

# DUCT HEAT SUBZONED WITH THERMA-FUSER™ VAV DIFFUSERS

(Use duct heat with Therma-Fuser™ diffusers for perimeter areas and for upgrading constant volume reheat systems)

## GOALS

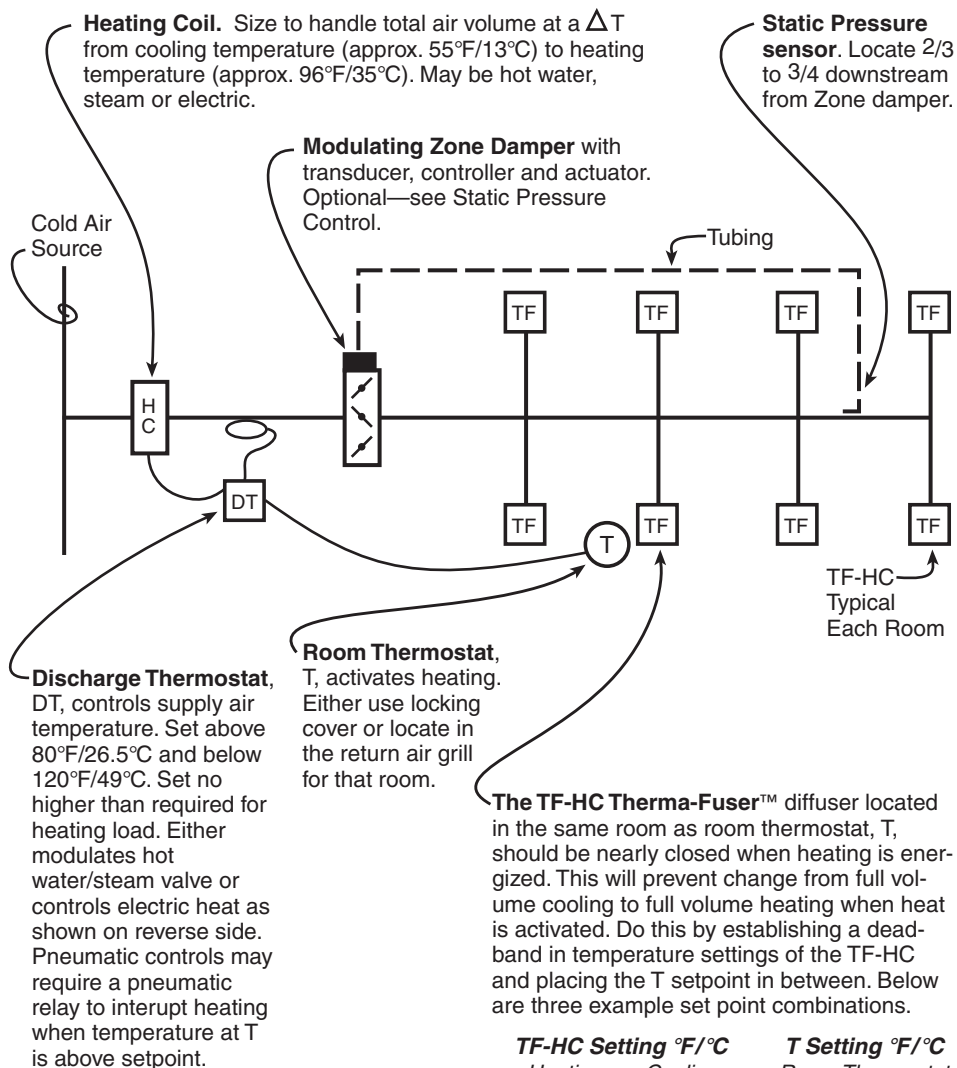
- 1) **Individual temperature control.** Each Therma-Fuser™ VAV diffuser is a zone of temperature control.
- 2) **Provide separate heating** for separate portions of a system. These may be perimeter areas which require heat when others such as interiors require cooling.
- 3) **Dramatic energy reduction** when upgrading a constant volume reheat system with Therma-Fuser™ VAV diffusers.
  - During the cooling season, VAV will reduce cool air flow. Heat will not be used to warm the cooled air to prevent overcooling.
  - During the heating season, VAV will reduce the volume of air to be heated.
  - In all seasons, VAV will reduce the fan energy required.
- 4) **Reuse existing ductwork.** Ductwork does not need to be changed when converting most constant volume reheat systems to Therma-Fuser VAV.

## SUPPLY AIR TEMPERATURE CONTROL

Note: BMS controls use sensors instead of thermostats. Control from BMS sensors located where thermostats are shown.

When the room temperature drops below the setpoint, room thermostat, T, signals that heating is needed. This activates control of the heating coil by the discharge thermostat, DT. The discharge thermostat maintains the supply air temperature at a selected level

(Continued)



## Notes

- 1) For systems with part fixed diffusers and part Therma-Fuser diffusers, control duct heat with a room thermostat located in one of the rooms with fixed diffusers. Preferably this is the room with the highest heating load.
- 2) Duct heat can be locked out when central heating is on. Central heating may be used during setback or warm up.
- 3) The Acutherm SMC can be used to control DX package units with duct heat. See Acutherm Form 40.4.
- 4) Hot water and steam coils with higher pressure drops require higher static pressures upstream. Pressure reducing stations (Acutherm PIM's) may be required when using Therma-Fuser diffusers on this higher pressure ductwork.



