Tranquility 27™ (TT) Series
Tranquility 20™ (TS) Series
Tranquility 16™ (TC) Series
Genesis Ultra (GS) Series
Genesis Standard (GR) Series
Genesis Compact (GC) Series

Commercial Horizontal & Vertical Packaged Water-Source Heat Pumps

Installation, Operation & Maintenance Instructions

50Hz & 60Hz

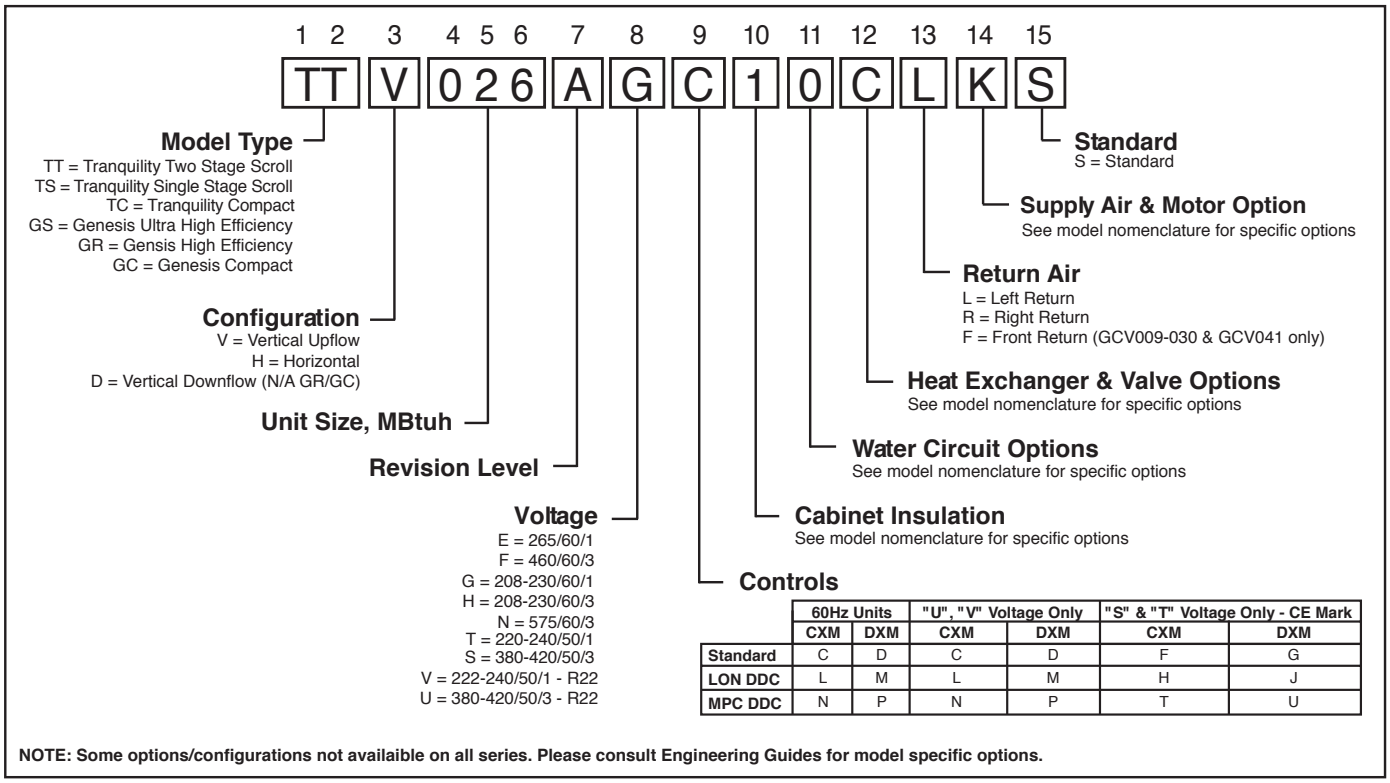
97B0045N02

Revision: 6 Jan, 2009B

CLIMATEMASTER®

Table of Contents

Model Nomenclature
General Overview For All H & V Series



	60Hz Units		"U", "V" Voltage Only		"S" & "T" Voltage Only - CE Mark	
	CXM	DXM	CXM	DXM	CXM	DXM
Standard	C	D	C	D	F	G
LON DDC	L	M	L	M	H	J
MPC DDC	N	P	N	P	T	U

NOTE: Some options/configurations not availaible on all series. Please consult Engineering Guides for model specific options.

Rev.: 1/6/09B

NOTE: Above model nomenclature is a general reference. Consult individual engineering guides for detailed information.

General Information

Safety
Warnings, cautions and notices appear throughout this manual. Read these items carefully before attempting any installation, service or troubleshooting of the equipment.

DANGER: Indicates an immediate hazardous situation, which if not avoided will result in death or serious injury. DANGER labels on unit access panels must be observed.

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

CAUTION: Indicates a potentially hazardous situation or an unsafe practice, which if not avoided could result in minor or moderate injury or product or property damage.

NOTICE: Notification of installation, operation or maintenance information, which is important, but which is not hazard-related.

⚠ WARNING! ⚠

WARNING! Verify refrigerant type before proceeding. Units are shipped with R-22, R-407c and R-410A (EarthPure®) refrigerants. The unit label will indicate which refrigerant is provided. The EarthPure® Application and Service Manual should be read and understood before attempting to service refrigerant circuits with R-407c or R-410A.

⚠ WARNING! ⚠

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

⚠ CAUTION! ⚠

CAUTION! To avoid equipment damage, DO NOT use these units as a source of heating or cooling during the construction process. The mechanical components and filters will quickly become clogged with construction dirt and debris, which may cause system damage.

⚠ WARNING! ⚠

WARNING! All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state, and federal statutes for the recovery and disposal of refrigerants. If a compressor is removed from this unit, refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, refrigerant lines of the compressor must be sealed after it is removed.

Inspection
Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the packaging of each unit, and inspect each unit for damage. Insure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and 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. Notify your equipment supplier of all damage within fifteen (15) days of shipment.

Storage
Equipment should be stored in its original packaging in a clean, dry area. Store units in an upright position at all times. Stack units a maximum of 3 units high.

Unit Protection
Cover units on the job site with either the original packaging or an equivalent protective covering. Cap the open ends of pipes stored on the job site. In areas where painting, plastering, and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the units and contamination by foreign material. Physical damage and contamination may prevent proper start-up and may result in costly equipment clean-up.

Examine all pipes, fittings, and valves before installing any of the system components. Remove any dirt or debris found in or on these components.

Pre-Installation
Installation, Operation, and Maintenance instructions are provided with each unit. Horizontal equipment is designed for installation above false ceiling or in a ceiling plenum. Other unit configurations are typically installed in a mechanical room. The installation site chosen should include adequate service clearance around the unit. Before unit start-up, read all manuals and become familiar with the unit and its operation. Thoroughly check the system before operation.

General Information

Prepare units for installation as follows:

1. Compare the electrical data on the unit nameplate with ordering and shipping information to verify that the correct unit has been shipped.
2. Keep the cabinet covered with the original packaging until installation is complete and all plastering, painting, etc. is finished.
3. Verify refrigerant tubing is free of kinks or dents and that it does not touch other unit components.
4. Inspect all electrical connections. Connections must be clean and tight at the terminals.
5. Remove any blower support packaging (water-to-air units only).
6. Loosen compressor bolts on units equipped with compressor spring vibration isolation until the compressor rides freely on the springs. Remove shipping restraints.
7. REMOVE COMPRESSOR SUPPORT PLATE 1/4" SHIPPING BOLTS (2 on each side) TO MAXIMIZE VIBRATION AND SOUND ATTENUATION (R22 units only).
8. Some airflow patterns are field convertible (horizontal units only). Locate the airflow conversion section of this IOM.
9. Locate and verify any hot water generator (HWG), hanger, or other accessory kit located in the compressor section or blower section.

⚠ CAUTION! ⚠

CAUTION! All three phase scroll compressors must have direction of rotation verified at start-up. Verification is achieved by checking compressor Amp draw. Amp draw will be substantially lower compared to nameplate values. Additionally, reverse rotation results in an elevated sound level compared to correct rotation. Reverse rotation will result in compressor internal overload trip within several minutes. Verify compressor type before proceeding.

⚠ CAUTION! ⚠

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

⚠ CAUTION! ⚠

CAUTION! CUT HAZARD - Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

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

Unit Physical Data

Tranquility 27™ Two-Stage (TT) Series (60Hz Only)

Model	026	038	049	064	072
Compressor (1 Each)	Two-Stage Scroll				
Factory Charge R410A (oz) [kg]	58 [1.64]	78 [2.21]	81 [2.30]	144 [4.08]	156 [4.42]
ECM Fan Motor & Blower					
Fan Motor (hp) [W]	1/2 [373]	1/2 [373]	1 [746]	1 [746]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Water Connection Size					
IPT (in)	3/4	3/4	1	1	1
HWG Connection Size					
IPT (in)	1/2	1/2	1/2	1/2	1/2
Coax Volume					
Volume (US Gallons) [liters]	0.76 [2.88]	0.92 [3.48]	1.24 [4.69]	1.56 [5.91]	1.56 [5.91]
Vertical Upflow/Downflow					
Air Coil Dimensions (h x w) - (in) [mm]	28 x 20 [711 x 508]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	28 x 24 [711 x 610]	28 x 30 [711 x 762]	2 - 16 x 30 [406 x 762]	1 - 16 x 30 [813 x 762] 1 - 20 x 30 [508 x 762	1 - 16 x 30 [813 x 762] 1 - 20 x 30 [508 x 762
Weight - Operating, (lbs) [kg]	266 [121]	327 [148]	416 [189]	443 [201]	443 [201]
Weight - Packaged, (lbs) [kg]	276 [125]	337 [153]	426 [193]	453 [205]	453 [205]
Horizontal					
Air Coil Dimensions (h x w) - (in) [mm]	18 x 31 [457 x 787]	20 x 25 [508 x 889]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	2 - 18 x 18 [457 x 457]	1 - 12 x 20 [305 x 508] 1 - 20 x 24 [508 x 635]	1 - 18 x 20 [457 x 508] 1 - 20 x 24 [508 x 610]	2 - 20 x 24 [508 x 610	2 - 20 x 24 [508 x 610
Weight - Operating, (lbs) [kg]	266 [121]	327 [148]	416 [189]	443 [201]	443 [201]
Weight - Packaged, (lbs) [kg]	276 [125]	337 [153]	426 [193]	453 [205]	453 [205]

All units have spring compressor mountings, and 1/2" [12.2mm] & 3/4" [19.mm] electrical knockouts.

Unit Physical Data

Tranquility 20™ Single-Stage (TS) Series (60Hz)

Model	006	009	012	018	024	030	036	042	048	060	070
Compressor (1 Each)	Rotary			Scroll							
Factory Charge R410A (oz) [kg]	24 [0.68]	32 [0.91]	34 [0.96]	50 [1.13]	56 [1.59]	58 [1.64]	70 [1.98]	80 [2.27]	80 [2.27]	136 [3.86]	144 [4.08]
ECM Fan Motor & Blower											
Fan Motor (hp) [W]	N/A	N/A	N/A	1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1/2 [373]	1 [746]	1 [746]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	N/A	N/A	N/A	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
PSC Fan Motor & Blower (3 Speeds)											
Fan Motor (hp) [W]	1/25 [30]	1/20 [37]	1/8 [93]	1/6 [124]	1/5 [149]	1/3 [249]	1/2 [373]	1/2 [373]	3/4 [560]	1 [746]	1 [746]
High Static Fan Motor (hp) [W]	N/A	N/A	N/A	1/5 [149]	1/3 [249]	1/2 [373]	1/2 [373]	3/4 [560]	3/4 [560]	1 [746]	Not Available
Blower Wheel Size (dia x w) - (in) [mm]	6 X 5 [152 X 127]	6 X 5 [152 X 127]	6 X 5 [152 X 127]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Water Connection Size											
IPT (in)	1/2”	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”	1”	1”	1”	1”
HWG Connection Size											
IPT (in)	N/A	N/A	N/A	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”
Coax Volume											
Volume (US Gallons) [liters]	0.17 [0.64]	0.29 [1.10]	0.45 [1.70]	0.56 [2.12]	0.76 [2.88]	0.76 [2.88]	0.92 [3.48]	1.24 [4.69]	1.24 [4.69]	1.56 [5.91]	1.56 [5.91]
Vertical Upflow/Downflow											
Air Coil Dimensions (h x w) - (in) [mm]	16 x 16 [406 x 406] Upflow Only	16 x 16 [406 x 406] Upflow Only	16 x 16 [406 x 406] Upflow Only	24 x 20 [610 x 508]	28 x 20 [711 x 508]	28 x 20 [711 x 508]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Standard Filter - 1” [25.4mm] Throwaway, qty (in) [mm]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	24 x 24 [610 x 610]	28 x 24 [711 x 610]	28 x 24 [711 x 610]	28 x 30 [711 x 762]	2 - 16 x 30 [2 - 406 x 762]	2 - 16 x 30 [2 - 406 x 762]	1 - 16 x 30; 1 - 20 x 30 [1 - 406 x 762; 1 - 508 x 762]	1 - 16 x 30; 1 - 20 x 30 [1 - 406 x 762; 1 - 508 x 762]
Weight - Operating, (lbs) [kg]	126 [57]	146 [66]	150 [68]	252 [114]	266 [121]	268 [122]	327 [148]	414 [188]	416 [189]	441 [200]	443 [201]
Weight - Packaged, (lbs) [kg]	136 [62]	156 [71]	160 [73]	262 [119]	276 [125]	278 [126]	337 [153]	424 [192]	426 [193]	451 [205]	453 [206]
Horizontal											
Air Coil Dimensions (h x w) - (in) [mm]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	18 x 27 [457 x 686]	18 x 31 [457 x 787]	18 x 31 [457 x 787]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Standard Filter - 1” [25.4mm] Throwaway, qty (in) [mm]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	2 - 18 x 18 [2 - 457 x 457]	2 - 18 x 18 [2 - 457 x 457]	2 - 18 x 18 [2 - 457 x 457]	1 - 12 x 20; 1- 20 x 25 [1 - 305 x 508; 1 - 508 x 635]	1 - 18 x 20; 1 - 20 x 24 [1 - 457 x 508; 1 - 508 x 610]	1 - 18 x 20; 1 - 20 x 24 [1 - 457 x 508; 1 - 508 x 610]	2 - 20 x 24 [2 - 508 x 610]	2 - 20 x 24 [2 - 508 x 610]
Weight - Operating, (lbs) [kg]	136 [62]	156 [71]	160 [73]	257 [117]	266 [121]	268 [122]	327 [148]	414 [188]	416 [189]	441 [200]	443 [201]
Weight - Packaged, (lbs) [kg]	146 [66]	166 [72]	170 [77]	267 [121]	276 [125]	278 [126]	337 [153]	424 [192]	426 [193]	451 [205]	453 [206]

All units have spring compressor mountings, TXV expansion devices, and 1/2” [12.2mm] & 3/4” [19.1mm] electrical knockouts.

Unit Physical Data

Tranquility 20™ Single-Stage (TS) Series (50Hz)

Model	006	009	012	018	024	030	036	042	048	060	070
Compressor (1 Each)	Rotary			Scroll							
Factory Charge R410A (oz) [kg]	24 [0.68]	31 [0.88]	34 [0.96]	50 [1.13]	56 [1.59]	58 [1.64]	70 [1.98]	80 [2.27]	80 [2.27]	136 [3.86]	144 [4.08]
PSC Fan Motor & Blower (3 Speeds)											
Fan Motor (hp) [W]	1/25 [30]	1/20 [37]	1/8 [93]	1/6 [124]	1/5 [149]	1/3 [249]	1/2 [373]	1/2 [373]	3/4 [560]	1 [746]	1 [746]
High Static Fan Motor (hp) [W]	N/A	N/A	N/A	1/5 [149]	1/3 [249]	1/2 [373]	1/2 [373]	3/4 [560]	3/4 [560]	1 [746]	Not Available
Blower Wheel Size (dia x w) - (in) [mm]	6 X 5 [152 X 127]	6 X 5 [152 X 127]	6 X 5 [152 X 127]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Water Connection Size											
IPT (in)	1/2”	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”	1”	1”	1”	1”
HWG Connection Size											
IPT (in)	N/A	N/A	N/A	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”
Coax Volume											
Volume (US Gallons) [liters]	0.17 [0.64]	0.29 [1.10]	0.45 [1.70]	0.56 [2.12]	0.76 [2.88]	0.76 [2.88]	0.92 [3.48]	1.24 [4.69]	1.24 [4.69]	1.56 [5.91]	1.56 [5.91]
Vertical Upflow/Downflow											
Air Coil Dimensions (h x w) - (in) [mm]	16 x 16 [406 x 406] Upflow Only	16 x 16 [406 x 406] Upflow Only	16 x 16 [406 x 406] Upflow Only	24 x 20 [610 x 508]	28 x 20 [711 x 508]	28 x 20 [711 x 508]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Standard Filter - 1” [25.4mm] Throwaway, qty (in) [mm]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	24 x 24 [610 x 610]	28 x 24 [711 x 610]	28 x 24 [711 x 610]	28 x 30 [711 x 762]	2 - 16 x 30 [2 - 406 x 762]	2 - 16 x 30 [2 - 406 x 762]	1 - 16 x 30; 1 - 20 x 30 [1 - 406 x 762; 1 - 508 x 762]	1 - 16 x 30; 1 - 20 x 30 [1 - 406 x 762; 1 - 508 x 762]
Weight - Operating, (lbs) [kg]	126 [57]	146 [66]	150 [68]	252 [114]	266 [121]	268 [122]	327 [148]	414 [188]	416 [189]	441 [200]	443 [201]
Weight - Packaged, (lbs) [kg]	136 [62]	156 [71]	160 [73]	262 [119]	276 [125]	278 [126]	337 [153]	424 [192]	426 [193]	451 [205]	453 [206]
Horizontal											
Air Coil Dimensions (h x w) - (in) [mm]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	18 x 27 [457 x 686]	18 x 31 [457 x 787]	18 x 31 [457 x 787]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Standard Filter - 1” [25.4mm] Throwaway, qty (in) [mm]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	2 - 18 x 18 [2 - 457 x 457]	2 - 18 x 18 [2 - 457 x 457]	2 - 18 x 18 [2 - 457 x 457]	1 - 12 x 20; 1- 20 x 25 [1 - 305 x 508; 1 - 508 x 635]	1 - 18 x 20; 1 - 20 x 24 [1 - 457 x 508; 1 - 508 x 610]	1 - 18 x 20; 1 - 20 x 24 [1 - 457 x 508; 1 - 508 x 610]	2 - 20 x 24 [2 - 508 x 610]	2 - 20 x 24 [2 - 508 x 610]
Weight - Operating, (lbs) [kg]	136 [62]	156 [71]	160 [73]	257 [117]	266 [121]	268 [122]	327 [148]	414 [188]	416 [189]	441 [200]	443 [201]
Weight - Packaged, (lbs) [kg]	146 [66]	166 [72]	170 [77]	267 [121]	276 [125]	278 [126]	337 [153]	424 [192]	426 [193]	451 [205]	453 [206]

All units have spring compressor mountings, TXV expansion devices, and 1/2” [12.2mm] & 3/4” [19.1mm] electrical knockouts.

Unit Physical Data

Tranquility 16™ (TC) Series (60 Hz)

TC Series	006	009	012	015	018	024	030	036	042	048	060
Compressor (1 Each)	Rotary					Scroll					
Factory Charge R410A (oz)	17	18.5	23	32	43	43	47	50	70	74	82
PSC Fan Motor & Blower											
Fan Motor Type/Speeds	PSC/3	PSC/3	PSC-3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3
Fan Motor (hp)	1/25	1/10	1/10	1/6	1/6	1/4	3/4	1/2	3/4	3/4	1
Blower Wheel Size (Dia x w)	5x5	5x5	6x5	8x7	8x7	9x7	9x7	9x8	9x8	10x10	11x10
Water Connection Size											
IPT	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"
Vertical											
Air Coil Dimensions (H x W)	10x15	10x15	10x15	20x17.25	20x17.25	20x17.25	20x17.25	24x21.75	24x21.76	24x28.25	24x28.25
Filter Standard - 1" Throwaway	10x18	10x18	10x18	20x20	20x20	20x20	20x20	24x24	24x24	1-14x24, 1-18x24	1-14x24, 1-18x24
Weight - Operating (lbs.)	103	105	114	153	158	189	197	203	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	194	202	209	224	270	285
Horizontal											
Air Coil Dimensions (H x W)	10x15	10x15	10x15	16x22	16x22	16x22	16x22	20x25	20x25	20x35	20x35
Filter Standard - 1" Throwaway	10x18	10x18	10x18	16x25	16x25	18x25	18x25	20x28 or 2-20x14	20x28 or 2-20x14	1-20x24, 1-20x14	1-20x24, 1-20x14
Weight - Operating (lbs.)	103	105	114	153	158	189	197	203	218	263	303
Weight - Packaged (lbs.)	113	115	124	158	163	194	202	209	224	270	310

Notes:
All units have grommet compressor mountings,TXV expansion device, and 1/2" & 3/4" electrical knockouts.

Unit Maximum Water Working Pressure	
Options	**Max Pressure PSIG [kPa]**
Base Unit	500 [3,445]

Use the lowest maximum pressure rating when multiple options are combined.

Tranquility 16™ (TC) Series (50 Hz)

TC Series	015	018	024	030	036	042	048	060
Compressor (1 Each)	Rotary		Scroll					
Factory Charge R410A - kg [oz]	0.99 [35]	1.22 [43]	1.22 [43]	1.36 [48]	1.42 [50]	1.98 [70]	2.10 [74]	2.32 [82]
PSC Fan Motor & Blower								
Fan Motor Type/Speeds	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3
Fan Motor (W) [hp]	124 [1/6]	124 [1/6]	187 [1/4]	560 [3/4]	373 [1/2]	560 [3/4]	560 [3/4]	746 [1]
Blower Wheel Size (Dia x w) mm [in]	[8x7]	[8x7]	[9x7]	[9x7]	[9x8]	[9x8]	[10x10]	[11x10]
Water Connection Size								
IPT	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"
Vertical								
Air Coil Dimensions (H x W) mm [in]	508 x 438 [20x17.25]	508 x 438 [20x17.25]	508 x 438 [20x17.25]	508 x 438 [20x17.25]	610 x 552 [24x21.75]	610 x 552 [24x21.75]	610 x 718 [24x28.25]	610 x 718 [24x28.25]
Filter Standard - 1" Throwaway mm [in]	508 x 508 [20x20]	508 x 508 [20x20]	508 x 508 [20x20]	508 x 508 [20x20]	610 x 610 [24x24]	610 x 610 [24x24]	1-356 x 610 [14x24], 1- 457 x 610 [18x24]	1-356 x 610 [14x24], 1- 457 x 610 [18x24]
Weight - Operating kg [lbs.]	69 [153]	72 [158]	86 [189]	89 [197]	92 [203]	99 [218]	119 [263]	126 [278]
Weight - Packaged kg [lbs.]	72 [158]	74 [163]	88 [194]	92 [202]	95 [209]	102 [224]	123 [270]	129 [285]
Horizontal								
Air Coil Dimensions (H x W) mm [in]	406 x 559 [16x22]	406 x 559 [16x22]	406 x 559 [16x22]	406 x 559 [16x22]	508 x 635 [20x25]	508 x 635 [20x25]	508 x 889 [20x35]	508 x 889 [20x35]
Filter Standard - 1" Throwaway mm [in]	406 x 635 [16x25]	406 x 635 [16x25]	457 x 635 [18x25]	457 x 635 [18x25]	508 x 711 [20x28] or (2) 508 x 356 [(2)-20x14]	508 x 711 [20x28] or (2) 508 x 356 [(2)-20x14]	1-508 x 610 [20x24], 1-508 x 356 [20x14]	1-508 x 610 [20x24], 1-508 x 356 [20x14]
Weight - Operating kg [lbs.]	69 [153]	72 [158]	86 [189]	89 [197]	92 [203]	99 [218]	119 [263]	138 [303]
Weight - Packaged kg [lbs.]	72 [158]	74 [163]	88 [194]	92 [202]	95 [209]	102 [224]	123 [270]	141 [310]

Notes:
All units have grommet compressor mountings,TXV expansion device, and 1/2" & 3/4" electrical knockouts.

Unit Maximum Water Working Pressure	
Options	**Max Pressure PSIG [kPa]**
Base Unit	500 [3,445]

Use the lowest maximum pressure rating when multiple options are combined.

Unit Physical Data

Genesis Ultra (GS) Series

Model	015	018	024	030	036	042	048	060	070
Compressor (1 Each)	Rotary		Scroll						
Factory Charge R22 (oz) [kg]	44 [1.25]	44 [1.25]	48 [1.36]	48 [1.36]	60 [1.70]	74 [2.10]	74 [2.10]	102 [2.89]	104 [2.95]
PSC Fan Motor & Blower (3 Speeds)									
Fan Motor (hp) [W]	1/6 [124]	1/6 [124]	1/5 [150]	1/3 [250]	1/2 [373]	1/2 [373]	3/4 [560]	3/4 [560]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Water Connection Size									
IPT (in)	3/4	3/4	3/4	3/4	3/4	1	1	1	1
Coax Volume									
Volume (US Gallons) [liters]	0.56 [2.12]	0.56 [2.12]	0.76 [2.88]	0.76 [2.88]	0.92 [3.48]	0.92 [3.48]	0.92 [3.48]	1.56 [5.91]	1.56 [5.91]
Vertical Upflow									
Air Coil Dimensions (h x w) - (in) [mm]	20 x 20 [508 x 508]	20 x 20 [508 x 508]	24 x 20 [610 x 508]	24 x 20 [610 x 508]	28 x 20 [711 x 508]	28 x 25 [711 x 635]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	20 x 24 [508 x 610]	20 x 24 [508 x 610]	24 x 24 [610 x 610]	24 x 24 [610 x 610]	2 - 14 x 24 [356 x 610]	2 - 14 x 30 [356 x 762]	2 - 14 x 30 [356 x 762]	2 - 10 x 30, 1 - 12 x 30 [254 x 762], [305 x 762]	3 - 12 x 30 [305 x 762]
Weight - Operating, (lbs) [kg]	174 [79]	184 [84]	250 [114]	252 [115]	266 [121]	323 [147]	327 [149]	416 [189]	443 [201]
Weight - Packaged, (lbs) [kg]	184 [84]	194 [88]	260 [118]	262 [119]	276 [126]	333 [151]	337 [154]	426 [194]	453 [206]
Horizontal									
Air Coil Dimensions (h x w) - (in) [mm]	18 x 22 [457 x 559]	18 x 22 [457 x 559]	18 x 27 [457 x 686]	18 x 27 [457 x 686]	18 x 31 [457 x 787]	20 x 35 [508 x 889]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	18 x 24 [457 x 610]	18 x 24 [457 x 610]	2 - 18 x 18 [457 x 457]	2 - 18 x 18 [457 x 457]	2 - 18 x 18 [457 x 457]	1 - 12 x 20, 1 - 20 x 25 [305 x 508], [508 x 635]	1 - 12 x 20, 1 - 20 x 25 [305 x 508], [508 x 635]	1 - 18 x 20, 1 - 20 x 24 [457 x 508], [508 x 610]	2 - 24 x 20 [610 x 508]
Weight - Operating, (lbs) [kg]	179 [81]	189 [86]	250 [114]	252 [115]	266 [121]	323 [147]	327 [149]	416 [189]	443 [201]
Weight - Packaged, (lbs) [kg]	189 [86]	199 [91]	260 [118]	262 [119]	276 [126]	333 [151]	337 [154]	426 [194]	453 [206]

Genesis Standard (GR) Series

Model	006	009	012	015	019	024	030	036	042	048	060
Compressor (1 Each)	Rotary				Recipricating						Scroll
Factory Charge R22 (oz) [kg]	12 [.34]	15 [.43]	15 [.43]	30 [.85]	30 [.85]	30 [.85]	41 [1.16]	44 [1.25]	46 [1.30]	54 [1.53]	80 [2.26]
Factory Charge R407c (kg) 50Hz Only	0.34	0.37	0.37	0.68	0.88	0.91	1.19	1.36	1.19	1.59	2.41
PSC Fan Motor & Blower (3 Speeds)											
Fan Motor (hp) [W]	1/25 [30]	1/10 [75]	1/10 [75]	1/6 [124]	1/5 [150]	1/3 [250]	1/2 [373]	3/4 [560]	3/4 [560]	3/4 [560]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	5 x 5 [127 x 127]	5 x 5 [127 x 127]	6 x 5 [152 x 127]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	10 x 10 [254 x 254]	11 x 10 [279 x 254]
Water Connection Size											
IPT (in)	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1	1
Coax Volume											
Volume (US Gallons) [liters]	0.123 [0.47]	0.143 [0.54]	0.167 [0.63]	0.286 [1.08]	.45 [1.70]	.45 [1.70]	0.56 [2.12]	0.76 [2.88]	0.76 [2.88]	0.92 [3.48]	0.92 [3.48]
Vertical Upflow											
Air Coil Dimensions (h x w) - (in) [mm]	N/A	10 x 16 [254 x 406]	10 x 16 [254 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	20 x 20 [508 x 508]	20 x 20 [508 x 508]	28 x 20 [711 x 508]	28 x 20 [711 x 508]	28 x 25 [711 x 635]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	N/A	10 x 20 [254 x 508]	10 x 20 [254 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	20 x 24 [508 x 610]	20 x 24 [508 x 610]	28 x 24 [711 x 610]	28 x 24 [711 x 610]	28 x 30 [711 x 762]
Horizontal											
Air Coil Dimensions (h x w) - (in) [mm]	10 x 16 [254 x 406]	10 x 16 [254 x 406]	10 x 16 [254 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	16 x 16 [406 x 406]	18 x 22 [457 x 559]	18 x 22 [457 x 559]	18 x 31 [457 x 787]	18 x 31 [457 x 787]	20 x 35 [508 x 889]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	10 x 20 [254 x 508]	10 x 20 [254 x 508]	10 x 20 [254 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	16 x 20 [406 x 508]	18 x 24 [457 x 610]	18 x 24 [457 x 610]	(2) 18 x 18 [457 x 457]	(2) 18 x 18 [457 x 457]	1 - 12 x 20, 1 - 25 x 20 [305 x 508], [635 x 508]
Weight - Operating, (lbs) [kg]	110 [50]	112 [51]	121 [55]	147 [67]	169 [77]	193 [88]	219 [100]	229 [104]	257 [117]	267 [121]	323 [147]
Weight - Packaged, (lbs) [kg]	120 [55]	122 [56]	131 [60]	157 [72]	179 [82]	203 [93]	231 [105]	241 [110]	269 [124]	279 [127]	338 [254]

All units have spring or grommet compressor mountings, and 1/2" [12.2mm] & 3/4" [19.mm] electrical knockouts.

Unit Physical Data

Genesis Compact (GC) Series

Model	006	009	012	018	024	030	036	041	042	048	060
Compressor (1 Each)	Rotary			Reciprocating							Scroll
Factory Charge Vertical R22 (oz) [kg]	-	14 [.40]	14 [.40]	25 [.74]	38 [1.08]	37 [1.05]	42 [1.19]	50 [1.42]	51 [1.87]	66 [1.87]	74 [2.10]
Factory Charge Horizontal R22 (oz) [kg]	14 [.40]	14 [.40]	14 [.40]	25 [.74]	38 [1.08]	37 [1.05]	41 [1.16]	-	51 [1.87]	66 [1.87]	74 [2.10]
PSC Fan Motor & Blower (3 Speeds)											
Fan Motor (hp) [W]	1/25 [30]	1/10 [75]	1/10 [75]	1/6 [124]	1/4 [187]	3/4 [560]	1/2 [373]	3/4 [560]	3/4 [560]	3/4 [560]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	5 x 5 [127 x 127]	5 x 5 [127 x 127]	6 x 5 [152 x 127]	8 x 7 [208 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 8 [229 x 203]	9 x 8 [229 x 203]	9 x 8 [229 x 203]	10 x 10 [254 x 254]	11 x 10 [279 x 254]
Water Connection Size											
IPT (in)	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	1	1
Coax Volume											
Volume (US Gallons) [liters]	0.123 [0.47]	0.143 [0.54]	0.167 [0.63]	0.286 [1.08]	0.286 [1.08]	0.323 [1.22]	0.526 [1.99]	0.738 [2.79]	0.890 [3.37]	0.738 [2.79]	0.939 [3.55]
Vertical Upflow											
Air Coil Dimensions (h x w) - (in) [mm]	-	10 x 15 [254 x 381]	10 x 15 [254 x 381]	20 x 17.25 [508 x 438]	20 x 17.25 [508 x 438]	20 x 17.25 [508 x 438]	24 x 21.75 [610 x 552]	20 x 17.25 [508 x 438]	24 x 21.75 [610 x 552]	24 x 28.25 [610 x 718]	24 x 28.25 [610 x 718]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	-	10 x 18 [254 x 457]	10 x 18 [254 x 457]	20 x 20 [508 x 508]	20 x 20 [508 x 508]	20 x 20 [508 x 508]	24 x 24 [610 x 610]	20 x 20 [508 x 508]	24 x 24 [610 x 610]	1 - 14 x 24, 1 - 18 x 24 [356 x 610], [457 x 610]	1 - 14 x 24, 1 - 18 x 24 [356 x 610], [457 x 610]
Horizontal											
Air Coil Dimensions (h x w) - (in) [mm]	10 x 15 [254 x 381]	10 x 15 [254 x 381]	10 x 15 [254 x 381]	16 x 22 [406 x 559]	16 x 22 [406 x 559]	16 x 22 [406 x 559]	20 x 25 [508 x 635]	-	20 x 25 [508 x 635]	20 x 35 [508 x 889]	20 x 35 [508 x 889]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	10 x 18 [254 x 457]	10 x 18 [254 x 457]	10 x 18 [254 x 457]	16 x 25 [406 x 635]	16 x 25 [406 x 635]	16 x 25 [406 x 635]	20 x 28 or 2 - 20 x 14 [508 x 711] or [2 - 508 x 356]	-	20 x 28 or 2 - 20 x 14 [508 x 711] or [2 - 508 x 356]	1 - 20 x 24, 1 - 20 x 14 [508 x 610], [508 x 356]	1 - 20 x 24, 1 - 20 x 14 [508 x 610], [508 x 356]
Weight - Operating, (lbs) [kg]	103 [47]	105 [48]	114 [52]	181 [82]	189 [86]	197 [89]	203 [92]	207 [94]	218 [99]	263 [119]	278 [126]
Weight - Packaged, (lbs) [kg]	113 [51]	115 [52]	124 [56]	186 [84]	194 [88]	202 [92]	209 [95]	212 [96]	224 [102]	270 [122]	285 [129]

All units have grommet compressor mountings, and 1/2" [12.2mm] & 3/4" [19.mm] electrical knockouts.

Horizontal Installation

Horizontal Unit Location

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the ceiling. Horizontal units are typically installed above a false ceiling or in a ceiling plenum. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Consideration should be given to access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figure 3 for an illustration of a typical installation. Refer to unit submittal data or engineering design guide for dimensional data.

In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing (GC, GR, GS units only).

Conform to the following guidelines when selecting unit location:

1. Provide a hinged access door in concealed-spline or plaster ceilings. Provide removable ceiling tiles in T-bar or lay-in ceilings. Refer to horizontal unit dimensions for specific series and model in unit submittal data. Size the access opening to accommodate the service technician during the removal or replacement of the compressor and the removal or installation of the unit itself.
2. Provide access to hanger brackets, water valves and fittings. Provide screwdriver clearance to access panels, discharge collars and all electrical connections.
3. DO NOT obstruct the space beneath the unit with piping, electrical cables and other items that prohibit future removal of components or the unit itself.
4. Use a manual portable jack/lift to lift and support the weight of the unit during installation and servicing.

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

Mounting Horizontal Units

Horizontal units have hanger kits pre-installed from the factory as shown in figure 1. Figure 3 shows a typical horizontal unit installation.

Horizontal heat pumps are typically suspended above a ceiling or within a soffit using field supplied, threaded rods sized to support the weight of the unit.

Use four (4) field supplied threaded rods and factory provided vibration isolators to suspend the unit. Hang the unit clear of the floor slab above and support the unit by the mounting bracket assemblies only. DO NOT attach the unit flush with the floor slab above.

Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 2.5 tons/ 8.8kW) ensure that unit pitch does not cause condensate leaks inside the cabinet.

Figure 1: Hanger Bracket

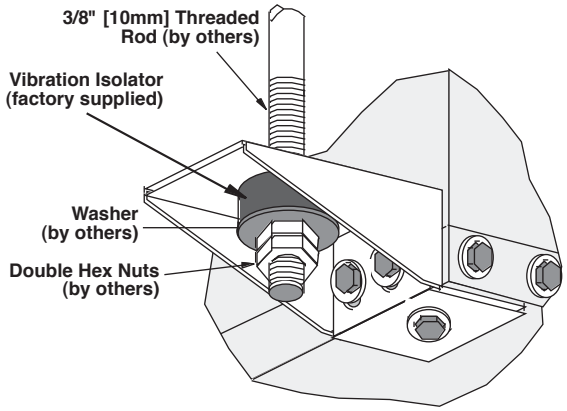
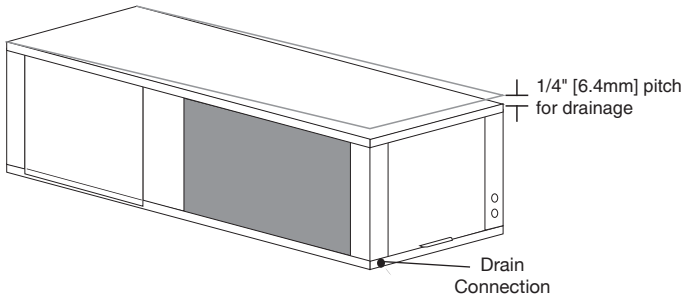
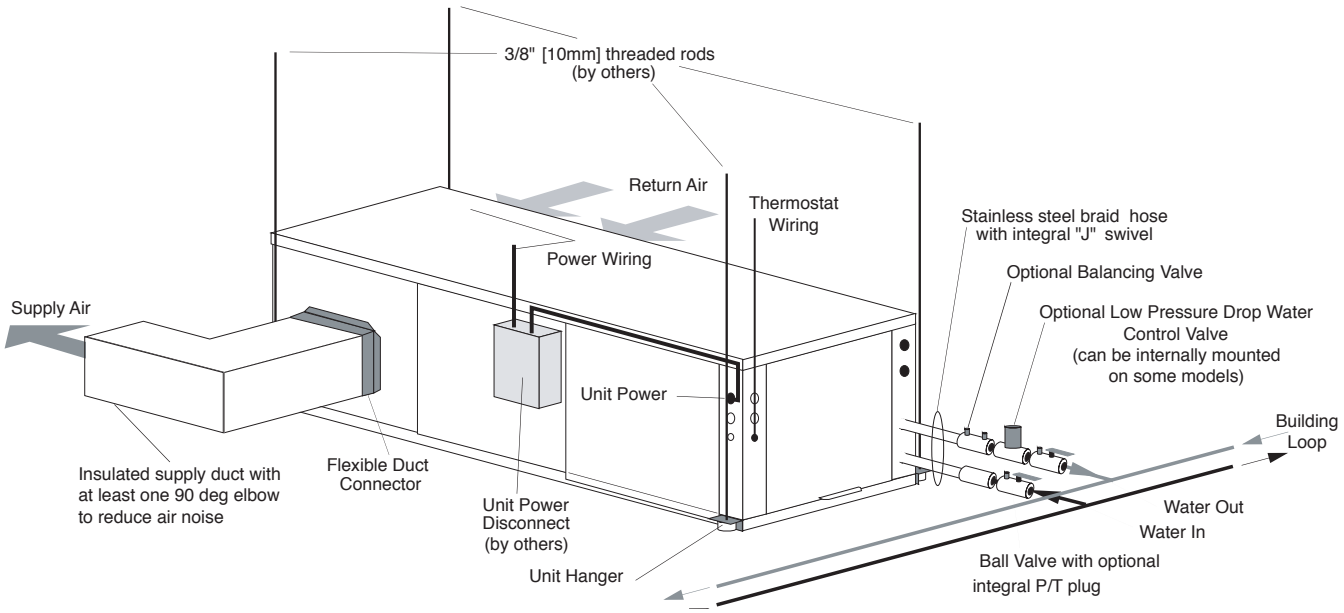


Figure 2: Horizontal Unit Pitch



Horizontal Installation

Figure 3: Typical Horizontal Unit Installation



Air Coil
To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended for both sides of the coil. A thorough water rinse should follow. **UV based anti-bacterial systems may damage e-coated air coils.**

NOTICE! Installation Note - Ducted Return: Many horizontal WSHPs are installed in a return air ceiling plenum application (above ceiling). Vertical WSHPs are commonly installed in a mechanical room with free return (e.g. louvered door). Therefore, filter rails are the industry standard and are included on ClimateMaster commercial heat pumps for the purposes of holding the filter only. For ducted return applications, the filter rail must be removed and replaced with a duct flange or filter rack. Canvas or flexible connectors should also be used to minimize vibration between the unit and ductwork.

Field Conversion of Air Discharge

Overview
Horizontal units can be field converted between side (straight) and back (end) discharge using the instructions below.

Note: It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes.

Preparation
It is best to field convert the unit on the ground before hanging. If the unit is already hung it should be taken down for the field conversion.

Side to Back Discharge Conversion
1. Place unit in well lit area. Remove the screws as shown in Figure 4 to free top panel and discharge panel.
2. Lift out the access panel and set aside. Lift and rotate the discharge panel to the other position as shown, being careful with the blower wiring.
3. Check blower wire routing and connections for tension or contact with sheet metal edges. Reroute if necessary.
4. Check refrigerant tubing for contact with other components.
5. Reinstall top panel and screws noting that the location for some screws will have changed.
6. Manually spin the fan wheel to insure that the wheel is not rubbing or obstructed.
7. Replace access panels.

Back to Side Discharge Conversion
If the discharge is changed from back to side, use above instruction noting that illustrations will be reversed.

Left vs. Right Return
It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes. However, the conversion process of side to back or back to side discharge for either right or left return configuration is the same. In some cases, it may be possible to rotate the entire unit 180 degrees if the return air connection needs to be on the opposite side. Note that rotating the unit will move the piping to the other end of the unit.

Figure 4: Left Return Side to Back

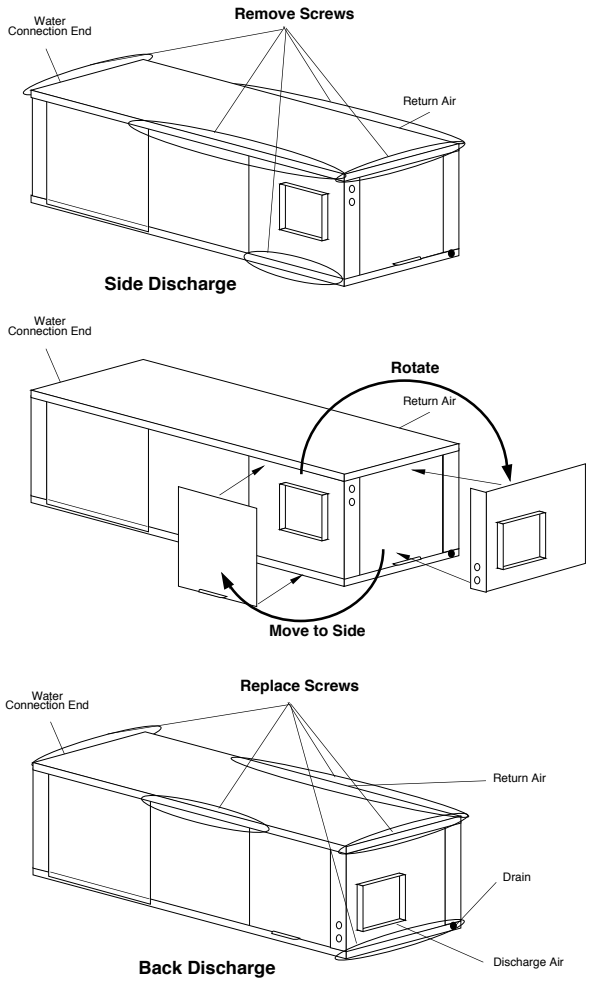
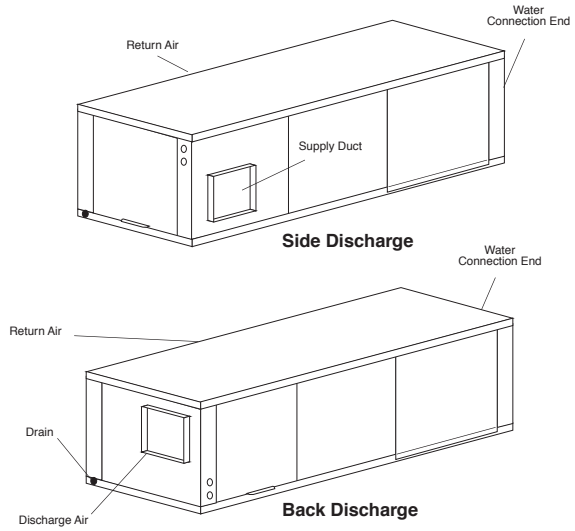


Figure 5: Right Return Side to Back



Horizontal Installation

Condensate Piping – Horizontal Units

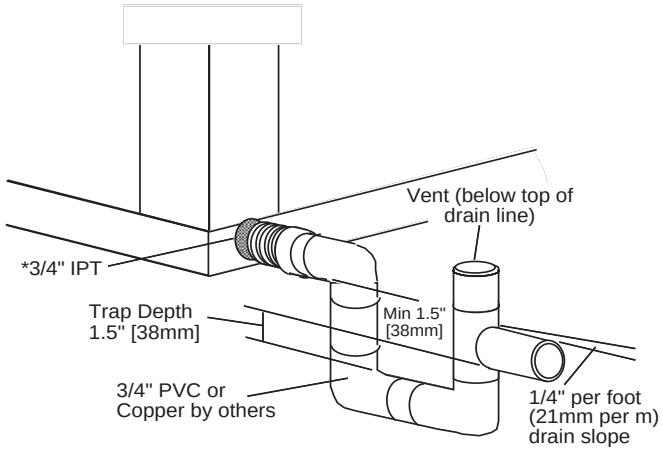
Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 2.5 tons/8.8 kW), insure that unit pitch does not cause condensate leaks inside the cabinet.

