Carrier
United Technologies

Aquazone™ 50HQP,VQP072-360 Large Capacity Water Source Heat Pumps

Installation, Start-Up, and Service Instructions

CONTENTS

IMPORTANT: Read the entire instruction manual before starting installation.

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.

Understand the signal words — DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage.

Recognize safety information. This is the safety-alert symbol (⚠). When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

⚠ WARNING

Electrical shock can cause personal injury or death. Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Turn off accessory heater power if applicable.

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⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

GENERAL

This Installation and Start-Up Instructions literature is for Aquazone™ water source heat pump systems.

Water source heat pumps (WSHPs) are single-package vertically mounted units with electronic controls designed for year-round cooling and heating.

IMPORTANT: The installation of water source heat pump units and all associated components, parts, and accessories which make up the installation shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

INSTALLATION

Step 1 — Check Jobsite — Installation, operation and maintenance instructions are provided with each unit. Before unit start-up, read all manuals and become familiar with the unit and its operation. Thoroughly check out the system before operation. Complete the inspections and instructions listed below to prepare a unit for installation. See Table 1 for unit physical data.

Units are designed for indoor installation only. See Fig. 1-5 for overall unit dimensions.

⚠ CAUTION

To avoid equipment damage, do not use these units as a source of heating or cooling during the construction process. The mechanical components and filters used in these units quickly becomes clogged with construction dirt and debris which may cause system damage.

Step 2 — Check Unit — Upon receipt of shipment at the jobsite, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the carton or crating of each unit, and inspect each unit for damage. Ensure the shipping company makes proper notation of any shortages or damage on all copies of the freight bill. Concealed damage not discovered during unloading must be reported to the shipping company within 15 days of receipt of shipment.

NOTE: It is the responsibility of the purchaser to file all necessary claims with the shipping company.

1. Verify unit is correct model for entering water temperature of job.
2. Be sure that the location chosen for unit installation provides ambient temperatures maintained above freezing. Well water applications are especially susceptible to freezing.
3. Be sure the installation location is isolated from sleeping areas, private offices and other acoustically sensitive spaces.

   NOTE: A sound control accessory package may be used to help eliminate sound in sensitive spaces.
4. Check local codes to be sure a secondary drain pan is not required under the unit.
5. Be sure unit is mounted at a height sufficient to provide an adequate slope of the condensate lines. If an appropriate slope cannot be achieved, a field-supplied condensate pump may be required.
6. Provide sufficient space for duct connection.
7. Provide adequate clearance for filter replacement and drain pan cleaning. Do not allow piping, conduit, etc. to block filter access.
8. Provide sufficient access to allow maintenance and servicing of the fan and fan motor, compressor and coils. Removal of the entire unit from the closet should not be necessary.
9. Provide an unobstructed path to the unit within the closet or mechanical room. Space should be sufficient to allow removal of unit if necessary.
10. Provide ready access to water valves and fittings, and screwdriver access to unit side panels, discharge collar, and all electrical connections.
11. Where access to side panels is limited, pre-removal of the control box side mounting screws may be necessary for future servicing.

STORAGE — If the equipment is not needed for immediate installation upon its arrival at the jobsite, it should be left in its shipping carton and stored in a clean, dry area of the building or in a warehouse. Units must be stored in an upright position at all times. If carton stacking is necessary, stack units a maximum of 3 high. Do not remove any equipment from its shipping package until it is needed for installation.

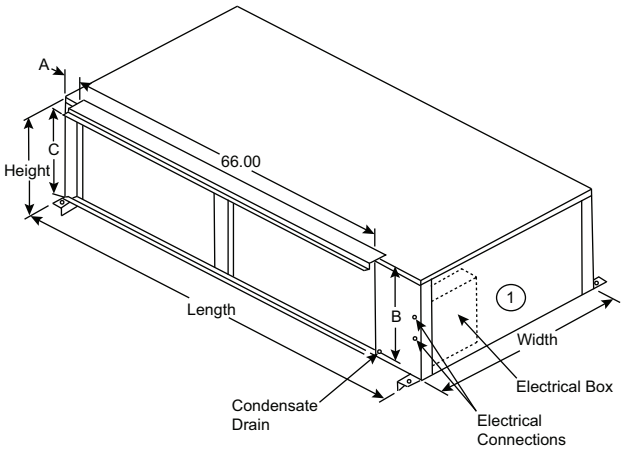
Table 1 — 50HQP,VQP Unit Physical Data

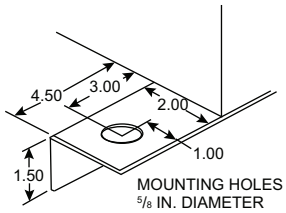
UNIT SIZE	072	096	120	150	151	180
Compressor Type	Reciprocating	Reciprocating	Scroll	Scroll	Scroll	Scroll
Quantity	2	2	2	2	2	2
Refrigerant Charge (lb)	7.75	9.25	10.38	12.75	12.13	14.63
Coil Face Area (sq ft)	7.00	9.00	9.00	10.83	14.33	10.83
Rows	3	3	3	3	3	3
Horizontal Filter Size (in.) (Nominal) (Qty)	20 x 34 1/2 x 1 (2)	20 x 34 1/2 x 1 (2)	20 x 34 1/2 x 1 (2)	24 x 34 x 1 (2)	NA	24 x 34 x 1 (2)
Vertical Filter Size (in.) (Nominal) (Qty)	20 x 34 1/2 x 1 (2)	20 x 34 1/2 x 1 (2)	20 x 34 1/2 x 1 (2)	NA	24 x 24 x 1 (4)	NA
Blower Size (in.)	12 x 12	12 x 12	15 x 15/12 x 9 (2)	15 x 15	15 x 15	12 x 12
Motor HP	1	1 1/2/2	2/3	3	3	3
Quantity	1	1	1	1	1	2
Type	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
Horizontal Water Connections (in.) FPT	1	1	1 1/4	1 1/2	NA	NA
Vertical Water Connections (in.) FPT	1	1	1 1/2	NA	1 1/2	NA
Rated Water Flow Rate (gpm)	14.0	18.0	24.0	30.0	30.0	32.0
Water Pressure Drop at Rated Flow (psig) and (FOH) Water Loop Cooling	4.8/11.0	5.1/11.7	4.3/10.0	3.0/7.0	3.0/7.0	3.4/7.9
Horizontal Condensate Connection (in.) FPT	3/4	3/4	3/4	3/4	3/4	1 1/4
Vertical Condensate Connection (in.) FPT	3/4	3/4	3/4	3/4	3/4	3/4
Horizontal Unit Ship Weight (lb)	660	815	770	912	NA	1100
Horizontal Unit Operating Weight (lb)	615	765	725	822	NA	1010
Vertical Unit Ship Weight (lb)	660	815	770	NA	972	NA
Vertical Unit Operating Weight (lb)	615	765	725	NA	882	NA

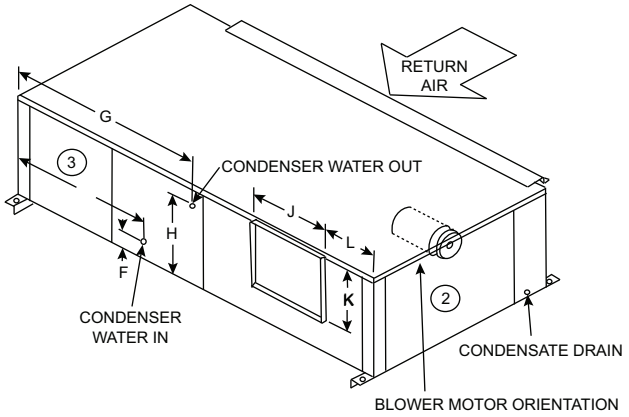
UNIT SIZE	181	210	240	242	300	360
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Quantity	2	2	2	2	2	2
Refrigerant Charge (lb)	14.0	16.25	18.13	18.13	18.13	36.00
Coil Face Area (sq ft)	14.33	18.10	18.10	15.30	18.10	27.00
Rows	3	3	3	3	3	3
Horizontal Filter Size (in.) (Nominal) (Qty)	NA	NA	NA	17 3/4 x 34 3/4 x 1 (2)	NA	NA
Vertical Filter Size (in.) (Nominal) (Qty)	24 x 24 x 1 (4)	20 x 34 1/2 x 1 (4)	20 x 34 1/2 x 1 (4)	NA	20 x 34 1/2 x 1 (4)	30 x 34 1/2 x 1 (4)
Blower Size (in.)	15 x 15	15 x 15	15 x 15	15 x 15	15 x 15	15 x 15
Motor HP	5	1 1/2	2	2	3	5
Quantity	1	2	2	2	2	2
Type	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
Horizontal Water Connections (in.) FPT	NA	NA	NA	2	NA	NA
Vertical Water Connections (in.) FPT	1 1/2	2	2	NA	2	2
Rated Water Flow Rate (gpm)	32.0	50.0	50.0	50.0	60.0	80.0
Water Pressure Drop at Rated Flow (psig) and (FOH) Water Loop Cooling	3.4/7.9	6.4/14.8	4.0/9.3	4.0/9.3	5.5/12.8	8.6/19.8
Condensate Connection (in.) FPT	3/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Horizontal Unit Ship Weight (lb)	NA	NA	NA	1400	NA	NA
Horizontal Unit Operating Weight (lb)	NA	NA	NA	1310	NA	NA
Vertical Unit Ship Weight (lb)	975	1180	1400	NA	1450	1750
Vertical Unit Operating Weight (lb)	885	1090	1310	NA	1350	1650

LEGEND

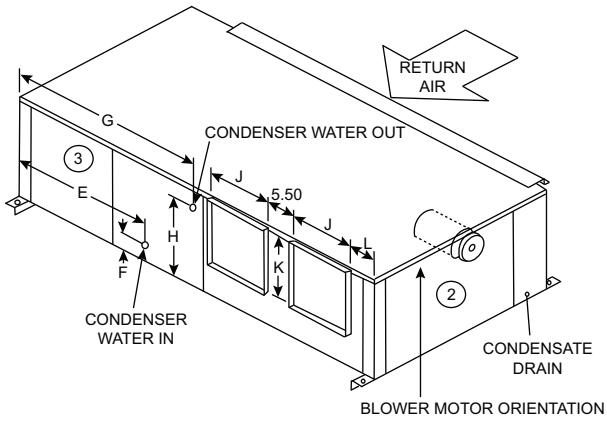
FOH — Feet of Heat
NA — Not Applicable







072, 096, AND 150



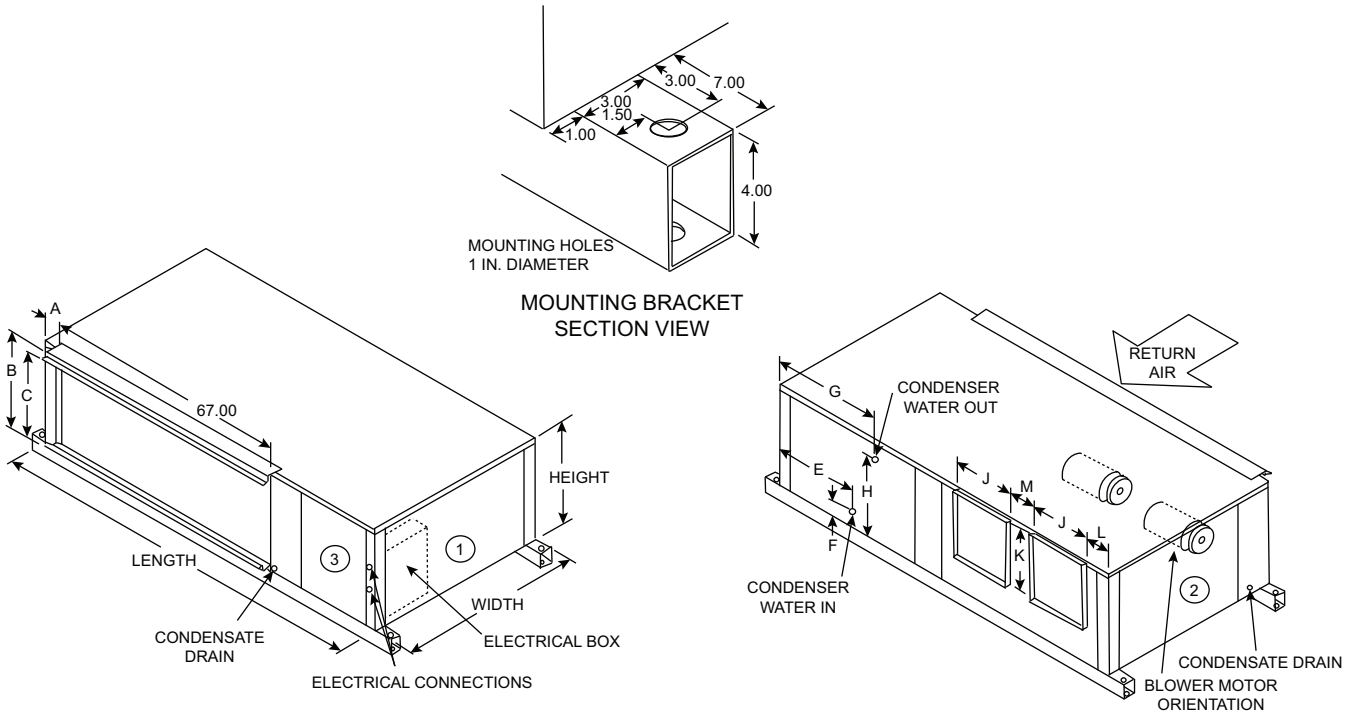
120

SERVICE ACCESS TO:		
(1)	(2)	(3)
CONTROLS, COMPRESSORS	BLOWER AND MOTOR	COMPRESSORS, REFRIGERATION COMPONENTS

UNIT SIZE	HEIGHT	WIDTH	DEPTH	RETURN AIR			CONDENSER WATER CONNECTIONS					SUPPLY AIR (Blower Outlets)			REPLACEMENT FILTER SIZE (NOMINAL)
				A	B	C	E	F	G	H	DIAMETER (FPT)	J	K	L	
072	21.50	38.00	78.00	2.00	20.50	18.50	28.00	2.75	28.00	14.50	1	15.50	13.50	10.50	20 x 34 1/2 x 1 (2 per unit)
096	21.50	38.00	78.00	2.00	20.50	18.50	26.25	3.50	28.00	19.25	1	15.50	13.50	10.50	
120	21.50	38.00	78.00	2.00	20.50	18.50	27.50	3.38	28.00	16.75	1.25	12.50	13.50	5.25	
150	26.75	42.00	82.00	2.00	24.00	22.00	24.00	2.75	24.00	17.75	1.50	18.50	16.00	14.00	24 x 34 x 1 (2 per unit)

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125-in. Specifications subject to change without notice. Condensate connections are 0.75 in. FPT on sizes 072 through 150.

Fig. 1 — 50HQP072-150 Units

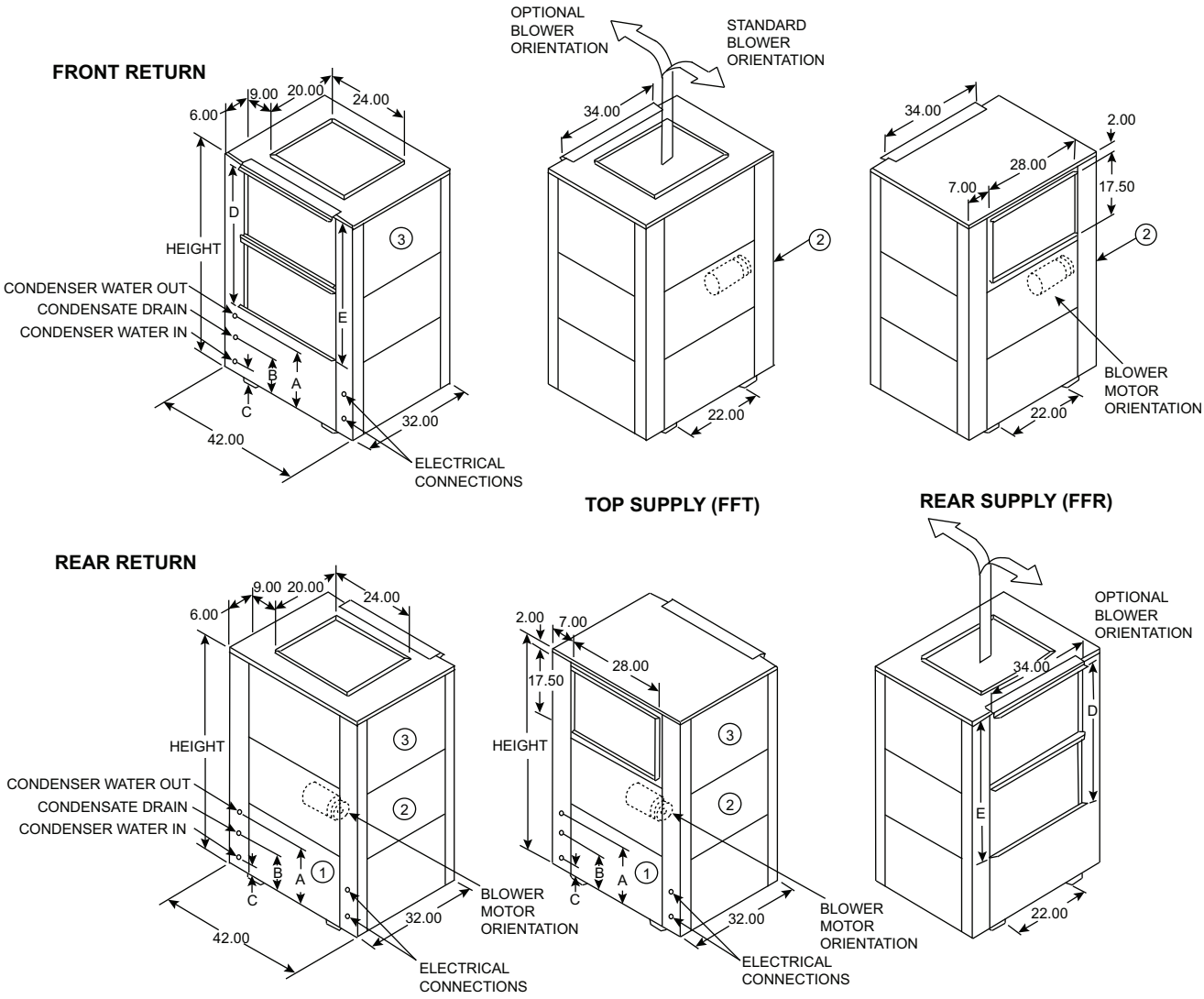


SERVICE ACCESS TO:		
①	②	③
CONTROLS, COMPRESSORS	BLOWER AND MOTOR	COMPRESSORS, REFRIGERATION COMPONENTS

UNIT SIZE	HEIGHT	WIDTH	DEPTH	RETURN AIR			CONDENSER WATER CONNECTIONS					SUPPLY AIR (Blower Outlets)				REPLACEMENT FILTER SIZE (NOMINAL)
				A	B	C	E	F	G	H	DIAMETER (FPT)	J	K	L	M	
180	25.25	60.25	106.50	2.00	24.00	22.00	22.00	6.25	22.00	16.00	1.25	27.75	17.25	5.00	4.00	24 x 34 x 1 (2 per unit)
242	36.00	60.25	106.50	2.00	34.75	32.75	24.50	7.25	24.50	19.62	1.25	23.75	19.75	7.75	9.75	$17^{3}/_{4}$ x $34^{3}/_{4}$ x 1 (2 per unit)

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125-in. Specifications subject to change without notice. Condensate connections are 1.25 in. FPT on sizes 180 and 242.

Fig. 2 — 50HQP180,242 Units



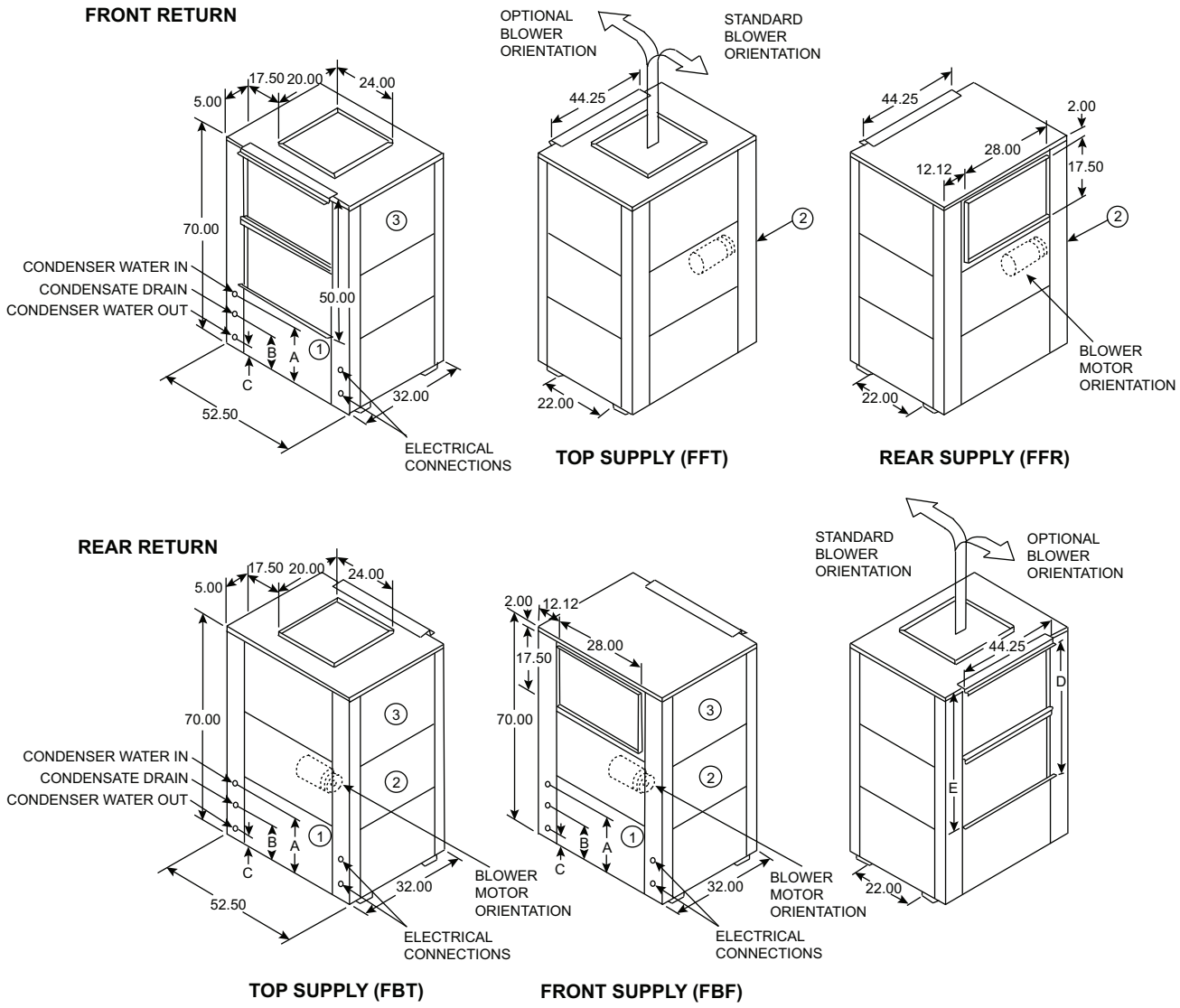
UNIT SIZE	HEIGHT	WIDTH	DEPTH	CONDENSER WATER CONNECTIONS				DUCT FLANGE D	FILTER RACK E	REPLACEMENT FILTER SIZE (NOMINAL)	SERVICE ACCESS		
				A	B	C	Diameter (FPT)				1	2	3
072	62.00	42.00	32.00	14.75	8.50	2.75	1	38.00	40.00	20 x 34 1/2 x 2	Controls, Compressors, Refrigeration Components	Blower and Motor	Blower
096	62.00	42.00	32.00	14.75	2.75	2.75	1						
120	62.00	42.00	32.00	15.00	9.00	3.00	1 1/2						

LEGEND

FFR — Front Water, Front Return, Rear Supply
FFT — Front Water, Front Return, Top Supply

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125-in. Specifications subject to change without notice. Condensate connections are 0.75 in. FPT on sizes 072 through 120.

