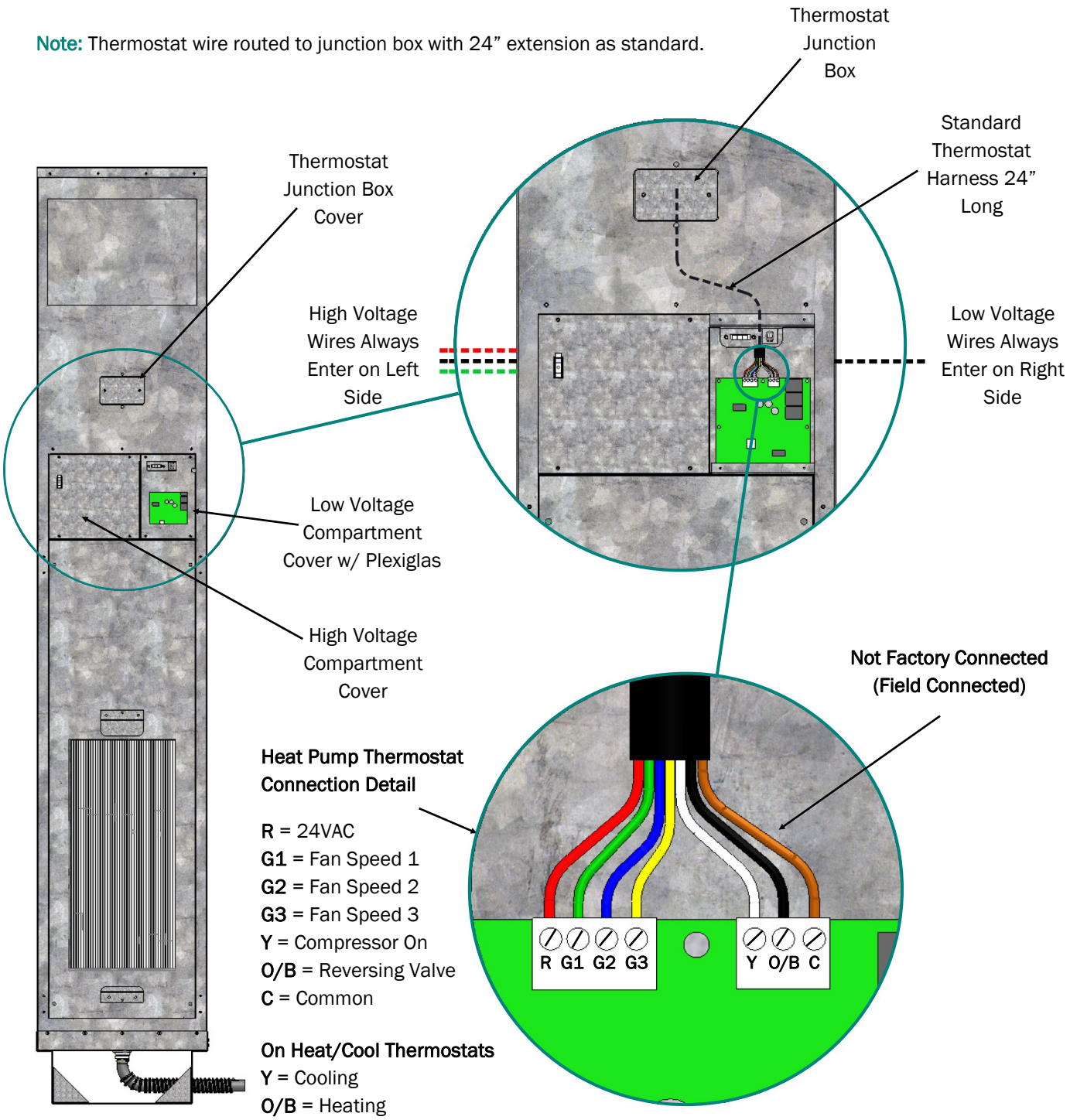
6.2.2 Wiring Diagram - EC Motor PWM Mode

AI	ANALOG INPUT
CMP	COMPRESSOR
COS	CONDENSATE OVER FLOW SENSOR
CR	CONTRACTOR RELAY
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
F	FUSE
FVCX	FLOW REGULATOR VALVE (OPTIONAL)
FVHC	REVERSING VALVE OR 3 WAY/1WAY VALVE
HP	HIGH PRESSURE SWITCH
L1	POWER LINE 1
L2	POWER LINE 2
LAT	LEAVING AIR TEMP SENSOR
LP	LOW PRESSURE SWITCH
OLP	THERMAL OVERLOAD SWITCH
SW	POWER SWITCH
RST	REFRIGERANT SUCTION TEMP SENSOR
TRA	TRANSFORMER
TSW	THREE POSITION SWITCH
WLDT	WATER LOOP DISCHARGE TEMP SENSOR



6.3 Electrical Details (Standard)

Note: Thermostat wire routed to junction box with 24" extension as standard.



Heat Pump Thermostat Connection Detail

R = 24VAC
G1 = Fan Speed 1
G2 = Fan Speed 2
G3 = Fan Speed 3
Y = Compressor On
O/B = Reversing Valve
C = Common

On Heat/Cool Thermostats
Y = Cooling
O/B = Heating

6.4 Fan Motor Control & Connection

Fan Control

In AUTO fan control mode (DIP1-6 = ON), thermostat inputs G1, G2 and G3 directly control fan speeds low, medium and high speed.

In MANUAL fan control mode (DIP1-6 = OFF), any single thermostat input on G1, G2 or G3 directly enables a fan request. When a fan request is made, the fan speed is determined by a three-position switch into the controller – low, medium or high.

Special Considerations:
All G inputs are software debounced for one second before registering a change of state.
It is possible to have all inputs G1, G2 and G3 OFF when switching between speeds. To eliminate nuisance cycling of these fan inputs, all G inputs must be OFF for three seconds before a fan request of OFF is registered.

Fan Control of PSC Motors

Omega utilizes standard three speed PSC motors across its entire product line. The PSC Fan Relay Pack is utilized to enable individual fan motor speeds. Refer to section 6.2.1 for more information.

Fan Control of ECM EON 42 Motors

Omega utilizes the EON 42 ECM motor for its smaller sized heat pumps. The EON 42 ECM motor can be used in **discrete** or **variable** speed mode.

In **discrete** mode, the EON-42 motor can be factory programmed with a specific speed for each of its 3 taps. EON-42 taps are selected by applying 208VAC on the required TAP. The EON 42 ECM motor utilizes the fan relay pack for discrete mode. Refer to section 6.2.2 for more information.

In **variable** mode, a low voltage pulse width module signal is utilized to control motor speed between 0 and 100% of full speed. The controller has been programmed to use 3 preprogrammed speeds for Low, Medium and High. These speeds can be set via an embedded web page in the controller. Refer to section 6.2.3 for more information.

Fan Control of ECM X13 Motors

Omega utilizes the X13 ECM motor for larger sized Heat Pumps. The X13 ECM motor is a multi-voltage motor, utilizing 208VAC for primary power and 24VAC for speed selection. Similar to the EON 42, the X13 requires a constant primary power supply of 208VAC at all times, even when unit is commanded OFF by controller. The X13 has five low voltage (24VAC) taps which can be selected. The X13 fan relay pack provides a convenient interface between the Omega controller and X13 motor. Refer to section 6.2.4 for more information.

6.5 Sequence of Operation for Standard Heat Pump

Refer to "heat pump controller development D" technical manual for detailed installation and operation of controller.

Calls for Heating and Cooling

Calls for heating and cooling are initiated by the thermostat.

If a HEAT PUMP thermostat is used, then DIP1-1 should be set to ON position.
- Y Terminal Closed = call for compressor
- O Terminal Open = reversing valve de-energized = call for HEATING
- O Terminal Closed = reversing valve energized = call for COOLING

If a HEAT/COOL thermostat is used, then DIP1-1 should be set to OFF position.
- Y Terminal Closed = call for COOLING.
- O Terminal Closed = call for HEATING.
- Note: If both Y and O are closed, a call for HEATING is assumed.

Request for Compressor

A request for the compressor will result from a "COOL" and "HEAT" request from the standard heat pump.

When a compressor request is made, the COAX Flow valve will be opened (if not already open). The compressor contactor will then be energized if the following conditions are met:

- Water flow through the coax exists for a minimum of 3 minutes (adjustable). (INTERLOCK)
- The fan has been running a minimum of 3 minutes (adjustable). (INTERLOCK)
- No high pressure alarm (HP_ALARM)
- No low pressure alarm (LP_ALARM)
- No condensate over flow alarm (CO_ALARM)
- The compressor anti-recycle timer of 7 minutes (adjustable) has expired. (ARTIMER)
- The water loop temperature is within design range (WLST_ALARM and WLDT_ALARM)
  - Greater than 115 °F (adjustable) on water supply WLST (In to Coax)
  - Greater than 127 °F (adjustable) on water discharge WLDT (Out of Coax)

When a compressor request is terminated, the COAX will be flushed for 3 minutes (adjustable) and the fan will remain on for 3 minutes (adjustable) to flush the air coil.

