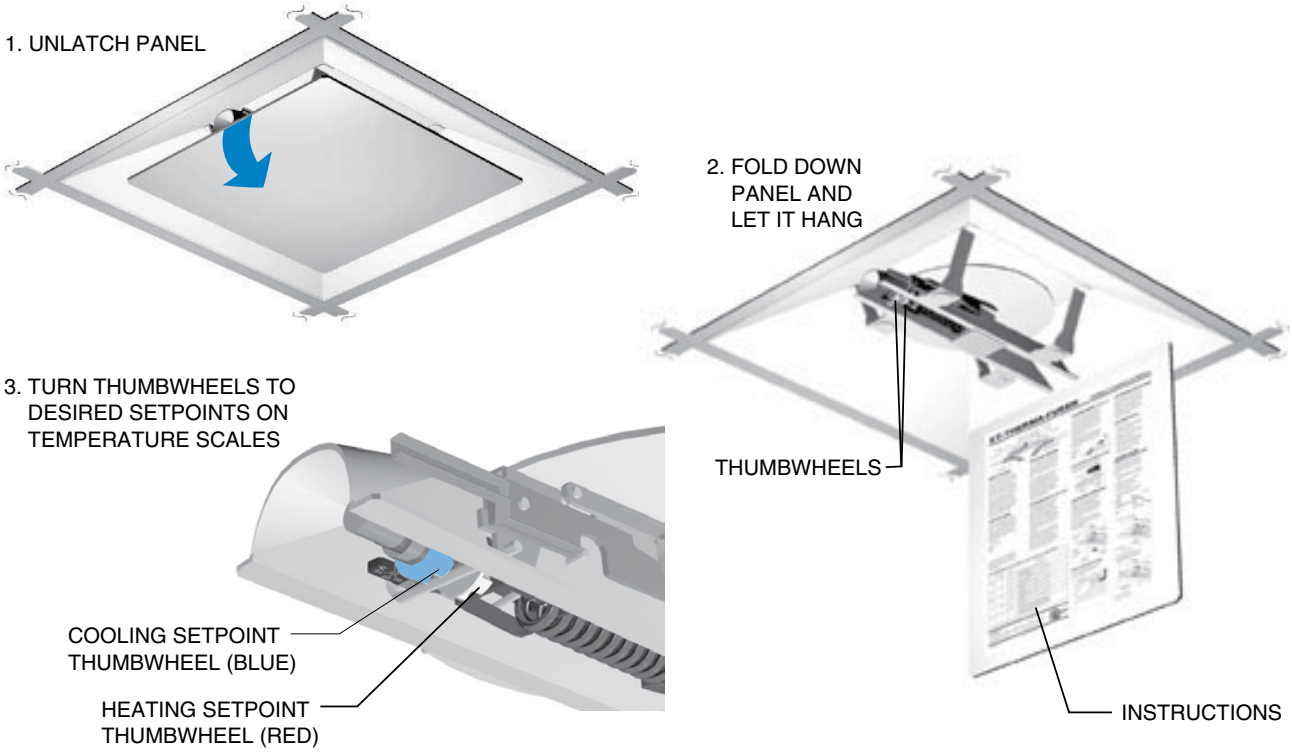
Therma-Fuser

Product Code	Face Size Metric	Inlet Designation Imperial	Price
16040	595 x 595	6	
16041	595 x 595	8	
16042	595 x 595	10	
16043	595 x 595	12	

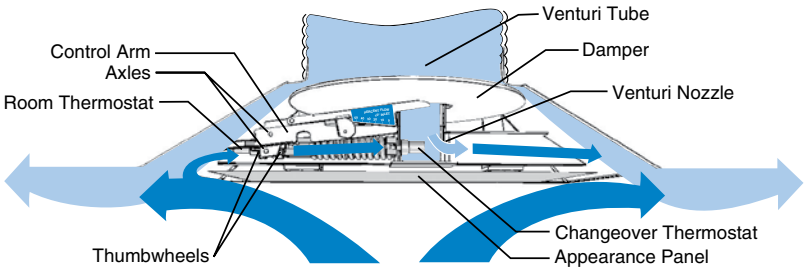
Grilles are white.
Therma-Fuser is thermal vav diffuser with full modulation on both heating and cooling.

