



TRANQUILITY WATER-TO-WATER (TMW) SERIES



SIZE 100 (100kW)
WATER-TO-WATER
R410A - 60Hz STANDARD & EXTENDED RANGE



TRANQUILITY WATER-TO-WATER (TM) SERIES



R410A - 90Hz STANDED & EXTENDED RANGE
WATER-TO-WATER SIZE 100 (100Kw)



THE TRANQUILITY MODULAR WATER-TO-WATER (TMW) SERIES

The TMW water-to-water series offers high efficiency and high capacity with advanced features, quiet operation and application flexibility at competitive prices. As ClimateMaster's largest water-to-water unit, the TMW series can be used for radiant floor heating, snow/ice melt, chilled water for fan coils, industrial process control, potable hot water generation*, hot/chilled water for make-up air, and many other types of HVAC and industrial applications that require cost effective heated or chilled water.

The Tranquility (TMW) Series exceeds ASHRAE 90.1 efficiencies, and also uses EarthPure® HFC-410A zero ozone depletion refrigerant, making it an extremely environmentally-friendly option. The unit is eligible for additional LEED® (Leadership in Energy and Environmental Design) points because of the "green" technology design.

Available in 28 ton capacity (100 kW), the TMW series provides high capacity in a small footprint, which saves mechanical room space. The TMW has an extended range refrigerant circuit (refrigerant and water circuit insulation is standard), capable of ground loop (geothermal) applications as well as water loop (boiler-tower) applications. Standard features are many. Microprocessor controls, galvanized steel cabinet, polyester powder coat paint and TXV refrigerant metering device are just some of the features of the flexible TMW series. The uniquely-designed coaxial heat exchangers are designed for many years of reliable operation.

ClimateMaster's dual-isolated compressor mounting and heavy gauge steel cabinet helps make the TMW series the quietest large capacity water-to-water unit on the market. Two scroll compressors operate quietly, and provide part load operation for capacity control. Options such as DDC controls and UltraQuiet™ sound attenuation package allow customized design solutions. For ease of installation and service, access to the refrigeration service and electrical control panel is located at the front of the unit, allowing units to be installed side-by-side for large capacity applications (see below).

The TMW Series water-to-water heat pumps are designed to meet the challenges of today's HVAC demands with a high efficiency, high value solution.

UNIT FEATURES

- Size 100 (100 kW, 28 ton)
- Two Copeland scroll compressors
- Dual independent refrigeration circuits
- Exclusive single side service access (front of unit) allows multiple units to be installed side-by-side for large capacity installations
- Top water connections, staggered for ease of manifolding multiple units
- Exceeds ASHRAE 90.1 efficiencies
- Heavy gauge galvanized steel construction with polyester powder coat paint and stainless steel front access panels
- Insulated compressor compartment
- Small footprint
- TXV metering devices
- Extended range (20 to 110°F, -6.7 to 43.3°C) operation
- Microprocessor controls standard (optional DXM and/or DDC controls)
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Compressor "run" and "fault" lights on the front of the cabinet
- Seven safeties standard
- Options include UltraQuiet™ sound attenuation package and Cupro-Nickel heat exchanger(s)

*Requires field supplied secondary heat exchanger.

Selection Procedure**Reference Calculations****Heating**

$$LWT = EWT - \frac{HE}{GPM \times 500}$$

Cooling

$$LWT = EWT + \frac{HR}{GPM \times 500}$$

Legend and Glossary of Abbreviations

BTUH = BTU(British Thermal Unit) per hour

CFM = airflow, cubic feet/minute

COP = coefficient of performance = BTUH output/BTUH input

DB = dry bulb temperature (°F)

EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)

EER = energy efficiency ratio = BTUH output/Watt input

EPT = external pipe thread

ESP = external static pressure (inches w.g.)

EWT = entering water temperature

GPM = water flow in U.S. gallons/minute

HE = total heat of extraction, BTUH

HC = air heating capacity, BTUH

HR = total heat of rejection, BTUH

HWC = hot water generator (desuperheater) capacity, Mbtuh

IPT = internal pipe thread

KW = total power unit input, kilowatts

LAT = leaving air temperature, °F

LC = latent cooling capacity, BTUH

LWT = leaving water temperature, °F

MBTUH = 1000 BTU per hour

S/T = sensible to total cooling ratio

SC = sensible cooling capacity, BTUH

TC = total cooling capacity, BTUH

WB = wet bulb temperature (°F)

WPD = waterside pressure drop (psi & ft. of hd.)

Conversion Table - to convert inch-pound (English) to SI (Metric)

Water Flow	Water Pressure Drop
Water Flow (L/s) = gpm x 0.0631	PD (kPa) = PD (ft of hd) x 2.99

Selection Procedure

Step 1: Determine the actual heating and/or cooling loads at the applicable source (building loop) water temperature/flow rate and load water temperature/flow rate. The source heat exchanger is the condenser in cooling/evaporator in heating; the load heat exchanger is the evaporator in cooling/condenser in heating.

Step 2: Obtain the following design parameters: Entering source/load water temperature, source/load water flow rate in GPM and water flow pressure drop. Water flow rate is generally between 2.25 and 3.00 GPM/ton for closed loop (boiler/tower and geothermal) systems, and between 1.5 and 2.0 GPM/ton for open loop (well water) systems. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.

Step 3: Determine application requirements. Water-to-water applications are almost always designed for a particular installation, which will change how the data tables are used for unit selection. For example, a water-to-water unit used for radiant floor heating on a geothermal closed loop is significantly different in unit selection from a water-to-water unit on a boiler/tower application used for generating chilled water for fan coil units. It is especially important to note that the load water flow rate must be maintained above minimum flow rates as shown in the data tables for proper refrigerant circuit operation and unit longevity. For example, most radiant floor applications require buffer (storage) tanks because the flow rate through the floor is usually lower than the minimum flow rate for the water-to-water unit. Therefore, selection of the heat pump is dependent upon maintaining a certain tank temperature and unit load flow rate. There would be a pump between the heat pump and the buffer tank, and a pump(s) between the buffer tank and radiant floor to maintain design flow rate on both sides.

Step 4: Enter tables at the design source water temperature and flow rate. Choose the appropriate load water temperature and flow rate. Read the total heating or cooling capacities (Note: interpolation is permissible; extrapolation is not).

Step 5: If the units selected are not within 10% of the load calculations, then review what effect changing the GPM and water temperature would have on the capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure.

Example Equipment Selection for Heating**Step 1 Load Determination:**

Assume we have determined that the application will be heating only (radiant floor) for a large commercial warehouse, and that the appropriate heating load at design conditions is as follows:

Total heating 210,000 BTUH

Step 2 Design Conditions:

Entering source temperature 30°F (geothermal closed loop)

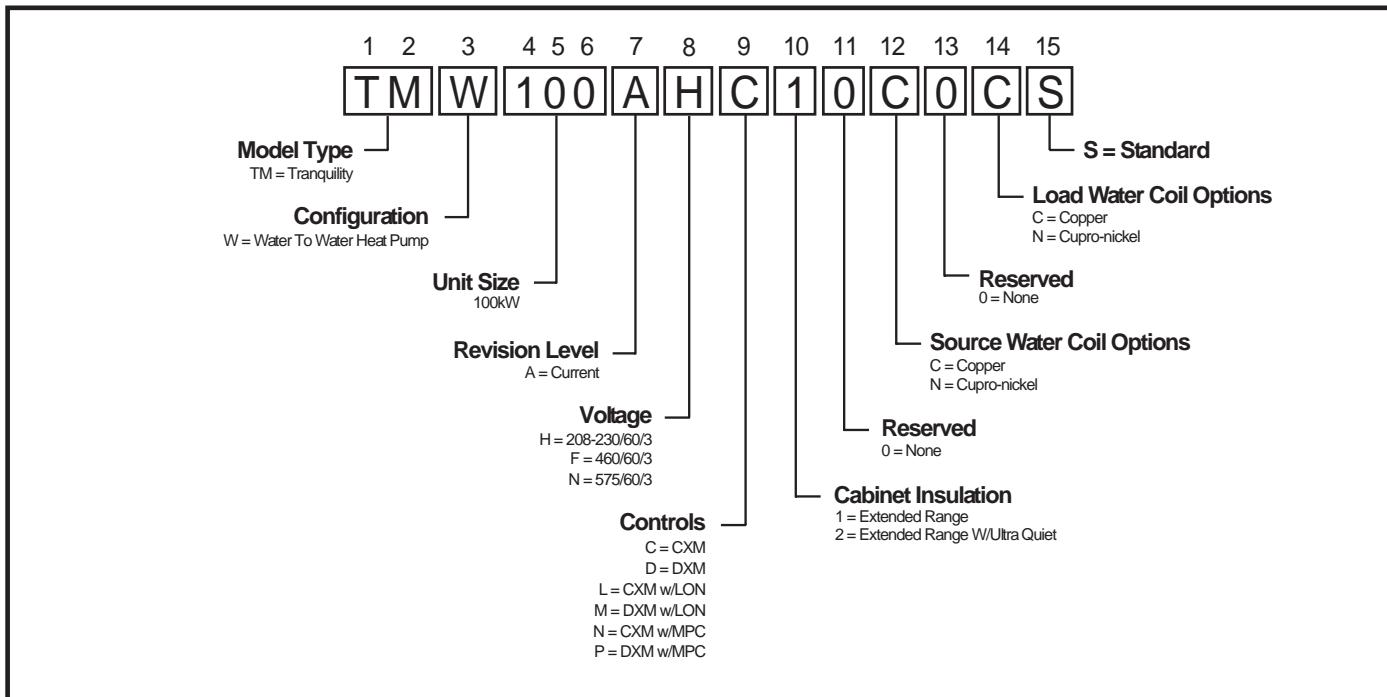
Source flow rate..... 53 GPM

Entering load temperature 100°F

Load flow rate 53 GPM

Steps 3, 4, 5 HP Selection:

We enter the tables at design source water temperature and flow rate, and select the appropriate load water temperature and flow rate. A TMW100 at design conditions supplies 211,100 BTUH, which meets the design heating load requirement.