Install condensate trap at each unit with the top of the trap positioned below the unit condensate drain connection as shown in Figure 6. Design the depth of the trap (water-seal) based upon the amount of ESP capability of the blower (where 2 inches [51mm] of ESP capability requires 2 inches [51mm] of trap depth). As a general rule, 1-1/2 inch [38mm] trap depth is the minimum.

Each unit must be installed with its own individual trap and connection to the condensate line (main) or riser. Provide a means to flush or blow out the condensate line. DO NOT install units with a common trap and/or vent.

Always vent the condensate line when dirt or air can collect in the line or a long horizontal drain line is required. Also vent when large units are working against higher external static pressure than other units connected to the same condensate main since this may cause poor drainage for all units on the line. WHEN A VENT IS INSTALLED IN THE DRAIN LINE, IT MUST BE LOCATED AFTER THE TRAP IN THE DIRECTION OF THE CONDENSATE FLOW.

Figure 6: Horizontal Condensate Connection



* Some units include a painted drain connection. Using a threaded pipe or similar device to clear any excess paint accumulated inside this fitting may ease final drain line installation.

Rev.: 10/26/06D

⚠ CAUTION! ⚠

CAUTION! Ensure condensate line is pitched toward drain 1/4” per foot [21mm per m] of run.

Duct System Installation

Duct System Installation
Proper duct sizing and design is critical to te performance of the unit. The duct system should be designed to allow adequate and even airflow through the unit during operation. Air flow through the unit MUST be at or above the minimum stated airflow for the unit to avoid equipment damage. Duct systems should be designed for quiet operation. Refer to Figure 3 for horizontal duct system details or figure 8 for vertical duct system details. A flexible connector is recommended for both discharge and return air duct connections on metal duct systems to eliminate the transfer of vibration to the duct system. To maximize sound attenuation of the unit blower, the supply and return plenums should include internal fiberglass duct liner or be constructed from ductboard for the first few feet. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended, as the unit's performance will be adversely affected.

At least one 90° elbow should be included in the supply duct to reduce air noise. If air noise or excessive air flow is a problem, the blower speed can be changed. For airflow charts, consult submittal data for the series and model of the specific unit.

If the unit is connected to existing ductwork, a previous check should have been made to insure that the ductwork has the capacity to handle the airflow required for the unit. If ducting is too small, as in the replacement of a heating only system, larger ductwork should be installed. All existing ductwork should be checked for leaks and repaired as necessary.

Vertical Installation

Vertical Unit Location

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the mechanical room/closet. Vertical units are typically installed in a mechanical room or closet. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Consideration should be given to access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figures 7 and 8 for typical installation illustrations. Refer to unit submittal data or engineering design guide for dimensional data.

1. Install the unit on a piece of rubber, neoprene or other mounting pad material for sound isolation. The pad should be at least 3/8" [10mm] to 1/2" [13mm] in thickness. Extend the pad beyond all four edges of the unit.
2. Provide adequate clearance for filter replacement and drain pan cleaning. Do not block filter access with piping, conduit or other materials. Refer to unit submittal data or engineering design guide for dimensional data.
3. Provide access for fan and fan motor maintenance and for servicing the compressor and coils without removing the unit.
4. Provide an unobstructed path to the unit within the closet or mechanical room. Space should be sufficient to allow removal of the unit, if necessary.
5. In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing (GC, GR, GS units only).
6. Provide access to water valves and fittings and screwdriver access to the unit side panels, discharge collar and all electrical connections.

Figure 7: Vertical Unit Mounting

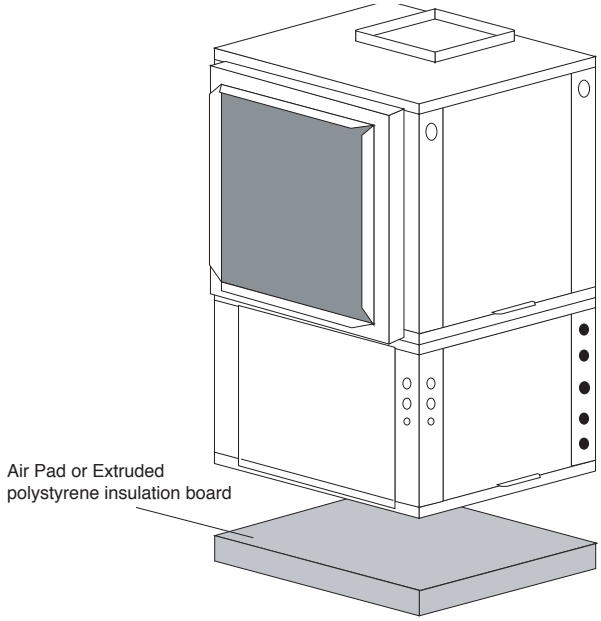
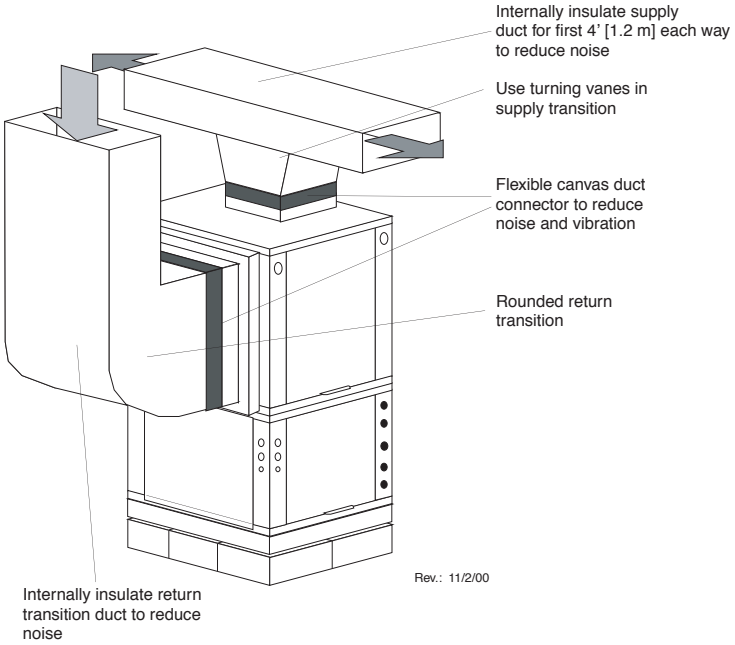


Figure 8: Typical Vertical Unit Installation Using Ducted Return Air

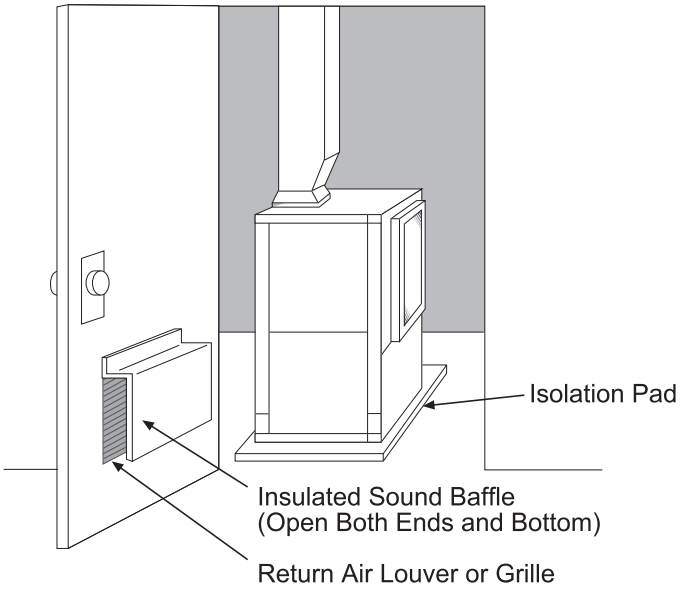


Vertical Installation

Sound Attenuation for Vertical Units
Sound attenuation is achieved by enclosing the unit within a small mechanical room or a closet. Additional measures for sound control include the following:

1. Mount the unit so that the return air inlet is 90° to the return air grille. Refer to Figure 9. Install a sound baffle as illustrated to reduce line-of sight sound transmitted through return air grilles.
2. Mount the unit on a rubber or neoprene isolation pad to minimize vibration transmission to the building structure.

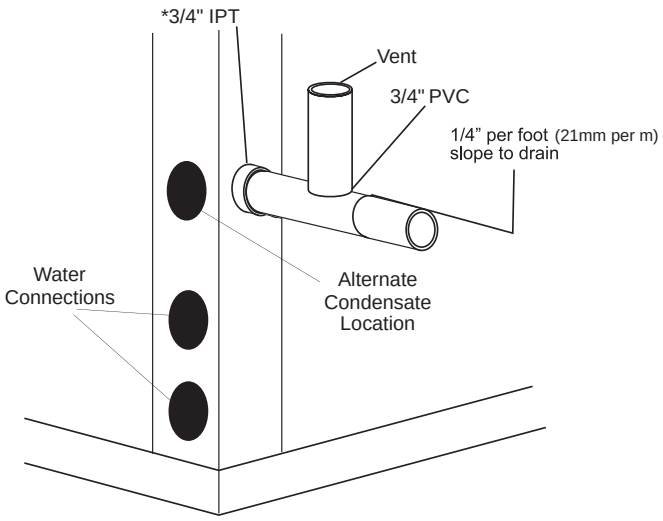
Figure 9: Vertical Sound Attenuation



NOTICE! Units with clear plastic drain lines should have regular maintenance (as required) to avoid buildup of debris, especially in new construction.

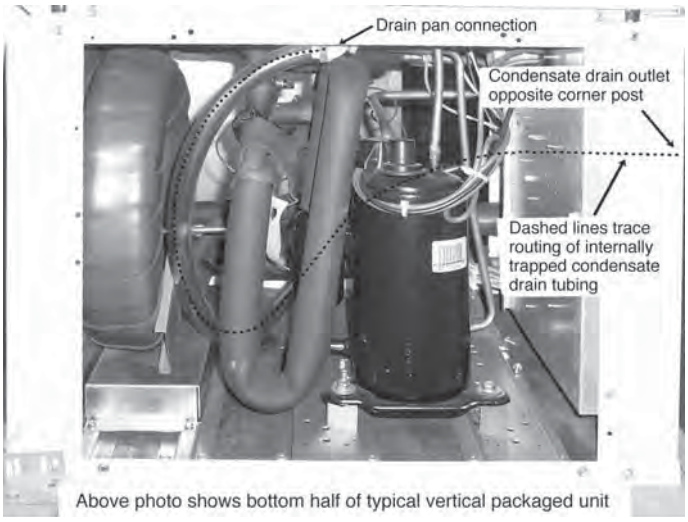
Condensate Piping – Vertical Units
Vertical units utilize a condensate hose inside the cabinet as a trapping loop; therefore an external trap is not necessary. Figure 10a shows typical condensate connections. Figure 10b illustrates the internal trap for a typical vertical heat pump. Each unit must be installed with its own individual vent (where necessary) and a means to flush or blow out the condensate drain line. Do not install units with a common trap and/or vent.

Figure 10a: Vertical Condensate Drain



* Some units include a painted drain connection. Using a threaded pipe or similar device to clear any excess paint accumulated inside this fitting may ease final drain line installation.

Figure 10b: Vertical Internal Condensate Trap



Above photo shows bottom half of typical vertical packaged unit

Piping Installation

Installation of Supply and Return Piping
Follow these piping guidelines.

1. Install a drain valve at the base of each supply and return riser to facilitate system flushing.
2. Install shut-off / balancing valves and unions at each unit to permit unit removal for servicing.
3. Place strainers at the inlet of each system circulating pump.
4. Select the proper hose length to allow slack between connection points. Hoses may vary in length by +2% to -4% under pressure.
5. Refer to Table 1. Do not exceed the minimum bend radius for the hose selected. Exceeding the minimum bend radius may cause the hose to collapse, which reduces water flow rate. Install an angle adapter to avoid sharp bends in the hose when the radius falls below the required minimum.

Insulation is not required on loop water piping except where the piping runs through unheated areas, outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient conditions. Insulation is required if loop water temperature drops below the dew point (insulation is required for ground loop applications in most climates).

Pipe joint compound is not necessary when Teflon® thread tape is pre-applied to hose assemblies or when flared-end connections are used. If pipe joint compound is preferred, use compound only in small amounts on the external pipe threads of the fitting adapters. Prevent sealant from reaching the flared surfaces of the joint.

Note: When anti-freeze is used in the loop, insure that it is compatible with the Teflon tape or pipe joint compound that is applied.

Maximum allowable torque for brass fittings is 30 ft-lbs [41 N-m]. If a torque wrench is not available, tighten finger-tight plus one quarter turn. Tighten steel fittings as necessary.

Optional pressure-rated hose assemblies designed specifically for use with ClimateMaster units are available. Similar hoses can be obtained from alternate suppliers. Supply and return hoses are fitted with swivel-joint fittings at one end to prevent kinking during installation.

Refer to Figure 11 for an illustration of a typical supply/return hose kit. Adapters secure hose assemblies to the unit and risers. Install hose assemblies properly and check regularly to avoid system failure and reduced service life.

A backup wrench is required when tightening water connections to prevent water line damage for GC series equipment. TT, TS, GS and GR series equipment have water connections secured to the corner post.

Installer Caution: After making water connections on units equipped with ClimaDry, ensure the three union nuts on the internal three-way water valve are tight.

ClimaDry-equipped units have a manual air bleed valve at the top of the reheat coil. This valve must be used to bleed the air from the reheat coil after filling the system, for the ClimaDry to operate properly.

⚠ CAUTION! ⚠

CAUTION! Corrosive system water requires corrosion resistant fittings and hoses, and may require water treatment.

⚠ CAUTION! ⚠

CAUTION! Do not bend or kink supply lines or hoses.

⚠ CAUTION! ⚠

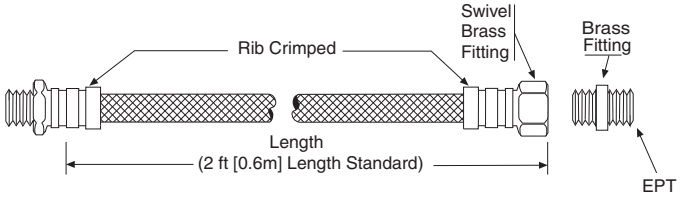
CAUTION! Piping must comply with all applicable codes.

Table 1: Metal Hose Minimum Bend Radii

Hose Diameter	Minimum Bend Radii
1/2" [12.7mm]	2-1/2" [6.4cm]
3/4" [19.1mm]	4" [10.2cm]
1" [25.4mm]	5-1/2" [14cm]
1-1/4" [31.8mm]	6-3/4" [17.1cm]

NOTICE! Do not allow hoses to rest against structural building components. Compressor vibration may be transmitted through the hoses to the structure, causing unnecessary noise complaints.

Figure 11: Supply/Return Hose Kit



Water-Loop Heat Pump Applications

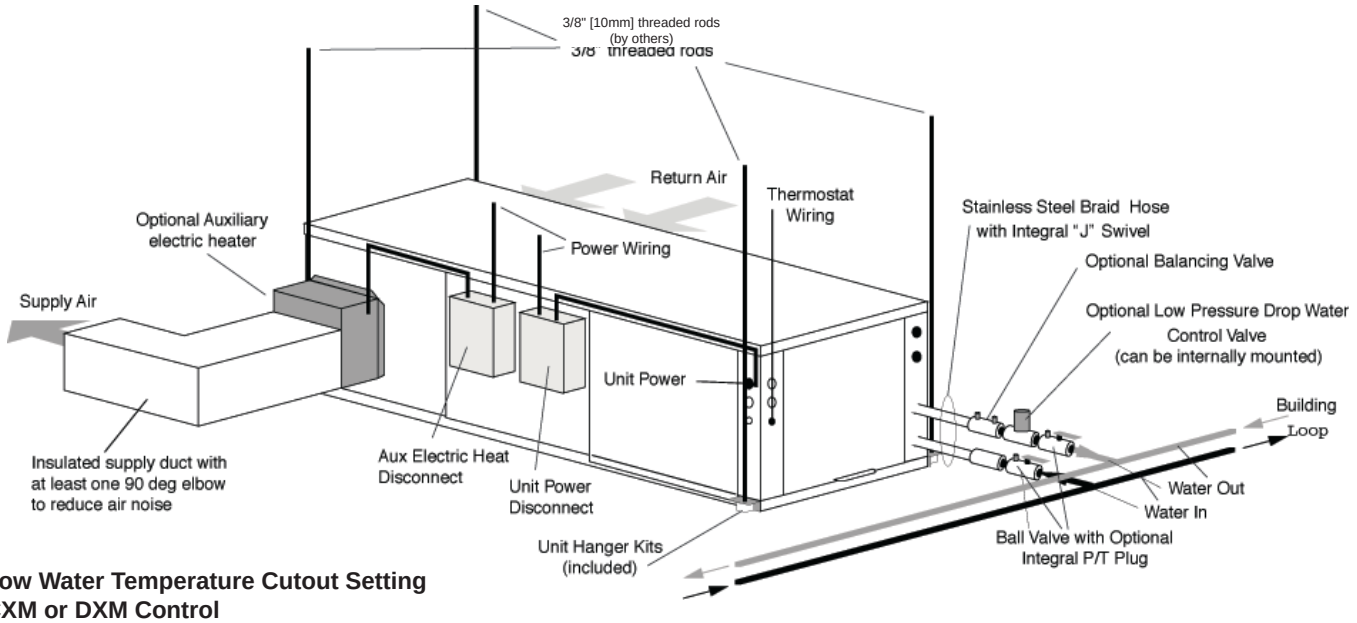
Commercial Water Loop Applications
Commercial systems typically include a number of units connected to a common piping system. Any unit plumbing maintenance work can introduce air into the piping system; therefore air elimination equipment is a major portion of the mechanical room plumbing. In piping systems expected to utilize water temperatures below 50°F [10°C], 1/2" (13mm) closed cell insulation is required on all piping surfaces to eliminate condensation (extended range units required). Metal to plastic threaded joints should never be used due to their tendency to leak over time. All commercial class units (except GC series) include low temperature-soldered bracket-supported IPT water connections, which do not require a backup wrench. A backup wrench must be used for GC series equipment fittings.

Teflon tape thread sealant is recommended to minimize internal fouling of the heat exchanger. Do not over tighten connections and route piping so as not to interfere with service or maintenance access. Hose kits are available from ClimateMaster in different configurations as shown in Figure 12 for connection between the unit and the piping system. Depending upon selection, hose kits may include shut off valves, P/T plugs for performance measurement, high pressure stainless steel braided hose, "Y" type strainer with blow down valve, and/or "J" type swivel connection. Balancing valves and an external low pressure drop solenoid valve for use in variable speed pumping systems may also be included in the hose kit.

The piping system should be flushed to remove dirt, piping chips, and other foreign material prior to operation (see "Piping System Cleaning and Flushing Procedures" in this manual). The flow rate is usually set between 2.25 and 3.5 gpm per ton [2.9 and 4.5 l/m per kW] of cooling capacity. ClimateMaster recommends 3 gpm per ton [3.9 l/m per kW] for most applications of water loop heat pumps. To insure proper maintenance and servicing, P/T ports are imperative for temperature and flow verification, as well as performance checks.

Water loop heat pump (cooling tower/boiler) systems typically utilize a common loop, maintained between 60 - 90°F [16 - 32°C]. The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

Figure 12: Typical Water-Loop Application



Low Water Temperature Cutout Setting
CXM or DXM Control
When antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (antifreeze 13°F [-10.6°C]) set point and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual). NOTE: Low water temperature operation requires extended range equipment.

Ground-Loop Heat Pump Applications

⚠ CAUTION! ⚠

CAUTION! The following instructions represent industry accepted installation practices for closed loop earth coupled heat pump systems. Instructions are provided to assist the contractor in installing trouble free ground loops. These instructions are recommendations only. State/provincial and local codes MUST be followed and installation MUST conform to ALL applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

⚠ CAUTION! ⚠

CAUTION! Ground loop applications require extended range equipment and optional refrigerant/water circuit insulation.

Pre-Installation

Prior to installation, locate and mark all existing underground utilities, piping, etc. Install loops for new construction before sidewalks, patios, driveways, and other construction has begun. During construction, accurately mark all ground loop piping on the plot plan as an aid in avoiding potential future damage to the installation.

Piping Installation

The typical closed loop ground source system is shown in Figure 13. All earth loop piping materials should be limited to polyethylene fusion only for in-ground sections of the loop. Galvanized or steel fittings should not be used at any time due to their tendency to corrode. All plastic to metal threaded fittings should be avoided due to their potential to leak in earth coupled applications. A flanged fitting should be substituted. P/T plugs should be used so that flow can be measured using the pressure drop of the unit heat exchanger.

Earth loop temperatures can range between 25 and 110°F [-4 to 43°C]. Flow rates between 2.25 and 3 gpm per ton [2.41 to 3.23 l/m per kW] of cooling capacity is recommended in these applications.

Test individual horizontal loop circuits before backfilling. Test vertical U-bends and pond loop assemblies prior to installation. Pressures of at least 100 psi [689 kPa] should be used when testing. Do not exceed the pipe pressure rating. Test entire system when all loops are assembled.

Flushing the Earth Loop

Upon completion of system installation and testing, flush the system to remove all foreign objects and purge to remove all air.

Antifreeze

In areas where minimum entering loop temperatures drop below 40°F [5°C] or where piping will be routed through areas subject to freezing, antifreeze is required. Alcohols and glycols are commonly used as antifreeze; however your local sales manager should be consulted for the antifreeze best suited to your area. Freeze protection should be maintained to 15°F [9°C] below the lowest expected entering loop temperature. For example, if 30°F [-1°C] is the minimum expected entering loop temperature, the leaving loop temperature would be 25 to 22°F [-4 to -6°C] and freeze protection should be at 15°F [-10°C]. Calculation is as follows:
30°F - 15°F = 15°F [-1°C - 9°C = -10°C].

All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under the water level to prevent fumes. Calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in table 2 for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Low Water Temperature Cutout Setting
CXM or DXM Control

When antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (antifreeze 13°F [-10.6°C]) set point and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual). NOTE: Low water temperature operation requires extended range equipment.

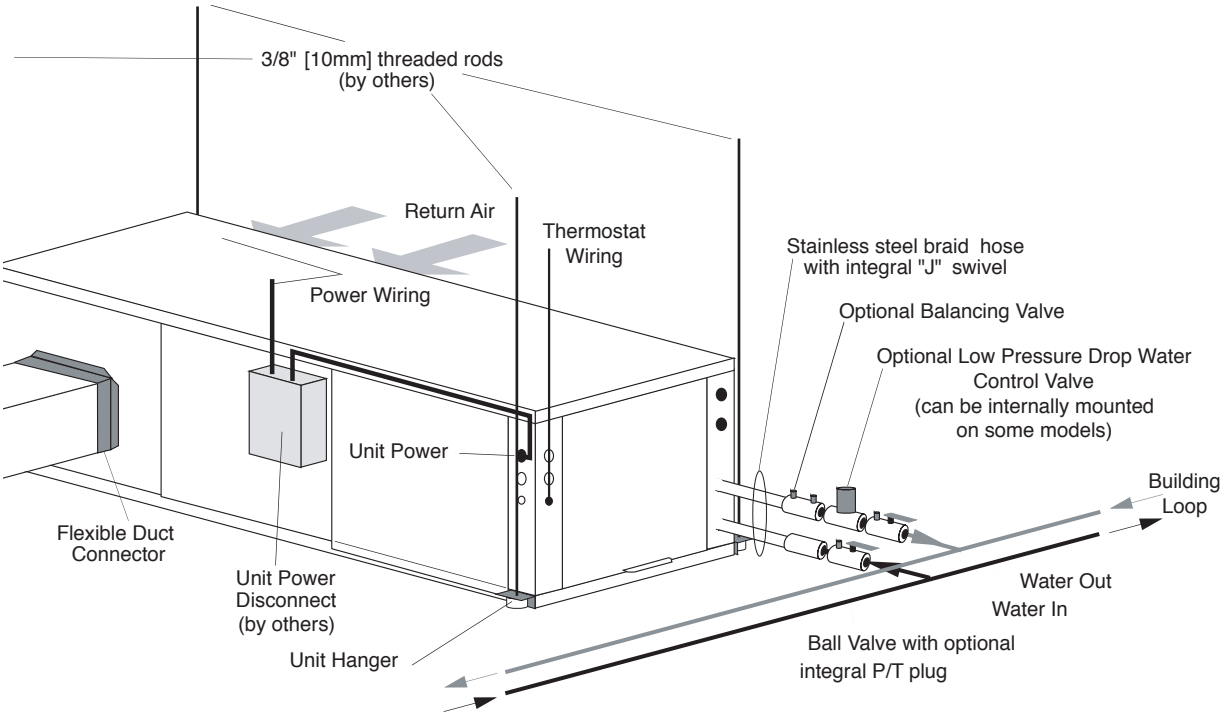
Table 2: Antifreeze Percentages by Volume

Type	Minimum Temperature for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	25%	21%	16%	10%
100% USP food grade Propylene Glycol	38%	25%	22%	15%
Ethanol*	29%	25%	20%	14%

* Must not be denatured with any petroleum based product

Ground-Loop Heat Pump Applications

Figure 13: Typical Ground-Loop Application



Ground-Water Heat Pump Applications

Open Loop - Ground Water Systems

Typical open loop piping is shown in Figure 14. Shut off valves should be included for ease of servicing. Boiler drains or other valves should be "tee'd" into the lines to allow acid flushing of the heat exchanger. Shut off valves should be positioned to allow flow through the coax via the boiler drains without allowing flow into the piping system. P/T plugs should be used so that pressure drop and temperature can be measured. Piping materials should be limited to copper or PVC SCH80. **Note: Due to the pressure and temperature extremes, PVC SCH40 is not recommended.**

Water quantity should be plentiful and of good quality. Consult table 3 for water quality guidelines. The unit can be ordered with either a copper or cupro-nickel water heat exchanger. Consult Table 3 for recommendations. Copper is recommended for closed loop systems and open loop ground water systems that are not high in mineral content or corrosiveness. In conditions anticipating heavy scale formation or in brackish water, a cupro-nickel heat exchanger is recommended. In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, an open loop system is not recommended. Heat exchanger coils may over time lose heat exchange capabilities due to build up of mineral deposits. Heat exchangers must only be serviced by a qualified technician, as acid and special pumping equipment is required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional acid flushing. In some cases, the desuperheater option should not be recommended due to hard water conditions and additional maintenance required.

Water Quality Standards

Table 3 should be consulted for water quality requirements. Scaling potential should be assessed using the pH/Calcium hardness method. If the pH <7.5 and the calcium hardness is less than 100 ppm, scaling potential is low. If this method yields numbers out of range of those listed, the Ryznar Stability and Langelier Saturation indecies should be calculated. Use the appropriate scaling surface temperature for the application, 150°F [66°C] for direct use (well water/open loop) and DHW (desuperheater); 90°F [32°F] for indirect use. A monitoring plan should be implemented in these probable scaling situations. Other water quality issues such as iron fouling, corrosion prevention and erosion and clogging should be referenced in Table 3.

Expansion Tank and Pump

Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. The expansion tank should be sized to provide at least one minute continuous run time of the pump using its drawdown capacity rating to prevent pump short cycling. Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local building codes (e.g. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

Water Control Valve

Note the placement of the water control valve in Figure 14. Always maintain water pressure in the heat exchanger by placing the water control valve(s) on the discharge line to prevent mineral precipitation during the off-cycle. Pilot operated slow closing valves are recommended to reduce water hammer. If water hammer persists, a mini-expansion tank can be mounted on the piping to help absorb the excess hammer shock. Insure that the total 'VA' draw of the valve can be supplied by the unit transformer. For instance, a slow closing valve can draw up to 35VA. This can overload smaller 40 or 50 VA transformers depending on the other controls in the circuit. A typical pilot operated solenoid valve draws approximately 15VA (see Figure 21). Note the special wiring diagrams for slow closing valves (Figures 22 & 23).

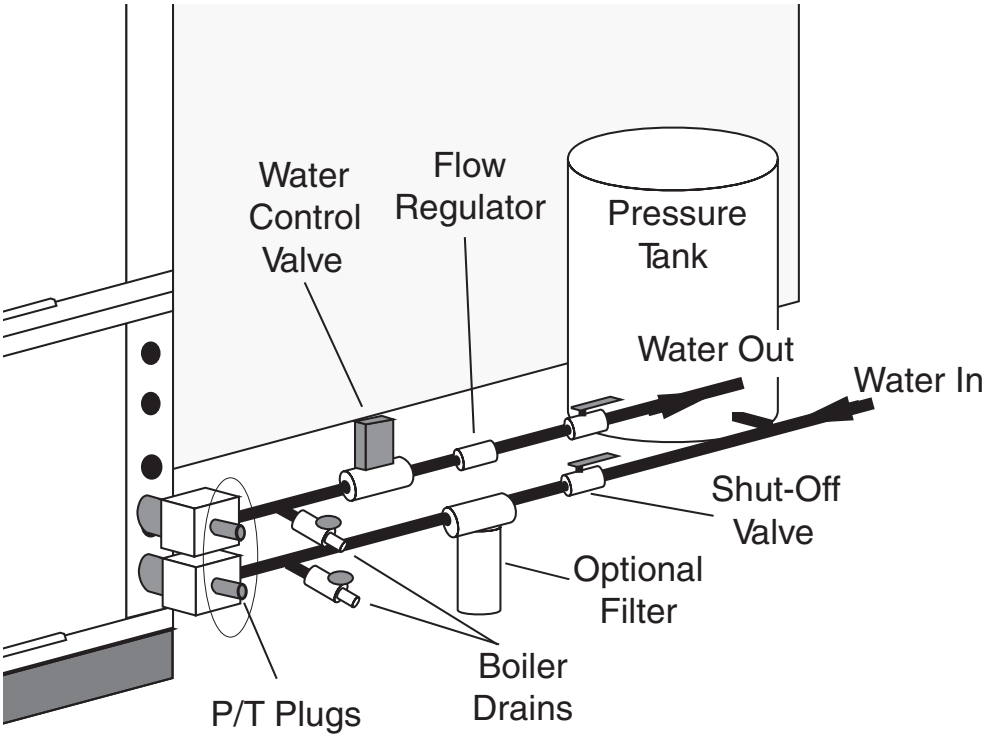
Flow Regulation

Flow regulation can be accomplished by two methods. One method of flow regulation involves simply adjusting the ball valve or water control valve on the discharge line. Measure the pressure drop through the unit heat exchanger, and determine flow rate from Tables 8a through 8e. Since the pressure is constantly varying, two pressure gauges may be needed. Adjust the valve until the desired flow of 1.5 to 2 gpm per ton [2.0 to 2.6 l/m per kW] is achieved. A second method of flow control requires a flow control device mounted on the outlet of the water control valve. The device is typically a brass fitting with an orifice of rubber or plastic material that is designed to allow a specified flow rate. On occasion, flow control devices may produce velocity noise that can be reduced by applying some back pressure from the ball valve located on the discharge line. Slightly closing the valve will spread the pressure drop over both devices, lessening the velocity noise. **NOTE: When EWT is below 50°F [10°C], 2 gpm per ton (2.6 l/m per kW) is required.**

Ground-Water Heat Pump Applications

Water Coil Low Temperature Limit Setting
For all open loop systems the 30°F [-1.1°C] FP1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See “Low Water Temperature Cutout Selection” in this manual for details on the low limit setting.

Figure 14: Typical Open Loop/Well Application



Water Quality Standards

Table 3: Water Quality Standards

Water Quality Parameter	HX Material	Closed Recirculating	Open Loop and Recirculating Well		
Scaling Potential - Primary Measurement					
Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below					
pH/Calcium Hardness Method	All	-	**pH < 7.5 and Ca Hardness <100ppm**		
Index Limits for Probable Scaling Situations - (Operation outside these limits is not recommended)					
Scaling indexes should be calculated at 150°F [66°C] for direct use and HWG applications, and at 90°F [32°C] for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	-	**6.0 - 7.5** If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	-	**-0.5 to +0.5** If <-0.5 minimize steel pipe use. Based upon 150°F [66°C] HWG and Direct well, 85°F [29°C] Indirect Well HX		
Iron Fouling					
Iron Fe $^{2+}$ (Ferrous) (Bacterial Iron potential)	All	-	**<0.2 ppm (Ferrous)** If Fe^{2+} (ferrous)>0.2 ppm with pH 6 - 8, O2<5 ppm check for iron bacteria		
Iron Fouling	All	-	**<0.5 ppm of Oxygen** Above this level deposition will occur.		
Corrosion Prevention					
pH	All	**6 - 8.5** Monitor/treat as needed	**6 - 8.5** Minimize steel pipe below 7 and no open tanks with pH <8		
Hydrogen Sulfide (H_2S)	All	-	**<0.5 ppm** At H_2S>0.2 ppm, avoid use of copper and copper nickel piping or HX's. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are OK to <0.5 ppm.		
Ammonia ion as hydroxide, chloride, nitrate and sulfate compounds	All	-	**<0.5 ppm**		
Maximum Chloride Levels			Maximum Allowable at maximum water temperature.		
			50°F (10°C)	75°F (24°C)	100\F (38\C)
	Copper	-	<20ppm	NR	NR
	CuproNickel	-	<150 ppm	NR	NR
	304 SS	-	<400 ppm	<250 ppm	<150 ppm
	316 SS	-	<1000 ppm	<550 ppm	< 375 ppm
	Titanium	-	>1000 ppm	>550 ppm	>375 ppm
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps [1.8 m/s] Filtered for maximum 800 micron [800mm, 20 mesh] size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particlesand a maximum velocity of 6 fps [1.8 m/s]. Filtered for maximum 800 micron [800mm, 20 mesh] size.Any particulate that is not removed can potentially clog components.		

Rev.: 01/21/09B

Notes:
- Closed Recirculating system is identified by a closed pressurized piping system.
- Recirculating open wells should observe the open recirculating design considerations.
- NR - Application not recommended.
- "-" No design Maximum.

Electrical - Line Voltage

Electrical - Line Voltage

All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

General Line Voltage Wiring

Be sure the available power is the same voltage and phase shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

Transformer

All commercial dual voltage units are factory wired for 208/60/1 or 240/50/1. If supply voltage is 230/60/1 or 220/50/1, installer must rewire transformer. See wire diagram for connections.

⚠ WARNING! ⚠

WARNING! To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ CAUTION! ⚠

CAUTION! Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

Electrical - Line Voltage

Table 4a: Tranquility 27™ (TT) Series Electrical Data (Standard Units)

All TT Units								Standard TT Units		
Model	Voltage Code	Voltage	Min/Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA				
TTH/V/D 026	G	208-230/60/1	197/254	1	10.3	52.0	4.3	14.6	17.2	25
TTH/V/D 038	G	208-230/60/1	197/254	1	16.7	82.0	4.3	21.0	25.2	40
	H	208-230/60/3	197/254	1	11.2	58.0	4.3	15.5	18.3	25
	F*	460/60/3*	414/506	1	4.5	29.0	4.1	8.6	9.7	15
TTH/V/D 049	G	208-230/60/1	197/254	1	21.2	96.0	7.0	28.2	33.5	50
	H	208-230/60/3	197/254	1	13.5	88.0	7.0	20.5	23.9	35
	F*	460/60/3*	414/506	1	6.4	41.0	6.9	13.3	14.9	20
TTH/V/D 064	G	208-230/60/1	197/254	1	25.6	118.0	7.0	32.6	39.0	60
	H	208-230/60/3	197/254	1	17.6	123.0	7.0	24.6	29.0	45
	F*	460/60/3*	414/506	1	9.0	62.0	6.9	15.9	18.2	25
TTH/V/D 072	G	208-230/60/1	197/254	1	27.2	150.0	7.0	34.2	41.0	60

HACR circuit breaker in USA only
Wire length based on one way measurement with 2% voltage drop
Wire size based on 60°C copper conductor
All fuses Class RK-5

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ECM motors require a four wire power supply with neutral. ECM motor is rated 265 vac and is wired between one hot leg and neutral.**

Table 4b: Tranquility 27™ (TT) Series Electrical Data Units with Secondary Pump or ClimaDry Reheat

All TT Units				TT Units with ClimaDry				TT Units with Secondary Pump			
Model	Voltage Code	Voltage	Min/Max Voltage	Reheat Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/HACR	Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
TTH/V/D 026	G	208-230/60/1	197/254	0.8	15.4	18.0	25	0.43	15.0	17.6	25
TTH/V/D 038	G	208-230/60/1	197/254	0.8	21.8	26.0	40	0.8	21.8	26.0	40
	H	208-230/60/3	197/254	0.8	16.3	19.1	30	0.8	16.3	19.1	30
	F*	460/60/3*	414/506	0.7	9.3	10.4	15	0.7	9.3	10.4	15
TTH/V/D 049	G	208-230/60/1	197/254	1.07	29.3	34.6	50	0.8	29.0	34.3	50
	H	208-230/60/3	197/254	1.07	21.6	24.9	35	0.8	21.3	24.7	35
	F*	460/60/3*	414/506	1.07	14.4	16.0	20	0.7	14.0	15.6	20
TTH/V/D 064	G	208-230/60/1	197/254	1.07	33.7	40.1	60	1.07	33.7	40.1	60
	H	208-230/60/3	197/254	1.07	25.7	30.1	45	1.07	25.7	30.1	45
	F*	460/60/3*	414/506	1.07	17.7	19.2	25	1.07	17.0	19.2	25
TTH/V/D 072	G	208-230/60/1	197/254	1.07	35.3	42.1	60	1.07	35.3	42.1	60

HACR circuit breaker in USA only
Wire length based on one way measurement with 2% voltage drop
Wire size based on 60°C copper conductor
All fuses Class RK-5

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ECM motors/ClimaDry/internal secondary circulators require a four wire power supply with neutral. ECM motors/reheat pumps/internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4c: Tranquility 20™ (TS) Series Electrical Data - (PSC Motor & ClimaDry)

All TS Units with Standard PSC Motor								TS Units (PSC)			TS Units with PSC Fan Motor and ClimaDry			
Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	1.0	10.0	12.3	20	0.8	10.8	13.1	20
	E	265/60/1	239/292	1	8.4	40.0	0.9	9.3	11.4	15	0.7	10.0	12.1	20
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	1.1	13.9	17.1	25	0.8	14.7	17.9	30
	E	265/60/1	239/292	1	10.9	58.0	0.9	11.8	14.5	25	0.7	12.5	15.2	25
	H	208-230/60/3	197/254	1	8.0	55.0	1.1	9.1	11.1	15	0.8	9.9	11.9	15
	F*	460/60/3*	414/506	1	4.0	22.4	0.6	4.6	5.6	15	0.7	5.3	6.3	15
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	1.4	14.9	18.3	30	0.8	15.7	19.1	30
	E	265/60/1	239/292	1	10.9	58.0	1.6	12.5	15.2	25	0.7	13.2	15.9	25
	H	208-230/60/3	197/254	1	8.3	63.0	1.4	9.7	11.8	20	0.8	10.5	12.6	20
	F*	460/60/3*	414/506	1	4.5	27.0	0.9	5.4	6.5	15	0.7	6.1	7.2	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	2.1	16.8	20.5	35	0.8	17.6	21.3	35
	E	265/60/1	239/292	1	12.5	61.0	2.2	14.7	17.8	30	0.7	15.4	18.5	30
	H	208-230/60/3	197/254	1	10.4	63.0	2.1	12.5	15.1	25	0.8	13.3	15.9	25
	F*	460/60/3*	414/506	1	4.5	32.0	1.3	5.8	6.9	15	0.7	6.5	7.6	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	2.1	17.5	21.4	35	0.8	18.3	22.2	35
	H	208-230/60/3	197/254	1	11.5	77.0	2.1	13.6	16.5	25	0.8	14.4	17.3	25
	F*	460/60/3*	414/506	1	5.1	35.0	1.0	6.1	7.4	15	0.7	6.8	8.1	15
	N	575/60/3	518/633	1	4.3	31.0	0.8	5.1	6.2	15	N/A	N/A	N/A	N/A
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	3.0	23.5	28.6	45	1.07	24.6	29.7	50
	H	208-230/60/3	197/254	1	14.6	91.0	3.0	17.6	21.3	35	1.07	18.7	22.3	35
	F*	460/60/3*	414/506	1	7.1	46.0	1.7	8.8	10.6	15	1.07	9.9	11.6	15
	N	575/60/3	518/633	1	5.1	34.1	1.4	6.5	7.8	15	N/A	N/A	N/A	N/A
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	4.9	31.8	38.5	60	1.07	32.9	39.6	60
	H	208-230/60/3	197/254	1	17.6	123.0	4.9	22.5	26.9	40	1.07	23.6	28.0	45
	F*	460/60/3*	414/506	1	9.6	64.0	2.5	12.1	14.5	20	1.07	13.2	15.6	25
	N	575/60/3	518/633	1	6.1	40.0	1.9	8.0	9.5	15	N/A	N/A	N/A	N/A
TSH/V/D 070	G	208-230/60/1	197/254	1	30.1	158.0	5.8	35.9	43.4	70	1.07	37.0	44.5	70
	H	208-230/60/3	197/254	1	20.5	155.0	5.8	26.3	31.4	50	1.07	27.4	32.5	50
	F*	460/60/3*	414/506	1	9.6	75.0	2.6	12.2	14.6	20	1.07	13.3	15.7	25
	N	575/60/3	518/633	1	7.6	54.0	2.3	9.9	11.8	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry require a four wire power supply with neutral. Reheat pump is rated 265 vac and is wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4d: Tranquility 20™ (TS) Series Electrical Data - (PSC High Static Motor & ClimaDry)

All TS Units with High Static PSC Fan Motor								TS (H.S. PSC) Units			TS Units with H.S. PSC Fan Motor and ClimaDry			
Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	1.1	10.1	12.4	20	0.8	10.9	13.2	20
	E	265/60/1	239/292	1	8.4	40.0	0.9	9.3	11.4	15	0.7	10.0	12.1	20
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	1.4	14.2	17.4	30	0.8	15.0	18.2	30
	E	265/60/1	239/292	1	10.9	58.0	1.6	12.5	15.2	25	0.7	13.2	15.9	25
	H	208-230/60/3	197/254	1	8.0	55.0	1.4	9.4	11.4	15	0.8	10.2	12.2	20
	F*	460/60/3*	414/506	1	4.0	22.4	0.9	4.9	5.9	15	0.7	5.6	6.6	15
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	1.8	15.3	18.7	30	0.8	16.1	19.5	30
	E	265/60/1	239/292	1	10.9	58.0	2.0	12.9	15.6	25	0.7	13.6	16.3	25
	H	208-230/60/3	197/254	1	8.3	63.0	1.8	10.1	12.2	20	0.8	10.9	13.0	20
	F*	460/60/3*	414/506	1	4.5	27.0	1.24	5.7	6.9	15	0.7	6.4	7.6	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	2.0	16.7	20.4	35	0.8	17.5	21.2	35
	E	265/60/1	239/292	1	12.5	61.0	1.66	14.2	17.3	25	0.7	14.9	18.0	30
	H	208-230/60/3	197/254	1	10.4	63.0	2.0	12.4	15.0	25	0.8	13.2	15.8	25
	F*	460/60/3*	414/506	1	4.5	32.0	1.0	5.5	6.6	15	0.7	6.2	7.3	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	3.0	18.4	22.3	35	0.8	19.2	23.1	35
	H	208-230/60/3	197/254	1	11.5	77.0	3.0	14.5	17.4	25	0.8	15.3	18.2	25
	F*	460/60/3*	414/506	1	5.1	35.0	1.7	6.8	8.1	15	0.7	7.5	8.8	15
	N	575/60/3	518/633	1	4.3	31.0	1.4	5.7	6.8	15	N/A	N/A	N/A	N/A
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	3.4	23.9	29.0	45	1.07	25.0	30.1	50
	H	208-230/60/3	197/254	1	14.6	91.0	3.4	18.0	21.7	35	1.07	19.1	22.7	35
	F*	460/60/3*	414/506	1	7.1	46.0	1.8	8.9	10.7	15	1.07	10.0	11.7	15
	N	575/60/3	518/633	1	5.1	34.1	1.4	6.5	7.8	15	N/A	N/A	N/A	N/A
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	5.8	32.7	39.4	60	1.07	33.8	40.5	60
	H	208-230/60/3	197/254	1	17.6	123.0	5.8	23.4	27.8	45	1.07	24.5	28.9	45
	F*	460/60/3*	414/506	1	9.6	64.0	2.6	12.2	14.6	20	1.07	13.3	15.7	25
	N	575/60/3	518/633	1	6.1	40.0	2.3	8.4	9.9	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry require a four wire power supply with neutral. Reheat pump is rated 265 vac and is wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4e: Tranquility 20™ (TS) Series Electrical Data - (ECM Motor & ClimaDry)

