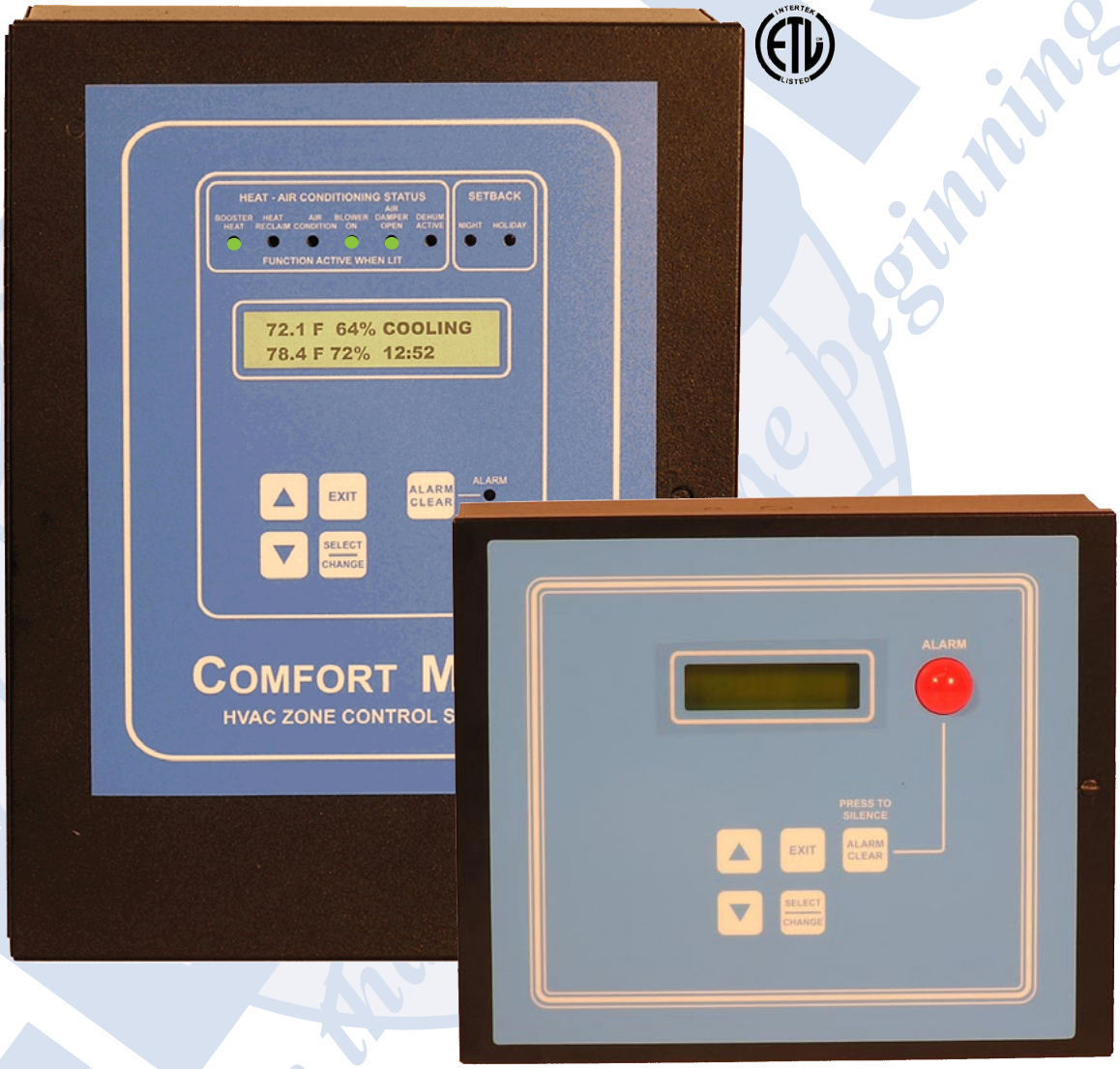
HVAC Cooling & Heating Control System



Comfort-Miser HVAC and Heat Modulation Control System

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HVAC COOLER CONTROL SYSTEM

The **Comfort-Miser HVAC Control System (CM1)** will control the entire operation of a single zone air handler with multiple stages of air condition, booster heat, heat reclaim, and fan blower. The CM1 can control an air damper, auxiliary heater, and anti-sweat heaters in refrigerated display cases and will monitor outside air temperature and humidity.

