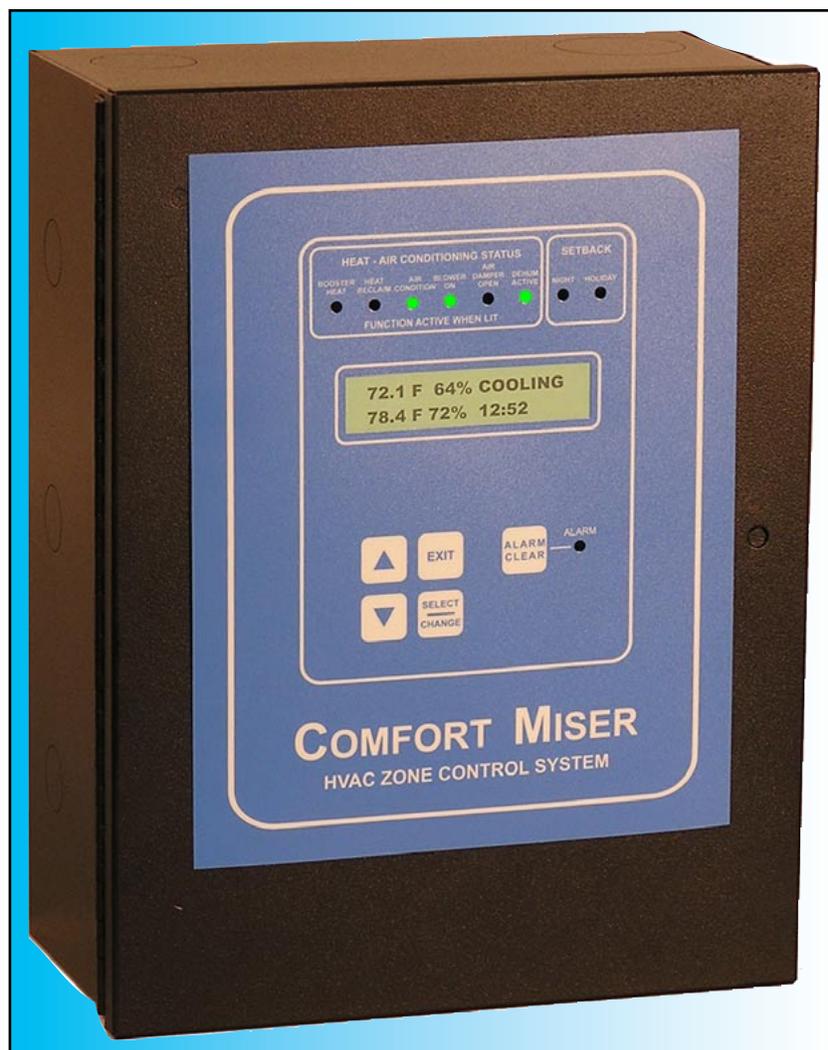


# COMFORT-MISER

## HVAC Control System

### With Variable Speed Drive



**SINGLE ZONE AIR HANDLER WITH  
TEMPERATURE & HUMIDITY CONTROL  
(CM1-12-VSD)**

**The Comfort-Miser HVAC Control System With VSD Outputs (CM1-12-VSD)** is an all electronic control that can control the entire operation of a single zone air handler with multiple stages of air condition, booster heat, heat reclaim, and fan blower, when available. The Comfort-Miser can control an air damper, auxiliary heater, and the anti-sweat heaters in refrigerated display cases. It can also monitor the outside air temperature and humidity.

**Temperature Control.** The primary function of the CM1-12-VSD is to maintain the temperature in each of its assigned areas. The Comfort-Miser can control up to six A/C stages, four heat reclaim stages and six booster heat stages.

**Heating Mode/Cooling Mode.** The CM1-12-VSD operates in two separate modes, heating mode and cooling mode. A heating mode setpoint and a cooling mode setpoint is programmed into the control. The temperature must exceed the setpoint of the non-active mode for over 30 minutes before the system will switch modes.

