# **GENERAL**

Furnish and install ClimateMaster Tranquility SM Vertical Stack water-source heat pumps as indicated on the plans with 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 43.3°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 60335-2-40 4th Edition, UL 60335-1 6th Edition for the United States and Can/CSA C22.2 No.

60335-2-40:22, CAN/CSA C22.2 No 60335-1:16 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 be shipped with each unit. **NOTE: If a unit fails the factory acceptance test, it shall not be allowed to ship. Unit serial number shall be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.**

 **CABINET CONSTRUCTION:**

The cabinet panels shall be fabricated from heavy gauge galvanized steel. The rigid one-piece cabinet assembly shall be constructed so that it is self- supporting, and can be installed prior to the chassis arrival, and to be able to avoid damage during construction. The cabinet shall have a full panel over the chassis opening for structural rigidity of the cabinet; **no “open” top or “open” bottom designs allowed.**

The cabinet base shall contain a secondary drain pan fully insulated with a pressure differential drain trap connected to the condensate riser pipe, and guide rails for the slide in refrigeration chassis. Drain pans to be rubber grommet mounted to provide isolation of chassis from the cabinet. The drain pan(s) shall be easily accessible for cleaning. All interior surfaces shall be lined with 1/2-inch (12.7 mm) thick, 1-1/2 lb/ft3 (24 kg/m3) acoustic-type fiberglass insulation. All insulation shall be **foil-faced** and have exposed edges butted up to flanges to prevent

the introduction of glass fibers into the air stream. 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.**

Standard units have a 1-inch (25-mm) filter holder with 1-inch (25-mm) thick fiberglass throwaway filter.

**Option: 2-inch (50-mm) filter holder with 2-inch (50- mm) thick fiberglass throwaway filter.**

**Option: Pre-Engineered Special: Integrated fresh- air intake. Removes the need for field attachment of fresh air assembly. Does not increase the cabinet footprint. Available with cabinet side connection only.**

Cabinet arrangements shall allow placement of riser piping on any one of the three sides of the cabinet not used for the chassis access and air supply. All cabinets shall have supply air knockouts on all sides and top. Return air K.O. to be removed from panel behind the filter. Field shall configure cabinets by removing factory knockouts and install duct flanges per model configuration shown on plans. For air noise attenuation purposes, the discharge air from fan shall discharge into insulated plenum that also contains

1. shape painted air baffle. Units not having supply air noise baffles are not acceptable. Cabinet design shall allow a full height base board (4.50 inches/114 mm) beneath the return air “G” panel. The cabinet shall contain an easily removable motor/blower assembly.

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**Option: Factory to configure supply air openings, remove K.O., cut insulation, and install duct angles. With dust protection, includes capping supply air openings and leaving**

**K.O. in panel behind filter (installer to remove both).**

Electrical conduit shall be installed from electrical unit control compartment to top of cabinet for low voltage control wiring as well as separate conduit for main power wiring. Units without these two factory- installed electric conduits will not be accepted.

**Option: Leader and follower cabinets.**

**Option: Required installation vibration isolation pad to be applied at the factory to the bottom of the cabinet if not field provided.**

**Option: Cabinet height 80 inches or 88 inches (203 or 223 cm)**

**Option: Pre-Engineered Special: Extended cabinet heights**

**Option: Construction for unit mounted Thermostat (thermostat ordered separate) - includes junction box mounted outside discharge plenum and has a Molex-type connector inside for quick connection to A91558 Series thermostat. The A91558 series use thermostat models ATA11U01, ATA11U03,**

**ATA22U01, ATP21W02, ATP21W02, ATP21W02, ATP32U03C, AWC99U01, ATA32V01,**

**AVB32V02C, AVB32V03C respectively with mating Molex-type connector.**

**Option: Pre-Engineered Special: Custom thermostat whips for connection to third-party provided thermostats.**

**Option: Low voltage 15-, 25-, or 35-foot (572-, 762-, or 1,067-cm) wire harness (whip) with Molex- type connector for connection to remote mounted thermostat. For use with A91558 thermostat series (see above).**

**Option: Pre-Engineered Special: Extended thermostat whips for remote thermostat location in excesses of 35 feet from the cabinet.**

