# **GENERAL**

Furnish and install ClimateMaster Tranquility® Console 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 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 shall be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.**

# **BASIC CONSTRUCTION**

Console units shall have one of the following air flow and piping arrangements: Front Inlet/Right- hand Piping; Front Inlet/Left-hand piping; Bottom Inlet/Right-hand piping; or Bottom Inlet/Left-hand piping 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. If other arrangements make servicing difficult, the contractor must provide access panels and clear routes to ease service. Architect/Engineer must approve any changes in layout.

The cabinet, wall mounted back wrapper and subbase shall be constructed of heavy gauge galvanized steel with a baked polyester powder coat paint finish. Corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. **Unit corrosion protection must meet these**

**stringent requirements or unit(s) will not be accepted.** Color will be Polar Ice. Both sides of the steel shall be painted for added protection. Additionally, the wall mounted back wrapper shall have welded corner bracing. The easily removable cabinet enclosure allows for easy service to the chassis, piping compartment and control compartment.

All interior surfaces shall be lined with 1/4-inch (6.4-mm) thick, 2 lb/ft3 (32 kg/m3) acoustic flexible-blanket type glass-fiber insulation with a non-woven, anti-microbial treated-mat face. 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. 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.**

The cabinet shall have a 30º sloped top with aluminum rigid bar type discharge grille. Aluminum discharge grille shall be anodized charcoal grey in color including hinged control door. Cabinet shall have rounded edges (0.325-inch/8.255-mm minimum radius) on all exposed corners for safety and aesthetic purposes. **Units not having sloped top and rounded corners (0.325-inch/8.255-mm minimum) on front, side, top slope, and top corners shall not be accepted.**

Return Air Filter shall be 1-inch (25.4 mm) fiberglass disposable type media for bottom return units (units with subbase) or 1/8-inch (3.2 mm) permanent cleanable type media for front return type units.

**Option: The unit shall be provided with a keyed lock on the control access door.**

**Option: The unit shall be provided with a motorized outside air damper and damper assembly, factory mounted and wired.**

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**Option: The unit shall be provided in front-return air configuration. Front-return air unit shall include a front-return air grille integrally stamped into the cabinet and shall be provided without a 5-inch high subbase.**

**Option: The unit shall include an optional architectural-style field-installed return-air grille to help conceal the subbase return-air opening (units with bottom return only).**

**Option: UltraQuiet package shall consist of high- technology sound-attenuating material that is strategically applied to the compressor and compressor compartment in addition to the standard ClimaQuiet system design, to further dampen and attenuate sound transmissions. Compressor is mounted on specially- engineered sound-tested EPDM isolators.**

# **FAN AND MOTOR ASSEMBLY**

Fan and motor assembly shall be assembled on a slide out fan deck with quick electrical

disconnecting means to provide and facilitate easy field servicing. The fan motor shall be multi-speed, 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 shall include a torsionally flexible motor mounting system or saddle mount system with resilient rings to inhibit vibration induced high noise levels associated with “hard wire belly band” motor mounting. The airflow 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 filter shall NOT be acceptable.**

# **REFRIGERANT CIRCUIT**

All units shall contain an R-454B sealed-refrigerant circuit including a high-efficiency 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 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 optional disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

Hermetic compressors shall be internally sprung. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation 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 (4,309 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 (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 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.

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

**Option: The unit will be supplied with internally factory-mounted two-way water valve for variable-speed pumping requirements.**

**A factory-mounted or field-installed high-pressure switch shall be installed in the water piping to disable compressor**

**operation in the event water pressures build due to water freezing in the piping system.**

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

**Option: The unit will be supplied with internally- mounted secondary pump for primary/ secondary applications, specifically single- pipe systems. (Requires extended unit).**

**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 refrigerant-to-air heat exchanger shall be coated.**

# **PIPING**

Water piping shall terminate in the same location regardless of the connection and valve options.

**Option: Threaded MPT copper fittings (sweat connections are standard).**

**Option: Threaded FPT copper fittings (sweat connections are standard).**

# **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. 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. Drain pan shall be insulated.

Drain outlet shall be located at pan as to allow complete and unobstructed drainage of condensate. The unit as standard will be supplied with solid-

state electronic condensate overflow protection.

**Mechanical float switches will NOT be accepted.**

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

# **ELECTRICAL**

Unit control shall be located under the hinged control door in the sloped top grille. Operating control shall consist of push buttons to select mode of operation “OFF”, “HEAT,” “COOL,” “AUTO”, Fan “AUTO” (fan cycles

with compressor), Fan “ON” (continuous fan), Fan “LO” (low speed fan), and Fan “HI” (high speed fan).

Temperature adjustment shall be accomplished via two push buttons, one labeled with an arrow up, and the other labeled with an arrow down. Control shall include an LCD display for display of temperature and setpoint. **Units without an LCD display shall not be accepted.**

A control box shall be located above the unit compressor compartment and shall contain operating controls as outlined in the paragraph above, 24VAC transformer, double-pole compressor 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. A unit mounted digital thermostat (CM100 or CM300)

with a remote sensor measuring return air temperature shall control the compressor operation for heating and cooling. 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 ºF or ºC. Field can configure digital thermostat for ACO or MCO operation.

**Option: Provisions for remote thermostat Option: Disconnect Switch, Non-Fused. Option: Breaker.**

**Option: 20A power plug/cord.**

**Option: 20A plug/cord, receptacle, disconnect switch, non-fused.**

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# **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.

# **REMOTE SERVICE SENTINEL (CXM2)**

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**

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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
9. high-pressure switch alarm
10. condensate-overflow alarm
11. hi-/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.

# **WARRANTY**

ClimateMaster shall warranty equipment for a period of 12 months from startup 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 CXM2 control board for a total of 5 years.**

# **FIELD-INSTALLED OPTIONS**

**Hose Kits**

Hoses shall be 1-foot (31 cm) long, braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted. **NOTE: Threaded connection piping option must be ordered for hose kit connections.**

**Option: 2-foot (61-cm) hose lengths instead of standard 1-foot (31-cm) length.**

**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.

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1. 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. **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 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. 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.

1. **CM300 – Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V02R)**

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. **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. **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 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. The thermostat shall provide permanent memory of setpoint(s) without batteries. The thermostat shall provide convenient override feature to temporarily change setpoint.

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. **Multistage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)**

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. 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 the thermostat to operate with EC fan dehumidification mode via settings changes. The 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. The thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event.

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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. **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 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. 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:

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).

# **SUBBASE RETURN AIR GRILLE**

Decorative-louvered grille covers the front of subbase including the large return-air opening. Order separate and field attach.

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