

THERMA-FUSER™

THERMALLY POWERED VAV DIFFUSER



MODULAR VAV SYSTEMS

BYPASS R-RINGS

Models: **ST-HC** **TF-HC** **TB-CW**
ST-C **TF-CW** **TB-C**
TF-C

Bypass R-Rings are used to bypass supply air into the ceiling plenum when Therma-Fuser VAV diffusers turn down. The purpose of the bypass is to limit diffuser noise by limiting inlet static pressure. A Therma-Fuser diffuser with a bypass R-Ring has a constant volume air flow to it and, therefore, also over the balancing damper. This results in a constant pressure drop over the balancing damper which, in turn, limits the static pressure at the diffuser at both full flow and turn down.

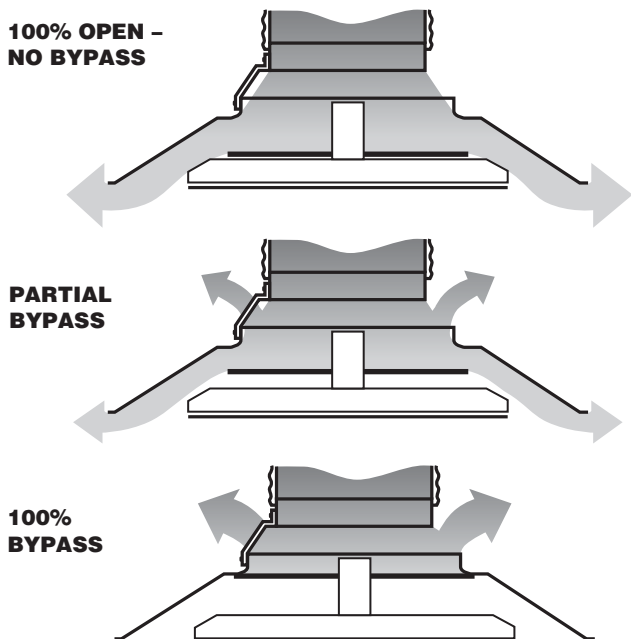
Because supply air is bypassed into the ceiling plenum, R-Rings can not be used with a ducted return. They also require a four way blow pattern as three, two or one way patterns upset the bypass.

R-Rings are available in three nominal inlet sizes of 6 in./150mm, 8 in./200 mm and 10 in./250mm. There is no 12 in./300mm inlet R-Ring.

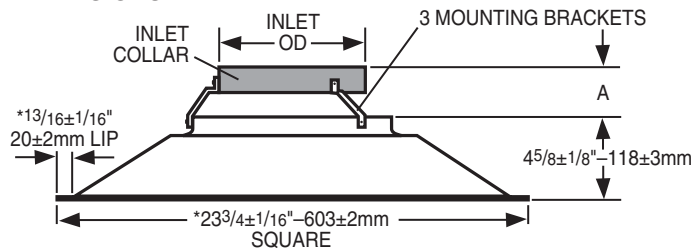
HOW THEY WORK

Therma-Fuser diffusers can be factory or field fitted with an R-Ring which is a smaller inlet collar mounted above the original diffuser neck. The supply duct is connected to the smaller inlet collar. The open space between the inlet collar and the original neck is used to bypass air into the ceiling plenum when the Therma-Fuser diffuser closes.

With the Therma-Fuser diffuser open at the zero bypass point, the geometry is such that the rated amount of air flows into the room and no air is bypassed. As the Therma-Fuser diffuser closes, less air enters the room and more air is bypassed. With the Therma-Fuser diffuser fully closed, except for normal leakage all air is bypassed into the ceiling plenum.



DIMENSIONS



*595±2mm Square with 16±2mm lip available
 —specify 595mm square.

SIZE	INLET OD	A
R6	57/8 in. / 150 mm	3 in. / 76 mm
R8	77/8 in. / 200 mm	3 1/8 in. / 79 mm
R10	97/8 in. / 250 mm	3 1/4 in. / 82 mm

APPLICATION AND INSTALLATION

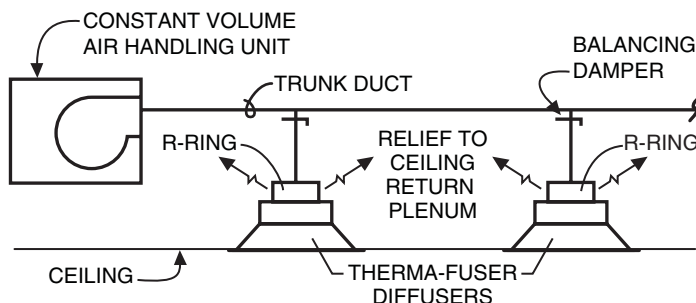
Select R-Rings using the standard performance guide for the appropriate model. Use the same inlet size as the R-Ring inlet. The geometry of the Acutherm R-Ring is designed for the same air volumes at the same static pressure shown in the performance guide. When R-Rings are used, throws may be as low as 90% of the throw shown in the performance guide and NC may be 2db higher. Inlet height also increases by 3 in./76mm to 3 1/4 in./82mm.

Only use R-Rings with ceiling plenum returns. Do not use them with ducted returns. Use only four way blow patterns. Do not use three, two or one way blow patterns.