All TS Units with ECM Fan Motor								TS Units (ECM)			TS Units with ECM Fan Motor and ClimaDry			
Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	4.3	13.3	15.6	20	0.8	14.1	16.4	25
	E	265/60/1	239/292	1	8.4	40.0	4.1	12.5	14.6	20	0.7	13.2	15.3	20
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	4.3	17.1	20.3	30	0.8	17.9	21.1	30
	E	265/60/1	239/292	1	10.9	58.0	4.1	15.0	17.7	25	0.7	15.7	18.4	25
	H	208-230/60/3	197/254	1	8.0	55.0	4.3	12.3	14.3	20	0.8	13.1	15.1	20
	F*	460/60/3*	414/506	1	4.0	22.4	4.1	8.1	9.1	15	0.7	8.8	9.8	15
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	4.3	17.8	21.2	30	0.8	18.6	22.0	35
	E	265/60/1	239/292	1	10.9	58.0	4.1	15.0	17.7	25	0.7	15.7	18.4	25
	H	208-230/60/3	197/254	1	8.3	63.0	4.3	12.6	14.7	20	0.8	13.4	15.5	20
	F*	460/60/3*	414/506	1	4.5	27.0	4.1	8.6	9.7	15	0.7	9.3	10.4	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	4.3	19.0	22.7	35	0.8	19.8	23.5	35
	E	265/60/1	239/292	1	12.5	61.0	4.1	16.6	19.7	30	0.7	17.3	20.4	30
	H	208-230/60/3	197/254	1	10.4	63.0	4.3	14.7	17.3	25	0.8	15.5	18.1	25
	F*	460/60/3*	414/506	1	4.5	32.0	4.1	8.6	9.7	15	0.7	9.3	10.4	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	4.3	19.7	23.6	35	0.8	20.5	24.4	35
	H	208-230/60/3	197/254	1	11.5	77.0	4.3	15.8	18.7	30	0.8	16.6	19.5	30
	F*	460/60/3*	414/506	1	5.1	35.0	4.1	9.2	10.5	15	0.7	9.9	11.2	15
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	7.0	27.5	32.6	50	1.07	28.6	33.7	50
	H	208-230/60/3	197/254	1	14.6	91.0	7.0	21.6	25.3	35	1.07	22.7	26.3	40
	F*	460/60/3*	414/506	1	7.1	46.0	6.9	14.0	15.8	20	1.07	15.1	16.8	20
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	7.0	33.9	40.6	60	1.07	35.0	41.7	60
	H	208-230/60/3	197/254	1	17.6	123.0	7.0	24.6	29.0	45	1.07	25.7	30.1	45
	F*	460/60/3*	414/506	1	9.6	64.0	6.9	16.5	18.9	25	1.07	17.6	20.0	25
TSH/V/D 070	G	208-230/60/1	197/254	1	30.1	158.0	7.0	37.1	44.6	70	1.07	38.2	45.7	70
	H	208-230/60/3	197/254	1	20.5	155.0	7.0	27.5	32.6	50	1.07	28.6	33.7	50
	F*	460/60/3*	414/506	1	9.6	75.0	6.9	16.5	18.9	25	1.07	17.6	20.0	25

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ECM motors/ClimaDry require a four wire power supply with neutral. ECM motors/reheat pumps are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4f: Tranquility 20™ (TS) Series Electrical Data - (PSC Motor & Secondary Pump)

All TS Units with Standard PSC Motor								TS Units (PSC)			TS Units with PSC Fan Motor and Secondary Pump			
Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V 006	G	208-230/60/1	197/254	1	3.1	17.7	0.4	3.5	4.3	15	0.43	3.9	4.7	15
TSH/V 009	G	208-230/60/1	197/254	1	3.9	21.0	0.4	4.3	5.3	15	0.43	4.8	5.7	15
	E	265/60/1	239/292	1	3.7	22.0	0.4	4.1	5.0	15	N/A	N/A	N/A	N/A
TSH/V 012	G	208-230/60/1	197/254	1	5.0	25.0	0.7	5.7	7.0	15	0.43	6.1	7.4	15
	E	265/60/1	239/292	1	4.5	22.0	0.7	5.2	6.4	15	N/A	N/A	N/A	N/A
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	1.0	10.0	12.3	20	0.43	10.4	12.7	20
	E	265/60/1	239/292	1	8.4	40.0	0.9	9.3	11.4	15	N/A	N/A	N/A	N/A
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	1.1	13.9	17.1	25	0.43	14.3	17.5	30
	E	265/60/1	239/292	1	10.9	58.0	0.9	11.8	14.5	25	0.7	12.5	15.2	25
	H	208-230/60/3	197/254	1	8.0	55.0	1.1	9.1	11.1	15	0.43	9.5	11.5	15
	F*	460/60/3*	414/506	1	4.0	22.4	0.6	4.6	5.6	15	N/A	N/A	N/A	N/A
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	1.4	14.9	18.3	30	0.8	15.7	19.1	30
	E	265/60/1	239/292	1	10.9	58.0	1.6	12.5	15.2	25	0.7	13.2	15.9	25
	H	208-230/60/3	197/254	1	8.3	63.0	1.4	9.7	11.8	20	0.8	10.5	12.6	20
	F*	460/60/3*	414/506	1	4.5	27.0	0.9	5.4	6.5	15	0.7	6.1	7.2	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	2.1	16.8	20.5	35	0.8	17.6	21.3	35
	E	265/60/1	239/292	1	12.5	61.0	2.2	14.7	17.8	30	0.7	15.4	18.5	30
	H	208-230/60/3	197/254	1	10.4	63.0	2.1	12.5	15.1	25	0.8	13.3	15.9	25
	F*	460/60/3*	414/506	1	4.5	32.0	1.3	5.8	6.9	15	0.7	6.5	7.6	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	2.1	17.5	21.4	35	0.8	18.3	22.2	35
	H	208-230/60/3	197/254	1	11.5	77.0	2.1	13.6	16.5	25	0.8	14.4	17.3	25
	F*	460/60/3*	414/506	1	5.1	35.0	1.0	6.1	7.4	15	0.7	6.8	8.1	15
	N	575/60/3	518/633	1	4.3	31.0	0.8	5.1	6.2	15	N/A	N/A	N/A	N/A
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	3.0	23.5	28.6	45	0.8	24.3	29.4	45
	H	208-230/60/3	197/254	1	14.6	91.0	3.0	17.6	21.3	35	0.8	18.4	22.1	35
	F*	460/60/3*	414/506	1	7.1	46.0	1.7	8.8	10.6	15	0.7	9.5	11.3	15
	N	575/60/3	518/633	1	5.1	34.1	1.4	6.5	7.8	15	N/A	N/A	N/A	N/A
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	4.9	31.8	38.5	60	1.07	32.9	39.6	60
	H	208-230/60/3	197/254	1	17.6	123.0	4.9	22.5	26.9	40	1.07	23.6	28.0	45
	F*	460/60/3*	414/506	1	9.6	64.0	2.5	12.1	14.5	20	1.07	13.2	15.6	25
	N	575/60/3	518/633	1	6.1	40.0	1.9	8.0	9.5	15	N/A	N/A	N/A	N/A
TSH/V/D 070	G	208-230/60/1	197/254	1	30.1	158.0	5.8	35.9	43.4	70	1.07	37.0	44.5	70
	H	208-230/60/3	197/254	1	20.5	155.0	5.8	26.3	31.4	50	1.07	27.4	32.5	50
	F*	460/60/3*	414/506	1	9.6	75.0	2.6	12.2	14.6	20	1.07	13.3	15.7	25
	N	575/60/3	518/633	1	7.6	54.0	2.3	9.9	11.8	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with internal secondary circulators require a four wire power supply with neutral. Internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4g: Tranquility 20™ (TS) Series Electrical Data - (PSC High Static Motor & Secondary Pump)

All TS Units with High Static PSC Fan Motor								TS (H.S. PSC) Units			TS Units with H.S. PSC Fan Motor and Secondary Pump			
Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	1.1	10.1	12.4	20	0.43	10.5	12.8	20
	E	265/60/1	239/292	1	8.4	40.0	0.9	9.3	11.4	15	N/A	N/A	N/A	N/A
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	1.4	14.2	17.4	30	0.43	14.6	17.8	30
	E	265/60/1	239/262	1	10.9	58.0	1.6	12.5	15.2	25	0.7	13.2	15.9	25
	H	208-230/60/3	197/254	1	8.0	55.0	1.4	9.4	11.4	15	0.43	9.8	11.8	15
	F*	460/60/3*	414/506	1	4.0	22.4	0.9	4.9	5.9	15	N/A	N/A	N/A	N/A
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	1.8	15.3	18.7	30	0.8	16.1	19.5	30
	E	265/60/1	239/292	1	10.9	58.0	2.0	12.9	15.6	25	0.7	13.6	16.3	25
	H	208-230/60/3	197/254	1	8.3	63.0	1.8	10.1	12.2	20	0.8	10.9	13.0	20
	F*	460/60/3*	414/506	1	4.5	27.0	1.24	5.7	6.9	15	0.7	6.4	7.6	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	2.0	16.7	20.4	35	0.8	17.5	21.2	35
	E	265/60/1	239/292	1	12.5	61.0	1.66	14.2	17.3	25	0.7	14.9	18.0	30
	H	208-230/60/3	197/254	1	10.4	63.0	2.0	12.4	15.0	25	0.8	13.2	15.8	25
	F*	460/60/3*	414/506	1	4.5	32.0	1.0	5.5	6.6	15	0.7	6.2	7.3	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	3.0	18.4	22.3	35	0.8	19.2	23.1	35
	H	208-230/60/3	197/254	1	11.5	77.0	3.0	14.5	17.4	25	0.8	15.3	18.2	25
	F*	460/60/3*	414/506	1	5.1	35.0	1.7	6.8	8.1	15	0.7	7.5	8.8	15
	N	575/60/3	518/633	1	4.3	31.0	1.4	5.7	6.8	15	N/A	N/A	N/A	N/A
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	3.4	23.9	29.0	45	0.8	24.7	29.8	50
	H	208-230/60/3	197/254	1	14.6	91.0	3.4	18.0	21.7	35	0.8	18.8	22.5	35
	F*	460/60/3*	414/506	1	7.1	46.0	1.8	8.9	10.7	15	0.7	9.6	11.4	15
	N	575/60/3	518/633	1	5.1	34.1	1.4	6.5	7.8	15	N/A	N/A	N/A	N/A
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	5.8	32.7	39.4	60	1.07	33.8	40.5	60
	H	208-230/60/3	197/254	1	17.6	123.0	5.8	23.4	27.8	45	1.07	24.5	28.9	45
	F*	460/60/3*	414/506	1	9.6	64.0	2.6	12.2	14.6	20	1.07	13.3	15.7	25
	N	575/60/3	518/633	1	6.1	40.0	2.3	8.4	9.9	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with internal secondary circulators require a four wire power supply with neutral. Internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4h: Tranquility 20™ (TS) Series Electrical Data - (ECM Motor & Secondary Pump)

All TS Units with ECM Fan Motor								TS Units (ECM)			TS Units with ECM Fan Motor and Secondary Pump			
Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR	Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA								
TSH/V/D 018	G	208-230/60/1	197/254	1	9.0	48.0	4.3	13.3	15.6	20	0.43	13.7	16.0	25
	E	265/60/1	239/292	1	8.4	40.0	4.1	12.5	14.6	20	N/A	N/A	N/A	N/A
TSH/V/D 024	G	208-230/60/1	197/254	1	12.8	60.0	4.3	17.1	20.3	30	0.43	17.5	20.7	30
	E	265/60/1	239/292	1	10.9	58.0	4.1	15.0	17.7	25	0.7	15.7	18.4	25
	H	208-230/60/3	197/254	1	8.0	55.0	4.3	12.3	14.3	20	0.43	12.7	14.7	20
	F*	460/60/3*	414/506	1	4.0	22.4	4.1	8.1	9.1	15	N/A	N/A	N/A	N/A
TSH/V/D 030	G	208-230/60/1	197/254	1	13.5	61.0	4.3	17.8	21.2	30	0.8	18.6	22.0	35
	E	265/60/1	239/292	1	10.9	58.0	4.1	15.0	17.7	25	0.7	15.7	18.4	25
	H	208-230/60/3	197/254	1	8.3	63.0	4.3	12.6	14.7	20	0.8	13.4	15.5	20
	F*	460/60/3*	414/506	1	4.5	27.0	4.1	8.6	9.7	15	0.7	9.3	10.4	15
TSH/V/D 036	G	208-230/60/1	197/254	1	14.7	72.5	4.3	19.0	22.7	35	0.8	19.8	23.5	35
	E	265/60/1	239/292	1	12.5	61.0	4.1	16.6	19.7	30	0.7	17.3	20.4	30
	H	208-230/60/3	197/254	1	10.4	63.0	4.3	14.7	17.3	25	0.8	15.5	18.1	25
	F*	460/60/3*	414/506	1	4.5	32.0	4.1	8.6	9.7	15	0.7	9.3	10.4	15
TSH/V/D 042	G	208-230/60/1	197/254	1	15.4	83.0	4.3	19.7	23.6	35	0.8	20.5	24.4	35
	H	208-230/60/3	197/254	1	11.5	77.0	4.3	15.8	18.7	30	0.8	16.6	19.5	30
	F*	460/60/3*	414/506	1	5.1	35.0	4.1	9.2	10.5	15	0.7	9.9	11.2	15
TSH/V/D 048	G	208-230/60/1	197/254	1	20.5	109.0	7.0	27.5	32.6	50	0.8	28.3	33.4	50
	H	208-230/60/3	197/254	1	14.6	91.0	7.0	21.6	25.3	35	0.8	22.4	26.1	40
	F*	460/60/3*	414/506	1	7.1	46.0	6.9	14.0	15.8	20	0.7	14.7	16.5	20
TSH/V/D 060	G	208-230/60/1	197/254	1	26.9	145.0	7.0	33.9	40.6	60	1.07	35.0	41.7	60
	H	208-230/60/3	197/254	1	17.6	123.0	7.0	24.6	29.0	45	1.07	25.7	30.1	45
	F*	460/60/3*	414/506	1	9.6	64.0	6.9	16.5	18.9	25	1.07	17.6	20.0	25
TSH/V/D 070	G	208-230/60/1	197/254	1	30.1	158.0	7.0	37.1	44.6	70	1.07	38.2	45.7	70
	H	208-230/60/3	197/254	1	20.5	155.0	7.0	27.5	32.6	50	1.07	28.6	33.7	50
	F*	460/60/3*	414/506	1	9.6	75.0	6.9	16.5	18.9	25	1.07	17.6	20.0	25

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ECM motors/internal secondary circulators require a four wire power supply with neutral. ECM motors/internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4I: Tranquility 20™ (TS) Series Electrical Data - (Standard 50Hz Units)

Model	Voltage Code	Rated Voltage	Min/Max	MCC	RLA	RLA	LRA	Compressor Qty	Fan Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
TSH/V 006	T	220-240/50/1	197/254	16.0	10.3	Data Not Available at Time of Publishing						
TSH/V 009	T	220-240/50/1	197/254	16.0	10.3	3.2	17.0	1	0.3	3.5	4.3	15
TSH/V 012	T	220-240/50/1	197/254	26.0	16.7	4.0	19.0	1	0.7	4.7	5.7	15
TSH/V/D 018	T	220-240/50/1	197/254	16.0	10.3	7.1	44.0	1	0.9	8.0	9.8	15
TSH/V/D 024	T	220-240/50/1	197/254	16.0	10.3	10.9	58.0	1	0.9	11.8	14.5	25
	S	380-420/50/3	342/462	16.0	10.3	4.0	24.0	1	0.6	4.6	5.6	15
TSH/V/D 030	T	220-240/50/1	197/254	26.0	16.7	10.9	58.0	1	1.6	12.5	15.2	25
	S	380-420/50/3	342/462	26.0	16.7	4.5	26.0	1	0.9	5.4	6.5	15
TSH/V/D 036	T	220-240/50/1	197/254	16.0	10.3	12.5	61.0	1	2.0	14.5	17.6	30
	S	380-420/50/3	342/462	16.0	10.3	4.5	32.0	1	1.2	5.7	6.8	15
TSH/V/D 042	S	380-420/50/3	342/462	16.0	10.3	5.1	35.0	1	1.0	6.1	7.4	15
TSH/V/D 048	S	380-420/50/3	342/462	26.0	16.7	7.1	48.0	1	1.7	8.8	10.6	15
TSH/V/D 060	S	380-420/50/3	342/462	16.0	10.3	9.6	64.0	1	2.5	12.1	14.5	20
TSH/V/D 070	S	380-420/50/3	342/462	26.0	16.7	9.6	74.0	1	2.6	12.2	14.6	20

Electrical - Line Voltage

Table 4j: Tranquility 16™ (TC) Series Electrical Data - (Standard 60Hz Units)

TC Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA				
006	G	208-230/60/1	197/254	1	3.3	17.7	0.40	3.7	4.5	15
009	G	208-230/60/1	197/254	1	5.6	22.2	0.80	6.4	7.8	15
012	G	208-230/60/1	197/254	1	5.1	32.5	0.80	5.9	7.2	15
015	G	208-230/60/1	197/254	1	6.0	29.0	1.00	7.0	8.5	15
	E	265/60/1	239/292	1	5.4	28.0	0.86	6.3	7.6	15
018	G	208-230/60/1	197/254	1	7.2	33.0	1.00	8.2	10.0	15
	E	265/60/1	239/292	1	5.9	28.0	0.86	6.8	8.2	15
024	G	208-230/60/1	197/254	1	12.8	58.3	1.50	14.3	17.5	30
	E	265/60/1	239/292	1	9.6	54.0	1.30	10.9	13.3	20
030	G	208-230/60/1	197/254	1	14.1	73.0	3.00	17.1	20.6	30
	E	265/60/1	239/292	1	11.2	60.0	2.70	13.9	16.7	25
	H	208-230/60/3	197/254	1	8.9	58.0	3.00	11.9	14.1	20
	F	460/60/3	414/506	1	4.2	28.0	1.70	5.9	7.0	15
036	G	208-230/60/1	197/254	1	16.7	79.0	1.80	18.5	22.7	35
	E	265/60/1	239/292	1	13.5	72.0	2.00	15.5	18.9	30
	H	208-230/60/3	197/254	1	10.4	73.0	1.80	12.2	14.8	25
	F	460/60/3	414/506	1	5.8	38.0	1.24	7.0	8.5	15
042	G	208-230/60/1	197/254	1	17.9	112.0	3.00	20.9	25.4	40
	H	208-230/60/3	197/254	1	13.5	88.0	3.00	16.5	19.9	30
	F	460/60/3	414/506	1	6.0	44.0	1.70	7.7	9.2	15
	N	575/60/3	518/633	1	4.9	34.0	1.40	6.3	7.5	15
048	G	208-230/60/1	197/254	1	21.8	117.0	3.40	25.2	30.7	50
	H	208-230/60/3	197/254	1	13.7	83.1	3.40	17.1	20.5	30
	F	460/60/3	414/506	1	6.2	41.0	1.80	8.0	9.6	15
	N	575/60/3	518/633	1	4.8	33.0	1.40	6.2	7.4	15
	G	208-230/60/1	197/254	1	26.3	134.0	4.90	31.2	37.8	60
060	H	208-230/60/3	197/254	1	15.6	110.0	4.90	20.5	24.4	40
	F	460/60/3	414/506	1	7.8	52.0	2.50	10.3	12.3	20
	N	575/60/3	518/633	1	5.8	38.9	1.90	7.7	9.2	15

HACR circuit breaker in USA only
All fuses Class RK-5

Electrical - Line Voltage

Table 4k: Tranquility 16™ (TC) Series Electrical Data - (Standard 50Hz Units)

TC Model	Voltage Code	Rated Voltage	Voltage Min/ Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/ HACR
				QTY	RLA	LRA				
015	V	220/240-50-1	209/252	1	4.7	23.0	0.9	5.6	6.7	15
018	V	220/240-50-1	209/252	1	5.9	24.0	0.9	6.8	8.2	15
024	V	220/240-50-1	209/252	1	9	52.0	1.3	10.3	12.6	20
030	V	220/240-50-1	209/252	1	11.2	60.0	2.7	13.9	16.7	25
	U	380/415-50-3	361/436	1	3.9	28.0	1.7	5.6	6.6	15
036	V	220/240-50-1	209/252	1	13.5	67.0	2.0	15.5	18.9	30
	U	380/415-50-3	361/436	1	5.4	38.0	1.2	6.6	8.0	15
042	U	380/415-50-3	361/436	1	6	46.0	1.7	7.7	9.2	15
048	U	380/415-50-3	361/436	1	6.1	43.0	1.8	7.9	9.4	15
060	U	380/415-50-3	361/436	1	7.8	51.5	2.5	10.3	12.3	20

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All fuses Class RK-5

Electrical - Line Voltage

Table 4l: Genesis Ultra (GS) Series Electrical Data - (Standard Units)

All GS Units								Standard GS Units		
Model	Voltage Code	Voltage	Min/Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/HACR
				QTY	RLA	LRA				
GSH/V 015	G	208-230/60/1	197/254	1	4.9	26.3	1.0	7.1	8.6	15
	E	265/60/1	239/292	1	4.4	28.0	0.9	5.7	6.9	15
	V	220-240/50/1	197/254	1	4.4	28.0	0.9	5.2	6.3	15
GSH/V 018	G	208-230/60/1	197/254	1	7.1	38.0	1.0	8.7	10.6	15
	E	265/60/1	239/292	1	5.5	32.0	0.9	6.7	8.2	15
	V	220-240/50/1	197/254	1	5.5	32.0	0.9	6.4	7.8	15
GSH/V 024	G	208-230/60/1	197/254	1	10.9	54.0	1.1	11.4	14.0	20
	E	265/60/1	239/292	1	9.0	55.0	0.9	9.6	11.8	20
	H	208-230/60/3	197/254	1	7.1	45.0	1.1	8.2	10.0	15
	F*	460/60/3	414/506	1	3.5	22.4	0.6	4.1	5.0	15
	V	220-240/50/1	197/254	1	8.7	47.0	0.9	9.6	11.7	20
GSH/V 030	G	208-230/60/1	197/254	1	12.2	67.0	1.3	13.5	16.6	25
	E	265/60/1	239/292	1	10.9	56.0	1.6	12.5	15.2	25
	H	208-230/60/3	197/254	1	7.7	55.0	1.3	9.0	10.9	15
	F*	460/60/3	414/506	1	3.8	27.0	0.9	4.7	5.7	15
	V	220-240/50/1	197/254	1	10.9	56.0	1.6	12.5	15.2	25
GSH/V 030 High Static	G	208-230/60/1	197/254	1	12.2	67.0	1.8	14.0	17.1	25
	E	265/60/1	239/292	1	10.9	56.0	2.0	12.9	15.6	25
	H	208-230/60/3	197/254	1	7.7	55.0	1.8	9.5	11.4	15
	F*	460/60/3	414/506	1	3.8	27.0	1.3	5.1	6.1	15
GSH/V 036	G	208-230/60/1	197/254	1	13.5	73.0	1.8	15.3	18.7	30
	E	265/60/1	239/292	1	12.8	71.0	2.0	14.8	18.0	30
	H	208-230/60/3	197/254	1	9.6	63.0	1.8	11.4	13.8	20
	F*	460/60/3	414/506	1	4.5	31.0	1.3	5.8	6.9	15
	V	220-240/50/1	197/254	1	12.8	71.0	2.0	14.8	18.0	30
GSH/V 036 High Static	G	208-230/60/1	197/254	1	13.5	73.0	3.0	16.5	19.9	30
	E	265/60/1	239/292	1	12.8	71.0	2.7	15.5	18.7	30
	H	208-230/60/3	197/254	1	9.6	63.0	3.0	12.6	15.0	20
	F*	460/60/3	414/506	1	4.5	31.0	1.7	6.2	7.3	15
GSH/V 042	G	208-230/60/1	197/254	1	16.5	95.0	1.9	18.4	22.5	35
	H	208-230/60/3	197/254	1	10.3	77.0	1.9	12.2	14.8	25
	F*	460/60/3	414/506	1	5.1	39.0	1.0	6.1	7.4	15
	N	575/60/3	518/633	1	4.2	31.0	0.8	5.0	6.1	15
	U	380-420/50/3	342/462	1	5.1	39.0	1.0	6.1	7.4	15
GSH/V 048	G	208-230/60/1	197/254	1	18.3	109.0	3.0	21.3	25.9	40
	H	208-230/60/3	197/254	1	12.4	88.0	3.0	15.4	18.5	30
	F*	460/60/3	414/506	1	6.4	44.0	1.7	8.1	9.7	15
	N	575/60/3	518/633	1	4.8	34.0	1.4	6.2	7.4	15
	U	380-420/50/3	342/462	1	6.4	44.0	1.7	8.1	9.7	15
GSH/V 060	G	208-230/60/1	197/254	1	25.0	148.0	3.4	28.4	34.7	50
	H	208-230/60/3	197/254	1	17.3	123.0	3.4	20.7	25.0	40
	F*	460/60/3	414/506	1	6.7	49.5	1.8	8.5	10.2	15
	N	575/60/3	518/633	1	5.8	40.0	1.4	7.2	8.7	15
	U	380-420/50/3	342/462	1	6.7	49.5	1.8	8.5	10.2	15
GSH/V 070	G	208-230/60/1	197/254	1	28.8	148.0	4.9	33.7	40.9	60
	H	208-230/60/3	197/254	1	17.3	137.0	4.9	22.2	26.5	40
	F*	460/60/3	414/506	1	9.0	62.0	2.5	11.5	13.8	20
	N	575/60/3	518/633	1	6.6	49.0	1.9	8.5	10.2	15
	U	380-420/50/3	342/462	1	9.0	62.0	2.5	11.5	13.7	20

HACR circuit breaker in USA only
All fuses Class RK-5

Electrical - Line Voltage

Table 4m: Genesis Ultra (GS) Series Electrical Data - (Units with ClimaDry or Secondary Pump)

All GS Units				GS Units with ClimaDry				GS Units with Secondary Pump			
Model	Voltage Code	Voltage	Min/Max Voltage	Reheat Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/HACR	Pump FLA	Total Unit FLA	Min Circuit Amp	Max Fuse/HACR
GSH/V 015	G	208-230/60/1	197/254	0.8	6.7	7.9	15	0.43	6.3	7.6	15
	E	265/60/1	239/292	0.7	6.0	7.1	15	N/A	N/A	N/A	N/A
GSH/V 018	G	208-230/60/1	197/254	0.8	8.9	10.7	15	0.43	8.5	10.3	15
	E	265/60/1	239/292	0.7	7.1	8.5	15	N/A	N/A	N/A	N/A
GSH/V 024	G	208-230/60/1	197/254	0.8	12.8	15.5	25	0.43	12.4	15.2	20
	E	265/60/1	239/292	0.7	10.6	12.9	20	N/A	N/A	N/A	N/A
	H	208-230/60/3	197/254	0.8	9.0	10.8	20	0.43	8.6	10.4	15
	F*	460/60/3*	414/506	0.7	4.8	5.7	15	N/A	N/A	N/A	N/A
GSH/V 030	G	208-230/60/1	197/254	0.8	14.3	17.4	25	0.8	14.3	17.4	25
	E	265/60/1	239/292	0.7	13.2	15.9	25	0.7	13.2	15.9	25
	H	208-230/60/3	197/254	0.8	9.8	11.7	15	0.8	9.8	11.7	15
	F*	460/60/3*	414/506	0.7	5.4	6.4	15	0.7	5.4	6.4	15
GSH/V 030 High Static	G	208-230/60/1	197/254	0.8	14.8	17.9	30	0.8	14.8	17.9	30
	E	265/60/1	239/292	0.7	13.6	16.3	25	0.7	13.6	16.3	25
	H	208-230/60/3	197/254	0.8	10.3	12.2	15	0.8	10.3	12.2	15
	F*	460/60/3*	414/506	0.7	5.8	6.8	15	0.7	5.8	6.8	15
GSH/V 036	G	208-230/60/1	197/254	0.8	16.1	19.5	30	0.8	16.1	19.5	30
	E	265/60/1	239/292	0.7	15.5	18.7	30	0.7	15.5	18.7	30
	H	208-230/60/3	197/254	0.8	12.2	14.6	20	0.8	12.2	14.6	20
	F*	460/60/3*	414/506	0.7	6.5	7.6	15	0.7	6.5	7.6	15
GSH/V 036 High Static	G	208-230/60/1	197/254	0.8	17.3	20.7	30	0.8	17.3	20.7	30
	E	265/60/1	239/292	0.7	16.2	19.4	30	0.7	16.2	19.4	30
	H	208-230/60/3	197/254	0.8	13.4	15.8	25	0.8	13.4	15.8	25
	F*	460/60/3*	414/506	0.7	6.9	8.0	15	0.7	6.9	8.0	15
GSH/V 042	G	208-230/60/1	197/254	0.8	19.2	23.3	35	0.8	19.2	23.3	35
	H	208-230/60/3	197/254	0.8	13.0	15.6	25	0.8	13.0	15.6	25
	F*	460/60/3*	414/506	0.7	6.8	8.1	15	0.7	6.8	8.1	15
	N	575/60/3	518/633	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GSH/V 048	G	208-230/60/1	197/254	1.07	22.4	26.9	45	0.8	22.1	26.7	40
	H	208-230/60/3	197/254	1.07	16.5	19.6	30	0.8	16.2	19.3	30
	F*	460/60/3*	414/506	1.07	9.2	10.8	15	0.7	8.8	10.4	15
	N	575/60/3	518/633	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GSH/V 060	G	208-230/60/1	197/254	1.07	29.5	35.7	60	1.07	29.5	35.7	60
	H	208-230/60/3	197/254	1.07	21.8	26.1	40	1.07	21.8	26.1	40
	F*	460/60/3*	414/506	1.07	9.6	11.2	15	1.07	9.6	11.2	15
	N	575/60/3	518/633	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GSH/V 070	G	208-230/60/1	197/254	1.07	34.8	42.0	70	1.07	34.8	42.0	70
	H	208-230/60/3	197/254	1.07	23.3	27.6	40	1.07	23.3	27.6	40
	F*	460/60/3*	414/506	1.07	12.6	14.8	20	1.07	12.6	14.8	20
	N	575/60/3	518/633	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

HACR circuit breaker in USA only.
All fuses Class RK-5

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry/internal secondary circulators require a four wire power supply with neutral. Reheat pumps/internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4n: Genesis Standard (GR) Series Electrical Data

All GR Units									Standard GR Units			GR Units with Secondary Pump			
Model	Voltage Code	Refrigerant	Voltage	Min/Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR	Pump FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR
					QTY	RLA	LRA								
GRH 006	G	R22	208-230/60/1	197/254	1	2.9	17.7	0.40	3.3	4.0	15	0.43	3.7	4.5	15
	E	R22	265/60/1	239/292	1	2.5	15.0	0.40	2.9	3.5	15	N/A	N/A	N/A	N/A
	V	R22	220-240/50/1	197/254	1	2.5	15.0	0.4	2.8	3.5	15	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	2.3	15.0	0.4	2.7	3.2	15	N/A	N/A	N/A	N/A
GRH/V 009	G	R22	208-230/60/1	197/254	1	3.9	22.2	0.80	4.7	5.7	15	0.43	5.1	6.1	15
	E	R22	265/60/1	239/292	1	3.3	18.8	0.70	4.0	4.8	15	N/A	N/A	N/A	N/A
	V	R22	220-240/50/1	197/254	1	3.3	18.8	0.9	4.2	5.0	15	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	2.7	18.8	0.7	3.7	4.5	15	N/A	N/A	N/A	N/A
GRH/V 012	G	R22	208-230/60/1	197/254	1	5.3	27.9	0.80	6.1	7.4	15	0.8	6.9	8.2	15
	E	R22	265/60/1	239/292	1	4.2	22.2	0.70	4.9	6.0	15	0.7	5.6	6.7	15
	V	R22	220-240/50/1	197/254	1	4.2	22.2	0.9	5.1	6.2	15	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	3.9	22.2	0.7	4.5	5.6	15	N/A	N/A	N/A	N/A
GRH/V 015	G	R22	208-230/60/1	197/254	1	5.9	29.0	1.00	6.9	8.4	15	0.43	7.3	8.8	15
	E	R22	265/60/1	239/292	1	5.4	27.0	0.90	6.3	7.6	15	N/A	N/A	N/A	N/A
	V	R22	220-240/50/1	197/254	1	5.4	27.0	0.9	6.3	7.7	15	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	4.2	27.0	0.9	5.9	7.1	15	N/A	N/A	N/A	N/A
GRH/V 019	G	R22	208-230/60/1	197/254	1	8.6	49.0	1.10	9.7	11.9	20	0.8	10.5	12.7	20
	E	R22	265/60/1	239/292	1	8.1	44.0	0.90	9.0	11.0	15	0.7	9.7	11.7	15
	V	R22	220-240/50/1	197/254	1	8.1	44.0	0.9	9.0	11.0	15	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	6.8	45.0	0.9	8.6	10.5	15	N/A	N/A	N/A	N/A
GRH/V 024	G	R22	208-230/60/1	197/254	1	9.6	50.0	1.30	10.9	13.3	20	0.8	11.7	14.1	20
	E	R22	265/60/1	239/292	1	8.8	55.0	1.60	10.4	12.6	20	0.7	11.1	13.3	20
	H	R22	208-230/60/3	197/254	1	6.7	51.0	1.30	8.0	9.7	15	0.8	8.8	10.5	15
	F	R22	460/60/3	414/506	1	3.5	25.0	0.90	4.4	5.3	15	0.7	5.1	6.0	15
	V	R22	220-240/50/1	197/254	1	8.8	55.0	1.6	10.4	12.6	20	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	8.2	51.0	1.6	10.4	12.6	20	N/A	N/A	N/A	N/A
GRH/V 030	G	R22	208-230/60/1	197/254	1	11.2	61.0	1.90	13.1	15.9	25	0.8	13.9	16.7	25
	E	R22	265/60/1	239/292	1	9.8	58.0	1.70	11.5	14.0	20	0.7	12.2	14.7	20
	H	R22	208-230/60/3	197/254	1	6.9	55.0	1.90	8.8	10.5	15	0.8	9.6	11.3	15
	F	R22	460/60/3	414/506	1	3.6	28.0	1.00	4.6	5.5	15	0.7	5.3	6.2	15
	V	R22	220-240/50/1	197/254	1	9.8	58.0	1.7	11.5	13.9	20	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	9.1	54.0	1.7	11.2	13.6	20	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with internal secondary circulators require a four wire power supply with neutral. ECM motors/internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4n: Genesis Standard (GR) Series Electrical Data

GRH/V 036	G	R22	208-230/60/1	197/254	1	14.4	82.0	3.00	17.4	21.0	35	0.8	18.2	21.8	35
	E	R22	265/60/1	239/292	1	12.2	64.0	2.70	14.9	18.0	30	0.7	15.6	18.7	30
	H	R22	208-230/60/3	197/254	1	9.4	65.5	3.00	12.4	14.8	20	0.8	13.2	15.6	20
	F	R22	460/60/3	414/506	1	4.4	33.0	1.70	6.1	7.2	15	0.7	6.8	7.9	15
	V	R22	220-240/50/1	197/254	1	12.2	83.0	2.7	14.9	18.0	30	N/A	N/A	N/A	N/A
	V	R407C	220-240/50/1	197/254	1	11.5	83.0	2.7	17.2	20.8	35	N/A	N/A	N/A	N/A
GRH/V 042	G	R22	208-230/60/1	197/254	1	16.2	96.0	3.00	19.2	23.3	35	0.8	20.0	24.1	40
	H	R22	208-230/60/3	197/254	1	10.3	75.0	3.00	13.3	15.9	25	0.8	14.1	16.7	25
	F	R22	460/60/3	414/506	1	4.3	40.0	1.70	6.0	7.1	15	0.7	6.7	7.8	15
	N	R22	575/60/3	518/633	1	3.7	31.0	1.50	5.2	6.0	15	N/A	N/A	N/A	N/A
	U	R22	380-420/50/3	342/462	1	4.3	40.0	1.7	6.0	7.1	15	N/A	N/A	N/A	N/A
	U	R407C	380-420/50/3	342/462	1	5.5	34.5	1.7	6.0	7.1	15	N/A	N/A	N/A	N/A
GRH/V 048	G	R22	208-230/60/1	197/254	1	18.3	102.0	3.40	21.7	26.3	40	1.07	22.8	27.3	45
	H	R22	208-230/60/3	197/254	1	12.6	91.0	3.40	16.0	19.2	30	1.07	17.1	20.2	20
	F	R22	460/60/3	414/506	1	5.7	42.0	1.80	7.5	8.9	15	1.07	8.6	10.0	15
	N	R22	575/60/3	518/633	1	4.7	39.0	1.40	6.1	7.3	15	N/A	N/A	N/A	N/A
	U	R22	380-420/50/3	342/462	1	5.7	42.0	1.8	7.5	8.9	15	N/A	N/A	N/A	N/A
	U	R407C	380-420/50/3	342/462	1	5.9	42.0	1.8	7.5	8.9	15	N/A	N/A	N/A	N/A
All GR Units									Standard GR Units			GR Units with Secondary Pump			
Model	Voltage Code	Refrigerant	Voltage	Min/Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR	Pump FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR
					QTY	RLA	LRA								
GRH/V 048 High Static	G	R22	208-230/60/1	197/254	1	18.3	102.0	4.9	23.2	27.8	45	1.07	24.3	28.8	45
	H	R22	208-230/60/3	197/254	1	12.6	91.0	4.9	17.5	20.7	30	1.07	18.6	21.7	30
	F	R22	460/60/3	414/506	1	5.7	42.0	2.5	8.2	9.6	15	1.07	9.3	10.7	15
	N	R22	575/60/3	518/633	1	4.7	39.0	1.9	6.6	7.6	15	N/A	N/A	N/A	N/A
GRH/V 060	G	R22	208-230/60/1	197/254	1	25.6	170.0	4.90	30.5	36.9	60	1.07	31.6	38.0	60
	H	R22	208-230/60/3	197/254	1	14.7	124.0	4.90	19.6	23.3	35	1.07	20.7	24.3	35
	F	R22	460/60/3	414/506	1	7.4	59.6	2.50	9.9	11.8	15	1.07	11.0	12.8	20
	N	R22	575/60/3	518/633	1	5.9	49.4	1.90	7.8	9.3	15	N/A	N/A	N/A	N/A
	U	R22	380-420/50/3	342/462	1	7.4	59.6	2.5	9.9	11.8	15	N/A	N/A	N/A	N/A
	U	R407C	380-420/50/3	342/462	1	8.2	61.8	2.5	9.9	11.8	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with internal secondary circulators require a four wire power supply with neutral. ECM motors/internal secondary circulators are rated 265 vac and are wired between one hot leg and neutral.**

HACR circuit breaker in USA only
All fuses Class RK-5

Electrical - Line Voltage

Table 4o: Genesis Compact (GC) Series Electrical Data - (PSC Motor & ClimaDry)

All GC Units								Standard GC Unit			GCV Units with ClimaDry			
Model	Voltage Code	Voltage	Min/ Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Cir-cuit Amps	Max Fuse/ HACR
				QTY	RLA	LRA								
GCH 006	G	208-230/60/1	197/254	1	2.9	17.7	0.4	3.3	4.0	15	N/A	N/A	N/A	N/A
	E	265/60/1	239/292	1	2.5	15.0	0.4	2.8	3.5	15	N/A	N/A	N/A	N/A
GCH/V 009	G	208-230/60/1	197/254	1	3.9	22.2	0.8	4.7	5.7	15	N/A	N/A	N/A	N/A
	E	265/60/1	239/292	1	3.3	18.8	0.7	4.0	4.8	15	N/A	N/A	N/A	N/A
GCH/V 012	G	208-230/60/1	197/254	1	5.3	27.9	0.8	6.1	7.4	15	N/A	N/A	N/A	N/A
	E	265/60/1	239/292	1	4.2	22.2	0.7	4.9	6.0	15	N/A	N/A	N/A	N/A
GCH/V 018	G	208-230/60/1	197/254	1	8.6	49.0	1.0	9.6	11.8	20	0.80	10.4	12.6	20
	E	265/60/1	239/292	1	8.1	44.0	0.9	8.9	11.0	15	0.70	9.6	11.7	15
	V	220-240/50/1	197/254	1	8.1	44.0	0.86	8.9	11.0	15	N/A	N/A	N/A	N/A
GCH/V 024	G	208-230/60/1	197/254	1	9.6	50.0	1.5	11.1	13.5	20	0.80	11.9	14.3	20
	E	265/60/1	239/292	1	9.1	55.0	1.3	10.4	12.7	20	0.70	11.1	13.4	20
	H	208-230/60/3	197/254	1	6.7	51.0	1.5	8.2	9.9	15	0.80	9.0	10.7	15
	F*	460/60/3	414/506	1	3.5	25.0	0.8	4.3	5.2	15	0.70	5.0	5.9	15
	V	220-240/50/1	197/254	1	9.1	55.0	1.30	10.4	12.7	20	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	3.5	25.0	0.76	4.2	5.1	15	N/A	N/A	N/A	N/A
GCH/V 030	G	208-230/60/1	197/254	1	11.2	61.0	3.0	14.2	17.0	25	0.80	15.0	17.8	25
	E	265/60/1	239/292	1	10.0	58.0	2.7	12.7	15.2	25	0.70	13.4	15.9	25
	H	208-230/60/3	197/254	1	6.9	55.0	3.0	9.9	11.6	15	0.80	10.7	124	15
	F*	460/60/3	414/506	1	3.6	28.0	1.7	5.3	6.2	15	0.70	6.0	6.9	15
	V	220-240/50/1	197/254	1	10.0	58.0	2.70	12.7	15.2	25	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	3.6	28.0	1.70	5.3	6.2	15	N/A	N/A	N/A	N/A
GCH/V 036	G	208-230/60/1	197/254	1	15.4	82.0	1.8	17.2	21.1	35	0.80	18.0	21.9	35
	E	265/60/1	239/292	1	14.4	83.0	2.0	16.4	20.0	30	0.70	17.1	20.7	35
	H	208-230/60/3	197/254	1	9.6	70.0	1.8	11.4	13.8	20	0.80	12.2	14.6	20
	F*	460/60/3	414/506	1	4.9	33.0	1.2	6.1	7.4	15	0.70	6.8	8.1	15
	V	220-240/50/1	197/254	1	14.4	83.0	2.00	16.4	20.0	30	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	4.9	33.0	1.24	6.1	7.4	15	N/A	N/A	N/A	N/A
GCV 041	G	208-230/60/1	197/254	1	16.2	96.0	3.0	19.2	23.3	35	N/A	N/A	N/A	N/A
	H	208-230/60/3	197/254	1	10.3	75.0	3.0	13.3	15.9	25	N/A	N/A	N/A	N/A
	F*	460/60/3	414/506	1	4.3	40.0	1.7	6.0	7.1	15	N/A	N/A	N/A	N/A
	N	575/60/3	518/633	1	3.7	31.0	1.5	5.2	6.0	15	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	4.3	40.0	1.70	6.0	7.1	15	N/A	N/A	N/A	N/A
GCH/V 042	G	208-230/60/1	197/254	1	17.1	105.0	3.0	20.1	24.4	40	0.80	20.9	25.2	40
	H	208-230/60/3	197/254	1	10.7	85.0	3.0	13.7	16.4	25	0.80	14.5	17.2	25
	F*	460/60/3	414/506	1	5.3	42.0	1.7	7.0	8.3	15	0.70	7.7	9.0	15
	N	575/60/3	518/633	1	4.3	34.0	1.4	5.7	6.8	15	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	5.3	42.0	1.70	7.0	8.3	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry require a four wire power supply with neutral. Reheat pump is rated 265 vac and is wired between one hot leg and neutral.**

Electrical - Line Voltage

Table 4o: Genesis Compact (GC) Series Electrical Data - (PSC Motor & ClimaDry)

GCH/V 048	G	208-230/60/1	197/254	1	18.3	102.0	3.4	21.7	26.3	40	1.07	22.8	27.3	45
	H	208-230/60/3	197/254	1	12.6	91.0	3.4	16.0	19.2	30	1.07	17.1	20.2	30
	F*	460/60/3	414/506	1	5.7	42.0	1.8	7.5	8.9	15	1.00	8.6	10.0	15
	N	575/60/3	518/633	1	4.7	39.0	1.4	6.1	7.2	15	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	5.7	42.0	1.80	7.5	8.9	15	N/A	N/A	N/A	N/A
All GC Units								Standard GC Unit			GCV Units with ClimaDry			
Model	Voltage Code	Voltage	Min/ Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Cir-cuit Amps	Max Fuse/ HACR
				QTY	RLA	LRA								
GCH/V 060	G	208-230/60/1	197/254	1	25.6	170.0	4.9	30.5	36.9	60	1.07	31.0	37.4	60
	H	208-230/60/3	197/254	1	14.7	124.0	4.9	19.6	23.3	35	1.07	20.1	23.7	35
	F*	460/60/3	414/506	1	7.4	59.6	2.5	9.9	11.8	15	1.00	11.0	12.8	20
	N	575/60/3	518/633	1	5.9	49.4	1.9	7.8	9.3	15	N/A	N/A	N/A	N/A
	U	380-420/50/3	342/462	1	7.4	59.6	2.50	9.9	11.8	15	N/A	N/A	N/A	N/A

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry require a four wire power supply with neutral. Reheat pump is rated 265 vac and is wired between one hot leg and neutral.**

HACR circuit breaker in USA only
All fuses Class RK-5

Electrical - Line Voltage

Table 4p: Genesis Compact (GC) Series Electrical Data - (High Static Blower Motor)

All GC Units								Standard GC Unit			GCV Units with ClimaDry			
Model	Voltage Code	Voltage	Min/ Max Voltage	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR	Reheat Pump FLA	Total Unit FLA	Min Cir-cuit Amps	Max Fuse/ HACR
				QTY	RLA	LRA								
GCH/V 018	G	208-230/60/1	197/254	1	8.6	49.0	1.0	9.6	11.8	20	0.80	10.4	12.6	20
	E	265/60/1	239/292	1	8.1	44.0	0.9	9.0	11.0	15	0.70	9.7	11.7	15
GCH/V 024	G	208-230/60/1	197/254	1	9.6	50.0	3.0	12.6	15.0	20	0.80	13.4	15.8	25
	E	265/60/1	239/292	1	9.1	55.0	2.7	11.8	14.1	20	0.70	12.5	14.8	20
	H	208-230/60/3	197/254	1	6.7	51.0	3.0	9.7	11.4	15	0.80	10.5	12.2	15
	F*	460/60/3*	414/506	1	3.5	25.0	1.7	5.2	6.1	15	0.70	5.9	6.8	15
GCH/V 030	G	208-230/60/1	197/254	1	11.2	61.0	3.0	14.2	17.0	25	0.80	15.0	17.8	25
	E	265/60/1	239/292	1	10.0	58.0	2.7	12.7	15.2	25	0.70	13.4	15.9	25
	H	208-230/60/3	197/254	1	6.9	55.0	3.0	9.9	11.6	15	0.80	10.7	12.4	15
	F*	460/60/3*	414/506	1	3.6	28.0	1.7	5.3	6.2	15	0.70	6.0	6.9	15
GCH/V 036	G	208-230/60/1	197/254	1	15.4	82.0	3.0	18.4	22.3	35	0.80	19.2	23.1	35
	E	265/60/1	239/292	1	14.4	83.0	2.7	17.1	20.7	35	0.70	17.8	21.4	35
	H	208-230/60/3	197/254	1	9.6	70.0	3.0	12.6	15.0	20	0.80	13.4	15.8	20
	F*	460/60/3*	414/506	1	4.9	33.0	1.7	6.6	7.8	15	0.70	7.3	8.5	15
GCH/V 042	G	208-230/60/1	197/254	1	17.1	105.0	3.0	20.1	24.4	40	0.80	20.9	25.2	40
	H	208-230/60/3	197/254	1	10.7	85.0	3.0	13.7	16.4	25	0.80	14.5	17.2	25
	F*	460/60/3*	414/506	1	5.3	42.0	1.7	7.0	8.3	15	0.70	7.7	9.0	15
	N	575/60/3	518/633	1	4.3	34.0	1.4	5.7	6.8	15	N/A	N/A	N/A	N/A
GCH/V 048	G	208-230/60/1	197/254	1	18.3	102.0	4.9	23.2	27.8	45	1.07	24.3	28.8	45
	H	208-230/60/3	197/254	1	12.6	91.0	4.9	17.5	20.7	30	1.07	18.6	21.7	30
	F*	460/60/3*	414/506	1	5.7	42.0	2.5	8.2	9.6	15	1.00	9.3	10.7	15
	N	575/60/3	518/633	1	4.7	39.0	1.9	6.6	7.8	15	N/A	N/A	N/A	N/A
GCH/V 060	G	208-230/60/1	197/254	1	25.6	170.0	5.8	31.4	37.8	60	1.07	32.5	38.9	60
	H	208-230/60/3	197/254	1	14.7	124.0	5.8	20.5	24.2	35	1.07	21.6	25.2	35
	F*	460/60/3*	414/506	1	7.4	59.6	2.6	10.0	11.9	15	1.00	11.1	12.9	20
	N	575/60/3	518/633	1	5.9	49.4	2.3	8.2	9.7	15	N/A	N/A	N/A	N/A

HACR circuit breaker in USA only
All fuses Class RK-5

*** NEUTRAL CONNECTION REQUIRED! All F Voltage (460 vac) units with ClimaDry require a four wire power supply with neutral. Reheat pump is rated 265 vac and is wired between one hot leg and neutral.**

Electrical - Power Wiring

⚠ WARNING! ⚠

WARNING! Disconnect electrical power source to prevent injury or death from electrical shock.