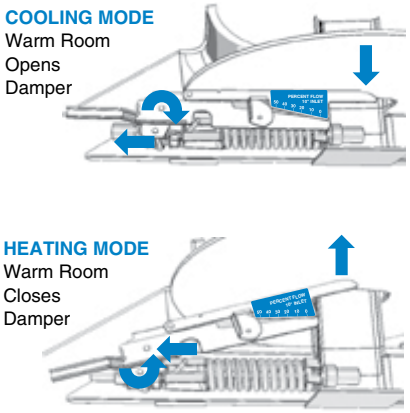


Individual Comfort Selection and Control
Every Therma-Fuser™ module is a VAV zone of temperature control providing pleasing comfort in both heating and cooling. The built in thermostat senses average room air temperature from a sample of air induced into the unit. It controls air flow to precisely match the comfort requirements of the room or portion of the room served. Occupants breathe easier knowing that their personal temperature choice will not be changed by someone else.

Easy Low Cost Installation and Balancing
No special skills or equipment are required to install Therma-Fuser VAV—just connect the supply air duct. Expensive electrical or pneumatic connections and complicated controls are eliminated. Minimum flow stop changes are easily dialed in. Opens for balancing with one hand without opening the appearance panel. Maintenance and recalibration are eliminated, even over the long term, due to the dependability of the durable wax motor.
*ADPI (Air Diffusion Performance Index) is defined in the ASHRAE Fundamentals Handbook.

Only Therma-Fuser Vav Offers These Benefits
- Separate temperature set points for VAV heating and VAV cooling.
- Superior air distribution—longer throws, no dumping, more entrainment, even temperature distribution, higher ADPI* and better ventilation effectiveness.
- Lowest cost per zone of control.
- Lowest energy VAV terminal—green VAV.
- Low to no maintenance—10 year warranty.
- Easily adapts to office changes.





How It Works

Model ST Therma-Fuser modules are 24" x 24" ceiling diffusers with built in temperature controls and VAV damper. The round damper moves up to close and down to open, metering air flow (warm or cool) into the room in response to room temperature. The damper is mechanically positioned by a thermal element, which is both room thermostat and actuator.

The room thermostat/actuator is a large brass cylinder containing a petroleum based wax. The wax melts and expands when heated, pushing against a fixed piston which moves the thermostat outward. A heavy spring pulls the thermostat inward when the wax cools and contracts. Thumbwheels on the room thermostat push the two offset axles of the control arm to move the damper up or down.

Cooling Mode

In the cooling mode the damper opens on a rise in room temperature. As the room warms, the wax in the room thermostat melts and expands. This pushes the thermostat and cooling thumbwheel outward away from the lower axle of the control arm. The control arm then pivots down around the upper control axle, opening the damper allowing more supply air to enter the room. When the room cools, the wax contracts, the spring pulls the room thermostat inward and the cooling thumbwheel pushes the lower control axle inward. This pivots the control arm up closing the damper.

Room Air Sensing

As with all diffusers, air circulates around the room in a circular motion. Secondary air rises under the diffuser, passes beneath the appearance panel and entrains with the primary air at the outside edge of the diffuser. This secondary air best represents average room temperature. To monitor average room temperature, a continuous sample of secondary air is drawn around the appearance panel past the room thermostat and through the channel. This is accomplished by feeding primary air through a nozzle in the side of the venturi tube. Primary air blowing through the nozzle creates just enough vacuum to draw some secondary air around the appearance panel, over the thermostat and out the other side.

Changeover (St-Hc Only)

Changeover between the cooling and heating modes is determined by supply air temperature. A second large thermostat/actuator located at the bottom of the venturi tube senses supply air temperature. Warming the changeover thermostat changes the ST-HC to the heating mode by indexing the room thermostat outward. As a result both thumbwheels are indexed outward. This moves the cooling thumbwheel away from the control axles while the heating thumbwheel is moved toward the control axles.

Changeover from cooling to heating begins at supply air temperature 76°F/24.5°C and completes at 80°F/26.5°C. Change back to cooling begins at 72°F/22°C and completes at68°F/20°C. During changeover the damper is closed or at minimum flow. The changeover control rod moves under the control arm, first closing the damper and then opening it.

