Versatec

Water-to-Water Heat Pumps

- 3, 5, 7, 10 Ton Capacity

Versatec Installation Manual

Installation Information

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Preventive Maintenance

ARI Standard 13256-1

WFI™

IM1355 11/06

WFI

Versatec

Model Nomenclature

VL 036 W 4 C C 0 A S S A

Family
- VL = Versatec (Low Temp) 50° - 110°F EST
- VX = Versatec (Ext. Range) 30° - 110°F EST

Unit Capacity
- 036 = MBTUH
- 060 = MBTUH
- 080 = MBTUH
- 120 = MBTUH

Model Type
- W = Water-to-Water

Voltage
- 0 = 208-230/60/1 Commercial
- 2 = 265/60/1 Commercial
- 3 = 208-230/60/3 Commercial
- 4 = 460/60/3 Commercial
- 5 = 575/60/3 Commercial
- 8 = 380/60/3 Commercial

Source Coax Options
- C = Copper
- N = Cupronickel

Load Coax Options
- C = Copper
- D = Vented (Potable Water 036 Model Only)
- N = Cupronickel

Cabinet Finish
- 0 = Painted Cabinet

Sound Kit
- A = None
- B = Blanket

Non-Standard Options

Non-Standard Options Detail

Vintage
- A = 036 (& 575 Volt 060)
- B = All Others

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General Installation Information

Safety Considerations

Installation and servicing of heating and air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available for all brazing operations.

Notes: Before installing, check voltage of unit(s) to ensure proper voltage.

WARNING: Before performing service or maintenance operations on the system, turn off main power switches to the unit. Turn off accessory heater power switch if applicable. Electrical shock could cause serious personal injury.

Moving and Storage

Move units in the normal “UP” orientation as indicated by the arrows on each carton. Do not stack more than three (3) units in total height. When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Examine units for shipping damage, removing the units from the cartons if necessary. Units in question should also be internally inspected. If any damage is noted, the carrier should make the proper notation on the delivery receipt, acknowledging the damage.

Unit Location

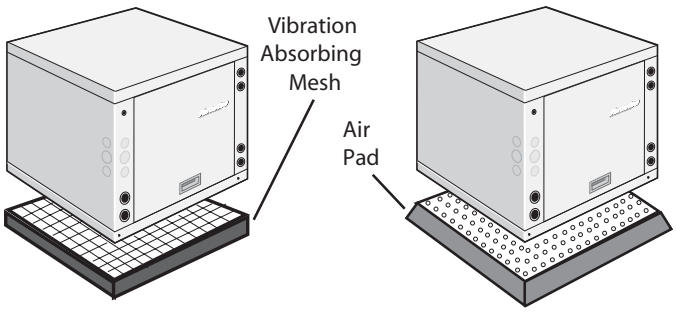
Locate the unit in an indoor area that allows easy removal of the access panels and has enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water and electrical connections. If the unit is located in a confined space such as a closet, provisions must be made for unit servicing. Units may be stacked vertically in small mechanical rooms. These units are not approved for outdoor installation and, therefore, must be installed inside the structure being conditioned.

CAUTION: Do not locate in areas subject to freezing.

Mounting Units

Units should be mounted level on a vibration absorbing pad slightly larger than the base to provide isolation between the unit and the floor. It is not necessary to anchor the unit to the floor. Allow access to front access panel for servicing compressor.

Figure 1: Unit Mounting



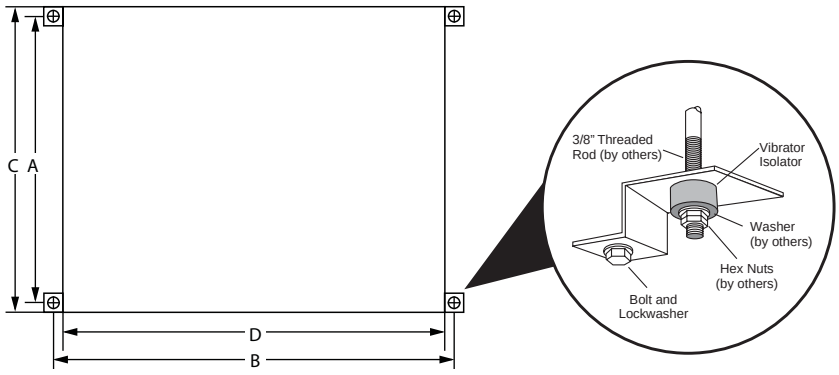
Hanging Units

Versatec water-to-water units can be suspended from the ceiling using 3/8" threaded rods. The rods are usually attached to the unit by optional hanger bracket kits (99S500A01). Lay out the threaded rods per the dimensions and assemble the hangers to the unit (see Figure 2). Securely tighten the brackets to the unit using the weld-nuts located on the underside of the bottom panel. When attaching the rods to the bracket, a double nut is required since vibration could loosen a single nut. Use the bolts provided in the kit to attach the brackets. The use of longer bolts could damage internal parts.

CAUTION: Do not use rods smaller than 3/8" diameter since they may not be strong enough to support the unit. The rods must be securely anchored to the structure.

General Installation Information (cont.)

