



Water-Source Heat Pump Submittal

RBM Revised

Project number

Architect:

Engineer:

Contractor:

Representative:

Project Notes:

Product Summary

Qty	Model	Tag
2	TC	,

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Performance Data

Model: TC-060 HP-5.0

Tag/Reference #: /

Qty: 1

General Information

Unit Configuration:	Horizontal		
Operating Weight:	278	lbs.	
Unit Length/Width/Height:	54.1/24.1/21.0	inches	

Systems Information

Fluid Flow:	12.50	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	Cooling		Heating	
Entering Air Dry Bulb:	80.0	°F	68.0	°F
Entering Air Wet Bulb:	67.0	°F		
Entering Water/Fluid:	85.0	°F	70.0	°F
Fan Speed:	MED		MED	

Selected Options

- Straight Discharge, PSC Motor
- Left Return, Polymer Drain Pan
- CXM2 Controls
- Std Range, 1" Filter Rail, UltraQuiet
- Uncoated Air Coil, Copper Water Coil

Unit Performance

	Cooling		Heating	
Air Flow:	1931	CFM	1931	CFM
Total Capacity:	58.7	MBH	80.5	MBH
Sensible Capacity:	40.7	MBH		
Heat of Rejection:	74.5	MBH		
Heat of Absorption:			62.1	MBH
Leaving Air Dry Bulb:	60.5	°F	106.6	°F
Leaving Air Wet Bulb:	57.2	°F		
Leaving Fluid Temp:	96.9	°F	60.1	°F
Fluid Pressure Drop:	15.4	ft. H2O	16.2	ft. H2O
Input Power:	4.6	kW	5.4	kW
Efficiency:	12.7	EER	4.4	COP

Unit Electrical Data

	Unit Amps - FLA	Min. Cir. Amps - MCA	Max. Fuse Size - MFS
460/60/3	10.2	12.15	15

Fan Performance

External Duct Static:	0.25	in. H2O
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Motor / Compressor Data

	Qty	FLA (ea.)	RLA (ea.)	LRA (ea.)
Fan Motor	1	2.4		
Compressor	1		7.8	52



Performance Data

Model: TC-048 HP-4.0

Tag/Reference #: /

Qty: 1

General Information

Unit Configuration:	Horizontal		
Operating Weight:	263		lbs.
Unit Length/Width/Height:	54.1/24.1/21.0		inches

Systems Information

Fluid Flow:	10.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	80.0	°F	68.0	°F
Entering Air Wet Bulb:	67.0	°F		
Entering Water/Fluid:	85.0	°F	70.0	°F
Fan Speed:	LOW		LOW	

Selected Options

- Straight Discharge, PSC Motor
- Left Return, Polymer Drain Pan
- CXM2 Controls
- Std Range, 1" Filter Rail, UltraQuiet
- Uncoated Air Coil, Copper Water Coil

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	1587	CFM	1587	CFM
Total Capacity:	48.4	MBH	58.1	MBH
Sensible Capacity:	34.7	MBH		
Heat of Rejection:	61.4	MBH		
Heat of Absorption:			45.8	MBH
Leaving Air Dry Bulb:	59.8	°F	101.9	°F
Leaving Air Wet Bulb:	57.2	°F		
Leaving Fluid Temp:	97.3	°F	60.8	°F
Fluid Pressure Drop:	7.8	ft. H2O	8.1	ft. H2O
Input Power:	3.8	kW	3.6	kW
Efficiency:	12.7	EER	4.7	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	7.9	9.5	15

Fan Performance

External Duct Static:	0.25	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	1.7		
Compressor	1		6.2	41

Unit Features

THE TRANQUILITY® 16 COMPACT (TC) SERIES

The award winning Tranquility® 16 Series raises the bar for water-source heat pump efficiencies, features and application flexibility. Not only does the Tranquility 16 exceed ASHRAE 90.1 efficiencies, but it also uses EarthPure® HFC-410A zero ozone depletion refrigerant, making it an extremely environmentally-friendly option. Tranquility 16 is eligible for LEED® (Leadership in Energy and Environmental Design) points because of the “green” technology design. With one of the smallest cabinets in the industry, the Tranquility 16 will easily fit into tight spaces. Designed to be backward compatible with thousands of older water-source heat pumps, the Tranquility 16 Compact Series heat pump is packed full of the innovation you have come to expect from the experts at ClimateMaster.