Heating Mode (St-Hc Only)

In the heating mode, the damper opens on a drop in room temperature. As the room cools, the wax in the room thermostat contracts and the spring pulls the room thermostat inward. This pushes the heating thumbwheel inward away from the upper control axle. The control arm then pivots down around the lower control axle, opening the damper allowing more supply air into the room. When the room warms, the wax expands, the room thermostat moves outward and the heating thumbwheel pushes the upper control axle outward. This pivots the control arm up closing the damper.

Options

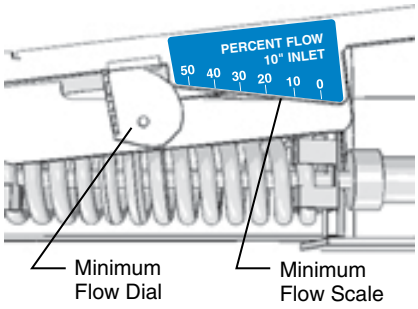
1. The ST Therma-Fuser module is available in two models:
   ST-HC – VAV Heating and VAV Cooling
   ST-C – VAV Cooling only
2. Frames are available for most ceiling types.
3. Other Therma-Fuser modules are available in 1x1/300mm sq. sizes and for linear applications.
4. Manually adjustable and return air units are also available in all sizes.
5. Interoperable VAV diffusers for DDC networks.

Performance Guide

Nominal Inlet Diameter	Inlet Static Pressure In. wg	Maximum Flow cfm	Maximum Flow		Maximum Flow	
			Throw - Feet* @vt=50/100/150FPM	NC	Throw - Feet* @vt=50/100/150FPM	NC
6”	.05	105	3/1/<1	<15	1/<1/<1	<15
	.10	150	4/2/1	17	2/<1/<1	<15
	• .11	150	4/2/1	17	2/<1/<1	<15
	.15	180	5/3/1	25	3/1/<1	<15
	.20	210	6/4/2	29	4/1/1	<15
	.25	240	7/5/3	32	4/2/1.5	21
8”	.05	165	5/2/1	<15	2/1/<1	<15
	.10	235	7/3/2	18	3/1/<1	<15
	• .13	260	7/4/2	25	3/1/<1	15
	.15	285	8/4/3	25	4/1/1	17
	.20	330	9/5/3	30	4/2/1	20
	.25	380	9/6/4	34	5/3/2	25
10”	.05	255	6/3/1.5	<15	3/1/<1	<15
	.10	360	8/5/2	23	3/1/<1	<15
	• .13	410	8/5/3	26	4/1/1	15
	.15	440	9/6/4	28	4/1.5/1	17
	.20	510	10/7/5	32	5/2.5/2	22
	.25	570	11/8/6	36	6/4/3	26
12”	.05	335	8/6/2	<15	4/1/<1	<15
	.10	470	10/7/4	25	5/2/1	<15
	• .15	580	11/8/5	31	6/2/1	21
	.20	670	12/10/7	35	7/3/1.5	27
	.25	740	13/11/9	38	8/4.5/1.5	31

• Denotes 750 fpm / 3.81 m/sec. inlet velocity.
NC based on Lw(10-12 watts reference)–10db
* Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.
Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.
Metric performance guide available on request. Patents Pending.

1



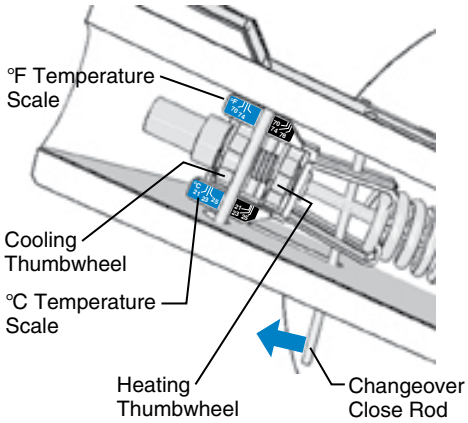
1. Adjusting Minimum Flow

Turn dial until the desired minimum flow on the scale intersects with the lower metal piece.