**Option: Cabinet to have wire harness for connection to A91558 series thermostat mounted to ADA “G” return air panel.**

**Option: Premium automotive grade rubber seal between cabinet inner panel and chassis.**

Full-length supply, return, and insulated condensate water risers shall be type M copper. Riser length

up to 120 inches (305 cm) is standard. Supply and return risers have integral internal piping including ball valves (for shut off purposes at unit). Risers and piping shall be factory pressure tested to check

for leaks. Field installed hose kits are required to connect the chassis piping to the cabinet ball valve. The condensate riser shall be insulated with 3/8-inch (9.5-mm) Armaflex type insulation. The top of each riser shall be deeply swaged (3 inches/76.2 mm)

to accept connection to the riser above/below, allowing for a floor-to-floor dimensional variance of ± 1 inch (25.4 mm). **Units not having swaged riser-piping connections shall not be acceptable. Couplings and trim pieces shall not be allowed.**

**Option: Bulk ship risers so complete riser stack can be installed, pressure tested, and filled before the cabinets are installed.**

**Option: Pre-Engineered Special: Risers/Cabinets/ Chassis shipped by floor. This helps with job site delivery coordination.**

**Option: Type L riser piping.**

**Option: Supply and return risers insulated with 3/8- inch (9.5 mm) ARMAFLEX (closed cell) type insulation. 1 inch through 3-inch diameter standard, 4-inch diameter available.**

**Option: Non-swaged riser piping for crimp (non- brazed) style connections.**

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**Option: Pre-Engineered Special: Risers for single pipe applications. Supply and return water lines are combined into one riser configuration.**

**Option: Pre-Engineered Special: Riser connection location moved lower. Standard riser connections are made above the cabinets. This requires the use of a ladder or scaffolding to get access to the connection. Riser connection locations are moved lower so that connections can be made at the ground level. Risers must be shipped separately.**

**Option: Pre-Engineered Special: Riser manual air vents. Allow for air to be purged from the riser stack during commissioning.**

**Option: Pre-Engineered Special: Extended risers.**

**Removes the need for riser extension pieces which results in less field connections.**

**Option: Pre-Engineered Special: Remove drain riser. This is needed when condensate drain risers are field provided.**

**Option: Pre-Engineered Special: Riser bypass valve. Allows water flow from supply to return riser during pressurization prior to the chassis being installed.**

# **FAN AND MOTOR ASSEMBLY**

The cabinet shall contain a removable motor/blower assembly. Units shall have a direct drive centrifugal fan. The base fan motor option shall be a 4-speed or 5-speed, permanently lubricated, Constant Torque EC motor type with thermal-overload protection. The fan motor for small size units (06-12) 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 medium and large units (15-36) shall be isolated with flexible rubber type isolation grommets only. Airflow/External static pressure rating of the unit shall be based on a wet coil and clean filter.

**Ratings based on a dry coil and/or no air filter shall not be acceptable.**

**Option: Constant Volume (CV) EC variable speed ball bearing type motor. The CV EC fan motor shall provide soft starting, maintain constant CFM over its static operating range and provide airflow adjustment in 25 CFM increments via its control board. The fan motor shall be isolated from 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).**

# **CHASSIS**

The chassis, which incorporates the air coil, water coil, drain pan with solid-state electronic

condensate-overflow protection, compressor, and electrical components shall be easily installed

for quick jobsite installation and future servicing purposes. The slide-in chassis shall have insulated panels surrounding the compressor. Compressors are not in the air stream. The chassis base shall be fabricated from heavy gauge galvanized steel formed to match the slide-in rails of the cabinet. Units shall have a factory-installed 1-inch (25.4-mm) thick filter bracket and throwaway type glass-fiber filter. Furnish one spare set of filters.