Figure 2: Hanger Locations and Assembly



MODEL	A	B	C	D
V036W	29.5 [74.9]	32.6 [83.1]	30.5 [77.5]	30.5 [77.5]
V060W	29.5 [74.9]	32.6 [83.1]	30.5 [77.5]	30.5 [77.5]
V080W	28.75 [73.0]	39.9 [101.3]	30.0 [76.2]	37.75 [95.9]
V120W	28.75 [73.0]	39.9 [101.3]	30.0 [76.2]	37.75 [95.9]

Notes: Dimensions are inches [cm]. Rev. 11/23/05

General Piping

Each unit is equipped with FPT fittings for the water supply and return lines. For making the water connections to the unit, a Teflon tape thread sealant is recommended to minimize internal fouling of the piping. Do not overtighten connections. The water lines should be routed so as not to interfere with access to the unit. The use of a short length of high pressure hose with a swivel type fitting may simplify the connections and prevent vibration.

Before final connection to the unit, the supply and return hose kits must be connected, and the system flushed to remove dirt, piping chips and other foreign material. Normally, a combination balancing and close-off (ball) valve is installed at the return, and a rated gate or ball valve is installed at the supply. The return valve can be adjusted to obtain the proper water flow. The valves allow the unit to be removed for servicing.

The proper water flow must be delivered to each unit whenever the unit heats or cools. To assure proper flow, the use of pressure/temperature ports is recommended to determine the flow rate. These ports should be located adjacent to the supply and return connections on the unit.

The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger (See Pressure Drop Table, page 14 for water flow and pressure drop information). Normally about 3 GPM flow rate per ton of cooling capacity (2.25 GPM per ton minimum) is needed.

Both source as well as load fluid piping must be at least as large as the unit connections on the heat pump (larger on long runs). Unit may be furnished with either a copper or optional cupronickel coil on either source or load coaxial heat exchangers. Copper is adequate for closed loop systems and ground water that is not high in mineral content. In condtions anticipating moderate scale formation or in brackish water, a cupronickel heat exchanger is recommended.

Notes: Cupronickel should always be used when chlorinated water is used as the source or load liquid.

For process water applications, it is recommended that a secondary load heat exchanger be installed to prevent corrosion to the unit's primary coaxial coil. In situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. Over a period of time, ground water unit heat exchanger coils may lose heat exchange capability due to a buildup of mineral deposits. These can be cleaned only by a qualified service mechanic as special pumping equipment and solutions are required.

Never use flexible hoses of a smaller inside diameter than that of the water connection on the unit and limit hose length to 10 ft. per connection. Check carefully for water leaks.

CAUTION: Water piping exposed to outside temperature may be subject to freezing.

Potable Water Systems

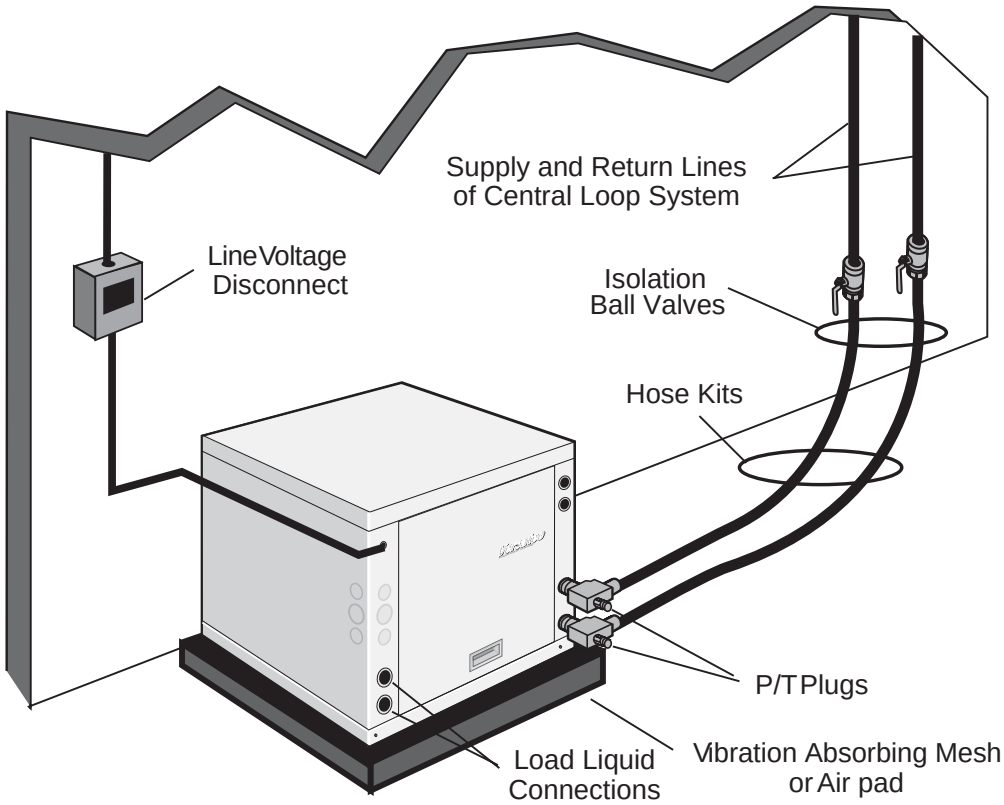
An optional domestic water coil is available on the 036 model to provide primary generation of domestic hot water. The coaxial heat exchanger provides double-wall construction and is vented to allow installation in potable water systems.