Available in sizes from 1/2 ton (1.76 kW) through 5 tons (17.6 kW) with multiple cabinet options (vertical upflow and horizontal) the Tranquility 16 offers a wide range of units for most any application.

ClimateMaster’s exclusive double isolation compressor mounting system makes the Tranquility 16 one of the quietest units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge mounting plate, which is further isolated from the cabinet base with rubber grommets for maximized vibration/sound attenuation. The easy access control box and large access panels make installing and maintaining the unit easier than other water-source heat pumps currently in production, proving that a small unit can be easy to service.

Options such as tin-plated air coil, DDC controls, and high efficiency pleated MERV rated air filters allow customized design solutions. Optional high static fan motor expands the operating range and helps overcome some of the challenges associated with ductwork for retrofit installations. ECM constant CFM or constant torque motors available for all sizes. A cupro-nickel water-coil and sound absorbing UltraQuiet package are options that make a great unit even better. [Optional factory installed Waterside Economizer \(WSE\) uses cool loop water for “free” cooling. WSE option meets IECC section C403.3.1 and is a requirement in many states.](#)

The Tranquility 16 (TC) Series Water-Source Heat Pumps are designed to meet the challenges of today’s HVAC demands with one of the most innovative products available on the market.

UNIT FEATURES

- Sizes 006 (1/2 ton, 1.76 kW) through 060 (5 tons, 17.6 kW)
- EarthPure HFC-410A refrigerant
- Exceeds ASHRAE 90.1 efficiencies
- Galvanized steel construction
- Sound absorbing glass fiber insulation
- Unique double isolation compressor mounting via vibration isolating rubber grommets for quiet operation
- Insulated divider and separate compressor/air handler compartments
- Copeland scroll compressors (rotary for size 018 and below)
- TXV metering device
- Microprocessor controls standard
- Field convertible discharge air arrangement for horizontal units
- PSC three-speed fan motor
- Unit Performance Sentinel performance monitoring system
- Eight Safeties Standard
- Extended range (20 to 120°F, -6.7 to 48.9°C) capable
- Polymer drain pan

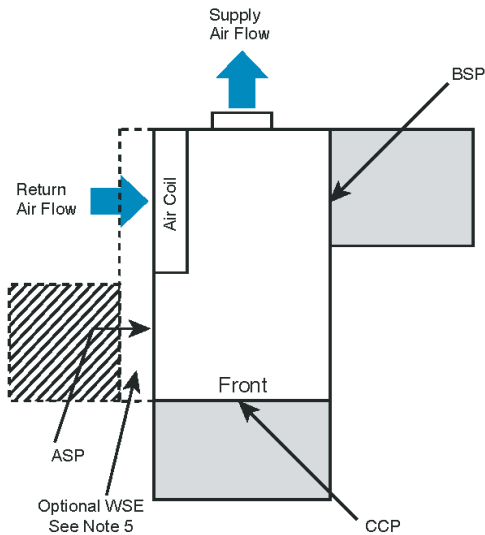
AVAILABLE OPTIONS

- Advanced DXM2 controls
- High static blowers
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Cupro-nickel water-coil
- Sound absorbing UltraQuiet package
- Constant CFM ECM variable speed communicating motor
- Constant torque ECM 4 or 5 speed TAP motor
- Waterside Economizer (WSE)
- Stainless steel condensate drain pan
- Electrical service disconnect

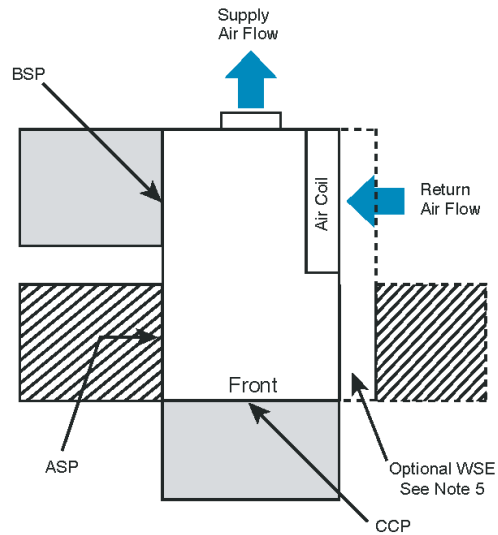
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TC - Horizontal Service Access

