EARTHLINKED TECHNOLOGIES

EarthLinked® Heating and Cooling System

Installation, Operation & Maintenance Manual

DISCLAIMER

Proper installation of the EarthLinked® Heating and Cooling System is essential to its reliable performance. All EarthLinked® systems must be installed by an authorized, trained technician who has successfully completed the training class and passed the final examination. Installation must be made in accordance with the instructions set forth in the *EarthLinked® Technical Manual.* Failure to provide installation by an authorized, trained installer in a manner consistent with the subject manual will void and nullify the limited warranty coverage for the system.

This manual also contains installation guidelines for field specified air handlers, electric storage water heaters, controls, water storage tanks, and the associated piping. This is informative material only, which may be helpful in the application of these field specified components.

EarthLinked Technologies, Inc. (ETI) does not manufacture or sell equipment or materials used in the manufacture, construction or application of these field specified components and further, ETI is not an authority in the design, manufacture, construction, or application of the field specified components.

Therefore ETI shall not be liable for any defect, unsatisfactory performance, damage or loss, whether direct or consequential, relative to the design, manufacture, construction, application or installation of the field specified components.

EarthLinked Technologies, Inc.
4151 South Pipkin Road
Lakeland, Florida 33811
tel. 863-701-0096 • fax 863-701-7796
info@earthlinked.com • www.earthlinked.com

CSI #23 80 00

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IMPORTANT

Proper installation of the EarthLinked® Heating and Cooling System is essential to its reliable performance. All EarthLinked systems must be installed by an authorized, trained technician who has successfully completed the training class and passed the final examination. Installation must be made in accordance with the instructions set forth in this manual and the *EarthLinked® Technical Manual.* Failure to provide installation by an authorized, trained installer in a manner consistent with the subject manual will void and nullify the limited warranty coverage for the system.

1. Inspection/Pre-Installation

A. Inspection

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Reference EarthLinked® matching system component model numbers in Figure 1. Make sure all units have been received and model numbers are the same as those ordered.

Compressor Unit[1]	Air Handler	Cased Coil	Hydronic Water Module	Domestic Water Module	Earth Loop[2]	Cathodic Protection System
-018	AFY-018	CCY-018	HWM-1836	DWM-1836	-018	CPS-1830
-024	AFY-024 AVY-024	CCY-024	HWM-1836	DWM-1836	-024	CPS-1830
-030	AFY-030	CCY-030	HWM-1836	DWM-1836	-030	CPS-1830
-036	AFY-036 AVY-036	CCY-036	HWM-1836	DWM-1836	-036	CPS-3642
-042	AFY-042	CCY-042	HWM-4248	DWM-4248	-042	CPS-3642
-048	AFY-048 AVY-048	CCY-048	HWM-4248	DWM-4248	-048	CPS-4872
-060	AFY-060 AVY-060	CCY-060	HWM-6072	DWM-6072	-060	CPS-4872
-072	AFY-072 AVY-072	CCY-072	HWM-6072	DWM-6072	-072	CPS-4872

1. All series Compressor Units: SC, SD, SCW, SW, HC, HW, HCW, HWW.
2. All series Earth Loops: V1, D1, T1, V1.5, D1.5, V2, D2, D3, H1, H2.
***Note**: Desuperheater Model DESPK and all EarthLinked® thermostats can be utilized with any size system listed above.*

Figure 1. Model Numbers

Inspect the carton or crating of each unit, and inspect each unit for damage. Assure the carrier makes proper notation of any shortages or damage on all copies of the freight bill and he completes a common carrier inspection report. Concealed damage not discovered during unloading must be reported to the carrier within 15 days of receipt of shipment. ***If not filed within 15 days, the freight company can deny the claim without recourse.*** **Note: it is the responsibility of the purchaser to file all necessary claims with the carrier.**

Equipment should be stored in its packaging in a clean, dry area. Store equipment in an upright position at all times. Equipment is to be stacked in accordance with the notation on the packaging. **DO NOT remove equipment from shipping cartons until equipment is required for installation.**

Cover equipment on the job site with shipping cartons, vinyl film, or an equivalent protective covering. In areas where painting, plastering and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the equipment and contamination by foreign material. Physical damage and contamination may prevent proper start-up and may result in costly equipment clean up. Examine all equipment before installing.

CAUTION

Wear adequate protective clothing and practice all applicable safety precautions while installing this equipment. Failure to do so may result in equipment and/or property damage, personal injury or death.

B. Pre-Installation

Prior to installing EarthLinked space heating and cooling system above-ground components, you will need tools and equipment listed in Appendix A to properly install the system.

Installation instructions are provided with each compressor unit that will address the installation of each EarthLinked HVAC component.

Installation instructions for earth loops are provided separately with each earth loop system.

IMPORTANT

Each compressor unit contains a QUIK-START instruction for properly installed EarthLinked heating and cooling systems.

Prepare units for installation as follows:

1. Compare the data on the unit nameplate or packaging with ordering and shipping information to verify the correct unit has been shipped (See Figure 1.)
2. Keep the equipment covered with the packaging until installation is begun and all plastering, painting, etc. is finished.
3. Verify refrigerant tubing is free of kinks or dents.
4. Inspect all electrical connections. Connections must be clean and tight at the terminals.

IMPORTANT

DO NOT USE THE EARTHLINKED COMPONENTS FOR HEATING OR COOLING DURING CONSTRUCTION. The mechanical components and filters will quickly become clogged with construction dirt and debris which will cause system fouling and damage.

2. General System Layout

Guidelines for the general layout of the system components are shown in Figure 2. Before placing the compressor unit (outside or indoors), review the guidelines in Figure 2.

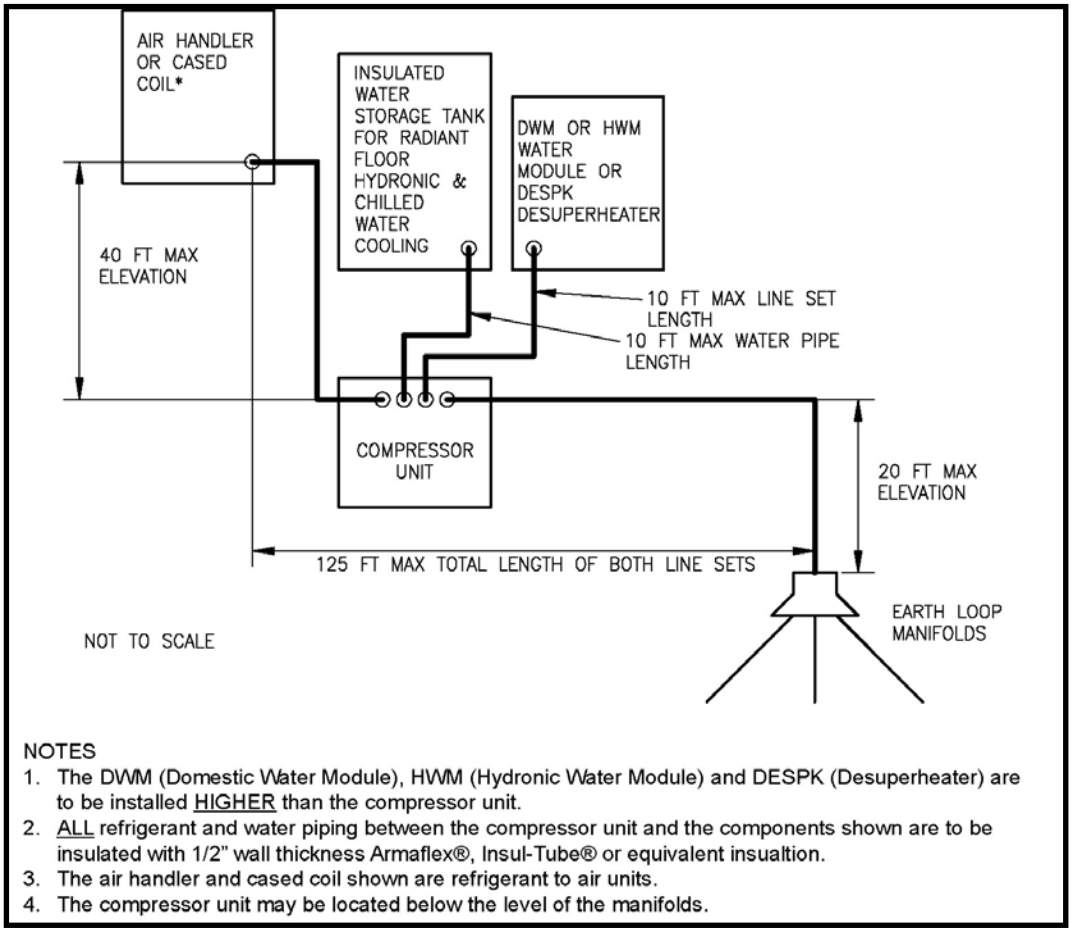


Figure 2. General System Layout

3. Compressor Unit

A. Placement

EarthLinked compressor units may be located outside or inside the building, following these guidelines.

OUTSIDE

Locate compressor unit:

- On a standard HVAC condensing unit pad, resting on firm, settled ground.
- Same as for INSIDE placement. See below.

INSIDE

Locate compressor unit:

- On a solid, level hard surface. If compressor unit is to be fastened, see Figure 3 for bracket installation.
- Where compressor unit sound and vibration will not disturb human activities. Compressor unit may be located in garage, basement, crawl space or utility room. Avoid placing compressor unit in kitchen, bedroom, family/living/dining room areas.
- In a condensate pan.
- On vibration pads.
- Attic installations, where necessary, must include a drip pan, anti-vibration pads and are to be suspended from the rafters with suspension isolators.
- For SD compressor units (which have potable domestic water connections) where the surrounding air temperature remains above 40°F.
- Where suggested clearance is 3 feet on both sides, top, and front for access. However, local codes and applicable regulations take precedence. Clearance from back panel to wall and minimum side clearance should be at least one foot. See Figure 4 for details.
- Where the total length of refrigerant line sets (from manifolds to compressor and from compressor to air handler) does not exceed 125 feet, as shown in Figure 2.
- Where the compressor unit is no more than 20 feet higher than the earth loop manifolds. Compressor unit may be located lower than the earth loop manifolds. See Figure 2.
- For SCW, HCW and HWW compressor units providing radiant panel hydronic hot water, where the hydronic primary circuit is adequately protected from freezing by controlling the surrounding lowest air temperature or providing an industry approved anti-freeze and water mixture for the surrounding lowest air temperature.
- For SCW, HCW and HWW compressor units where the chilled water outlet at the compressor is protected with a freeze protection thermostat set to turn the compressor unit off when chilled water temperature exiting the heat exchanger drops to 38°F.

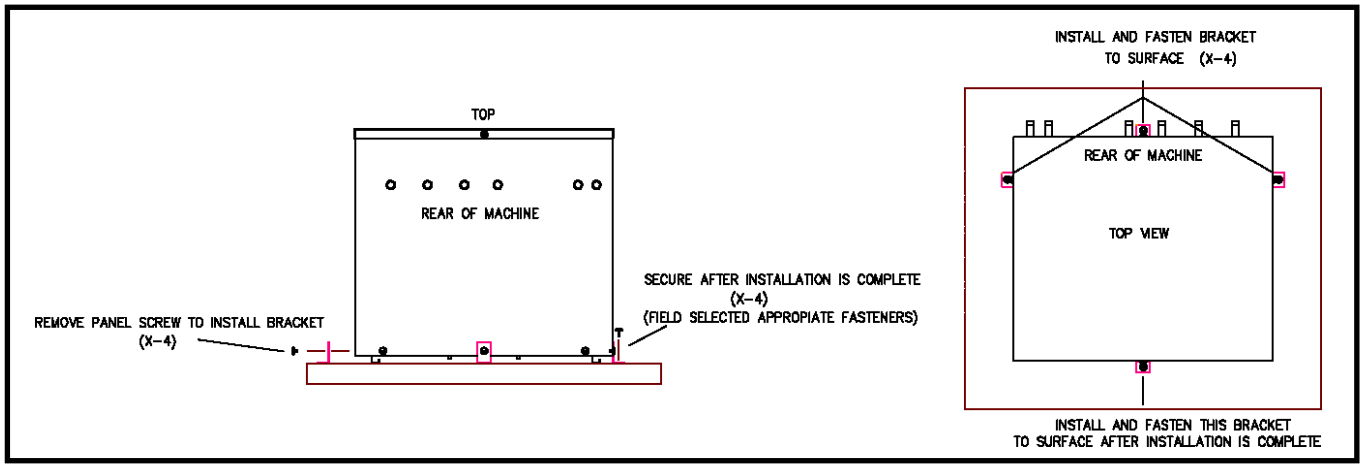


Figure 3. Compressor Unit Bracket Installation

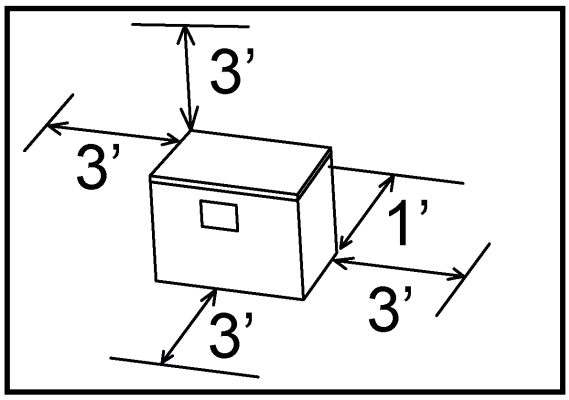


Figure 4. Compressor Unit Clearance

B. Connections, Dimensions, Piping and Electrical Data

Electrical data for all compressor units is detailed in Figure 5.

Model	Voltage/Phase/Hz	Voltage		LRA	RLA	MCA	MFS
		Min.	Max.				
-018-1A/1B	230/208-1-60	187	253	45.0	9.6	12.0	20
-024-1A/1B	230/208-1-60	187	253	63.0	12.2	15.0	25
-024-2A/2B	230/208-3-60	187	253	55.0	8.6	11.0	20
-024-3A/3B	460-3-60	414	506	27.0	4.3	5.0	10
-030-1A/1B	230/208-1-60	187	253	73.0	13.5	17.0	25
-030-2A/2B	230/208-3-60	187	253	63.0	10.7	13.0	20
-030-3A/3B	460-3-60	414	506	31.0	5.0	6.0	10
-030-6A/6B	575-3-60	518	632	24.0	4.3	5.0	10
-036-1A/1B	230/208-1-60	187	253	95.0	16.5	20.0	30

-036-2A/2B	230/208-3-60	187	253	77.0	10.3	13.0	20
-036-3A/3B	460-3-60	414	506	39.0	5.7	7.0	10
-036-6A/6B	575-3-60	518	632	31.0	4.2	5.0	10
-042-1A/1B	230/208-1-60	187	253	109.0	18.3	23.0	35
-042-2A/2B	230/208-3-60	187	253	88.0	13.9	17.0	25
-042-3A/3B	460-3-60	414	506	44.0	7.1	9.0	15
-042-6A/6B	575-3-60	518	632	34.0	5.4	7.0	10
-048-1A/1B	230/208-1-60	187	253	137.0	19.9	24.0	35
-048-2A/2B	230/208-3-60	187	253	91.0	14.7	18.0	30
-048-3A/3B	460-3-60	414	506	50.0	7.1	9.0	15
-048-6A/6B	575-3-60	518	632	37.5	5.3	7.0	10
-060-1A/1B	230/208-1-60	187	253	176.0	28.8	35.0	50
-060-2A/2B	230/208-3-60	187	253	128.0	18.6	23.0	35
-060-3A/3B	460-3-60	414	506	63.0	9.0	11.0	15
-060-6A/6B	575-3-60	518	632	50.0	7.1	9.0	15
-072-1A/1B	230/208-1-60	187	253	176.0	28.8	35.0	50
-072-2A/2B	230/208-3-60	187	253	156.0	18.6	23.0	35
-072-3A/3B	460-3-60	414	506	75.0	9.0	11.0	15
-072-6A/6B	575-3-60	518	632	54.0	7.4	9.0	15

LRA = Locked Rotor Amps
Size RLA = Rated Load Amps
MCA = Maximum Circuit Ampacity
MFS = Maximum Fuse or HACR Circuit Breaker (External)
AWG = Consult NEC and Local Codes

Figure 5. Compressor Unit Electrical Data

IMPORTANT

REFRIGERANT PIPING CONNECTIONS

Refrigerant piping joints and connections in the EarthLinked heating and cooling system, including the DIRECT AXXESS® earth loop system, are to be brazed with 15% silver content brazing alloy, utilizing the **NITROGREN BRAZING TECHNIQUE.**

IMPORTANT

NITROGEN BRAZING PROCESS

Purpose
Utilize on all brazed refrigerant piping connections. This process eliminates oxidation products from inside joint surfaces**.**

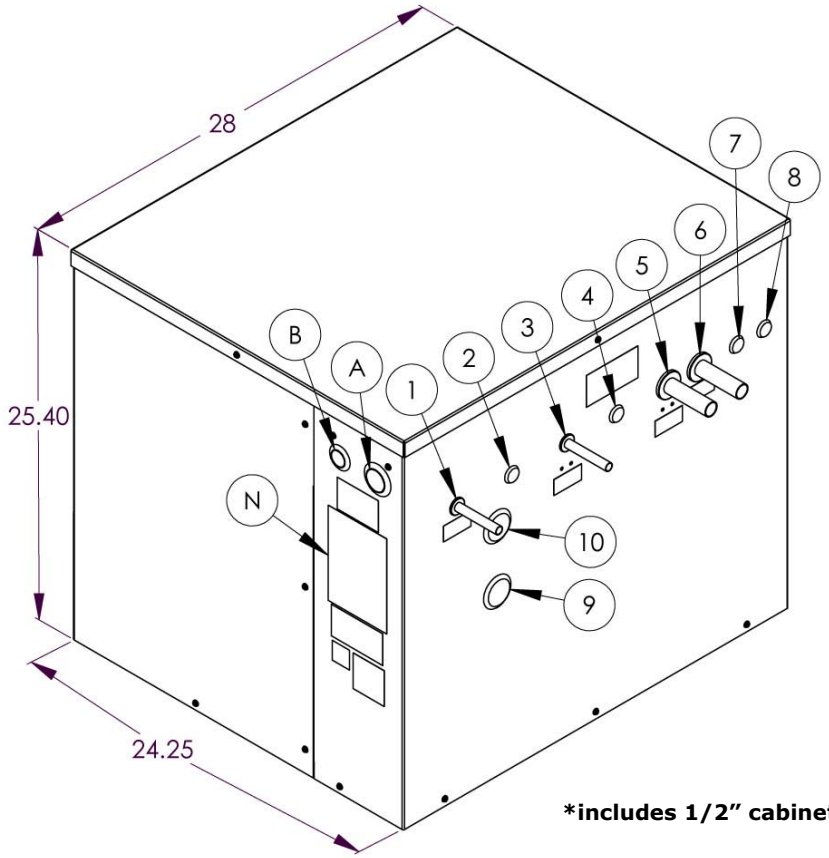
Technique
"Trickle" nitrogen gas at 1-2 psi pressure through the joint area being brazed to displace the oxygen. When oxygen has been displaced the flow of nitrogen can be terminated.

Consequences
Failure to displace oxygen with nitrogen at the brazed joint will result in particulate matter being released into the system. The result is discoloration of refrigerant oil, contamination of the system and possible system failure.

Specific information **FOR EACH COMPRESSOR SERIES** follows. It is comprised of:

1. Compressor cabinet dimensions, port identification, and connection types and sizes.
2. Compressor unit internal flow schematics and piping illustrations.
3. Compressor series application options and system piping guidelines. **INCLUDES LISTING OF FIELD SUPPLIED EQUIPMENT**.
4. Electrical ladder diagrams, schematics and field wiring diagrams for 230-1-60 power supply.
5. Same as item 4 for 230-3-60, 460-3-60 and 575-3-60 power supplies in **Appendix B**.

Compressor unit page numbers are as follows:



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	AH/CC/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
2	Plugged	--	--	--	--	--	--	--	--	--
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	AH/CC/HWM Vapor	MSWT	3/4	3/4	3/4	3/4	7/8	7/8	7/8	7/8
7	Plugged	--	--	--	--	--	--	--	--	--
8	Plugged	--	--	--	--	--	--	--	--	--
9	Plugged	--	--	--	--	--	--	--	--	--
10	Plugged	--	--	--	--	--	--	--	--	--

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 6. SC Connections

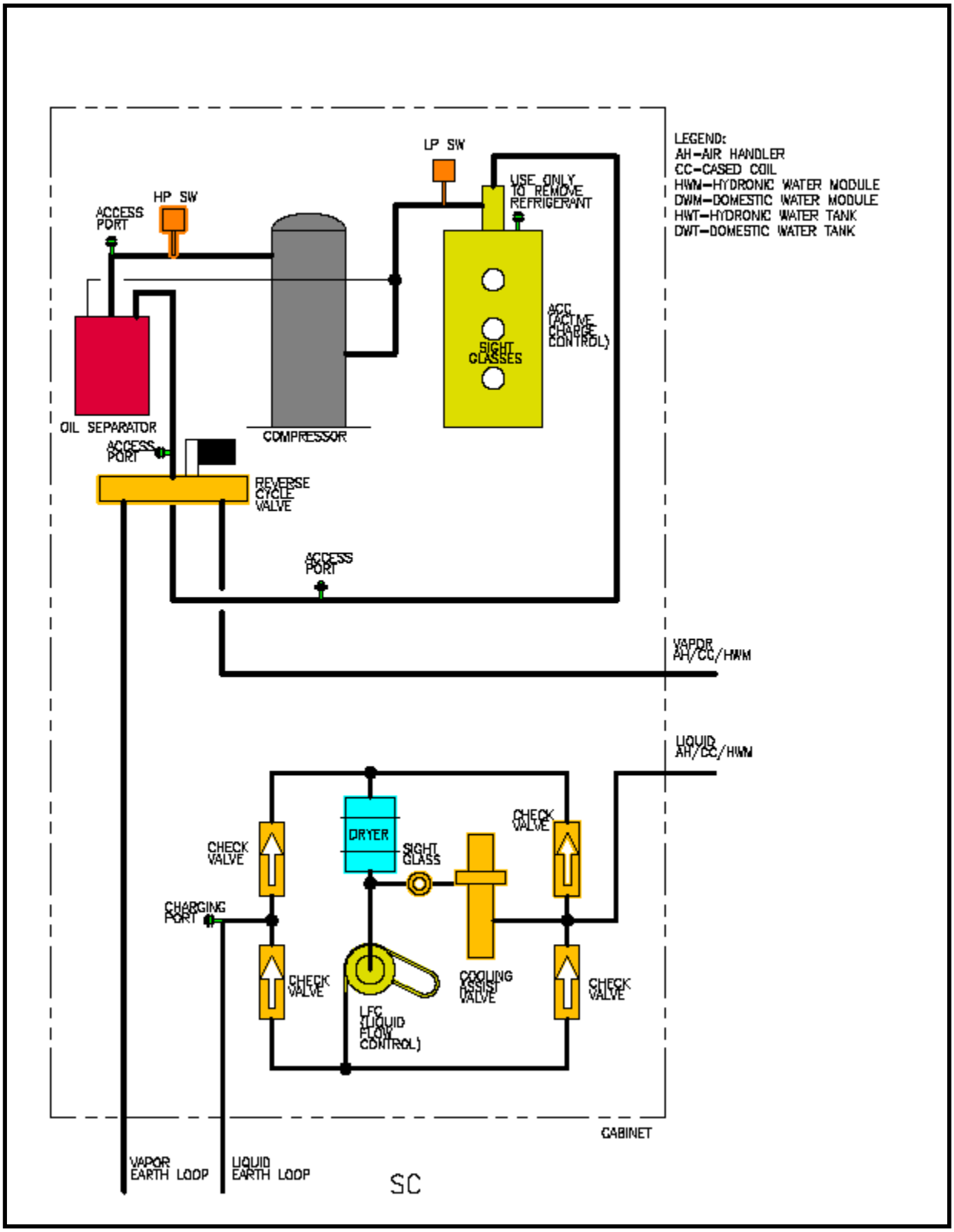


Figure 7a. SC Internal Flow Schematic

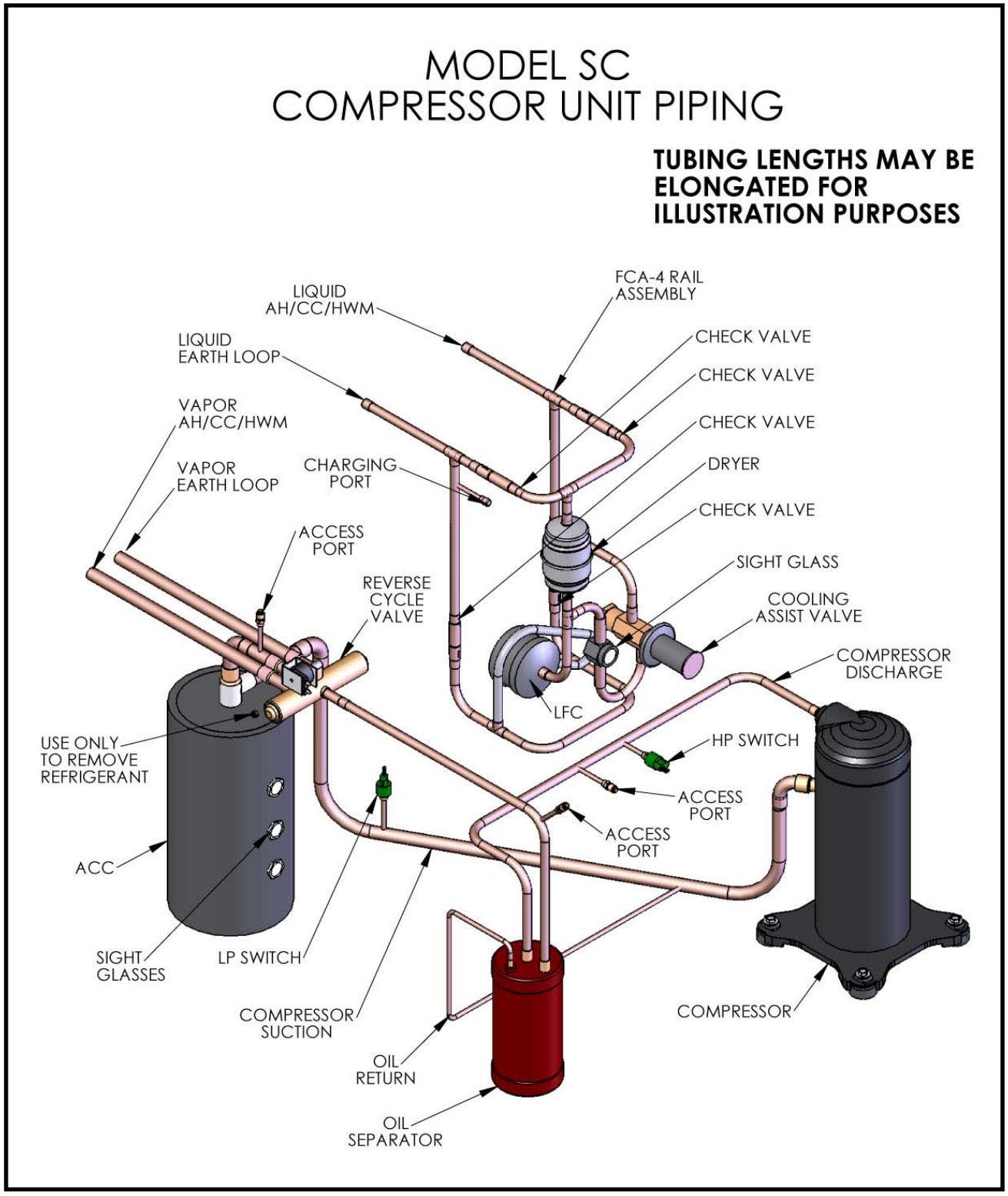
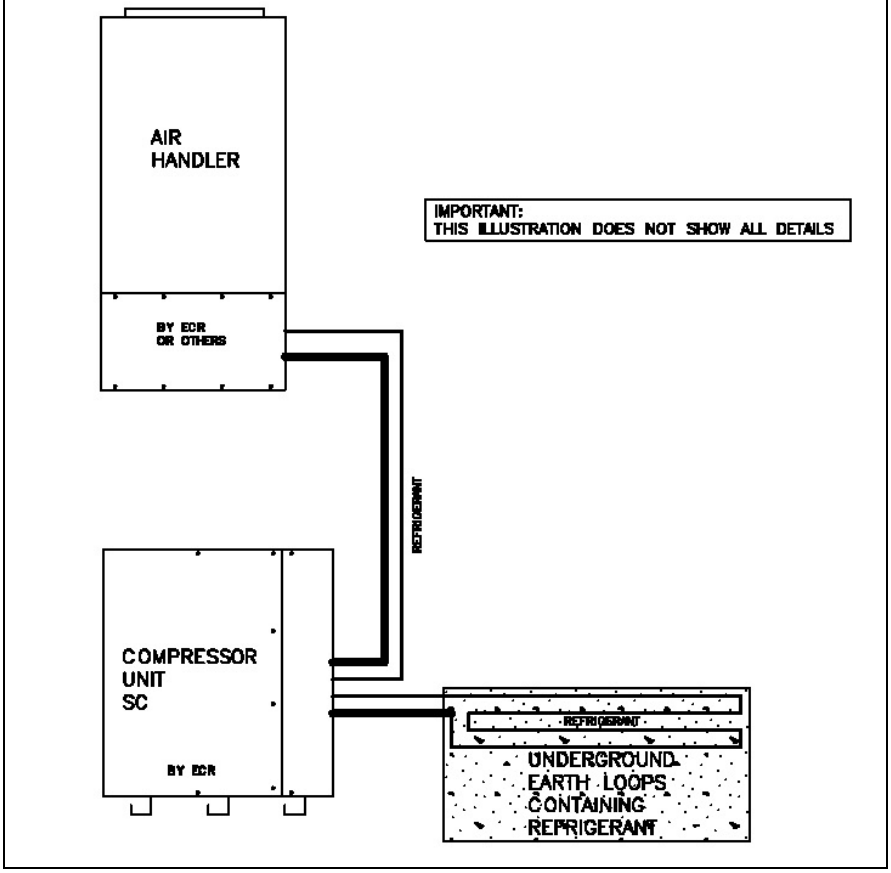


Figure 7b. SC Piping



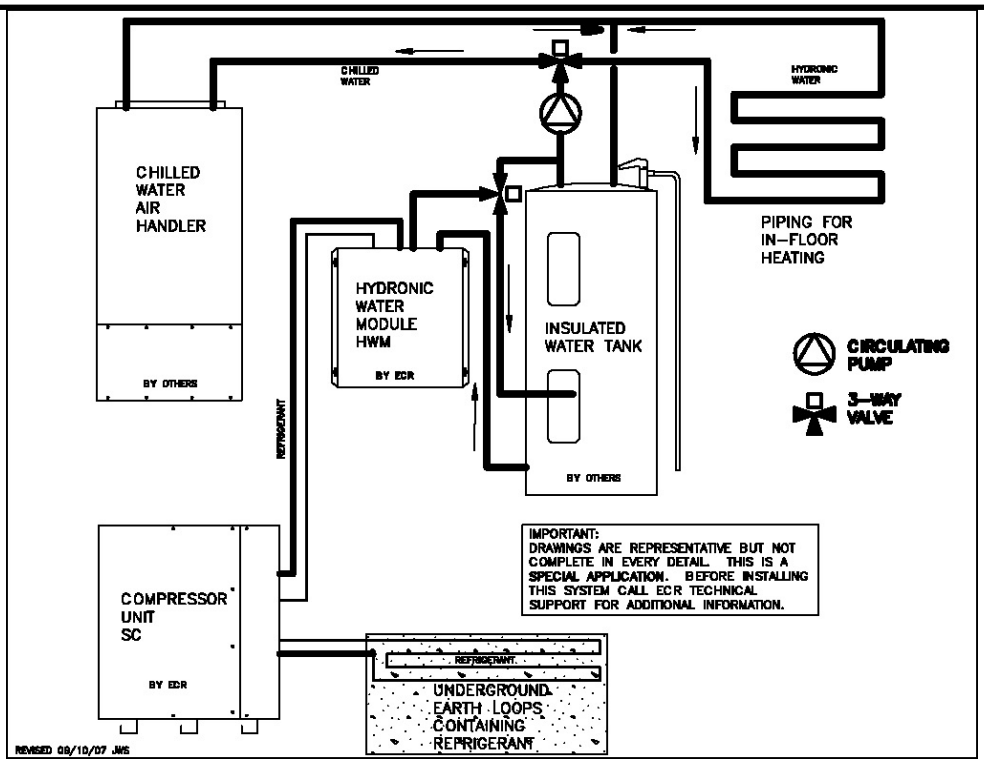
FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 6, 8a; section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 6, 8a; Spec Guide Figure 40
6.	Condensate pan,vibration pads	Spec Guide section 3A5
7.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 8a. SC Air Heating and Cooling

IMPORTANT

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°F

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figure 6, 8b and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to HWM)	Spec Guide Figure 51
5.	Pipe insulation (refrigerant)	Figures 6, 8b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Freeze protection switch	Spec Guide Figure 48a
8.	Three-way Johnson Model JT3 electric zone valve	Spec Guide Figure 58 and section 3E4b
9.	Hydronic heating remote bulb temperature controller – Johnson model A19ABC-4C	Spec Guide section 3E4a
10.	Chilled water temperature controller – Johnson model A19AAC-4C	Spec Guide section 3E4b
11.	Primary circuit water pipe and insulation	Spec Guide Figures 46, 48a, 52
12.	Chilled water air handler	Spec Guide section 3D
13.	Water storage tank	Spec Guide section 3E2
14.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 8b. SC Radiant Panel Hydronic Heating and Air (Chilled Water) Cooling

IMPORTANT
FOR HYDRONIC HEATING APPLICATIONS

(1) Requires field-installed pump wire kit PW1-1872 for 230/208-1-60 and 230/208-3-60 power supply.
(2) Requires field-installed pump wire kit PW2-1872 for 460-3-60 and 575-3-60 power supply.

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°
Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.

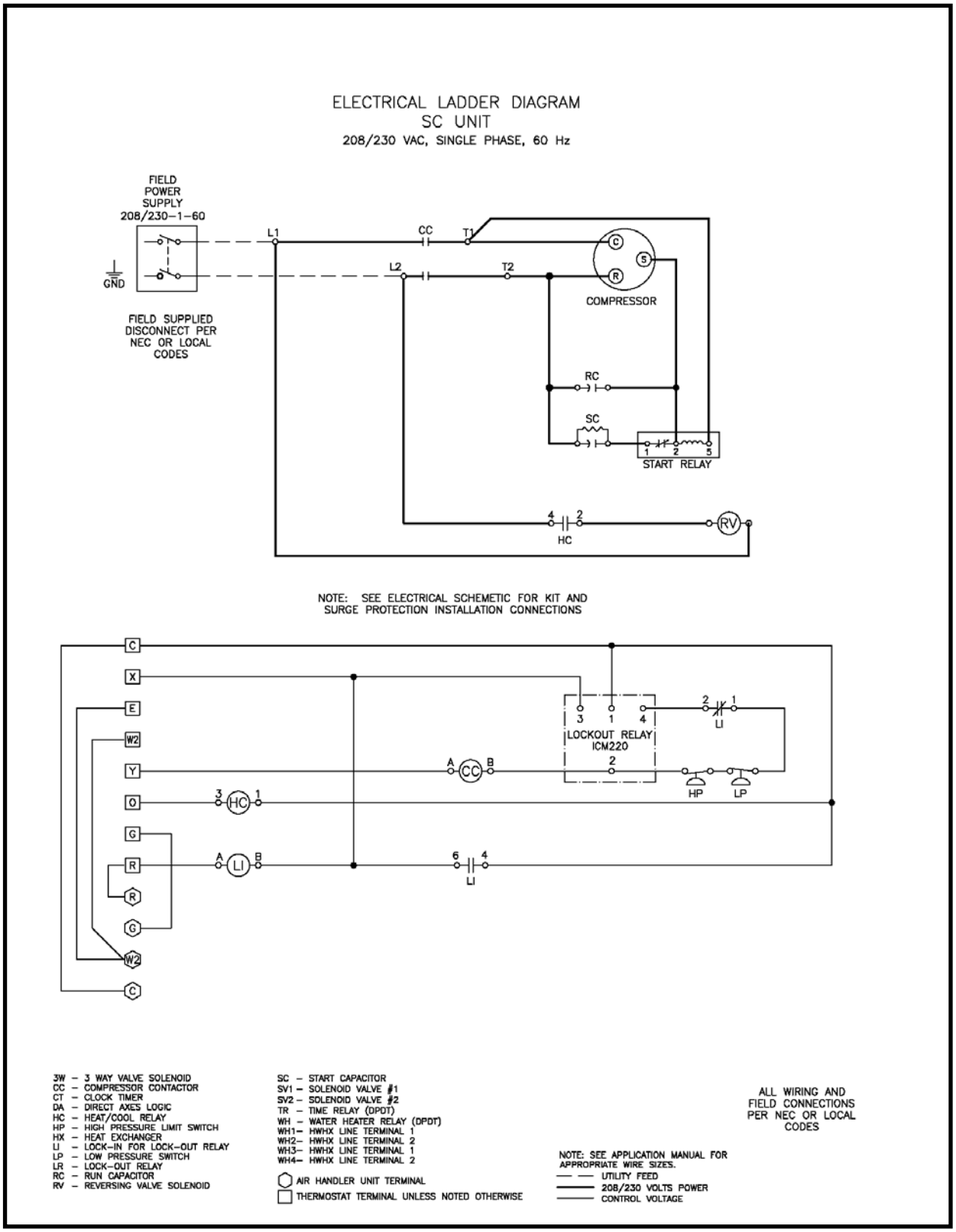


Figure 9. SC Electrical Ladder Diagram (230-1-60)

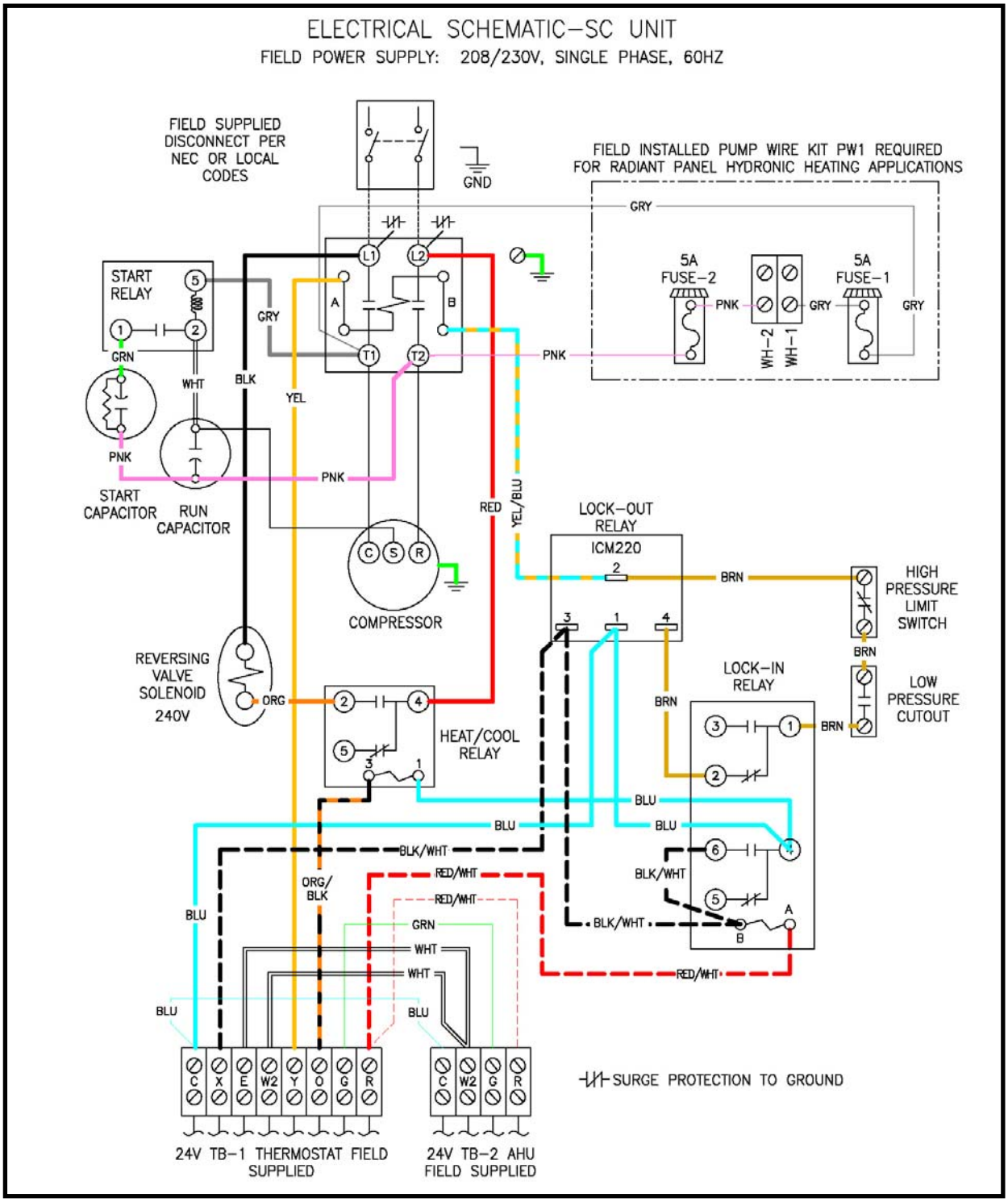


Figure 10a. SC Electrical Schematic (230-1-60)

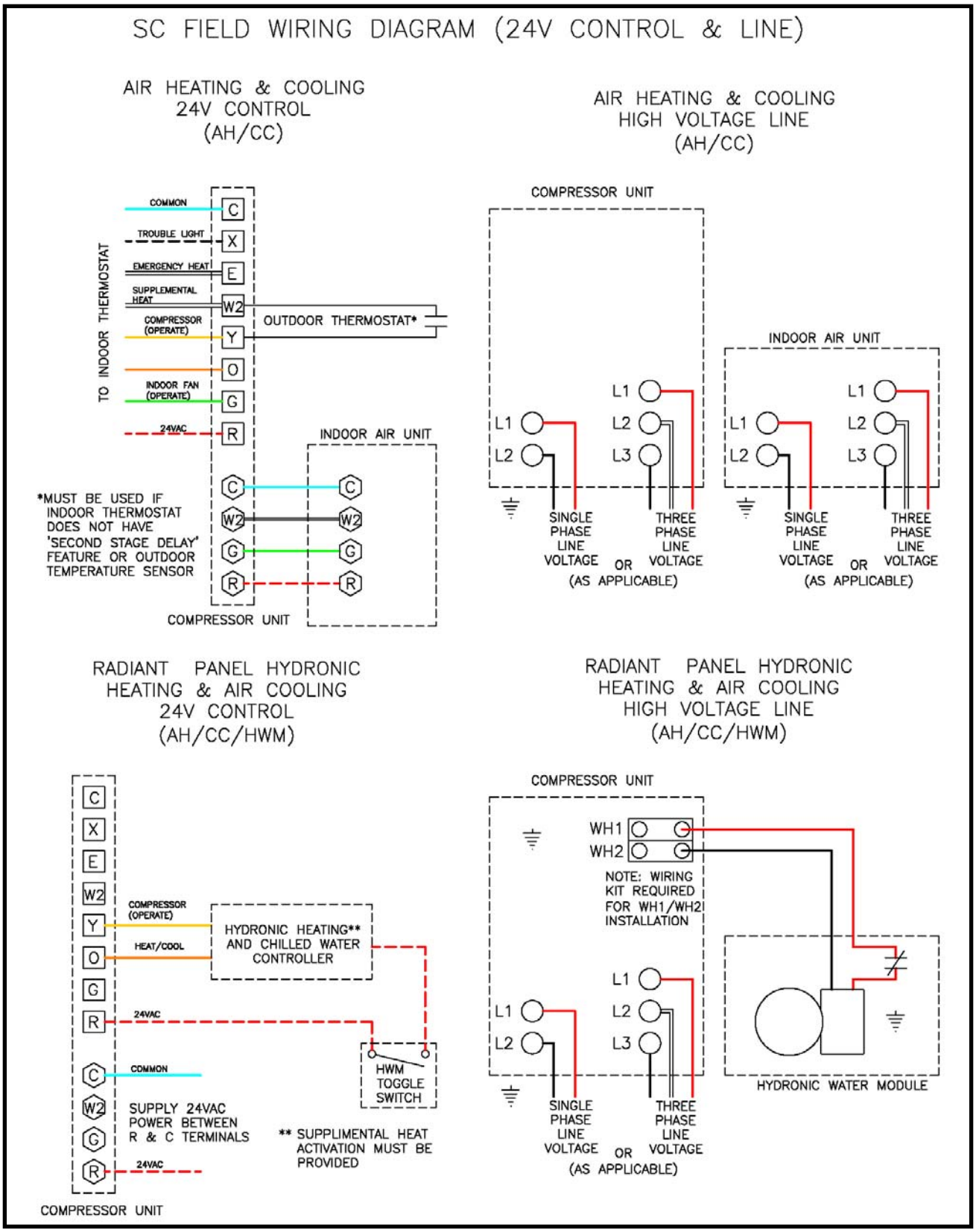
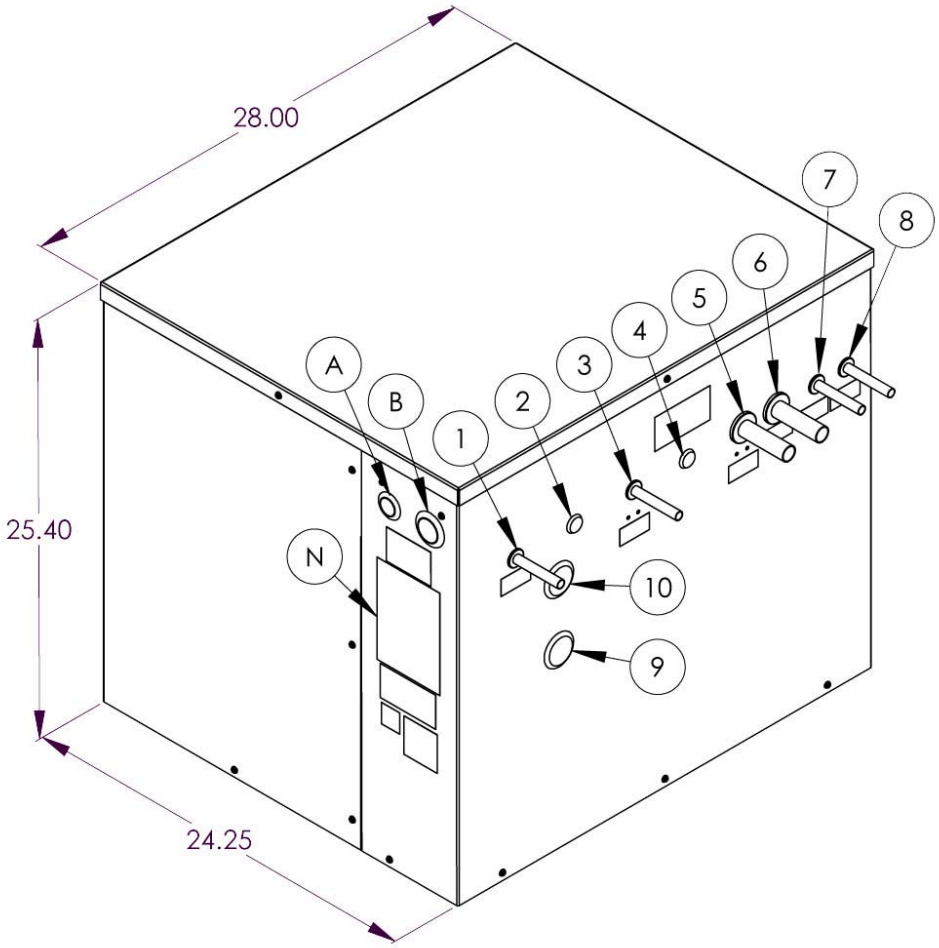


Figure 10b. SC Field Wiring Diagram



PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	AH/CC/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
2	Plugged	--	--	--	--	--	--	--	--	--
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	AH/CC/HWM Vapor	MSWT, OD	3/4	3/4	3/4	3/4	7/8	7/8	7/8	7/8
7	DWT Supply	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
8	DWT Return	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
9	Plugged	--	--	--	--	--	--	--	--	--
10	Plugged	--	--	--	--	--	--	--	--	--

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 11. SD Connections

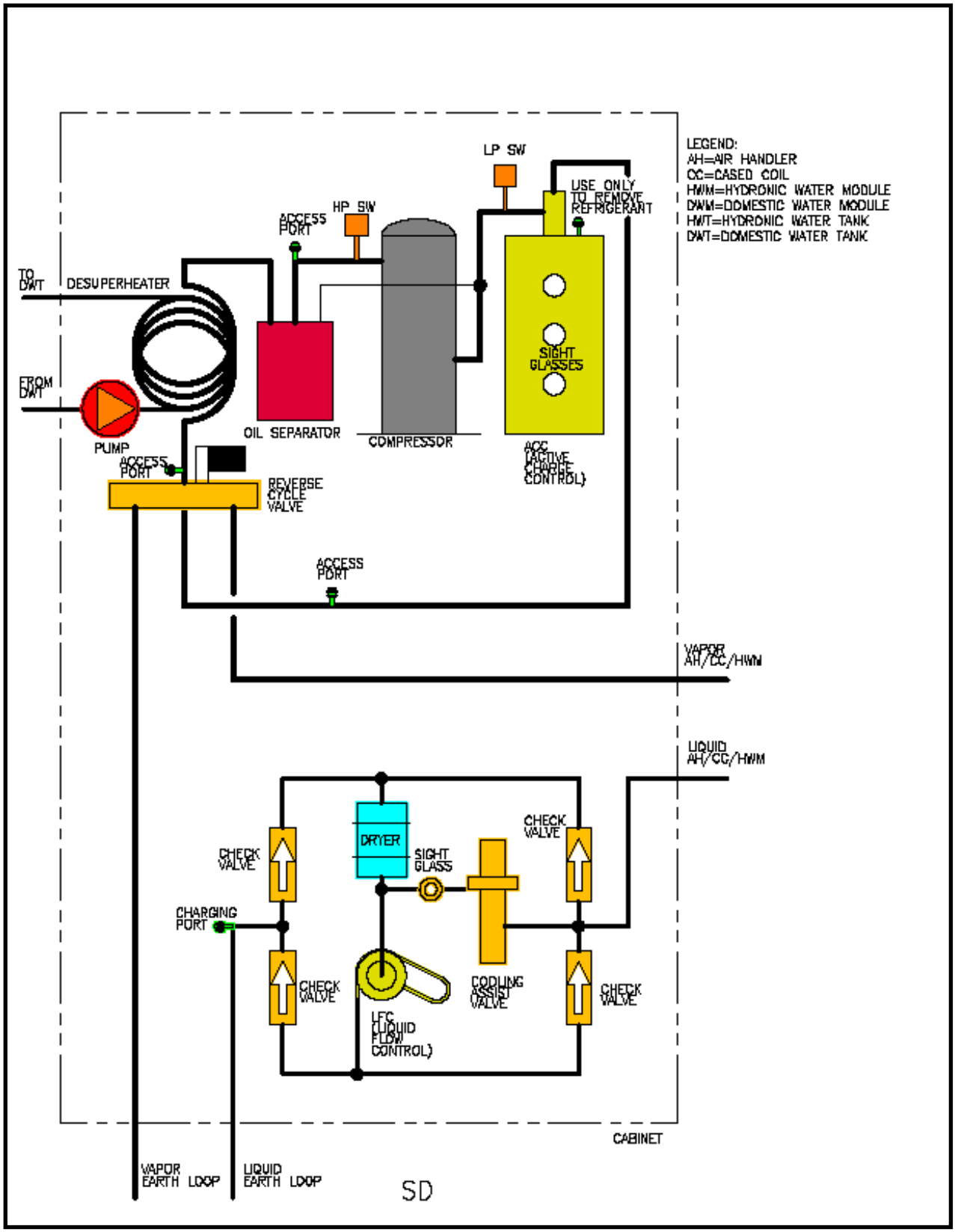


Figure 12a. SD Internal Flow Schematic

MODEL SD
COMPRESSOR UNIT PIPING

TUBING LENGTHS MAY BE ELONGATED FOR ILLUSTRATION PURPOSES

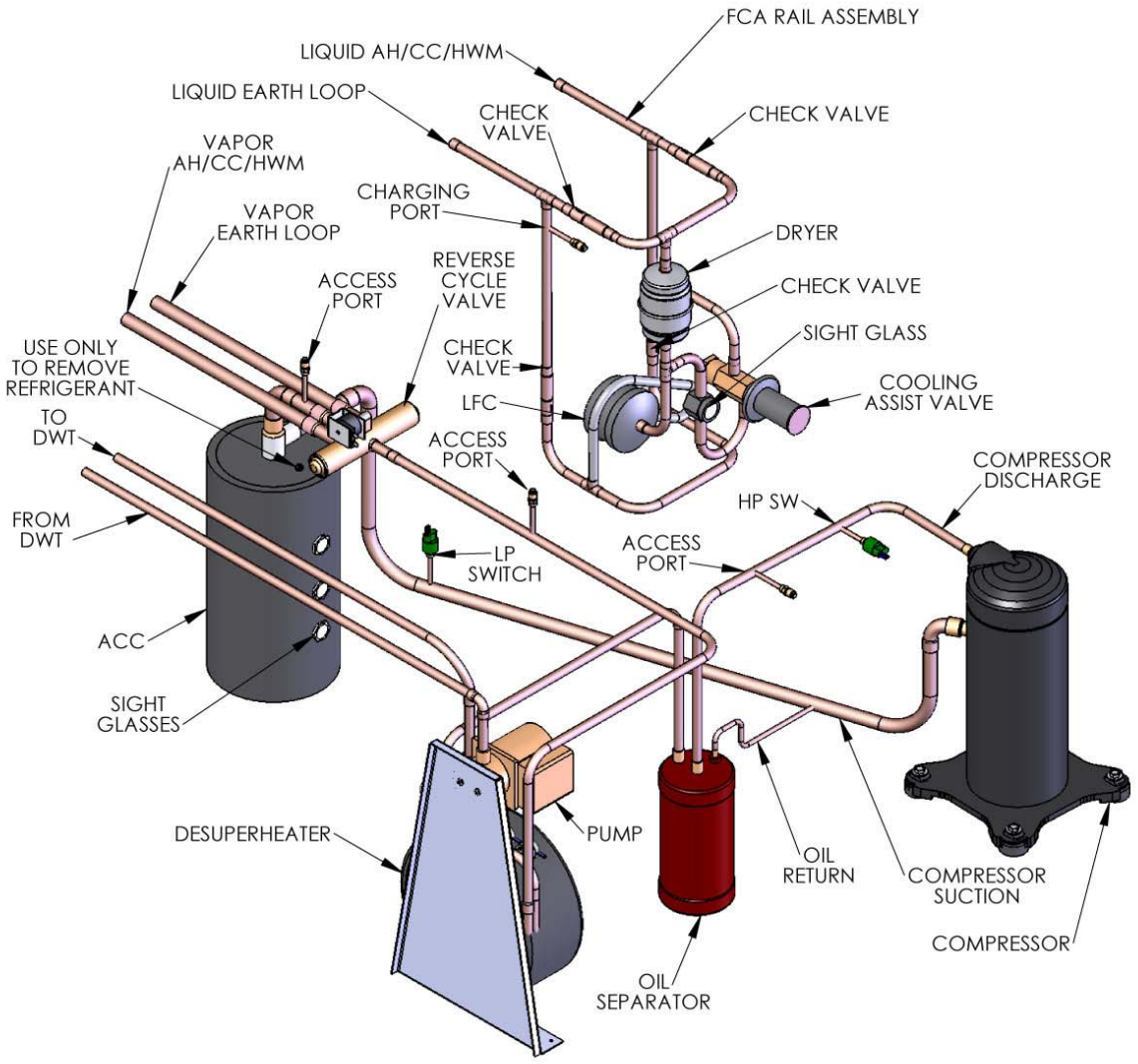
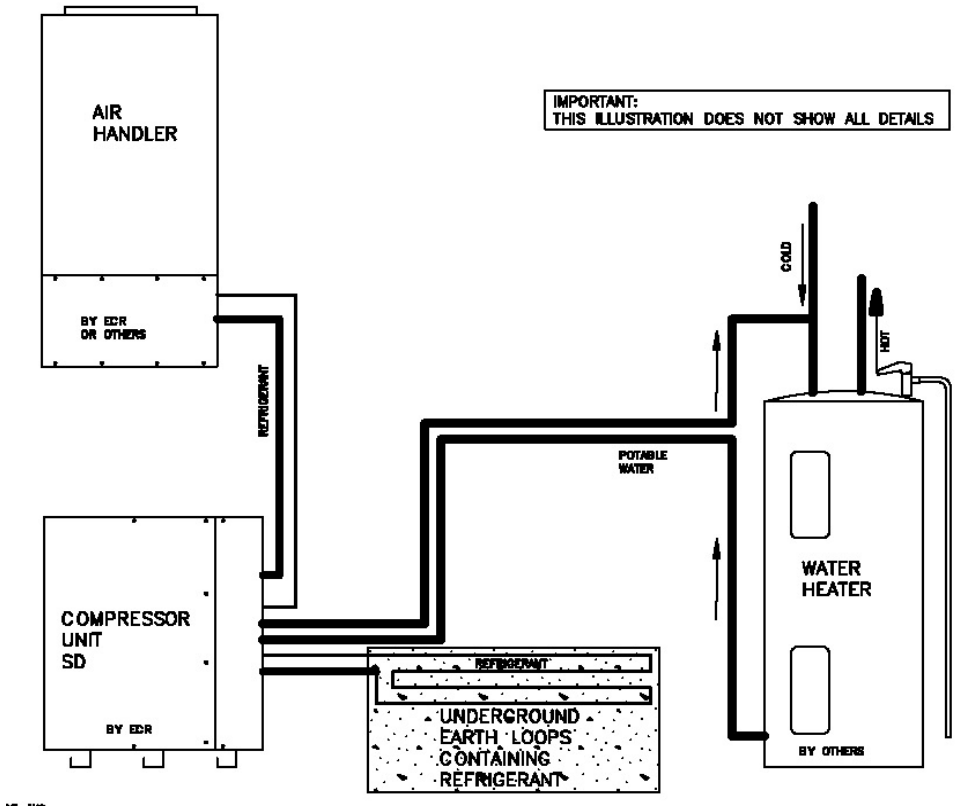


Figure 12b. SD Piping



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 11, 13a; section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 11, 13a; Spec Guide Figure 40
6.	Condensate pan,vibration pads	Spec Guide section 3A5
7.	Water piping, insulation and fittings	Spec Guide section 3F1 and Figure 62
8.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 13a. SD Air Heating and Cooling, Domestic Hot Water by Desuperheater

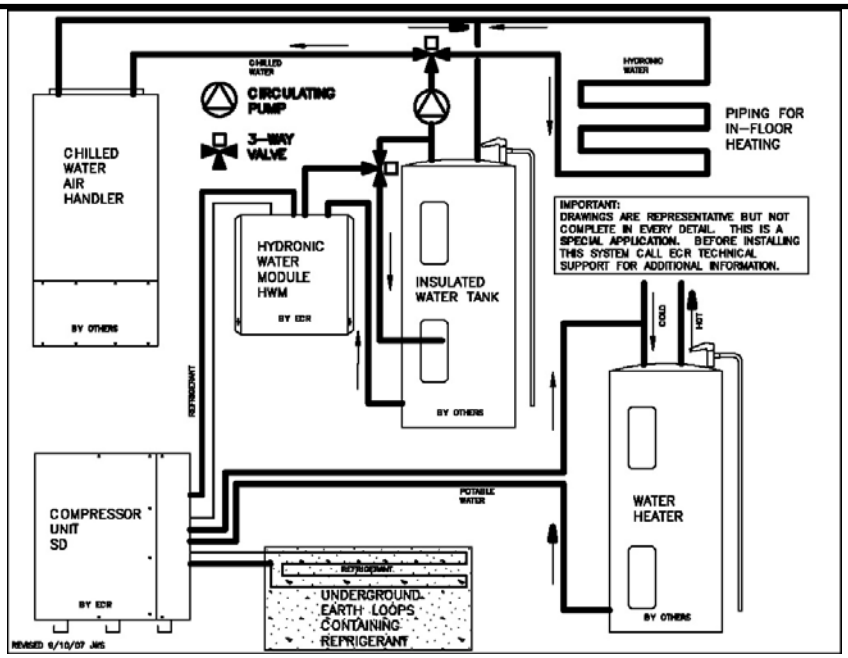
CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

IMPORTANT

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°F

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 11, 13b and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to HWM)	Spec Guide Figure 51
5.	Pipe insulation (refrigerant)	Figures 11, 13b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Freeze protection switch	Spec Guide Figure 48a
8.	Three-way Johnson Model JT3 electric zone valve	Spec Guide Figure 58 and section 3E4b
9.	Hydronic heating remote bulb temperature controller – Johnson model A19ABC-4C	Spec Guide section 3E4a
10.	Chilled water temperature controller – Johnson model A19AAC-4C	Spec Guide section 3E4b
11.	Primary circuit water pipe and insulation	Spec Guide Figures 46, 48a, 52
12.	Chilled water air handler	Spec Guide section 3D
13.	Compressor unit to water heater water piping, insulation and fittings	Spec Guide section 3F1 and Figure 62
14.	Water storage tank	Spec Guide section 3E2
15.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 13b. SD Radiant Panel Hydronic Heating and Air (Chilled Water) Cooling, Domestic Hot Water by Desuperheater

IMPORTANT

FOR HYDRONIC HEATING APPLICATIONS

(1) Require field-installed pump wire kit PW1-1872 for 230/208-1-60 and 230/208-3-60 power supply.
(2) Requires field-installed pump wire kit PW2-1872 for 460-3-60 and 575-3-60 power supply.

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.

CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

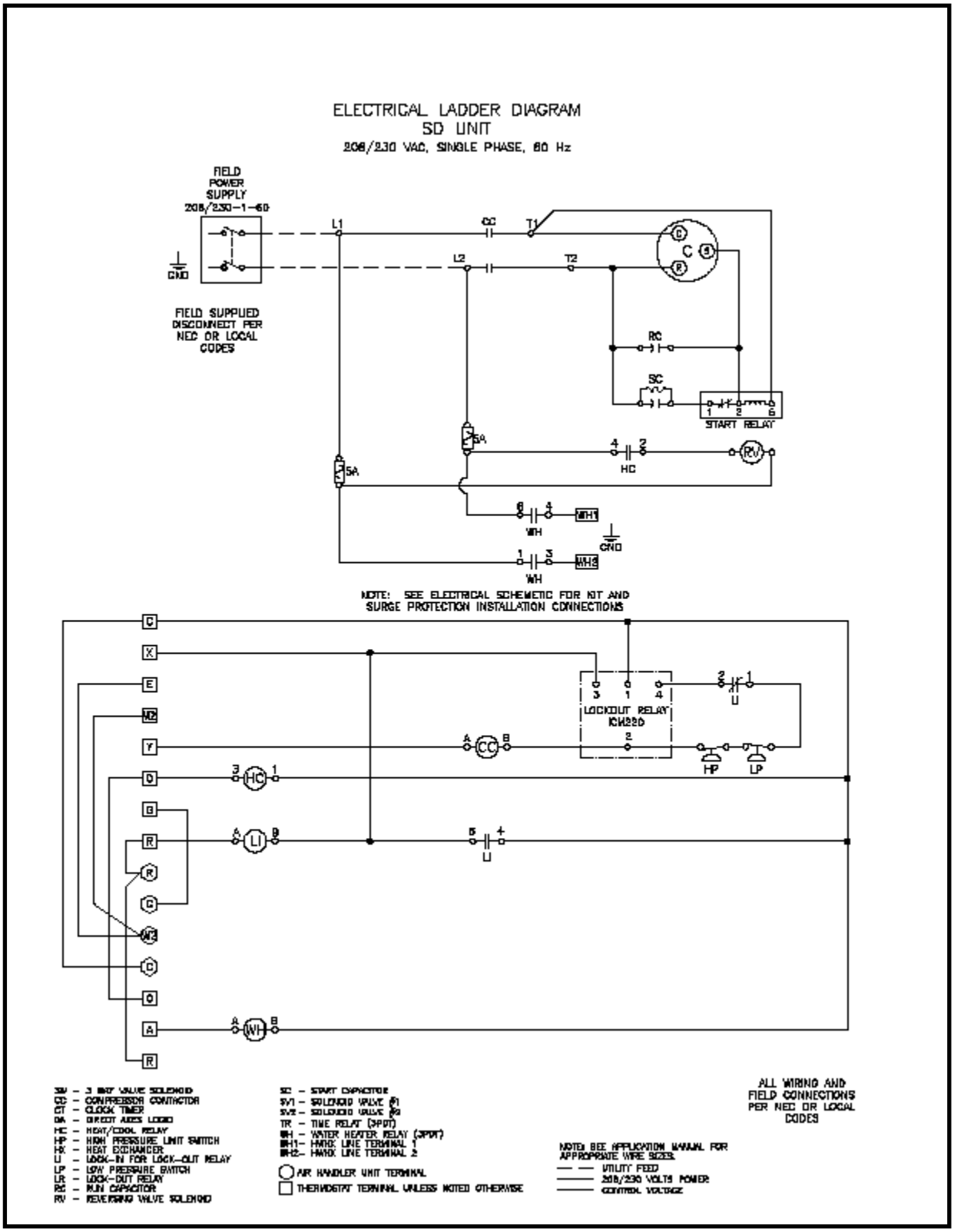


Figure 14. SD Electrical Ladder Diagram (230-1-60)

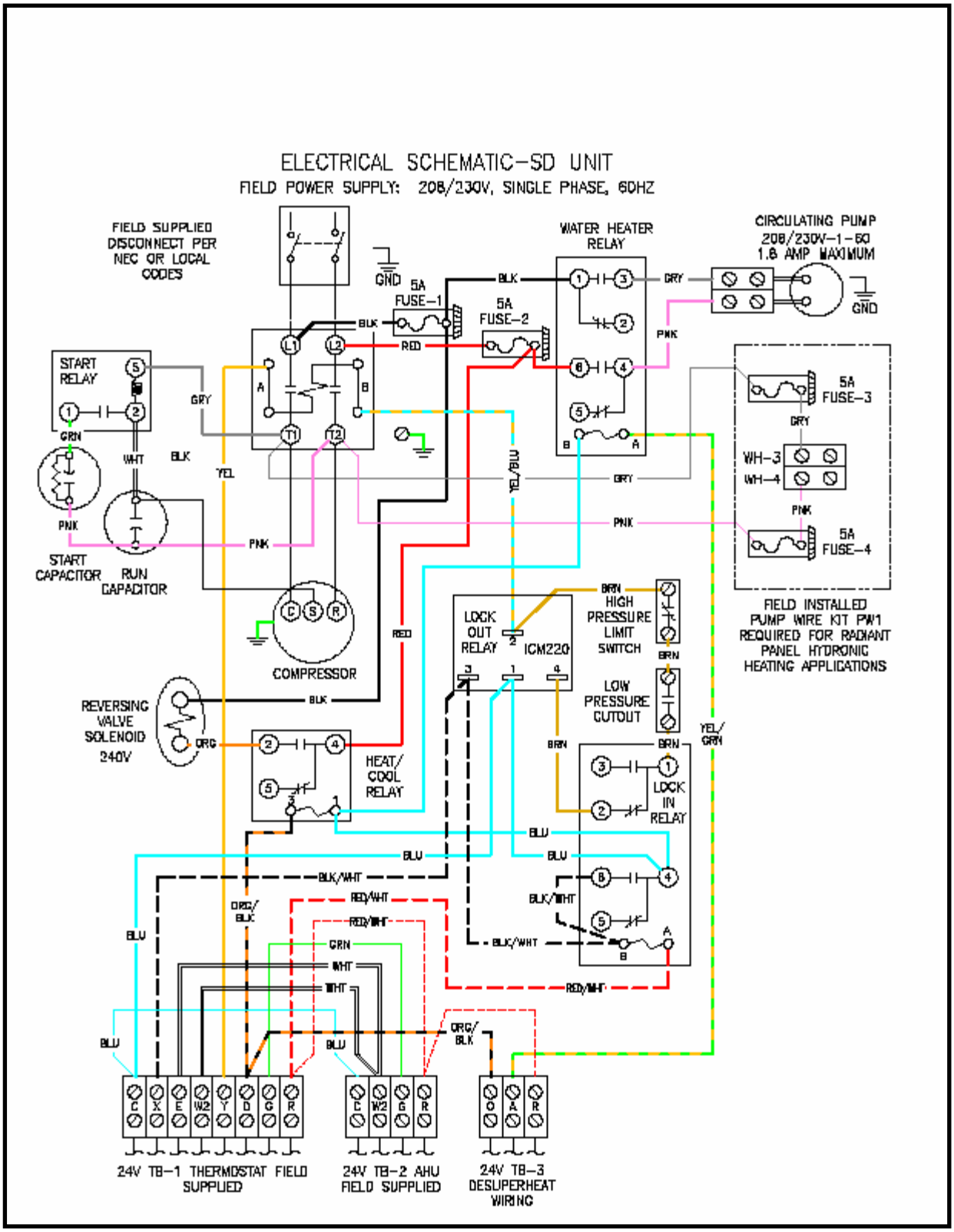


Figure 15a. SD Electrical Schematic (230-1-60)

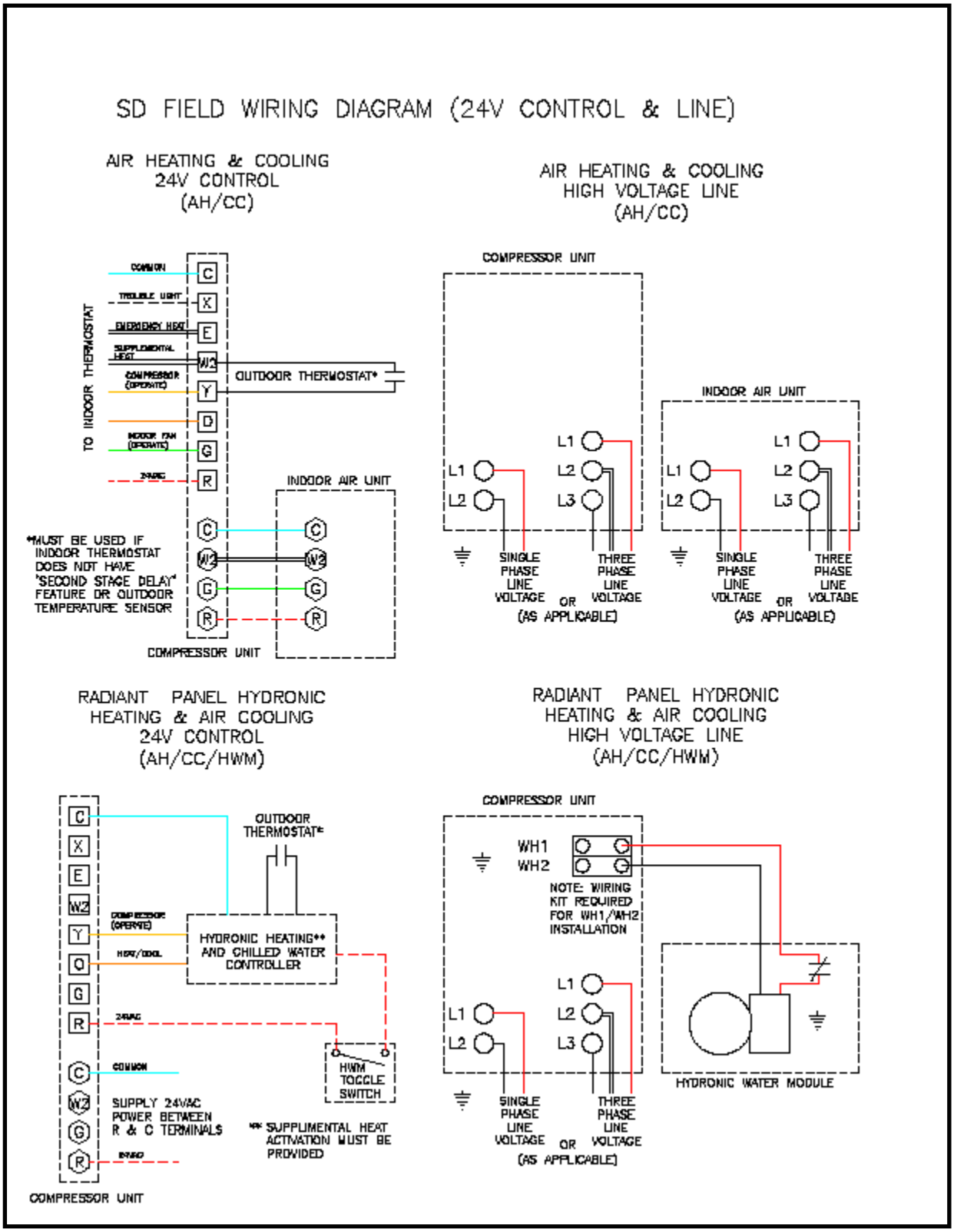
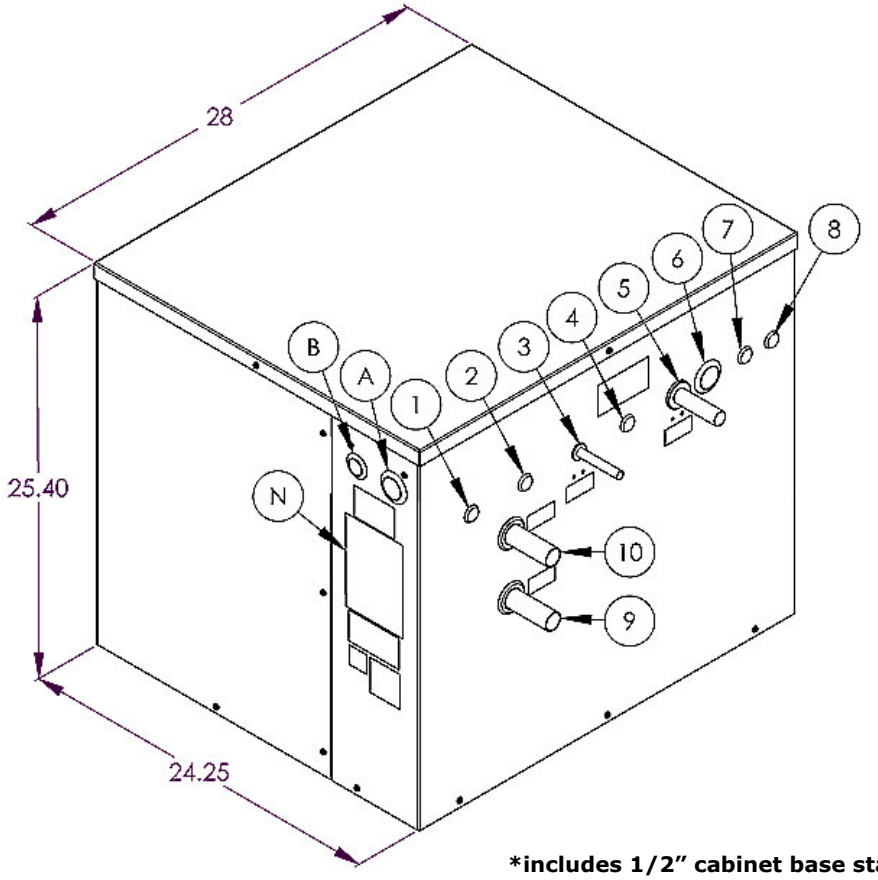