Water Loop (Boiler/Tower) Systems

The water loop is usually maintained between 60°F and 90°F for proper heating and cooling operation. This is accomplished with a cooling tower and a boiler.

To reject excess heat from the water loop, the use of a closed circuit evaporative cooler or an open type cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used without a secondary heat exchanger, continuous chemical treatment and filtering of the water must be performed to ensure the water is free from damaging materials.

Figure 3: Typical Water Loop Installation

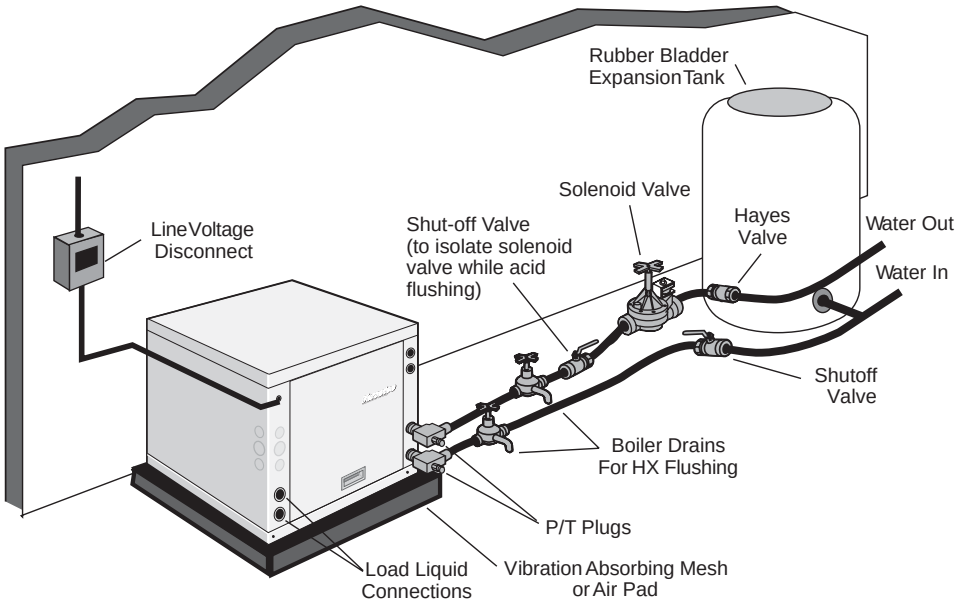


CAUTION: An optional freeze protection kit must be field installed to prevent damage to the heat exchangers.

Open Loop Systems

Typical open loop piping is shown in Figure 4. Always maintain water pressure in the heat exchanger by placing water control valves at the outlet of the unit and use a closed bladder type expansion tank to minimize mineral deposits. Insure proper water flow through the unit by checking pressure drop across the heat exchanger and comparing it to the figures in the Pressure Drop Table on page 14. Normally about 2 GPM flow rate per ton of cooling capacity (1.5 GPM per ton minimum if entering source temperature is above 50° F) is needed in open loop systems. Some water control valves draw their power directly from the unit's 24V transformer and can overload and possibly burn out the transformer. Check total VA draw of the water valve(s) and ensure it is under 40 VA. Discharge water from a heat pump is not contaminated in any manner and can be disposed of in various ways depending on local building codes (i.e. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid use of sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

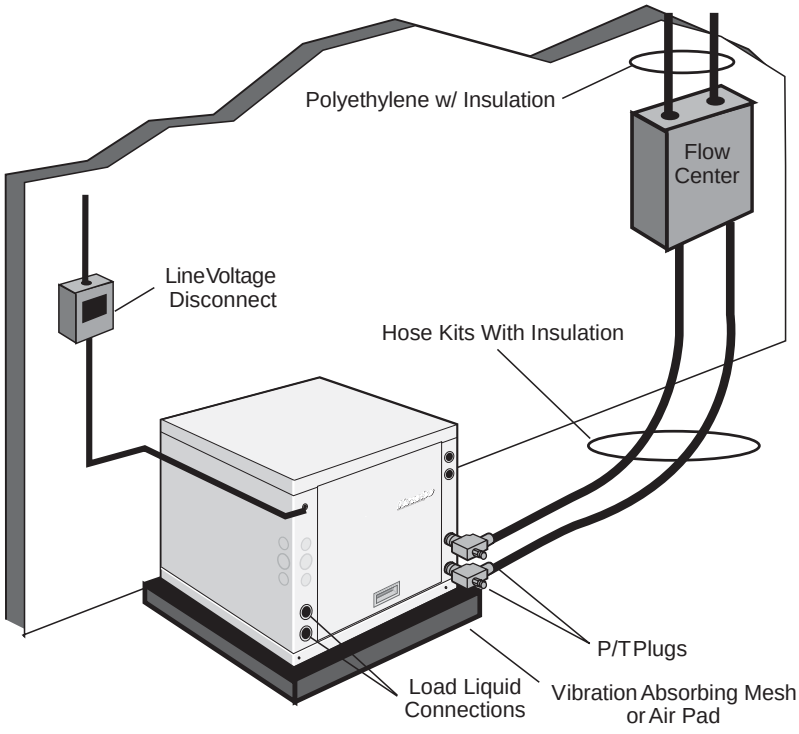
Figure 4: Typical Open Loop Installation



Earth-Coupled Systems

Once piping is completed between the unit, flow center and the earth loop, final purging and charging of the loop is needed. A flush cart (at least a 1.5 hp pump) is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop itself. Antifreeze solution is used in most areas to prevent freezing. Maintain the pH in the 7.6 - 8.2 range for final charging. Flush the system adequately to remove as much air as possible, then pressurize the loop to a static pressure of 50-75 psi. This is normally adequate for good system operation. Ensure that the flow center provides adequate flow through the unit by checking pressure drop across the heat exchanger and by comparing it to the figures shown in the Pressure Drop Table (page 14). Usually 3 GPM (2.25 GPM/ton minimum) of flow per ton of cooling capacity is needed in earth loop applications.