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## DUCT HEAT—continued

120°F/49°C. This sequence prevents excessive supply air temperatures and assures that the temperature is warm enough to complete changeover of the TF-HC Therma-Fuser diffusers to the heating mode.

### STATIC PRESSURE CONTROL

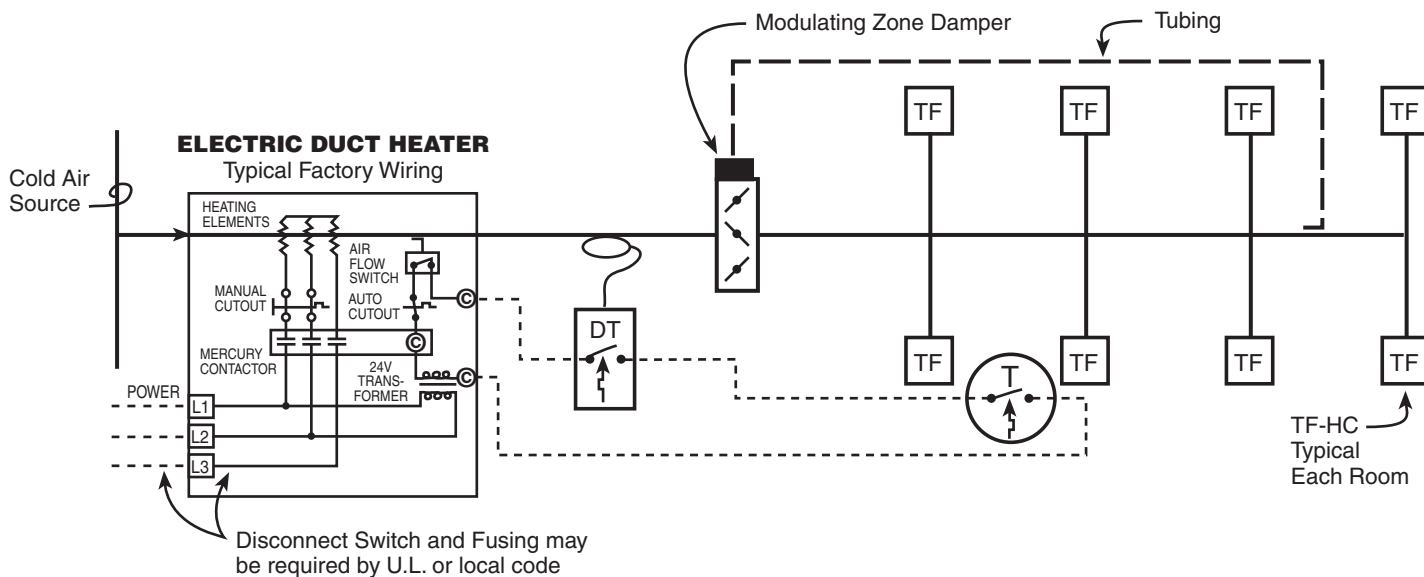
Static pressure control at the heating coil will be necessary if the cold

air source (AHU) does not have some form of static pressure control/pressure independence capable of maintaining a maximum of 0.25"wg / 62 Pa, such as fan speed control or a bypass. Static pressure control will also be necessary if ducts are not sized for a maximum pressure of 0.25"wg / 62 Pa at the first takeoff after the heating coil while providing sufficient static pressure at the last diffuser.

For static pressure control and pressure independence use one of:

- 1) Modulating zone damper as shown. Set static pressure for 0.20"wg/50 Pa or less. Can be Acutherm PIM module.
- 2) Ceiling plenum bypass with an R-Ring on each Therma-Fuser diffuser. Do not use with ducted returns.

### ADDITIONAL NOTES FOR ELECTRIC HEAT



- 1) Mount the bulb for the discharge thermostat so that it does not "see" radiant heat from the heaters.
- 2) Mercury contactors are preferred in electric duct heaters because they can fast cycle without welding, make less noise and are more dependable.
- 3) The air flow switch in most electric heaters measures the pressure differential between the sensor location and the air pressure in the ceiling space immediately surrounding the duct heater. If this pressure differential becomes too small, usually lower than 0.05"wg/12 Pa, the heating elements are disengaged and no heat is provided. To avoid disengagement of heating elements at low duct pressures it is desirable to locate the duct heater at a location at which duct static pressure will remain above the level needed to

keep the duct heater operational. Examples are upstream of a manual balancing damper, modulating zone damper or Acutherm PIM.

- 4) The standard on/off control cycles supply air temperature except when at maximum heat. For a constant supply air temperature modulate electric heat with an SCR and modulating discharge thermostat.
- 5) Control multistage electric heat with a discharge thermostat with multiple set points. Use lower temperature set points for additional heating stages.
- 6) The TF-HC Therma-Fuser diffusers may have minimum flow stops for minimum flow through the duct heater. Minimum flow stops also risk overcooling.



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