Figure 15b. SD Field Wiring Diagram



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	Plugged	--	--	--	--	--	--	--	--	--
2	Plugged	--	--	--	--	--	--	--	--	--
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	Plugged	--	--	--	--	--	--	--	--	--
7	Plugged	--	--	--	--	--	--	--	--	--
8	Plugged	--	--	--	--	--	--	--	--	--
9	HWT Return	MSWT, OD	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8
10	HWT Supply	MSWT, OD	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 16. SCW Connections

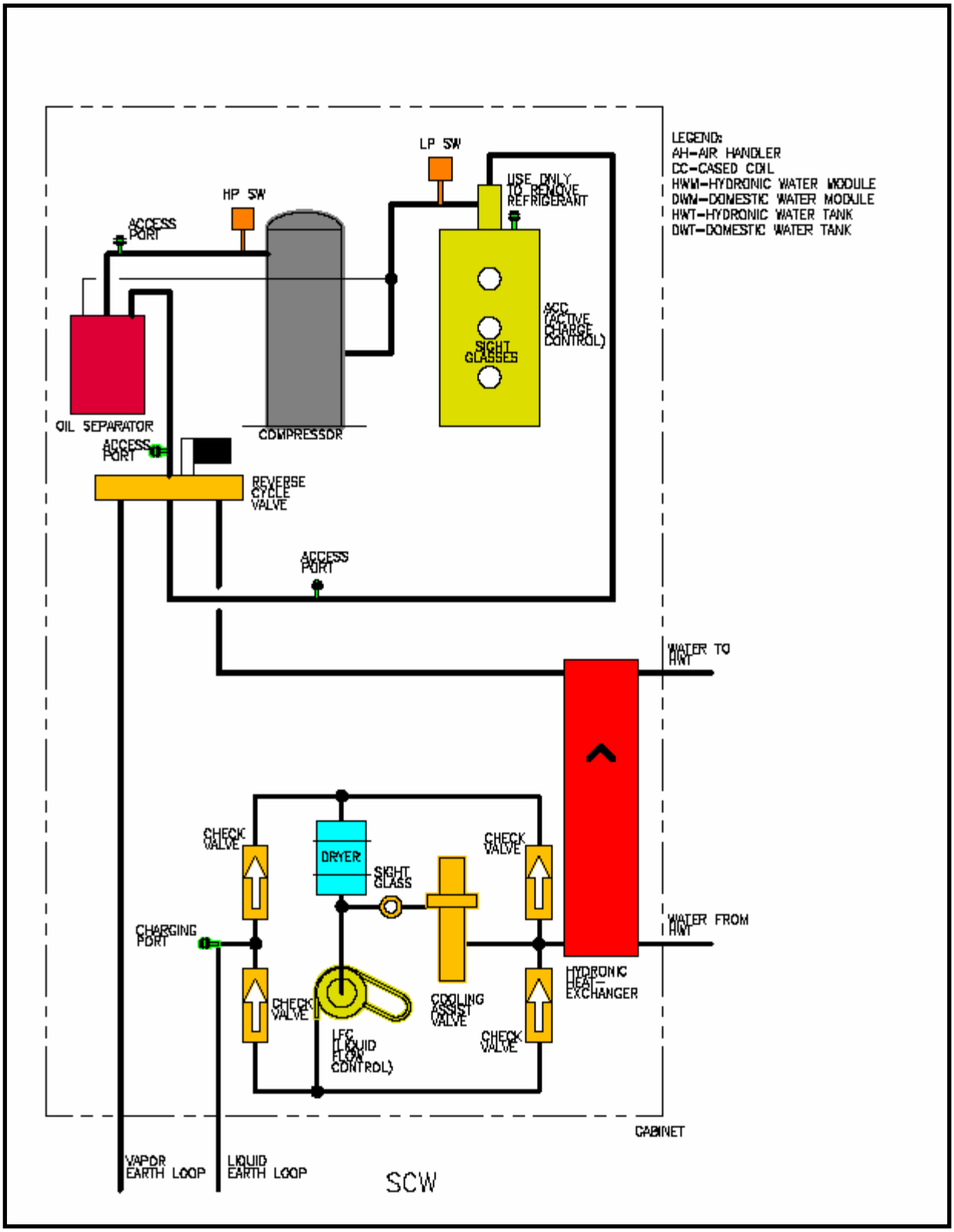


Figure 17a. SCW Internal Flow Schematic

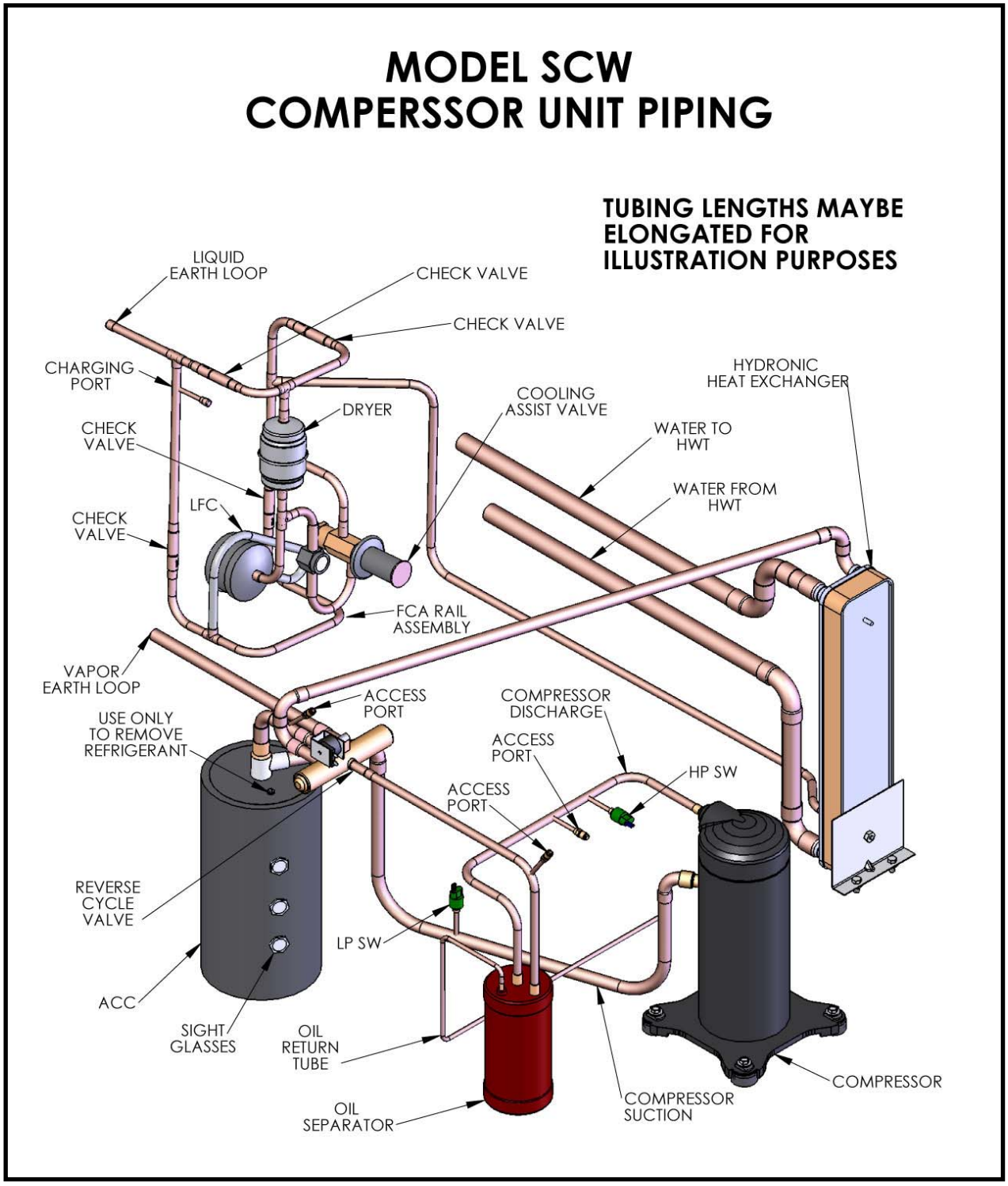
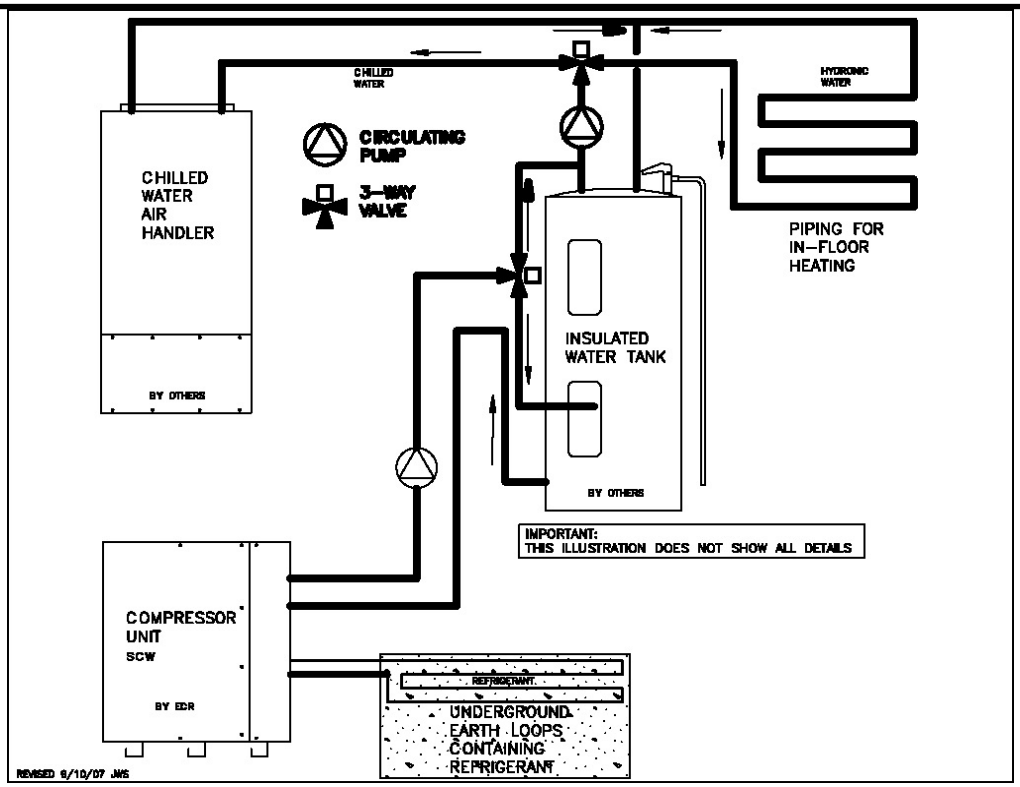


Figure 17b. SCW Piping



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 16, 18 and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Condensate pan, vibration pads	Spec Guide section 3A5
5.	Freeze protection switch	Spec Guide Figure 48b
6.	Three-way Johnson Model JT3 electric zone valve	Spec Guide Figure 58 and section 3E4b
7.	Hydronic heating remote bulb temperature controller – Johnson model A19ABC-4C	Spec Guide section 3E4a
8.	Chilled water temperature controller – Johnson model A19AAC-4C	Spec Guide section 3E4b
9.	Primary circuit water pipe and insulation	Spec Guide Figures 46, 48a, 52
10.	Chilled water air handler	Spec Guide section 3D
11.	Primary circuit water pipe and insulation	Spec Guide section 3E3
12.	Water storage tank	Spec Guide section 3E2
13.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 18. SCW Radiant Panel Hydronic Heating and Air (Chilled Water) Cooling

IMPORTANT

FOR HYDRONIC HEATING APPLICATIONS

(1) Require field-installed pump wire kit PW1-1872 for 230/208-1-60 and 230/208-3-60 power supply.
(2) Requires field-installed pump wire kit PW2-1872 for 460-3-60 and 575-3-60 power supply.

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.

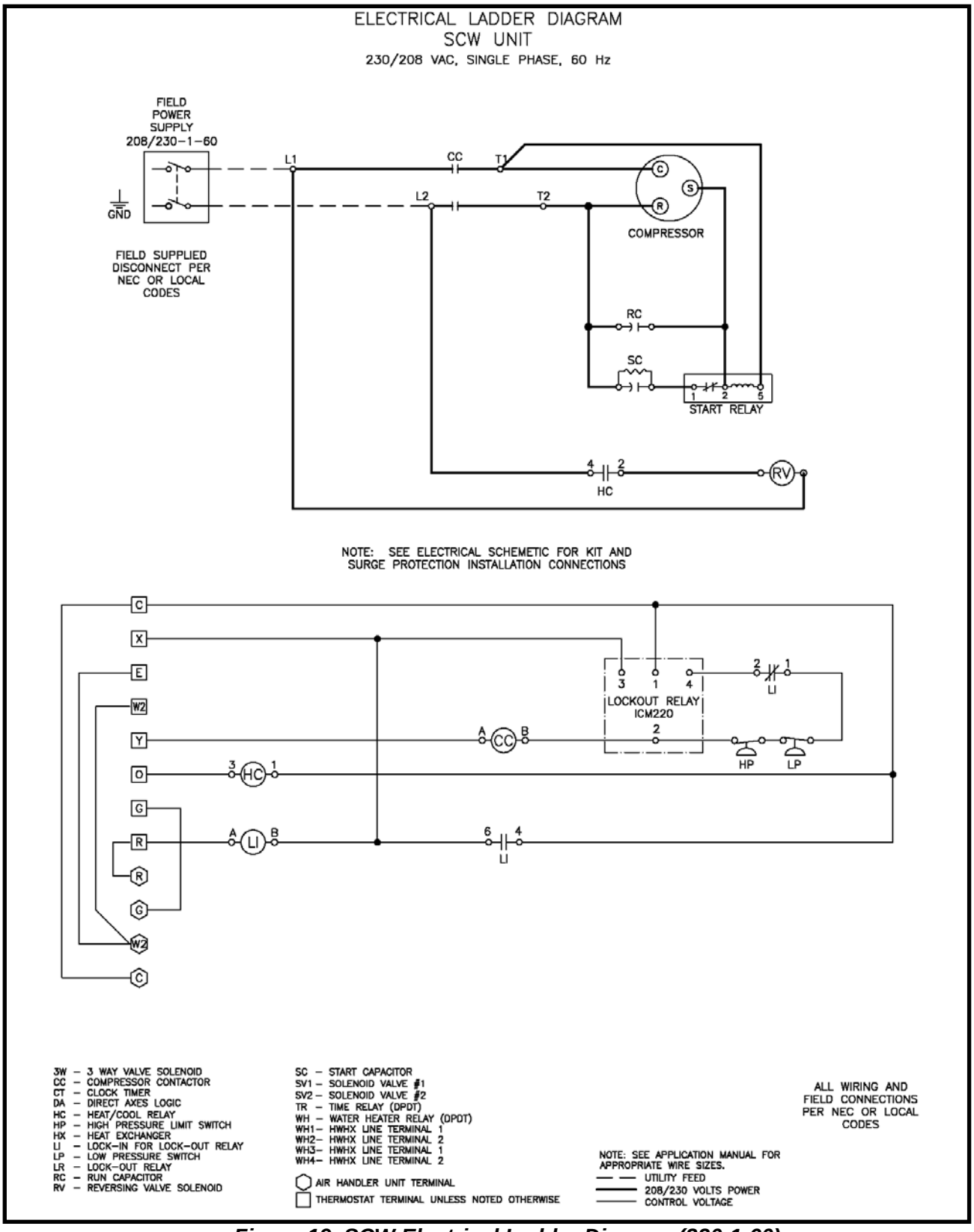


Figure 19. SCW Electrical Ladder Diagram (230-1-60)

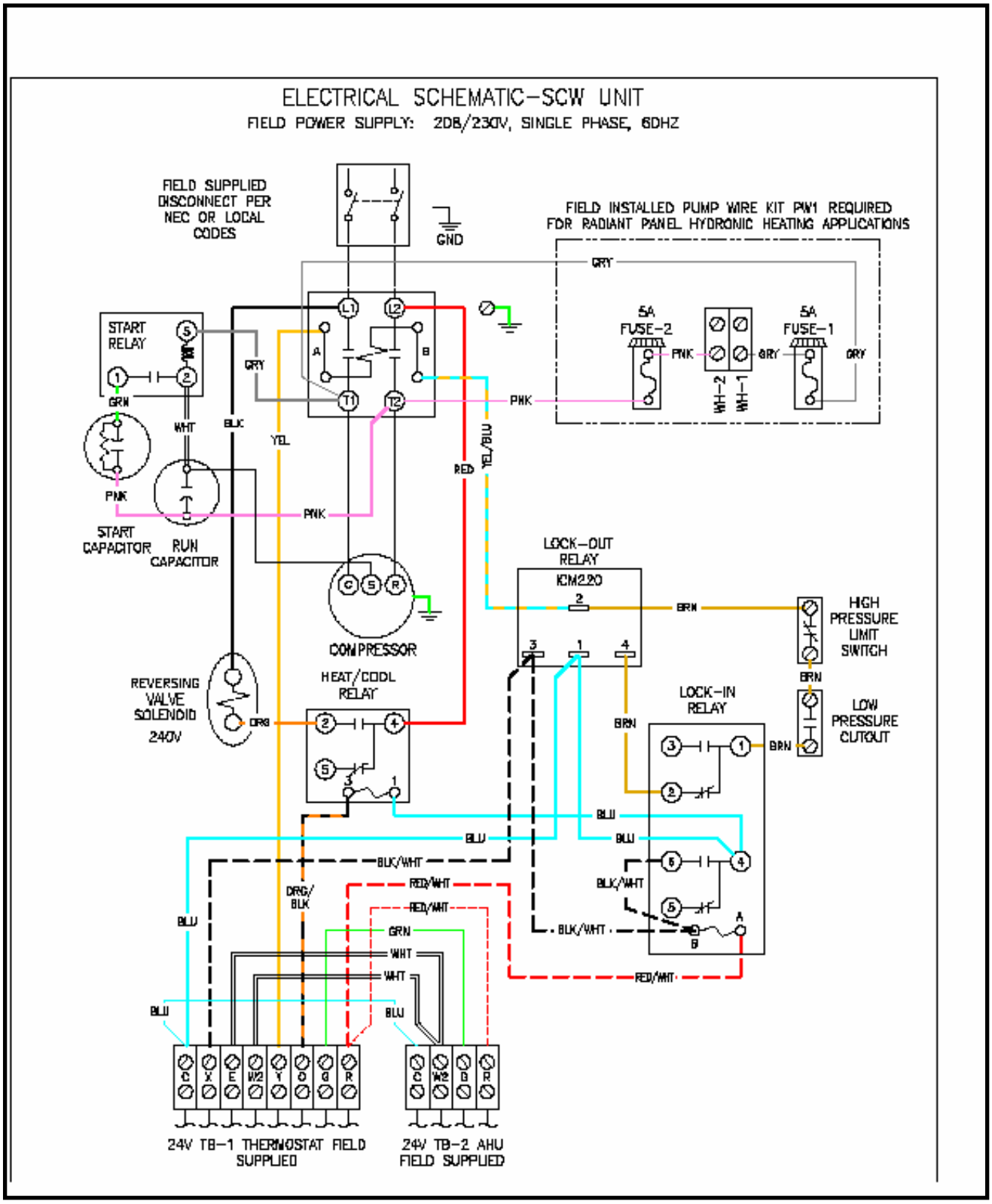


Figure 20a. SCW Electrical Schematic (230-1-60)

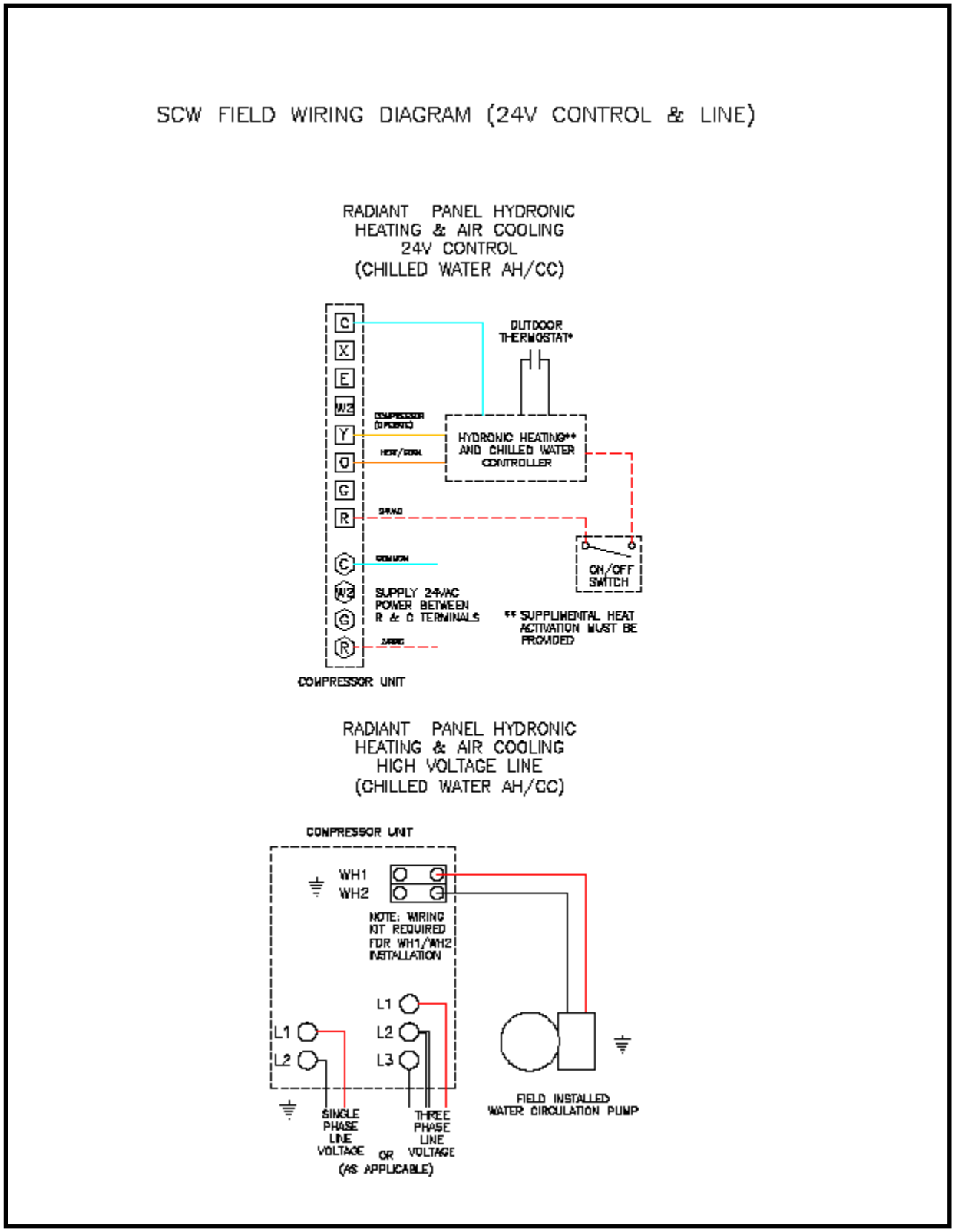
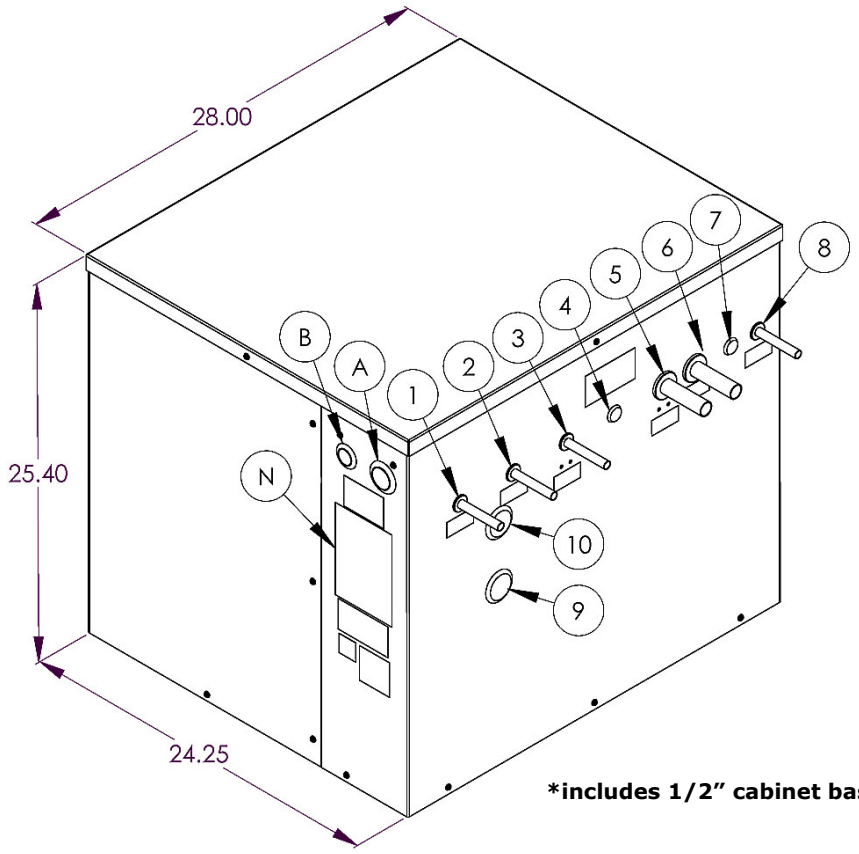


Figure 20b. SCW Field Wiring Diagram



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	AH/CC/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
2	DWM/HWM Vapor	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	AH/CC/HWM Vapor	MSWT, OD	3/4	3/4	3/4	3/4	7/8	7/8	7/8	7/8
7	Plugged	--	--	--	--	--	--	--	--	--
8	DWM/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
9	Plugged	--	--	--	--	--	--	--	--	--
10	Plugged	--	--	--	--	--	--	--	--	--

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 21. SW Connections

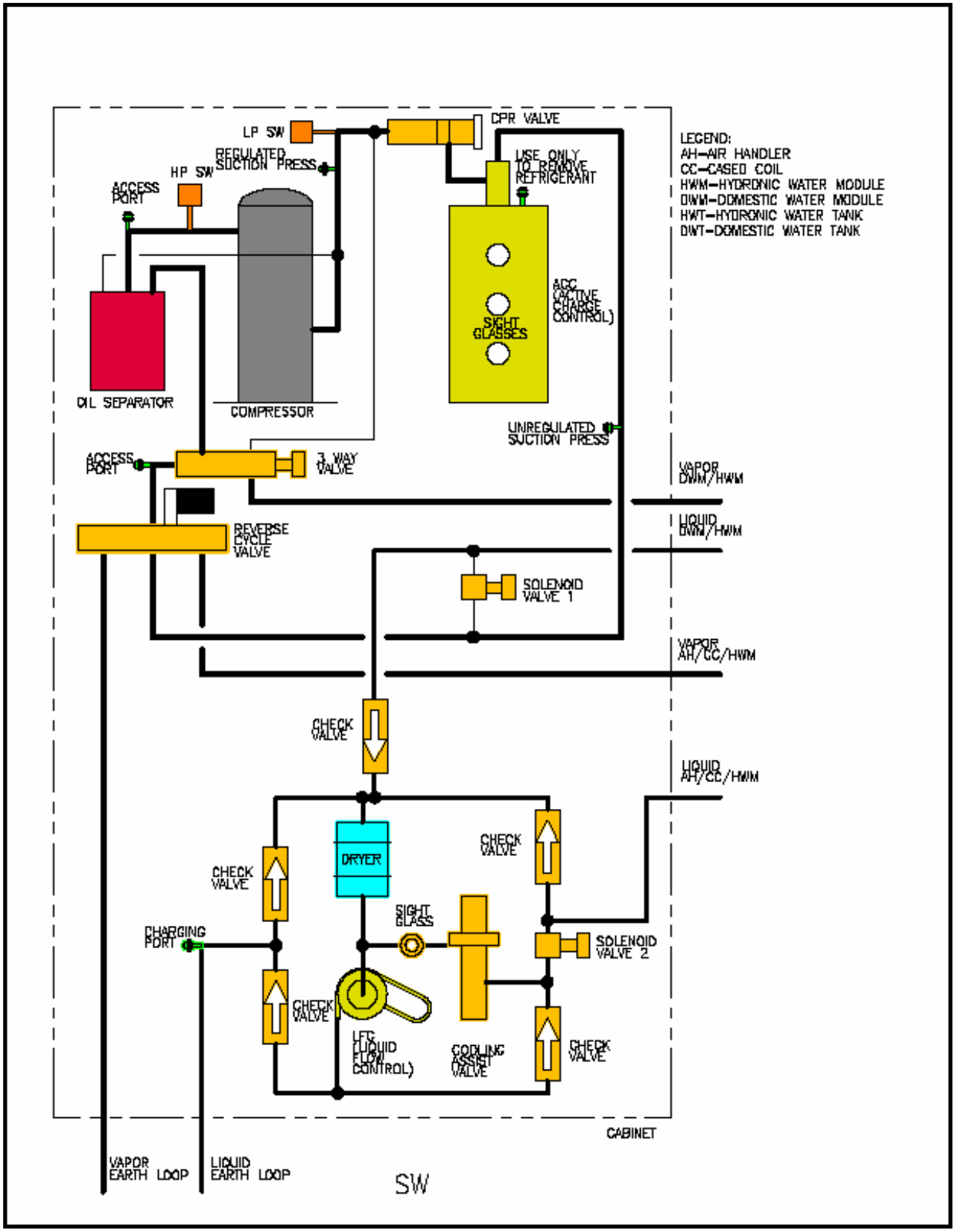


Figure 22a. SW Internal Flow Schematic

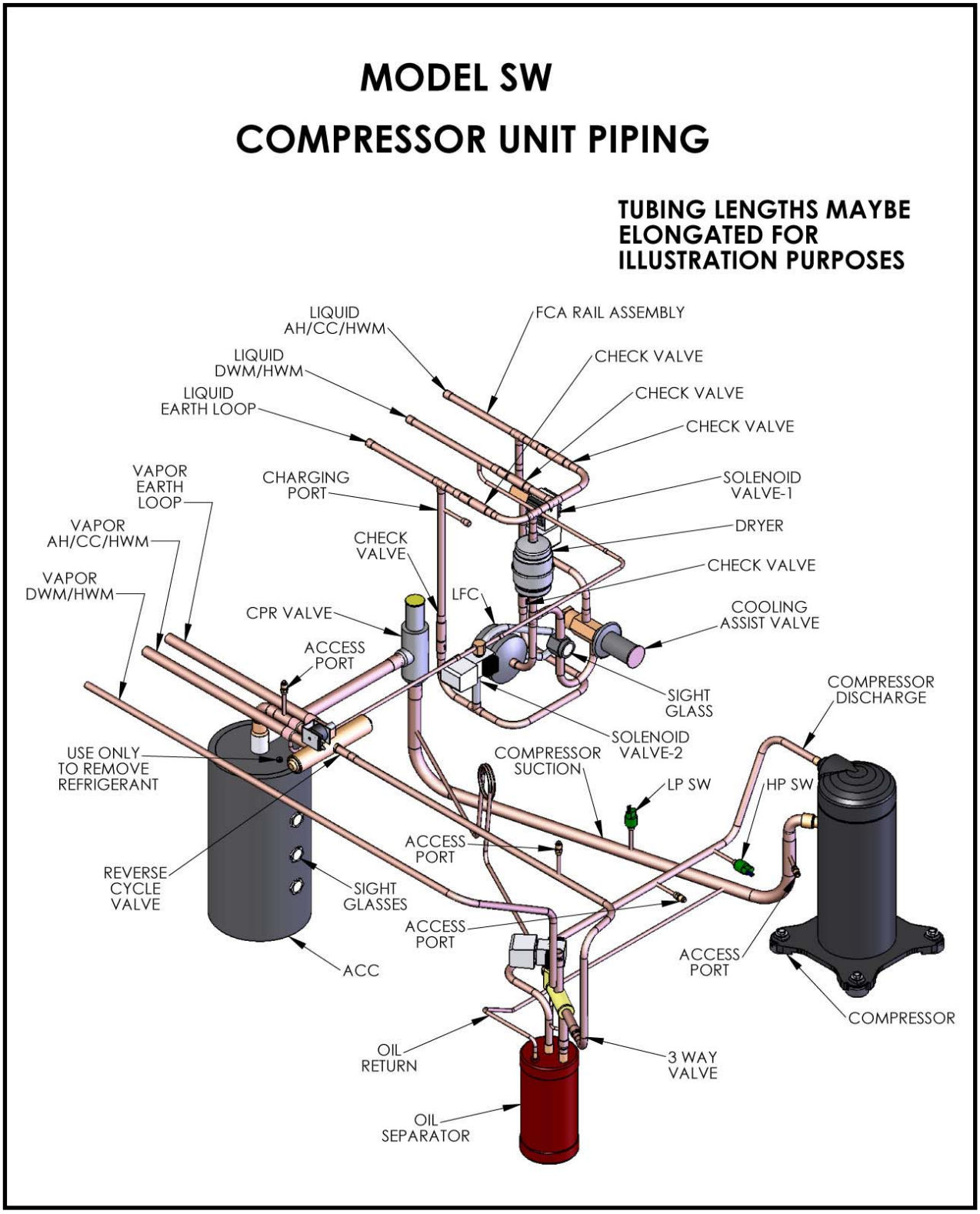
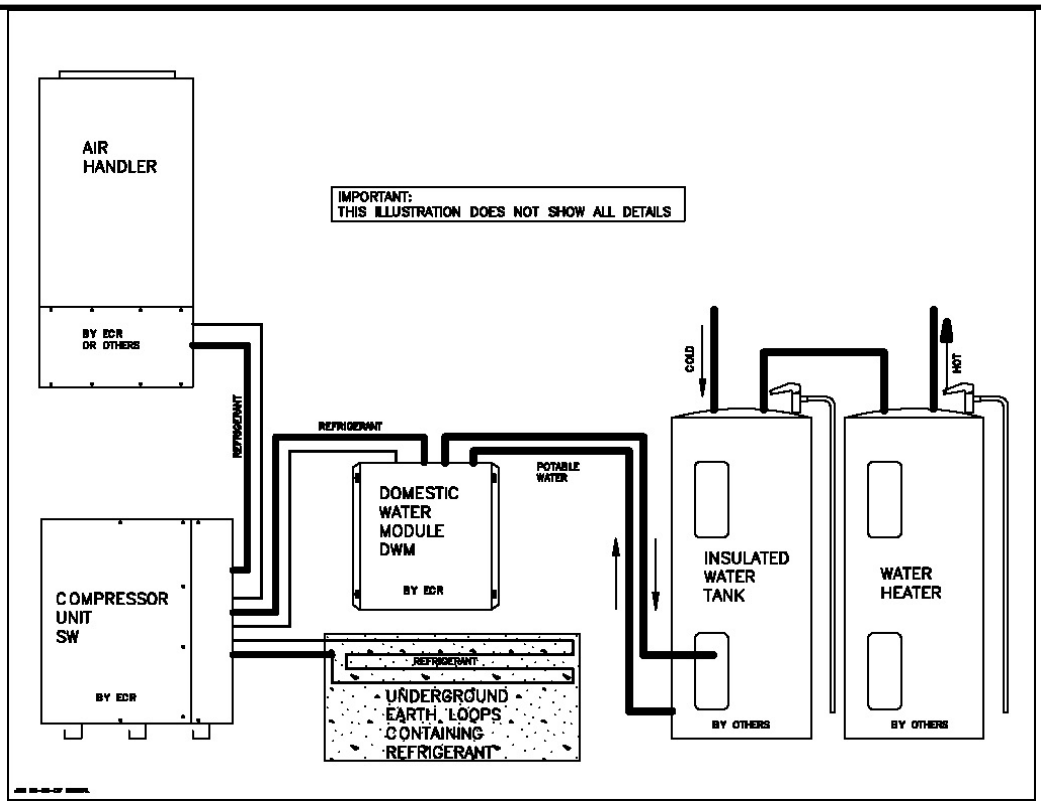


Figure 22b. SW Piping



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 21, 23a and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 21, 23a; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to DWM)	Spec Guide Figure 65
8.	Water pipe, fittings and insulation from DWM to water storage tank	Figure 46; Spec Guide Section 3F2a and Figures 52, 63
9.	Water filtration system	Spec Guide section 3F2a and Figure 64
10.	Domestic water heating remote bulb temperature controller, Johnson Model A19ABC-4C	Spec Guide section 3E4a
11.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 23a. SW Air Heating, Cooling and Domestic Hot Water by Priority Heating with DWM

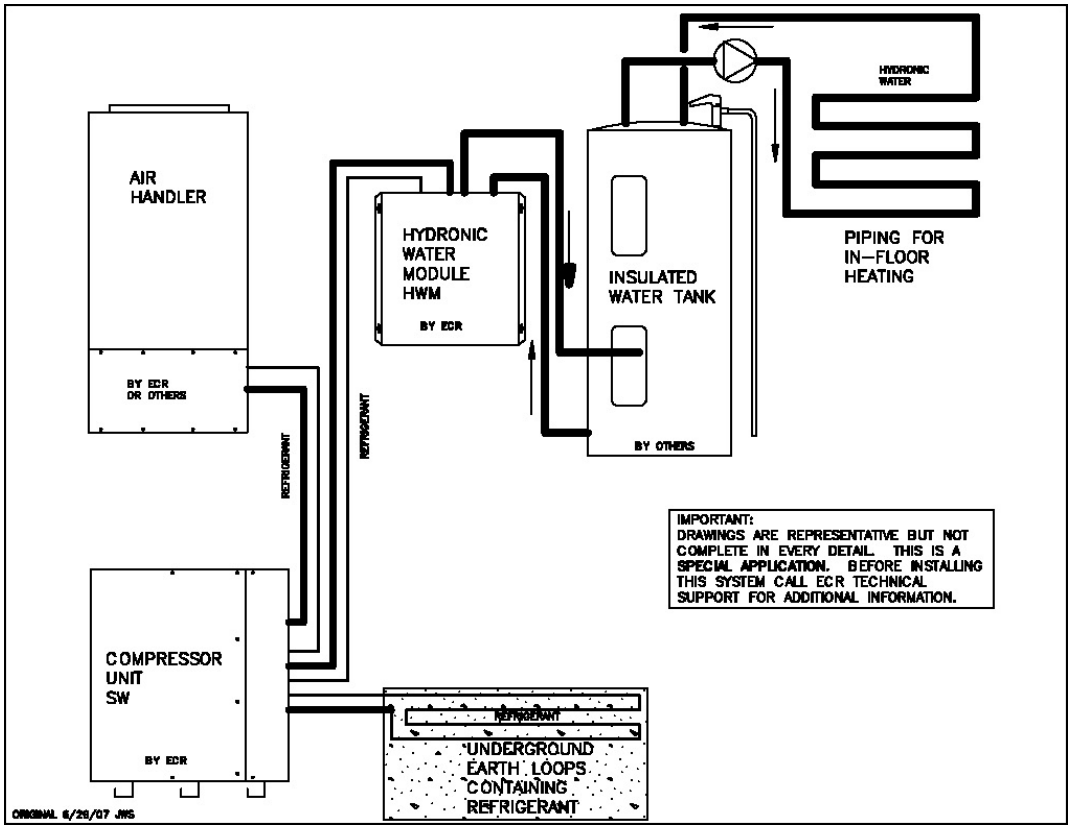
CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

IMPORTANT

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°F

Requires filed-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 21, 23b and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 21, 23b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to HWM)	Spec Guide Figure 51
8.	Water pipe, fittings and insulation from HWM to water storage tank	Figure 46; Spec Guide Figures 48a, 52
9.	Freeze protection switch	Spec Guide Figure 48a
10.	Hydronic heating remote bulb temperature controller, Johnson Model A19ABC-4C	Spec Guide section 3E4a
11.	Water storage tank	Spec Guide section 3E2
12.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 23b. SW Radiant Panel Hydronic Heating and Air Cooling

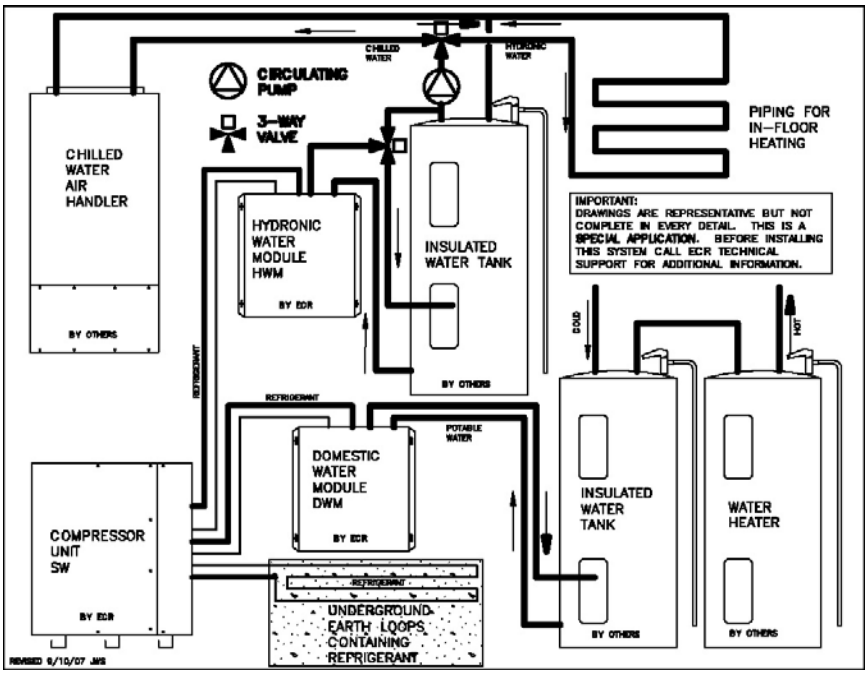
IMPORTANT

FOR HYDRONIC HEATING AND DX AIR COOLING

Require field-installed SWT Timer Kit SW-1872.

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 21, 23c and section 3B
3.	Refrigerant, 7 # per ton	Spec Guide section 1A
4.	Line set (compressor to HWM)	Spec Guide Figure 51
5.	Pipe insulation (refrigerant)	Figures 21, 23c; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to DWM)	Spec Guide Figure 65
8.	Freeze protection switch	Spec Guide Figure 48a
9.	Three-way Johnson model JT3 electric zone valve	Spec Guide Figure 58 and Section 3E4b
10.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide Section 3E4a
11.	Chilled water temperature controller, Johnson Model A19AAC-4C	Spec Guide Section 3E4b
12.	Primary circuit water pipe and insulation	Figure 46; Spec Guide Figures 48a, 52
13.	Chilled water air handler	Spec Guide Section 3D
14.	DWM to water storage tank water piping, insulation and fittings	Figure 46; Spec Guide Section 3F2a and Figure 64
15.	Water filtration system	Spec Guide Section 3F2a and Figure 34
16.	Water storage tank	Spec Guide Section 3E2
17.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 23c. SW Radiant Panel Hydronic Heating and Air (Chilled Water) Cooling and Domestic Hot Water by Priority Heating with DWM

IMPORTANT

FOR HYDRONIC HEATING APPLICATIONS

(1) Require field-installed pump wire kit PW1-1872 for 230/208-1-60 and 230/208-3-60 power supply.
(2) Requires field-installed pump wire kit PW2-1872 for 460-3-60 and 575-3-60 power supply.

FOR COMMERCIAL COOLING LOADS AND EARTH TEMP ≥ 70°

Requires field-installed heating performance enhancement kit HPE-1872. See compressor unit price pages.

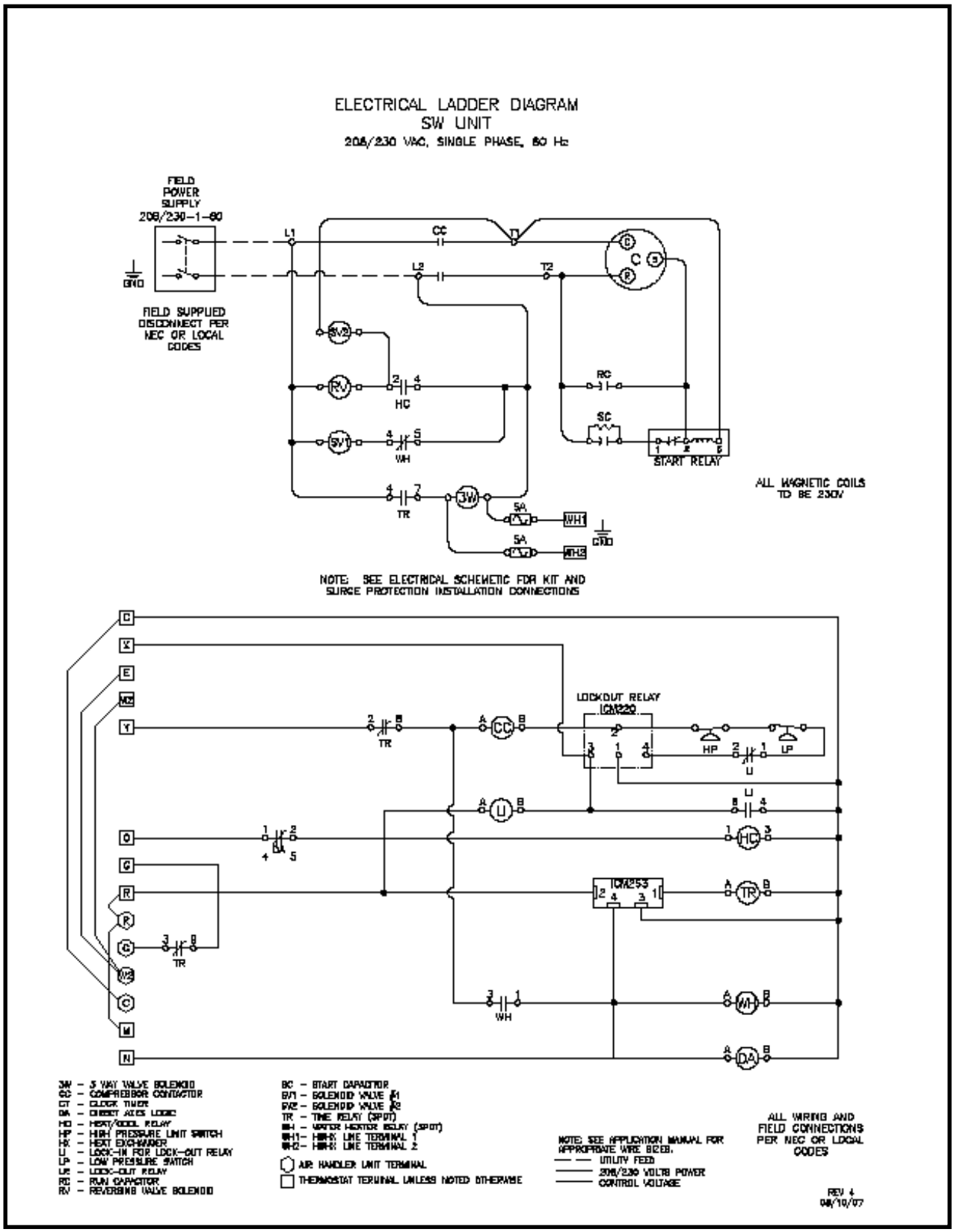


Figure 24. SW Electrical Ladder Diagram (230-1-60)

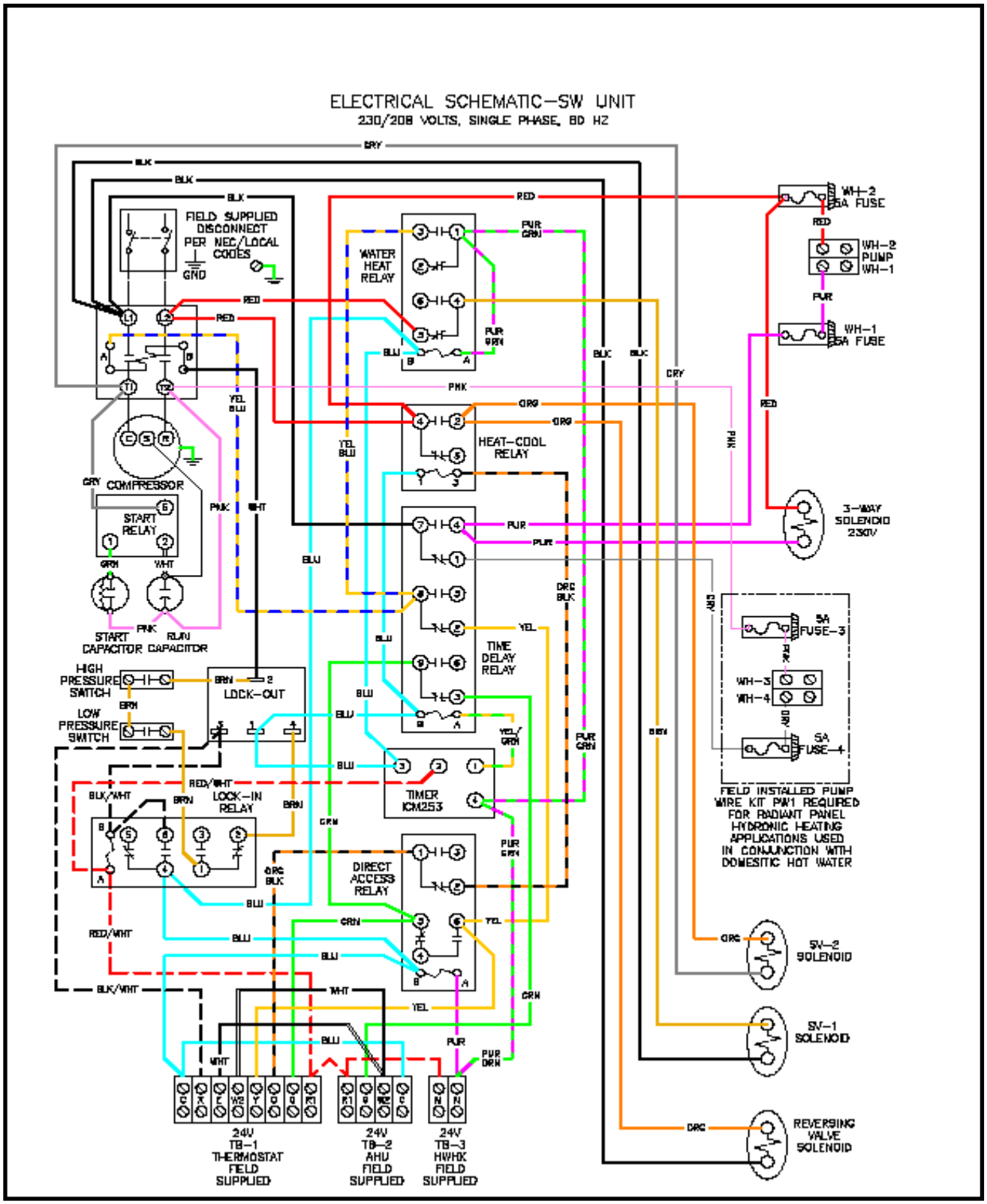


Figure 25a. SW Electrical Schematic (230-1-60)

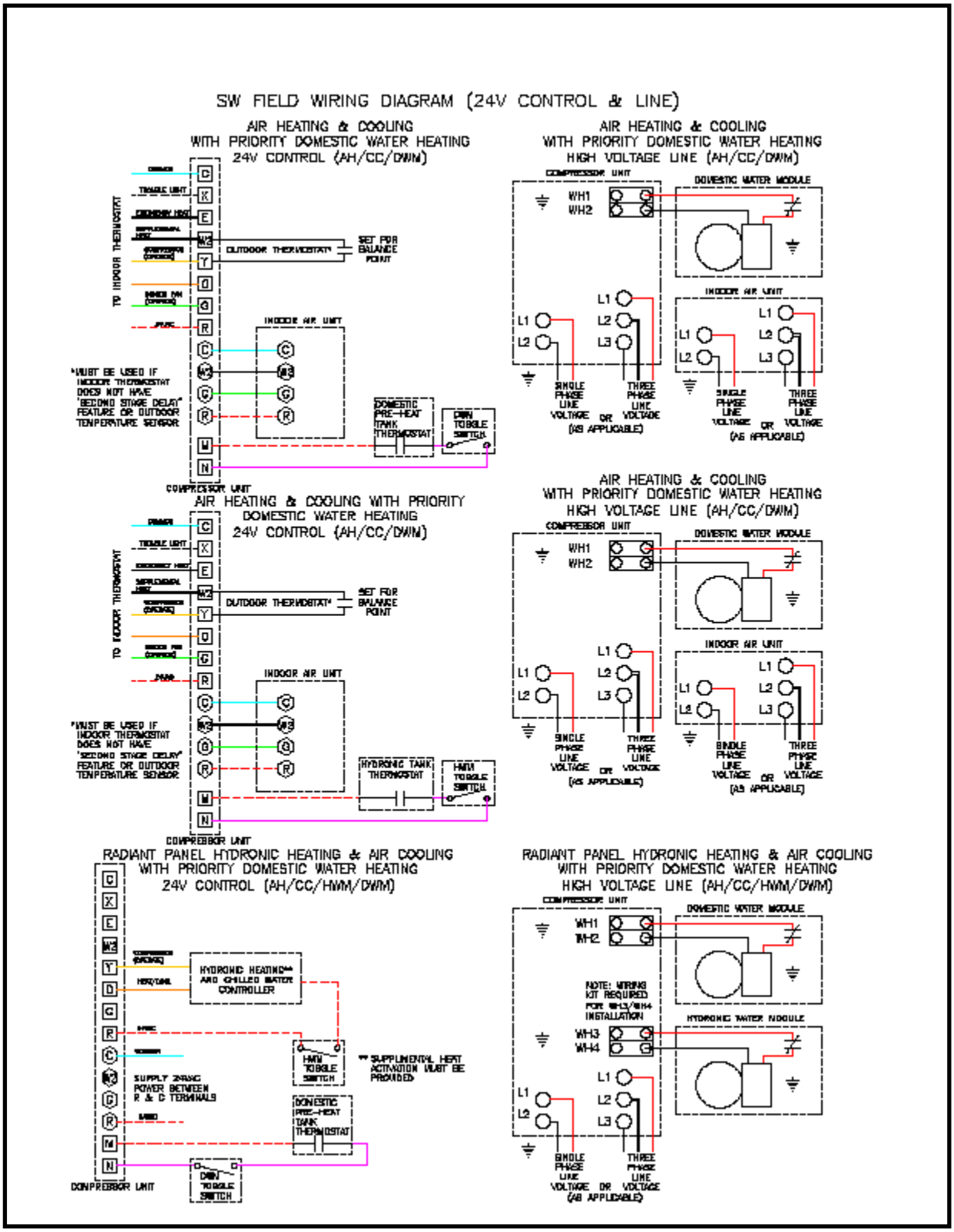
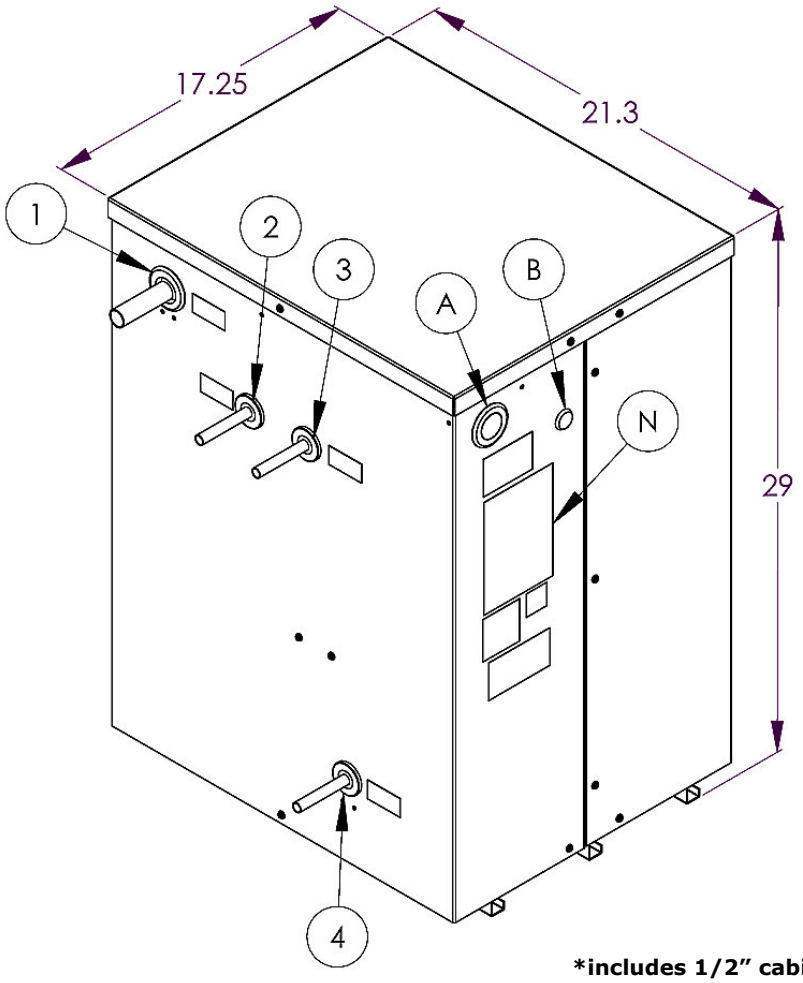


Figure 25b. SW Field Wiring Diagram



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
2	AH/CC/HWM/DWM Vapor	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
3	AH/CC/HWM/DWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
4	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8

N = Nameplate and other information
1 = Nominal electrical connector sizes

* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 26. HC Connections

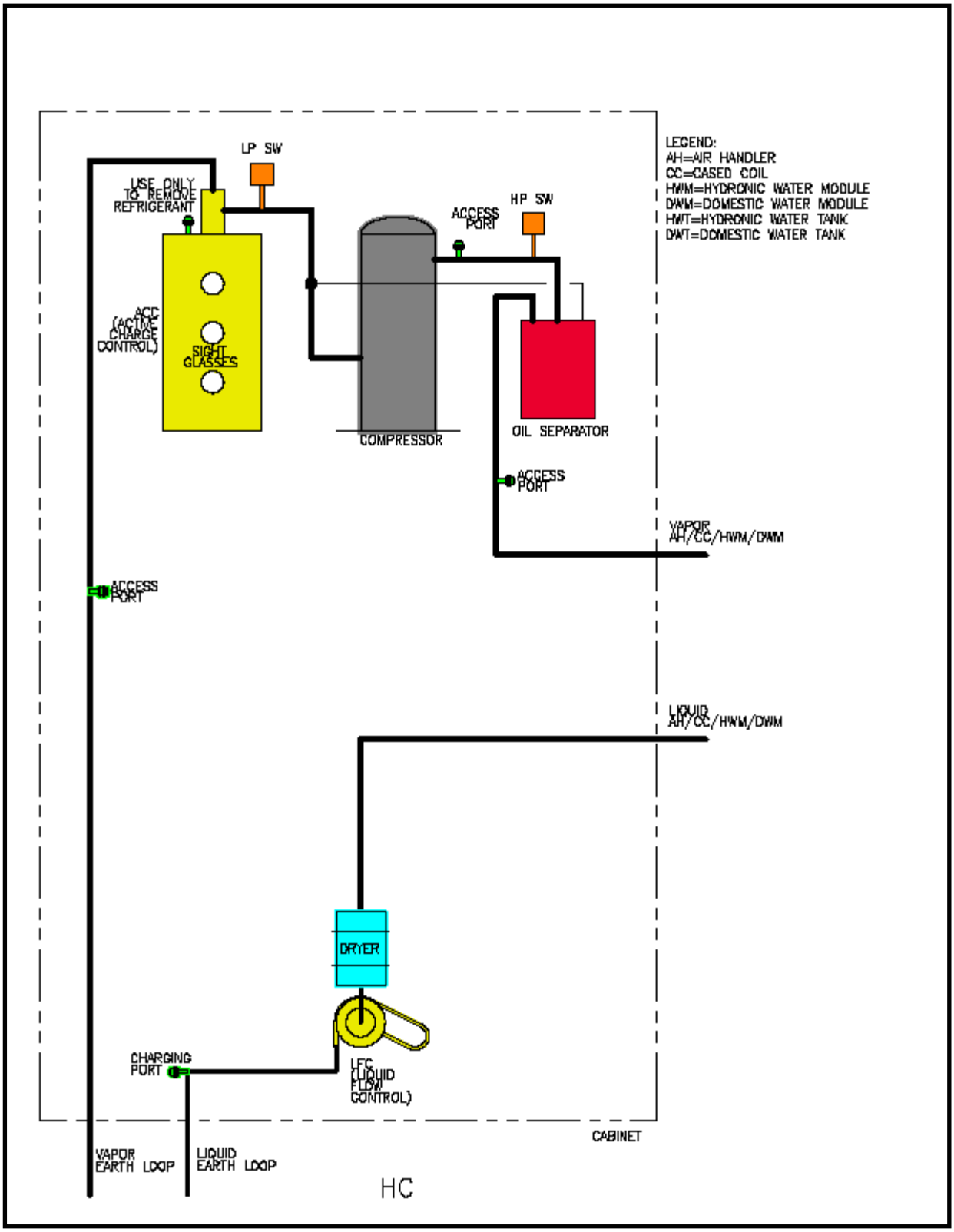


Figure 27a. HC Internal Flow Schematic

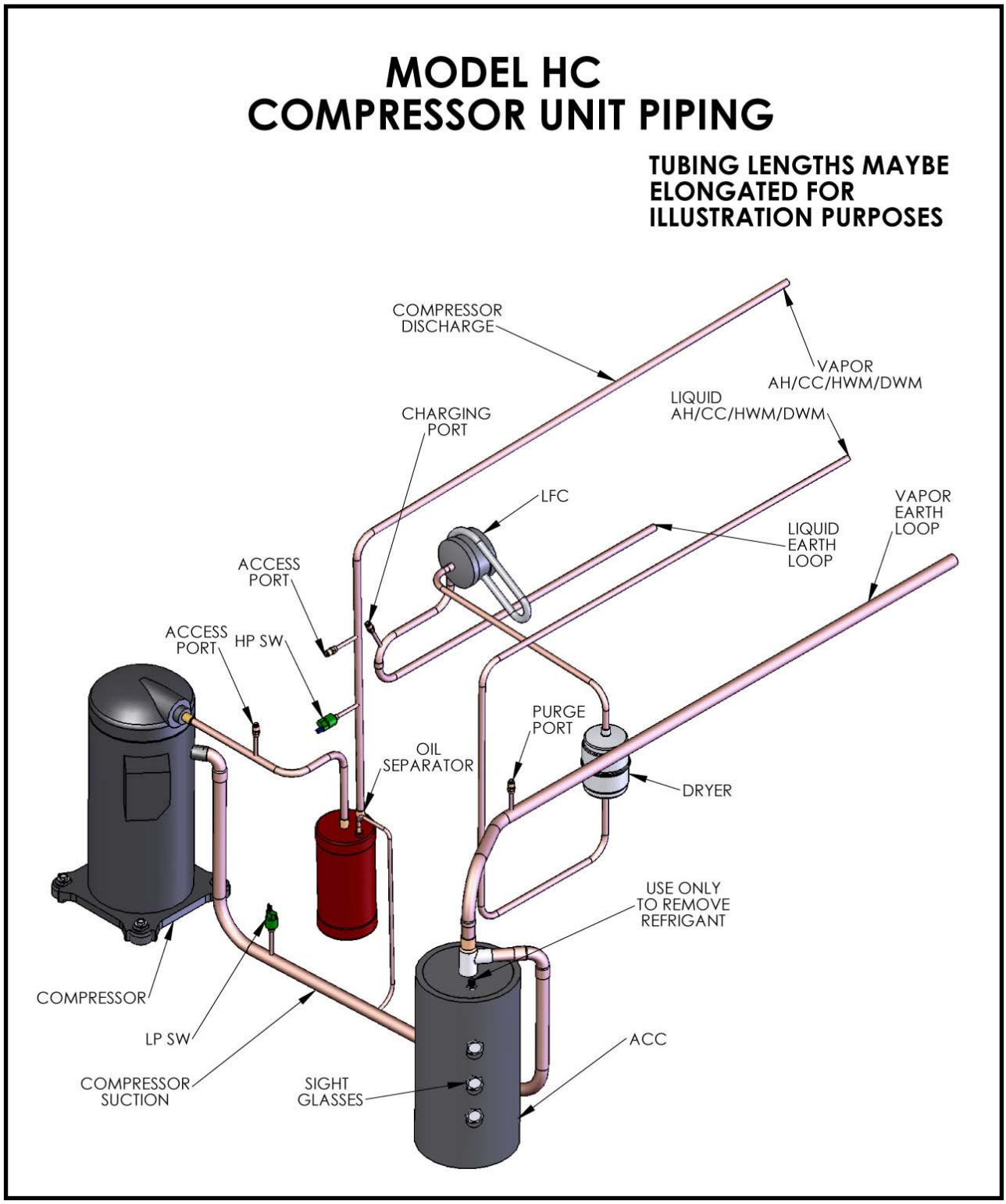
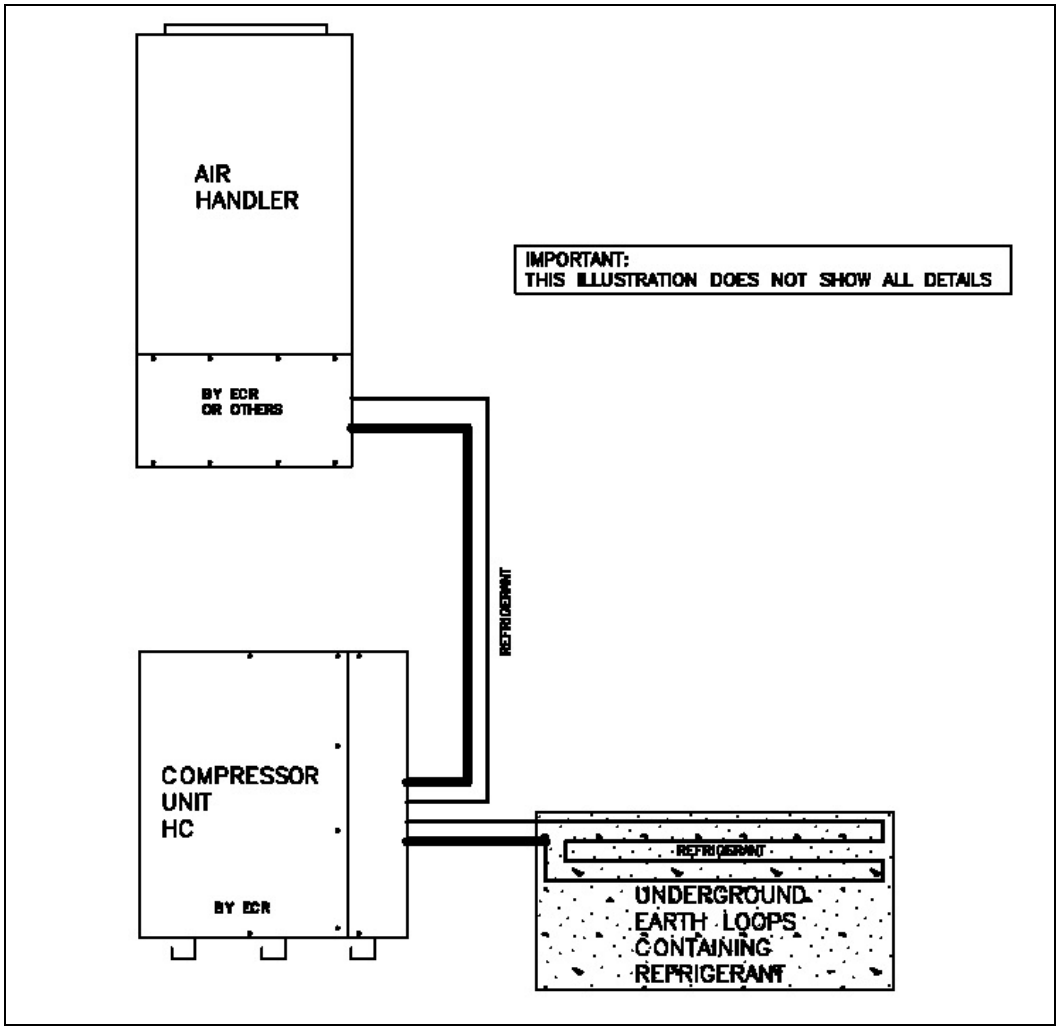
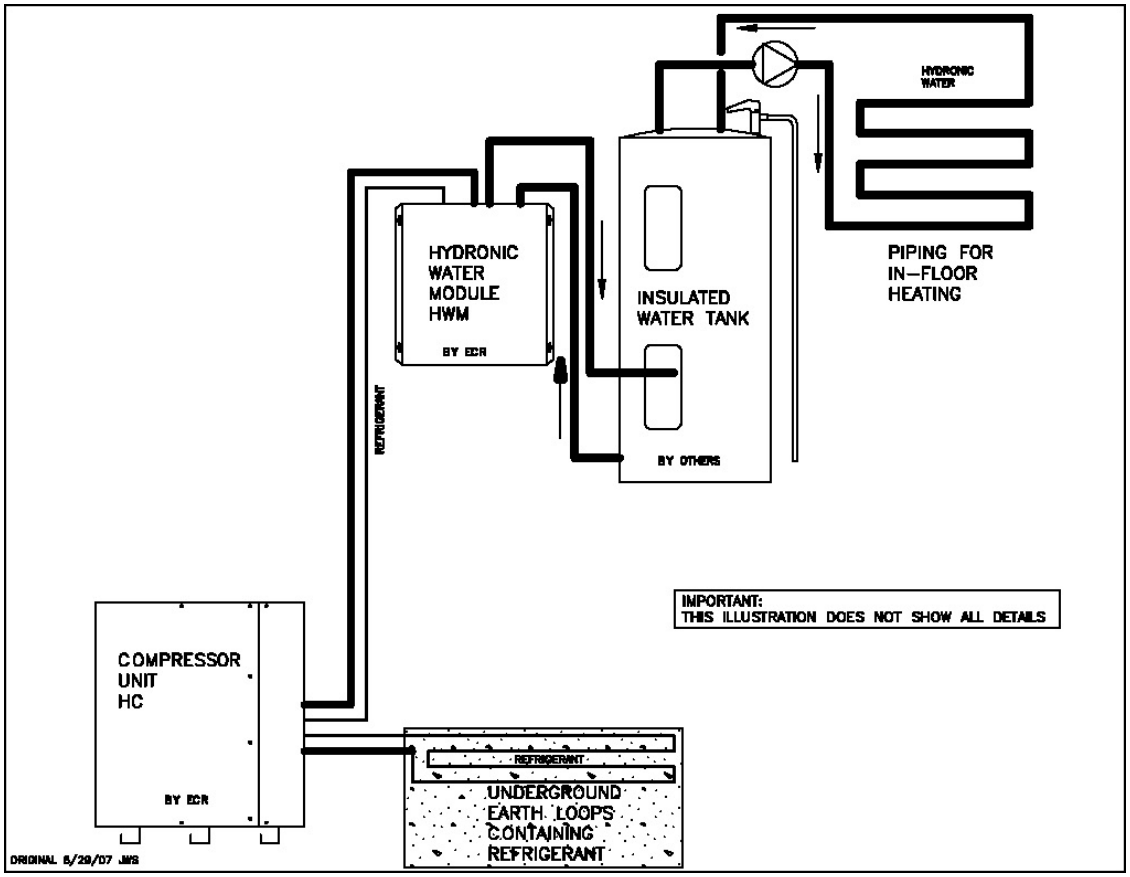


Figure 27b. HC Piping



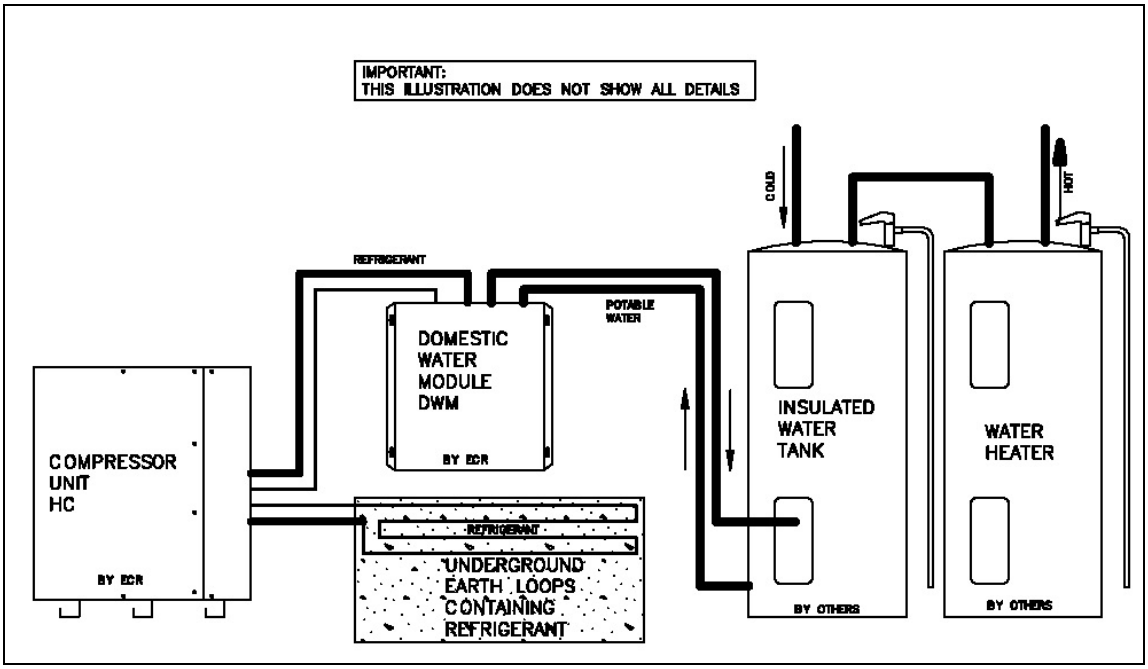
FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 26, 28a and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 26, 28a; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 28a. HC Air Heating