Figure 5: Typical Closed Loop Earth Coupled Installation



Physical Data

Model	V036W	V060W	V080W	V120W
Compressor	Scroll	Scroll	Scroll	Scroll
Ref. Charge - R22 (oz.)	49.0 [1.39]	84.0 [2.38]	120.0 [3.4]	170.0 [4.82]
Unit Weight (lbs.)	244.0 [110.7]	275.0 [124.7]	445.0 [201.8]	460.0 [208.7]

Notes: Ref. Charge--Ounces, [kg] Rev. 11/23/05
Unit Weight--Pounds, [kg]

Electrical

General

Be sure the available power is the same voltage and phase as that shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable. See the Unit Electrical Data chart below for wire and fuse or circuit breaker sizing information.

Flow Center Pump Operation

An Auxillary Power Relay (APR) kit should be field installed for fused wiring of the flow center pump(s).

208 Volt Operation

All 208-230 volt units are factory wired for 230 volt operation. For 208 volt operation, the position of the red and blue transformer wires should be switched.

Electrical Data

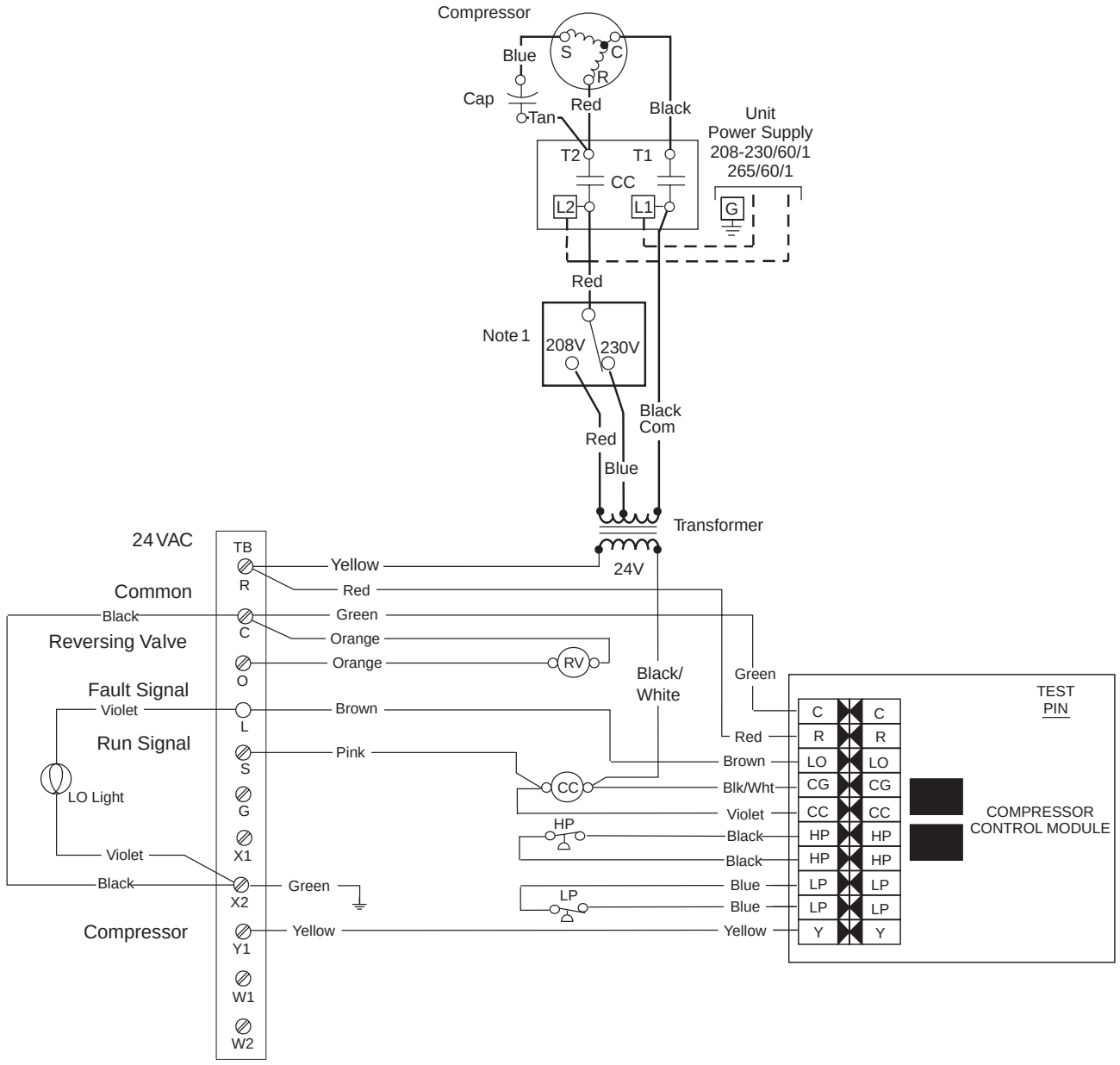
Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor				Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
				Qty	MCC	RLA	LRA			
VL/VX 036W	**1**	208-230/60/1	197/254	1	21.0	15.0	72.5	13.5	18.8	30
	2	265/60/1	239/292	1	18.0	11.5	61.0	11.5	14.4	25
	3	208-230/60/3	197/254	1	14.0	9.0	63.0	9.0	11.2	20
	4	460/60/3	414/506	1	7.0	4.5	31.0	4.5	5.6	10
VL/VX 060W	**1**	208-230/60/1	197/254	1	31.0	19.9	137.0	19.9	24.8	40
	3	208-230/60/3	197/254	1	23.0	14.7	91.0	14.7	18.4	30
	4	460/60/3	414/506	1	11.0	7.1	50.0	7.1	8.8	15
	5	575/60/3	518/633	1	8.0	5.1	37.0	5.1	6.4	10
VL/VX 080W	**3**	208-230/60/3	197/254	1	29.5	18.9	146.0	18.9	23.6	40
	8	380/60/3	342/418	1	17.9	11.5	88.4	11.5	14.4	25
	4	460/60/3	414/506	1	14.8	9.5	73.0	9.5	11.9	20
	5	575/60/3	518/633	1	11.8	7.6	58.4	7.6	9.5	15
VL/VX 120W	**3**	208-230/60/3	197/254	1	47.0	30.1	225.0	30.1	37.7	60
	8	380/60/3	342/418	1	26.0	16.6	140.0	16.6	20.1	35
	4	460/60/3	414/506	1	24.2	15.5	114.0	15.5	19.4	30
	5	575/60/3	518/633	1	18.9	12.1	80.0	12.1	15.1	25