6.5 Sequence of Operation for Standard Heat Pump

Alarms

HP Alarm – High Pressure (Latching Alarm)

- A high pressure alarm will occur when the HP Switch opens.
- The red HP_LED will be illuminated solid when a HP Alarm occurs
- This is a latching alarm

LP Alarm – Low Pressure (Latching Alarm)

LP ByPass Mode (warning)

- If the LP switch is open and the compressor is running for less than 3 minutes (adjustable); a Low Pressure ByPass warning will be activated. If the LP Switch closes or the compressor is disabled before 3 minutes (adjustable) expires, the ByPass timer will be reset
- The red LP_LED will be blinking when in LP ByPass mode

LP Alarm Mode (Latching Alarm)

- A low pressure alarm will occur when the LP Switch is open for 3 continuous minutes (adjustable), and the compressor is running
- The red LP_LED will be illuminated solid when a LP Alarm occurs
- This is a latching alarm

Notes:

1. If the LP Switch is open on unit power up, a LP Alarm is triggered immediately
2. If a LP Alarm is triggered during heating a 1 minute defrost is instantiated (i.e. reversing valve switched to cooling and compressor run for 1 minute).

CO Alarm – Condensate Over Flow (Latching Alarm)

- A condensate overflow alarm will occur if the water sensor input is less than 900 (adjustable) for 30 (adjustable) continuous seconds.
- This is a latching alarm.

WLST Alarm - Water Loop Supply Temperature (Non-Latching Alarm)

- A water loop supply temperature greater than 115 °F (CutOut) will trip a WLST Alarm
- A water loop supply temperature of less than 110 °F (CutIn) will reset the WLST Alarm
- The water loop supply temperature is only tested when the COAX Flow Valve is open
- The WLST LED will be illuminated solid on a WLST Alarm
- This is a non-latching alarm

Notes:

1. If the WLST Sensor is sensed open (missing) or closed (shorted), a WLST ALARM is triggered
2. The red WLST_LED will be blinking

6.5 Sequence of Operation for Standard Heat Pump

WLDT Alarm - Water Loop Discharge Temperature (Non-Latching Alarm)

- A water loop discharge temperature greater than 127 °F (CutOut) will trip a WLDT alarm
- A water loop discharge temperature of less than 122 °F (CutIn) will reset the WLDT alarm
- The water loop discharge temperature is only tested when the coax flow valve is open
- The WLDT LED will be illuminated solid on a WLDT alarm
- This is a non-latching alarm

Notes:
If the WLDT Sensor is sensed open (missing) or closed (shorted), a WLDT alarm is triggered.
The red WLDT_LED will blink for this type of alarm.

RST Alarm – Refrigerant Suction Temperature (NON-Latching Alarm)

- RST temperature is simply monitored for logging and display purposes. It is not actively used in control
- If the RST sensor is sensed open (missing) or closed (shorted), a RST alarm is triggered
- The red RST_LED will be blinking for this type of alarm
- This is a non-latching alarm, and it is not used in any control

Timers and Interlocks

Selected timers and interlocks that are used in the control sequences are described below:

Anti-Recycle Timer
The compressor anti-recycle timer starts when the compressor is disabled. The timer ensures that the compressor is not over cycled as per the manufacturer's recommendations. The default is 7 minutes, and is adjustable on the parameter setting page.

Fan On Timer
The Fan On Timer starts when a fan request is made, and the fan is on. This timer a permissive start for the compressor. The default is 3 minutes and is adjustable on the parameter setting page.

Valve Open Timer
The Valve Open Timer starts when a fan request is made and the fan is on. This timer is a permissive start for the compressor, and ensures developed flow in the coax prior to a compressor start. The default is 3 minutes, and is adjustable on the parameter setting page.

Fan Off Timer
The Fan Off Timer starts when a compressor request is terminated. This timer is ensures that the fan runs for 3 minutes (adjustable) after the compressor is turned off. The default is 3 minutes, and is adjustable on the parameter setting page.

Valve Closed Timer
The Valve Closed Timer starts when a compressor request is terminated. This timer ensures that the co-ax is flushed for 3 minutes (adjustable) after the compressor is turned off. The default is 3 minutes and is adjustable on the parameter setting page.

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SECTION 7

PERFORMANCE DATA

7. PERFORMANCE DATA

7.1 ISO Data

Table 7.1 - Unit ISO Data						COOLING			HEATING		
SIZE	REFRIG	VOLTAGE	WATER FLOW (GPM)	AIR FLOW (CFM)	WATER PRESSURE DROP	BTUH	WATT	EER	BTUH	WATT	COP
HRP 20	R410	208-230/60/1	1.5	200	3.3	5800	475	12.20	7200	491	4.30
HRP 30	R410	208-230/60/1	2.6	350	11.0	8900	712	12.50	11900	758	4.60
HRP 40	R410	208-230/60/1	3.5	460	11.1	11600	847	13.70	14700	917	4.70
HRP 50	R410	208-230/60/1	4	530	14.3	15100	974	15.50	17200	1050	4.80
HRP 60	R410	208-230/60/1	5.1	630	20.2	17900	1234	14.50	22500	1465	4.50
HRP 80	R410	208-230/60/1	6.7	820	10.2	22000	1654	13.30	29500	1965	4.40
HRP 100	R410	208-230/60/1	7.9	1010	14.2	26400	2031	13.00	36000	2454	4.30
HRP 120	R410	208-230/60/1	9	1200	18.4	35965	2810	12.80	46668	3256	4.20

The data table 7.1 is certified in accordance with ISO Standard 135256-1. Cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air, with 86ºF entering water temperature. Heating capacity based on 68ºF DB entering air, with 68ºF entering water temperature.

7.2.1 Heating & Cooling Performance Data - HRP 020

Table 7.2.1 - HRP 020 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
1.2	3.0								20	18.8	2128	418	1.79	695
1.7	5.8									19.2	2194	414	1.87	720
2.1	8.8									19.3	2246	388	2.02	736
2.5	12.4									19.4	2298	342	2.26	750
1.2	2.8	30	43.2	7066	4615	247	24.66	7922	30	27.0	3276	436	2.40	1789
1.7	5.5		39.4	7204	4686	237	26.23	8031		27.8	3376	431	2.50	1852
2.1	8.3		37.8	7261	4743	229	27.40	8143		28.2	3457	404	2.71	1894
2.5	11.7		36.6	7270	4799	221	28.48	8277		28.5	3537	356	3.03	1930
1.2	2.7	40	53.2	7014	4643	272	22.18	7944	40	35.3	4361	452	2.95	2823
1.7	5.2		49.5	7151	4714	261	23.60	8053		36.6	4495	447	3.07	2922
2.1	7.9		47.8	7207	4771	252	24.65	8165		37.2	4602	418	3.33	2990
2.5	11.1		46.6	7216	4828	243	25.62	8299		37.6	4709	369	3.73	3046
1.2	2.5	50	63.2	6880	4634	304	19.78	7913	50	43.7	5385	466	3.45	3799
1.7	4.9		59.4	7015	4705	292	21.04	8021		45.4	5550	461	3.60	3933
2.1	7.5		57.7	7070	4762	282	21.98	8133		46.2	5682	432	3.90	4023
2.5	10.5		56.6	7079	4819	272	22.85	8266		46.7	5814	381	4.36	4099
1.2	2.4	60	73.0	6665	4591	345	17.45	7829	60	52.1	6346	480	3.91	4716
1.7	4.7		69.3	6795	4661	331	18.57	7936		54.3	6540	474	4.07	4882
2.1	7.1		67.7	6849	4717	319	19.39	8047		55.2	6696	445	4.41	4994
2.5	10.0		66.5	6858	4774	308	20.16	8179		55.9	6852	392	4.93	5089
1.2	2.3	70	82.8	6369	4511	393	15.20	7693	70	60.7	7245	492	4.31	5574
1.7	4.5		79.2	6493	4580	377	16.17	7798		63.2	7467	486	4.49	5771
2.1	6.8		77.5	6545	4636	364	16.89	7907		64.4	7645	456	4.86	5904
2.5	9.5		76.4	6553	4691	351	17.56	8037		65.2	7823	402	5.44	6015
1.2	2.2	80	92.5	5991	4396	450	13.02	7504	80	69.4	8081	503	4.66	6374
1.7	4.3		88.9	6108	4464	431	13.85	7607		72.2	8329	497	4.85	6599
2.1	6.5		87.3	6157	4518	416	14.46	7713		73.6	8528	466	5.26	6751
2.5	9.1		86.3	6164	4572	401	15.04	7839		74.5	8726	411	5.89	6878
1.2	2.2	85	97.3	5772	4326	481	11.95	7390	85	73.7	8476	508	4.82	6752
1.7	4.2		93.8	5885	4392	461	12.72	7491		76.8	8736	502	5.02	6990
2.1	6.4		92.2	5931	4445	445	13.28	7595		78.2	8945	470	5.44	7151
2.5	9.0		91.2	5938	4498	429	13.81	7720		79.2	9153	415	6.08	7286
1.2	2.1	90	102.1	5532	4246	514	10.91	7263	90	78.1	8856	512	4.96	7115
1.7	4.1		98.7	5640	4311	493	11.60	7362		81.3	9128	507	5.17	7366
2.1	6.3		97.1	5685	4363	476	12.12	7465		82.8	9345	475	5.60	7535
2.5	8.8		96.1	5692	4415	459	12.60	7587		83.9	9562	418	6.26	7677
1.2	2.0	100	111.6	4992	4060	587	8.87	6969						
1.7	4.0		108.3	5090	4122	562	9.44	7064						
2.1	6.1		106.8	5130	4172	543	9.86	7163						
2.5	8.5		105.8	5136	4222	523	10.25	7280						
1.2	2.0	110	121.0	4370	3838	667	6.91	6623						
1.7	3.9		117.9	4456	3897	640	7.35	6713						
2.1	5.9		116.5	4491	3944	617	7.68	6807						
2.5	8.3		115.5	4497	3991	595	7.98	6919						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.2 Heating & Cooling Performance Data - HRP 030