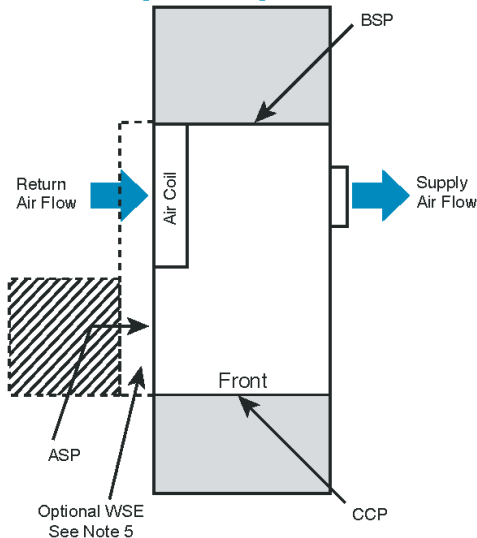
Left Return Back Discharge



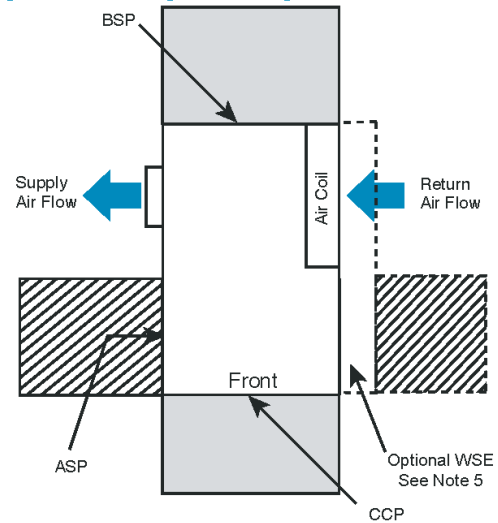
Right Return Back Discharge



Left Return Straight Discharge



Right Return Straight Discharge



Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. CCP and BSP requires 2' service access.
3. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.
4. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.
5. Units with WSE must have access to water valve through side access panel.

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- = mandatory 2' service access
- = (optional) additional 2' service access

Legend:
 CCP = Control/Compressor Access Panel
 BSP = Blower Service Panel
 ASP = Additional Service Panel (not required)
 WSE = Waterside Economizer

Qty: 2 Tags: ,

Physical Data

TC Series	006	009	012	015	018	024	030	036	041	042	048	060
Compressor (1 Each)	Rotary						Scroll					
Factory Charge HFC-410A (oz)	19	20	23	35	43	40	48	50	70	70	74	82
ECM Fan Motor & Blower												
Blower Wheel Size (Dia x w)	6x5	6x5	6x5	9x7	9x7	9x7	9x7	9x8	N/A	9x8	10x10	12x10
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	PSC/3
Blower Wheel Size (Dia x w)	5x5	5x5	6x5	8x7	8x7	9x7	9x7	9x8	9x8	9x8	10x10	12x10
Water Connection Size												
FPT	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"
Coax Volume (gallons)	0.123	0.143	0.167	0.286	0.450	0.286	0.323	0.323	0.890	0.890	0.738	0.939
Vertical												
Air Coil Dimensions (H x W)	10x15	10x15	10x15	20x17.25	20x17.25	20x17.25	20x17.25	24x21.75	20x17.25	24x21.76	24x28.25	24x28.25
Filter Standard - 1" Throwaway	10x18	10x18	10x18	20x20	20x20	20x20	20x20	24x24	20x20	24x24	1-14x24, 1-18x24	1-14x24, 1-18x24
Weight - Operating (lbs.)	103	105	114	153	158	189	197	203	210	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	194	202	209	217	224	270	285
Horizontal												
Air Coil Dimensions (H x W)	10x15	10x15	10x15	16x22	16x22	16x22	16x22	20x25	N/A	20x25	20x35	20x35
Filter Standard - 1" Throwaway	10x18	10x18	10x18	16x25	16x25	18x25	18x25	20x28 or 2-20x14	N/A	20x28 or 2-20x14	1-20x24, 1-20x14	1-20x24, 1-20x14
Weight - Operating (lbs.)	103	105	114	153	158	174	182	203	N/A	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	179	187	209	N/A	224	270	285

Notes:
 All units have TXV expansion device, and 1/2" & 3/4" electrical knockouts.
 FPT = Female Pipe Thread
 Condensate Drain Connection is rubber coupling that couples to 3/4" schedule 40/80 PVC.
 575 volt fan motors are two speed.