**Option: Chassis can ship upright in any cabinet that risers are not attached.**

**Option: UltraQuiet package shall consist of the standard double isolation of the compressor plus sound attenuating compressor blanket applied to the compressor. All sheet metal surrounding the compressor shall have high density sound attenuating material with STC rating of 26 per ASTM E-90 and then covered with fiberglass insulation.**

**Option: Factory wired for communicating thermostat, requires AWC99U01 thermostat.**

**Option: Rib relay replaces contactor for models 06 through 18. Eliminates contactor “click” sound when first energized.**

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**Option: vFLow: The unit will be supplied with internally factory mounted modulating water valve**

**with delta T control. The factory built-in valve shall modulate water flow through unit based on a field adjustable water temperature difference between the entering and leaving water. The valve shall automatically adjust for operating mode, source water temperature and variations in external head pressure.**

**The valve will also act as a shut-off valve to prevent water flow through the unit when the unit is not activated and will have a minimum position capability.**

**Option: Factory installed 3-way water valve. Valves are used on units at the end of a riser water loop to ensure continuous flow between supply and return riser stacks when those units are not in operation. This prevents excessive water flow and pressure drop through the coax when it is not in operation.**

**Option: Pre-Engineered Special: Internally factory mounted water loop strainer. Strainers filter water to ensure debris does not enter the unit coaxial heat exchanger. Debris in water loops can degrade thermal transfer**

**(efficiency) and potentially limit water flow. Please consult SM IOM for proper care and maintenance of strainers when selecting this option.**

**Option: Pre-Engineered Special: Supply and Return P/T ports. Allows the for the water pressure drop to be checked across the heat exchanger which can be correlated**

**to a fluid flow rate. Technicians can use this feature to determine if there is proper water flow through the unit.**

**Option: The unit will be supplied with internally factory mounted two-way motorized water valve (MWV) for variable speed loop pumping requirements. Valve to be fail closed type. The water circuit will have factory installed high-pressure switch**

**located between MWV and heat exchanger.**

**Option: The unit will be supplied with internally factory mounted automatic water flow regulators.**

**Option: The unit will be supplied with internally factory mounted secondary pump rated for 200 PSIG applications.**

**Option: Hybrid hydronic heating. In heating mode, the building loop water is diverted to a hydronic coil for traditional fan-coil style heating.**

Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. AHU hose ends shall be Internal NPSH (National Pipe Straight Hose) swivel ends with EPDM washers which connect to mating threaded end connection on chassis and riser ball valve. The hose kit shall be rated for 300 psi (2,068 kPa) design working pressure.

# **REFRIGERANT CIRCUIT**

All units shall contain an R-454B 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 aluminium 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 switch (loss of charge), 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.**

Hermetic compressors shall be internally sprung and externally isolated. The compressor shall have a dual level vibration isolation system.

The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor base pan, which is then isolated from the cabinet by resting on condensate drain pan which is isolated by grommets for maximized vibration attenuation.

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All units (except units with rotary compressors) shall include a discharge muffler to further enhance sound attenuation. Compressor shall have thermal overload protection.

Refrigerant-to-air heat exchangers shall utilize enhanced corrugated lanced aluminium fins and rifled copper tube construction rated to withstand 625 PSIG (4,309 kPa) refrigerant working pressure. Copper hairpins are tin electroplated for added protection from formicary corrosion. **Units that do not have tin-plated hairpins shall not be acceptable**.

Refrigerant-to-water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4,309 kPa) working refrigerant pressure and 300 PSIG (2,068 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 1,000 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 types 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). The 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.

Units charged with 62 ounces or greater of R-454B shall be supplied with a Refrigerant Detection System (RDS) with sensors to be strategically placed within the cabinet. In the event of a refrigerant leak, the RDS disables compressor operation, and the unit blower runs to disperse any concentration of leaked

refrigerant in compliance with UL 60335-2-40 safety standards for flammable refrigerants. **Units charged with 62 ounces or greater of R-454B that do not have an RDS shall not be acceptable.**

**Option: The unit will be supplied with non-plated air to refrigerant heat exchanger.**

# **CABINET 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 1,000-hour salt spray test per ASTM B117. The drain pan will be isolated from cabinet with four EPDM vibration isolation grommets. If plastic type material is used, it must

be HDPE (High Density Polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit. The drain pan shall be fully insulated.