Table 7.2.2 - HRP 030 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
1.3	3.7								20	15.2	5301	660	2.14	3133
1.8	6.9									16.4	5487	665	2.20	3262
2.4	12.1									17.2	5669	671	2.26	3391
2.6	14.2									17.4	5719	672	2.27	3428
1.3	3.5	30	49.1	10775	7077	486	26.04	12442	30	23.5	6455	679	2.61	4202
1.8	6.6		43.9	10977	7146	471	27.43	12545		25.1	6681	684	2.68	4376
2.4	11.6		40.5	11179	7245	449	29.21	12631		26.2	6903	690	2.75	4549
2.6	13.5		39.7	11237	7282	440	29.83	12651		26.5	6965	692	2.77	4598
1.3	3.4	40	58.8	10456	7027	521	22.80	12224	40	31.8	7629	698	3.08	5299
1.8	6.3		53.7	10652	7096	505	24.02	12325		33.9	7897	703	3.16	5517
2.4	11.0		50.3	10848	7195	481	25.57	12410		35.2	8160	709	3.24	5735
2.6	12.9		49.6	10905	7231	471	26.11	12429		35.5	8233	711	3.26	5797
1.3	3.2	50	68.5	10102	6945	564	19.79	11999	50	40.1	8825	715	3.54	6422
1.8	6.0		63.4	10291	7013	547	20.85	12099		42.6	9135	721	3.63	6687
2.4	10.6		60.2	10481	7110	520	22.20	12182		44.2	9438	727	3.72	6951
2.6	12.4		59.4	10535	7146	510	22.67	12201		44.6	9522	728	3.74	7026
1.3	3.1	60	78.1	9712	6829	616	17.02	11769	60	48.4	10041	732	3.99	7572
1.8	5.8		73.2	9894	6895	596	17.93	11867		51.2	10393	737	4.09	7885
2.4	10.2		70.0	10077	6991	568	19.09	11948		53.2	10738	743	4.20	8196
2.6	11.9		69.2	10129	7027	557	19.50	11967		53.6	10834	745	4.22	8285
1.3	3.0	70	87.7	9287	6679	675	14.48	11533	70	56.5	11277	747	4.43	8750
1.8	5.6		82.9	9461	6744	654	15.26	11629		59.9	11673	753	4.55	9111
2.4	9.8		79.8	9636	6838	623	16.25	11709		62.1	12061	759	4.66	9471
2.6	11.5		79.0	9686	6873	610	16.59	11727		62.6	12169	761	4.69	9573
1.3	2.9	80	97.4	8827	6496	743	12.18	11291	80	64.7	12534	762	4.87	9954
1.8	5.4		92.6	8992	6560	720	12.83	11384		68.5	12974	768	5.00	10365
2.4	9.5		89.6	9158	6651	685	13.66	11462		71.0	13405	774	5.12	10774
2.6	11.2		88.8	9206	6685	672	13.95	11480		71.6	13525	776	5.16	10891
1.3	2.9	85	102.2	8584	6392	780	11.12	11167	85	68.7	13171	769	5.09	10566
1.8	5.4		97.5	8744	6455	755	11.71	11260		72.8	13633	775	5.22	11002
2.4	9.4		94.4	8906	6544	719	12.47	11337		75.5	14086	782	5.35	11437
2.6	11.0		93.7	8952	6577	705	12.74	11355		76.1	14212	784	5.39	11560
1.3	2.8	90	107.0	8331	6279	819	10.11	11042	90	72.8	13812	776	5.30	11185
1.8	5.3		102.4	8487	6341	793	10.65	11134		77.1	14297	782	5.44	11646
2.4	9.3		99.3	8644	6429	755	11.35	11210		79.9	14772	789	5.58	12107
2.6	10.9		98.6	8689	6462	740	11.59	11228		80.6	14904	791	5.62	12238
1.3	2.8	100	116.6	7800	6030	903	8.28	10788						
1.8	5.2		112.1	7946	6089	875	8.72	10877						
2.4	9.1		109.1	8093	6173	833	9.29	10952						
2.6	10.7		108.4	8135	6205	816	9.49	10969						
1.3	2.7	110	126.2	7234	5746	995	6.68	10527						
1.8	5.2		121.8	7369	5803	964	7.04	10615						
2.4	9.0		118.9	7505	5883	918	7.50	10688						
2.6	10.6		118.2	7544	5913	900	7.66	10704						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.3 Heating & Cooling Performance Data - HRP 040

Table 7.2.3 - HRP 040 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
1.7	3.8								20	15.2	6789	791	2.55	4086
2.4	7.4									16.4	7044	796	2.62	4270
3.3	13.8									17.3	7267	802	2.69	4438
3.5	15.4									17.4	7300	803	2.70	4465
1.7	3.6	30	48.5	13971	9419	516	28.66	15743	30	23.6	8190	814	2.97	5416
2.4	7.0		43.3	14308	9572	488	30.86	15910		25.3	8497	820	3.06	5659
3.3	13.0		39.7	14487	9700	469	32.68	15991		26.4	8765	826	3.13	5882
3.5	14.6		39.1	14488	9718	467	32.93	15989		26.6	8806	827	3.15	5918
1.7	3.4	40	58.3	13659	9353	568	25.06	15592	40	32.0	9607	837	3.37	6759
2.4	6.6		53.1	13989	9506	537	26.99	15758		34.1	9968	843	3.47	7063
3.3	12.4		49.6	14164	9633	516	28.58	15838		35.6	10283	849	3.56	7341
3.5	13.9		49.0	14164	9651	514	28.80	15836		35.8	10330	850	3.57	7386
1.7	3.2	50	68.1	13267	9233	630	21.73	15392	50	40.5	11043	861	3.76	8115
2.4	6.3		63.0	13587	9384	596	23.40	15556		42.9	11457	866	3.87	8481
3.3	11.7		59.5	13757	9509	572	24.78	15635		44.7	11819	873	3.97	8814
3.5	13.2		58.9	13758	9527	570	24.97	15633		44.9	11874	874	3.99	8868
1.7	3.1	60	77.8	12794	9059	701	18.66	15144	60	48.8	12496	884	4.14	9485
2.4	6.0		72.8	13103	9206	664	20.10	15304		51.7	12965	890	4.26	9912
3.3	11.1		69.3	13266	9330	637	21.29	15382		53.8	13375	896	4.37	10302
3.5	12.5		68.8	13267	9347	635	21.45	15380		54.1	13436	898	4.39	10365
1.7	2.9	70	87.5	12240	8830	783	15.86	14845	70	57.2	13967	907	4.50	10868
2.4	5.7		82.5	12536	8974	741	17.08	15003		60.5	14491	913	4.64	11357
3.3	10.6		79.1	12692	9094	712	18.09	15080		62.8	14949	920	4.76	11804
3.5	11.9		78.6	12693	9111	709	18.23	15077		63.2	15018	921	4.78	11876
1.7	2.8	80	97.1	11606	8546	875	13.32	14498	80	65.6	15455	930	4.85	12264
2.4	5.4		92.2	11886	8686	828	14.34	14652		69.3	16035	937	5.00	12816
3.3	10.1		88.9	12034	8802	795	15.19	14727		71.9	16542	944	5.13	13321
3.5	11.4		88.4	12035	8818	792	15.31	14725		72.3	16618	945	5.15	13401
1.7	2.7	85	101.8	11258	8384	925	12.15	14306	85	69.7	16206	942	5.03	12967
2.4	5.3		97.0	11530	8521	875	13.08	14458		73.7	16814	949	5.18	13551
3.3	9.9		93.8	11674	8635	841	13.85	14532		76.5	17345	956	5.31	14084
3.5	11.1		93.3	11675	8651	837	13.96	14530		76.9	17426	957	5.33	14170
1.7	2.7	90	106.6	10891	8208	977	11.04	14102	90	73.9	16961	954	5.19	13673
2.4	5.2		101.9	11154	8342	925	11.89	14251		78.1	17597	960	5.35	14289
3.3	9.7		98.7	11293	8454	888	12.59	14324		81.0	18154	967	5.49	14851
3.5	10.9		98.2	11293	8469	885	12.69	14322		81.5	18238	969	5.51	14941
1.7	2.6	100	116.1	10095	7816	1089	9.03	13656						
2.4	5.0		111.5	10338	7943	1031	9.72	13801						
3.3	9.3		108.4	10467	8050	990	10.30	13871						
3.5	10.4		107.9	10468	8065	986	10.37	13869						
1.7	2.5	110	125.5	9218	7369	1212	7.28	13161						
2.4	4.8		121.1	9441	7489	1146	7.84	13301						
3.3	9.0		118.1	9559	7589	1101	8.30	13369						
3.5	10.1		117.6	9559	7603	1097	8.36	13367						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.4 Heating & Cooling Performance Data - HRP 050