Unit Maximum Water Working Pressure	Max Pressure PSIG [kPa]
Base Unit	500 [3447]
WSE Option	300 [2068]

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Corner Weights for TCH Series Units

Model		Total	Left-Front*	Right-Front*	Left-Back*	Right-Back*
TCH006	Lbs	103	37	24	23	19
	kg	46.72	16.78	10.89	10.43	8.62
TCH009	Lbs	105	38	24	23	20
	kg	47.63	17.24	10.89	10.43	9.07
TCH012	Lbs	114	42	26	25	21
	kg	51.71	19.05	11.79	11.34	9.53
TCH015	Lbs	153	53	36	34	30
	kg	69	24	16	15	14
TCH018	Lbs	158	55	37	35	31
	kg	72	25	17	16	14
TCH024	Lbs	174	62	40	39	33
	kg	79	28	18	18	15
TCH030	Lbs	182	67	41	40	34
	kg	83	30	19	18	15
TCH036	Lbs	203	75	47	44	37
	kg	92	34	21	20	17
TCH042	Lbs	218	81	50	48	39
	kg	99	37	23	22	18
TCH048	Lbs.	263	98	60	58	47
	kg	119	44	27	26	21
TCH060	Lbs.	278	94	59	56	69
	kg	126	43	27	25	31

*Front is control box end.

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Qty: 2 Tags: ,

TC - Horizontal – Dimensional Data

Horizontal Model		Overall Cabinet		
		A Width	B Length	C Height
006 - 012	in cm	19.1 48.5	34.1 86.6	11.1 28.2
015 - 018	in cm	20.1 51.1	43.1 109.5	17.0 43.2
024 - 030	in cm	20.1 51.1	43.1 109.5	18.3 46.5
036 - 042	in cm	20.1 51.1	47.1 119.6	21.0 53.3
048 - 060	in cm	24.1 61.2	54.1 137.4	21.0 53.3