⚠ CAUTION! ⚠

CAUTION! Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

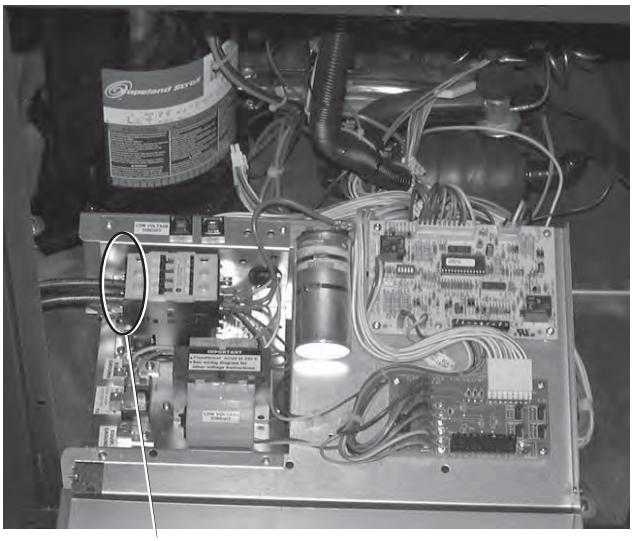
Electrical - Line Voltage

All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

General Line Voltage Wiring

Be sure the available power is the same voltage and phase shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

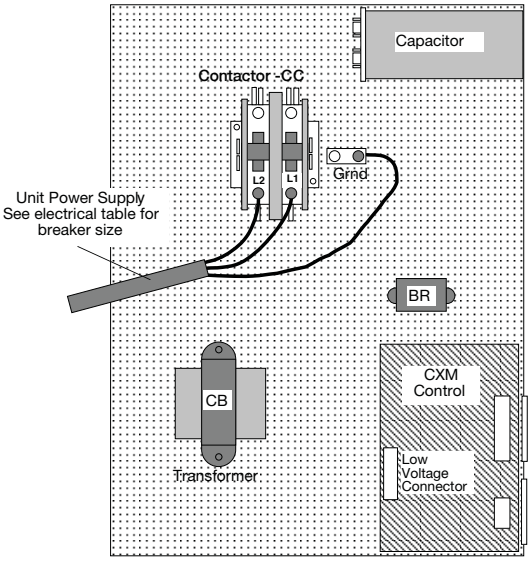
Figure 15: TT/TS Single Phase Line Voltage Field Wiring. Three phase wiring is similar except that all three power wires are directly connected to the contactor.



Unit Power Supply
(see electrical table for wire and breaker size)

Note: 460V units with ECM motor require a neutral wire.

Figure 16: GS/GR/GC Single Phase Line Voltage Field Wiring. Three phase wiring is similar except that all three power wires are directly connected to the contactor.



Power Connection

Line voltage connection is made by connecting the incoming line voltage wires to the “L” side of the contractor as shown in Figures 15 and 16. Consult Tables 4a and 4g for correct fuse size.

Transformer

All commercial dual voltage units are factory wired for 208/60/1 or 240/50/1. If supply voltage is 230/60/1 or 220/50/1, installer must rewire transformer. See wire diagram for connections.

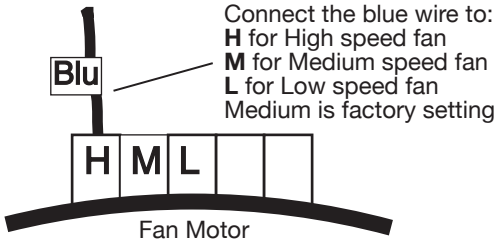
Blower Speed Selection – Units with PSC Motor

PSC (Permanent Split Capacitor) blower fan speed can be changed by moving the blue wire on the fan motor terminal block to the desired speed as shown in Figure 17. Optional ECM motor (TT/TS units only) speeds are set via low voltage controls (see “ECM Blower Control”). Most ClimateMaster units are shipped on the medium speed tap. Consult submittal data or engineering design guide for specific unit airflow tables. Typical unit design delivers rated airflow at nominal static (0.15 in. w.g. [37Pa]) on medium speed and rated airflow at a higher static (0.4 to 0.5 in. w.g. [100 to 125 Pa]) on high speed for applications where higher static is required. Low speed will deliver approximately 85% of rated airflow at 0.10 in. w.g. [25 Pa]. An optional high static blower is available on some models.

Electrical - Power & Low Voltage Wiring

Special Note for ARI Testing: To achieve rated airflow for ARI testing purposes on all PSC products, it is necessary to change the fan speed to "HI" speed. When the heat pump has experienced less than 100 operational hours and the coil has not had sufficient time to be "seasoned", it is necessary to clean the coil with a mild surfactant such as Calgon to remove the oils left by manufacturing processes and enable the condensate to properly "sheet" off of the coil.

Figure 17: PSC Motor Speed Selection

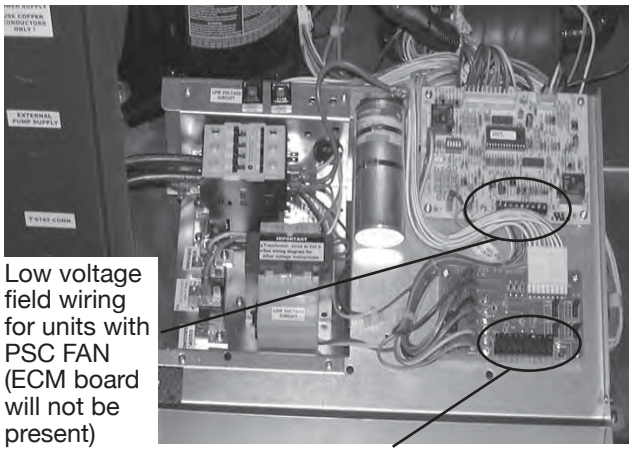


ELECTRICAL - LOW VOLTAGE WIRING

Thermostat Connections

The thermostat should be wired directly to the CXM or DXM board (units with PSC fan). Units with optional ECM motor include factory wiring from the CXM or DXM board to the ECM interface board. Thermostat wiring for these units should be connected to the ECM interface board. Figure 18 shows wiring for GS/GR/GC units; figure 19 should be used for TT/TS units with PSC or optional ECM motor. See "Electrical – Thermostat" for specific terminal connections. Review the appropriate AOM (Application, Operation and Maintenance) manual for units with DDC controls.

Figure 18: TT/TS Low Voltage Field Wiring



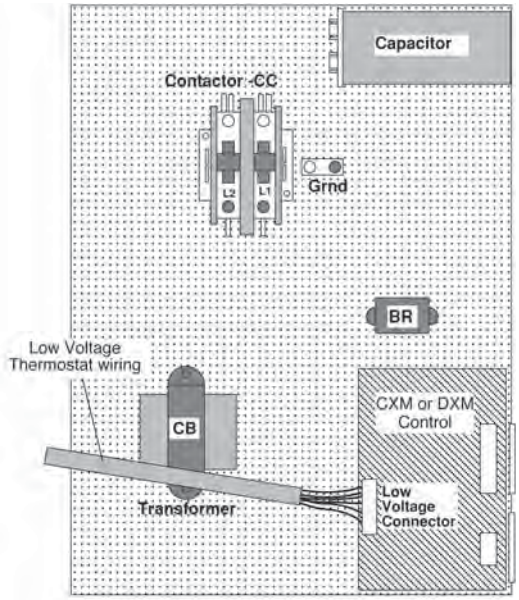
Low voltage field wiring for units with ECM fan

Low Water Temperature Cutout Selection

The CXM/DXM control allows the field selection of low water (or water-antifreeze solution) temperature limit by clipping jumper JW3, which changes the sensing temperature associated with thermistor FP1. Note that the FP1 thermistor is located on the refrigerant line between the coaxial heat exchanger and expansion device (TXV or cap tube). Therefore, FP1 is sensing refrigerant temperature, not water temperature, which is a better indication of how water flow rate/temperature is affecting the refrigeration circuit.

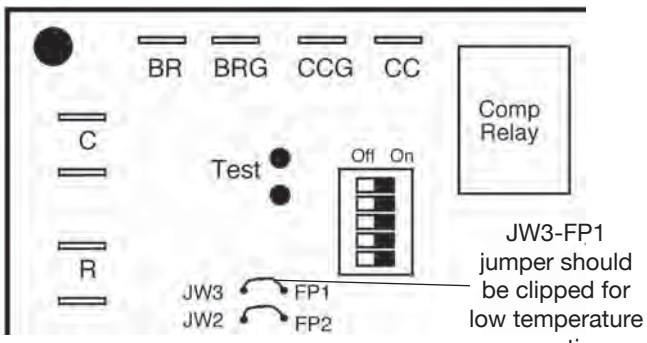
The factory setting for FP1 is for systems using water (30°F [-1.1°C] refrigerant temperature). In low water temperature (extended range) applications with antifreeze (most ground loops), jumper JW3 should be clipped as shown in Figure 20 to change the setting to 10°F [-12.2°C] refrigerant temperature, a more suitable temperature when using an antifreeze solution. All ClimateMaster units operating with entering water temperatures below 59°F [15°C] must include the optional water/refrigerant circuit insulation package to prevent internal condensation. GC series equipment is not rated for extended range applications.

Figure 19: GS/GR/GC Low Voltage Field Wiring



Electrical - Low Voltage Wiring

Figure 20: FP1 Limit Setting



CXM PCB

JW3 should never be clipped for GC series equipment or systems without antifreeze

⚠ CAUTION! ⚠

CAUTION! GC series equipment may not be used when EWT is below 60°F [15°C]. Extended range equipment is required.

Accessory Connections

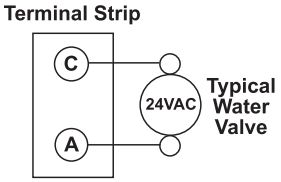
A terminal paralleling the compressor contactor coil has been provided on the CXM/DXM control. Terminal "A" is designed to control accessory devices, such as water valves. Note: This terminal should be used only with 24 Volt signals and not line voltage. Terminal "A" is energized with the compressor contactor. See Figure 21 or the specific unit wiring diagram for details.

Low Voltage VA Ratings

Component	VA
Typical Blower Relay	6 - 7
Typical Reversing Valve Solenoid	4 - 6
30A Compressor Contactor	6 - 9
Subtotal	16 - 22
+ CXM board (5 - 9 VA)*	21 - 31
Remaing VA for Accessories	19 - 29
+ DXM board (8 - 12 VA)*	24 - 34
Remaing VA for Accessories	41 - 51

*Standard transformer for CXM board is 50VA. Optional DXM board and/or DDC controls include 75VA transformer.

Figure 21: Accessory Wiring



Water Solenoid Valves

An external solenoid valve(s) should be used on ground water installations to shut off flow to the unit when the compressor is not operating. A slow closing valve may be required to help reduce water hammer. Figure 21 shows typical wiring for a 24VAC external solenoid valve. Figures 22 and 23 illustrate typical slow closing water control valve wiring for Taco 500 series (ClimateMaster P/N AMV…) and Taco ESP series valves. Slow closing valves take approximately 60 seconds to open (very little water will flow before 45 seconds). Once fully open, an end switch allows the compressor to be energized. Only relay or triac based electronic thermostats should be used with slow closing valves. When wired as shown, the slow closing valve will operate properly with the following notations:

1. The valve will remain open during a unit lockout.
2. The valve will draw approximately 25-35 VA through the "Y" signal of the thermostat.

Note: This valve can overheat the anticipator of an electromechanical thermostat. Therefore, only relay or triac based thermostats should be used.

Two-stage Units

Tranquility 27™ (TT) two-stage units should be designed with two parallel valves for ground water applications to limit water use during first stage operation. For example, at 1.5 gpm/ton [2.0 l/m per kW], a TT049 unit requires 6 gpm [23 l/m] for full load (2nd stage) operation, but only 4 gpm [15 l/m] during 1st stage operation. Since the unit will operate on first stage 80-90% of the time, significant water savings can be realized by using two parallel solenoid valves with two flow regulators. In the example above, stage one solenoid would be installed with a 4 gpm [15 l/m] flow regulator on the outlet, while stage two would utilize a 2 gpm [8 l/m] flow regulator. When stage one is operating, the second solenoid valve will be closed. When stage two is operating, both valves will be open, allowing full load flow rate.

Figure 24 illustrates piping for two-stage solenoid valves. Review figures 21-23 for wiring of stage one valve. Stage two valve should be wired between terminal "Y2" (ECM board) and terminal "C." NOTE: When EWT is below 50°F [10°C], 2 gpm per ton (2.6 l/m per kW) is required.

Electrical - Low Voltage Wiring

Figure 22: AMV Valve Wiring

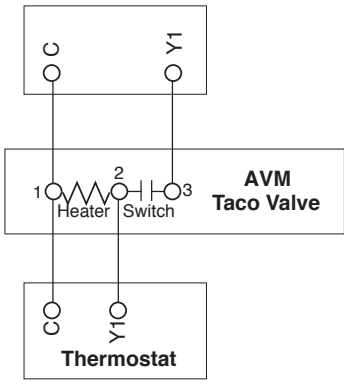


Figure 23: Taco SBV Valve Wiring

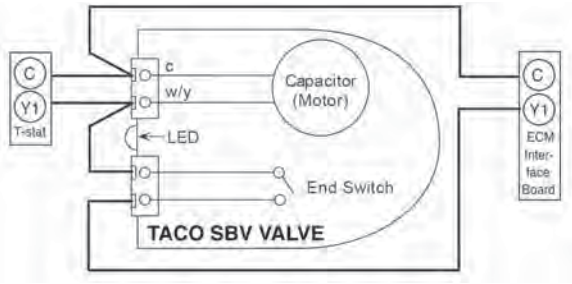
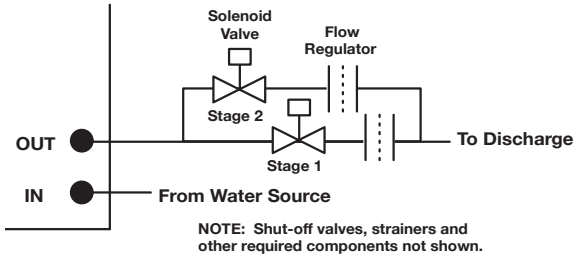


Figure 24: Two-Stage Piping



⚠ CAUTION! ⚠

CAUTION! Many units are installed with a factory or field supplied manual or electric shut-off valve. **DAMAGE WILL OCCUR** if shut-off valve is **closed** during unit operation. A high pressure switch must be installed on the heat pump side of any field provided shut-off valves and connected to the heat pump controls in series with the built-in refrigerant circuit high pressure switch to disable compressor operation if water pressure exceeds pressure switch setting. The field installed high pressure switch shall have a cut-out pressure of 300 psig and a cut-in pressure of 250 psig. This pressure switch can be ordered from ClimateMaster with a 1/4" internal flare connection as part number 39B0005N02.

Electrical - Thermostat Wiring

Thermostat Installation
The thermostat should be located on an interior wall in a larger room, away from supply duct drafts. DO NOT locate the thermostat in areas subject to sunlight, drafts or on external walls. The wire access hole behind the thermostat may in certain cases need to be sealed to prevent erroneous temperature measurement. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate. Mark the position of the back plate mounting holes and drill holes with a 3/16" (5mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire. Wire the appropriate thermostat as shown in Figures 25a through 25c to the low voltage terminal strip on the CXM, DXM or ECM control board. Practically any heat pump thermostat will work with ClimateMaster units, provided it has the correct number of heating and cooling stages.

Figure 25a: Units With PSC Fan And CXM

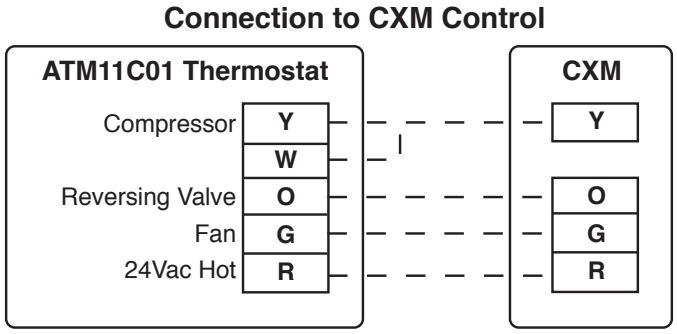
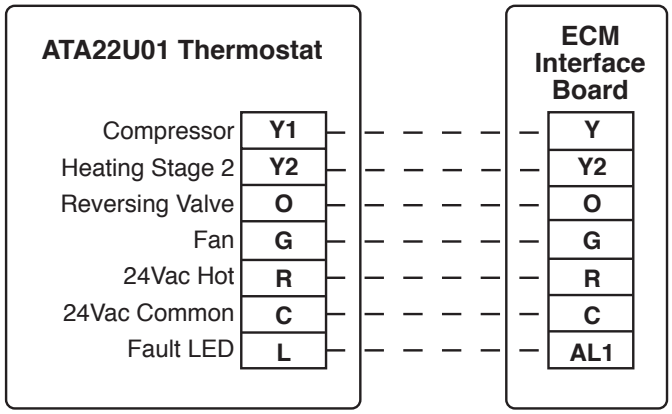


Figure 25b: Units With Optional ECM Fan.
(A Two Stage Thermostat Is Required)



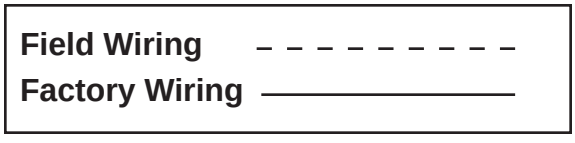
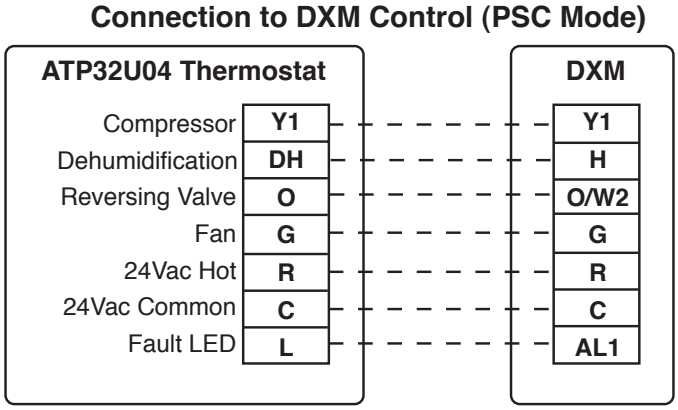
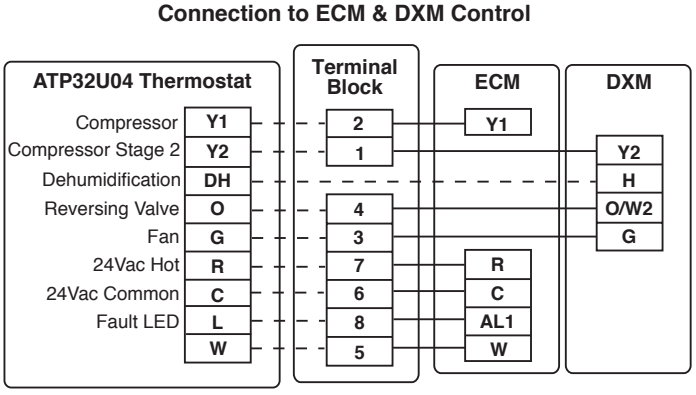


Figure 25c: GC/GS/TT/TS Series With ClimaDry™ Reheat Option (DXM Board Required) And ATP32U02 Thermostat



Single stage unit with ClimaDry Modulating Reheat Option and DXM board (PSC or belt drive fan motor)

Units with ClimaDry™ Reheat & ECM Fan



Single or two-stage unit with ClimaDry Modulating Reheat Option and DXM board (ECM fan motor)

ECM Blower Control

The ECM fan is controlled by an interface board that converts thermostat inputs and field selectable CFM settings to signals used by the ECM motor controller. Units manufactured before July 2005 have version I (P/N 69243707). Units manufactured after July 2005 have version II (P/N 17B0019N01). Fan speeds are selected with jumpers for version I or via a nine position DIP switch for version II. To take full advantage of the ECM motor features, a multi-stage thermostat should be used (2-stage heat/2-stage cool or 3-stage heat/2-stage cool).

Note: Power must be off to the unit for at least three seconds before the ECM motor will recognize a speed change. The motor will recognize a change in the CFM Adjust or dehumidification mode settings while the unit is powered.

There are four different airflow settings from lowest airflow rate (speed tap 1) to the highest airflow rate (speed tap 4). The charts below indicate settings for both versions of the ECM interface board, followed by detailed information for each setting.

Cooling Settings: The cooling setting determines the cooling (normal) CFM for all units with ECM motor. Cooling (normal) setting is used when the unit is not in dehumidification mode. This setting also determines the heating CFM for Genesis (GS) units. Tap 1 is the lowest CFM setting, while tap 4 is the highest CFM setting. To avoid air coil freeze-up, tap 1 may not be used if the dehumidification mode is selected. Consult submittal data or specifications catalog for the specific unit series and model to correlate speed tap setting to airflow in CFM.

Heating Settings: The heating setting determines the heating CFM for Tranquility 27™ (TT) and Tranquility 20™ (TS) units. This setting is not used for Genesis (GS) units. Tap 1 is the lowest CFM setting, while tap 4 is the highest CFM setting. Consult submittal data or specifications catalog for the specific unit series and model to correlate speed tap setting to airflow in CFM.

Auxiliary/Emergency Heat Settings: The auxiliary/emergency heat setting determines the CFM when the unit is in auxiliary heat or emergency heat mode. This setting is used for residential units with internal electric heat. When auxiliary electric heat is energized (i.e. compressor and electric heat), the greater of the auxiliary/emergency or heating setting will be used. A “G” (fan) signal must be present from the thermostat for electric heat to operate. Consult the submittal data or specifications catalog for the specific unit series and model to correlate speed tap setting to airflow in CFM.

CFM Adjust Settings: The CFM adjust setting allows four selections. The NORM setting is the factory default position. The + or – settings adjust the airflow by +/- 15%. The +/- settings are used to “fine tune” airflow adjustments. The TEST setting runs the ECM motor at 70% torque, which causes the motor to operate like a standard PSC motor, and disables the CFM counter.

Dehumidification Mode Settings: The dehumidification mode setting provides field selection of humidity control. When operating in the normal mode, the cooling airflow settings are determined by the cooling tap setting above. When dehumidification is enabled there is a reduction in airflow in cooling to increase the moisture removal of the heat pump. Consult submittal data or specifications catalog for the specific unit series and model to correlate speed tap to airflow in CFM. The dehumidification mode can be enabled in two ways.

1. Constant Dehumidification Mode: When the dehumidification mode is selected (via DIP switch or jumper setting), the ECM motor will operate with a multiplier applied to the cooling CFM settings (approx. 20-25% lower airflow). Any time the unit is running in the cooling mode, it will operate at the lower airflow to improve latent capacity. The “DEHUM” LED will be illuminated at all times. Heating airflow is not affected. NOTE: Do not select dehumidification mode if cooling setting is tap 1.
2. Automatic (Humidistat-controlled) Dehumidification Mode: When the dehumidification mode is selected (via DIP switch or jumper setting) AND a humidistat is connected to terminal DH (version II) or HUM (version I), the cooling airflow will only be reduced when the humidistat senses that additional dehumidification is required. The DH (or HUM) terminal is reverse logic. Therefore, a humidistat (not dehumidistat) is required. The “DEHUM” LED will be illuminated only when the humidistat is calling for dehumidification mode. Heating airflow is not affected. NOTE: Do not select dehumidification mode if cooling setting is tap 1.

ECM Blower Control

Table 5: ECM Board Tap Settings

Cooling settings: TT, TS, GS units*

Tap Setting	Version I 69243707 *HP CFM* Jumper	Version II 17B0019N01 DIP Switch SW1	SW2
1	1	ON	ON
2	2	ON	OFF
3	3	OFF	ON
4	4	OFF	OFF

*GS units use the same settings for both cooling (normal) CFM and heating CFM.

Heating settings: TT, TS units*

Tap Setting	Version I 69243707 *DELAY* Jumper	Version II 17B0019N01 DIP Switch SW3	SW4
1	1	ON	ON
2	2	ON	OFF
3	3	OFF	ON
4	4	OFF	OFF

*This table not used for GS units.

Aux/Emerg Heat settings: TT, TS, GS units*

Tap Setting	Version I 69243707 *AUX CFM* Jumper	Version II 17B0019N01 DIP Switch SW5	SW6
1	1	ON	ON
2	2	ON	OFF
3	3	OFF	ON
4	4	OFF	OFF

*Residential units

CFM Adjust settings: TT, TS, GS units

Tap Setting	Version I 69243707 *CFM Adj* Jumper	Version II 17B0019N01 DIP Switch SW7	SW8
TEST	1	ON	ON
-	2	ON	OFF
+	3	OFF	ON
NORM	4	OFF	OFF

Dehum Mode settings: TT, TS, GS units

Tap Setting	Version I 69243707 *Dehumid* Jumper	Version II 17B0019N01 DIP Switch SW9
NORM	pins 1,2	ON
Dehumid	pins 2,3	OFF

Figure 26a: ECM Version II Interface Layout

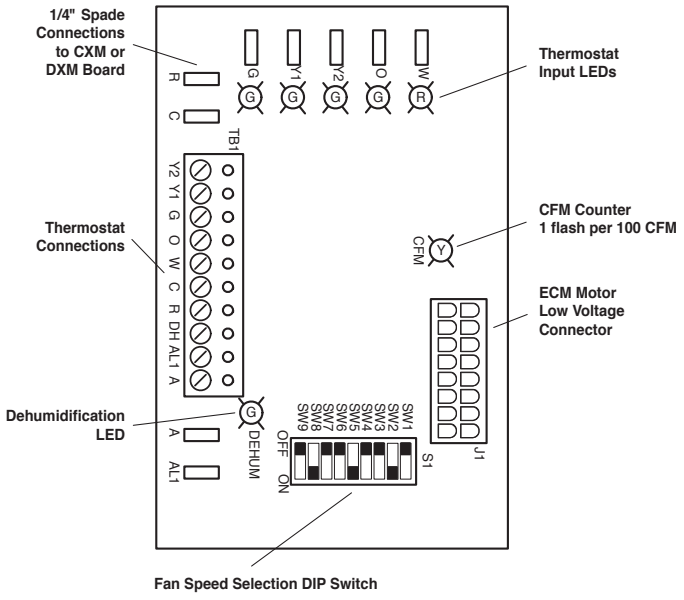
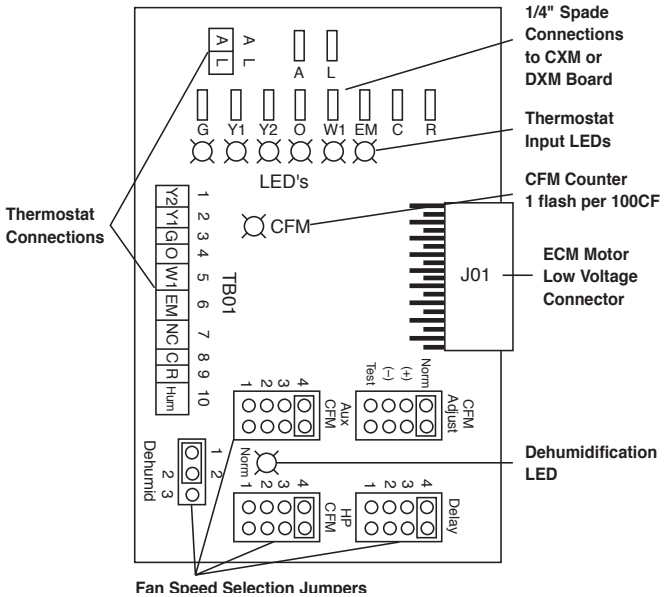
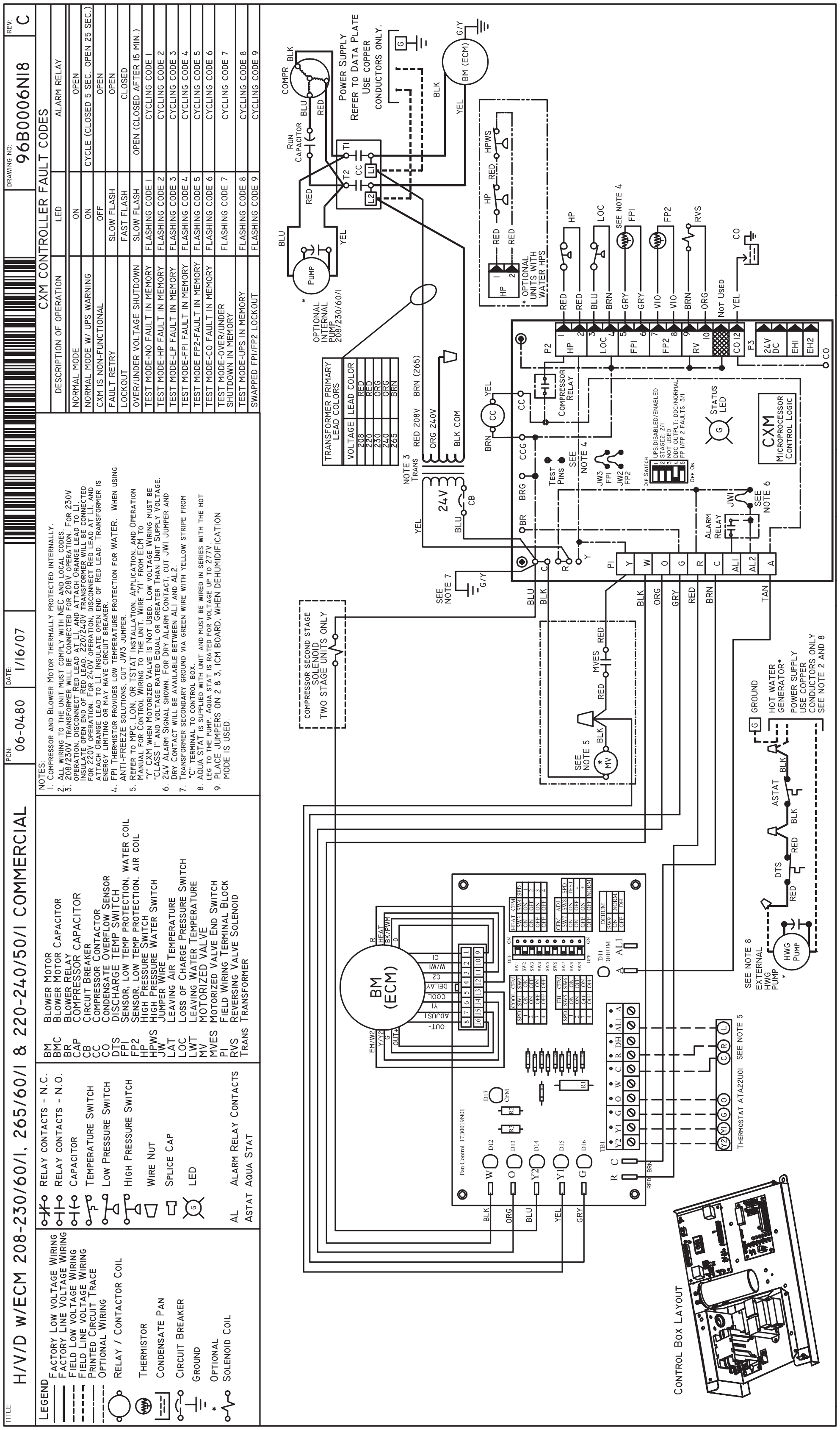


Figure 26b: ECM Version I Interface Layout

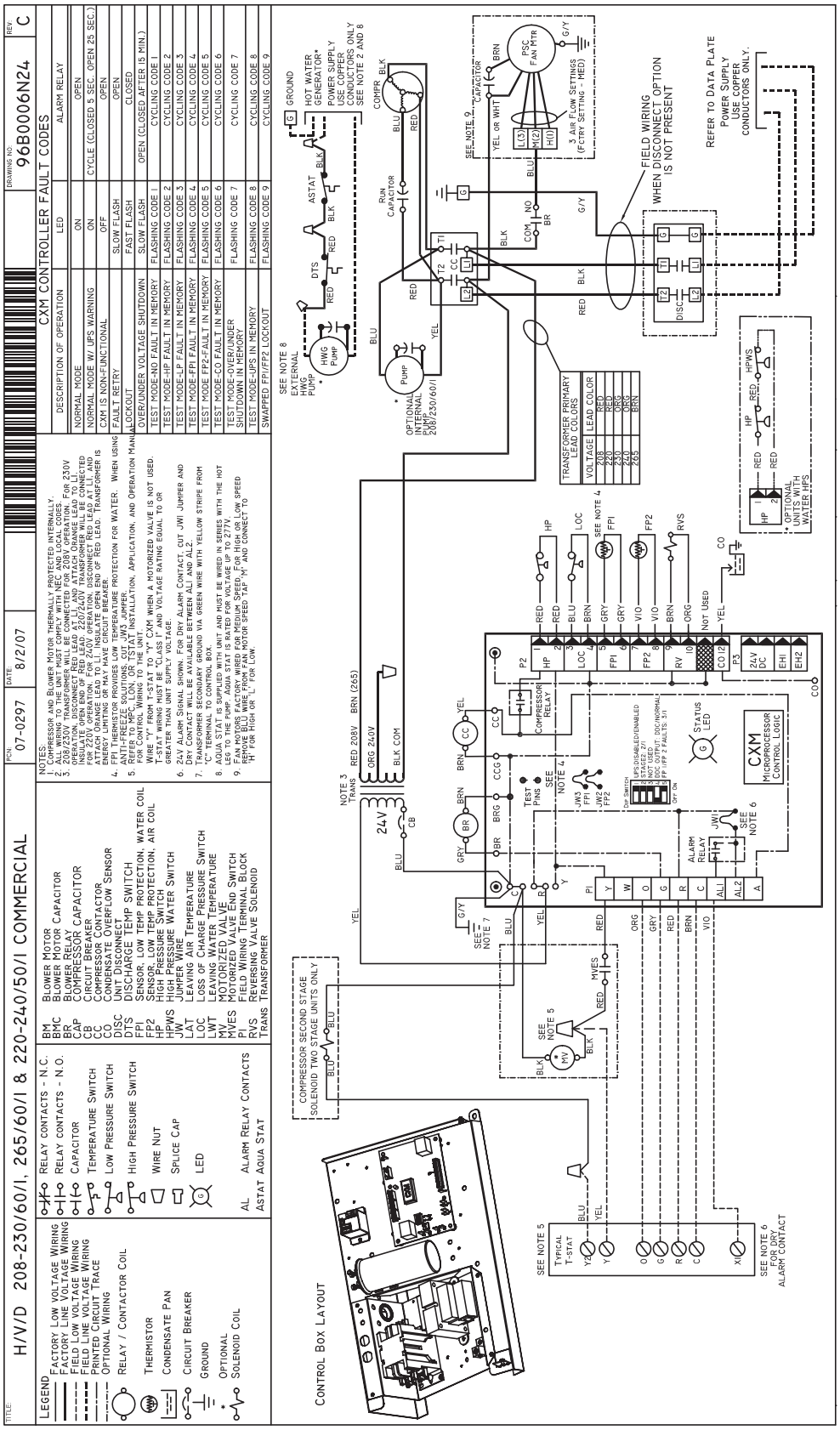


Typical Wiring Diagram - TT/TS Units with CXM Board and ECM Fan Motor (Single Phase)

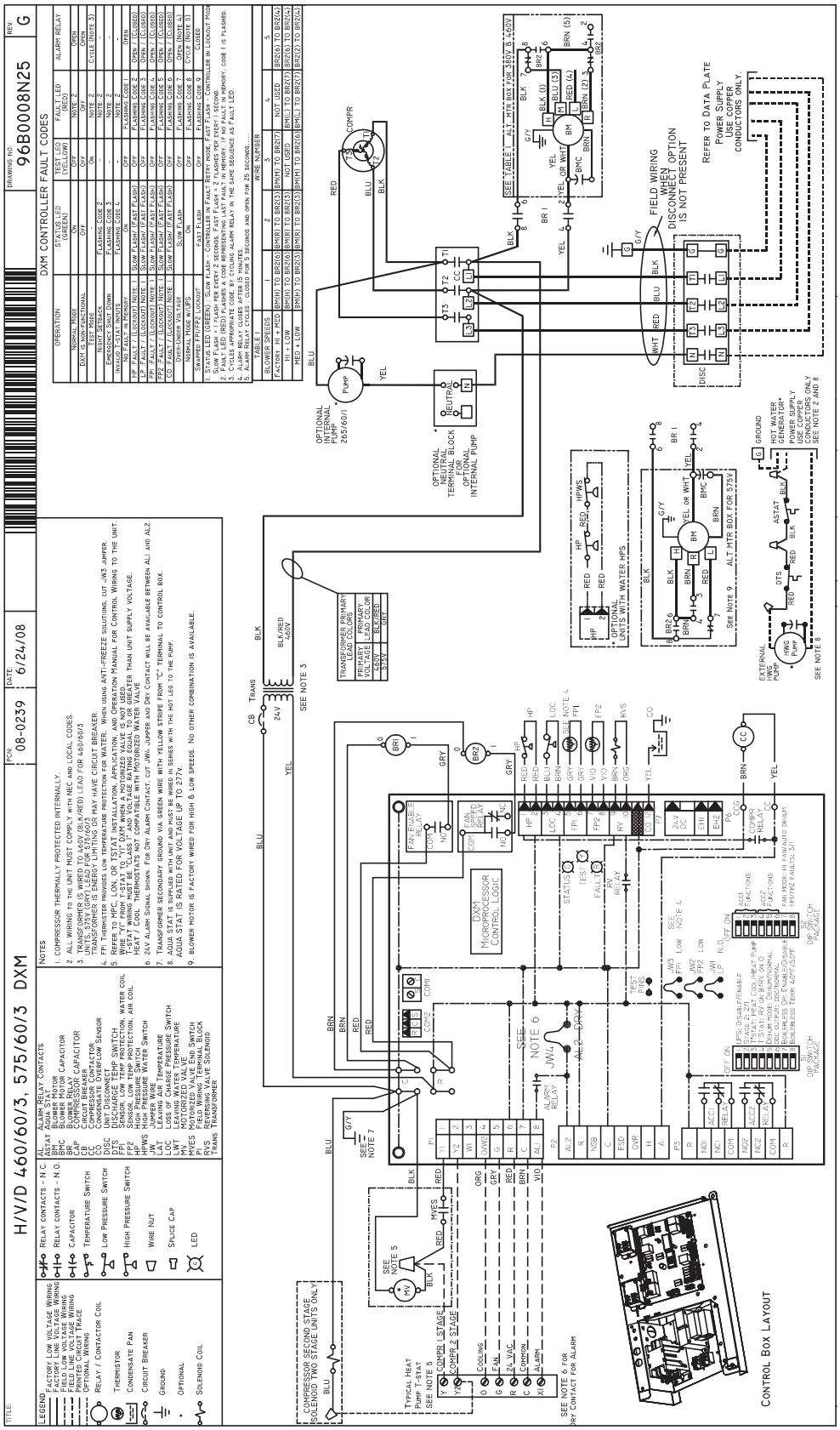


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - TS Units with CXM Board and PSC Fan Motor (Single Phase)

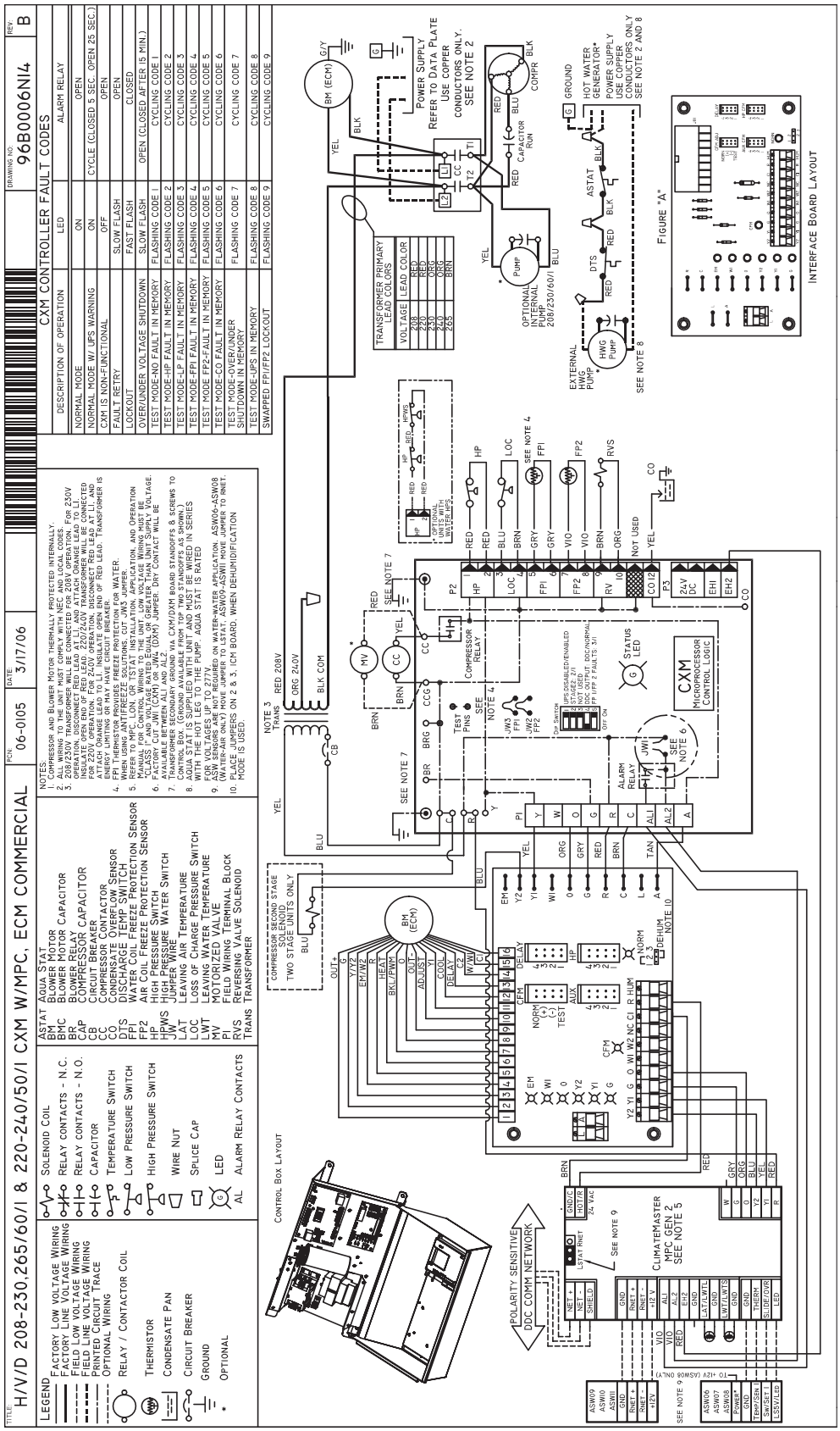


Typical Wiring Diagram - TS Units with DXM Board and PSC Fan Motor (Three Phase)

