INSTALLATION MANUAL

R-410A

DHQ024-060

2-5 Ton

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General

Unitary Products Model DHQ units are dual fuel heat pump units designed for outdoor installation. Only gas piping, electric power and duct connections are required at the point of installation.

The two stage gas-fired heaters have spark to pilot ignition. The tubular heat exchangers are aluminized steel.

The refrigerant system is fully charged with R-410A Refrigerant, and is tested and factory sealed.

Safety Considerations

This is a safety alert symbol ⚠. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention the signal words **DANGER**, **WARNING** or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury.**

WARNING indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury.**

CAUTION indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury.** It is also used to alert against unsafe practices and hazards involving only property damage.

⚠WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.

⚠ CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state and national codes including, but not limited to building, electrical, and mechanical codes.

⚠WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gage sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

⚠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.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

a. Do not try to light any appliance.
b. Do not touch any electrical switch; do not use any phone in your building.
c. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
d. If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠WARNING

Lo-NOx furnaces requiring propane (LP) gas must have the NOx screens removed prior to operation. Failure to do so may result in operational problems and/or reduced heat exchanger life. Follow the instructions below for removal of the NOx screens.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including ANSI Z223.1 or CSA-B149.1- latest edition.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

Inspection

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state and national codes including, but not limited to, building, electrical, and mechanical codes.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG.

Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG

Renewal Parts

Contact your local Unitary Products parts distribution center for authorized replacement parts.

Approvals

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with supplemental electric heat or a forced air furnace.
2. For outdoor installation only.
3. For installation on combustible material and may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials.
4. For use with natural gas (convertible to LP with kit).

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

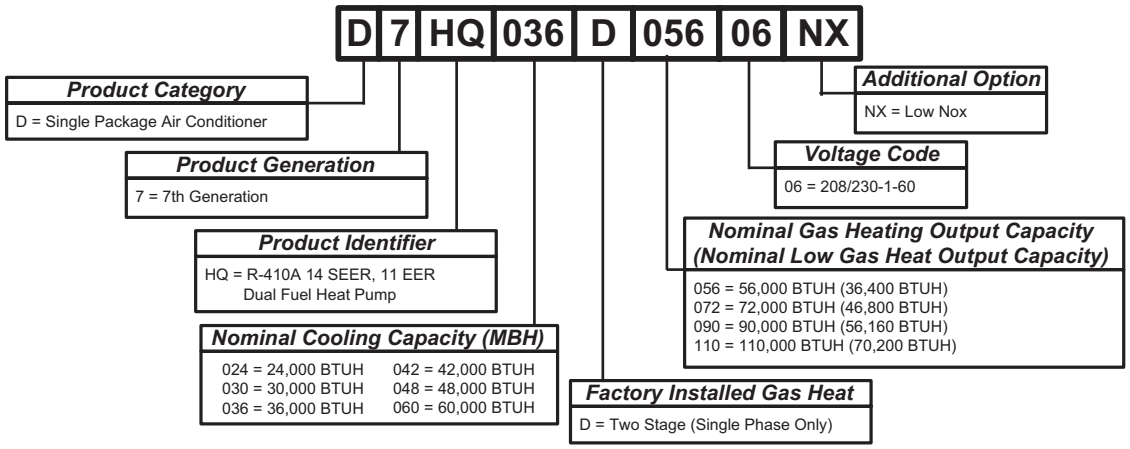
⚠WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.

Nomenclature



Installation

Installation Safety Information

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Refer to the unit rating plate for the approved type of gas for this product.
2. Install this unit only in a location and position as specified on Page 5 of these instructions.
3. Never test for gas leaks with an open flame. Use commercially available soap solution made specifically for the detection of leaks when checking all connections, as specified on Pages 3 and 14 of these instructions.
4. Always install furnace to operate within the furnace's intended temperature-rise range with the duct system and within the allowable external static pressure range, as specified on the unit name/rating plate, specified on Page 17 of these instructions.
5. This equipment is not to be used for temporary heating of buildings or structures under construction.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

Limitations

These units must be installed in accordance with the following:

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. National Fuel Gas Code, ANSI Z223.1 - Latest Edition

3. Gas-Fired Central Furnace Standard, ANSI Z21.47a. - Latest Edition
4. Local building codes, and
5. Local gas utility requirements

In Canada:

1. Canadian Electrical Code, CSA C22.1
2. Installation Codes, CSA - B149.1.
3. Local plumbing and waste water codes, and
4. Other applicable local codes.

Refer to unit application data found in this document.

After installation, gas fired units must be adjusted to obtain a temperature rise within the range specified on the unit rating plate.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

This furnace is not to be used for temporary heating of buildings or structures under construction.

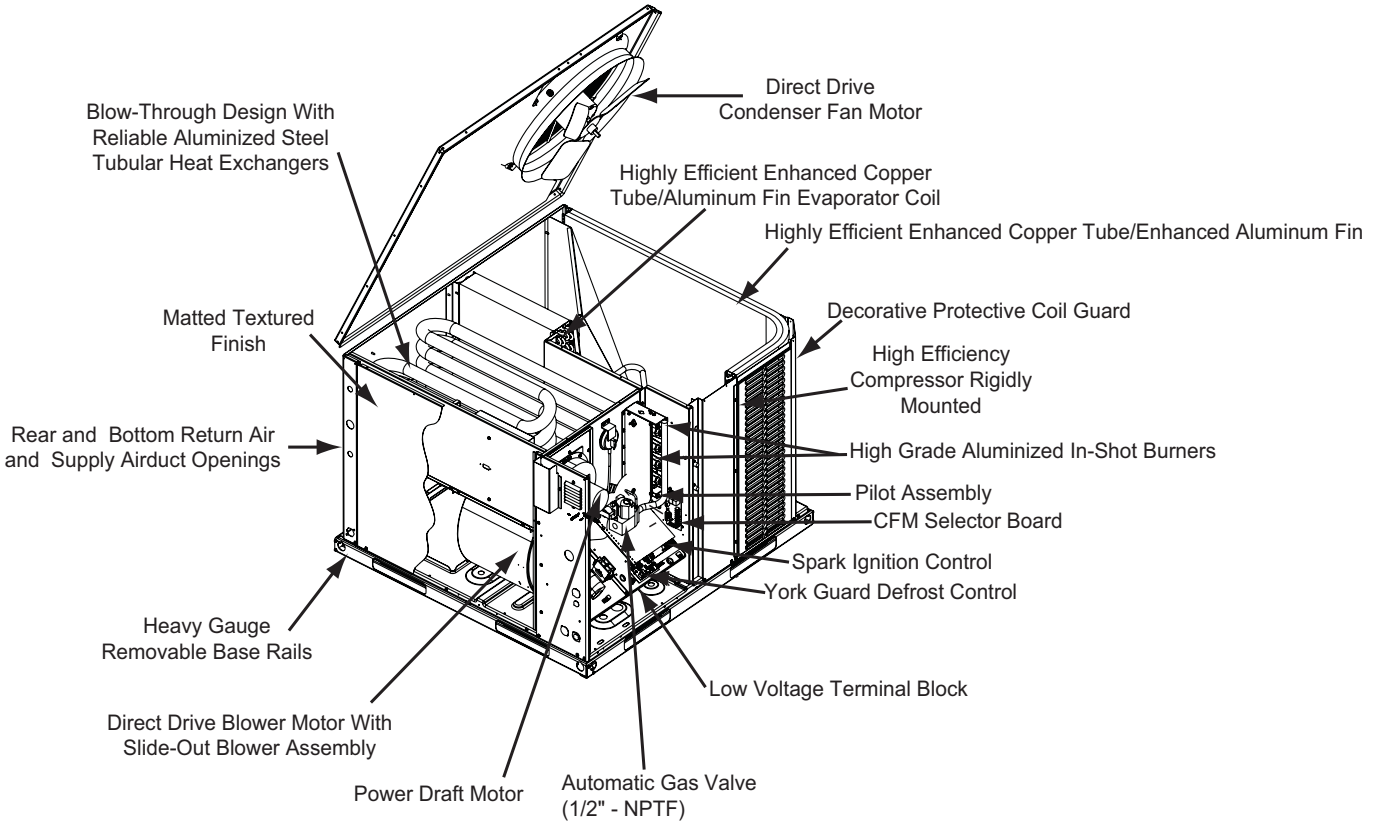


Figure 1: Component Location

Table 1: Unit Limitations

Model (Tons)	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temp
		Min	Max	Max (°F)
DHQ024 (2.0)	208/230-1-60	187	252	125
DHQ030 (2.5)	208/230-1-60	187	252	125
DHQ036 (3.0)	208/230-1-60	187	252	125
DHQ042 (3.5)	208/230-1-60	187	252	125
DHQ048 (4.0)	208/230-1-60	187	252	125

Table 1: Unit Limitations

Model (Tons)	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temp
		Min	Max	Max (°F)
DEQ060 (5.0)	208/230-1-60	187	252	125

Location

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only*.
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, a level pad or slab should be used. The thickness and size of the pad or slab used should meet local codes and unit weight. Do not tie the slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/8” across the entire width and length of unit.

⚠WARNING

Excessive exposure of this furnace to contaminated combustion air may result in equipment damage or personal injury. Typical contaminates include: permanent wave solution, chlorinated waxes and cleaners, chlorine based swimming pool chemicals, water softening chemicals, carbon tetrachloride, Halogen type refrigerants, cleaning solvents (e.g. perchloroethylene), printing inks, paint removers, varnishes, hydrochloric acid, cements and glues, antistatic fabric softeners for clothes dryers, masonry acid washing materials.

Clearances

All units require particular clearances for proper operation and service. Installer must make provisions for adequate combustion and ventilation air in accordance with section 5.3 of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 – Latest Edition (in U.S.A.), or Sections 7.2, 7.3, or 7.4 of Gas Installation Codes, CSA-B149.1 (in Canada) - Latest Edition, and/or applicable provisions of the local building codes. Refer to Table 5 for clearances required for combustible construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

Rigging And Handling

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a Unitary Products roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

⚠ CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

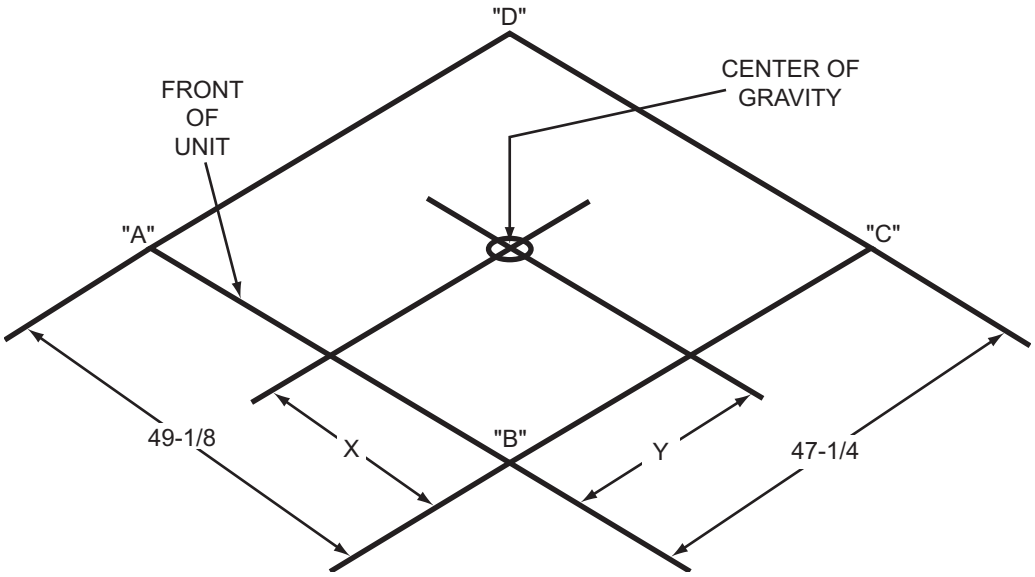


Figure 2: Unit 4 Point Load Weight

Table 2: Weights and Dimensions

Model (Tons)	Weight (lbs.)		Center of Gravity		4 Point Load Location (lbs.)				6 Point Load Location (lbs.)					
	Shipping	Operating	X	Y	A	B	C	D	A	B	C	D	E	F
DHQ024 (2.0)	418	413	25	20.1	81	88	128	116	53	56	60	87	81	76
DHQ030 (2.5)	431	426	24.4	20.1	85	89	129	123	56	58	60	86	84	81
DHQ036 (3.0)	438	433	24.6	20.1	86	91	132	124	57	59	61	89	85	82
DHQ042 (3.5)	519	514	25.1	20.4	101	112	158	143	66	71	76	107	100	93
DHQ048 (4.0)	545	540	25.3	20.8	107	121	165	146	70	76	82	112	103	96
DHQ060 (5.0)	554	549	25.5	20.5	107	122	171	149	70	76	83	117	106	97

Table 3: Unit Accessory Weights

Unit Accessory	Model	Weight (lbs.)	
		Shipping	Operating
Add Economizer	All	45	40

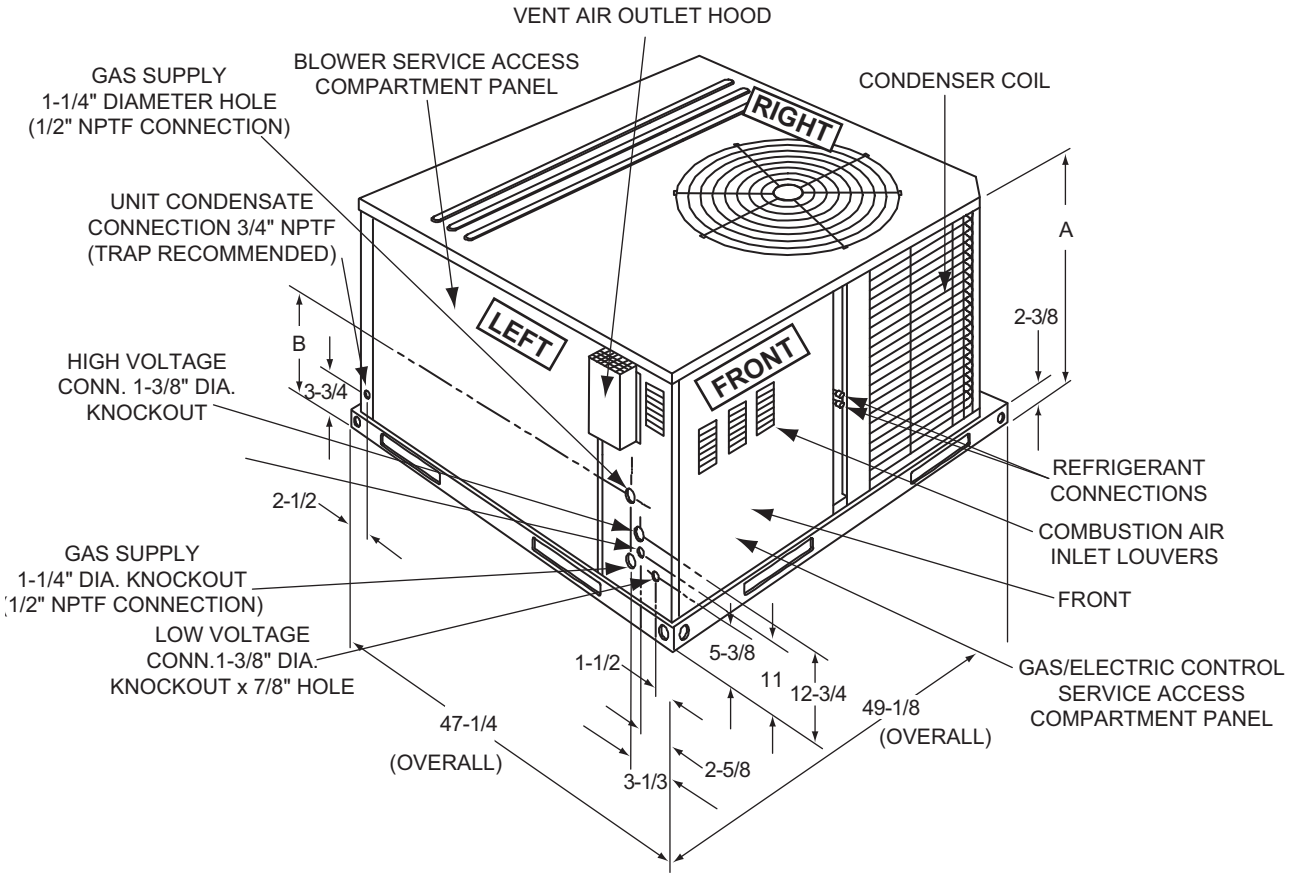


Figure 3: Unit Dimensions

Table 4: Unit Dimensions Front

Unit Model	Dimensions	
	"A"	"B"
DHQ024, 030, 036	33-1/2	18-1/4
DHQ042, 048, 060	41-1/2	23-1/8

Table 5: Unit Clearances[1] [2]

Direction	Distance (in.)	Direction	Distance (in.)
Top[3]	36	Right	12
Front	36	Left	24
Rear	0	Bottom[4]	0

1. A 1" clearance must be provided between any combustible material and the supply air duct work.
2. The products of combustion must not be allowed to accumulate within a confined space and recirculate.
3. Units must be installed outdoors. Over hanging structure or shrubs should not obscure condenser air discharge outlet.
4. Units may be installed on combustable floors made from wood or class A, B or C roof covering materials.