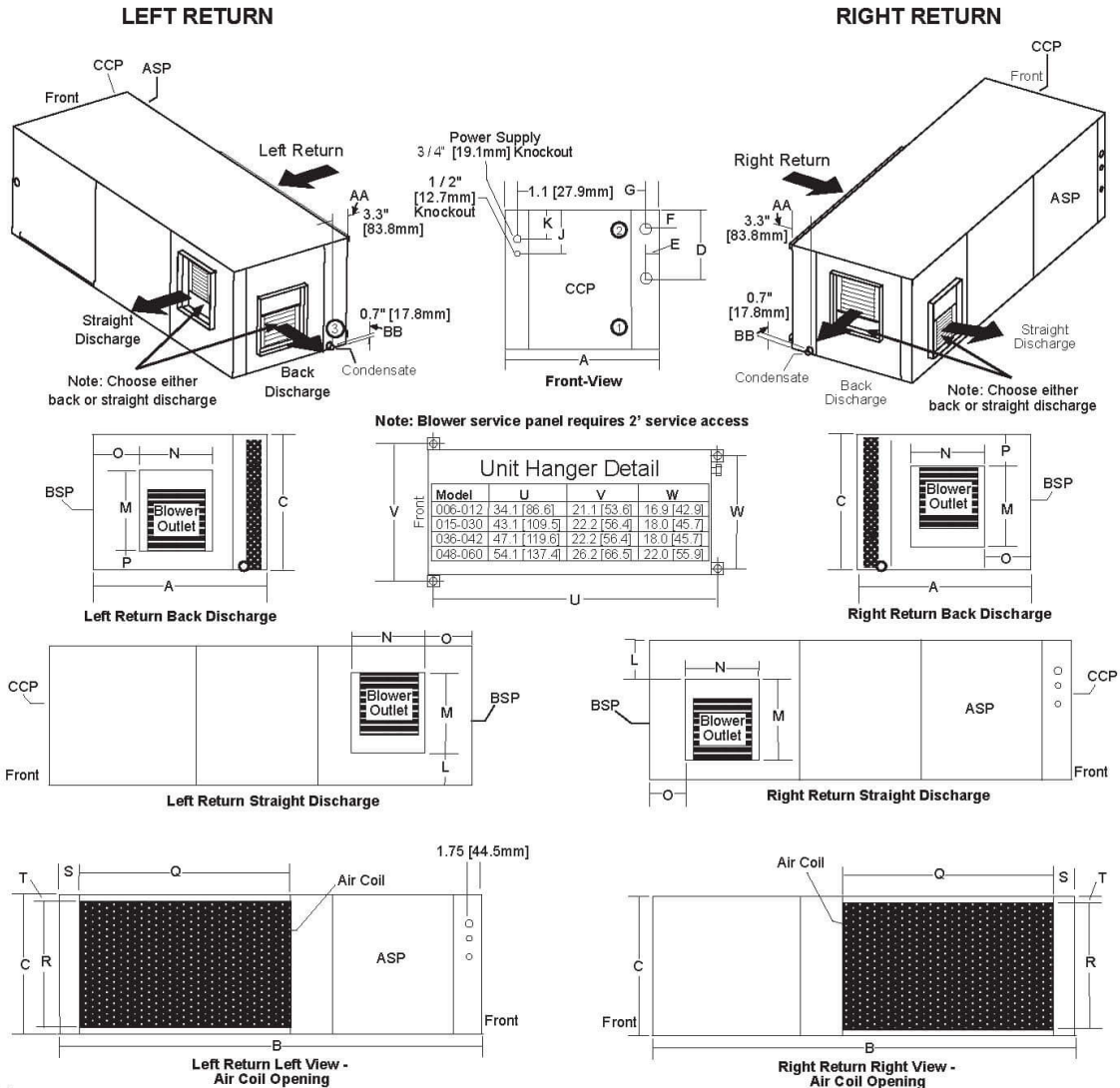
Horizontal Model		Electrical Knockouts	
		J 1/2"	K 3/4"
		Low Voltage	Power Supply
006 - 012	in cm	5.1 13.0	2.1 5.4
015 - 018	in cm	9.9 25.2	6.9 17.5
024 - 030	in cm	11.1 28.2	8.1 20.6
036 - 060	in cm	13.9 35.3	10.9 27.7

Horizontal Model		Water Connections						
		①		②		③		Loop In/Out FPT
		Loop In D	Loop In E	Loop Out F	Loop Out G	AA	BB	
006 - 012	in cm	5.6 14.2	1.1 2.7	1.6 4.1	1.1 2.7	3.3 8.4	0.7 1.8	1/2"
015	in cm	15.1 38.4	1.4 3.4	3.2 8.1	1.4 3.5	3.3 8.4	0.7 1.8	1/2"
018	in cm	15.1 38.4	1.4 3.4	4.1 10.4	1.4 3.5	3.3 8.4	0.7 1.8	1/2"
024	in cm	16.4 41.7	1.4 3.4	4.4 11.3	1.4 3.5	3.3 8.4	0.7 1.8	3/4"
030	in cm	16.4 41.7	1.4 3.4	3.1 7.8	1.4 3.5	3.3 8.4	0.7 1.8	3/4"
036	in cm	19.1 48.5	1.4 3.4	5.3 13.4	1.4 3.5	3.3 8.4	0.7 1.8	3/4"
042	in cm	19.1 48.5	1.4 3.4	4.4 11.3	1.4 3.5	3.3 8.4	0.7 1.8	3/4"
048	in cm	19.1 48.5	1.4 3.4	4.4 11.1	1.4 3.5	3.3 8.4	0.7 1.8	1"
060	in cm	19.1 48.5	1.4 3.4	3.8 9.7	1.4 3.5	3.3 8.4	0.7 1.8	1"