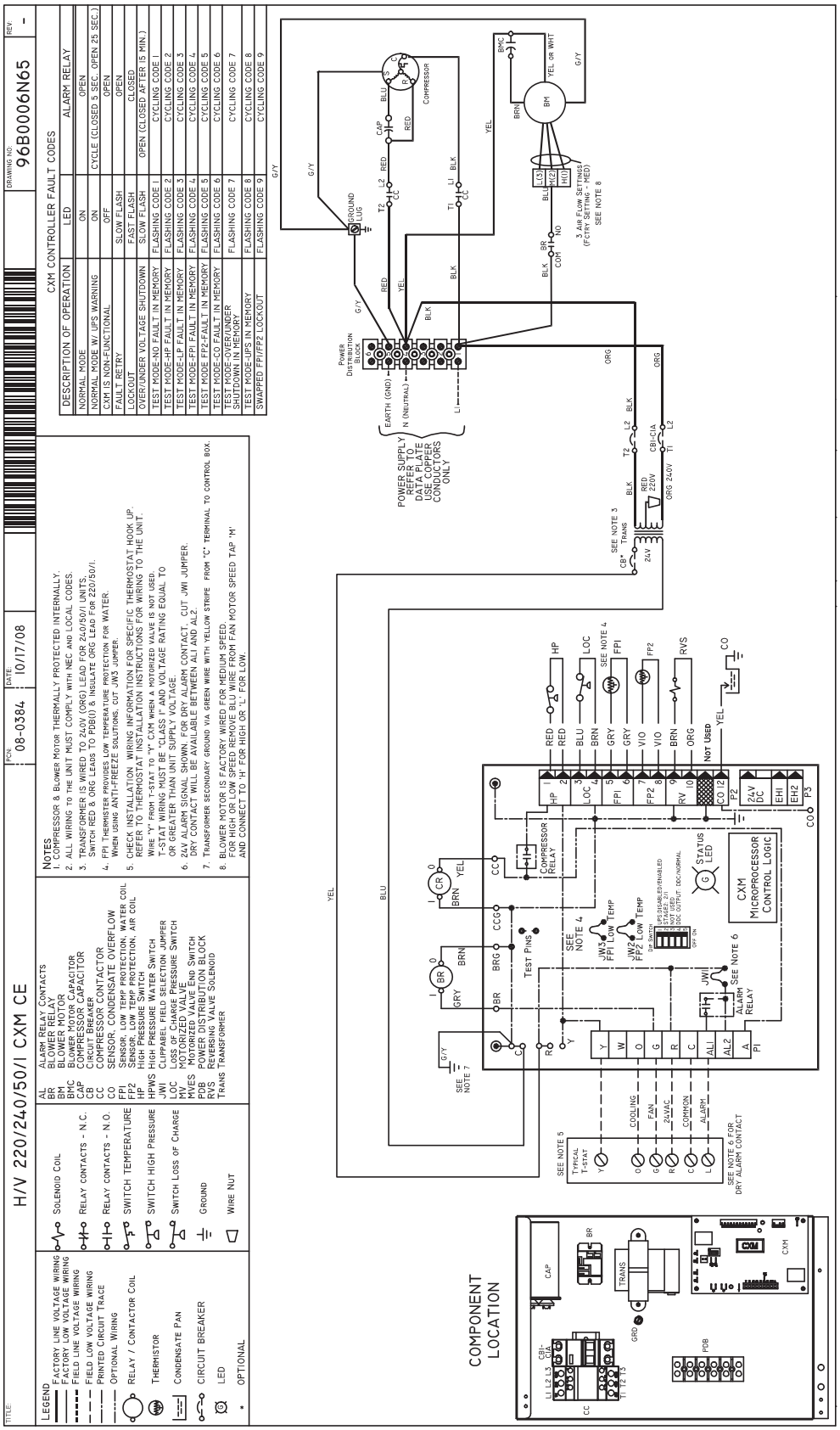


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - TS Units with CXM Board, ECM Fan Motor, and MPC (DDC) CONTROLS (SINGLE PHASE)

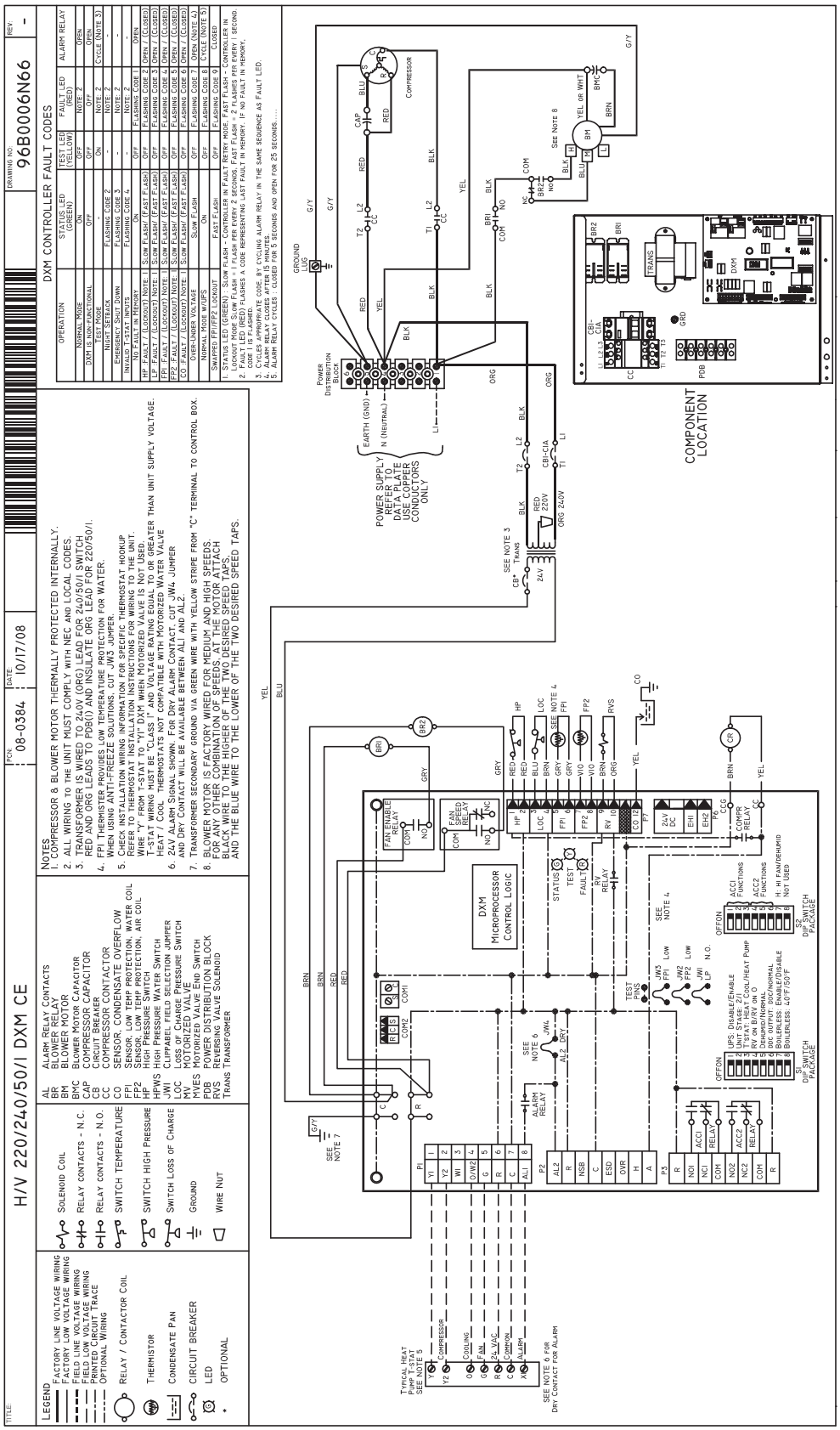


Typical Wiring Diagram - Single Phase 50 Hz TC Units With CXM Controller

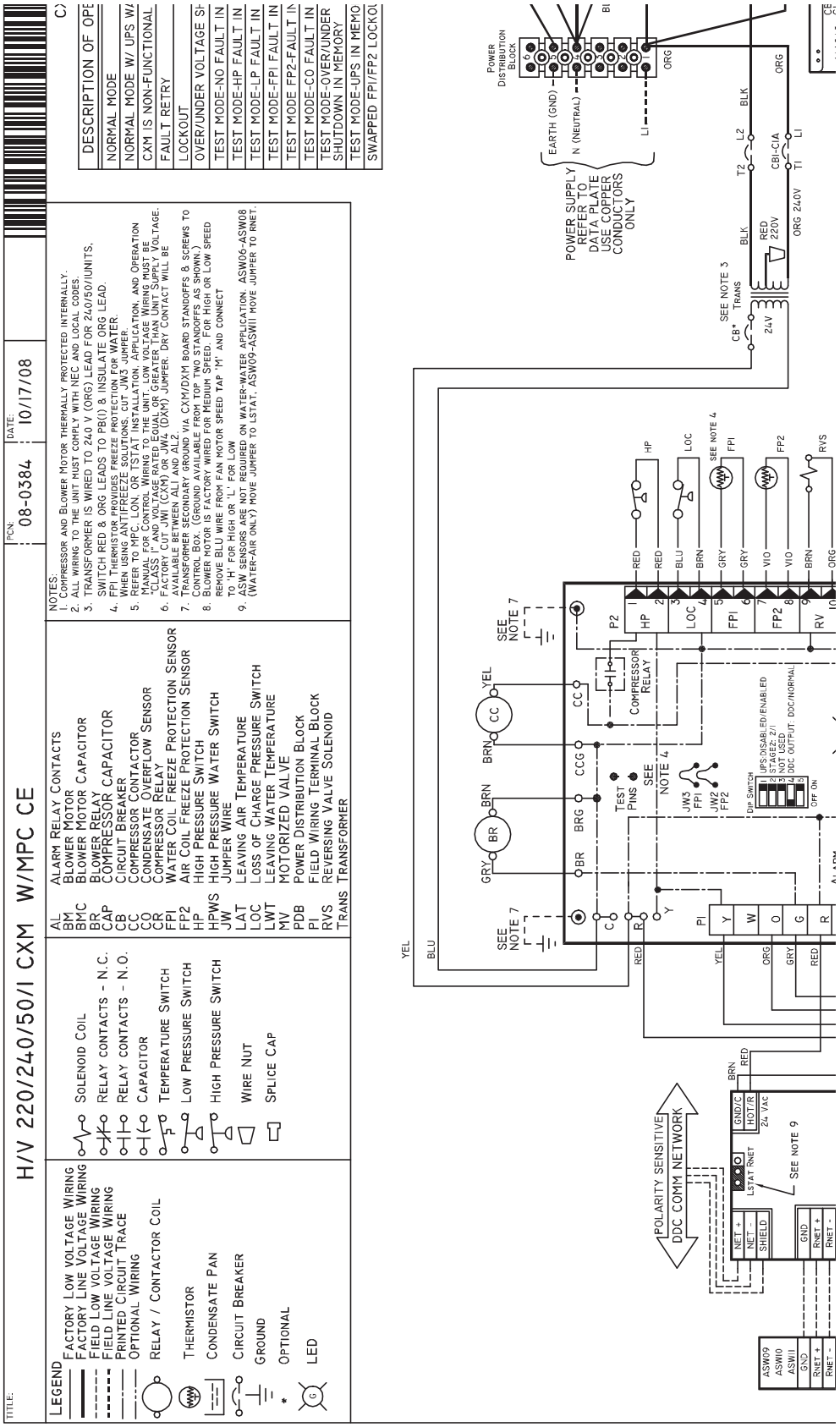


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - Single Phase 50 Hz TC Units With DXM Controller

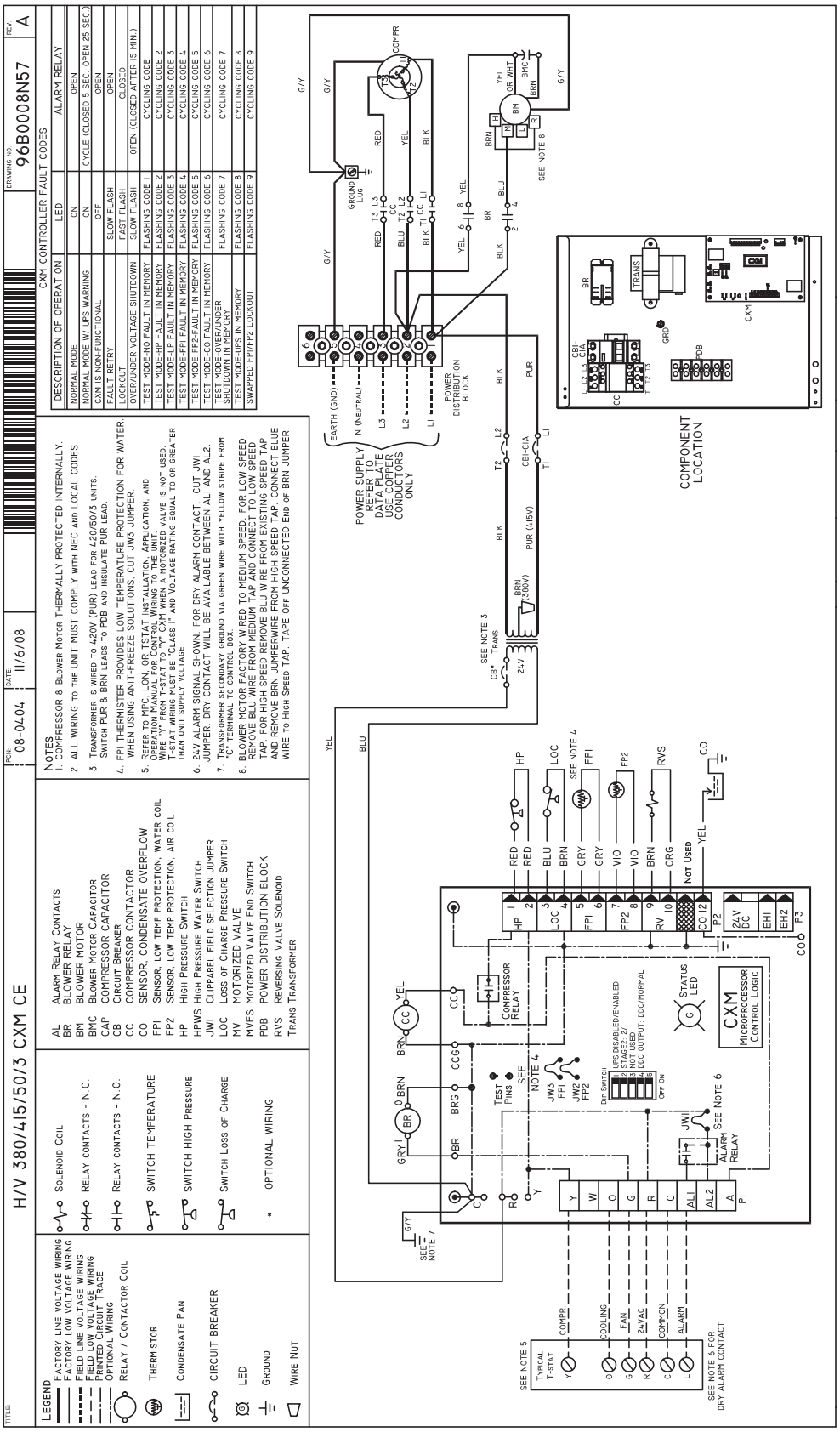


Typical Wiring Diagram - Single Phase 50 Hz TC Units With CXM Controller and MPC (DDC) Controls

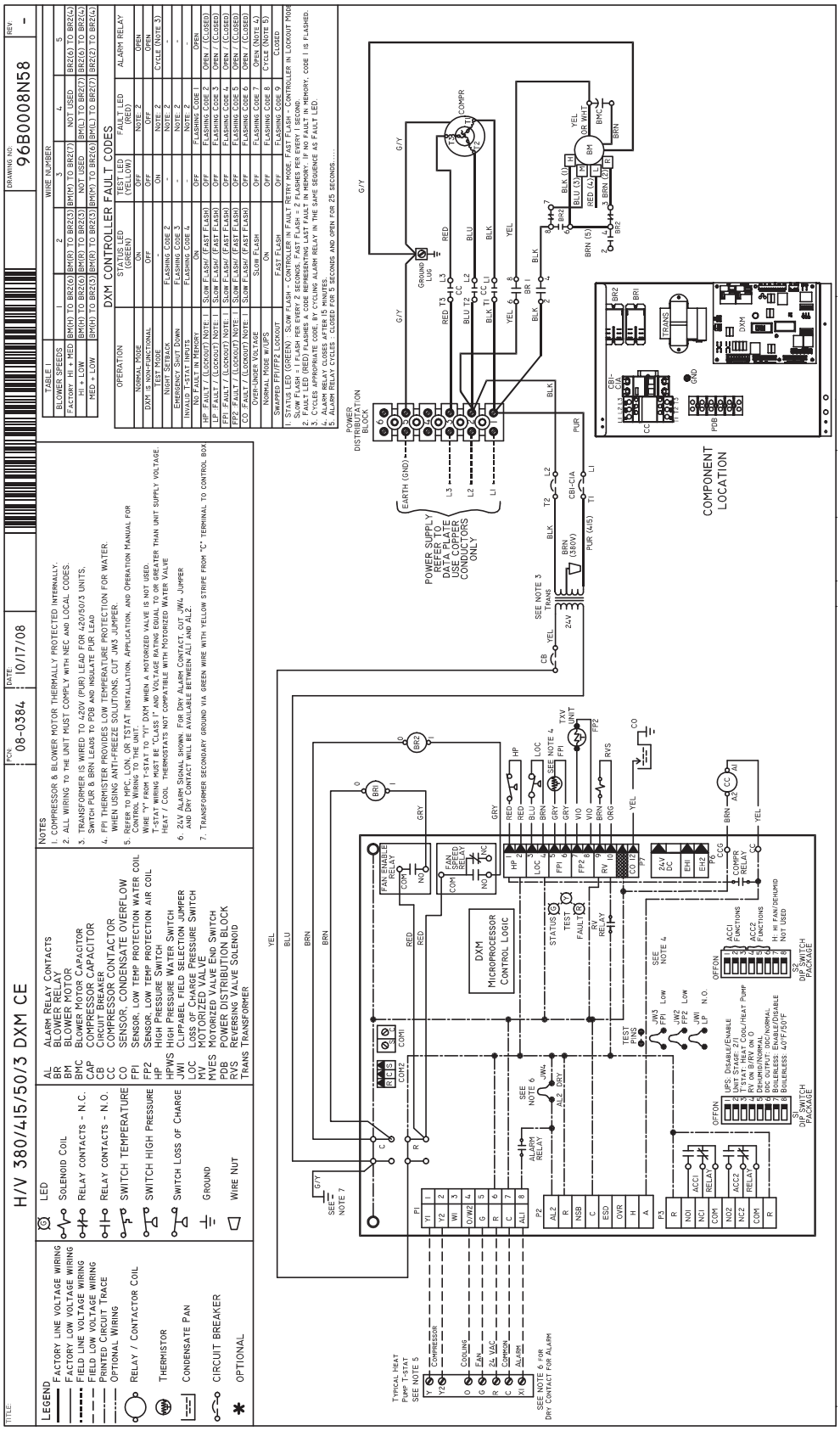


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - Three Phase 50 Hz TC Units With CXM Controller

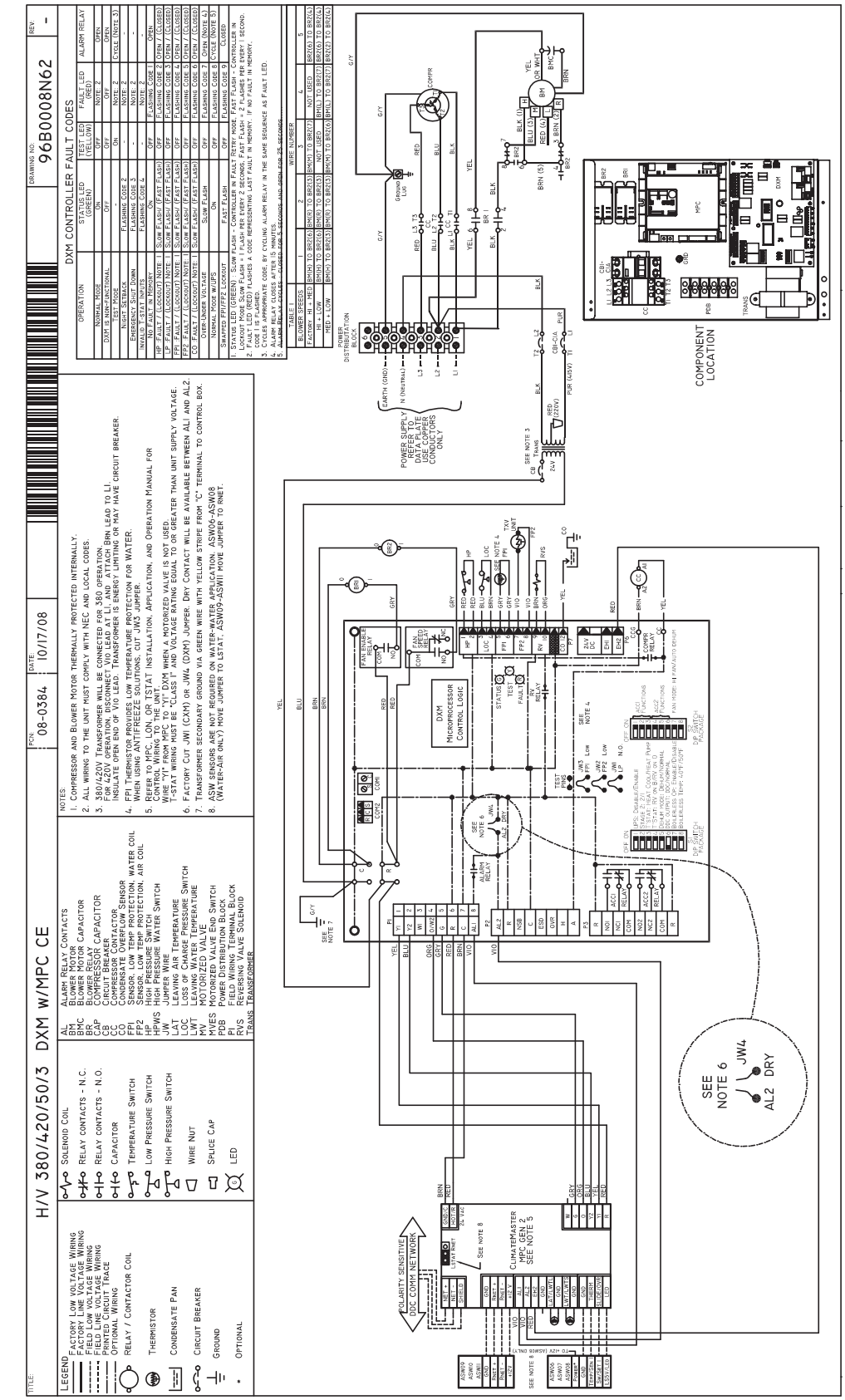


Typical Wiring Diagram - Three Phase 50 Hz TC Units With DXM Controller

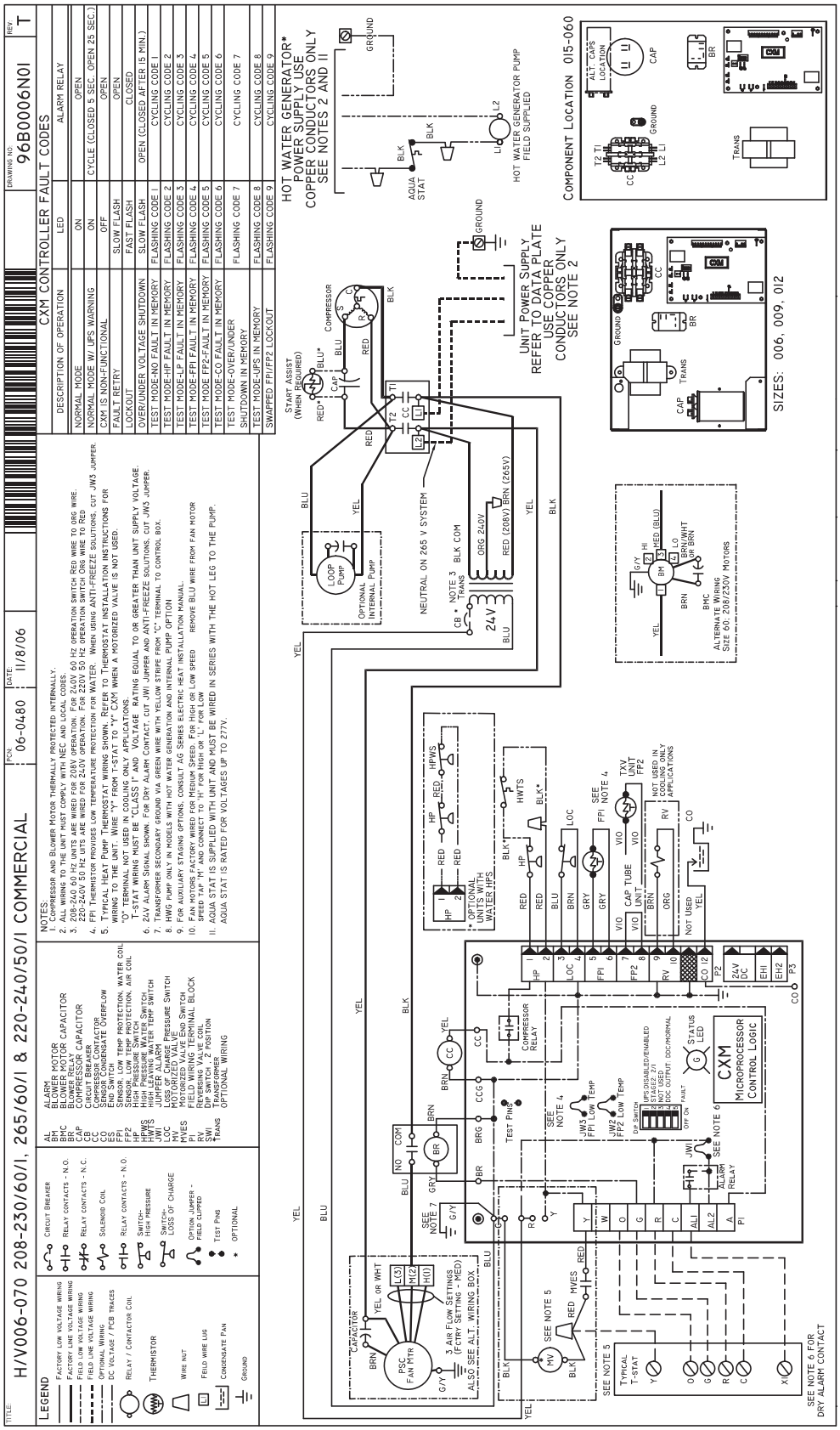


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - Three Phase 50 Hz TC Units With DXM Controller and MPC (DDC) Controls

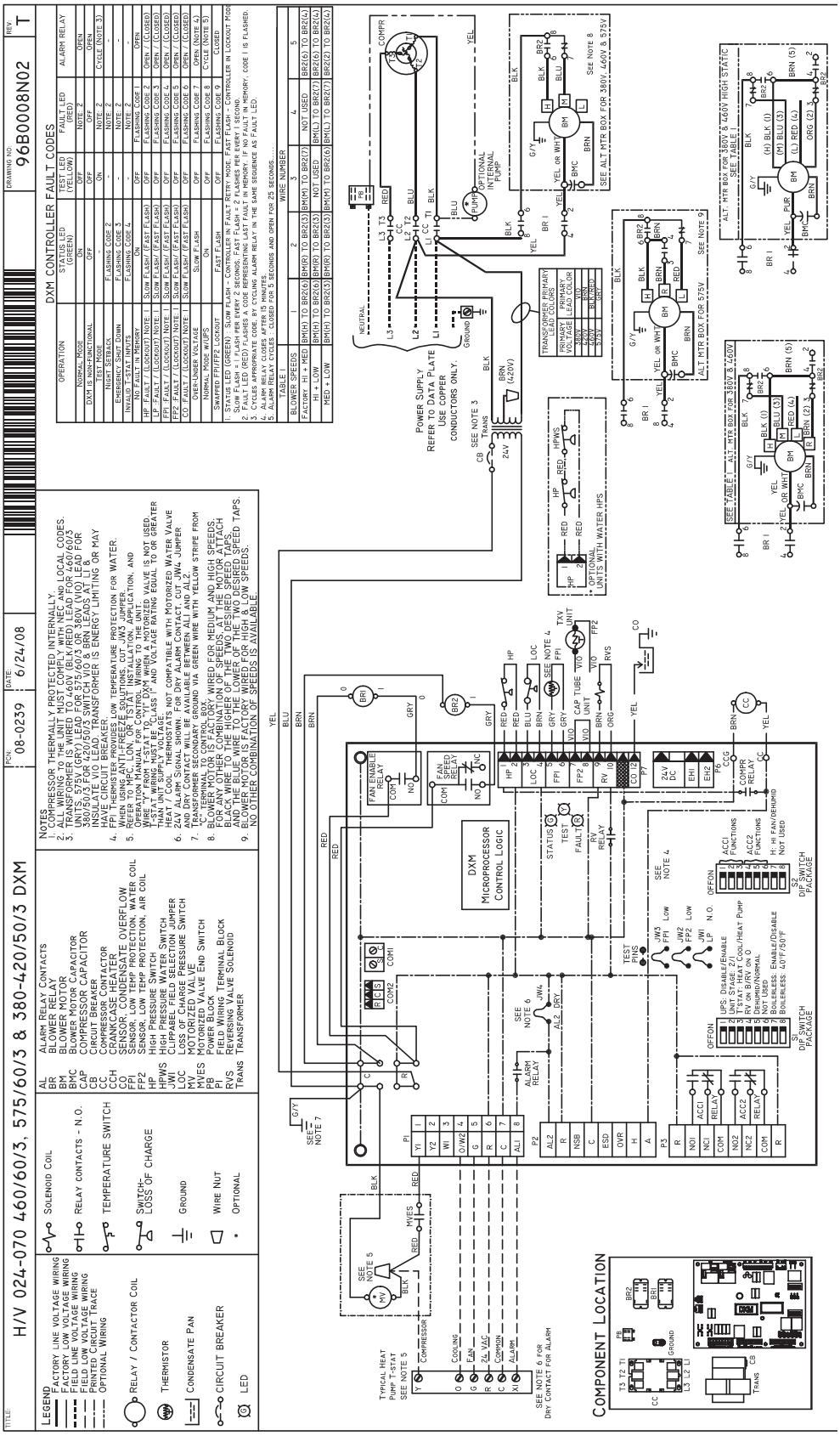


Typical Wiring Diagram - GS/GR/GC Units with CXM Board (Single Phase)

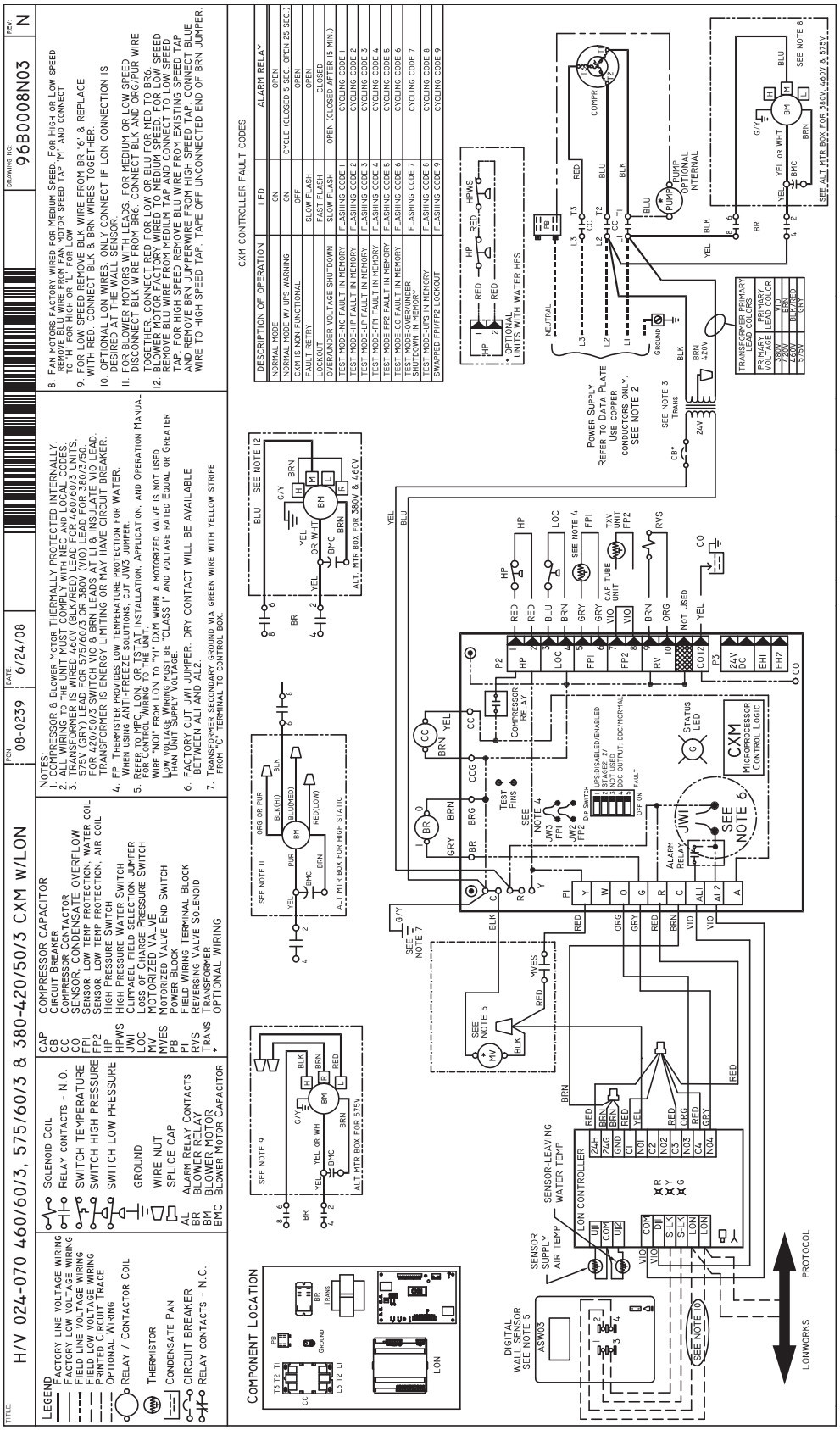


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - GS/GR/GC Units with DXM Board (Single Phase)

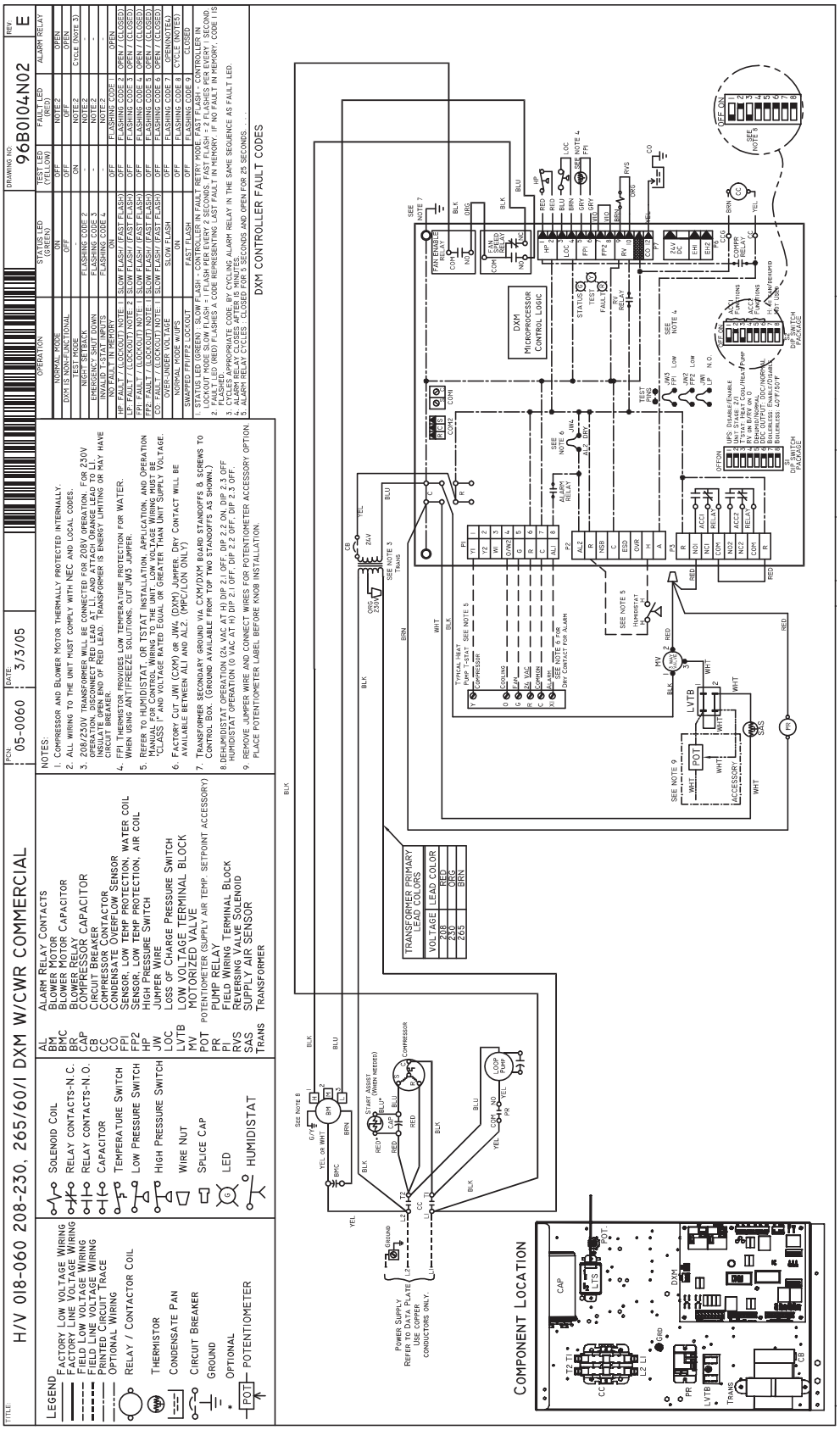


Typical Wiring Diagram - GS/GR/GC Units with CXM Board and LON Controller (Three Phase)

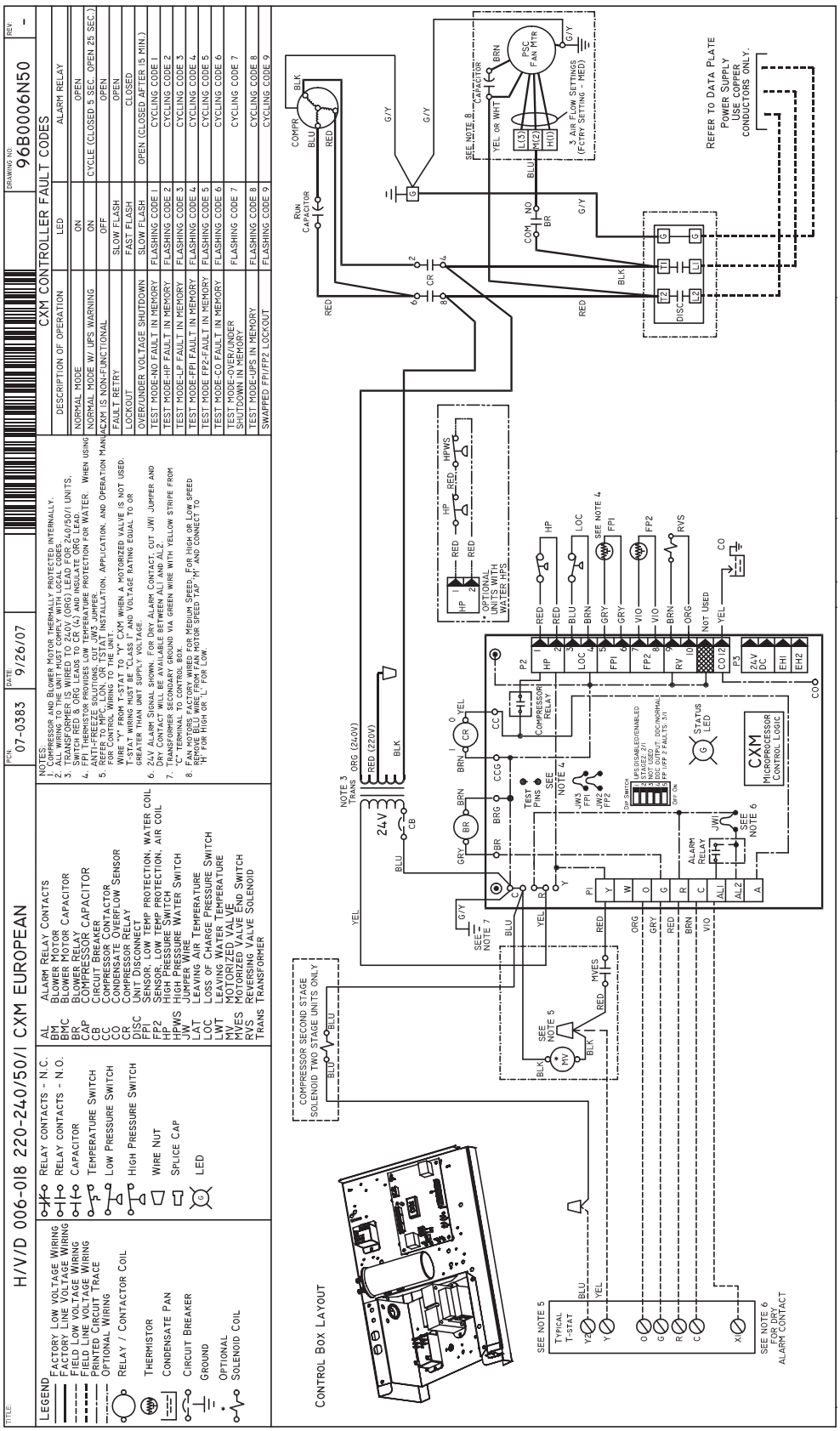


Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - GCV Units with DXM Board and ClimaDry™ Reheat (Single Phase)

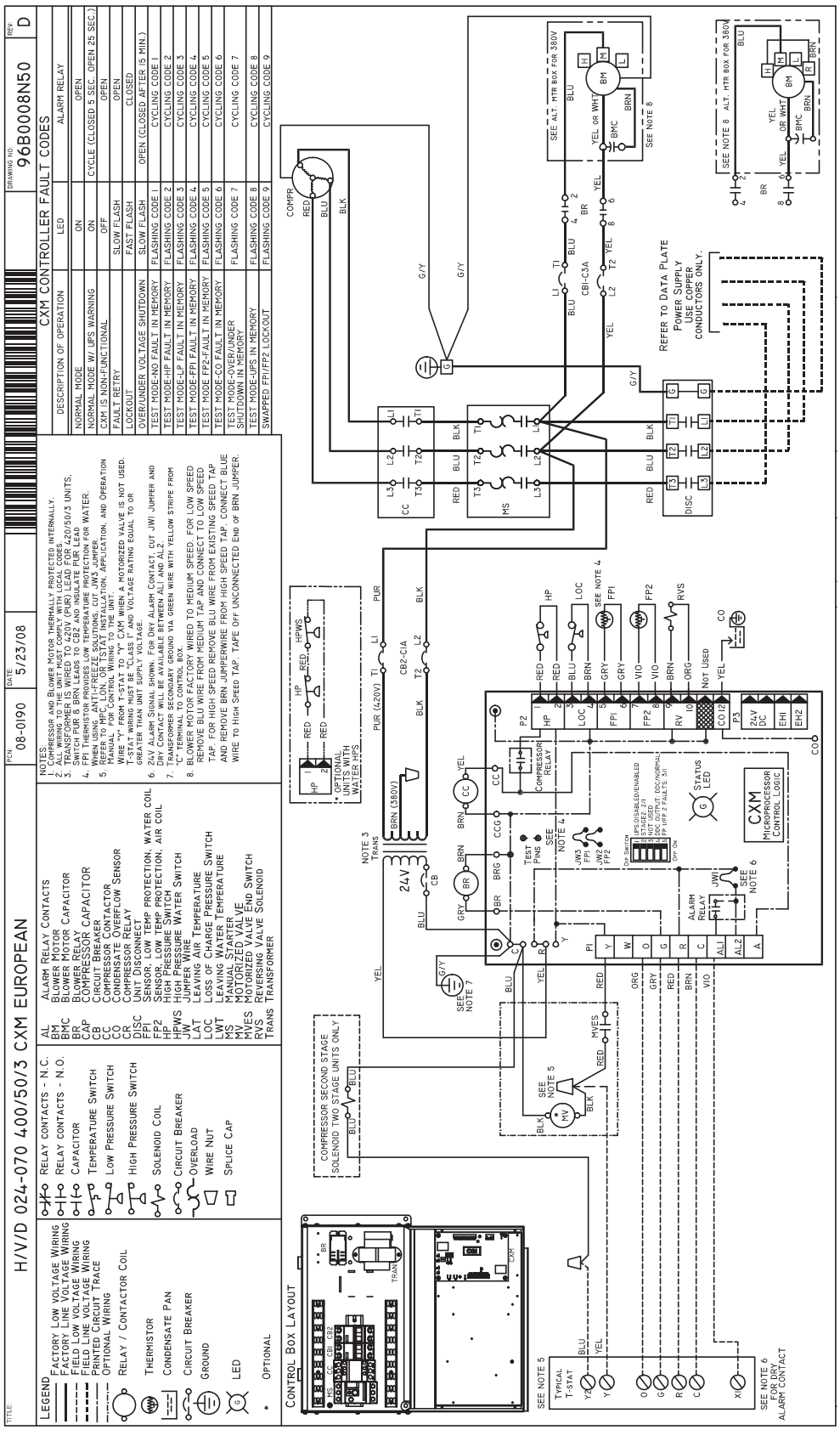


Typical Wiring Diagram - Single Phase TS Units 50Hz (Size 006-018) with CXM Controller



Packaged Units
Rev.: 1/06/09B

Typical Wiring Diagram - Three Phase TS Units 50Hz (Size 024 - 070) With CXM Controller



CXM Controls

CXM Control

For detailed control information, see CXM or DXM Application, Operation and Maintenance (AOM) manual (part # 97B0003N12 or part #97B0003N13).