2. Adjusting Setpoints

Heating and cooling setpoints are separately adjusted by turning the heating and cooling thumbwheels. Align the outside of each thumbwheel with its respective temperature scale. Each setpoint can be anywhere between 70° and 78°F/21° and 26°C. Both are factory set at 74°F/23°C. (The model ST-C has only one thumbwheel). If the cooling thumbwheel is tight when the room is cool, continue to turn the thumbwheel and pull the changeover close rod outward to relieve the tightness.

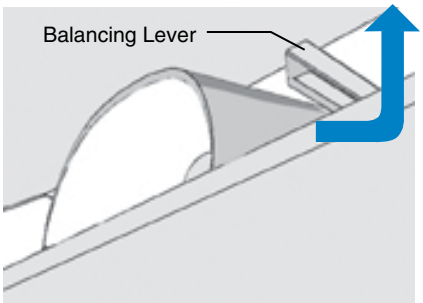
2



3. Open For Balancing

To open, push the balancing lever to the right and up. To close, push the balancing lever down until it latches.

3



Individual Temperature Control
Each Therma-Fuser module is a VAV zone. The thermostats, actuator and damper are built into the diffuser. Temperature set points for both heating and cooling are separately adjusted between 70°F/21°C and 78°F/26°C. It easily zones open offices. Thumbwheel thermostat adjustments are right above the hinge down appearance panel. They are easily accessed but concealed and out of casual reach for tampering by others.

Superior Air Distribution
Unlike the fixed opening diffusers used with VAV boxes, Therma-Fuser modules vary the discharge opening as they vary air volume. The result is a constant discharge velocity with comfort benefits of higher throws, no dumping, better room air movement and uniform temperature distribution—especially when turned down. For IAQ considerations, simply dial in minimum flow adjustment from 5 cfm / 2.4L/s to 50% of design air volume. Module closes during changeover to eliminate any control uncertainty.

Better Senses Average Room Temperature
Unlike wall thermostats, Therma-Fuser thermostats are never in the wrong location. They maintain average temperature within 1½°F/0.9°C of set point by sensing secondary space air at all times. Secondary air is the return air of the space—the best place to sense the average room temperature. Positive induction of secondary air over the thermostat at all supply air flows from full open to full closed assures good sensing.

Lowest Cost Per Zone Of Control
A single trade can install Therma-Fuser VAV because it is self contained. When comparing total installed cost—including labor—systems with Therma-Fuser VAV are clearly the lowest cost of any VAV alternative because Therma-Fuser diffusers do not require wiring and are more easily installed. Opens for balancing with one hand—no need to remove the appearance panel. Accepts fire dampers as nothing protrudes above the inlet.

Lowest Energy Vav Terminal
Therma-Fuser modules have the lowest pressure drop of any VAV terminal which allows low pressure systems and low energy fan motors. Fan energy is further reduced by a variable speed drive when the system turns down. It saves refrigeration and heating energy because no portion of the building is overcooled or overheated. No energy is required to operate the Therma-Fuser controls.

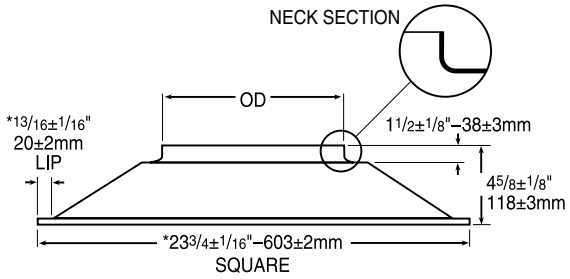
Low To No Maintenance
Customers using Therma-Fuser modules for as long as 20 years testify that no maintenance at all has been required. What VAV box or control offers similar results? Or the NAP 10 year warranty? The construction is simple—very few moving parts. The construction is robust—extra large thermostats, heavy metal, and one large tension spring. Forces between thermostats are in one straight line. The damper slides on ball bearings. The complete mechanism is visible for trouble shooting by simply hinging down the appearance panel. Appearance panel has dual latch clips for added safety. Undo four screws to remove the complete mechanism. Mechanism is normally open for full air flow in the rare case of total failure.

Easily Adapts To Office Layout Changes
No Therma-Fuser zone is split when office walls are put up or moved, a common problem with VAV boxes.