TMW Series Nomenclature

Rev.: 09/06/06D

**Performance Data
ARI/ASHRAE/ISO 13256-2**

ASHRAE/ARI/ISO 13256-2. 60Hz - English (I-P) Units

Model	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling		Heating		Cooling		Heating		Cooling		Heating	
	Indoor 53.6°F Outdoor 86°F		Indoor 104°F Outdoor 68°F		Indoor 53.6°F Outdoor 59°F		Indoor 104°F Outdoor 50°F		Indoor 53.6°F Outdoor 77°F		Indoor 104°F Outdoor 32°F	
	Capacity Btuh	EER BtuH/W	Capacity Btuh	COP BtuH/ Btuh	Capacity Btuh	EER BtuH/W	Capacity Btuh	COP BtuH/ Btuh	Capacity Btuh	EER BtuH/W	Capacity Btuh	COP BtuH/ Btuh
TMW100	253,500	13.6	336,200	4.4	282,000	19.60	277,000	3.7	266,600	15.6	220,000	3.0

All ratings based upon 208V operation

Indoor coil also called "Load" and outdoor coil also called "Source"

ASHRAE/ARI/ISO 13256-2. 60Hz - Metric (S.I.) Units

Model	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling		Heating		Cooling		Heating		Cooling		Heating	
	Indoor 12°C Outdoor 30°C		Indoor 40°C Outdoor 20°C		Indoor 12°C Outdoor 15°C		Indoor 40°C Outdoor 10°C		Indoor 12°C Outdoor 25°C		Indoor 40°C Outdoor 0°C	
	Capacity Watts	EER W/W	Capacity Watts	COP W/W	Capacity Watts	EER W/W	Capacity Watts	COP W/W	Capacity Watts	EER W/W	Capacity Watts	COP W/W
TMW100	74,297	3.99	98,535	4.4	82,649	5.74	81,184	3.7	78,136	4.57	64,478	3.0

All ratings based upon 208V operation

Indoor coil also called "Load" and outdoor coil also called "Source"

ASHRAE/ARI/ISO 13256-2. 50Hz - Metric (S.I.) Units

Model	Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
	Cooling		Heating		Cooling		Heating		Cooling		Heating	
	Indoor 12°C Outdoor 30°C		Indoor 40°C Outdoor 20°C		Indoor 12°C Outdoor 15°C		Indoor 40°C Outdoor 10°C		Indoor 12°C Outdoor 25°C		Indoor 40°C Outdoor 0°C	
	Capacity Watts	EER W/W	Capacity Watts	COP W/W	Capacity Watts	EER W/W	Capacity Watts	COP W/W	Capacity Watts	EER W/W	Capacity Watts	COP W/W
TMW100	68,227	4.3	91,559	5.0	78,450	6.38	73,147	3.97	73,807	4.99	57,366	3.18

All ratings based upon 208V operation

Indoor coil also called "Load" and outdoor coil also called "Source"

Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

Performance Data Selection Notes

For operation in the shaded area when water is used in lieu of an anti-freeze solution, the LWT (Leaving Water Temperature) must be calculated. Flow must be maintained to a level such that the LWT is maintained above 40°F [4.4°C] when the JW3 jumper is not clipped (see example below). This is due to the potential of the refrigerant temperature being as low as 32°F [0°C] with 40°F [4.4°C] LWT, which may lead to a nuisance cutout due to the activation of the Low Temperature Protection. JW3 should never be clipped for standard range equipment or systems without antifreeze.

Example:

At 50°F EWT (Entering Water Temperature) and 1.5 gpm/ton, a 3 ton unit has a HE of 22,500 Btuh. To calculate LWT, rearrange the formula for HE as follows:

$HE = TD \times GPM \times 500$, where $HE =$ Heat of Extraction (Btuh); $TD =$ temperature difference (EWT - LWT) and $GPM =$ U.S. Gallons per Minute.

$$TD = HE / (GPM \times 500)$$

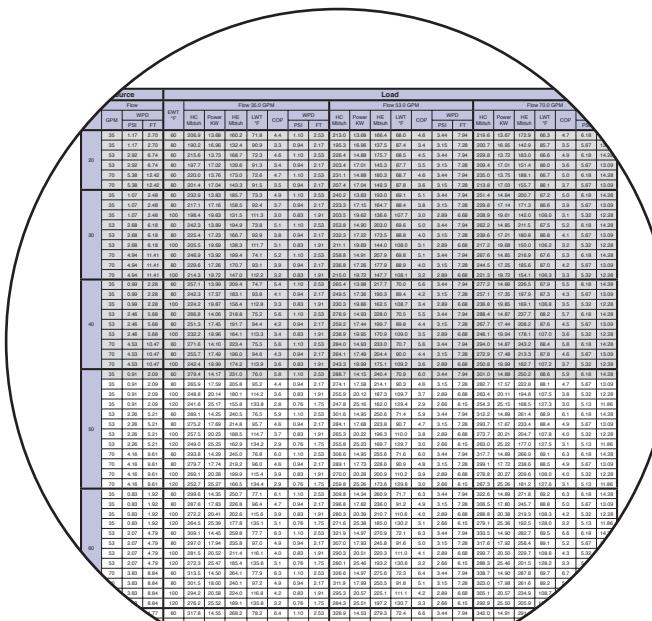
$$TD = 22,500 / (4.5 \times 500)$$

$$TD = 10^{\circ}\text{F}$$

$$LWT = EWT - TD$$

$$LWT = 50 - 10 = 40^{\circ}\text{F}$$

In this example, as long as the EWT does not fall below 50°F, the system will operate as designed. For EWTs below 50°F, higher flow rates will be required (open loop systems, for example, require at least 2 gpm/ton when EWT is below 50°F).