Notes: All fuses type “D” time delay (or HACR circuit breaker in USA). Rev. 08/06
All units equipped with 75VA transformer with circuit breaker.

Wiring Schematics

Versatec Series Water-to-Water - 208-230/60/1

97P641-16 8/21/02



Legend

- Factory low voltage wiring
- Factory line voltage wiring
- Field low voltage wiring
- Field line voltage wiring
- Optional block
- Quick connect terminal
- Screw terminal - field connection

CCM - Compressor Control Module
CC - Compressor contactor
HP - High pressure switch
LP - Low pressure switch
RV - Reversing valve coil
TB - Terminal board

- L1 Field wire lug
- Ground
- Relay Contacts - N.O., N.C.
- P 2 3 1 Polarized connector

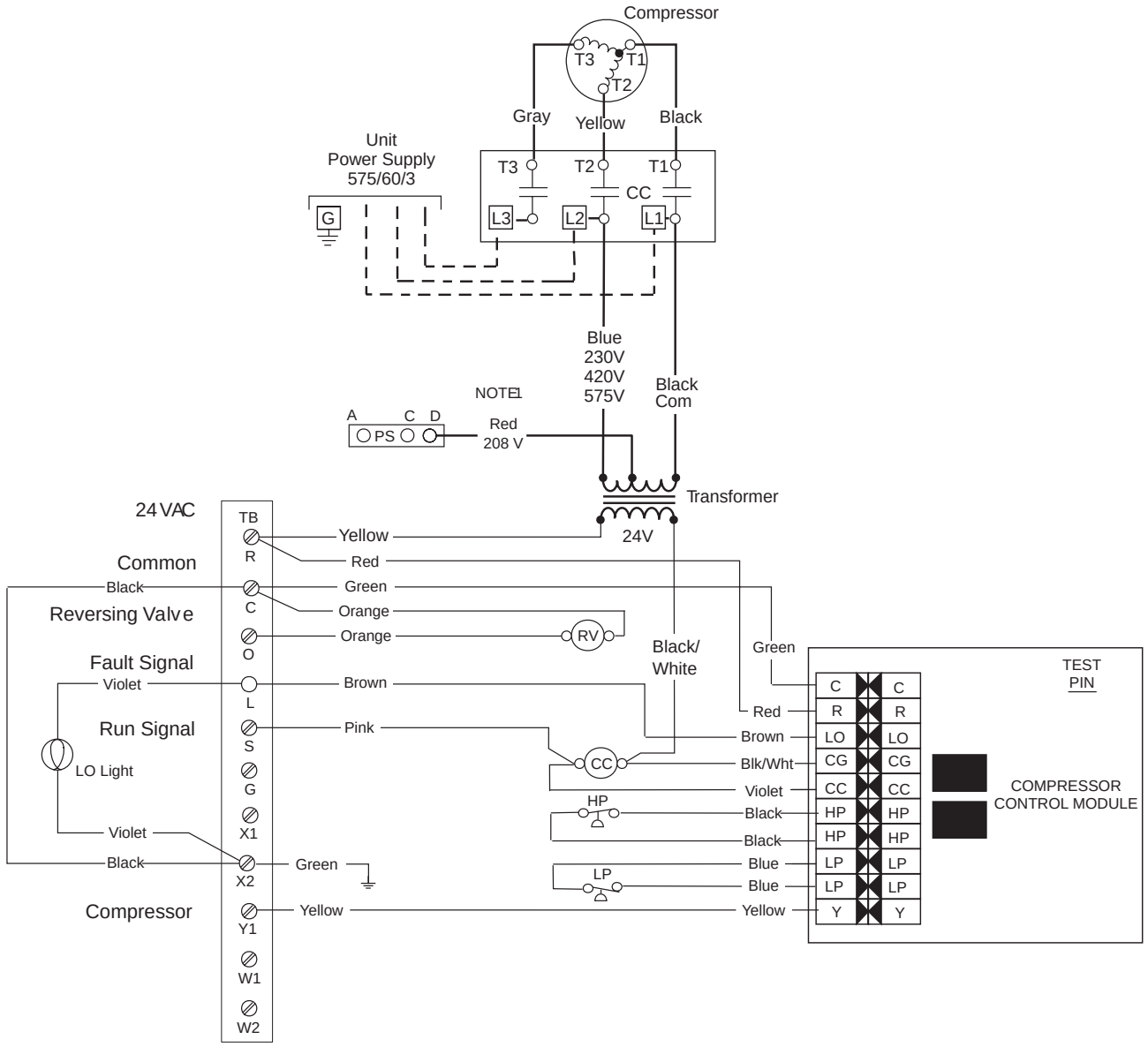
- Switch - High pressure
- Switch - Low pressure
- Relay coil
- Capacitor