Table 7.2.4 - HRP 050 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
2.8	8.1								20	16.5	8036	918	2.56	4960
3.5	12.5									17.1	8227	923	2.61	5104
3.8	14.6									17.3	8288	924	2.62	5146
4	16.1									17.4	8322	925	2.63	5167
2.8	8.0	30	44.5	18343	12071	551	39.34	20324	30	25.3	9704	945	2.99	6516
3.5	12.2		41.7	18536	12160	536	41.15	20412		26.2	9934	950	3.05	6705
3.8	14.3		40.7	18575	12183	531	41.64	20423		26.4	10008	952	3.07	6761
4	15.8		40.2	18586	12194	529	41.87	20421		26.6	10049	953	3.08	6789
2.8	7.8	40	54.3	17809	11836	611	33.59	19983	40	34.2	11434	971	3.43	8143
3.5	12.0		51.5	17996	11924	595	35.13	20069		35.2	11704	977	3.49	8379
3.8	14.1		50.6	18034	11947	590	35.55	20080		35.6	11791	978	3.51	8448
4	15.5		50.0	18045	11957	587	35.75	20079		35.8	11840	979	3.52	8483
2.8	7.7	50	64.0	17239	11589	682	28.41	19636	50	43.0	13226	997	3.87	9840
3.5	11.8		61.3	17421	11675	663	29.72	19720		44.2	13539	1003	3.94	10125
3.8	13.8		60.4	17457	11697	658	30.08	19731		44.6	13640	1004	3.96	10209
4	15.3		59.9	17468	11707	655	30.24	19730		44.9	13696	1005	3.98	10251
2.8	7.5	60	73.8	16635	11328	762	23.82	19283	60	51.7	15081	1022	4.31	11606
3.5	11.6		71.1	16810	11412	741	24.91	19366		53.2	15438	1028	4.39	11944
3.8	13.6		70.2	16846	11434	735	25.21	19376		53.7	15553	1030	4.42	12042
4	15.0		69.7	16856	11444	732	25.35	19375		54.0	15617	1031	4.43	12092
2.8	7.4	70	83.5	15997	11055	851	19.80	18923	70	60.4	16998	1046	4.76	13443
3.5	11.4		80.9	16165	11137	828	20.71	19005		62.1	17401	1052	4.85	13834
3.8	13.3		80.0	16199	11159	821	20.95	19015		62.7	17530	1054	4.88	13947
4	14.7		79.5	16209	11168	818	21.07	19014		63.0	17602	1055	4.89	14005
2.8	7.3	80	93.3	15323	10770	950	16.35	18558	80	69.0	18978	1070	5.21	15350
3.5	11.2		90.7	15484	10849	924	17.10	18638		71.0	19428	1076	5.31	15796
3.8	13.1		89.8	15517	10870	917	17.31	18648		71.6	19572	1078	5.34	15926
4	14.5		89.3	15526	10879	913	17.40	18647		72.0	19653	1079	5.36	15992
2.8	7.2	85	98.1	14973	10622	1003	14.85	18373	85	73.3	19991	1081	5.44	16330
3.5	11.1		95.5	15131	10701	976	15.53	18453		75.4	20465	1087	5.54	16804
3.8	13.0		94.7	15163	10721	968	15.71	18463		76.1	20617	1089	5.57	16942
4	14.3		94.2	15172	10730	964	15.80	18461		76.5	20702	1090	5.59	17012
2.8	7.2	90	103.0	14615	10471	1058	13.49	18187	90	77.6	21020	1093	5.67	17327
3.5	11.0		100.4	14769	10549	1030	14.11	18266		79.8	21518	1099	5.78	17830
3.8	12.9		99.6	14800	10569	1021	14.27	18276		80.5	21678	1101	5.81	17977
4	14.2		99.1	14809	10578	1017	14.35	18274		81.0	21768	1102	5.83	18051
2.8	7.0	100	112.7	13872	10160	1176	11.20	17810						
3.5	10.8		110.2	14018	10235	1144	11.71	17887						
3.8	12.7		109.4	14047	10255	1135	11.85	17897						
4	14.0		108.9	14056	10263	1130	11.92	17895						
2.8	6.9	110	122.4	13094	9836	1304	9.48	17427						
3.5	10.6		120.0	13232	9909	1268	9.92	17502						
3.8	12.4		119.2	13259	9928	1258	10.04	17512						
4	13.7		118.8	13268	9936	1253	10.09	17510						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.5 Heating & Cooling Performance Data - HRP 060

Table 7.2.5 - HRP 060 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
2.7	7.0									15.0	11009	1285	2.35	6724
3.9	14.1								20	16.4	11453	1300	2.42	7052
4	14.8									16.5	11481	1301	2.42	7073
5.2	24.5									17.2	11719	1311	2.45	7243
2.7	6.8		47.1	20687	14075	668	30.16	23070		23.6	13071	1317	2.77	8652
3.9	13.7	30	41.9	21118	14312	634	32.43	23277	30	25.3	13597	1333	2.86	9074
4	14.3		41.6	21147	14328	632	32.58	23291		25.4	13631	1334	2.86	9101
5.2	23.8		39.0	21405	14485	618	33.83	23399		26.4	13913	1344	2.90	9320
2.7	6.6		57.2	20497	14229	754	26.47	23156		32.1	15161	1349	3.19	10612
3.9	13.3	40	52.0	20925	14469	715	28.47	23364	40	34.3	15771	1365	3.29	11129
4	14.0		51.7	20953	14486	713	28.60	23377		34.4	15810	1366	3.29	11162
5.2	23.2		49.0	21209	14644	696	29.69	23486		35.6	16137	1377	3.33	11431
2.7	6.4		67.1	20128	14248	854	23.05	23107		40.7	17278	1381	3.60	12603
3.9	12.9	50	62.0	20548	14488	810	24.79	23314	50	43.2	17974	1397	3.71	13218
4	13.6		61.7	20576	14504	807	24.90	23327		43.4	18019	1398	3.72	13257
5.2	22.6		59.0	20827	14663	789	25.85	23436		44.8	18392	1409	3.76	13575
2.7	6.3		77.0	19579	14130	968	19.89	22922		49.2	19424	1412	4.00	14625
3.9	12.6	60	71.9	19987	14369	919	21.40	23127	60	52.1	20206	1429	4.12	15339
4	13.3		71.6	20015	14385	916	21.49	23141		52.3	20257	1430	4.13	15384
5.2	22.0		68.9	20259	14543	895	22.31	23249		53.9	20676	1441	4.18	15754
2.7	6.1		86.7	18851	13877	1097	17.01	22601		57.6	21597	1443	4.38	16679
3.9	12.4	70	81.7	19244	14111	1041	18.29	22804	70	61.0	22468	1460	4.52	17493
4	13.0		81.4	19270	14127	1038	18.38	22817		61.2	22523	1461	4.53	17544
5.2	21.6		78.8	19505	14282	1014	19.08	22923		63.1	22989	1472	4.58	17966
2.7	6.0		96.4	17943	13488	1241	14.39	22145		66.1	23799	1474	4.77	18764
3.9	12.1	80	91.5	18317	13716	1178	15.48	22344	80	69.9	24758	1491	4.91	19679
4	12.7		91.2	18342	13731	1174	15.55	22357		70.1	24819	1492	4.92	19737
5.2	21.2		88.6	18566	13882	1147	16.15	22461		72.2	25333	1503	4.98	20212
2.7	6.0		101.2	17421	13243	1319	13.19	21867		70.3	24910	1489	4.95	19818
3.9	12.0	85	96.3	17785	13466	1251	14.18	22063	85	74.3	25914	1506	5.11	20785
4	12.6		96.0	17809	13482	1247	14.25	22075		74.6	25978	1508	5.12	20846
5.2	21.0		93.5	18026	13629	1219	14.79	22178		76.8	26515	1519	5.18	21348
2.7	5.9		106.0	16855	12964	1400	12.05	21554		74.5	26028	1504	5.14	20880
3.9	11.9	90	101.2	17207	13182	1328	12.96	21747	90	78.8	27077	1522	5.30	21899
4	12.5		100.9	17230	13197	1324	13.01	21759		79.0	27144	1523	5.31	21963
5.2	20.8		98.4	17440	13342	1294	13.51	21861		81.3	27706	1534	5.37	22492
2.7	5.8		115.4	15588	12303	1573	9.97	20827						
3.9	11.8	100	110.8	15913	12511	1492	10.72	21014						
4	12.3		110.5	15935	12525	1488	10.77	21026						
5.2	20.5		108.1	16129	12662	1454	11.18	21124						
2.7	5.8		124.8	14141	11507	1761	8.15	19964						
3.9	11.6	110	120.3	14436	11701	1670	8.77	20144						
4	12.2		120.1	14456	11714	1665	8.81	20155						
5.2	20.3		117.8	14632	11842	1627	9.15	20249						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.6 Heating & Cooling Performance Data - HRP 080