Fig. 3 — 50VQP072-120 Units



UNIT SIZE	HEIGHT	WIDTH	DEPTH	CONDENSER WATER CONNECTIONS				DUCT FLANGE	FILTER RACK	REPLACEMENT FILTER SIZE (NOMINAL)	SERVICE ACCESS		
				A	B	C	Diameter (FPT)				1	2	3
151	70.00	52.50	32.00	17.00	10.50	3.00	1 1/2	48.00	50.00	24 x 24 x 1 (4 per unit)	Controls, Compressors, Refrigeration Components	Blower and Motor	Blower
181	70.00	52.50	32.00	17.00	10.50	3.00	1 1/2						

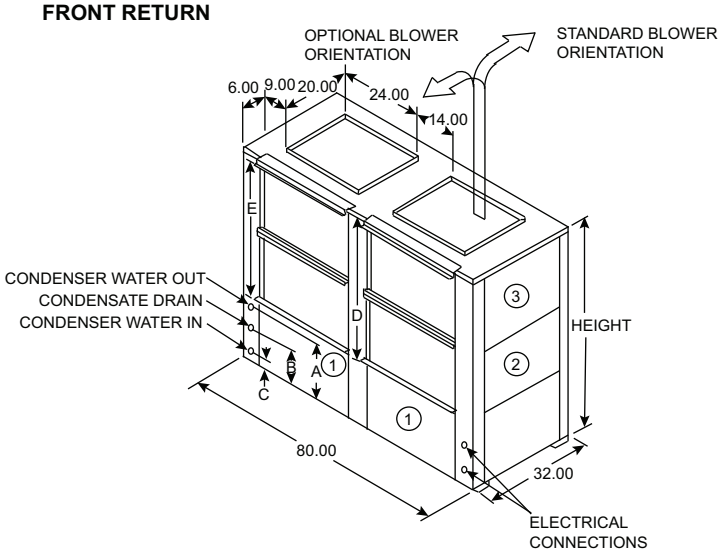
LEGEND

FBF — Front Water, Back Return, Front Supply
FBT — Front Water, Back Return, Top Supply
FFR — Front Water, Front Return, Rear Supply
FFT — Front Water, Front Return, Top Supply

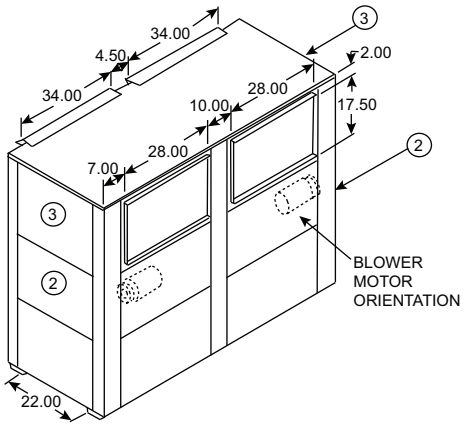
NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125-in. Specifications subject to change without notice. Condensate connections are 0.75 in. FPT on sizes 151 and 181.

Fig. 4 — 50VQP151,181 Units

FRONT RETURN

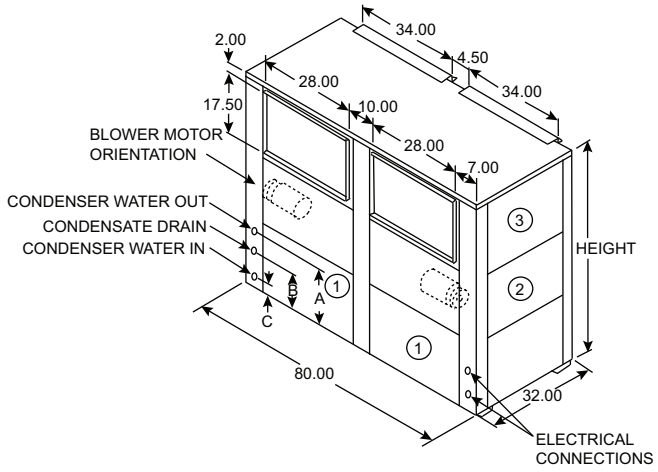


TOP SUPPLY (FFT)

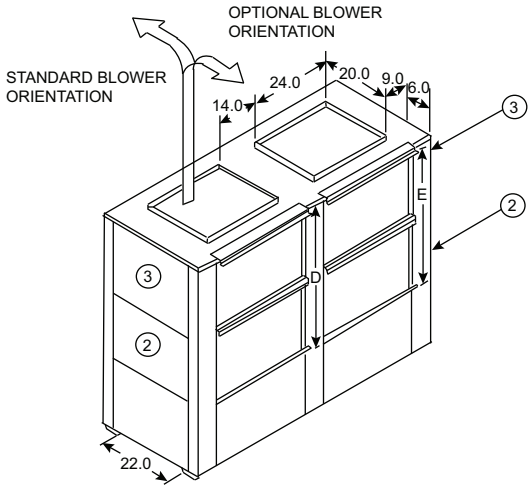


REAR SUPPLY (FFR)

REAR RETURN



FRONT SUPPLY (FBF)



TOP SUPPLY (FBT)

UNIT SIZE	HEIGHT	WIDTH	DEPTH	CONDENSER WATER CONNECTIONS				DUCT FLANGE	FILTER RACK	REPLACEMENT FILTER SIZE (NOMINAL)	SERVICE ACCESS		
				A	B	C	Diameter (FPT)	D	E		1	2	3
210	62.00	80.00	32.00	18.00	8.75	2.75	2	40.00	38.00	20 x 34 1/2 x 1 (4 per unit)	Controls, Compressors, Refrigeration Components	Blower and Motor	Blower
240	66.50	80.00	32.00	18.00	8.75	2.75	2	40.00	38.00				
300	66.50	80.00	32.00	18.00	8.75	2.75	2	40.00	38.00	30 x 34 1/2 x 1 (4 per unit, size 360 only)			
360	86.50	80.00	32.00	17.00	9.00	3.50	2	60.00	58.00				

LEGEND

FBF — Front Water, Back Return, Front Supply
FBT — Front Water, Back Return, Top Supply
FFR — Front Water, Front Return, Rear Supply
FFT — Front Water, Front Return, Top Supply

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125-in. Specifications subject to change without notice. Condensate connections are 1.25 in. FPT on sizes 210 through 360.

Fig. 5 — 50VQP210-360 Units

PROTECTION — Once the units are properly positioned on the jobsite, they must be covered with either a shipping carton, vinyl film, or an equivalent protective covering. Open ends of pipes stored on the jobsite must be capped. This precaution is especially important in areas where painting, plastering, or spraying of fireproof material, etc. is not yet complete. Foreign material that is allowed to accumulate within the units can prevent proper start-up and necessitate costly clean-up operations.

Before installing any of the system components, be sure to examine each pipe, fitting, and valve, and remove any dirt or foreign material found in or on these components.

⚠ CAUTION

DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move units in an upright position. Tilting units on their sides may cause equipment damage.

INSPECT UNIT — To prepare the unit for installation, complete the procedures listed below:

1. Compare the electrical data on the unit nameplate with ordering and shipping information to verify that the correct unit has been shipped.
2. Do not remove the packaging until the unit is ready for installation.
3. Verify that the unit's refrigerant tubing is free of kinks or dents, and that it does not touch other unit components.
4. Inspect all electrical connections. Be sure connections are clean and tight at their terminations.
5. Loosen compressor bolts until the compressor rides freely on springs. Remove shipping restraints.
6. Remove the shipping bolts from compressor support plate to maximize vibration and sound alternation.

⚠ CAUTION

Failure to remove shipping brackets from spring-mounted compressors will cause excessive noise and could cause component failure due to added vibration.

7. Remove any blower support cardboard from inlet of the blower.
8. Locate and verify any accessory kit located in compressor and/or blower section.
9. Remove any access panel screws that may be difficult to remove once unit is installed.

Step 3 — Locate Unit — The following guidelines should be considered when choosing a location for a WSHP:

- Units are for indoor use only.
- Locate in areas where ambient temperatures are between 40 F and 100 F and relative humidity is no greater than 75%.
- Provide sufficient space for water, electrical and duct connections.

  NOTE: Water inlets/outlets and high/low voltage electrical access are available on either side of the unit. Electrical access is also available on the unit front.
- Locate unit in an area that allows for easy access and removal of filter and access panels.

  NOTE: Unit has full filter frame bottom access for one, 2, or 4 in. filters.
- ALLOW enough space for service personnel to perform maintenance.
- Provisions must be made for return air to freely enter the space if unit needs to be installed in a confined area such as a closet.

Step 4 — Mount the Unit

⚠ CAUTION

Remove all shipping blocks under blower housing. Loosen compressor mounting bolts. Failure to do so could result in equipment damage.

MOUNTING VERTICAL UNITS — Vertical units up to five tons are available in left, right, front, or rear air return configurations. Vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to minimize vibration transmission to the building structure. It is not necessary to anchor the unit to the floor. (See Fig. 6.) Vertical units larger than five tons should be vibration isolated according to the design engineers' specifications.

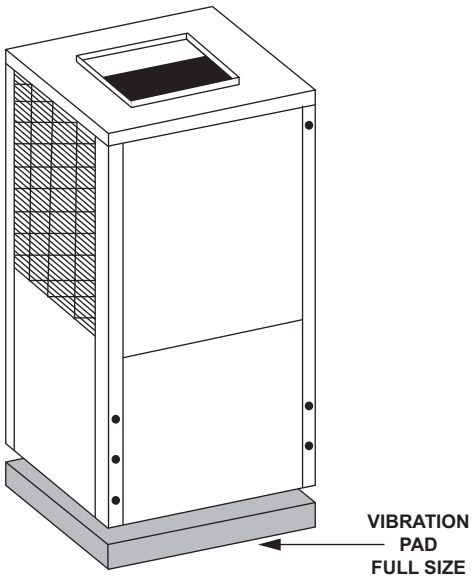


Fig. 6 — Vertical Unit on Vibration Pad

MOUNTING HORIZONTAL UNITS — While horizontal units may be installed on any level surface strong enough to hold their weight, they are typically suspended above a ceiling by threaded rods. The rods are usually attached to the unit corners by hanger bracket kits. (See Fig. 7.) The rods must be securely anchored to the ceiling. Refer to the hanging bracket assembly and installation instructions (Included with the unit) for details. Units larger than six tons include an integral angle iron frame with mounting holes present. (See unit horizontal detail drawing.) Horizontal units installed above the ceiling must conform to all local codes. An auxiliary drain pan if required by code, should be at least four inches larger than the bottom of the heat pump. Plumbing connected to the heat pump must not come in direct contact with joists, trusses, walls, etc.

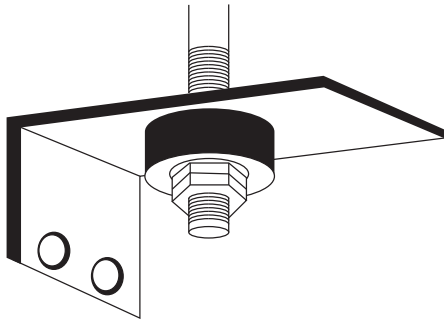


Fig. 7 — Typical Horizontal Unit Hanging Bracket

Some applications require an attic floor installation of the horizontal unit. In this case the unit should be set in a full size secondary drain pan on top of a vibration absorbing mesh. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing mesh. In both cases, a $^3/_4$-in. drain connected to this secondary pan should be run to an eave at a location that will be noticeable. If the unit is located in a crawl space, the bottom of the unit must be at least 4-in. above grade to prevent flooding of the electrical parts due to heavy rains.

Step 5 — Check Duct System — All units are provided with a return air duct flange, while a supply air outlet collar is provided on all models except the 6 through 12 ton horizontal models to facilitate duct connections. Refer to the individual data specification sheet for physical dimensions of the collar and flange.

A flexible connector is recommended for supply and return air connections on metal duct systems. All metal ducting should be insulated with a minimum of one inch duct insulation to avoid heat loss or gain and prevent condensate forming during the cooling operation. Application of the unit to uninsulated duct work is not recommended as the unit's performance will be adversely affected. Do not connect discharge ducts directly to the blower outlet. The factory provided air filter must be removed when using a filter back return air grille.The factory filter should be left in place on a free return system. If the unit will be installed in a new installation with new ductwork, the installation should be designed using current ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) procedures for duct sizing. If the unit will be connected to an existing duct system, a check should be made to assure that the duct system has the capacity to handle the air required for the unit application. If the duct system is too small, larger ductwork must be installed. Be certain to check for existing leaks and repair.

The duct system and all diffusers should be sized to handle the designed airflow quietly. To maximize sound attenuation of the unit blower, the supply and return air plenums should be insulated. There should be no direct straight air path through the return-air grille into the heat pump. The return air inlet to the heat pump must have at least one 90 degree turn away from the space return air grille. If air noise or excessive airflow are a problem, the blower speed can be changed to a lower speed to reduce airflow.

Step 6 — Install Condensate Drain

⚠ CAUTION

If equipped with float style condensate overflow switch, final adjustment must be made in the field. Failure to do so could result in equipment damage.

A drain line must be connected to the heat pump and pitched away from the unit a minimum of $^1/_8$-in. per foot to allow the condensate to flow away from the unit.

This connection must be in conformance with local plumbing codes. A trap must be installed in the condensate line to insure free condensate flow. (Units are not internally trapped.) A vertical air vent is sometimes required to avoid air pockets. (See Fig. 8.) The length of the trap depends on the amount of positive or negative pressure on the drain pan.

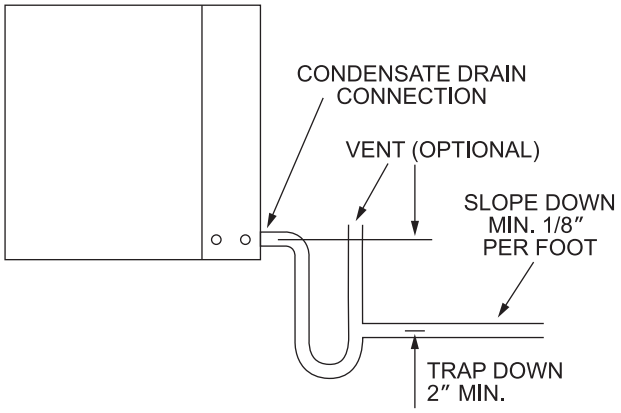


Fig. 8 —Condensate Trapping

A second trap must not be included. The horizontal unit should be pitched approximately $^1/_4$-in. towards the drain in both directions, to facilitate condensate removal. (See Fig. 9.)

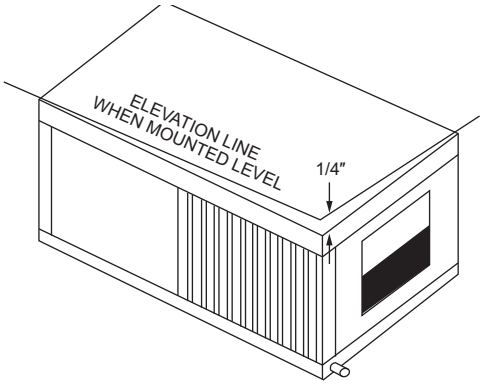


Fig. 9 — Sloped Horizontal Unit Installation

Step 7 — Pipe Connections — Supply and return piping must be as large as the unit connections on the heat pump (larger on long runs). Never use flexible hoses of a smaller inside diameter than that of the water connections on the unit. Units are supplied with either a copper or optional cupro-nickel condenser. Copper is adequate for ground water that is not high in mineral content. Should your well driller express concern regarding the quality of the well water available or should any known hazards exist in your area, we recommend proper testing to assure the well water quality is suitable for use with water source equipment. In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended.

Both the supply and discharge water lines will sweat if subjected to low water temperature. These lines should be insulated to prevent damage from condensation.

All manual flow valves used in the system must be ball valves. Globe and gate valves must not be used due to high pressure drop and poor throttling characteristics. Never exceed the recommended water flow rates. Serious damage or erosion of the water to refrigerant heat exchanger could occur.

Always check carefully for water leaks and repair appropriately. Units are equipped with female pipe thread fittings. Consult the specification sheets for sizes. Teflon* tape sealer should be used when connecting water piping connections to the units to insure against leaks and possible heat exchanger fouling. Do not overtighten the connections. Flexible hoses should be used between the unit and the rigid system to avoid possible vibration. Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing.

Pressure/temperature ports are recommended in both the supply and return lines for system flow balancing. The water flow can be accurately set by measuring the water-to-refrigerant heat exchangers water side pressure drop. See the unit specification sheets for the water flow and pressure drop information.

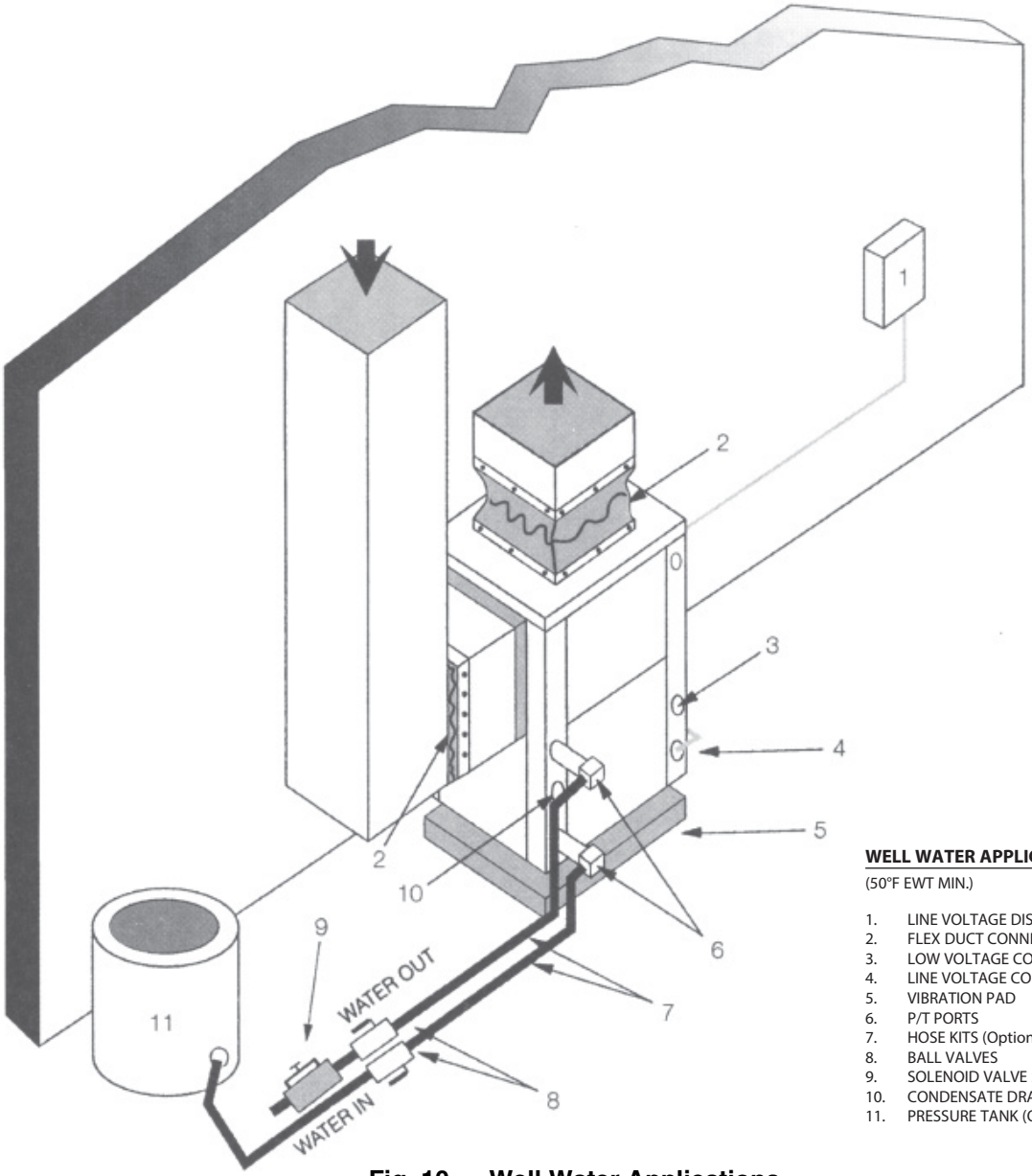
⚠ CAUTION

Water piping exposed to extreme, low ambient temperatures is subject to freezing.

WELL WATER SYSTEMS (50 F EWT [entering water temperature] MINIMUM) — When a water well is used exclusively for supplying water to the heat pump, the pump should operate only when the heat pump operates. A 24 volt, double-pole single-throw contactor can be used to operate the well pump with the heat pump.