Field Selectable Inputs

Test mode: Test mode allows the service technician to check the operation of the control in a timely manner. By momentarily shorting the test terminals, the CXM control enters a 20 minute test mode period in which all time delays are sped up 15 times. Upon entering test mode, the status LED will flash a code representing the last fault. For diagnostic ease at the thermostat, the alarm relay will also cycle during test mode. The alarm relay will cycle on and off similar to the status LED to indicate a code representing the last fault, at the thermostat. Test mode can be exited by shorting the test terminals for 3 seconds.
Retry Mode: If the control is attempting a retry of a fault, the status LED will slow flash (slow flash = one flash every 2 seconds) to indicate the control is in the process of retrying.

Field Configuration Options

Note: In the following field configuration options, jumper wires should be clipped ONLY when power is removed from the CXM control.

Water coil low temperature limit setting: Jumper 3 (JW3-FP1 Low Temp) provides field selection of temperature limit setting for FP1 of 30°F or 10°F [-1°F or -12°C] (refrigerant temperature).
Not Clipped = 30°F [-1°C]. Clipped = 10°F [-12°C].
Air coil low temperature limit setting: Jumper 2 (JW2-FP2 Low Temp) provides field selection of temperature limit setting for FP2 of 30°F or 10°F [-1°F or -12°C] (refrigerant temperature). Note: This jumper should only be clipped under extenuating circumstances, as recommended by the factory.
Not Clipped = 30°F [-1°C]. Clipped = 10°F [-12°C].
Alarm relay setting: Jumper 1 (JW1-AL2 Dry) provides field selection of the alarm relay terminal AL2 to be jumpered to 24VAC or to be a dry contact (no connection).
Not Clipped = AL2 connected to R. Clipped = AL2 dry contact (no connection).

DIP Switches

Note: In the following field configuration options, DIP switches should only be changed when power is removed from the CXM control.
DIP switch 1: Unit Performance Sentinel Disable - provides field selection to disable the UPS feature.
On = Enabled. Off = Disabled.
DIP switch 2: Stage 2 Selection - provides selection of whether compressor has an "on" delay. If set to stage 2, the compressor will have a 3 second delay before energizing. Also, if set for stage 2, the alarm relay will NOT cycle during test mode.
On = Stage 1. Off = Stage 2
DIP switch 3: Not Used.
DIP switch 4: DDC Output at EH2 - provides selection for DDC operation. If set to "DDC Output at EH2," the EH2 terminal will continuously output the last fault code of the controller. If set to "EH2 normal," EH2 will operate as standard electric heat output.
On = EH2 Normal. Off = DDC Output at EH2.
NOTE: Some CXM controls only have a 2 position DIP switch package. If this is the case, this option can be selected by clipping the jumper which is in position 4 of SW1.
Jumper not clipped = EH2 Normal. Jumper clipped = DDC Output at EH2.
DIP switch 5: Factory Setting - Normal position is "On." Do not change selection unless instructed to do so by the factory.

Table 6a: CXM/DXM LED And Alarm Relay Operations

Description of Operation	LED	Alarm Relay
Normal Mode	On	Open
Normal Mode with UPS Warning	On	Cycle (closed 5 sec., Open 25 sec.)
CXM is non-functional	Off	Open
Fault Retry	Slow Flash	Open
Lockout	Fast Flash	Closed
Over/Under Voltage Shutdown	Slow Flash	Open (Closed after 15 minutes)
Test Mode - No fault in memory	Flashing Code 1	Cycling Code 1
Test Mode - HP Fault in memory	Flashing Code 2	Cycling Code 2
Test Mode - LP Fault in memory	Flashing Code 3	Cycling Code 3
Test Mode - FP1 Fault in memory	Flashing Code 4	Cycling Code 4
Test Mode - FP2 Fault in memory	Flashing Code 5	Cycling Code 5
Test Mode - CO Fault in memory	Flashing Code 6	Cycling Code 6
Test Mode - Over/Under shutdown in memory	Flashing Code 7	Cycling Code 7
Test Mode - UPS in memory	Flashing Code 8	Cycling Code 8
Test Mode - Swapped Thermistor	Flashing Code 9	Cycling Code 9

-Slow Flash = 1 flash every 2 seconds
-Fast Flash = 2 flashes every 1 second
-Flash code 2 = 2 quick flashes, 10 second pause, 2 quick flashes, 10 second pause, etc.
-On pulse 1/3 second; off pulse 1/3 second

⚠ CAUTION! ⚠

CAUTION! Do not restart units without inspection and remedy of faulting condition. Equipment damage may occur.

DXM Controls

DXM Control

For detailed control information, see CXM/DXM AOM (part #97B0003N08), Lon controller AOM (part #97B0013N01) or MPC AOM (part # 97B0031N01).

Table 6b: DXM LED And Alarm Relay Operations

Description of Operation	Status LED (green)	Test LED (yellow)	Fault LED (red)	Alarm Relay
Normal mode	On	-	Off	Open
Normal mode with UPS	On	-	Flashing Code 8	Cycle (closed 5 sec, open 25 sec)
DXM is non-functional	Off	Off	Off	Open
Fault Retry	Slow Flash	-	Flashing fault code	Open
Lockout	Fast Flash	-	Flashing fault code	Closed
Test Mode	-	On	-	-
Night Setback	Flashing Code 2	-	-	-
ESD	Flashing Code 3	-	-	-
Invalid T-stat Inputs	Flashing Code 4	-	-	-
HP Fault	Slow Flash	-	Flashing Code 2	Open
LP Fault	Slow Flash	-	Flashing Code 3	Open
FP1 Fault	Slow Flash	-	Flashing Code 4	Open
FP2 Fault	Slow Flash	-	Flashing Code 5	Open
CO Fault	Slow Flash	-	Flashing Code 6	Open
Over/Under Voltage	Slow Flash	-	Flashing Code 7	Open (closed after 15 minutes)

-Slow Flash = 1 flash every 2 seconds
-Fast Flash = 2 flashes every 1 second
-Flash code 2 = 2 quick flashes, 10 second pause, 2 quick flashes, 10 second pause, etc.
-On pulse 1/3 second; off pulse 1/3 second

Field Selectable Inputs

Test mode: Test mode allows the service technician to check the operation of the control in a timely manner. By momentarily shorting the test terminals, the DXM control enters a 20 minute test mode period in which all time delays are sped up 15 times. Upon entering test mode, the status LED will flash a code representing the last fault. For diagnostic ease at the thermostat, the alarm relay will also cycle during test mode. The alarm relay will cycle on and off similar to the status LED to indicate a code representing the last fault, at the thermostat. Test mode can be exited by shorting the test terminals for 3 seconds.
Retry mode: If the control is attempting a retry of a fault, the status LED will slow flash (slow flash = one flash every 2 seconds) to indicate the control is in the process of retrying.

Field Configuration Options

Note: In the following field configuration options, jumper wires should be clipped ONLY when power is removed from the DXM control.

Water coil low temperature limit setting: Jumper 3 (JW3-FP1 Low Temp) provides field selection of temperature limit setting for FP1 of 30°F or 10°F [-1°F or -12°C] (refrigerant temperature).
Not Clipped = 30°F [-1°C]. Clipped = 10°F [-12°C].
Air coil low temperature limit setting: Jumper 2 (JW2-FP2 Low Temp) provides field selection of temperature limit setting for FP2 of 30°F or 10°F [-1°F or -12°C] (refrigerant temperature). Note: This jumper should only be clipped under extenuating circumstances, as recommended by ClimateMaster technical services.
Not Clipped = 30°F [-1°C]. Clipped = 10°F [-12°C].
Alarm relay setting: Jumper 4 (JW4-AL2 Dry) provides field selection of the alarm relay terminal AL2 to be jumpered to 24VAC or to be a dry contact (no connection).
Not Clipped = AL2 connected to R.
Clipped = AL2 dry contact (no connection).
Low pressure normally open: Jumper 1 (JW1-LP norm open) provides field selection for low pressure input to be normally closed or normally open.
Not Clipped = LP normally closed. Clipped = LP normally open.

DIP Switches

Note: In the following field configuration options, DIP switches should only be changed when power is removed from the DXM control.

DIP Package #1 (S1)

DIP Package #1 has 8 switches and provides the following setup selections:
1.1 - Unit Performance Sentinel (UPS) disable: DIP Switch 1.1 provides field selection to disable the UPS feature.
On = Enabled. Off = Disabled.
1.2 - Compressor relay staging operation: DIP 1.2 provides selection of compressor relay staging operation. The compressor relay can be selected to turn on with a stage 1 or stage 2 call from the thermostat. This is used with dual stage units (2 compressors where 2 DXM controls are being used) or with master/slave applications. In master/slave applications, each compressor and fan will stage according to its appropriate DIP 1.2 setting. If set to stage 2, the compressor will have a 3 second on-delay before energizing during a Stage 2 demand. Also, if set for stage 2, the alarm relay will NOT cycle during test mode.
On = Stage 1. Off = Stage 2.
1.3 - Thermostat type (heat pump or heat/cool): DIP 1.3 provides selection of thermostat type. Heat pump or heat/cool thermostats can be selected. When in heat/cool mode, Y1 is the input call for cooling stage 1; Y2 is

the input call for cooling stage 2; W1 is the input call for heating stage 1; and O/W2 is the input call for heating stage 2. In heat pump mode, Y1 is the input call for compressor stage 1; Y2 is the input call for compressor stage 2; W1 is the input call for heating stage 3 or emergency heat; and O/W2 is the input call for reversing valve (heating or cooling, depending upon DIP 1.4).
On = Heat Pump. Off = Heat/Cool.
1.4 - Thermostat type (O/B): DIP 1.4 provides selection of thermostat type for reversing valve activation. Heat pump thermostats with "O" output (reversing valve energized for cooling) or "B" output (reversing valve energized for heating) can be selected with DIP 1.4.
On = HP stat with "O" output for cooling. Off = HP stat with "B" output for heating.
1.5 - Dehumidification mode: DIP 1.5 provides selection of normal or dehumidification fan mode. In dehumidification mode, the fan speed relay will remain off during cooling stage 2. In normal mode, the fan speed relay will turn on during cooling stage 2.
On = Normal fan mode. Off = Dehumidification mode.
1.6 - DDC output at EH2: DIP 1.6 provides selection for DDC operation. If set to "DDC Output at EH2," the EH2 terminal will continuously output the last fault code of the controller. If set to "EH2 normal," EH2 will operate as standard electric heat output.
On = EH2 Normal. Off = DDC Output at EH2.
1.7 - Boilerless operation: DIP 1.7 provides selection of boilerless operation. In boilerless mode, the compressor is only used for heating when FP1 is above the temperature specified by the setting of DIP 1.8. Below DIP 1.8 setting, the compressor is not used and the control goes into emergency heat mode, staging on EH1 and EH2 to provide heating.
On = normal. Off = Boilerless operation.
1.8 - Boilerless changeover temperature: DIP 1.8 provides selection of boilerless changeover temperature set point. Note that the FP1 thermistor is sensing refrigerant temperature between the coaxial heat exchanger and the expansion device (TXV or cap tube). Therefore, the 50°F [10°C] setting is not 50°F [10°C] water, but approximately 60°F [16°C] EWT.
On = 50°F [10°C]. Off = 40°F [16°C].

DIP Package #2 (S2)
DIP Package #2 has 8 switches and provides the following setup selections:
2.1 - Accessory1 relay personality: DIP 2.1 provides selection of ACC1 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.2 - Accessory1 relay personality: DIP 2.2 provides selection of ACC 1 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.3 - Accessory1 relay personality: DIP 2.3 provides selection of ACC 1 relay options. See table 6c for description of functionality.
2.4 - Accessory2 relay personality: DIP 2.4 provides selection of ACC 2 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.5 - Accessory2 relay personality: DIP 2.5 provides selection of ACC 2 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.6 - Accessory2 relay personality: DIP 2.6 provides selection of ACC 2 relay options. See table 6c for description of functionality.
2.7 - Auto dehumidification fan mode or high fan mode: DIP 2.7 provides selection of auto dehumidification fan mode or high fan mode. In auto dehumidification mode, the fan speed relay will remain off during cooling stage 2 IF the H input is active. In high fan mode, the fan enable and fan speed relays will turn on when the H input is active.
On = Auto dehumidification mode. Off = High fan mode.
2.8 - Special factory selection: DIP 2.8 provides special factory selection. Normal position is "On." Do not change selection unless instructed to do so by the factory.

Table 6c: Accessory DIP Switch Settings

DIP 2.1	DIP 2.2	DIP 2.3	ACC1 Relay Option
On	On	On	Cycle with fan
Off	On	On	Digital NSB
On	Off	On	Water Valve - slow opening
On	On	Off	OAD
Off	Off	Off	Reheat Option - Humidistat
Off	On	Off	Reheat Option - Dehumidistat
DIP 2.4	DIP 2.5	DIP 2.6	ACC2 Relay Option
On	On	On	Cycle with compressor
Off	On	On	Digital NSB
On	Off	On	Water Valve - slow opening
On	On	Off	OAD

All other DIP combinations are invalid

Safety Features

Safety Features – CXM/DXM Control
The safety features below are provided to protect the compressor, heat exchangers, wiring and other components from damage caused by operation outside of design conditions.

Anti-short cycle protection: The control features a 5 minute anti-short cycle protection for the compressor. Note: The 5 minute anti-short cycle also occurs at power up.
Random start: The control features a random start upon power up of 5-80 seconds.
Fault Retry: In Fault Retry mode, the Status LED begins slowly flashing to signal that the control is trying to recover from a fault input. The control will stage off the outputs and then "try again" to satisfy the thermostat input call. Once the thermostat input call is satisfied, the control will continue on as if no fault occurred. If 3 consecutive faults occur without satisfying the thermostat input call, the control will go into "lockout" mode. The last fault causing the lockout will be stored in memory and can be viewed at the "fault" LED (DXM board) or by going into test mode (CXM board). Note: FP1/FP2 faults are factory set at only one try.
Lockout: In lockout mode, the status LED will begin fast flashing. The compressor relay is turned off immediately. Lockout mode can be "soft" reset by turning off the thermostat (or satisfying the call). A "soft" reset keeps the fault in memory but resets the control. A "hard" reset (disconnecting power to the control) resets the control and erases fault memory.
Lockout with emergency heat: While in lockout mode, if W becomes active (CXM), emergency heat mode will occur. If DXM is configured for heat pump thermostat type (DIP 1.3), emergency heat will become active if O/W2 is energized.
High pressure switch: When the high pressure switch opens due to high refrigerant pressures, the compressor relay is de-energized immediately since the high pressure switch is in series with the compressor contactor coil. The high pressure fault recognition is immediate (does not delay for 30 continuous seconds before de-energizing the compressor).
High pressure lockout code = 2
Example: 2 quick flashes, 10 sec pause, 2 quick flashes, 10 sec. pause, etc.
Low pressure switch: The low pressure switch must be open and remain open for 30 continuous seconds during "on" cycle to be recognized as a low pressure fault. If the low pressure switch is open for 30 seconds prior to compressor power up it will be considered a low pressure (loss of charge) fault. The low pressure switch input is bypassed for the initial 60 seconds of a compressor run cycle.
Low pressure lockout code = 3
Water coil low temperature (FP1): The FP1 thermistor temperature must be below the selected low temperature limit setting for 30 continuous seconds during a compressor run cycle to be recognized as a FP1 fault. The FP1 input is bypassed for the initial 60 seconds of a compressor run cycle. FP1 is set at the factory for one try. Therefore, the control will go into lockout mode once the FP1 fault has occurred.
FP1 lockout code = 4
Air coil low temperature (FP2): The FP2 thermistor temperature must be below the selected low temperature limit setting for 30 continuous seconds during a compressor run cycle to be recognized as a FP2 fault. The FP2 input is bypassed for the initial 60 seconds of a compressor run cycle. FP2 is set at the factory for one try. Therefore, the control will go into lockout mode once the FP2 fault has occurred.
FP2 lockout code = 5
Condensate overflow: The condensate overflow sensor must sense overflow level for 30 continuous seconds to be recognized as a CO fault. Condensate overflow will be monitored at all times.
CO lockout code = 6
Over/under voltage shutdown: An over/under voltage condition exists when the control voltage is outside the range of 19VAC to 30VAC. Over/under voltage shut down is a self-resetting safety. If the voltage comes back within range for at least 0.5 seconds, normal operation is restored. This is not considered a fault or lockout. If the CXM/DXM is in over/under voltage shutdown for 15 minutes, the alarm relay will close.
Over/under voltage shut down code = 7
Unit Performance Sentinel-UPS (patent pending): The UPS feature indicates when the heat pump is operating inefficiently. A UPS condition exists when:

a) In heating mode with compressor energized, FP2 is greater than 125°F [52°C] for 30 continuous seconds, or:
b) In cooling mode with compressor energized, FP1 is greater than 125°F [52°C] for 30 continuous seconds, or:
c) In cooling mode with compressor energized, FP2 is less than 40°F [4.5°C] for 30 continuous seconds.

CXM and DXM Controls

If a UPS condition occurs, the control will immediately go to UPS warning. The status LED will remain on as if the control is in normal mode. Outputs of the control, excluding LED and alarm relay, will NOT be affected by UPS. The UPS condition cannot occur during a compressor off cycle. During UPS warning, the alarm relay will cycle on and off. The cycle rate will be “on” for 5 seconds, “off” for 25 seconds, “on” for 5 seconds, “off” for 25 seconds, etc.

UPS warning code = 8

Swapped FP1/FP2 thermistors: During test mode, the control monitors to see if the FP1 and FP2 thermistors are in the appropriate places. If the control is in test mode, the control will lockout with code 9 after 30 seconds if:

a) The compressor is on in the cooling mode and the FP1 sensor is colder than the FP2 sensor, or:
b) The compressor is on in the heating mode and the FP2 sensor is colder than the FP1 sensor.

Swapped FP1/FP2 thermistor code = 9.

ESD (DXM only): The ESD (Emergency Shut Down) mode can be enabled from an external common signal to terminal ESD to shut down the unit. The green status light will flash code 3 when the unit is in ESD mode.

ESD mode = code 3 (green “status” LED)

Diagnostic Features

The LED on the CXM board advises the technician of the current status of the CXM control. The LED can display either the current CXM mode or the last fault in memory if in test mode. If there is no fault in memory, the LED will flash Code 1 (when in test mode).

The green status LED and red fault LED on the DXM board advise the technician of the current status of the DXM control. The status LED will indicate the current mode that the DXM control is in. The fault LED will ALWAYS flash a code representing the LAST fault in memory. If there is no fault in memory, the fault LED will flash Code 1. The yellow test LED will turn on when in test mode. **CAUTION: Do not restart units without inspection and remedy of faulting condition. Damage may occur.**

CXM/DXM Control Start-up Operation

The control will not operate until all inputs and safety controls are checked for normal conditions. The compressor will have a 5 minute anti-short cycle delay at power-up. The first time after power-up that there is a call for compressor, the compressor will follow a 5 to 80 second random start delay. After the random start delay and anti-short cycle delay, the compressor relay will be energized. On all subsequent compressor calls, the random start delay is omitted.

ClimaDry Modulating Reheat Option - GCV, GSH/V, TTH/V/D & TSH/V/D 60Hz Units Only

ClimaDry Sequence Of Operation

A heat pump equipped with ClimaDry can operate in three modes, cooling, cooling with reheat, and heating. The cooling/heating modes are like any other ClimateMaster WSHP. The reversing valve ("O" signal) is energized in cooling, along with the compressor contactor(s) and blower relay. In the heating mode the reversing valve is de-energized. Almost any thermostat will activate the heat pump in heating or cooling modes. The DXM microprocessor board, which is standard with the ClimaDry option, will accept either heat pump (Y,O) thermostats or non-heat pump (Y,W) thermostats.

The reheat mode requires a either a separate humidistat/ dehumidistat or a thermostat that has an integrated dehumidification function for activation. The DXM board is configured to work with either a humidistat or dehumidistat input to terminal "H" (DIP switch settings for the DXM board are shown below in table 7). Upon receiving an "H" input, the DXM board will activate the cooling mode and engage reheat. Table 8 shows the relationship between thermostat input signals and unit operation.

There are four operational inputs for single stage units and six operational inputs for dual stage units:

-Fan Only
-1st Stage Cooling
-2nd Stage Cooling
-1st Stage Heating
-2nd Stage Heating
-Reheat Mode

- Fan Only: A (G) call from the thermostat to the (G terminal of the DXM control board will bring the unit on in fan only mode.
- 1st Stage Cooling: A simultaneous call from (G), (Y1), and (O) to the (G), (Y1), (O/W2) terminals of the DXM control board will bring the unit on in 1st Stage Cooling.
- 2nd Stage Cooling: A simultaneous call from (G), (Y1), (Y2), and (O) to the (G), (Y1), (Y2), and (O/W2) terminals of the DXM control board will bring the unit on in 2nd Stage Cooling. When the call is satisfied at the thermostat the unit will continue to run in 1st Stage Cooling until the 1st Stage Cooling call is removed or satisfied, shutting down the unit. NOTE: Not all units have two-stage cooling functionality (e.g. GC series units).
- 1st Stage Heating: A simultaneous call from (G) and (Y1) to the (G) and (Y1) terminals of the DXM control board will bring the unit on in 1st Stage Heating.
- 2nd Stage Heating: A simultaneous call from (G), (Y1), and (Y2) to the (G), (Y1), and (Y2) terminals of the DXM control board will bring the unit on in 2nd Stage Heating. When the call is satisfied at the thermostat the unit will continue to run in 1st Stage Heating until the call is removed or satisfied, shutting down the unit. NOTE: Not all units have two-stage heating functionality (e.g. GC series units).
- Reheat Mode: A call from the Humidistat/Dehumidistat to the (H) terminal of the DXM control board will bring the unit on in Reheat Mode if there is no call for cooling at the thermostat. When the Humidistat Dehumidification call is removed or satisfied the unit will shut down. NOTE: Cooling always overrides Reheat Mode. In the Cooling mode, the unit cools and dehumidifies. If the cooling thermostat is satisfied but there is still a call for dehumidification, the unit will continue to operate in Reheat Mode.

ClimaDry Component Functions

The ClimaDry option consists of the following components:

- Proportional Controller
- Supply Air Sensor
- Motorized Valve
- Loop Pump
- Hydronic Coil

The Proportional Controller operates on 24 VAC power supply and automatically adjusts the water valve based upon the Supply Air Sensor. The Supply Air Sensor senses supply air temperature at the blower inlet providing the input signal necessary for the proportional control to drive the motorized valve during the reheat mode of operation. The Motorized Valve is a proportional actuator/three-way valve combination used to divert the condenser water from the coax to the hydronic reheat coil during the reheat mode of operation. The proportional controller sends a signal to the motorized valve based on the supply air temperature of the supply air sensor.

The Loop Pump circulates condenser water through the hydronic reheat coil during the reheat mode of operation. In this application, the loop pump is only energized during the reheat mode of operation. The Hydronic Coil is utilized during the reheat mode of operation to reheat the air to the setpoint of the proportional controller. Condenser water is diverted by the motorized valve and pumped through the hydronic coil by the loop pump in proportion to the control setpoint. The amount of reheating is dependent on the setpoint and how far

ClimaDry Modulating Reheat Option - GCV, GSH/V, TTH/V/D & TSH/V/D 60Hz Units Only

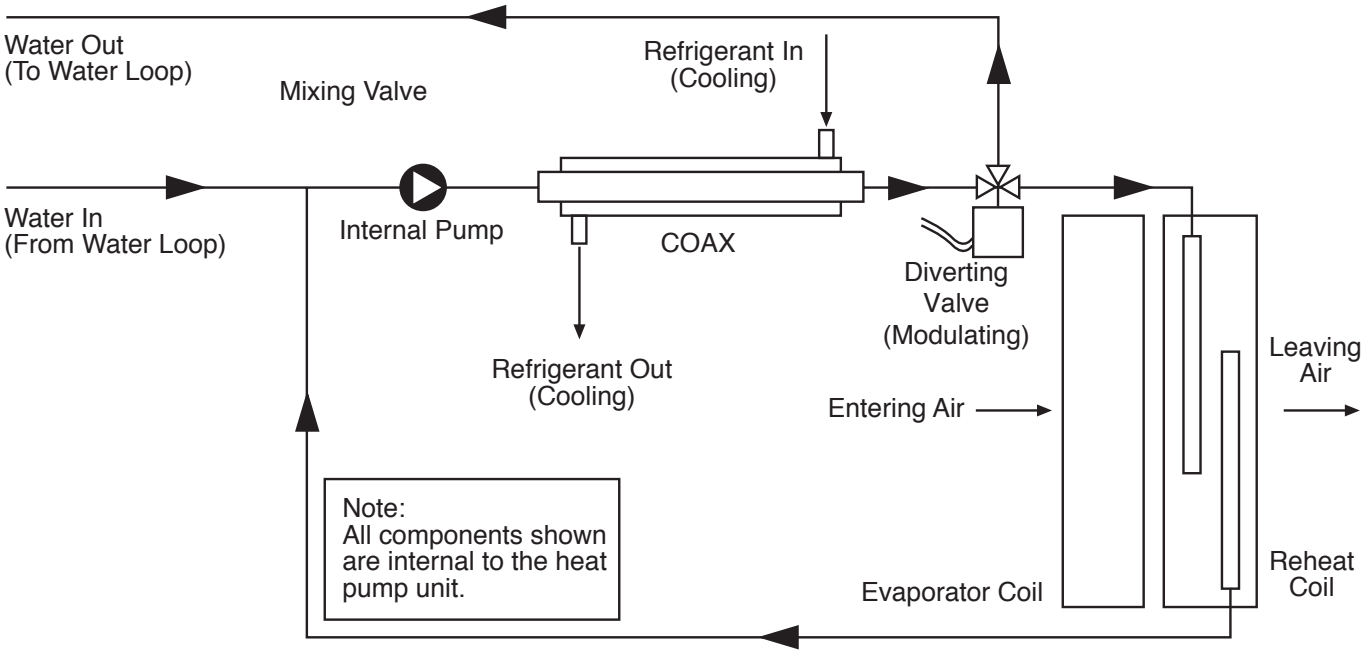
from setpoint the supply air temperature is. The factory setpoint is 70–75°F [21-24°C], generally considered "neutral" air.

ClimaDry Application Considerations

Unlike most hot gas reheat options, the ClimaDry option will operate over a wide range of EWTs. Special flow regulation (water regulating valve) is not required for low EWT conditions. However, below 55°F [13°C], supply air temperatures may not be maintained at 72°F [22°C] because the cooling capacity exceeds the reheat coil capacity at low water temperatures. Below 55°F [13°C], essentially all water is diverted to the reheat coil (no heat of rejection to the building loop). Although the ClimaDry option will work fine with low EWTs, overcooling of the space may result with well water systems or on rare occasions with ground loop (geothermal) systems (Note: Extended range units are required for well water and ground loop systems). Since dehumidification is generally only required in cooling, most ground loop systems will not experience overcooling of the supply air temperature. If overcooling of the space is a concern (e.g. computer room well water application), auxiliary heating may be required to maintain space temperature when the unit is operating in the dehumidification mode.

Water-Source Heat Pumps with ClimaDry should not be used as make-up air units. These applications should use equipment specifically designed for makeup air.

Figure 27: ClimaDry Schematic



ClimaDry Modulating Reheat Option - GCV, GSH/V, TTH/V/D & TSH/V/D 60Hz Units Only

Table 7: Humidistat/Dehumidistat Logic & DXM (2.1, 2.2., 2.3) DIP Settings

Sensor	2.1	2.2	2.3	Logic	Reheat (ON) - H	Reheat (OFF) - H
Humidistat	OFF	OFF	OFF	Reverse	0 VAC	24 VAC
Dehumidistat	OFF	ON	OFF	Standard	24 VAC	0 VAC

Table 8: ClimaDry Operating Modes

Mode	Input					Output				
	O	G	Y1	Y2[3]	H	O	G	Y1	Y2[3]	Reheat
No Demand	ON/OFF	OFF	OFF	OFF	OFF	ON/OFF	OFF	OFF	OFF	OFF
Fan Only	ON/OFF	ON	OFF	OFF	OFF	ON/OFF	ON	OFF	OFF	OFF
Cooling 1st Stage	ON	ON	ON	OFF	OFF	ON	ON	ON	OFF	OFF
Cooling 2nd Stage	ON	ON	ON	ON	OFF	ON	ON	ON	ON	OFF
Cooling & Dehumidistat[1]	ON	ON	ON	ON/OFF	ON	ON	ON	ON	ON/OFF	OFF
Dehumidistat Only	ON/OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON
Heating 1st Stage	OFF	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
Heating 2nd Stage	OFF	ON	ON	ON	OFF	OFF	ON	ON	ON	OFF
Heating & Dehumidistat[2]	OFF	ON	ON	ON/OFF	ON	OFF	ON	ON	ON/OFF	OFF

[1]Cooling input takes priority over dehumidify input.
[2]DXM is programmed to ignore the H demand when the unit is in heating mode.
[3]N/A for single stage units; Full load operation for dual capacity units.
[4]ON/OFF = Either ON or OFF.

UNIT STARTING AND OPERATING CONDITIONS

Operating Limits

Environment – Units are designed for indoor installation only. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air).
Power Supply – A voltage variation of +/– 10% of nameplate utilization voltage is acceptable.

Determination of operating limits is dependent primarily upon three factors: 1) return air temperature. 2) water temperature, and 3) ambient temperature. When any one of these factors is at minimum or maximum levels, the other two factors should be at normal levels to insure proper unit operation. Extreme variations in temperature and humidity and/or corrosive water or air will adversely affect unit performance, reliability, and service life. Consult Table 9a for operating limits.

Table 9a: Operating Limits

Starting Limits	TT		TS		TC	
	Cooling	Heating	Cooling	Heating	Cooling	Heating
Air Limits						
Min. ambient air, DB	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]
Rated ambient air, DB	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]
Max. ambient air, DB	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]
Min. entering air, DB/WB	60/45ºF [16/7ºC]	40ºF [4.4ºC]	60/50ºF [16/10ºC]	45ºF [7ºC]	65/50ºF [18/10ºC]	45ºF [7.2ºC]
Rated entering air, DB/WB	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]
Max. entering air, DB/WB	100/75ºF [38/24ºC]	80ºF [27ºC]	95/75ºF [35/24ºC]	80ºF [27ºC]	95/75ºF [35/24ºC]	80ºF [27ºC]
Water Limits						
Min. entering water	30ºF [-1ºC]	20ºF [-6.7ºC]	30ºF [-1ºC]	20ºF [-6.7ºC]	30ºF [-1ºC]	20ºF [-6.7ºC]
Normal entering water	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]
Max. entering water	120ºF [49ºC]	90ºF [32ºC]	120ºF [49ºC]	90ºF [32ºC]	120ºF [49ºC]	90ºF [32ºC]
Normal Water Flow	1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]	

Unit Starting and Operating Conditions

Table 9a: Operating Limits Continued

Starting Limits	GS		GR		TC	
	Cooling	Heating	Cooling	Heating	Cooling	Heating
Air Limits						
Min. ambient air, DB	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]
Rated ambient air, DB	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]
Max. ambient air, DB	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]
Min. entering air, DB/WB	70/60ºF [21/16ºC]	60ºF [15.6ºC]	70/60ºF [21/16ºC]	60ºF [16ºC]	70/60ºF [21/16ºC]	60ºF [16ºC]
Rated entering air, DB/WB	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]
Max. entering air, DB/WB	95/75ºF [35/24ºC]	80ºF [27ºC]	95/75ºF [35/24ºC]	80ºF [27ºC]	95/75ºF [35/24ºC]	80ºF [27ºC]
Water Limits						
Min. entering water	30ºF [-1ºC]	20ºF [-7ºC]	30ºF [-1ºC]	20ºF [-7ºC]	50ºF [10ºC]	50ºF [10ºC]
Normal entering water	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	60-90ºF [15 to 32ºC]	60-70ºF [15 to 21ºC]
Max. entering water	120ºF [49ºC]	90ºF [32ºC]	120ºF [49ºC]	90ºF [32ºC]	110ºF [43ºC]	90ºF [32ºC]
Normal Water Flow	1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		2.5 to 3.0 gpm / ton [2.7 to 3.2 l/m per kW]	

Rev.: 23 Jan., 2009B

Starting Conditions

Consult Table 9b for the particular model. Starting conditions vary depending upon model and are based upon the following notes:

Notes:

1. Conditions in Table 9b are not normal or continuous operating conditions. Minimum/maximum limits are start-up conditions to bring the building space up to occupancy temperatures. Units are not designed to operate under these conditions on a regular basis.
2. Voltage utilization range complies with ARI Standard 110.

Table 9b: Starting Limits

Starting Limits	TT/TS		GS/GR		GC	
	Cooling	Heating	Cooling	Heating	Cooling	Heating
Air Limits						
Min. ambient air, DB	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]	45ºF [7ºC]	39ºF [4ºC]
Rated ambient air, DB	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]	80.6ºF [27ºC]	68ºF [20ºC]
Max. ambient air, DB	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]	110ºF [43ºC]	85ºF [29ºC]
Min. entering air, DB/WB	50ºF [10ºC]	40ºF [4.5ºC]	50ºF [10ºC]	50ºF [10ºC]	70/61ºF [21/16ºC]	50ºF [10ºC]
Rated entering air, DB/WB	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]	80.6/66.2ºF [27/19ºC]	68ºF [20ºC]
Max. entering air, DB/WB	110/83ºF [43/28ºC]	80ºF [27ºC]	110/83ºF [43/28ºC]	80ºF [27ºC]	95/76ºF [35/24ºC]	80ºF [27ºC]
Water Limits						
Min. entering water	30ºF [-1ºC]	20ºF [-6.7ºC]	30ºF [-1ºC]	20ºF [-6.7ºC]	50ºF [10ºC]	50ºF [10ºC]
Normal entering water	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	50-110ºF [10-43ºC]	30-70ºF [-1 to 21ºC]	60-90ºF [15-32ºC]	60-70ºF [15-21ºC]
Max. entering water	120ºF [49ºC]	90ºF [32ºC]	120ºF [49ºC]	90ºF [32ºC]	110ºF [43ºC]	90ºF [32ºC]
Normal Water Flow	1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		1.5 to 3.0 gpm / ton [1.6 to 3.2 l/m per kW]		2.5 to 3.0 gpm / ton [2.7 to 3.2 l/m per kW]	

Rev.: 30 July, 2007D

Piping System Cleaning and Flushing

Piping System Cleaning and Flushing
Cleaning and flushing the WLHP piping system is the single most important step to insure proper start-up and continued efficient operation of the system.
Follow the instructions below to properly clean and flush the system:

1. Insure that electrical power to the unit is disconnected.
2. Install the system with the supply hose connected directly to the return riser valve. Use a single length of flexible hose.
3. Open all air vents. Fill the system with water. DO NOT allow system to overflow. Bleed all air from the system. Pressurize and check the system for leaks and repair as appropriate.
   ClimaDry-equipped units have a manual air bleed valve at the top of the reheat coil. This valve must be used to bleed the air from the reheat coil after filling the system, for ClimaDry to operate properly.
4. Verify that all strainers are in place (ClimateMaster recommends a strainer with a #20 stainless steel wire mesh). Start the pumps, and systematically check each vent to ensure that all air is bled from the system.
5. Verify that make-up water is available. Adjust make-up water as required to replace the air which was bled from the system. Check and adjust the water/air level in the expansion tank.
6. Set the boiler to raise the loop temperature to approximately 86°F [30°C]. Open a drain at the lowest point in the system. Adjust the make-up water replacement rate to equal the rate of bleed.
7. Refill the system and add trisodium phosphate in a proportion of approximately one pound per 150 gallons [1/2 kg per 750 l] of water (or other equivalent approved cleaning agent). Reset the boiler to raise the loop temperature to 100°F [38°C]. Circulate the solution for a minimum of 8 to 24 hours. At the end of this period, shut off the circulating pump and drain the solution. Repeat system cleaning if desired.
8. When the cleaning process is complete, remove the short-circuited hoses. Reconnect the hoses to the proper supply, and return the connections to each of the units. Refill the system and bleed off all air.
9. Test the system pH with litmus paper. The system water should be in the range of pH 6.0 - 8.5 (see table 3). Add chemicals, as appropriate to maintain neutral pH levels.
10. When the system is successfully cleaned, flushed, refilled and bled, check the main system panels, safety cutouts and alarms. Set the controls to properly maintain loop temperatures.

DO NOT use “Stop Leak” or similar chemical agent in this system. Addition of chemicals of this type to the loop water will foul the heat exchanger and inhibit unit operation.

NOTE:
ClimateMaster strongly recommends all piping connections, both internal and external to the unit, be pressure tested by an appropriate method prior to any finishing of the interior space or before access to all connections is limited. Test pressure may not exceed the maximum allowable pressure for the unit and all components within the water system. ClimateMaster will not be responsible or liable for damages from water leaks due to inadequate or lack of a pressurized leak test, or damages caused by exceeding the maximum pressure rating during installation.

⚠ CAUTION! ⚠

CAUTION! To avoid possible damage to a plastic (PVC) piping system, do not allow temperatures to exceed 113°F [45°C].

UNIT AND SYSTEM CHECKOUT

Unit and System Checkout
BEFORE POWERING SYSTEM, please check the following:

UNIT CHECKOUT

- ❑ Balancing/shutoff valves: Insure that all isolation valves are open and water control valves are wired.
- ❑ ClimaDry-equipped units have a manual air bleed valve at the top of the reheat coil. This valve must be used to bleed the air from the reheat coil after filling the system, for ClimaDry to operate properly.
- ❑ Line voltage and wiring: Verify that voltage is within an acceptable range for the unit and wiring and fuses/ breakers are properly sized. Verify that low voltage wiring is complete.
- ❑ Unit control transformer: Insure that transformer has the properly selected voltage tap. Commercial 208-230V units are factory wired for 208V operation unless specified otherwise.
- ❑ Entering water and air: Insure that entering water and air temperatures are within operating limits of Table 7.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out on the CXM/DXM control is properly set.
- ❑ Unit fan: Manually rotate fan to verify free rotation and insure that blower wheel is secured to the motor shaft. Be sure to remove any shipping supports if needed. DO NOT oil motors upon start-up. Fan motors are pre-oiled at the factory. Check unit fan speed selection and compare to design requirements.
- ❑ Condensate line: Verify that condensate line is open and properly pitched toward drain.
- ❑ Water flow balancing: Record inlet and outlet water temperatures for each heat pump upon startup. This check can eliminate nuisance trip outs and high velocity water flow that could erode heat exchangers.
- ❑ Unit air coil and filters: Insure that filter is clean and accessible. Clean air coil of all manufacturing oils.
- ❑ Unit controls: Verify that CXM or DXM field selection options are properly set.

SYSTEM CHECKOUT

- ❑ System water temperature: Check water temperature for proper range and also verify heating and cooling set points for proper operation.
- ❑ System pH: Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes longevity of hoses and fittings (see table 3).
- ❑ System flushing: Verify that all hoses are connected end to end when flushing to insure that debris bypasses the unit heat exchanger, water valves and other components. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Verify that all air is purged from the system. Air in the system can cause poor operation or system corrosion.
- ❑ Cooling tower/boiler: Check equipment for proper set points and operation.
- ❑ Standby pumps: Verify that the standby pump is properly installed and in operating condition.
- ❑ System controls: Verify that system controls function and operate in the proper sequence.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out controls are provided for the outdoor portion of the loop. Otherwise, operating problems may occur.
- ❑ System control center: Verify that the control center and alarm panel have appropriate set points and are operating as designed.
- ❑ Miscellaneous: Note any questionable aspects of the installation.

⚠ CAUTION! ⚠

CAUTION! Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the coax or water lines can permanently damage the heat pump.

⚠ CAUTION! ⚠

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

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

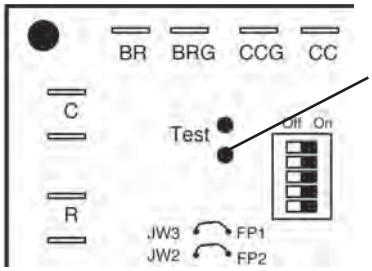
Unit Start-Up Procedure

Unit Start-up Procedure

1. Turn the thermostat fan position to “ON”. Blower should start.
2. Balance air flow at registers.
3. Adjust all valves to their full open positions. Turn on the line power to all heat pumps.
4. Room temperature should be within the minimum-maximum ranges of table 9. During start-up checks, loop water temperature entering the heat pump should be between 60°F [16°C] and 95°F [35°C].
5. Two factors determine the operating limits of ClimateMaster heat pumps, (a) return air temperature, and (b) water temperature. When any one of these factors is at a minimum or maximum level, the other factor must be at normal level to insure proper unit operation.
   a. Adjust the unit thermostat to the warmest setting. Place the thermostat mode switch in the “COOL” position. Slowly reduce thermostat setting until the compressor activates.
   b. Check for cool air delivery at the unit grille within a few minutes after the unit has begun to operate. Note: Units have a five minute time delay in the control circuit that can be eliminated on the CXM/DXM control board as shown below in Figure 28. See controls description for details.
   c. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using the P/T plugs and comparing to tables 10a through 10e.
   d. Check the elevation and cleanliness of the condensate lines. Dripping may be a sign of a blocked line. Check that the condensate trap is filled to provide a water seal.
   e. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. If temperature is outside of the operating range, check refrigerant pressures and compare to tables 12 through 15. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in tables 10a through 10e. Heat of rejection (HR) can be calculated and compared to submittal data capacity pages. The formula for HR for systems with water is as follows:
   HR (Btuh) = TD x GPM x 500, where TD is the temperature difference between the entering and leaving water, and GPM is the flow rate in U.S. GPM, determined by comparing the pressure drop across the heat exchanger to tables 8a through 8e. In S.I. units, the formula is as follows: HR (kW) = TD x l/s x 4.18.
   f. Check air temperature drop across the air coil when compressor is operating. Air temperature drop should be between 15°F and 25°F [8°C and 14°C].
   g. Turn thermostat to “OFF” position. A hissing noise indicates proper functioning of the reversing valve.
6. Allow five (5) minutes between tests for pressure to equalize before beginning heating test.
   a. Adjust the thermostat to the lowest setting. Place the thermostat mode switch in the “HEAT” position.
   b. Slowly raise the thermostat to a higher temperature until the compressor activates.
   c. Check for warm air delivery within a few minutes after the unit has begun to operate.
   d. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. If temperature is outside of the operating range, check refrigerant pressures and compare to tables 11 through 16. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in tables 10a through 10e. Heat of extraction (HE) can be calculated and compared to submittal data capacity pages. The formula for HE for systems with water is as follows: HE (Btuh) = TD x GPM x 500, where TD is the temperature difference between the entering and leaving water, and GPM is the flow rate in U.S. GPM, determined by comparing the pressure drop across the heat exchanger to tables 10a through 10e. In S.I. units, the formula is as follows: HE (kW) = TD x l/s x 4.18.
   e. Check air temperature rise across the air coil when compressor is operating. Air temperature rise should be between 20°F and 30°F [11°C and 17°C].
   f. Check for vibration, noise, and water leaks.
7. If unit fails to operate, perform troubleshooting analysis (see troubleshooting section). If the check described fails to reveal the problem and the unit still does not operate, contact a trained service technician to insure proper diagnosis and repair of the equipment.
8. When testing is complete, set system to maintain desired comfort level.
9. BE CERTAIN TO FILL OUT AND FORWARD ALL WARRANTY REGISTRATION PAPERS TO CLIMATEMASTER.