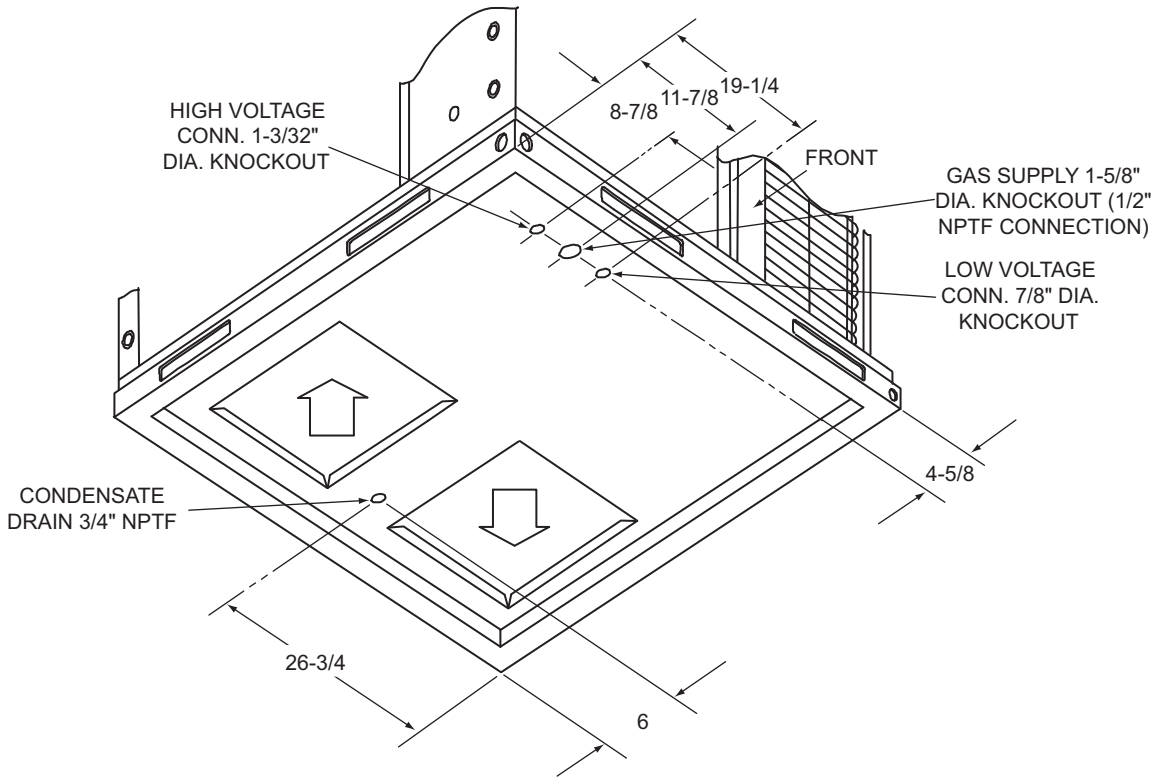


Figure 4: Dimensions Front and Bottom

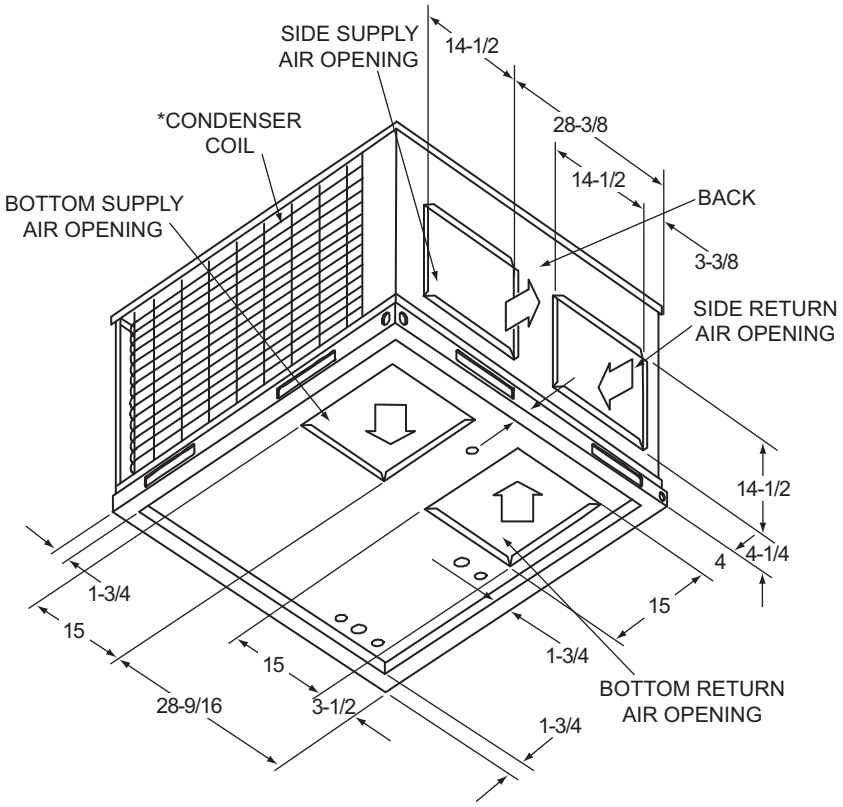


Figure 5: Dimensions Back and Bottom

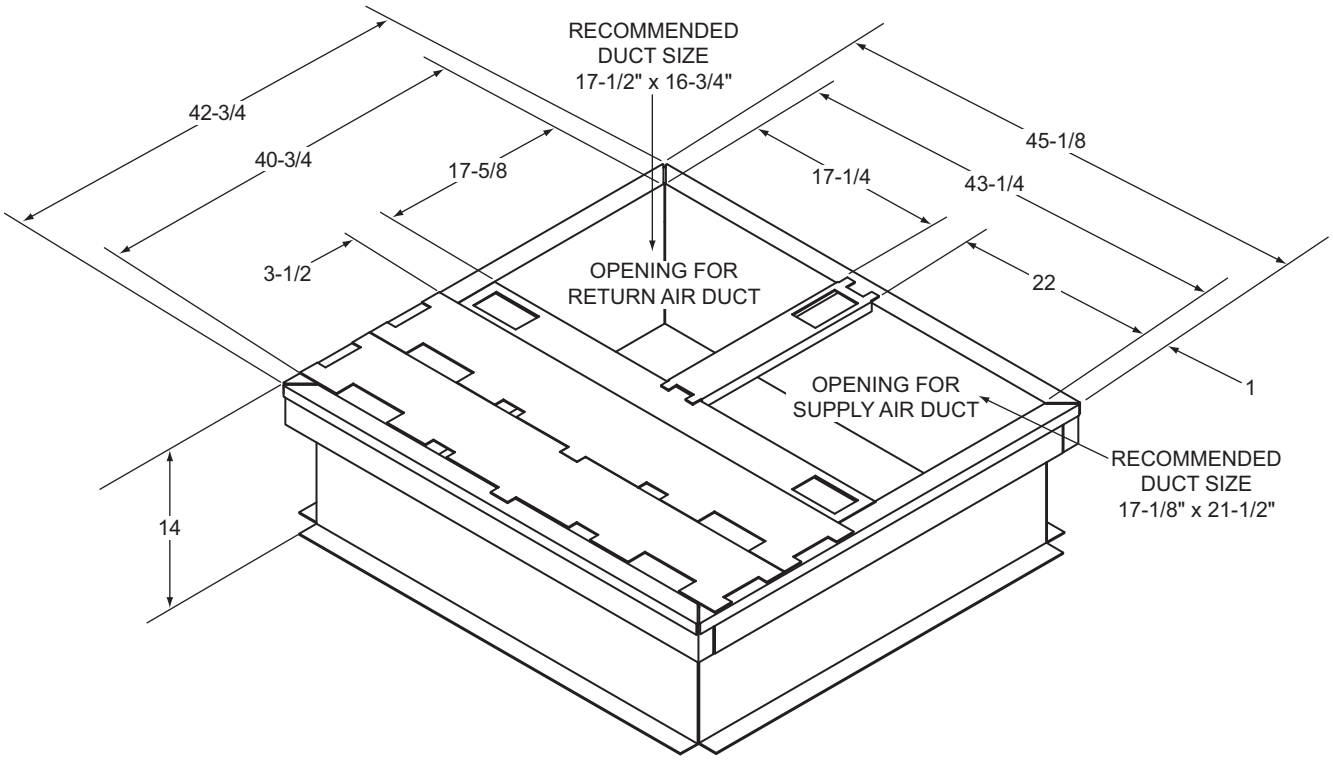


Figure 6: Roof Curb[1]

Ductwork

These units are adaptable to downflow use as well as rear supply and return air duct openings. To convert to downflow, use the following steps:

1. Remove the duct covers found in the bottom return and supply air duct openings. There are four (4) screws securing each duct cover (save these screws to use in Step 2).
2. Install the duct covers (removed in step one) to the rear supply and return air duct openings. Secure with the four (4) screws used in step one.
3. Seal duct covers with silicone caulk.

Duct work should be designed and sized according to the methods of the Air Conditioning Contractors of America (ACCA), as set forth in their Manual D.

A closed return duct system shall be used. This shall not preclude use of economizers or ventilation air intake. Flexible joints may be used in the supply and return duct work to minimize the transmission of noise.

NOTE: Be sure to note supply and return openings.

Refer to Figures 4 and 5 for information concerning rear and bottom supply and return air duct openings.

Roof Curb

On applications when a roof curb is used, the unit must be positioned on the curb so the front of the unit is tight against the curb.

Filters

Single phase units are shipped without a filter or filter racks. It is the responsibility of the installer to secure a filter in the return air ductwork or install a Filter/Frame Kit (1FF0110, 1FF0112 or 1FF0114).

A filter rack and high velocity filters are standard on three phase units.

Filters must always be used and must be kept clean. When filters become dirt laden, insufficient air will be delivered by the blower, decreasing your units efficiency and increasing operating costs and wear-and-tear on the unit and controls.

Filters should be checked monthly; this is especially important since this unit is used for both heating and cooling.

1. 8” Roof Curb also available.

Condensate Drain

A condensate trap is recommended to be installed in the condensate drain. The plumbing must conform to local codes.

Use a sealing compound on male pipe threads. Install the condensate drain line (3/4” NPTF) to spill into an open drain.

⚠ CAUTION

Hand tighten only.

Service Access

Access to all serviceable components is provided at the following locations:

- Blower compartment access panel
- Gas control/electrical access panel
- Refrigerant connections

Refer to Figure 3 for location of these access locations and minimum clearances in Table 5.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gage sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

⚠WARNING

Wear safety glasses and gloves when handling refrigerants. Failure to follow this warning can cause serious personal injury.

Refer to Figure for the R-410A Quick Reference Guide.

Thermostat

The room thermostat should be located on an inside wall approximately 56" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow manufacturer's instructions enclosed with the thermostat for general installation procedure. Color coded insulated wires (minimum #18 AWG) should be used to connect thermostat to unit. See Figures thru 8.

Power And Control Wiring

Field wiring to the unit must conform to provisions of the current N.E.C. ANSI/NFPA No. 70 or C.E.C. and/or local ordinances. The unit must be electrically grounded in accordance with local codes or, in their absence, with the N.E.C./C.E.C. Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 6.

The wiring entering the cabinet must be provided with mechanical strain relief.

A fused disconnect switch should be field provided for the unit. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram.

Electrical line must be sized properly to carry the load. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figures thru 8 for typical field wiring and to the appropriate unit wiring diagram for control circuit and power wiring information.

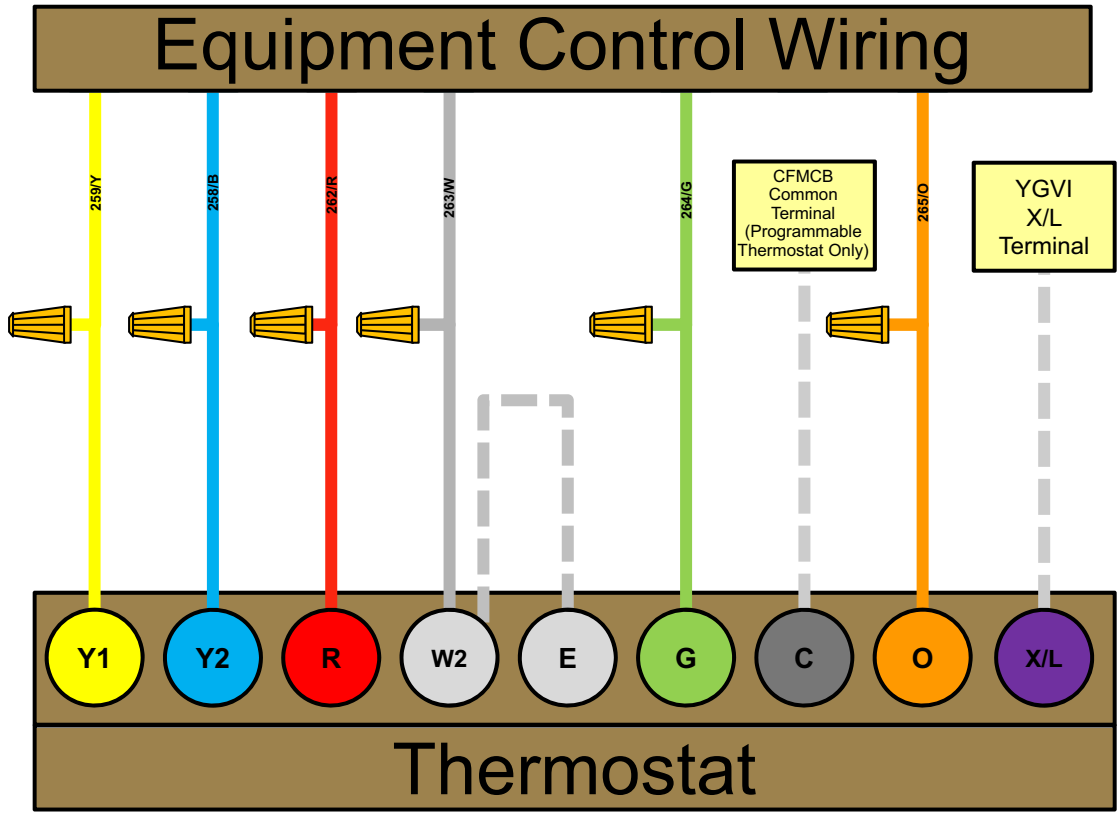


Figure 7: Typical Field Control Wiring Diagram For Dual Fuel Heat Pump

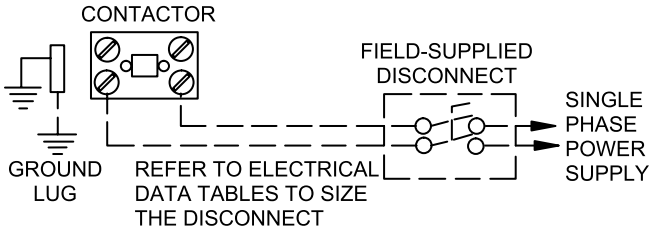


Figure 8: Typical Field Power Wiring Diagram

Table 6: Electrical Data

Model (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	MCA[1] (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)
		RLA	LRA	MCC	FLA	FLA		
DHQ024 (2.0)	208/230-1-60	11.6	58	18	2.8	4.3	21.6	30
DHQ030 (2.5)	208/230-1-60	13.1	73	20	2.8	6.8	26	35
DHQ036 (3.0)	208/230-1-60	15.2	83	24	2.8	6.8	28.6	35
DHQ042 (3.5)	208/230-1-60	17.9	96	28	2.8	9.1	34.3	45
DHQ048 (4.0)	208/230-1-60	21.1	104	33	2.8	9.1	38.3	50
DHQ060 (5.0)	208/230-1-60	28.8	153	45	2.8	9.1	47.	60

1. Minimum Circuit Ampacity.
2. Maximum Over Current Protection per standard UL 1995.
3. Fuse or HACR circuit breaker size installed at factory or field installed.