The drain pan shall have at a minimum a doubled sloped surface to allow positive drainage to the outlet opening, which shall be at the lowest level of the entire pan surface. The drain outlet shall be connected from pan outlet to condensate riser (if

supplied) with factory installed trap inside of cabinet. The cabinet drain pan as standard will be supplied with solid-state electronic condensate-overflow protection. **Drain pans that are not isolated from cabinet shall not be acceptable. Mechanical float switches will NOT be accepted.**

**Option: Stainless-steel drain pan**

# **ELECTRICAL**

A control compartment shall be located within the chassis and shall contain a 50VA transformer, 24V activated, 2-pole compressor contactor, relay 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 24V and provide heating or cooling as required by the remote thermostat/sensor. A control compartment

shall be located within the cabinet and shall contain a terminal block for high-voltage connections. All electrical connections between the chassis and cabinet shall be made via locking quick-connects.

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**Option: Disconnect Switch, Non-Fused, classified as motor disconnect.**

**Option: Circuit Breaker, all 208/230V and 265V, 15 and 20 amp - HACR rated, 265V 25 amp and higher - supplemental rated.**

# **ENHANCED SOLID STATE CONTROL SYSTEM (CXM2)**

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:

* 1. Anti-short cycle time delay on compressor operation.
	2. Random start on power up mode.
	3. Low-voltage protection.
	4. High-voltage protection.
	5. Unit shutdown on high- or low-refrigerant pressures.
	6. Unit shutdown on low water temperature.
	7. Condensate-overflow electronic protection.
	8. Option to reset unit at thermostat or disconnect.
	9. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs three times sequentially without thermostat meeting

temperature, then lockout requiring manual reset will occur.

* 1. Ability to defeat time delays for servicing.
	2. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
	3. 24V output to cycle a motorized water valve or other device with compressor contactor.
	4. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
	5. Water coil low-temperature sensing (selectable for water or anti-freeze).
	6. Air coil low-temperature sensing.
	7. 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).
	8. Emergency shutdown contacts.
	9. Entering- and leaving-water temperature sensing.
	10. Leaving-air temperature sensing.
	11. Compressor-discharge temperature sensing.

**NOTE: Units not providing the eight 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.**

When CXM2 is connected to AWC99U01 thermostat or handheld service tool, the installer/service technician can; check DIP Switch S2 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 - water coil (LT1), air coil (LT2), compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults.

When the AWC99U01 communicating thermostat is used this same functionality can be viewed and adjusted remotely in the web portal or mobile app.

**Systems not providing remote access, diagnosis, and adjustment functionality will not be accepted.**

# **ENHANCED SOLID STATE CONTROL SYSTEM (DXM2.5)**

This control system is a communicating controller.

Control shall have the above-mentioned features of the CXM2 control system along with the following expanded features:

1. Removable thermostat connector.
2. Night setback control.
3. Random start on return from night setback.

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1. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
2. Dry contact night setback output for digital night setback thermostats.
3. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
4. Ability to work with heat pump thermostats using O or B reversing valve control.
5. Boilerless system heat control at low loop water temperature.
6. Ability to allow up to three units to be controlled by one thermostat.
7. Relay to operate an external damper.
8. Relay to start system pump.
9. 75VA control transformer. The control transformer shall have load-side short circuit and overload protection via a built-in circuit breaker.

**NOTE: Units not providing the eight 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 DXM2.5 is connected to AWC99U01 communicating thermostat or handheld service tool, the installer/service technician can; check and set CFM; 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 - water coil (LT1), air coil (LT2), compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults. When the AWC99U01 communicating thermostat is used, this same functionality can be viewed and adjusted remotely with the portal or mobile app. **Systems not providing remote access, diagnosis, and adjustment functionality will not be accepted.**

# **DIGITAL NIGHT SETBACK WITH PUMP RESTART (DXM2.5 W/ ATP32U03C/04C, AWC99U01)**

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2.5 controller with an ATP32U03C/04C or AWC99U01 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 DXM2.5 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.**

# **REMOTE SERVICE SENTINEL (CXM2/DXM2.5)**

The solid-state control system shall communicate with applicable thermostats 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, indicating a lockout. A detailed message shall be provided at the communicating thermostat or service tool 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 CXM2 or DXM2.5) 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.