Notes:
1 - For 208V - 230V operation place transformer switch to desired voltage. (Not available on 265 V)

Wiring Schematics (cont.)

Versatec Series Water-to-Water - 208-230, 480, 575/60/3

97P641-14 8/21/02



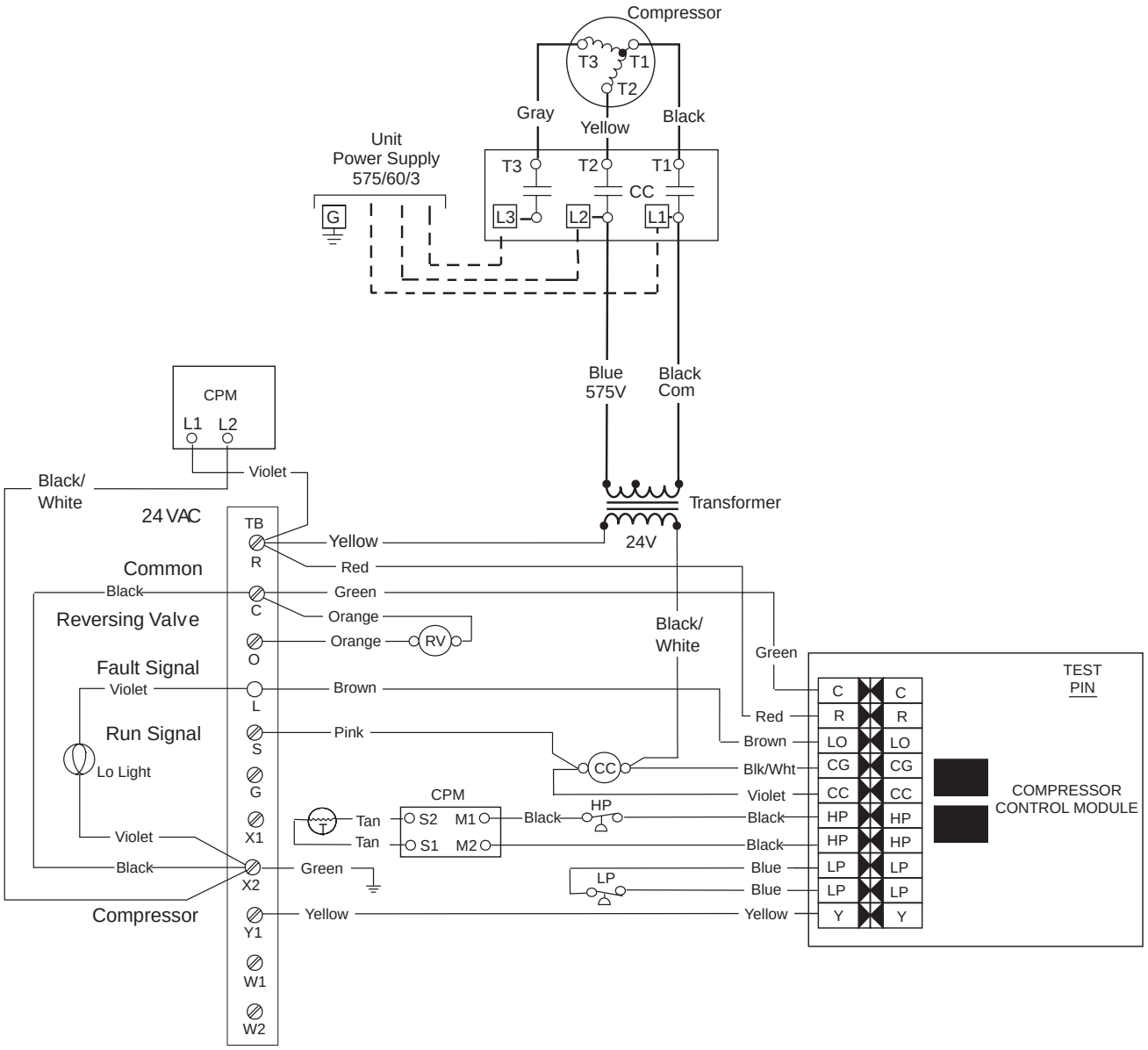
Legend

Factory low voltage wiring Factory line voltage wiring Field low voltage wiring Field line voltage wiring Optional block Quick connect terminal Screw terminal - field connection	CCM - Compressor Control Module CC - Compressor contactor HP - High pressure switch LP - Low pressure switch RV - Reversing valve coil TB - Terminal board	L1 Field wire lug Ground Relay Contacts - N.O., N.C. P Polarized connector	Switch - High pressure Switch - Low pressure Relay coil Capacitor	Notes: 1- Switch blue and red wires for 208V operation

Wiring Schematics (cont.)