Table 7: DHQ024-060 Two Stage Gas Heat

Component	Models					
	DHQ024	DHQ030	DHQ036	DHQ042	DHQ048	DHQ060
Nominal Tonnage	**2.0**	**2.5**	**3.0**	**3.5**	**4.0**	**5.0**
AHRI COOLING PERFORMANCE						
Gross Capacity @ AHRI A point (MBH)	23.7	30.1	37.2	43.5	47.7	55.0
AHRI net capacity (MBH)	22.8	29.0	34.6	41.0	45.5	52.5
EER	11.0	11.0	11.0	11.0	11.0	11.0
SEER	14.0	14.0	14.0	14.0	14.0	14.0
Nominal CFM	850	950	1050	1400	1400	1550
System power (KW)	2.1	2.6	3.2	3.8	4.2	4.8
Refrigerant type	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge (lb-oz)	10-10	9-0	9-6	12-4	12-14	12-14
AHRI HEAT PUMP PERFORMANCE						
47ºF capacity rating (MBH)	21.0	26.5	30.5	38.0	44.4	51.4
System power (KW) / COP	3.30	3.30	3.15	3.30	3.20	3.10
17ºF capacity rating (MBH)	11.5	15.0	18.5	21.6	23.6	31.0
System power (KW) / COP	2.15	2.10	2.15	2.15	2.10	2.15
HSPF (Btu/Watts-hr)	8.0	8.0	8.0	8.0	8.0	8.0
AHRI GAS HEAT PERFORMANCE						
Heating model	D056	D056	D056 / D072	D090	D090 / D110	D090 / D110
Heat input (K Btu)	70/45.5	70/45.5	70/45.5 / 90/58.5	108/70.2	108/70.2 / 135/87.8	108/70.2 / 135/87.8
Heat output (K Btu)	56/36.4	56/36.4	56/36.4 / 72/46.8	87/56.2	87/56.2 / 108/70.2	87/56.2 / 108/70.2
AFUE[1]	81.0	81.0	81.0 / 81.0	81.0	81.0 / 81.0	81.0 / 81.0
No. burners	3	3	3 / 4	4	4 / 5	4 / 5
No. stages	2	2	2 / 2	2	2 / 2	2 / 2
Temperature Rise Range (ºF)	30-60	30-60	25-55 / 30-60	45-75	35-65 / 45-75	35-65 / 45-75
Max. Outlet Air Temp. (ºF)	175	175	175 / 175	175	175 / 175	175 / 175
Gas Limit Setting (ºF)	160	160	160 / 160	175	175 / 170	175 / 170
Gas piping connection (in.)	1/2	1/2	1/2	1/2	1/2	1/2
DIMENSIONS (inches)						
Length	49 1/8	49 1/8	49 1/8	49 1/8	49 1/8	49 1/8
Width	47 1/4	47 1/4	47 1/4	47 1/4	47 1/4	47 1/4
Height	33 1/2	33 1/2	33 1/2	41 1/2	41 1/2	41 1/2
OPERATING WT. (lbs.)						
Unit Weight (lbs.)	413	426	433	514	540	549
COMPRESSOR						
Type	Scroll 2-speeds	Scroll 2-speeds	Scroll 2-speeds	Scroll 2-speeds	Scroll 2-speeds	Scroll 2-speeds
CONDENSER COIL DATA						
Face area (Sq. Ft.)	11.9	11.9	11.9	15	15	15
Rows	2	2	2	2	2	3
Fins per inch	16	16	16	16	16	13
Tube diameter	3/8	3/8	3/8	3/8	3/8	3/8
Circuitry Type	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced
EVAPORATOR COIL DATA						
Face area (Sq. Ft.)	3.4	3.4	3.4	4.4	4.4	4.4
Rows	4	4	4	4	4	4
Fins per inch	13	13	13	13	13	13
Tube diameter	3/8	3/8	3/8	3/8	3/8	3/8
Circuitry Type	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced
Refrigerant control	TXV	TXV	TXV	TXV	TXV	TXV
CONDENSER FAN DATA						
Fan diameter (Inch)	22	22	22	22	22	22
Type	Prop	Prop	Prop	Prop	Prop	Prop
Drive type	Direct	Direct	Direct	Direct	Direct	Direct
No. speeds	1	2	2	2	2	2
Motor HP	1/3	1/3	1/3	1/3	1/3	1/3
RPM	850	1100	1100	1100	1100	1100
Nominal total CFM	2000	2400	2400	3200	3200	3200
DIRECT DRIVE EVAP FAN DATA						
Fan Size (Inch)	10 x 8	10 x 8	11 x 10	12 x 11	12 x 11	12 x 11
Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Motor HP	1/2	3/4	3/4	1	1	1
RPM	Variable	Variable	Variable	Variable	Variable	Variable
Frame size	48	48	48	48	48	48
FILTERS						
Quantity - Size	1 - 20 x 20 x 1	1 - 20 x 20 x 1	1 - 20 x 20 x 1	2 - 20 x 12 x 1	2 - 20 x 12 x 1	2 - 20 x 12 x 1

1. 208/230 volt single phase only.

Compressors

The scroll compressor used in this product is specifically designed to operate with R-410A Refrigerant and cannot be interchanged.

⚠ CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.

The compressor also uses a polyolester (POE oil), Mobil 3MA POE. This oil is extremely hydroscopic, meaning it absorbs water readily. POE oil can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

⚠ CAUTION

Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the **POE oil** in the system. This type of oil is highly susceptible to moisture absorption

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials.

⚠ CAUTION

Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take precautions to protect roofing.

Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device or coil.

Units are shipped with compressor mountings which are factory-adjusted and ready for operation.

⚠ CAUTION

Do not loosen compressor mounting bolts.

Gas Heat

These single or two stage gas-fired heaters have aluminized-steel tubular heat exchangers with spark to pilot ignition.

Gas Piping

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of run. National Fuel Gas Code Z223.1 or CSA B149.1 should be followed in all cases unless superseded by local codes or gas company requirements. Refer to Tables 8 and 9.

The heating value of the gas may differ with locality. The value should be checked with the local gas utility.

NOTE: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1/2 inch pipe connection at the gas valve.

Gas Connection

The gas supply line can be routed through the hole located on the left side of the unit. Refer to Figure 3 to locate these access openings. Typical supply piping arrangements are shown in Figure 9.

Gas piping requirements:

1. A drip leg and a ground joint union must be installed in the gas piping.
2. When required by local codes, a manual shut-off valve may have to be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

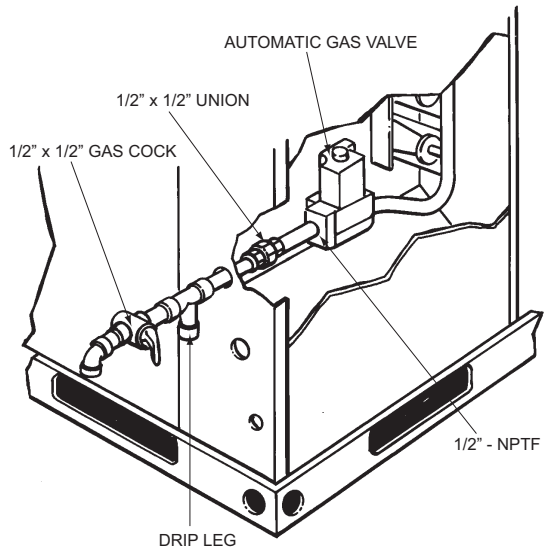


Figure 9: External Supply Connection External Shut-Off

Table 8: Natural Gas Pipe Sizing Chart[1]

Length In Feet	Nominal Inches Iron Pipe Size			
	1/2"	3/4"	1"	1-1/4"
10	132	278	520	1,050
20	92	190	350	730
30	73	152	285	590
40	63	130	245	500
50	56	115	215	440
60	50	105	195	400
70	46	96	180	370
80	43	90	170	350
90	40	84	160	320
100	38	79	150	305

1. Maximum capacity of pipe in cubic feet of gas per hour (based upon a pressure drop of 0.3 inch water column and 0.6 specific gravity gas).

Table 9: Propane (LP) Gas Pipe Sizing Chart[1]

Length In Feet	Nominal Inches Iron Pipe Size			
	1/2"	3/4"	1"	1-1/4"
10	275	567	1,071	2,205
20	189	393	732	1,496
30	152	315	590	1,212
40	129	267	504	1,039
50	114	237	448	913
60	103	217	409	834
70	96	196	378	771
80	89	185	346	724
90	83	173	322	677
100	78	162	307	630

1. Maximum capacity of pipe in thousands of BTU per hour (based upon a pressure drop of 0.5 inch water column).

⚠ CAUTION

If flexible stainless steel tubing is allowed by the authority having jurisdiction, wrought iron or steel pipe must be installed at the gas valve and extend a minimum of two (2) inches outside of the unit casing.

⚠WARNING

Natural gas may contain some propane. Propane being an excellent solvent, will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe dope must be applied when wrought iron or steel pipe is used. Shellac base compounds such as gaskoloc or stalastic, and compounds such as rectorseal # 5, Clyde's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out the loose dirt and scale. Before initial start-up, be sure that all of the gas lines external to the unit have been purged of air.
5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under Limitations, shown on Page 3. After the gas connections have been completed, open the main shut-off valve admitting normal gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. NEVER USE A FLAME.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

6. The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve before conducting any pressure testing of the gas supply piping system at test pressures equal to or greater than 1/2 psig (3.48 kPa).

Flue Vent Hood

The flue vent hood with screen is shipped loose. This hood must be installed to assure proper unit operation. The hood must be fastened to the outside of the side gas control/electrical compartment with the screws provided in the bag attached to the inside of the gas control/electrical compartment, see Figure 10.

⚠WARNING

Flue hood surfaces may be hot.

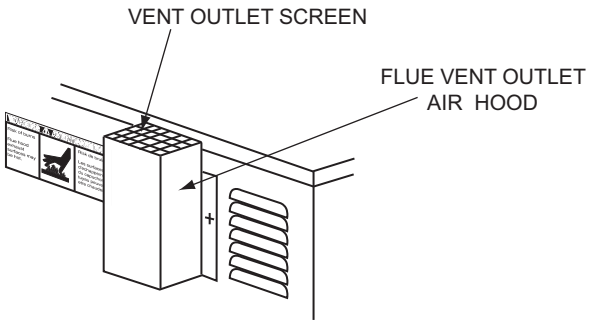


Figure 10: Flue Vent Outlet Air Hood

⚠ CAUTION

The flue exhaust hood must be properly installed and within the recommended clearances. Further communications and action must be given to the home or building owner(s) to eliminate any unauthorized human contact around this area during the heating cycle. Flue hood surface and the immediate area reach high temperatures during the heating cycle.

Table 10: Natural Gas Application Data-Two Stage

Available On Models	Input (MBH)[1] High Fire/Low Fire	Output (MBH) High Fire/Low Fire	Gas Rate[2] Ft.^{3}/Hr. High Fire/Low Fire	Number of Burners	Temp. Rise ºF At Full Input[3]	
					Min.	Max.
2 Ton	70 / 45.5	56 / 36.4	65 / 42	3	30	60
3 Ton	70 / 45.5	56 / 36.4	65 / 42	3	25	55
3 Ton	90 / 58.5	72 / 46.8	84 / 54	4	30	60
4, 5 Ton	108 / 70.2	87 / 56.2	100 / 65	4	35	65
4, 5 Ton	135 / 87.75	108 / 70.2	126 / 82	5	45	75

1. Heating capacity valid for elevations up to 2000 feet above sea level. For elevations above 2,000 feet, rated capacity should be reduced by 4% for each 1,000 feet above sea level.
2. Based on 1075 BTU/Ft.^{3}.
3. The air flow must be adequate to obtain a temperature rise within the range shown. Continuous return air temperature should not be below 55°F.

Table 11: Propane[1] (LP) Gas Application Data-Two Stage

Available On Models	Input Capacity (Mbh)[2] High Fire/Low Fire	Output Capacity (Mbh) High Fire/Low Fire	Gas Rate[3] Ft.^{3}/Hr. High Fire/Low Fire	Number of Burners	Temp. Rise ºF At Full Input[4]	
					Min.	Max.
2 Ton	70 / 45.5	56 / 36.4	28 / 18.2	3	30	60
3 Ton	70 / 45.5	56 / 36.4	28 / 18.2	3	25	55
3 Ton	90 / 58.5	72 / 46.8	36 / 23.4	4	30	60
4, 5 Ton	108 / 70.2	87 / 56.2	43 / 27.95	4	35	65
4, 5 Ton	135 / 87.75	108 / 70.2	54 / 35.1	5	45	75

1. Propane applications are accomplished by field installation of a Propane Conversion Accessory, Model 1NP0809 for 2 and 3 Ton units with 33-1/2" tall cabinets and Model 1NP0810 for 4 and 5 Ton units with 41-1/2" tall cabinets.
2. Heating capacity valid for elevations up to 2,000 feet above sea level. For elevations above 2,000 feet, rated capacity should be reduced by 4% for each 1,000 feet above sea level.
3. Based on 2500 BTU/Ft.^{3}.
4. The air flow must be adequate to obtain a temperature rise within the range shown. Continuous return air temperature should not be below 55°F.

Airflow Performance

Bottom Duct Application

Table 12: DHQ024-060

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ024 (2.0)	Cool	Low	Y1+O	COOL-A	580	89	112	134	159	184	206	229	252	276
			Y1+O	COOL-B	400	43	62	81	101	121	137	153	173	192
			Y1+O	COOL-C	600	96	119	142	167	193	216	239	263	287
			Y1+O	COOL-D	667	120	145	170	198	225	250	275	301	328
		High	Y1+Y2+O	COOL-A	870	215	248	281	315	349	380	410	444	477
			Y1+Y2+O	COOL-B	600	95	119	142	167	193	216	239	263	287
			Y1+Y2+O	COOL-C	900	232	266	301	335	370	402	434	468	503
			Y1+Y2+O	COOL-D	1000	292	332	371	410	448	482	516	555	594
	Heat Pump	Low	Y1	COOL-A	600	96	119	142	167	193	216	239	263	287
			Y1	COOL-B	500	65	86	107	130	152	172	192	213	235
			Y1	COOL-C	467	57	77	97	119	141	159	178	199	220
			Y1	COOL-D	667	120	145	170	198	225	250	275	301	328
		High	Y1+Y2	COOL-A	900	232	266	301	335	370	402	434	468	503
			Y1+Y2	COOL-B	750	155	183	211	241	271	299	326	355	384
			Y1+Y2	COOL-C	700	133	159	186	214	243	269	295	322	349
			Y1+Y2	COOL-D	1000	292	332	371	410	448	482	516	555	594
	Heat	D056	W1	HEAT-A	670	121	146	172	199	227	-	-	-	-
			W1	HEAT-B	690	129	155	181	209	237	-	-	-	-
			W1	HEAT-C	710	137	164	191	219	248	-	-	-	-
			W1	HEAT-D	750	155	183	211	241	271	-	-	-	-
			W1+W2	HEAT-A	940	255	291	328	364	400	-	-	-	-
			W1+W2	HEAT-B	970	273	311	349	386	424	-	-	-	-
			W1+W2	HEAT-C	1000	292	332	371	410	448	-	-	-	-
			W1+W2	HEAT-D	1050	326	368	410	450	490	-	-	-	-
DHQ030 (2.5)	Cool	Low	Y1+O	COOL-A	634	119	142	164	192	220	245	269	294	319
			Y1+O	COOL-B	500	98	118	137	160	182	203	224	244	264
			Y1+O	COOL-C	700	136	160	185	215	245	272	298	325	351
			Y1+O	COOL-D	834	183	212	242	275	308	339	369	397	425
		High	Y1+Y2+O	COOL-A	950	239	273	308	342	377	410	444	472	500
			Y1+Y2+O	COOL-B	750	151	178	204	235	267	295	323	350	377
			Y1+Y2+O	COOL-C	1050	298	337	376	411	446	482	519	546	573
			Y1+Y2+O	COOL-D	1250	446	496	547	580	613	655	697	718	739
	Heat Pump	Low	Y1	COOL-A	700	136	160	185	215	245	272	298	325	351
			Y1	COOL-B	634	119	142	164	192	220	245	269	294	319
			Y1	COOL-C	767	157	184	211	243	275	303	331	359	387
			Y1	COOL-D	834	183	212	242	275	308	339	369	397	425
		High	Y1+Y2	COOL-A	1050	298	337	376	411	446	482	519	546	573
			Y1+Y2	COOL-B	950	239	273	308	342	377	410	444	472	500
			Y1+Y2	COOL-C	1150	367	411	456	490	525	564	603	628	652
			Y1+Y2	COOL-D	1250	446	496	547	580	613	655	697	718	739
	Heat	D056	W1	HEAT-A	680	130	154	178	208	237	-	-	-	-
			W1	HEAT-B	735	146	172	198	229	260	-	-	-	-
			W1	HEAT-C	790	166	193	221	253	286	-	-	-	-
			W1	HEAT-D	840	186	215	245	278	312	-	-	-	-
			W1+W2	HEAT-A	1050	298	337	376	411	446	-	-	-	-
			W1+W2	HEAT-B	1135	356	399	443	478	512	-	-	-	-
			W1+W2	HEAT-C	1220	421	470	519	552	585	-	-	-	-
			W1+W2	HEAT-D	1300	489	543	597	629	660	-	-	-	-