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 26, 28b and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to HWM)	Spec Guide Figure 51
5.	Pipe insulation (refrigerant)	Figures 26, 28b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Primary circuit water piping, insulation and fittings	Figure 46; Spec Guide Figures 48a, 52
8.	Freeze protection switch	Spec Guide Figure 48a
9.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide Section 3E4a
10.	Water storage tank	Spec Guide Section 3E2
11.	Line set (compressor to earth loop)	Sec Guide Figure 40

Figure 28b. HC Radiant Panel Hydronic Heating



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27; local codes
2.	Nitrogen and 15% brazing alloy	Figures 26, 28c and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to DWM)	Spec Guide Figure 65
5.	Pipe insulation (refrigerant)	Figures 26, 28c; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Water piping,fittings and insulation from DWM to water storage tank	Figure 46; Spec Guide section 3F2a and Figure 64
8.	Water filtration system	Spec Guide section 3F2a and Figure 34
9.	Domestic water heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide Section 3E4a
10.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 28c. HC Domestic Hot Water by Priority Heating with DWM

CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

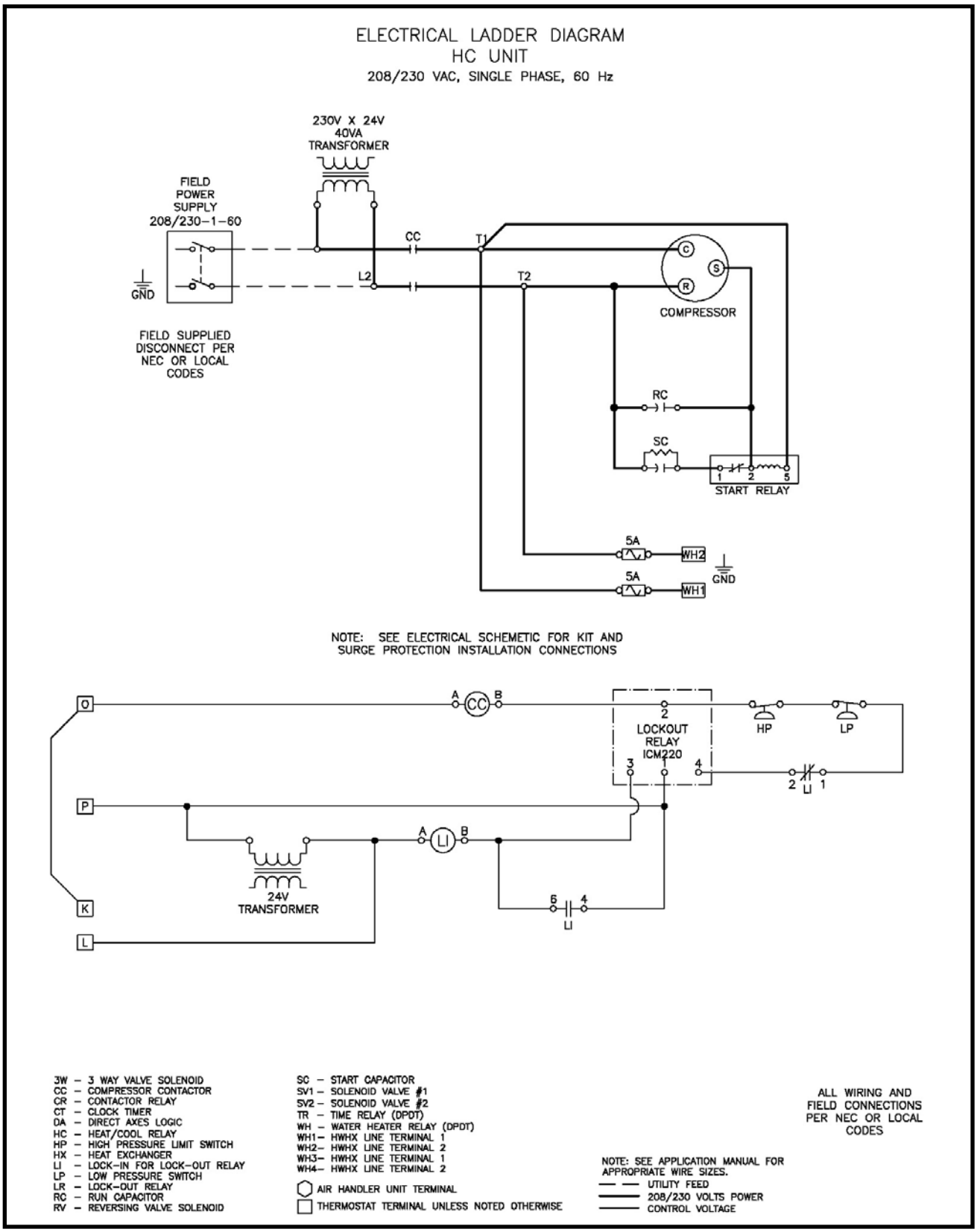


Figure 29. HC Electrical Ladder Diagram (230-1-60)

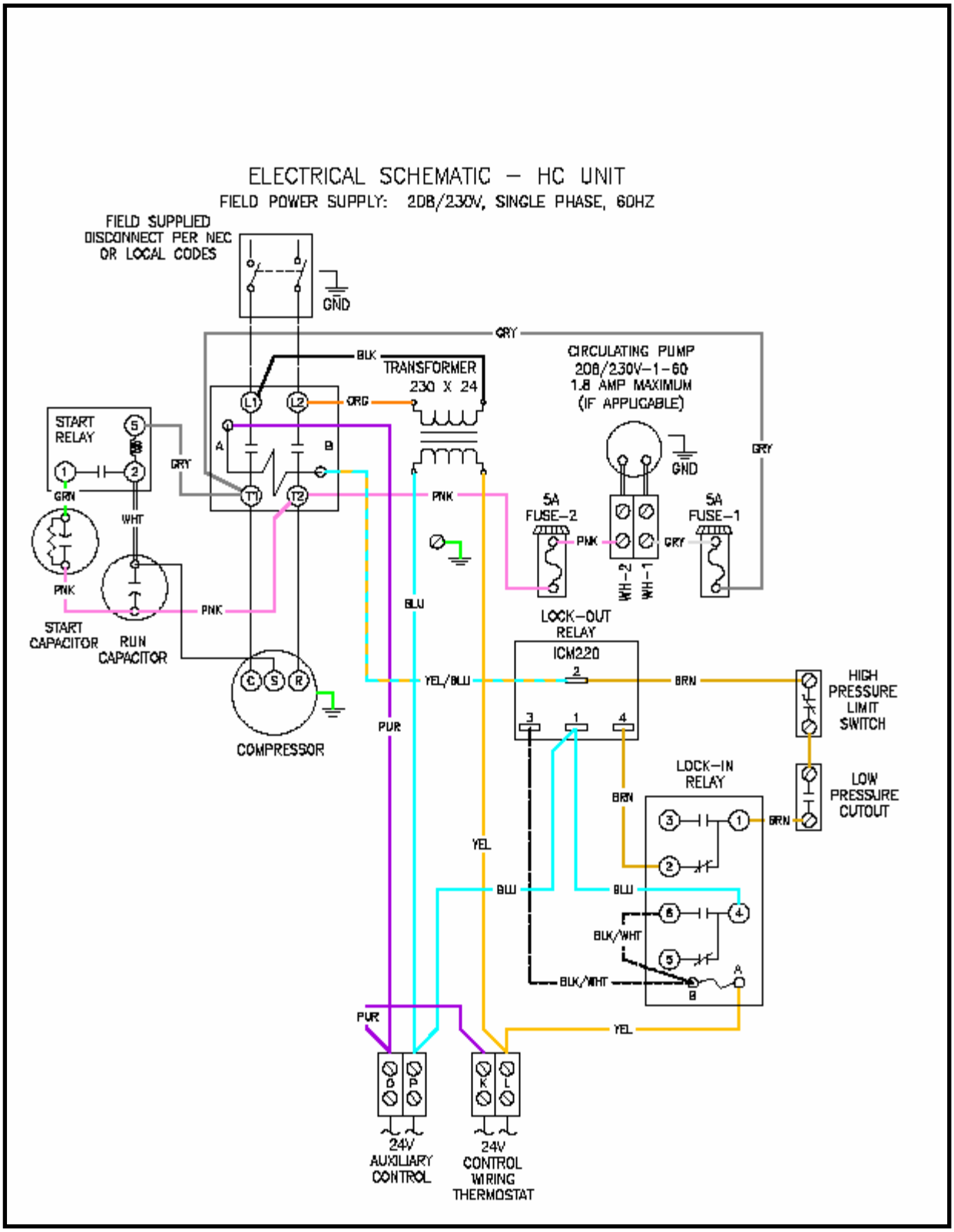


Figure 30a. HC Electrical Schematic (230-1-60)

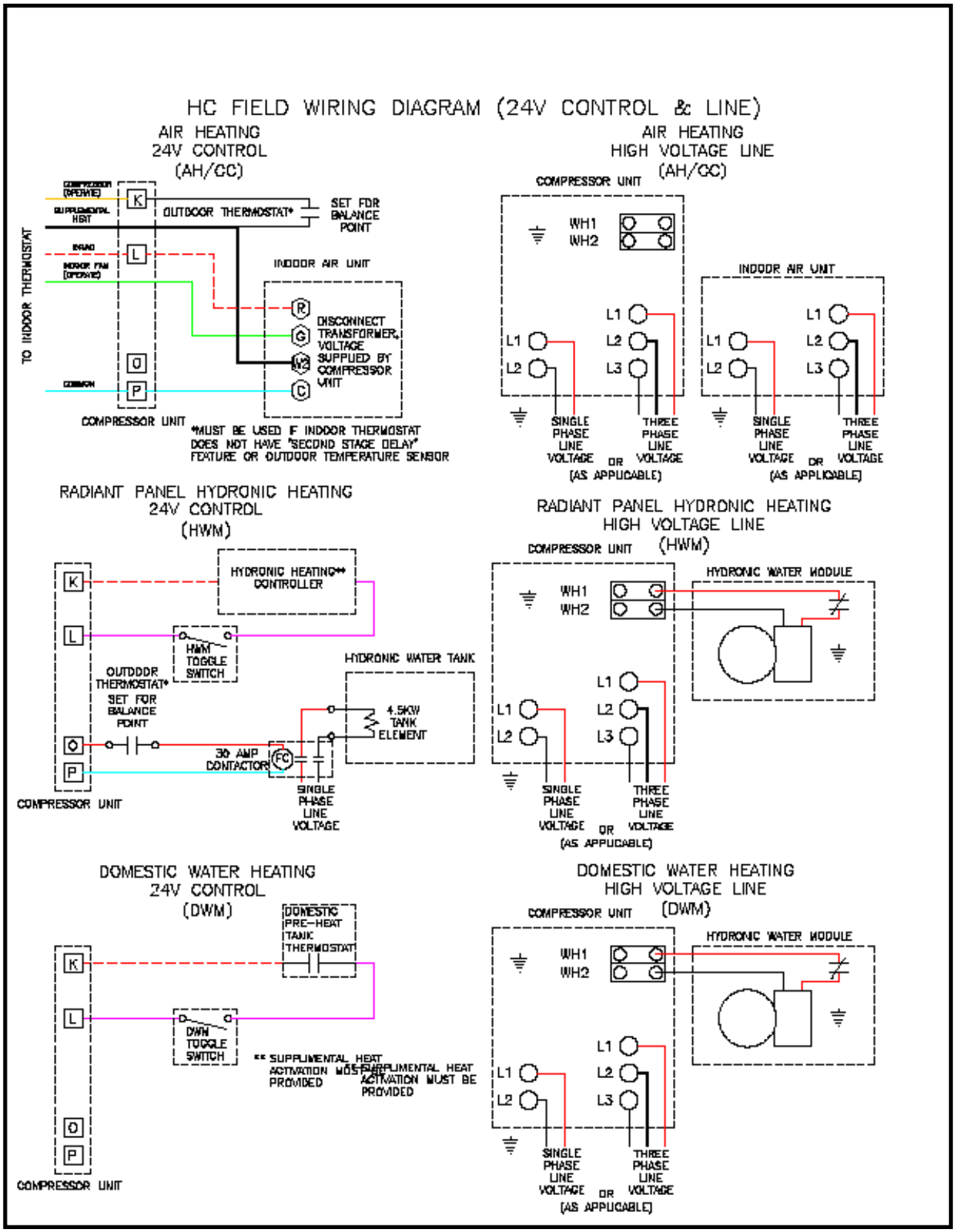
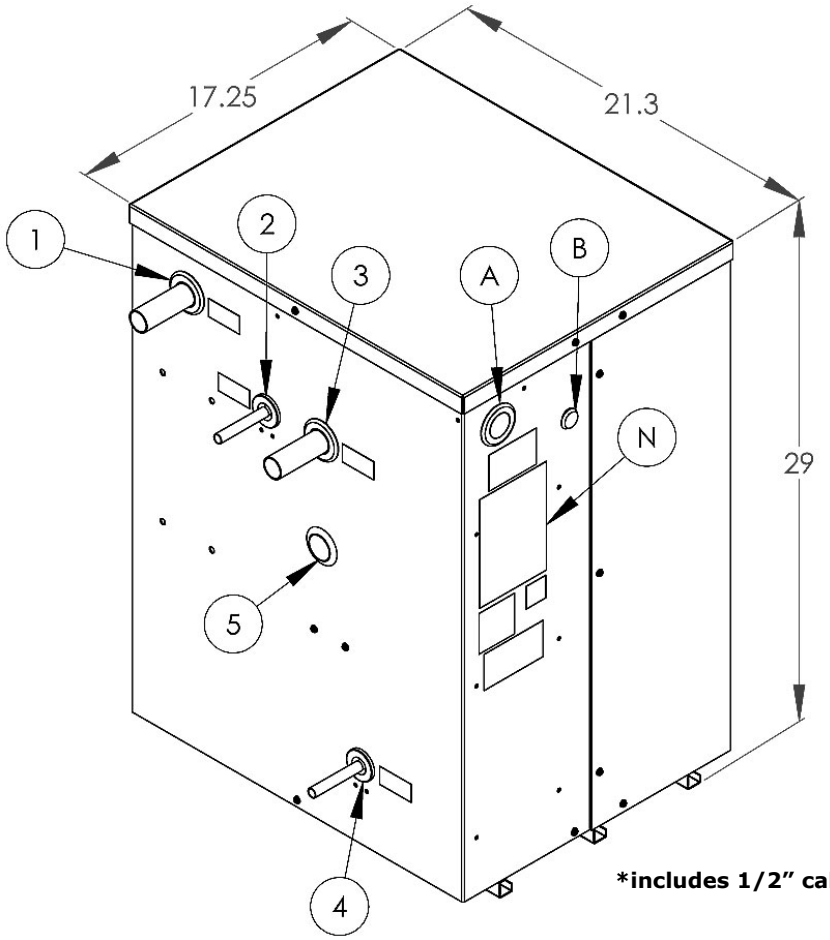


Figure 30b. HC Field Wiring Diagram



PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	HWT Return	MSWT, OD	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8
2	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
3	HWT Supply	MSWT, OD	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8
4	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
5	Plugged	--	--	--	--	--	--	--	--	--

N = Nameplate and other information
1 = Nominal electrical connector sizes

* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 31. HCW Connections

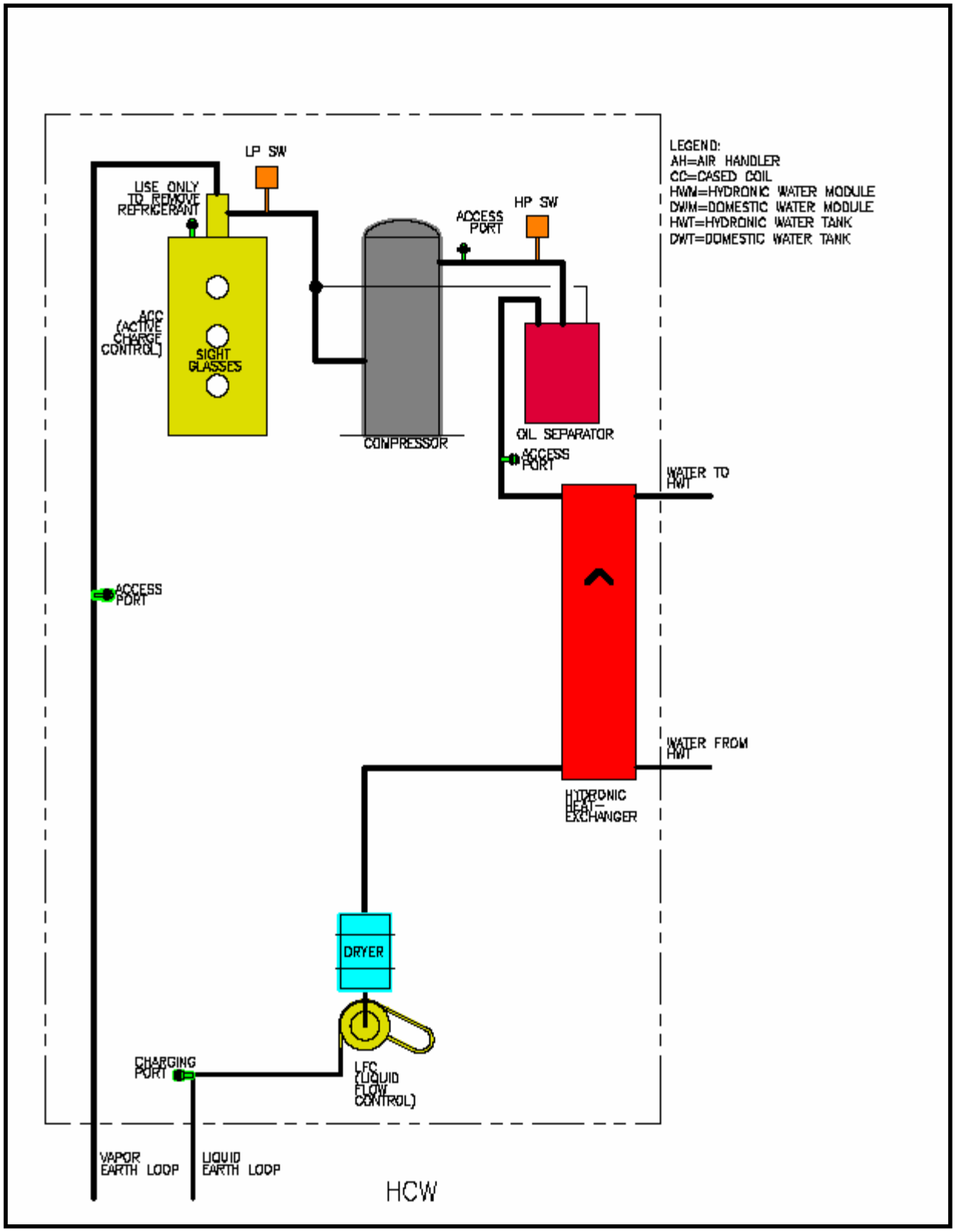


Figure 32a. HCW Internal Flow Schematic

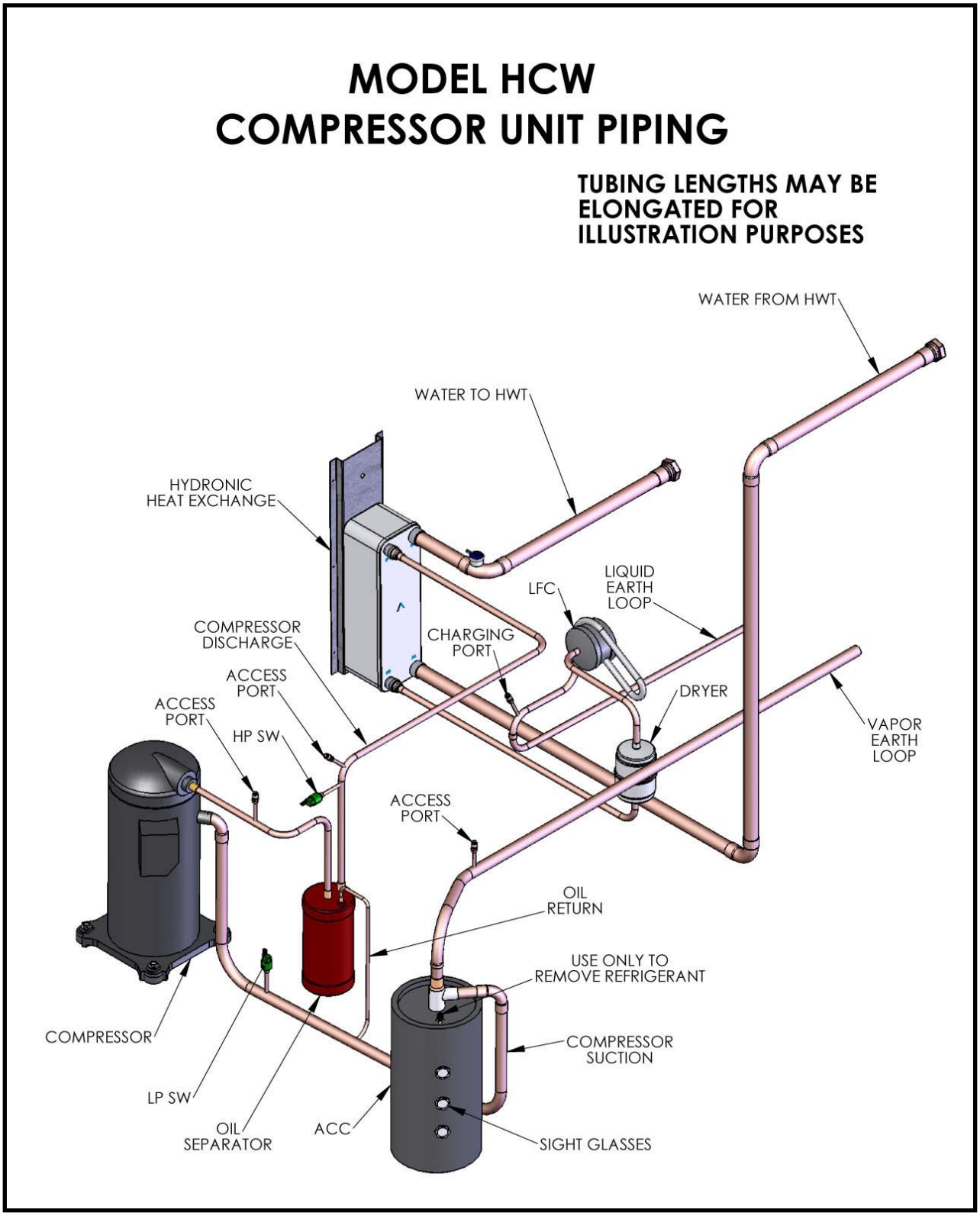
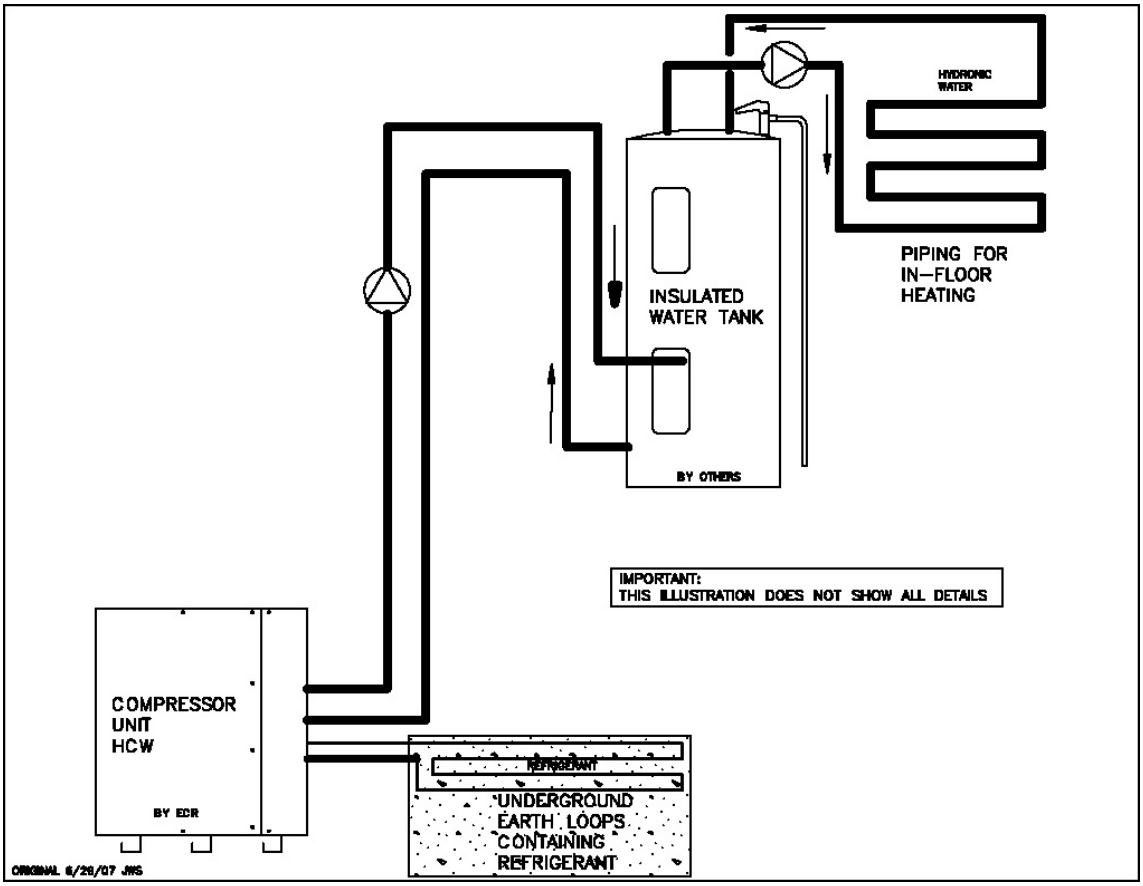


Figure 32b. HCW Piping



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 31, 33 and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Condensate pan, vibration pads	Spec Guide, Section 3A5
5.	Freeze protection switch	Spec Guide Figure 48b
6.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide Section 3E4a
7.	Primary circuit water pipe, fittings and insulation	Spec Guide Figures 46, 48b, 52
8.	Primary circuit water solution circulating pump	Spec Guide Section 3E3
9.	Water storage tank	Spec Guide Section 3E2
10.	Line set (compressor to earth loop)_	Spec Guide Figure 40

Figure 33. HCW Radiant Panel Hydronic Heating

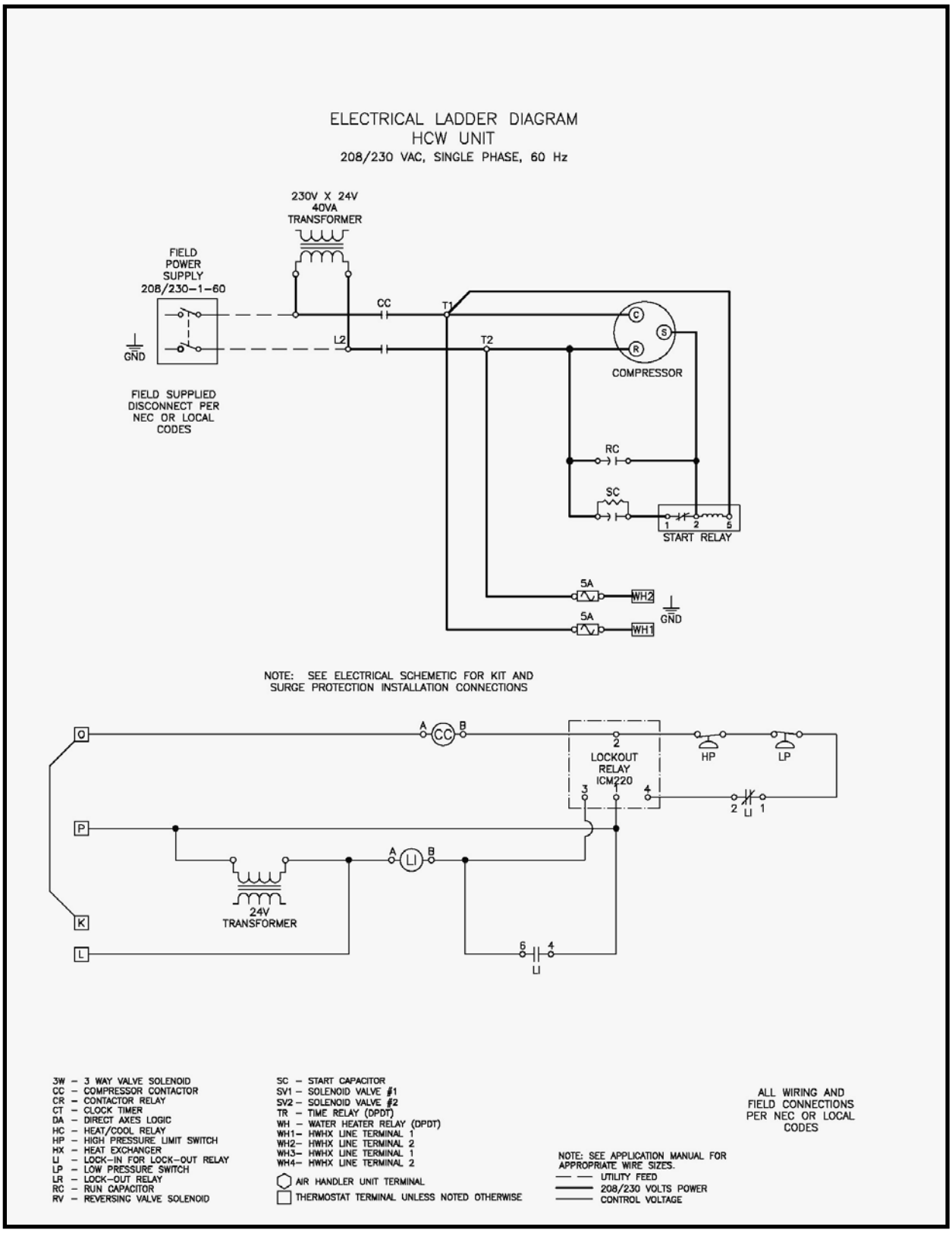


Figure 34. HCW Electrical Ladder Diagram (230-1-60)

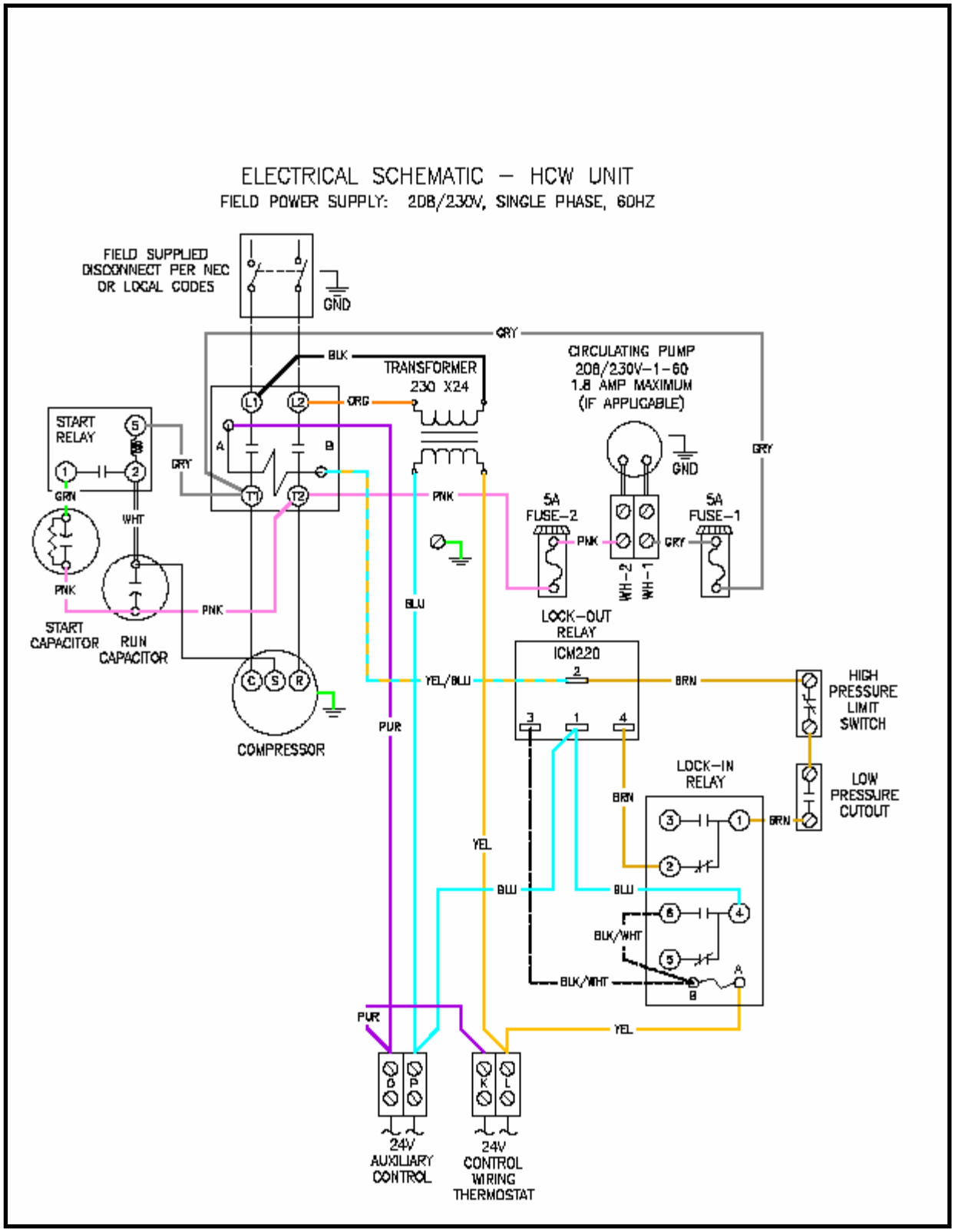


Figure 35a. HCW Electrical Schematic (230-1-60)

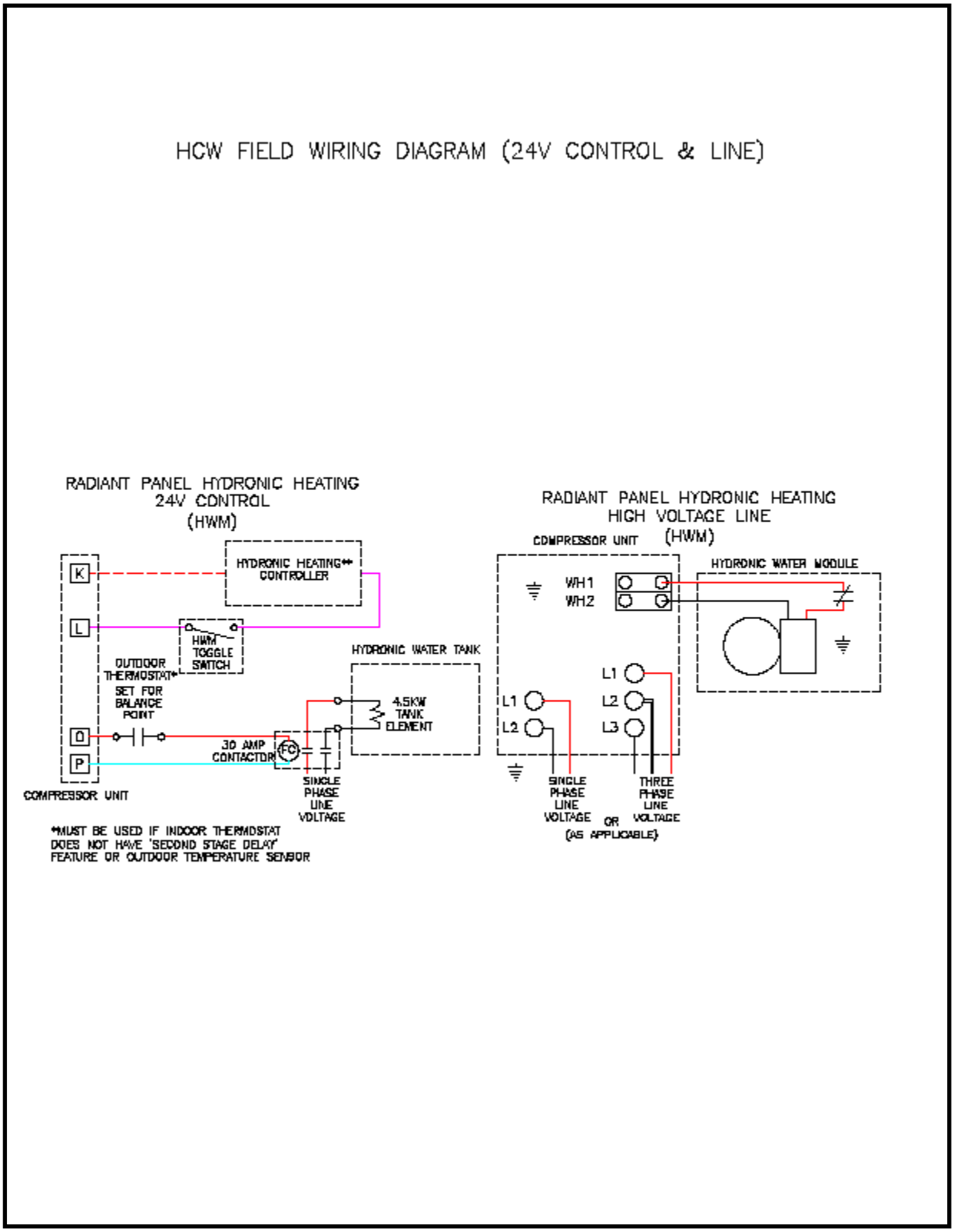
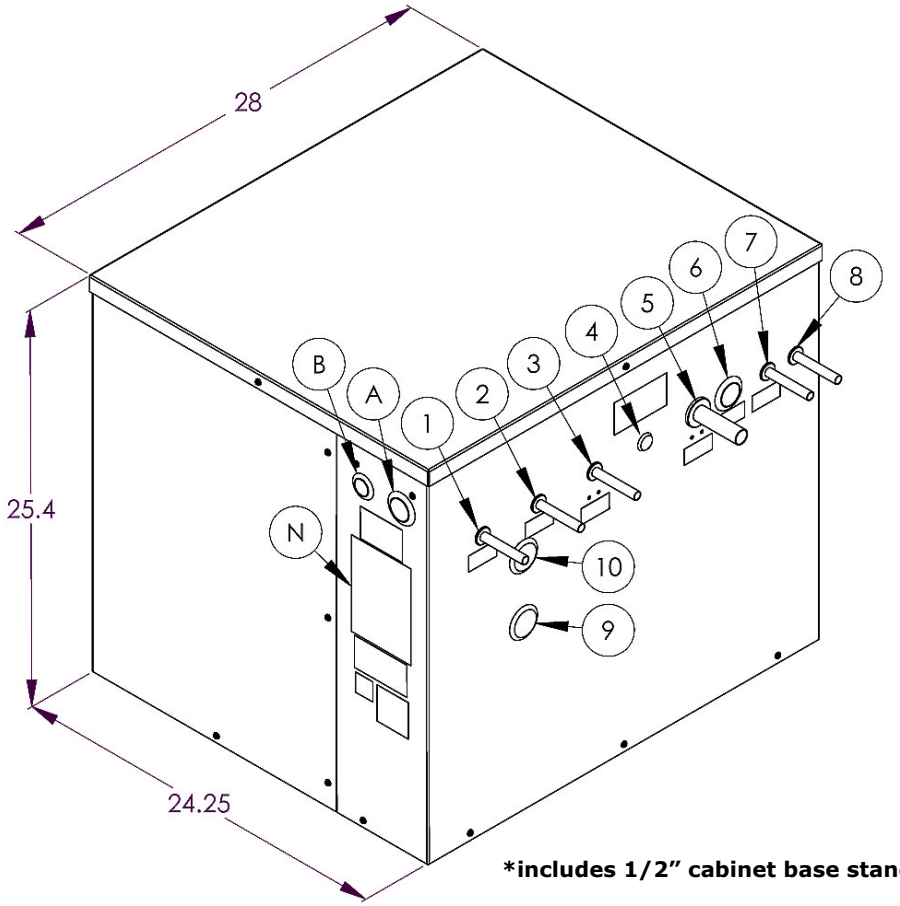


Figure 35b. HCW Field Wiring Diagram



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	AH/CC/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
2	DWM/HWM Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	Plugged	--	--	--	--	--	--	--	--	--
7	AH/CC/HWM Vapor	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
8	DWM/HWM Vapor	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
9	Plugged	--	--	--	--	--	--	--	--	--
10	Plugged	--	--	--	--	--	--	--	--	--

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 36. HW Connections

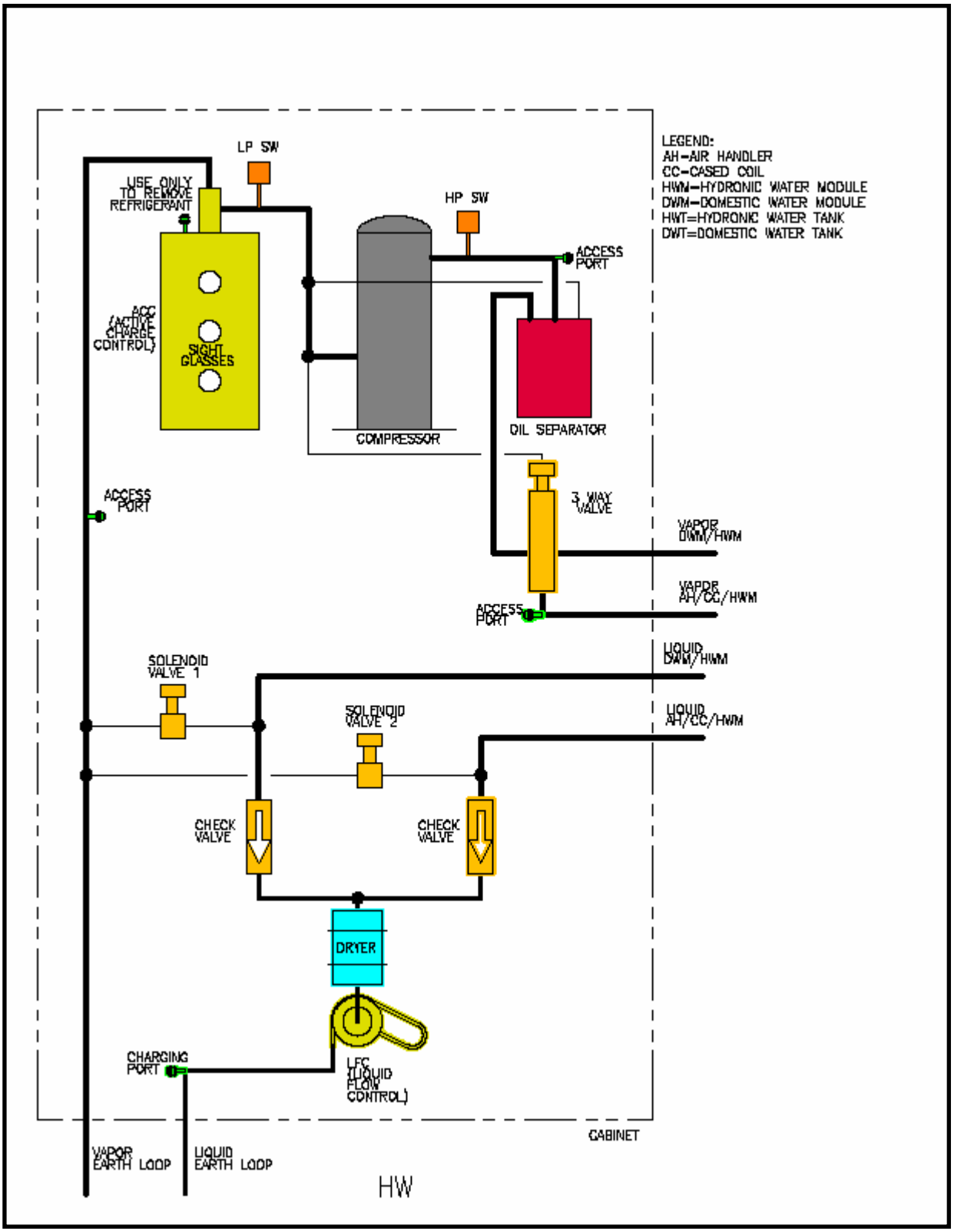


Figure 37a. HW Internal Flow Schematic

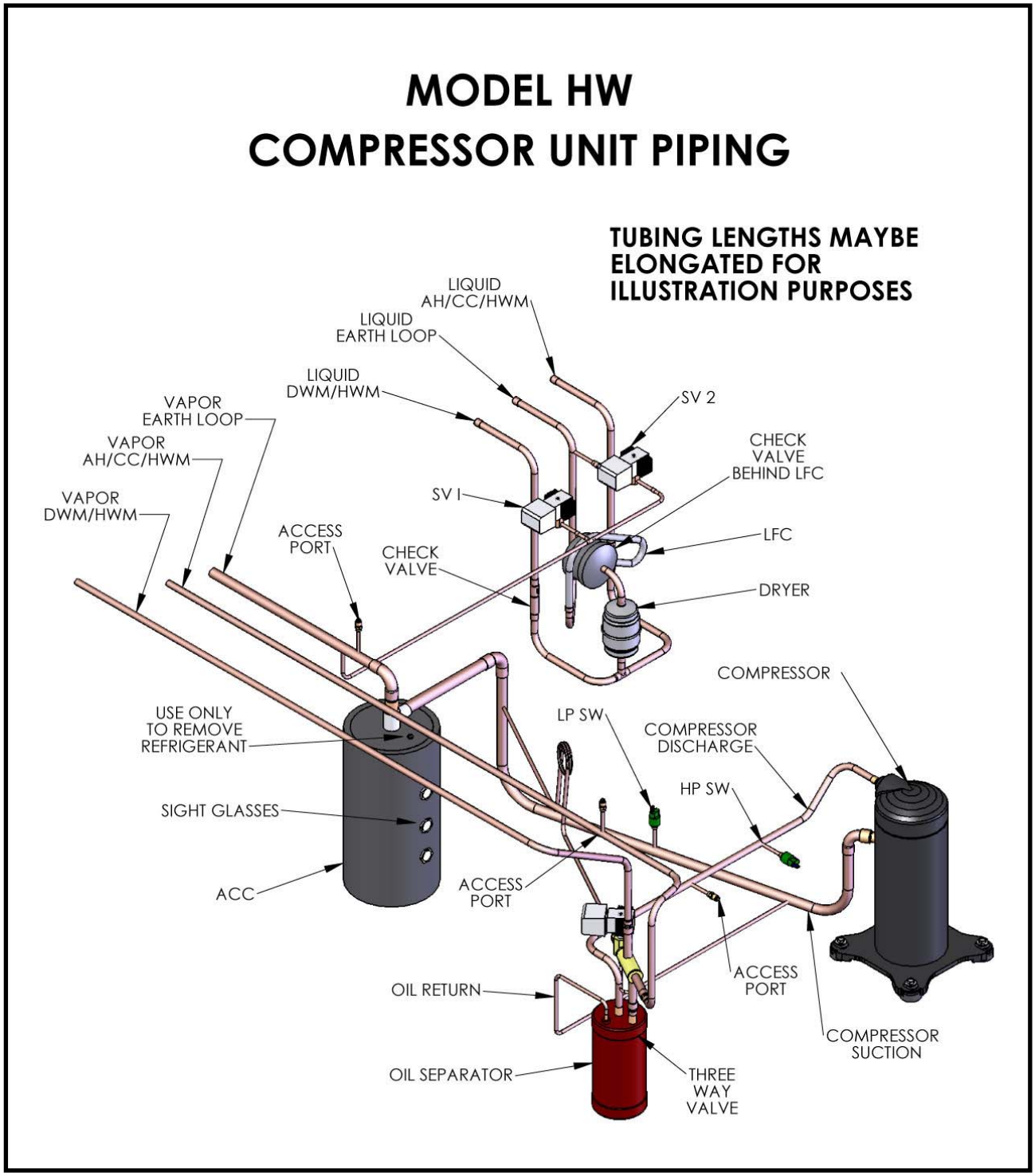
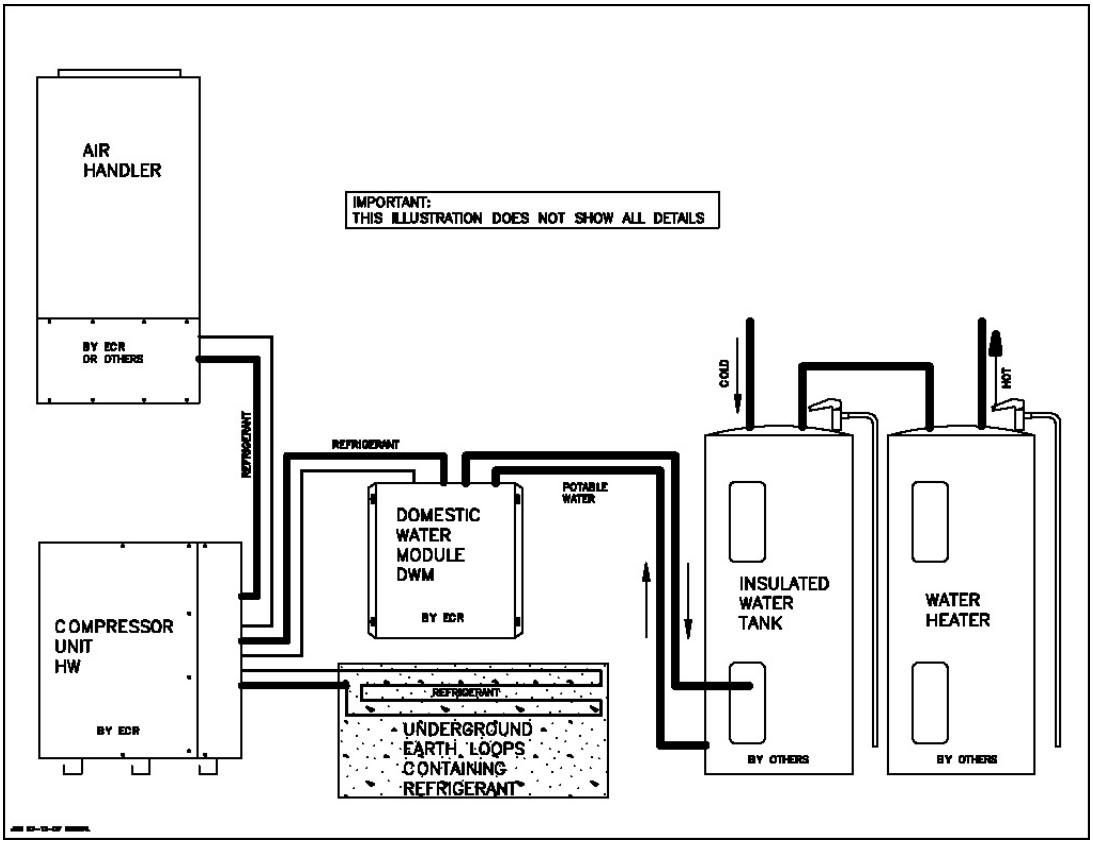


Figure 37b. HW Piping

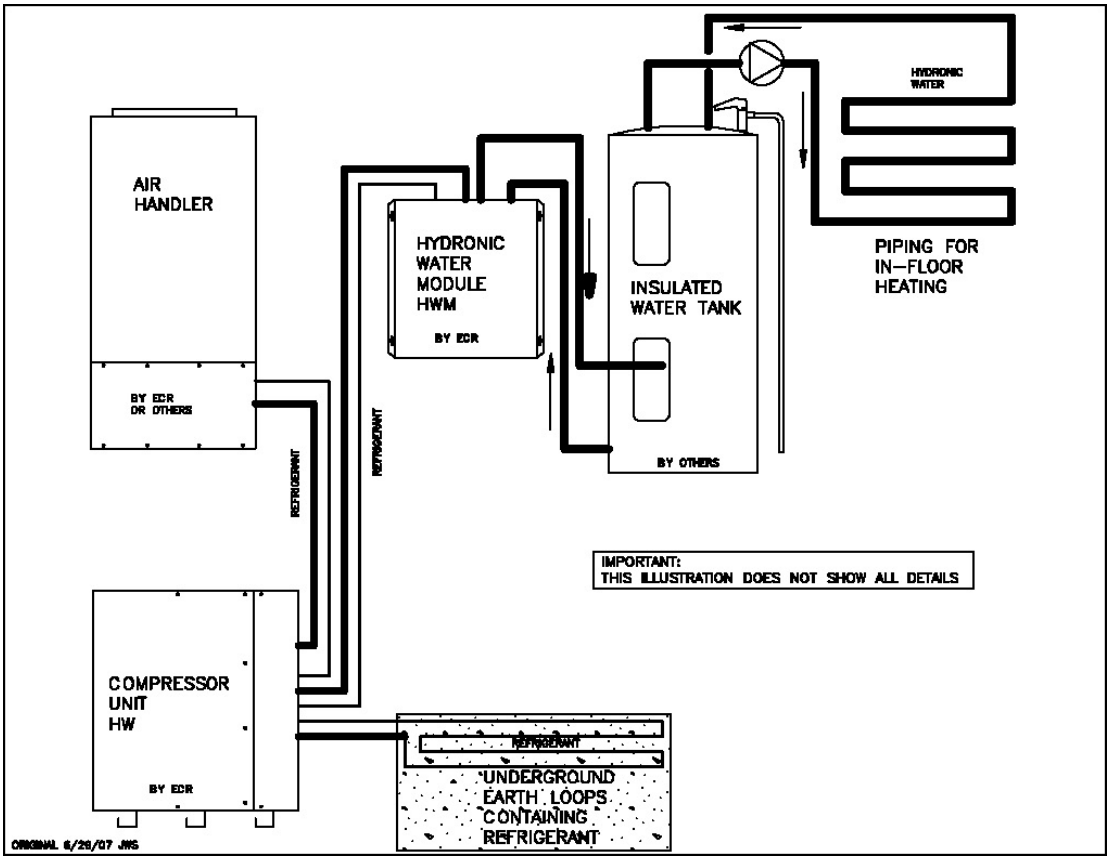


FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 36, 38a and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 36, 38a; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to DWM)	Spec Guide Figure 65
8.	Water pipe, fittings and insulation from DWM to water storage tank	Figure 46; Spec Guide section 3F2a and Figures 52, 63
9.	Water filtration system	Spec Guide section 3F2a and Figure 64
10.	Domestic water heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide section 3E4a
11.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 38a. HW Air Heating and Domestic Hot Water by Priority Heating with DWM

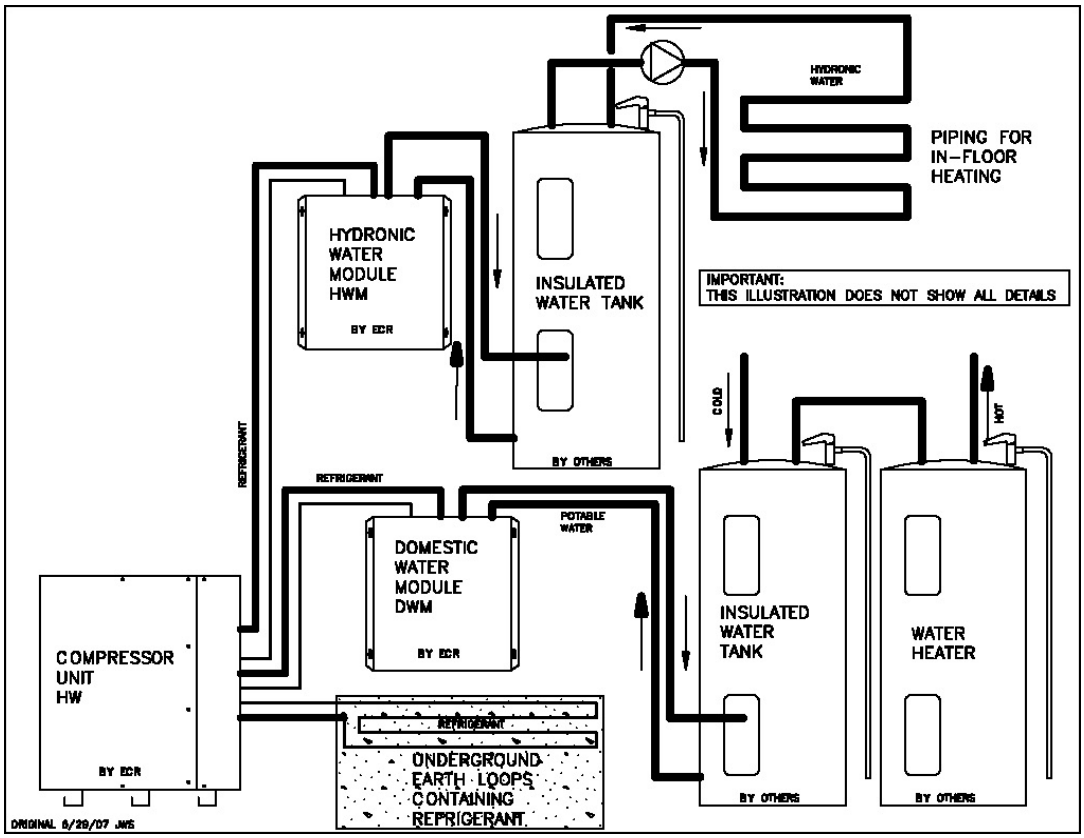
CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 36, 38b and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 36, 38b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to HWM)	Spec Guide Figure 51
8.	Water pipe, fittings and insulation from HWM to water storage tank	Figure 46; Spec Guide Figures 48a, 52
9.	Freeze protection switch	Spec Guide Figure 48a
10.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide section 3E4a
11.	Water storage tank	Spec Guide section 3E2
12.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 38b. HW Air Heating and Radiant Panel Hydronic Heating



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 36, 38c and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to HWM)	Spec Guide Figure 51
5.	Pipe insulation (refrigerant)	Figures 36, 38c; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Line set (compressor to DWM)	Spec Guide Figure 65
8.	Freeze protection switch	Spec Guide Figure 48a
9.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide section 3E4a
10.	Primary circuit water pipe, fittings and insulation	Figure 46; Spec Guide Figures 48a, 52
11.	DWM to storage tank water piping, insulation and fittings	Figure 46; Spec Guide section 3F2a and Figure 64
12.	Water filtration system	Spec Guide Section 3F2a and Figure 34
13.	Water storage tank	Spec Guide section 3E2
14.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 38c. HW Radiant Panel Hydronic Heating and Domestic Hot Water by Priority Heating with DWM

CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

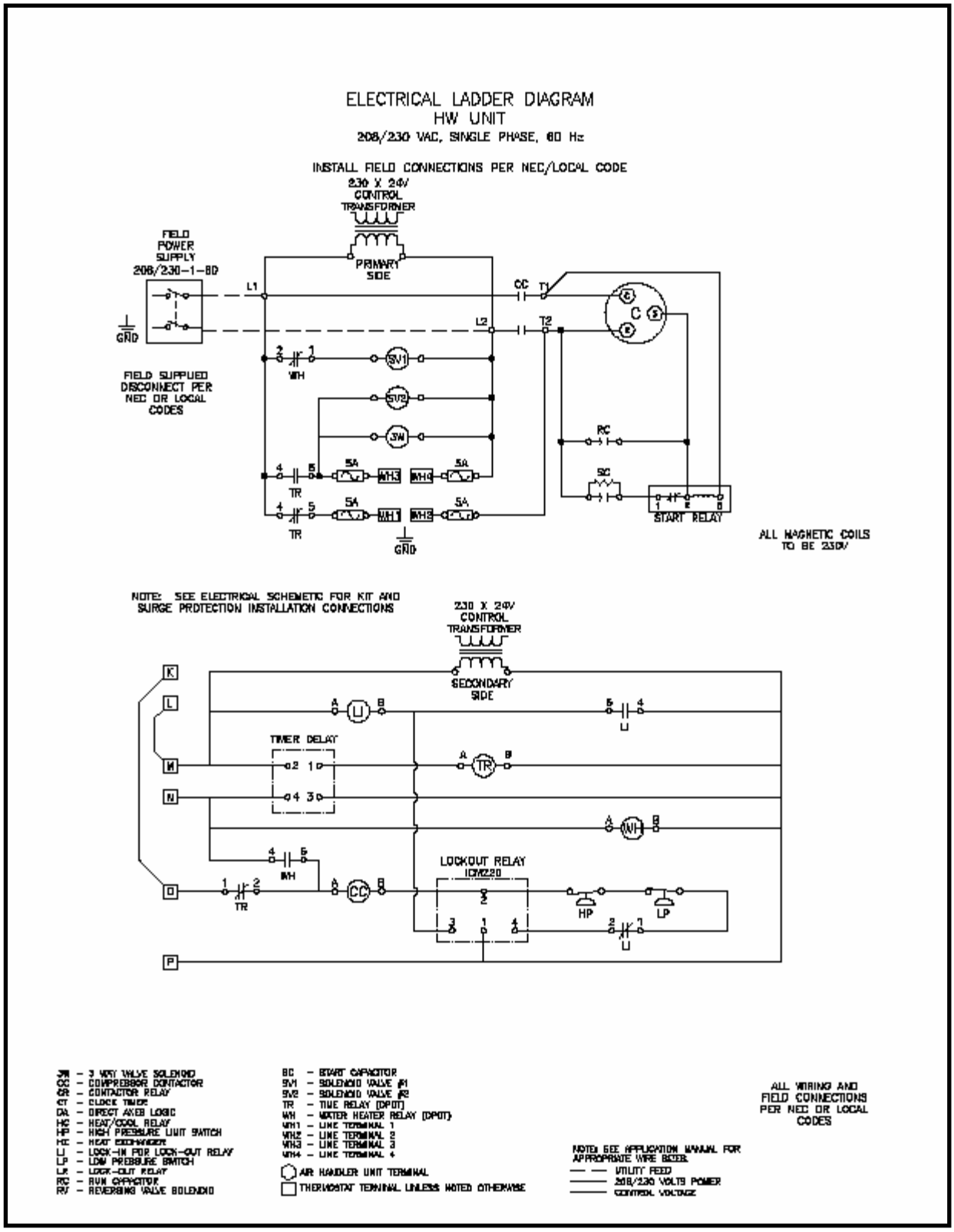


Figure 39. HW Electrical Ladder Diagram (230-1-60)

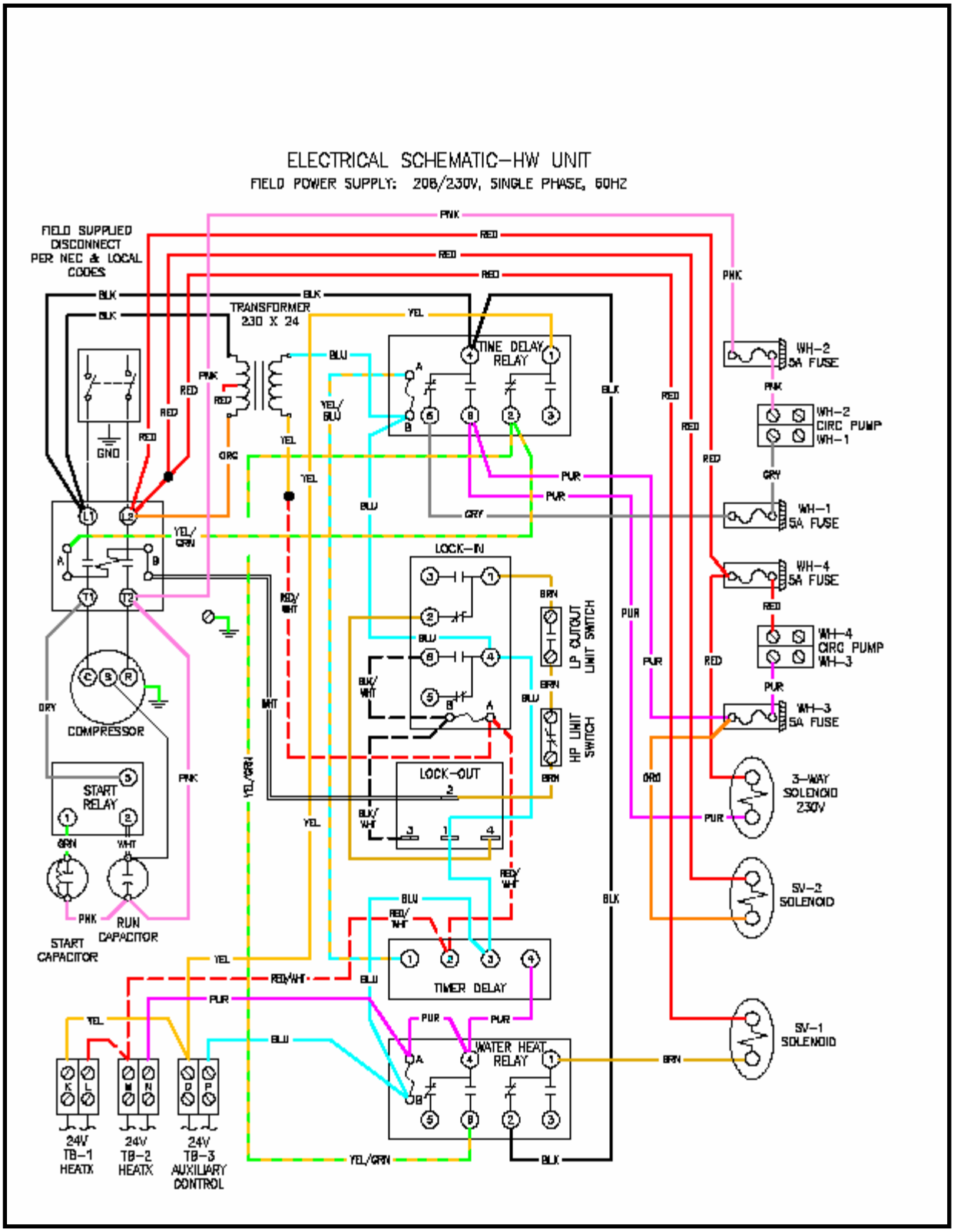


Figure 40a. HW Electrical Schematic (230-1-60)

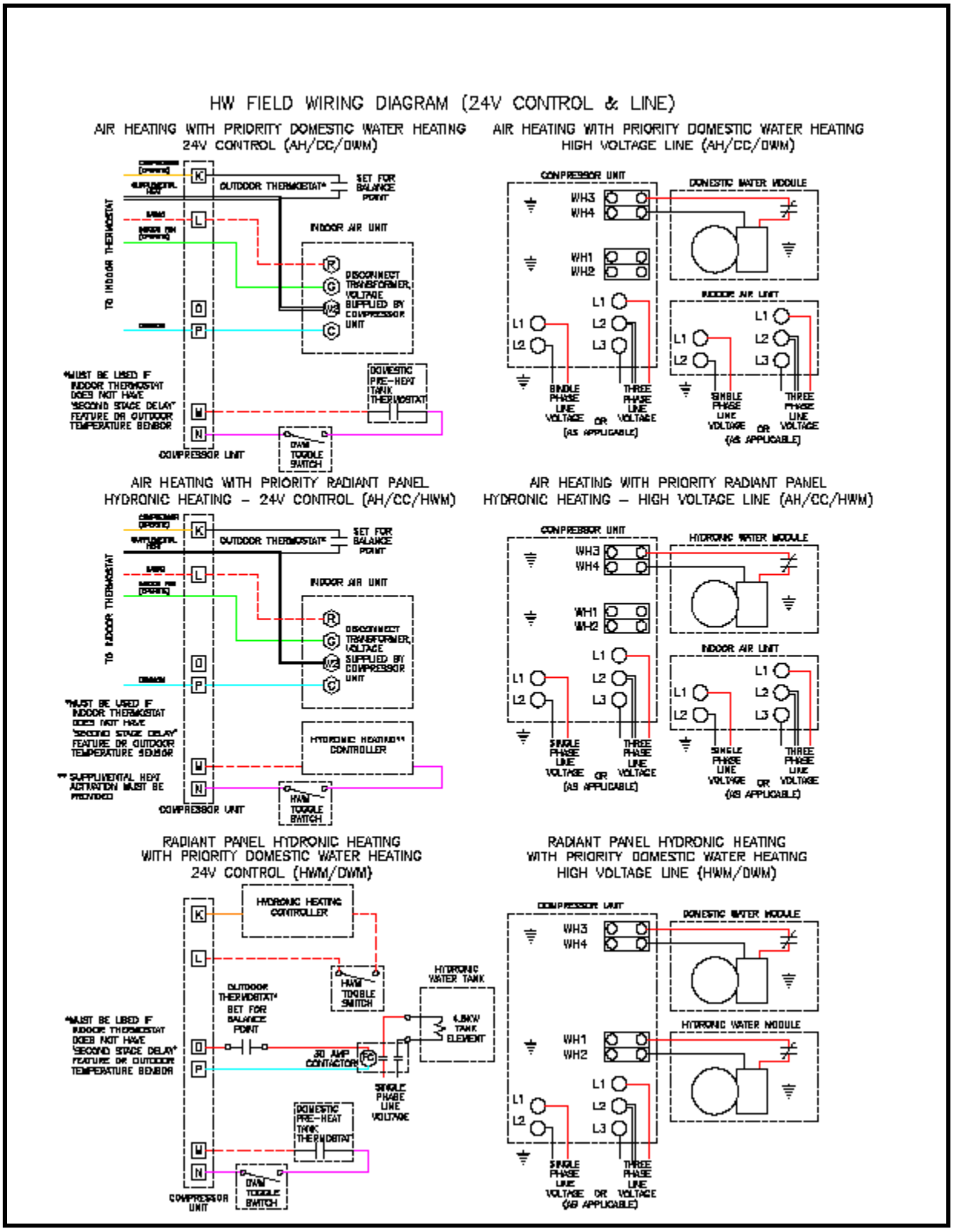
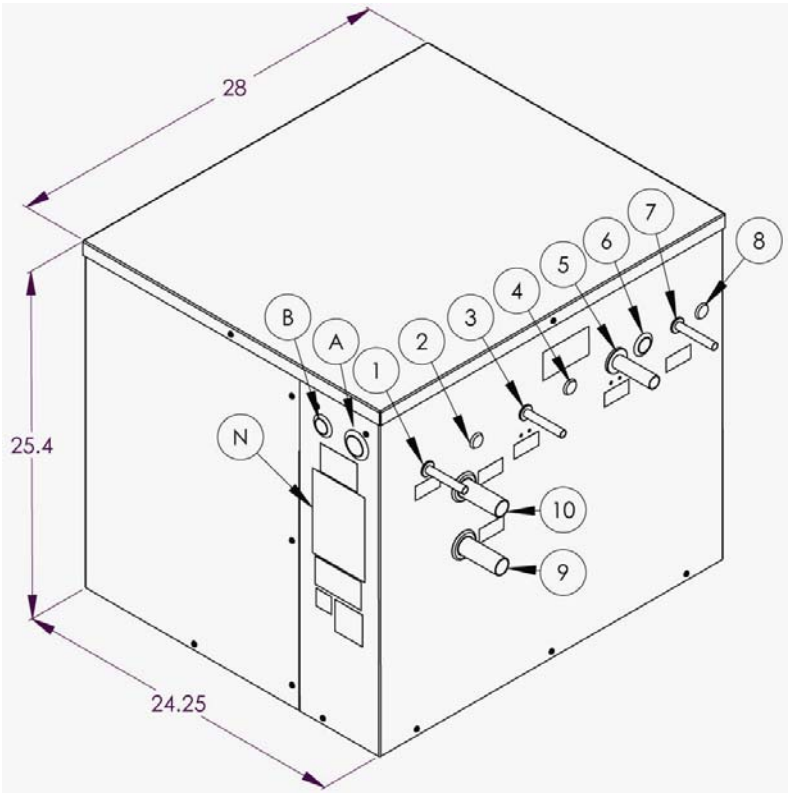


Figure 40b. HW Field Wiring Diagram



***includes 1/2" cabinet base standoffs**

PORT	FUNCTION	CONNECTION TYPE	SIZE (inches)							
			-018	-024	-030	-036	-042	-048	-060	-072
A[1]	Electrical, Power	1-1/4" Hole	1	1	1	1	1	1	1	1
B[1, 2]	Electrical, Control	7/8" Hole	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
1	DWM/AH/CC Liquid	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
2	Plugged	--	--	--	--	--	--	--	--	--
3	EL Liquid*	MSWT, OD	5/16	3/8	3/8	3/8	1/2	1/2	1/2	5/8
4	Plugged	--	--	--	--	--	--	--	--	--
5	EL Vapor*	MSWT, OD	5/8	3/4	3/4	3/4	7/8	7/8	1-1/8	1-1/8
6	Plugged	--	--	--	--	--	--	--	--	--
7	DWM/AH/CC Vapor	MSWT, OD	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
8	Plugged	--	--	--	--	--	--	--	--	--
9	HWT Return	MSWT, OD	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8
10	HWT Supply	MSWT, OD	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8

N = Nameplate and other information
1 = Nominal electrical connector sizes
2 = Two additional electrical control ports on opposite side, same size
* Line set sizes with provided compressor unit adapters

LEGEND
AH = Air Handler
CC = Cased Coil
EL = Earth Loop
HWM = Hydronic Water Module
DWM = Domestic Water Module
HWT = Hydronic Water Tank
DWT = Domestic Water Tank