Table 7.2.6 - HRP 080 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
3.4	3.9								20	15.5	13323	1690	2.11	7688
4.9	7.6									16.7	13926	1713	2.17	8108
6.5	12.9									17.4	14365	1732	2.22	8408
6.7	13.6									17.5	14405	1734	2.23	8434
3.4	3.6	30	47.1	25866	16695	926	31.18	29073	30	23.9	16141	1722	2.61	10383
4.9	7.2		42.0	26500	16979	873	33.85	29391		25.5	16872	1745	2.69	10951
6.5	12.2		39.1	26935	17259	835	35.85	29567		26.5	17404	1764	2.75	11354
6.7	12.9		38.8	26972	17293	832	36.04	29577		26.6	17452	1766	2.76	11390
3.4	3.5	40	57.1	25562	16719	1037	26.78	29120	40	32.3	19007	1761	3.07	13095
4.9	6.8		52.0	26188	17004	978	29.07	29438		34.4	19868	1785	3.17	13811
6.5	11.6		49.1	26618	17284	936	30.79	29615		35.6	20494	1805	3.24	14320
6.7	12.3		48.8	26655	17318	932	30.96	29625		35.7	20551	1807	3.25	14365
3.4	3.3	50	67.1	25020	16596	1170	22.76	28999	50	40.7	21921	1809	3.50	15824
4.9	6.5		62.0	25632	16878	1104	24.72	29316		43.2	22914	1833	3.60	16689
6.5	11.0		59.1	26053	17156	1056	26.18	29492		44.7	23635	1853	3.69	17304
6.7	11.7		58.8	26089	17189	1052	26.32	29502		44.8	23701	1856	3.69	17359
3.4	3.2	60	76.9	24240	16324	1327	19.14	28710	60	49.1	24882	1865	3.89	18570
4.9	6.2		71.8	24833	16602	1252	20.78	29024		52.0	26009	1890	4.00	19585
6.5	10.6		69.0	25241	16876	1197	22.01	29198		53.8	26827	1911	4.09	20308
6.7	11.2		68.7	25276	16908	1193	22.12	29208		53.9	26902	1913	4.10	20372
3.4	3.0	70	86.6	23222	15905	1506	15.89	28253	70	57.5	27890	1929	4.23	21334
4.9	6.0		81.7	23790	16175	1421	17.26	28562		60.8	29153	1955	4.36	22500
6.5	10.2		78.8	24181	16442	1359	18.28	28733		62.8	30071	1977	4.46	23330
6.7	10.8		78.6	24214	16474	1354	18.37	28743		63.0	30155	1979	4.47	23403
3.4	2.9	80	96.3	21966	15337	1708	13.04	27629	80	65.8	30946	2001	4.54	24114
4.9	5.8		91.4	22503	15598	1611	14.15	27931		69.6	32348	2028	4.68	25432
6.5	9.8		88.6	22873	15855	1542	14.99	28098		71.9	33366	2051	4.79	26370
6.7	10.4		88.4	22905	15886	1535	15.07	28108		72.1	33459	2053	4.80	26454
3.4	2.9	85	101.0	21249	14998	1818	11.75	27253	85	70.0	32492	2040	4.68	25511
4.9	5.7		96.2	21769	15254	1715	12.76	27551		74.0	33964	2068	4.82	26905
6.5	9.7		93.5	22127	15505	1641	13.51	27716		76.4	35033	2091	4.93	27898
6.7	10.2		93.3	22157	15535	1634	13.58	27726		76.6	35130	2093	4.95	27986
3.4	2.9	90	105.8	20472	14622	1933	10.56	26836	90	74.2	34050	2082	4.81	26912
4.9	5.6		101.1	20973	14871	1824	11.47	27129		78.4	35592	2110	4.96	28383
6.5	9.5		98.4	21318	15116	1745	12.15	27292		80.9	36712	2133	5.07	29430
6.7	10.1		98.1	21347	15145	1737	12.21	27301		81.2	36814	2136	5.08	29523
3.4	2.8	100	115.2	18740	13759	2181	8.47	25875						
4.9	5.5		110.7	19199	13993	2057	9.20	26158						
6.5	9.3		108.1	19515	14224	1968	9.74	26315						
6.7	9.9		107.9	19542	14252	1960	9.80	26324						
3.4	2.8	110	124.6	16771	12748	2451	6.77	24746						
4.9	5.4		120.2	17182	12965	2312	7.35	25017						
6.5	9.2		117.7	17464	13179	2212	7.79	25167						
6.7	9.7		117.5	17488	13205	2203	7.83	25175						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.7 Heating & Cooling Performance Data - HRP 100

Table 7.2.7 - HRP 100 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
4.3	4.9								20	15.4	17054	2183	2.17	9818
6.1	10.1									16.7	17599	2194	2.22	10206
6.5	11.5									16.8	17676	2196	2.23	10255
8.1	18.2									17.5	17823	2205	2.24	10317
4.3	4.7	30	45.8	29857	19986	1219	25.52	33970	30	23.5	21375	2241	2.69	13927
6.1	9.8		41.2	30433	20287	1171	26.98	34296		25.3	22059	2252	2.75	14477
6.5	11.1		40.6	30533	20344	1165	27.20	34368		25.5	22155	2254	2.76	14547
8.1	17.6		38.6	30830	20535	1162	27.65	34650		26.4	22339	2263	2.78	14634
4.3	4.5	40	55.9	29780	20450	1321	22.82	34224	40	31.8	25330	2295	3.15	17679
6.1	9.4		51.3	30354	20758	1268	24.12	34553		34.0	26140	2306	3.23	18377
6.5	10.8		50.7	30454	20816	1262	24.31	34625		34.3	26255	2309	3.24	18466
8.1	17.0		48.6	30750	21011	1258	24.72	34910		35.4	26473	2318	3.26	18576
4.3	4.4	50	65.9	29405	20658	1449	20.24	34270	50	40.2	28919	2346	3.56	21073
6.1	9.1		61.3	29972	20969	1391	21.39	34599		42.8	29843	2358	3.65	21905
6.5	10.4		60.7	30070	21028	1384	21.56	34672		43.2	29974	2360	3.66	22011
8.1	16.4		58.6	30363	21225	1381	21.92	34956		44.5	30223	2370	3.69	22143
4.3	4.3	60	75.9	28733	20610	1604	17.79	34107	60	48.8	32141	2394	3.91	24110
6.1	8.9		71.3	29287	20921	1540	18.80	34435		51.8	33168	2406	4.01	25062
6.5	10.1		70.6	29383	20980	1533	18.95	34507		52.3	33314	2409	4.02	25183
8.1	16.0		68.6	29668	21176	1529	19.27	34790		53.7	33591	2418	4.05	25334
4.3	4.2	70	85.7	27762	20307	1786	15.46	33736	70	57.5	34996	2439	4.21	26790
6.1	8.6		81.2	28298	20613	1715	16.35	34060		60.9	36115	2451	4.31	27848
6.5	9.9		80.5	28390	20671	1707	16.47	34131		61.4	36273	2454	4.33	27982
8.1	15.5		78.5	28667	20865	1702	16.75	34412		63.0	36575	2464	4.36	28150
4.3	4.1	80	95.4	26494	19748	1995	13.27	33156	80	66.5	37485	2481	4.45	29112
6.1	8.4		91.0	27005	20046	1916	14.02	33475		70.1	38684	2493	4.56	30262
6.5	9.6		90.3	27094	20102	1906	14.13	33545		70.6	38853	2496	4.57	30408
8.1	15.2		88.4	27357	20291	1901	14.37	33820		72.4	39176	2506	4.61	30590
4.3	4.0	85	100.3	25749	19373	2110	12.22	32788	85	71.0	38592	2500	4.55	30139
6.1	8.3		95.9	26245	19665	2026	12.91	33103		74.7	39826	2513	4.66	31330
6.5	9.5		95.2	26331	19720	2016	13.02	33172		75.3	40000	2515	4.68	31481
8.1	15.0		93.3	26587	19905	2010	13.23	33444		77.2	40333	2526	4.71	31670
4.3	4.0	90	105.1	24929	18934	2231	11.20	32367	90	75.5	39607	2519	4.63	31077
6.1	8.2		100.7	25409	19219	2142	11.84	32679		79.4	40874	2532	4.75	32305
6.5	9.4		100.1	25493	19273	2132	11.93	32747		80.0	41052	2534	4.76	32461
8.1	14.8		98.2	25741	19454	2126	12.13	33016		81.9	41394	2545	4.80	32655
4.3	3.9	100	114.6	23065	17864	2494	9.26	31370						
6.1	8.1		110.4	23510	18133	2394	9.79	31672						
6.5	9.2		109.8	23587	18184	2383	9.86	31738						
8.1	14.6		107.9	23816	18354	2376	10.03	31999						
4.3	3.8	110	124.0	20904	16538	2783	7.45	30164						
6.1	8.0		120.0	21307	16787	2673	7.87	30454						
6.5	9.1		119.4	21377	16834	2660	7.93	30518						
8.1	14.3		117.6	21585	16992	2652	8.07	30769						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