Versatec Series Water-to-Water - 575/60/3

97P641-12 10/10/02



Legend

Factory low voltage wiring Factory line voltage wiring Field low voltage wiring Field line voltage wiring Optional block Quick connect terminal Screw terminal - field connection	CCM - Compressor Control Module CC - Compressor contactor HP - High pressure switch LP - Low pressure switch RV - Reversing valve coil TB - Terminal board CPM - Compressor Profection Module	L1 Field wire lug Ground Relay Contacts - N.O., N.C. P 2 3 1 Polarized connector	Switch - High pressure Switch - Low pressure Relay coil	Notes:

Startup

Before powering unit, check the following:

- High voltage wiring is correct and matches the nameplate
- Fuses, breakers and wire size are correct
- Low voltage wiring is completed
- Piping is completed and water system has been cleaned and flushed
- Air is purged from the closed loop system
- Isolation valves are open and loop water control valves or loop pumps are wired
- Compressor mounting bolts are loosened to reduce vibration noise
- Service/access panels are in place
- Aquastat is in the OFF position

Unit Startup

1. Set aquastat to highest temperature.
2. Set aquastat operation switch to the COOL position. Compressor should NOT come on.
3. Slowly reduce the aquastat setting until both the compressor and water control valve/loop pumps are activated. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using the P/T plugs. This measured differential should then be compared to the pressure drop table (page 14).
4. Perform a heat of rejection (HR) test by multiplying GPM x ΔT x 485 (anti-freeze/water.) Use 500 for 100% water. Check HR against catalog data at same conditions.
5. Turn aquastat switch to the OFF position. A hissing sound should indicate proper functioning of reversing valve.
6. Leave unit OFF for approximately five (5) minutes to allow pressure to equalize.
7. Turn aquastat to lowest setting.
8. Set aquastat switch to the HEAT position.
9. Turn aquastat operation to higher temperatures until both compressor and water control valve/loop pumps are activated.
10. Perform a heat of extraction (HE) test by multiplying GPM x ΔT x 485 (anti-freeze/water.) Use 500 for 100% water. Check HE against catalog data at same conditions.
11. Check for vibrations, noise and water leaks.
12. Set system to maintain desired comfort level.
13. Instruct the owner/operator of correct aquastat and system operation.
14. **Be certain to fill out and forward all warranty papers to the WFI warranty deptartment.**

Operating Specifications

Heating Mode

Entering Load Temp (ºF)	Entering Source Temp (ºF)	Suction Pressure (PSIG)	Discharge Pressure (PSIG)	Superheat (ºF)	Subcooling (ºF)
60	30	33-38	113-124	7-19	6-14
	50	51-60	123-135	11-19	6-18
	70	68-74	133-147	15-19	5-20
80	30	35-41	168-189	6-18	5-15
	50	57-60	180-202	8-19	5-18
	70	69-81	185-216	10-20	4-20
100	30	39-44	229-254	5-17	4-16
	50	57-64	237-269	9-19	4-18
	70	74-84	245-283	13-21	3-20
120	30	40-46	287-318	3-15	3-16
	50	59-67	294-335	5-19	3-18
	70	77-89	300-351	7-22	2-20

Cooling Mode

Entering Load Temp (ºF)	Entering Source Temp (ºF)	Suction Pressure (PSIG)	Discharge Pressure (PSIG)	Superheat (ºF)	Subcooling (ºF)
30	50	35-37	106-116	14-16	3-11
	70	35-38	158-162	15-16	3-13
	90	35-38	196-209	17-18	2-14
50	50	42-55	111-133	12-32	2-17
	70	47-57	163-180	11-27	2-17
	90	52-60	203-229	10-21	1-16
70	50	57-71	118-136	20-30	2-17
	70	63-76	168-186	19-28	2-17
	90	68-81	212-235	17-25	1-17
90	50	52-88	119-148	23-57	2-21
	70	75-95	172-203	20-33	2-20
	90	73-102	220-258	17-40	1-19

Pressure Drop Data

Load Side

LOAD SIDE	GPM	30º EWT		50º EWT		70º EWT		90º EWT	
		PSI	FT HD	PSI	FT HD	PSI	FT HD	PSI	FT HD
V036W	5.0	1.7	3.9	1.6	3.7	1.6	3.7	1.5	3.5
	7.0	4.0	9.2	3.9	9.0	3.5	8.1	3.2	7.4
	9.0	5.3	12.0	5.2	12.0	5.0	11.6	4.9	11.3
V060W	8.0	2.8	6.5	2.5	5.8	2.3	5.3	2.0	4.6
	11.0	5.4	12.5	4.9	11.2	4.4	10.2	3.9	8.9
	14.0	8.0	18.5	7.2	16.6	6.5	15.0	5.7	13.2
V080W	10.0	1.8	4.2	1.7	3.9	1.6	3.7	1.5	3.5
	16.0	4.9	11.2	4.5	10.4	4.2	9.6	4.0	9.2
	22.0	7.9	18.2	7.3	16.9	6.7	15.5	6.4	14.8
V120W	16.0	3.6	8.3	3.5	8.0	3.3	7.6	2.7	6.2
	22.0	6.5	14.9	6.3	14.6	6.2	14.2	5.5	12.7
	28.0	9.3	21.5	9.2	21.1	9.0	20.8	8.2	18.9