Table 12: DHQ024-060 (Continued)

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ036 (3.0)	Cool	Low	Y1+O	COOL-A	734	123	158	194	229	264	298	331	365	398
			Y1+O	COOL-B	600	78	113	147	179	210	238	265	291	315
			Y1+O	COOL-C	834	165	202	238	276	313	350	388	426	465
			Y1+O	COOL-D	900	197	235	273	311	350	390	430	471	512
		High	Y1+Y2+O	COOL-A	1100	314	355	396	439	482	526	571	617	663
			Y1+Y2+O	COOL-B	900	197	235	273	311	350	390	430	471	512
			Y1+Y2+O	COOL-C	1250	422	466	510	555	601	647	694	741	788
			Y1+Y2+O	COOL-D	1350	503	550	597	643	690	737	783	830	876
	Heat Pump	Low	Y1	COOL-A	767	136	172	208	244	279	315	350	385	420
			Y1	COOL-B	834	165	202	238	276	313	350	388	426	465
			Y1	COOL-C	900	197	235	273	311	350	390	430	471	512
			Y1	COOL-D	967	233	271	310	350	391	432	474	517	561
		High	Y1+Y2	COOL-A	1150	348	390	432	476	520	564	610	657	704
			Y1+Y2	COOL-B	1250	422	466	510	555	601	647	694	741	788
			Y1+Y2	COOL-C	1350	503	550	597	643	690	737	783	830	876
			Y1+Y2	COOL-D	1450	591	642	691	739	787	834	880	925	969
	Heat	D056	W1	HEAT-A	680	103	139	173	207	240	-	-	-	-
			W1	HEAT-B	735	123	159	194	229	264	-	-	-	-
			W1	HEAT-C	790	145	182	218	254	290	-	-	-	-
			W1	HEAT-D	840	168	204	241	279	316	-	-	-	-
			W1+W2	HEAT-A	1050	282	322	362	404	446	-	-	-	-
			W1+W2	HEAT-B	1140	341	383	425	468	512	-	-	-	-
			W1+W2	HEAT-C	1220	399	442	486	531	576	-	-	-	-
			W1+W2	HEAT-D	1300	461	507	552	598	645	-	-	-	-
		D072	W1	HEAT-A	790	145	182	218	254	-	-	-	-	-
			W1	HEAT-B	855	175	212	249	286	-	-	-	-	-
			W1	HEAT-C	920	207	245	283	322	-	-	-	-	-
			W1	HEAT-D	975	237	276	315	355	-	-	-	-	-
			W1+W2	HEAT-A	1200	384	427	470	514	-	-	-	-	-
			W1+W2	HEAT-B	1300	461	507	552	598	-	-	-	-	-
			W1+W2	HEAT-C	1400	546	595	643	690	-	-	-	-	-
			W1+W2	HEAT-D	1480	619	671	721	770	-	-	-	-	-
DHQ042 (3.5)	Cool	Low	Y1+O	COOL-A	934	225	253	281	317	352	384	415	447	479
			Y1+O	COOL-B	800	208	233	258	277	297	331	351	374	398
			Y1+O	COOL-C	1000	239	268	298	341	384	414	451	487	523
			Y1+O	COOL-D	1100	266	298	330	383	437	466	510	552	594
		High	Y1+Y2+O	COOL-A	1400	396	435	473	551	629	663	725	782	839
			Y1+Y2+O	COOL-B	1200	301	335	369	432	495	525	575	623	670
			Y1+Y2+O	COOL-C	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2+O	COOL-D	1650	560	604	648	740	832	876	946	1013	1081
	Heat Pump	Low	Y1	COOL-A	934	225	253	281	317	352	384	415	447	479
			Y1	COOL-B	867	214	241	268	295	323	356	381	409	437
			Y1	COOL-C	1000	239	268	298	341	384	414	451	487	523
			Y1	COOL-D	1100	266	298	330	383	437	466	510	552	594
		High	Y1+Y2	COOL-A	1400	396	435	473	551	629	663	725	782	839
			Y1+Y2	COOL-B	1300	345	381	417	488	559	591	647	699	752
			Y1+Y2	COOL-C	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2	COOL-D	1650	560	604	648	740	832	876	946	1013	1081
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	-	-	-
			W1	HEAT-B	920	222	250	278	312	346	378	-	-	-
			W1	HEAT-C	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-D	1050	251	282	313	361	409	439	-	-	-
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	-	-	-
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	-	-	-
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	-	-	-

Table 12: DHQ024-060 (Continued)

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ048 (4.0)	Cool	Low	Y1+O	COOL-A	967	231	260	289	328	368	398	432	467	501
			Y1+O	COOL-B	800	208	233	258	277	297	331	351	374	398
			Y1+O	COOL-C	1101	266	298	330	383	437	466	510	552	594
			Y1+O	COOL-D	1301	345	381	418	489	560	591	647	700	752
		High	Y1+Y2+O	COOL-A	1450	425	464	504	586	667	702	766	825	885
			Y1+Y2+O	COOL-B	1200	301	335	369	432	495	525	575	623	670
			Y1+Y2+O	COOL-C	1650	560	604	648	740	832	876	946	1013	1081
			Y1+Y2+O	COOL-D	1950	822	873	924	1024	1124	1189	1262	1339	1416
	Heat Pump	Low	Y1	COOL-A	1067	256	287	318	368	418	448	490	530	570
			Y1	COOL-B	1000	239	268	298	341	384	414	451	487	523
			Y1	COOL-C	1134	277	310	342	399	455	485	531	575	619
			Y1	COOL-D	1301	345	381	418	489	560	591	647	700	752
		High	Y1+Y2	COOL-A	1600	523	566	609	699	788	830	898	964	1030
			Y1+Y2	COOL-B	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2	COOL-C	1700	598	644	689	783	877	924	995	1064	1133
			Y1+Y2	COOL-D	1950	822	873	924	1024	1124	1189	1262	1339	1416
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	383	411	439
			W1	HEAT-B	920	222	250	278	312	346	378	408	439	470
			W1	HEAT-C	985	235	264	293	335	376	407	442	478	513
			W1	HEAT-D	1050	251	282	313	361	409	439	479	519	558
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	670	723	777
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	725	782	839
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	808	870	931
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	898	964	1030
	Heat	D110	W1	HEAT-A	940	226	254	282	319	-	-	-	-	-
			W1	HEAT-B	970	232	261	290	329	-	-	-	-	-
			W1	HEAT-C	1050	251	282	313	361	-	-	-	-	-
			W1	HEAT-D	1100	266	298	329	383	-	-	-	-	-
			W1+W2	HEAT-A	1450	425	464	504	586	-	-	-	-	-
			W1+W2	HEAT-B	1500	455	496	537	622	-	-	-	-	-
			W1+W2	HEAT-C	1600	523	566	609	699	-	-	-	-	-
			W1+W2	HEAT-D	1700	598	644	689	783	-	-	-	-	-
DHQ060 (5.0)	Cool	Low	Y1+O	COOL-A	1034	247	277	307	354	401	431	470	508	546
			Y1+O	COOL-B	1101	266	298	330	383	437	466	510	552	594
			Y1+O	COOL-C	1167	289	322	355	415	475	505	553	599	645
			Y1+O	COOL-D	1334	361	398	435	509	582	615	673	727	781
		High	Y1+Y2+O	COOL-A	1550	488	530	572	659	746	786	853	916	980
			Y1+Y2+O	COOL-B	1650	560	604	648	740	832	876	946	1013	1081
			Y1+Y2+O	COOL-C	1750	639	685	732	828	923	974	1045	1116	1187
			Y1+Y2+O	COOL-D	2000	872	925	977	1077	1178	1248	1320	1398	1476
	Heat Pump	Low	Y1	COOL-A	1167	289	322	355	415	475	505	553	599	645
			Y1	COOL-B	1234	315	350	385	450	516	546	599	648	697
			Y1	COOL-C	1301	345	381	418	489	560	591	647	700	752
			Y1	COOL-D	1334	361	398	435	509	582	615	673	727	781
		High	Y1+Y2	COOL-A	1750	639	685	732	828	923	974	1045	1116	1187
			Y1+Y2	COOL-B	1850	726	775	824	922	1021	1078	1150	1224	1298
			Y1+Y2	COOL-C	1950	822	873	924	1024	1124	1189	1262	1339	1416
			Y1+Y2	COOL-D	2000	872	925	977	1077	1178	1248	1320	1398	1476
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	-	-	-
			W1	HEAT-B	920	222	250	278	312	346	378	-	-	-
			W1	HEAT-C	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-D	1050	251	282	313	361	409	439	-	-	-
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	-	-	-
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	-	-	-
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	-	-	-
	Heat	D110	W1	HEAT-A	940	226	254	282	319	355	386	-	-	-
			W1	HEAT-B	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-C	1035	247	277	308	355	401	431	-	-	-
			W1	HEAT-D	1100	266	298	329	383	436	466	-	-	-
			W1+W2	HEAT-A	1450	425	464	504	586	667	702	-	-	-
			W1+W2	HEAT-B	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-C	1600	523	566	609	699	788	830	-	-	-
			W1+W2	HEAT-D	1700	598	644	689	783	877	924	-	-	-

Side Duct Application

Table 13: DHQ024-060

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ024 (2.0)	Cool	Low	Y1+O	COOL-A	580	89	112	134	159	184	206	229	252	276
			Y1+O	COOL-B	400	43	62	81	101	121	137	153	173	192
			Y1+O	COOL-C	600	96	119	142	167	193	216	239	263	287
			Y1+O	COOL-D	667	120	145	170	198	225	250	275	301	328
		High	Y1+Y2+O	COOL-A	870	215	248	281	315	349	380	410	444	477
			Y1+Y2+O	COOL-B	600	95	119	142	167	193	216	239	263	287
			Y1+Y2+O	COOL-C	900	232	266	301	335	370	402	434	468	503
			Y1+Y2+O	COOL-D	1000	292	332	371	410	448	482	516	555	594
	Heat Pump	Low	Y1	COOL-A	600	96	119	142	167	193	216	239	263	287
			Y1	COOL-B	500	65	86	107	130	152	172	192	213	235
			Y1	COOL-C	467	57	77	97	119	141	159	178	199	220
			Y1	COOL-D	667	120	145	170	198	225	250	275	301	328
		High	Y1+Y2	COOL-A	900	232	266	301	335	370	402	434	468	503
			Y1+Y2	COOL-B	750	155	183	211	241	271	299	326	355	384
			Y1+Y2	COOL-C	700	133	159	186	214	243	269	295	322	349
			Y1+Y2	COOL-D	1000	292	332	371	410	448	482	516	555	594
	Heat	D056	W1	HEAT-A	670	121	146	172	199	227	-	-	-	-
			W1	HEAT-B	690	129	155	181	209	237	-	-	-	-
			W1	HEAT-C	710	137	164	191	219	248	-	-	-	-
			W1	HEAT-D	750	155	183	211	241	271	-	-	-	-
			W1+W2	HEAT-A	940	255	291	328	364	400	-	-	-	-
			W1+W2	HEAT-B	970	273	311	349	386	424	-	-	-	-
			W1+W2	HEAT-C	1000	292	332	371	410	448	-	-	-	-
			W1+W2	HEAT-D	1050	326	368	410	450	490	-	-	-	-
DHQ030 (2.5)	Cool	Low	Y1+O	COOL-A	634	119	142	164	192	220	245	269	294	319
			Y1+O	COOL-B	500	98	118	137	160	182	203	224	244	264
			Y1+O	COOL-C	700	136	160	185	215	245	272	298	325	351
			Y1+O	COOL-D	834	183	212	242	275	308	339	369	397	425
		High	Y1+Y2+O	COOL-A	950	239	273	308	342	377	410	444	472	500
			Y1+Y2+O	COOL-B	750	151	178	204	235	267	295	323	350	377
			Y1+Y2+O	COOL-C	1050	298	337	376	411	446	482	519	546	573
			Y1+Y2+O	COOL-D	1250	446	496	547	580	613	655	697	718	739
	Heat Pump	Low	Y1	COOL-A	700	136	160	185	215	245	272	298	325	351
			Y1	COOL-B	634	119	142	164	192	220	245	269	294	319
			Y1	COOL-C	767	157	184	211	243	275	303	331	359	387
			Y1	COOL-D	834	183	212	242	275	308	339	369	397	425
		High	Y1+Y2	COOL-A	1050	298	337	376	411	446	482	519	546	573
			Y1+Y2	COOL-B	950	239	273	308	342	377	410	444	472	500
			Y1+Y2	COOL-C	1150	367	411	456	490	525	564	603	628	652
			Y1+Y2	COOL-D	1250	446	496	547	580	613	655	697	718	739
	Heat	D056	W1	HEAT-A	680	130	154	178	208	237	-	-	-	-
			W1	HEAT-B	735	146	172	198	229	260	-	-	-	-
			W1	HEAT-C	790	166	193	221	253	286	-	-	-	-
			W1	HEAT-D	840	186	215	245	278	312	-	-	-	-
			W1+W2	HEAT-A	1050	298	337	376	411	446	-	-	-	-
			W1+W2	HEAT-B	1135	356	399	443	478	512	-	-	-	-
			W1+W2	HEAT-C	1220	421	470	519	552	585	-	-	-	-
			W1+W2	HEAT-D	1300	489	543	597	629	660	-	-	-	-

Table 13: DHQ024-060 (Continued)

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ036 (3.0)	Cool	Low	Y1+O	COOL-A	734	123	158	194	229	264	298	331	365	398
			Y1+O	COOL-B	600	78	113	147	179	210	238	265	291	315
			Y1+O	COOL-C	834	165	202	238	276	313	350	388	426	465
			Y1+O	COOL-D	900	197	235	273	311	350	390	430	471	512
		High	Y1+Y2+O	COOL-A	1100	314	355	396	439	482	526	571	617	663
			Y1+Y2+O	COOL-B	900	197	235	273	311	350	390	430	471	512
			Y1+Y2+O	COOL-C	1250	422	466	510	555	601	647	694	741	788
			Y1+Y2+O	COOL-D	1350	503	550	597	643	690	737	783	830	876
	Heat Pump	Low	Y1	COOL-A	767	136	172	208	244	279	315	350	385	420
			Y1	COOL-B	834	165	202	238	276	313	350	388	426	465
			Y1	COOL-C	900	197	235	273	311	350	390	430	471	512
			Y1	COOL-D	967	233	271	310	350	391	432	474	517	561
		High	Y1+Y2	COOL-A	1150	348	390	432	476	520	564	610	657	704
			Y1+Y2	COOL-B	1250	422	466	510	555	601	647	694	741	788
			Y1+Y2	COOL-C	1350	503	550	597	643	690	737	783	830	876
			Y1+Y2	COOL-D	1450	591	642	691	739	787	834	880	925	969
	Heat	D056	W1	HEAT-A	680	103	139	173	207	240	-	-	-	-
			W1	HEAT-B	735	123	159	194	229	264	-	-	-	-
			W1	HEAT-C	790	145	182	218	254	290	-	-	-	-
			W1	HEAT-D	840	168	204	241	279	316	-	-	-	-
			W1+W2	HEAT-A	1050	282	322	362	404	446	-	-	-	-
			W1+W2	HEAT-B	1140	341	383	425	468	512	-	-	-	-
			W1+W2	HEAT-C	1220	399	442	486	531	576	-	-	-	-
			W1+W2	HEAT-D	1300	461	507	552	598	645	-	-	-	-
		D072	W1	HEAT-A	790	145	182	218	254	-	-	-	-	-
			W1	HEAT-B	855	175	212	249	286	-	-	-	-	-
			W1	HEAT-C	920	207	245	283	322	-	-	-	-	-
			W1	HEAT-D	975	237	276	315	355	-	-	-	-	-
			W1+W2	HEAT-A	1200	384	427	470	514	-	-	-	-	-
			W1+W2	HEAT-B	1300	461	507	552	598	-	-	-	-	-
			W1+W2	HEAT-C	1400	546	595	643	690	-	-	-	-	-
			W1+W2	HEAT-D	1480	619	671	721	770	-	-	-	-	-
DHQ042 (3.5)	Cool	Low	Y1+O	COOL-A	934	225	253	281	317	352	384	415	447	479
			Y1+O	COOL-B	800	208	233	258	277	297	331	351	374	398
			Y1+O	COOL-C	1000	239	268	298	341	384	414	451	487	523
			Y1+O	COOL-D	1100	266	298	330	383	437	466	510	552	594
		High	Y1+Y2+O	COOL-A	1400	396	435	473	551	629	663	725	782	839
			Y1+Y2+O	COOL-B	1200	301	335	369	432	495	525	575	623	670
			Y1+Y2+O	COOL-C	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2+O	COOL-D	1650	560	604	648	740	832	876	946	1013	1081
	Heat Pump	Low	Y1	COOL-A	934	225	253	281	317	352	384	415	447	479
			Y1	COOL-B	867	214	241	268	295	323	356	381	409	437
			Y1	COOL-C	1000	239	268	298	341	384	414	451	487	523
			Y1	COOL-D	1100	266	298	330	383	437	466	510	552	594
		High	Y1+Y2	COOL-A	1400	396	435	473	551	629	663	725	782	839
			Y1+Y2	COOL-B	1300	345	381	417	488	559	591	647	699	752
			Y1+Y2	COOL-C	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2	COOL-D	1650	560	604	648	740	832	876	946	1013	1081
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	-	-	-
			W1	HEAT-B	920	222	250	278	312	346	378	-	-	-
			W1	HEAT-C	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-D	1050	251	282	313	361	409	439	-	-	-
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	-	-	-
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	-	-	-
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	-	-	-