Note: If performance during any mode appears abnormal, refer to the CXM/DXM section or troubleshooting section of this manual. To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended.

Figure 28: Test Mode Pins



Short test pins together to enter Test Mode and speed-up timing and delays for 20 minutes.

⚠ WARNING! ⚠

WARNING! When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with energized equipment.

⚠ CAUTION! ⚠

CAUTION! Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the coax or water lines can permanently damage the heat pump.

UNIT OPERATING CONDITIONS

Table 10a: TT Coax Water Pressure Drop

Model	U.S. GPM	l/s	l/m	Pressure Drop, psi [kPa]*			
				30°F [-1°C]	50°F [10°C]	70°F [21°C]	90°F [32°C]
026	4.0	0.252	15	1.5 [10.3]	1.3 [9.0]	1.1 [7.6]	1.0 [6.9]
	6.0	0.378	23	3.1 [21.4]	2.6 [17.9]	2.3 [15.9]	2.1 [14.5]
	7.0	0.441	26	4.1 [28.3]	3.4 [23.4]	3.0 [20.7]	2.7 [18.6]
	8.0	0.504	30	5.1 [35.2]	4.3 [29.7]	3.8 [26.2]	3.4 [23.4]
038	4.0	0.252	15	1.2 [8.3]	1.0 [6.9]	0.8 [5.5]	0.6 [4.1]
	6.0	0.378	23	2.6 [17.9]	2.5 [17.2]	2.3 [15.9]	2.1 [14.5]
	8.0	0.504	30	4.5 [31.0]	4.2 [29.0]	4.0 [27.6]	3.7 [25.5]
	9.0	0.567	34	5.7 [39.3]	5.2 [35.9]	4.8 [33.1]	4.4 [30.3]
049	5.5	0.347	21	1.1 [7.6]	0.9 [6.2]	0.8 [5.5]	0.7 [4.8]
	8.3	0.523	31	2.2 [15.2]	2.1 [14.5]	2.0 [13.8]	1.8 [12.4]
	11.0	0.693	42	3.9 [26.9]	3.6 [24.8]	3.2 [22.1]	3.1 [21.4]
	12.0	0.756	45	4.5 [31.0]	4.2 [29.0]	3.8 [26.2]	3.5 [24.1]
064	7.0	0.441	26	0.5 [3.4]	0.3 [2.1]	0.2 [1.4]	0.1 [0.7]
	10.5	0.662	40	1.9 [13.1]	1.8 [12.4]	1.7 [11.7]	1.6 [11.0]
	14.0	0.882	53	3.9 [26.9]	3.5 [24.1]	3.2 [22.1]	2.9 [20.0]
	15.0	0.945	57	4.8 [33.1]	4.3 [29.7]	3.9 [26.9]	3.5 [24.1]
072	7.5	0.473	29	1.7 [11.7]	1.5 [10.3]	1.3 [9.0]	1.3 [9.0]
	11.3	0.712	43	3.9 [26.9]	3.4 [23.4]	3.0 [20.7]	2.8 [19.3]
	15.0	0.945	57	6.9 [47.6]	6.0 [41.4]	5.4 [37.2]	5.0 [34.5]
	17.0	1.071	64	8.9 [61.4]	7.7 [53.1]	6.9 [47.6]	6.5 [44.8]

*Note: To convert kPa to millibars, multiply by 10.

Unit Operating Conditions

Table 10b: TS Coax Water Pressure Drop

Model	U.S. GPM	l/s	l/m	Pressure Drop, psi [kPa]*			
				30°F [-1°C]	50°F [10°C]	70°F [21°C]	90°F [32°C]
006	1	0.063	4	0.3 [2.1]	0.3 [2.1]	0.2 [1.4]	0.2 [1.4]
	1.5	0.095	6	1.6 [11.0]	1.4 [11.0]	1.2 [11.0]	1.0 [11.0]
	2	0.126	8	3.0 [20.7]	2.6 [17.9]	2.2 [15.2]	1.8 [12.4]
006	1.4	0.088	5	0.8 [5.5]	0.7 [4.8]	0.6 [4.1]	0.6 [4.1]
	2.1	0.132	8	1.5 [10.3]	1.4 [9.7]	1.2 [8.3]	1.1 [7.6]
	2.8	0.177	11	2.7 [18.6]	2.4 [16.5]	2.2 [15.2]	1.9 [13.1]
012	1.8	0.114	7	0.6 [4.1]	0.5 [3.4]	0.4 [2.8]	0.3 [2.1]
	2.6	0.164	10	2.1 [14.5]	1.9 [13.1]	1.6 [11.0]	1.4 [9.7]
	3.5	0.221	13	3.8 [26.2]	3.4 [23.4]	3.0 [20.7]	2.6 [17.9]
018	2.8	0.176	11	0.7 [4.8]	0.5 [3.4]	0.3 [2.1]	0.2[1.4]
	4.1	0.258	15	2.1 [14.5]	1.7 [11.7]	1.4 [9.7]	1.1 [7.6]
	5.5	0.347	21	3.5 [24.1]	2.8 [19.3]	2.4 [16.6]	2.0 [13.8]
024	4.0	0.252	15	1.5 [10.3]	1.3 [9.0]	1.1 [7.6]	1.0 [6.9]
	6.0	0.378	23	3.1 [21.4]	2.6 [17.9]	2.3 [15.9]	2.1 [14.5]
	8.0	0.504	30	5.1 [35.2]	4.3 [29.7]	3.8 [26.2]	3.4 [23.4]
030	4.0	0.252	15	1.5 [10.3]	1.3 [9.0]	1.1 [7.6]	1.0 [6.9]
	6.0	0.378	23	3.1 [21.4]	2.6 [17.9]	2.3 [15.9]	2.1 [14.5]
	8.0	0.504	30	5.1 [35.2]	4.3 [29.7]	3.8 [26.2]	3.4 [23.4]
036	4.5	0.284	17	1.7 [11.7]	1.3 [9.0]	1.1 [7.6]	0.9 [6.2]
	6.8	0.428	26	3.3 [22.8]	3.1 [21.4]	2.9 [20.0]	2.6 [17.9]
	9.0	0.567	34	5.7 [39.3]	5.2 [35.9]	4.8 [33.1]	4.4 [30.3]
042	5.5	0.347	21	1.1 [7.6]	0.9 [6.2]	0.8 [5.5]	0.7 [4.8]
	8.3	0.523	31	2.2 [15.2]	2.1 [14.5]	2.0 [13.8]	1.8 [12.4]
	11.0	0.693	42	3.9 [26.9]	3.6 [24.8]	3.2 [22.1]	3.1 [21.4]
048	6.0	0.378	23	1.3 [9.0]	1.1 [7.6]	1.0 [6.9]	0.9 [6.2]
	9.0	0.567	34	2.6 [17.9]	2.5 [17.2]	2.3 [15.9]	2.2 [15.2]
	12.0	0.756	45	4.5 [31.0]	4.2 [29.0]	3.8 [26.2]	3.5 [24.1]
060	7.5	0.473	28	0.6 [4.1]	0.4 [2.8]	0.3 [2.1]	0.2 [1.4]
	11.3	0.712	43	2.3 [15.9]	2.1 [14.5]	2.0 [13.8]	1.8 [12.4]
	15.0	0.945	57	4.8 [33.1]	4.3 [29.7]	3.9 [26.9]	3.5 [24.1]
070	8.3	0.523	31	2.4 [16.6]	2.0 [13.8]	1.7 [11.7]	1.6 [11.0]
	12.4	0.781	47	5.2 [35.9]	4.5 [31.0]	4.0 [27.6]	3.8 [26.2]
	16.5	1.040	62	8.0 [55.2]	7.0 [48.3]	6.3 [43.4]	6.0 [41.4]

*Note: To convert kPa to millibars, multiply by 10.

Unit Operating Conditions

Table 10c: TC Coax Water Pressure Drop

Model	U.S. GPM	l/s	Pressure Drop, psi [kPa]*			
			30°F [-1°C]	50°F [10°C]	70°F [21°C]	90°F [32°C]
015	1.9	0.12	1.0 (6.9)	0.6 (4.4)	0.5 (3.4)	0.4 (2.8)
	2.8	0.18	1.8 (12.4)	1.4 (9.3)	1.1 (7.6)	1.0 (6.9)
	3.8	0.24	3.3 (22.7)	2.5 (17.5)	2.1 (14.7)	1.9 (13.1)
018	2.3	0.14	2.1 (14.5)	1.4 (9.9)	1.1 (7.6)	0.9 (6.2)
	3.4	0.21	3.4 (23.4)	2.6 (17.6)	2.1 (14.7)	1.8 (12.4)
	4.5	0.28	5.9 (40.6)	4.6 (31.5)	3.9 (26.9)	3.4 (23.4)
024	3.0	0.19	2.2 (15.2)	1.7 (11.6)	1.4 (9.6)	1.2 (8.3)
	4.5	0.28	4.0 (27.6)	3.2 (22.2)	2.8 (19.3)	2.5 (17.2)
	6.0	0.38	7.2 (49.6)	5.9 (40.6)	5.2 (35.8)	4.7 (32.4)
030	3.8	0.24	1.3 (9.0)	0.9 (6.1)	0.7 (4.8)	0.6 (4.1)
	5.6	0.35	2.3 (15.8)	1.8 (12.5)	1.5 (10.3)	1.4 (9.6)
	7.5	0.47	4.2 (28.9)	3.4 (23.2)	2.9 (20)	2.6 (17.9)
036	4.5	0.28	1.8 (12.4)	1.4 (9.6)	1.2 (8.3)	1.0 (6.9)
	6.8	0.43	3.1 (21.4)	2.4 (16.8)	2.1 (14.7)	1.9 (13.1)
	9.0	0.57	5.4 (37.2)	4.4 (30.0)	3.8 (26.2)	3.4 (23.4)
042	5.3	0.33	2.3 (15.8)	1.8 (12.1)	1.5 (10.3)	1.3 (9.0)
	7.9	0.50	4.3 (29.6)	3.5 (24.2)	3.1 (26.4)	2.8 (19.3)
	10.5	0.66	7.9 (54.4)	6.5 (44.8)	5.7 (39.3)	5.2 (35.8)
048	6.0	.038	1.8 (12.4)	1.5 (10.1)	1.3 (9.0)	1.2 (8.3)
	9.0	0.57	3.4 (23.4)	3.0 (20.4)	2.7 (18.6)	2.6 (17.9)
	12.0	0.76	6.2 (42.7)	5.5 (37.9)	5.1 (35.1)	4.8 (35.1)
060	7.5	0.47	3.4 (23.4)	2.8 (19.2)	2.4 (16.5)	2.2 (15.2)
	11.3	0.71	6.8 (46.9)	5.9 (40.8)	5.4 (37.2)	5.0 (34.5)
	15.0	0.95	12.6 (86.8)	11.1 (76.8)	10.3 (71.0)	9.6 (66.1)

Unit Operating Conditions

Table 10d: GS Coax Water Pressure Drop

Model	U.S. GPM	l/s	l/m	Pressure Drop, psi [kPa]*			
				30°F [-1°C]	50°F [10°C]	70°F [21°C]	90°F [32°C]
015	1.8	0.113	7	0.6 [4.1]	0.5 [3.4]	0.5 [3.4]	0.5 [3.4]
	2.8	0.176	11	1.0 [6.9]	0.9 [6.2]	0.8 [5.5]	0.8 [5.5]
	3.8	0.239	14	1.5 [10.3]	1.4 [9.7]	1.3 [9.0]	1.2 [8.3]
018	2.2	0.139	8	0.7 [4.8]	0.7 [4.8]	0.6 [4.1]	0.6 [4.1]
	3.5	0.221	13	1.3 [9.0]	1.2 [8.3]	1.1 [7.6]	1.1 [7.6]
	4.5	0.284	17	1.8 [12.4]	1.8 [12.4]	1.6 [11.0]	1.5 [10.3]
024	3.0	0.189	11	0.6 [4.1]	0.6 [4.1]	0.5 [3.4]	0.5 [3.4]
	4.5	0.284	17	1.1 [7.6]	1.1 [7.6]	1.0 [6.9]	0.9 [6.2]
	6.0	0.378	23	1.8 [12.4]	1.7 [11.7]	1.5 [10.3]	1.5 [10.3]
030	3.7	0.233	14	0.8 [5.5]	0.8 [5.5]	0.7 [4.8]	0.7 [4.8]
	5.5	0.347	21	1.6 [11.0]	1.4 [9.7]	1.3 [9.0]	1.3 [9.0]
	7.5	0.473	28	2.6 [17.9]	2.4 [16.6]	2.2 [15.2]	2.1 [14.5]
036	4.5	0.284	17	1.3 [9.0]	1.2 [8.3]	1.1 [7.6]	1.1 [7.6]
	7.0	0.441	26	2.1 [14.5]	1.9 [13.1]	1.8 [12.4]	1.7 [11.7]
	9.0	0.567	34	3.9 [26.9]	3.7 [25.5]	3.4 [23.4]	3.2 [22.1]
042	5.2	0.328	20	1.6 [11.0]	1.5 [10.3]	1.4 [9.7]	1.3 [9.0]
	8.0	0.504	30	3.2 [22.1]	3.0 [20.7]	2.8 [19.3]	2.6 [17.9]
	10.5	0.662	40	5.1 [35.2]	4.7 [32.4]	4.4 [30.3]	4.1 [28.3]
048	6.0	0.378	23	2.1 [14.5]	1.9 [13.1]	1.8 [12.4]	1.7 [11.7]
	9.0	0.567	34	3.9 [26.9]	3.7 [25.5]	3.4 [23.4]	3.2 [22.1]
	12.0	0.756	45	6.4 [44.1]	5.9 [40.7]	5.5 [37.9]	5.2 [35.9]
060	7.5	0.473	28	1.1 [7.6]	1.0 [6.9]	1.0 [6.9]	0.9 [6.2]
	11.3	0.712	43	2.2 [15.2]	2.1 [14.5]	1.9 [13.1]	1.8 [12.4]
	15.0	0.945	57	3.6 [24.8]	3.4 [23.4]	3.1 [21.4]	3.0 [20.7]
070	9.0	0.567	34	1.5 [10.3]	1.4 [9.7]	1.3 [9.0]	1.2 [8.3]
	13.5	0.851	51	3.0 [20.7]	2.8 [19.3]	2.6 [17.9]	2.5 [17.2]
	18.0	1.134	68	5.0 [34.5]	4.7 [32.4]	4.3 [29.7]	4.1 [28.3]

*Note: To convert kPa to millibars, multiply by 10.

Unit Operating Conditions

Table 10e: GR Coax Water Pressure Drop

Model	U.S. GPM	l/s	l/m	Pressure Drop, psi [kPa]*			
				30°F [-1°C]	50°F [10°C]	70°F [21°C]	90°F [32°C]
006	0.8	0.050	3	0.9 [6.2]	0.8 [5.5]	0.8 [5.5]	0.7 [4.8]
	1.1	0.069	4	1.2 [8.3]	1.1 [7.6]	1.0 [6.9]	0.9 [6.2]
	1.5	0.095	6	2.0 [13.8]	1.9 [13.1]	1.8 [12.4]	1.6 [11.0]
	2.0	0.126	8	3.5 [24.1]	3.2 [22.1]	3.0 [20.7]	2.8 [19.3]
009	1.1	0.069	4	1.2 [8.3]	1.1 [7.6]	1.0 [6.9]	0.9 [6.2]
	1.7	0.107	6	1.7 [11.7]	1.6 [11.0]	1.5 [10.3]	1.4 [9.7]
	2.2	0.139	8	3.5 [24.1]	3.2 [22.1]	3.0 [20.7]	2.8 [19.3]
	3.0	0.189	11	6.0 [41.4]	5.6 [38.6]	5.2 [35.9]	4.9 [33.8]
012	1.5	0.095	6	2.8 [19.3]	2.6 [17.9]	2.4 [16.6]	2.3 [15.9]
	2.3	0.145	9	6.0 [41.4]	5.6 [38.6]	5.2 [35.9]	4.9 [33.8]
	3.0	0.189	11	9.6 [66.2]	9.0 [62.1]	8.3 [57.2]	7.8 [53.8]
	4.0	0.252	15	17.9 [123.4]	16.6 [114.5]	15.4 [106.2]	14.5 [100.0]
015	1.8	0.113	7	2.4 [16.6]	2.3 [15.9]	2.1 [14.5]	2.0 [13.8]
	2.8	0.176	11	4.8 [33.1]	4.4 [30.3]	4.1 [28.3]	3.9 [26.9]
	3.8	0.239	14	8.1 [55.9]	7.6 [52.4]	7.0 [48.3]	6.6 [45.5]
	5.0	0.315	19	14.4 [99.3]	13.4 [92.4]	12.4 [85.5]	11.7 [80.7]
019	2.3	0.145	9	1.9 [13.1]	1.7 [11.7]	1.6 [11.0]	1.5 [10.3]
	3.5	0.221	13	3.4 [23.4]	3.1 [21.4]	2.9 [20.0]	2.7 [18.6]
	4.5	0.284	17	6.6 [45.5]	6.2 [42.8]	5.7 [39.3]	5.4 [37.2]
	6.0	0.378	23	13.2 [91.0]	12.3 [84.8]	11.4 [78.6]	10.7 [73.8]
024	3.0	0.189	11	2.0 [13.8]	1.8 [12.4]	1.7 [11.7]	1.6 [11.0]
	4.5	0.284	17	4.2 [29.0]	3.9 [26.9]	3.6 [24.8]	3.4 [23.4]
	6.0	0.378	23	7.0 [48.3]	6.5 [44.8]	6.0 [41.4]	5.6 [38.6]
	8.0	0.504	30	15.7 [108.3]	14.6 [100.7]	13.5 [93.1]	12.7 [87.6]
030	3.8	0.239	14	1.4 [9.7]	1.3 [9.0]	1.2 [8.3]	1.2 [8.3]
	5.5	0.347	21	2.5 [17.2]	2.3 [15.9]	2.1 [14.5]	2.0 [13.8]
	7.5	0.473	28	3.9 [26.9]	3.7 [25.5]	3.4 [23.4]	3.2 [22.1]
	10.0	0.630	38	6.2 [42.8]	5.8 [40.0]	5.4 [37.2]	5.1 [35.2]
036	4.5	0.284	17	1.1 [7.6]	1.1 [7.6]	1.0 [6.9]	0.9 [6.2]
	6.8	0.428	26	2.2 [15.2]	2.0 [13.8]	1.9 [13.1]	1.7 [11.7]
	9.0	0.567	34	3.5 [24.1]	3.2 [22.1]	3.0 [20.7]	2.8 [19.3]
	12.0	0.756	45	5.7 [39.3]	5.3 [36.5]	4.9 [33.8]	4.6 [31.7]
042	5.3	0.334	20	1.4 [9.7]	1.3 [9.0]	1.2 [8.3]	1.2 [8.3]
	8.0	0.504	30	2.9 [20.0]	2.7 [18.6]	2.5 [17.2]	2.3 [15.9]
	10.5	0.662	40	4.5 [31.0]	4.2 [29.0]	3.9 [26.9]	3.7 [25.5]
	14.0	0.882	53	7.5 [51.7]	7.0 [48.3]	6.5 [44.8]	6.1 [42.1]
048	6.0	0.378	23	2.1 [14.5]	1.9 [13.1]	1.8 [12.4]	1.7 [11.7]
	9.0	0.567	34	3.9 [26.9]	3.7 [25.5]	3.4 [23.4]	3.2 [22.1]
	12.0	0.756	45	6.4 [44.1]	5.9 [40.7]	5.5 [37.9]	5.2 [35.9]
	16.0	1.008	60	10.5 [72.4]	9.8 [67.6]	9.1 [62.8]	8.5 [58.6]
060	7.5	0.473	28	4.9 [33.8]	4.5 [31.0]	4.2 [29.0]	3.9 [26.9]
	11.3	0.712	43	8.5 [58.6]	7.9 [54.5]	7.3 [50.3]	6.9 [47.6]
	15.0	0.945	57	12.9 [89.0]	12.0 [82.8]	11.1 [76.5]	10.4 [71.7]
	20.0	1.260	76	19.8 [136.5]	18.5 [127.6]	17.1 [117.9]	16.1 [111.0]

*Note: To convert kPa to millibars, multiply by 10.

Unit Operating Conditions

Table 10f: GC Coax Water Pressure Drop

Model	U.S. GPM	l/s	l/m	Pressure Drop, psi [kPa]*			
				60°F [16°C]	70°F [21°C]	80°F [27°C]	90°F [32°C]
006	0.9	0.057	3	0.7 [4.8]	0.7 [4.8]	0.7 [4.8]	0.6 [4.1]
	1.1	0.069	4	1.2 [8.3]	1.2 [8.3]	1.2 [8.3]	1.1 [7.6]
	1.7	0.107	6	1.9 [13.1]	1.9 [13.1]	1.8 [12.4]	1.8 [12.4]
	2.0	0.126	8	2.9 [20.0]	2.8 [19.3]	2.7 [18.6]	2.6 [17.9]
009	1.1	0.069	4	2.4 [16.6]	2.3 [15.9]	2.3 [15.9]	2.2 [15.2]
	1.7	0.107	6	3.1 [21.4]	3.0 [20.7]	2.9 [20.0]	2.8 [19.3]
	2.3	0.145	9	4.0 [27.6]	3.9 [26.9]	3.8 [26.2]	3.7 [25.5]
	3.0	0.189	11	5.4 [37.2]	5.3 [36.5]	5.1 [35.2]	4.9 [33.8]
012	1.5	0.095	6	2.3 [15.9]	2.2 [15.2]	2.1 [14.5]	2.1 [14.5]
	2.3	0.145	9	4.4 [30.3]	4.3 [29.7]	4.2 [29.0]	4.0 [27.6]
	3.0	0.189	11	6.4 [44.1]	6.2 [42.8]	6.0 [41.4]	5.8 [40.0]
	4.0	0.252	15	13.3 [91.7]	12.9 [89.0]	12.6 [86.9]	12.2 [84.1]
018	2.3	0.145	9	2.0 [13.8]	2.0 [13.8]	1.9 [13.1]	1.8 [12.4]
	3.5	0.221	13	3.1 [21.4]	3.0 [20.7]	2.9 [20.0]	2.8 [19.3]
	4.5	0.284	17	4.2 [29.0]	4.1 [28.3]	3.9 [26.9]	3.8 [26.2]
	6.0	0.378	23	5.9 [40.7]	5.7 [39.3]	5.6 [38.6]	5.4 [37.2]
024	3.0	0.189	11	2.0 [13.8]	1.9 [13.1]	1.8 [12.4]	1.8 [12.4]
	4.5	0.284	17	3.9 [26.9]	3.7 [25.5]	3.6 [24.8]	3.5 [24.1]
	6.0	0.378	23	6.4 [44.1]	6.2 [42.8]	6.0 [41.4]	5.8 [40.0]
	8.0	0.504	30	10.6 [73.1]	10.3 [71.0]	10.0 [69.0]	9.7 [66.9]
030	3.8	0.239	14	1.5 [10.3]	1.5 [10.3]	1.4 [9.7]	1.4 [9.7]
	5.5	0.347	21	2.7 [18.6]	2.6 [17.9]	2.5 [17.2]	2.4 [16.6]
	7.5	0.473	28	4.3 [29.7]	4.2 [29.0]	4.1 [28.3]	3.9 [26.9]
	10.0	0.630	38	6.9 [47.6]	6.7 [46.2]	6.5 [44.8]	6.3 [43.4]
036	4.5	0.284	17	1.7 [11.7]	1.7 [11.7]	1.6 [11.0]	1.6 [11.0]
	6.8	0.428	26	3.2 [22.1]	3.1 [21.4]	3.0 [20.7]	2.9 [20.0]
	9.0	0.567	34	5.0 [34.5]	4.9 [33.8]	4.8 [33.1]	4.6 [31.7]
	12.0	0.756	45	8.2 [56.5]	7.9 [54.5]	7.7 [53.1]	7.5 [51.7]
041	5.3	0.334	20	0.9 [6.2]	0.9 [6.2]	0.9 [6.2]	0.9 [6.2]
	7.9	0.498	30	2.2 [15.2]	2.1 [14.5]	2.1 [14.5]	2.0 [13.8]
	10.5	0.662	40	4.0 [27.6]	3.9 [26.9]	3.8 [26.2]	3.6 [24.8]
	13.0	0.819	49	6.2 [42.8]	6.0 [41.4]	5.8 [40.0]	5.7 [39.3]
042	5.3	0.334	20	1.0 [6.9]	1.0 [6.9]	1.0 [6.9]	0.9 [6.2]
	8.0	0.504	30	2.6 [17.9]	2.6 [17.9]	2.5 [17.2]	2.4 [16.6]
	11.0	0.693	42	5.3 [36.5]	5.1 [35.2]	4.9 [33.8]	4.8 [33.1]
	14.0	0.882	53	8.7 [60.0]	8.5 [58.6]	8.2 [56.5]	8.0 [55.2]
048	6.0	0.378	23	1.2 [8.3]	1.2 [8.3]	1.2 [8.3]	1.1 [7.6]
	9.0	0.567	34	2.9 [20.0]	2.8 [19.3]	2.7 [18.6]	2.6 [17.9]
	12.0	0.756	45	5.3 [36.5]	5.1 [35.2]	4.9 [33.8]	4.8 [33.1]
	16.0	1.008	60	9.5 [65.5]	9.2 [63.4]	8.9 [61.4]	8.6 [59.3]
060	7.5	0.473	28	4.4 [30.3]	4.2 [29.0]	4.1 [28.3]	4.0 [27.6]
	11.3	0.712	43	7.6 [52.4]	7.3 [50.3]	7.1 [49.0]	6.9 [47.6]
	15.0	0.945	57	11.4 [78.6]	11.1 [76.5]	10.8 [74.5]	10.4 [71.7]
	20.0	1.260	76	17.6 [121.4]	17.1 [117.9]	16.6 [114.5]	16.1 [111.0]

*Note: To convert kPa to millibars, multiply by 10.

Unit Operating Conditions

NOTE: Tables 11 through 16 include the following notes:
- Airflow is at nominal (rated) conditions;
- Entering air is based upon 70°F [21°C] DB in heating and 80/67°F [27/19°C] in cooling;
- Subcooling is based upon head pressure at compressor service port;
- GC series units have cap tube expansion devices; all others in this manual include TXV expansion devices;
- Cooling air and water values can vary greatly with changes in humidity level.

Table 11: TT Series Typical Unit Operating Pressures and Temperatures (60Hz - I.P. Units)

026		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	118-128	159-179	25-30	9-14	16.7-18.7	19-25	72-83	273-293	6-11	3-8	5.9-7.9	16-22
	2.25	118-128	146-166	25-30	7-12	12.3-14.3	20-26	75-85	275-295	6-11	3-8	4.2-6.2	17-23
	3	118-128	132-152	25-30	7-12	7.9-9.9	20-26	78-88	277-297	6-11	3-8	2.7-4.7	18-24
50	1.5	128-138	186-206	18-23	8-13	16.3-18.3	19-25	102-112	302-322	8-12	6-11	8.9-10.9	22-28
	2.25	128-138	172-192	18-23	6-11	12.1-14.1	20-26	106-116	303-323	8-12	6-11	6.7-8.7	23-29
	3	128-138	158-178	18-23	6-11	7.8-9.8	20-26	110-120	305-325	8-12	6-11	4.5-6.5	23-29
70	1.5	136-146	281-301	7-12	7-12	15.7-17.7	19-25	128-138	330-350	10-15	8-13	11.3-13.3	27-34
	2.25	136-146	267-287	7-12	5-10	11.6-13.6	19-25	134-144	332-352	10-15	8-13	8.5-10.5	28-35
	3	136-146	253-273	7-12	4-9	7.6-9.6	19-25	141-151	334-354	10-15	8-13	5.8-7.8	28-35
90	1.5	139-149	368-388	6-11	7-12	14.9-16.9	18-24	162-172	367-387	14-19	10-15	14.4-16.4	33-41
	2.25	139-149	354-374	6-11	5-10	11-13	18-24	166-176	372-392	15-20	10-15	10.8-12.8	34-42
	3	139-149	340-360	6-11	5-10	7.2-9.2	18-24	171-181	377-397	17-22	10-15	7.1-9.1	34-42
110	1.5	143-153	465-485	6-11	7-12	13.9-15.9	17-23						
	2.25	143-153	450-470	6-11	5-10	10.2-12.2	17-23						
	3	143-153	433-453	6-11	5-10	6.5-8.5	17-23						

038		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	120-130	156-176	25-30	9-14	22.1-24.1	18-24	69-79	293-313	7-12	14-19	8.9-10.9	17-23
	2.25	119-129	148-168	25-30	8-13	16.8-18.8	19-25	73-83	297-317	7-12	14-19	6.7-8.7	18-24
	3	119-129	138-158	25-30	8-13	10.5-12.5	19-25	76-86	300-320	7-12	14-19	4.5-6.5	19-25
50	1.5	129-139	225-245	15-20	10-15	21.9-23.9	18-24	96-106	322-342	10-15	17-22	12.2-14.2	23-29
	2.25	128-138	211-231	15-20	9-14	16.1-18.1	19-25	100-110	326-346	10-15	17-22	9.3-11.3	24-30
	3	128-138	197-217	15-20	9-14	10.3-12.3	19-25	105-115	331-351	10-15	17-22	6.4-8.4	24-30
70	1.5	136-146	302-322	9-14	13-18	21.5-23.5	18-24	123-133	352-372	11-16	19-24	15-17	28-35
	2.25	135-145	283-303	9-14	12-17	15.8-17.8	19-25	129-139	358-378	11-16	19-24	11.6-13.6	29-36
	3	135-145	265-285	9-14	12-17	10-12	19-25	135-145	364-384	11-16	19-24	8.2-10.2	30-37
90	1.5	140-150	390-410	7-12	13-18	20.5-22.5	17-23	157-167	390-410	13-18	18-23	21-23	36-44
	2.25	140-150	369-389	8-13	8-13	14.9-16.9	17-23	169-179	399-419	13-18	16.5-21.5	15.5-17.5	37-45
	3	140-150	349-369	8-13	8-13	9.3-11.3	17-23	181-191	408-428	14-19	15-20	10.5-12.5	39-47
110	1.5	145-155	488-508	7-12	13-18	19-21	17-23						
	2.25	145-155	467-487	8-13	8-13	14-16	17-23						
	3	145-155	447-467	8-13	8-13	9-11	17-23						

Unit Operating Conditions

Table 11: TT Series Typical Unit Operating Pressures and Temperatures: Continued

049		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	112-122	187-207	22-27	14-19	20.7-22.7	18-24	66-76	286-306	7-12	8-13	8-10	18-24
	2.25	111-121	167-187	22-27	12-17	15.5-17.5	18-24	69-79	289-309	7-12	9-14	6-8	19-25
	3	111-121	147-167	23-28	11-16	10.2-12.2	18-24	72-82	292-312	7-12	9-14	4-6	19-25
50	1.5	125-135	242-262	13-18	10-15	20.9-22.9	19-25	93-103	314-334	8-13	10-15	11.5-13.5	23-29
	2.25	123-133	224-244	13-18	9-14	15.6-17.6	19-25	98-108	320-340	8-13	10-15	8.7-10.7	24-30
	3	122-132	205-225	14-19	7-12	10.2-12.2	19-25	103-113	326-346	8-13	10-15	5.9-7.9	25-31
70	1.5	133-143	310-330	8-13	8-13	20.5-22.5	19-25	123-133	344-364	9-14	9-14	15-17	28-35
	2.25	132-142	290-310	8-13	7-12	15.2-17.2	19-25	130-140	354-374	9-14	9-14	11.5-13.5	29-36
	3	131-141	270-290	9-14	5-10	9.9-11.9	19-25	137-147	361-381	9-14	9-14	7.9-9.9	30-37
90	1.5	138-148	396-416	7-12	7-12	19.2-21.2	18-24	165-175	390-410	13-18	8-13	19.6-21.6	37-45
	2.25	137-147	374-394	7-12	6-11	14.3-16.3	18-24	175-185	401-421	15-20	8-13	15-17	38-46
	3	136-146	352-372	7-12	4-9	9.3-11.3	18-24	185-195	413-433	17-22	8-13	10.3-12.3	39-47
110	1.5	144-154	497-517	7-12	5-10	18-20	17-23						
	2.25	143-153	472-492	7-12	4-9	13.3-15.3	17-23						
	3	142-152	447-467	7-12	3-8	8.5-10.5	17-23						

064		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool- ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool- ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	117-127	170-190	27-32	15-20	18.2-20.2	17-23	66-76	282-302	10-16	9-14	8-10	19-25
	2.25	116-126	143-163	28-33	13-18	12.6-14.6	17-23	69-79	285-305	10-16	9-14	6-8	19-25
	3	115-125	135-155	29-34	12-17	7-9	17-23	72-82	289-309	10-16	10-15	4-6	20-26
50	1.5	128-138	238-258	16-21	14-19	20.5-22.5	21-27	90-100	310-330	11-17	12-17	11.3-13.3	24-30
	2.25	126-136	222-242	21-26	13-18	14.9-16.9	21-27	95-105	313-333	11-17	12-17	8.5-10.5	25-31
	3	125-135	205-225	26-31	12-17	9.2-11.2	21-27	99-109	316-336	11-17	12-17	5.7-7.7	26-32
70	1.5	135-145	315-335	10-15	14-19	21-23	22-28	115-125	337-357	12-18	14-19	14-16	28-35
	2.25	134-144	296-316	12-17	13-18	15.5-17.5	22-28	120-130	341-361	12-18	14-19	10.6-12.6	29-36
	3	133-143	276-296	15-20	11-16	10-12	22-28	126-136	345-365	12-18	15-20	7.3-9.3	30-37
90	1.5	139-149	408-428	10-15	15-20	20.1-22.1	21-27	157-167	390-410	15-20	14-19	18.2-20.2	37-45
	2.25	138-148	386-406	10-15	13-18	14.8-16.8	21-27	161-171	394-414	15-20	14-19	13.9-15.9	38-46
	3	138-148	364-384	10-15	11-16	9.5-11.5	21-27	166-176	398-418	15-20	15-20	9.6-11.6	39-47
110	1.5	144-154	515-535	8-13	14-19	19-21	20-26						
	2.25	143-153	493-513	8-13	13-18	14-16	20-26						
	3	142-152	469-489	8-13	12-17	9-11	20-26						

Unit Operating Conditions

Table 11: TT Series Typical Unit Operating Pressures and Temperatures: Continued

072		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	119-129 117-127 115-125	155-175 150-170 144-164	25-30 25-30 28-32	17-22 17-22 17-22	18-20 13.2-15.2 8.4-9.4	21-27 21-27 22-28	61-71 65-75 68-78	292-312 296-316 300-320	11-16 11-16 10-15	13-18 14-19 15-20	7.2-9.2 5.4-7.4 3.5-5.5	19-25 20-26 21-27
50	1.5 2.25 3	131-141 130-140 129-139	210-230 205-225 200-220	10-15 11-16 13-18	12-17 12-17 12-17	18.5-20.5 14-16 9.5-11.5	22-28 23-29 24-30	89-99 98-108 106-116	327-347 337-357 348-368	10-15 10-15 10-15	19-24 14-19 9-14	10.9-12.9 8.3-10.3 5.7-7.7	26-32 28-34 30-36
70	1.5 2.25 3	135-145 131-141 128-138	300-320 295-315 290-310	10-15 11-16 13-18	15-20 14-19 14-19	17.6-19.6 13.8-15.8 10-12	23-29 23-29 23-29	119-129 132-142 144-154	365-385 380-400 395-415	10-15 10-15 10-15	21-26 16-21 11-16	14.7-16.7 11.3-13.3 7.9-9.9	33-39 36-42 38-44
90	1.5 2.25 3	139-149 137-147 135-145	390-410 370-390 350-370	10-15 10-15 10-15	16-21 14-19 13-18	16.7-18.7 12.6-14.6 8.5-10.5	22-28 22-28 22-28	162-172 172-182 182-192	418-438 430-450 444-464	10-15 10-15 11-16	19-24 19-24 19-24	19.4-21.4 14.7-16.7 10.1-12.1	43-49 45-51 47-53
110	1.5 2.25 3	145-155 145-155 144-154	490-510 470-490 452-472	10-15 10-15 9-14	16-21 14-19 13-18	15.9-17.9 11.7-13.7 7.4-9	20-27 20-27 20-27						

Table 12: TS Series Typical Unit Operating Pressures and Temperatures (60Hz - I.P. Units)

006		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Sub cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	114-124 111-121 109-119	142-162 132-152 122-142	24-29 26-31 28-33	3-8 3-8 3-8	15.2-17.2 11.4-13.4 7.5-9.5	17-23 17-23 17-23	75-85 78-88 81-91	272-292 274-294 276-296	13-18 13-18 13-18	4-9 4-9 4-9	5.9-7.9 4.3-6.3 2.7-4.7	16-22 16-22 17-23
50	1.5 2.25 3	130-140 129-139 128-138	190-210 180-200 170-190	14-19 16-21 19-24	2-7 2-7 2-7	16.5-18.5 12.3-14.3 8-10	18-24 18-24 18-24	104-114 112-122 120-130	299-319 304-324 308-328	12-17 12-17 12-17	6-11 4-9 3-8	8.8-10.8 6.7-8.7 4.5-6.5	21-27 22-28 23-29
70	1.5 2.25 3	143-153 141-151 140-150	265-285 252-272 240-260	9-14 10-15 11-16	2-7 2-7 2-7	15.5-17.5 11.5-13.5 7.5-9.5	18-24 18-24 18-24	129-139 144-154 159-169	321-341 330-350 340-360	11-16 13-18 15-20	7-12 4-9 3-8	11.2-13.2 8.8-10.8 6.3-8.3	25-31 27-33 28-34
90	1.5 2.25 3	149-159 149-159 148-158	340-370 335-355 320-340	8-13 8-13 8-13	2-7 2-7 2-7	14.2-16.2 10.6-12.6 7-9	17-23 17-23 17-23	163-173 180-190 198-208	349-369 360-380 372-392	13-18 11-16 10-15	7-12 4-9 3-8	14.3-16.3 11.2-13.2 8.1-10.1	30-36 32-38 34-40
110	1.5 2.25 3	154-164 154-164 153-163	451-471 428-448 405-425	8-13 8-13 8-13	2-7 2-7 2-7	12.7-14.7 9.5-11.5 6.5-8.5	15-21 15-21 15-21						

009		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Sub cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	126-136 126-136 126-136	161-181 146-166 131-151	17-22 17-22 17-22	8-13 7-12 6-11	19.8-21.8 14.9-16.9 9.9-11.9	21-27 21-27 21-27	74-84 77-87 79-89	278-298 280-300 283-303	6-11 6-11 6-11	4-9 4-9 3-8	6.1-8.1 4.5-6.5 2.8-4.8	18-24 18-24 19-25
50	1.5 2.25 3	132-142 132-142 132-142	215-235 200-220 185-205	10-15 10-15 10-15	8-13 7-12 6-11	18.8-20.8 14.1-16.1 9.4-11.4	20-26 20-26 20-26	104-114 106-116 108-118	309-329 312-332 315-335	8-12 8-12 8-12	7-12 7-12 7-12	9.6-11.6 7-9 4.5-6.5	24-30 24-30 25-31
70	1.5 2.25 3	138-148 138-148 137-147	278-298 263-283 248-268	8-13 8-13 8-13	9-14 8-13 7-12	17.7-19.7 13.1-15.1 8.5-10.5	19-25 19-25 19-25	127-137 132-142 138-148	332-352 340-360 347-367	10-15 11-16 13-18	10-15 10-15 10-15	12-14 9-10 6.1-8.1	29-35 29-35 30-36
90	1.5 2.25 3	142-152 142-152 142-152	365-385 351-371 337-357	8-13 8-13 8-13	9-14 8-13 7-12	16-18 12-14 8-10	18-24 18-24 18-24	164-174 165-175 167-177	372-392 375-395 379-399	17-22 18-23 19-24	13-18 13-18 13-18	14.5-16.5 11.2-13.2 7.9-9.9	35-41 35-41 36-42
110	1.5 2.25 3	150-160 150-160 150-160	439-459 439-459 439-459	7-12 7-12 7-12	9-14 8-13 7-12	14.2-16.2 10.6-12.6 6.9-8.9	17-23 17-23 17-23						

Unit Operating Conditions

Table 12: TS Series Typical Unit Operating Pressures and Temperatures: Continued

012		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Sub cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	98-108 98-108 99-109	140-160 135-155 127-148	36-41 36-41 36-41	14-19 12-17 10-15	17.1-19.1 12.5-14.5 7.9-9.9	19-25 19-25 19-25	72-82 85-95 78-88	301-321 304-324 308-328	9-14 9-14 9-14	12-17 12-17 12-17	6.5-8.5 4.7-6.7 2.9-4.9	21-27 21-27 22-28
50	1.5 2.25 3	118-128 118-128 118-128	215-235 200-220 185-205	22-27 22-27 22-27	14-19 12-17 10-15	18.1-20.1 13.1-15.1 8.1-10.1	20-26 20-26 19-25	100-110 98-108 95-105	337-357 334-354 332-352	10-15 10-15 11-16	15-20 15-20 15-20	9.5-11.5 6.6-8.6 3.8-5.8	26-32 26-32 26-32
70	1.5 2.25 3	132-142 132-142 132-142	300-320 263-282 245-265	11-16 11-16 12-17	12-17 10-15 7-12	17-19 12.6-14.6 8.2-10.2	19-25 19-25 19-25	115-125 112-122 110-120	361-381 360-380 356-376	19-24 20-25 21-26	18-23 18-23 18-23	11.1-13.1 8-10 4.8-6.8	29-35 29-35 29-35
90	1.5 2.25 3	138-148 138-148 138-148	366-386 353-373 340-360	9-14 9-14 9-14	11-16 9-14 6-11	15.8-17.8 14.9-16.9 14-16	18-24 18-24 18-24	122-132 123-133 124-134	376-396 378-398 380-400	34-39 36-41 38-43	22-27 22-27 23-28	12.1-14.1 9-11 5.8-7.8	32-38 32-38 32-38
110	1.5 2.25 3	145-155 145-155 145-155	453-473 442-462 431-451	9-14 9-14 9-14	9-14 7-12 5-10	14.7-16.7 10.8-12.8 6.8-8.8	16-22 16-22 17-23						

018		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	120-130 120-130 120-130	155-175 142-162 128-148	27-32 27-32 27-32	11-16 9-14 9-14	16.9-19.9 12.5-14.5 8.1-10.1	16-22 17-23 17-23	73-83 75-85 78-88	268-288 270-290 272-292	8-13 8-13 8-13	4-9 4-9 4-9	6.1-8.1 4.4-6.4 2.9-4.9	15-21 16-22 16-22
50	1.5 2.25 3	137-147 137-147 137-147	220-240 206-226 192-212	16-21 16-21 16-21	10-15 8-13 8-13	17-19 12.6-14.6 8.4-10.4	16-22 17-23 17-23	102-112 106-116 110-120	295-315 297-317 299-319	8-13 8-13 8-13	8-13 8-13 8-13	9.1-11.1 6.9-8.9 4.7-6.7	20-26 21-27 21-27
70	1.5 2.25 3	142-152 142-152 142-152	287-307 273-239 259-279	7-12 7-12 7-12	10-15 8-13 8-13	15.9-17.9 11.8-13.8 7.8-9.8	16-22 17-23 17-23	131-141 137-147 144-154	324-344 326-346 328-348	9-14 9-14 9-14	10-15 10-15 10-15	12.1-14.1 9.3-11.3 6.6-8.6	25-33 26-34 26-34
90	1.5 2.25 3	146-156 146-156 146-156	375-395 361-381 347-367	6-11 6-11 6-11	10-15 8-13 8-13	14.9-16.9 11-13 7.2-9.2	16-22 17-23 17-23	174-184 180-190 187-197	360-380 367-387 374-394	10-15 11-16 12-17	12-17 12-17 12-17	15.8-17.8 11.9-13.9 8-10	32-40 33-41 33-41
110	1.5 2.25 3	154-164 154-164 154-164	478-498 461-481 445-465	6-11 6-11 6-11	10-15 8-13 8-13	14-16 10.2-12.2 6.5-8.5	16-22 16-22 16-22						

024		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	115-125 115-125 115-125	154-174 141-161 127-147	40-45 40-45 40-45	8-13 6-11 6-11	16.5-18.5 12.1-14.1 77.7-9.7	19-25 20-26 20-26	73-83 75-85 78-88	283-303 285-305 287-307	8-12 8-12 8-12	6-11 6-11 6-11	5.9-7.9 4.2-6.2 2.7-4.7	16-22 17-23 18-24
50	1.5 2.25 3	115-120 115-120 115-120	209-229 195-215 181-201	24-29 24-29 24-29	10-15 8-13 8-13	15.7-17.7 11.6-13.6 7.6-9.6	18-24 18-24 18-24	102-112 106-116 110-120	313-333 314-334 316-336	8-12 8-12 8-12	8-13 8-13 8-13	8.9-10.9 6.7-8.7 4.5-6.5	22-28 23-29 23-29
70	1.5 2.25 3	136-146 136-146 136-146	275-295 261-281 247-267	6-11 6-11 6-11	6-11 5-10 4-9	15.7-17.7 11.6-13.6 7.6-9.6	18-24 18-24 18-24	128-138 134-144 141-151	340-360 342-362 344-364	9-14 9-14 9-14	9-14 9-14 9-14	11.3-13.3 8.5-10.5 5.8-7.8	27-34 28-35 28-35
90	1.5 2.25 3	140-150 140-150 140-150	361-381 347-367 333-353	6-11 6-11 6-11	6-11 5-10 4-9	14.9-16.9 11-13 7.2-9.2	18-24 18-24 18-24	162-172 166-176 171-181	370-390 376-396 383-403	14-19 15-20 16-21	9-14 9-14 9-14	14.4-16.4 10.8-12.8 7.1-9.1	32-40 34-42 34-42
110	1.5 2.25 3	144-154 144-154 144-154	460-480 445-465 428-448	6-11 6-11 6-11	6-11 4-9 4-9	13.9-15.9 10.2-12.2 6.5-8.5	17-23 17-23 17-23						