7.2.8 Heating & Cooling Performance Data - HRP 120

Table 7.2.8 - HRP 120 Performance Data

		COOLING							HEATING					
GPM US GPM	WPD FT H20	EWT °F	LWT °F	TOT BTUH	SEN BTUH	WATT	EER	THR BTUH	EWT °F	LWT °F	TOT BTUH	WATT	COP	THA BTUH
5.5	9.6								20	14.2	25737	2865	2.20	16085
7	14.7									15.3	26382	2885	2.24	16558
8	18.7									15.8	26702	2896	2.27	16793
9	23.2									16.2	26933	2904	2.28	16964
5.5	9.2	30	47.6	42257	27336	1823	29.23	48479	30	22.8	29677	2926	2.65	19809
7	14.1		44.0	43004	27642	1768	30.66	48929		24.2	30421	2947	2.70	20392
8	17.9		42.3	43365	27782	1738	31.43	49141		24.8	30789	2957	2.73	20681
9	22.2		41.0	43616	27869	1714	32.03	49282		25.4	31056	2966	2.75	20892
5.5	8.9	40	57.5	41476	27301	1968	25.44	48156	40	31.5	33612	2993	3.07	23507
7	13.5		53.9	42209	27607	1908	26.69	48603		33.1	34454	3014	3.13	24197
8	17.2		52.2	42564	27747	1876	27.35	48813		33.9	34871	3025	3.16	24541
9	21.3		50.9	42810	27834	1850	27.88	48954		34.5	35173	3034	3.18	24791
5.5	8.5	50	67.3	40460	27081	2141	21.94	47689	50	40.1	37540	3066	3.45	27177
7	13.0		63.8	41174	27385	2076	23.01	48131		42.0	38481	3088	3.52	27976
8	16.6		62.1	41520	27523	2040	23.58	48340		42.9	38947	3099	3.55	28373
9	20.5		60.8	41761	27610	2012	24.04	48479		43.6	39284	3108	3.57	28661
5.5	8.2	60	77.1	39207	26675	2341	18.72	47077	60	48.8	41463	3145	3.80	30820
7	12.6		73.6	39899	26974	2269	19.63	47514		50.9	42502	3167	3.87	31726
8	16.0		71.9	40234	27110	2231	20.12	47719		52.0	43016	3179	3.91	32176
9	19.8		70.6	40467	27196	2200	20.51	47857		52.8	43388	3188	3.94	32503
5.5	8.0	70	86.8	37718	26083	2568	15.78	46321	70	57.5	45380	3230	4.11	34436
7	12.2		83.4	38384	26375	2490	16.55	46750		59.9	46517	3253	4.20	35448
8	15.5		81.7	38706	26509	2448	16.96	46953		61.0	47080	3265	4.24	35951
9	19.2		80.5	38931	26592	2414	17.29	47088		61.9	47487	3274	4.26	36317
5.5	7.8	80	96.5	35993	25305	2823	13.13	45420	80	66.2	49291	3321	4.39	38025
7	11.9		93.1	36629	25589	2737	13.78	45841		68.8	50526	3345	4.48	39142
8	15.1		91.5	36936	25718	2691	14.12	46040		70.1	51138	3357	4.53	39698
9	18.7		90.3	37150	25800	2653	14.39	46172		71.1	51580	3366	4.55	40102
5.5	7.7	85	101.3	35042	24847	2961	11.92	44915	85	70.5	51244	3369	4.52	39809
7	11.7		98.0	35661	25126	2871	12.50	45332		73.3	52528	3393	4.61	40979
8	14.9		96.4	35960	25253	2822	12.81	45528		74.6	53164	3405	4.66	41561
9	18.4		95.1	36169	25332	2783	13.06	45659		75.7	53624	3415	4.69	41984
5.5	7.6	90	106.1	34032	24342	3106	10.77	44375	90	74.9	53196	3418	4.64	41587
7	11.6		102.8	34633	24615	3011	11.30	44786		77.8	54529	3442	4.74	42809
8	14.7		101.2	34924	24739	2960	11.58	44980		79.1	55189	3455	4.78	43417
9	18.2		100.0	35126	24817	2919	11.80	45110		80.3	55667	3465	4.81	43859
5.5	7.5	100	115.7	31835	23193	3416	8.69	43185						
7	11.4		112.5	32397	23453	3312	9.12	43586						
8	14.5		110.9	32669	23572	3256	9.34	43774						
9	17.9		109.8	32858	23646	3211	9.53	43900						
5.5	7.4	110	125.2	29402	21858	3754	6.90	41851						
7	11.2		122.1	29921	22104	3639	7.24	42239						
8	14.3		120.6	30172	22215	3578	7.42	42422						
9	17.7		119.5	30347	22285	3528	7.56	42544						

The cooling capacity is based on 80.6ºF DB and 66.2ºF WB entering air. The heating capacity is based on 68ºF DB entering air.
*See correction factor in section 8 for capacity multipliers at other conditions.

SECTION 8

CORRECTION FACTOR TABLES

8. CORRECTION FACTOR TABLES

Table 8.1 - Entering Air Temperature Correction Factors for Cooling Performance									
EAT Wet Bulb (°F)	COOLING								
	Total Cooling Capacity (BTUh)	Watts (W)	THR (BTUh)	Sensible Cooling (BTUh) @ EAT Dry Bulb (°F)					
				70	75	80	85	90	95
60	0.89	1.001	0.91	0.63	0.93				
65	0.98	1	0.98	0.52	0.77	1.03			
67	1.02	1	1.01	0.48	0.71	0.94	1.16		
70	1.07	0.999	1.05		0.6	0.79	0.99	1.19	1.38
75	1.17	0.996	1.12			0.55	0.68	0.82	0.95

The cooling capacity based on 80.6ºF DB and 66.2ºF WB entering air.

Entering Air Temperature Correction Factors for Cooling Performance

Table 8.1 is used to correct the catalog values if the entering air temperature for cooling is not 80.6 °F, dry bulb or 66.2 °F wet bulb. To use the table, find the desired wet bulb EAT on the "EAT Wet Bulb (°F)" column. Then multiply the catalog results by the value corresponding to the desired EAT wet bulb and the same output. To find the result for sensible cooling, the column that is used must correspond to the proper EAT dry bulb.

For example, a HRP 40 unit operating at 70 °F EWT and 3.3 GPM is expected to have a sensible cooling capacity of 9094 BTUh (See Table 7.2.3). However, if it is operated with an EAT wet bulb of 70 °F and an EAT dry bulb of 90 °F, then the value of 1.19 is pulled from the correction factor table and multiplied to the result to produce a more accurate answer of 10822 BTUh. The same process is repeated for total cooling capacity, cooling watts and THR. However, those three results do not need to account for the EAT dry bulb.

Actual Result = Catalog Result x Correction Factor

EAT- Entering Air Temperature
EWT - Entering Water Temperature
DB - Dry Bulb
WB - Wet Bulb
THR - Total Heat of Rejection
THA - Total Heat of Absorption

8. CORRECTION FACTOR TABLES

Table 8.2 - Entering Air Temperature Correction Factors for Heating Performance			
EAT Dry Bulb (°F)	HEATING		
	Total Heating Capacity (BTUh)	Watts (W)	THA (BTUh)
50	1.06	0.83	1.13
55	1.04	0.88	1.09
60	1.03	0.92	1.06
65	1.01	0.97	1.02
68	1.00	1.00	1.00
75	0.98	1.07	0.95
80	0.96	1.12	0.91
85	0.94	1.18	0.88

The heating capacity based on 68ºF DB entering air.