Temperature Control - The CM1 will maintain the temperature in each of its assigned areas. It can control up to six A/C, four heat reclaim and six booster heat stages.

Heating Mode/Cooling Mode - The CM1 operates in two separate modes, heating and cooling. A heating mode and cooling mode setpoint is programmed in and the temperature must exceed the setpoint of the non-active mode for over 30 minutes before the system will switch modes.

A/C & Heat Staging - Each stage has a common cut in / cut out temperature and minimum runtime setpoint. CM1 has an adjustable temperature deadband between the cooling and heating modes and a set changeover time delay.

Fan Control - The CM1 air handler first stage fan can run as needed or be on continuously. The second stage fan activates by A/C or booster heat stages set by the user.

Fan Proofing - A digital dry contact signal sail switch can be installed in the return air to indicate fan operation.

De-Humidification - The CM1 Utilizes Air-Conditioning to remove moisture from the air and operates the de-humidification process in both the heating and cooling mode. It remains in the de-humidification mode until the indoor humidity drops 3% below the setpoint.

Setback Temperature Schedule and Differential Setpoint - During regular scheduled times, the controller can be programmed to run in setback mode. There are three setback schedules: Night, Holiday and an extra setback. Each schedule can be programmed for on-time and off-time. The holiday setback schedule has 10 programmed holiday dates. The CM1 gives the option of locking out booster heat while in setback; this will delay its activation after the end of setback.

Load Shedding - During periods of peak energy demand, the CM1 can be placed into load shedding mode. When the input reads a closed signal from an energy management system, the control enters load shedding. The control will raise the cooling mode temperature setpoint by the load shedd differential value and will lower the heating mode temperature setpoint by the same value.

System Status Indication Panel - The CM1 has an LED status on the front panel of the control housing. It indicates the status of each step of control and alarms.

Anti-Sweat Heater - The CM1 can activate anti-sweat heaters mounted in refrigerated display cases within each assigned HVAC zone.

Economiser Air Damper - In cooling mode, a two position air damper can be activated to open 100% when the outside temperature is below 65°F and the outside RH is less than 45%.

Booster Heat Lockout - Each booster heat stage has a programmable lockout temperature setpoint. The booster heat will not activate when the outdoor temperature is above this setpoint.

Auxiliary Heaters - Auxiliary heating is used to turn on/off a heating source according to the outside temperature, such as a vestibule air current or a sidewalk heater.

VSD CONTROL OUTPUT OPTION

The **CM1-12-VSD** will change up to two the OFF/ON relays into variable speed OFF/ON with a 0-10 Volt analog output based upon system need. The relays will cycle on and off as part of the entire system.

HEAT MODULATION CONTROL (WHMC)

The Heat Modulation Control System (WHMC) is an ETL listed control that was designed to incorporate most of the control functions necessary to monitor and control up to 3 heater inputs with a variable speed fan.

Modes of Operation - The WHMC has four different modes of operation; RUN SCHEDULE, HOLD TEMP, FORCE SETBACK and FORCE NORMAL. Depending upon which mode you are in, the WHMC will run on a different temperature setpoint. The SETBACK and HOLIDAY temperature schedules are set in the SCHEDULE MENU and are used for off time hours.

Relay Outputs - This unit has 5 Dry Contact relays. **Alarm Relay,** Relay One is the SYSTEM ALARM relay. **Heater Relay,** Relays 2, 3 and 4 are the HEATER CONTROL relays. **Fan Relay,** Relay 5 is the FAN relay

4-20 milliamp Output - This signal output coupled with the fan relay will control the modulated heat. When heat is called for, the 4-20mA signal will ramp up to maximum when a heater relay is activated and ramp down to 50% when the next heater relay is activated and ramp back up until all three heater relays have turned on.

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