Aesthetic Appearance, "Architectural Look"
The clean lines of the "architectural square panel" harmonize with the ceiling resulting in a virtually unbroken ceiling plane. Large solid appearance panel has no distracting holes or slots.

Dimensions

Inlet Designation	OD	
	Inches ±1/16	mm ±3
6	5 15/16	150
8	7 15/16	200
10	9 15/16	250
12	11 15/16	300



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

System Design

The best control for heating/cooling units supplying air to VAV terminals is a discharge thermostat which maintains a constant supply air temperature. With DX equipment these are a high and low limit. Use a room thermostat for changeover between heating and cooling modes. For hybrid systems (part VAV and part constant volume) control the heating/cooling supply unit with a thermostat in one of the rooms with a constant volume diffuser, preferably the space with the greatest load. For both VAV or hybrid systems, the fan should run continuously.

The constant discharge velocity of Therma-Fuser modules at varying air flow provides good room circulation which reduces stratification. Keeping heating supply air temperatures as low as possible will further reduce room air stratification to a negligible level.

Static pressure at the inlet of the Therma-Fuser module should be between .05"wg./12Pa and .25"wg./62Pa, at full and partial air flows. Static pressure below .05"wg./12pA will result in low air flow and less induction. Above .25"wg./62Pa, Therma-Fuser modules operate well but excessive noise may result. Use minimum flow settings where Therma-Fuser tight shut off is not needed.

If the system turns down more than 30%, static pressure should be controlled. Included in the options for static pressure control are bypass, fan control and discharge dampers. Zone dampers are recommended where several zones share a higher pressure duct or riser.

When designing ducts, if Therma-Fuser modules are to deliver nominal volume at inlet SP of.15"wg./37Pa and if a maximum SP if .25"wg./62Pa is to be held for quiet operation, size the duct for a maximum pressure drop of .1"wg/25Pa between the first and last takeoff.

Because Therma-Fuser modules control room temperature by sensing room air induced up the center of the space, care should be taken not to disturb room air induction and entrainment. For example, location next to walls or dropped lights results in the reflection of primary air back at the Therma-Fuser module. Avoid this with a three-way blow pattern or relocate either the Therma-Fuser module or the light.

NAP has "how to" system design brochures for almost every ducted air system. For specific recommendations refer to the brochure for your system.

Guide Specification

(Suitable for Part 2 of CSI Specification section 15840) Material in italics applies only to model ST-HC. Delete the italics for model ST-C.

2.2 Thermally Powered VAV Diffusers

A. Thermally powered VAV diffusers shall be a complete VAV terminal and thermostat self-contained in a nominal 2' X 2'/600 x 600 mm diffuser. They shall be thermally powered with one room thermostat/ actuator and one changeover thermostat/actuator. External wiring or pneumatics shall not be allowed.

B. The VAV diffusers shall have a thumbwheel and temperature scale to adjust the cooling set point and another thumbwheel and temperature scale for the heating set point. The adjustment shall be right above the hinge down panel. Each set point shall be separately adjustable between 70°F/21°C and 78°F/26°C. The initial set point shall be factory set at 74°F/23°C.

C. In the cooling mode the VAV diffusers shall open on a rise in room temperature and in the heating mode they shall close on a rise in room temperature. The changeover thermostat shall be factory installed and adjusted to engage the heating mode when the supply air temperature rises above 80°F/27°C and return to the cooling mode when the supply air temperature falls below 68°F/20°C. During changeover the diffuser shall close or, if a minimum flow is set, go to the minimum. Nothing including the changeover mechanism shall extend above the inlet of the diffuser.

D. All VAV diffusers shall have a dial and scale to adjust minimum flow between 5 cfm/2.4 L/s and 50% of maximum flow without tools. Minimum flow shall be factory set 10%. A fixed maximum flow stop shall be factory set for the fully open air flow of the specified inlet size.

E. All VAV diffusers shall have a lever which will open the damper for balancing without tools. The balancing lever shall be accessible from the outside of the diffuser without folding down the appearance panel or removing any part of the diffuser.