When two or more units are supplied from one well, the pump can be wired to operate independently from either unit. Two 24-volt double-pole single-throw relays wired in parallel are required. An upsized VA transformer may be required in either case.

The discharge water from the heat pump is not contaminated in any manner and can be disposed of in various ways depending on local codes (i.e., discharge well, dry well, storm sewer, drain field, stream, pond, etc.) See Fig. 10.



WELL WATER APPLICATIONS

(50°F EWT MIN.)

1. LINE VOLTAGE DISCONNECT
2. FLEX DUCT CONNECTION
3. LOW VOLTAGE CONTROL CONNECTION
4. LINE VOLTAGE CONNECTION
5. VIBRATION PAD
6. P/T PORTS
7. HOSE KITS (Optional)
8. BALL VALVES
9. SOLENOID VALVE SLOW CLOSING
10. CONDENSATE DRAIN CONNECTION
11. PRESSURE TANK (Optional)

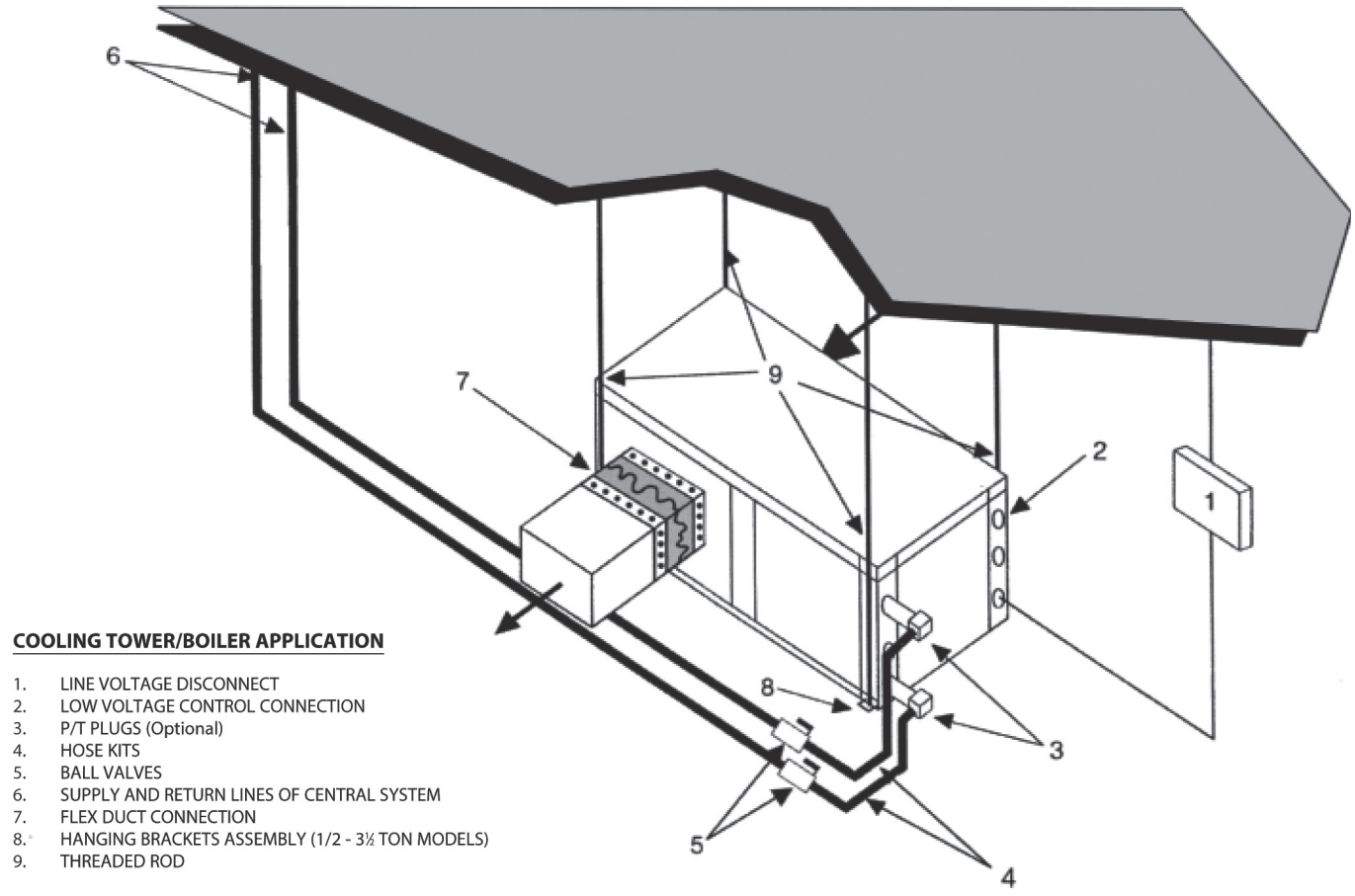
Fig. 10 — Well Water Applications

* Registered trademark of Dupont.

COOLING TOWER/BOILER APPLICATION — To assure adequate cooling and heating performance, the cooling tower and boiler water loop temperature should be maintained between 50 F and 75 F in the heating mode and 60 F and 110 F in the cooling mode. In the cooling mode, heat is rejected from the unit into the water loop. A cooling tower provides evaporative cooling to the loop fluid; thus, maintaining a constant supply temperature to the unit. When utilizing an open cooling tower, chemical water treatment is mandatory to ensure the water is free of corrosive materials.

A secondary heat exchanger (plate frame between the unit and the open cooling tower) may also be used. It is imperative that all air is eliminated from the closed loop side of the heat exchanger to prevent condenser fouling. In the heating mode, heat is absorbed from the water loop to the unit. A boiler can be utilized to maintain the loop within the proper temperature range.

No unit should be connected to the supply or return piping until the water system has been completely cleaned and flushed to remove dirt, piping chips or other foreign material. Supply and return hoses should be connected together during this process to ensure the entire system is properly flushed. After the cleaning and flushing has taken place the unit may be connected to the water loop and should have all valves wide open. See Fig. 11.



COOLING TOWER/BOILER APPLICATION

1. LINE VOLTAGE DISCONNECT
2. LOW VOLTAGE CONTROL CONNECTION
3. P/T PLUGS (Optional)
4. HOSE KITS
5. BALL VALVES
6. SUPPLY AND RETURN LINES OF CENTRAL SYSTEM
7. FLEX DUCT CONNECTION
8. HANGING BRACKETS ASSEMBLY (1/2 - 3½ TON MODELS)
9. THREADED ROD

Fig. 11 — Cooling Tower/Boiler Application

EARTH COUPLED SYSTEMS — Operation of a unit on a closed loop application requires the extended range option. See Fig. 12.

NOTE: Closed loop and pond applications require specialized design knowledge. No attempt at these installations should be made unless the dealer has received specialized training.

Utilizing Ground Loop Pumping Package (GLP) makes the installation easy. Anti-freeze solutions must be utilized when low evaporating conditions are expected to occur. Refer to the installation manuals for more specific instructions.

Electrical Connections — See Table 2 and Fig. 13-28 for electrical data.

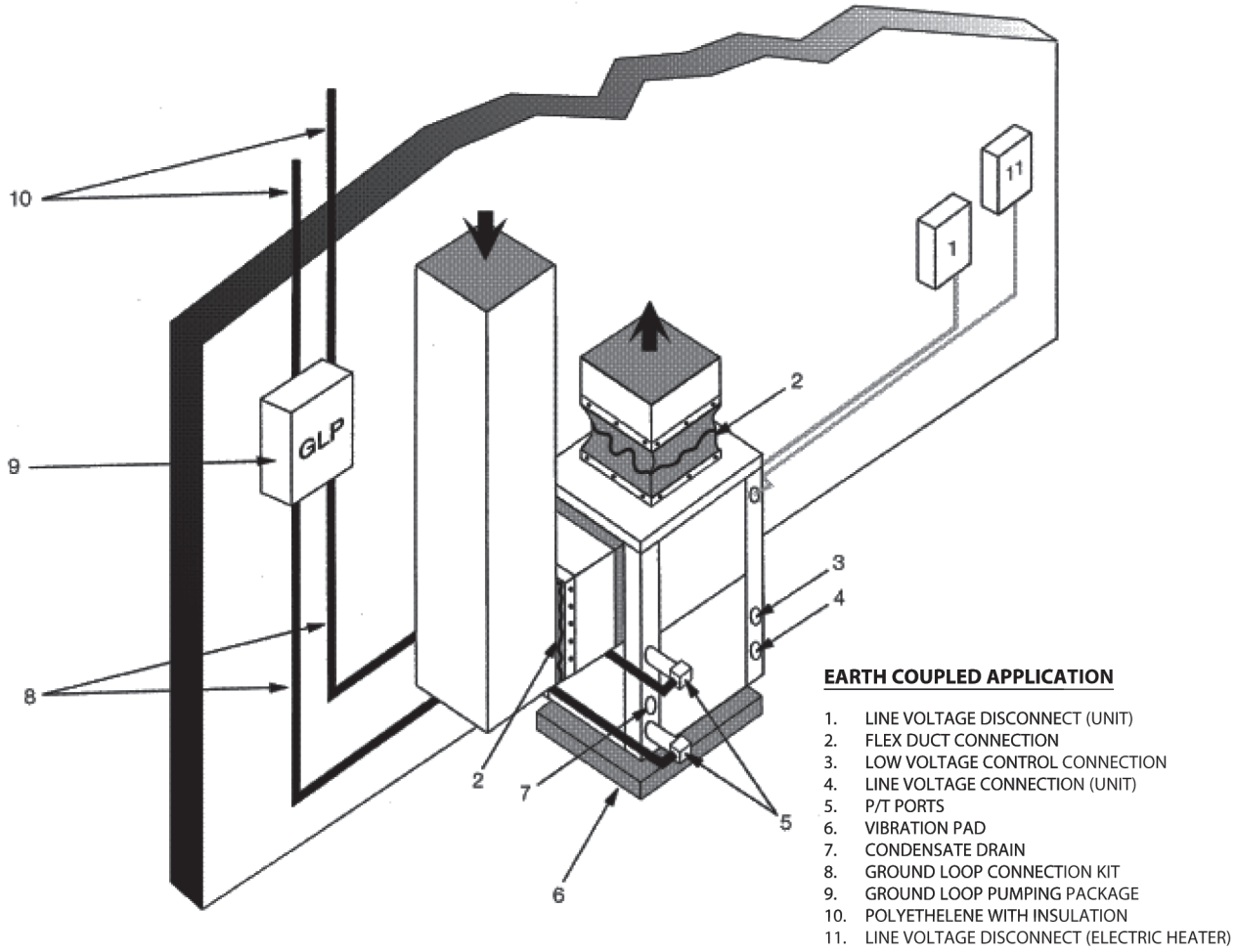


Fig. 12 — Earth Coupled Applications

Table 2 — 50HQP,VQP Unit Electrical Data

50HQP,VQP UNIT SIZE	VOLTAGE (V-Ph-Hz)	COMPRESSOR (x2)		BLOWER MOTOR			MIN CIRCUIT AMPS*	MAX FUSE/ HACR
		RLA	LRA	QTY	FLA*	HP*		
072	208/230-1-60	13.0	74.0	1	7.0	1	36.3	45
	208/230-3-60	7.8	68.0	1	3.6	1	21.2	25
	460-3-60	3.9	34.0	1	1.8	1	10.6	15
096	208/230-1-60	15.7	84.0	1	8.4/9.8	1 1/2/2	47.6/45.1	50/60
	208/230-3-60	11.0	88.0	1	4.8/6.2	1 1/2/2	29.5/31.0	40/40
	460-3-60	5.4	44.0	1	2.4/3.1	1 1/2/2	14.6/15.2	15/20
	575-3-60	4.4	36.0	1	2.0/2.6	1 1/2/2	11.9/12.5	15/15
120	208/230-1-60	26.3	145.0	1	9.8	2	69.0	90
	208/230-3-60	15.6	123.0	1	6.2/9.2	2/3	41.3/44.3	50/50
	460-3-60	7.8	70.0	1	3.1/4.3	2/3	20.6/21.9	25/25
	575-3-60	5.8	53.0	1	2.6/3.7	2/3	15.7/16.8	20/20
150	208/230-3-60	20.5	155.0	1	9.2	3	55.3	70
	460-3-60	9.6	75.0	1	4.3	3	25.9	35
	575-3-60	7.6	54.0	1	3.7	3	20.8	25
151	208/230-3-60	20.5	155.0	1	9.2	3	55.3	70
	460-3-60	9.6	75.0	1	4.3	3	25.9	35
	575-3-60	7.6	54.0	1	3.7	3	20.8	25
180	208/230-3-60	22.4	149.0	2	6.2	2	62.8	80
	460-3-60	10.6	75.0	2	3.2	2	30.1	40
	575-3-60	7.7	54.0	2	2.6	2	22.5	30
181	208/230-3-60	22.4	149.0	1	12.2	5	62.6	80
	460-3-60	10.6	75.0	1	6.1	5	30.0	40
	575-3-60	7.7	54.0	1	5.4	5	22.7	30
210	208/230-3-60	29.5	195.0	2	4.8	1 1/2	76.0	100
	460-3-60	14.7	95.0	2	2.4	1 1/2	37.9	50
	575-3-60	12.2	80.0	2	2.0	1 1/2	31.5	40
240	208/230-3-60	30.1	225.0	2	6.2	2	80.1	110
	460-3-60	16.7	114.0	2	3.1	2	43.8	60
	575-3-60	12.2	80.0	2	2.6	2	32.6	40
242	208/230-3-60	30.1	225.0	2	6.2	2	80.1	110
	460-3-60	16.7	114.0	2	3.1	2	43.8	60
	575-3-60	12.2	80.0	2	2.6	2	32.6	40
300	208/230-3-60	48.1	245.0	2	9.2	3	126.6	150
	460-3-60	18.6	125.0	2	4.3	3	50.5	60
	575-3-60	14.7	100.0	2	3.7	3	40.5	50
360	208/230-3-60	55.8	340.0	2	12.2	5	150.0	200
	460-3-60	26.9	173.0	2	6.1	5	72.7	90
	575-3-60	23.7	132.0	2	5.4	5	64.1	80

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning, and Refrigeration
LRA — Locked Rotor Amps
RLA — Rated Load Amps

* First value is for vertical models and second value is for horizontal.

NOTES:

1. HACR circuit breaker in U.S.A. only.
2. A voltage variation of ± 10% of nameplate rating is acceptable. Phase imbalance shall not exceed 2%.

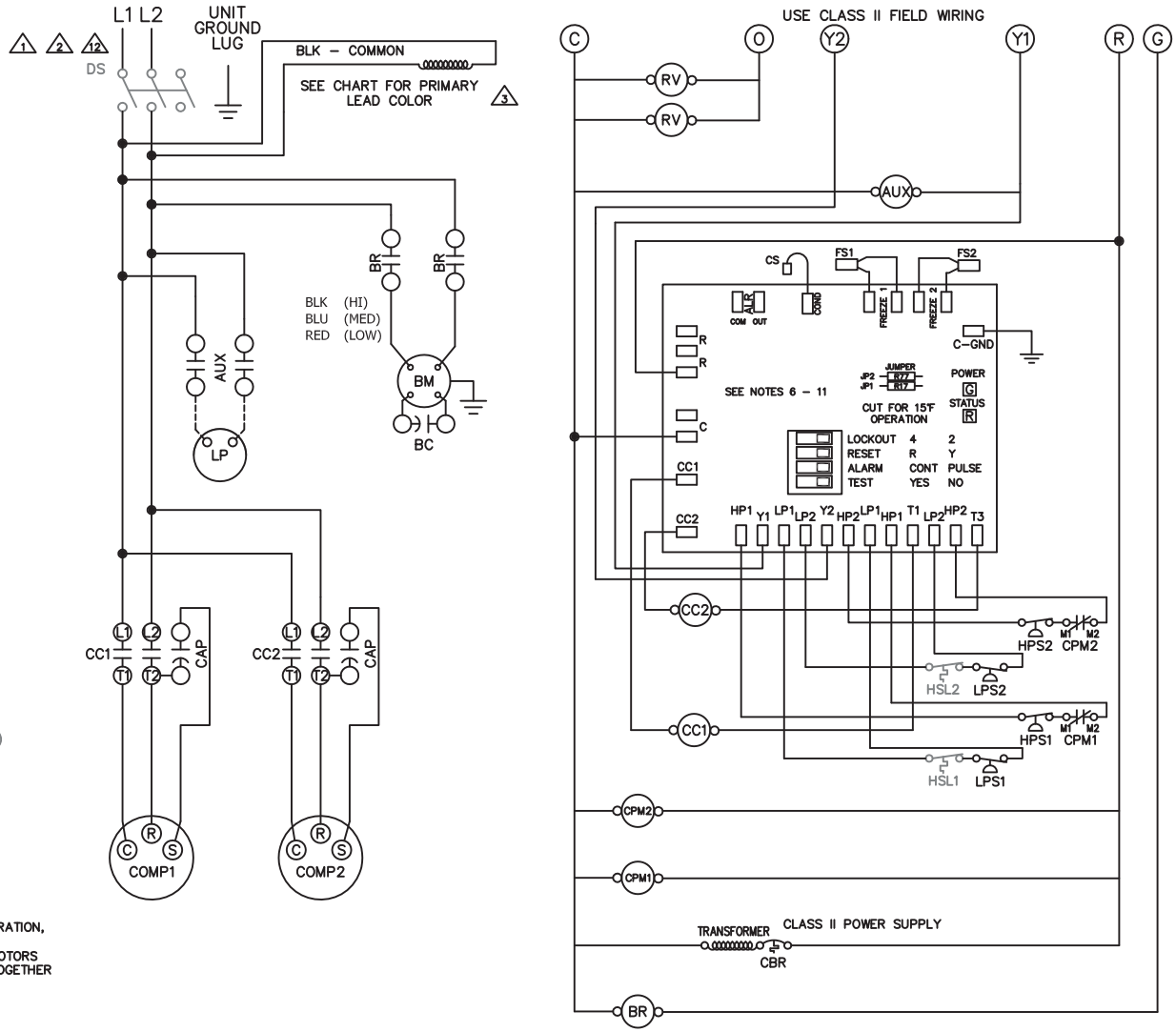
TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:
#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)



NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.

Fig. 13 — Single-Phase Complete C Board

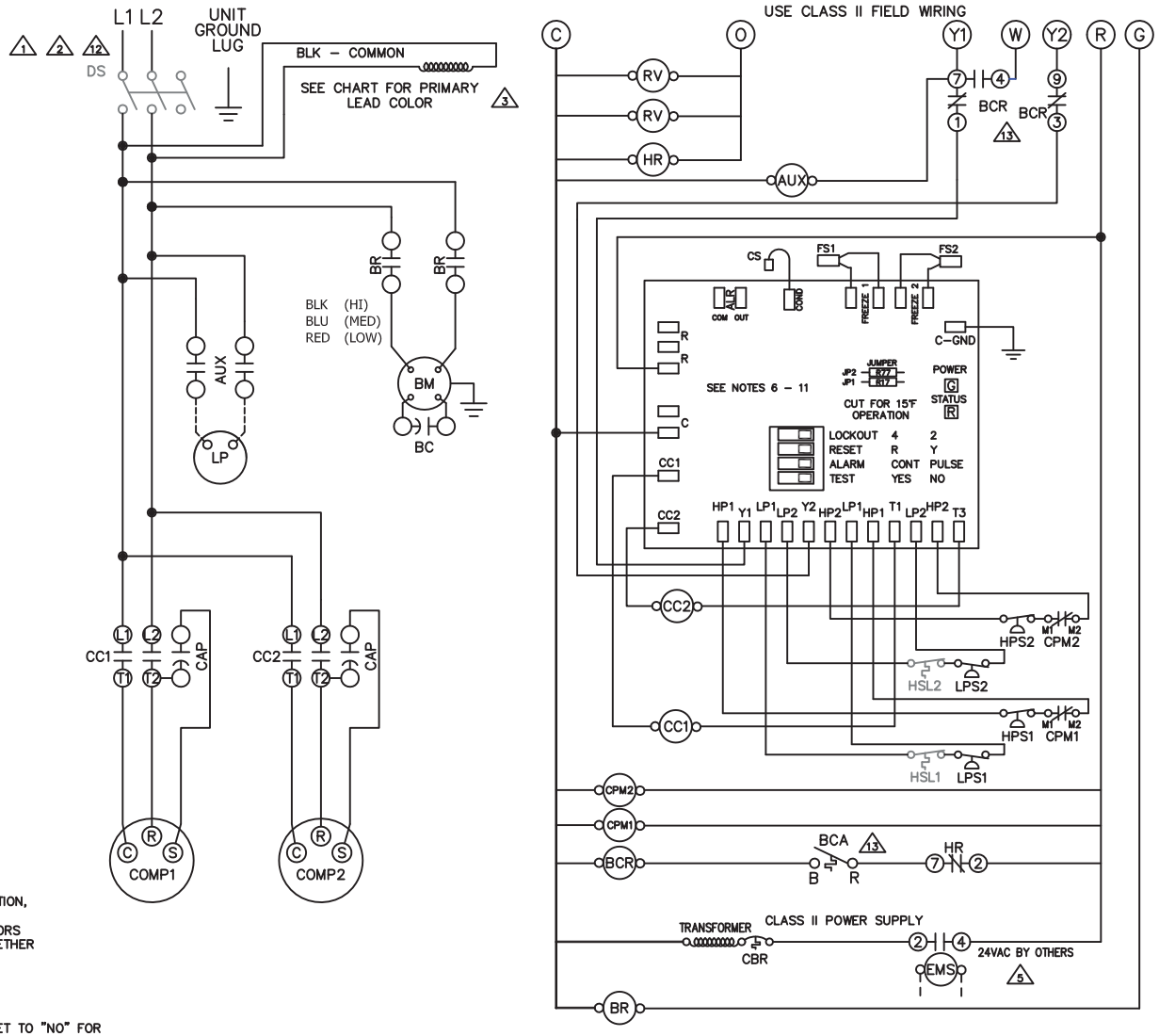
TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:
#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BCA – BOILERLESS CONTROL AQUASTAT
BCR – BOILERLESS CONTROL RELAY
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EMS – EMERGENCY SHUTDOWN RELAY
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)



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4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. DELUXE D INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR DELUXE D BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