Table 13: DHQ024-060 (Continued)

Model (Tons)	Mode		Thermostat Input	Speed Tap	CFM	External Static Pressure (Inch Water Gauge)								
						0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
						Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts	Watts
DHQ048 (4.0)	Cool	Low	Y1+O	COOL-A	967	231	260	289	328	368	398	432	467	501
			Y1+O	COOL-B	800	208	233	258	277	297	331	351	374	398
			Y1+O	COOL-C	1101	266	298	330	383	437	466	510	552	594
			Y1+O	COOL-D	1301	345	381	418	489	560	591	647	700	752
		High	Y1+Y2+O	COOL-A	1450	425	464	504	586	667	702	766	825	885
			Y1+Y2+O	COOL-B	1200	301	335	369	432	495	525	575	623	670
			Y1+Y2+O	COOL-C	1650	560	604	648	740	832	876	946	1013	1081
			Y1+Y2+O	COOL-D	1950	822	873	924	1024	1124	1189	1262	1339	1416
	Heat Pump	Low	Y1	COOL-A	1067	256	287	318	368	418	448	490	530	570
			Y1	COOL-B	1000	239	268	298	341	384	414	451	487	523
			Y1	COOL-C	1134	277	310	342	399	455	485	531	575	619
			Y1	COOL-D	1301	345	381	418	489	560	591	647	700	752
		High	Y1+Y2	COOL-A	1600	523	566	609	699	788	830	898	964	1030
			Y1+Y2	COOL-B	1500	455	496	537	622	706	743	808	870	931
			Y1+Y2	COOL-C	1700	598	644	689	783	877	924	995	1064	1133
			Y1+Y2	COOL-D	1950	822	873	924	1024	1124	1189	1262	1339	1416
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	383	411	439
			W1	HEAT-B	920	222	250	278	312	346	378	408	439	470
			W1	HEAT-C	985	235	264	293	335	376	407	442	478	513
			W1	HEAT-D	1050	251	282	313	361	409	439	479	519	558
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	670	723	777
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	725	782	839
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	808	870	931
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	898	964	1030
	Heat	D110	W1	HEAT-A	940	226	254	282	319	-	-	-	-	-
			W1	HEAT-B	970	232	261	290	329	-	-	-	-	-
			W1	HEAT-C	1050	251	282	313	361	-	-	-	-	-
			W1	HEAT-D	1100	266	298	329	383	-	-	-	-	-
			W1+W2	HEAT-A	1450	425	464	504	586	-	-	-	-	-
			W1+W2	HEAT-B	1500	455	496	537	622	-	-	-	-	-
			W1+W2	HEAT-C	1600	523	566	609	699	-	-	-	-	-
			W1+W2	HEAT-D	1700	598	644	689	783	-	-	-	-	-
DHQ060 (5.0)	Cool	Low	Y1+O	COOL-A	1034	247	277	307	354	401	431	470	508	546
			Y1+O	COOL-B	1101	266	298	330	383	437	466	510	552	594
			Y1+O	COOL-C	1167	289	322	355	415	475	505	553	599	645
			Y1+O	COOL-D	1334	361	398	435	509	582	615	673	727	781
		High	Y1+Y2+O	COOL-A	1550	488	530	572	659	746	786	853	916	980
			Y1+Y2+O	COOL-B	1650	560	604	648	740	832	876	946	1013	1081
			Y1+Y2+O	COOL-C	1750	639	685	732	828	923	974	1045	1116	1187
			Y1+Y2+O	COOL-D	2000	872	925	977	1077	1178	1248	1320	1398	1476
	Heat Pump	Low	Y1	COOL-A	1167	289	322	355	415	475	505	553	599	645
			Y1	COOL-B	1234	315	350	385	450	516	546	599	648	697
			Y1	COOL-C	1301	345	381	418	489	560	591	647	700	752
			Y1	COOL-D	1334	361	398	435	509	582	615	673	727	781
		High	Y1+Y2	COOL-A	1750	639	685	732	828	923	974	1045	1116	1187
			Y1+Y2	COOL-B	1850	726	775	824	922	1021	1078	1150	1224	1298
			Y1+Y2	COOL-C	1950	822	873	924	1024	1124	1189	1262	1339	1416
			Y1+Y2	COOL-D	2000	872	925	977	1077	1178	1248	1320	1398	1476
	Heat	D090	W1	HEAT-A	870	215	241	268	296	325	357	-	-	-
			W1	HEAT-B	920	222	250	278	312	346	378	-	-	-
			W1	HEAT-C	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-D	1050	251	282	313	361	409	439	-	-	-
			W1+W2	HEAT-A	1330	359	396	433	506	580	612	-	-	-
			W1+W2	HEAT-B	1400	396	435	473	551	629	663	-	-	-
			W1+W2	HEAT-C	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-D	1600	523	566	609	699	788	830	-	-	-
	Heat	D110	W1	HEAT-A	940	226	254	282	319	355	386	-	-	-
			W1	HEAT-B	985	235	264	293	335	376	407	-	-	-
			W1	HEAT-C	1035	247	277	308	355	401	431	-	-	-
			W1	HEAT-D	1100	266	298	329	383	436	466	-	-	-
			W1+W2	HEAT-A	1450	425	464	504	586	667	702	-	-	-
			W1+W2	HEAT-B	1500	455	496	537	622	706	743	-	-	-
			W1+W2	HEAT-C	1600	523	566	609	699	788	830	-	-	-
			W1+W2	HEAT-D	1700	598	644	689	783	877	924	-	-	-

Table 14: Additional Static Resistance

Model (Tons)	CFM	Wet Indoor Coil	Economizer[1]	Filter/Frame Kit	Electric Heat
DHQ024 (2.0)	500	0.01	0.00	0.01	-
	600	0.01	0.00	0.02	-
	700	0.01	0.00	0.04	-
	800	0.02	0.01	0.06	-
	900	0.03	0.01	0.08	-
	1000	0.04	0.01	0.10	-
	1100	0.05	0.01	0.13	-
	1200	0.06	0.02	0.16	-
DHQ0030 (2.5)	700	0.01	0.00	0.04	-
	800	0.02	0.01	0.06	-
	900	0.03	0.01	0.08	-
	1000	0.04	0.01	0.10	-
	1100	0.05	0.01	0.13	-
	1200	0.06	0.02	0.16	-
	1300	0.07	0.03	0.17	-
DHQ0036 (3.0)	700	0.01	0.00	0.04	-
	800	0.02	0.01	0.06	-
	900	0.03	0.01	0.08	-
	1000	0.04	0.01	0.10	-
	1100	0.05	0.01	0.13	-
	1200	0.06	0.02	0.16	-
	1300	0.07	0.03	0.17	-
	1400	0.08	0.04	0.18	-
DHQ0042 (3.5)	1100	0.02	0.02	0.04	-
	1200	0.03	0.02	0.04	-
	1300	0.04	0.02	0.05	-
	1400	0.05	0.03	0.05	-
	1500	0.06	0.04	0.06	-
	1600	0.07	0.04	0.07	-
	1700	0.07	0.04	0.08	-
	1800	0.08	0.04	0.09	-
	1900	0.09	0.05	0.10	-
	2000	0.09	0.05	0.11	-
DHQ0048 (4.0)	1100	0.02	0.02	0.04	-
	1200	0.03	0.02	0.04	-
	1300	0.04	0.02	0.05	-
	1400	0.05	0.03	0.05	-
	1500	0.06	0.04	0.06	-
	1600	0.07	0.04	0.07	-
	1700	0.07	0.04	0.08	-
	1800	0.08	0.04	0.09	-
	1900	0.09	0.05	0.10	-
	2000	0.09	0.05	0.11	-
DHQ0060 (5.0)	1100	0.02	0.02	0.04	-
	1200	0.03	0.02	0.04	-
	1300	0.04	0.02	0.05	-
	1400	0.05	0.03	0.05	-
	1500	0.06	0.04	0.06	-
	1600	0.07	0.04	0.07	-
	1700	0.07	0.04	0.08	-
	1800	0.08	0.04	0.09	-
	1900	0.09	0.05	0.10	-
	2000	0.09	0.05	0.11	-

1. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Table 15: Indoor Blower Specifications

Model (Tons)	Motor				
	HP	RPM	Eff.	SF	Frame
DHQ024 (2.0)	1/2	1050	0.8	1.0	48
DHQ030 (2.5)	3/4	1050	0.8	1.0	48
DHQ036 (3.0)	3/4	1050	0.8	1.0	48
DHQ042 (3.5)	1	1050	0.8	1.0	48
DHQ048 (4.0)	1	1050	0.8	1.0	48
DHQ060 (5.0)	1	1050	0.8	1.0	48

Blower Speed Selection

The variable speed blowers are designed to deliver constant CFM regardless of the external static pressure (ESP) in the ductwork. Therefore, if too many supply registers are closed, a filter becomes clogged, or there is a restriction in the ductwork, the motor will automatically operate at a higher speed to compensate for the higher ESP. This may result in a higher operating sound level.

These units have variable speed motors that automatically adjust to provide constant CFM from 0.2" to 0.6" w.c. static pressure. From 0.6" to 1.0" static pressure, CFM is reduced by 2% per 0.1" increase in static. Operation on duct systems with greater than 1.0" w.c. external static pressure is not recommended.

To Set Cooling CFM for DHQ Units:

Refer to Airflow Performance Tables 13 and 14 for the possible cooling speed CFM selections.

Set “COOL” and “ADJ” Jumpers on the CFM selection board as indicated in Tables 13, 14 and Figure 11.

NOTE: CFM indicator light flashes once for every 100 CFM (i.e. 12 flashes = 1200 CFM).

⚠ CAUTION

Do not change the “ADJ” tab position on the CFM selection board as this will change your cooling CFM previously selected.

To Set Delay Profile:

Every unit has multiple cooling “blower off delay” profiles to optimize system performance and efficiency. Refer to Table 16 for the regional climate in your area. Place the “DELAY” jumper tap on the CFM selection board on the appropriate pin setting.

Factory Set Gas Heat CFM:

The blower speed required for gas heat is different than for cooling. The heating CFM is factory set, but is adjustable.

The “Heat” Jumper on the CFM selection board should be set to “A” from the factory.

Fan Only CFM:

When the connection is made from “R” to “G”, the fan only mode is activated. In this mode, the blower will deliver 75% of the cooling system CFM. This connection is factory set from the manufacturer, but can be field adjusted.

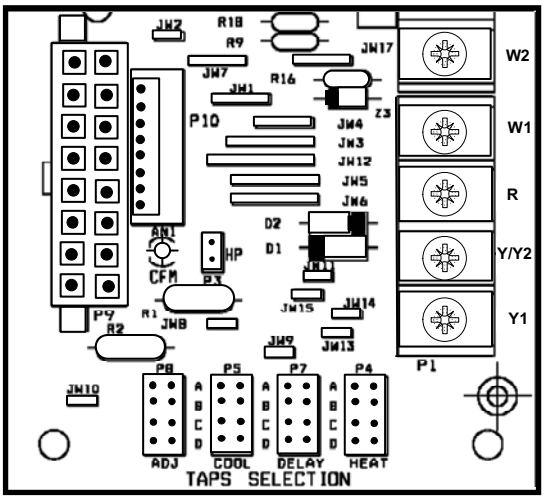


Figure 11: Control Board Speed Tap Location

Table 16: Delay Profile

Delay Tap	Regional Climate Type
Jumper at “A”	Standard Setting
Jumper at “B”	Humid Climate
Jumper at “C”	Dry Climate
Jumper at “D”	Temperate Climate

Operation

The unit is controlled by a conventional heating/cooling thermostat common to this class of equipment.

Sequence Of Operation

Heat

First Stage Cooling Call

On a first stage cooling call, the thermostat sends 24 Volts AC out of the “Y1”, “O”, and “G” terminals to the CFM Selector Board (CFMCB).

When 24 Volts AC is sent from CFMCB to the “Y1” terminal of the YorkGuard VI defrost control board (DCB) energizing the “M1” contactor coil.

When the contactor coil is energized, the compressor operates in first stage cooling; the “ODF” contacts on the DCB close and energize the ECM 142R outdoor fan motor in low speed.

Exception: The 2 ton dual fuel units operate the outdoor fan at high speed anytime the compressor is operating.

24 Volts AC is also sent out of the CFMCB to the ECM Blower Motor for first stage cooling fan speed and out of the “RV” and

"RVG" terminals on the DCB energizing the reversing valve for cooling operation.

The compressor, reversing valve, outdoor fan motor and blower motor are energized in first stage operation.

Second Stage Cooling Call – "Y1", "Y2", "O", and "G" from the thermostat:

After a first stage call for cooling and any delays from the thermostat, if a second stage call is initiated from the thermostat at the "Y2" terminal:

24 Volts AC is sent from the thermostat to the "Y2" terminal of the DCB, and is sent out of the "M2" terminal to Terminal Block 2 (TB2). This provides 24 Volts AC to the rectifier located on the compressor. The rectifier converts the 24 Volts AC to DC voltage, providing DC control voltage to a solenoid internal to the compressor for full capacity operation.

At the same time the compressor is energized at full capacity, 24 Volts AC is provided at the outdoor fan motor for high speed operation.

Exception: 2 ton dual fuel units operate the outdoor fan at high speed anytime the compressor is operating.

When the outdoor unit is energized at full capacity, 24 Volts AC is also sent out of the "Y2OUT" terminal on the DCB to the "Y/Y2" terminal of the CFMCB, energizing the ECM Blower Motor for second stage cooling airflow.

At this time the compressor, reversing valve, outdoor fan motor, and indoor blower are in second stage cooling operation.

Pressure Switch Proving

The control board energizes the induced draft motor (High speed for 2 stage model) and waits for the low pressure switch to close. When the low pressure switch closes, the control begins Pre-purge period. If the call for heat is lost, the control de-energizes the inducer without post-purge and returns to standby.

If the low pressure switch does not close within 10 seconds of inducer energizing, the control board flashes "2" on the LED. If the pressure switch does not close within 5 minutes of inducer energizing, the control shuts off the inducer for 30 seconds, then energizes the inducer for another 5 minute try to close the pressure switch. This cycle continues indefinitely until either the pressure switch is proved closed, or the call for heat ends.

Heating when the Outdoor Ambient Temperature is Greater than the Balance Point

First Stage Mechanical Heat Call – "Y1" and "G" from the thermostat:

On a first stage mechanical heating call, the thermostat sends 24 Volts AC out of the "Y1" terminal to the CFM Selector Board (CFMCB). When the CFMCB receives 24 Volts AC at "Y1", control voltage is sent to the "Y1" terminal of the YorkGuard VI Defrost Control Board (DCB) energizing the "M1" contactor coil.

When the contactor coil is energized, the compressor operates in first stage mechanical heating.

At the same time the compressor is energized, the "ODF" contacts on the DCB close and provide control voltage to the outdoor ECM 142R fan motor energizing the motor in first stage operation.

Exception: The 2 ton dual fuel units operate the outdoor fan at high speed anytime the compressor is operating.

When the compressor is energized, the CFMCB energizes the ECM Blower Motor in first stage mechanical heating fan speed.

At this time the compressor, outdoor fan motor and blower are operating in first stage heating mode.

Second Stage Mechanical Heat Call – "Y1", "Y2" and "G" from the thermostat:

After a first stage call for mechanical heat and any delays from the thermostat, when a second stage call is initiated from the thermostat at the "Y2" terminal:

24 Volts AC is sent from the thermostat to the "Y2" terminal of the DCB and is sent out of the "M2" terminal to Terminal Block 2 (TB2).