Horizontal Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Using Return Air Opening			
		L	M Supply Height	N Supply Width	O	P	Q Return Width	R Return Height	S	T
006 - 012	in cm	0.8 1.9	8.9 22.7	6.7 17.0	6.0 15.2	1.3 3.3	16.1 41.0	9.8 25.0	1.1 2.7	0.6 1.5
015 - 018	in cm	2.6 6.6	13.3 33.8	9.9 25.1	4.1 10.5	1.3 3.3	23.0 58.4	15.0 38.1	1.1 2.8	1.0 2.5
024 - 030	in cm	2.6 6.6	13.3 33.8	9.9 25.1	4.1 10.5	1.3 3.3	23.0 58.4	16.3 41.4	1.1 2.8	1.0 2.5
036 - 042	in cm	2.5 6.3	16.1 40.9	11.0 27.9	3.0 7.7	2.5 6.4	25.9 65.8	19.0 48.3	1.1 2.8	1.0 2.5
048	in cm	3.7 9.5	16.1 41.0	13.7 34.8	4.1 10.3	1.3 3.2	35.9 91.2	19.0 48.3	1.1 2.8	1.0 2.5
060	in cm	1.7 4.4	18.1 46.0	13.7 34.8	4.1 10.3	1.3 3.2	35.9 91.2	19.0 48.3	1.1 2.8	1.0 2.5

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TC - Horizontal – Dimensional Data



- Notes:
1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
 2. Units are shipped with air filter rails that are not suitable for supporting return air ductwork. An air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for further information on this frame.
 3. Discharge flange and hanger brackets are factory installed.
 4. Condensate fitting on Polymer drain pan is rubber coupling that couples to 3/4" schedule 40/80 PVC, S.S. drain pan is 3/4" MPT.
 5. Blower service panel requires 2' service access.
 6. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units

Legend:
 CCP = Control/Compressor Access Panel
 BSP = Blower Service Panel
 *ASP = Additional Service Panel (not required)

Note:
 *ASP are removable panels that provide additional access to the units interior.
 Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

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Qty: 1 Tags:

TC Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial Professional' (go to 'Resources/literature/wiring diagrams' in the upper right), use part numbers below to lookup wiring diagrams

Unit Controller	Fan Motor	Water Side Economizer	208v/1 - 265v/1		208v/3	460v/3	575v/3
			006-012	015-060	024-060	024-060	041-060
CXM	PSC	None	96B0500N11		96B0500N21	96B0500N31	
		WSE	96B0452N15		96B0452N20	96B0452N30	
	CT ECM	None	96B0506N11		96B0506N21	96B0506N31	
		WSE	96B0455N11		96B0455N21	96B0455N31	
DXM2	PSC	None	96B0521N11		96B0521N21	96B0521N31	
		WSE	96B0476N11		96B0476N21	96B0476N31	
	CT ECM	None	96B0527N11		96B0527N21	96B0527N31	
		WSE	96B0478N11		96B0478N21	96B0478N31	
	CV ECM	None	96B0523N01	96B0523N11	96B0523N21	96B0523N31	
		WSE	96B0477N01	96B0477N11	96B0477N21	96B0477N31	
Auxiliary WD for MPC			96B0147N14				
Control Box Layouts			96B0500N00				

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Qty: 1 Tags:

Tranquility® 16 (TC) Series 60 Hz Engineering Specifications – Page 1

General:

Furnish and install ClimateMaster Tranquility® "TC" Water Source Heat Pumps, 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.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120°F (-6.7° to 48.9°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI/ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform the factory acceptance test via computer. A detailed report card from the factory acceptance test shall ship with each unit. **Note: If unit fails the factory acceptance test it shall not be allowed to ship. Unit serial number will be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.**

Basic Construction:

Horizontal units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left) Discharge; Left Inlet/Back Discharge; or Right Inlet/Back Discharge as shown on the plans. Units must have the ability to be field convertible from straight to back or back to straight discharge with no additional parts or unit structure modification. Horizontal units will have factory installed hanger brackets with rubber isolation grommets packaged separately.

Vertical units shall have one of the following airflow arrangements: Left Return/Top Discharge, Right Return/Top Discharge, as shown on the plans.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units (horizontal and vertical) must have a minimum of two access panels for serviceability of compressor compartment. **Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.**

Compressor section interior surfaces shall be lined with 1/2 inch (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 in (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) **foil-faced** fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. **Units without foil-faced insulation in the air handling section will not be accepted.**

The heat pumps shall be fabricated from heavy gauge galvanized steel.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and 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.**

All horizontal units to have factory installed 1 inch (25.4 mm) discharge air duct collars, 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed, and factory installed unit-mounting brackets. Vertical units to have field installed discharge air duct collar, shipped loose and 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed. **If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their sub-contractor to install these provisions.**

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All units must have an insulated panel separating the fan compartment from the compressor compartment. **Units with the compressor in the air stream are not acceptable.** Units shall have factory installed 1 inch (25.4 mm) wide filter rails for filter removal from either side. Units shall have a 1 inch (25.4 mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

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 FPT fittings. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. 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.