Figure 41. HWW Connections

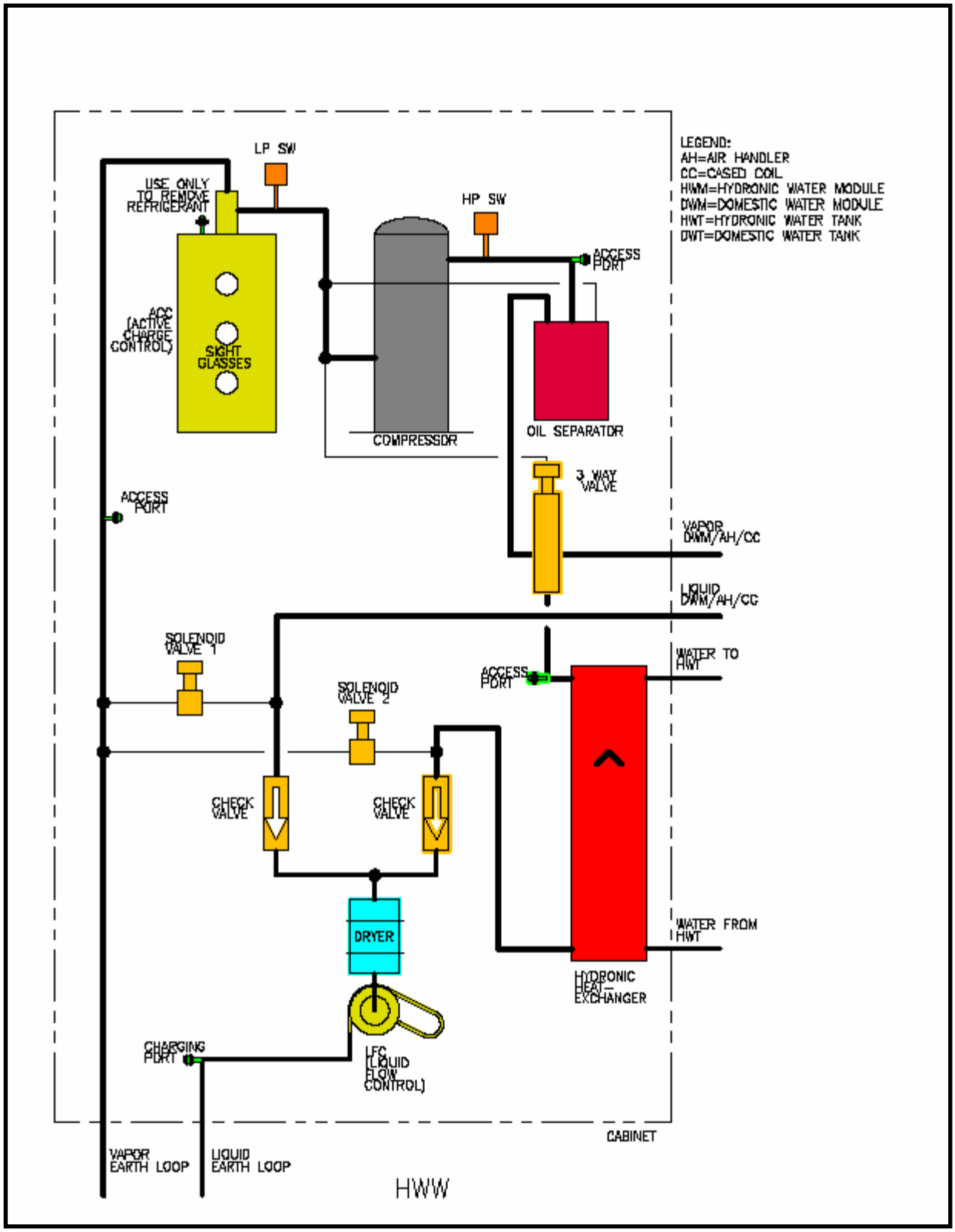


Figure 42a. HWW Internal Flow Schematic

MODEL HWW
COMPRESSOR UNIT PIPING

TUBING LENGTHS MAYBE ELONGATED FOR ILLUSTRATION PURPOSES

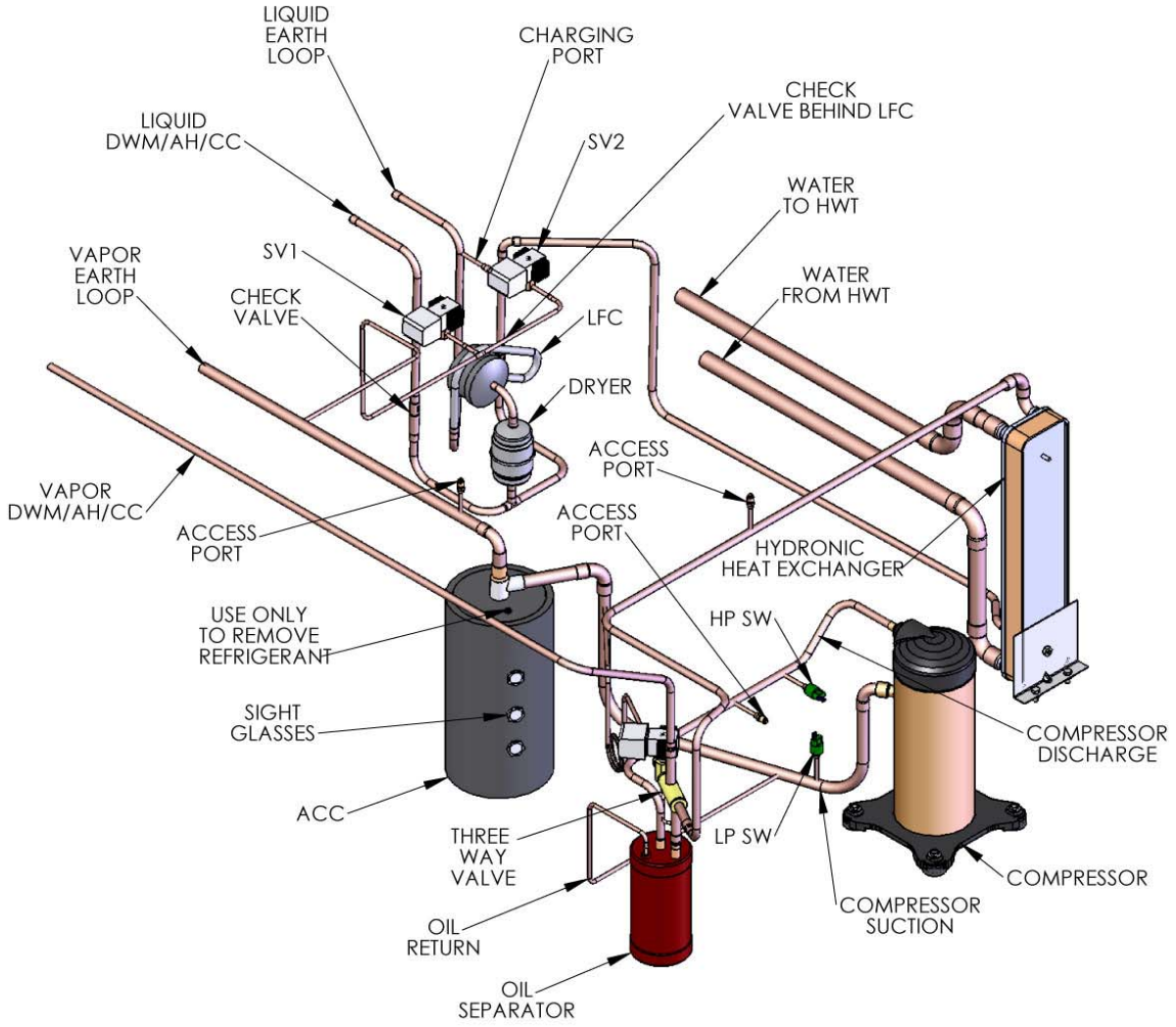
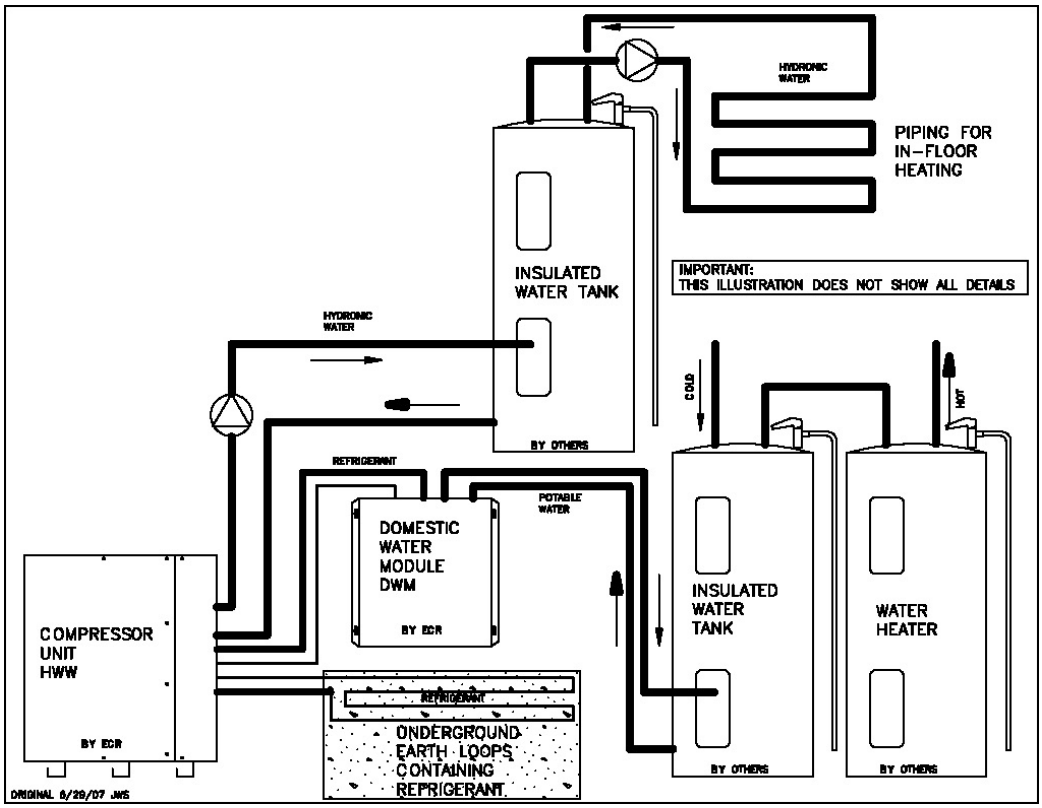


Figure 42b. HWW Piping

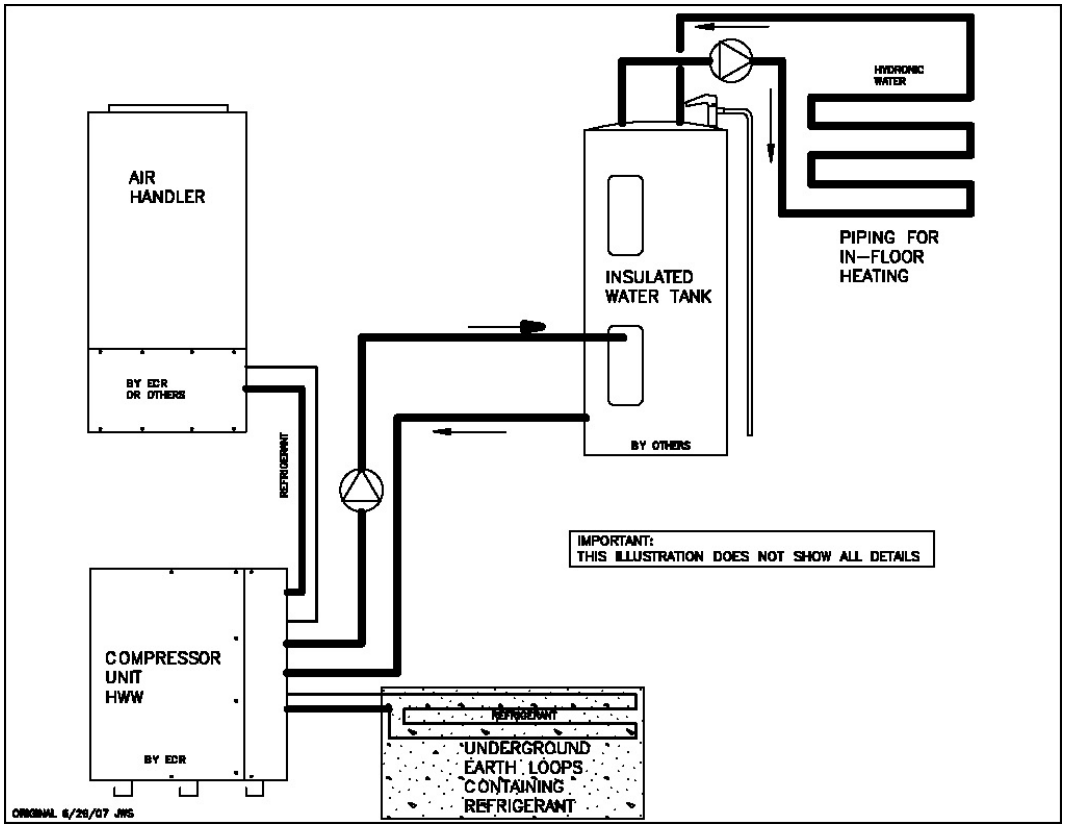


FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 41, 43a and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to DWM)	Spec Guide Figure 65
5.	Pipe insulation (refrigerant)	Figures 41, 43a; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Primary circuit water solution circulating pump	Spec Guide section 3E3
8.	Freeze protection switch	Spec Guide Figure 48a
9.	Hydronic (and domestic) heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide section 3E4a
10.	Primary circuit water pipe, fittings and insulation	Figure 46; Spec Guide Figures 48b, 52
11.	DWM to storage tank water piping, insulation and fittings	Figure 46; Spec Guide section 3F2a and Figure 64
12.	Water filtration system	Spec Guide Section 3F2a and Figure 34
13.	Water storage tank	Spec Guide section 3E2
14.	Line set (compressor to earth loop)	Spec Guide Figure 40

Figure 43a. HWW Radiant Panel Hydronic Heating and Domestic Hot Water by Priority Heating with DWM

CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.



FIELD SPECIFIED & SUPPLIED PARTS, EQUIPMENT AND MATERIALS		
ITEM	**DESCRIPTION**	**REFERENCE**
1.	Electrical disconnects, breakers and power, control and thermostat wire	Figure 47; Spec Guide Figures 27, 43a, 44a, 68; local codes
2.	Nitrogen and 15% brazing alloy	Figures 41, 43b and section 3B
3.	Refrigerant, 5 # per ton	Spec Guide section 1A
4.	Line set (compressor to air handler)	Spec Guide Figure 40
5.	Pipe insulation (refrigerant)	Figures 41, 43b; Spec Guide Figure 40
6.	Condensate pan, vibration pads	Spec Guide section 3A5
7.	Primary circuit water solution circulating pump	Spec Guide section 3E3
8.	Freeze protection switch	Spec Guide Figure 48a
9.	Hydronic heating remote bulb temperature controller Johnson Model A19ABC-4C	Spec Guide section 3E4a
10.	Primary circuit water pipe, fittings and insulation	Figure 46; Spec Guide section 3F2a and Figure 64
11.	Water storage tank	Spec Guide section 3E2
12.	Line set (compressor to earth loops)	Spec Guide Figure 40

Figure 43b. HWW Air Heating and Radiant Panel Hydronic Heating

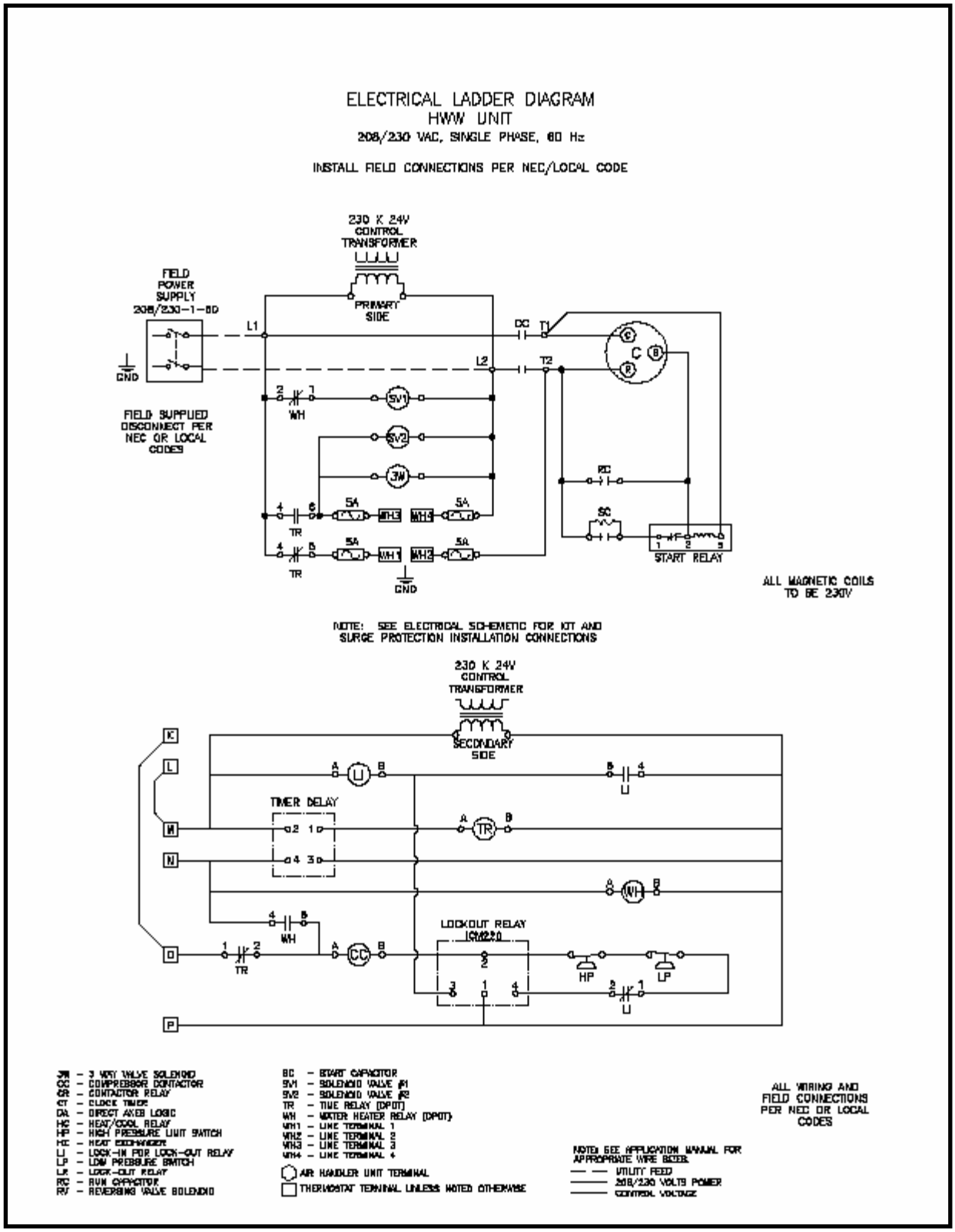


Figure 44. HWW Electrical Ladder Diagram (230-1-60)

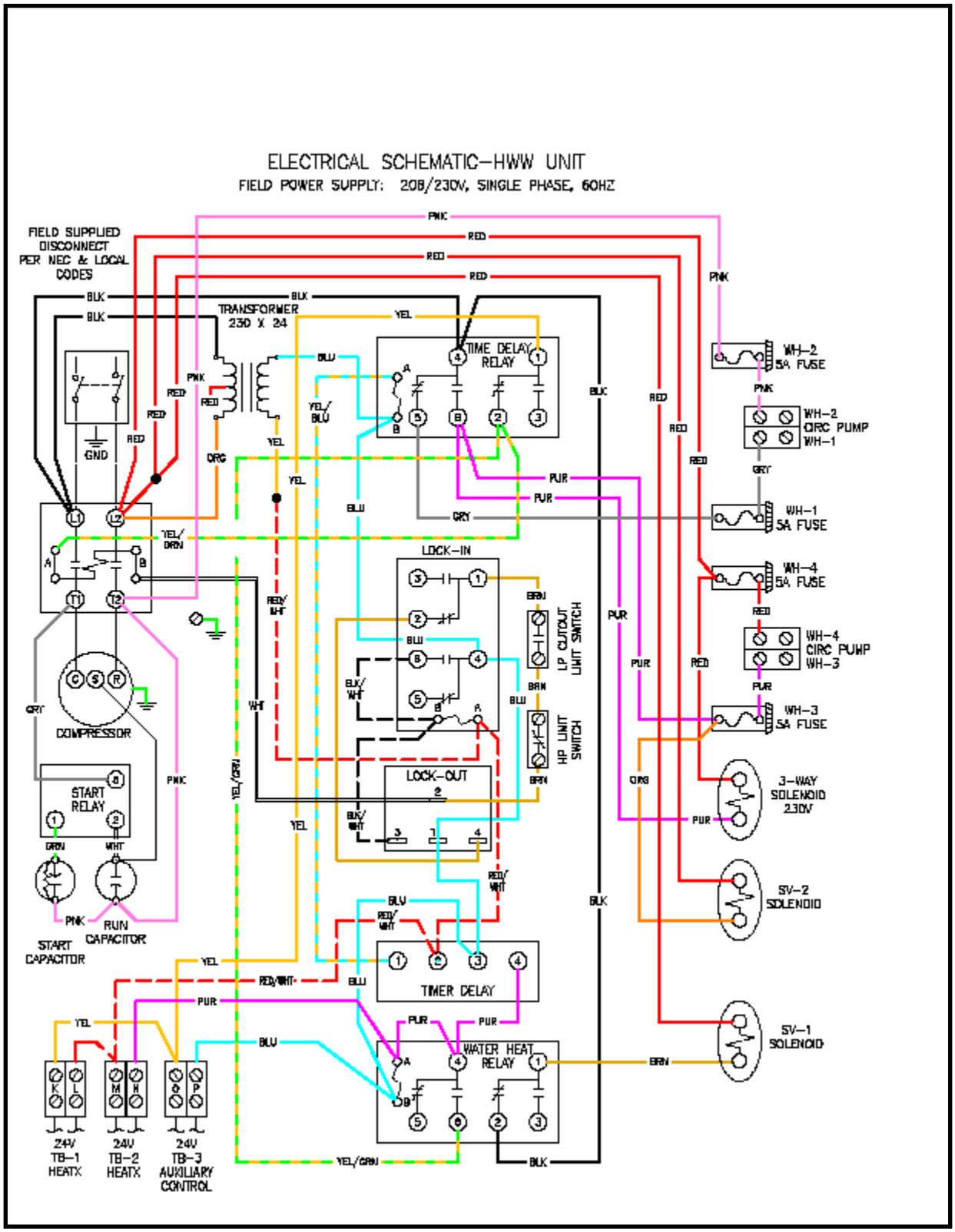


Figure 45a. HWW Electrical Schematic (230-1-60)

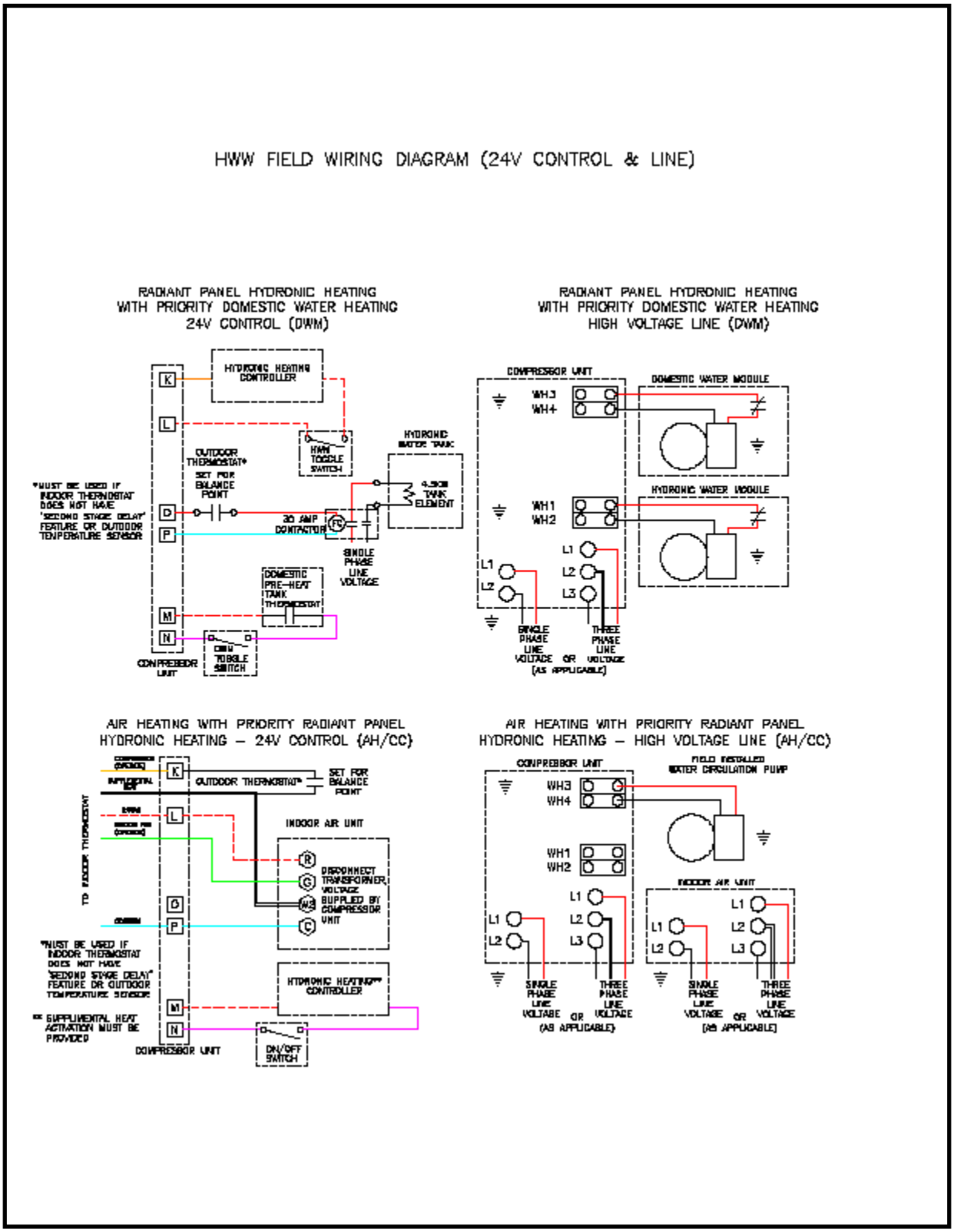


Figure 45b. HWW Field Wiring Diagram

C. Installation

Compressor units are to be placed in accordance with the guidelines in Spec Guide section 3A5.

Compressor units are shipped from the factory with a low pressure nitrogen holding charge. Carefully relieve the holding charge when the compressor unit is being prepared to connect refrigerant system piping.

All brazing is to utilize the **Nitrogen Brazing Process** as described in Spec Guide section 3A6. 15% silver brazing alloy is to be used on all braze joints.

It may be desirable to install service valves on the compressor unit earth loop connections. **Service valve kits are available from EarthLinked Technologies and are listed on the EarthLinked compressor unit price pages for each compressor model.**

IMPORTANT

All compressor units come from the factory equipped with a compressor unit to earth loop adapter kit (2 adapters) for the liquid and vapor connections at the compressor unit.

All earth loop systems come from the factory equipped with a earth loop to compressor adapter kit (2 adapters) for the liquid and vapor connections at the earth loop manifolds.

When EarthLinked systems are installed (1) in commercial load applications, or (2) in residential load applications where heating and cooling modes of operation occur regularly within a 24 hour period of time, combined with (3) the local earth temperature is 70°F or above, the Heating Performance Enhancement Kit is required for field installation on the compressor unit to ensure peak performance. It is listed on the compressor price pages.

For SW series compressor units that are being installed with a hydronic water module for heating and a DX air handler for cooling as shown in Figure 23b, it is necessary to install the SWT Timer Kit which can be ordered from the SW compressor price pages.

For SC, SD and SCW Compressor Units used in radiant panel hydronic heating applications, a pump wire kit is required and listed on the compressor price pages.

For SW Compressor Units applications having radiant panel hydronic heating (with HWM) and the domestic water heating (with DWM) from one compressor unit, a pump wire kit is required and listed on the compressor price pages.

4. Air Handler/Cased Coil

A. Technical Information

Technical information on the EarthLinked® AFY and AVY series air handlers and the CCY series cased coils appears in Spec Guide section 3C1.

Use of other manufacturer's air handlers and cased coils depends on the specific equipment meeting criteria detailed in Spec Guide 3C2.

All air handlers and cased coils that are field supplied must be converted in accordance with Spec Guide section 3C2c.

B. Supplemental Electric Heat

All DX air handlers utilized as a component in an EarthLinked® warm air heating system must be equipped and operated with supplemental heat in accordance with the following statement:

IMPORTANT

For an EarthLinked warm air heating system utilizing a DX air handler, it is MANDATORY to install supplemental heat of at least 5 KW (17,000 BTUH) to be operated on the second stage of an EarthLinked Technologies or field supplied thermostat, using a properly calibrated outdoor temperature sensor, as appropriate.

For an EarthLinked hydronic heating system, it is MANDATORY to install supplemental heat of a least 5 KW (17,000 BTUH) in the primary circuit water storage tank, to be operated by a thermostat sensing tank water temperature.

Failure to do the above will void the EarthLinked system warranty.

It is highly recommended for an EarthLinked warm air heating system, that supplemental heat, equivalent to at least 90% of the design heating load, be installed for operation as emergency heat, in DX air handlers.

All EarthLinked® air handlers are factory equipped with supplemental heat that is rated at least 90% of the nominal tonnage rating for the matching compressor unit, as listed in Figure 1.

5. Chilled Water Air Handlers

Chilled water air handlers are utilized to provide air cooling in the EarthLinked® system application illustrated in Figures 8b, 13b, 18c and 23c.

The performance tables in Spec Guide Appendix A provide compressor unit performance for leaving chilled water temperatures over a range of 42°F to 60°F.

Chilled water air handlers are field specified and supplied. Selection and installation of a chilled water air handler should be made only after careful review of the manufacturer's information to assure good system performance.

Several USA chilled water air handler manufacturers offering UL Listed products are listed in Spec Guide Section 3D.

IMPORTANT

When utilizing a chilled water air handler as a component of the EarthLinked system, the addition of anti-freeze to the water circuit is necessary for freeze protection. See Spec Guide section 3E1 for details.

When using a chilled water heat exchanger in combination with an EarthLinked heating and cooling system, it is mandatory to install a low temperature switch on the leaving water connection as shown in Spec Guide Figures 48a and 48b. The Switch is to be set at 38°F and controls the compressor unit.

6. Primary Circuit Radiant Panel Hydronic Heating & Chilled Water Cooling

A. Water Storage Tank & Supplemental Electric Heat

Water storage tank sizing is in Spec Guide section 3E2.

IMPORTANT

.For an EarthLinked hydronic heating system, it is MANDATORY to install supplemental heat of a least 5 KW (17,000 BTUH) in the primary circuit water storage tank, to be operated by a thermostat sensing tank water temperature.

Failure to do the above will void the EarthLinked system warranty.

If the water storage tank is utilized for **hydronic heating only**, a two element standard height water heater will be adequate. However, the water heater may have to be commercial, to accept a 5 KW heating element. (The lower heating element port is utilized as a water connection.)

If the water storage tank is utilized for **hydronic heating and chilled water cooling**, a three element standard height water heater will be required. This requirement will most likely necessitate use of a commercial water heater with single 5 KW heating element. (The lower heating element port is used as a water connection and the uppermost heating element port is used for the chilled water temperature controller.)

B. Circulating Pump & Piping

The circulating pump and piping requirements for the EarthLinked systems (1) using the hydronic water module and (2) the field-supplied circulating pump required with the SCW, HCW and HWW compressor units is detailed in Spec Guide section 3E3.

Specific piping and fitting details for the primary water solution circuit will be dependent upon local codes and industry practices. Figure 46 provides piping guidelines to enable the HWM or compressor unit heat exchanger to be cleaned, and to enable removal of the HWM or compressor unit for servicing. Additional fittings and piping are to be in accordance with local codes and industry practice.

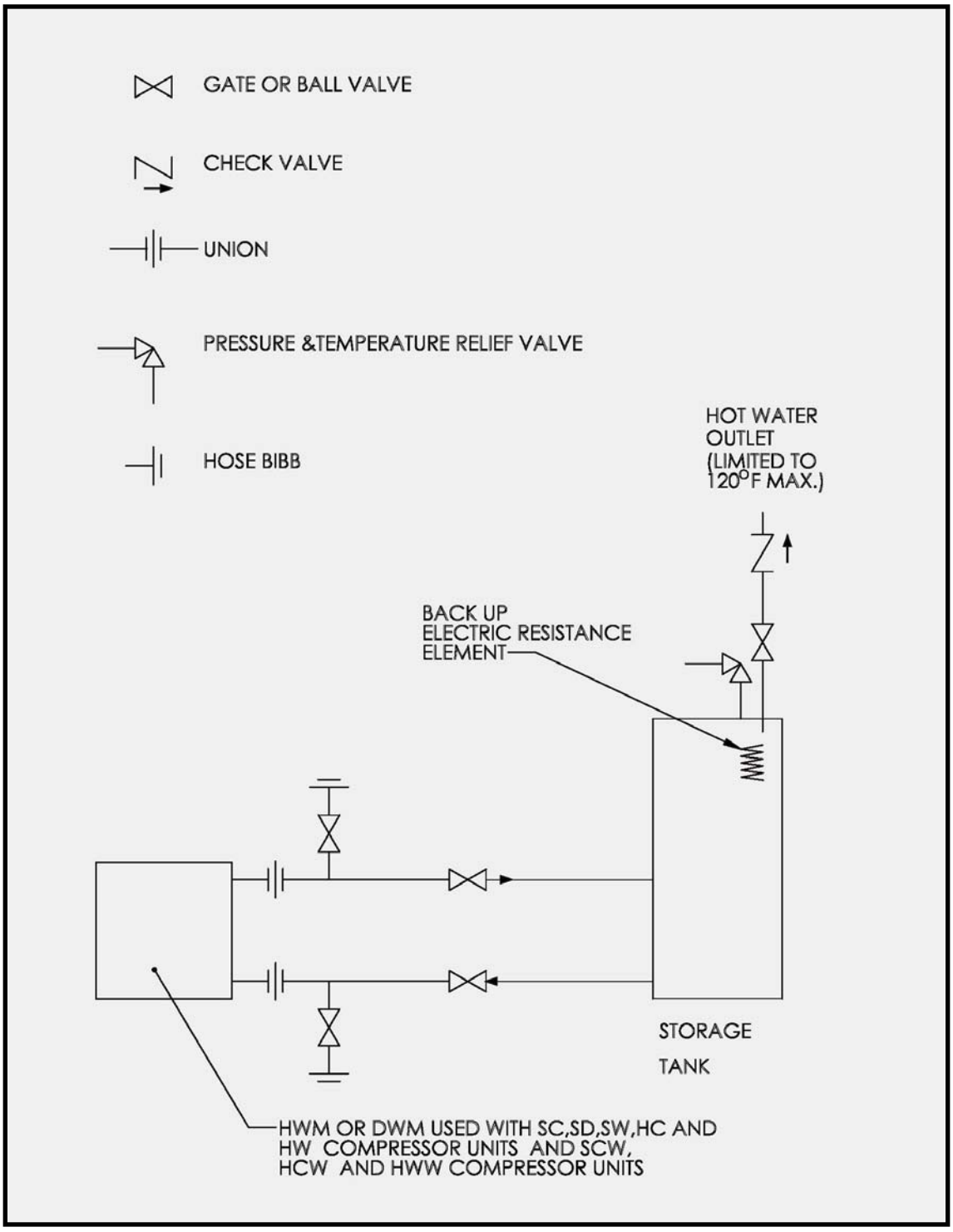


Figure 46. Typical Primary Circuit Plumbing

The brazed plate heat exchangers in the HWM and the SCW, HCW and HWW compressor units are to be checked for water side performance on a periodic basis. If there is evidence of scale build-up in the water side passages, heat exchanger maintenance is required and detailed in Appendix C.

Figure 47 illustrates the typical interface wiring for the hydronic (and domestic) water modules (HWM and DWM).

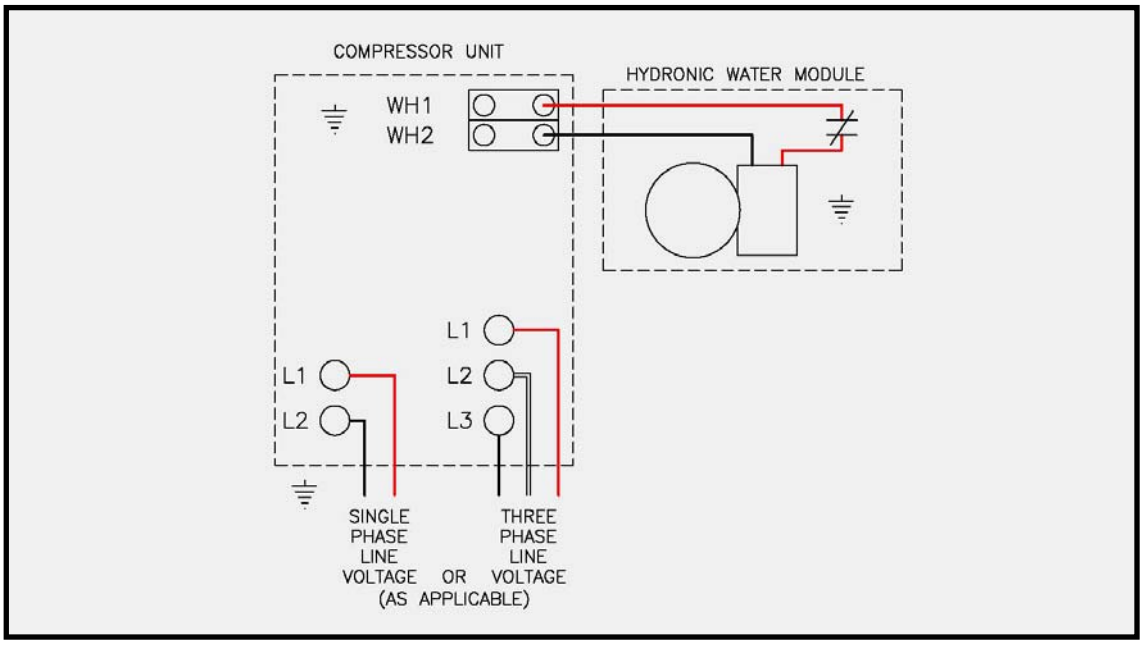


Figure 47. HWM and DWM Interface Wiring

C. Controls

The temperature controls for hydronic heating and chilled water cooling are described in Spec Guide section 3E4.

Figure 48 illustrates typical compressor unit electrical connections for hydronic and chilled water temperature controls.

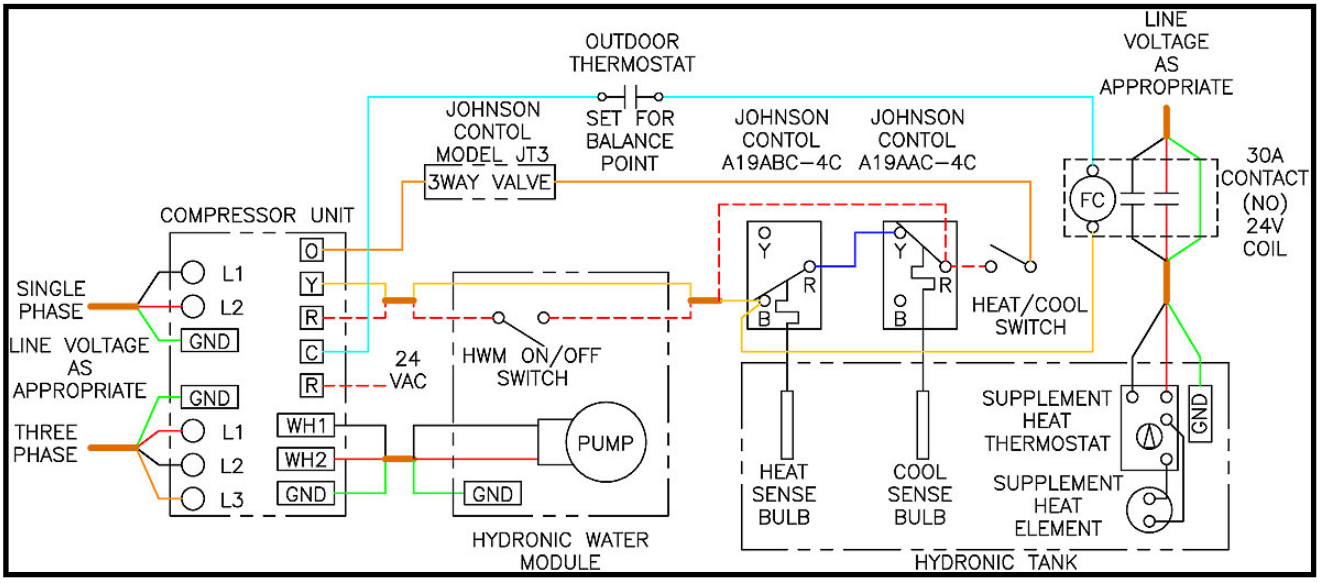


Figure 48. Typical Hydronic and Chilled Water Temperature Control Electrical Interface

7. Domestic (Potable) Water Heating

A. Desuperheater Water Heating

The Model DESPK desuperheater is fully described in Spec Guide section 3F1, in terms of its controls and functions.

If the DESPK desuperheater is installed in the field, the piping diagram is shown in Spec Guide Figure 63.

When the model DESPK desuperheater is installed as a retrofit, it is shipped with a complete set of installation and start-up instructions and an installation kit which contains all necessary parts for installation.

Figure 49 illustrates a retrofit model DESPK Desuperheater electrical interface with a compressor unit.

CAUTION

Domestic water piping to and from any EarthLinked desuperheater, domestic water module or SD compressor unit must be freeze protected for the field-specific installation. Failure for the installer to do so may result in equipment and property damage.

B. Domestic Water Module (Priority) Water Heating

Examples of the use of the Domestic Water Module (DWM) in EarthLinked heating and cooling systems applications is seen in Figures 23a, 23c, 28c, 38a, 38c and 43a.

The piping and filtration system for the DWM is described in Spec Guide section 3F2 and Spec Guide Figures 64 through 68.

The interface wiring for the Domestic Water Module and compressor unit is shown in Figure 47.

The brazed plate heat exchanger in the DWM is to be checked for water side performance on a periodic basis. If there is evidence of scale build-up in the water side passages, heat exchanger maintenance is required and detailed in Appendix C.

Maintenance of the water filtration system is detailed in Appendix D.

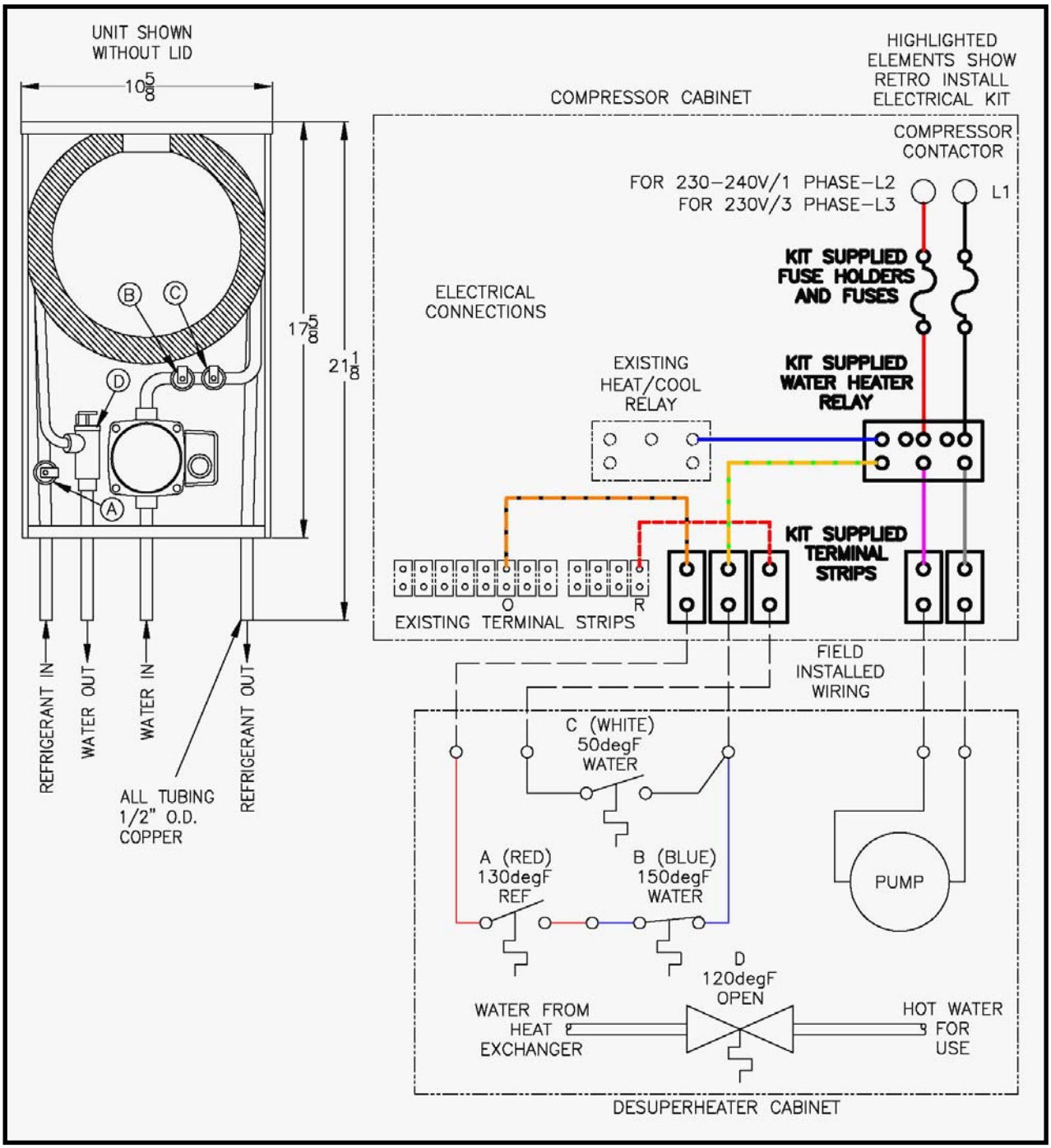


Figure 49. Model DESPK Desuperheater Electrical Interface with Compressor Unit

8. Comfort Control

The EarthLinked thermostats described in Spec Guide section 3G are available through EarthLinked Technologies on the Comfort Control price pages. The Robershaw and Honeywell model numbers also appear on the price pages to enable purchase of the same thermostat through a local HVAC distributor.

Because the EarthLinked® Technologies TR94 (Robershaw) thermostat is not compatible with a fossil fuel furnace as-is, Figure 50 illustrates the control wiring schematic utilizing a field supplied relay, to make the TR94 compatible with a fossil fuel furnace.

Also shown in Figure 50 are control wiring schematics for the ECR TR97 thermostat and a typical field supplied thermostat applied to a fossil fuel furnace. Note the use of an outdoor thermostat for field supplied wall thermostats.

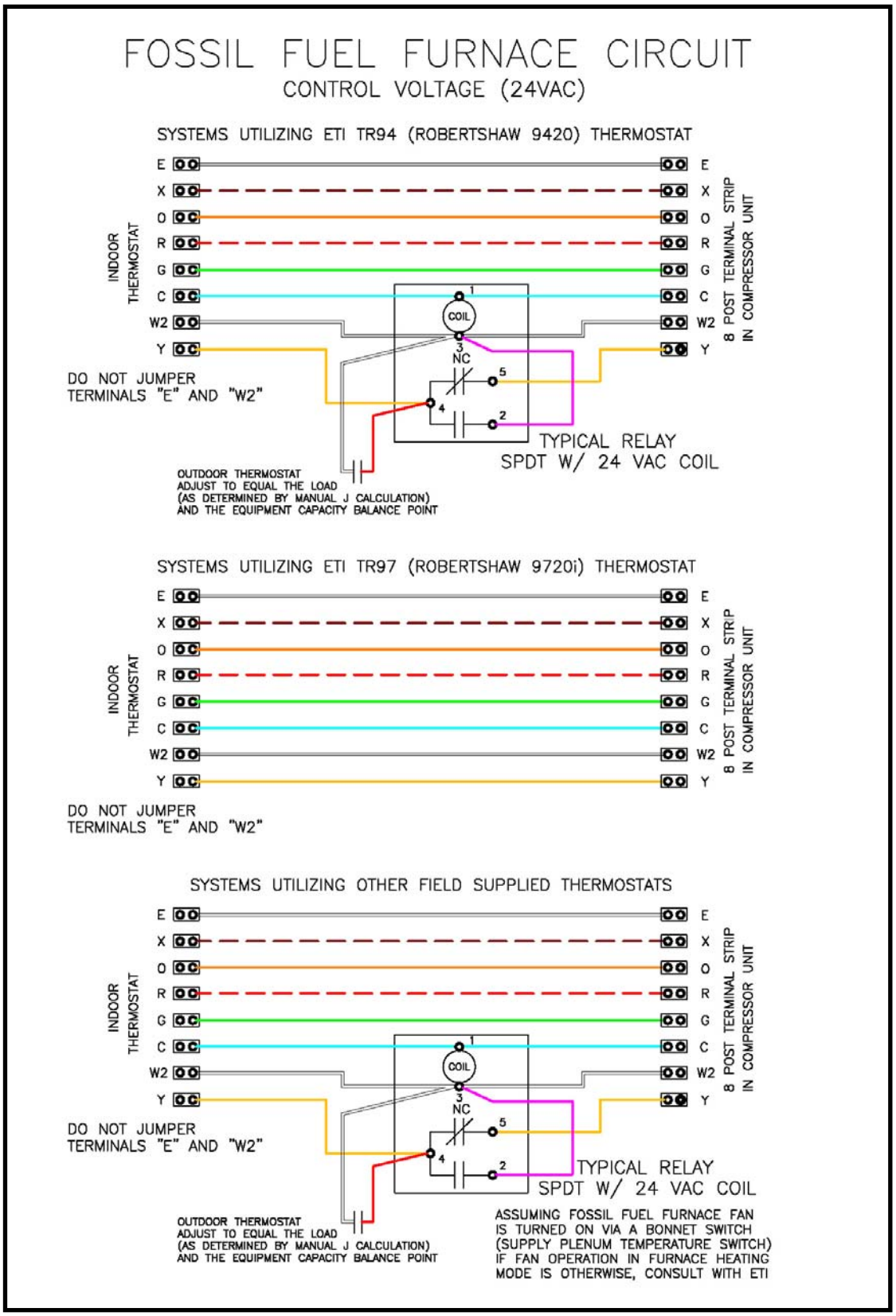


Figure 50. Control Wiring Schematics for TR94, TR97 and Field Supplied Thermostats – Fossil Fuel Application

9. System Start-up

A. Evacuation/Charging

IMPORTANT

Proper installation of the EarthLinked Heating and Cooling System is essential to its reliable performance. All EarthLinked systems must be installed by an authorized, trained technician who has successfully completed the training class and passed the final examination. Installation must be made in accordance with the instructions set forth in this manual and the EarthLinked Technical Manual. Failure to provide installation by an authorized, trained installation in a manner consistent with the subject manual will void and nullify the limited warranty coverage for the system.

IMPORTANT

Prior to evacuating the EarthLinked Heating and Cooling System, ensure the electrical power to the system is "OFF."

1. SC, SD, SCW, HC, HCW, HW and HWW Models refer to Figure 51 and the following description:

a. Evacuation and Initial Charge

1. Carefully vent the nitrogen charge from the system.
2. Connect the gauge manifold set as shown in Figure 51.
3. Connect a good quality micron gauge and vacuum pump, of at least 6 CFM capacity, to the gauge block as shown in Figure 51. This can be done using a commercially available vacuum pump manifold.

   If there is an additional pressure tap available on the earth loop liquid line outside the compressor cabinet, it is preferable to attach the micron gauge to it.

IMPORTANT

Do not energize the compressor while system is under vacuum. This will cause damage to the compressor.

4. Connect the refrigerant hose from the refrigerant container to the Charging Port. **Container must have at least 7 pounds of NEW refrigerant per ton of capacity before charging.**
5. Purge refrigerant hose of air, tighten charging port connection, and turn refrigerant container valve off completely.
6. **Evacuate system to 400 microns pressure.**

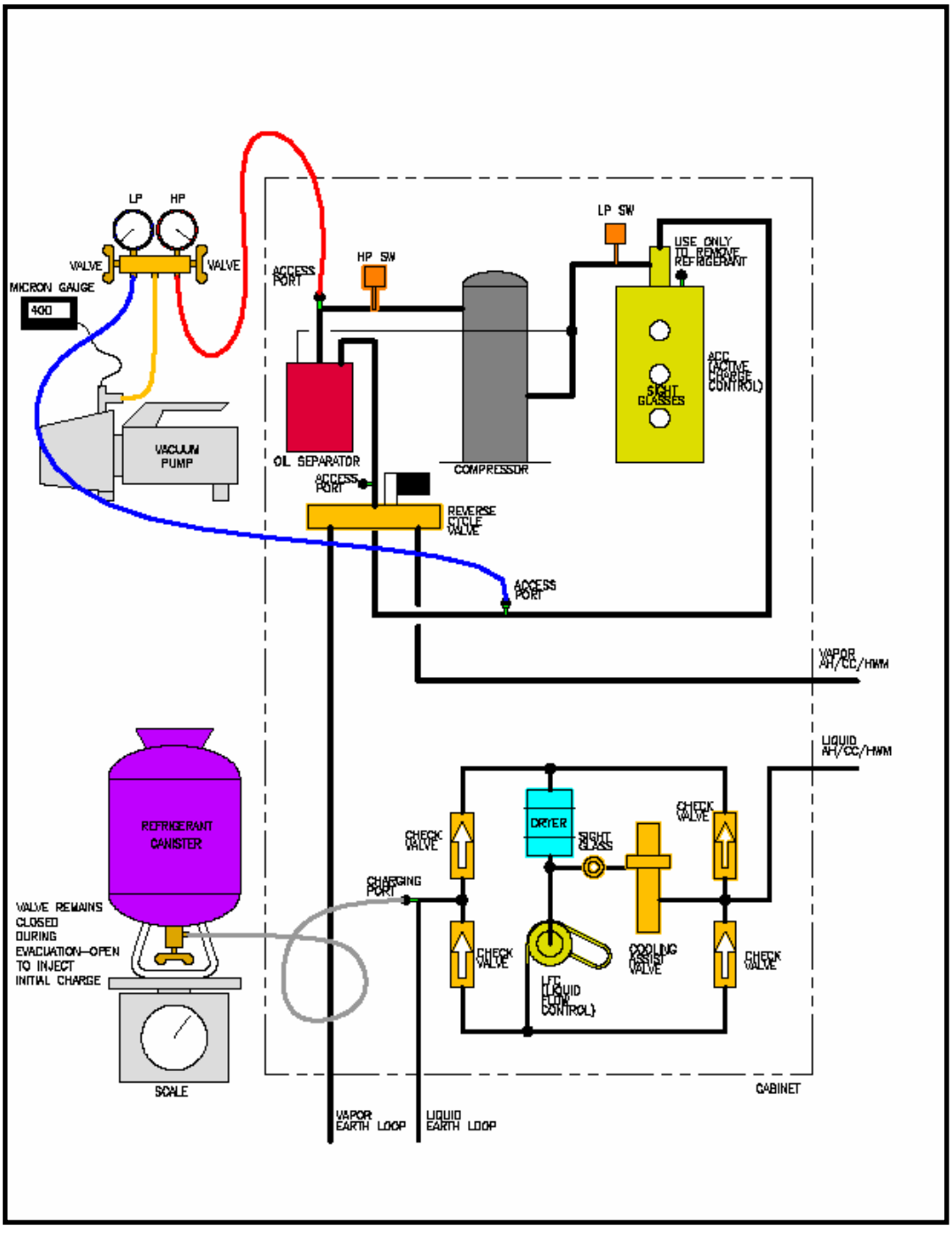


Figure 51. Typical Evacuation & Initial Charge Set-up for SC, SD, SCW, HC, HCW, HW and HWW Compressor Models (SC model shown)

WARNING

Inhalation of high concentrations of refrigerant gas vapor is harmful and may cause heart irregularities, unconsciousness or death. Vapor reduces oxygen available for breathing and is heavier than air. Decomposition products are hazardous. Liquid contact can cause frostbite. Avoid contact of liquid with eyes and prolonged skin exposure. Liquid and gas are under pressure. Deliberate inhalation of refrigerant gas is extremely dangerous. Asphyxiation can occur without warning due to lack of oxygen. Before using, read the material safety data sheet.

IMPORTANT

Do not charge system or proceed further until 400 microns have been achieved.

If necessary contact EarthLinked® Technologies Technical Support at 863-701-0096.

7. After 400 microns pressure has been achieved, close both valves completely on the gauge manifold set.

8. Turn the vacuum pump off and disconnect the utility hose from the vacuum pump. The micron gauge is connected to the vacuum pump manifold and will be disconnected from the utility hose, also.

   Disconnect micron gauge from earth loop liquid line tap outside the compressor cabinet, as appropriate.

9. Slowly open the refrigerant container valve and **inject liquid refrigerant into the charging port** as shown in Figure 51.

10. **For HC, HCW, HW and HWW Compressor Units:** Charge with liquid refrigerant until **3 pounds** of refrigerant per ton of system capacity, has entered the system.

    For SC, SD and SCW Compressor Units: Charge with liquid refrigerant until **5 pounds** of refrigerant per ton of system capacity, has entered the system.

    Liquid entering the system at the charging port goes directly to the system earth loops. It does not go to the compressor. Should the pressures equalize and prevent the intended charge from entering completely, terminate the process of initial charging.

11. When the initial refrigerant charge (see item 10 above) has entered the system, close the refrigerant container valve and disconnect the refrigerant hose from the charging port.

12. The system has now been initially charged.

b. Final Charge

It is critical to control the conditions under which the compressor unit operates while final charging the system.

Air Handler Systems

If heating is provided by one of the following DX air handler systems, as shown in Figure 52a, the return air to the air handler during the final charging is to be maintained in the range of 65°F to 95°F. If necessary, the air can be warmed with electric supplemental heat in the air handler. (Shunt "R" to "W2" at the terminal block.)

Item	Comp. Unit	Air Htg.	Hydronic Htg.	Air Clg.	Domestic Water Htg.	System Functions	Figure
1	SC	Yes		Yes		Air heating and cooling	8a
2	SD	Yes		Yes	Yes[1]	Air heating and cooling; and domestic hot water by desuperheater	13a
3	SW	Yes		Yes	Yes[2]	Air heating and cooling; and domestic hot water by priority heating with DWM	23a
4	HC	Yes				Air heating	28a
5	HW	Yes			Yes[2]	Air heating; and domestic hot water by priority heating with DWM	38a
6	HW	Yes	Yes[3]			Air heating and radiant panel hydronic heating	38b
7	HWW	Yes	Yes[4]			Air heating and radiant panel hydronic heating	43b

[1] Includes Desuperheater Model DESPK to supplement water heating as a by-product when system is operating in cooling mode only.

[2] Priority water heating provided with separately purchased Series DWM Domestic Water Module.

[3] Hydronic (radiant floor) water heating provided with separately purchased Series HWM Hydronic Water Module.

[4] Has internal refrigerant water heat exchanger. Requires field supplied water circulating pump.

Figure 52a. Systems Heating with DX Air Handlers

Hydronic Systems

If heating is provided by one of the hydronic heating systems (direct from compressor unit for SCW, HCW and HWW models or through a hydronic water module, HWM), as shown in Figure 52b, the circulating water in the primary circuit (see Figures 52c and 52d) for the hydronic system is to be maintained in the 40°F to 70°F range. Water from the main supply can be flushed through the primary circuit to maintain this water temperature range while final charging the compressor unit.

Item	Comp. Unit	Air Htg.	Hydronic Htg.	Air Clg.	Domestic Water Htg.	System Functions	Figure
1	SC		Yes[3]	Yes[3]		Radiant panel hydronic heating and air cooling (chilled water air handler)	8b
2	SD		Yes[3]	Yes[3]	Yes[1]	Radiant panel hydronic heating and air cooling (chilled water air handler); and domestic hot water by desuperheater	13b
3	SCW		Yes[4]	Yes[4]		Radiant panel hydronic heating and air cooling (chilled water air handler)	18
4	SW		Yes[3]	Yes		Radiant panel hydronic heating and air cooling	23b
5	SW		Yes[3]	Yes[3]	Yes[2]	Radiant panel hydronic heating and air cooling (chilled water air handler); and domestic hot water by priority heating with DWM	23c
6	HC		Yes[3]			Radiant panel hydronic heating	28b
7	HC		Yes[3]		Yes[2]	Domestic hot water by priority heating with DWM	28c
8	HCW		Yes[4]			Radiant panel hydronic heating	33
9	HW		Yes[3]		Yes[2]	Radiant panel hydronic heating and domestic hot water by priority heating with DWM	38a
10	HWW		Yes[4]		Yes[2]	Radiant panel hydronic heating and domestic hot water by priority heating with DWM	43a

[1] Includes Desuperheater Model DESPK to supplement water heating as a by-product when system is operating in cooling mode only.

[2] Priority water heating provided with separately purchased Series DWM Domestic Water Module.

[3] Hydronic (radiant floor) water heating provided with separately purchased Series HWM Hydronic Water Module.

[4] Has internal refrigerant water heat exchanger. Requires field supplied water circulating pump.

Figure 52b. Systems Heating with Hydronic Heat Exchangers

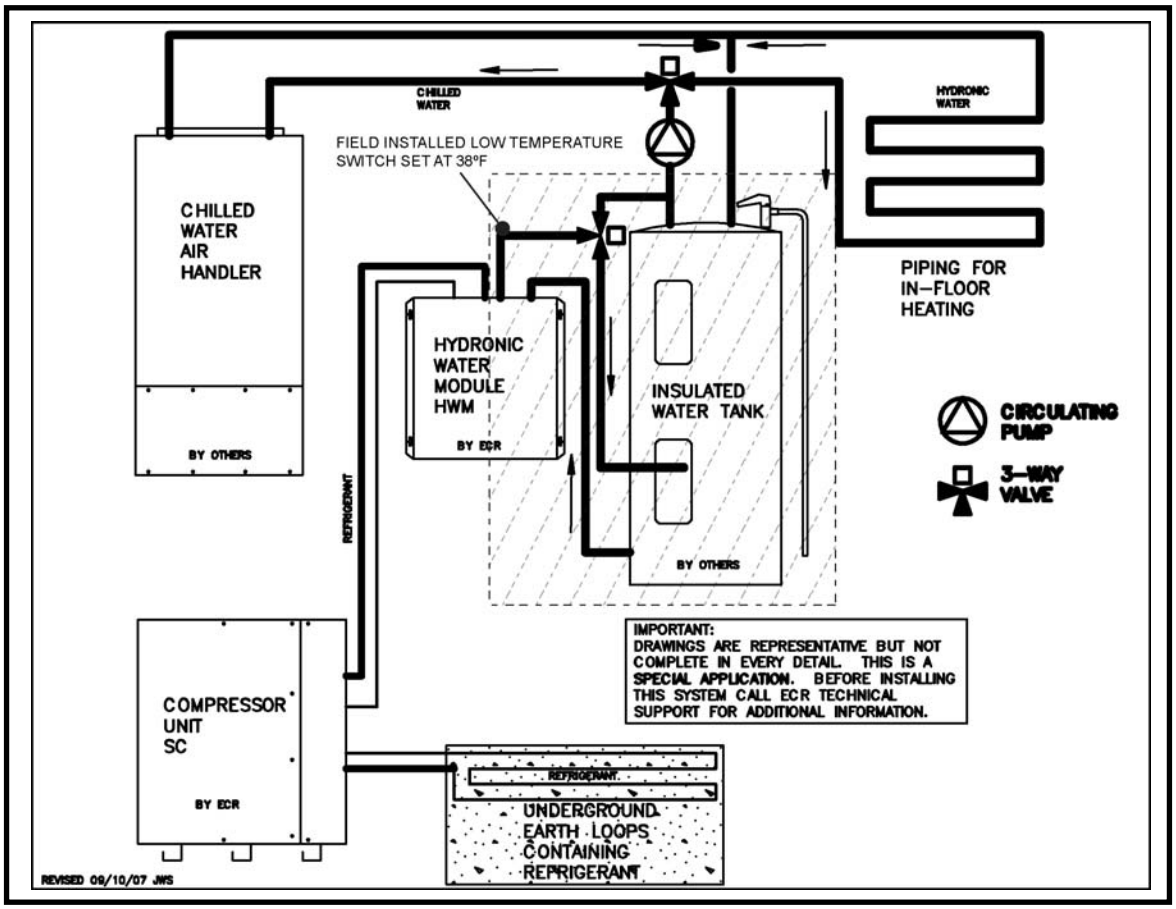


Figure 52c. Primary Circuit with Hydronic Water Module (HWM)

The final charging procedure is as follows, with the charging set up described in Figure 53:

1. Continue measuring the refrigerant charge weight as shown in Figures 51 and 53.
2. If the system is equipped with a domestic water module (DWM) in addition to the primary (air handler or hydronic) heating system, be sure the DWM switch is OFF.
3. Be sure that conditions with the air handler (section 9A2a) or hydronic primary circuit (section 9A2b) are running appropriately.
4. Turn the system on in the HEAT mode.
5. Initiate final charging by slowly opening the refrigerant container valve and then, the gauge manifold low pressure valve to allow liquid refrigerant to slowly enter the system as shown in Figure 53. The ACC will not allow liquid refrigerant to enter the compressor.
6. Adding liquid refrigerant will raise the liquid level in the ACC. Continue to slowly add liquid refrigerant to the system until the liquid level has reached the middle sight glass, as shown in Figure 54a.
7. **When the liquid level is at the middle sight glass, as shown in Figure 54a, turn off the refrigerant container valve. The system is fully charged.**

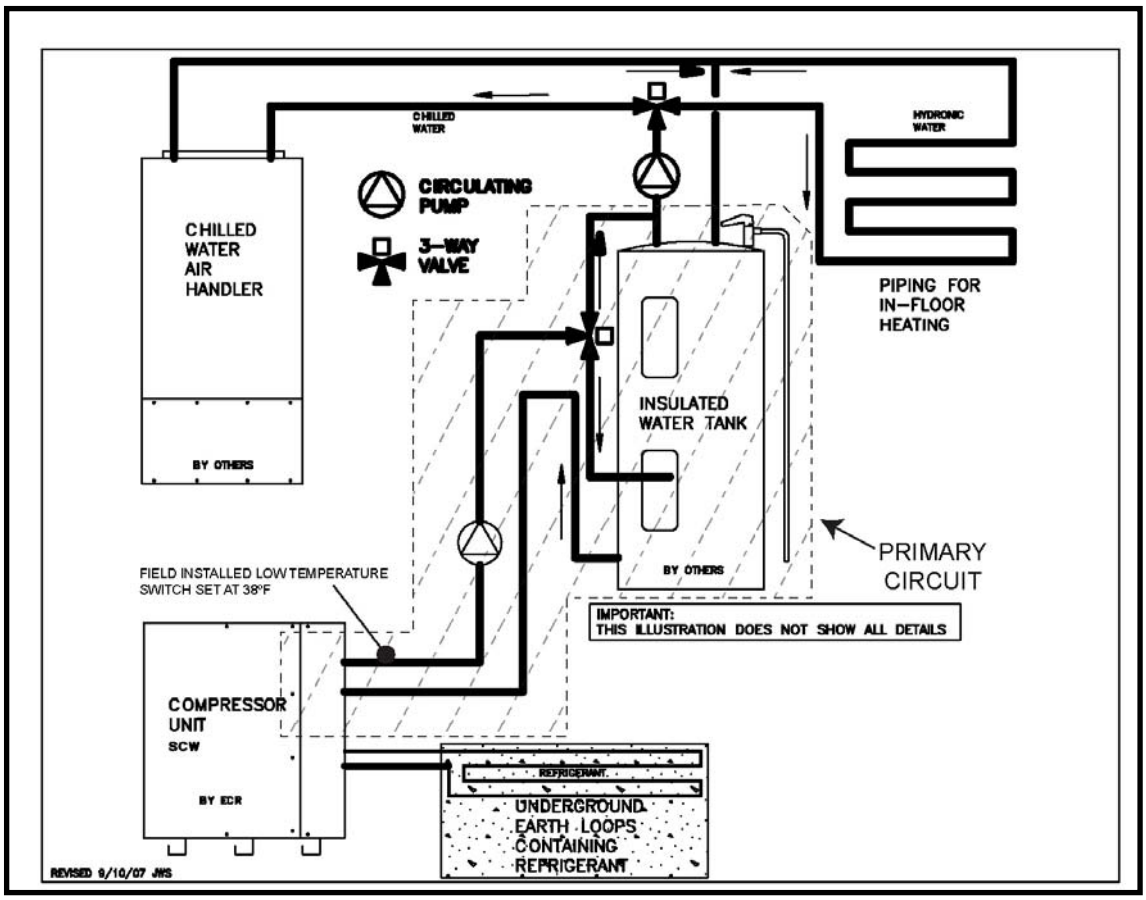


Figure 52d. Primary Circuit with Compressor Unit Heat Exchanger

8. When the system has run for three minutes with full charge, read the suction and discharge pressures. Locate the suction pressure gauge reading on the horizontal axis of Figure 54b. The corresponding discharge pressure reading on the gauge should fall between the upper and lower parallel lines of Figure 54b.

   When applied to air handler systems, the pressure profiles in Figure 54b are valid when air delivery is 400 CFM per ton. If discharge pressure is above the acceptable range, insufficient air is being delivered. If discharge pressure is below the acceptable range, too much air is being delivered.

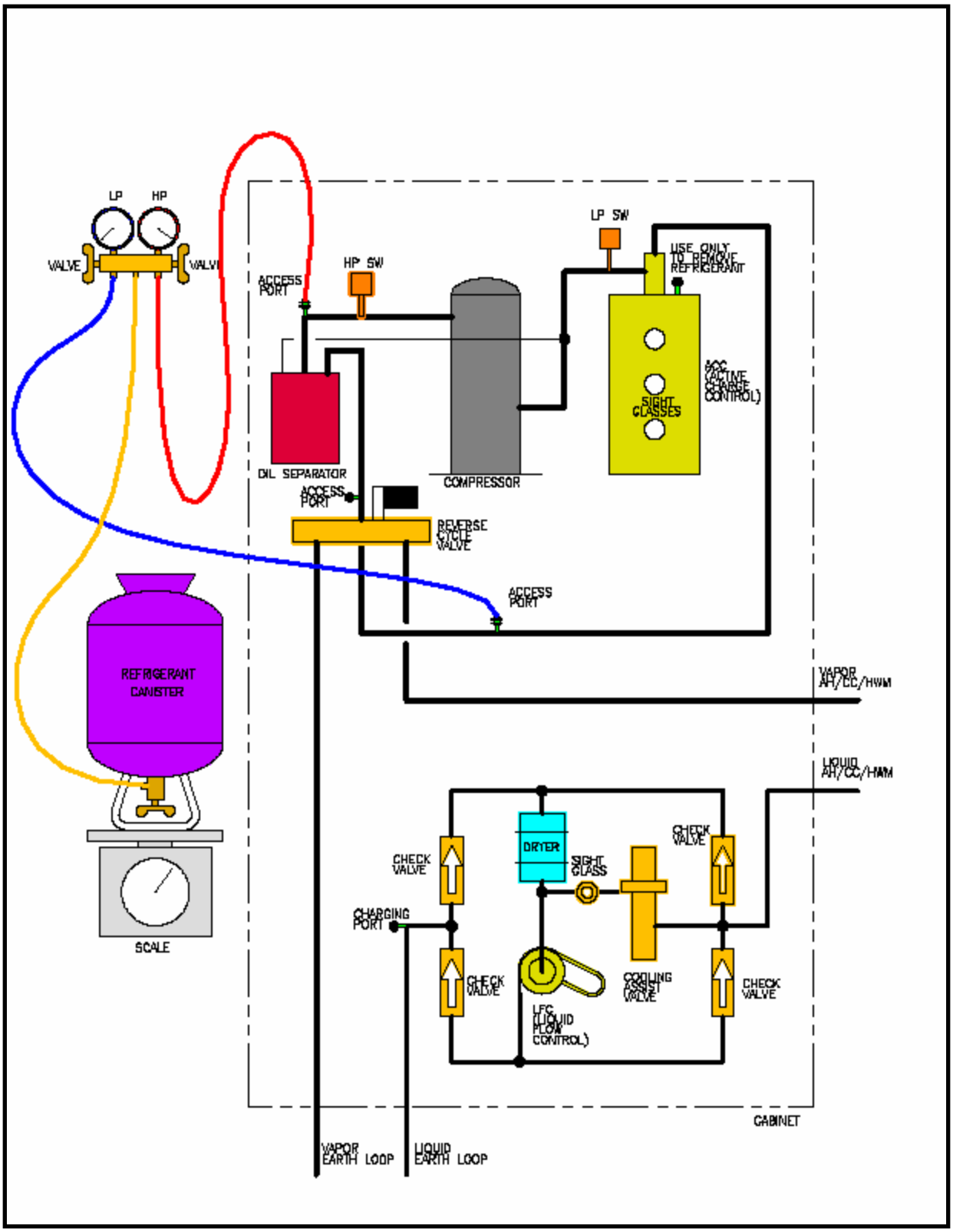


Figure 53. Typical Final Charge Set-up for SC, SD, SCW, HC, HCW, HW and HWW Compressor Units (SC Model shown)

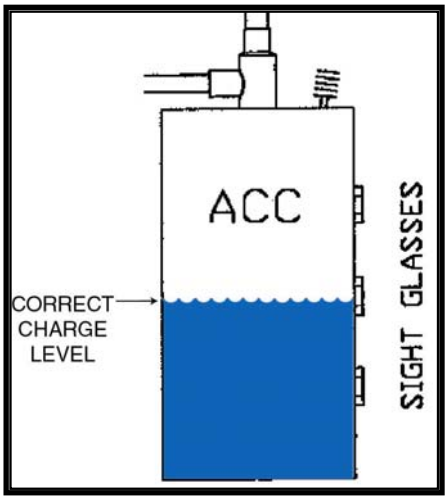


Figure 54a. Correct Final Charge Level

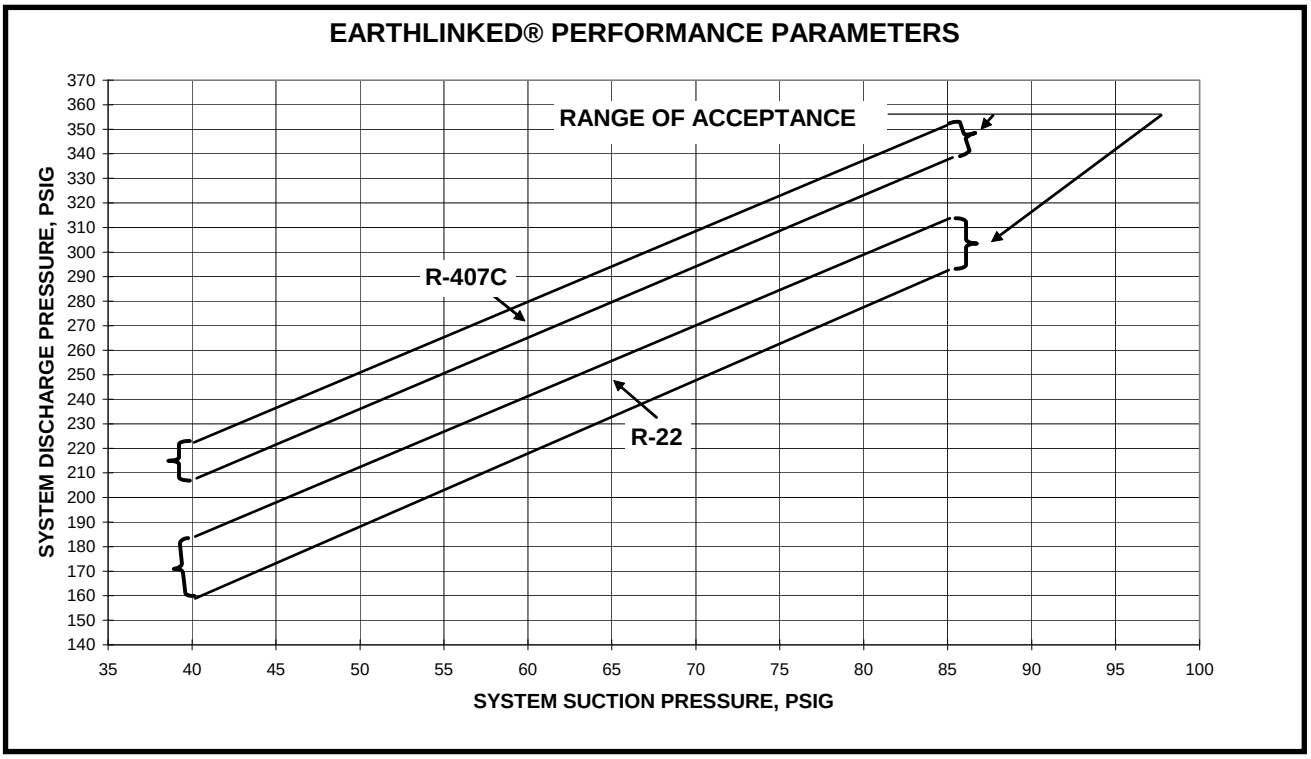


Figure 54b. EarthLinked® Performance Parameters

9. Check the suction saturation temperature to verify that it is within ±3°F for the measured suction pressure. The suction temperature should be approximately 15 to 20°F lower than the local earth temperature.