Fig. 14 — Single-Phase Deluxe D Board

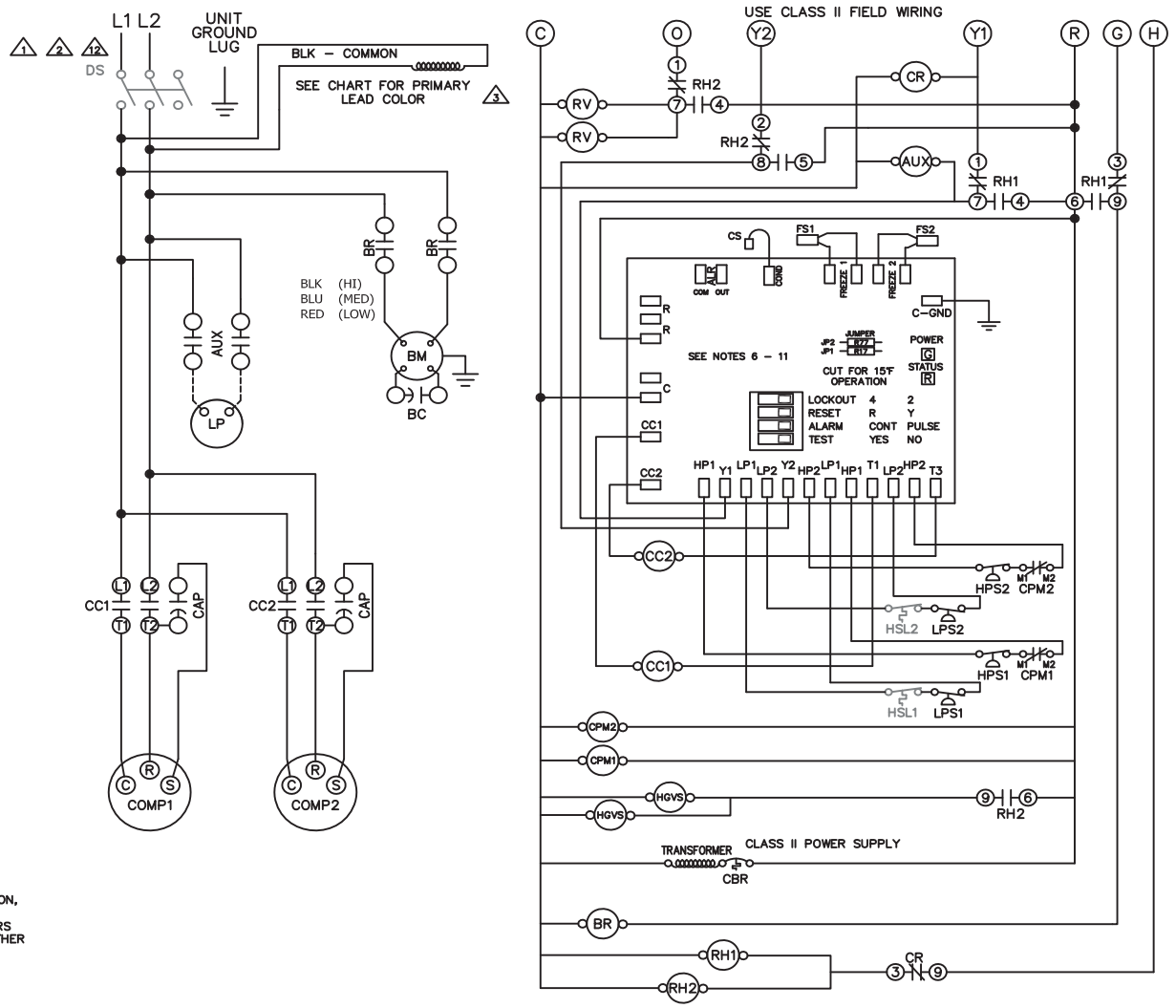
TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:
#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CR – COOLING/HEATING RELAY
CS – CONDENSATE SENSOR (IN DRAIN PAN)
FS – FREEZE SENSOR
HGVS – HOT GAS REHEAT SOLENOID VALVE
HPS – HIGH PRESSURE SWITCH
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)



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4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.

Fig. 15 — Single-Phase Complete C with Hot Gas Reheat

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:

#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BCA – BOILERLESS CONTROL AQUASTAT
BCR – BOILERLESS CONTROL RELAY
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
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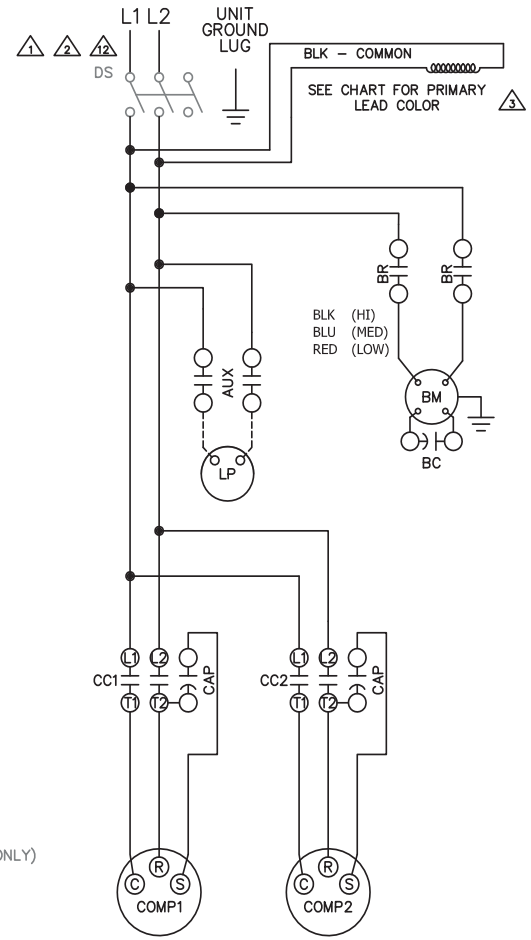
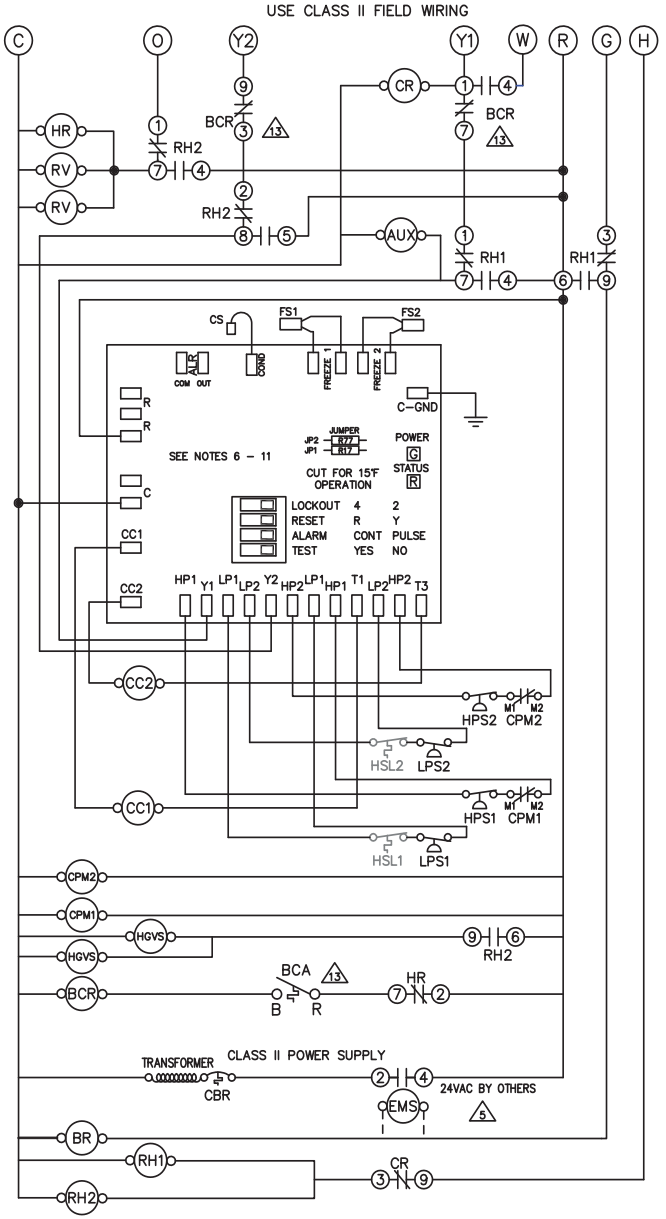
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CR – COOLING/HEATING RELAY
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EMS – EMERGENCY SHUTDOWN RELAY
FS – FREEZE SENSOR3
HGVS – HOT GAS REHEAT SOLENOID VALVE
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)

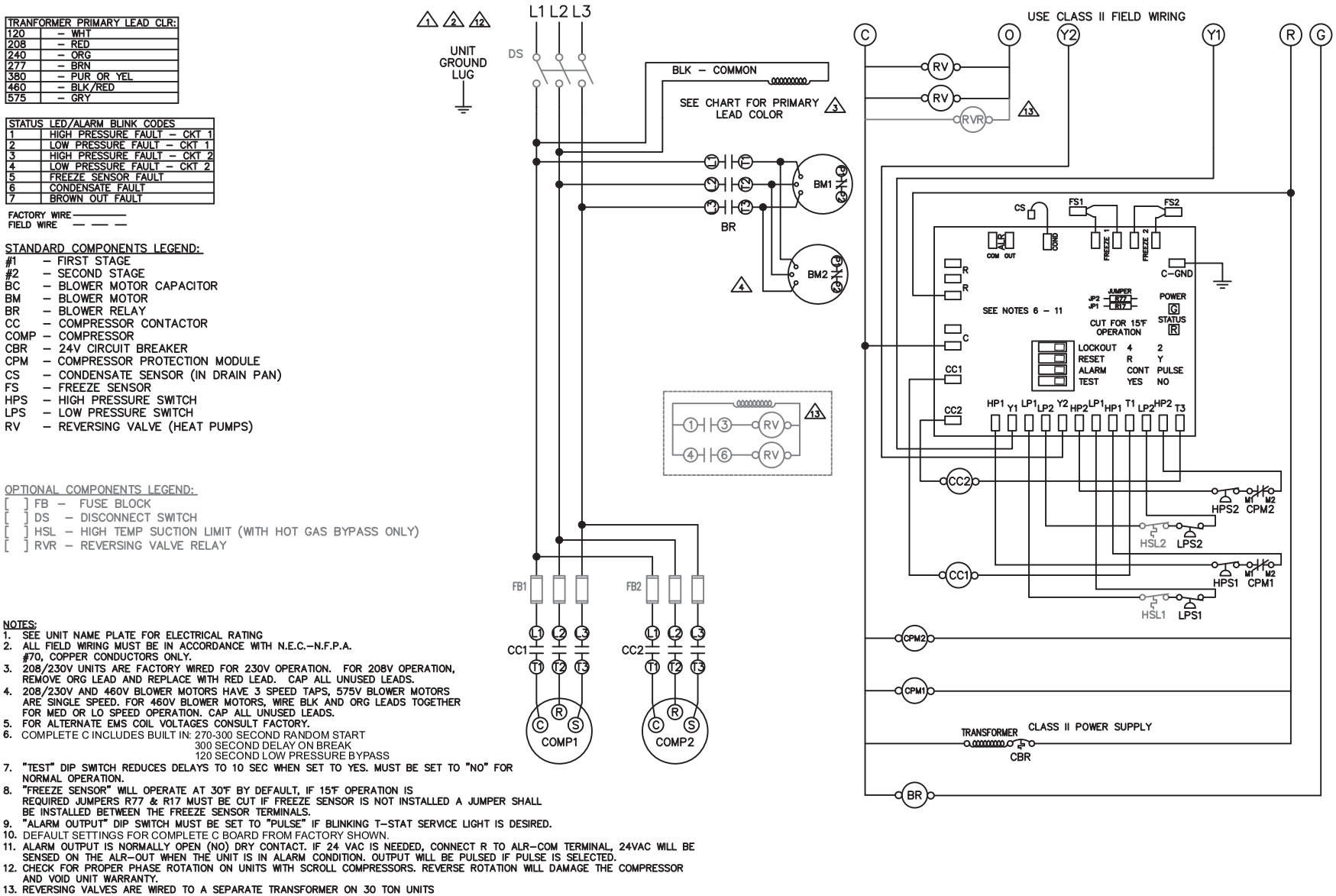




NOTES:

1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.–N.F.P.A. #70, COPPER CONDUCTORS ONLY.
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. DELUXE D INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR DELUXE D BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

Fig. 16 — Single-Phase Deluxe D with Hot Gas Reheat



NOTES:
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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS

Fig. 17 — 3-Phase Complete C Board

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

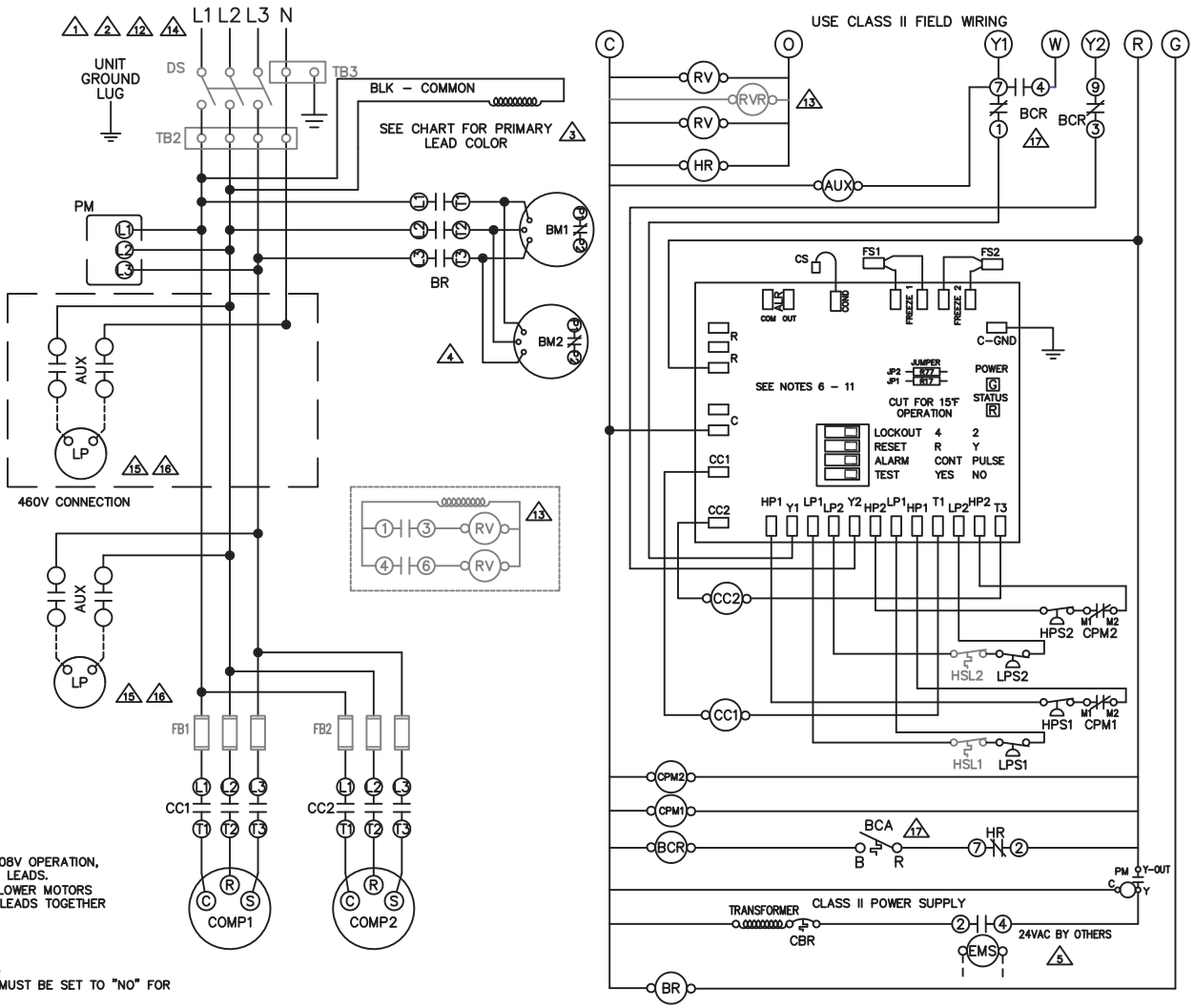
FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:

#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BCA – BOILERLESS CONTROL AQUASTAT
BCR – BOILERLESS CONTROL RELAY
BM – BLOWER MOTOR
BR – BLOWER RELAY
CC – COMPRESSOR CONTACTOR
COMP – COMPRESSOR
CBR – 24V CIRCUIT BREAKER
CPM – COMPRESSOR PROTECTION MODULE
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EMS – EMERGENCY SHUTDOWN RELAY
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
PM – PHASE MONITOR
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] FB – FUSE BLOCK
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] RVR – REVERSING VALVE RELAY
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)



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4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. DELUXE D INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR DELUXE D BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS
14. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX
15. FACTORY MOUNTED LOOP PUMP OR TWO WAY WATER VALVE. BOTH DEVICES WILL NOT BE PRESENT IN THE SAME UNIT.
16. PUMP MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS PUMP MOTOR IS WIRED BETWEEN LINES.
17. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

Fig. 18 — 3-Phase Deluxe D Board

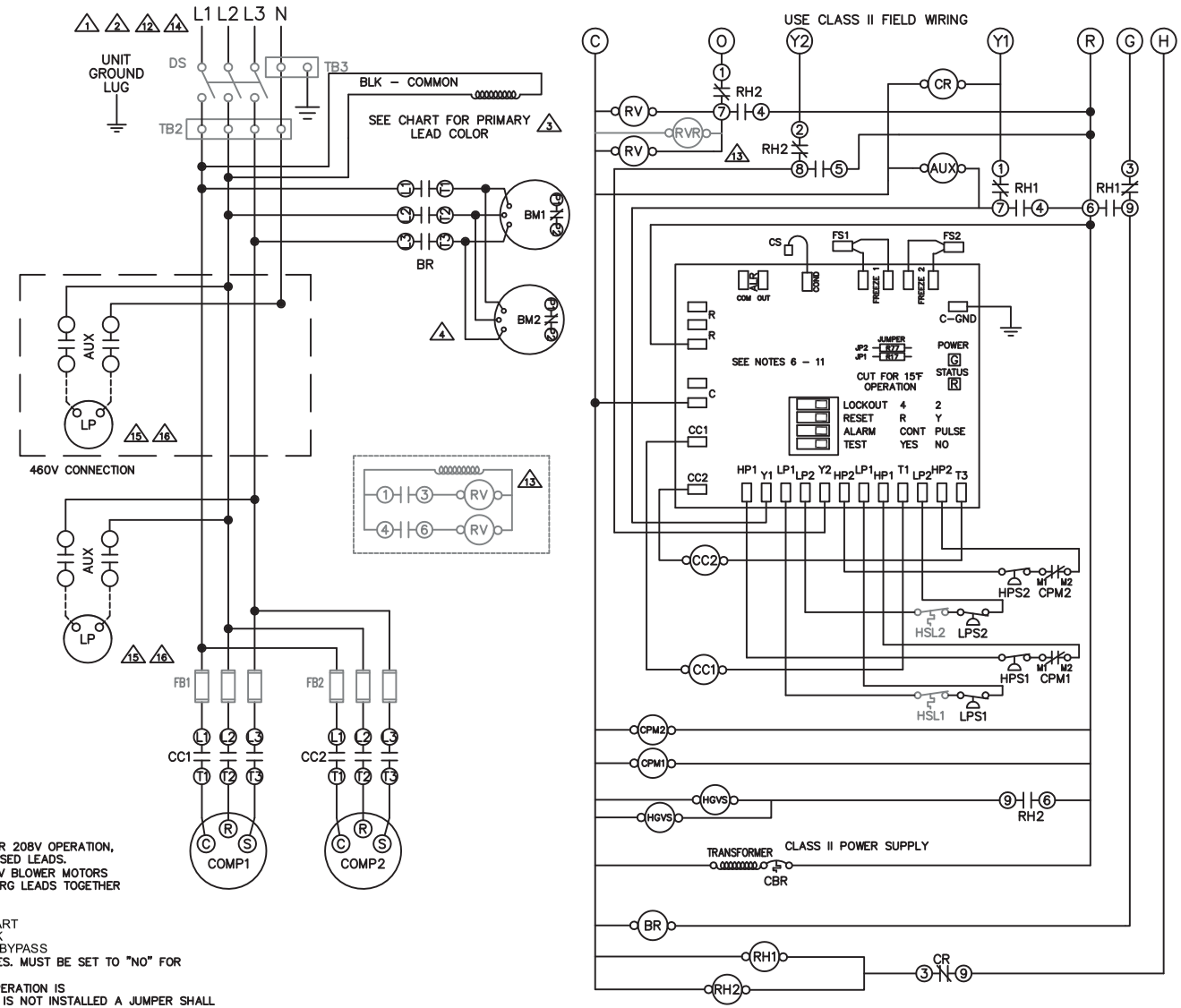
TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:
#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CS – CONDENSATE SENSOR (IN DRAIN PAN)
CR – COOLING/HEATING RELAY
FS – FREEZE SENSOR
HGVS – HOT GAS REHEAT SOLENOID VALVE
HPS – HIGH PRESSURE SWITCH
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] FB – FUSE BLOCK
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] RVR – REVERSING VALVE RELAY
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)



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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T-STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS
14. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX
15. FACTORY MOUNTED LOOP PUMP OR TWO WAY WATER VALVE. BOTH DEVICES WILL NOT BE PRESENT IN THE SAME UNIT.
16. PUMP MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS PUMP MOTOR IS WIRED BETWEEN LINES.