Option: Contractor shall install 2 inch (50.8 mm) filter frame with removable access door and 2 inch (50.8 mm) Glass Fiber throwaway filters on all units.

Option: UltraQuiet package shall consist of additional sound insulation applied to the base pan, removable panels and blower housing. A discharge muffler is included on sizes 015 through 060.

Option: The unit shall be supplied with extended range insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

Option: The unit shall be supplied with Waterside Economizer (WSE). The WSE will consist of hydronic coil, 3 way valve, and aquastat. Aquastat will be adjustable type and factory set at 45° F (72° C). Units with WSE will require heat pump thermostat with 2 stages of cooling and S.S. drain pan.

Fan and Motor Assembly:

Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing. Units shall have a **direct-drive centrifugal fan**. The fan motor shall be 3-speed (2-speed for 575V), permanently lubricated, PSC type, with internal thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service. The fan motor on small and medium size units (006-042) shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The fan motor on larger units (048 & 060) shall be isolated with flexible rubber type isolation grommets only. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow/Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil, and/or no air filter shall NOT be acceptable.**

Option: High static motors (Sizes 015-060)

Option: Constant torque ECM motors (sizes 006 to 060 except 041): ECM variable speed ball bearing type motor. The ECM fan maximize motor efficiency over its static operating range, and provide airflow adjustment with 4 or 5 speed taps. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled).

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Option: Constant CFM ECM motors (sizes 006 to 060 except 041): ECM variable speed ball bearing type motor. The ECM fan motor shall provide a soft low noise fan start by ramping fan up to full selected speed over a 30 second period, and slowly ramp down fan at the end of each blower cycle, maintain constant CFM, maximize motor efficiency over its static operating range, and provide airflow adjustment in multiple CFM increments. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled). Constant CFM ECM motors without controlled ramp up and ramp down features, with constant CFM speed taps, or with no microprocessor controller are not acceptable.

Refrigerant Circuit:

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure (loss of charge) switch, water coil low temperature sensor, and air coil low temperature sensor. 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. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets or springs to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced type with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.

Drain Pan:

The drain pan shall be constructed of a polymer material that inhibits corrosion. If galvanized steel drain pan is used, it must meet the stringent 1,000 hour salt spray test per ASTM B117. Drain outlet shall be located at pan as to allow unobstructed drainage of

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Drain Pan:

The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. Drain pan shall be fully insulated. Drain outlet shall be located at pan as to allow unobstructed drainage of condensate. Drain outlet for horizontal units shall be connected from pan directly to FPT fitting. **No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.** The unit as standard will be supplied with solid-state electronic condensate overflow protection. **Mechanical float switches will NOT be accepted.**

Vertical units shall be furnished with a PVC FPT condensate drain connection and an internal factory installed condensate trap. **If units without an internal trap are used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their sub-contractor to install these provisions.**

Option: The unit shall be supplied with stainless steel drain pan.

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 50VA transformer, 24 volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and fan motor 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 thermostat/sensor.

Option: The unit shall be supplied with factory installed, non-fused, electrical service disconnect switch.

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. Condensate overflow electronic protection.
- h. Option to reset unit at thermostat or disconnect.
- i. 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.
- j. Ability to defeat time delays for servicing.
- k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
- l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- m. 24V output to cycle a motorized water valve or other device with compressor contactor.
- n. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.

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- o. Water coil low temperature sensing (selectable for water or anti-freeze).
- p. Air coil low temperature sensing.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

Option: Enhanced Solid State Control System (DXM2)

This control system is a communicating controller

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

- a. Removable thermostat connector.
- b. Night setback control.
- c. Random start on return from night setback.
- d. 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).
- e. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
- f. Dry contact night setback output for digital night setback thermostats.
- g. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
- h. Ability to work with heat pump thermostats using O or B reversing valve control.
- i. Emergency shutdown contacts.
- j. Boilerless system heat control at low loop water temperature.
- k. Ability to allow up to 3 units to be controlled by one thermostat.
- l. Relay to operate an external damper.
- m. Relay to start system pump.
- n. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built-in circuit breaker.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protection for both drain pans will not be accepted.