**A/C and Heat Staging.** Each stage has a common cut in and cut out temperature setpoint and a minimum runtime setpoint. CM1-12-VSD has an adjustable temperature deadband between the cooling and heating modes and a 30 minute changeover time delay. Every stage is offset from each other by 0.4° F.

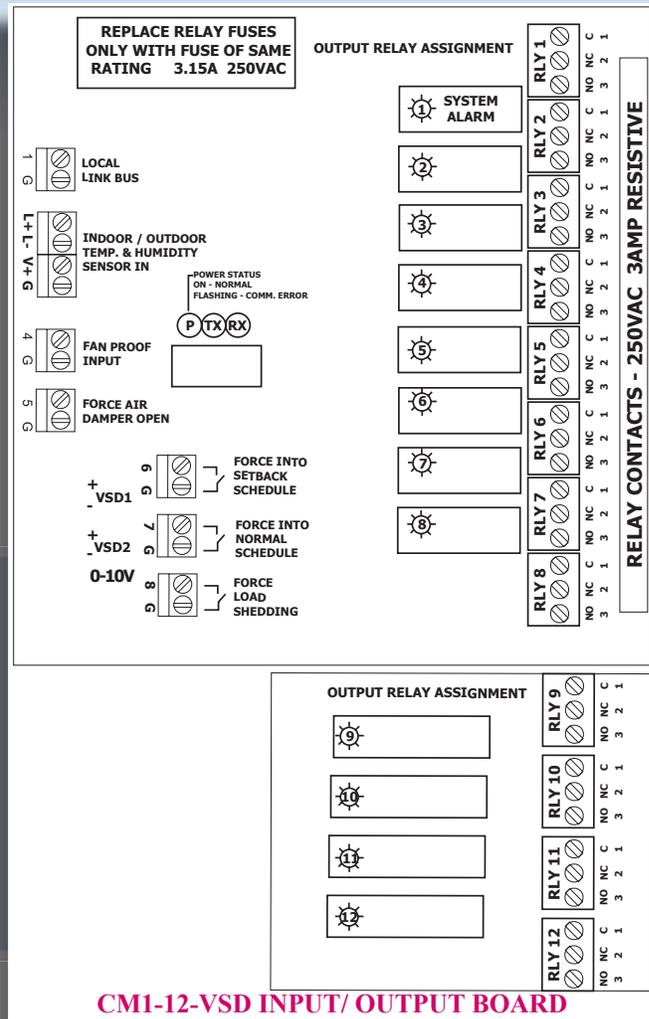
**Fan Control.** The air handler first stage fan can be activated as needed or be on continuously. The second stage fan can be activated by certain A/C or booster heat stages set by the user.

**Fan Proofing.** A digital dry contact signal sail switch can be installed in the return air duct and monitored to indicate if the fan is operating.

**De-Humidification.** The CM1-12-VSD Utilizes Air-Conditioning to remove moisture from the air. The control operates the de-humidification process in both the heating and cooling mode. The control will remain in the de-humidification mode until the indoor humidity drops 3% below the de-humidification setpoint.

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

**Load Shedding.** During periods of peak energy demand, the Control can be placed into a load shedding mode. When this input reads a closed signal from an energy management system, the control will enter the load shedding mode. The



control will raise the cooling mode temperature setpoint by the load shedding differential value and will lower the heating mode temperature setpoint by the same differential value.

**Economiser Air Damper.** (Available when the outdoor temperature and humidity sensor is enabled) In cooling mode, a two position air damper can be activated to open 100% when the outside air temperature is below 65° F. and the outside RH is less than 45%.

**Booster Heat Lockout.** (Available when the outdoor temperature and humidity sensor is enabled) Each booster heat stage has a programmable lockout temperature setpoint. The booster heat will not be activated when the outdoor temperature is above this setpoint.

**System Status Indication Panel.** Each CM1-12-VSD has an LED status board on the front panel of the control housing. This panel will indicate the run status of each stage, the fan status, setback, alarm status and de-humidification.

**Auxiliary Heaters.** (Available when the outdoor temperature and humidity sensor is enabled) 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.

