

# THERMAL PRODUCTS CORPORATION

## VARI-FLOW CEILING DIFFUSER VFS-24 SERIES BALANCING MANUAL

### VAV Cooling & Constant Volume Heat

#### Introduction

Balancing a system using VAV diffusers is in theory unnecessary as the damper in the diffuser will adjust the volume of air discharging to maintain a constant temperature. This essentially makes the system self-balancing. This does not mean that a balancer is not needed. The purpose for balancing changes when using VAV diffusers vs. constant volume diffusers. Balancing an air distribution system adjusts the volume of air at each outlet to that which is specified by the mechanical engineer. This process has the following two purposes:

- ?? The first purpose is to certify that the mechanical equipment and air distribution system is physically capable of delivering the rate or specified volume of air to the conditioned space under the specified pressure and noise criteria.
- ?? The second purpose is to indirectly adjust the temperature within a control zone by adjusting the air volume at the outlet relative to the other outlets on that zone of control.

The first purpose for balancing (cited above) is the only reason that balancing is required on a system using VAV diffusers. There are two different models of the VFS Series diffusers, the "C" models which are VAV cooling only and the "H" models which are VAV cooling and constant volume heating. The balancing procedure for the "C" models is different from the "H" models. It is **important** to know what model diffusers are used to know which procedure to follow.

#### ?? Procedure for Balancing "H" Diffusers (Constant Volume Heat)

The supply air temperature will determine the operating mode of the diffuser. The modes of operation are, VAV for cooling (supply air temperatures below 70 degrees F.) and constant volume for heating (supply air temperatures above 80 degrees F.). It is important to know what mode the diffuser is in before attempting to balance or adjust the temperature from the diffuser because the adjustments will be disengaged when the diffuser is not in its respective operating modes. The constant volume heating adjustment will have no apparent effect on the damper position when the unit is in the VAV cooling mode but changing the setting will affect the damper position when the diffuser changes over to heating. The same is true for adjusting the

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VAV cooling temperature when the diffuser is in the heating mode. A thermal element mounted in the neck of the diffuser senses the temperature of the supply air and automatically changes the mode of operation of the diffuser. Knowing the operating mode of the diffuser is as easy as knowing the supply air temperature.

The balancing procedure for the VFS "H" model diffusers in the heating mode of operation is the same as a standard constant volume diffuser with a manually adjustable damper. This is due to the fact that the VFS model "H" diffuser becomes a constant volume diffuser with a manually adjustable damper during change over. The damper will return to the constant volume damper position that has been set during the balancing procedure for heating each time heating change over occurs (supply air temperatures over 80 degrees F.)

- o Required Tools
  - 9/64" set screw wrench
  - 1/16" set screw wrench
  - Balancing pin (1/8" dia. x 2 1/8" rod)

## Steps

1. Set the temperature on the primary temperature control so that the supply air temperature is 65 degrees F. or less. The room temperature should be less than 75 degrees F. The temperature is not important until *Step #10* (adjusting the minimum set point). If a minimum air volume is not specified or required, the room temperature is not important for the purpose of balancing.
2. Open and remove the appearance panel cover.
3. Open the adjustment access cover by rotating it to expose the adjustment set screw.
4. Remove the MINIMUM SET POINT adjustment set screw with the 9 - 16"" set screw wrench. Store the set screw where it can easily be found for re-installation.
5. Insert the balancing pin (1/8" dia. X 2 1/8" rod) into the MINIMUM SET POINT adjustment hole. As the balancing pin is inserted, note that the damper is opened to the full open position. Rotate the adjustment access cover to the closed position over the balancing pin. The adjustment access cover will hold the balancing pin in place with the damper in the full open position.
6. Repeat *Steps 1-8* for all diffusers in the control zone.
7. Measure the discharge volume with a flow hood and adjust the balancing dampers to the specified air volume.
8. Remove the balancing pin.
9. Re-install the MINIMUM SET POINT set screw. If a minimum air volume is specified, proceed to *Step #10*.

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10. The damper should be in the full closed position before the minimum set point can be set properly. Check the damper position by visual inspection or feel. If the damper is not closed, adjust the VAV cooling adjustment to a higher temperature to close the damper. Adjust the minimum set point adjustment screw to open the damper. Check the volume with a flow hood. Adjust the specified minimum volume.
11. Adjust the VAV cooling temperature set point. (See the instruction label on the diffuser.)
12. *Repeat Steps 7 - 11* for all diffusers in the control zone.

The following covers *Constant Volume Heating Adjustment*

13. Adjust the system controls to heat to provide hot supply air. The supply air temperature should be greater than 80 degrees F. for at least 15 minutes prior to adjusting the constant volume heating adjustment. This will insure complete change over from VAV cooling to constant volume heating. Once the diffuser has changed over to constant volume heating, the diffuser will act as a standard constant volume ceiling diffuser with a manually adjustable damper.
14. Determine the specified heating volume. Measure the volume of air discharged from the diffuser with a flow hood. Adjust the volume with the constant volume heating adjustment set screw to the specified volume. (See the instruction label on the diffuser.)
15. *Repeat Step 14* for all diffusers in the control zone.
16. Close the adjustment access cover.
17. Replace and close the appearance panel on the diffuser.

**NOTE:** **VFS "C"** units are factory set for VAV cooling at approximately 70 degrees F.

**VFS "H"** units are shipped from the factory with the damper set in a fully closed position for the heating mode.

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