Proper return air design is important to achieve a negative plenum pressure relative to the room. Otherwise the radiant effect of the ceiling and leakage through the ceiling could result in poor control of the room temperature.

Install the duct no lower than the shoulder on the R-Ring bracket. Do not install the duct below the bottom of the inlet collar.

A manual balancing damper should be installed at the takeoff for each Therma-Fuser diffuser. Use this balancing damper to adjust for design air flow from the Therma-Fuser diffuser. See *System Balancing*.

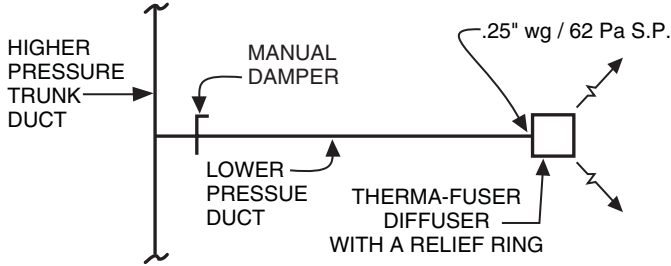


R-RINGS ON HIGHER PRESSURE TRUNK DUCT

R-Rings can be used when there is a need to supply air to Therma-Fuser diffusers from a medium pressure duct system, and the use of a modulating zone damper is not justified because of cost or other reasons. (For more on static pressure control, see *Forms 5.2* and *6.3*.)

Therma-Fuser diffusers with relief rings receive a constant volume of air from the higher pressure duct. The Therma-Fuser diffusers supply air to the conditioned space and/or relieve air through the R-Rings. This is a pressure dependent system. If pressure in the higher pressure duct changes, flow through the lower pressure duct will change.

Sound attenuation should be considered when taking pressure drops higher than 1 in. wg / 240 Pa. over the manual balancing damper to counteract both radiated and duct born noise.



SYSTEM BALANCING

VAV systems are balanced for design air volume at maximum air flow and systems using Therma-Fuser VAV diffusers are no exception. When all the Therma-Fuser diffusers are set for maximum air flow by fully opening them, the system is really a constant air volume system and is balanced as a constant volume system. Balancing dampers are best located at the takeoff before the runout to the Therma-Fuser diffuser.

1. Prepare system for balancing. Make necessary checks for diversity, fan capacities, fan rotation, minimum outside air requirements and duct leaks. Set outside air control damper for minimum air and return air control damper for maximum air.

2. Open Therma-Fuser diffusers.

A. Models ST-HC and ST-C

Note: When field fitting R-Rings to ST diffusers, the maximum flow stops must be changed before balancing. See instructions with the field installation kit.

Locate the side of the ST diffuser with the thermostat and the balancing lever. Push the balancing lever to the right and up.

B. Models TF-HC, TF-CW and TFC

Open the appearance panel. Do not disconnect the spring. Use temporary balancing stops made of wood supplied with the diffuser to hold the blades open the proper distance for balancing. Thickness of the stop

will depend on the size of the R-Ring used. See Table. Close the appearance panel.

Model R-Ring	R6	R8	R10
Nominal Duct Size	6in / 150mm	8in / 200mm	10in / 250mm
Stop Thickness—Correct Dimension For Blade Opening When Balancing	3/8in / 9.5mm	5/8in / 16mm	7/8in / 22mm

C. Models TB-C and TB-CW

Note: When field fitting R-Rings to TB diffusers, a spacer must be added above the existing maximum flow stop before balancing. See instructions with the field installation kit.

The TB-C and TB-CW model Therma-Fuser diffuser is kept fully open by holding down the control arm and allowing the diffusion disc to drop down against the stop. The easiest way of holding down the control arm is to insert either a 4" nail, a rod, some heavy wire, a screwdriver, or even a lollipop stick through the matching holes in the control arm and channel. See *Form 11.1*.

3. Start fans, adjust system for 100% air flow and make system checks. (Measure static pressure across filters and coils and at sensor for static pressure controller. Measure supply, return and branch duct air flow.)
4. Measure air flow from each Therma-Fuser diffuser and adjust the damper at the duct takeoff to obtain maximum design air flow. Air flow measurement may be with a direct reading diffuser balancing hood or air velocity meter. In either case, static pressure is measured with all appearance panels in place. This is because the appearance panel affects pressure drop through the diffuser. When a velocity meter is used to measure the discharge velocity, the velocity is measured at the top edge of the housing.

A_k factors when the Therma-Fuser diffuser is open are as follows:

R-RING	A_k ft ²		
	ST-HC, ST-C	TF-HC, TF-CW, TF-C	TB-CW, TB-C
R6	0.12	0.14	0.12
R8	0.21	0.22	0.21
R10	0.28	0.28	0.28

5. Return Therma-Fuser diffusers to operating condition.

A. Model ST-HC and ST-C

Pull the balancing lever down until it latches.

B. Model TF-HC, TF-CW and TF-C

Open the appearance panel, remove the balancing stops and close the appearance panel.

C. Model TB-CW and TB-C

Remove whatever is used to hold down the control arm (inserted in step 2) and close the appearance panel.

6. Return the remainder of the system to operating condition.



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