This provides 24 Volts AC to the rectifier located on the compressor. The rectifier converts the 24 Volts AC to DC voltage and energizes the compressor at full capacity operation. At the same time the compressor is energized at full capacity, 24 Volts AC is provided at the outdoor fan motor for high speed operation (second stage).

When the outdoor unit is energized at full capacity, 24 Volts AC is also sent from the "Y2OUT" terminal on the DCB to the "Y/Y2" terminal of the CFMCB. This provides control voltage to the ECM Blower Motor for second stage mechanical heating airflow.

At this time the compressor, outdoor fan motor, and indoor blower are operating in second stage mechanical heating mode.

Third Stage Heat Call

If the thermostat initiates a third stage heat call when the outdoor ambient temperature is above the selected Balance Point on the DCB, gas heating operation is not allowed. The only exception to this would be if there is a continuous heating call for 4 hours at which time the gas heat section would be energized and mechanical heating would be terminated 30 seconds after the initiation of gas heating. (4 Hour Pipe Freeze Protection)

Defrost

When the liquid line and ambient sensors indicate that defrost is required, the supplemental gas heating section is energized for 30 seconds before defrost is initiated. This allows the heat exchanger time to begin warming up prior to reversing refrigerant flow.

24 Volts AC is sent out of the “W1OUT” terminal of the DCB to the “W1” terminal of the CFMCB and to the “W1” terminal on the Spark Ignition Control Board (EMCB).

The induced draft motor (DM) is energized in high speed for pre-purge of the heat exchanger. The control board continues the pre-purge cycle for approximately 15 seconds and then initiates an ignition trial period.

During the ignition trial period, the control board energizes the pilot gas valve (P) and spark ignition for up to an 85 second trial period.

When the Flame Sensor senses pilot flame (minimum of 0.2 microamperes), the pilot valve remains energized and spark ignition is de-energized.

The EMCB control board waits approximately 2 seconds for flame stabilization prior to energizing the main gas valve.

The EMCB will send 24 Volts AC to the “M” and “HI” terminals of the gas valve operating the gas heat section at full fire for approximately 60 seconds.

The EMCB de-energizes “H-IND” and provides 120 Volts AC out of the “IND” terminal reducing the DM to low speed. Control voltage is also removed from “HI” at the gas valve reducing gas heat to low fire operation tempering the air provided to the conditioned space.

30 seconds after a call for defrost, the reversing valve is energized, the “ODF” contacts on the DCB are opened de-energizing the outdoor fan motor and the compressor operates at full capacity during defrost.

During defrost if the discharge pressure raises to 360psig, the Furnace Control Pressure Switch (FCS) will close sending 24 Volts AC to the defrost relay coil (DR) de-energizing the gas heat section. The DM would continue operating until the post purge cycle timer expires.

When the discharge pressure drops back to 300psig, the DR coil is de-energized and the gas heat section is available on the next defrost or heating cycle.

Defrost Termination

Defrost is terminated when either the liquid line sensor reaches 65°F, or the maximum defrost time of 8 minutes has been reached.

Note: The defrost termination temperature and time are dependent on the selected defrost curve.

When the liquid line sensor or the maximum defrost timer has reached the termination point:

Control voltage is removed from the “W1 OUT” terminal, de-energizing the gas heat section. Control voltage is also removed from the “RV” and “RVG” terminals de-energizing the reversing valve. The “ODF” contacts on the DCB re-close energizing the outdoor fan motor. Mechanical heating operation resumes.

Emergency Heat Call

When the thermostat is set to emergency heat on the Residential Dual Fuel Package Units, 24 Volts AC is provided to the “W1” terminal on the Spark Ignition Control Board (EMCB).

The EMCB will send 120 Volts AC out of the “H-IND” terminals energizing the DM in high speed for pre-purge of the heat exchanger. The control board continues the pre-purge cycle for approximately 15 seconds and then initiates an ignition trial period.

The control board energizes the pilot terminal “P” on the gas valve and spark ignition for up to an 85 seconds. When the Flame Sensor senses pilot flame (minimum of 0.2 microamperes), the pilot valve remains energized and spark ignition is de-energized.

The EMCB control board provides a 2 second flame stabilization period prior to energizing the main gas valve. The EMCB provides 24 Volts AC to the “M” and “HI” terminals of the gas valve, operating the gas heat section at full fire for approximately 60 seconds.

The EMCB then de-energizes “H-IND” at the DM and provides 120 Volts AC out of the “IND” terminal reducing the DM to low speed. Control voltage is also removed from “HI” at the gas valve reducing gas heat operation to low fire operation.

After operating at low gas heat for 15 minutes, the DCB will provide 24 Volts AC to the “W2” terminal on the EMCB energizing the gas valve at high fire. The EMCB will also send 120 Volts AC out of the “H-IND” terminal and remove 120 Volts AC from the “IND” terminal energizing the DM at high speed.

The unit will continue to operate at full capacity (Gas Heat) until the thermostat is satisfied. When the thermostat is satisfied, the gas heat section is de-energized and the DM will operate for a 30 second post purge cycle. At the same time the blower will operate until the on board Blower Off Delay selection of 60, 90, 120, or 180 seconds expires.

Outdoor Ambient Temperature is Between the Balance Point and Low Temperature Cutout

First Stage Mechanical Heat Call – “Y1” and “G” from the thermostat:

Same as when Outdoor Ambient Temperature is above Balance Point as previously discussed.

Second Stage Mechanical Heat Call – “Y1”, “Y2” and “G” from the thermostat:

Same as when Outdoor Ambient Temperature is above Balance Point as previously discussed.

Defrost –

Same as when Outdoor Ambient Temperature is above Balance Point as previously discussed.

Defrost Termination –

Same as when Outdoor Ambient Temperature is above Balance Point as previously discussed.

Third Stage Heat Call – "Y1", "Y2", "W2" and "G" from the thermostat:

Depending on the model of the thermostat, the dead band, and/ or time delay settings programmed into the thermostat, there can be additional delays between 2nd and 3rd stage heating operation.

Mechanical heating will operate for 30 seconds after receiving a "W2" call from the thermostat when control voltage from "Y1" and "Y2" are present. After 30 seconds, mechanical heat is de-energized and the unit operates using gas heat only for the remainder of the heating call.

The unit will continue to operate at full capacity (Gas Heat) until the thermostat is satisfied.

Outdoor Ambient Temperature is Below the Low Temperature Cutout

When the Outdoor Ambient Temperature is below the Low Temperature Cutout setting on the YorkGuard VI Defrost Control Board, mechanical heat is not allowed. The Residential Dual Fuel Package Units will operate using gas heat only.

First Stage Heat Call

On a first stage heating call, the thermostat sends 24 Volts AC out of the "Y1" terminal to the CFM Selector Board (CFMCB) and to the "Y1" terminal of the YorkGuard VI Defrost Control Board (DCB).

If the outdoor ambient temperature sensor connected to the DCB indicates that the temperature is below the Low Temperature Cutout (LTCO) set point, the DCB will provide 24 Volts AC out of the "W1OUT" terminal.

24 Volts AC from passes through the CFM Selector Board (CFMCB) and is provided to the "W1" terminal on the Spark Ignition Control Board (EMCB).

The EMCB will send 120 Volts AC out of the "H-IND" terminals energizing the DM in high speed for pre-purge of the heat exchanger. The control board continues the pre-purge cycle for approximately 15 seconds and then initiates an ignition trial period.

The control board energizes the pilot terminal "P" on the gas valve and spark ignition for up to an 85 seconds. When the Flame Sensor senses pilot flame (minimum of 0.2 microamperes), the pilot valve remains energized and spark ignition is de-energized.

The EMCB control board provides a 2 second flame stabilization period prior to energizing the main gas valve. The EMCB provides 24 Volts AC to the "M" and "HI" terminals of the gas valve, operating the gas heat section at full fire for approximately 60 seconds.

The EMCB then de-energizes "H-IND" at the DM and provides 120 Volts AC out of the "IND" terminal reducing the DM to low speed. Control voltage is also removed from "HI" at the gas valve reducing gas heat operation to low fire operation.

Second Stage Heat Call

If the thermostat initiates a second stage heating call at the "Y2" terminal when the outdoor ambient temperature is below the LTCO, 24 Volts AC is immediately sent to the "Y2" terminal on the DCB. This provides control voltage to the "W2" terminal on the EMCB energizing the gas valve at high fire. The EMCB will also send 120 Volts AC out of the "H-IND" terminal and remove 120 Volts AC from the "IND" terminal energizing the DM at high speed.

The unit will continue to operate at full capacity (Gas Heat) until the thermostat is satisfied or the call is reduced to "Y1" first stage heating only.

If the call is reduced to a first stage call, the gas heat section will reduce to low fire.

If the heating call is satisfied, the gas heat section is de-energized and the DM will operate for a 30 second post purge cycle. At the same time the blower will operate until the on-board Blower Off Delay selection of 60, 90, 120, or 180 seconds expires.

Emergency Heat Call

When the thermostat is set to emergency heat on the Residential Dual Fuel Package Units, 24 Volts AC is provided to the "W1" terminal on the Spark Ignition Control Board (EMCB).

The EMCB will send 120 Volts AC out of the "H-IND" terminals energizing the DM in high speed for pre-purge of the heat exchanger. The control board continues the pre-purge cycle for approximately 15 seconds and then initiates an ignition trial period.

The control board energizes the pilot terminal "P" on the gas valve and spark ignition for up to an 85 seconds. When the Flame Sensor senses pilot flame (minimum of 0.2 microamperes), the pilot valve remains energized and spark ignition is de-energized.

The EMCB control board provides a 2 second flame stabilization period prior to energizing the main gas valve. The EMCB provides 24 Volts AC to the "M" and "HI" terminals of the gas valve, operating the gas heat section at full fire for approximately 60 seconds.

The EMCB then de-energizes "H-IND" at the DM and provides 120 Volts AC out of the "IND" terminal reducing the DM to low speed. Control voltage is also removed from "HI" at the gas valve reducing gas heat operation to low fire operation.

After operating at low gas heat for 15 minutes, the DCB will provide 24 Volts AC to the "W2" terminal on the EMCB energizing the gas valve at high fire. The EMCB will also send 120 Volts AC out of the "H-IND" terminal and remove 120 Volts AC from the "IND" terminal energizing the DM at high speed.

The unit will continue to operate at full capacity (Gas Heat) until the thermostat is satisfied. When the thermostat is satisfied, the gas heat section is de-energized and the DM will operate for a 30 second post purge cycle. At the same time the blower will operate until the on board Blower Off Delay selection of 60, 90, 120, or 180 seconds expires.

Table 17: Dual Fuel Package Unit Operating Chart

Outdoor Ambient Temperature is Greater than the Balance Point				
Control Board	**"Y1"**	**"Y1" + "Y2"**	**"Y1" + "Y2" + "W"**	**"Emergency Heat"**
YorkGuard VI Defrost Control Board (DCB)	Stage 1 Compressor	Full Capacity Compressor	Full Capacity Compressor "W1 Out" after 4 Hour Pipe Freeze Timer "W2 Out" 15 Minutes Later	"W1 Out" "W2 Out" after 15 Minutes
When a "Y1" + "Y2" + "W" call are present, mechanical heat is de-energized 30 seconds after the gas heat section is energized and is locked out for the remainder of the heating call.				

Outdoor Ambient Temperature is Between the Balance Point and the LTCO				
Control Board	**"Y1"**	**"Y1" + "Y2"**	**"Y1" + "Y2" + "W"**	**"Emergency Heat"**
YorkGuard VI Defrost Control Board (DCB)	Stage 1 Compressor	Full Capacity Compressor	"W1 Out" "W2 Out" after 15 Minutes	"W1 Out" "W2 Out" after 15 Minutes
When a "Y1" + "Y2" + "W" call are present, mechanical heat is de-energized 30 seconds after the gas heat section is energized and is locked out for the remainder of the heating call.				

Outdoor Ambient Temperature is Below the LTCO				
Control Board	**"Y1"**	**"Y1" + "Y2"**	**"Y1" + "Y2" + "W"**	**"Emergency Heat"**
YorkGuard VI Defrost Control Board (DCB)	"W1 Out" First Stage Gas Heat	"W1 Out" "W2 Out" Full Capacity Gas Heat	"W1 Out" "W2 Out" Full Capacity Gas Heat	"W1 Out" "W2 Out" after 15 Minutes
When a "Y1" + "Y2" + "W" call are present, mechanical heat is not allowed when the Outdoor Ambient Temperature is Below the LTCO.				

Defrost Operation			
Control Board	**Prior to Defrost**	**During Defrost**	**"Supplemental Heat"**
YorkGuard VI Defrost Control Board (DCB)	"W1 Out" First Stage Gas Heat 30 seconds before defrost is allowed	"W1 Out" Gas Heat operates in low fire, Reversing Valve Energized, Compressor Operates at full Capacity, Outdoor Fan is De-energized	"W1 Out" is energized during defrost, but if the high side pressure exceeds 360 PSIG, the gas heat section will be locked out for the remainder of the defrost cycle

Compressor Lockout Condition				
Control Board	**"Y1"**	**"Y1" + "Y2"**	**"Y1" + "Y2" + "W"**	**"Emergency Heat"**
YorkGuard VI Defrost Control Board (DCB)	No Heat until overridden by the 4 hour pipe freeze timer	No Heat until overridden by the 4 hour pipe freeze timer	"W1 Out" "W2 Out" after 15 Minutes	"W1 Out" "W2 Out" after 15 Minutes

Lockout

While in lockout, the control board keeps the pilot gas valve, main gas valve and induced draft motor de-energized.

Lockouts due to failed ignition or flame losses may be reset by removing the call for heat (W1) for more than 1 second, but less than 20 seconds, or by removing power from the control for over 0.25 seconds. The control will automatically reset lockout after 60 minutes.

Lockouts due to detected internal control faults will reset after 60 minutes or power interruption.

High Temperature Limit Switch

Any time the high temperature limit switch is open the control board will run the indoor blower motor on heat speed, the inducer (on high speed for 2 stage models), de-energize the gas valve, and flash “6” on the LED. When the high temperature switch closes, the control will restart the ignition sequence beginning with pre-purge.

Rollout Switch

If the rollout switch opens for more than 0.25 seconds, the control board will run the inducer (on high speed for 2 stage models) for a post-purge period, immediately de-energize the gas valve, and flash “7” on the LED. The blower output will be energized during an open rollout condition.

If the rollout switch closes, the control shall remain locked out until power removed or “W” is removed.

Rollout switch lockout shall not reset automatically.

Power Interruptions

Power interruptions of any duration shall not cause lockout or any operation requiring manual intervention.

Flame present with Gas off

If flame is sensed for longer than 4.0 seconds during a period when the gas valve should be closed, the control will enter lockout flashing “8” on the LED. The control will turn on the inducer blower while the flame is present.

Gas Valve Stuck Open or Closed

If either or both Pilot and Main Gas valve outputs are sensed to be off for more than 1 second when commanded to be on, the control board shuts off all outputs and enters a hard lockout flashing "9" on the LED.

If the Pilot valve or Main valve output is sensed to be energized for more than 1 second when commanded to be off, the control de-energizes the induced draft motor (if flame is not present) to attempt to open the pressure switch to de-energize the gas valve. If the pilot or main gas valve is still sensed as energized after the inducer has been off for 5 seconds, the control re-energizes the inducer to attempt to vent the unburned gas. In either case, the control enters a hard lockout flashing "9" on the LED. If the pilot or main valve becomes Un-Welded the inducer will de-energize, but the control will remain in a hard lockout and not respond to any thermostat demands.

The only way to recover from a hard lockout is to remove and then reapply 24VAC power to the control board.

Flame Sense Circuit Failure

If the control detects an internal hardware failure in the flame sense circuit, it shuts off all outputs and enters a hard lockout flashing "10" on the LED. The control will not respond to thermostat demands during a hard lockout.

The only way to recover from a hard lockout is to remove and then reapply 24VAC power to the control. If problem persist after removal and reapplication of 24VAC power, the board may need to be replaced.

Safety Controls

The control circuit includes the following safety controls:

1. **Limit Switch (LS)** - This control is located inside the heat exchanger compartment and is set to open at the temperature indicated in the Temperature Controls Table of the unit wiring diagram. It resets automatically. The limit switch operates when a high temperature condition caused by inadequate supply air flow occurs, thus shutting down the ignition control and closing the main gas valve and energizing the blower.
2. **Pressure Switch (PS)** - If the draft motor should fail, the pressure switch prevents the ignition controls and gas valves from being energized.
3. **Flame Sensor** - The flame sensor and controls are located per Proper Flame Adjustment Figure 14. If an ignition control fails to detect a signal from the flame sensor indicating the pilot flame is properly ignited, then the main gas valve will not open.
4. **Rollout Switch (RS)** - This switch is located in the burner vestibule. In the event of a sustained main burner flame rollout, it shuts off the ignition control and closes the main gas valve.