F. The manufacturer shall warrant that the VAV diffuser shall be free from defects in materials and workmanship for a period of ten years from date of shipment.

G. The VAV diffusers shall have a solid (no holes or slots) appearance panel which unlatches and hinges down to allow hands to be free for adjusting temperature set point or minimum flow. The appearance panel shall have dual latch clips for a safety backup. Instructions for the diffuser shall be on the inside of the panel. The complete control mechanism shall be visible when the panel is hinged down.

H. The VAV diffusers shall have positive induction of secondary room air over the room thermostat at all flows from fully closed to fully open. The diffusers shall fail with the damper fully open. The damper shall slide up and down on ball bearings.

I. Supply air to the VAV diffuser shall be constant temperature (may be reset to another constant temperature). Supply air shall be limited to no lower than 50°F/10°C on cooling and no higher than 120°F/49°C on heating. The heating high limit shall be as low as possible but no lower than 80°F/26.5°C.

TEN YEAR WARRANTY

NAP warrants that its Therma-Fuser modules, exclusive of any options and accessories (whether factory or field installed) shall be free from defects in material or workmanship for a period of ten (10) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said ten (10) year period due to any such defects which would not have occurred had reasonable care been taken, provided that such parts have been inspected by NAP and found defective and provided the modules have been given normal and proper usage and all parts and controls remain unaltered.

NAP makes NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. NAP'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY NAP. IN NO EVENT SHALL NAP BE LIABLE FOR INCIDENTAL, INDIRECTOR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY.

NAP shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty nor for cost or installation.

ST Metric Performance Guide

Inlet Designation	Nominal Inlet Dia mm	Inlet Static Pressure Pa.	Max Flow		Maximum Flow				25% Maximum Flow			
					Throw (m)* @vt=			NC	Throw (m)* @vt=			NC
			L/s	m3/h	0.25 m/s	0.50 m/s	0.75 m/s		0.25 m/s	0.50 m/s	0.75 m/s	
		10	44	160	0.9	0.3	0.3	<15	0.3	<0.3	<0.3	<15
		20	63	228	1.1	0.5	0.3	16	0.5	0.3	<0.3	<15
		• 27.4	71	255	1.2	0.6	0.3	16	0.6	0.3	<0.3	<15
6	150	30	75	271	1.4	0.8	0.3	21	0.8	0.3	<0.3	<15
		40	88	319	1.7	1.1	0.5	27	1.1	0.3	0.3	<15
		50	101	362	2.0	1.4	0.8	29	1.2	0.5	0.4	17
		60	111	401	2.1	1.5	0.9	32	1.2	0.6	0.5	21
		10	70	252	1.5	0.6	0.3	<15	0.6	0.3	0.3	<15
		20	99	357	1.8	0.8	0.5	16	0.8	0.3	0.3	<15
		30	120	432	2.1	1.1	0.6	21	0.9	0.3	0.3	<15
8	200	• 32.3	123	442	2.1	1.2	0.6	25	0.9	0.3	0.3	15
		40	140	503	2.6	1.4	0.9	27	1.2	0.5	0.3	18
		50	159	571	2.7	1.7	1.1	30	1.4	0.8	0.5	22
		60	176	635	2.7	1.8	1.2	34	1.5	0.9	0.6	25
		10	108	389	1.8	0.9	0.5	<15	0.9	0.3	0.3	<15
		20	153	549	2.1	1.2	0.5	19	0.9	0.3	0.3	<15
		30	187	672	2.4	1.5	0.8	24	1.1	0.3	0.3	<15
10	250	• 32.3	194	697	2.4	1.5	0.9	26	1.2	0.3	0.3	15
		40	216	776	2.9	2.0	1.4	30	1.4	0.6	0.5	19
		50	241	869	3.2	2.3	1.7	32	1.7	1.0	0.8	24
		60	264	952	3.4	2.4	1.8	36	1.8	1.2	0.9	26
		10	142	511	2.4	1.8	0.6	<15	1.2	0.3	<0.3	<15
		20	200	720	2.7	2.0	0.9	20	1.4	0.5	0.3	<15
		30	245	881	3.2	2.3	1.4	28	1.7	0.6	0.3	18
12	300	• 37.2	274	986	3.4	2.4	1.5	31	1.8	0.6	0.3	21
		40	284	1021	3.5	2.7	1.8	33	2.0	0.8	0.4	24
		50	315	1135	3.8	3.2	2.4	35	2.3	1.1	0.5	29
		60	343	1236	4.0	3.4	2.7	38	2.4	1.4	0.5	31

