

Models:

Engineering Specs SE 4-072

02

# **GENERAL**

Furnish and install ClimateMaster Tranquility® SE 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 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 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 EPDM isolation grommets packaged separately.

Vertical units shall have one of the following air flow 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 multiple 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 (12.7 mm) thick, 11/2 lb/ft3 (24 kg/m3) acoustic type glass fiber insulation. Air-handling section interior surfaces shall be lined with 1/2-inch (12.7 mm) thick,

11/2 lb/ft3 (24 kg/m3) **foil-faced,** glass-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 pump cabinets shall be fabricated from heavy gauge galvanized steel with powder coat paint finish. Both sides of the steel shall be painted for added protection.

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 his subcontractor to install these provisions.**

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 a

factory-installed 1-inch-wide (25.4 mm) filter bracket for filter removal from either side. Units shall have

a 1-inch-thick (25.4 mm), throwaway-type, glass- fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters

on completion of startup. 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 and shall be securely mounted flush to

the cabinet corner post allowing for connection to a flexible hose without the use of a back-up wrench. **Water connections that protrude through the cabinet or require the use of a backup wrench shall not**

**be allowed.** All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. The 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: The unit will be supplied with optional field- or factory-installed 2-inch air-filter rails (typically used for free-return installation) or 1-inch or 2-inch air-filter frames with filter- access door and return air-duct flanges (typically used for ducted return installation). A corresponding 1-inch or 2-inch throwaway type glass-fiber filter will ship with the factory-installed filter rail or frame.**

**Option: The contractor shall install 1-inch or 2-inch MERV-rated, pleated-media, disposable air filters on all units.**

**Option: UltraQuiet package shall consist of high- technology, sound-attenuating material that is strategically applied to the compressor and air handling compartment casings**

**and fan scroll in addition to the standard ClimaQuiet system design, to further dampen and attenuate sound transmissions.**

**Option: The unit will be supplied with internal 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. For two- stage units, the modulating valve will automatically reduce the water flow**

**through the unit during part-load operation to maintain the configured temperature difference. The valve shall automatically adjust for operating mode, stage of capacity, 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. Externally- mounted, modulating water valves will not be accepted.**

**Option: The unit will be supplied with internal factory-mounted, variable-speed, water- circulating pump with internal check valve. The variable-speed pump shall modulate water flow through the unit based on a field-adjustable temperature difference between the entering and leaving water.**

**For two-stage units, the modulating valve will automatically reduce the water flow through the unit during part-load operation to maintain the configured temperature difference. The variable-speed pump**

**shall automatically adjust for operating mode, stage of capacity, source water temperature, and variations in external head pressure. Externally mounted circulating pumps will not be accepted.**

**Option: The unit will be supplied with internal mounted secondary pump for primary/ secondary applications, including one-pipe systems. Externally mounted secondary pump will not be accepted.**

**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.**

# **BLOWER AND MOTOR ASSEMBLY**

Blowers 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 an EC variable speed ball-bearing-type motor. The EC blower motor shall provide soft-starting functionality, 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 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).

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.**

# **REFRIGERANT CIRCUIT**

All units shall contain an R-454B sealed refrigerant circuit including a high-efficiency, two-stage scroll compressor designed for heat pump operation;

a thermostatic expansion valve for refrigerant metering; enhanced, corrugated-aluminum lanced fin, rifled-copper-tube or all-aluminum- microchannel, refrigerant-to-air heat exchanger; a

reversing valve; a coaxial (tube-in-tube) refrigerant- to-water heat exchanger; and safety controls including a high-pressure switch, a low-pressure switch (loss of charge), a water-coil low-temperature sensor, and an 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. 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 mounting plate, which is then isolated from the cabinet base with EPDM grommets for maximized vibration attenuation. All units shall include a discharge muffler to further enhance sound attenuation. Compressors shall have thermal overload protection. Compressors shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant-to-air heat exchangers shall utilize enhanced, corrugated-aluminum lanced fins, and rifled-copper-tube or all-aluminum-microchannel construction rated to withstand 625 PSIG (4309 kPa) refrigerant working 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 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). 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 (1.76 kilograms) 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 (1.76 kilograms) or greater of R-454B that do not have an RDS shall not be acceptable.**

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

**Option: The unit shall be supplied with a hot-water generator (desuperheater).**

**Option: The Refrigerant Detection System (RDS) package shall consist of the RDS module and 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 (Optional for sizes 024-048).**

# **DRAIN PAN**

The drain pan shall be constructed of 304 Stainless Steel to inhibit corrosion. This corrosion protection system shall meet the stringent 1,000-hour salt- spray test per ASTM B117. 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 outlet shall be located at pan to allow unobstructed drainage of condensate.