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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:

1. Space temperature
2. Leaving-water temperature
3. Discharge-air temperature
4. Command-of-space temperature setpoint
5. Cooling status
6. Heating status
7. Low-temperature sensor alarm
8. Low-pressure sensor alarm
9. High-pressure switch alarm
10. Condensate-overflow alarm
11. High-/low-voltage alarm
12. Fan “ON/AUTO” position of space thermostat as specified above
13. Unoccupied/occupied command
14. Cooling command
15. Heating command
16. Fan “ON/AUTO” command
17. Fault-reset command
18. Itemized fault code revealing reason for specific shutdown fault (any one of seven)

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

# **RETURN PANELS**

The “G” return AR panel assembly shall be architecturally designed, acoustic type, with one- piece frame and hinged door for easy and quick access to filter. Assembly is attached to the cabinet with four bolts which can be easily removed for chassis access. The hinged return panel shall be made of heavy gauge die formed galvanized steel with a powder-coat finish in Polar Ice or special color. Return air panels that protrude from wall more than 5/8 inch (15.9 mm) are not acceptable.

**Option: Return air panel painted Bright White color**

**Option: Pre-Engineered Special: Custom painting of return air panels per field specified color.**

**Option: “G” panel with mounting for ADA thermostat allows thermostat to be mounted low to comply with ADA height requirement.**

**Option: Pre-Engineered Special: Custom return air panel knock outs for ADA mounted 3rd party provided thermostats.**

**Option: Pre-Engineered Special: ADA return air panels with knock out moved lower.**

**Needed when cabinets are placed on unit stands to comply with ADA maximum thermostat height.**

**Option: “G” panel with keyed locks - prevents users from tampering with units.**

**Option: Style “G” return air panel with frame for recessing cabinet behind finished wall.**

**Option: Motorized fresh air damper for “G” panel with frame - allows outside air to enter on right or left side.**

**Option: Flush Mounted “L” panel. Offered in Bright White and Polar Ice color option. Allows for chassis to be removed without removing the frame.**

# **SUPPLY GRILLE(S)**

Supply grille(s) shall be aesthetically pleasing brushed aluminium or powder-coated finish in Polar Ice color.

**Option: Supply grille painted Bright White.**

**Option: Supply grille with double deflection style louvers.**

**Option: Supply grille with double deflection style louvers with opposed damper.**

# **WARRANTY**

ClimateMaster shall warranty equipment for a period of 12 months from startup or 18 months from shipping (whichever occurs first).

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**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 CXM2/DXM2.5 control board for a total of 5 years.**

# **FIELD-INSTALLED OPTIONS**

**Hose Kits (required for field water connections):**

Water connections between chassis and the cabinet shall be accomplished via a hose kit consisting of Kevlar-reinforced EPDM core hose surrounded by a stainless-steel braid. Hose kit shall have brass fittings with stainless-steel ferrules. The hose kit shall be rated for 300 psi (2,068 kPa) design working pressure. The AHU hose kits are required for each cabinet.

**Cabinet Stands - ACST Series:**

Cabinet stands are used when applications have baseboards with heights taller than 4 inches. Heavy 16-gauge galvanized steel construction, bolts to bottom of cabinet. Heights 1-inch (25 mm) to 13-inch (330 mm) by 1inch (25 mm) increments. Ships in bulk for field attachment.

**Option: Pre-Engineered Special: Cabinet stands factory assembled and attached to the cabinet.**

**Filters:**

Pleated media disposable 1-inch (25-mm) thick MERV 8 or MERV 11, 2-inches (50 mm) thick MERV 8, MERV 11

or MERV 13.