Unit Operating Conditions

Table 12: TS Series Typical Unit Operating Pressures and Temperatures: Continued

030		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	116-126 115-125 115-125	146-166 138-158 128-148	27-32 27-32 27-32	7-13 6-11 6-11	19.6-21.6 14.3-16.3 8-10	16-22 17-23 17-23	69-79 73-83 76-86	275-295 277-297 279-299	7-12 7-12 7-12	6-11 6-11 6-11	7.2-9.2 5.4-7.4 3.5-5.5	16-22 17-23 17-23
50	1.5 2.25 3	129-139 128-138 128-138	217-237 203-223 189-209	12-17 12-17 12-17	6-11 5-10 5-10	20.8-22.8 15-17 9.2-11.2	17-23 18-24 18-24	96-106 100-110 105-115	300-320 304-324 309-329	10-15 10-15 10-15	9-14 9-14 9-14	10.5-12.5 7.6-9.6 4.8-6.8	21-27 22-28 22-28
70	1.5 2.25 3	132-142 131-141 131-141	293-313 274-294 256-276	9-14 9-14 9-14	6-11 5-10 5-10	20.1-22.1 14.4-16.4 8.6-10.6	17-23 18-24 18-24	123-133 129-139 135-145	327-347 333-353 339-359	11-16 11-16 11-16	11-16 11-16 11-16	13.2-15.2 9.8-11.8 6.4-8.4	25-32 26-33 27-34
90	1.5 2.25 3	137-147 137-147 137-147	383-403 362-382 342-362	7-12 7-12 7-12	5-10 5-10 5-10	19.4-21.4 13.8-15.8 8.2-10.2	16-22 16-22 16-22	155-165 162-172 169-179	355-375 362-382 369-389	13-18 14-19 16-21	11-16 11-16 11-16	16.8-18.8 12.7-14.7 8.6-10.6	30-38 31-39 32-40
110	1.5 2.25 3	143-153 143-153 143-153	475-495 457-477 439-459	6-11 6-11 6-11	9-14 6-11 6-11	18.2-20.2 13-14 7.7-9.7	16-22 16-22 16-22						

036		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	117-127 116-126 116-126	142-162 134-154 124-144	33-38 33-38 33-38	8-14 7-12 7-12	19.1-21.1 13.8-15.8 7.4-9.4	15-22 15-22 15-22	69-79 73-83 76-86	276-296 278-298 280-300	10-15 10-15 10-15	10-15 10-15 10-15	7.2-9.2 5.3-7.3 3.5-5.5	17-23 18-24 18-24
50	1.5 2.25 3	136-146 136-146 136-146	211-231 197-217 183-203	11-16 11-16 11-16	6-11 5-10 5-10	20.6-22.6 14.8-16.8 9-11	17-23 17-23 17-23	99-109 103-113 108-118	302-322 306-326 311-331	10-15 10-15 10-15	13-18 13-18 13-18	10.6-12.6 7.7-9.7 5-7	22-28 23-29 23-29
70	1.5 2.25 3	137-147 137-147 137-147	275-295 260-280 245-265	9-14 9-14 9-14	10-15 9-14 9-14	19-21 13.8-15.8 8-10	18-24 19-25 19-25	127-137 133-143 139-149	332-352 338-358 344-364	10-15 10-15 10-15	15-20 15-20 15-20	13.5-15.5 10.1-12.1 6.7-8.7	27-34 28-35 29-36
90	1.5 2.25 3	142-152 142-152 142-152	373-393 352-372 332-352	7-12 8-13 8-13	10-15 6-11 6-11	19.5-21.5 13.9-15.9 8.3-10.3	17-23 17-23 17-23	164-174 172-182 181-191	365-385 372-392 379-399	11-16 11-16 12-17	15-20 15-20 15-20	17.4-19.4 13.2-15.2 9-11	34-42 35-43 36-44
110	1.5 2.25 3	147-157 147-157 147-157	467-487 448-468 430-450	6-11 6-11 6-11	10-15 8-13 7-12	16.2-18.2 11.9-13.9 7.6-9.6	16-22 16-22 16-22						

042		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	114-124 113-123 113-123	170-190 150-170 131-151	27-32 27-32 27-32	10-15 9-14 7-12	17.2-19.2 12.7-14.7 8.2-10.2	17-23 17-23 17-23	69-79 72-82 75-85	286-306 289-309 292-312	5-10 5-10 6-11	5-10 6-11 6-11	4.5-6.5 3.9-5.9 3.2-5.2	16-22 17-23 18-24
50	1.5 2.25 3	130-140 129-139 129-139	226-246 208-228 190-210	10-15 10-15 10-15	6-11 5-10 4-9	17.8-19.8 13.3-15.3 8.8-10.8	20-26 20-26 20-26	100-110 105-115 110-120	315-335 322-342 330-350	7-12 8-13 10-15	6-11 6-11 7-12	9-11 7-9 5-7	22-28 23-29 24-30
70	1.5 2.25 3	132-142 131-141 131-141	290-310 273-293 255-275	6-11 6-11 6-11	6-11 5-10 4-9	17.3-19.3 12.8-14.8 8.3-10.3	19-25 19-25 19-25	131-141 138-148 145-155	347-367 358-378 369-389	11-16 13-18 16-21	6-11 8-13 9-14	13.4-15.4 10-12 6.9-8.9	29-35 30-36 31-37
90	1.5 2.25 3	136-146 135-145 135-145	370-390 350-370 330-350	6-11 6-11 6-11	6-11 5-10 4-9	16-18 11.8-13.8 7.6-9.6	17-23 17-23 17-23	175-185 177-187 180-190	393-413 401-421 409-429	19-24 20-25 22-27	7-12 9-14 12-17	17.6-19.6 13.2-15.2 8.7-10.7	36-42 37-43 38-44
110	1.5 2.25 3	143-153 142-152 141-151	469-489 448-468 427-447	6-11 6-11 6-11	6-11 5-10 4-9	14-16 11-13 7-9	16-22 16-22 16-22						

Unit Operating Conditions

Table 12: TS Series Typical Unit Operating Pressures and Temperatures: Continued

048		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	108-118	180-200	27-32	12-17	19.8-21.8	19-25	65-75	293-313	7-12	9-14	8.2-10.2	17-23
	2.25	107-117	161-181	28-33	10-15	14.8-16.8	19-25	68-78	297-217	8-13	9-14	6.2-8.2	18-24
	3	107-117	142-162	29-34	9-14	9.8-11.8	19-25	72-82	301-321	9-14	9-14	4.2-6.2	19-25
50	1.5	123-133	236-256	16-21	8-13	20.2-22.2	21-27	92-102	321-341	10-15	11-16	11.6-13.6	23-29
	2.25	122-132	218-238	17-22	7-12	15.2-18.2	21-27	100-110	330-350	11-16	11-16	8.9-10.9	24-30
	3	122-132	200-220	17-22	6-11	10.2-12.2	21-27	108-118	340-360	12-17	11-16	6-8	26-32
70	1.5	130-140	305-325	10-15	8-13	20-22	20-26	122-132	353-373	12-17	11-16	15-17	29-35
	2.25	129-139	285-305	11-16	6-11	15-17	20-26	133-143	365-385	14-19	11-16	11.5-13.5	31-37
	3	129-139	265-285	11-16	5-10	10-12	20-26	144-154	378-398	16-21	11-16	8-10	33-39
90	1.5	133-143	390-410	8-13	8-13	19-21	19-25	166-176	397-417	16-21	9-14	19.5-21.5	37-43
	2.25	132-142	368-388	9-14	6-11	14-16	19-25	173-183	407-727	18-23	9-14	14.7-16.7	38-44
	3	132-142	345-365	9-14	5-10	9-11	19-25	181-191	417-437	19-24	10-15	9.9-11.9	40-46
110	1.5	141-151	497-517	6-11	8-13	18-20	18-24						
	2.25	140-150	472-492	7-12	6-11	13.5-15.5	18-24						
	3	140-150	447-467	8-13	5-10	8.7-10.7	18-24						

060		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	98-108	160-180	40-45	12-17	20-22	19-25	62-72	276-296	6-11	6-11	8-10	17-23
	2.25	97-107	149-169	41-46	12-17	14.3-16.3	19-25	66-76	280-300	6-11	6-11	6-8	18-24
	3	96-106	137-157	42-48	11-16	8.5-10.5	20-26	70-80	284-304	7-12	6-11	4-6	19-25
50	1.5	118-128	225-245	36-41	11-16	21.2-23.2	19-25	88-98	306-326	10-15	8-13	11-13	23-29
	2.25	117-127	210-230	37-42	10-15	15.7-17.7	20-26	94-104	311-331	10-15	8-13	8.3-10.3	24-30
	3	115-125	195-215	38-43	9-14	10.2-12.2	21-27	100-110	317-337	11-16	9-14	5.5-7.5	25-31
70	1.5	135-145	300-320	12-17	9-14	20.3-22.3	21-27	112-122	333-353	12-17	10-15	14-16	28-34
	2.25	133-143	285-305	14-19	8-13	15-17	21-27	122-132	342-362	14-19	10-15	10.5-12.5	30-36
	3	132-142	270-290	16-21	7-12	10-12	22-28	130-140	351-371	15-20	11-16	7.3-9.3	32-38
90	1.5	139-149	390-410	8-13	7-12	19.3-21.3	20-26	147-157	369-389	15-20	10-15	17.7-19.7	36-42
	2.25	138-148	370-390	8-13	6-11	14.3-16.3	21-27	154-164	377-397	18-23	10-15	13.4-15.4	37-43
	3	138-148	350-370	8-13	6-11	9.3-11.3	21-27	160-170	385-405	19-24	11-16	9-11	38-44
110	1.5	144-154	488-508	8-13	8-13	18.4-20.4	21-27						
	2.25	143-153	468-488	7-12	6-11	13.6-15.6	21-27						
	3	142-152	448-468	7-12	5-10	8.8-10.8	21-27						

070		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	110-120	177-197	36-41	15-20	20.2-22.2	21-27	61-71	290-310	12-18	9-14	8-10	19-25
	2.25	109-119	162-182	37-42	13-18	15-17	21-27	65-75	292-312	12-18	10-15	6-8	20-26
	3	107-117	147-167	38-43	11-16	9.7-11.7	22-28	68-78	296-316	12-18	10-15	4-6	21-27
50	1.5	128-138	246-266	18-23	11-16	21-23	22-28	88-98	320-340	11-17	13-18	11.7-13.7	26-32
	2.25	128-138	228-248	19-24	9-14	15.6-17.6	23-29	96-106	330-350	11-17	11-16	9-11	27-33
	3	127-137	210-230	20-25	6-11	10.2-12.2	24-30	105-115	338-358	11-17	9-14	6-8	29-35
70	1.5	134-144	305-325	9-14	11-16	20.8-22.8	23-29	118-128	355-375	10-16	14-19	15.2-17.2	33-39
	2.25	133-143	289-309	9-14	9-14	15.4-17.4	23-29	130-140	368-388	12-18	13-18	11.7-13.7	35-41
	3	131-141	273-293	9-14	6-11	10-12	23-29	141-151	380-400	15-21	11-16	8-10	37-43
90	1.5	140-150	390-410	10-15	11-16	19.6-21.6	22-28	158-168	401-421	9-15	13-18	19.5-21.5	41-47
	2.25	139-149	373-393	10-15	9-14	14.5-16.5	22-28	168-178	412-432	10-16	12-17	14.8-16.8	43-49
	3	138-148	355-375	10-15	6-11	9.3-11.3	22-28	178-188	423-443	12-18	12-17	10-12	45-51
110	1.5	144-154	488-508	10-15	9-14	18.4-20.4	20-27						
	2.25	143-153	468-488	10-15	6-11	13.6-15.6	20-27						
	3	142-152	448-468	9-14	5-10	8.8-10.8	20-27						

Unit Operating Conditions

Table 13: GS/GR Series Typical Unit Operating Pressures and Temperatures (60Hz - I.P. Units)

Entering Water Temp °F	Water Flow GPM/ton	Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
		Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcool-ing	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5 2.25 3	75-85 74-84 73-83	90-105 80-95 70-85	25-40 25-40 25-40	12-20 11-18 10-16	21-24 13-16 10-16	21-26 21-26 21-26	34-39 37-43 40-46	167-186 172-191 177-196	12-16 12-16 12-16	1-4 1-4 1-4	7.6-8.4 4.8-5.6 3.4-4.2	14-20 16-22 16-22
50	1.5 2.25 3	75-85 74-84 73-83	125-155 120-142 115-138	12-20 12-20 12-20	10-18 9-16 8-14	20-23 12-15 8-12	20-25 20-25 20-25	50-60 53-62 55-65	180-210 185-215 190-220	10-17 10-17 10-17	1-5 1-5 1-5	10.8-11.9 6.7-8.1 5.1-5.9	23-29 24-30 28-31
70	1.5 2.25 3	75-85 74-84 73-83	179-198 168-186 158-175	9-16 9-16 9-16	8-15 8-14 8-12	19-22 12-17 7-12	19-24 19-24 19-24	71-82 73-85 76-88	205-230 210-238 215-242	14-19 14-19 14-19	1-5 1-5 1-5	14.0-15.2 9.0-10.2 6.7-7.9	28-34 30-37 31-38
90	1.5 2.25 3	75-85 74-84 73-83	229-251 218-241 208-230	9-17 9-17 9-17	8-15 8-14 8-12	18-21 10-14 6-11	17-23 17-23 17-23	85-95 90-100 95-105	220-260 225-265 230-270	18-28 18-28 18-28	2-5 2-5 2-5	14.4-16.6 10.8-12.4 7.2-8.3	32-39 33-41 35-42
110	1.5 2.25 3	77-87 76-86 75-85	280-320 270-310 260-300	8-15 8-15 8-15	10-25 10-24 10-22	17-20 9-13 5-10	15-20 15-20 15-20						

Table 14: GS/GR Series Typical Unit Operating Pressures and Temperatures (50Hz - S.I. Units)

Entering Water Temp °C	Water Flow l/m per kW	Cooling - without HWG active						Heating - without HWG active					
		Suction Pressure bar	Discharge Pressure bar	Superheat °C	Subcooling °C	Water Temp Rise °C	Air Temp Drop °C	Suction Pressure bar	Discharge Pressure bar	Superheat °C	Subcooling °C	Water Temp Drop °C	Air Temp Rise °C
0	1.6 2.4 3.2	5.2-5.9 5.1-5.8 5.0-5.7	6.2-7.2 5.5-6.6 4.8-5.9	14-22 14-22 14-22	7-11 6-10 6-9	12-13 7-9 6-9	12-14 12-14 12-14	2.3-2.7 2.6-3.0 2.8-3.2	11.5-12.8 11.9-13.2 12.2-13.5	7-9 7-9 7-9	1-2 1-2 1-2	4-5 3-4 2-3	8-11 9-12 9-12
10	1.6 2.4 3.2	5.2-5.9 5.1-5.8 5.0-5.7	8.6-10.7 8.3-9.8 7.9-9.5	7-11 7-11 7-11	6-10 5-9 4-8	11-13 7-8 4-7	11-14 11-14 11-14	3.4-4.1 3.7-4.3 3.8-4.5	12.4-14.5 12.8-14.8 13.1-15.2	6-9 6-9 6-9	1-3 1-3 1-3	6-7 4-5 3-4	13-16 13-17 16-17
20	1.6 2.4 3.2	5.2-5.9 5.1-5.8 5.0-5.7	12.3-13.7 11.6-12.8 10.9-12.1	5-9 5-9 5-9	4-8 4-8 4-7	11-12 7-9 4-7	11-13 11-13 11-13	4.9-5.7 5.0-5.9 5.2-6.1	14.1-15.9 14.5-16.4 14.8-16.7	8-11 8-11 8-11	1-3 1-3 1-3	8-9 5-6 4-5	16-19 17-21 17-21
32	1.6 2.4 3.2	5.2-5.9 5.1-5.8 5.0-5.7	15.8-17.3 15.0-16.6 14.3-15.9	5-9 5-9 5-9	4-8 4-8 4-7	10-12 6-8 3-6	9-13 9-13 9-13	5.9-6.6 6.2-6.9 6.6-7.2	15.2-17.9 15.5-18.3 15.9-18.6	10-16 10-16 10-16	1-3 1-3 1-3	8-9 6-7 4-5	18-22 18-23 19-23
43	1.6 2.4 3.2	5.3-6.0 5.2-5.9 5.2-5.9	19.3-22.1 18.6-21.4 17.9-20.7	4-8 4-8 4-8	6-14 6-13 6-12	9-11 5-7 3-6	8-11 8-11 8-11						

Unit Operating Conditions

Table 15: GC Series Typical Unit Operating Pressures and Temperatures (60Hz - I.P. Units)

Entering Water Temp °F	Water Flow GPM/ton	Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
		Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
60	1.5	66-75	160-190	10-20	6-16	20-23	20-25	60-70	205-230	10-18	1-5	12.1-14	23-29
	2.25	65-75	145-175	15-25	8-18	12-15	20-25	63-73	210-238	10-18	1-5	7.2-9.0	24-30
	3	64-74	130-160	20-30	10-20	8-12	20-25	65-75	215-242	10-18	1-5	5.8-6.9	25-31
70	1.5	71-82	200-230	10-20	6-16	19-22	19-24	66-72	205-230	15-25	2-8	14.0-15.2	28-34
	2.25	70-80	185-215	15-25	8-18	12-17	19-24	68-74	210-238	15-25	2-8	9.0-10.2	30-37
	3	69-79	175-205	20-30	10-20	7-12	19-24	70-76	215-242	15-25	2-8	6.7-7.9	31-38
80	1.5	75-85	230-260	10-16	5-12	19-22	18-23	68-74	205-230	20-35	2-10	14.2-15.9	32-39
	2.25	74-84	215-245	13-20	7-14	12-17	18-23	70-76	210-238	20-35	2-10	9.9-11.1	33-41
	3	72-82	200-230	15-25	8-15	7-12	18-23	72-76	215-242	20-35	2-10	6.9-8.1	35-42
90	1.5	79-90	260-290	2-8	1-8	18-21	17-23						
	2.25	77-88	245-275	5-12	2-9	10-14	17-23						
	3	75-87	230-260	8-16	3-10	6-11	17-23						

Table 16: GC Series Typical Unit Operating Pressures and Temperatures (50Hz - S.I. Units)

Entering Water Temp °C	Water flow l/m per kW	Cooling - without HWG active						Heating - without HWG active					
		Suction Pressure bar	Discharge Pressure bar	Superheat °C	Subcooling °C	Water Temp Rise °C	Air Temp Drop °C	Suction Pressure bar	Discharge Pressure bar	Superheat °C	Subcooling °C	Water Temp Drop °C	Air Temp Rise °C
15	1.6	4.6-5.2	11.0-13.1	6-11	3-9	11-13	11-14	4.1-4.8	14.1-15.9	6-10	1-3	7-8	13-16
	2.4	4.5-5.2	10.0-12.1	8-14	4-10	7-8	11-14	4.3-5.0	14.5-16.4	6-10	1-3	4-5	13-17
	3.2	4.4-5.1	9.0-11.0	11-17	6-11	4-7	11-14	4.5-5.2	14.8-16.7	6-10	1-3	3-4	14-17
20	1.6	4.9-5.7	13.8-15.9	6-11	3-9	11-12	11-13	4.6-5.0	14.1-15.9	8-14	1-4	8-8	16-19
	2.4	4.8-5.5	12.8-14.8	8-14	4-10	7-9	11-13	4.7-5.1	14.5-16.4	8-14	1-4	5-6	17-21
	3.2	4.8-5.4	12.1-14.1	11-17	6-11	4-7	11-13	4.8-5.2	14.8-16.7	8-14	1-4	4-4	17-21
27	1.6	5.2-5.9	15.9-17.9	6-9	3-7	11-12	10-13	4.7-5.1	14.1-15.9	11-19	1-6	8-9	18-22
	2.4	5.1-5.8	14.8-16.9	7-11	4-8	7-9	10-13	4.8-5.2	14.5-16.4	11-19	1-6	6-6	18-23
	3.2	5.0-5.7	13.8-15.9	8-14	4-8	4-7	10-13	5.0-5.2	14.8-16.7	11-19	1-6	4-5	19-23
32	1.6	5.4-6.2	17.9-20.0	1-4	1-4	10-12	9-13						
	2.4	5.3-6.1	16.9-19.0	3-7	1-5	6-8	9-13						
	3.2	5.2-6.0	15.9-17.9	4-9	2-6	3-6	9-13						

NOTE: Tables 11 through 16 include the following notes:
- Airflow is at nominal (rated) conditions;
- Entering air is based upon 70°F [21°C] DB in heating and 80/67°F [27/19°C] in cooling;
- Subcooling is based upon head pressure at compressor service port;
- GC series units have cap tube expansion devices; all others in this manual include TXV expansion devices;
- Cooling air and water values can vary greatly with changes in humidity level.

Table 17: Water Temperature Change Through Heat Exchanger

Water Flow, gpm [l/m]	Rise, Cooling °F, [°C]	Drop, Heating °F, [°C]
For Closed Loop: Ground Source or Closed Loop Systems at 3 gpm per ton [3.2 l/m per kW]	9 - 12 [5 - 6.7]	4 - 8 [2.2 - 4.4]
For Open Loop: Ground Water Systems at 1.5 gpm per ton [1.6 l/m per kW]	20 - 26 [11.1 - 14.4]	10 - 17 [5.6 - 9.4]

Preventive Maintenance

Water Coil Maintenance
(Direct ground water applications only)
If the system is installed in an area with a known high mineral content (125 P.P.M. or greater) in the water, it is best to establish a periodic maintenance schedule with the owner so the coil can be checked regularly. Consult the well water applications section of this manual for a more detailed water coil material selection. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. Therefore, 1.5 gpm per ton [1.6 l/m per kW] is recommended as a minimum flow. Minimum flow rate for entering water temperatures below 50°F [10°C] is 2.0 gpm per ton [2.2 l/m per kW].

Water Coil Maintenance
(All other water loop applications)
Generally water coil maintenance is not needed for closed loop systems. However, if the piping is known to have high dirt or debris content, it is best to establish a periodic maintenance schedule with the owner so the water coil can be checked regularly. Dirty installations are typically the result of deterioration of iron or galvanized piping or components in the system. Open cooling towers requiring heavy chemical treatment and mineral buildup through water use can also contribute to higher maintenance. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with both the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. However, flow rates over 3 gpm per ton (3.9 l/m per kW) can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

Hot Water Generator Coils
See water coil maintenance for ground water units. If the potable water is hard or not chemically softened, the high temperatures of the desuperheater will tend to scale even quicker than the water coil and may need more frequent inspections. In areas with extremely hard water, a HWG is not recommended.

Filters
Filters must be clean to obtain maximum performance. Filters should be inspected every month under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

Washable, high efficiency, electrostatic filters, when dirty, can exhibit a very high pressure drop for the fan motor and reduce air flow, resulting in poor performance. It is especially important to provide consistent washing of these filters (in the opposite direction of the normal air flow) once per month using a high pressure wash similar to those found at self-serve car washes.

Condensate Drain
In areas where airborne bacteria may produce a “slimy” substance in the drain pan, it may be necessary to treat the drain pan chemically with an algaecide approximately every three months to minimize the problem. The condensate pan may also need to be cleaned periodically to insure indoor air quality. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect the drain twice a year to avoid the possibility of plugging and eventual overflow.

Compressor
Conduct annual amperage checks to insure that amp draw is no more than 10% greater than indicated on the serial plate data.

Fan Motors
All units have lubricated fan motors. Fan motors should never be lubricated unless obvious, dry operation is suspected. Periodic maintenance oiling is not recommended, as it will result in dirt accumulating in the excess oil and cause eventual motor failure. Conduct annual dry operation check and amperage check to insure amp draw is no more than 10% greater than indicated on serial plate data.

Air Coil
The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Care must be taken not to damage the aluminum fins while cleaning. CAUTION: Fin edges are sharp.

Cabinet
Do not allow water to stay in contact with the cabinet for long periods of time to prevent corrosion of the cabinet sheet metal. Generally, vertical cabinets are set up from the floor a few inches [7 - 8 cm] to prevent water from entering the cabinet. The cabinet can be cleaned using a mild detergent.

Refrigerant System
To maintain sealed circuit integrity, do not install service gauges unless unit operation appears abnormal. Reference the operating charts for pressures and temperatures. Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

Functional Troubleshooting

Fault	Htg	Clg	Possible Cause	Solution
Main power Problems	X	X	Green Status LED Off	Check Line Voltage circuit breaker and disconnect
				Check for line voltage between L1 and L2 on the contactor
				Check for 24VAC between R and C on CXM/DXM
				Check primary/secondary voltage on transformer
HP Fault-Code 2 High pressure		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting
				Check water flow adjust to proper flow rate
		X	Water Temperature out of range in cooling	Bring water temp within design parameters
	X		Reduced or no Air flow in heating	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Dirty Air Coil- construction dust etc.
				Too high of external static. Check static vs blower table
	X		Air Temperature out of range in heating	Bring return air temp within design parameters
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table
	X	X	Bad HP Switch	Check switch continuity and operation. Replace
LP/LOC Fault-Code 3	X	X	Insufficient charge	Check for refrigerant leaks
Low Pressure/Loss of Charge	X		Compressor pump down at start-up	Check charge and start-up water flow
FP1 Fault - Code 4 Water Coil low temperature limit	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting
				Plugged strainer or filter. Clean or replace.
				Check water flow adjust to proper flow rate
	X		Inadequate anti-freeze level	Check antifreeze density with hydrometer
	X		Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Clip JW3 jumper for antifreeze (10°F [-12°C]) use
	X		Water Temperature out of range	Bring water temp within design parameters
	X	X	Bad thermistor	Check temp and impedance correlation per chart
FP2 fault - Code 5 Air Coil low temperature limit		X	Reduced or no Air flow in cooling	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters
		X	Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Normal airside applications will require 30°F [-1°C] only
	X	X	Bad thermistor	Check temp and impedance correlation per chart
Condensate Fault-Code 6	X	X	Blocked Drain	Check for blockage and clean drain
	X	X	Improper trap	Check trap dimensions and location ahead of vent
		X	Poor Drainage	Check for piping slope away from unit
				Check slope of unit toward outlet
				Poor venting. Check vent location
		X	Moisture on sensor	Check for moisture shorting to air coil
Over/Under Voltage-Code 7 (Auto resetting)	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size
				Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer tap for correct power supply voltage
	X	X	Over Voltage	Check power supply voltage and 24VAC before and during operation.
				Check 24VAC and unit transformer tap for correct power supply voltage
Unit Performance Sentinel-Code 8	X		Heating mode FP2>125°F [52°C]	Check for poor air flow or overcharged unit.
		X	Cooling Mode FP1>125°F [52°C] OR FP2< 40\F [4\C]	Check for poor water flow, or air flow
No Fault Code Shown	X	X	No compressor operation	See "Only fan operates"
	X	X	Compressor Overload	Check and Replace if necessary
	X	X	Control board	Reset power and check operation
Unit Short Cycles	X	X	Dirty Air Filter	Check and Clean air filter
	X	X	Unit in "Test Mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor Overload	Check and Replace if necessary
Only Fan Runs	X	X	Thermostat position	Insure thermostat set for heating or cooling operation
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor Overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.

Functional Troubleshooting

Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation.
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for Line voltage across BR contacts.
				Check fan power enable relay operation (if present)
	X	X	Fan motor	Check for line voltage at motor. Check capacitor
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
Unit Doesn't Operate in Cooling		X	Reversing Valve	Set for cooling demand and check 24VAC on RV coil and at CXM/DXM board.
				If RV is stuck, run high pressure up by reducing water flow and while operating engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	Check for 'O' RV setup not 'B'
		X	Thermostat wiring	Check O wiring at heat pump. Jumper O and R for RV coil 'Click'.
		X	Thermostat wiring	Put thermostat in cooling mode. Check for 24VAC on O (check between C and O); check for 24VAC on W (check between W and C). There should be voltage on O, but not on W. If voltage is present on W, thermostat may be bad or wired incorrectly.

Performance Troubleshooting

Performance Troubleshooting	Htg	Clg	Possible Cause	Solution
Insufficient capacity/ Not cooling or heating properly	X	X	Dirty Filter	Replace or clean
	X		Reduced or no Air flow in heating	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Reduced or no Air flow in cooling	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
	X	X	Leaky duct work	Check supply and return air temperatures at the unit and at distant duct registers if significantly different, duct leaks are present
	X	X	Low refrigerant charge	Check superheat and subcooling per chart
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
		X	Defective Reversing Valve	Perform RV touch test
	X	X	Thermostat improperly located	Check location and for air drafts behind stat
	X	X	Unit undersized	Recheck loads & sizing check sensible clg load and heat pump capacity
	X	X	Scaling in water heat exchanger	Perform Scaling check and clean if necessary
	X	X	Inlet Water too Hot or Cold	Check load, loop sizing, loop backfill, ground moisture.
High Head Pressure	X		Reduced or no Air flow in heating	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting
				Check water flow adjust to proper flow rate
		X	Inlet Water too Hot	Check load, loop sizing, loop backfill, ground moisture.
	X		Air Temperature out of range in heating	Bring return air temp within design parameters
		X	Scaling in water heat exchanger	Perform Scaling check and clean if necessary
	X	X	Unit Overcharged	Check superheat and subcooling. Reweigh in charge
	X	X	Non-condensables insystem	Vacuum system and reweigh in charge
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
Low Suction Pressure	X		Reduced water flow in heating	Check pump operation or water valve operation/setting
				Plugged strainer or filter. Clean or replace.
				Check water flow adjust to proper flow rate
	X		Water Temperature out of range	Bring water temp within design parameters
		X	Reduced Air flow in cooling	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters
	X	X	Insufficient charge	Check for refrigerant leaks
Low discharge air temperature in heating	X		Too high of air flow	Check fan motor speed selection and airflow chart
	X		Poor Performance	See 'Insufficient Capacity'
High humidity		X	Too high of air flow	Check fan motor speed selection and airflow chart
		X	Unit oversized	Recheck loads & sizing check sensible clg load and heat pump capacity

Functional Troubleshooting - I.P. Units

HEATING CYCLE ANALYSIS -

Refrigerant Type:

R410A

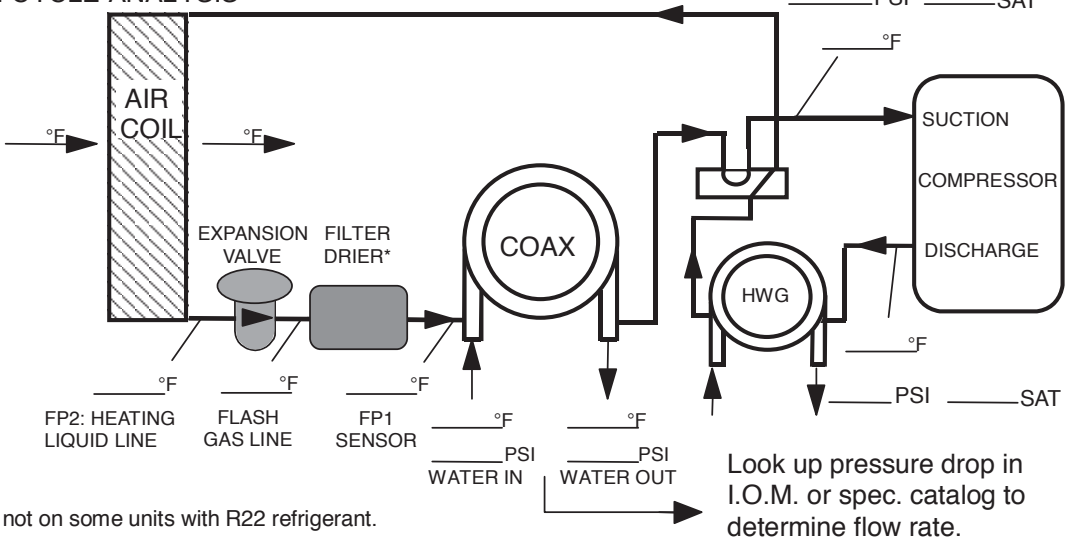
R22

R407C

Voltage: _____

Comp Amps: _____

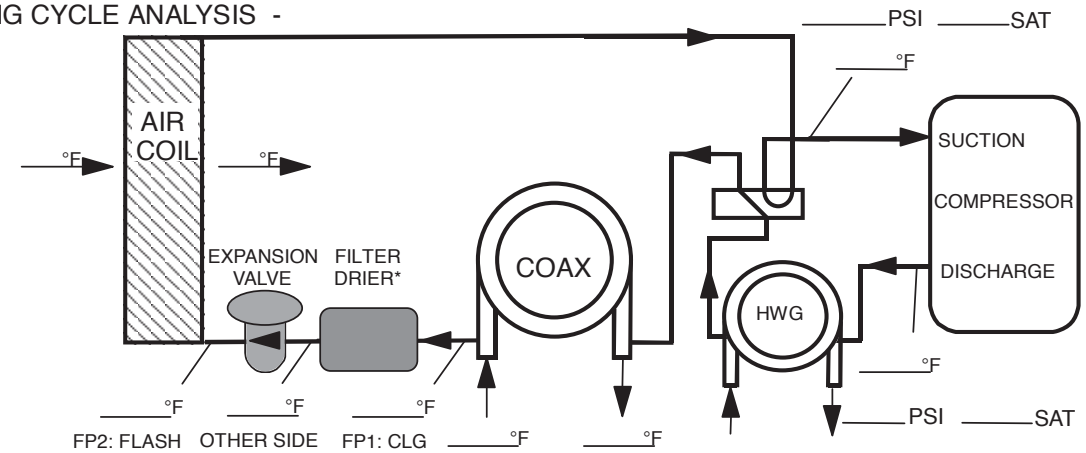
Total Amps: _____



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

*Filter drier not on some units with R22 refrigerant.

COOLING CYCLE ANALYSIS -



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

Heat of Extraction (Absorption) or Heat of Rejection =

_____ flow rate (gpm) x _____ temp.diff. (deg. F) x _____ fluid factor† = _____ (Btu/hr)

Superheat = Suction temperature - suction saturation temp. = _____ (deg F)

Subcooling = Discharge saturation temp. - liquid line temp. = _____ (deg F)

† Use 500 for water, 485 for antifreeze.

Rev. 12/08

Note: Never connect refrigerant gauges during startup procedures. Conduct water-side analysis using P/T ports to determine water flow and temperature difference. If water-side analysis shows poor performance, refrigerant troubleshooting may be required. Connect refrigerant gauges as a last resort.

Functional Troubleshooting - S.I. Units

HEATING CYCLE ANALYSIS -

Refrigerant Type:

R410A

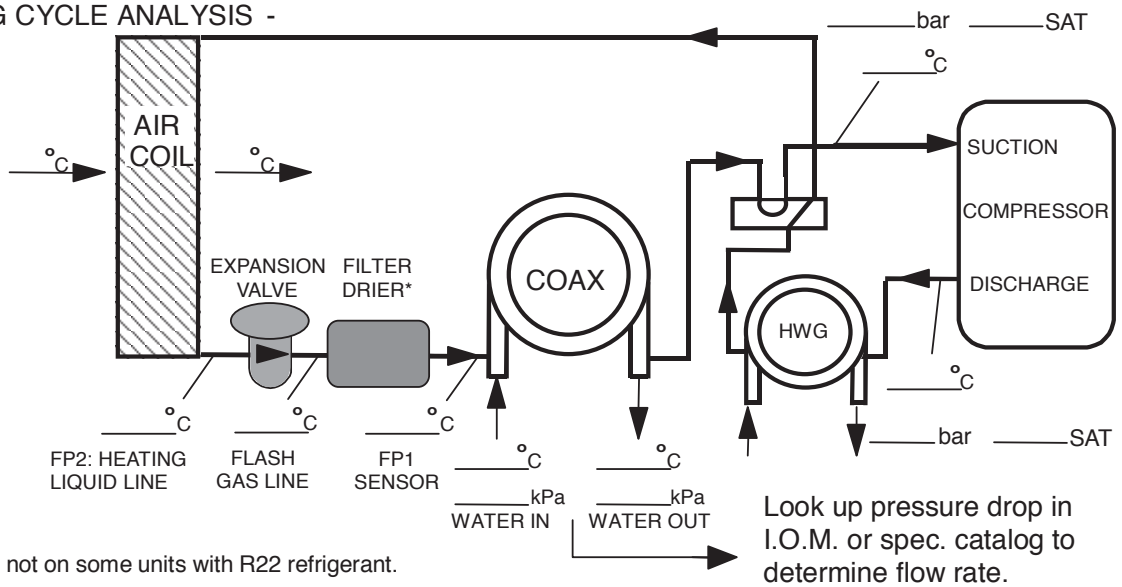
R22

R407C

Voltage: _____

Comp Amps: _____

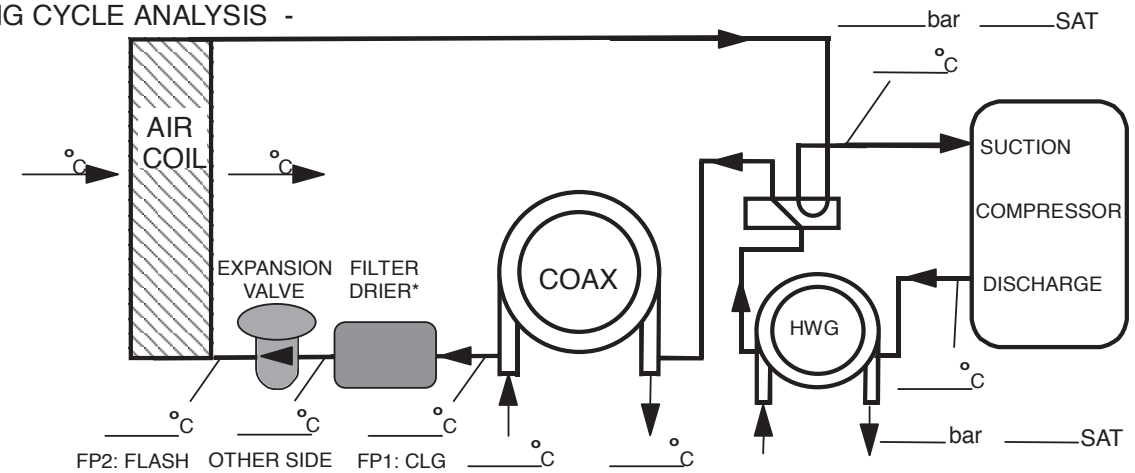
Total Amps: _____



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

*Filter drier not on some units with R22 refrigerant.

COOLING CYCLE ANALYSIS -



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

Heat of Extraction (Absorption) or Heat of Rejection =

_____flow rate (l/s) x _____ temp. diff. (deg. C) x _____ fluid factor† = _____ (kW)

Superheat = Suction temperature - suction saturation temp. = _____ (deg C)

Subcooling = Discharge saturation temp. - liquid line temp. = _____ (deg C)

† Use 4.18 for water, 4.05 for antifreeze

Rev. 11/06

Note: Never connect refrigerant gauges during startup procedures. Conduct water-side analysis using P/T ports to determine water flow and temperature difference. If water-side analysis shows poor performance, refrigerant troubleshooting may be required. Connect refrigerant gauges as a last resort.

Packaged Units
Rev.: 1/06/09B

Warranty (U.S. & Canada)

CLIMATEMASTER®
Geothermal Heating & Cooling Systems

CLIMATE MASTER, INC.
LIMITED EXPRESS WARRANTY/ LIMITATION OF REMEDIES AND LIABILITY

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climate Master, Inc., a Delaware corporation, ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog or agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CM's opinion or commendation of CM's products. **EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CM'S PRODUCTS. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS. CM MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

GRANT OF LIMITED EXPRESS WARRANTY
CM warrants CM products purchased and retained in the United States of America and Canada to be free from defects in material and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating and/or heat pump units built or sold by CM for twelve (12) months from date of unit start-up or eighteen (18) months from date of shipment (from factory), whichever comes first; (2) Repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from factory). All parts must be returned to CM's factory in Oklahoma City, Oklahoma, freight prepaid, no later than sixty (60) days after the date of the failure of the part; if CM determines the part to be defective and within CM's Limited Express Warranty, CM shall, when such part has been either replaced or repaired, return such to a factory recognized dealer, contractor or service organization, F.O.B. CM's factory, Oklahoma City, Oklahoma, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This warranty does not cover and does not apply to: (1) Air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels have been removed or defaced; (5) Products on which payment to CM is or has been in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, alteration or mis application of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CM's printed instructions; or (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CM's products.

CM is not responsible for: (1) The costs of any fluids, refrigerant or other system components, or associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CM's Limited Express Warranty; (2) The costs of labor, refrigerant, materials or service incurred in removal of the defective part, or in obtaining and replacing the new or repaired part (except for the limited labor coverage set forth above); or, (3) Transportation costs of the defective part from the installation site to ClimateMaster or of the return of any part not covered by CM's Limited Express Warranty.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined that other warranties exist, any such express warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty.

LIMITATION OF REMEDIES
In the event of a breach of the Limited Express Warranty, CM will only be obligated at CM's option to repair the failed part or unit or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CM to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR PURCHASER AGAINST CM FOR THE BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY
CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM. **CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY.**

OBTAINING WARRANTY PERFORMANCE
Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized dealer, contractor or service organization. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 S.W. 44th Street • Oklahoma City, Oklahoma 73179 (405) 745-6000

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev:: 3/03

LC083

CLIMATE MASTER, INC.
LIMITED EXPRESS WARRANTY /LIMITATION OF REMEDIES AND LIABILITY
(FOR INTERNATIONAL CLASS PRODUCTS)

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climate Master, Inc., a Delaware corporation, U. S. A. ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog or agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CM's opinion or commendation of CM's products. **EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CM'S PRODUCTS. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS. CM MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

GRANT OF LIMITED EXPRESS WARRANTY

CM warrants CM products purchased and shipped outside the United States and Canada to be free from defects in material and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating and/or heat pump units built or sold by CM for twelve (12) months from date of unit start-up or eighteen (18) months from date of shipment (from factory), whichever comes first; and, (2) Repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from factory). All parts must be returned to CM's factory in Oklahoma City, Oklahoma, freight prepaid, no later than sixty (60) days after the date of the failure of the part; if CM determines the part to be detective and within CM's Limited Express Warranty, CM shall, when such part has been either replaced or repaired, return such to a factory recognized dealer, contractor or service organization, EX-WORKS (Incoterms 1990), CM's factory, Oklahoma City, Oklahoma, U.S.A. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This warranty does not cover and does not apply to: (1) Air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels have been removed or defaced; (5) Products on which payment to CM is or has been in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, alteration or mis application of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CM's printed instructions; or (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CM's products.

CM is not responsible for: (1) The costs of any fluids, refrigerant or other system components, or associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CM's Limited Express Warranty; (2) The costs of labor, refrigerant, materials or service incurred in removal of the defective part, or in obtaining and replacing the new or repaired part (except for the limited labor coverage set forth above); or, (3) Transportation costs of the defective part from the installation site to ClimateMaster or of the return of any part not covered by CM's Extended Limited Express Warranty.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined that other warranties exist, any such express warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty.

LIMITATION OF REMEDIES

In the event of a breach of the Limited Express Warranty, CM will only be obligated at CM's option to repair the failed part or unit or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CM to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR PURCHASER AGAINST CM FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY

CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM. **CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY.**

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NOTE: Some countries do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and country to country.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev.: 3/03

LC079

Packaged Units
Rev.: 1/06/09B

Revision History

Date	Item	Description
5 Nov, 2008	Various	TC Data Added
16 Oct, 2008	Line Voltage	Two Notes Added Below Tables and 460 Vac Note
9 Sept, 2008	CXM Control	Pressure Testing Note Updated
30 June, 2008	Low Volt Wiring	Shut-Off Valve Note Added
4 June, 2008	Various	Added 460 Vac Note to Electrical Tables
21 May, 2008	CXM Control	Added Pressure Testing Language Note
26 Nov, 2007	Line Voltage	Added TS 50Hz Electrical Data
14 Sep, 2007	Various	Added Data for TS Size 006, 009, 012
30 July, 2007	Various	Updated Metric Information
May 23, 2007	Various	Added Data for TT Size 072
May 23, 2007	Various	Updated TS Size 018 for Rev B
20 Nov, 2006		Added International Warranty
20 Nov, 2006		Added GS, GR, GC 50Hz Service Data
20 Nov, 2006		Added ClimaDry Reheat Option Information
20 Nov, 2006		Added GS, GR, GC 50Hz Electrical Data
11 July, 2005	Various	Updated Low Temperature Limit Verbiage
11 July, 2005	All	First Published

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CLIMATEMASTER
Geothermal Heating & Cooling Systems
7300 S.W. 44th Street
Oklahoma City, OK 73179
Phone: 405-745-6000
Fax: 405-745-6058
climatemaster.com