Performance Data TMW100 - Cooling

Source			Load																						
EWT °F	Flow		EWT °F	Flow 35.0 GPM							Flow 53.0 GPM							Flow 70.0 GPM							
	GPM	WPD		TC Mbtuh	Power kW	HR Mbtuh	LWT °F	EER	WPD		TC Mbtuh	Power kW	HR Mbtuh	LWT °F	EER	WPD		TC Mbtuh	Power kW	HR Mbtuh	LWT °F	EER	WPD		
									PSI	FT						PSI	FT						PSI	FT	
50	35	1.19	2.75	50					271.2	13.86	318.5	39.8	19.6	3.59	8.30	277.3	13.94	324.9	42.1	19.9	6.50	15.02			
	35	1.19	2.75	60	282.0	13.81	329.1	43.9	20.1	1.10	2.53	294.1	13.92	341.6	48.9	21.1	3.44	7.94	299.9	13.97	347.5	51.4	21.5	6.18	14.28
	35	1.19	2.75	70	302.7	13.99	350.4	52.7	21.3	1.01	2.34	313.9	14.09	362.0	58.2	22.3	3.29	7.60	319.0	14.14	367.3	60.9	22.6	5.91	13.64
	35	1.19	2.75	80	320.5	14.15	368.8	61.7	22.4	0.94	2.17	330.2	14.24	378.8	67.5	23.2	3.15	7.28	334.5	14.28	383.2	70.4	23.4	5.67	13.09
	35	1.19	2.75	90	335.0	14.28	383.8	70.9	23.3	0.88	2.03	342.7	14.35	391.6	77.1	23.9	3.02	6.97	345.8	14.38	394.8	80.1	24.0	5.47	12.64
	53	3.59	8.30	50					275.0	12.76	318.5	39.6	21.5	3.59	8.30	281.1	12.80	324.8	42.0	22.0	6.50	15.02			
	53	3.59	8.30	60	285.4	12.83	329.2	43.7	21.9	1.10	2.53	297.6	12.90	341.6	48.8	23.1	3.44	7.94	303.3	12.93	347.4	51.3	23.4	6.18	14.28
	53	3.59	8.30	70	305.8	12.95	350.0	52.5	23.3	1.01	2.34	316.8	13.01	361.2	58.0	24.3	3.29	7.60	321.9	13.04	366.4	60.8	24.7	5.91	13.64
	53	3.59	8.30	80	323.1	13.05	367.7	61.5	24.5	0.94	2.17	332.6	13.11	377.4	67.4	25.4	3.15	7.28	336.8	13.13	381.6	70.4	25.6	5.67	13.09
	53	3.59	8.30	90	337.3	13.14	382.1	70.7	25.5	0.88	2.03	344.8	13.18	389.8	77.0	26.2	3.02	6.97	347.9	13.20	392.9	80.1	26.4	5.47	12.64
	70	6.50	15.02	50					276.2	12.30	318.2	39.6	22.5	3.59	8.30	282.4	12.33	324.5	41.9	22.9	6.50	15.02			
	70	6.50	15.02	60	286.7	12.35	328.9	43.6	22.8	1.10	2.53	298.9	12.41	341.2	48.7	24.1	3.44	7.94	304.6	12.43	347.0	51.3	24.5	6.18	14.28
	70	6.50	15.02	70	307.1	12.44	349.6	52.5	24.3	1.01	2.34	318.1	12.50	360.7	58.0	25.5	3.29	7.60	323.1	12.52	365.8	60.8	25.8	5.91	13.64
	70	6.50	15.02	80	324.3	12.52	367.1	61.5	25.6	0.94	2.17	333.7	12.57	376.6	67.4	26.6	3.15	7.28	337.8	12.59	380.8	70.3	26.8	5.67	13.09
	70	6.50	15.02	90	338.2	12.59	381.2	70.7	26.7	0.88	2.03	345.6	12.62	388.7	77.0	27.4	3.02	6.97	348.6	12.63	391.7	80.0	27.6	5.47	12.64
70	35	1.01	2.34	50					251.5	16.64	308.3	40.5	15.1	3.59	8.30	258.3	16.70	315.3	42.6	15.5	6.50	15.02			
	35	1.01	2.34	60	265.3	16.76	322.5	44.8	15.4	1.10	2.53	279.0	16.88	336.6	49.5	16.5	3.44	7.94	285.6	16.94	343.4	51.8	16.9	6.18	14.28
	35	1.01	2.34	70	289.9	16.98	347.8	53.4	16.7	1.01	2.34	302.7	17.10	361.1	58.6	17.7	3.29	7.60	308.7	17.15	367.2	61.2	18.0	5.91	13.64
	35	1.01	2.34	80	311.0	17.17	369.6	62.2	17.8	0.94	2.17	322.2	17.27	381.1	67.8	18.7	3.15	7.28	327.1	17.32	386.2	70.7	18.9	5.67	13.09
	35	1.01	2.34	90	328.1	17.32	387.2	71.3	18.7	0.88	2.03	336.8	17.40	396.2	77.3	19.4	3.02	6.97	340.3	17.43	399.8	80.3	19.5	5.47	12.64
	53	3.29	7.60	50					258.4	15.76	312.2	40.2	16.4	3.59	8.30	265.2	15.80	319.1	42.4	16.8	6.50	15.02			
	53	3.29	7.60	60	271.4	15.83	325.4	44.5	16.7	1.10	2.53	284.8	15.91	339.1	49.3	17.9	3.44	7.94	291.2	15.95	345.6	51.7	18.3	6.18	14.28
	53	3.29	7.60	70	294.9	15.97	349.4	53.1	18.1	1.01	2.34	307.3	16.04	362.1	58.4	19.2	3.29	7.60	313.0	16.08	367.9	61.1	19.5	5.91	13.64
	53	3.29	7.60	80	315.0	16.09	369.8	62.0	19.3	0.94	2.17	325.5	16.15	380.6	67.7	20.2	3.15	7.28	330.1	16.17	385.3	70.6	20.4	5.67	13.09
	53	3.29	7.60	90	330.9	16.18	386.1	71.1	20.2	0.88	2.03	338.9	16.23	394.2	77.2	20.9	3.02	6.97	341.9	16.24	397.4	80.2	21.1	5.47	12.64
	70	5.91	13.64	50					261.5	15.34	313.9	40.1	17.0	3.59	8.30	268.2	15.37	320.6	42.3	17.5	6.50	15.02			
	70	5.91	13.64	60	274.0	15.39	326.5	44.3	17.4	1.10	2.53	287.3	15.45	340.0	49.2	18.6	3.44	7.94	293.6	15.48	346.4	51.6	19.0	6.18	14.28
	70	5.91	13.64	70	297.0	15.49	349.9	53.0	18.8	1.01	2.34	309.2	15.55	362.3	58.3	19.9	3.29	7.60	314.8	15.57	367.9	61.0	20.2	5.91	13.64
	70	5.91	13.64	80	316.6	15.58	369.7	61.9	20.0	0.94	2.17	326.9	15.62	380.2	67.7	20.9	3.15	7.28	331.4	15.64	384.8	70.5	21.2	5.67	13.09
	70	5.91	13.64	90	332.1	15.65	385.5	71.0	21.0	0.88	2.03	339.9	15.68	393.4	77.2	21.7	3.02	6.97	343.0	15.69	396.5	80.2	21.9	5.47	12.64
90	35	0.88	2.03	50					225.8	19.64	292.8	41.5	11.5	3.59	8.30	232.6	19.71	299.8	43.4	11.8	6.50	15.02			
	35	0.88	2.03	60	242.3	19.80	309.9	46.2	11.7	1.10	2.53	256.2	19.94	324.3	50.3	12.8	3.44	7.94	263.1	20.01	331.4	52.5	13.1	6.18	14.28
	35	0.88	2.03	70	269.7	20.08	338.2	54.6	13.0	1.01	2.34	283.6	20.22	352.6	59.3	14.0	3.29	7.60	290.4	20.28	359.6	61.7	14.3	5.91	13.64
	35	0.88	2.03	80	294.5	20.32	363.8	63.2	14.1	0.94	2.17	308.0	20.46	377.8	68.4	15.1	3.15	7.28	314.4	20.53	384.5	71.0	15.3	5.67	13.09
	35	0.88	2.03	90	316.5	20.55	386.6	71.9	15.1	0.88	2.03	329.1	20.68	399.7	77.6	15.9	3.02	6.97	334.9	20.74	405.6	80.4	16.2	5.47	12.64
	53	3.02	6.97	50					233.7	18.75	297.6	41.2	12.5	3.59	8.30	240.8	18.79	304.9	43.1	12.8	6.50	15.02			
	53	3.02	6.97	60	249.9	18.85	314.2	45.7	12.7	1.10	2.53	264.3	18.94	329.0	50.0	14.0	3.44	7.94	271.4	18.98	336.1	52.2	14.3	6.18	14.28
	53	3.02	6.97	70	277.2	19.02	342.1	54.2	14.1	1.01	2.34	291.2	19.10	356.4	59.0	15.2	3.29	7.60	297.9	19.15	363.2	61.5	15.6	5.91	13.64
	53	3.02	6.97	80	301.3	19.17	366.7	62.8	15.3	0.94	2.17	314.3	19.25	379.9	68.1	16.3	3.15	7.28	320.3	19.29	386.1	70.8	16.6	5.67	13.09
	53	3.02	6.97	90	321.9	19.30	387.7	71.6	16.3	0.88	2.03	333.3	19.37	399.4	77.4	17.2	3.02	6.97	338.4	19.40	404.6	80.3	17.4	5.47	12.64
	70	5.47	12.64	50					237.3	18.32	299.8	41.0	13.0	3.59	8.										

Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

Performance Data

TMW100 - Heating

Source			Load																						
EWT °F	Flow		EWT °F	Flow 35.0 GPM						Flow 53.0 GPM						Flow 70.0 GPM									
	GPM	WPD		HC Mbtuh	Power kW	HE Mbtuh	LWT °F	COP	WPD		HC Mbtuh	Power kW	HE Mbtuh	LWT °F	COP	WPD		HC Mbtuh	Power kW	HE Mbtuh	LWT °F	COP	WPD		
									PSI	FT						PSI	FT						PSI	FT	
20	70	5.38	12.42	60	220.0	13.76	173.0	72.6	4.7	1.10	2.53	231.1	14.88	180.3	68.7	4.6	3.44	7.94	235.0	13.75	188.1	66.7	5.0	6.18	14.28
	70	5.38	12.42	80	201.4	17.04	143.3	91.5	3.5	0.94	2.17	207.4	17.04	149.3	87.8	3.6	3.15	7.28	213.8	17.03	155.7	86.1	3.7	5.67	13.09
30	35	1.07	2.48	60	232.9	13.83	185.7	73.3	4.9	1.10	2.53	240.2	13.83	193.0	69.1	5.1	3.44	7.94	251.4	14.84	200.7	67.2	5.0	6.18	14.28
	35	1.07	2.48	80	217.1	17.16	158.5	92.4	3.7	0.94	2.17	223.3	17.15	164.7	88.4	3.8	3.15	7.28	229.8	17.14	171.3	86.6	3.9	5.67	13.09
	35	1.07	2.48	100	198.4	19.63	131.5	111.3	3.0	0.83	1.91	203.5	19.62	136.6	107.7	3.0	2.89	6.68	208.9	19.61	142.0	106.0	3.1	5.32	12.28
	53	2.68	6.18	60	242.3	13.89	194.9	73.8	5.1	1.10	2.53	253.8	14.90	203.0	69.6	5.0	3.44	7.94	262.2	14.85	211.5	67.5	5.2	6.18	14.28
	53	2.68	6.18	80	225.4	17.23	166.7	92.9	3.8	0.94	2.17	232.3	17.22	173.5	88.8	4.0	3.15	7.28	239.6	17.21	180.8	86.8	4.1	5.67	13.09
	53	2.68	6.18	100	205.5	19.69	138.3	111.7	3.1	0.83	1.91	211.1	19.69	144.0	108.0	3.1	2.89	6.68	217.2	19.68	150.0	106.2	3.2	5.32	12.28
	70	4.94	11.41	60	246.9	13.92	199.4	74.1	5.2	1.10	2.53	258.8	14.91	207.9	69.8	5.1	3.44	7.94	267.6	14.85	216.9	67.6	5.3	6.18	14.28
	70	4.94	11.41	80	229.6	17.26	170.7	93.1	3.9	0.94	2.17	236.8	17.26	177.9	88.9	4.0	3.15	7.28	244.5	17.25	185.6	87.0	4.2	5.67	13.09
40	70	4.94	11.41	100	214.3	19.72	147.0	112.2	3.2	0.83	1.91	215.0	19.72	147.7	108.1	3.2	2.89	6.68	221.3	19.72	154.1	106.3	3.3	5.32	12.28
	35	0.99	2.28	60	257.1	13.99	209.4	74.7	5.4	1.10	2.53	265.4	13.98	217.7	70.0	5.6	3.44	7.94	277.2	14.86	226.5	67.9	5.5	6.18	14.28
	35	0.99	2.28	80	242.3	17.37	183.1	93.8	4.1	0.94	2.17	249.5	17.36	190.3	89.4	4.2	3.15	7.28	257.1	17.35	197.9	87.3	4.3	5.67	13.09
	35	0.99	2.28	100	224.2	19.87	156.4	112.8	3.3	0.83	1.91	230.3	19.86	162.5	108.7	3.4	2.89	6.68	236.8	19.85	169.1	106.8	3.5	5.32	12.28
	53	2.46	5.68	60	266.8	14.06	218.8	75.2	5.6	1.10	2.53	278.9	14.93	228.0	70.5	5.5	3.44	7.94	288.4	14.87	237.7	68.2	5.7	6.18	14.28
	53	2.46	5.68	80	251.3	17.45	191.7	94.4	4.2	0.94	2.17	259.2	17.44	199.7	89.8	4.4	3.15	7.28	267.7	17.44	208.2	87.6	4.5	5.67	13.09
	53	2.46	5.68	100	232.2	19.96	164.1	113.3	3.4	0.83	1.91	238.9	19.95	170.9	109.0	3.5	2.89	6.68	246.1	19.94	178.1	107.0	3.6	5.32	12.28
	70	4.53	10.47	60	271.6	14.10	223.4	75.5	5.6	1.10	2.53	284.0	14.93	233.0	70.7	5.6	3.44	7.94	294.0	14.87	243.2	68.4	5.8	6.18	14.28
50	70	4.53	10.47	80	255.7	17.49	196.0	94.6	4.3	0.94	2.17	264.1	17.49	204.4	90.0	4.4	3.15	7.28	272.9	17.48	213.3	87.8	4.6	5.67	13.09
	70	4.53	10.47	100	242.4	19.99	174.2	113.9	3.6	0.83	1.91	243.3	19.99	175.1	109.2	3.6	2.89	6.68	250.8	19.99	182.7	107.2	3.7	5.32	12.28
	35	0.91	2.09	60	279.4	14.17	231.0	76.0	5.8	1.10	2.53	288.7	14.15	240.4	70.9	6.0	3.44	7.94	301.0	14.88	250.2	68.6	5.9	6.18	14.28
	35	0.91	2.09	80	265.9	17.59	205.8	95.2	4.4	0.94	2.17	274.1	17.58	214.1	90.3	4.6	3.15	7.28	282.7	17.57	222.8	88.1	4.7	5.67	13.09
	35	0.91	2.09	100	248.8	20.14	180.1	114.2	3.6	0.83	1.91	255.9	20.12	187.3	109.7	3.7	2.89	6.68	263.4	20.11	194.8	107.5	3.8	5.32	12.28
	35	0.91	2.09	120	241.6	25.17	155.8	133.8	2.8	0.76	1.75	247.8	25.16	162.0	129.4	2.9	2.66	6.15	254.3	25.15	168.5	127.3	3.0	5.13	11.86
	53	2.26	5.21	60	289.1	14.25	240.5	76.5	5.9	1.10	2.53	301.6	14.95	250.6	71.4	5.9	3.44	7.94	312.2	14.89	261.4	68.9	6.1	6.18	14.28
	53	2.26	5.21	80	275.2	17.69	214.8	95.7	4.6	0.94	2.17	284.1	17.68	223.8	90.7	4.7	3.15	7.28	293.7	17.67	233.4	88.4	4.9	5.67	13.09
60	53	2.26	5.21	100	257.5	20.23	188.5	114.7	3.7	0.83	1.91	265.3	20.22	196.3	110.0	3.8	2.89	6.68	273.7	20.21	204.7	107.8	4.0	5.32	12.28
	53	2.26	5.21	120	249.0	25.23	162.9	134.2	2.9	0.76	1.75	255.8	25.23	169.7	129.7	3.0	2.66	6.15	263.0	25.22	177.0	127.5	3.1	5.13	11.86
	70	4.16	9.61	60	293.8	14.29	245.0	76.8	6.0	1.10	2.53	306.6	14.95	255.6	71.6	6.0	3.44	7.94	317.7	14.89	266.9	69.1	6.3	6.18	14.28
	70	4.16	9.61	80	279.7	17.74	219.2	96.0	4.6	0.94	2.17	289.1	17.73	228.6	90.9	4.8	3.15	7.28	299.1	17.72	238.6	88.5	4.9	5.67	13.09
	70	4.16	9.61	100	269.1	20.28	199.9	115.4	3.9	0.83	1.91	270.0	20.28	200.9	110.2	3.9	2.89	6.68	278.8	20.27	209.6	108.0	4.0	5.32	12.28
	70	4.16	9.61	120	252.7	25.27	166.5	134.4	2.9	0.76	1.75	259.8	25.26	173.6	129.8	3.0	2.66	6.15	267.3	25.26	181.2	127.6	3.1	5.13	11.86
	35	0.83	1.92	60	299.6	14.35	250.7	77.1	6.1	1.10	2.53	309.8	14.34	260.9	71.7	6.3	3.44	7.94	322.6	14.89	271.8	69.2	6.3	6.18	14.28
	35	0.83	1.92	80	287.6	17.83	226.8	96.4	4.7	0.94	2.17	296.8	17.82	236.0	91.2	4.9	3.15	7.28	306.5	17.80	245.7	88.8	5.0	5.67	13.09
70	35	0.83	1.92	100	272.2	20.41	202.6	115.6	3.9	0.83	1.91	280.3	20.39	210.7	110.6	4.0	2.89	6.68	288.8	20.38	219.3	108.3	4.2	5.32	12.28
	35	0.83	1.92	120	264.5	25.39	177.8	135.1	3.1	0.76	1.75	271.6	25.38	185.0	130.2	3.1	2.66	6.15	279.1	25.36	192.5	128.0	3.2	5.13	11.86
	53	2.07	4.79	60	309.1	14.45	259.8	77.7	6.3	1.10	2.53	321.9	14.97	270.9	72.1	6.3	3.44	7.94	333.5	14.90	282.7	69.5	6.6	6.18	14.28
	53	2.07	4.79	80	297.0	17.94	235.8	97.0	4.9	0.94	2.17	307.0	17.93	245.8	91.6	5.0	3.15	7.28	317.6	17.92	256.4	89.1	5.2	5.67	13.09
	53	2.07	4.79	100	281.5	20.52	211.4	116.1	4.0	0.83	1.91	290.3	20.51	220.3	111.0	4.1	2.89	6.68	299.7	20.50	229.7	108.6	4.3	5.32	12.28
	53	2.07	4.79	120	272.3	25.47	185.4	135.6	3.1																

Antifreeze Correction Table

Antifreeze Type	Antifreeze %	Cooling			Heating		WPD Corr. Fct. EWT 30°F	
		EWT 90°F			EWT 30°F			
		Total Cap	Sens Cap	Power	Htg Cap	Power		
Water	0	1.000	1.000	1.000	1.000	1.000	1.000	
Propylene Glycol	5	0.995	0.995	1.003	0.989	0.997	1.070	
	15	0.986	0.986	1.009	0.968	0.990	1.210	
	25	0.978	0.978	1.014	0.947	0.983	1.360	
Methanol	5	0.997	0.997	1.002	0.989	0.997	1.070	
	15	0.990	0.990	1.007	0.968	0.990	1.160	
	25	0.982	0.982	1.012	0.949	0.984	1.220	
Ethanol	5	0.998	0.998	1.002	0.981	0.994	1.140	
	15	0.994	0.994	1.005	0.944	0.983	1.300	
	25	0.986	0.986	1.009	0.917	0.974	1.360	
Ethylene Glycol	5	0.998	0.998	1.002	0.993	0.998	1.040	
	15	0.994	0.994	1.004	0.980	0.994	1.120	
	25	0.988	0.988	1.008	0.966	0.990	1.200	

Physical & Electrical Data**Physical Data**

Model	100
Compressor (qty)	Scroll (2)
Factory Charge R410A (lbs) [kg]	14.9 [6.8]
Indoor/Load Water Connection Size	
IPT (in)	2
Outdoor/Source Water Connection Size	
IPT (in)	2
Weight - Operating, (lbs) [kg]	1330 [605]
Weight - Packaged, (lbs) [kg]	1340 [608]