NOTE: The manual reset **Rollout Switch (RS)** must be reset before allowing furnace operation.

5. **Auxiliary Limit Switch (ALS)** - This control is located inside the heat exchanger compartment and is set to open at 160°F. It is a manual reset switch. If ALS trips, then the primary limit (LS) has not functioned correctly. Replace the primary limit LS.

Table 18: Ignition Control Board Flash Codes

Flash Code	Description
Heart Beat	Normal Operation
2 Flashes	Pressure switch open with inducer on
3 Flashes	Pressure switch closed with inducer off
4 Flashes	Not Used
5 Flashes	Lockout from too many flame losses
6 Flashes	High temperature switch open
7 Flashes	Rollout switch open
8 Flashes	Flame present with gas off
9 Flashes	Gas valve stuck OFF or ON
10 Flashes	Flame sense circuit failure

Safety Controls

The control circuit includes the following safety controls:

1. **High Pressure Switch (HP)-** This switch protects against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure (opens at 625 ± 25 psig and resets at 500 ± 25 psig).
2. **Low Pressure Switch (LP)-** This switch protects against loss of refrigerant charge (opens at 7 ± 3 psig and resets at 22 ± 5 psig).

The above pressure switches are specifically designed to operate with R-410A systems. R-22 pressure switches **must not** be used as replacements for the R-410A pressure switches.

⚠WARNING

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools and equipment. If you do not possess these, do not attempt to perform any maintenance other than those procedures recommended in this Installation Manual. Failure to heed this warning could result in serious injury and possible damage to this equipment.

Circulating Fan

When the thermostat calls for FAN, the thermostat terminal G is energized signaling the circulating fan to run at the heat speed 2 seconds after the G terminal is energized.

If a call for HEAT occurs, the circulating fan continues to run at the heat speed.

If a call for COOL occurs, the circulating fan switches to cool speed according to the fan delay profile selected in Table 16.

When the thermostat ends the call for FAN, the thermostat terminal G is de-energized, de-energizing the circulating fan.

Start-Up

Prestart Check List

Complete the following checks before starting the unit.

3. Check the type of gas being supplied. Be sure that it is the same as listed on the unit nameplate.
4. Make sure that the vent outlet air hood has been properly installed.

Operating Instructions

1. STOP! Read the information on the unit safety label.
2. Set the thermostat to the OFF position.
3. Turn off all electrical power to the unit.
4. DO NOT try to light the burners by hand. This appliance is equipped with an ignition device which automatically lights the burners.
5. Remove the access panel.
6. Turn the gas valve switch to the OFF position.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow B in the information on the unit safety label. If you don't smell gas, go to the next step.
8. Turn the gas valve switch to the ON position.
9. Replace the control access panel.
10. Turn on all electric power to the unit.
11. Set the thermostat to the desired setting.
12. If the unit will not operate, follow the instructions To Turn Off Gas To Appliance and call your service technician or gas supplier.

To Turn Off Gas To Unit

1. Set the thermostat to the OFF position.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove the control access panel.
4. Turn the gas valve switch to the OFF position. DO NOT FORCE.
5. Replace the control access panel.

Post Start Check List

After the entire control circuit has been energized and the heating section is operating, make the following checks:

1. Check for gas leaks in the unit piping as well as the supply piping.
2. Check for correct manifold gas pressures. See Checking Gas Input.
3. Check the supply gas pressure. It must be within the limits shown on rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas line pressure exceed 13.5", nor the operating pressure drop below 4.5" for natural gas units. If gas pressure is outside these limits, contact the local gas utility for corrective action.

Manifold Gas Pressure Adjustment

Small adjustments to the gas flow may be made by turning the pressure regulator adjusting screw on the automatic gas valve. Refer to Figures 14 and 12.

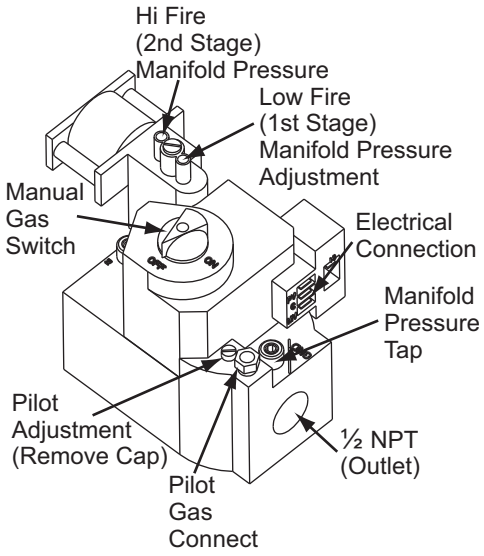


Figure 12: Two Stage Gas Valve Front

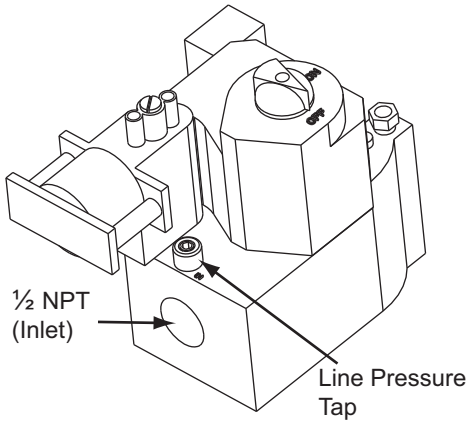


Figure 13: Two Stage Gas Valve Rear

Adjust as follows:

1. Remove the cap from the valve body. See Figures 14 and 12 for location.
2. To decrease the gas pressure, turn the adjusting screw counterclockwise.
3. To increase the gas pressure, turn the adjusting screw clockwise.

NOTE: The correct manifold pressure for natural gas furnaces is 3.5 IWG high heat and 1.5 IWG low heat. The correct manifold pressure for propane (LP) is 10.0 IWG high heat and 4.5 IWG low heat.

Burner Instructions

To check or change the burners, CLOSE THE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL POWER TO THE UNIT.

1. Remove the two (2) #8 screws holding each burner in place.
2. Remove the burner assembly from the manifold assembly by moving the burner assembly forward, turn at an angle and pull back.
3. Burners are now accessible for service.

Pilot Instruction

To adjust the pilot flame:

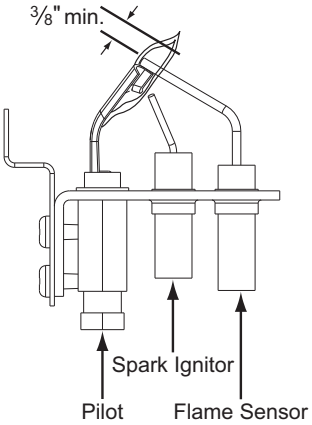


Figure 14: Proper Flame Adjustment

1. Remove the pilot adjustment cover screw.
2. Adjust the pilot adjustment screw to achieve the proper pilot flame.
3. The pilot flame should envelope 3/8” of the end of the flame sensor and not contain any yellow color, see Figure 14.
4. Replace the pilot adjustment cover screw after the pilot flame is set.

To check, adjust or remove the hot surface pilot assembly, CLOSE THE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL POWER TO THE UNIT.

1. Disconnect the wiring from the control board to the pilot assembly.
2. Remove the two (2) #8 screws holding the pilot assembly in place.
3. Remove the pilot assembly.

Adjustment of Temperature Rise

After about 20 minutes of high heat operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts about six feet from the furnace where they will not be affected by radiant heat.

The temperature rise (or temperature difference between the return air and the heated air from the furnace) must lie within the range shown on the rating plate and the data in Tables 11 thru 11.

After the temperature rise has been determined, the CFM can be calculated as follows:

$$\text{Degrees F Temp Rise} = \frac{\text{BTUH Output}}{1.08 \times \text{CFM}}$$

OR

$$\text{CFM} = \frac{\text{BTUH Output}}{1.08 \times \text{Degrees F Temp Rise}}$$

Direct Drive Blower

All units have direct drive, constant CFM blower motors.

Checking Gas Heat Input

Natural Gas

1. Turn off all other gas appliances connected to the gas meter.
2. With the furnace turned on, measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter usually has a 1/2 or a 1 cubic foot test dial.
3. Using the number of seconds for each revolution and the size of the test dial increment, find the cubic feet of gas consumed per hour from Table 19.

If the actual input is not within 5% of the furnace rating with allowance being made for the permissible range of the regulator setting, replace the orifice spuds with spuds of the proper size.

NOTE: To find the BTU input, multiply the number of cubic feet of gas consumed per hour by the BTU content of the gas in your particular locality. (Contact your gas company for this information since it varies widely from city to city.)

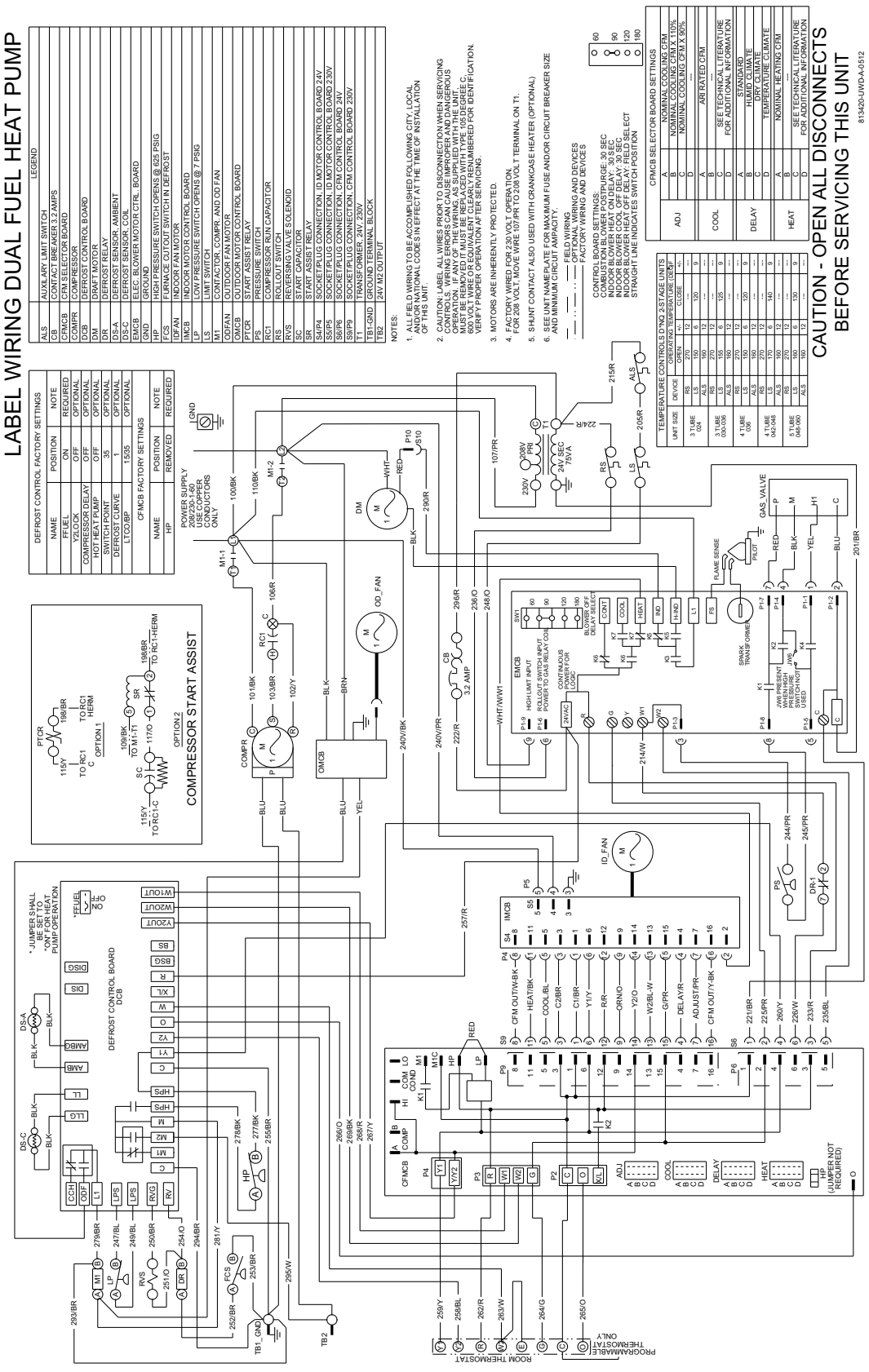
Table 19: Gas Rate Cubic Feet Per Hour[1]

Seconds for One Rev.	Size of Test Dial	
	1/2 cu. ft.	1 cu. ft.
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	37	75
50	36	72
52	35	69
54	34	67
56	32	64
58	31	62
60	30	60

1. *EXAMPLE*: By actual measurement, it takes 38 seconds for the hand on the 1-cubic foot dial to make a revolution with just a 100,000 BTUH furnace running. Using this information, locate 38 seconds in the first column of Table 19. Read across to the column headed “1 Cubic Foot,” where you will see that 95 cubic feet of gas per hour are consumed by the furnace at that rate. Multiply 95 x 1050 (the BTU rating of the gas obtained from the local gas company). The result is 99,750 BTUH, which is close to the 100,000 BTUH rating of the furnace.

Typical Wiring Diagrams

Typical DHQ024 Heat Pump with Two Stage Gas Heat 208/230-1-60 volt Wiring Diagram



Typical DHQ030-060 Heat Pump with Two Stage Gas Heat 208/230-1-60 volt Wiring Diagram

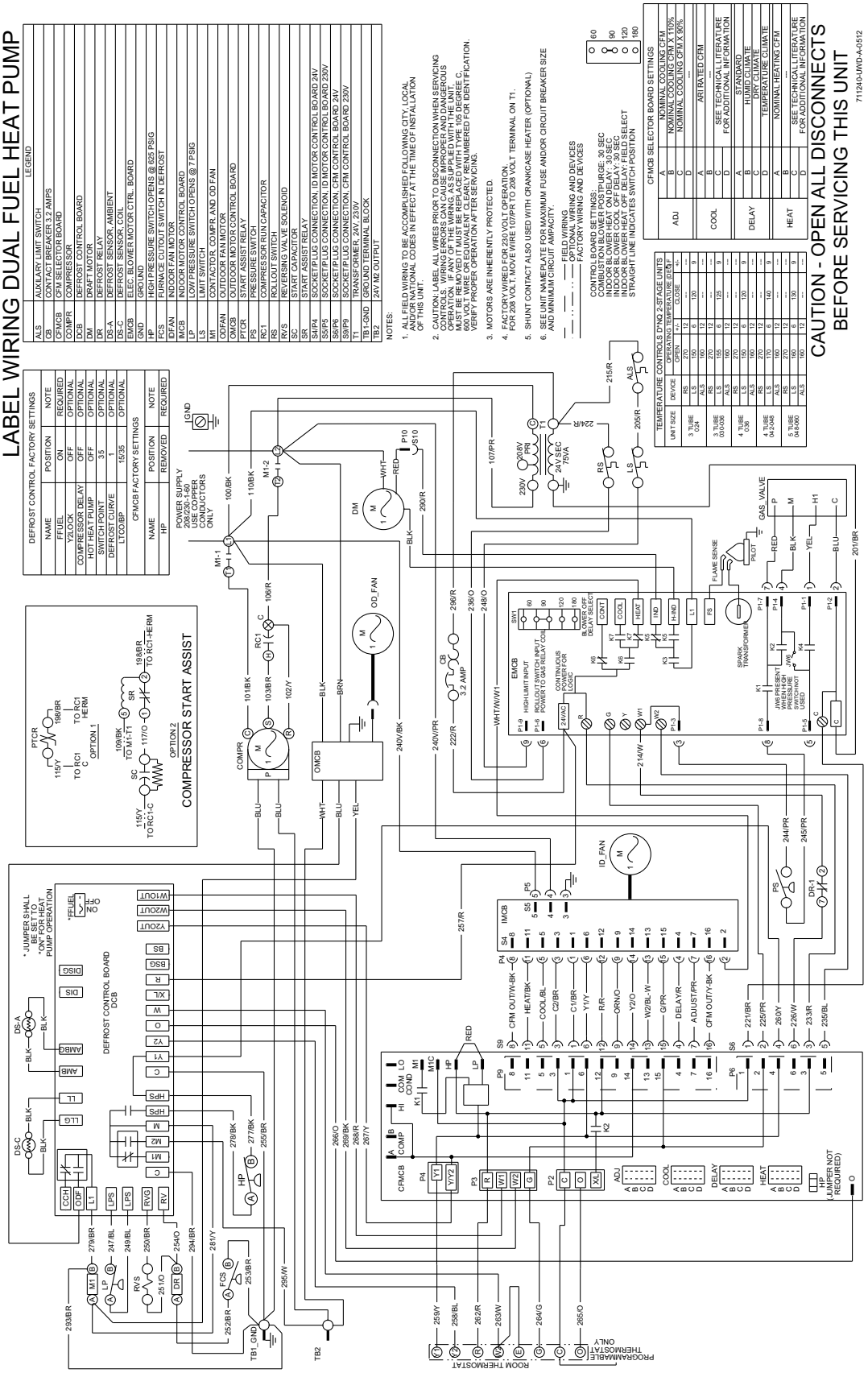


Table 20: DHQ24 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	132	64	286	78	-30	80	50	6.3
	85	135	66	331	88	-29	80	51	7.1
	95	139	67	383	98	-27	80	52	8.1
300 Cfm/Ton 80/67	75	143	69	291	77	-25	80	55	6.4
	85	146	70	336	88	-24	80	56	7.2
	95	150	71	389	98	-23	80	57	8.2
300 Cfm/Ton 80/72	75	156	71	297	78	-20	80	60	6.5
	85	159	73	343	88	-19	80	61	7.3
	95	162	75	395	99	-18	80	62	8.3
300 Cfm/Ton 75/63	75	133	65	286	77	-24	75	51	6.3
	85	137	66	332	88	-23	75	52	7.1
	95	138	68	378	97	-22	75	53	8.0
400 Cfm/Ton 80/62	75	139	67	282	76	-27	80	53	6.2
	85	142	69	333	88	-26	80	54	7.1
	95	145	70	383	98	-25	80	55	8.1
400 Cfm/Ton 80/67	75	150	71	296	78	-22	80	58	6.5
	85	150	72	339	88	-21	80	59	7.3
	95	154	73	391	98	-20	80	59	8.3
400 Cfm/Ton 80/72	75	163	73	302	78	-17	80	63	6.5
	85	164	75	347	88	-17	80	64	7.4
	95	167	77	398	99	-16	80	64	8.4
400 Cfm/Ton 75/63	75	138	67	288	77	-21	75	54	6.3
	85	141	68	335	88	-20	75	55	7.2
	95	145	70	386	98	-19	75	56	8.2

