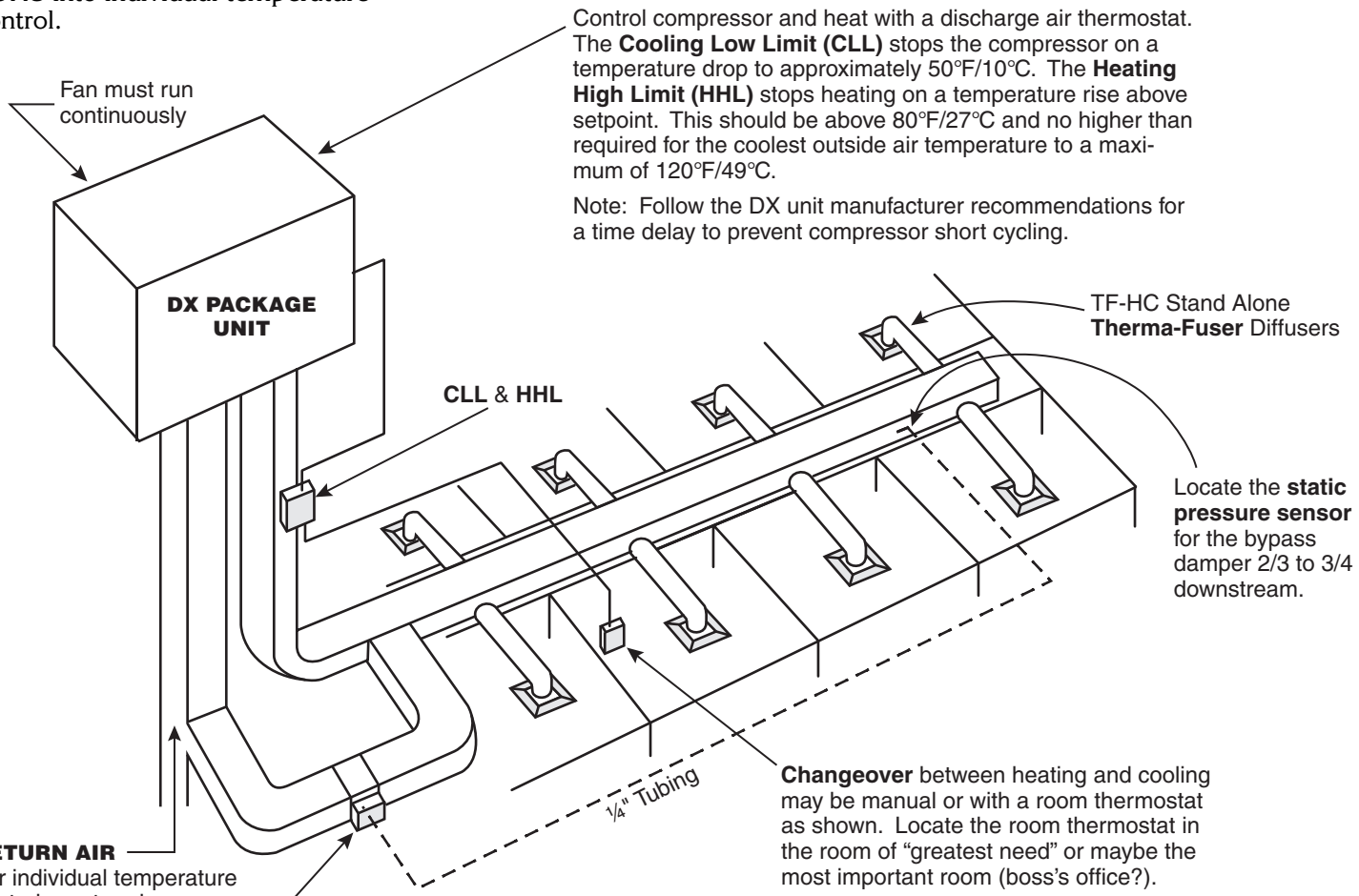
CONSTANT VOLUME DX UNITS INCLUDING HEAT PUMPS
ZONED WITH THERMA-FUSER™ VAV DIFFUSERS
(See note 8 for VAV DX Units)

GOALS

Individual temperature control is the principle goal of the Therma-Fuser™ VAV application in direct expansion (DX) cooling systems. Therma-Fuser diffusers can subzone SYSTEMS AS SMALL AS TWO TONS into individual temperature control.



Control compressor and heat with a discharge air thermostat. The **Cooling Low Limit (CLL)** stops the compressor on a temperature drop to approximately 50°F/10°C. The **Heating High Limit (HHL)** stops heating on a temperature rise above setpoint. This should be above 80°F/27°C and no higher than required for the coolest outside air temperature to a maximum of 120°F/49°C.