Fig. 19 — 3-Phase Complete C Board with Hot Gas Reheat

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ———
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:

#1 – FIRST STAGE
#2 – SECOND STAGE
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BCA – BOILERLESS CONTROL AQUASTAT
BCR – BOILERLESS CONTROL RELAY
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CR – COOLING/HEATING RELAY
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EMS – EMERGENCY SHUTDOWN RELAY
HGVS – HOT GAS REHEAT SOLENOID VALVE
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
PM – PHASE MONITOR
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] FB – FUSE BLOCK
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] RVR – REVERSING VALVE RELAY
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)

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5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. DELUXE D INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
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12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS
14. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX
15. FACTORY MOUNTED LOOP PUMP OR TWO WAY WATER VALVE. BOTH DEVICES WILL NOT BE PRESENT IN THE SAME UNIT.
16. PUMP MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS PUMP MOTOR IS WIRED BETWEEN LINES.
17. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

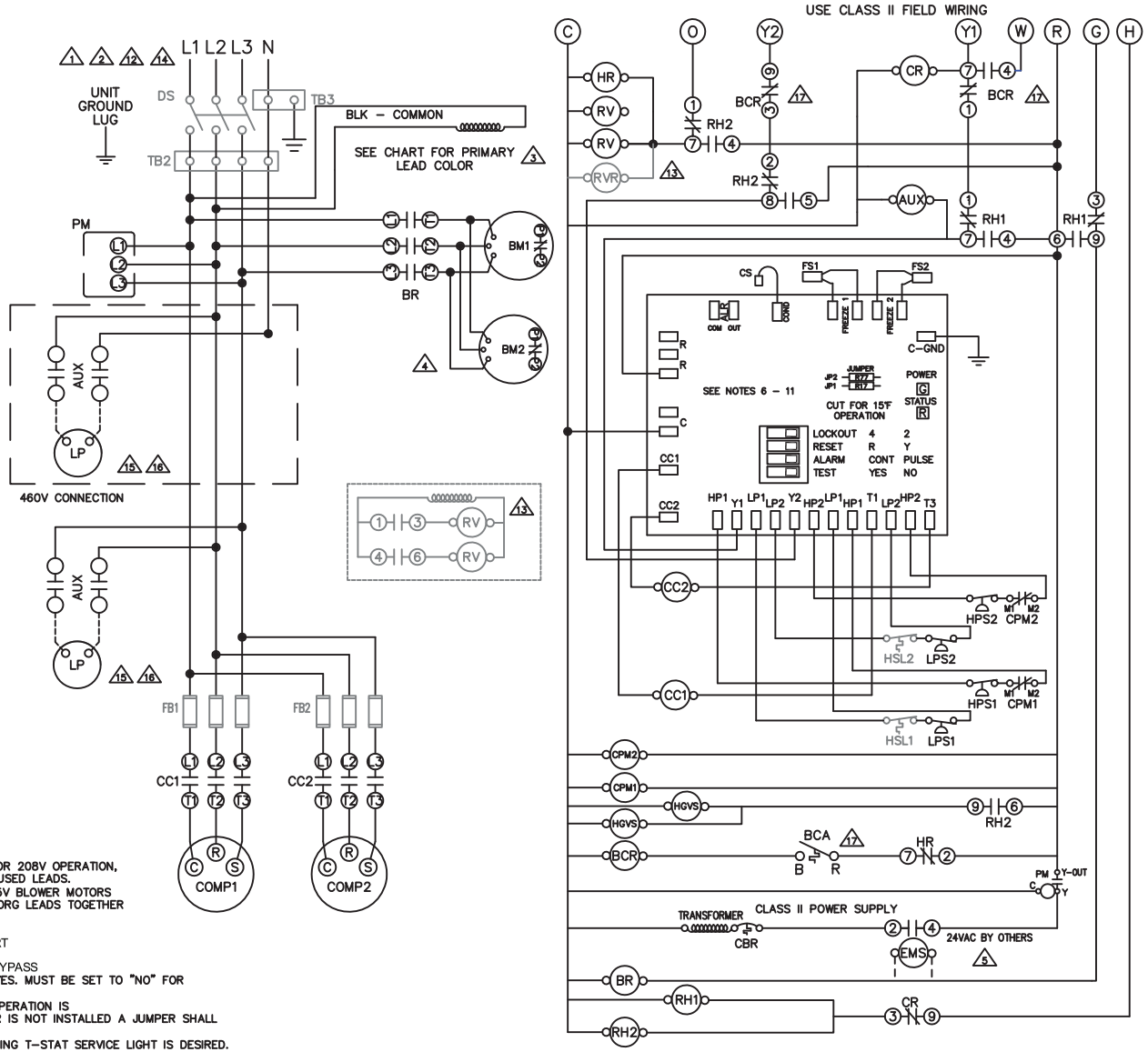


Fig. 20 — 3-Phase Deluxe D Board with Hot Gas Reheat

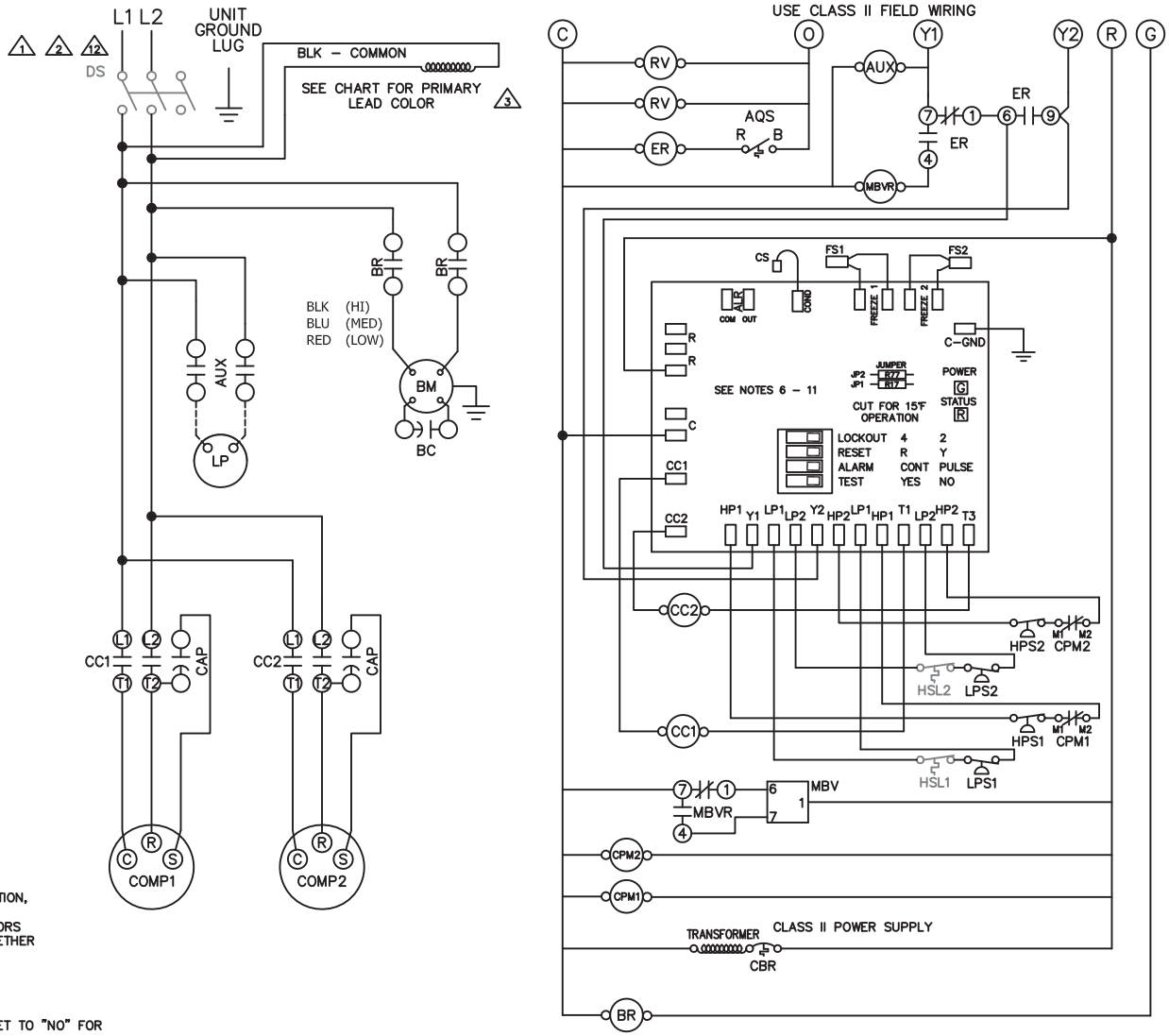
TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

FACTORY WIRE ————
FIELD WIRE — — —

STANDARD COMPONENTS LEGEND:
#1 – FIRST STAGE
#2 – SECOND STAGE
AQS – AQUASTAT
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CS – CONDENSATE SENSOR (IN DRAIN PAN)
ER – ECONOMIZER RELAY
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
MBV – MOTORIZED BALL VALVE
MBVR – MOTORIZED BALL VALVE RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)



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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
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10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.

Fig. 21 — Single-Phase Complete C Board with Water Economizer

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
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FIELD WIRE — — —

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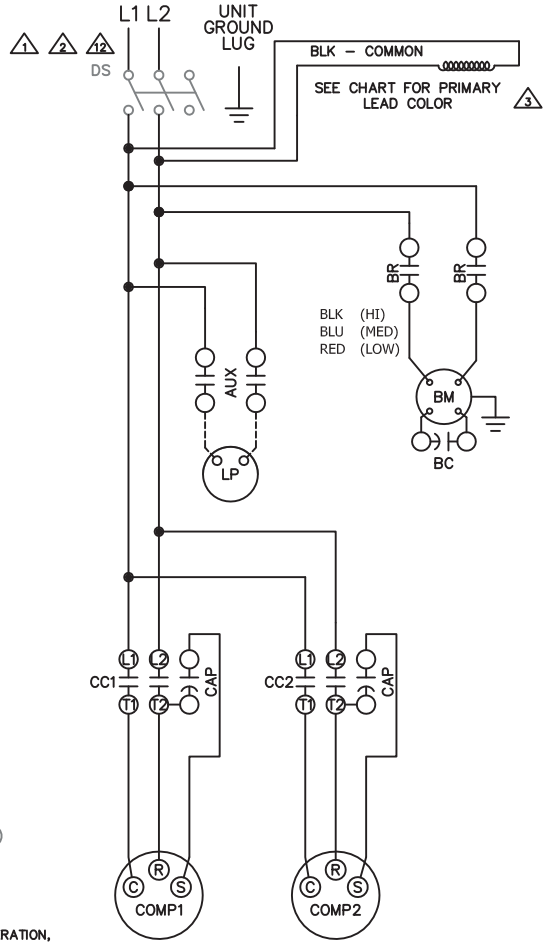
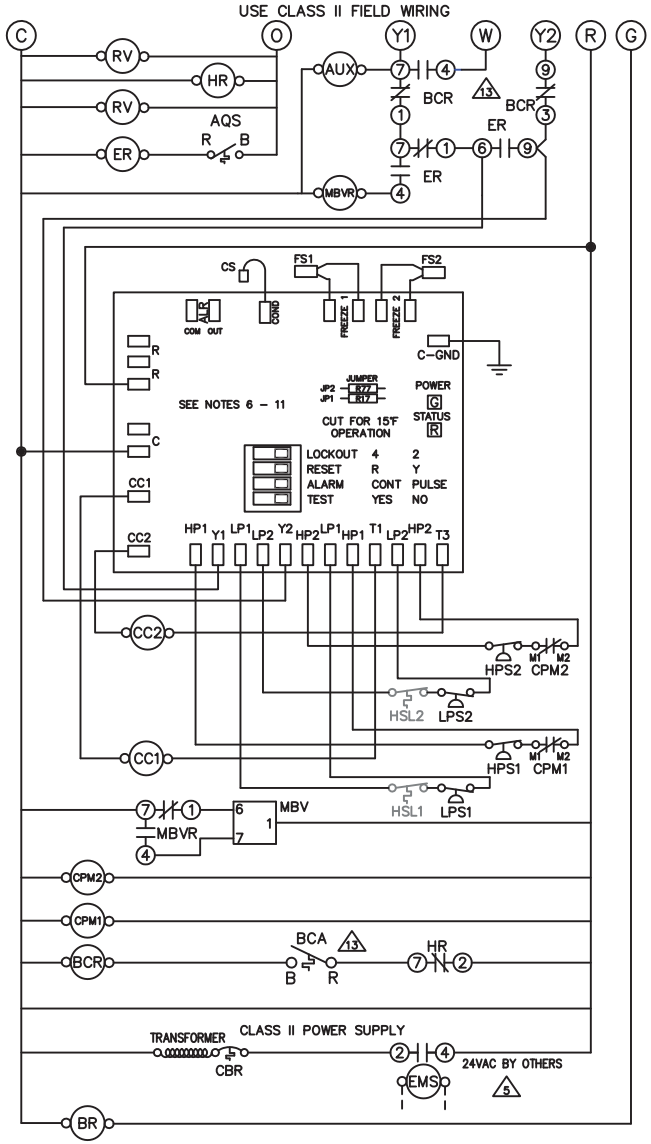
CS – CONDENSATE SENSOR (IN DRAIN PAN)
ER – ECONOMIZER RELAY
EMS – EMERGENCY SHUTDOWN RELAY
FS – FREEZE SENSOR
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
MBV – MOTORIZED BALL VALVE
MBVR – MOTORIZED BALL VALVE RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)





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13. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

Fig. 22 — Single-Phase Deluxe D Board with Water Economizer

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

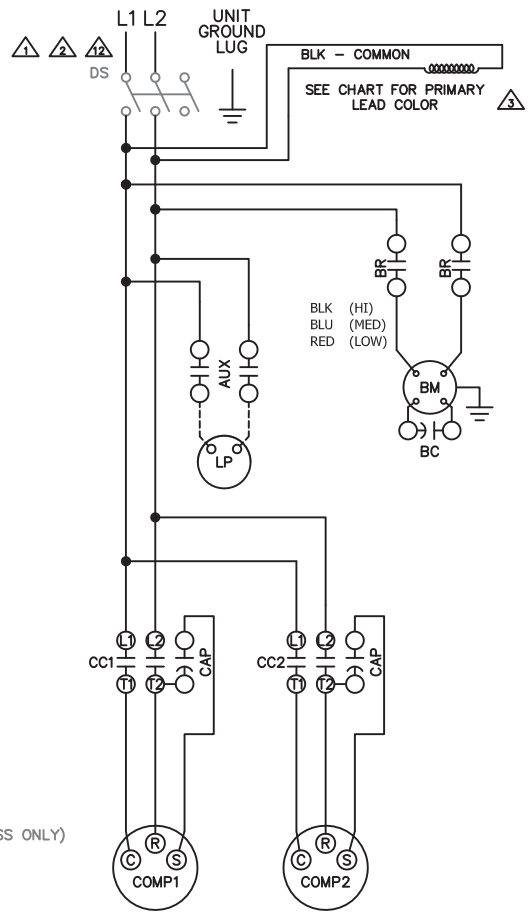
STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

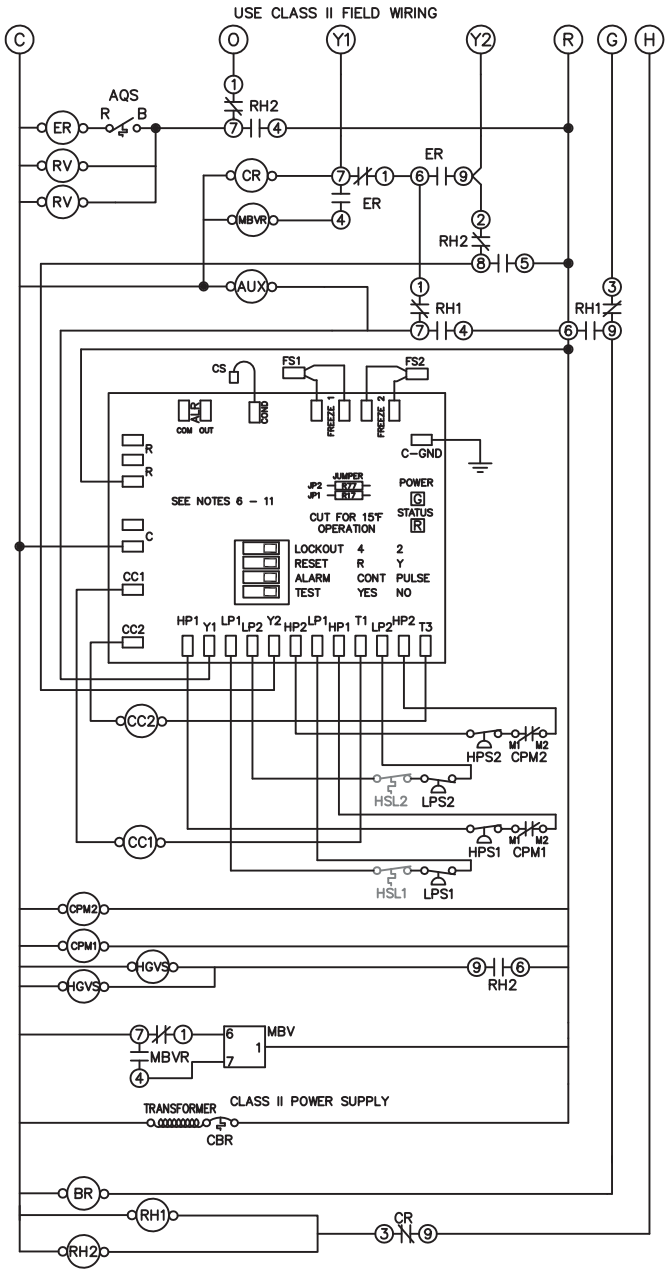
FACTORY WIRE ———
FIELD WIRE — —

STANDARD COMPONENTS LEGEND:

#1	– FIRST STAGE
#2	– SECOND STAGE
AQS	– AQUASTAT
AUX	– AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BC	– BLOWER MOTOR CAPACITOR
BM	– BLOWER MOTOR
BR	– BLOWER RELAY
COMP	– COMPRESSOR
CAP	– COMPRESSOR CAPACITOR
CBR	– 24V CIRCUIT BREAKER
CC	– COMPRESSOR CONTACTOR
CPM	– COMPRESSOR PROTECTION MODULE
CR	– COOLING/HEATING RELAY
CS	– CONDENSATE SENSOR (IN DRAIN PAN)
ER	– ECONOMIZER RELAY
FS	– FREEZE SENSOR
HGVS	– HOT GAS REHEAT SOLENOID VALVE
HPS	– HIGH PRESSURE SWITCH
LP	– LOOP PUMP
LPS	– LOW PRESSURE SWITCH
MBV	– MOTORIZED BALL VALVE
MBVR	– MOTORIZED BALL VALVE RELAY
RH	– REHEAT RELAY
RV	– REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)





NOTES:
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3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS.
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.

Fig. 23 — Single-Phase Complete C Board with Water Economizer and Hot Gas Reheat

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

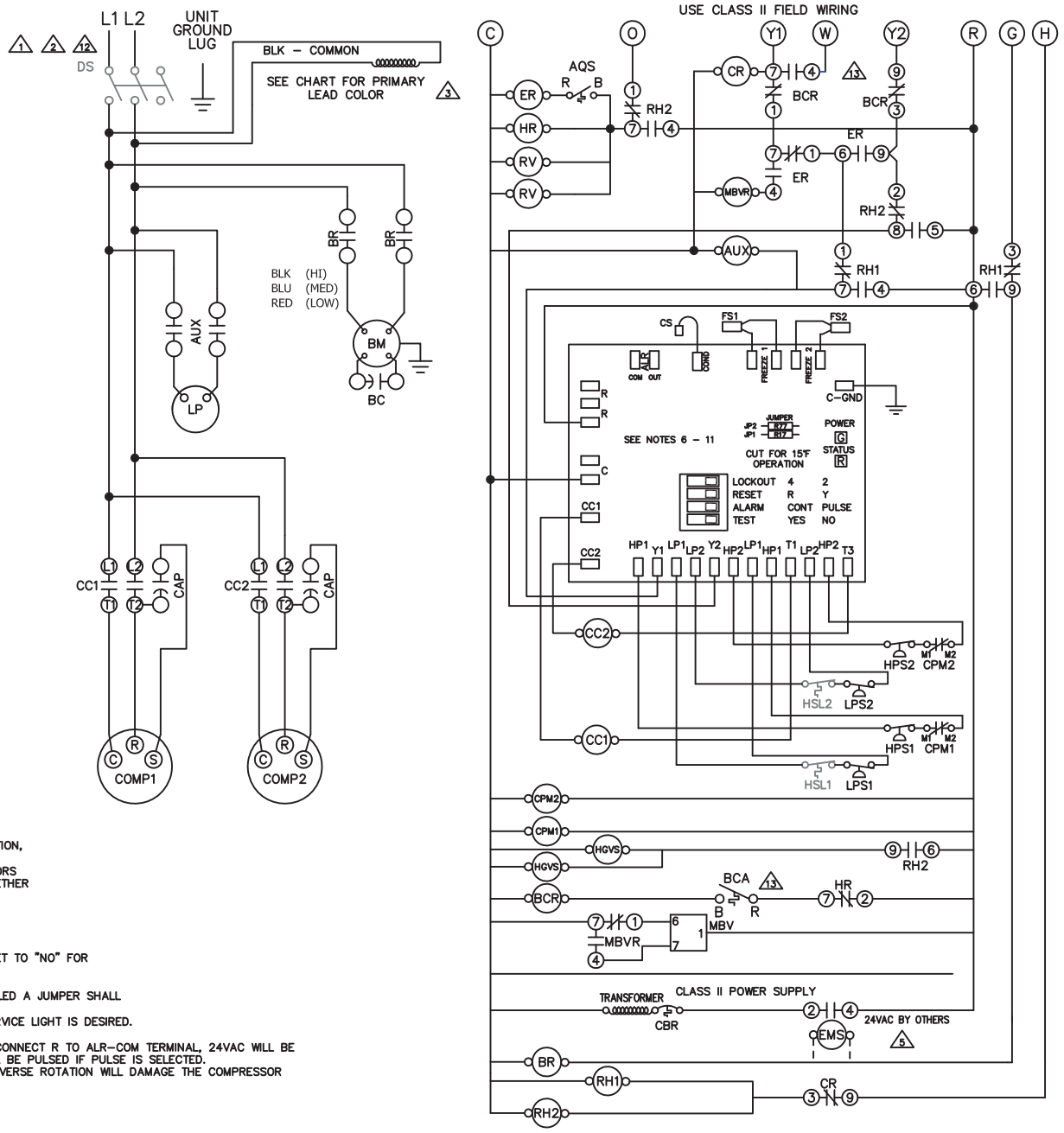
FACTORY WIRE ————
FIELD WIRE —— ——

STANDARD COMPONENTS LEGEND:

#1 – FIRST STAGE
#2 – SECOND STAGE
AQS – AQUASTAT
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BCA – BOILERLESS CONTROL AQUASTAT
BCR – BOILERLESS CONTROL RELAY
BC – BLOWER MOTOR CAPACITOR
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CAP – COMPRESSOR CAPACITOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CR – COOLING/HEATING RELAY
CS – CONDENSATE SENSOR (IN DRAIN PAN)
EMS – EMERGENCY SHUTDOWN RELAY
ER – ECONOMIZER RELAY
FS – FREEZE SENSOR
HGVS – HOT GAS REHEAT SOLENOID VALVE
HPS – HIGH PRESSURE SWITCH
HR – HEATING/COOLING RELAY
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
MBV – MOTORIZED BALL VALVE
MBVR – MOTORIZED BALL VALVE RELAY
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)



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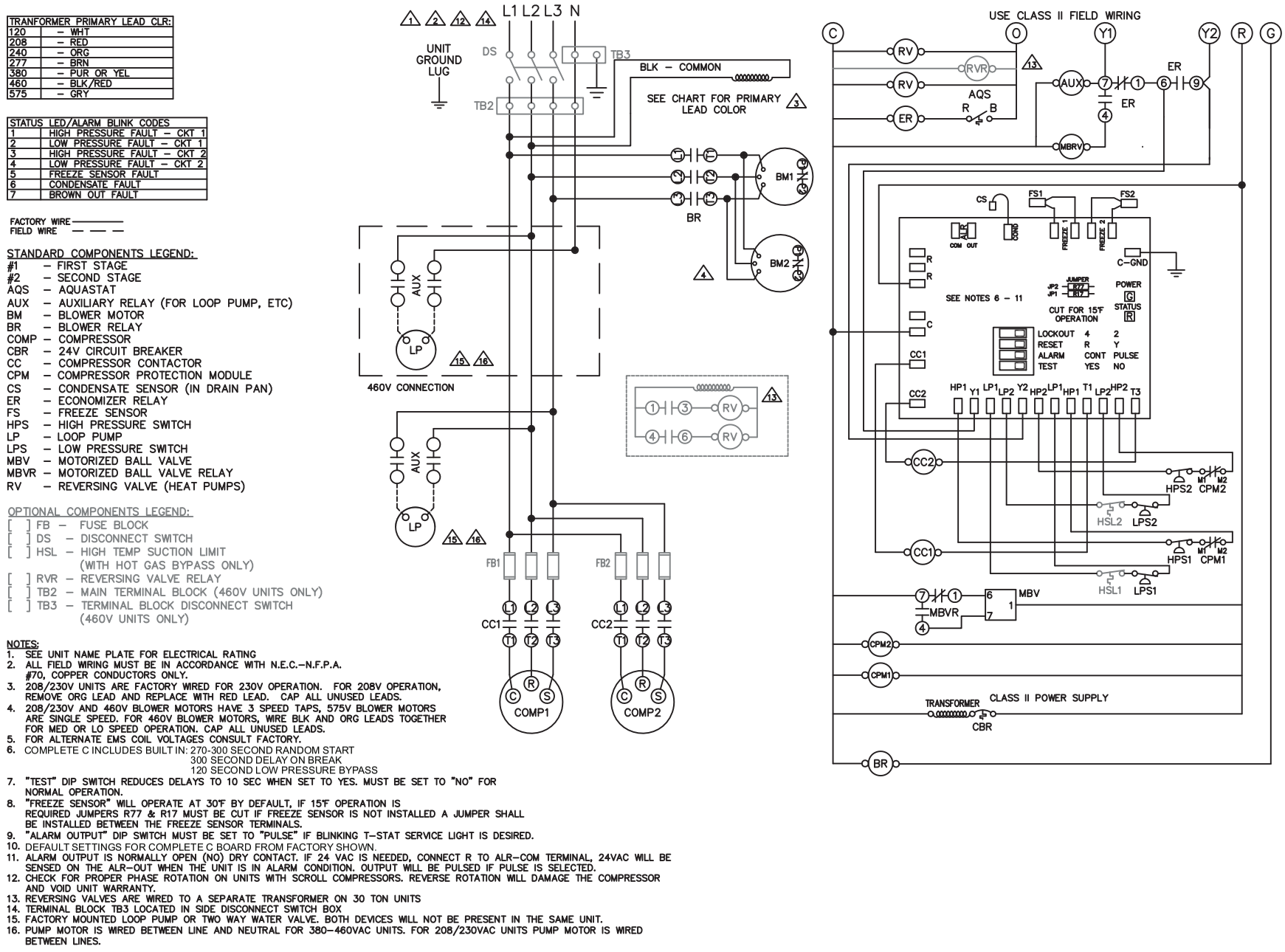
4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. DELUXE D INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR DELUXE D BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. BCA CONTACTS R–Y OPEN ON DROP IN WATER TEMPERATURE AND R–B CLOSE

Fig. 24 — Single-Phase Deluxe D Board with Water Economizer and Hot Gas Reheat



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5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
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9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN (NO) DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS
14. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX
15. FACTORY MOUNTED LOOP PUMP OR TWO WAY WATER VALVE. BOTH DEVICES WILL NOT BE PRESENT IN THE SAME UNIT.
16. PUMP MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS PUMP MOTOR IS WIRED BETWEEN LINES.

Fig. 25 — 3-Phase Complete C Board with Water Economizer

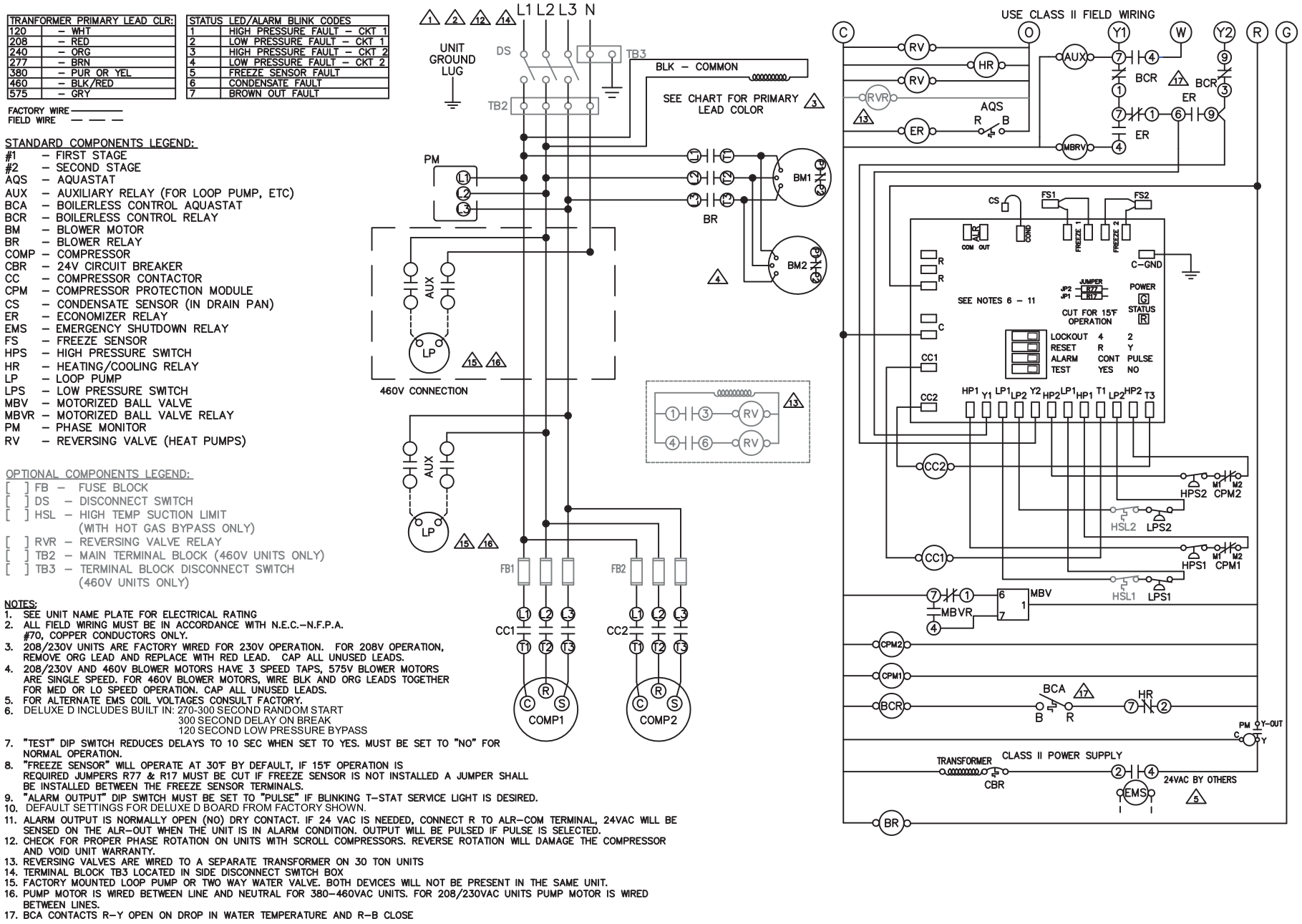


Fig. 26 — 3 Phase Deluxe D Board with Water Economizer

TRANFORMER PRIMARY LEAD CLR:	
120	– WHT
208	– RED
240	– ORG
277	– BRN
380	– PUR OR YEL
460	– BLK/RED
575	– GRY

STATUS LED/ALARM BLINK CODES	
1	HIGH PRESSURE FAULT – CKT 1
2	LOW PRESSURE FAULT – CKT 1
3	HIGH PRESSURE FAULT – CKT 2
4	LOW PRESSURE FAULT – CKT 2
5	FREEZE SENSOR FAULT
6	CONDENSATE FAULT
7	BROWN OUT FAULT

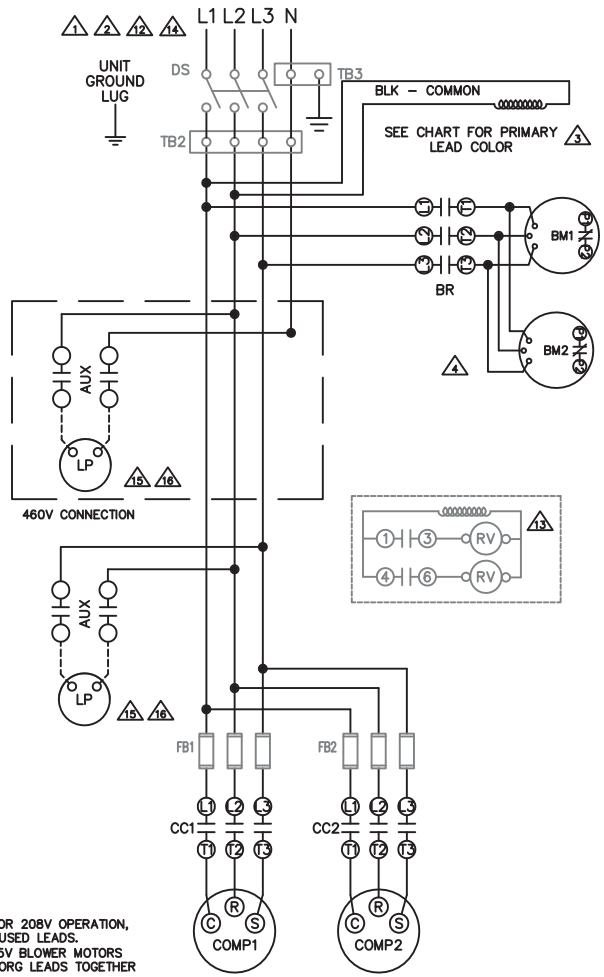
FACTORY WIRE ————
FIELD WIRE — — —

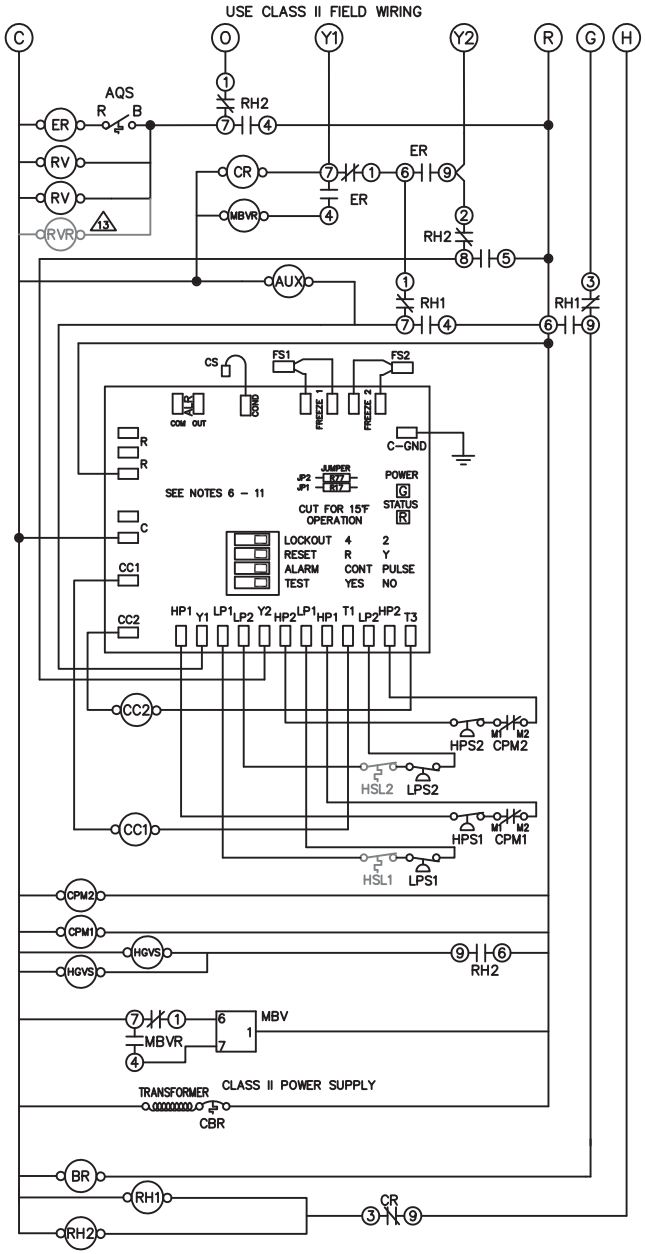
STANDARD COMPONENTS LEGEND:

#1 – FIRST STAGE
#2 – SECOND STAGE
AQS – AQUASTAT
AUX – AUXILIARY RELAY (FOR LOOP PUMP, ETC)
BM – BLOWER MOTOR
BR – BLOWER RELAY
COMP – COMPRESSOR
CBR – 24V CIRCUIT BREAKER
CC – COMPRESSOR CONTACTOR
CPM – COMPRESSOR PROTECTION MODULE
CR – COOLING/HEATING RELAY
CS – CONDENSATE SENSOR (IN DRAIN PAN)
ER – ECONOMIZER RELAY
FS – FREEZE SENSOR
HGVS – HOT GAS REHEAT SOLENOID VALVE
HPS – HIGH PRESSURE SWITCH
LP – LOOP PUMP
LPS – LOW PRESSURE SWITCH
MBV – MOTORIZED BALL VALVE
MBVR – MOTORIZED BALL VALVE RELAY
RH – REHEAT RELAY
RV – REVERSING VALVE (HEAT PUMPS)

OPTIONAL COMPONENTS LEGEND:

[ ] FB – FUSE BLOCK
[ ] DS – DISCONNECT SWITCH
[ ] HSL – HIGH TEMP SUCTION LIMIT (WITH HOT GAS BYPASS ONLY)
[ ] RVR – REVERSING VALVE RELAY
[ ] TB2 – MAIN TERMINAL BLOCK (460V UNITS ONLY)
[ ] TB3 – TERMINAL BLOCK DISCONNECT SWITCH (460V UNITS ONLY)





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4. 208/230V AND 460V BLOWER MOTORS HAVE 3 SPEED TAPS, 575V BLOWER MOTORS ARE SINGLE SPEED. FOR 460V BLOWER MOTORS, WIRE BLK AND ORG LEADS TOGETHER FOR MED OR LO SPEED OPERATION. CAP ALL UNUSED LEADS.
5. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
6. COMPLETE C INCLUDES BUILT IN: 270-300 SECOND RANDOM START
   300 SECOND DELAY ON BREAK
   120 SECOND LOW PRESSURE BYPASS
7. "TEST" DIP SWITCH REDUCES DELAYS TO 10 SEC WHEN SET TO YES. MUST BE SET TO "NO" FOR NORMAL OPERATION.
8. "FREEZE SENSOR" WILL OPERATE AT 30°F BY DEFAULT, IF 15°F OPERATION IS REQUIRED JUMPERS R77 & R17 MUST BE CUT IF FREEZE SENSOR IS NOT INSTALLED A JUMPER SHALL BE INSTALLED BETWEEN THE FREEZE SENSOR TERMINALS.
9. "ALARM OUTPUT" DIP SWITCH MUST BE SET TO "PULSE" IF BLINKING T–STAT SERVICE LIGHT IS DESIRED.
10. DEFAULT SETTINGS FOR COMPLETE C BOARD FROM FACTORY SHOWN.
11. ALARM OUTPUT IS NORMALLY OPEN NO DRY CONTACT. IF 24 VAC IS NEEDED, CONNECT R TO ALR–COM TERMINAL, 24VAC WILL BE SENSED ON THE ALR–OUT WHEN THE UNIT IS IN ALARM CONDITION. OUTPUT WILL BE PULSED IF PULSE IS SELECTED.
12. CHECK FOR PROPER PHASE ROTATION ON UNITS WITH SCROLL COMPRESSORS. REVERSE ROTATION WILL DAMAGE THE COMPRESSOR AND VOID UNIT WARRANTY.
13. REVERSING VALVES ARE WIRED TO A SEPARATE TRANSFORMER ON 30 TON UNITS
14. TERMINAL BLOCK TB3 LOCATED IN SIDE DISCONNECT SWITCH BOX
15. FACTORY MOUNTED LOOP PUMP OR TWO WAY WATER VALVE. BOTH DEVICES WILL NOT BE PRESENT IN THE SAME UNIT.
16. PUMP MOTOR IS WIRED BETWEEN LINE AND NEUTRAL FOR 380–460VAC UNITS. FOR 208/230VAC UNITS PUMP MOTOR IS WIRED BETWEEN LINES.

Fig. 27 — 3-Phase Complete C Board with Water Economizer and Hot Gas Reheat

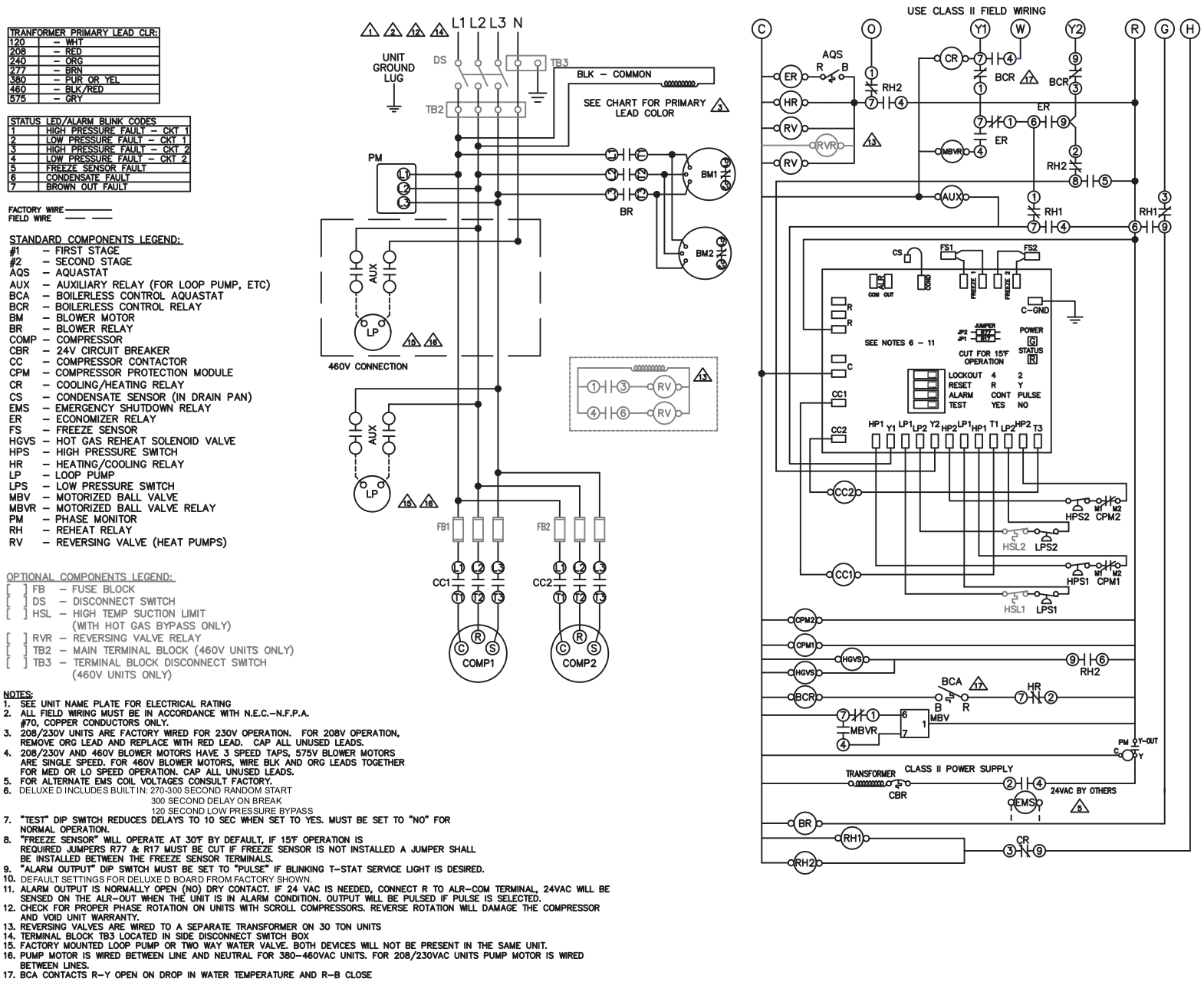


Fig. 28 — 3-Phase Deluxe D Board with Water Economizer and Hot Gas Reheat

PRE-START-UP

System Checkout — When the installation is complete, follow the system checkout procedure outlined below before starting up the system. Be sure:

1. Voltage is within the utilization range specifications of the unit compressor and fan motor and voltage is balanced for 3-phase units.
2. Fuses, breakers and wire are correct size.
3. Low voltage wiring is complete.
4. Piping and system flushing is complete.
5. Air is purged from closed loop system.
6. System is balanced as required. Monitor if necessary.
7. Isolation valves are open.
8. Water control valves or loop pumps are wired.
9. Condensate line is open and correctly pitched.
10. Transformer switched to lower voltage tap if necessary.
11. Blower rotates freely — shipping support is removed.
12. Blower speed is on correct setting.
13. Air filter is clean and in position.
14. Service/access panels are in place.
15. Return-air temperature is 40 to 80 F for heating and 50 to 110 F for cooling.
16. Air coil is clean.
17. Control field-selected settings are correct.