**Anti-Sweat Heater.** The CM1-12-VSD can activate the anti-sweat heaters mounted in the refrigerated display cases within their assigned HVAC zone. Anti-Sweat heaters are designed to prevent condensation from gathering on the glass doors and case frames by heating the surfaces to temperatures above the dew point.

### TEMPERATURE CONTROL

The CM1-12-VSD will maintain the temperature of the concerned areas. There are two modes of operation, cooling and heating. The control monitors the temperature constantly and turns on/off the appropriate heating/cooling sources. The Figure below shows the heating setpoint and cooling setpoint. These setpoints can be adjusted in the software. There are up to six relays assignable to A/C (air conditioning) stagings, up to four relays assignable to heat reclaim stagings and up to six relays assignable to booster heat stagings. The CUT-IN to CUT-OUT span for the stage is settable by the user. When a stage is turned on, it will remain on at least the STAGING MINIMUM ON time that is also settable by the user.

The control monitors the temperature constantly and will switch between the heating mode and the cooling mode automatically. The change-over time is about 30 minutes.

**VSD Control Output.** 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 the system need. The relays will cycle on and off as part of the entire system.

**Temperature & Humidity Sensors.** There are two types of sensors available. The HVAC **Indoor Temperature and Humidity Sensor** is standard and comes with every CM1-12-VSD and the HVAC **Outdoor Temperature and Humidity Sensor**. These sensors consist of a microprocessor based control module that reads the temperature and humidity with an internal sensor and transmits the information to the HVAC control via a 4 wire communications link. The sensor is powered by 12V DC supplied by the control, and is mountable up to 250 feet from the controller.



**INDOOR TEMPERATURE & HUMIDITY SENSOR**



**OUTDOOR TEMPERATURE & HUMIDITY SENSOR**

### Sensor Specifications

#### Calibration

The humidity sensor is calibrated at the controller. The temperature sensor is accurate to  $\pm 0.5^{\circ}\text{F}$ .

#### Sensor Operating Range

*Temperature*  
*Humidity*

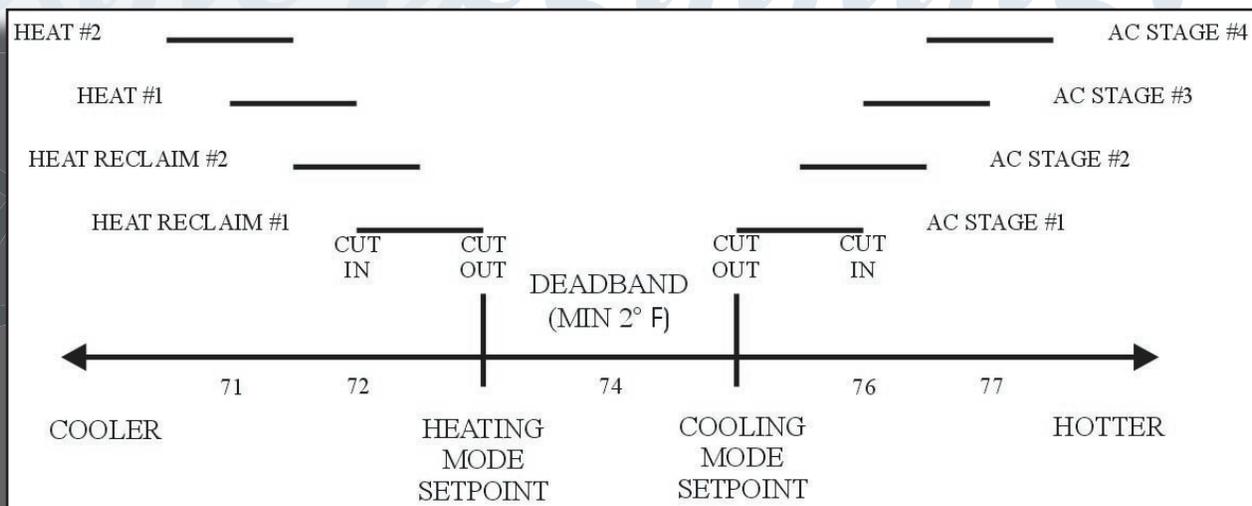
-40°F to 150°F  
-40°F to 150°F,  
0 to 100% RH (non-condensing)