IMPORTANT

Reconfirm the liquid level of refrigerant is at the middle sight glass. If necessary, add or remove refrigerant to be at the middle sight glass.
Document the total weight of refrigerant charge in the system. Write it down on the **Warranty Registration Card** and inside the compressor unit on the electrical diagram for future reference. This is the full system charge. **DO NOT VARY THE CHARGE FOR COOLING MODE OPERATION!**

2. SW Model

a. Evacuation and Initial Charge

Refer to Figure 55 and the following description:

1. Carefully vent the nitrogen charge from the system.
2. Connect the gauge manifold as shown in Figure 55.
3. Connect a good quality micron gauge and vacuum pump, of at least 6 CFM capacity, to the gauge block as shown in Figure 55. This can be done using a commercially available vacuum pump manifold.

   If there is an additional pressure tap available on the earth loop liquid line outside the compressor cabinet, it is preferable to attach the micron gauge to it.

IMPORTANT

Do not energize the compressor while system is under vacuum. This will cause damage to the compressor.

4. **Evacuate system to 400 microns pressure.**

   If necessary contact EarthLinked® Technologies Technical Support at 863-701-0096.

IMPORTANT

Do not charge system or proceed further until 400 microns have been achieved.

5. Close both gauge manifold valves completely.
6. Turn the vacuum pump off and disconnect the utility hose from the vacuum pump. Disconnect and remove the micron gauge.

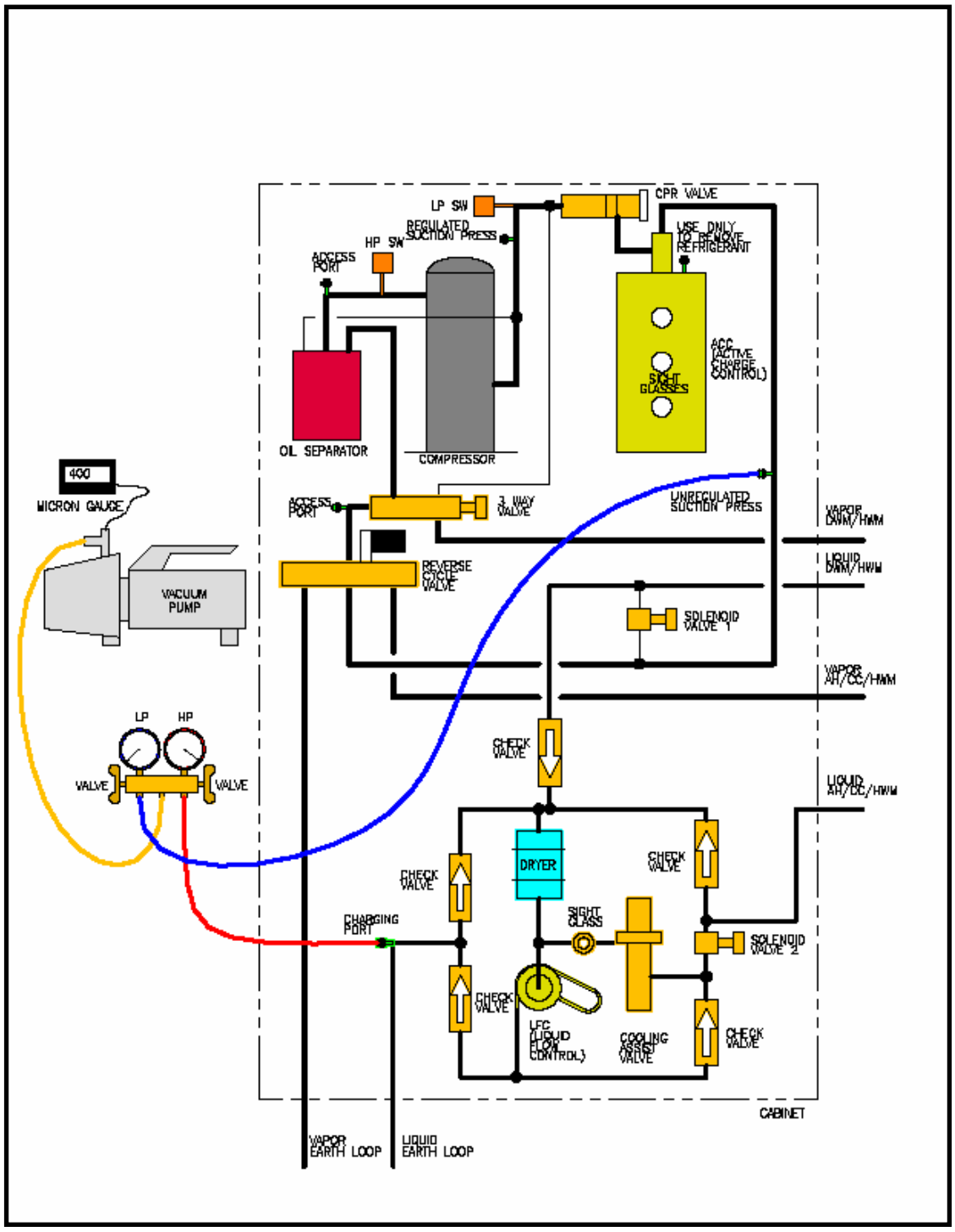


Figure 55. Typical Evacuation and Initial Charge Set up for SW Compressor Unit Models

WARNING

Inhalation of high concentrations of refrigerant gas vapor is harmful and may cause heart irregularities, unconsciousness or death. Vapor reduces oxygen available for breathing and is heavier than air. Decomposition products are hazardous. Liquid contact can cause frostbite. Avoid contact of liquid with eyes and prolonged skin exposure. Liquid and gas are under pressure. Deliberate inhalation of refrigerant gas is extremely dangerous. Asphyxiation can occur without warning due to lack of oxygen. Before using, read the material safety data sheet.

7. Connect the refrigerant container to provide liquid refrigerant to the utility hose of the gauge manifold as shown in Figure 56. **Have at least 7 pounds of NEW refrigerant per ton of system capacity available before charging.**

8. Open the valve on the refrigerant tank and purge the utility hose with refrigerant.

9. Open the high pressure valve on the gauge manifold going to the charging port, shown in Figure 56. Flow liquid refrigerant into the charging port.

10. Liquid entering the system at the charging port goes directly to the system earth loops. It does not go to the compressor. Should the pressures equalize and prevent the intended charge from entering completely, terminate the process of initial charging.

11. Close and disconnect the refrigerant hose from the charging port.

12. The system has now been initially charged.

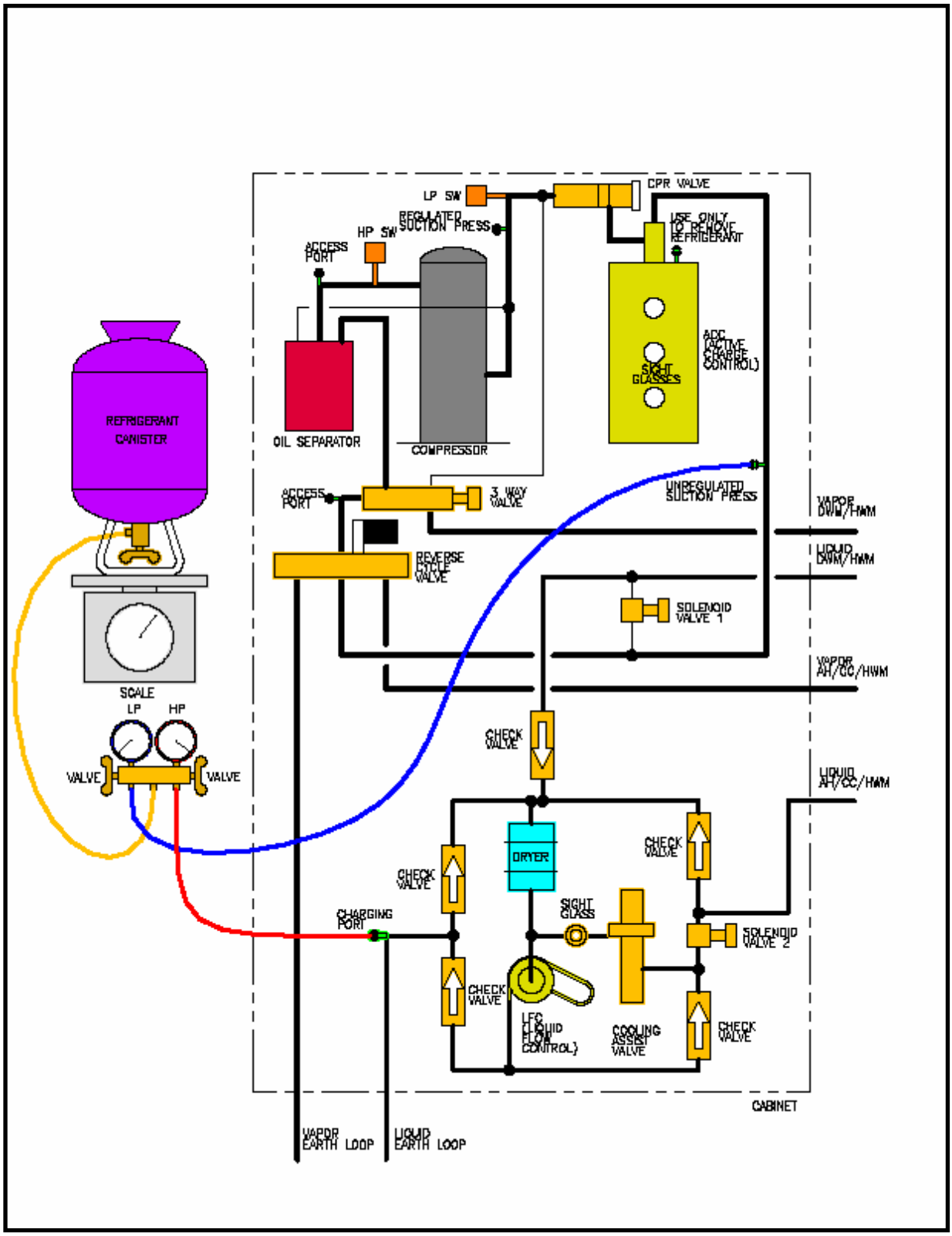


Figure 56. SW Compressor Unit Initial Charge Set-up

b. Final Charge

It is critical to control the conditions under which the compressor unit operates while final charging the system.

Air Handler Systems

If heating is provided by one of the following DX air handler systems, as shown in Figure 57a, the return air to the air handler during the final charging is to be maintained in the range of 65°F to 95°F. If necessary, the air can be warmed with electric supplemental heat in the air handler. (Shunt "R" to "W2" at the terminal block.)

Item	Comp. Unit	Air Htg.	Hydronic Htg.	Air Clg.	Domestic Water Htg.	System Functions	Figure
1	SC	Yes		Yes		Air heating and cooling	8a
2	SD	Yes		Yes	Yes[1]	Air heating and cooling; and domestic hot water by desuperheater	13a
3	SW	Yes		Yes	Yes[2]	Air heating and cooling; and domestic hot water by priority heating with DWM	23a
4	HC	Yes				Air heating	28a
5	HW	Yes			Yes[2]	Air heating; and domestic hot water by priority heating with DWM	38a
6	HW	Yes	Yes[3]			Air heating and radiant panel hydronic heating	38b
7	HWW	Yes	Yes[4]			Air heating and radiant panel hydronic heating	43b

[1] *Includes Desuperheater Model DESPK to supplement water heating as a by-product when system is operating in cooling mode only.*

[2] *Priority water heating provided with separately purchased Series DWM Domestic Water Module.*

[3] *Hydronic (radiant floor) water heating provided with separately purchased Series HWM Hydronic Water Module.*

[4] *Has internal refrigerant water heat exchanger. Requires field supplied water circulating pump.*

Figure 57a. Systems Heating with DX Air Handlers

Hydronic Systems

If heating is provided by one of the hydronic heating systems (direct from compressor unit for SCW, HCW and HWW models or through a hydronic water module, HWM), as shown in Figure 57b, the circulating water in the primary circuit (see Figures 57c and 57d) for the hydronic system is to be maintained in the 40°F to 70°F range. Water from the main supply can be flushed through the primary circuit to maintain this water temperature range while final charging the compressor unit.

Item	Comp. Unit	Air Htg.	Hydronic Htg.	Air Clg.	Domestic Water Htg.	System Functions	Figure
1	SC		Yes[3]	Yes[3]		Radiant panel hydronic heating and air cooling (chilled water air handler)	8b
2	SD		Yes[3]	Yes[3]	Yes[1]	Radiant panel hydronic heating and air cooling (chilled water air handler); and domestic hot water by desuperheater	13b
3	SCW		Yes[4]	Yes[4]		Radiant panel hydronic heating and air cooling (chilled water air handler)	18
4	SW		Yes[3]	Yes		Radiant panel hydronic heating and air cooling	23b
5	SW		Yes[3]	Yes[3]	Yes[2]	Radiant panel hydronic heating and air cooling (chilled water air handler); and domestic hot water by priority heating with DWM	23c
6	HC		Yes[3]			Radiant panel hydronic heating	28b
7	HC		Yes[3]		Yes[2]	Domestic hot water by priority heating with DWM	28c
8	HCW		Yes[4]			Radiant panel hydronic heating	33
9	HW		Yes[3]		Yes[2]	Radiant panel hydronic heating and domestic hot water by priority heating with DWM	38a
10	HWW		Yes[4]		Yes[2]	Radiant panel hydronic heating and domestic hot water by priority heating with DWM	43a

[1] Includes Desuperheater Model DESPK to supplement water heating as a by-product when system is operating in cooling mode only.

[2] Priority water heating provided with separately purchased Series DWM Domestic Water Module.

[3] Hydronic (radiant floor) water heating provided with separately purchased Series HWM Hydronic Water Module.

[4] Has internal refrigerant water heat exchanger. Requires field supplied water circulating pump.

Figure 57b. Systems Heating with Hydronic Heat Exchangers

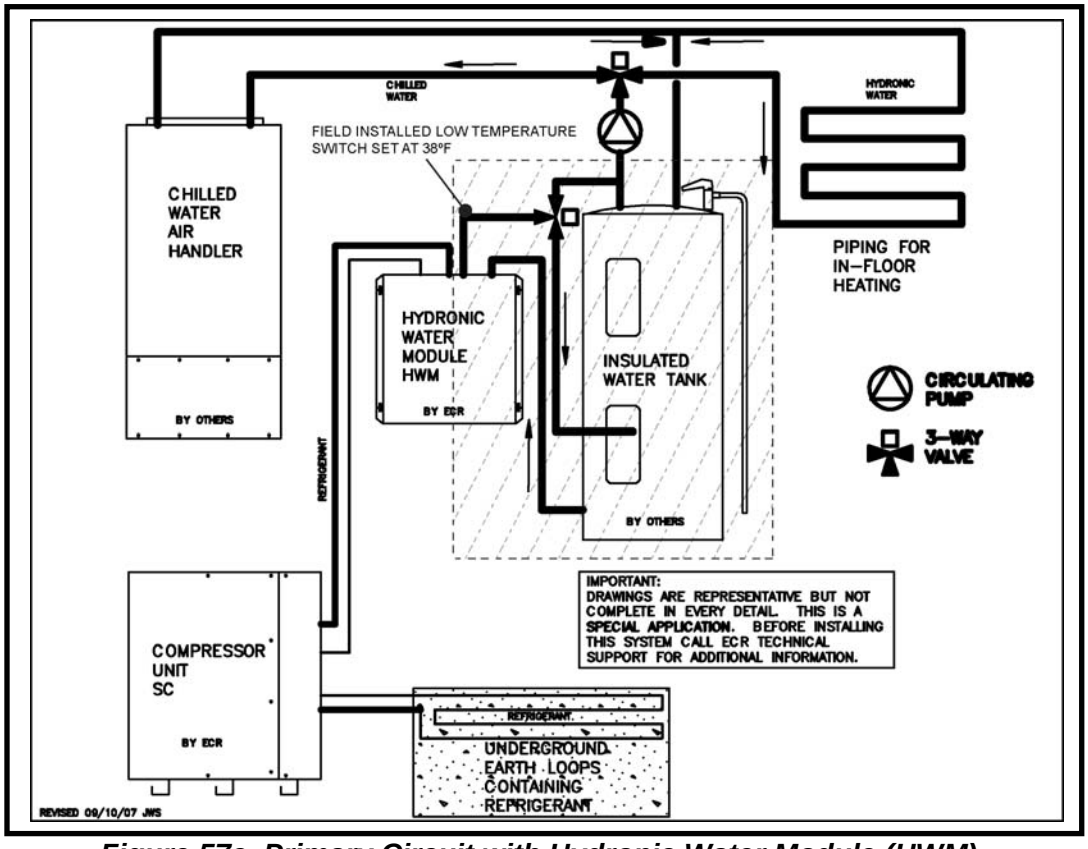


Figure 57c. Primary Circuit with Hydronic Water Module (HWM)

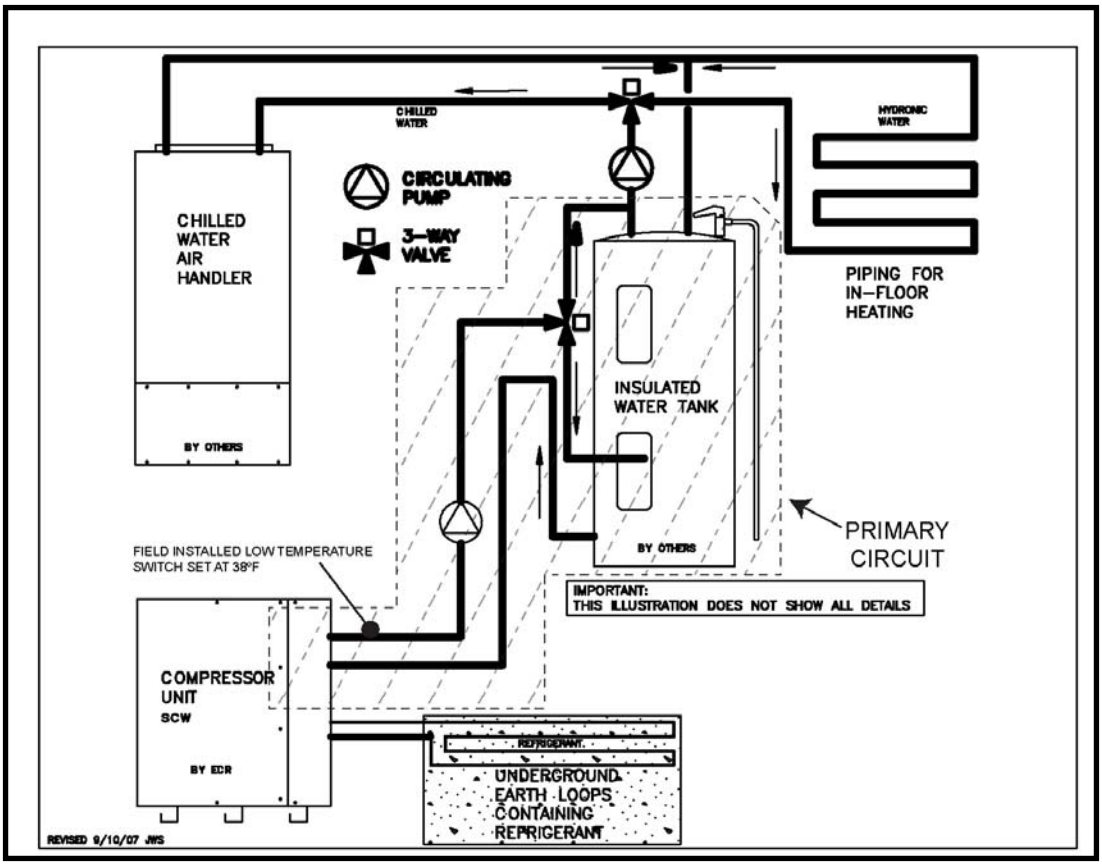


Figure 57d. Primary Circuit with Compressor Unit Heat Exchanger

The final charging procedure is as follows, with the charging set up described in Figure 58:

1. Reconnect the hose from the HP gauge manifold to the access port on the compressor discharge line, as shown in Figure 58. Be sure to purge the HP line with refrigerant.

2. Continue measuring the refrigerant charge weight as shown in Figures 56 and 58.

3. If the system is equipped with a domestic water module (DWM) in addition to the primary (air handler or hydronic) heating system, be sure the DWM switch is OFF.

4. Be sure that conditions with the air handler (section 9A2a) or hydronic primary circuit (section 9A2b) are running appropriately.

5. Turn the system on in the HEAT mode.

6. Initiate final charging by slowly opening the refrigerant container valve and then, the gauge manifold low pressure valve to allow liquid refrigerant to slowly enter the system as shown in Figure 58. The ACC will not allow liquid refrigerant to enter the compressor.

7. Adding liquid refrigerant will raise the liquid level in the ACC. Continue to slowly add liquid refrigerant to the system until the liquid level has reached the middle sight glass, as shown in Figure 59.

8. **When the liquid level is at the middle sight glass, as shown in Figure 59, turn off the refrigerant container valve. The system is fully charged.**

9. When the system has run for three minutes with full charge, read the suction and discharge pressures. Locate the suction pressure gauge reading on the horizontal axis of Figure 60. The corresponding discharge pressure reading on the gauge should fall between the upper and lower parallel lines of Figure 60.

   When applied to air handler systems, the pressure profiles in Figure 60 are valid when air delivery is 400 CFM per ton. If discharge pressure is above the acceptable range, insufficient air is being delivered. If discharge pressure is below the acceptable range, too much air is being delivered.

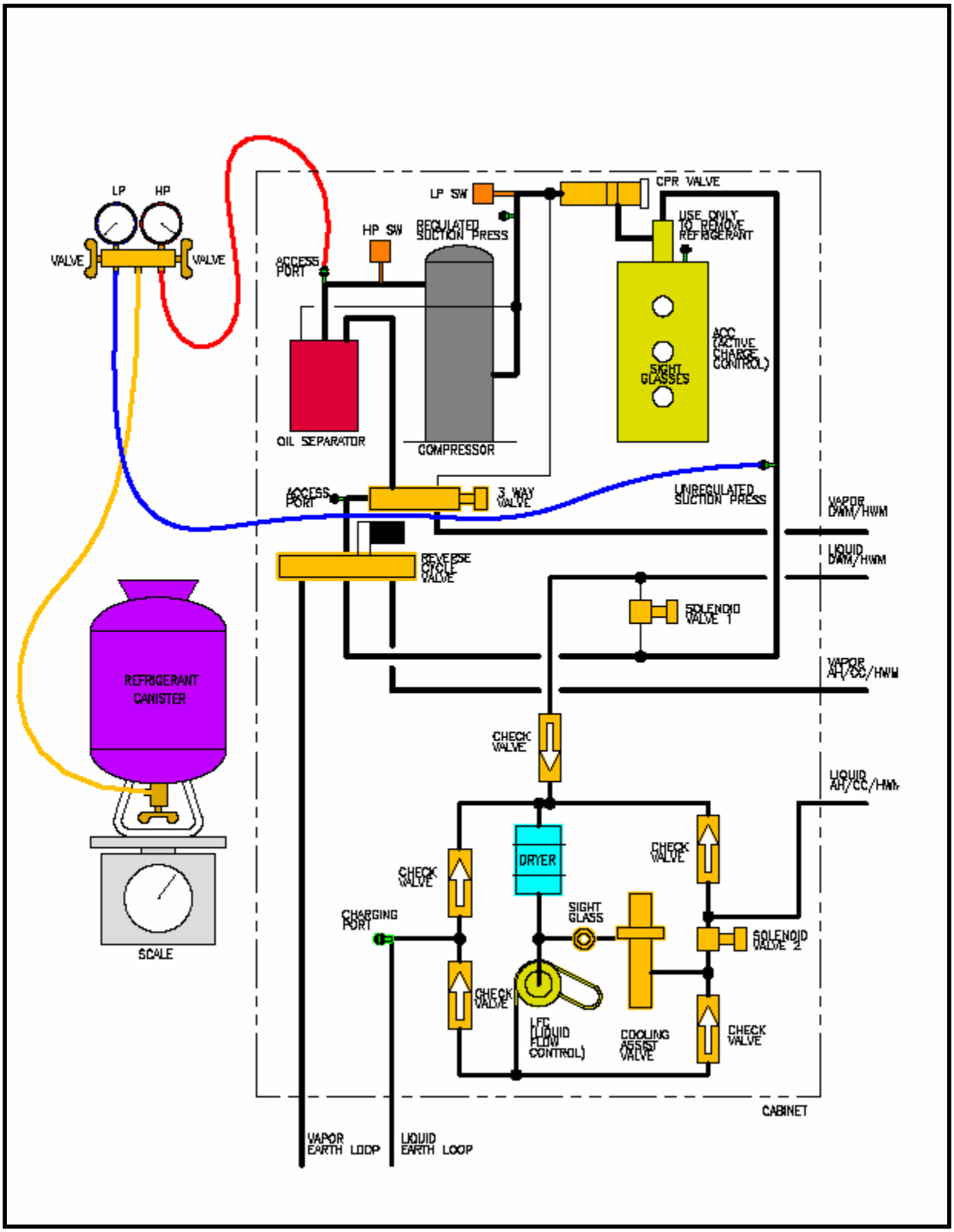


Figure 58. Typical Final Charge Set-up for SW Compressor Unit Models

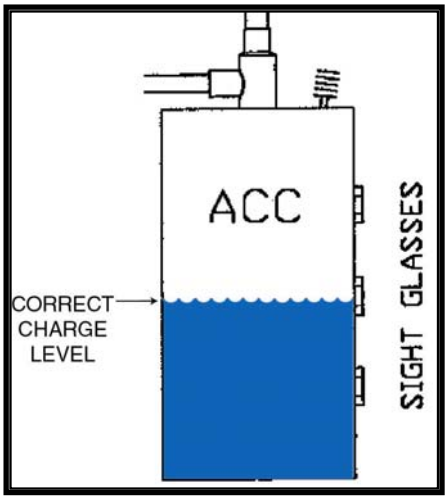


Figure 59 Correct Final Charge Level

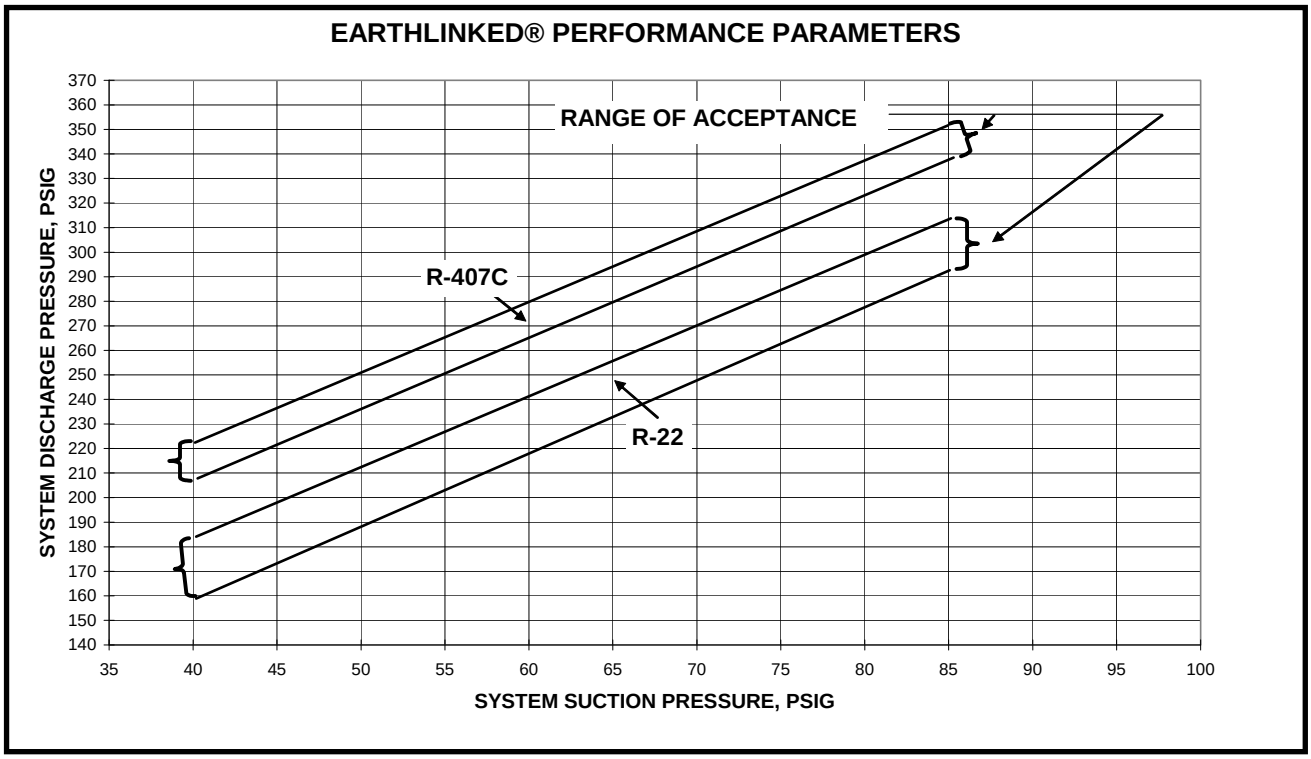


Figure 60. EarthLinked® Performance Parameters

10. Check the suction saturation temperature to verify that it is within ±3°F for the measured suction pressure. The suction temperature should be approximately 15 to 20°F lower than the local earth temperature.

IMPORTANT

Reconfirm the liquid level of refrigerant is at the middle sight glass. If necessary, add or remove refrigerant to be at the middle sight glass.

Document the total weight of refrigerant charge in the system. Write it down on the Warranty Registration Card and inside the compressor unit on the electrical diagram for future reference. This is the full system charge. DO NOT VARY THE CHARGE FOR COOLING MODE OPERATION!

B. Cooling Assist Valve (CAV) Adjustment

IMPORTANT

This is for SC, SD, SCW and SW Compressor Unit models only.

After the system has been fully charged as detailed in section 9A, the Cooling Assist Valve (CAV) is to be adjusted in accordance with the following instructions or the process flow chart in Figure 64.

1. Before adjusting the CAV, run the air handler and compressor unit system in cooling mode with return air temperature maintained at 70°F. If necessary, warm the return air with the electric strip heat in the air handler. Chilled water return temperature should be maintained at 45-50°F.
2. The CAV has been adjusted to full open position at the factory. This is the extreme **clockwise** position.
3. Connect the pressure gauge to the low pressure connection shown in Figure 53 or 58. After an initial drop in suction pressure (when the system is first started in cooling mode) the suction pressure will begin to rise, as will the liquid refrigerant level in the ACC.
4. When suction pressure climbs to greater than 60 psig for R-22 systems (70 psig for R-407C systems), adjust the cooling assist valve (CAV) slowly COUNTER-CLOCKWISE – 1/4 turn is typical. Do not allow the suction pressure to drop below 60 psig for R-22 systems (70 psig for R-407C systems). Observe the refrigerant quality in the in-line sight glass immediately upstream of the CAV, shown in Figure 61.

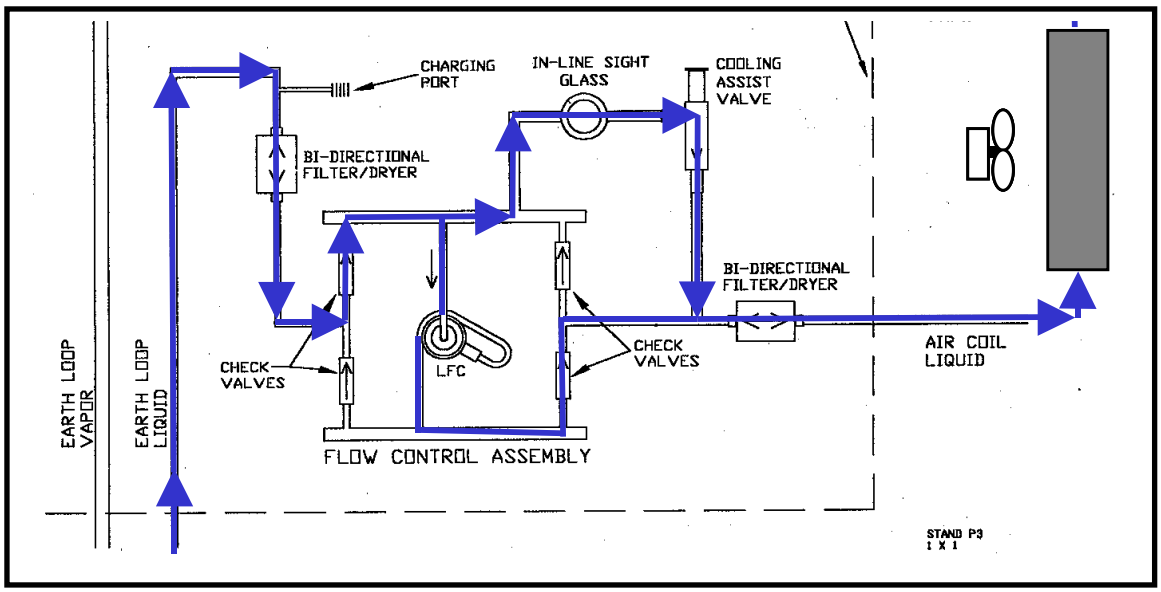


Figure 61. Refrigerant Flow During CAV Adjustment

5. There will be many bubbles in the sight glass as shown in Figure 62.

6. After approximately 10 minutes, repeat step 4. Liquid must always be visible in the Active Charge Control (ACC) but not allowed above the top sight glass for an extended period of time.

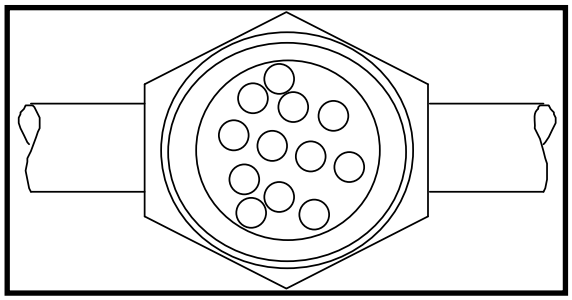


Figure 62. Initial Sight Glass Refrigerant Condition

7. Continue with this adjustment procedure repetitively until the refrigerant condition as viewed in the in-line sight glass is such that bubbles have been reduced to a tiny trickle, or many small bubbles, as shown in Figure 63. The suction pressure may be greater than 60 psig for R-22 systems (70 psig for R-407C system) at final adjustment. If two hours have elapsed, many bubbles are still present in the in-line sight glass and suction pressure is 60 psig for R-22 systems (70 psig for R-407C systems), the adjustment is complete.

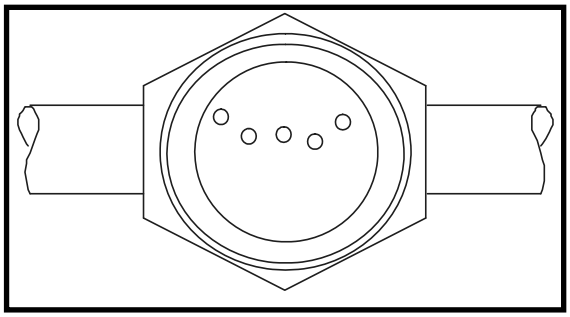


Figure 63. Final Sight Glass Refrigerant Condition

8. **After the in-line sight glass refrigerant condition appears as in Figure 63**, check the liquid level in the ACC and verify that it is visible.

9. Effects of adjusting the CAV counterclockwise are as follows:
   - Reduces suction pressure
   - Lowers liquid level in the ACC

- Reduces bubbles in in-line sight glass

10. **The conditions for completion of the CAV adjustment are:**
    - **Suction pressure must be at 60 PSIG or above**
    - **Liquid level in the ACC must be visible**
    - **Bubbles in the in-line sight glass must be a "trickle" or "many small bubbles."**
    - **CAV adjustment must be made at a return air temperature of 70°F for a direct expansion air handler (or a chilled water return temperature of 45 – 50°F).**

IMPORTANT

When the CAV has been adjusted at start-up, it should not be adjusted thereafter.

Do not allow operation of the system over an extended period of time with liquid refrigerant **above** the top sight glass in the ACC.

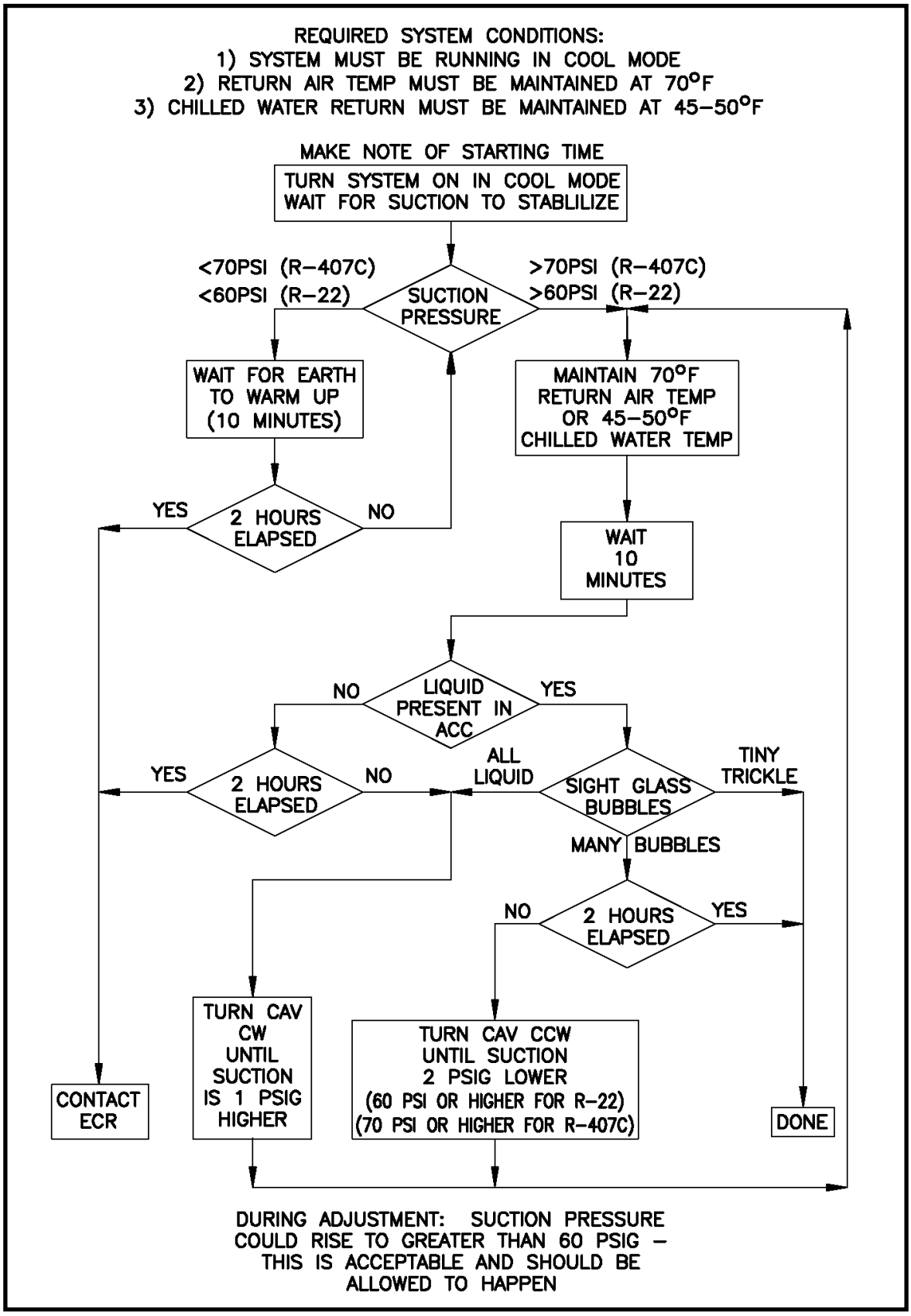


Figure 64. CAV Adjustment Process Flow Chart

C. Hydronic and Domestic Water Module Start-up

1. Hydronic Water Module (HWM)

When the Hydronic Water Module (HWM) is utilized in the EarthLinked® system, a water storage tank is required in the primary water solution circuit as shown in Figure 57a. There are two options for the functions performed by the HWM.

a. Heating Only

It is highly recommended for accuracy and reliability, that a remote bulb temperature control be field installed in the water storage tank, as described in Spec Guide section 3E4a. Utilize a two element standard height commercial water heater.

The conversion of the electrical wiring in an electric water heater for use as a hydronic water storage tank with supplemental heat is illustrated in Figure 65. The upper element is to be 5 KW minimum. The thermostat on the supplemental heat should be set to turn on at approximately 5°F lower than the remote bulb temperature control.

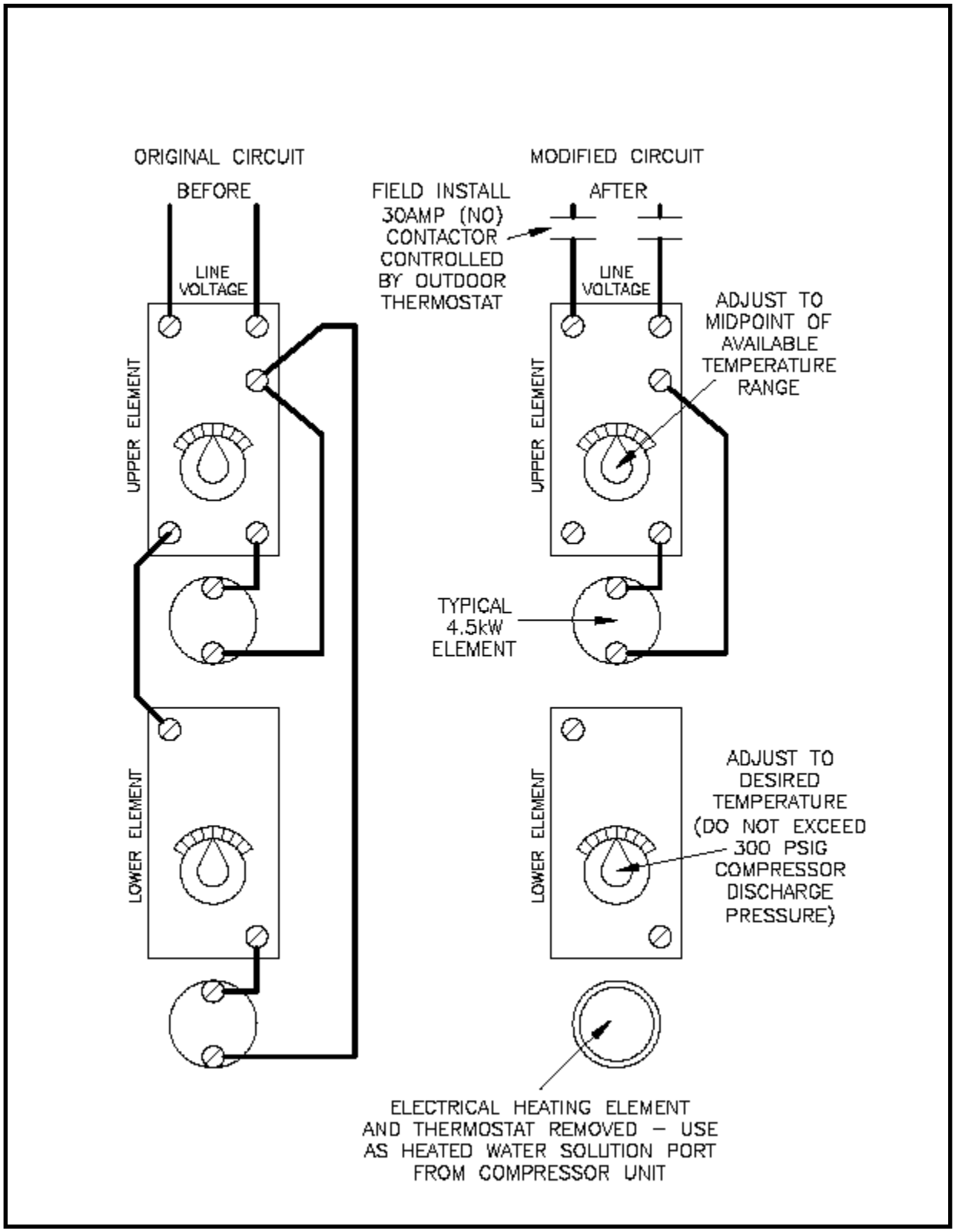


Figure 65. Electric Water Heater Conversion for a Hydronic Heating System

A field wiring diagram for the heating only hydronic primary circuit using an HWM is shown in Figure 66.

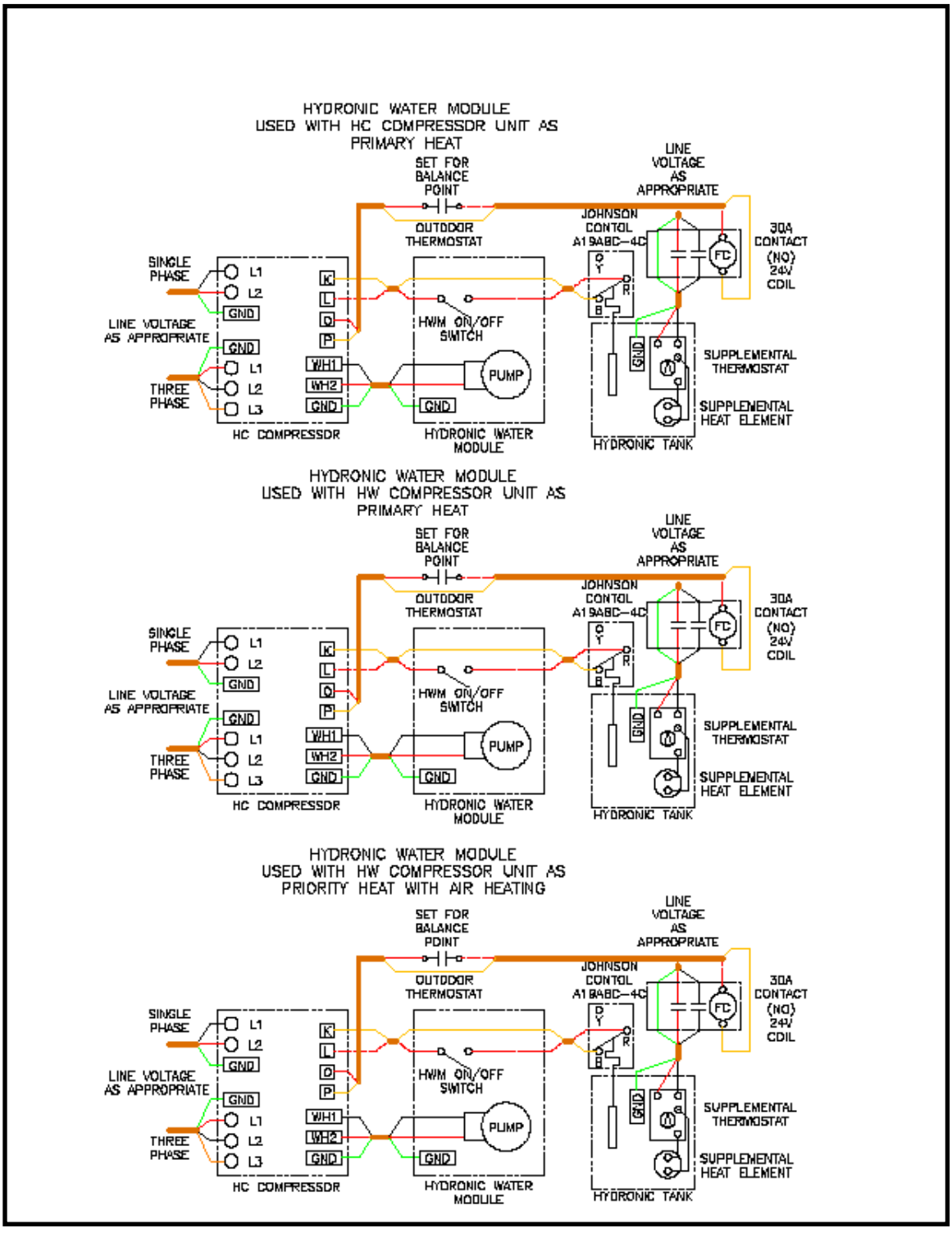


Figure 66. Field Wiring for Heating Only Hydronic Primary Circuit with HWM

b. Heating and Cooling

Figure 57a illustrates a typical hydronic heating and chilled water cooling primary circuit configuration. The use of a three-way valve is shown in this illustration. For heating, the valve is normally open with the flow from the HWM directed DOWNWARD providing heated water to the storage tank. When cooling is called for, the valve is energized and directs chilled water UPWARD to the hydronic circulating pump.

The cooling function also requires the addition of a storage tank chilled water controller to cycle the compressor unit, in response to chilled water demand.

The chilled water controller is detailed in Spec Guide section 3E4b. As noted, this application will require a three element commercial water heater with one upper element and the lower element converted as shown in Figure 65. The remaining upper element is removed and replaced by the chilled water controller.

The chilled water controller should be set to turn the compressor unit off at approximately 5°F higher temperature than the specified leaving water temperature.

The field wiring diagram for hydronic heating and chilled water cooling, using an HWM and showing the three-way valve (a Johnson J-series valve or equivalent), the hydronic temperature controller, the chilled water controller and the supplemental electric heat is shown in Figure 67.

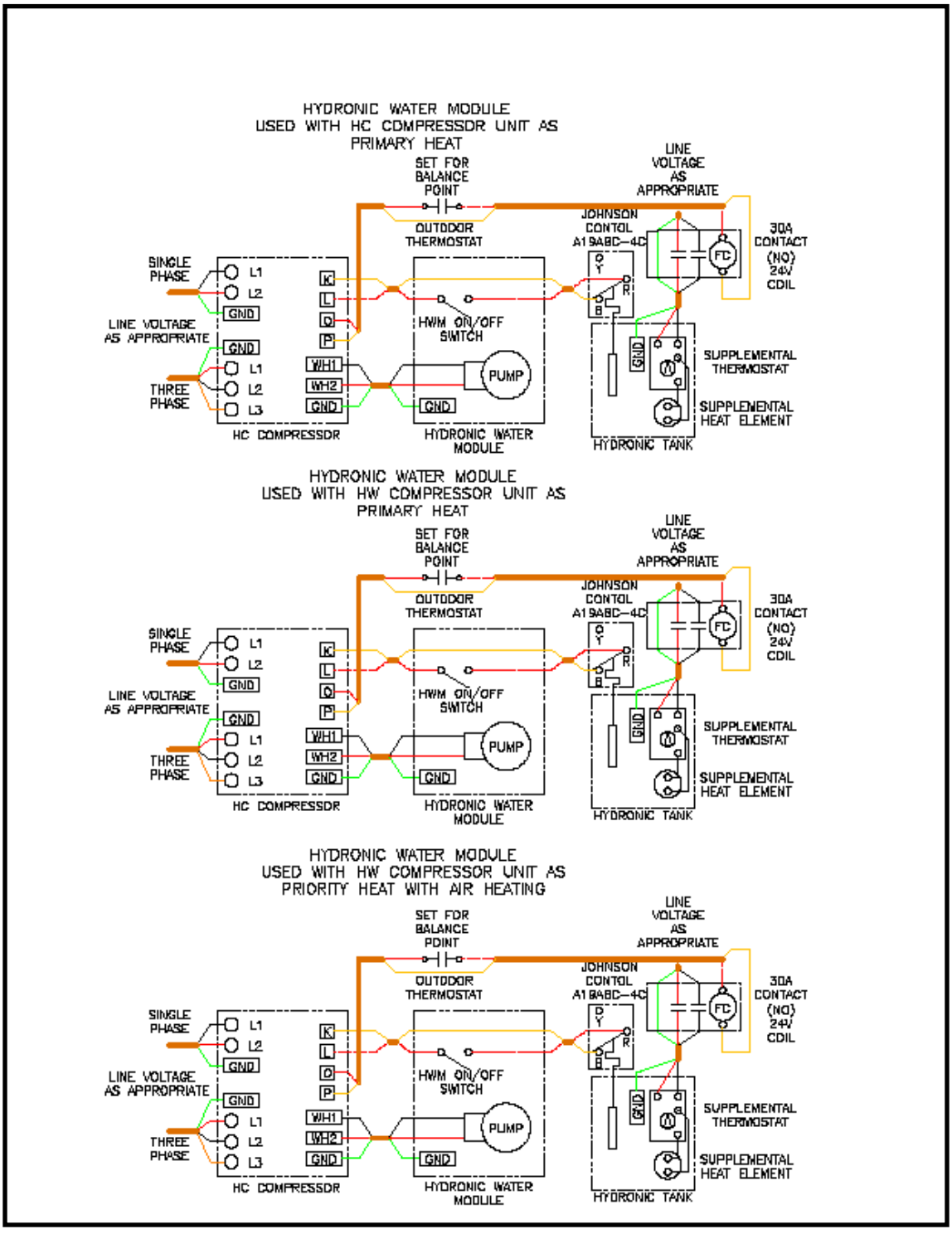


Figure 67. Field Wiring for Hydronic Heating and Chilled Water Cooling with HWM

c. Start-up Procedure

The following conditions must be met before starting the HWM:

- The toggle switch on the HWM cabinet must be “OFF”.
- The system has been charged according to instructions.
- Heating elements in the hot water storage tank are “OFF”.
- Temperature of water in hot water storage tank is less than 100°F.
- HWM pump is primed and tank water pressure is normal.
- Gauge manifold set is connected to high and low pressure connections on the compressor unit.
- The water storage tank temperature controller is adjusted to the highest desired water temperature setting (120°F maximum).
- An accurate temperature sensor is connected to the “Water Out” tube of the HWM and insulated from ambient air temperature.

IMPORTANT

The EarthLinked system with HWM will heat water up to a maximum of 120°F. The objective in starting the HWM is to achieve the desired hot water temperature and not exceed 300 psig discharge pressure.

The HWM start-up steps are as follows:

1. Turn the HWM toggle switch to “ON”.
2. Start system running and monitor compressor discharge pressure and HWM “Water Out” temperature as water temperature rises.
3. If compressor discharge pressure reaches 300 PSIG before desired hot water temperature is achieved, adjust the storage tank temperature controller setting to turn the compressor off, or (next):
4. When “Water Out” temperature is achieved (pressure < 300 psig), adjust water storage tank temperature controller to turn compressor unit “OFF”.

IMPORTANT

The HWM “Water Out” temperature is approximately 5°F higher than actual hot water temperature in water storage tank.

5. The water storage tank temperature controller setting should be verified by draining some hot water from the tank and cycling the system again.

IMPORTANT

If the hot water storage tank temperature controller is adjusted for a high temperature setting, compressor discharge pressure should be checked and the storage tank temperature controller adjusted appropriately to ensure that compressor discharge pressure does not exceed 300 PSIG.

6. Adjust thermostat on supplemental electric heater element to cut in at approximately 5°F lower than the final storage tank temperature controller set point temperature.
7. As appropriate, adjust chilled water controller to a temperature cut out point which is approximately 5°F above the desired chilled water leaving temperature.

2. Domestic Water Module (DWM)

a. Control Options

For the greatest accuracy and reliability, the remote bulb temperature controller detailed in Spec Guide 3E4a should be installed in the water storage tank, to control heated water temperature. In this preferred arrangement, the upper and lower thermostats and power to the heating elements are deactivated.

An option, utilizing the surface-type thermostat, which is a standard component of an electric water heater, is shown in Figure 68. In this case, the upper thermostat and power to the heating elements are de-activated.

b. Start-up Procedure

The following conditions must be met before starting the DWM:

- The toggle switch on the DWM cabinet must be “OFF”.
- The system has been charged according to instructions.
- Heating elements in the hot water storage tank are “OFF”.
- Temperature of water in hot water storage tank is less than 100°F.
- DWM pump is primed and tank water pressure is normal.
- Gauge manifold set is connected to high and low pressure connections on the compressor unit.
- The water storage tank temperature controller is adjusted to the highest desired water temperature setting (120°F maximum).
- An accurate temperature sensor is connected at the “Water Out” connection of the DWM and insulated from ambient air temperature.

The DWM start-up steps are as follows:

1. Turn the DWM toggle switch to “ON”.
2. Start system running and monitor compressor discharge pressure and DWM “Water Out” temperature as water temperature rises.
3. If compressor discharge pressure reaches 300 PSIG before desired hot water temperature is achieved, adjust the storage tank temperature controller setting to turn the compressor off, or (next):
4. .When “Water Out” temperature is achieved (pressure < 300 psig), adjust water storage tank temperature controller to turn compressor unit “OFF”.

IMPORTANT

The DWM “Water Out” temperature is approximately 5°F higher than actual hot water temperature in water storage tank.

5. The water storage tank temperature controller setting should be verified by draining some hot water from the tank and cycling the system again.

IMPORTANT

If the hot water storage tank temperature controller is adjusted for a high temperature setting, compressor discharge pressure should be checked and the storage tank temperature controller adjusted appropriately to ensure that compressor discharge pressure does not exceed 300 PSIG.

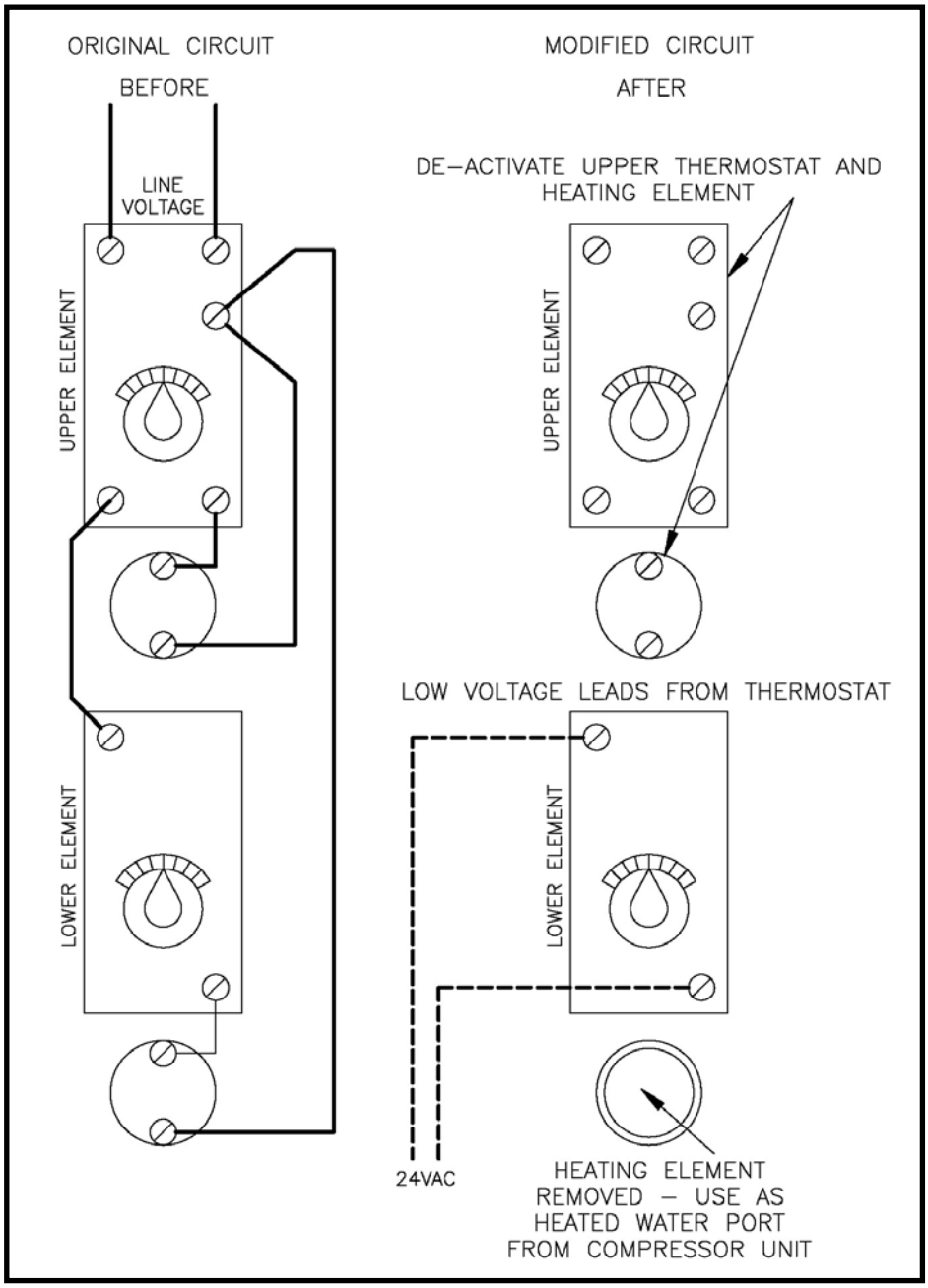


Figure 68. Electric Water Heater Conversion for a Domestic Water Heating System

IMPORTANT

The EarthLinked system with DWM will heat water up to a maximum of 120°F. The objective in starting the DWM is to achieve the desired hot water temperature and not exceed 300 psig discharge pressure.

c. Crankcase Pressure Regulator (CPR)

The Crankcase Pressure Regulator (CPR) is shown in the SW Model compressor units in Figure 22a.

The purpose of the CPR is to regulate suction pressure when the SW compressor unit shifts from cooling mode to domestic water heating with the DWM.

The CPR is factory-adjusted to 70 psig regulated pressure for all SW Compressor Units.

For SW Compressor Units utilizing R-22 refrigerant, NO ADJUSTMENT of the CPR is necessary or recommended at the time of start-up. EarthLinked® Technologies Technical Support is to be contacted at 863-701-0096 prior to adjusting the CPR on R-22 systems.

For SW Compressor Units utilizing R-407C refrigerant, no adjustment of the CPR is necessary at the time of start-up. However, **if higher heated water temperature is required**, it is permissible to adjust the CPR by turning the adjusting screw counter-clockwise. This increases the suction pressure and refrigerant temperature at the compressor inlet. Adjusting the suction pressure from the factory setting of 70 psig upward to between 80 to 90 psig should be done in increments to track the corresponding increase in heated water temperature. Do not exceed 90 psig suction pressure or the desired heated water temperature, whichever is reached first.

D. Hydronic Systems with SCW, HCW or HWW Compressor Units

The typical primary circuit for a hydronic heating (and chilled water cooling) system with the heat exchanger inside the compressor unit is shown in Figure 57b.

The plumbing and controls details are detailed in Figure 57b and Spec Guide sections 3E4a and 3E4b.

The field wiring diagrams for the systems are shown in Figure 69.

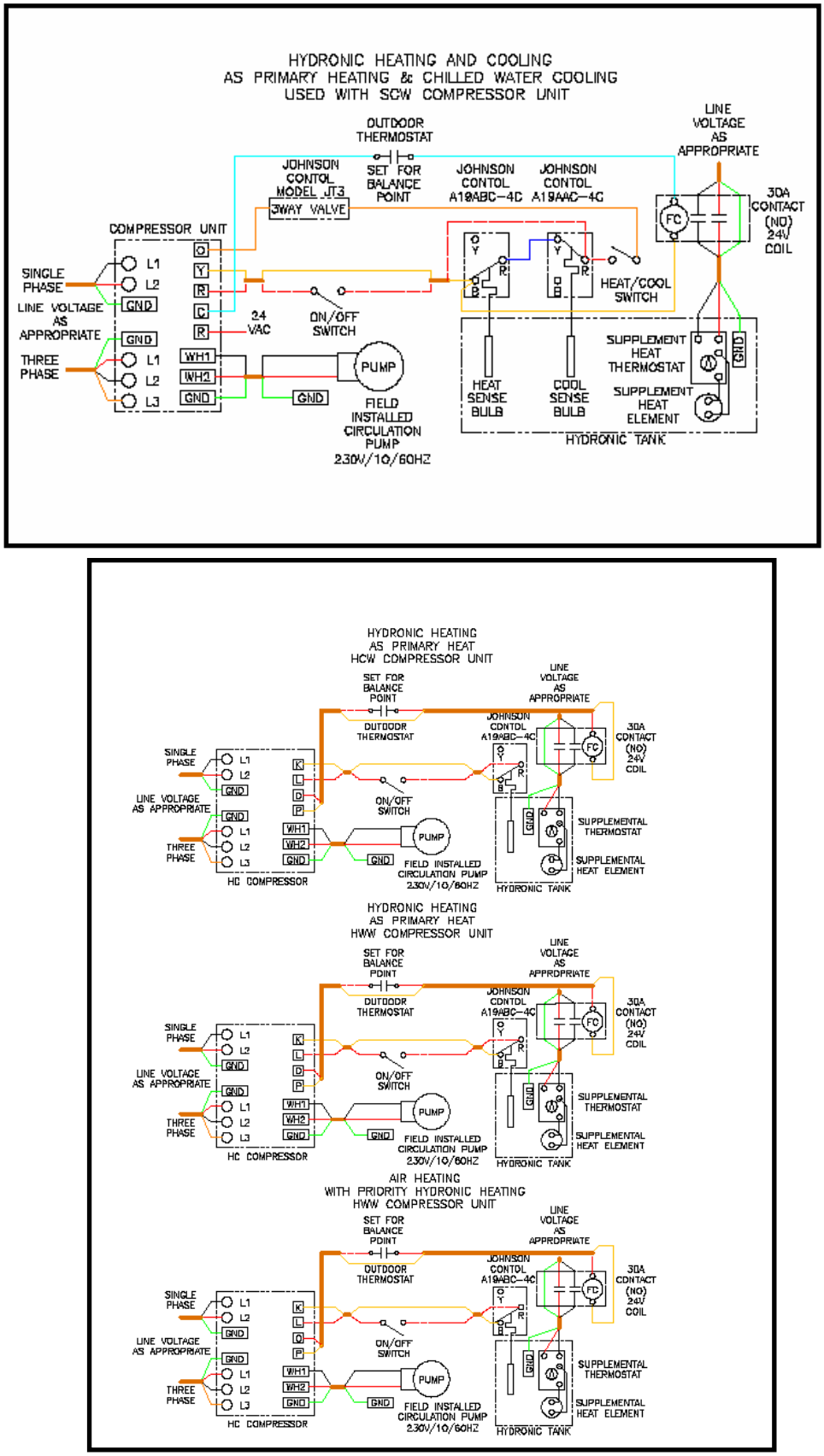


Figure 69. Field wiring for Hydronic Heating and Chilled Water Cooling

The following conditions must be met before starting the hydronic system:

- Power to the water circulating pump is “OFF”.
- The system has been charged according to instructions.
- Temperature of the water in the water storage tank is less than 100°F.
- Supplemental heating elements in the water storage tank are “OFF”.
- Gauge manifold set is connected to high and low pressure connections on the compressor unit.
- The water storage tank temperature controller is adjusted to the highest desired water temperature setting (120°F maximum).
- An accurate temperature sensor is connected to the “water out” connection of the compressor unit and insulated from ambient air temperature.

IMPORTANT

The EarthLinked system with DWM will heat water up to a maximum of 120°F. The objective in starting the DWM is to achieve the desired hot water temperature and not exceed 300 psig discharge pressure.

The start-up steps are as follows:

1. Provide power to the entire system.
2. Start system running and monitor compressor discharge pressure and compressor unit “water out” temperature as the water temperature rises.
3. If the compressor discharge pressure reaches 300 psig before the desired hot water temperature is achieved, adjust the storage tank temperature controller setting to turn the compressor off, or (next):
4. When “water out” temperature is achieved (pressure < 300 psig), adjust water storage tank temperature controller to turn compressor unit “OFF”.

IMPORTANT

The DWM “Water Out” temperature is approximately 5°F higher than actual hot water temperature in water storage tank.

5. The water storage tank temperature controller setting should be verified by draining some hot water from the tank and cycling the system again.

IMPORTANT

If the hot water storage tank temperature controller is adjusted for a high temperature setting, compressor discharge pressure should be checked and the storage tank temperature controller adjusted appropriately to ensure that compressor discharge pressure does not exceed 300 PSIG.

6. Adjust thermostat on supplemental electric heater element to cut in at approximately 5°F lower than the final storage tank temperature controller set point temperature.

7. As appropriate with SCW compressor unit, adjust the chilled water controller to a temperature cut out point which is approximately 5°F above the desired chilled water leaving temperature.

E. Cathodic Protection System

If a Cathodic Protection System (CPS) is being installed, it is assumed that the anode has been installed outdoors, the anode wire has been run indoors to the compressor unit location, and the remaining connections to make the CPS system operational can be made indoors in proximity to the compressor unit.

Figure 69a illustrates the CPS control and the necessary connections.

CAUTION

Be sure power cord on the CPS control is NOT plugged in while making electrical connections.

Proceed as follows (reference Figure 69a):

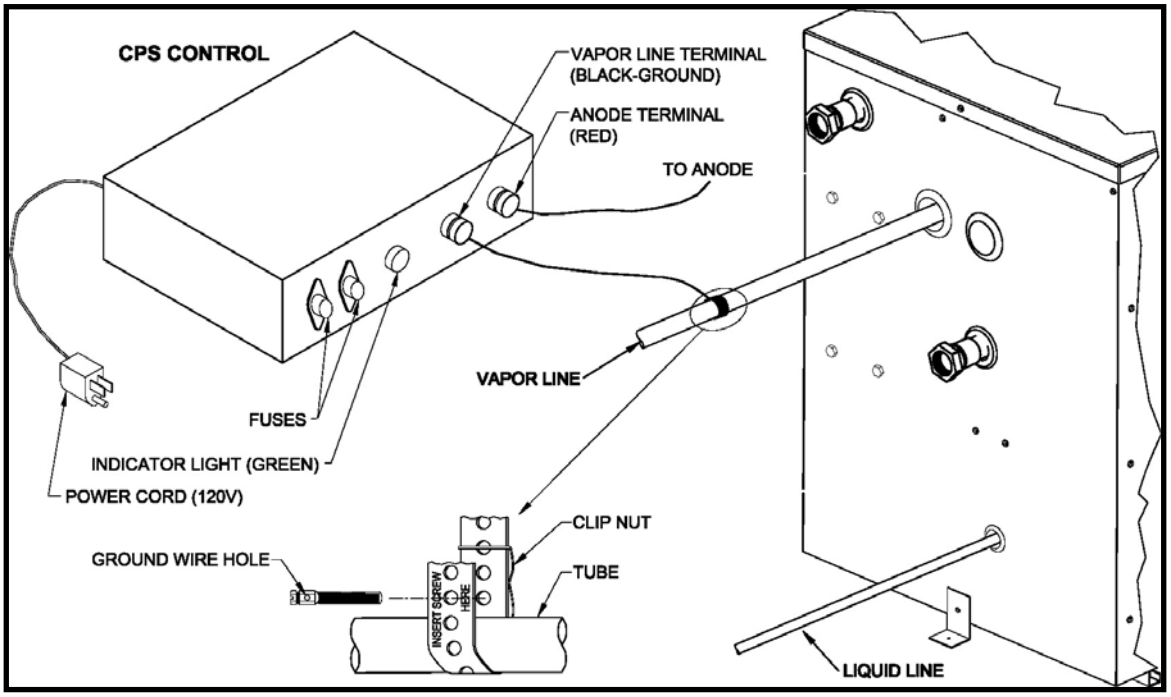


Figure 69a. Typical CPS Control Connections

(1) Connect the loop wire to the vapor tube of the line set:

- Insert bolt assembly into strap hole marked “INSERT SCREW HERE.”
- Wrap strap around tube.