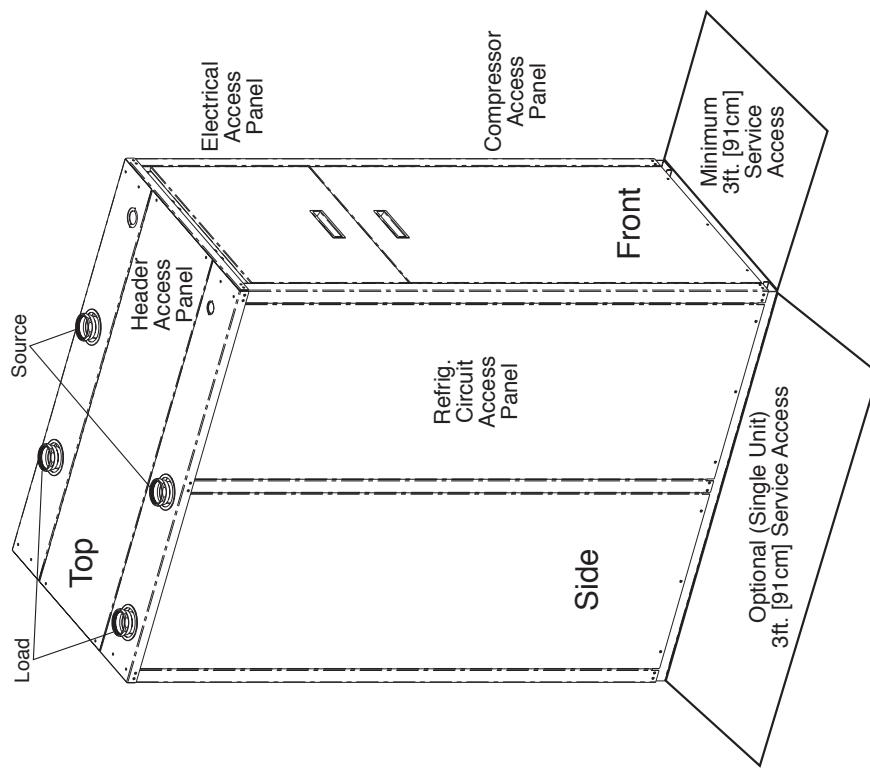
Dual isolated compressor mounting
Balanced port expansion valve (TXV)
Insulated Source and Load Water Coils standard
Insulated Refrigerant Circuit standard
Compressor on (green) and fault (red) light

Electrical Data

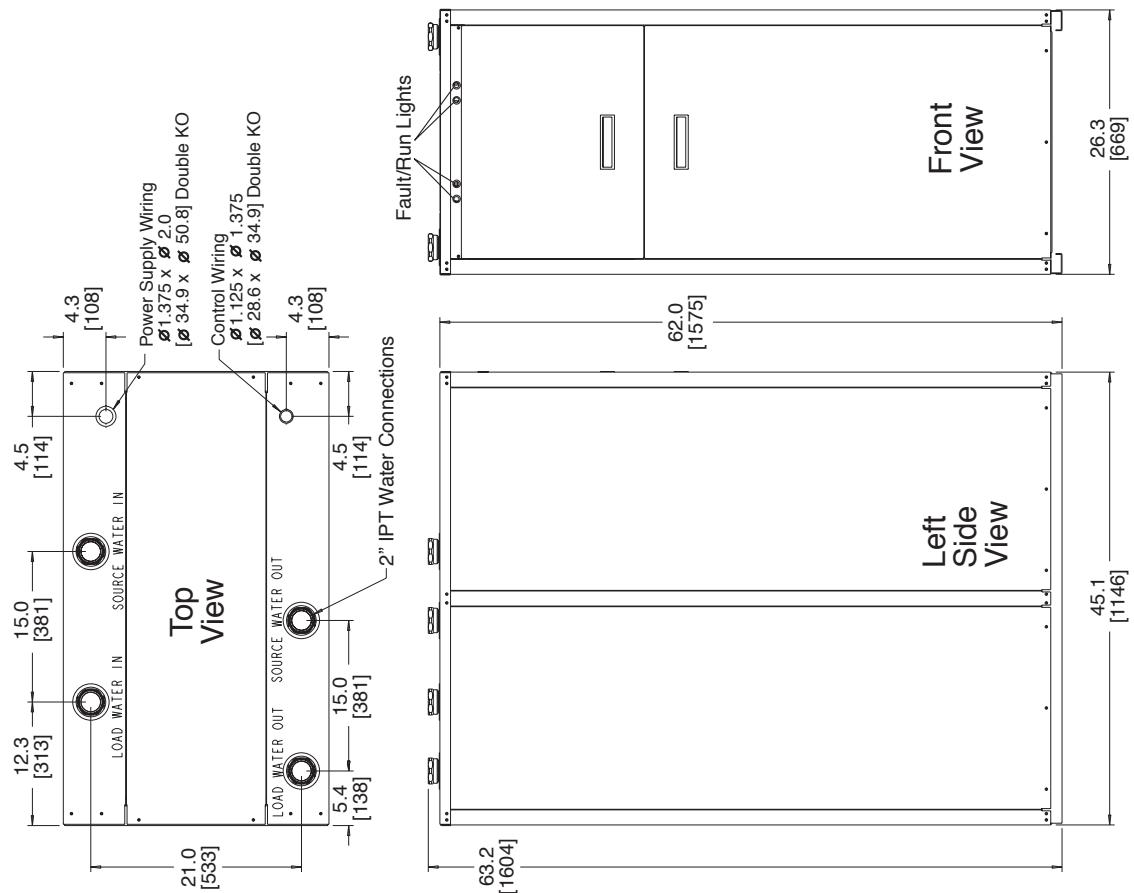
Model	Voltage Code	Voltage	Min/Max Voltage	Compressor			Total Unit FLA	Min Circuit Amps	Max Fuse/ HACR
				QTY	RLA	LRA			
TMW100	H	208-230/60/3	187/254	2	53.6	245.0	107.2	120.6	150
	F	460/60/3	414/506	2	20.7	125.0	41.4	46.6	60
	N	575/60/3	518/633	2	16.4	100.0	32.8	36.9	50
	U	380-420/50/3	342/462	2	20.7	118.0	41.4	46.6	60

HACR circuit breaker in USA only

Dimensional Data



Note: Dimensions shown in inches and [millimeters].



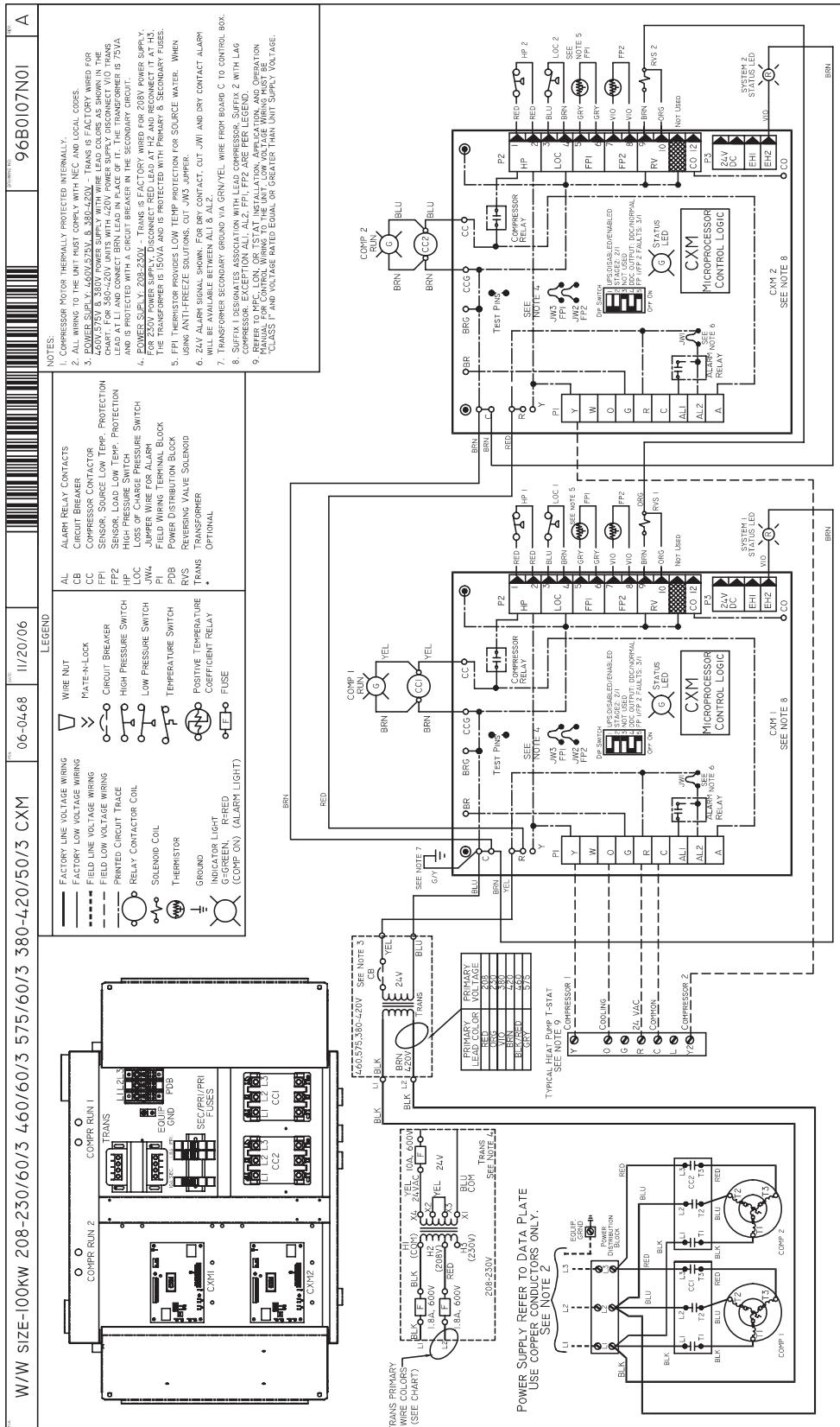
TMW Series Wiring Diagram Matrix

Only CXM and DXM diagrams, with a representative diagram of LON and MPC Options are presented in this submittal.
 Other diagrams can be located online at www.climatemaster.com using the part numbers presented below.