Entering Air Temperature Correction Factors for Heating Performance

Table 8.2 is used to correct the catalog values if the dry bulb entering air temperature for heating is not 68 °F. To use the table, find the desired dry bulb EAT on the "EAT Dry Bulb (°F)" column. Then multiply the catalog results by the value corresponding to the desired EAT dry bulb and the same output.

For example, a HRP 80 unit operating at 60 °F EWT and 4.9 GPM is expected to have a total heating capacity of 26009 BTUh (See Table 7.2.6). However, if it is operated with a EAT dry bulb temperature of 85 °F, then the value of 0.94 is pulled from the correction factor table and multiplied to the result to produce a more accurate answer of 24448 BTUh. The same correction process is then repeated for heating watts and THA.

Actual Result = Catalog Result x Correction Factor

EAT- Entering Air Temperature
EWT - Entering Water Temperature
DB - Dry Bulb
WB - Wet Bulb
THR - Total Heat of Rejection
THA - Total Heat of Absorption

8. CORRECTION FACTOR TABLES

Table 8.3 - Airflow Correction Factors							
Airflow	COOLING				HEATING		
% Rated CFM	Total Cooling Capacity (BTUh)	Sensible Cooling (BTUh)	Watts (W)	THR (BTUh)	Total Heating Capacity (BTUh)	Watts (W)	THA (BTUh)
70	0.93	0.82	0.97	0.94	0.94	1.08	0.93
75	0.94	0.85	0.98	0.95	0.95	1.06	0.94
80	0.95	0.88	0.98	0.96	0.96	1.05	0.96
85	0.97	0.91	0.99	0.97	0.97	1.03	0.97
90	0.98	0.94	0.99	0.98	0.98	1.02	0.98
95	0.99	0.97	1.00	0.99	0.99	1.01	0.99
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00
105	1.01	1.03	1.00	1.01	1.01	0.99	1.01
110	1.02	1.06	1.01	1.02	1.02	0.98	1.02
115	1.03	1.09	1.01	1.03	1.02	0.98	1.03

Airflow Correction Factors

Table 8.3 is used to correct the catalog values if the desired CFM is different from the rated CFM. To use the table, find the desired CFM on the "% Rated CFM" column. Then multiply the catalog results by the value corresponding to the desired % Rated CFM and the same output.

For example, a HRP 40 unit operating at 70 °F EWT and 2.4 GPM is expected to have a total cooling capacity of 12536 BTUh (See Table 7.2.3). However, if it is operated at 75% of the rated CFM, then the value of 0.94 is pulled from the correction factor table and multiplied to the result to produce a more accurate answer of 11784 BTUh. The same correction process is then repeated for sensible cooling, cooling watts, THR, total heating capacity, heating watts and THA.

Actual Result = Catalog Result x Correction Factor

EAT- Entering Air Temperature
EWT - Entering Water Temperature
DB - Dry Bulb
WB - Wet Bulb
THR - Total Heat of Rejection
THA - Total Heat of Absorption

8. CORRECTION FACTOR TABLES

Table 8.4 - Antifreeze Correction Factors						
Glycol Type	% Glycol	COOLING			HEATING	
		Total Cooling Capacity (BTUh)	Sensible Cooling (BTUh)	Watts (W)	Total Heating Capacity (BTUh)	Watts (W)
Ethylene Glycol	0	1.000	1.000	1.000	1.000	1.000
	10	0.996	0.997	1.001	0.990	0.996
	20	0.991	0.992	1.004	0.980	0.992
	30	0.987	0.985	1.009	0.971	0.988
	40	0.982	0.976	1.016	0.961	0.984
	50	0.976	0.965	1.025	0.952	0.980
Propelyne Glycol	0	1.000	1.000	1.000	1.000	1.000
	10	0.991	0.991	1.007	0.984	0.993
	20	0.983	0.982	1.012	0.968	0.986
	30	0.975	0.975	1.017	0.953	0.979
	40	0.968	0.968	1.020	0.938	0.972
	50	0.961	0.963	1.023	0.923	0.965

Antifreeze Correction Factors

Table 8.4 is used to correct the catalog values if the desired antifreeze % is not 0%. To use the table, find the desired antifreeze type on the "Glycol Type" column, then find the desired antifreeze % on the "% Glycol" column. Then multiply the catalog results by the value corresponding to the desired antifreeze % and the same output.

For example, a HRP 60 unit operating at 80 °F EWT and 3.9 GPM is expected to have a sensible capacity of 13,716 BTUh (See Table 7.2.5). However, if it is operated with 30% Ethylene Glycol, then the value of 0.985 is pulled from the correction factor table, and multiplied to the result to produce a more accurate answer of 13,510 BTUh. The same correction process is then repeated for total cooling, cooling watts, total heating capacity and heating watts.

Actual Result = Catalog Result x Correction Factor

EAT- Entering Air Temperature
EWT - Entering Water Temperature
DB - Dry Bulb
WB - Wet Bulb
THR - Total Heat of Rejection
THA - Total Heat of Absorption

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SECTION 9

FAN & MOTOR DATA

9. FAN & MOTOR DATA

9.1 PSC Motor Data

Table 9.1.1 - PSC Motor Performance Data				External Static Pressure ("w.g.)							
Model	Rated CFM	Min. CFM	Speed	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
HRP 020	200	150	High	430	353	340	317	280	238	186	-
			Medium	321	268	248	226	201	159	-	-
			Low	284	228	210	195	159	-	-	-
HRP 030	350	210	High	404	369	350	313	282	236	-	-
			Medium	312	276	252	231	-	-	-	-
			Low	276	236	218	-	-	-	-	-
HRP 040	460	270	High	601	552	520	497	381	312	-	-
			Medium	411	368	349	338	315	-	-	-
			Low	341	299	275	-	-	-	-	-
HRP 050	530	370	High	764	715	671	629	584	529	455	390
			Medium	643	584	552	505	461	413	-	-
			Low	562	511	474	448	-	-	-	-
HRP 060	630	410	High	764	715	671	629	584	529	455	-
			Medium	643	584	552	505	461	413	-	-
			Low	562	511	474	448	-	-	-	-
HRP 080	820	570	High	896	838	792	743	708	643	603	-
			Medium	853	792	751	708	672	613	-	-
			Low	784	734	699	653	613	571	-	-
HRP 100	1010	640	High	1153	1074	1008	937	846	776	672	-
			Medium	1045	970	924	853	784	708	-	-
			Low	896	853	792	743	672	-	-	-
HRP 120	1200	740	High	1227	1148	1080	1002	937	853	760	-
			Medium	1169	1097	1026	970	889	800	-	-
			Low	1153	1080	1014	950	875	792	-	-

9.2 EC Motor Data

Table 9.2.1 - ECM Motor Performance Data				External Static Pressure ("w.g.)							
Model	Rated CFM	Min. CFM	Torque	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
HRP 020	200	150	100%	439	402	377	340	292	243	180	-
			80%	438	402	374	337	294	243	180	-
			60%	380	352	333	312	286	243	170	-
			40%	304	274	248	220	186	163	-	-
			20%	207	159	-	-	-	-	-	-
HRP 030	350	210	100%	430	402	379	340	294	245	-	-
			80%	433	404	377	340	302	248	-	-
			60%	379	350	330	312	288	245	-	-
			40%	304	274	250	218	-	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 040	460	270	100%	610	571	544	500	380	-	-	-
			80%	535	492	459	420	376	-	-	-
			60%	451	404	363	310	-	-	-	-
			40%	354	301	-	-	-	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 050	530	370	100%	681	638	597	566	530	444	-	-
			80%	598	559	510	468	434	398	-	-
			60%	505	453	406	-	-	-	-	-
			40%	399	-	-	-	-	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 060	630	410	100%	681	638	597	566	530	444	-	-
			80%	598	559	510	468	434	-	-	-
			60%	505	453	-	-	-	-	-	-
			40%	-	-	-	-	-	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 080	820	570	100%	964	904	861	812	765	703	636	581
			80%	896	857	830	784	735	687	630	574
			60%	789	724	703	671	642	612	587	-
			40%	624	581	-	-	-	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 100	1010	640	100%	1206	1131	1068	1008	937	882	784	690
			80%	1185	1131	1063	1008	930	860	760	672
			60%	1063	1014	963	917	868	808	743	-
			40%	868	808	768	717	653	-	-	-
			20%	-	-	-	-	-	-	-	-
HRP 120	1200	740	100%	1277	1227	1142	1086	1020	930	831	-
			80%	1277	1217	1137	1068	1002	917	831	-
			60%	1257	1201	1137	1068	1002	903	815	-
			40%	1063	1020	989	950	903	868	800	-
			20%	-	-	-	-	-	-	-	-

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SECTION 10

SPECIFICATIONS

10. SPECIFICATIONS

PART ONE - GENERAL

1.1 General

1.1.1. Conform to General Provisions For Mechanical Divisions Section _____ and Basic Materials and Methods Section _____.