- Slide clip nut to hole closest to the tube which still allows bolt to be secured.
- Thread bolt into clip nut. Tighten securely.
- Loosen set screw, insert loop wire lead and tighten.

(2) Connect loop wire to the CPS control (black).

(3) Connect anode wire to the CPS control (red).

(4) Check all loop and anode wire connections to ensure they are not backwards.

CAUTION

CONNECTING LOOP AND ANODE WIRES BACKWARDS WILL INITIATE ACCELERATED CORROSION.

(5) Plug CPS power cord into a standard 120 VAC outlet to activate the system. The green indicator light shows system is active.

10. Troubleshooting

CAUTION

SERVICE MAY BE PERFORMED ONLY BY AN EARTHLINKED TECHNOLOGIES AUTHORIZED PROFESSIONAL HVAC OR REFRIGERATION SERVICE PERSON. USE ONLY SAFE AND APPROVED SERVICE TECHNIQUES.

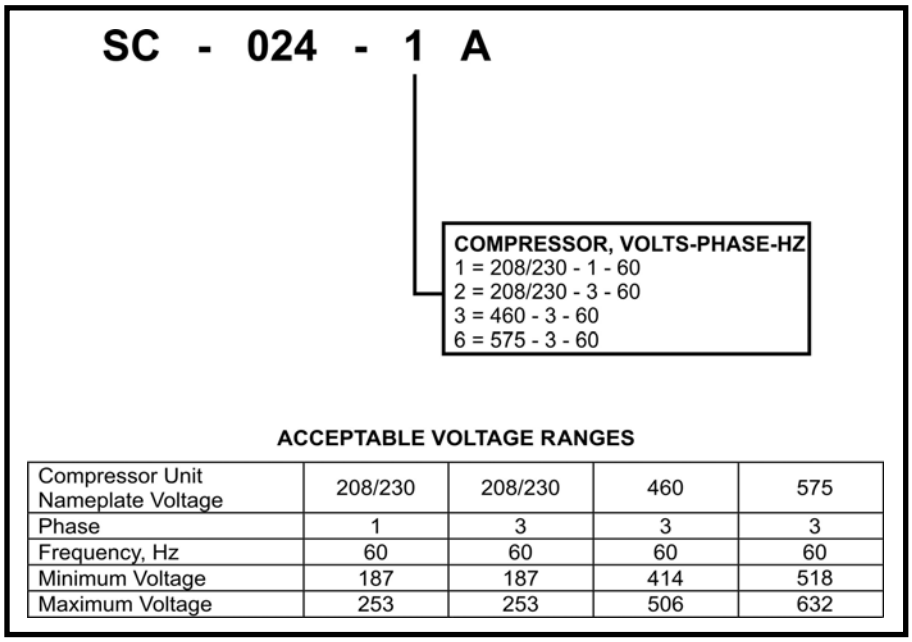
IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, MAINTENANCE OR SERVICE CAN CAUSE 1) THE EARTHLINKED SYSTEM OR COMPONENTS TO MALFUNCTION AND OR FAIL, 2) PROPERTY DAMAGE, INJURY OR DEATH.

A. Introduction

If you experience difficulties with the EarthLinked® system, please review the appropriate section of the manual. It may be helpful to have another professional HVAC or refrigeration service person review and check it with you.

Time and expense can be saved by taking a thoughtful and orderly approach to troubleshooting. Start with a visual check: Are there loose wires, crimped tubing, missing parts, etc?

After setting the remote (wall) thermostat system switch to the "OFF" position and the thermostat fan switch to the "AUTO" position, proceed to check the supply voltage at (1) the line terminals to the breaker/disconnect; 2) the system side of the breaker/disconnect, and 3) the line-side of the transformer. Verify the proper voltage rating for the system with the compressor unit model number shown in Figure 70.



ACCEPTABLE VOLTAGE RANGES

Compressor Unit Nameplate Voltage	208/230	208/230	460	575
Phase	1	3	3	3
Frequency, Hz	60	60	60	60
Minimum Voltage	187	187	414	518
Maximum Voltage	253	253	506	632

Figure 70. Compressor Unit Voltage Information

IMPORTANT

Unless it is ABSOLUTELY NECESSARY to have electrical power to the system for troubleshooting purposes, be sure power is turned off at the breaker/disconnect.

B. System Troubleshooting/Service Tips

Problem / Symptom	Likely Cause(s)	Correction
A. System does not run. ***Note: An internal anti-short cycle timer will prevent the system from starting for 30 seconds following system cycle off. Some digital thermostats have a five-minute time delay*.**	1. Power supply problem.	1. Check power supply for adequate phase and voltage. Check wiring to system and external breakers or fuses.
	2. Control voltage problem.	2. Check for 24V on terminal strip between "R" and "C".
	3. Shut off by external thermostat or thermostat is defective.	3. Check operation of thermostat.
	4. System off on high pressure or low pressure switch.	4. Reset limit lockout relay. Analyze system for root cause.
	5. Internal component or connection failure.	5. Check for loose wiring. Check components for failure, especially water heater relay plugged into socket on SW Models.
	6. Compressor contactor not pulling in.	6. Check for 24V across contactor. Replace if necessary. Trace 24V circuit between "Y" and "C" by hop scotching components.
	7. Water heater relay is not plugged in.	7. Plug in relay.
	8. Faulty run capacitor or start components.	8. Replace as necessary.
B. System runs for long period or continuously.	1. Refrigerant undercharged.	1. Repair leak. Evacuate and recharge system per section 9.
	2. Component failure (cooling mode).	2. Check pressures and electrical circuits for abnormalities.
	3. Cooling Assist Valve not adjusted properly (cooling mode).	3. Adjust per section 9B.
	4. Outdoor thermostat not connected or failed (heating mode).	4. Check outdoor thermostat and electric supplemental heat operation. Confirm proper wiring.
	5. Reduced air flow.	5. Check air ducts for leaks and repair. Check blower operation. Check air filter(s). Remove air flow restrictions.
C. System is locked out on high or low pressure.	1. Loss or restriction of air flow.	1. Check blower assembly for proper operation. Same as B5.
	2. Restriction in refrigerant circuit.	2. Check for blockage or restriction, especially in Liquid Flow Control. Assure that modification of non-ECR air handler is performed per EarthLinked® DX Air handler/Cased Coil Conversion Manual.
	3. Loss of refrigerant.	3. Repair leak. Evacuate system and recharge per section 9.
	4. Defective pressure control.	4. Check limit cut-off pressures. Control is set to actuate at 15 psig (low pressure) and 400 psig (high pressure) ±10%. Check for continuity on both switches under normal pressure conditions.
	5. Defective lockout relay.	5. Check relay for proper operation and continuity of internal contacts.
	6. Head pressure regulator out of adjustment (SW Model only).	6. Readjust per Appendix, Item D (SW Models only).

Problem / Symptom	Likely Cause(s)	Correction
C. System is locked out on high or low pressure. (cont.)	7. Four-way valve does not seat internally. This causes low pressure lockout while heating water (SW Models only).	7. Replace four-way valve. Evacuate and recharge system per section 9.
	8. Active Charge Control is full of liquid refrigerant.	8. Reset lockout and run unit until liquid level drops below top sight glass in ACC. If this does not occur within 15 minutes, shut down system and call ETI Technical Support at 863-701-0096, ext. 25. (If this condition is corrected by this procedure but occurs again, call ETI Technical Support.)
	9. CPR not adjusted properly (when system locks out on high pressure).	9. Adjust CPR so outlet pressure is set not to exceed 70 psig.
D. System blows fuses or trips circuit breaker.	1. Inadequate circuit ampacity.	1. Note electrical requirement and correct as necessary. Reference Section 5.
	2. Short, loose or improper connection in field wiring.	2. Check field wiring for problems.
	3. Internal short circuit. Loose or improper connection in system.	3. Check wiring in system. See appropriate wiring schematics and diagrams. Test components, especially the compressor, for shorts and grounds per section 10C.
	4. Excessively high or low supply voltage or phase loss (3∅ only).	4. Note voltage range limitations specific to the compressor per Section 10C.
	5. Faulty run capacitor or start components.	5. Replace as necessary.
E. Blower fan will not run.	1. Thermostat defective.	1. Check for 24V power on eight-post terminal strip between “C” and “G”.
	2. Defective water heater relay (plug-in).	2. Check for good socket connections. Replace if necessary.
	3. Defective fan relay in air handler.	3. Check relay operation and continuity of terminals.
F. System will not switch to cooling mode (continues to run in heating mode).	1. Thermostat faulty.	1. Check operation of thermostat and replace if necessary.
	2. Open heat/cool circuit (orange wire).	2. Check for 24V on eight-post terminal strip between “O” and “C”.
	3. Four-way valve solenoid not energized.	3. Check for magnetism at end of valve coil.
	4. Four-way valve stuck in heat mode.	4. Contact ETI Technical Support at 863-701-0096, ext. 25.
G. No space heating or reduced heating (systems equipped with supplemental electric resistance heat).	1. Defective heating element(s).	1. Check resistance element(s) for continuity.
	2. Thermal limit is open.	2. Check continuity across thermal limit switch.
	3. Defective heater relay.	3. Check relay for proper operation. Replace if defective.
	4. Thermostat is set too low.	4. Adjust thermostat.
	5. Compressor fault.	5. To reset switch, turn primary power off then back on; or turn thermostat system switch to OFF, then back on. If this does not correct the problem, see Section 10C.

Problem / Symptom	Likely Cause(s)	Correction
H. Compressor turns off on thermal overload.	1. Refrigerant leak.	1. Check for refrigerant level in ACC. Repair leak, evacuate system and recharge with refrigerant.
	2. System undercharged.	2. Charge system per section 9.
	3. Cooling Assist Valve is not adjusted properly.	3. Adjust CAV, section 9B.
	4. Four-way valve is short circuiting refrigerant and bypassing hot gas to suction.	4. Replace four-way valve, evacuate, recharge and start-up system, section 9.
	5. Compressor valves are faulty.	5. Replace compressor and evacuate, recharge and start-up system, section 9.

Service Tips

1. **Refrigerant Recovery:** The ACC is capable of holding a large amount of liquid refrigerant. Recovering refrigerant form the system is most effectively accomplished by removing it via the dip tube in the top of the ACC. If the dip tube is not utilized to remove the refrigerant, the only alternative is to evaporate it.

   Evaporation involves running the system to supply superheat to the ACC thus slowly recovering the suction gas. The ACC will be empty when the inlet and outlet tube temperatures are equal and superheated. Only then can the system be turned off and the remainder of the refrigerant recovered.

2. **System Charging:** Endeavor to inject as much liquid refrigerant as possible through the special charging port provided. This will send the initial refrigerant charge into the earth loops. Although it is possible to inject liquid refrigerant directly into the ACC, it should be kept in mind that the refrigerant charge can only be placed into system circulation by evaporating (a slower process) from the ACC reservoir. Therefore, when injecting liquid refrigerant into the ACC, inject it slowly to allow the liquid to change to a gas.

3. **Thermostat Bypass:** All of the thermostat terminals are exposed on top of the electric control box. System start-up can be expedited and simplified by controlling the heating/cooling operating modes from the terminal strip during start-up. The initial thermostat activation will be in the cooling mode. Adjust the set-point temperature low for prolonged system operation.

   To operate for quick change from cool to heating to cooling modes, simply remove the orange wire from the “O” terminal for heat, and replace for cool. This can be done while continuing system operation without shutting down to change over.

4. **System Evacuation/Vacuum:** A system evacuation can required from one hour to overnight, depending on the size of the system, vacuum pump capacity, etc. Leaving a vacuum pump run overnight usually makes the most effective use of a service person’s time and should be timed accordingly.

5. **Domestic Water Module (DWM) or Hydronic Water Module (HWM) Dry Run:** Initiating water flow through the DWM or HWM will prevent troublesome high pressure lockouts due to the water pump not being primed. To avoid this, first remove the black “C” lead from “T1” to prevent compressor operation. Then place two jumper wires from “L1” and “L2” to “WH1” and “WH2,” respectively. Provide water to the pump inlet, activate the pump and confirm water flow through the pump. Remove jumpers, replace the black lead and start the water heating mode of operation per Appendix, Item D.

C. Compressor Troubleshooting Checklist

Prior to concluding the compressor has failed, check the following:

1. **Electrical Service Panel** – turn power off.
   a. Check circuit connections for tightness
   b. Circuit breaker sized right?*
   c. Wire size correct?*
2. **Check start and run capacitors** or other start components for bulges, overheating or loose connections.
3. **Test capacitors** and start components and replace if necessary. Capacitors can be checked by substitution.
4. **Check incoming power supply voltage** to determine whether it is within acceptable voltage range.*
5. **Check voltage at compressor unit terminals** to determine whether it is within acceptable voltage range.*

***Check unit nameplate, installation manual and NEC/local codes for correct information.**

6. **Running Amperage.** Connect a clip-on type ammeter to the (common) lead to the compressor. Turn on the supply voltage and energize the unit. The compressor will initially draw high amperage; it should soon drop to the RLA value or less. If the amperage stays high, check the motor winding resistance.

   Note: Feel the top of the compressor to see if it has overheated. If it is hot, the internal overload may be open. You may have to wait several hours for it to reset.

   If the compressor draws a high amperage and does not start (amperage is approximately locked rotor amperage – LRA in Spec Guide Figure 27), the compressor is locked mechanically and should be removed from the system.

> ***IMPORTANT***
>
> Turn power OFF to the compressor unit before proceeding to the next st

7. **Motor Circuit Testing**

   Using a digital volt-ohmmeter (VOM), measure the resistance across the compressor windings as shown below in Figure 71. The power leads to the compressor must be disconnected before taking an electrical measurement. A good rule of thumb for single phase compressors is that start winding resistance (R_2) is 3 to 5 times greater than run winding resistance (R_1).

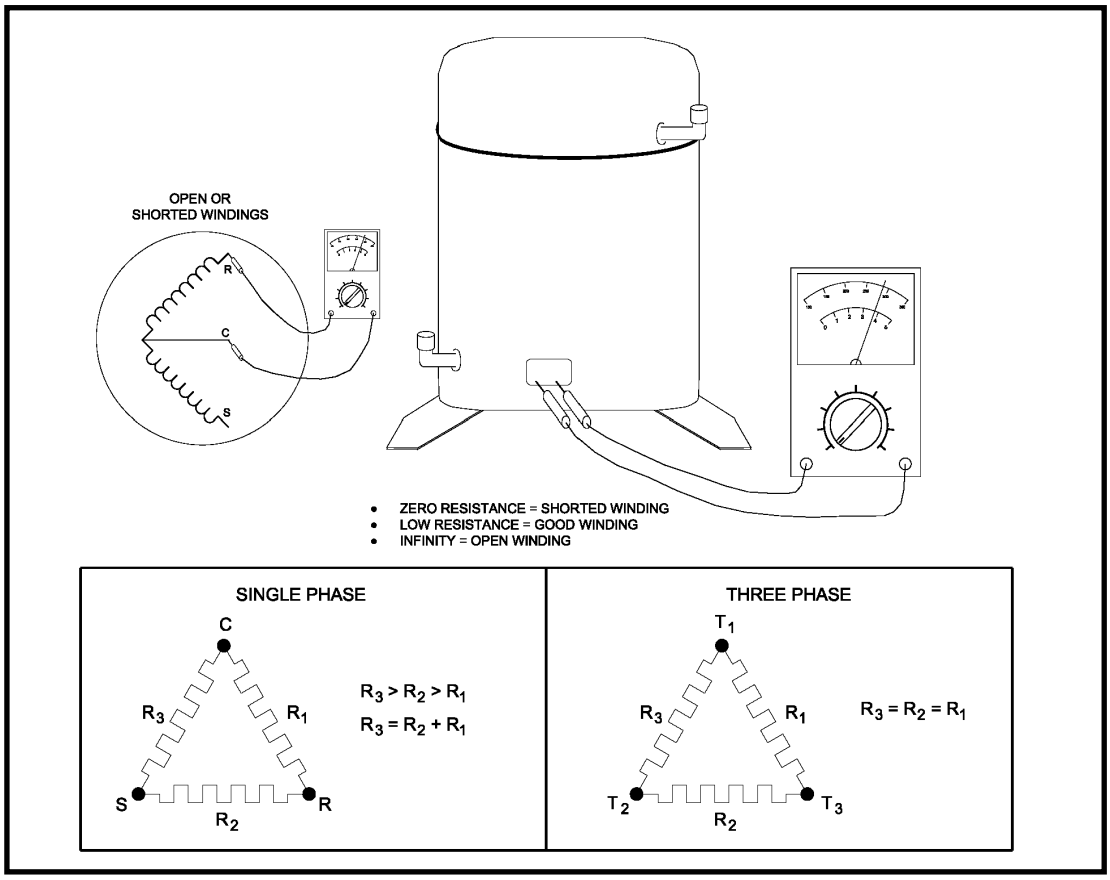


Figure 71. Compressor Motor Circuit Testing

8. Grounded Windings

Test the compressor motor for a grounded winding. The check should be made using an ohmmeter capable of measuring very high resistance on a VOM. The resistance between windings and the housing is one million to three million ohms for an **ungrounded** winding.

IMPORTANT

DO NOT do this test when the system is under vacuum.

Attach on lead to the compressor case on a bare metal tube and to each compressor terminal as shown in Figure 72. A short circuit at a high voltage indicates a motor defect.

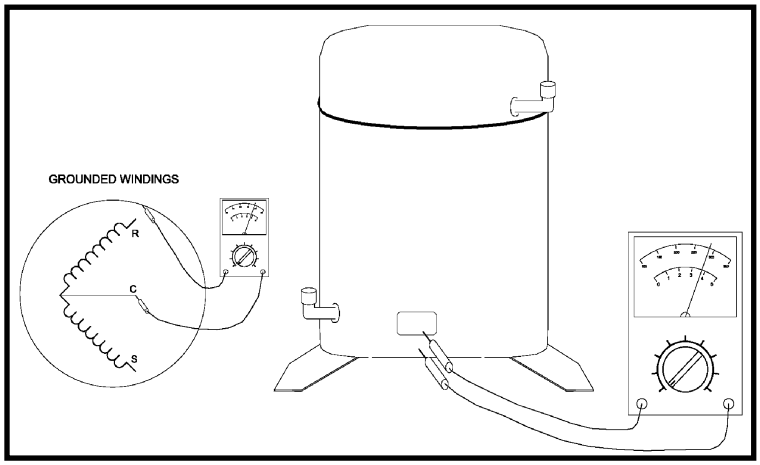


Figure 72. Compressor Motor Grounded Windings Test

9. **Compressor not pumping.**

   Connect gauge block hoses to the suction and discharge pressure ports in the compressor unit. Read pressure gauges to affirm that system is pressurized with refrigerant. Turn on power to compressor unit and run unit. Observe pressure gauges. If pressures on both gauges remain the same, compressor is not pumping and there is a possible internal failure. Remove compressor.

D. Controls Functions

1. **Active Charge Control (ACC):** This patented control is a liquid/vapor separator which allows only saturated vapor to exit. By its design, oil is entrained by the exiting vapor. It must always contain some liquid during operation which can be seen through the sight glasses on the side of the tank. If superheated gas should arrive at the ACC, it will "feed" liquid refrigerant into circulation until the superheat is removed.

2. **Liquid Flow Control (LFC):** This proprietary control meters refrigerant from the high to the low side of the system. It is the expansion device for heating and cooling modes of operation. By modulating continuously and sampling a tiny trickle of vapor bubbles exiting the condenser, it prevents subcooling of the liquid refrigerant.

3. **High Pressure Switch:** This switch is located on the hot gas line. It is electrically connected to a lockout relay which shuts the system down if the refrigerant pressure rises to 400 psig. This protects the system if air flow is reduced or lost through the heat transfer surface performing the condenser function.

   The contacts of the high pressure switch automatically close when the refrigerant pressure falls to approximately 300 psig. However, the lockout relay must be reset by disconnecting the control voltage which activated it. A manual reset is necessary to prevent harmful short-cycling. To reset the switch, turn off the primary power, then turn it back on; or turn the thermostat system switch off, then back on.

4. **Low Pressure Switch:** This switch is located on the system's suction line and when tripped, it activates the lockout relay and shuts down the system. This switch protects the system if there is loss of refrigerant. A manual reset is needed to restart the system. To reset the switch, turn off the primary power, then turn it back on; or turn the thermostat system switch off, then back on.

5. **Lockout Relay:** The relay prevents the system from cycling on the pressure switches by providing positive shut-down if the low pressure or high pressure limits are exceeded. The coil is wired in series with the compressor contact coil. However, the impedance (resistance) is such that the majority of the control voltage is dropped across the contactor.

   Opening the high or low pressure switch will cause the control voltage to be dropped across its coil, activating its contacts to perpetuate its function. Removing control voltage from its coil will reset its contacts to the normal operating position. A replacement lockout relay must be an exact match.

6. **Time Delay/Anti-Short Cycle Timer:** The time delay module (delay on break for SC Models only) prevents the compressor from restarting immediately after an interruption of power. The delay interval, which is factory-adjusted to three minutes, protects the compressor by allowing internal refrigerant pressures to equalize. The time delay does not affect the electric heat circuit.

   The time delay (delay on make for SW Models) prevents the compressor from restarting immediately after completion of heating water. The delay interval, which is factory-adjusted to 30 seconds, provides an adequate time interval for the high pressures associated with water heating, to be reduced (bled off). This pause is necessary to cause the three and four-way valves to throw back to their normal

operating positions. This time delay is for the purpose of reducing pressure differentials across the valves.

7. **Start Relay and Capacitor:** This provides the compressor with higher starting torques. The start relay characteristics are matched to the compressor. A replacement must be an exact equivalent to the original.

8. **Indoor Thermostats (wall-mounted):** EarthLinked® Technologies Model TR94, TR97 and TH9421 are electronic thermostats having energy savings features compatible with EarthLinked® Systems. If the indoor thermostat is to be field-supplied, it should be an electromechanical or electronic heat pump thermostat with two-stage heat, one-stage cool and emergency heat capability. It can be programmable or non-programmable. The thermostat is to be powered by a single transformer (40 VA max.) system (with a single "R" terminal). Secondary current draw is to be limited to a maximum of 1.5 amperes.

9. **Building Automation Systems (BAS):** Prior to installing any building automation system to the EarthLinked® heat pump system, please call EarthLinked® Technologies Technical Support at 863-701-0096 for further instructions.

10. **Outdoor Thermostat:** This thermostat (EarthLinked® Technologies Model THOD) is field-adjusted to the balance point temperature and determines the outdoor temperature at which supplemental electric heat turns on.

    Its proper adjustment is critical to the optimum performance of the system and providing the highest level of comfort. **Do not assume a balance point temperature.** The balance point setting is determined by calculating the heating load (per ACCA *Manual J* method and properly matching the EarthLinked® heat pump system performance characteristics to the load requirements. Contact EarthLinked® Technologies Technical Support at 863-701-0096 for more information.

11. **Cooling Assist Valve (CAV):** This valve initiates refrigerant flow in cooling mode operation by acting to bypass the LFC, which is initially closed. It also compensates for variations in earth temperatures, interconnecting refrigerant line lengths and earth loop configurations. The setting of this valve should not be altered after initial system start-up.

12. **Crankcase Pressure Regulator (CPR) (on SW Compressor Units):** The CPR, located between the Active Charge Control (ACC) and the compressor, regulates the inlet (suction) pressure to the compressor. The CPR is factory set at 70 psig and DOES NOT require adjustment in the field at the time of start-up.

13. **Solenoid Valve #1:** This valve drains the Domestic Water Module (DWM) or the Hydronic Water Module (HWM) of refrigerant when the system is operating in heating or cooling mode and there is no demand for hot water.

14. **Solenoid Valve #2:** This valve closes during water heating mode to prevent refrigerant migration into the idle air handler coil.

15. **Desuperheater Thermostats (Reference Spec Guide Figure 61):**

    a. **Thermostat C**: Located inside the desuperheater box, this thermostat tests the water temperature and closes when water temperature is 50°F or below. This is a freeze protection thermostat.

    b. **Thermostat A:** This thermostat tests the refrigerant temperature and closes on a rise to 130°F, sending its electric signal to thermostat #3 to energize the water pump.

    c. **Thermostat B:** This thermostat tests the water temperature and opens on a rise to 150°F to turn off the water pump.

d. Thermostatic Valve D: This valve opens on a rise in water temperature at its (adjustable) temperature set point. It is field-adjusted at start-up to 120°F. It prevents heat transfer from the water to system refrigerant.

11. Warranty Claims Procedure

A. Warranty – What is Covered/Not Covered

WARRANTY: WHAT IS COVERED

A summary of the Standard Factory Warranties (Limited Warranty) appears in the following table for the EarthLinked® System HVAC Components (Items 1A. and 1B.), and the DIRECT AXXESS® Earth Loop (Item 2.). See the Limited Warranty (LIT-63) for details.

Covered Items	Parts Replacement	Labor Allowance
1A. Standard warranty on the following Compressor Unit Components: (a) compressor, (b) Liquid Flow Control, (c) Active Charge Control.	0 – 5th year	0 – 5th year
1B. Standard warranty on the Compressor Unit Components not listed in 1A above, Air Handler, Cased Coil, Domestic Water Module, Hydronic Water Module, Desuperheater, Cathodic Protection System and Thermostat.	0 – 1st year	0 – 1st year
2. Standard warranty on DIRECT AXXESS® Earth Loop system (loops and manifolds).	0 – 20th year	0 – 5th year

WARRANTY: WHAT IS NOT COVERED:

1. Conditions or damages resulting from any of the following:
   a. Improper transportation or delivery, installation, service, or maintenance
   b. Any repair, modification, alteration or adjustment not authorized by ETI
   c. Misuse, abuse, accidents and unreasonable use
   d. Improper setting or use of any control
   e. Improper electrical supply or refrigerant charge
   f. Improper backfill, grouting or compaction of earth loops
   g. Use of system components in a corrosive atmosphere
   h. Use of earth loops in a corrosive soil without ETI's Corrosion Protection System
   i. Subjecting installed earth loops to electrical currents
   j. Field supplied and installed system components
   k. Installation done by anyone other than an ETI trained and authorized installer.
   l. Use of any field supplied component that is not listed with applicable industry safety and performance standards agencies

2. The cost of a service call to:
   a. Diagnose a problem
   b. Correct installation errors
   c. Instruct the user on the proper operation of the product
3. Consequential or incidental damages sustained by any person as a result of any breach of the attached warranties.

Some states do not allow exclusion or limitation of consequential or incidental damages, so the above exclusion may not apply in these states.

B. Warranty Claims Procedure

DEALER WARRANTY CLAIM AND RETURNED GOODS AUTHORIZATION PROCEDURE FOR EARTHLINKED® HEATING, COOLING AND DIRECT AXXESS® PRODUCTS

A. As a licensed professional HVAC service representative authorized by EarthLinked® Technologies, Inc. (ETI), you shall diagnose and correct system problems in accordance with ETI's Limited Warranty, ETI training, and professionally recognized heat pump system service practices. All diagnostic, service, installation, and transportation costs are the responsibility of the owner, unless otherwise specified in ETI's Standard Factory Warranties (See Limited Warranty attached). **REVIEW WHAT THE WARRANTY DOES AND DOES NOT COVER STARTING ON PAGE 3.**

B. Diagnose the root cause(s) of the problem(s) and the corrective action(s) necessary to restore the system to proper operating condition. **CALL EARTHLINKED® TECHNOLOGIES AT 863-701-0096. AFTER DIAGNOSING THE PROBLEM AND BEFORE PROCEEDING WITH THE REPAIR PROCESS TO: (1)UNDERSTAND THE WARRANTY ALLOWANCES, (2) RECEIVE AUTHORIZATION TO PROCEED WITH THE REPAIR PROCESS AND (3) SECURE A RETURN GOODS AUTHORIZATION (RGA) NUMBER IF A PART(S) IS TO BE RETURNED TO ECR (SEE E. BELOW).**

C. If the original warranty registration card(s) for the subject EarthLinked® HVAC Components and DIRECT AXXESS® Earth Loop System were not completed and returned at the time of installation, the warranty period starts from the date the system/part was shipped from ETI.

D. If a part is being replaced, refer to the Service Parts Price Sheets or call ETI to determine the replacement part number.

E. The service representative may be required to ship the part(s) to ETI with the warranty claim. **CONTACT ETI TO: DETERMINE IF SHIPMENT OF RETURN PART(S) IS REQUIRED AND (2) OBTAIN AN RGA NUMBER PRIOR TO SHIPMENT OF ANY RETURN PART(S).** If ETI requires a part(s) to be returned, ETI will pay standard freight to return the part(s) to ETI. ETI will also pay standard freight on service replacement parts shipped from ETI to the service representative's place of business. Expedited freight charges are the responsibility of the service representative.

F. **TO INITIATE A WARRANTY CLAIM** use your current method of billing a customer (work order, etc.) and include the following:

   1. Model and serial number of equipment/part.
   2. Brief description of work performed (copy of service ticket total amount due)
   3. Customer signature (if available)

4. Support information for replacement parts

G. Guidelines for completing and filing your warranty claim with EarthLinked® Technologies on claims pertaining to the standard factory warranties are:

1. The service representative must have an ETI approved hourly service charge rate on file with EarthLinked® Technologies. This should be a copy of a current customer invoice clearly indicating the hourly service charge rate. If the service representative's hourly service rate is not known and approved by ETI, the maximum hourly service rate paid by ETI will be the rate posted on ETI's current In-Warranty Labor Allowances, LIT-66.

2. Labor time claims will be credited in accordance with ETI's current In-Warranty Labor Allowances, LIT-66.

H. Mail Warranty Claims to:

For EarthLinked® System HVAC Components Standard Factory Warranty or DIRECT AXXESS® Earth Loop Standard Factory Warranty:

EarthLinked® Technologies, Inc. (www.earthlinked.com)
4151 Pipkin Road
Lakeland, FL 33811
TEL: 863-701-0096
FAX: 863-701-7796

I. All returned part packages must be labeled with an RGA number. Without a clearly visible RGA number, the package will and the warranty claim may be refused.

J. **RGA instructions are outlined below.**

1. **Obtain the following information: (A) Customer Name and Address, (B) Return part(s) description (including model/serial numbers) and (C) Reason for the return**

2. **CALL ETI @ 863-701-0096.** ETI will want to know the above information that will enable them to initiate the RGA form, as appropriate.

3. **If a part is to be returned, ETI will mail you a pre-addressed shipping label with the issued RGA number on it. Place the label on the return package so the RGA number is clearly visible at a quick glance.**

4. **Ship only the part(s) that are directly pertinent to the warranty claim.** If the correct RGA number is not on the return part(s) arriving at ETI, it will be refused.

5. **WARRANTY CLAIMS AND RETURNED PARTS MUST BE RECEIVED BY ETI WITHIN 30 DAYS AFTER ETI AUTHORIZES SERVICE.**

IMPORTANT

RGA numbers are to be clearly visible on the outside of the return package.

C. Warranty

LIMITED WARRANTY

EARTHLINKED® TECHNOLOGIES, INC

EARTHLINKED® GEOTHERMAL HEAT PUMP HVAC COMPONENTS AND DIRECT AXXESS® EARTH LOOPS

EarthLinked® Technologies, Inc (ETI) hereby warrants to the consumer that all EarthLinked® Geothermal Heat Pump HVAC Components and DIRECT AXXESS® Earth Loops are free from defects in materials and workmanship, and will replace or repair system components and reimburse labor costs in accordance with the terms of t his Limited Warranty. The terms of this warranty are effective from the date of installation and apply only to products purchased and installed within the USA and Canada. The installation must be done by an ETI trained and authorized installer in accordance with the ETI manuals, in effect at the time of installation or the warranty will be void. All transportation, service labor, diagnostic calls and excavation, backfilling and drilling expenses other than those specifically allowed by this Warranty are excluded.

Five-Year Parts & Labor for Specified Compressor Unit Components: If any of the specified EarthLinked® Compressor Unit Components (defined as the compressor, Liquid Flow Control, and Active Charge Control) fails within five (5) years due to a defect in manufacture or ETI's fabrication of that components, ETI will provide for the replacement of the appropriate part(s) to the installer. The replacement part(s) will be warranted for the remainder of the five-year period. If ETI provides the replacement part(s) for a failure within five years of installation due to a defect in manufacture or ETI's fabrication, ETI will also provide for the reimbursement (in the form of credit to the claimant's account) of labor costs to the installer, as specified in the EarthLinked® Geothermal Heat Pump Warranty Allowance Schedule in effect at the time of system installation, for a period of five(5) YEARS.

One-Year Parts & Labor for HVAC Components: If any EarthLinked® Geothermal Heat Pump HVAC Component (defined as the compressor unit, air handler, cased coil, domestic water module, hydronic water module, Cathodic Protection System, desuperheater or thermostat) fails within one (1) year due to a defect in manufacture or ETI's fabrication of that HVAC component, ETI will provide for the replacement of the appropriate part(s) installer. The replacement parts(s) will be warranted for the remainder of the one-year period. If ETI provides the replacement part(s) for a failure within one year of installation due to a defect in manufacture or ETI's fabrication, ETI will also provide for the reimbursement (in the form of credit to the claimant's account) of labor costs to the installer, as specified in the EarthLinked® Geothermal Heat Pump Warranty Allowance Schedule in effect at the time of system installation for a period of one (1) year.

Twenty Year Parts & Five Year Labor for Earth Loops: If any DIRECT AXXESS® Earth Loop fails within twenty years due to a defect in material or workmanship in manufacture, ETI will provide the appropriate replacement part(s) to the installer. The replacement part(s) will be warranted for the remainder of the twenty-year period. If ETI provides the replacement part(s) for a failure within five years of installation due to a defect in manufacture or ETI's fabrication, ETI will also provide for the reimbursement (in the form of credit to the claimant's account) of labor, excavation and backfill costs to the installer, as specified in the DIRECT AXXESS® Warranty Allowance Schedule in effect at the time of system installation, for a period of five (5) years.

Exclusion: This Warranty shall not apply to damaged system components caused by transportation, improper installation, service or alteration, acts of God, improper electrical supply or refrigerant charge, improper backfill, grouting or compaction of earth loops use of the components in a corrosive atmosphere, use of the earth loops in a corrosive soil without ETI's Cathodic Protection System or earth loops subjected to electrical currents. This Warranty does not apply to field-supplied and installed components for this system.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE HEREOF AND THIS LIMITED WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES AND LIABILITIES. THE FOREGOING STATES ETI'S ENTIRE AND EXCLUSIVE LIABILITY AND BUYER'S EXCLUSIVE AND SOLE REMEDY. ETI WILL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL OR CONTINGENT DAMAGE OR EXPENSE ARISING DIRECTLY OR INDIRECTLY FROM ANY DEFECT IN ITS GOODS OR FROM THE USE THEROF, NOR IS ANY OTHER PERSON AUTHORIZED TO ASSUME FOR ETI ANY SUCH LIABILITY.

IN NO EVENT, WHETHER AS A RESULT OF BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE OR STRICT LIABILITY, SHALL ETI BE LIABLE FOR SPECIFIC, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, PROPERTY DAMAGE, LOSS OF USE OF THE EQUIPMENT OR ASSOCIATED EQUIPMENT, LOST REVENUES OR PROFITS, COST OF SUBSTITUTE EQUIPMENT OR COST OF FUEL OR ELECTRICITY. THE ABOVE LIMITATIONS SHALL INURE TO THE BENEFIT OF ETI'S SUPPLIERS, DEALERS, AGENTS AND SUBCONTRACTORS. THE ABOVE LIMITATION ON CONSEQUENTIAL DAMAGES SHALL NOT APPLY TO INJURIES TO PERSONS IN THE CASE OF CONSUMER GOODS.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OR LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OR LIABILITY FOR STRICT LIABILITY IN TORT, SO THAT THE ABOVE EXCLUSIONS AND LIMITATIONS MAY NOT APPLY IN SUCH STATES.

ETI DOES NOT ASSUME, OR AUTHORIZE ANY OTHER PERSON TO ASSUME FOR ETI, ANY OTHER LIABILITY FOR AND/OR REGARDING THE SALE OF THIS PRODUCT AND/OR RELATED PRODUCT.

Figure 73. Limited Warranty

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Appendix A Tools and Equipment

The purpose of the following list is to highlight key pieces of equipment, tools and materials necessary for the installation, maintenance and servicing of EarthLinked® Heating and Cooling System HVAC (above ground) equipment.

The professional HVAC technician is expected to have a compliment of standard tools for the general servicing of refrigeration equipment.

Equipment, Tools and Materials

ITEM	DESCRIPTION
1.	Vacuum Pump (6 CFM minimum capacity)
2.	Evacuation Manifold (for vacuum pump)
3.	Digital Vacuum (micron) Gauge
4.	Charging/Evacuating Manifold for R-22/R-407C (quantity of 2)
5.	Charging/Hi-Vacuum Hoses (black, quantity of 6)
6.	Digital Refrigerant Scale
7.	Digital Thermometer
8.	Digital Sling Psychrometer
9.	Air Flow Meter (for air handlers)
10.	Nitrogen Tank with 0 – 600 psig Regulator and Handtruck
11.	Oxy-acetylene Welding Torch Set
12.	15% Silver Brazing Alloy
13.	Refrigerant Recovery Unit (1/2 #/minute minimum vapor capacity)
14.	Recovery Cylinder (50# capacity)
15.	Halogen Leak Detector
16.	Digital VOM
17.	Digital Clamp-on Ammeter
18.	Digital Water Flowmeter (3 to 30 gpm)
19.	Tubing Cutters
20.	Tubing Benders
21.	Nut Driver
22.	Cordless Drill (3/8”)
23.	Swaging Kit
24.	Deburring Tool
25.	Drill Bit Set
26.	Inspection Mirror

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Appendix B Electrical Illustrations for Compressor Units