Model	Refrigerant	Wiring Diagram Part Number	Electrical	Control	DDC	Agency
TMW100	EarthPure® R410A	96B0107N01	208-230/60/3, 460/60/3, 575/60/3, 380-420/60/3	CXM	-	-
		96B0107N03			LON	-
		96B0107N05			MPC	-
		96B0107N02		DXM	-	-
		96B0107N04			LON	-
		96B0107N06			MPC	-

All wiring diagrams available at www.climatemaster.com.

Typical Wiring Diagram Three Phase TMW Units With CXM Controller



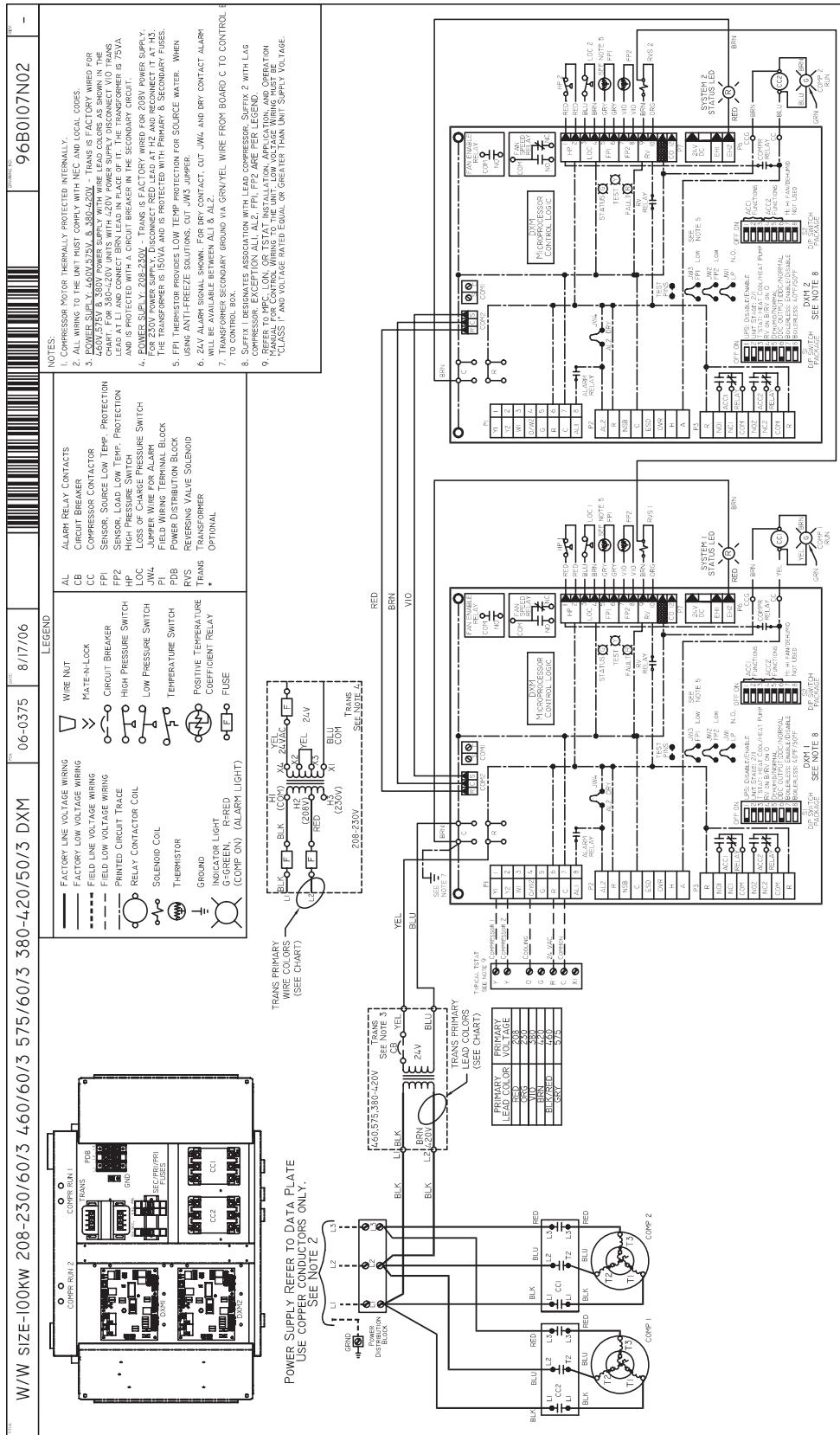
Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

