Model RAD Bypass Dampers

The Relief Air Damper (RAD) is used to bypass excess air from the supply to the return of the AHU. The RAD is necessary on all systems to avoid excessive air noise as a result of increased static pressure. The RAD automatically adjusts to these changes and bypasses air so that the velocities maintained in the duct system remain constant.

Figure 2.9 RAD Bypass Damper

The RAD's construction is the same as the AVD zone damper. A static pressure sensor is equipped with indicator lights to indicate whether the damper is driving open or closed. Completely self contained, the bypass damper requires only 24VAC power. The damper actuator travels at the same speed as the AVD terminals and as a result the RAD tracks the static pressure at the same rate of change as is being imposed on the system by the opening and closing AVD's.

The RAD should be installed directly off the supply main on a straight piece of duct before any duct branches outlets. The static pressure sensor is located on the inlet of the RAD. If the RAD damper cannot be located in an acceptable location then the sensor tube can be removed and extended, to within 12 feet of the sensor, to a straight piece of duct where the turbulence is not apparent.

Selecting the RAD Bypass Damper

RAD dampers are selected to operate at a higher fpm range than the zone dampers and should be selected for an operating range of 2000–2500 fpm. Two methods are used to select the RAD depending on the system's size.

Small Systems (6 zones or less)

The size of the damper is based on the worst case scenario. The smallest zone's CFM is subtracted from the total CFM size of the AHU. If minimum damper positions are specified the sum total of these CFM's can also be subtracted from the total, although it should be noted that if anytime in the future the minimum position are reduced the resulting increase in air will mean the bypass damper is undersized.

Systems with 7 or more zones

Depending on the size of the system more than 1 RAD may be required. For larger systems an arbitrary factor of 0.75 *X* the total AHU CFM can be used to determine the total bypass air requirements.

Table 2-2 is used to select the correct bypass damper given from the calculated velocity and total CFM to be bypassed.

Table 2.2 RAD Capacities

	RAD Selection			
Velocity (fpm)	**800**	**1100**	**1500**	**2000**
Model & Size (in.)	**CFM**			
RAD-6″	285			
RAD-8″	525			
RAD-10″	817	1090		
RAD-12″	1180	1572	2670	
RAD-16″	2095	2790	3490	4180

Note: Maximum recommended velocity is 3000 fpm
pd - Pressure drop in inches of water gauge

0.35" w.g. pd

Adjusting the Bypass Damper

Before the bypass damper can be adjusted all of the zone dampers must be driven to the full open position. This is done by enabling the air balance mode, dip switch #8, located on the master control panel. Once all of the zone dampers have driven fully open and the bypass damper is closed, the bypass damper can be adjusted to “just” remain closed at that reference static pressure. This is accomplished by turning the set screw counter clockwise to the point where the LED indicator turns green, then backing off just to the point the LED returns to red. The set screw should be left so that after a period of time the bypass damper remains in the fully closed position. If the LED indicators flicker back and forth between open and closed this is fine provided the damper remains closed. If more than one bypass damper exists on a system then the remaining dampers are adjusted in a similar fashion. To check RAD operation, close the smallest zone and ensure the damper senses the relative increase in static pressure and begins to open to maintain a constant static pressure.