AIR COIL — To obtain maximum performance, the air coil should be cleaned before starting the unit. A 10% solution of dishwasher detergent and water is recommended for both sides of the coil. Rinse thoroughly with water.

FIELD SELECTABLE INPUTS

Jumpers and DIP (dual in-line package) switches on the control board are used to customize unit operation and can be configured in the field.

IMPORTANT: Jumpers and DIP switches should only be clipped when power to control board has been turned off.

⚠ CAUTION

To avoid equipment damage, DO NOT leave system filled in a building without heat during the winter unless antifreeze is added to system water. Condenser coils never fully drain by themselves and will freeze unless winterized with antifreeze.

START-UP

Use the procedure outlined below to initiate proper unit start-up.

NOTE: This equipment is designed for indoor installation only.

Operating Limits

ENVIRONMENT — This equipment is designed for indoor installation ONLY. Extreme variations in temperature, humidity and corrosive water or air will adversely affect the unit performance, reliability and service life.

POWER SUPPLY — A voltage variation of ± 10% of nameplate utilization voltage is acceptable.

UNIT STARTING CONDITIONS — All units start and operate in an ambient of 45 F with entering-air at 40 F, entering-water at 20 F and with both air and water at the flow rates used.

NOTE: These operating conditions are not normal or continuous operating conditions. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

⚠ WARNING

When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with the energized equipment. Electrical shock can cause personal injury or death.

Start Up System

1. Set the thermostat to the highest setting.
2. Set the thermostat system switch to "COOL," and the fan switch to the "AUTO" position. The reversing valve solenoid should energize. The compressor and fan should not run.
3. Reduce the thermostat setting approximately 5 degrees below the room temperature.
4. Verify the heat pump is operating in the cooling mode.
5. Turn the thermostat system switch to the "OFF" position. The unit should stop running and the reversing valve should deenergize.
6. Leave the unit off for approximately (5) minutes to allow for system equalization.
7. Turn the thermostat to the lowest setting.
8. Set the thermostat switch to "HEAT."
9. Increase the thermostat setting approximately 5 degrees above the room temperature.
10. Verify the heat pump is operating in the heating mode.
11. Set the thermostat to maintain the desired space temperature.
12. Check for vibrations, leaks, etc.
13. Instruct the owner on the unit and thermostat operation.

NOTE: Three factors determine the operating limits of a unit: (1) entering-air temperature, (2) water temperature and (3) ambient temperature. Whenever any of these factors are at a minimum or maximum level, the other two factors must be at a normal level to ensure proper unit operation. See Table 3.

Table 3 — 50HQP,VQP Unit Operating Limits

AIR LIMITS	COOLING (F)	HEATING (F)
Min. Ambient Air	45	45
Rated Ambient Air	80	70
Max. Ambient Air	100	85
Min. Ent. Air	50	40
Normal Entering Air db/wb	75/63-80/67	70
Max. Entering Air db/wb	110/83	80
WATER LIMITS		
Min. Entering Water	*30	45 (*20)
Normal Entering Water	40-90	40-90
Max. Entering Water	110	90

LEGEND

db — Dry Bulb
wb — Wet Bulb

*With antifreeze, optional extended range insulation and low temperature cut-out jumper clipped for antifreeze.

Scroll Compressor Rotation — It is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.

3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Turn off power to the unit. Install disconnect tag.
2. Reverse any two of the unit power leads.
3. Reapply power to the unit and verify pressures are correct.

The suction and discharge pressure levels should now move to their normal start-up levels. See Table 4.

When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide cooling.

After a few minutes of reverse operation, the scroll compressor internal overload protection will open, thus activating the unit lockout. This requires a manual reset. To reset, turn the thermostat on and then off.

NOTE: There is a 5-minute time delay before the compressor will start.

Table 4 — 50HQP,VQP Typical Unit Operating Pressures and Temperatures

UNIT SIZE	ENTERING WATER TEMP (F)	WATER FLOW (GPM/ton)	COOLING				HEATING			
			Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (F)	Air Temp Drop (F) DB	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (F)	Air Temp Rise (F) DB
072	30	10.0	—	—	—	—	65- 80	282-344	6- 7	14-17
		16.0	—	—	—	—	73- 89	294-359	3- 4	15-18
	40	10.0	121-148	184-225	17-21	18-22	80- 98	299-365	7- 9	16-20
		16.0	117-143	167-204	10-13	19-23	89-108	311-380	4- 5	17-21
	50	10.0	123-151	222-271	17-20	17-21	95-116	315-385	9-11	19-23
		16.0	119-145	202-247	10-12	18-23	105-128	329-402	5- 7	20-24
	60	10.0	125-153	260-318	16-19	17-21	109-133	332-406	11-13	21-26
		16.0	120-147	237-289	10-12	18-22	121-148	346-423	6- 8	22-27
	70	10.0	127-155	298-365	15-19	17-20	124-151	349-427	12-15	23-28
		16.0	122-149	271-331	9-11	18-21	138-168	364-444	7- 9	25-30
	80	10.0	129-158	336-411	14-18	16-20	138-169	366-447	14-17	26-31
		16.0	124-152	306-374	9-11	17-21	154-188	381-466	8-10	27-33
	90	10.0	131-160	374-458	14-17	16-19	153-187	383-468	16-19	28-34
		16.0	126-154	340-416	8-10	17-20	170-208	399-487	9-12	29-36
	100	10.0	133-162	413-504	13-16	15-19	—	—	—	—
		16.0	128-156	375-458	8-10	16-20	—	—	—	—
096	30	13.0	—	—	—	—	72- 87	296-361	5- 6	21-25
		22.0	—	—	—	—	75- 92	301-368	3- 4	22-26
	40	13.0	114-139	155-190	14-17	22-27	88-107	314-384	6- 7	24-29
		22.0	108-132	147-180	10-12	23-28	92-112	321-392	4- 5	25-30
	50	13.0	116-142	192-234	13-16	21-26	104-127	333-407	7- 9	27-33
		22.0	111-135	182-222	9-12	22-27	109-133	340-415	5- 6	28-34
	60	13.0	119-146	228-279	13-16	21-26	120-146	352-430	8-10	30-37
		22.0	113-138	217-265	9-11	22-27	125-153	359-439	6- 7	32-39
	70	13.0	122-149	264-323	13-15	20-25	136-166	371-453	9-12	33-41
		22.0	116-142	251-307	9-11	21-26	142-174	378-462	7- 8	35-43
	80	13.0	125-152	301-368	12-15	20-24	152-185	389-476	11-13	36-44
		22.0	118-145	286-349	9-11	21-26	159-194	397-485	8- 9	38-47
	90	13.0	127-156	337-412	12-15	19-24	168-205	408-499	12-15	39-48
		22.0	121-148	320-392	9-10	20-25	176-215	416-509	8-10	41-51
	100	13.0	130-159	374-457	12-14	19-23	—	—	—	—
		22.0	124-151	355-434	8-10	20-24	—	—	—	—
120	30	16.0	—	—	—	—	73- 89	266-325	5- 6	15-18
		32.0	—	—	—	—	77- 94	272-333	3- 4	16-19
	40	16.0	117-143	189-231	14-17	18-22	86-105	279-341	6- 7	17-21
		32.0	112-137	178-217	8- 9	19-24	90-110	286-350	4- 5	18-22
	50	16.0	126-154	221-270	14-17	18-21	162-198	293-358	7- 8	20-24
		32.0	121-148	207-253	8- 9	19-23	170-208	300-366	5- 6	21-25
	60	16.0	131-160	252-308	13-16	17-21	110-134	306-374	8-10	22-27
		32.0	125-153	237-290	8- 9	18-22	115-141	314-383	6- 7	23-29
	70	16.0	135-165	284-347	13-16	17-20	122-150	320-391	9-11	24-30
		32.0	130-158	266-326	7- 9	18-22	129-157	327-400	6- 8	26-32
	80	16.0	140-171	320-391	13-16	16-20	134-164	333-407	11-13	27-33
		32.0	134-164	300-367	7- 9	17-21	141-172	341-417	7- 9	28-35
	90	16.0	144-176	360-440	13-16	16-19	147-179	347-424	12-14	29-36
		32.0	138-169	338-414	7- 9	17-21	154-188	355-434	8-10	31-38
	100	16.0	149-182	405-495	13-15	15-19	—	—	—	—
		32.0	143-174	381-465	7- 9	16-20	—	—	—	—

LEGEND

DB — Dry Bulb

Table 4 — 50HQP,VQP Typical Unit Operating Pressures and Temperatures (cont)

UNIT SIZE	ENTERING WATER TEMP (F)	WATER FLOW (GPM/ton)	COOLING				HEATING			
			Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (F)	Air Temp Drop (F) DB	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (F)	Air Temp Rise (F) DB
150/151	30	22.0	—	—	—	—	74- 90	244-299	3- 4	13-15
		38.0	—	—	—	—	78- 95	251-306	2- 3	13-16
	40	22.0	122-149	183-224	14-18	19-23	87-106	257-314	4- 5	15-18
		38.0	117-143	172-210	8-10	20-24	91-111	263-322	3- 3	16-19
	50	22.0	131-160	214-261	14-18	18-22	164-201	269-329	5- 6	17-20
		38.0	126-154	201-245	8-10	19-24	173-211	276-337	3- 4	18-22
	60	22.0	136-166	244-298	14-17	18-22	111-136	282-344	6- 7	19-23
		38.0	131-160	230-281	8-10	19-23	117-143	289-353	4- 5	20-24
	70	22.0	141-172	275-336	14-17	17-21	124-152	294-360	7- 8	21-25
		38.0	135-165	258-316	8-10	18-22	131-160	302-369	5- 6	22-27
	80	22.0	145-178	310-378	14-17	17-20	136-166	307-375	8- 9	23-28
		38.0	140-171	291-356	8-10	18-22	143-175	314-384	5- 6	24-30
	90	22.0	150-183	349-426	14-17	16-19	149-182	319-390	8-10	25-30
		38.0	144-176	328-401	8- 9	17-21	156-191	327-400	6- 7	26-32
	100	22.0	155-189	392-480	13-16	16-19	—	—	—	—
		38.0	149-182	369-451	8- 9	17-21	—	—	—	—
180/181	30	25.0	—	—	—	—	64- 78	248-303	5- 6	15-18
		45.0	—	—	—	—	67- 82	254-311	3- 4	16-19
	40	25.0	109-134	183-224	18-22	19-23	75- 91	261-319	6- 8	17-21
		45.0	105-128	172-210	10-12	20-25	79- 96	267-327	4- 5	18-23
	50	25.0	118-144	214-261	18-22	19-23	142-173	273-334	8-10	20-24
		45.0	113-138	201-245	10-12	20-24	149-182	280-342	5- 7	21-26
	60	25.0	122-149	244-298	17-21	18-22	96-117	286-349	9-11	22-27
		45.0	117-143	230-281	10-12	19-24	101-123	293-358	6- 8	24-29
	70	25.0	126-154	275-336	17-21	18-22	107-131	299-365	11-13	25-30
		45.0	121-148	258-316	10-12	19-23	113-138	306-374	7- 9	26-32
	80	25.0	130-159	310-378	17-21	17-21	117-143	311-380	12-15	27-33
		45.0	125-153	291-356	10-12	18-22	123-151	319-390	8-10	29-35
	90	25.0	134-164	349-426	17-20	17-20	128-157	324-396	13-16	29-36
		45.0	129-158	328-401	9-12	18-22	135-165	332-406	9-11	31-38
	100	25.0	139-170	392-480	16-20	16-20	—	—	—	—
		45.0	133-163	369-451	9-11	17-21	—	—	—	—
210	30	28.0	—	—	—	—	71- 87	277-339	6- 7	15-19
		52.0	—	—	—	—	75- 92	284-347	4- 5	16-20
	40	28.0	118-144	194-237	21-25	19-23	84-102	291-356	7- 9	18-22
		52.0	113-138	182-223	12-14	20-24	88-108	299-365	5- 6	19-23
	50	28.0	127-155	226-276	21-25	18-22	159-194	305-373	9-11	20-25
		52.0	122-149	213-260	12-14	19-24	167-204	313-383	6- 7	21-26
	60	28.0	131-160	259-316	21-25	18-22	108-132	320-391	10-13	23-28
		52.0	126-154	243-297	12-14	19-23	113-138	328-400	7- 9	24-29
	70	28.0	136-166	291-355	20-25	17-21	120-147	334-408	12-15	25-31
		52.0	130-159	273-334	12-14	18-22	126-154	342-418	8-10	27-32
	80	28.0	140-171	328-401	20-24	17-20	131-161	348-425	14-17	27-34
		52.0	135-165	308-377	11-14	18-22	138-169	356-436	9-11	29-36
	90	28.0	145-177	369-451	20-24	16-20	144-176	362-442	15-18	30-37
		52.0	139-170	347-424	11-14	17-21	151-185	371-453	10-12	32-39
	100	28.0	149-183	415-508	19-24	16-19	—	—	—	—
		52.0	143-175	391-477	11-14	17-21	—	—	—	—
240/242	30	32.0	—	—	—	—	68- 84	256-313	5- 7	19-23
		64.0	—	—	—	—	73- 89	261-319	4- 5	20-25
	40	32.0	113-138	172-210	18-22	19-23	81- 99	277-339	7- 8	22-26
		64.0	110-134	161-196	12-14	20-24	86-105	283-346	5- 6	23-28
	50	32.0	116-142	206-252	17-21	19-23	93-114	299-365	8- 9	24-29
		64.0	112-137	193-236	12-14	19-24	99-121	305-373	6- 7	25-31
	60	32.0	118-145	241-294	17-21	18-23	106-129	321-392	9-11	26-32
		64.0	115-140	225-275	11-14	19-23	113-138	327-400	7- 8	28-34
	70	32.0	121-148	275-336	17-21	18-22	118-145	342-418	10-12	29-35
		64.0	117-143	257-314	11-14	19-23	126-154	349-427	8- 9	30-37
	80	32.0	123-151	309-378	16-20	18-22	131-160	364-444	11-14	31-38
		64.0	120-146	289-353	11-13	19-23	139-170	371-454	8-10	33-40
	90	32.0	126-154	344-420	16-20	18-22	143-175	385-471	12-15	33-41
		64.0	122-149	321-392	11-13	18-22	152-186	393-480	9-11	35-43
	100	32.0	128-157	378-462	16-19	17-21	—	—	—	—
		64.0	125-152	353-432	11-13	18-22	—	—	—	—

Table 4 — 50HQP,VQP Typical Unit Operating Pressures and Temperatures (cont)

UNIT SIZE	ENTERING WATER TEMP (F)	WATER FLOW (GPM/ton)	COOLING				HEATING			
			Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Rise (F)	Air Temp Drop (F) DB	Suction Pressure (psig)	Discharge Pressure (psig)	Water Temp Drop (F)	Air Temp Rise (F) DB
300	30	45.0	—	—	—	—	68- 84	256-313	5- 7	19-23
		75.0	—	—	—	—	73- 89	261-319	4- 5	20-25
	40	45.0	117-143	210-256	15-19	21-26	81- 99	277-339	7- 8	22-26
		75.0	114-139	196-239	11-14	22-27	86-105	283-346	5- 6	23-28
	50	45.0	120-147	243-297	15-18	20-25	93-114	299-365	8- 9	24-29
		75.0	117-143	227-277	11-14	21-26	99-121	305-373	6- 7	25-31
	60	45.0	123-150	276-337	14-17	20-24	106-129	321-392	9-11	26-32
		75.0	119-146	258-315	11-13	21-25	113-138	327-400	7- 8	28-34
	70	45.0	126-154	309-378	14-17	19-24	118-145	342-418	10-12	29-35
		75.0	122-149	289-353	10-13	20-25	126-154	349-427	8- 9	30-37
	80	45.0	129-157	343-419	13-16	19-23	131-160	364-444	11-14	31-38
		75.0	125-153	320-391	10-12	19-24	139-170	371-454	8-10	33-40
	90	45.0	132-161	376-459	13-16	18-22	143-175	385-471	12-15	33-41
		75.0	128-156	351-429	10-12	19-23	152-186	393-480	9-11	35-43
	100	45.0	134-164	409-500	12-15	17-21	—	—	—	—
		75.0	131-160	382-467	9-11	18-22	—	—	—	—
360	30	50.0	—	—	—	—	65- 80	282-344	6- 7	14-17
		90.0	—	—	—	—	73- 89	294-359	3- 4	15-18
	40	50.0	121-148	184-225	17-21	18-22	80- 98	299-365	7- 9	16-20
		90.0	117-143	167-204	10-13	19-23	89-108	311-380	4- 5	17-21
	50	50.0	123-151	222-271	17-20	17-21	95-116	315-385	9-11	19-23
		90.0	119-145	202-247	10-12	18-23	105-128	329-402	5- 7	20-24
	60	50.0	125-153	260-318	16-19	17-21	109-133	332-406	11-13	21-26
		90.0	120-147	237-289	10-12	18-22	121-148	346-423	6- 8	22-27
	70	50.0	127-155	298-365	15-19	17-20	124-151	349-427	12-15	23-28
		90.0	122-149	271-331	9-11	18-21	138-168	364-444	7- 9	25-30
	80	50.0	129-158	336-411	14-18	16-20	138-169	366-447	14-17	26-31
		90.0	124-152	306-374	9-11	17-21	154-188	381-466	8-10	27-33
	90	50.0	131-160	374-458	14-17	16-19	153-187	383-468	16-19	28-34
		90.0	126-154	340-416	8-10	17-20	170-208	399-487	9-12	29-36
	100	50.0	133-162	413-504	13-16	15-19	—	—	—	—
		90.0	128-156	375-458	8-10	16-20	—	—	—	—

Flow Regulation — Flow regulation can be accomplished by two methods. Most water control valves have a flow adjustment built into the valve. By measuring the pressure drop through the unit heat exchanger, the flow rate can be determined. Adjust the water control valve until the flow of 1.5 to 2 gpm is achieved. Since the pressure constantly varies, two pressure gages may be needed in some applications.

An alternative method is to install a flow control device. These devices are typically an orifice of plastic material designed to allow a specified flow rate that are mounted on the outlet of the water control valve. Occasionally these valves produce a velocity noise that can be reduced by applying some back pressure. To accomplish this, slightly close the leaving isolation valve of the well water setup.

⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position before flushing system.

Flushing — Once the piping is complete, final purging and loop charging is needed. A flush cart pump of at least 1.5 hp is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop. Flush the loop in both directions with a high volume of water at a high velocity. Follow the steps below to properly flush the loop:

1. Verify power is off.
2. Fill loop with water from hose through flush cart before using flush cart pump to ensure an even fill. Do not allow the water level in the flush cart tank to drop below the pump inlet line to prevent air from filling the line.
3. Maintain a fluid level in the tank above the return tee to avoid air entering back into the fluid.
4. Shutting off the return valve that connects into the flush cart reservoir will allow 50 psig surges to help purge air pockets. This maintains the pump at 50 psig.
5. To purge, keep the pump at 50 psig until maximum pumping pressure is reached.
6. Open the return valve to send a pressure surge through the loop to purge any air pockets in the piping system.
7. A noticeable drop in fluid level will be seen in the flush cart tank. This is the only indication of air in the loop.

NOTE: If air is purged from the system while using a 10 in. PVC flush tank, only a 1 to 2 in. level drop will be noticed since liquids are incompressible. If the level drops more than this, flushing should continue since air is still being compressed in the loop. If level is less than 1 to 2 in., reverse the flow.

8. Repeat this procedure until all air is purged.
9. Restore power.

Antifreeze may be added before, during or after the flushing process. However, depending on when it is added in the process, it can be wasted. Refer to the Antifreeze section for more detail.

Loop static pressure will fluctuate with the seasons. Pressures will be higher in the winter months than during the warmer months. This fluctuation is normal and should be considered when charging the system initially. Run the unit in either heating or cooling for several minutes to condition the loop to a homogenous temperature.

When complete, perform a final flush and pressurize the loop to a static pressure of 40 to 50 psig for winter months or 15 to 20 psig for summer months.

After pressurization, be sure to remove the plug from the end of the loop pump motor(s) to allow trapped air to be discharged and to ensure the motor housing has been flooded. Be sure the loop flow center provides adequate flow

through the unit by checking pressure drop across the heat exchanger.

Antifreeze — In areas where entering loop temperatures drop below 40 F or where piping will be routed through areas subject to freezing, antifreeze is needed.

Alcohols and glycols are commonly used as antifreeze agents. Freeze protection should be maintained to 15 F below the lowest expected entering loop temperature. For example, if the lowest expected entering loop temperature is 30 F, the leaving loop temperature would be 22 to 25 F. Therefore, the freeze protection should be at 15 F (30 F – 15 F = 15 F).

IMPORTANT: All alcohols should be pre-mixed and pumped from a reservoir outside of the building or introduced under water level to prevent alcohols from fuming.

Calculate the total volume of fluid in the piping system. See Table 5. Use the percentage by volume in Table 6 to determine the amount of antifreeze to use. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Table 5 — Approximate Fluid Volume (gal.) per 100 Ft of Pipe

PIPE	DIAMETER (in.)	VOLUME (gal.)
Copper	1	4.1
	1.25	6.4
	1.5	9.2
Rubber Hose	1	3.9
Polyethylene	3/4 IPS SDR11	2.8
	1 IPS SDR11	4.5
	1 1/4 IPS SDR11	8.0
	1/2 IPS SDR11	10.9
	2 IPS SDR11	18.0
	1 1/4 IPS SCH40	8.3
	1 1/2 IPS SCH40	10.9
	2 IPS SCH40	17.0

LEGEND

IPS — Internal Pipe Size
SCH — Schedule
SDR — Standard Dimensional Ratio

NOTE: Volume of heat exchanger is approximately 1.0 gallon.