When DXM2 is connected to either ACDCU service tool or ATC32U thermostat, the installer/service technician can; check and set CFM and check DIP switch S1, S2, and S3 settings; run operation modes manually; check all physical inputs from thermostat and refrigerant pressure switches status, (Y1, Y2, W, O, G, H, ESD, NSB, OR, HP switch, and LOC switch); current or at time of fault the following temperatures -LT1, LT2, compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults.

Digital Night Setback with Pump Restart (DXM2 w/ ATP32U03C/04C, ATC32U03C):

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2 controller with an ATP32U03C/04C or ATC32U03C thermostat and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period. An additional accessory relay on the unit DXM2 controller will energize the building loop pump control for the duration of the override period. **(Note: This feature requires additional low voltage wiring. Consult Application Drawings for details.)**

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Remote Service Sentinel (CXM/DXM2)

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: MPC (Multiple Protocol Control) interface system

Units shall have all the features listed above (either CXM or DXM2) 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. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate overflow alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied/occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. 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: Lonworks interface system

Units shall have all the features listed above (either CXM or DXM2) 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:

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- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate sensor alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied/occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. 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:

ClimateMaster 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/DXM2 control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units shall be connected with hoses. The hoses shall be 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, FPT connections.
- b. Ball valve with memory stop and PT port.
- c. "Y" strainer with blowdown valve; bronze material, FPT connections.
- d. Motorized water valve; slow acting, 24v, FPT connections.

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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 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 with PT ports, and ball valve.
- d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type thermostat as selected below with the described features:

- a. Single Stage Digital Auto or Manual Changeover (ATA11U01)
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and setpoint(s) in °F or °C. The Thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.
- b. Single-Stage Digital Automatic or Manual Changeover with Two-Speed Fan Control (ATA11C04) – DXM2 required
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch, fan ON-AUTO switch, and fan LO-HI switch. Thermostat shall have an LCD display with temperature and setpoint(s) in °F or °C. A fault LED shall be provided to display specific fault condition. Thermostat shall allow use of an accessory remote temperature sensor (AST009), but may be operated with internal sensor via orientation of a jumper.
- c. Multi-stage Digital Automatic Changeover (ATA22U01)
Thermostat shall be multi-stage (2H/2C), manual or automatic changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). Thermostat shall provide temperature display offset for custom applications. Thermostat shall allow unit to provide better dehumidification with optional DXM2 controller by automatically using lower fan speed on stage 1 cooling (higher latent cooling) as main cooling mode, and automatically shifting to high speed fan on stage 2 cooling.
- d. Multi-stage Manual Changeover Programmable 5/2 Day (ATP21U01)
Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. Thermostat shall provide convenient override feature to temporarily change setpoint.
- e. Multi-stage Automatic or Manual Changeover Programmable 7 Day (ATP32U03C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable

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for °F or °C. Time display shall be selectable for 12 or 24-hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

- f. Multi-stage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat dehumidification mode to operate with ClimaDry® reheat or with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.
- g. CM100 - Multi-stage Automatic or Manual Changeover digital thermostat (ATA32V01)
Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a green backlit LED display with temperature, setpoints, mode, and status indication via a green (cooling) or red (heating) LED. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring. Thermostat navigation shall be accomplished via four buttons (Mode/fan/down/up) with menu-driven selections for ease of use and programming.
- h. CM300 – Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V02C)
Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, night time control of display backlight, bi-color LED indicates a heating or cooling demand, keypad lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on

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- i. CM500 – Color Touchscreen Display, Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V03C)

Thermostat shall have color resistive touchscreen display with space temperature, relative humidity, setpoints, mode, status indication and local weather (if connected to Wi-Fi). Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, customizable screen saver and background displays, indicator on display indicates a heating or cooling demand, set-point lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on the display. Capable of being monitored by 3rd party software. Compatible with AST014 Wi-Fi remote sensor. Configurator mobile app or web portal for easy setup. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12- or 24-hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide access to a web portal and mobile app for installer setup for configuring options. Thermostat shall have menu-driven selections for ease of use and programming.

DDC Sensors:

ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional interface system described above. Several types as described below:

- a. Sensor only with no display (LON and MPC).
- b. Sensor with override (LON only).
- c. Sensor with setpoint adjustment and override (MPC only).
- d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC).

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