Source Side

SOURCE SIDE	GPM	30º EWT		50º EWT		70º EWT		90º EWT	
		PSI	FT HD	PSI	FT HD	PSI	FT HD	PSI	FT HD
V036W	5.0	1.7	3.9	1.6	3.7	1.6	3.7	1.5	3.5
	7.0	3.5	8.1	3.4	7.9	3.3	7.6	3.2	7.4
	9.0	5.3	12.0	5.2	12.0	5.0	11.6	4.9	11.3
V060W	8.0	3.6	8.3	3.2	7.4	2.9	6.7	2.5	5.8
	11.0	6.1	14.0	5.7	13.1	5.3	12.2	4.9	11.3
	14.0	8.5	19.6	8.1	18.7	7.7	17.8	7.3	16.9
V080W	10.0	1.8	4.2	1.7	3.9	1.6	3.7	1.5	3.5
	16.0	4.9	11.2	4.5	10.4	4.2	9.6	4.0	9.2
	22.0	7.9	18.2	7.3	16.9	6.7	15.5	6.4	14.8
V120W	16.0	3.6	8.3	3.5	8.0	3.3	7.6	2.7	6.2
	22.0	6.5	14.9	6.3	14.6	6.2	14.2	5.5	12.7
	28.0	9.3	21.5	9.2	21.1	9.0	20.8	8.2	18.9

Troubleshooting

Should a major problem develop, refer to the following information for possible causes and corrective steps:

If the compressor won't run:

1. The fuse may be blown or the circuit breaker open. Check electrical circuits and motor windings for shorts or grounds. Investigate for possible overloading. Replace fuse or reset circuit breakers after fault is corrected.
2. Supply voltage may be too low. Check it with a volt ohm meter.
3. Control system may be faulty. Check aquastat for correct wiring, setting, calibration, and 24 volt tranformer for burnout.
4. Wires may be loose or broken. Replace or tighten.
5. The low pressure switch may have tripped due to one or more of the following:
   a. fouled or plugged coaxial heat exchanger
   b. low or no water flow
   c. water too cold
   d. low refrigerant
6. The high pressure switch may have tripped due to one or more of the following:
   a. fouled or plugged coaxial heat exchanger
   b. low or no water flow
   c. water too warm
7. Check capacitor.
8. The compressor overload protection may be open. If the compressor dome is extremely hot, the overload will not reset until cooled down. If the overload does not reset when cool, it may be defective. If so, replace the compressor.
9. The internal winding of the compressor motor may be grounded to the compressor shell. If so, replace the compressor.
10. The compressor winding may be open. Check continuity with ohm meter. If the winding is open, replace the compressor.

If sufficient cooling or heating is not obtained:

1. Check thermostat for improper location.
2. Check for restriction in water flow.
3. Check subcooling for low refrigerant charge.
4. The reversing valve may be defective, creating a refrigerant bypass. If unit won't cool, check reversing valve coil.
5. Check thermal expansion valve for possible malfunction.

If the unit operation is noisy:

1. Check compressor for loosened mounting bolts. Make sure compressor is floating free on its isolator mounts.
2. Check for tubing contact with the compressor or other surfaces. Readjust it by bending slightly.
3. Check screws on all panels.
4. Check for clatter or hum in the contactor or relays due to low voltage or defective holding coil. Replace component.
5. Check vibration absorbing material under unit for proper installation. Unit must be fully supported, not just corners.
6. Check for abnormally high discharge pressures.

Preventive Maintenance

1. Keep all air out of the water. An open loop system should be checked to insure that the well head is not allowing air to infiltrate the water line. Lines should always be airtight.
2. Keep the system under pressure at all times. It is recommended in open loop systems that a water control valve be placed in the discharge line to prevent loss of pressure during off cycles. Closed loop systems must have a positive static pressure.

Notes: If the installation is performed in an area with a known high mineral content in the water, it is best to establish a periodic maintenance schedule with the owner for checking the water-to-refrigerant heat exchanger on a regular basis. Should periodic cleaning be necessary, use standard cleaning procedures which are compatible with either the cupronickel or copper water lines. Generally, the more water flowing through the unit, the less chance there is for scaling. Low GPM flow rates produce higher temperatures through the coil. To avoid excessive pressure drop and the possibility of copper erosion, do not exceed GPM flow rate as shown on the specification sheets for each unit.

Replacement Procedures

When contacting WFI for service or replacement parts, refer to the model number and serial number of the unit as stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

Manufactured by WFI
9000 Conservation Way
Fort Wayne, IN 46809

Product:	Versatec
Type:	Water-to-Water Heat Pumps
Size:	3, 5, 7, 10 Tons

Document Type:	Installation Manual
Part Number:	IM1355
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