Drain outlet for horizontal units shall be connected from pan directly to MPT 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 his sub-contractor to install these provisions.

# **ELECTRICAL**

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24V-activated, two- or three-pole- compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and blower 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.

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

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

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. This control system is a communicating controller with 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 3 times sequentially without thermostat meeting

temperature, then lockout requiring manual reset will occur.

1. Ability to defeat time delays for servicing.
2. 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.
3. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
4. 24V output to cycle a motorized water valve or other device with compressor contactor.
5. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
6. Water coil low-temperature sensing (selectable for water or antifreeze).
7. Air coil low-temperature sensing.
8. Removable thermostat connector.
9. Night-setback control.
10. Random start on return from night setback.
11. 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).
12. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
13. Dry-contact night-setback output for digital night-setback thermostats.
14. Ability to work with heat pump (Y, O) or heat/ cool (Y, W) type thermostats.
15. Ability to work with heat-pump thermostats using O or B reversing-valve control.
16. Emergency-shutdown contacts.
17. Entering- and leaving-water temperature sensing.
18. Leaving-air temperature sensing.

ab. Compressor-discharge temperature sensing. ac. Boilerless system heat control at low loop

water temperature.

ad. Ability to allow up to three units to be controlled by one thermostat.

ae. Relay to operate an external damper. af. Relay to start system pump.

ag. 75VA control transformer. 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 will not be accepted.**

**NOTE: To achieve full benefit of the two-stage compressor and EC fan, a 2 Heat/2 Cool thermostat (or a 3 Heat/2 Cool thermostat when electric backup heat is required) should be employed.**

When DXM2.5 is connected to either ACDU service tool or 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 online 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 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**

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 units 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 three 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 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:

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

**Hose Kits**

# **FIELD-INSTALLED OPTIONS**

1. high-pressure switch alarm
2. condensate-overflow alarm
3. high-/low-voltage alarm
4. fan “ON/AUTO” position of space thermostat as specified above
5. unoccupied/occupied command
6. cooling command
7. heating command
8. fan “ON/AUTO” command
9. fault-reset command
10. itemized fault code revealing reason for specific shutdown fault (any one of seven)
11. refrigerant-leak-detection communication path

# **WARRANTY**

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (whichever 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 DXM2.5 control board for a total of 5 years.**

All units shall be connected with hoses. The hoses shall be 2-feet-long (61-cm), 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:

1. Ball valve; bronze material, standard port full- flow design, FPT connections.
2. Ball valve with memory stop and PT port.
3. “Y” strainer with blowdown valve; bronze material, FPT connections.
4. Motorized water valve; slow acting, 24V, FPT connections.

**Hose Kit Assemblies**

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

1. Supply and return hoses having ball valve with PT port.
2. Supply hose having ball valve with PT port; return hose having automatic flow-regulator valve with PT ports, and ball valve.
3. 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.
4. 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:

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–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.

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). Residential version shall be 7-day

programmable with up to four setpoints per day. 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 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 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.

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

Residential version shall be 7-day programmable with up to four setpoints per day. 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, 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

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. 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. The thermostat navigation shall be accomplished via four

buttons (Mode/fan/down/up) with menu-driven

selections for ease of use and programming.

1. **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 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. 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.

1. **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 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). Thermostat shall provide temperature-display offset for custom applications. Thermostat shall allow unit to provide better dehumidification by automatically using lower fan speed on stage-one cooling (higher latent cooling) as main cooling mode, and automatically shifting to high-speed fan on stage-two cooling.

1. **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 to operate with

EC 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 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. 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.

# **DDC SENSORS**

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

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

# **HAND HELD COMMUNICATION/ DIAGNOSTIC SERVICE TOOL (ACDU02C)**

Allows installation and service personnel to access the configuration and service modes of the DXM2.5 control board without installing the AWC99U01 communicating thermostat:

1. Configure the airflow, pump, or modulating valve operation etc.
2. Diagnose by viewing fault history and operating conditions at the time of fault and manually operating the unit.

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

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