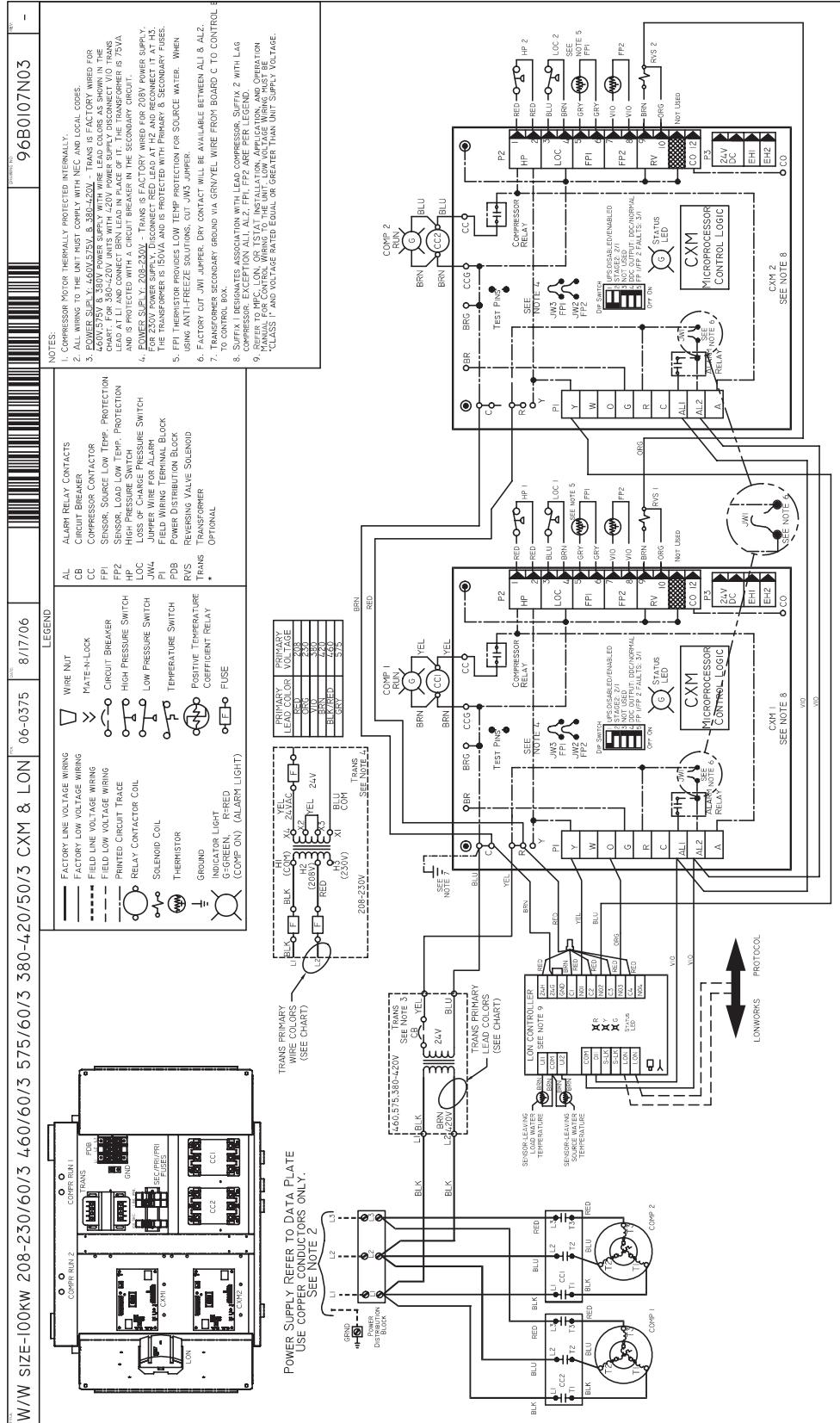
Typical Wiring Diagram

Three Phase TMW Units

With DXM Controller



Typical Wiring Diagram Three Phase TMW Units With CXM & LON Controller



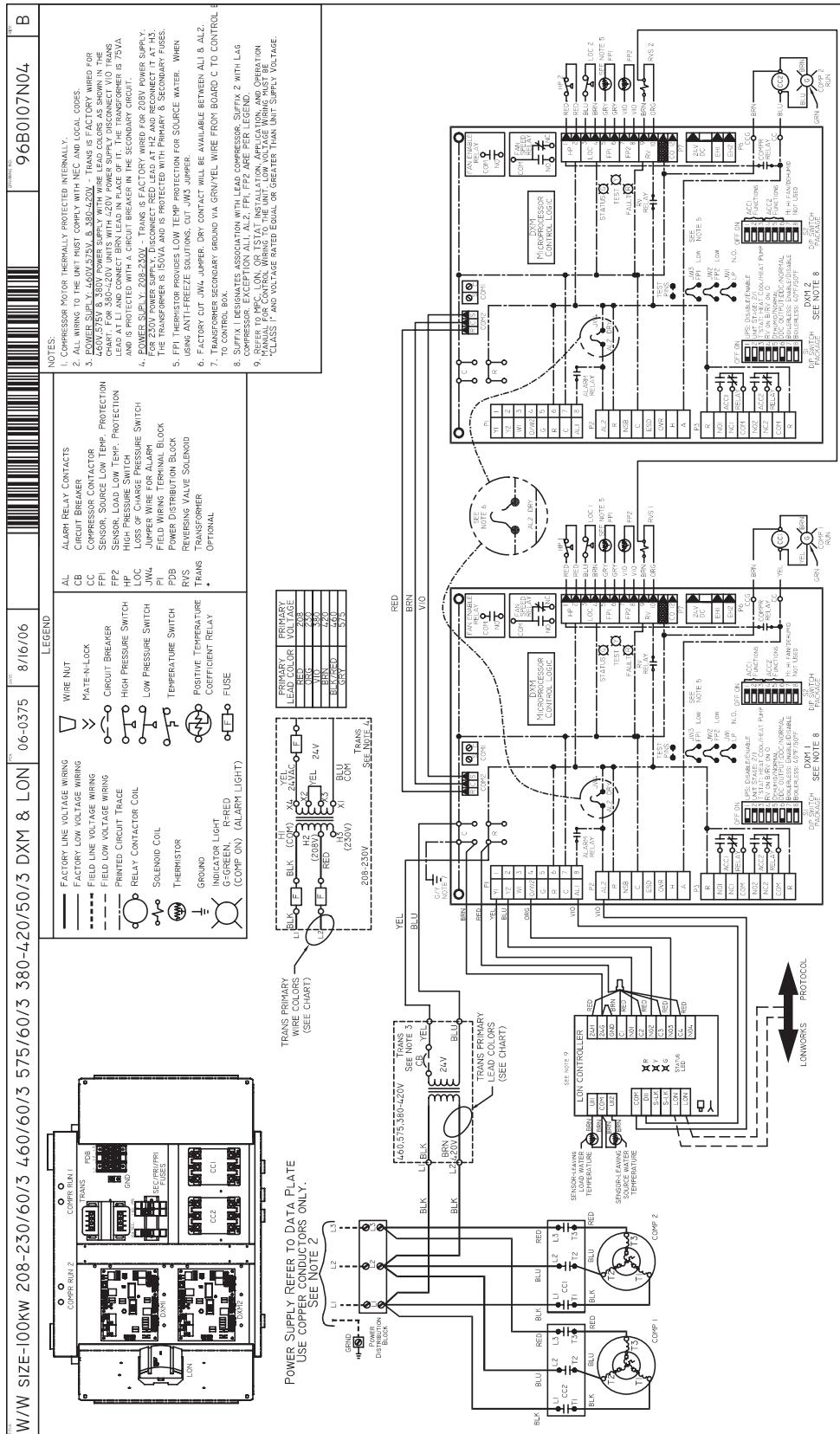
Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