1.2 Submittals

1.2.1. Submit shop drawings and product data in accordance with Section _____.

1.2.2. Indicate the following: complete specifications; wiring diagrams (showing all interconnections) weight and performance details.

1.2.3. Provide data for inclusion in the Operating and Maintenance manuals in accordance with Section _____.

PART TWO - PRODUCT

2.1 General

2.1.1. Vertical stacked heat pump units shall be Omega (Gold & Silver) Series. Units shall provide scheduled capacities at the ampacity and voltage specified.

2.1.2. The cabinet shall be 20 gauge galvanized steel. Riveted internal components for rigidity. Insulate internal surfaces with 1" thick acoustic and thermal mould resistant insulation.

2.1.3.A (STANDARD SILVER UNIT) Unit shall be consistent of single entity cabinet and contractor is responsible to isolate the discharge. Unit shall be lined with 1" thick, 3.5 lbs. density, mould resistant, neoprene lined and mechanically fastened acoustic insulation on all inside surfaces.

2.1.3.B (OPTIONAL GOLD UNITS) Cabinet shall be sectionalized for acoustic and installation purposes. Lower section shall have risers attached to it, house supply fan and removable chassis. Upper section shall be an acoustic discharge plenum with 1" thick, 3.5 lbs. density, mould resistant, neoprene lined and mechanically fastened acoustic insulation on all inside surfaces. Discharge plenum shall be designed to be fastened to the underside of the concrete slab with (factory)(field) cut discharge openings. There shall be no rigid connection between the upper and lower cabinet sections. Provide a factory installed flexible connection between the upper and lower sections. Ensure mating surfaces of the canvas connection overlap by at least two inches, and are glued together. Provide "S" cleat to join upper and lower plenums to the metal portion of the flex connection. Fasten metal portion of the flex connection with sheet metal screws through the "S" cleat into the metal of the plenums. Heat pump manufacturer shall factory attach flexible connection to the discharge plenum section. Installing contractor shall make the final connection of the flexible connection to the lower cabinet section with field provided sheet metal screws into the factory installed "S" cleat.

2.1.4. The drain pan shall be 16 gauge stainless steel. Provide a 7/8 OD copper drain connection.

2.1.5. Provide direct drive fan and motor assembly with internally overload protected, permanent split capacitor and oil lubricated motor. Units shall be supplied with three speed fan motors. Fan motors are factory wired to high speed.

2.1.6. Factory installed supply and return risers shall be (Type M) (Type L) (Type K) copper, with two combination balancing and shut off ball valves inside the cabinet. Valves shall be brass and rated for 400 PSI. Provide (3/4" internal) (external) condensate riser factory installed. Risers sizes shall be as shown on the plans.

2.1.7. Provide high temperature, high pressure water hoses for connection of the risers to the chassis. Hoses supplied shall be constructed with an inner core of rubber, a metal braided covering and an outer rubber coating. Fittings shall be brass construction. Hoses shall carry a pressure rating of 2000 PSIG. Steel braided hoses without the outer rubber covering are not acceptable.

2.1.8. The compressor chassis shall be mounted on 12 gauge slide rails. The chassis shall be isolated from the cabinet. Compressor shall have an acoustical enclosure ensuring compressor noise is isolated from air stream. Provide plug type electrical connections so that the chassis can be easily removed from the front of the cabinet for service.

10. SPECIFICATIONS

2.1.9. The refrigeration circuit shall have two Schrader service valves extended to the top of the compressor enclosure. The service valves shall be accessible without removing the chassis. The refrigerant circuit shall contain reversing valve and refrigerant metering device arranged for reversing refrigerant flow.

2.1.10. Compressor shall be hermetically sealed type with internal thermal overload protection. Compressor shall be mounted on RIS isolation.

2.1.11. Air side coils shall have copper tubes mechanically bonded to aluminum fins. Coils shall be sized to meet scheduled performance for cooling and heating. Provide 1" T/A filter on coil face.

2.1.12. Water side heat exchanger shall be coaxial type with steel outer tube and copper inner tube. Condenser shall be rated at 400 PSI water side and 450 PSI refrigerant side.

2.1.13. Each unit shall be supplied with double deflection supply grilles as shown on the plans.

2.1.14. Each unit shall have (Acoustic) (Perimeter) return air acoustical panel. Panel shall be insulated with acoustical insulation. Panel shall be easily removable without tools to allow access for filter and disconnect. Panel shall be flush mounted on the drywall.

2.1.15. Unit mounted control enclosure shall contain: controls for compressor; reversing valve and fan motor; 24 volt control power transformer; terminal block for low voltage field wiring connection; terminal block for main electrical connection; (optional) unit mounted disconnect switch. Operating and safety controls shall include: low suction pressure; high discharge pressure lock out switch; compressor overload; supply fan overload. Reset of safety devices shall be accomplished by interrupting power supply to the unit. All control components, except CPT and reversing valve, shall be mounted on a circuit board with plug in quick connects to components they are controlling. Compressor capacitor shall be located in the control panel. Relays and capacitors shall be located within the acoustic compressor enclosure.

2.1.16. Thermostats shall be (unit) (remote) mounted. Thermostat shall have a minimum 5-minute off time between compressor starts. Thermostats shall be:

(A) Manual changeover low voltage for cooling and heating operation. Sub base shall have system "Heat-Off-Cool" and fan "On-Auto" switches.

(B) Automatic changeover low voltage for cooling and heating operation. Sub base shall have system "Off-Auto" and fan "On-Auto" switches.

(C) Programmable microelectronic for cooling and heating, night setback, night setup, and day/night time clock operation. Thermostat shall have system "On-Off", temperature "Heat-Auto-Cool" and fan "On-Auto" switches.

2.1.17. Warranty shall be for 1 year not to exceed 18 months from date of shipment for parts only. (Optional) Provide 5 year compressor replacement parts warranty only. (Optional) Provide 5 year complete refrigerant circuit parts and labour warranty.

PART THREE—EXECUTION

3.1 Installation

3.1.1 Install units on neoprene vibration isolation pads.

3.1.2. Install all units neat and level following manufacturer instructions.

3.1.3. Installing contractor shall supply and install connection fittings to units. The flare fittings should be connected in a fashion matching industry standards. (Finger tight plus 1/4 turn with wrench.)

3.1.4. (Add for Gold Units) Discharge plenum shall be fastened to the underside of the concrete slab.

3.1.5. Flush the system per manufacturer instructions before connecting chassis water connections to risers.

3.1.6. Engage the services of a trained representative of the equipment manufacturer to supervise the startup of units.

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SECTION 11

START-UP PROCEEDURES

11. SYSTEM START-UP PROCEEDURES

The following information is designed to guide you through the process of flushing the HRP system. Failure to perform any of the steps below will result in the termination of the manufacturer's warranty.

- Store the chassis above freezing point
- Chassis should be at room temperature prior to start up
- Prior to first operation of any HRP unit, the water circulating system must be cleaned and flushed of all construction dirt and debris. The chassis cannot be connected to system when flushing is being conducted. Supply and return pipes must be interconnected with factory supplied hoses to properly flush system. This will prevent the introduction of dirt into the chassis
- Prior to filling, the installer should ensure all fitting connections to the heat pumps meet industry standards (finger tight plus 1/4 turn with wrench)
- Fill system at city water makeup connection with all air vents open. After filling, close all air vents assure that boiler and heat rejector are off, but flow is allowed through each. The installer/contractor should start main circulating pump with pressure reducing makeup valve open. Check vents in sequence to bleed off any trapped air, assuring circulation through all components of the system
- Shut off circulating pump and open all drains and vents to completely drain the system. Short circuited supply and return runouts should now be connected to the HRP unit with factory supplied supply and return hoses. Teflon tape is recommended instead of pipe dope for pipe thread connections. Do not use sealers at the swivel flare connections of hoses
- Trisodium phosphate is recommended as a cleaning agent during flushing. However, many localities prohibit the introduction of phosphates into their sewage systems. The current recommendation is to contact your local water treatment specialist
- Refill the system with clean water. Test with litmus paper for acidity, and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Do not use automotive grade antifreeze
- Installing contractor to provide written confirmation that the system was properly flushed and balanced. An independent flushing & balancing agency must be used. Once this is complete, a proper start can be completed by HRP start-up contractor
- Set the system heat add set point to 70°F (27°C), and the heat rejection set point to 85°F (29°C). Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season) and air vented and loop temperatures stabilized, each of the HRP units will be ready for check, test and start-up and for air and water balancing

omega
HEAT PUMPS

Omega has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

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