

## Building Management Signal/0-10VDC or 4-20mA Signal Conditioner/Blower-Heat-Cool Relays (Modular)

### Description of Temperature Control

- Signal Conditioner for temperature control
- Conditioner accepts 0-10VDC or 4-20mA signal from BAS System
- Discharge Sensor Mounted in Blower
- All necessary safeties provided integral to the unit

### Applications

Where tempered make-up air is required for a building with a Building Automation System and the controller is provided by others.

### Heater Type

100% Outside Air Single Speed or Variable Air Volume (VAV) Unit

### Sequence of Operations

With the disconnect in ON position and contact closure from an external source to the BAS blower relay (RE-11), power is supplied to the damper motor (MT-02), if equipped.

When the damper motor approaches the OPEN position (approximately 70%), the damper-end switch (SW-03) closes energizing the blower motor starter contactor (ST-01) and powering the blower motor (MT-01).

*If the unit is equipped with the low-temperature limit control (TS-01), after ten minutes, the low-temperature limit control shuts down the unit if the discharge temperature does not reach the minimum set-point on the low-temperature limit control.*

*If the unit is equipped with a smoke detector (TS-07), the smoke detector will shut down the unit if smoke is detected.*

*If the unit is equipped with a clogged filter switch (PS-05), the pressure drop across the filters will be monitored.*

The low airflow switch (PS-01) and the high airflow switch (PS-02) must be proven. The intake air sensor (TS-03) will then either switch on the heating circuit or switch to the cooling interlock with the BAS cooling relay (RE-13). If the intake air sensor calls for heat, the BAS burner relay (RE-12) is energized from an external source and the high temperature limit switch (TS-02) is not activated, the Fireeye flame safety control (FSC-01) will monitor the flame via the flame rod (FR-01) and send a signal to the spark plug and pilot gas valve (VA-01).

(Note: the high temperature limit switch will monitor the air temperature and shut down the burner if the temperature set point is exceeded. The high temperature limit will require a manual reset.)

*If equipped with the modular packaged unit option, and the intake air sensor (TS-03) does not call for heat, the BAS cooling relay is energized, and the cooling thermostat (TS-06) calls for cooling, the compressors will be energized. The first stage of cooling will be factory set to activate at 85 °F and the second stage will activate if the ambient air temperature rises another 10 °F above the first stage of cooling.*

*If equipped, the optional low and high gas pressure switches (PS-03 & PS-04) will be energized. If the gas pressure is not between the set-points the burner will turn off and require a manual reset.*

*If an exhaust fan starter coil is tied into the exhaust fan interlock (RE-E), the exhaust fan will turn on.*

After the flame rod (FR-01) proves flame the main valve (VA-02) opens. If the flame rod does not prove after 3 ignition cycles, the burner will shut off.

The temperature control system's amplifier (MA-01) receives two signals; one from the discharge sensor (TS-05) and one from an external 0-10VDC or 4-20mA signal from the Building Automation System. The amplifier continually compares these signals and when heat is required the amplifier will send a DC voltage to the modulating valve (VA-03). As the DC voltage from the amplifier increases the modulating valve will open, allowing more gas to flow. By comparing the two signals the amplifier will maintain the discharge temperature by sending a signal to the modulating gas valve.

### Additional Sequence of Operation for VAV units

#### **VAV with Static Pressure Control**

The VFD is energized after the damper motor switch (SW-03).

The photohelic, used to monitor the indoor air pressure, sends a signal to the VFD proving that the indoor pressure is satisfied, positive, or negative. Based on this signal, the VFD alters the HZ to the blower. Depending on the signal from the photohelic, the VFD will do the following:

- If the space is satisfied, the VFD will maintain current operation
- If the space is negative, the VFD will ramp up to rebuild the pressure in the space
- If the space is positive, the VFD will modulate down to reduce the pressure in the space

#### **VAV with Manual Potentiometer**

The VFD is energized after the damper motor switch (SW-03).

The manual potentiometer alters the speed of the VFD by altering the HZ to the blower.

#### **VAV with Constant Speed Control or Analog Input Control**

The VFD is energized after the damper motor switch (SW-03).

The VFD can operate by either an analog input or preset speeds.

If analog input is required, an analog input signal is sent to the VFD by an external source, which will directly control the signal to the blower.

If preset speeds are required, an external switch can be used to manually adjust between programmed speeds in the VFD. The VFD will send a signal to the blower.