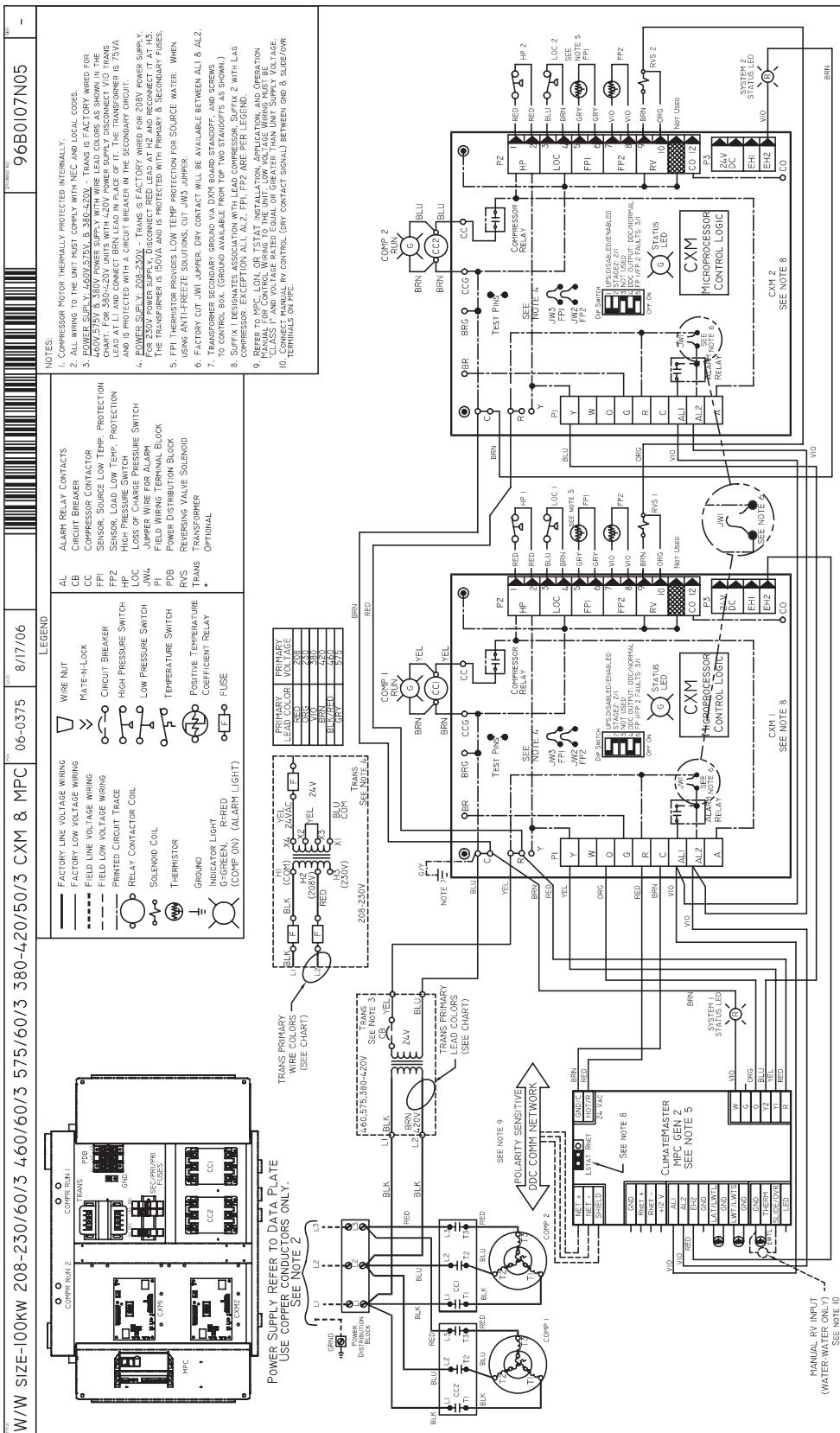
Typical Wiring Diagram

Three Phase TMW Units

With DXM & LON Controller



Typical Wiring Diagram Three Phase TMW Units With CXM & MPC Controller

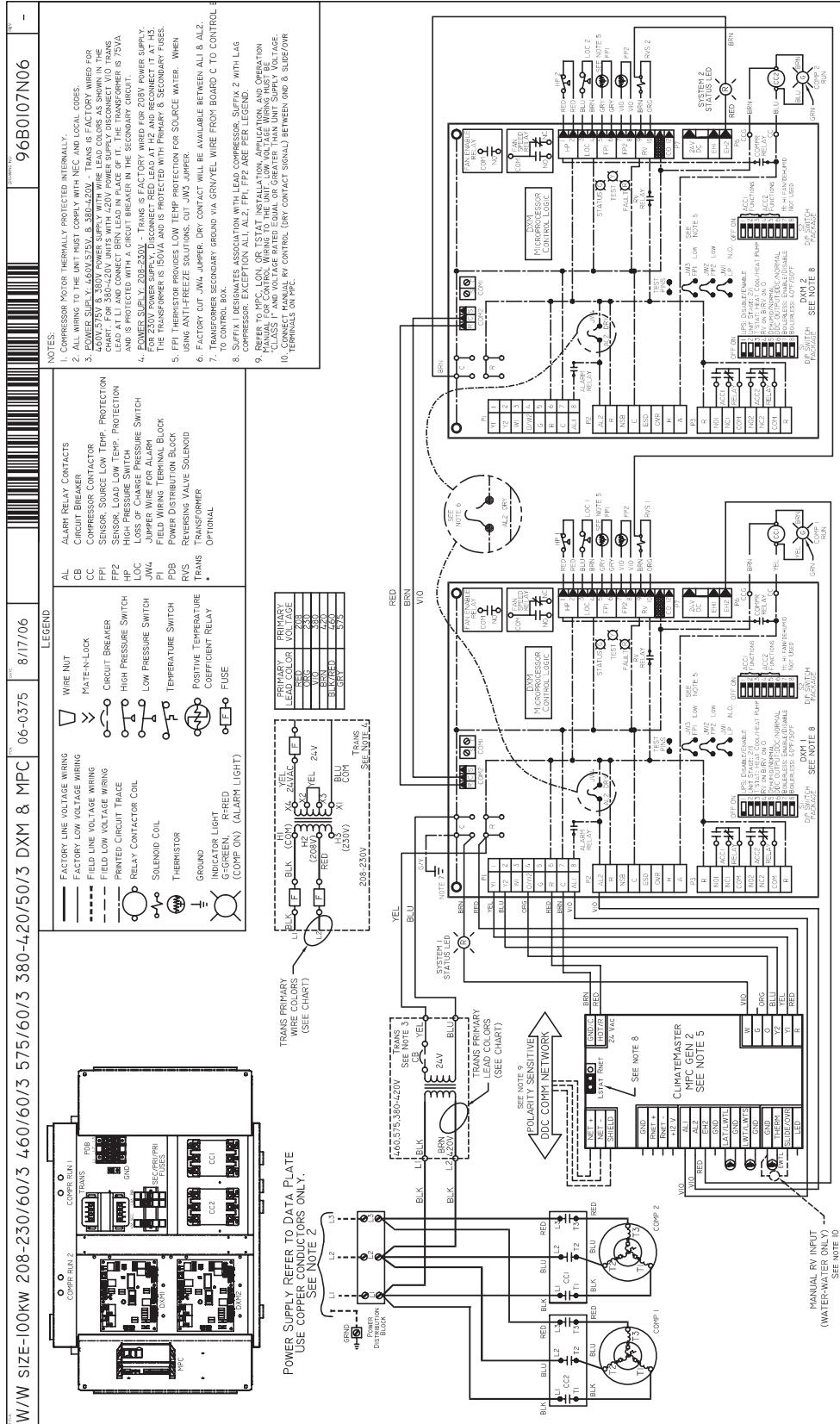


CLIMATEMASTER WATER-SOURCE HEAT PUMPS

Tranquility Water-to-Water (TMW) Series
Rev.: 05/23/07D

Rev.: 05/23/07 D

Typical Wiring Diagram Three Phase TMW Units With DXM & MPC Controller



Tranquility Water-to-Water (TMW) Series 60Hz

Engineering Specifications Rev.: 04/02/07

General:

Furnish and install ClimateMaster "Tranquility" Water Source Heat Pumps with EarthPure (HFC-410A) refrigerant, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Water-to-Water Heat Pumps:

Units shall be supplied completely factory built for an entering source water temperature range from 20° to 110°F (-6.7° to 43.3°C) and entering (heating) load water temperature range from 60° to 120°F (15.6° to 48.9°C) or entering (cooling) load water temperature range of 50° to 90°F (10.0° to 32.2°C) as standard. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated in accordance with American Refrigeration Institute / International Standards Organization (ARI / ISO) and Environmental Testing Laboratories for United States and Canada (ETL-US-C). The units shall have ARI / ISO and ETL-US-C labels. All units shall be fully quality tested by factory run testing under normal operating conditions and water flow rates as described herein. Quality control system shall automatically perform via computer: triple leak check, pressure tests, evacuate and accurately charge system, perform detailed heating and cooling mode tests, and quality cross check all operational and test conditions to pass/fail data base. Detailed report card will ship with each unit displaying all test performance data. Note: If unit fails on any cross check, system shall not be allowed unit to ship. Serial numbers will be recorded by factory and furnished to contractor on report card for ease of unit warranty status.

Units tested without water flow are not acceptable.

Basic Construction:

All units must have a minimum of three access panels for serviceability of compressor compartment. **Units having only one access panel to compressor shall not be acceptable.**

The heat pumps shall be fabricated from heavy gauge galvanized steel with powder coat paint finish. Both sides of the steel shall be painted for added protection. All interior surfaces shall be lined with 1/2 inch (12.7mm) thick, dual density, 1-3/4 lb/ft³ (28 kg/m³) acoustic type glass fiber insulation. Insulation placement shall be designed in a manner that will eliminate any exposed edges.

Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper IPT fittings, terminating out the top of the unit, and shall be staggered to allow headering of multiple units, side-by-side. **Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature.** Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Unit(s) shall have exterior indicator lights showing, 1) compressor operation (on/off) and 2) unit "fault" status. Contractor shall be responsible for providing control circuitry and indicator lights for units not providing this feature.

Option: UltraQuiet package shall consist of sound attenuating blanket on both compressors to reduce radiated noise.

Option: The unit will be supplied with cupro nickel coaxial water to refrigerant heat exchanger (specify source and/or load heat exchanger).

Refrigerant Circuit:

Units shall have two sealed, isolated refrigerant circuits, each including a high efficiency scroll compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, a reversing valve, two sets of coaxial (tube in tube) refrigerant to water heat exchangers, and safety controls including a high pressure switch, low pressure switch (loss of charge), and low water temperature sensors. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. **Units with brazed plate heat exchangers will not be accepted.**

Unit shall be supplied with extended range insulation, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchangers.

Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

Hermetic compressors shall be internally sprung. The compressors shall have a dual level vibration isolation system. The compressors will be mounted on rubber grommets to a large heavy gauge compressor mounting tray plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. Compressors shall have thermal overload protection. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (3101 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. The refrigerant to water heat exchanger shall be powder-coated for extra corrosion protection. **Plate to plate heat exchangers are not acceptable.**

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 110°F (-6.7° to 43.3°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function.

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote aquastat / sensor. Two compressor units shall have a solid-state time delay relay and random start to prevent both compressors from starting simultaneously.

Solid State Control System (CXM):

Units shall have a solid-state control system. **Units utilizing electro-mechanical control shall not be acceptable.** The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature.
- g. Option to reset unit at thermostat or disconnect.
- h. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- i. Ability to defeat time delays for servicing.
- j. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, freeze protection, condensate overflow, and control voltage status.
- k. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- l. 24V output to cycle a motorized water valve or other device with compressor contactor.
- m. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
- n. Source water coil low temperature sensing (selectable for water or anti-freeze).
- o. Load water coil low temperature sensing.

NOTE: Units not providing the 7 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), source water coil low water temperature sensing and load water coil low water temperature sensing will not be accepted.

Option: Enhanced solid state control system (DXM)

Control shall have all of the above mentioned features of the CXM control system along with the following expanded features:

- a. Removable thermostat connector.
- b. Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.).
- c. Ability to work with heat pump or heat/cool (Y, W) type controls.
- d. Ability to work with controls using O or B reversing valve control.
- e. Emergency shutdown contacts.
- f. Relay to operate an external damper.
- g. Relay to start system pump.
- h. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built in circuit breaker.

Option: Lonworks interface system

Units shall have all the features listed above (either CXM or DXM) and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Source leaving water temperature
- b. Load leaving water temperature
- c. Command of temperature setpoint
- d. Cooling status
- e. Heating status
- f. Low temperature sensor alarm
- g. Low pressure sensor alarm
- h. High pressure switch alarm
- i. Hi/low voltage alarm
- j. Unoccupied / occupied command
- k. Cooling command
- l. Heating command
- m. Fault reset command
- n. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Option: MPC (Multiple Protocol Control) interface system

Units shall have all the features listed above (either CXM or DXM) and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. Protocol selection shall not require any additional programming or special external hardware or software tools. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Source leaving water temperature
- b. Load leaving water temperature
- c. Command of space temperature setpoint
- d. Cooling status
- e. Heating status
- f. Low temperature sensor alarm
- g. Low pressure sensor alarm
- h. High pressure switch alarm
- i. Hi/low voltage alarm
- j. Unoccupied / occupied command
- k. Cooling command
- l. Heating command
- m. Fault reset command
- n. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Warranty:

Climate Master shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM/DXM control board for a total of 5 years.

FIELD INSTALLED OPTIONS**Hose Kits:**

All units shall be connected with hoses. The hoses shall be 2 feet (61cm) long, braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, IPT connections.
- b. Ball valve with memory stop and PT Port; standard port full flow design, IPT connections.
- c. "Y" strainer with cap; bronze material, IPT connections.
- d. "Y" strainer with blowdown valve; bronze material, IPT connections.
- e. Motorized water valve; slow acting, 24v, IPT connections.

Hose Kit Assemblies:

The following assemblies ship with the valves already assembled to the hose described:

- a. Supply and return hoses having ball valve with PT port.
- b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve (Measureflo) with PT ports, and ball valve.
- c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator (Measureflo) with PT ports, and ball valve.

Section Change Log

Date:	Item:	Action:
05/23/07	Specifications	Updated for new Safety Agency
02/08/07	Specifications	Updated
01/01/07	First Published	

Notes:

THE SMART SOLUTION FOR ENERGY EFFICIENCY

Tranquility Water-to-Water (TMW) Series

Rev.: 05/23/07D

Notes:

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