Electrical Illustrations

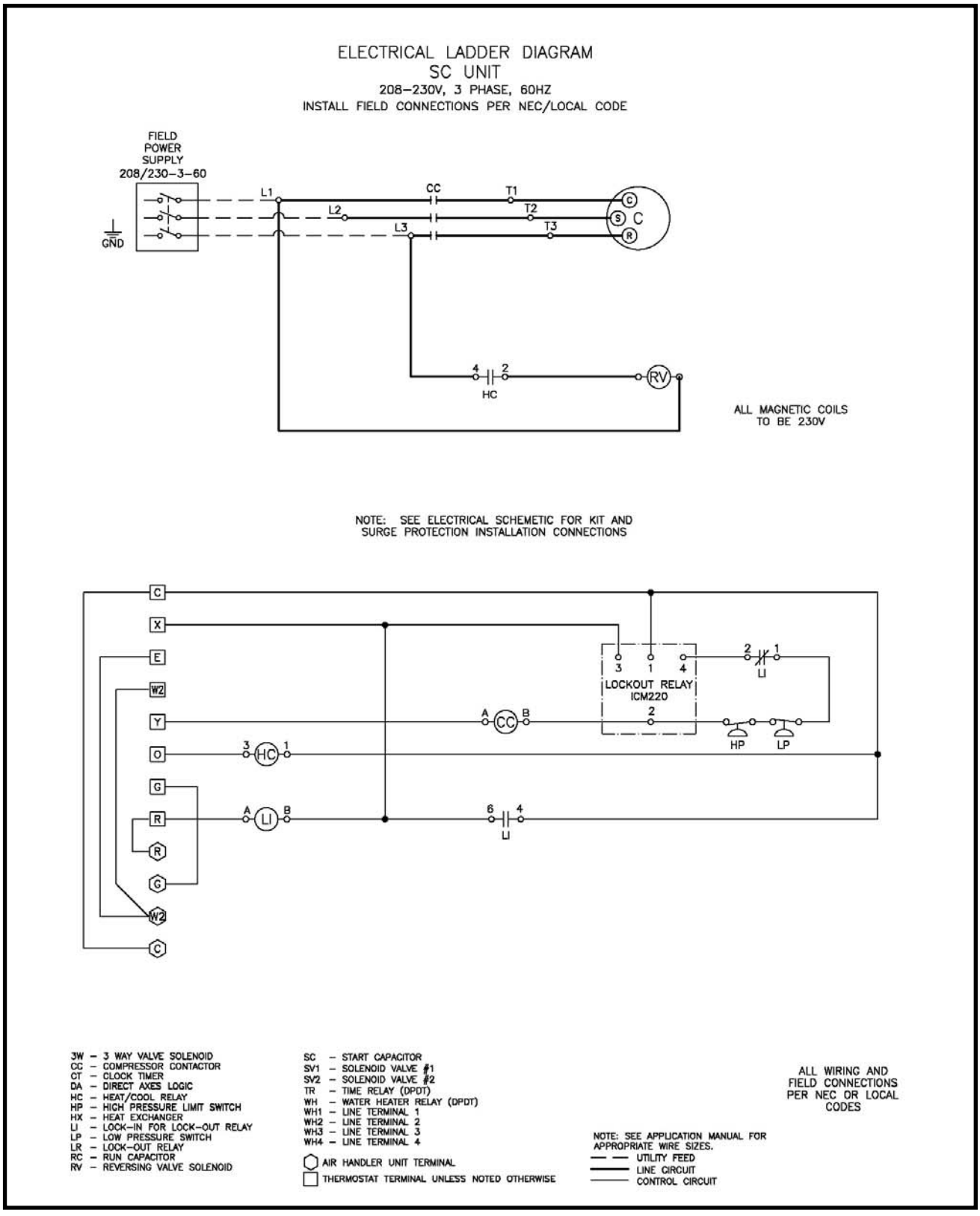

Figure B-1. SC Series 230/208-3-60 Electrical Ladder Diagram

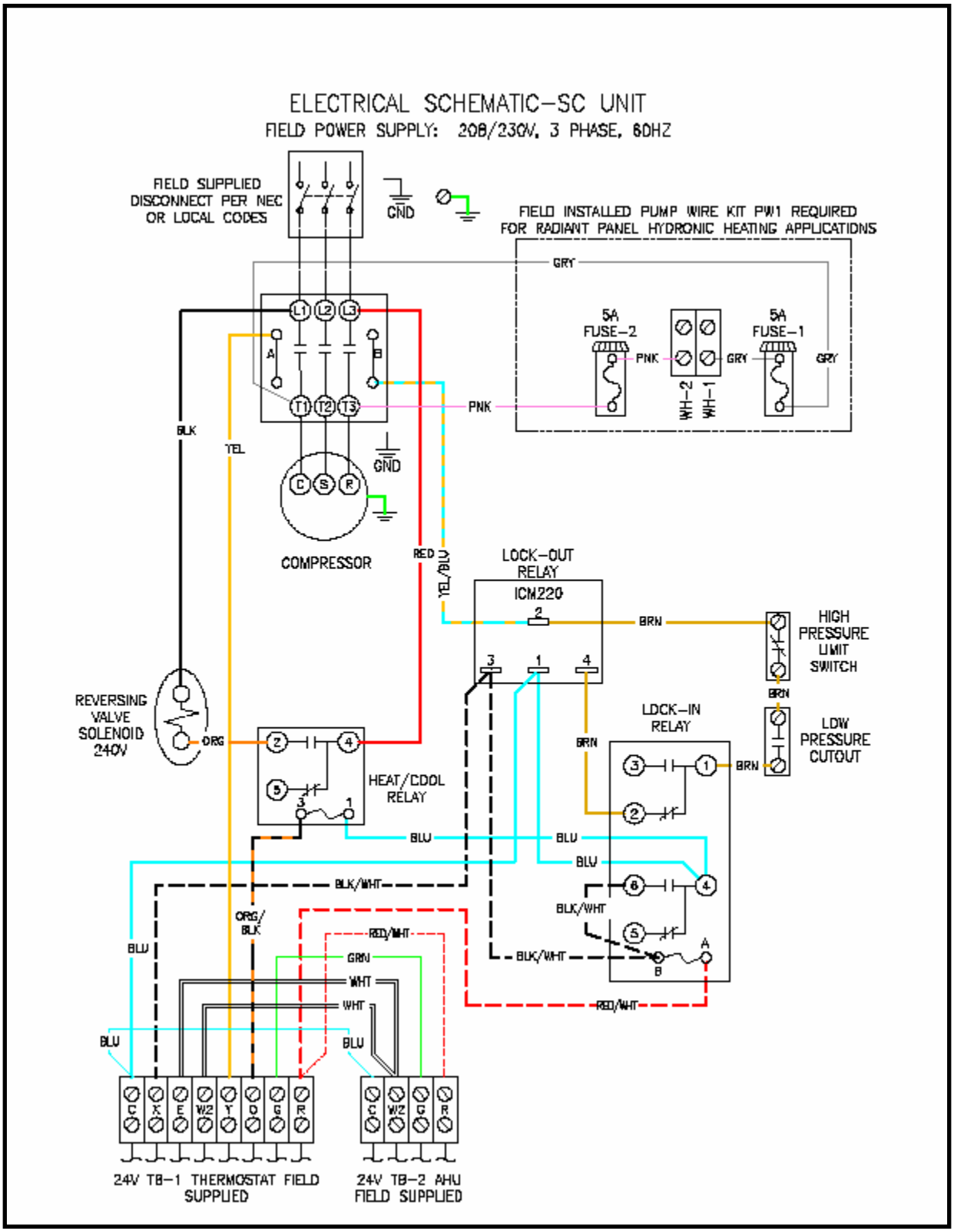

Figure B-2. SC Series 230/208-3-60 Electrical Schematic

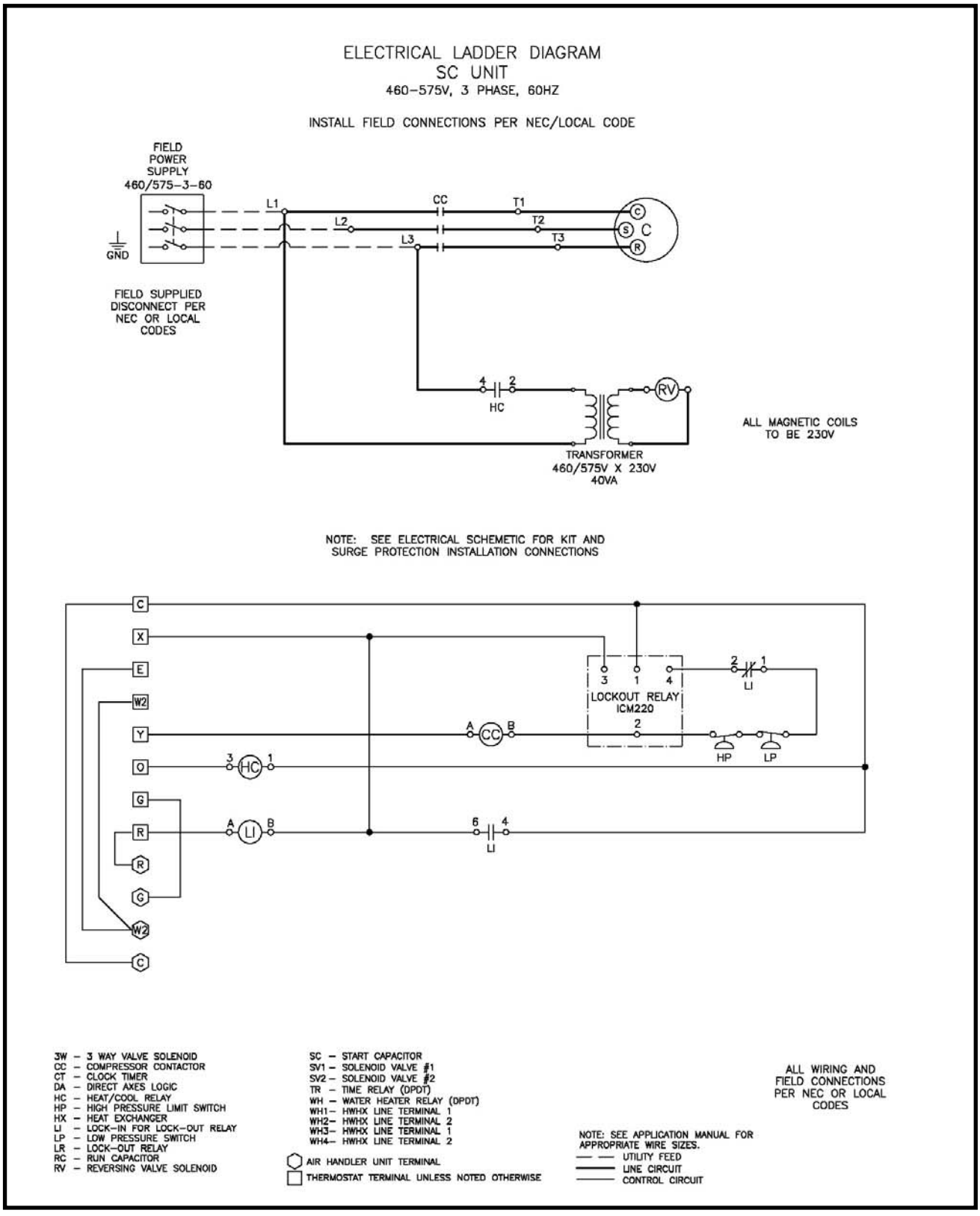

Figure B-3. SC Series 460-3-60 Electrical Ladder Diagram

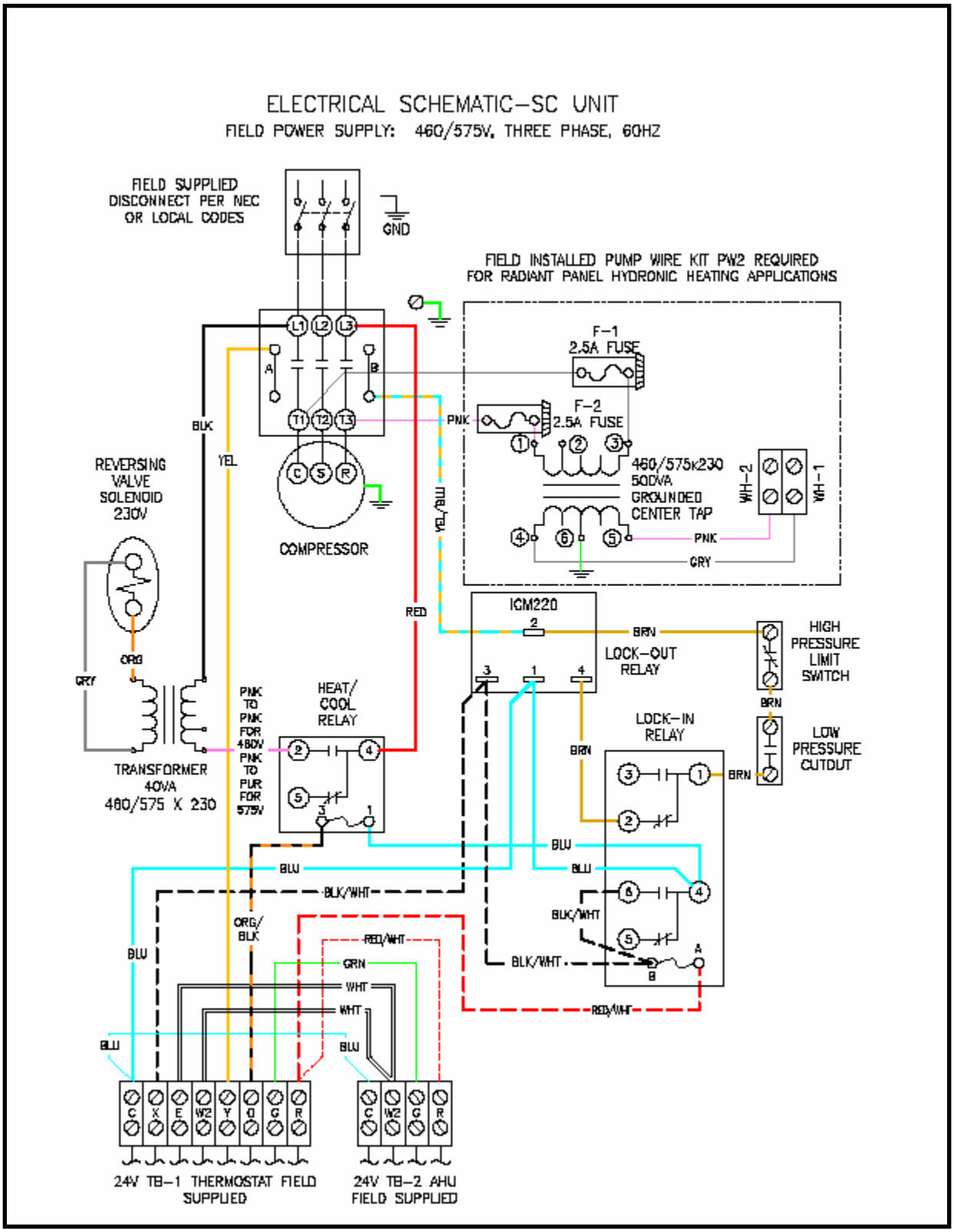

Figure B-4. SC Series 460-3-60 Electrical Schematic

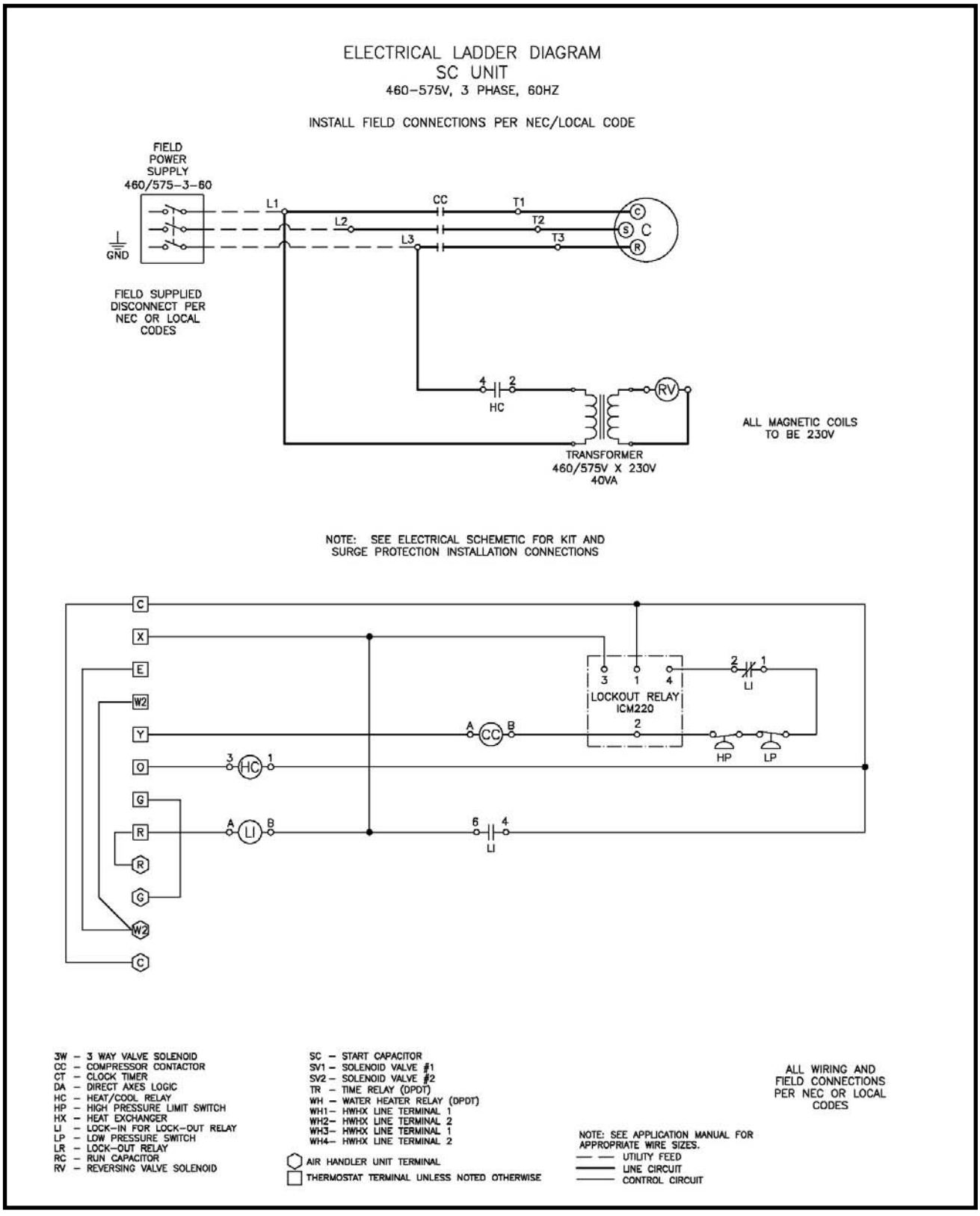

Figure B-5. SC Series 575-3-60 Electrical Ladder Diagram

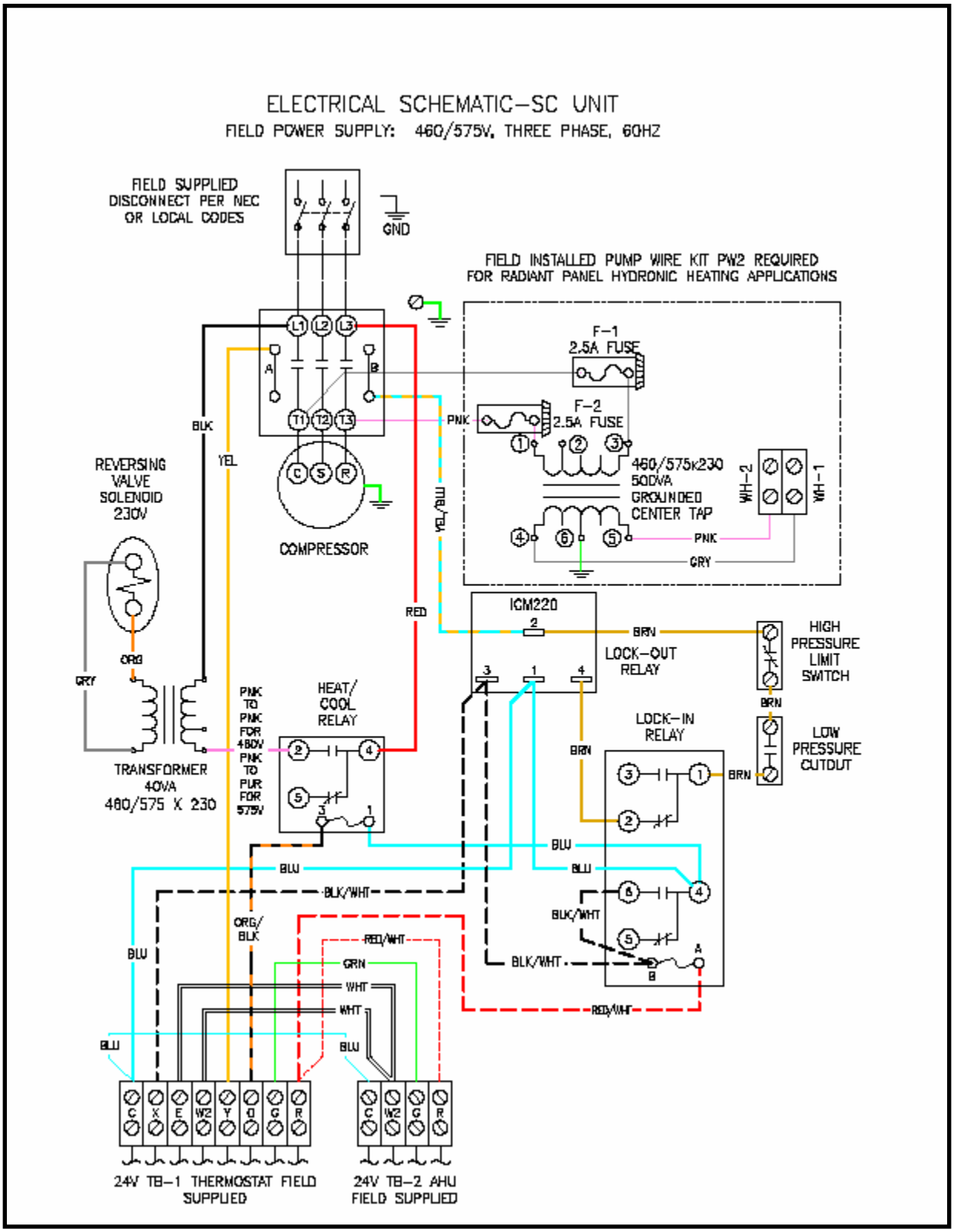

Figure B-6. SC Series 575-3-60 Electrical Schematic

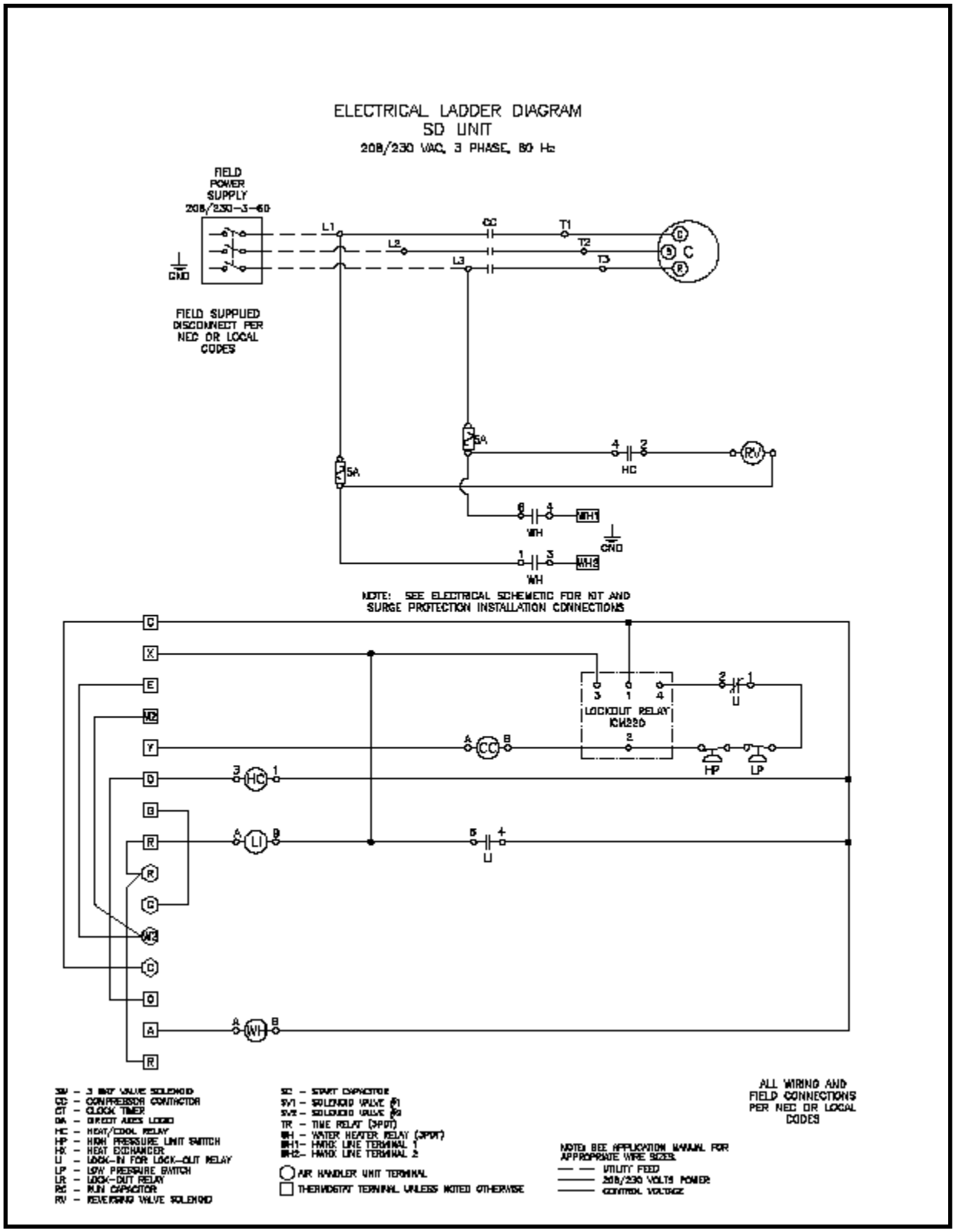

Figure B-7. SD Series 230/208-3-60 Electrical Ladder Diagram

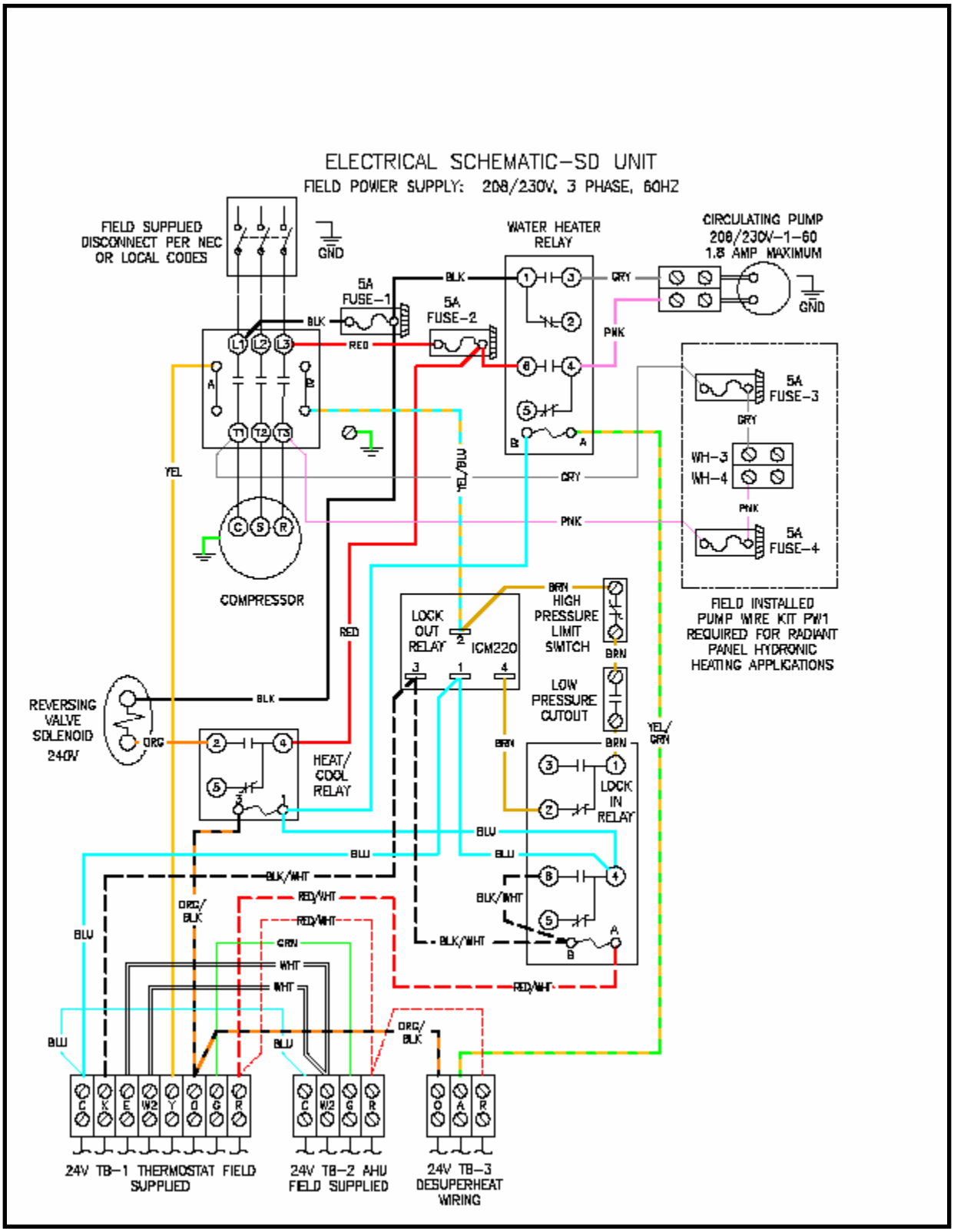

Figure B-8. SD Series 230/208-3-60 Electrical Schematic

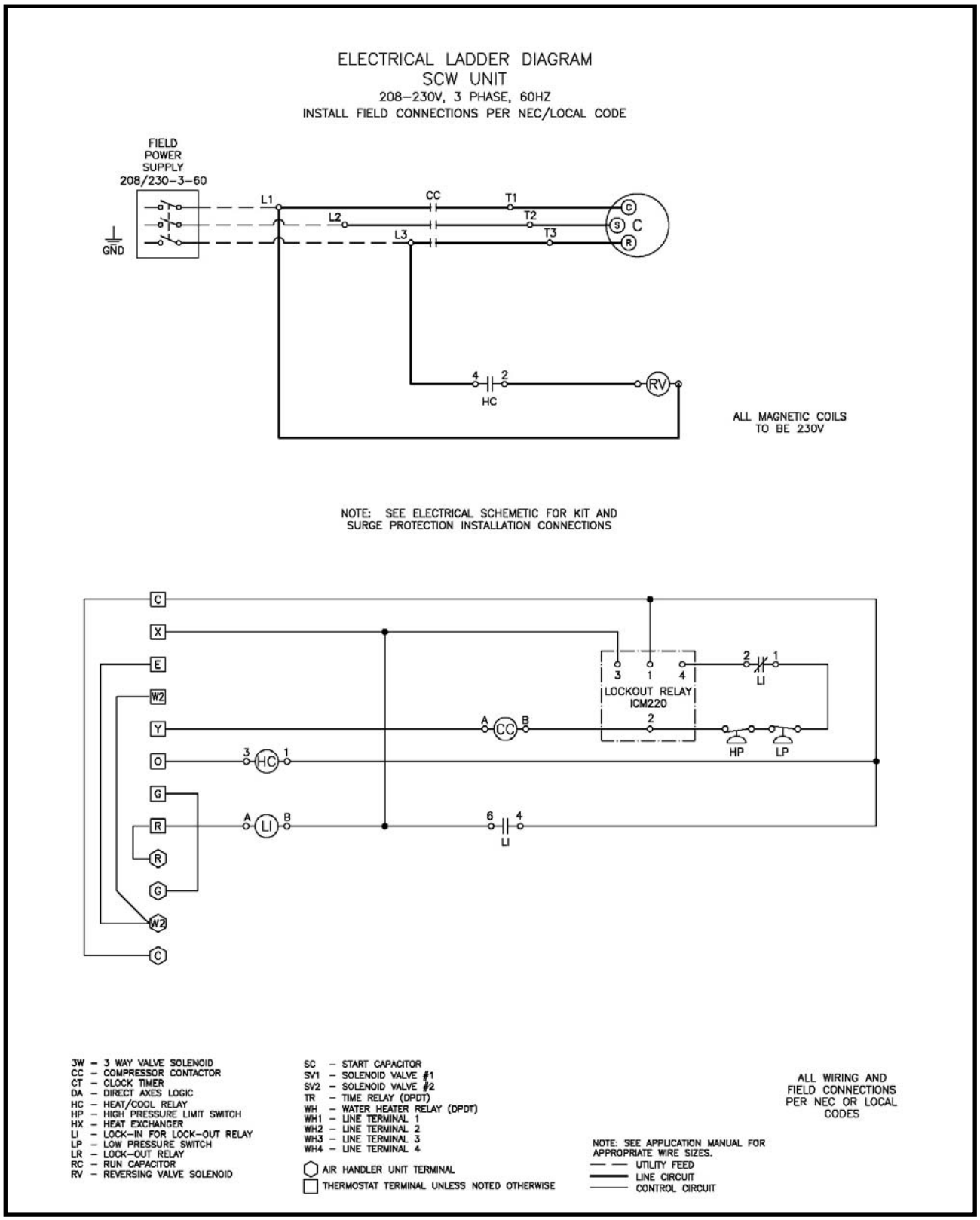

Figure B-13. SCW Series 230/208-3-60 Electrical Ladder Diagram

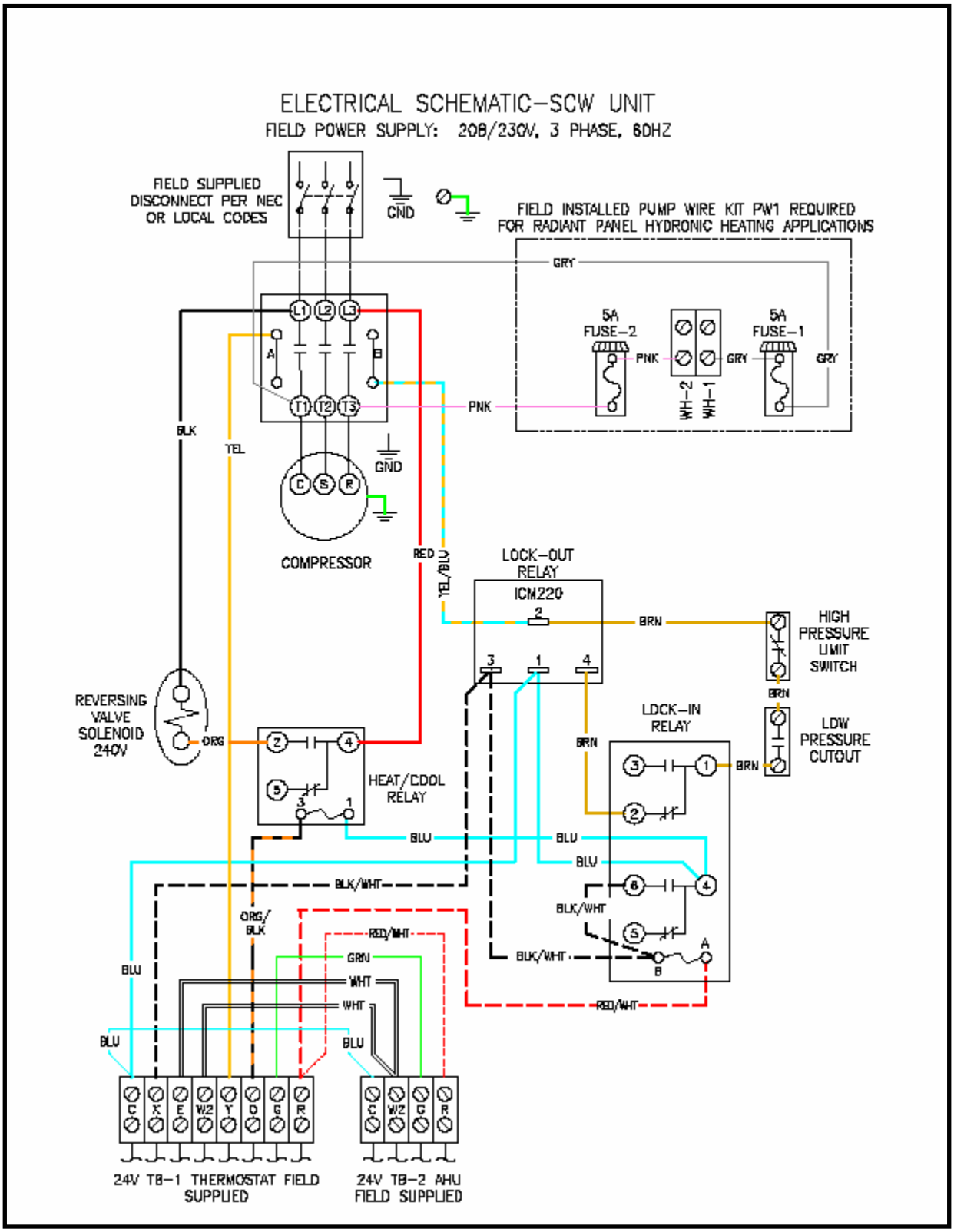

Figure B-14. SCW Series 230/208-3-60 Electrical Schematic

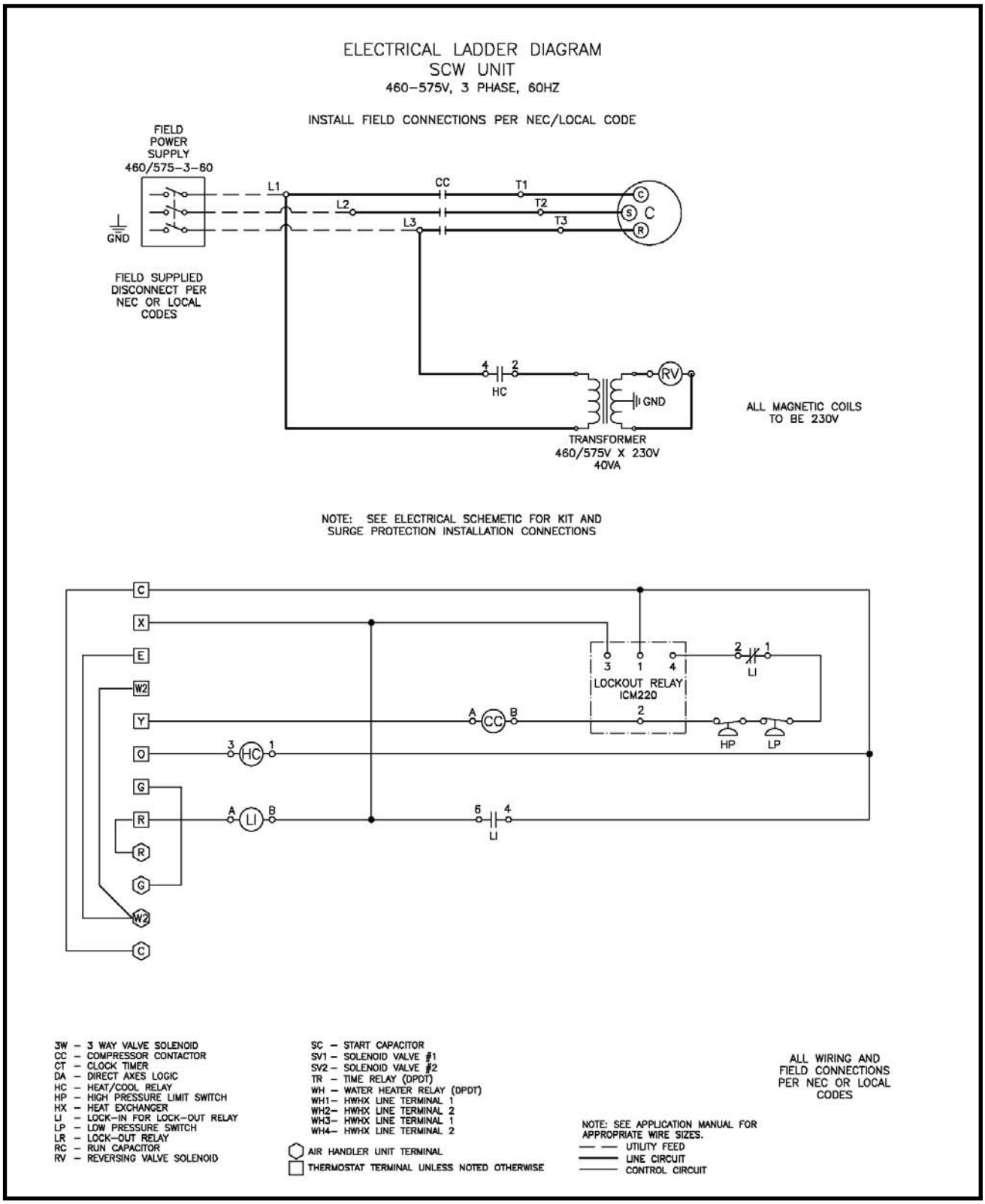

Figure B-15. SCW Series 460-3-60 Electrical Ladder Diagram

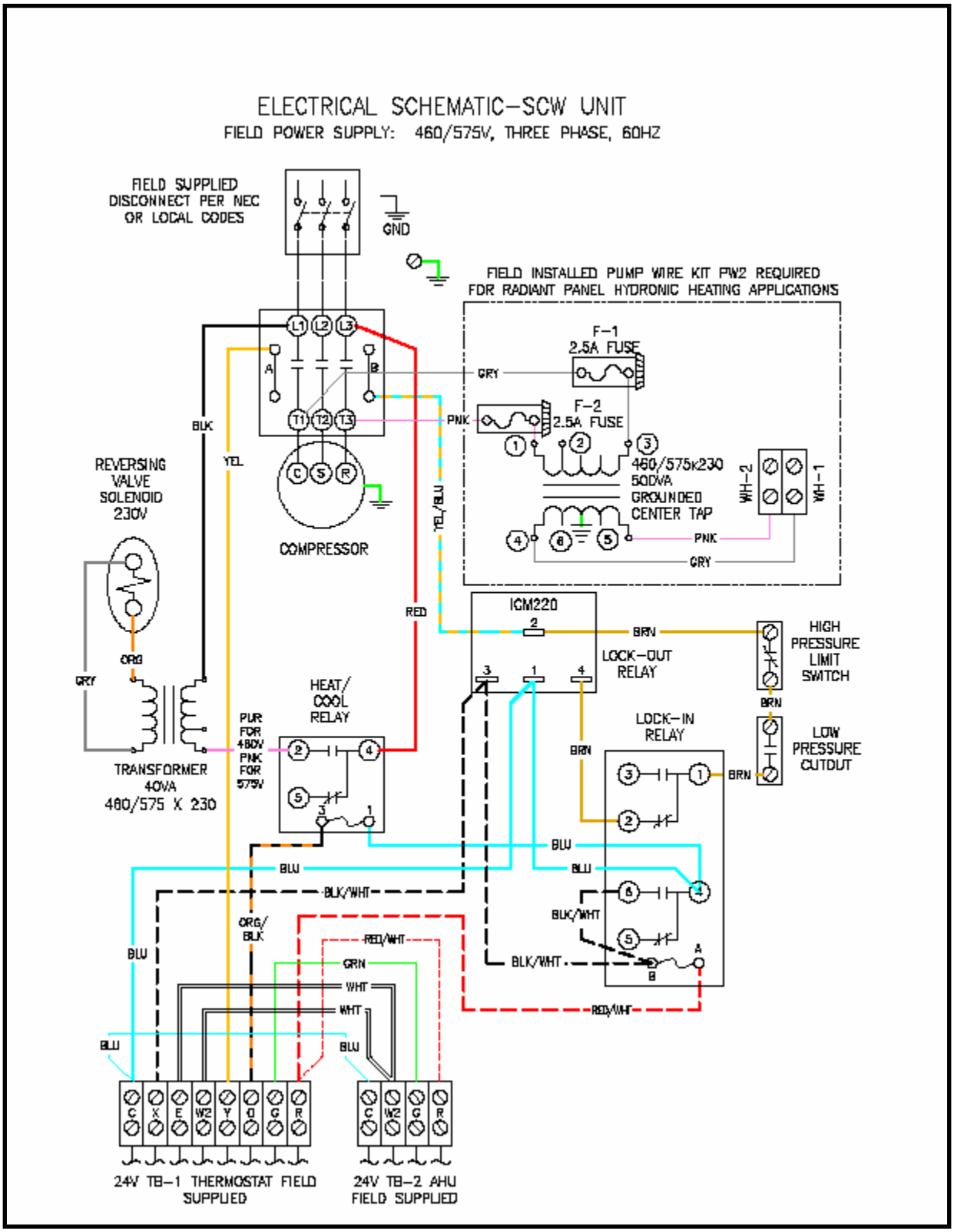

Figure B-16. SCW Series 460-3-60 Electrical Schematic

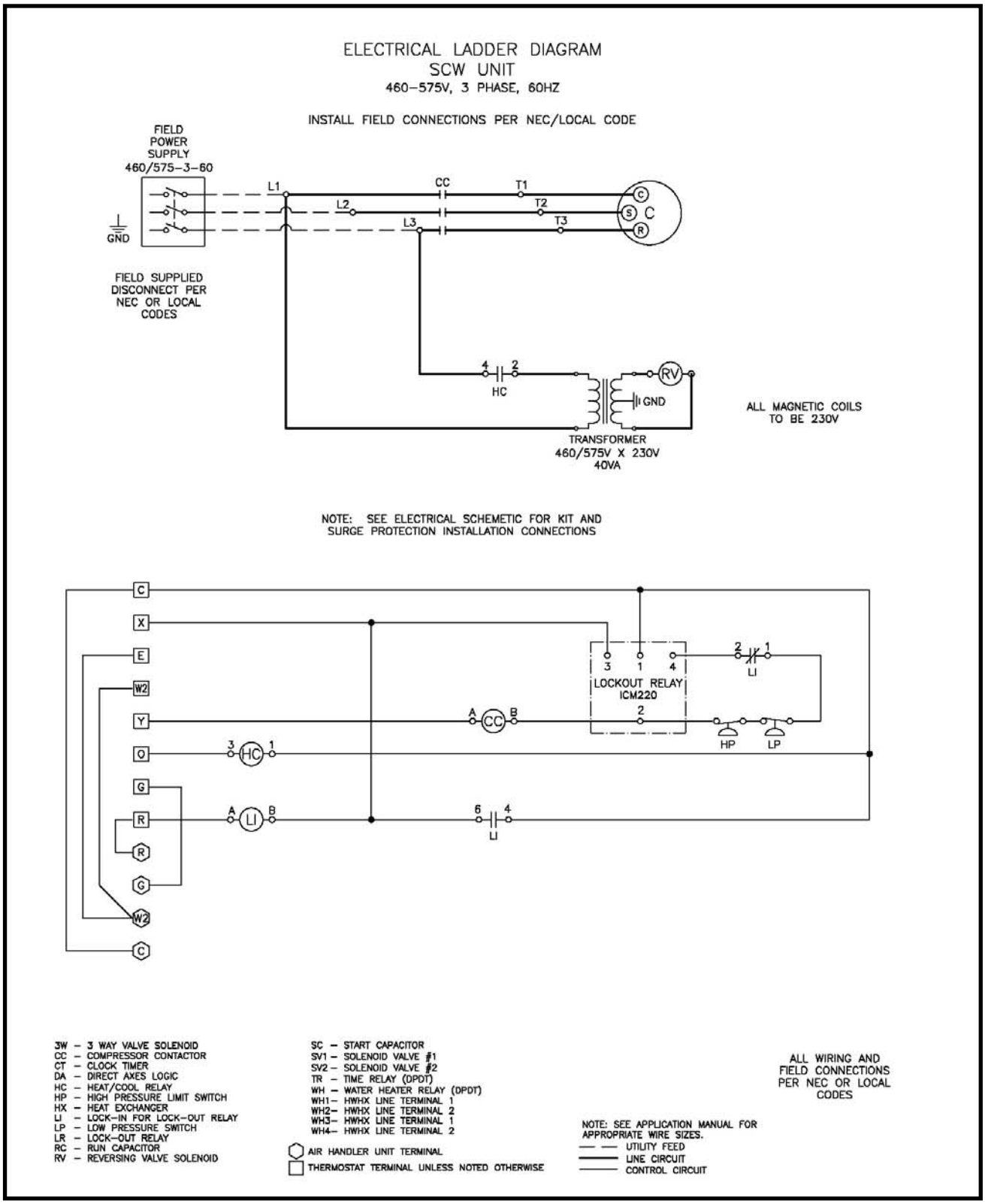

Figure B-17. SCW Series 575-3-60 Electrical Ladder Diagram

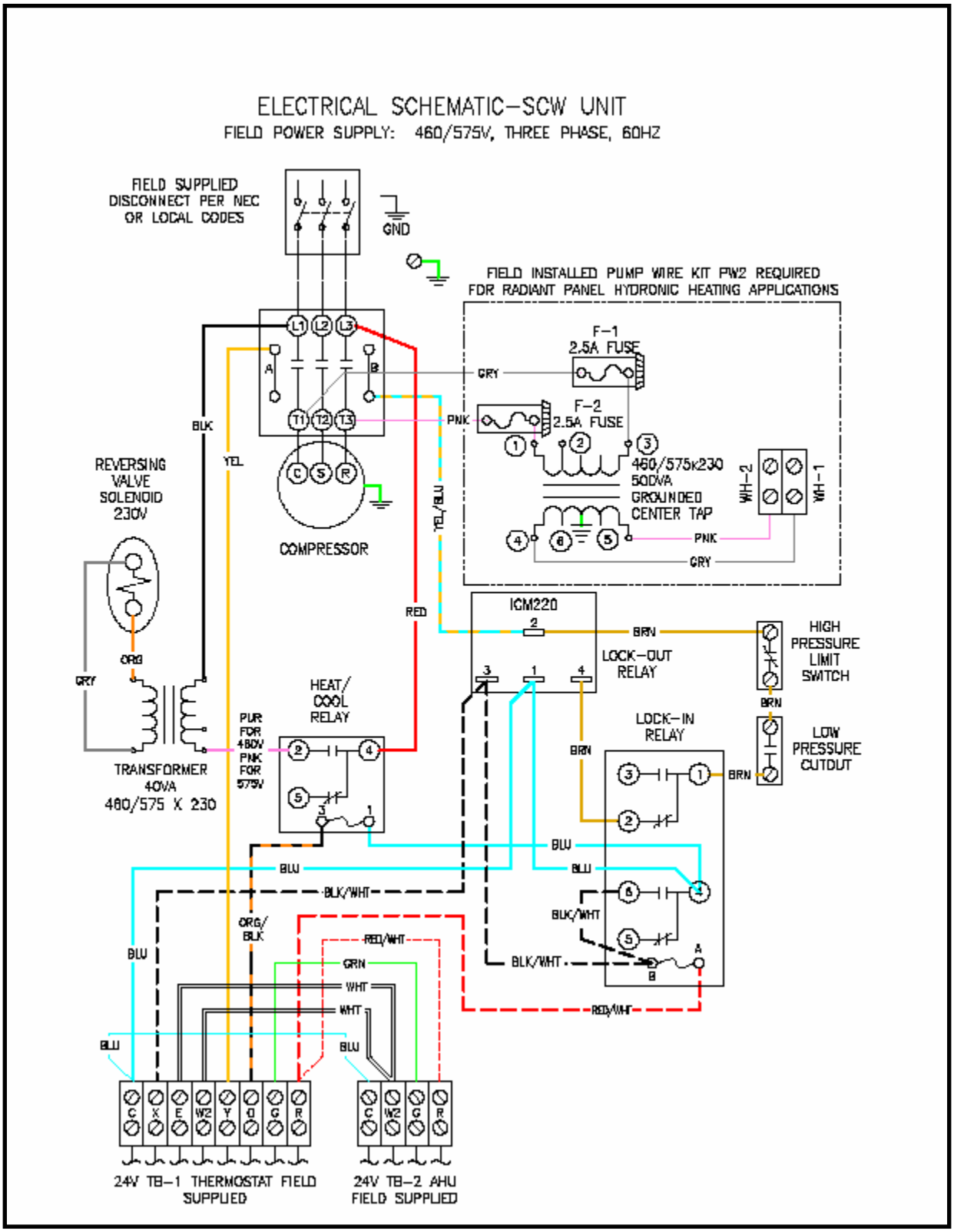

Figure B-18. SCW Series 575-3-60 Electrical Schematic

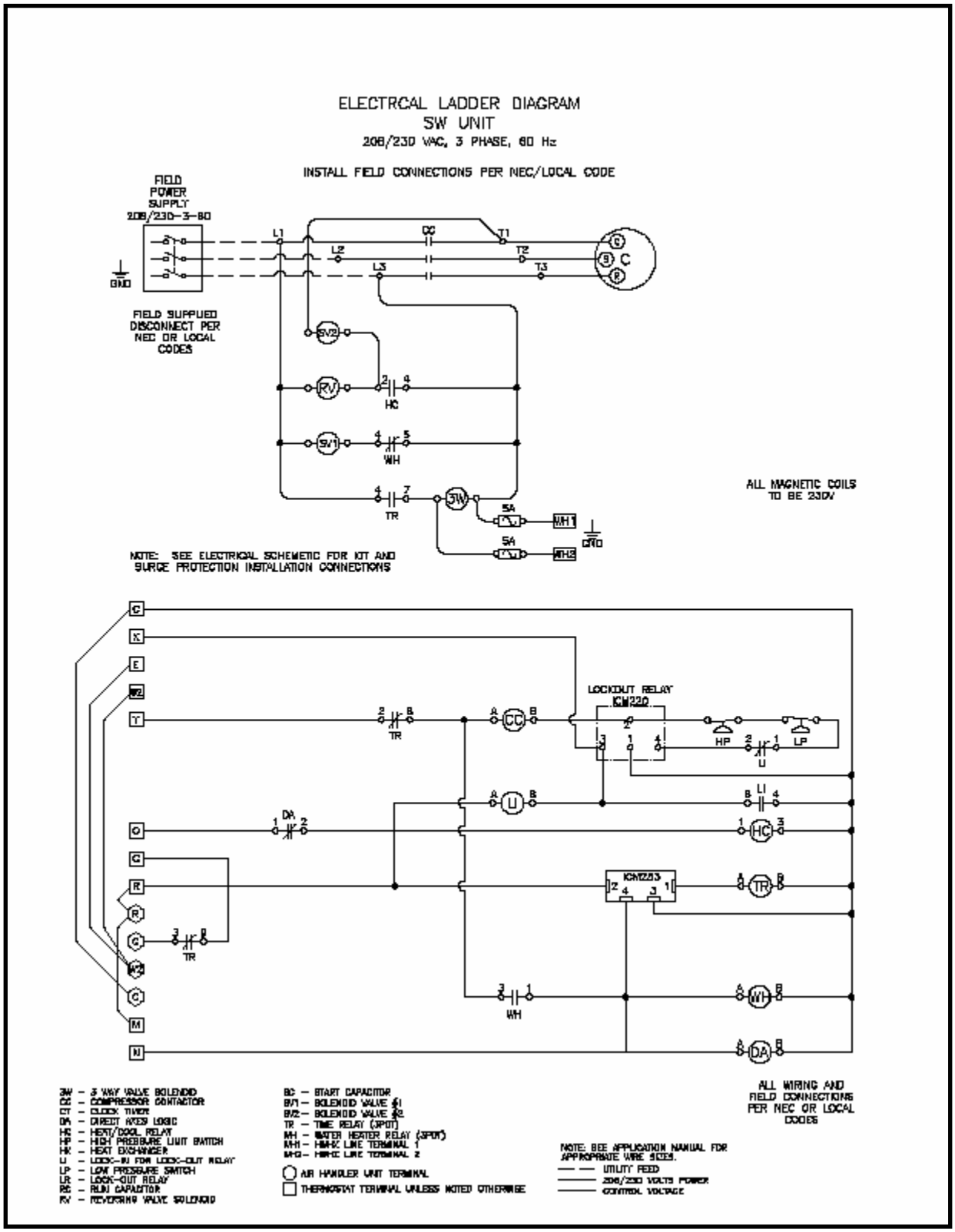

Figure B-19. SW Series 230/208-3-60 Electrical Ladder Diagram

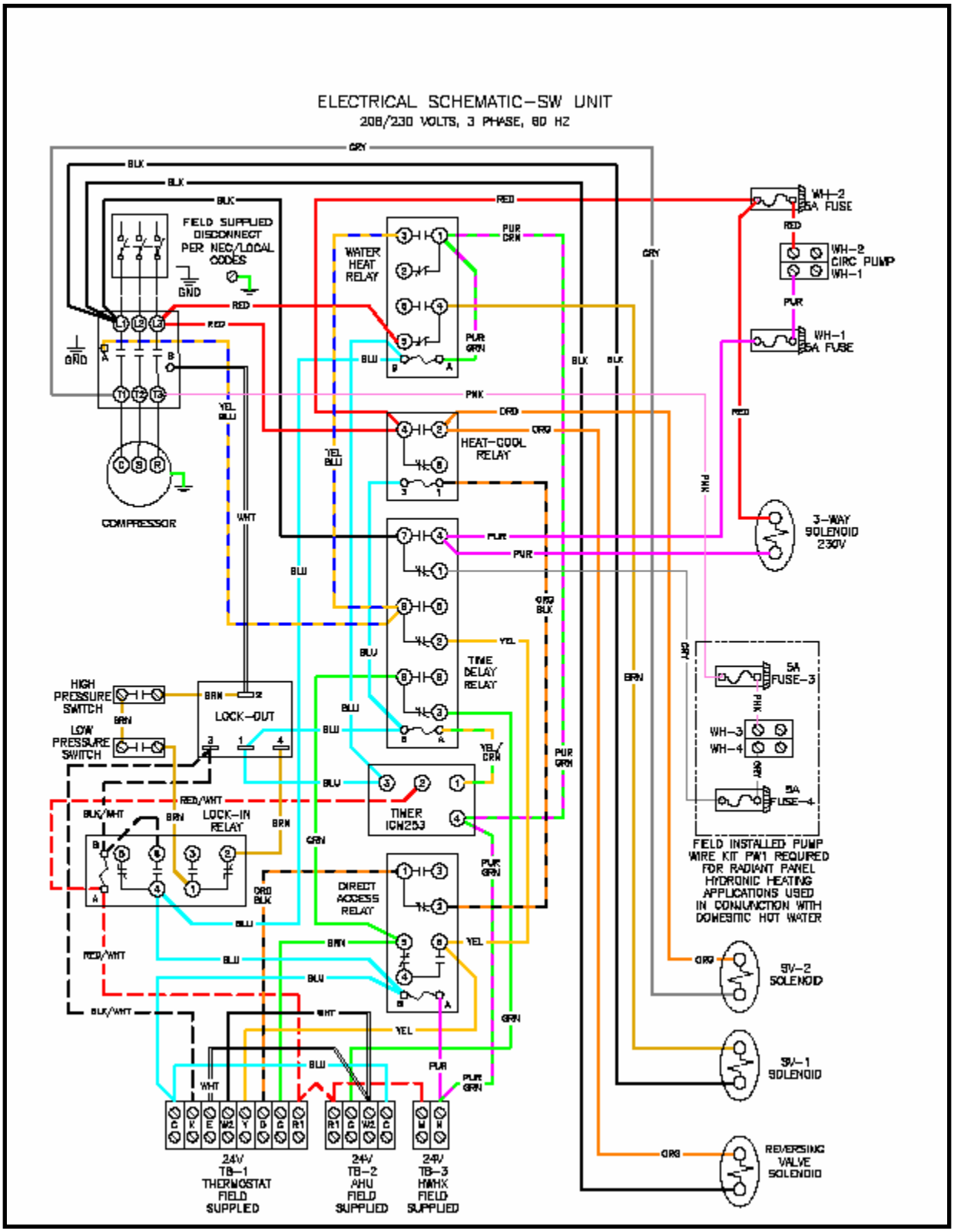

Figure B-20. SW Series 230/208-3-60 Electrical Schematic

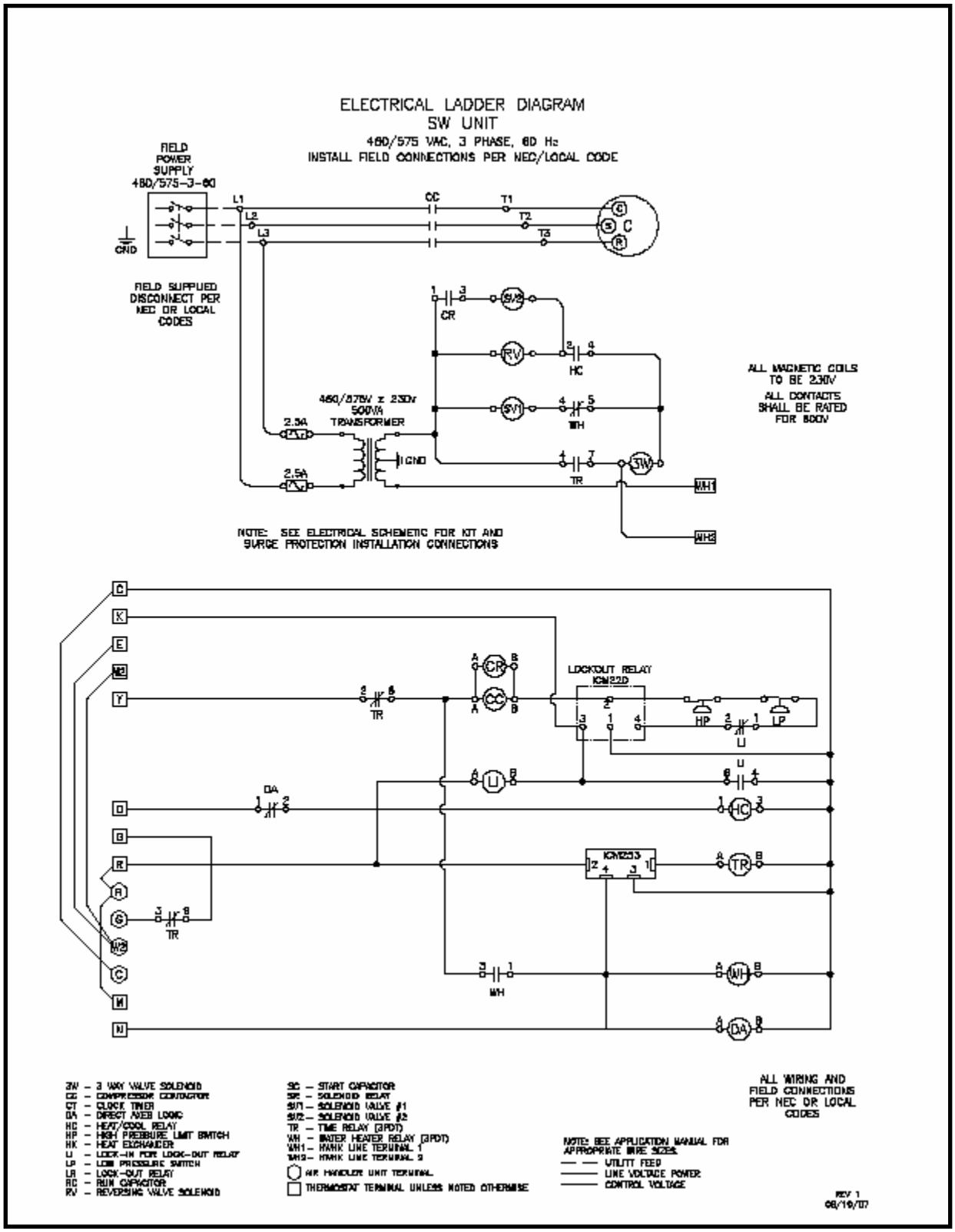

Figure B-21. SW Series 460-3-60 Electrical Ladder Diagram

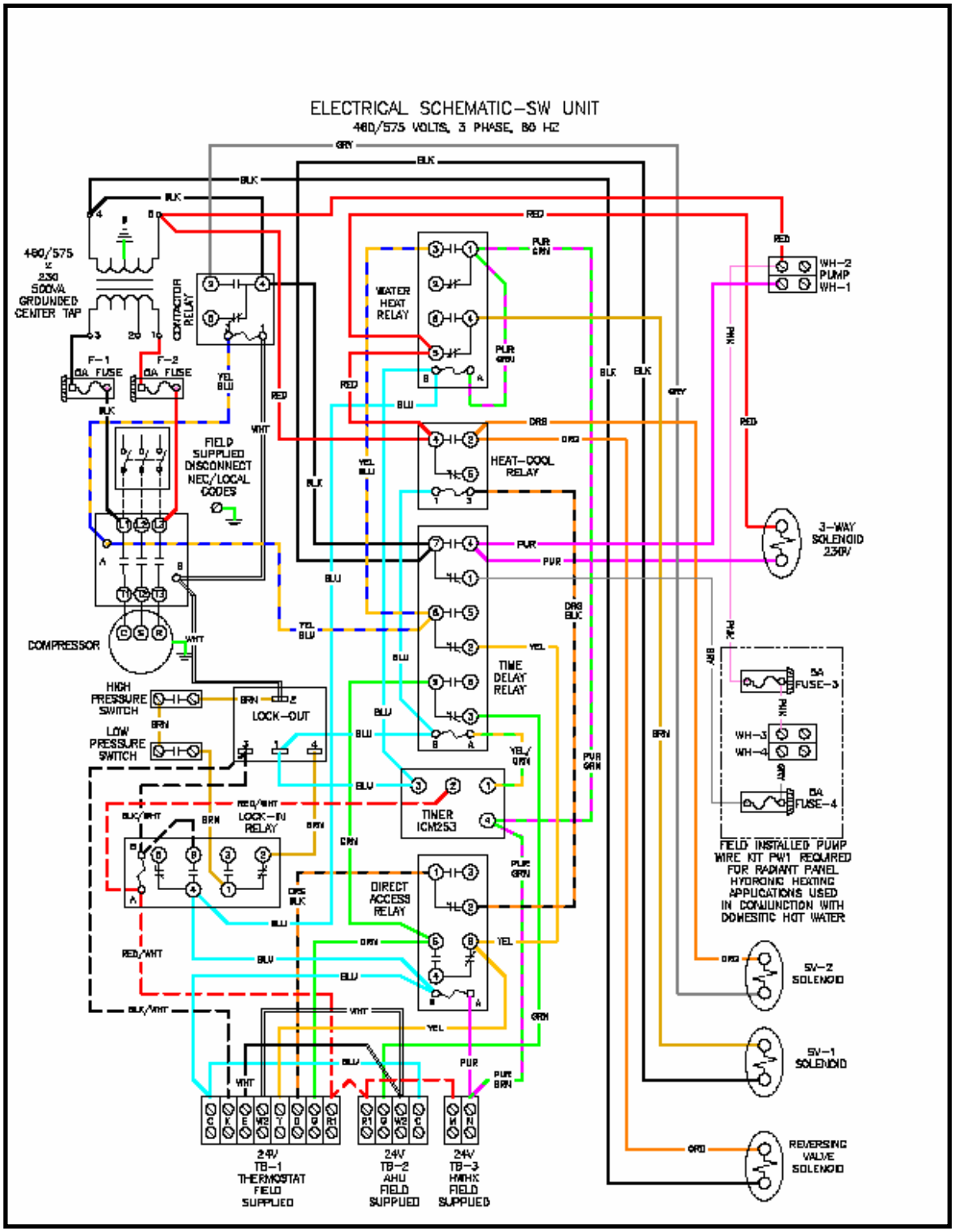

Figure B-22. SW Series 460-3-60 Electrical Schematic

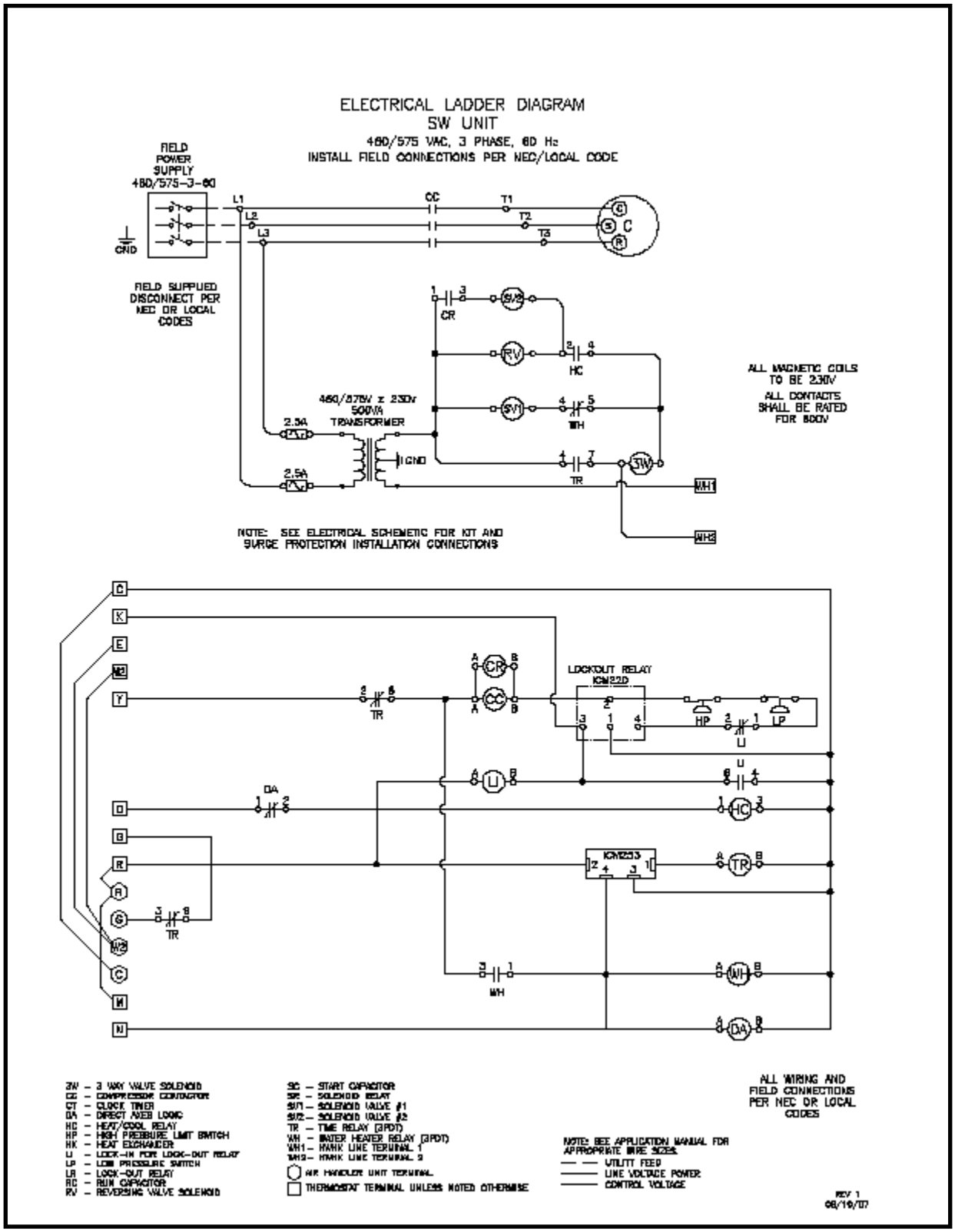

Figure B-23. SW Series 575-3-60 Electrical Ladder Diagram

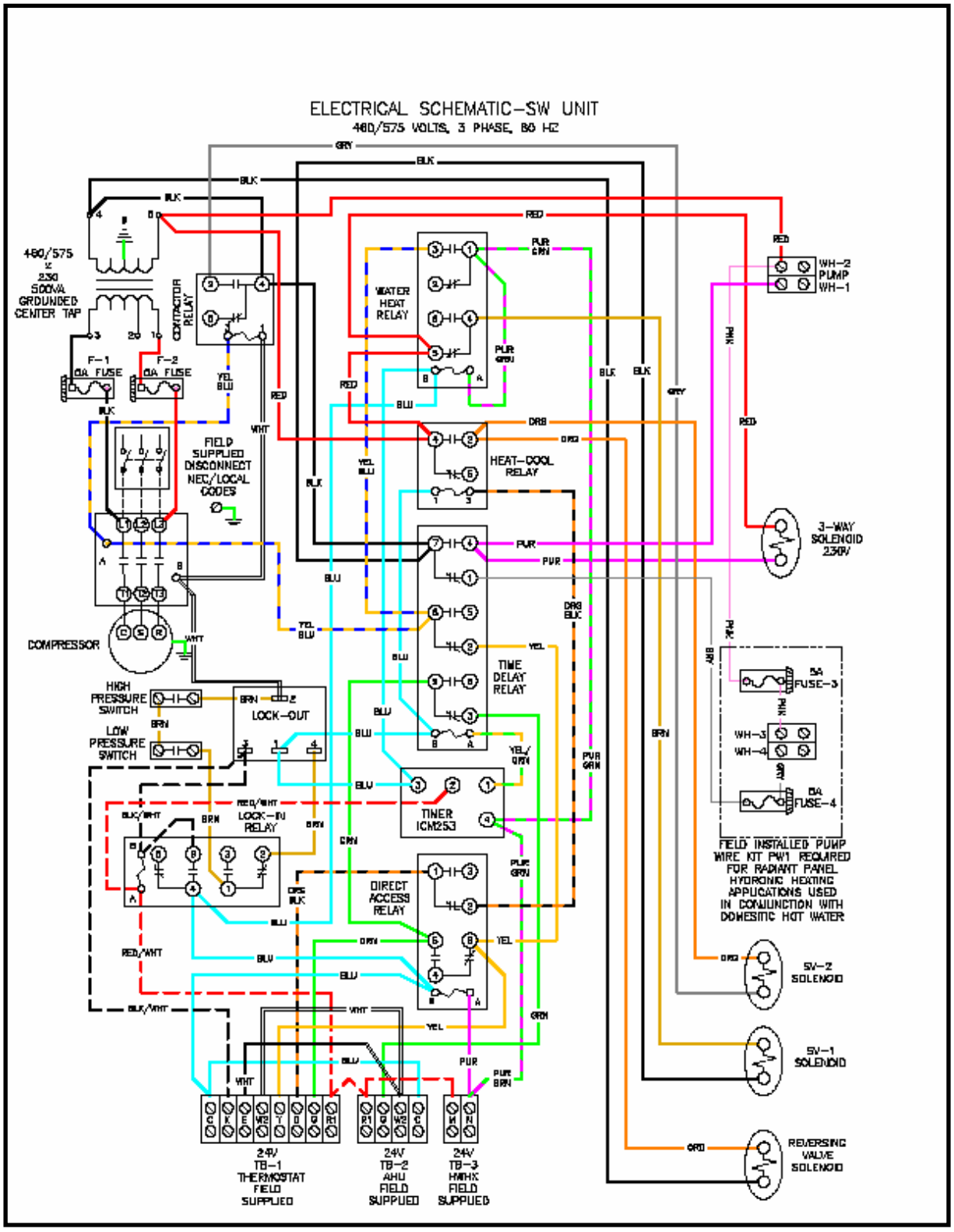

Figure B-24. SW Series 575-3-60 Electrical Schematic

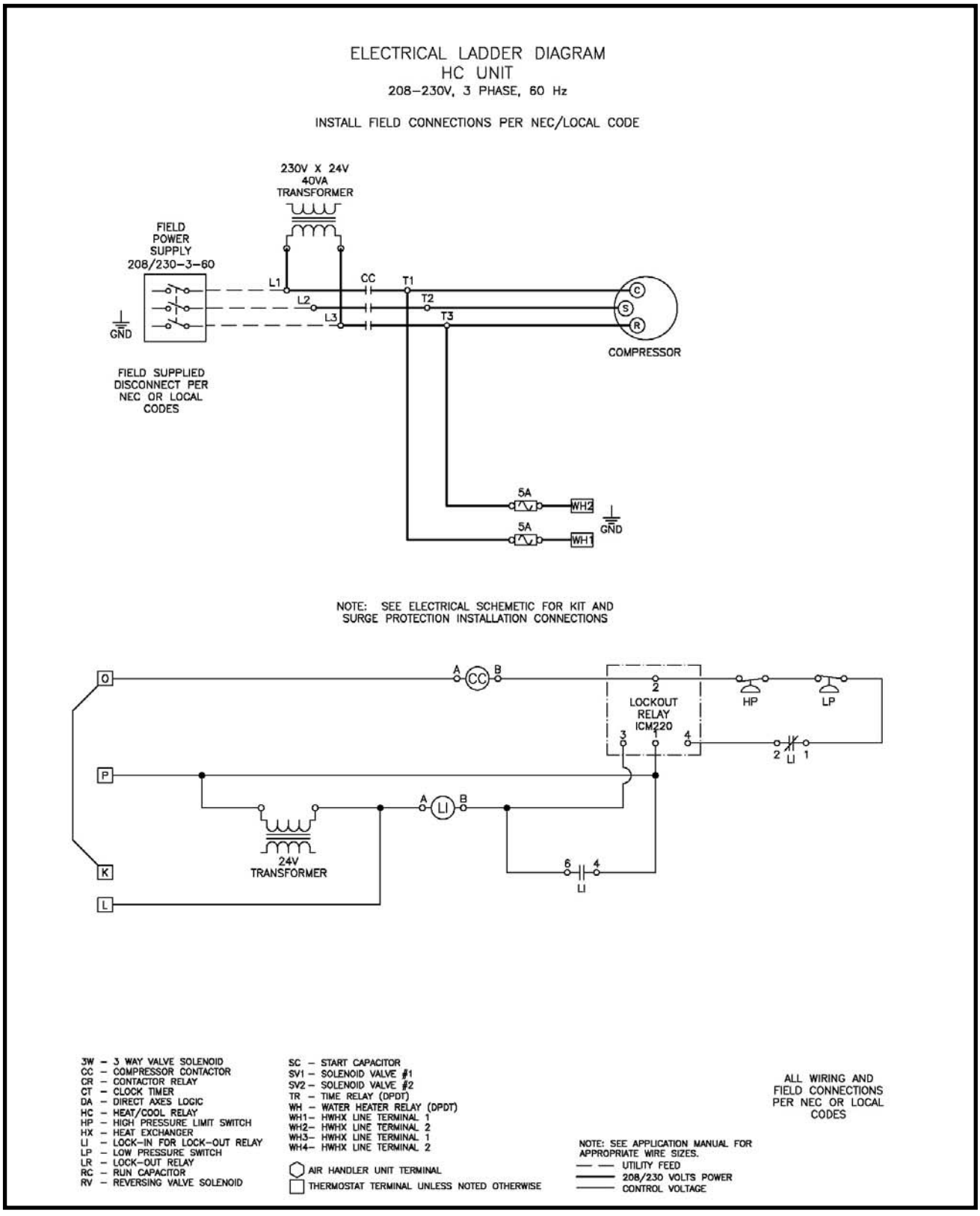

Figure B-25. HC Series 230/208-3-60 Electrical Ladder Diagram

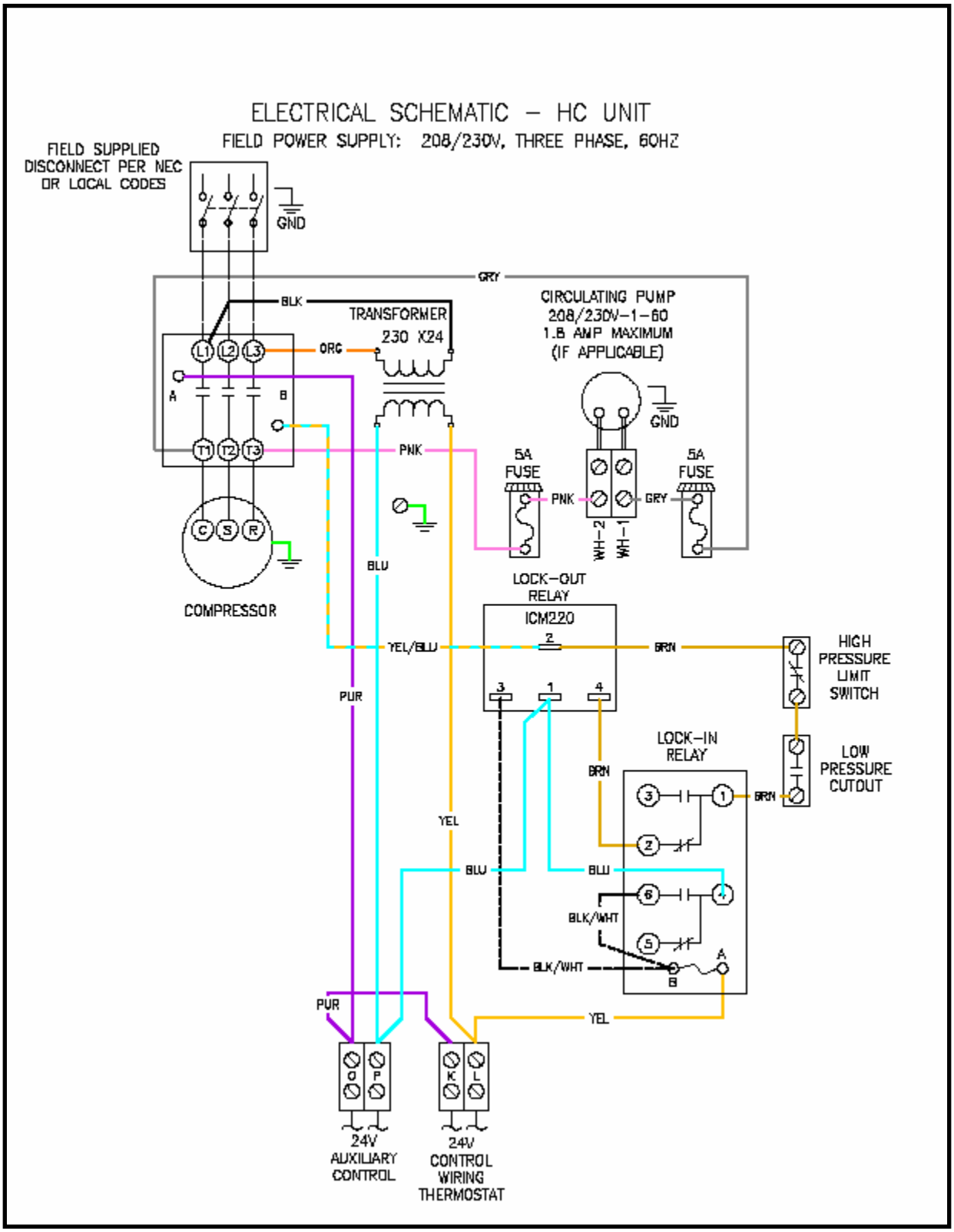

Figure B-26. HC Series 230/208-3-60 Electrical Schematic

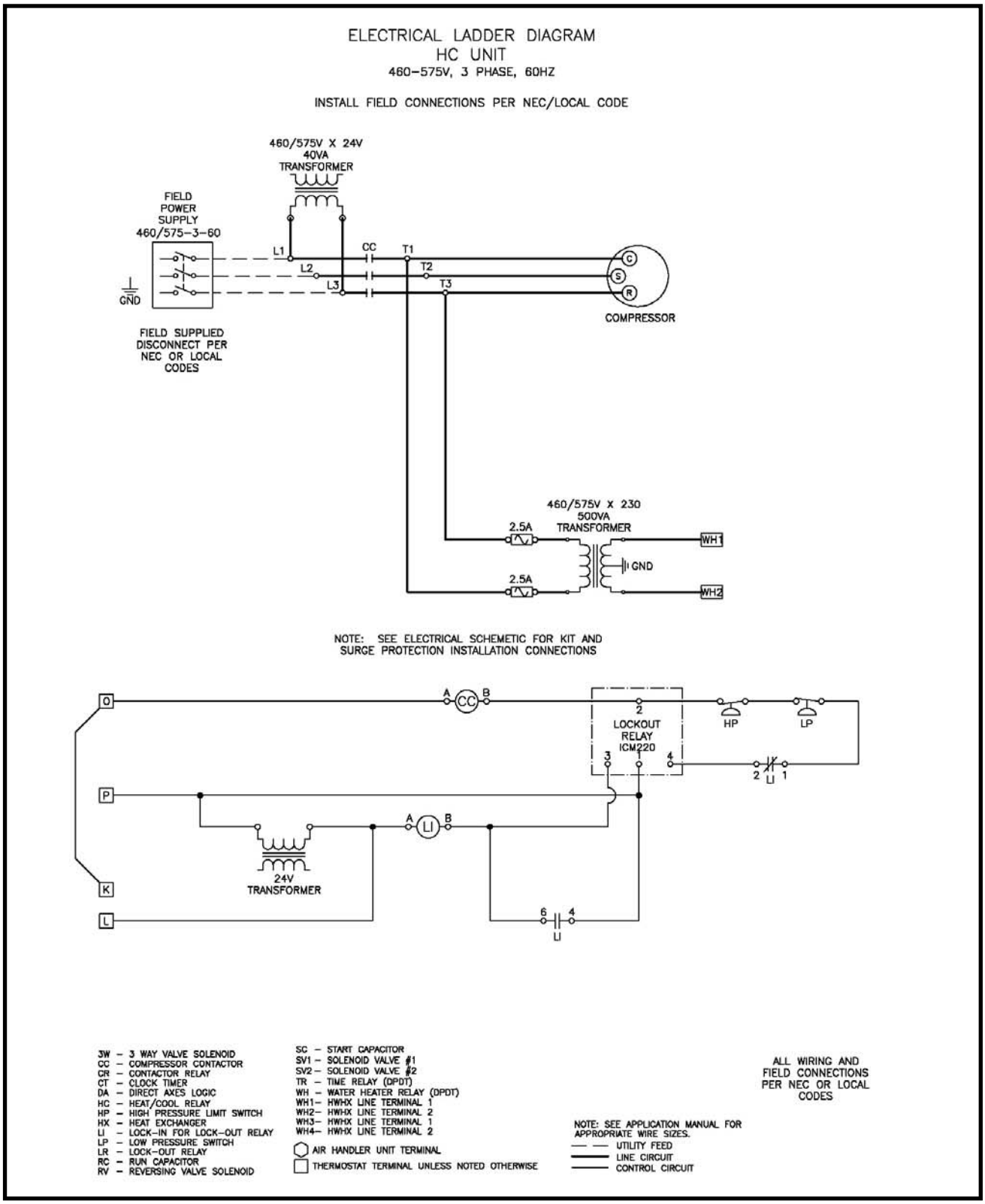

Figure B-27. HC Series 460-3-60 Electrical Ladder Diagram

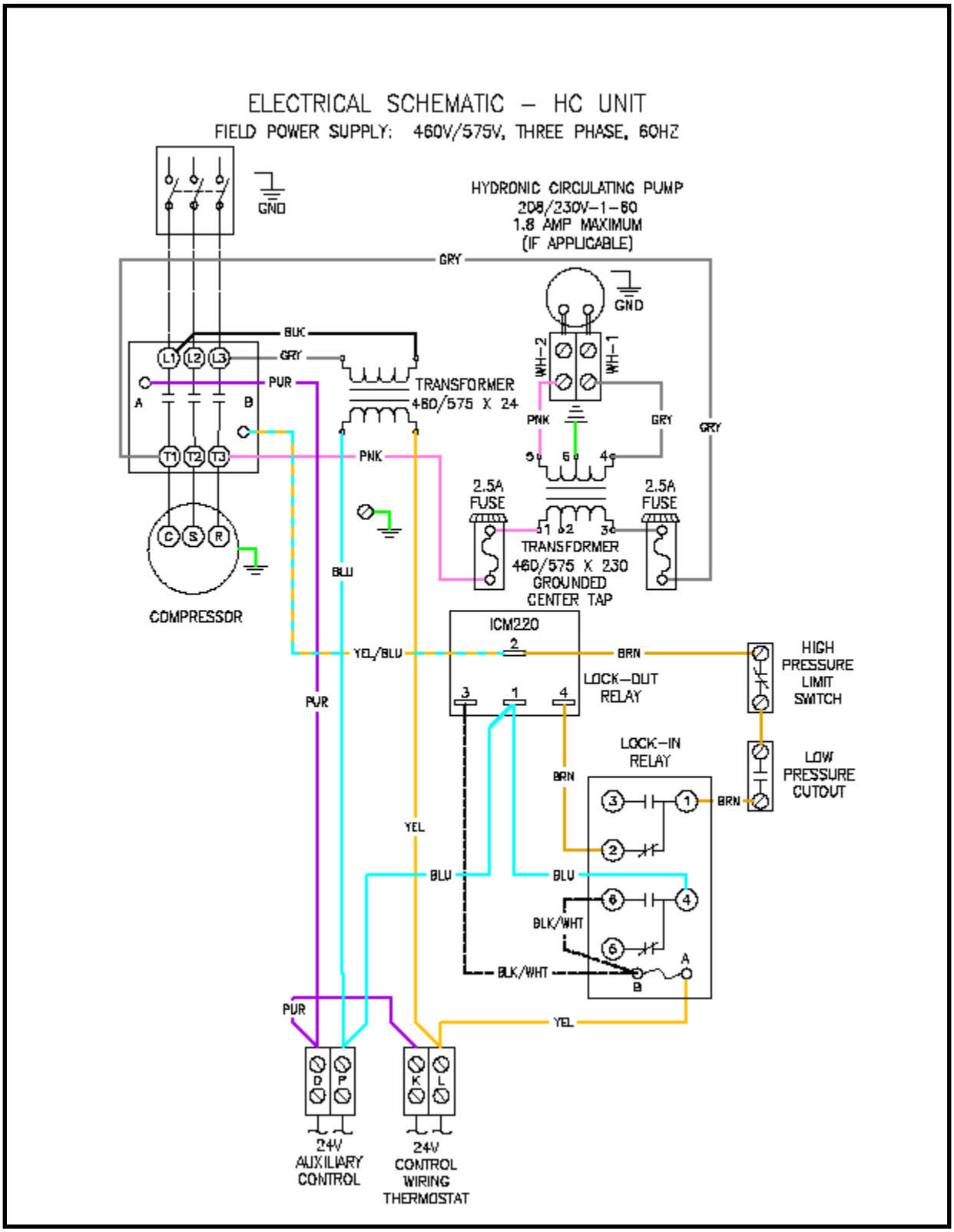

Figure B-28. HC Series 460-3-60 Electrical Schematic

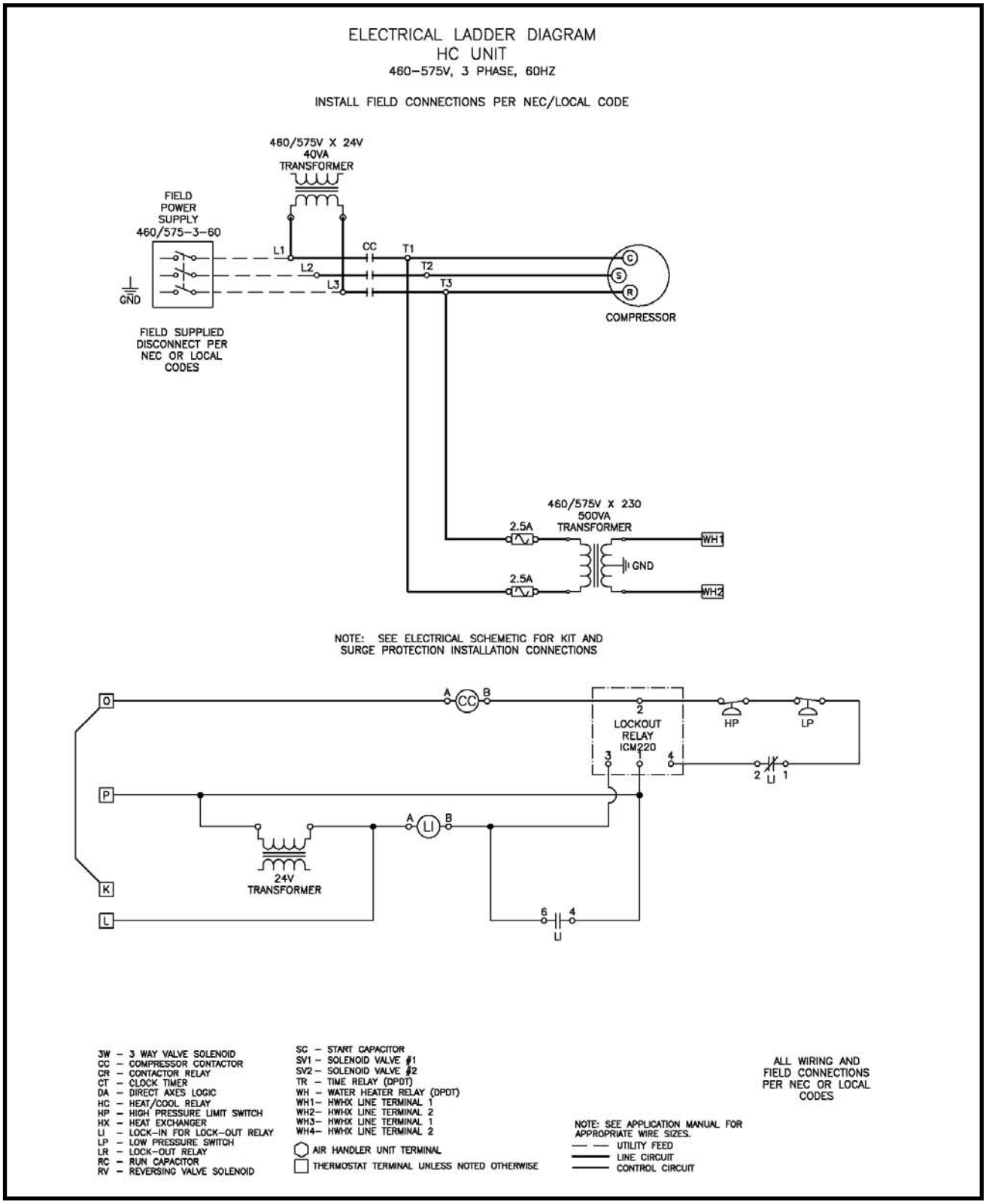

Figure B-29. HC Series 575-3-60 Electrical Ladder Diagram

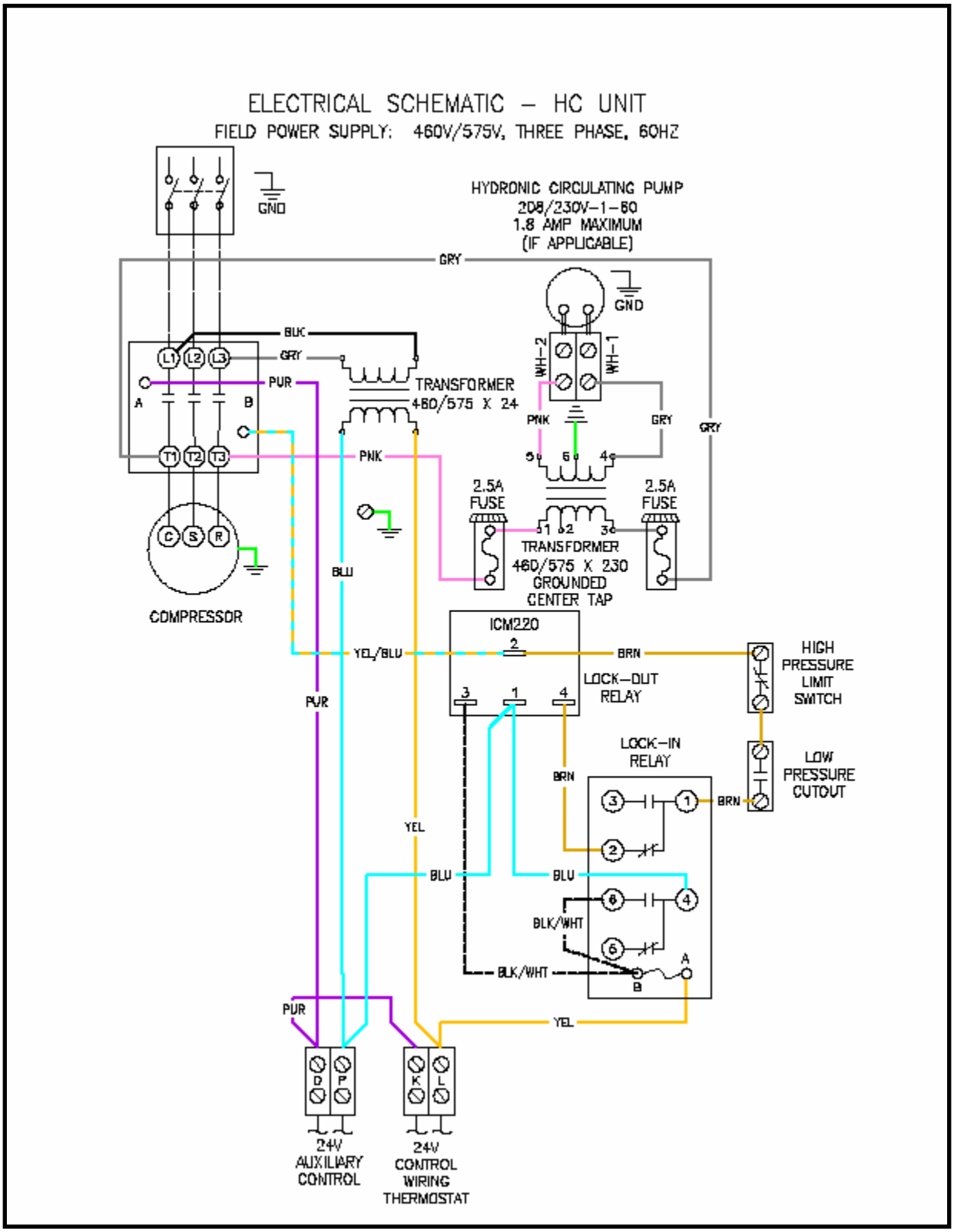

Figure B-30. HC Series 575-3-60 Electrical Schematic

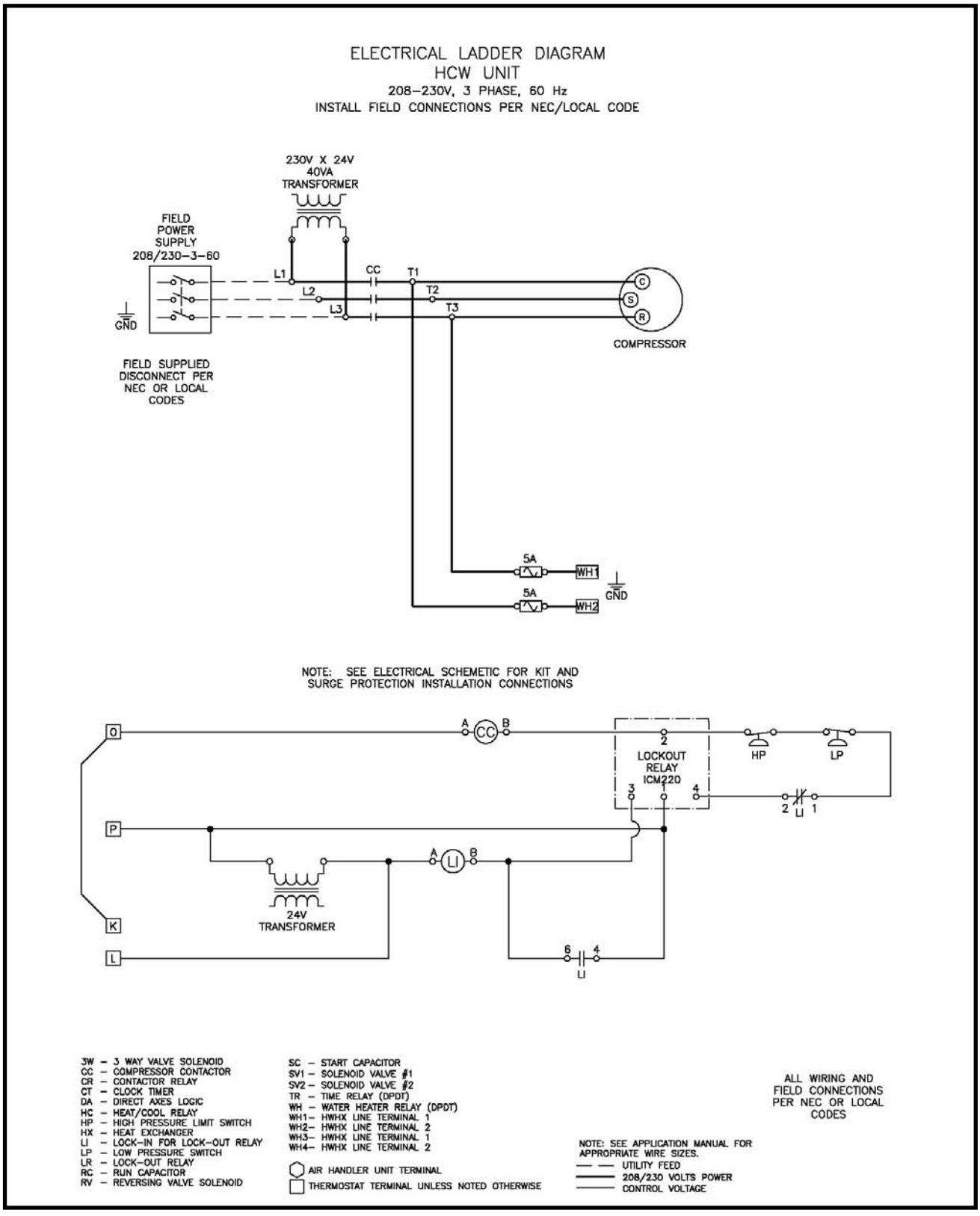

Figure B-31. HCW Series 230/208-3-60 Electrical Ladder Diagram

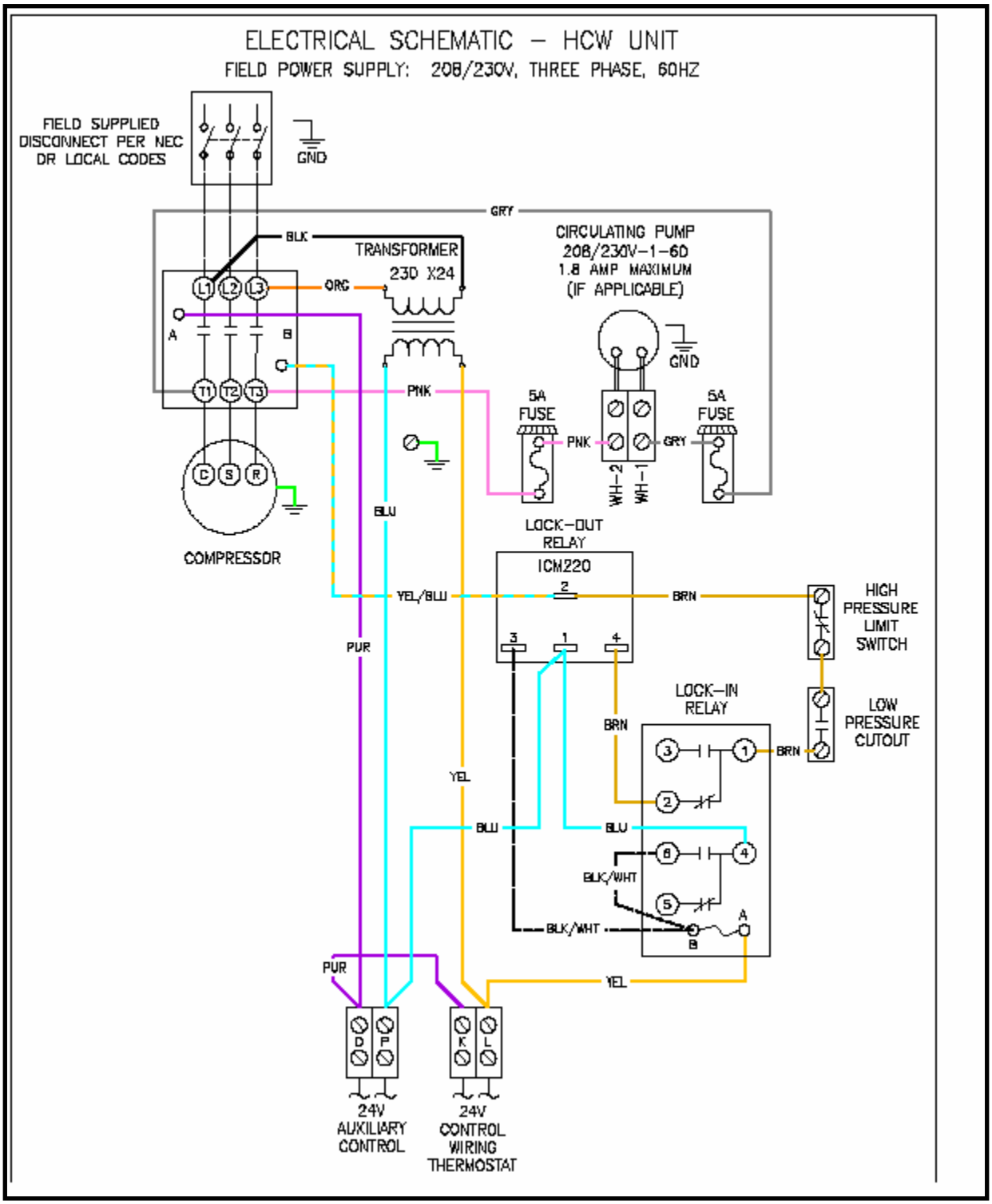

Figure B-32. HCW Series 230/208-3-60 Electrical Schematic

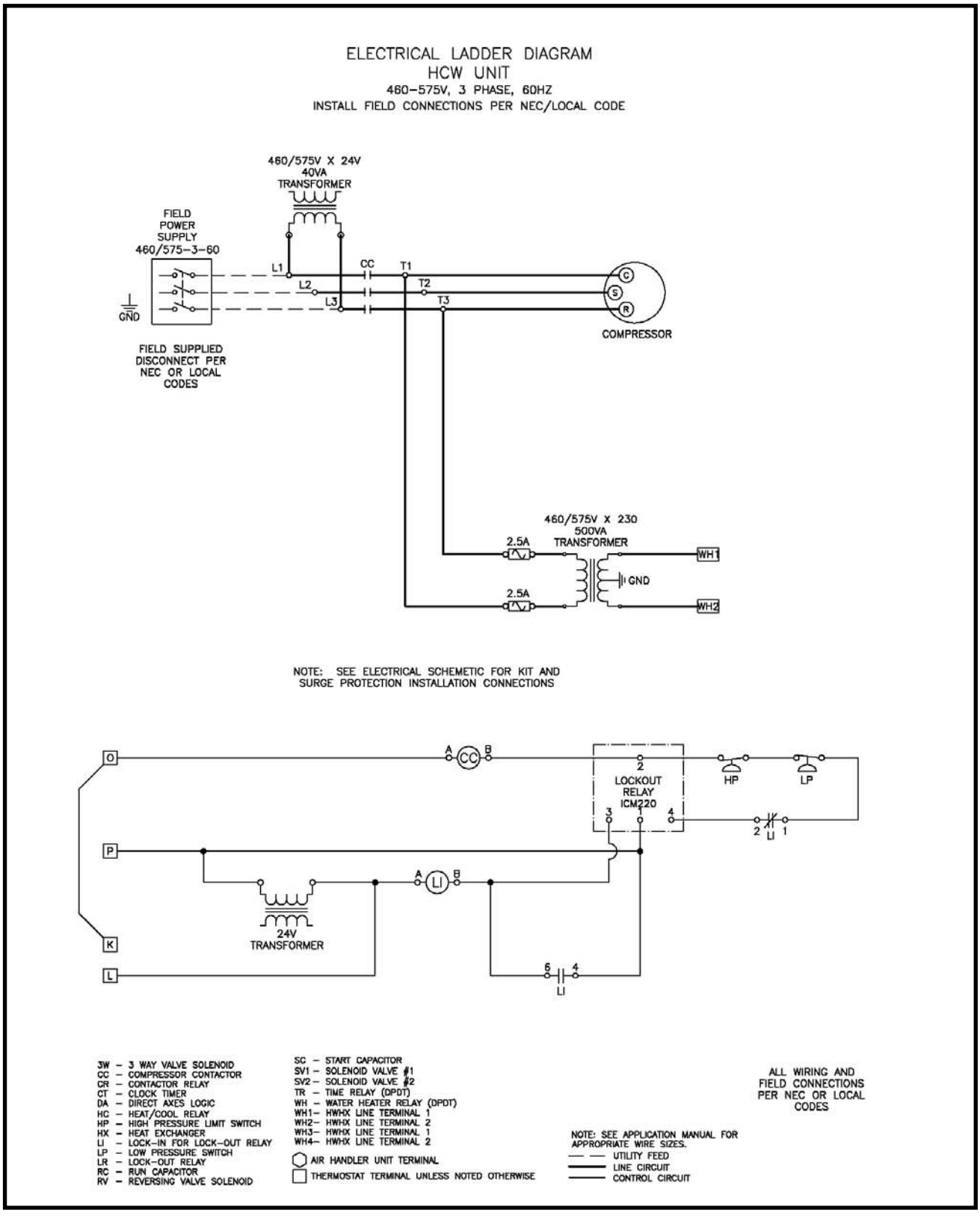

Figure B-33. HCW Series 460-3-60 Electrical Ladder Diagram

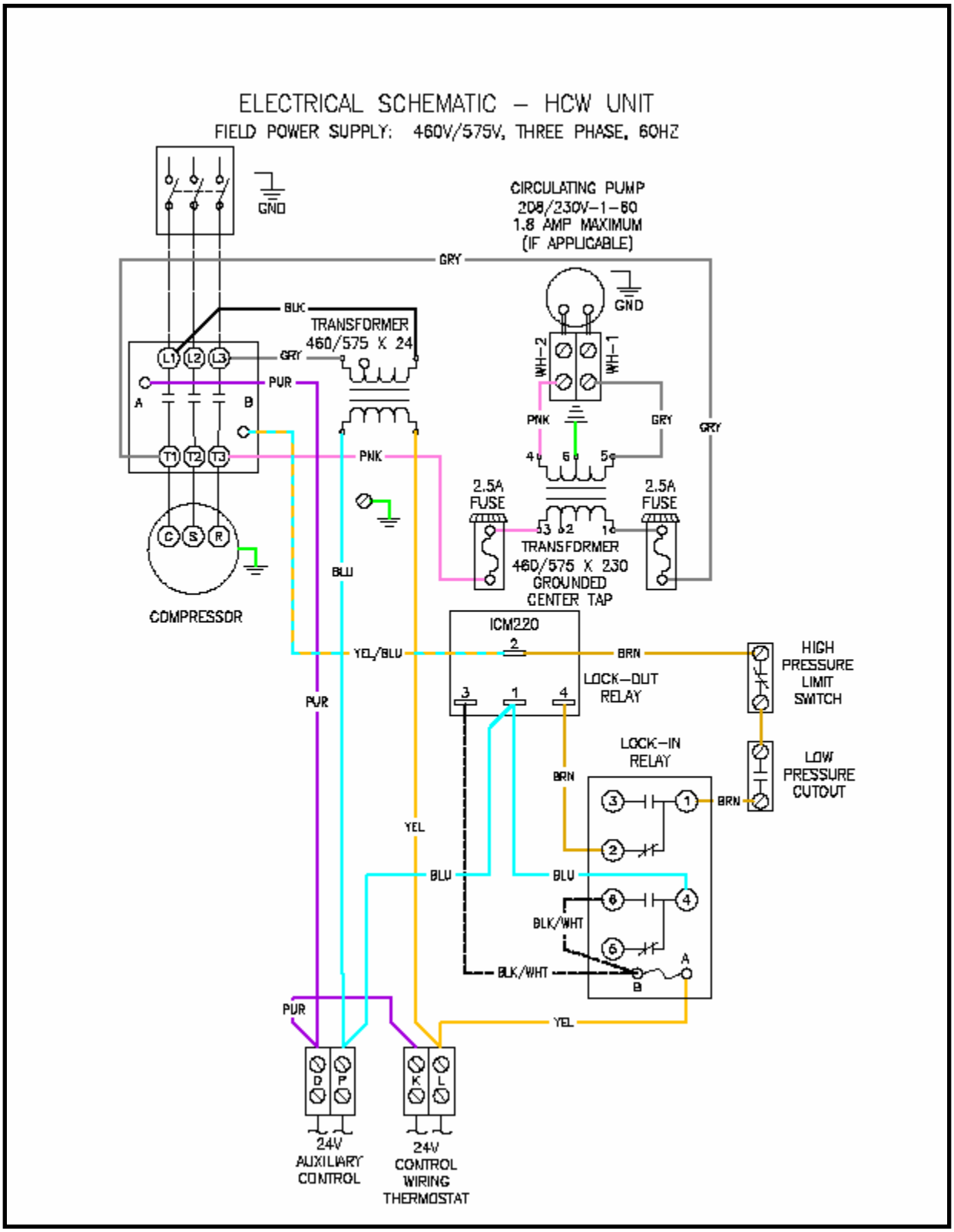

Figure B-34. HCW Series 460-3-60 Electrical Schematic

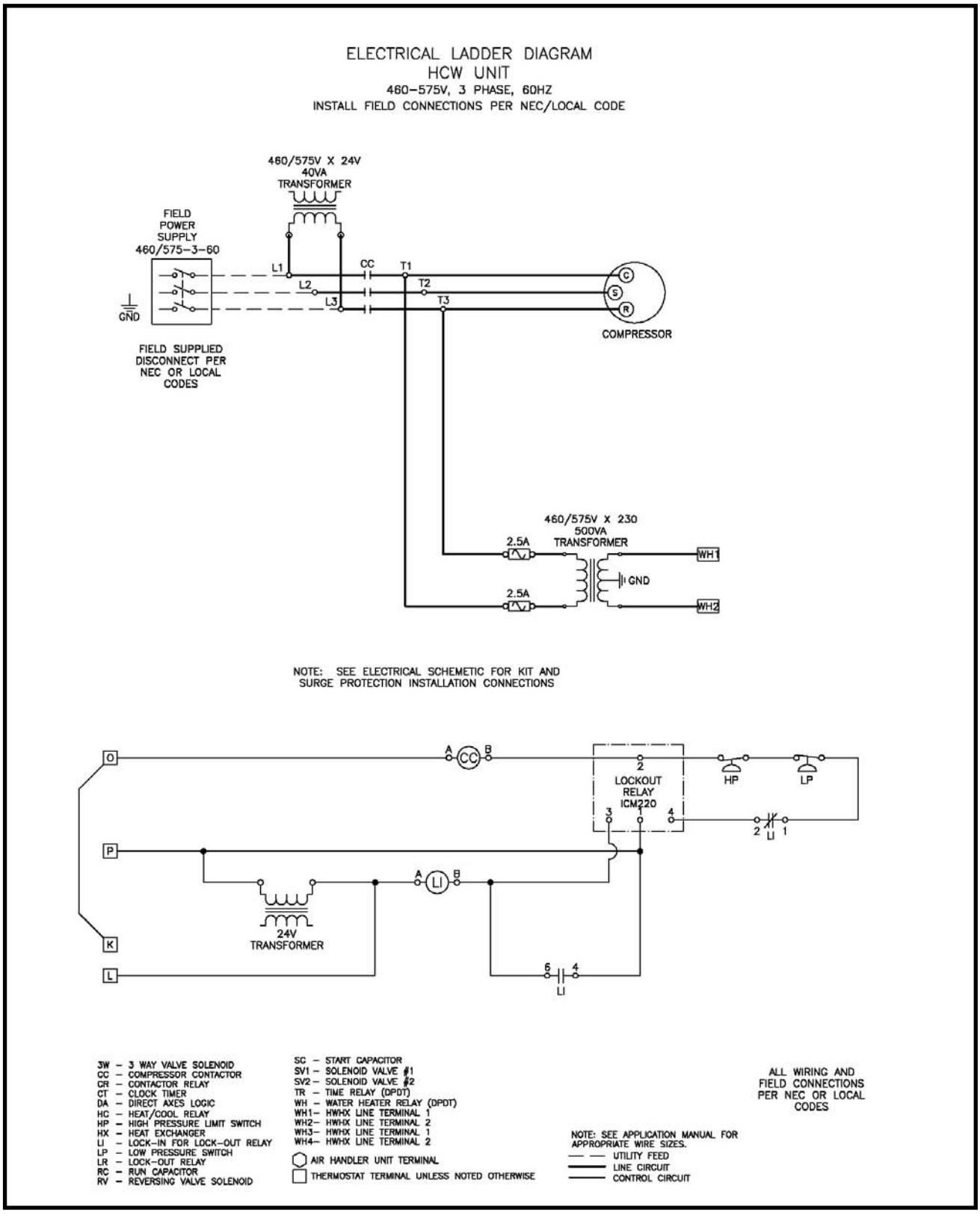

Figure B-35. HCW Series 575-3-60 Electrical Ladder Diagram

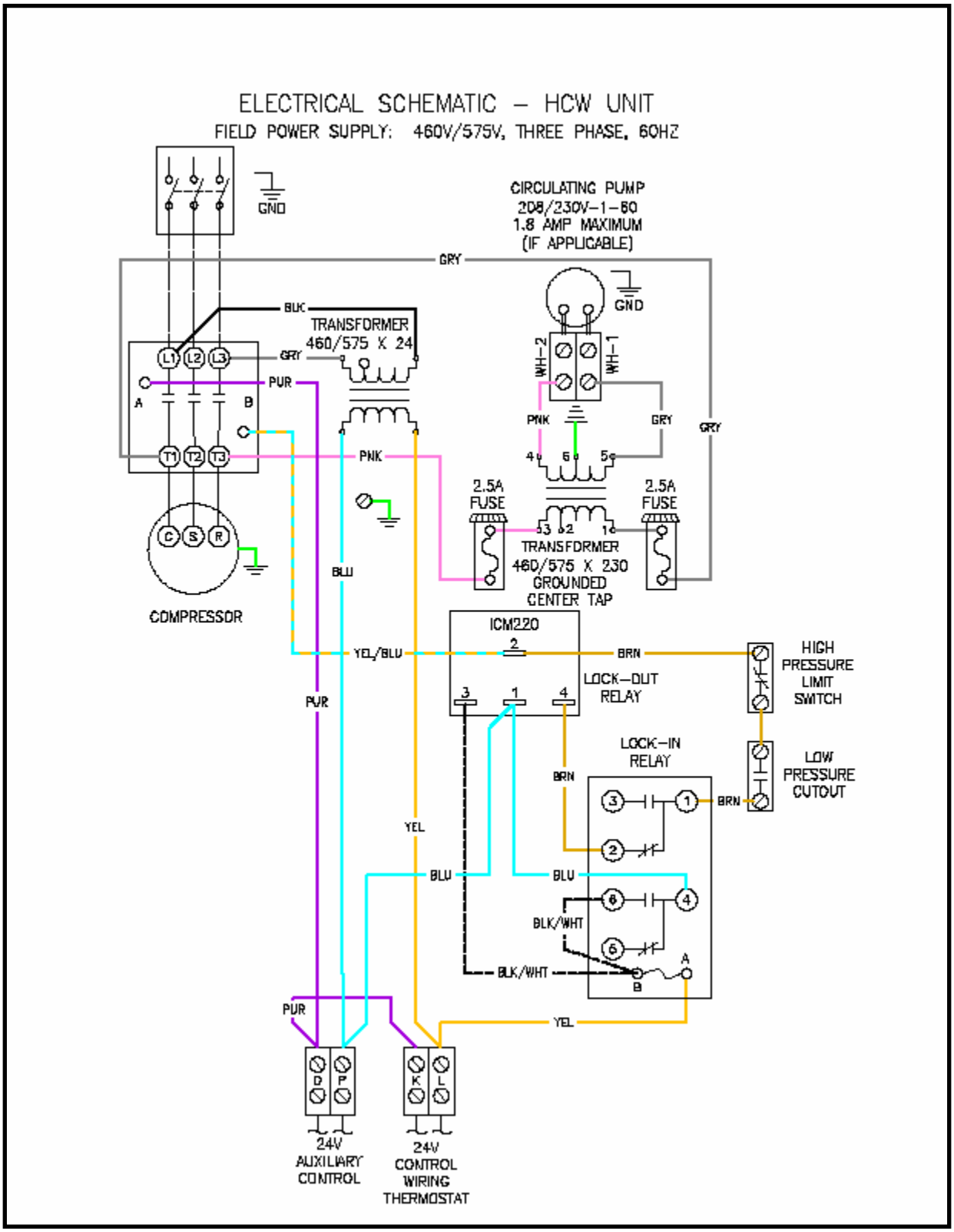

Figure B-36. HCW Series 575-3-60 Electrical Schematic

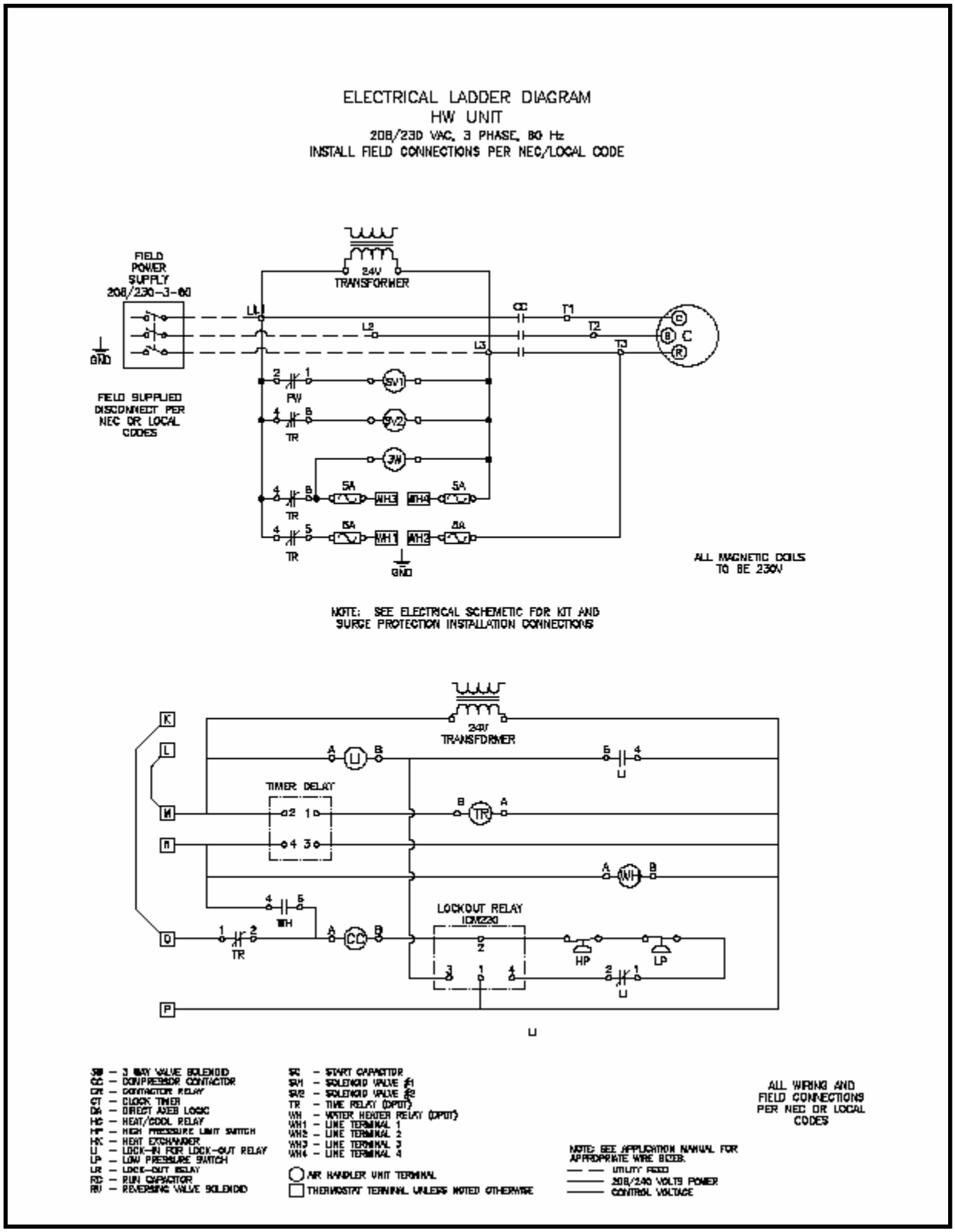

Figure B-37. HW Series 230/208-3-60 Electrical Ladder Diagram

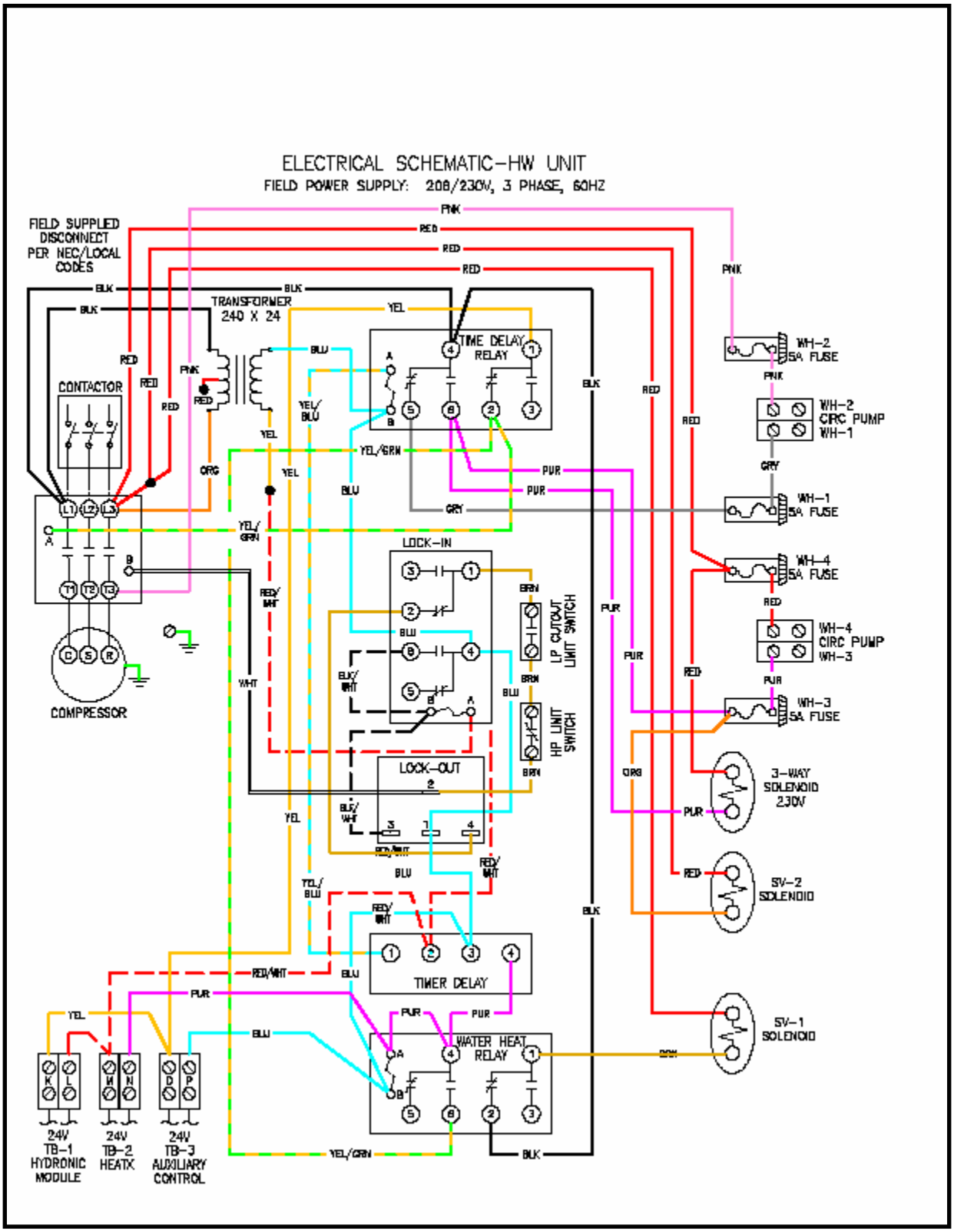

Figure B-38. HW Series 230/208-3-60 Electrical Schematic

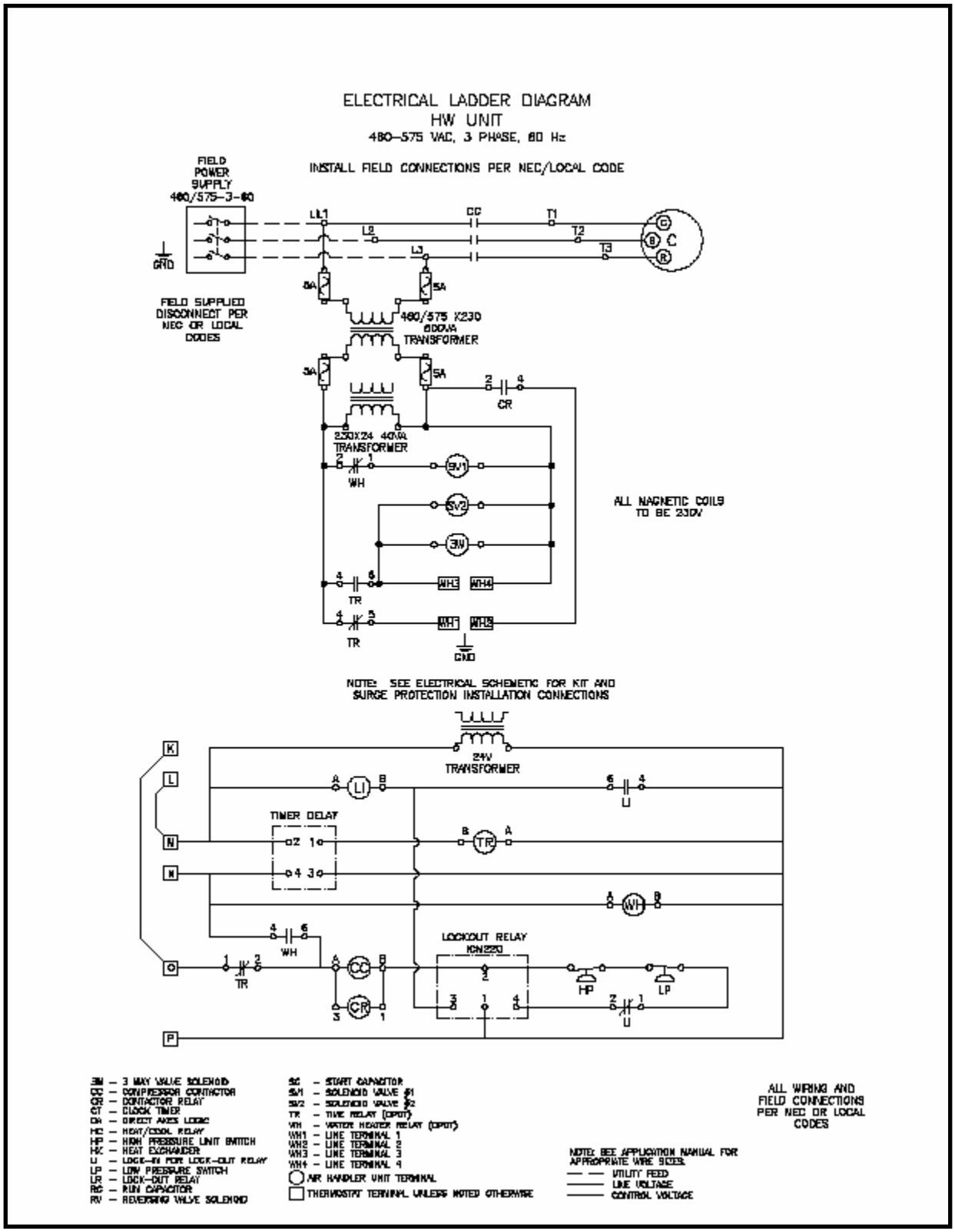

Figure B-39. HW Series 460-3-60 Electrical Ladder Diagram

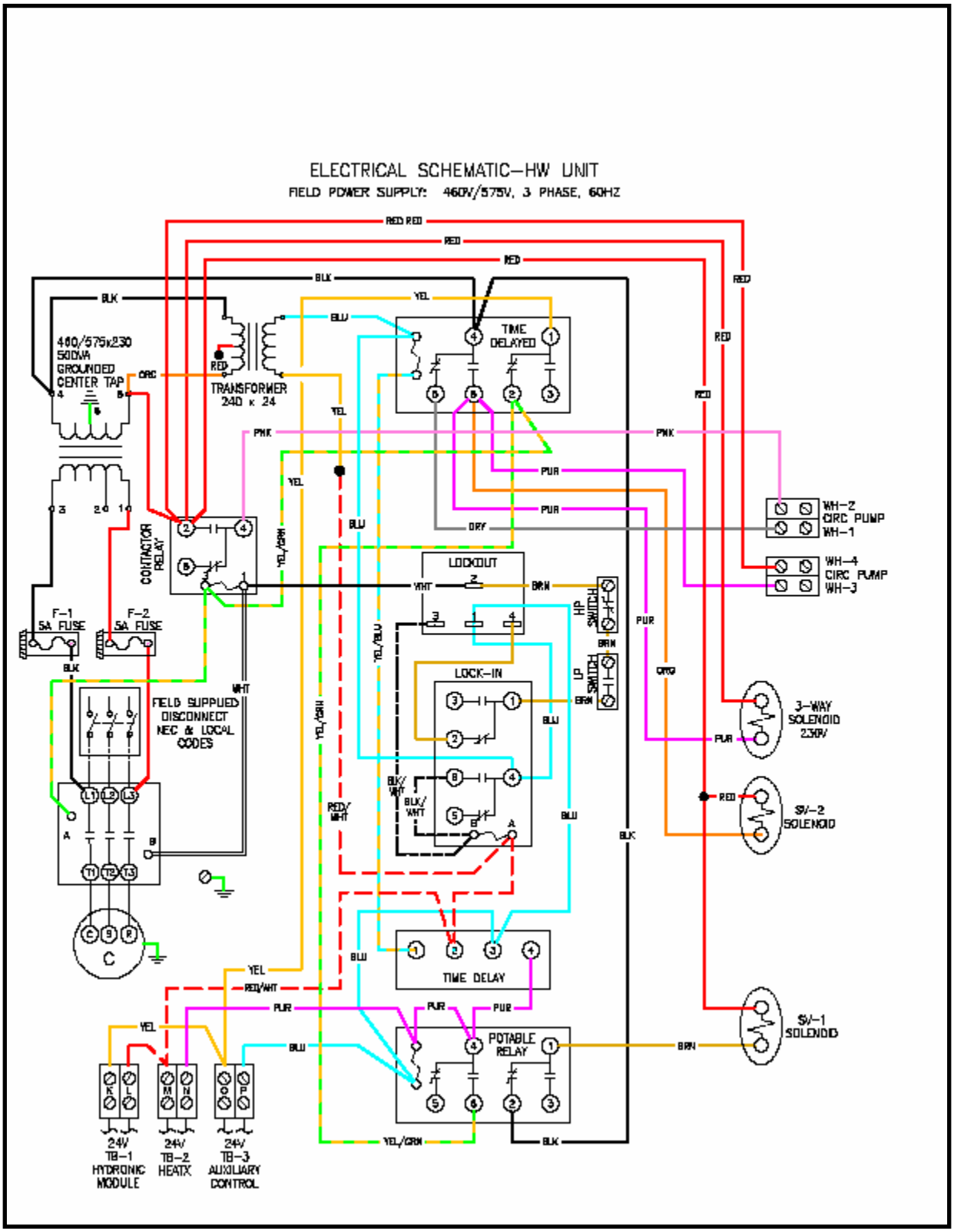

Figure B-40. HW Series 460-3-60 Electrical Schematic

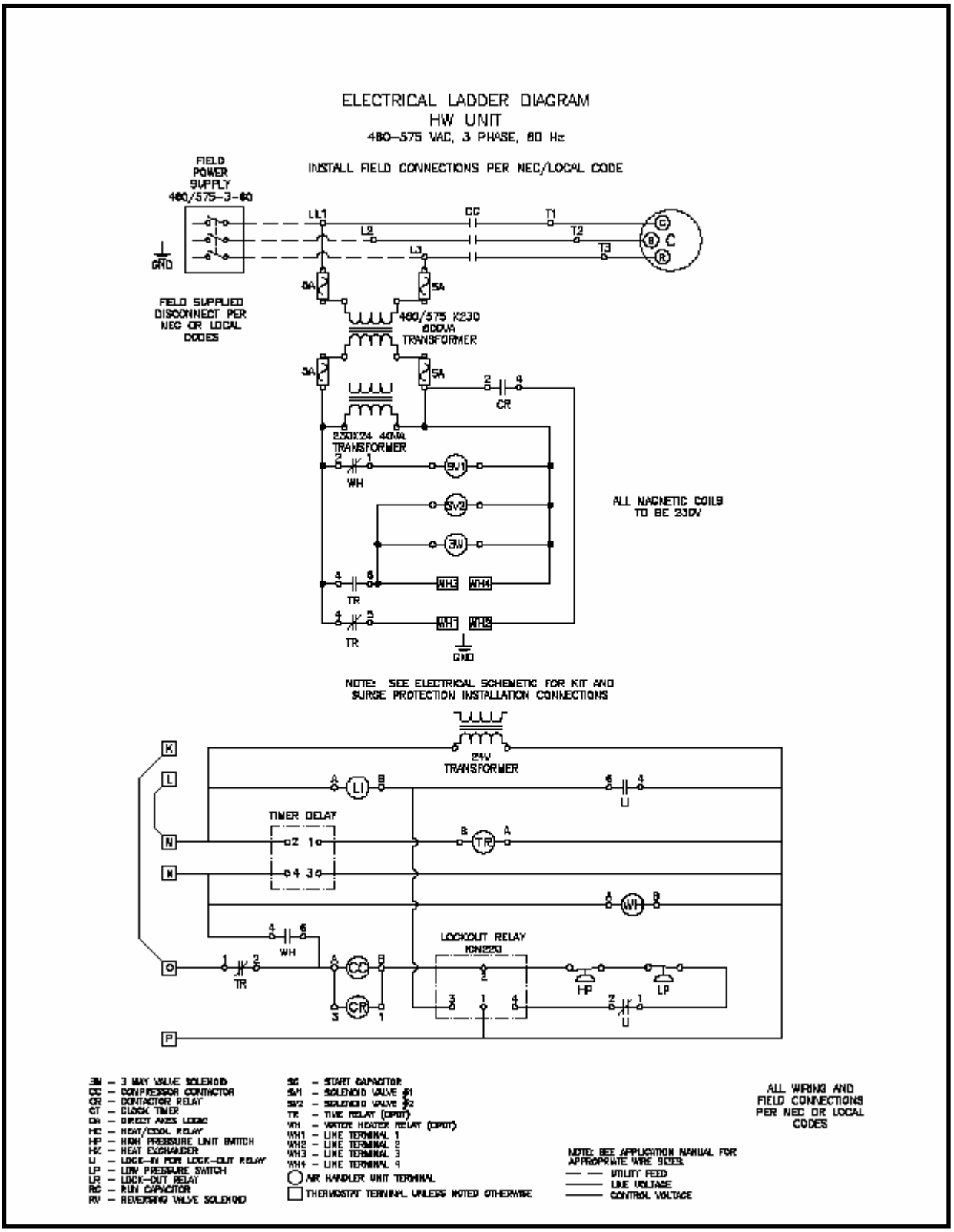

Figure B-41. HW Series 575-3-60 Electrical Ladder Diagram

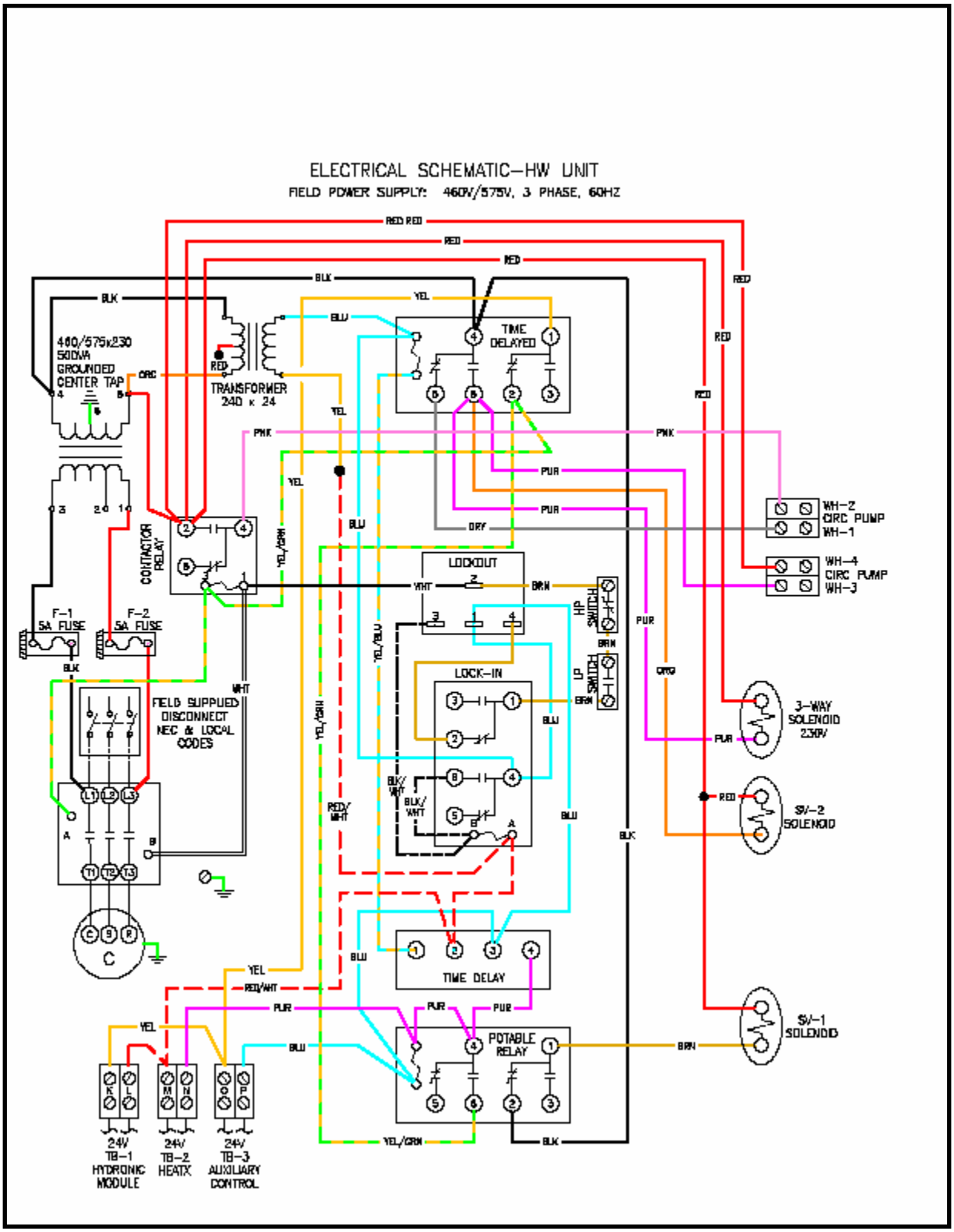

Figure B-42. HW Series 575-3-60 Electrical Schematic

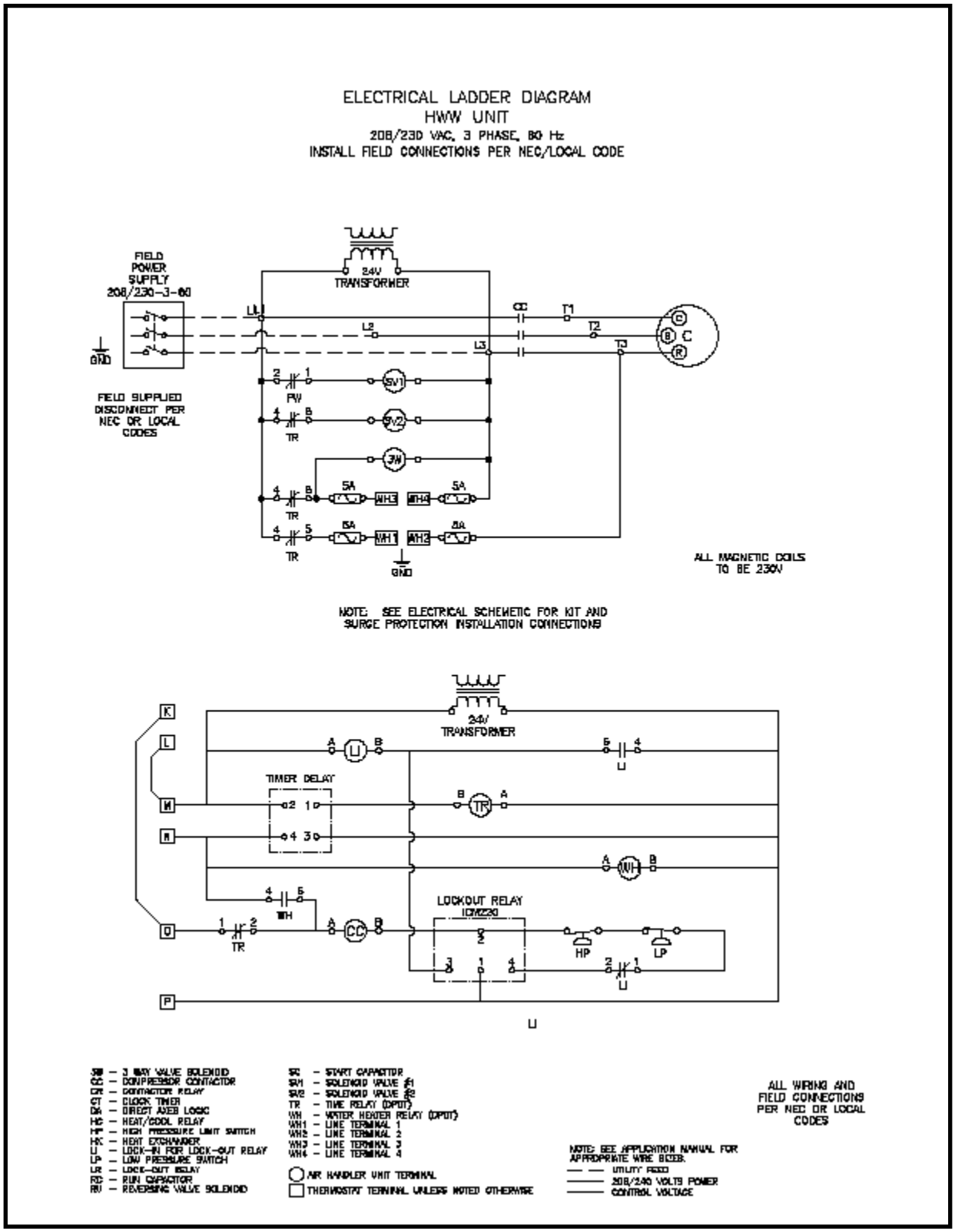

Figure B-43. HWW Series 230/208-3-60 Electrical Ladder Diagram

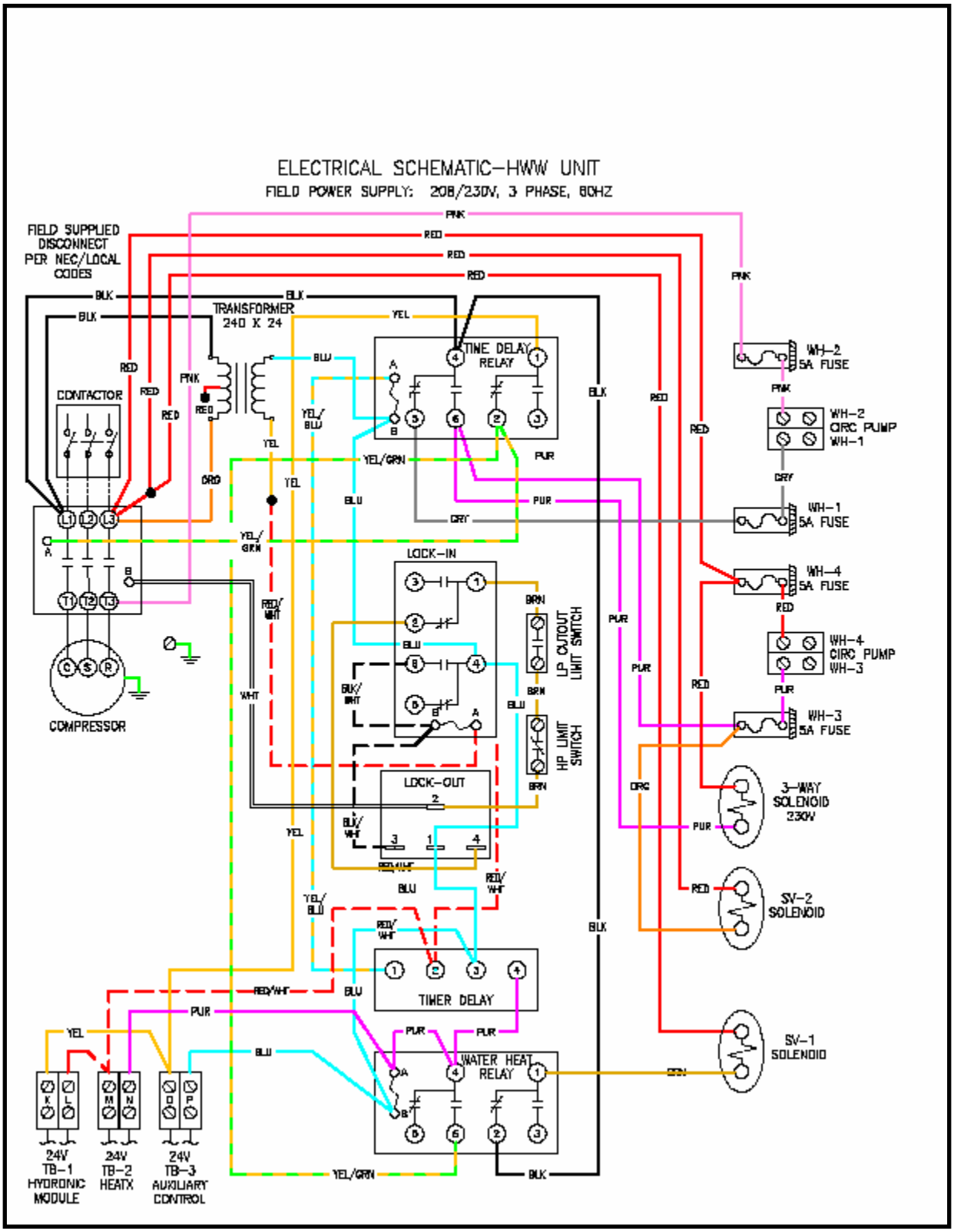

Figure B-44. HWW Series 230/208-3-60 Electrical Schematic

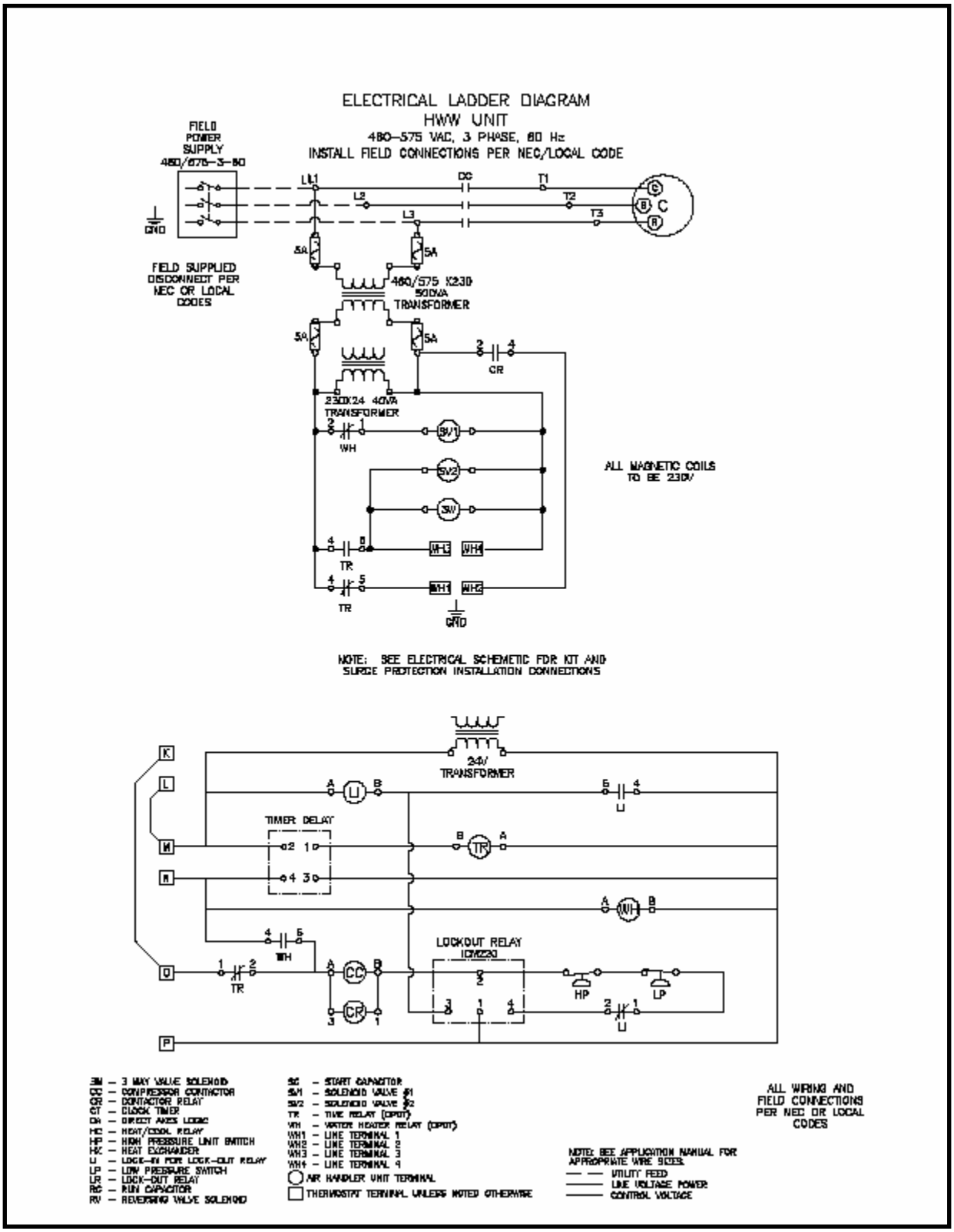

Figure B-45. HWW Series 460-3-60 Electrical Ladder Diagram

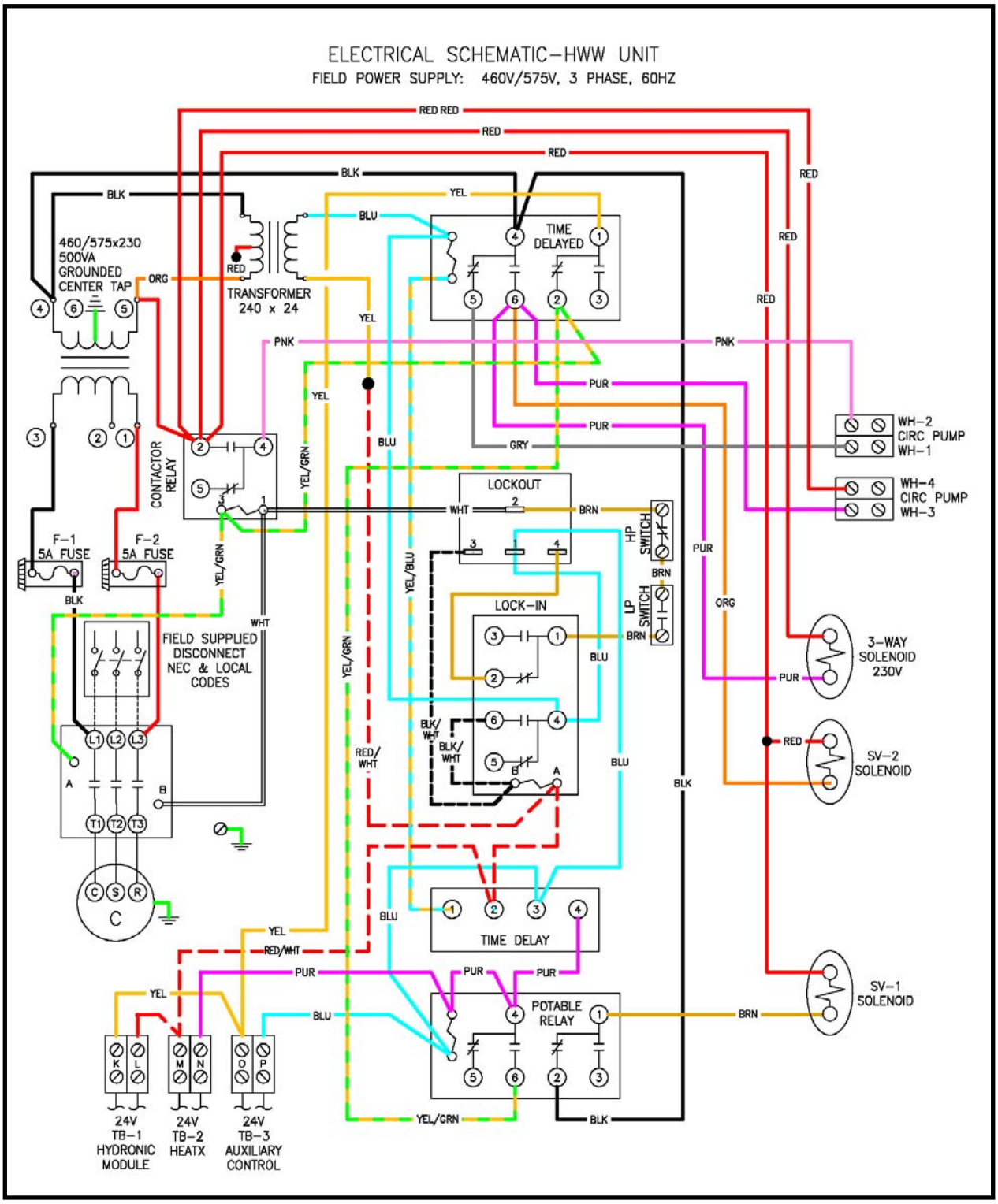

Figure B-46. HWW Series 460-3-60 Electrical Schematic

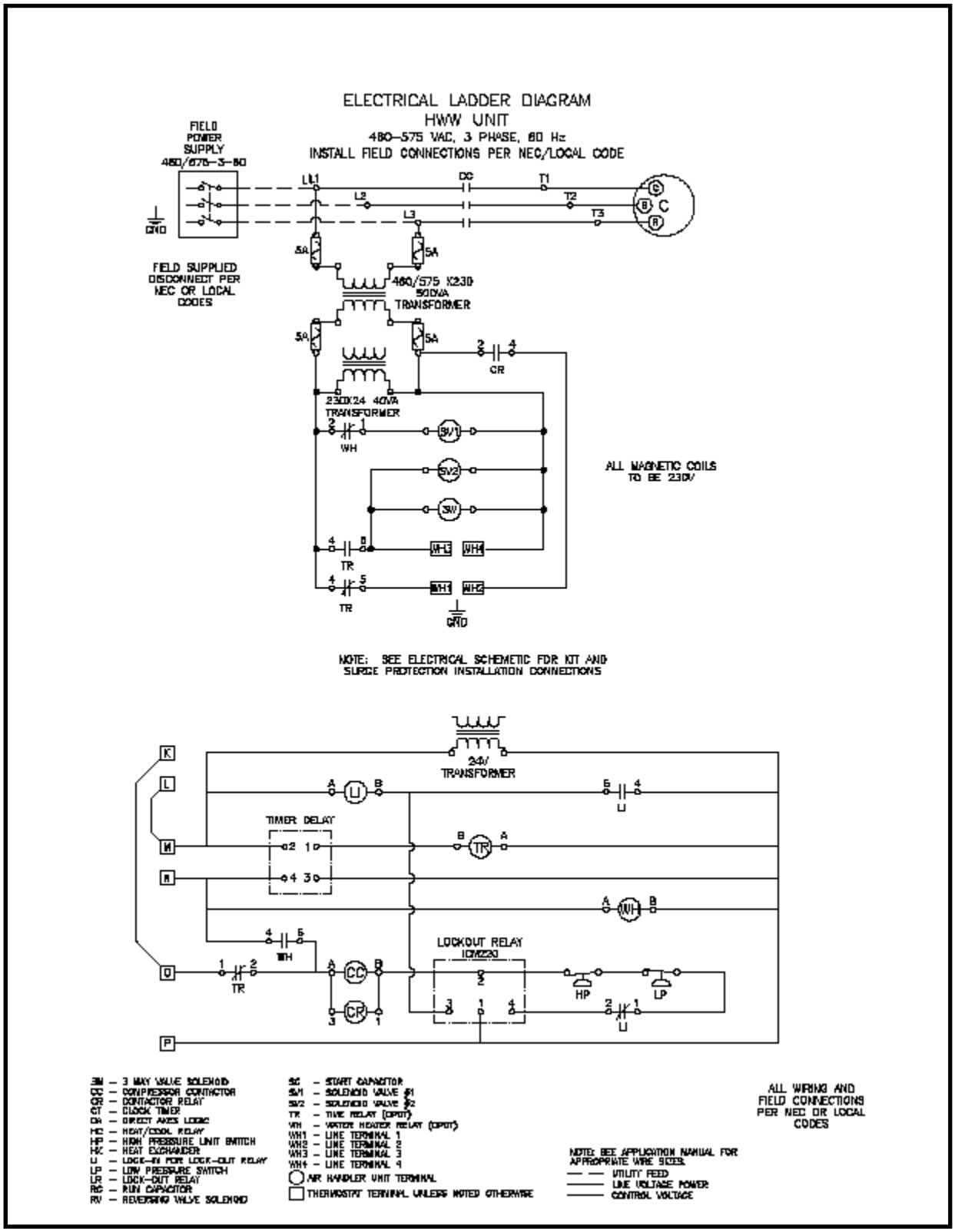

Figure B-47. HWW Series 575-3-60 Electrical Ladder Diagram

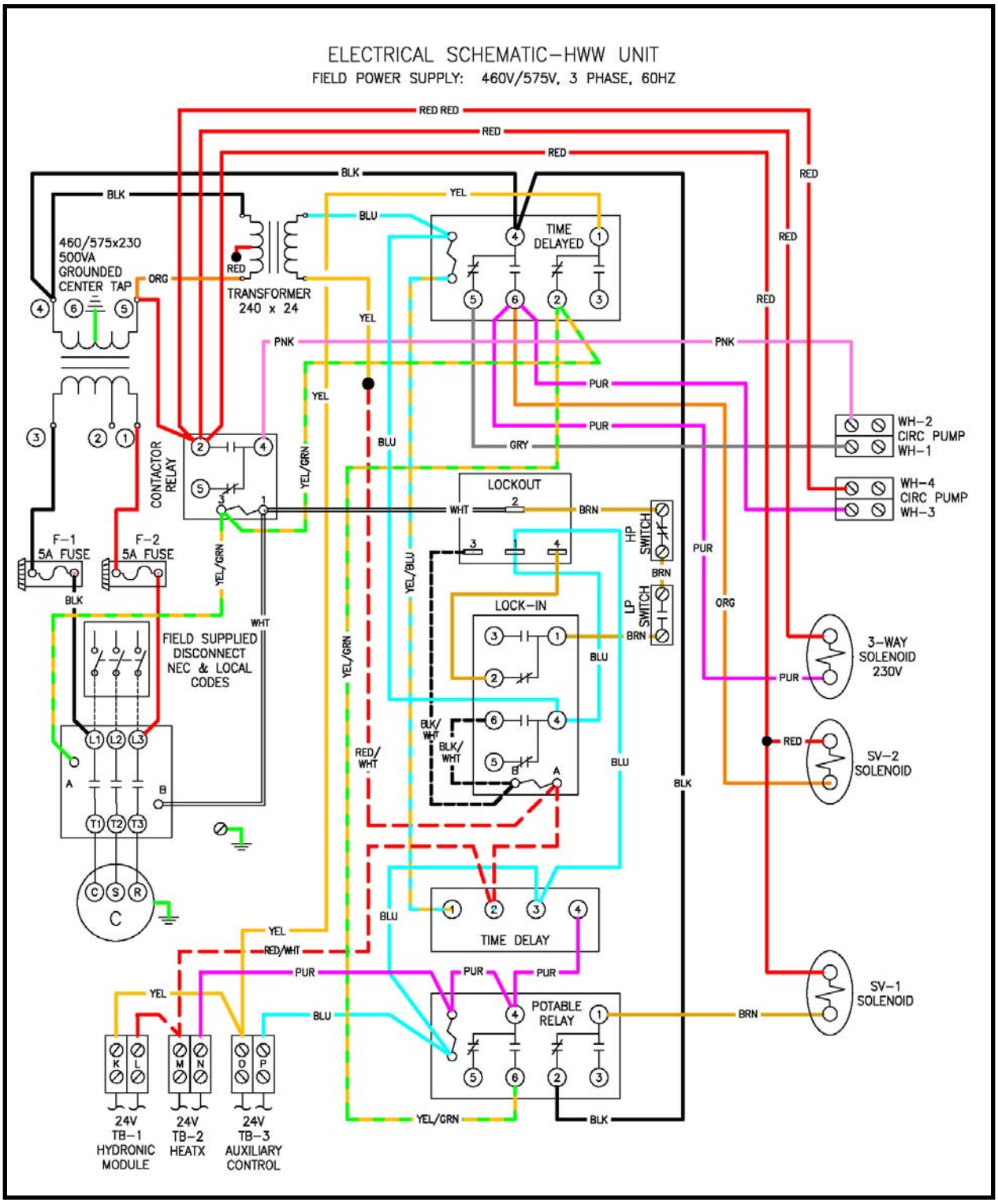

Figure B-48. HWW Series 575-3-60 Electrical Schematic

Appendix C Heat Exchanger Maintenance Procedure

Compact brazed heat exchangers are utilized in the Hydronic Water Module (HWM), Domestic Water Module (DWM) and the SCW, HCW and HWW Compressor Units.

The water flow rate designed into each of these heat exchangers is 3-4 gallons per minute per ton of nominal system capacity.

The water flow rate range for each system is shown in Figure C-1. While it is important for the proper performance of the heat exchanger to maintain water flow rate between the minimum and maximum shown, **it is CRITICAL that the flow rate not drop below the minimum.**

SCW, HCW, HWW COMPRESSOR UNIT SIZE & CAPACITY, BTUH	HWM/DWM MODELS	WATER FLOW RATE, GPM	
		MINIMUM	MAXIMUM
-018 (18,000)	-1836	4.5	6.0
-024 (24,000)	-1836	6.0	8.0
-030 (30,000)	-1836	7.5	10.0
-036 (36,000)	-1836	9.0	12.0
-042 (42,000)	-4248	10.5	14.0
-048 (48,000)	-4248	12.0	16.0
-060 (60,000)	-6072	15.0	20.0
-072 (72,000)	-6072	18.0	24.0

Figure C-1. Heat Exchanger Water Flow Rates

Determine how frequently the system heat exchanger should be checked for water flow rate. Spec Guide section 3F2a describes how water hardness (calcium carbonate) affects build-up on the heat exchanger passages.

If the water hardness test conducted at installation indicates a total hardness greater than 60 mg/l (or ppm) or greater than 3.5 gpg (reference Spec Guide section 3F2a), **the heat exchanger water flow rate should be checked after the first year of operation to determine if water flow rate is within the normal operating range.**

To test the water flow rate of the compressor unit, a flow meter is installed in the water circuit as shown in Figure C-2 and after the gate valve (5) has been closed.