#### Sensor Inputs

Remote Sensors are 4-wire terminated inputs. One pair for the RS-485 Communication one pair for V+ & GND (+12V DC, 500ma)

The Temperature & Humidity Sensor comes with a 4 input plug for V+, Ground, Digital Input, and Digital Output. All temperatures are transmitted on the Local Communications Bus from the Sensor module to the control. This method assures accuracy and noise isolation. The indoor sensor is mounted in a NEMA1 Housing. The outdoor sensor is mounted in a NEMA 3R Semi-Rigid Polypropylene 4X4 box with a filtered inlet.

**Fan Proofing Sail Switch** (Not Pictured) The Fan Proofing Sail Switch is a duct-mountable, SPDT snap acting sail switch that provides a make on fan on and break on fan off dry contact digital signal.



**HARDWARE SPECIFICATIONS:**  
**CONTROL SYSTEM**

**Control**

Microprocessor based program logic stored within non-volatile flash EEPROM or OTP EPROM. Setpoints and system configuration stored within serial EEPROM. Minimum of 10 year storage life. leap year compatible until 2100 and is capacitor backed for a Minimum of 3 days.

**Keypad**

Front panel accessible with 5 tactile key switches. Key assignments--Up, Down, Exit, Menu, Select, and alarm clear. Display 20x2 character LCD with back-light.

**Power Input**

95 - 240 VAC,  
 50/60 Hz, 40 VA

**Housing**

Metal Cabinet, NEMA 1  
 Optional ABS NEMA 4X  
 Optional Panel Mount

**Listings**

ETL, Conforms to  
 UL Std. 3111-1  
 Certified to CAN/CSA  
 C22.2 Std. No. 1010.1



**INPUTS**

**Sensor Modules**

Remote Sensors are 4-wire terminal inputs. One pair for the RS-485 Remote temperature and humidity signal and one pair for the V+ & Ground (+12VDC, 500mA). All temperatures are transmitted on the local communications bus from the sensor module to the control. This method assures accuracy and noise isolation.

**Digital Inputs**

All digital inputs are low voltage, open or close signal inputs. All digital signal sources are non-polarity specific.

**OUTPUTS**

**Control Relays**

All relay outputs are 1 form C SPDT rated for 250VAC and 3 Amp per circuit. Each relay circuit is fused with a 3 Amp slow blow fuse on the common leg. All contacts are protected by a RC snubber circuit. All relay action is indicated by an LED on the PC board next to the relay. Relays 1 and 2 can be used for VFD to override and run it as fixed in conjunction with VFD bypass input or just use as a fixed dry contact output.

**NEMA 1 Compliant Enclosure** - This enclosure is intended for indoor use only primarily to provide a degree of protection against contact with the enclosed equipment. The enclosure is not designed to provide protection from water or to be placed in a hazardous environment. Mount only in Pollution Level 2 environments, ie. environmentally controlled offices, control rooms, or environmentally controlled machine rooms.

**Dimensions** Inches (mm)  
 12.0 x 9.5 x 5.0 (305 x 241 x 127)

**NEMA 4X Compliant Enclosure** - This enclosure is intended for either indoor or outdoor use, 0 to 50 °C, to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water.

**Dimensions** Inches (mm)  
 12.3 x 15.0 x 8.2 (312 X 381 X 208)

**NEMA 1 Panel Mount Option** - The control and display assemblies must be suitably mounted in an enclosure. The Faceplate may be surface mounted onto a Nema 1 enclosure. The IO Board Assembly must be mounted within an enclosure providing at least Nema 1 protection.

**Dimensions** Inches (mm)  
 10.2 x 8.5 x 2.0 (259 x 216 x 51)      PM Faceplate  
 10.6 x 8.5 x 3.0 (269 x 216 x 76)      PM Backplate



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