1. • Denotes 3.81 m/sec. inlet velocity
2. NC based on Lw(10-12 watts reference) -10db
3. * Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.
4. Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.
5. Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories.
6. The performance guide does not apply to Therma-Fuser diffusers with R-Ring ceiling plenum bypass. Use separate ratings.
7. When blocking for direction with the NAP directional baffles, the air volume for a given static pressure is reduced from maximum flow listed in the performance guide by:

	Reduction		
Inlet Designation	3 way	2 way Corner	2 way Opposite
6	.99	.99	1.00
8	.97	.86	.87
10	.88	.75	.72
12	.85	.65	.77

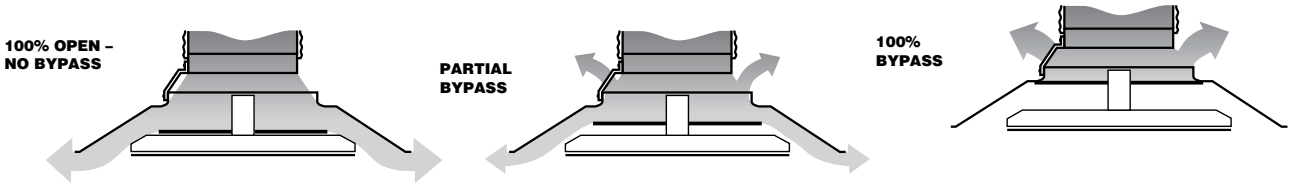
BYPASS R-RINGS

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

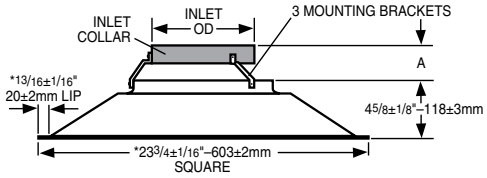
Bypass R-Rings are used to bypass supply air into the ceiling plenum when Therma-Fuser VAV diffusers turn down. The purpose of the bypass is to limit diffuser noise by limiting inlet static pressure. A Therma-Fuser diffuser with a bypass RRing has a constant volume air flow to it and, therefore, also 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, RRings 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

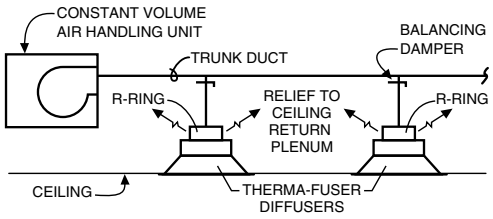


*595±2mm Square with 16±2mm lip available —specify 595mm square.

SIZE	INLET OD	A
R6	5 7/8 in. / 150 mm	3 in. / 76 mm
R8	7 7/8 in. / 200 mm	3 1/8 in. / 79 mm
R10	9 7/8 in. / 250 mm	3 1/4 in. / 82 mm

Application and Installation

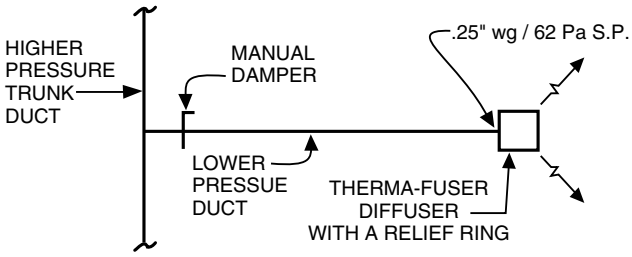
Select R-Rings using the standard performance guide for the appropriate model. Use the same inlet size as the R-Ring inlet. The geometry of the NAP R-Ring is designed for the same air volumes at the same static pressure shown in the performance guide. When R-Rings are used, throws may be as low as 90% of the throw shown in the performance guide and NC may be 2db higher. Inlet height also increases by 3 in./76mm to 3¼ 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	Ak ft2		
	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.