Table 6 — Antifreeze Percentages by Volume

ANTIFREEZE	MINIMUM TEMPERATURE FOR FREEZE PROTECTION (F)			
	10	15	20	25
Methanol (%)	25	21	16	10
100% USP Food Grade Propylene Glycol (%)	38	30	22	15
Ethanol (%)	29	25	20	14

Cooling Tower/Boiler Systems — These systems typically use a common loop maintained at 60 to 90 F. The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

Ground Coupled, Closed Loop and Plateframe Heat Exchanger Well Systems — These systems allow water temperatures from 30 to 110 F. The external loop field is divided up into 2 in. polyethylene supply and return lines. Each line has valves connected in such a way that upon system start-up, each line can be isolated for flushing using only the system pumps. Air separation should be located in the piping system prior to the fluid re-entering the loop field.

OPERATION

Power Up Mode — The unit will not operate until all the inputs, terminals and safety controls are checked for normal operation.

NOTE: The compressor will have a 5-minute anti-short cycle upon power up.

Units with Aquazone™ Complete C Control

STANDBY — Y and W terminals are not active in Standby mode. However, the O and G terminals may be active, depending on the application. The compressor will be off.

COOLING — Y and O terminals are active in Cooling mode. After power up, the first call to the compressor will initiate a 270 to 300 second random start delay and a 5-minute anti-short cycle protection time delay. After both delays are complete, the compressor is energized.

NOTE: On all subsequent compressor calls the random start delay is omitted.

HEATING STAGE 1 — Terminal Y is active in heating stage 1. After power up, the first call to the compressor will initiate a 270 to 300 second random start delay and a 5-minute anti-short cycle protection time delay. After both delays are complete, the compressor is energized.

NOTE: On all subsequent compressor calls the random start delay is omitted.

HEATING STAGE 2 — To enter Stage 2 mode (units equipped with 2 step compressor or with two compressors only), terminal Y2 is active (Y is already active). Also, the G terminal must be active or the W terminal is disregarded. The compressor relay will remain on and EH1 is immediately turned on. EH2 will turn on after 10 minutes of continual stage 2 demand.

LOCKOUT MODE — The status LED will flash fast in Lockout mode and the compressor relay will be turned off immediately. Lockout mode can be "soft" reset via the Y input or can be reset via the disconnect depending on the DIP switch settings. The last fault causing the lockout is stored in memory and can be viewed by entering test mode.

LOCKOUT WITH EMERGENCY HEAT — While in Lockout mode, if W becomes active, then Emergency Heat mode will occur.

EMERGENCY HEAT — In Emergency Heat mode, terminal W is active while terminal Y is not. Terminal G must be active in the 50HQP,VQP units the fan will be run if W is energized. EH1 is immediately turned on. EH2 will turn on.

Units with Aquazone Deluxe D Control

STANDBY/FAN ONLY — The compressor will be off. The Fan Enable, Fan Speed, and reversing valve (RV) relays will be on if inputs are present.

NOTE: DIP switch 5 on S1 does not have an effect upon Fan 1 and Fan 2 outputs.

HEATING STAGE 1 — In Heating Stage 1 mode, the Fan Enable and Compressor relays are turned on immediately. Once the demand is removed, the relays are turned off and the control reverts to Standby mode.

EMERGENCY HEAT — In Emergency Heat mode, the Fan Enable and Fan Speed relays are turned on. The EH1 output is turned on immediately.

COOLING STAGE 2 — In Cooling Stage 2 mode, the Fan Enable, compressor and RV relays remain on. The Fan Speed relay is turned on immediately and turned off immediately once the Cooling Stage 2 demand is removed. The control reverts to Cooling Stage 1 when the thermostat removes all Y2 call.

Retry Mode — In Retry mode, the staus LED will flash the code for the corresponding fault. If the fault clears and the thermostat call (Y) is still present the Complete C or Deluxe D control will run the compressor once the ASC (anti-short cycle) timer has expired and will try to satisfy the call. If the call is satisfied, the unit will resume its normal operation.

If 2 or 4 consecutive faults occur (depending on the DIP switch setting) within 1 hour, the controller will lock the compressor operation out and will flash the alarm code on the status LED as well as alarm dry contact output. When the Complete C or Deluxe D control enters lockout mode, the alarm will also be shown on the panel mounted LED.

SERVICE

Perform the procedures outlined below periodically, as indicated.

IMPORTANT: When a compressor is removed from this unit, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

IMPORTANT: All refrigerant discharged from this unit must be recovered without exception. Technicians must follow industry accepted guidelines and all local, state and federal statutes for the recovery and disposal of refrigerants.

⚠ CAUTION

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must only be serviced by technicians which meet local, state and federal proficiency requirements.

⚠ WARNING

To prevent injury or death due to electrical shock or contact with moving parts, open unit disconnect switch before servicing unit.

Filters — Filters must be clean for maximum performance. Inspect filters every month under normal operating conditions. replace when necessary.

IMPORTANT: Units should never be operated without a filter.

Water Coil — Keep all air out of the water coil. Check open loop systems to be sure the well head is not allowing air to infiltrate the water line. Always keep lines airtight.

Inspect heat exchangers regularly, and clean more frequently if the unit is located in a "dirty" environment. The heat exchanger should be kept full of water at all times. Open loop systems should have an inverted P trap placed in the discharge line to keep water in the heat exchanger during off cycles. Closed loop systems must have a minimum of 15 psig during the summer and 40 psig during the winter.

Check P trap frequently for proper operation.

IMPORTANT: To avoid fouled machinery and extensive unit clean-up, DO NOT operate units without filters in place. DO NOT use equipment as a temporary heat source during construction.

Condensate Drain Pans — Check condensate drain pans for algae growth twice a year. If algae growth is apparent, consult a water treatment specialist for proper chemical treatment. The application of an algaecide every three months will typically eliminate algae problems in most locations.

Refrigerant System — Verify air and water flow rates are at proper levels before servicing. To maintain sealed circuitry integrity, do not install service gages unless unit operation appears abnormal.

Condensate Drain Cleaning — Clean the drain line and unit drain pan at the start of each cooling season. Check flow by pouring water into drain. Be sure trap is filled to maintain an air seal.

Air Coil Cleaning — Remove dirt and debris from evaporator coil as required by condition of the coil. Clean coil with a stiff brush, vacuum cleaner, or compressed air. Use a fin comb of the correct tooth spacing when straightening mashed or bent coil fins.

Condenser Cleaning — Water-cooled condensers may require cleaning of scale (water deposits) due to improperly maintained closed-loop water systems. Sludge build-up may need to be cleaned in an open water tower system due to induced contaminants.

Local water conditions may cause excessive fouling or pitting of tubes. Condenser tubes should therefore be cleaned at least once a year, or more often if the water is contaminated.

Proper water treatment can minimize tube fouling and pitting. If such conditions are anticipated, water treatment analysis is recommended. Refer to the Carrier System Design Manual, Part 5, for general water conditioning information.

⚠ CAUTION

Follow all safety codes. Wear safety glasses and rubber gloves when using inhibited hydrochloric acid solution. Observe and follow acid manufacturer's instructions. Failure to follow these safety precautions could result in personal injury or equipment or property damage.

Clean condensers with an inhibited hydrochloric acid solution. The acid can stain hands and clothing, damage concrete, and, without inhibitor, damage steel. Cover surroundings to guard against splashing. Vapors from vent pipe are not harmful, but take care to prevent liquid from being carried over by the gases.

Warm solution acts faster, but cold solution is just as effective if applied for a longer period.

GRAVITY FLOW METHOD — Do not add solution faster than vent can exhaust the generated gases.

When condenser is full, allow solution to remain overnight, then drain condenser and flush with clean water. Follow acid manufacturer's instructions. See Fig. 29.

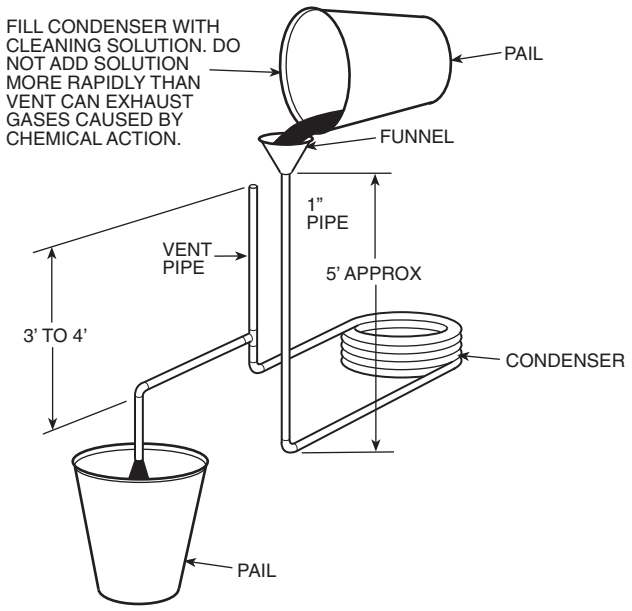


Fig. 29 — Gravity Flow Method

FORCED CIRCULATION METHOD — Fully open vent pipe when filling condenser. The vent may be closed when condenser is full and pump is operating. See Fig. 30.

Regulate flow to condenser with a supply line valve. If pump is a non-overloading type, the valve may be fully closed while pump is running.

For average scale deposit, allow solution to remain in condenser overnight. For heavy scale deposit, allow 24 hours. Drain condenser and flush with clean water. Follow acid manufacturer's instructions.

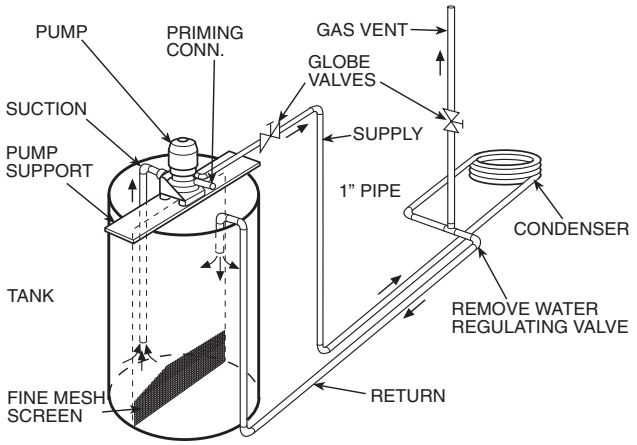


Fig. 30 — Forced Circulation Method

Checking System Charge — Units are shipped with full operating charge. If recharging is necessary:

1. Insert thermometer bulb in insulating rubber sleeve on liquid line near filter drier. Use a digital thermometer for all temperature measurements. DO NOT use a mercury or dial-type thermometer.
2. Connect pressure gage to discharge line near compressor.
3. After unit conditions have stabilized, read head pressure on discharge line gage.

   NOTE: Operate unit a minimum of 15 minutes before checking charge.
4. From standard field-supplied Pressure-Temperature chart for R-410A, find equivalent saturated condensing temperature.
5. Read liquid line temperature on thermometer; then subtract from saturated condensing temperature. The difference equals subcooling temperature.

Refrigerant Charging

⚠ WARNING

To prevent personal injury, wear safety glasses and gloves when handling refrigerant. Do not overcharge system — this can cause compressor flooding.

NOTE: Do not vent or depressurize unit refrigerant to atmosphere. Remove and recover refrigerant following accepted practices.

Air Coil Fan Motor Removal

⚠ CAUTION

Before attempting to remove fan motors or motor mounts, place a piece of plywood over evaporator coils to prevent coil damage.

Motor power wires need to be disconnected from motor terminals before motor is removed from unit.

1. Shut off unit main power supply.
2. Loosen bolts on mounting bracket so that fan belt can be removed.
3. Loosen and remove the 2 motor mounting bracket bolts on left side of bracket.
4. Slide motor/bracket assembly to extreme right and lift out through space between fan scroll and side frame. Rest motor on a high platform such as a step ladder. Do not allow motor to hang by its power wires.

TROUBLESHOOTING

When troubleshooting problems with a WSHP, consider the following and see Table 7:

Thermistor — A thermistor may be required for single-phase units where starting the unit is a problem due to low voltage. See Fig. 31 for thermistor nominal resistance.

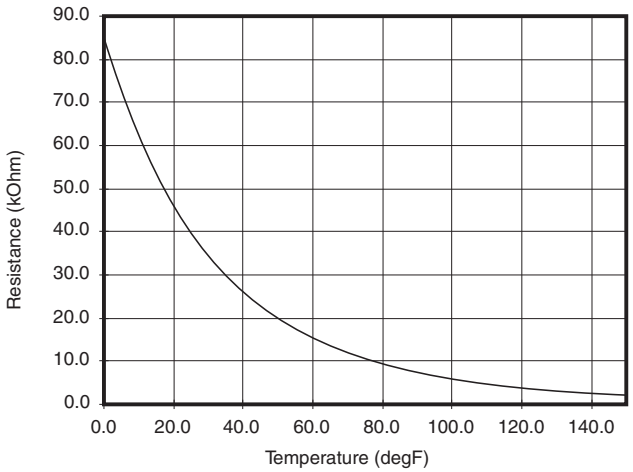


Fig. 31 — Thermistor Nominal Resistance

Table 7 — Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power, close disconnect
	Blown fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Voltage supply low	If voltage is below minimum voltage specified on unit data plate, contact local power company.
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower or compressor run in all three cases, the thermostat could be miswired or faulty.To ensure miswired or faulty thermostat verify 24 volts is available on the condensing section low voltage terminal strip between "R" and "C", "Y" and "C", and "O" and "C". If the blower does not operate, verify 24 volts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
BLOWER OPERATES BUT COMPRESSOR DOES NOT	Thermostat	Check setting, calibration, and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor, or contactor.
	Safety controls	Check Complete C/Deluxe D board red default LED for Blink Code
	Compressor overload open	If the compressor is cool and the overload will not reset, replace compressor.
	Compressor motor grounded	Internal winding grounded to the compressor shell. Replace compressor. If compressor burnout, install suction filter dryer.
	Compressor windings open	After compressor has cooled, check continuity of the compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL	Discharge pressure too high	In "COOLING" mode: Lack of or inadequate water flow. Entering water temperature too warm. Scaled or plugged condenser. In "HEATING" mode: Lack of or inadequate airflow. Blower inoperative, clogged filter or restrictions in ductwork.
	Refrigerant charge	The unit is overcharged with refrigerant. Recover refrigerant, evacuate and recharge with factory recommended charge.
	High pressure	Check for defective or improperly calibrated high pressure switch.
UNIT OFF ON LOW PRESSURE CONTROL	Suction pressure too low	In "COOLING" mode: Lack of or inadequate air flow. Entering air temperature too cold. Blower inoperative, clogged filter, or restrictions in ductwork. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or plugged condenser.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factory recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low-pressure switch.
UNIT SHORT CYCLES	Unit oversized	Recalculate heating and or cooling loads.
	Thermostat	Thermostat installed near a supply air grille, relocate thermostat. Readjust heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heating and or cooling loads. If excessive, possibly adding insulation and shading will rectify the problem.
	Loss of conditioned air by leaks	Check for leaks in ductwork or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate airflow or improper distribution of air. Replace dirty filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	TXV/Capillary Tube	Check for possible restriction or defect. Replace if necessary.
	Moisture, noncondensables	The refrigerant system may be contaminated with moisture or noncondensables. Recover refrigerant, evacuate and recharge with factory recommended charge. Note: a liquid line drier may be required.

LEGEND

LED — Light Emitting Diode
TXV — Thermostatic Expansion Valve

50HQP,VQP
START-UP CHECKLIST

CUSTOMER:_____ JOB NAME:

MODEL NO.:_____ SERIAL NO.:_____ DATE:

I. PRE-START-UP

DOES THE UNIT VOLTAGE CORRESPOND WITH THE SUPPLY VOLTAGE AVAILABLE? (Y/N) _____

HAVE THE POWER AND CONTROL WIRING CONNECTIONS BEEN MADE AND TERMINALS TIGHT? (Y/N) _____

HAVE WATER CONNECTIONS BEEN MADE AND IS FLUID AVAILABLE AT HEAT EXCHANGER? (Y/N) _____

HAS PUMP BEEN TURNED ON AND ARE ISOLATION VALVES OPEN? (Y/N) _____

HAS CONDENSATE CONNECTION BEEN MADE AND IS A TRAP INSTALLED? (Y/N) _____

IS AN AIR FILTER INSTALLED? (Y/N) _____

II. START-UP

IS FAN OPERATING WHEN COMPRESSOR OPERATES? (Y/N) _____

IF 3-PHASE SCROLL COMPRESSOR IS PRESENT, VERIFY PROPER ROTATION PER INSTRUCTIONS. (Y/N) _____

UNIT VOLTAGE — COOLING OPERATION

PHASE AB VOLTS_____ PHASE BC VOLTS _____ (if 3 phase) PHASE CA VOLTS _____ (if 3 phase)

PHASE AB AMPS_____ PHASE BC AMPS_____ (if 3 phase) PHASE CA AMPS _____ (if 3 phase)

CONTROL VOLTAGE

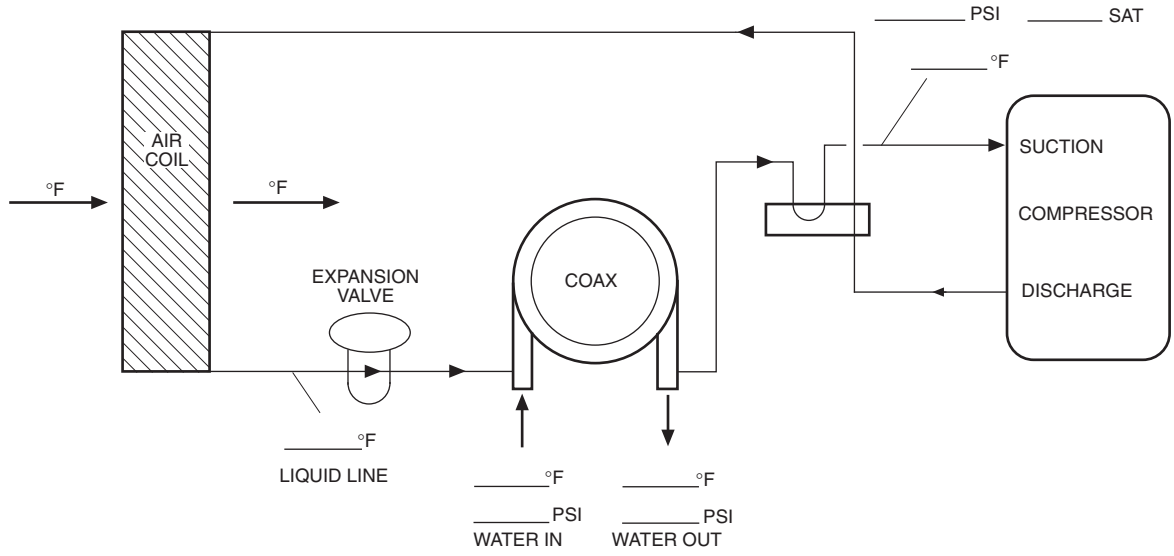
IS CONTROL VOLTAGE ABOVE 21.6 VOLTS? (Y/N) _____.
IF NOT, CHECK FOR PROPER TRANSFORMER CONNECTION.

TEMPERATURES

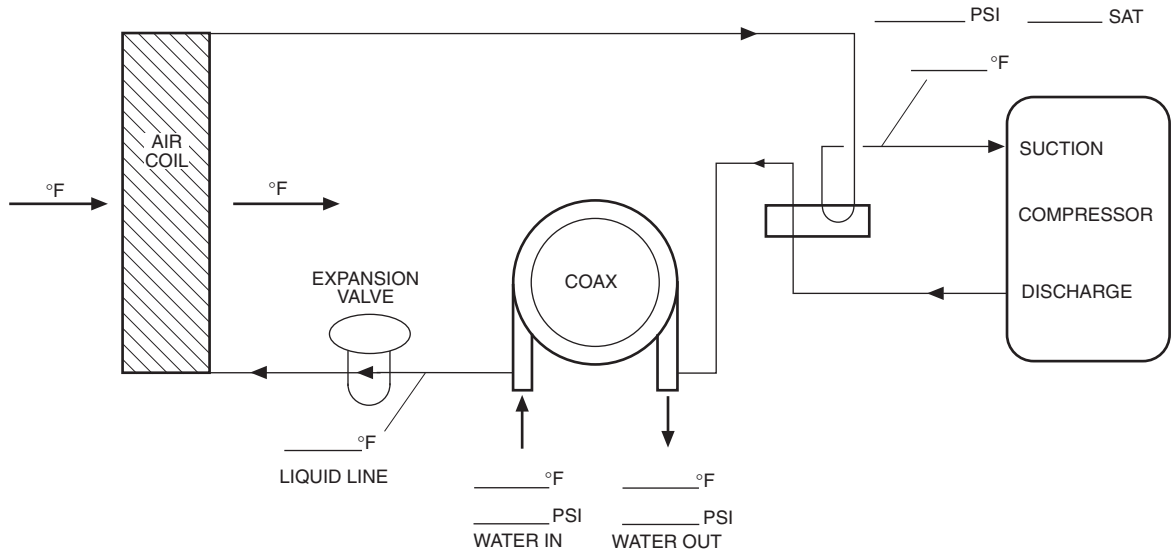
FILL IN THE ANALYSIS CHART ATTACHED.

COAXIAL HEAT EXCHANGER	COOLING CYCLE: FLUID IN	_____ F	FLUID OUT	_____ F	_____ PSI	_____ FLOW		
	HEATING CYCLE: FLUID IN	_____ F	FLUID OUT	_____ F	_____ PSI	_____ FLOW		
AIR COIL	COOLING CYCLE: AIR IN	_____ F	AIR OUT	_____ F				
	HEATING CYCLE: AIR IN	_____ F	AIR OUT	_____ F				

HEATING CYCLE ANALYSIS



COOLING CYCLE ANALYSIS



HEAT OF EXTRACTION (ABSORPTION) OR HEAT OF REJECTION =

_____ FLOW RATE (GPM) x _____ TEMP. DIFF. (DEG. F) x _____ FLUID FACTOR* = _____ (Btu/hr)

SUPERHEAT = SUCTION TEMPERATURE – SUCTION SATURATION TEMPERATURE
= ____ (DEG F)

SUBCOOLING = DISCHARGE SATURATION TEMPERATURE – LIQUID LINE TEMPERATURE
= ____ (DEG F)

*Use 500 for water, 485 for antifreeze.

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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