Note: Follow the DX unit manufacturer recommendations for a time delay to prevent compressor short cycling.

Changeover between heating and cooling may be manual or with a room thermostat as shown. Locate the room thermostat in the room of "greatest need" or maybe the most important room (boss's office?).

RETURN AIR
For individual temperature control, a return is required in each space with a TF-HC diffuser.

For **static pressure control** and pressure independence use one of:

1) Automatic bypass damper as shown. Set static pressure for .20"wg / 50 Pa or less. Can be Acutherm PIM™ module.
2) Ceiling plenum bypass with an R-Ring on each diffuser. Do not use with ducted returns.

CLL, HHL and changeover can be the Acutherm System Mode Control (SMC™) module.

See notes on next page.

acutherm™
The Individual Temperature Control People

NOTES:

1) **These systems can not heat and cool at the same time**. Where there are perimeter and interior portions of a building together or multiple exposures together, consider multiple DX units, separate perimeter heat or duct heat stations.

2) Control **multi-state DX units** the same as shown except use CLL and HHL with multiple setpoints. Use higher temperature CLL setpoints for additional cooling stages. Use lower temperature HHL setpoints for additional heating stages.

3) **Supply air** should not exceed a maximum of 120°F/49°C. Lower temperatures are preferred to keep stratification low. If the HHL setpoint is unknown, try 90°F/32°C.

4) For **duct sizing** see chapter 7 of *Designing Modular VAV Systems* (Form 5.2).

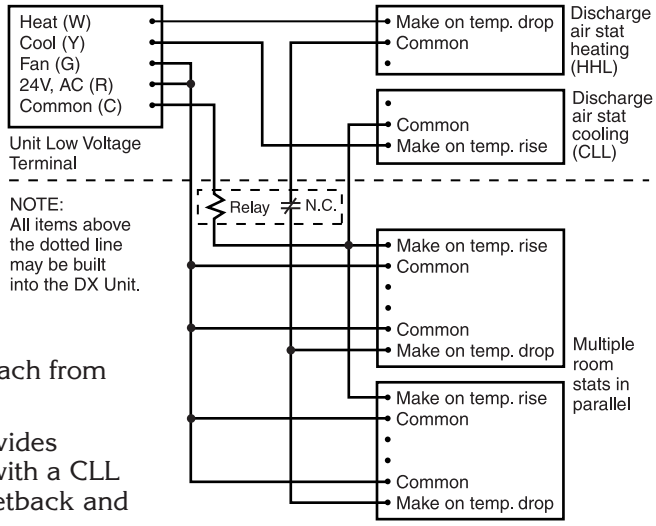
5) **Do not oversize** (or undersize) **the DX unit**. If loads are unknown, consider 1 TR (12,000 BTU/HR or 3,500 watts) for each 400 to 450 ft^2 / 37 to 42 m^2 of floor area.

6) **Multiple changeover thermostats:**

A) **Two or more thermostats connected in parallel** address changeover where a single room with the "greatest need" can not be identified or it changes. Activating both heating and cooling at the same time is prevented by using a relay to make changeover selection "cooling dominant."

If temperature at a room thermostat drops to its heating setpoint, heating will operate unless one or more room thermostats call for cooling.

Use Therma-Fuser diffusers in the rooms with thermostats. The room thermostats may be located in the return air opening of the specific room to put them out of reach from continual readjustment.



B) **The Acutherm System Mode Control (SMC™) module** provides multiple changeover thermostats for mode selection along with a CLL and HHL. It also has a 24 hour seven day clock to control setback and warm-up.

7) **Control systems with part fixed diffusers** and part Therma-Fuser diffusers the same as described on the first page except:

A) Control the compressor with a room thermostat in one of the rooms with the fixed diffusers. This should be the room with the "greatest need."

B) If the system does not turn down more than 30% of rated capacity, static pressure control is not necessary. The rule of thumb is static pressure control is not required if three or less of every ten diffusers are Therma-Fuser diffusers.

8) **VAV DX package units** have both built in fan control and built-in refrigerator capacity control (such as compressor speed, cylinder unloading, multiple compressors and hot gas bypass). Control VAV DX package units the same as described on the first page except:

A) Instead of the CLL, use a **modulating discharge thermostat** (may be built-in) to control refrigeration capacity.

B) Instead of a bypass, the **built-in fan control** may provide static pressure control and pressure independence if turndown is not limited as with some inlet vanes. Locate the static pressure sensor 2/3 to 3/4 downstream as shown.

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