Table 21: DHQ030 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	137	62	265	80	-30	80	50	5.9
	85	139	64	313	91	-29	80	51	6.2
	95	142	67	360	100	-27	80	53	7.2
300 Cfm/Ton 80/67	75	139	59	287	81	-26	80	54	7.9
	85	142	60	335	91	-25	80	55	9.0
	95	145	62	381	101	-24	80	56	10.0
300 Cfm/Ton 80/72	75	161	72	278	82	-19	80	61	5.9
	85	163	73	326	92	-18	80	62	6.1
	95	166	75	373	102	-18	80	62	7.1
300 Cfm/Ton 75/63	75	143	64	284	80	-20	75	55	8.0
	85	145	66	325	90	-19	75	56	8.8
	95	146	66	383	101	-18	75	57	11.2
400 Cfm/Ton 80/62	75	134	63	283	81	-29	80	51	7.8
	85	138	65	326	91	-28	80	52	8.8
	95	141	67	371	101	-27	80	53	9.8
400 Cfm/Ton 80/67	75	145	65	291	81	-24	80	56	8.0
	85	148	68	333	91	-23	80	57	8.9
	95	150	69	379	101	-22	80	58	10.0
400 Cfm/Ton 80/72	75	157	69	298	82	-19	80	61	8.2
	85	160	71	340	92	-18	80	62	9.1
	95	160	71	340	92	-18	80	62	9.1
400 Cfm/Ton 75/63	75	135	62	279	80	-23	75	52	7.8
	85	137	63	321	90	-22	75	53	8.7
	95	140	65	366	100	-21	75	54	9.7

Table 22: DHQ036 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	125	59	284	77	-31	80	49	9.1
	85	128	60	327	87	-30	80	50	10.2
	95	130	62	375	97	-29	80	51	10.5
300 Cfm/Ton 80/67	75	137	62	291	78	-26	80	54	9.4
	85	139	64	335	88	-25	80	55	9.7
	95	142	66	383	98	-24	80	56	10.8
300 Cfm/Ton 80/72	75	149	68	296	78	-20	80	60	9.6
	85	153	68	341	88	-19	80	61	10.8
	95	155	70	389	98	-19	80	62	11.0
300 Cfm/Ton 75/63	75	123	59	284	77	-27	75	48	9.1
	85	126	60	328	87	-25	75	50	10.3
	95	131	62	376	97	-23	75	52	10.6
400 Cfm/Ton 80/62	75	131	61	288	77	-28	80	52	9.2
	85	134	63	331	88	-28	80	52	10.3
	95	139	65	380	98	-26	80	54	11.8
400 Cfm/Ton 80/67	75	142	64	294	78	-23	80	57	9.4
	85	144	66	337	88	-23	80	57	10.6
	95	148	67	386	98	-22	80	58	12.0
400 Cfm/Ton 80/72	75	154	70	300	78	-18	80	62	9.7
	85	157	70	345	89	-17	80	63	10.8
	95	159	71	393	99	-17	80	63	11.1
400 Cfm/Ton 75/63	75	132	61	288	77	-22	75	53	9.3
	85	134	63	332	87	-22	75	54	10.4
	95	138	64	393	99	-21	75	54	12.1

Table 23: DHQ42 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	124	56	288	79	-32	80	48	10.0
	85	127	59	334	89	-31	80	49	11.3
	95	130	62	383	99	-30	80	50	12.8
300 Cfm/Ton 80/67	75	134	60	294	79	-26	80	54	10.2
	85	138	63	339	89	-26	80	54	11.5
	95	141	65	390	100	-24	80	56	13.0
300 Cfm/Ton 80/72	75	147	65	300	80	-21	80	59	10.4
	85	150	66	346	90	-20	80	60	11.7
	95	153	68	397	100	-19	80	61	13.1
300 Cfm/Ton 75/63	75	125	57	288	78	-26	75	50	10.0
	85	128	59	334	89	-25	75	50	11.3
	95	131	62	384	99	-24	75	51	12.8
400 Cfm/Ton 80/62	75	133	59	293	79	-27	80	53	10.9
	85	133	61	335	89	-28	80	52	11.3
	95	136	63	383	99	-27	80	53	12.7
400 Cfm/Ton 80/67	75	144	63	298	80	-22	80	58	11.1
	85	147	65	342	90	-22	80	58	11.5
	95	149	67	392	100	-21	80	59	13.0
400 Cfm/Ton 80/72	75	157	67	304	81	-17	80	63	11.3
	85	159	69	350	91	-17	80	63	11.7
	95	162	70	400	101	-16	80	64	13.2
400 Cfm/Ton 75/63	75	134	59	293	79	-21	75	54	11.0
	85	137	61	337	89	-21	75	55	12.4
	95	140	64	386	99	-20	75	55	14.1

Table 24: DHQ48 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	126	58	298	79	-30	80	50	12.3
	85	129	61	342	89	-29	80	51	14.7
	95	131	63	391	99	-28	80	52	16.9
300 Cfm/Ton 80/67	75	135	62	303	80	-25	80	55	13.2
	85	139	66	349	90	-24	80	56	15.0
	95	131	63	394	100	-28	80	52	15.6
300 Cfm/Ton 80/72	75	148	65	309	81	-20	80	60	13.5
	85	151	67	359	91	-19	80	61	15.4
	95	155	69	408	102	-19	80	62	17.4
300 Cfm/Ton 75/63	75	127	59	297	80	-24	75	51	13.1
	85	129	64	343	90	-23	75	52	14.8
	95	132	65	395	100	-23	75	53	17.0
400 Cfm/Ton 80/62	75	132	61	300	80	-27	80	53	13.1
	85	135	64	347	90	-26	80	54	14.9
	95	138	66	395	100	-25	80	55	17.1
400 Cfm/Ton 80/67	75	143	64	306	80	-22	80	58	13.3
	85	146	66	353	91	-21	80	59	15.1
	95	149	67	405	101	-21	80	59	17.3
400 Cfm/Ton 80/72	75	155	67	314	81	-17	80	63	13.6
	85	158	68	361	92	-16	80	64	15.4
	95	160	70	409	101	-16	80	64	17.3
400 Cfm/Ton 75/63	75	132	60	301	79	-21	75	54	13.1
	85	134	62	348	90	-20	75	55	15.1
	95	137	64	396	99	-20	75	55	17.1

Table 25: DHQ060 Charging Table

Air Flow Indoor Db/Wb	Outdoor DB	Suction Pressure	Suction Temp.	Discharge Pressure	Liquid Temp.	Delta T Db	Entering Evap Db	Leaving Evap Db	Compressor Amps
300 Cfm/Ton 80/62	75	122	58	296	81	-30	80	50	15.3
	85	127	61	348	92	-29	80	51	16.5
	95	132	63	396	102	-28	80	52	18.3
300 Cfm/Ton 80/67	75	134	61	305	82	-25	80	55	15.6
	85	139	64	356	94	-23	80	57	16.9
	95	140	65	394	103	-23	80	57	18.4
300 Cfm/Ton 80/72	75	145	66	312	84	-20	80	60	16.0
	85	149	65	363	95	-19	80	61	17.1
	95	152	66	411	105	-19	80	61	18.8
300 Cfm/Ton 75/63	75	125	58	297	81	-24	75	51	15.3
	85	128	60	339	91	-23	75	52	17.0
	95	130	63	386	101	-22	75	53	19.1
400 Cfm/Ton 80/62	75	132	62	303	82	-25	80	55	15.6
	85	137	65	355	93	-24	80	56	16.8
	95	142	67	403	103	-23	80	57	18.6
400 Cfm/Ton 80/67	75	142	64	310	83	-22	80	58	15.9
	85	145	66	360	94	-21	80	59	17.0
	95	148	67	408	104	-20	80	60	18.8
400 Cfm/Ton 80/72	75	152	71	317	84	-17	80	63	16.2
	85	156	70	368	95	-16	80	64	17.3
	95	159	71	416	105	-15	80	65	19.0
400 Cfm/Ton 75/63	75	132	61	303	82	-21	75	55	15.6
	85	134	62	346	92	-20	75	55	17.4
	95	137	64	393	102	-19	75	56	19.5

Start-Up Sheet

Print Form

Residential Package Dual Fuel Start-Up Sheet

Proper start-up is critical to customer comfort and equipment longevity

Reset Form

Start-Up Date | Company Name | Start-Up Technician

Owner Information

Name | Address | Daytime Phone

City | State or Province | Zip or Postal Code

Equipment Data

Unit Model # | Unit Serial #

General Information (Check all that apply)

◯ Residential	◯ New Construction	◯ Roof level	◯ Down flow
◯ Commercial	◯ Retrofit	◯ Grade level	◯ Side flow

Unit Location and Connections (Check all that apply)

☐ Unit is level and installed on: ☐ Slab ☐ Roof curb ☐ Duct connections are complete: ☐ Supply ☐ Return

☐ Condensate drain properly connected per the installation instructions ☐ Condensate trap has been primed with water

Filters

☐ Filters installed | Number of filters | Filter size | ◯ Filter located inside ◯ Filter located outside

Additional Kits & Accessories Installed (Check all that apply)

☐ Refrigerant safety kit ☐ Low ambient kit ☐ Anti-recycle timer ☐ Crank case heater ☐ Filter frame kit

☐ Transformer kit ☐ Economizer ☐ Roof curb kit ☐ Burglar bar kit ☐ Hail guard kit

☐ Manual fresh air damper kit ☐ Motorized fresh air damper kit

Electrical Connections & Inspection (Check all that apply)

◯ Single phase ◯ Three phase ◯ 208 volts AC ◯ 230 volt AC ◯ 460 volts AC ◯ 575 volts AC

☐ Inspect wires and electrical connections ☐ Transformer wired properly for primary supply voltage ☐ Ground connected

☐ Low voltage present at control board "R & C" Measured voltage "R" and "C" outdoor unit control board

☐ Line voltage present at disconnect Measured voltage "L1 to L2" "L2 to L3" "L1 to L3"

Compressor amperes "L1" "L2" "L3" Total amperes "L1" "L2" "L3"

◯ Single stage compressor ◯ Two stage compressor

Air Flow Setup / Cooling

Blower Type & Set-Up						
	◯ ECM	COOL	◯ A	◯ B	◯ C	◯ D
		ADJUST	◯ A	◯ B	◯ C	◯ D
		DELAY	◯ A	◯ B	◯ C	◯ D
	◯ X-13	◯ 1	◯ 2	◯ 3	◯ 4	◯ 5
	◯ PSC	◯ Low	◯ Medium Low	◯ Medium	◯ Medium High	◯ High

Supply static (inches of water column)	Supply air dry bulb temperature	Outside air dry bulb temperature
Return static (inches of water column)	Return air dry bulb temperature	Return air wet bulb temperature
Total external static pressure	Temperature drop	Supply air wet bulb temperature

Refrigerant Charge and Metering Device

◯ R-410A ◯ R-22	Data plate - lbs / Oz	Suction line temperature	Discharge pressure
◯ TXV ◯ Fixed Orifice	Discharge line temperature	Suction pressure	Liquid line temperature
TXV# / Orifice size		Superheat	Subcooling

YorkGuard VI Defrost Control Board

Fill in the information ie.. "ON", "OFF", "YES", "NO", or the appropriate "Value" for the selected pin settings

Part Number	Version Number (located on the Chip on the Defrost Board)			
Low Temp Cut Out	Balance Point	Defrost Curve	Y2 Lock	FFUEL
Switch Point	Hot Heat Pump	Bonnet Sensor Present	Compressor Delay	

Supplementary Heating Indoor Blower Set-Up

◯ ECM HEAT	◯ A	◯ B	◯ C	◯ D	
◯ X-13	◯ 1	◯ 2	◯ 3	◯ 4	◯ 5
◯ PSC	◯ Low	◯ Medium Low	◯ Medium	◯ Medium High	◯ High

◯ Single Stage ◯ Two Stage ◯ Natural Gas ◯ Propane LP (Requires LP Conversion Kit)

LP Gas Conversion Kit # | LP Conversion Kit Installed By | Inlet Gas Pressure (w.c.")

Manifold Pressure at 100% Firing Rate (w.c.") | Measured BTU/H (Clock Gas Meter Nat Gas) | Rated BTU/H

Manifold Pressure / Low Fire Rate (w.c.") | Return Air Dry Bulb Temp | Supply Air Dry Bulb Temp | Temp Rise

☐ Burner Flame Inspection - Blue flames extending directly into the primary heat exchanger cells

Clean Up Job Site

- ☐ Job site has been cleaned, indoor and outdoor debris removed from job site
- ☐ Tools have been removed from unit
- ☐ All panels have been installed

Unit Operation and Cycle Test

- ☐ Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems
- ☐ Operate the unit through cooling cycles from the thermostat, noting and correcting any problems

Owner Education

- ☐ Provide owner with the owner's manual
- ☐ Explain operation of system to equipment owner
- ☐ Explain thermostat use and programming (if applicable) to owner
- ☐ Explain the importance of regular filter replacement and equipment maintenance

Comments and Additional Job Details

R-410A QUICK REFERENCE GUIDE

Refer to Installation Instructions for specific installation requirements.

- **R-410A Refrigerant operates at 50 - 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with R-410A.**
- **R-410A Refrigerant cylinders are rose colored.**
- **Recovery cylinder service pressure rating must be 400 psig, DOT 4BA400, or DOT BW400.**
- **Recovery equipment must be rated for R-410A.**
- **Do Not use R-410A service equipment on R-22 systems. All hoses, gages, recovery cylinders, charging cylinders and recovery equipment must be dedicated for use on R-410A systems only.**
- **Manifold sets must be at least 700 psig high side, and 180 psig low side, with 550 psig retard.**
- **All hoses must have a service pressure rating of 800 psig.**
- **Leak detectors must be designed to detect HFC refrigerants.**
- **Systems must be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.**
- **R-410A can only be used with POE type oils.**
- **POE type oils rapidly absorb moisture from the atmosphere.**
- **Vacuum pumps will not remove moisture from POE type oils.**
- **Do not use liquid line driers with a rated working pressure rating less than 600 psig.**
- **Do not install suction line driers in the liquid line.**
- **A liquid line drier is required on every unit.**
- **Do not use a R-22 TXV. If a TXV is to be used, it must be a R-410A TXV.**
- **Never open system to atmosphere when under a vacuum.**
- **If system must be opened for service, evacuate system then break the vacuum with dry nitrogen and replace all filter driers.**

Figure 15: R-410A Quick Reference Guide

1101790-UIM-C-0414
Supersedes: 1101790-UIM-B-0314

York International Corporation
5005 York Drive
Norman, OK 73069