The flow meter is installed directly onto gate valve (3) and the hose bibb originally on gate valve (3) is transferred to the outlet of the flow meter. 15 feet of 3/4"ID heavy duty water hose is run from the outlet of the flow meter to the hose bibb on gate valve (4).

With the hose bibb on gate valve (4) cracked open, slowly open gate valve (6) and let water flow through the compressor unit pump heat exchanger and flow meter until it is purged of air. Tighten hose connection on gate valve (4).

Close gate valve (6) and disconnect compressor from power. Turn compressor unit water pump on and circulate water through the flow meter and the closed circuit.

Check water flow rate against the minimum rates shown in Figure C-1.

If the water flow rates are less than those listed in Figure C-1, above, the heat exchanger is to be cleaned by setting the system up as noted in Figure C-3.

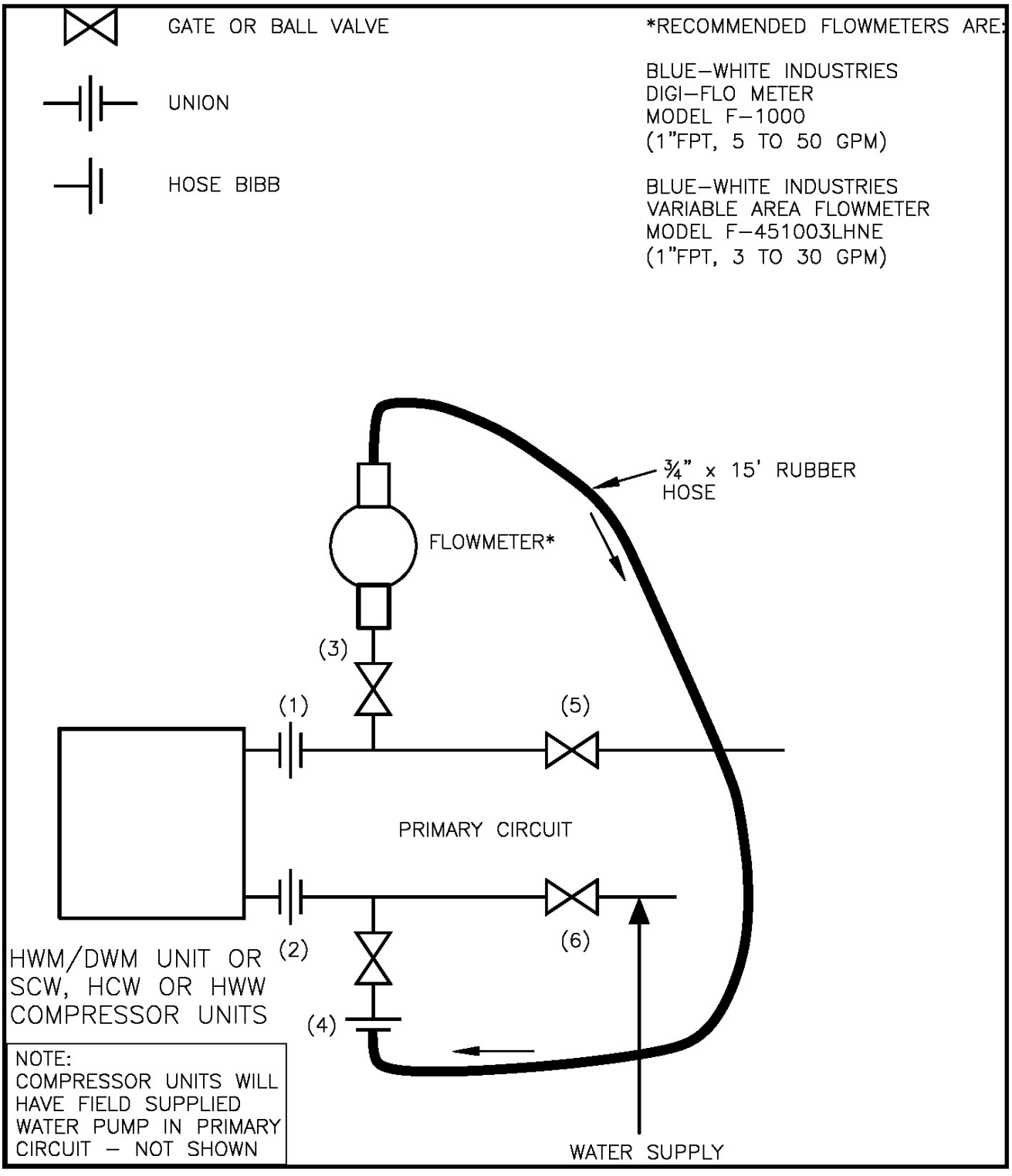

Figure C-2. Water Flow Test Set-up

IMPORTANT

Be sure gate valves (5) and (6) are tightly shut before cleaning the heat exchanger.

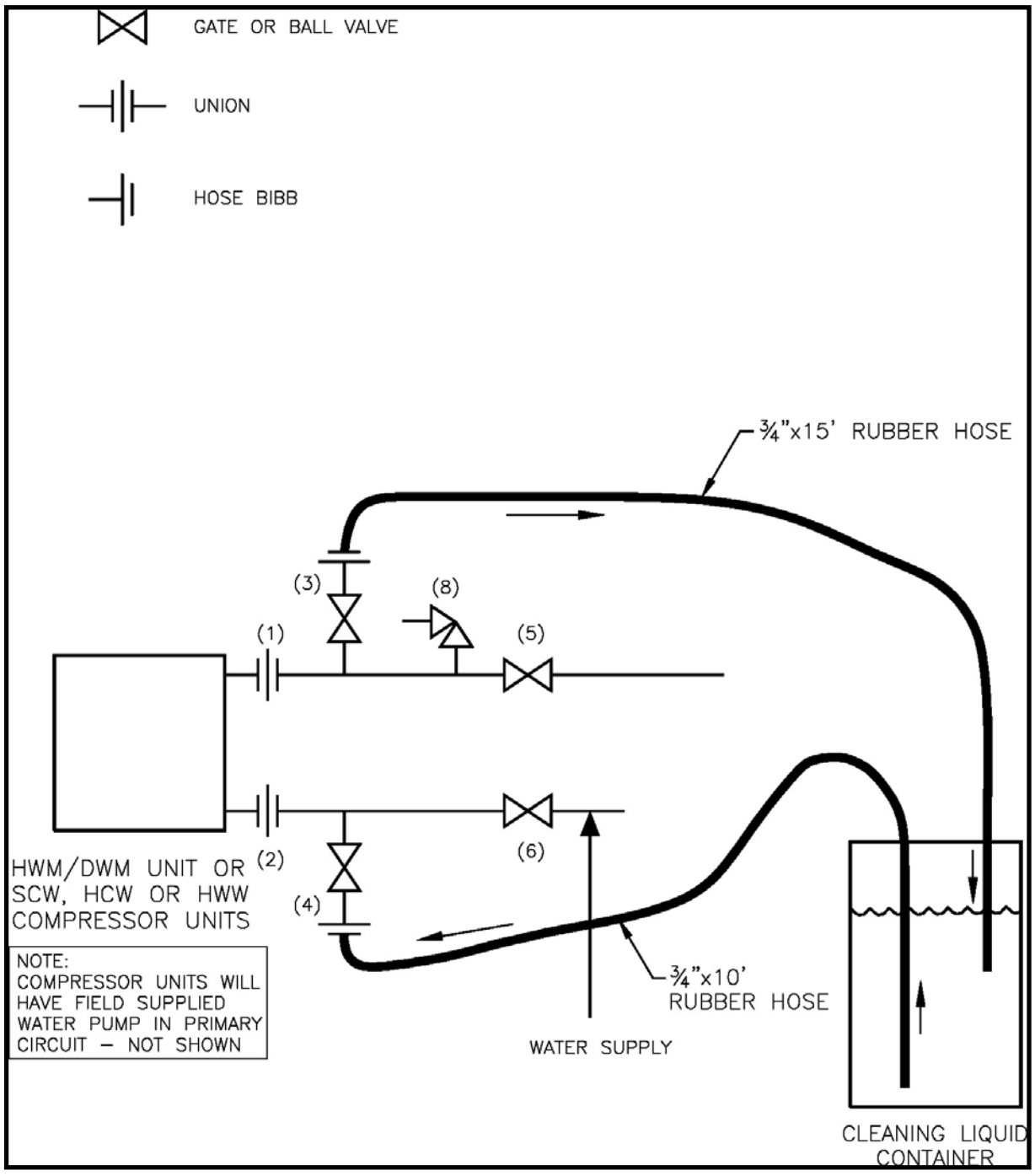

Figure C-3. Compressor Heat Exchanger Cleaning Set-up

Disconnect power from compressor and be sure pump is off.

Mix heat exchanger cleaning solution in a 55 gallon drum can be sealed and disposed of in accordance with local and federal chemical waste regulations, when the cleaning process is completed.

The concentrated cleaning solution for the heat exchanger cleaning process is liquid ice machine cleaner which is available at any distributor who handles ice machine supplies (Johnstone Supply, W.W. Grainger, etc).

Two gallons of concentrated liquid ice machine cleaner are recommended for each heat exchanger cleaning. Recommended brands and manufacturer order numbers are:

Virginia KMP (1 Gallon), Mfr. H419

Nu-Calgon (1 Gallon), Mfr. 4207-48

Mix 1 gallon of concentrated liquid lice machine cleaner per 15 gallons of water in the 55 gallon drum as shown in Figure C-3.

IMPORTANT

Use splash goggles, wear appropriate clothing to prevent skin exposure, and rubber gloves while handling cleaning solution. Have good ventilation if vapors, mists or dusts are formed. Have eye wash and shower in area.

FIRST AID

Wash skin and eyes thoroughly with water after contact. If swallowed give water or milk to drink and ice to suck. DO NOT induce vomiting. Get medical attention.

SPILLS

Cover spill with soda ash or inert material, then place in a chemical waste container. Dispose of in a manner consistent with federal and local law.

IMPORTANT

ALWAYS pour concentrated cleaning solution into water.

Connect the 3/4" ID x 15' heavy duty hose to the hose bibb on gate valve (3) and return to the container holding the cleaning solution. Connect the 3/4" ID x 10' heavy duty hose to the hose bibb on gate valve (4) and run near to the bottom of the container holding cleaning solution. See Figure C-3.

Start the closed circuit cleaning by ensuring that gate valves (5) and (6) are tightly shut and then energize the compressor unit water circulating pump.

Circulate the cleaning solution through the compressor unit closed circuit for approximately an hour or until there is no further change in the color of the cleaning solution.

When cleaning process is completed, turn off the water circulating pump and close gate valve (4). Disconnect hose from hose bibb on gate valve (4) and drain cleaning solution into drum. Safely dispose of hose.

Slowly open gate valve (6) to flush the heat exchanger water system clear of cleaning solution. The flushed mixture is routed into the 55 gallon drum. Approximately 20 gallons of water flushed through the system will ensure cleaning solution has been thoroughly flushed out of the system and into the drum.

Close gate valve (3) and remove the hose from the hose bibb on gate valve (3), draining residual water into the drum.

Safely dispose of hose. Close and seal drum and safely dispose of drum containing used cleaning solution.

Re-open gate valve (5) as appropriate.

Reconnect power to the compressor and pump in the normal operational mode.

Establish a schedule for regular maintenance of the compressor unit heat exchanger, based on the total hardness rating of the water and the results of the first heat exchanger cleaning.

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Appendix D Water Filtration System Maintenance Procedure

For EarthLinked® Heating and Cooling systems that utilize the Domestic Water Module (DWM) to heat potable water, **the filtration system is to be checked at least every 3 months to determine if the cartridge is to be replaced.**

Figure D-1 illustrates the recommended filters to be used with the DWM, and includes the replacement cartridges.

FILTRATION SYSTEM MODEL	REPLACEMENT CARTRIDGE MODEL	DIMENSIONS & CONNECTIONS	RETAIL SOURCE
Whirlpool WHCF-DWHBB	WHCF-GD25BB (25 micron)	13-1/4 x 7-1/2 x 7-1/2” 1” FPT	Lowes
General Electric GNWH35F	FXHSC (30 micron)	14 x 8 x 8” 1” FPT	Home Depot

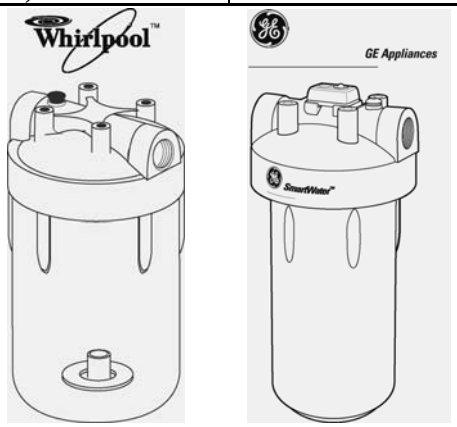

Figure D-1. Recommended Water Filtration Systems

The general water plumbing layout for the DWM system including the water filtration system and the insulated water tank, is illustrated in Figure D-2.

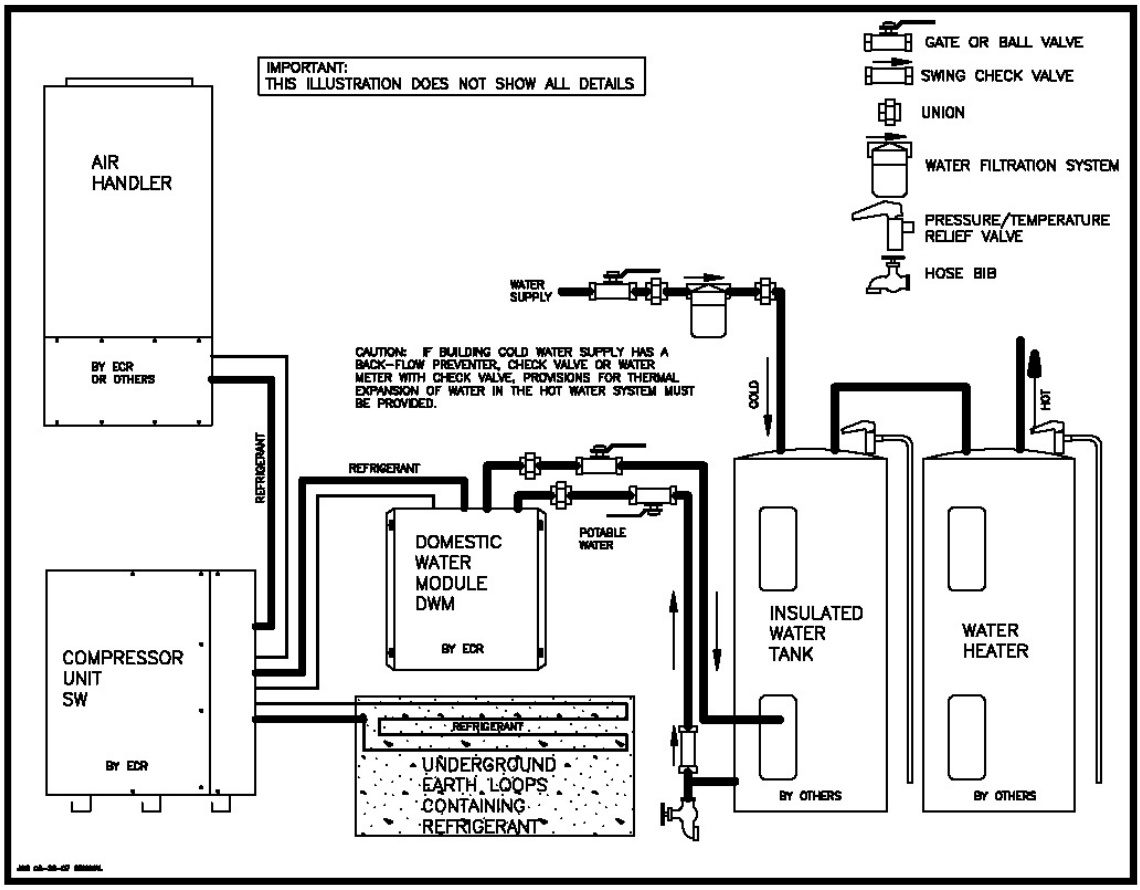

Figure D-2. Typical DWM Application showing Water Filtration System and Water Piping Details

When the water filtration system is being checked, a cleaning of sediment from the insulated water tank may be in order.

The tank drain valve is shown in Figure D-2 and exits the tank at the lowest point, sharing the return water line to the DWM.

To drain sediment from the tank, do the following:

1. Turn electrical supply to compressor unit “OFF”.
2. CLOSE the cold water inlet valve to the water tank.
3. OPEN a nearby hot water faucet and leave open while draining the tank.
4. Connect a hose to the drain valve and terminate to an adequate drain.
5. OPEN the water tank drain valve to enable tank to drain.
6. After visible sediment has drained, and water is clear, close the drain valve and nearby hot water faucet.
7. Reopen the cold water supply to the storage tank.
8. Allow air to exit by opening the nearest hot water faucet. Allow water to run until a constant flow is obtained.
9. Close hot water faucet and re-energize power to compressor unit.

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