# **THERMOSTATS**

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

**NOTE: To achieve the full benefit of controls, use 2-speed thermostats (switch for manual or Y2 for automatic change).**

1. **Thermostat (Communicating) (AWC99U01)**

An electronic communicating web-enabled touchscreen thermostat shall be provided. The thermostat shall offer three stages of heating and two stages of cooling with precise temperature control and have a four-wire connection to

the unit. The thermostat shall be capable of manual or automatic change-over operation and shall operate in standard or programmable mode. An integrated humidity control feature shall be included to control a humidifier and/or a dehumidifier. The thermostat shall include a utility demand reduction feature to be initiated by an independent time program or an external input. The thermostat shall provide access to via the web portal or mobile application to include temperature adjustment, schedule adjustment including occupied/unoccupied, entering-water temperature, leaving-water temperature, water- coil temperature, air-coil temperature, leaving- air temperature, and compressor-discharge temperature. A graphical system layout to

be provided with real-time operating mode

information of the temperature sensors for easy diagnostics. The thermostat shall display system faults with probable cause and troubleshooting guidance. The system shall provide in clear language the last five faults, time of faults, operating temps at time of fault, and possible reasons for the fault. The thermostat shall provide access for immediate manual control of all outputs via the web portal/mobile application for rapid troubleshooting.

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1. **Single-Stage Digital Auto or Manual Changeover (ATA11U01)**

The thermostat shall be a single-stage, digital, auto, or manual changeover with HEAT-OFF- COOL-AUTO system switch and fan ON-AUTO switch. The thermostat shall have an LCD display with temperature and setpoint(s) in ºF or ºC. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. The thermostat shall provide temperature display offset for custom applications.

1. **Single Stage Digital Auto or Manual Changeover and Manual Two Fan Speed Selections (ATA11U03)**

The thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-

COOL-AUTO system settings, high and low fan settings and fan ON-AUTO settings. The thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall

be selectable for ºF or ºC. The thermostat shall provide permanent memory of setpoint(s) without batteries. The 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. The thermostat

shall allow the use of an accessory remote- temperature sensor (17B0008N05). The thermostat navigation shall be accomplished via four buttons.

1. **Multi-stage Digital Automatic Changeover (ATA22U01)**

The 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. The thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). The thermostat shall provide temperature display offset for custom applications. The thermostat shall allow unit to provide better dehumidification with optional

DXM2.5 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. The thermostat can be configured to heat and cool even if in off mode (replaces night low limit switch (NLLS) in cabinet).

1. **Multi-stage Manual Changeover Programmable 5/2 Day (ATP21W02)**

The thermostat shall be 5-day/2-day programmable (with up to four setpoints per day), multi-stage (2H/1C), manual or automatic changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings.

The thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC.

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1. **Multi-stage Automatic or Manual Changeover Programmable 7-Day (ATP32U03C)**

The thermostat shall be 7-day programmable (with up to four 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. The thermostat

shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall

be selectable for ºF or ºC. Time display shall be selectable for 12- or 24-hour clock. Fault identification shall be provided 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. The 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. The thermostat shall provide progressive recovery

to anticipate the time required to bring space temperature to the next programmed event. The thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. The 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.

1. **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. The 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 ºF or ºC. Time display shall be selectable for 12- or 24-hour clock. The thermostat shall provide permanent memory of setpoints without batteries. The 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. The thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. The 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.

1. **CM300 – Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V02C/R)**

The commercial version shall be 7-day programmable with four 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, nighttime 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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1. **CM500 – Color-Touchscreen Display, Multi- stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V03C/R)**

The thermostat shall have color-resistive touchscreen display with space temperature, relative humidity, setpoints, mode, status indication and local weather (if connected to Wi-Fi). The residential version shall be 7-day programmable with up to four setpoints per day. The commercial version shall be 7-day programmable with four 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 third-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 ºF or ºC. Time display shall be selectable for 12- or 24-hour clock. The thermostat shall provide permanent memory of setpoints without batteries.

The thermostat shall provide heating setpoint- range limit, cooling setpoint-range limit, temperature display offset, dead-band range setting, and inter-stage differential settings. The thermostat shall provide progressive recovery to anticipate time required to bring space

temperature to the next programmed event. The thermostat shall provide access to a web portal and mobile app for installer setup for configuring options. The 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 DDC interface system described above. Several types as described below:

1. Sensor only with no display (MPC).
2. Sensor with setpoint adjustment and override (MPC).
3. Sensor with setpoint adjustment and override, LCD display, status/fault indication (MPC).

**NOTICE! This product specification document is furnished as a means to copy and paste**

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