

# STR Therma-Fuser™

## Round Thermally Powered VAV Diffuser

Models: **STR-HC** Separate set points for VAV heating and VAV cooling.  
**STR-C** One set point for VAV cooling only.



STR: Product Overview  
FORM 046.101 REV 1009

### BENEFITS AT A GLANCE.

#### ARCHITECTURALLY PLEASING ROUND SHAPE

With its architecturally pleasing shape, round Therma-Fuser™ diffusers provide the same benefits as square Therma-Fuser diffusers but with a shape to blend in with round architectural features or exposed round duct work. The round flat lip and the round flat appearance panel provide an unobtrusive thermally powered diffuser when used with an exposed duct work ceiling. Addition of the optional air lifter (anti-smudge) ring makes a bigger architectural statement and lofts the air for less drop. Round Therma-Fuser diffusers are a nominal 24in / 600mm diameter and fit between the tee bars of standard lay-in ceilings.

#### INDIVIDUAL COMFORT SELECTION AND CONTROL

Every Therma-Fuser™ diffuser 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. Expensive electrical or pneumatic connections and complicated controls are eliminated.

#### 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 room air change 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.

\*ADPI (Air Diffusion Performance Index) is defined in the ASHRAE Fundamentals Handbook.

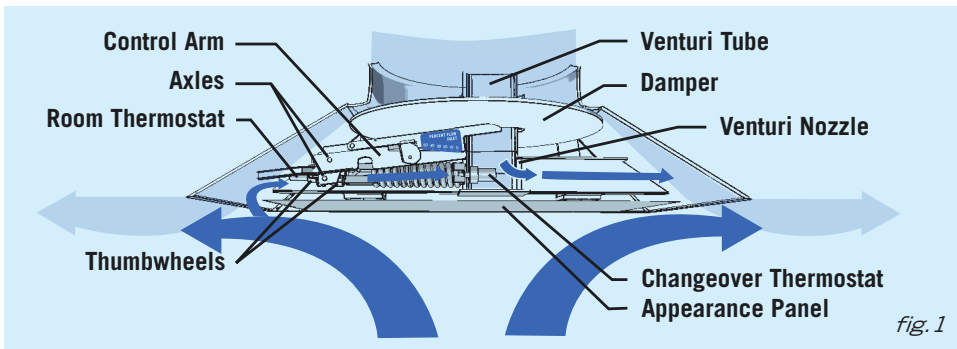


fig. 1

## HOW IT WORKS

Round model STR Therma-Fuser diffusers are 24in / 600mm diameter 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 thermostat/actuator which is both a room thermostat and damper motor.

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.

## 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. *fig. 1* 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. A properly applied STR will hold the room average within 1.5°F/0.9°C of the temperature selected.

## 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.

## CHANGEOVER (STR-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 STR-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 at 68°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 (STR-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.

## ADJUSTING SET POINTS

Heating and cooling setpoints are separately adjusted by turning the heating and cooling thumbwheels. *fig. 2* Align the outside of each thumbwheel with its respective temperature scale. Each setpoint can be anywhere between 70°F/21°C and 78°F/26°C Both are factory set at 74°F/23°C. (The model STR-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.

## OPEN FOR BALANCING

To open, push the balancing lever to the right and up. *fig. 3* To close, push the balancing lever down until it latches.

## ADJUSTING MINIMUM FLOW

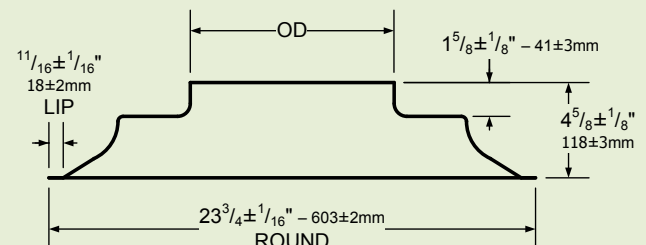
Turn dial until the desired minimum flow on the scale intersects with the lower metal piece. *fig. 4*

## 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)

## DIMENSIONS

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



## PERFORMANCE GUIDE

Inlet Designation	Inlet Diameter in	Inlet Static Pressure in wg	Maximum Flow CFM	Maximum Flow Throw* (ft)			†NC	25% Maximum Flow Throw* (ft)			†NC
				v <sub>i</sub> =50 FPM	v <sub>i</sub> =100 FPM	v <sub>i</sub> =150 FPM		v <sub>i</sub> =50 FPM	v <sub>i</sub> =100 FPM	v <sub>i</sub> =150 FPM	
6	5 15/16	0.05	95	3	1	<1	22	<1	<1	<1	<15
		0.10	130	4	2	1	24	2	<1	<1	18
		• 0.12	144	4	2	1	24	2	<1	<1	19
		0.15	165	5	3	1	25	3	<1	<1	21
		0.20	190	6	4	2	28	4	2	<1	23
		0.25	215	7	4	2	31	4	2	1	24
8	7 15/16	0.05	160	4	2	<1	<15	2	1	<1	<15
		0.10	218	6	2	1	22	3	2	<1	<15
		• 0.13	252	7	2	1	26	4	2	<1	<15
		0.15	275	8	3	1	29	4	2	<1	<15
		0.20	318	9	3	2	34	5	3	2	19
		0.25	360	9	4	2	39	6	3	2	22
10	9 15/16	0.05	240	6	4	2	21	3	1	<1	19
		0.10	333	8	6	3	27	5	3	<1	20
		• 0.14	407	9	7	4	32	6	4	1	21
		0.15	425	9	7	4	33	6	4	1	21
		0.20	495	10	8	5	38	7	5	2	25
		0.25	565	11	8	5	43	7	5	2	29
12	11 15/16	0.05	320	8	4	1	16	5	1	<1	16
		0.10	448	9	6	3	27	6	2	1	18
		0.15	540	10	7	4	36	7	2	1	19
		• 0.17	576	10	7	4	38	7	2	1	21
		0.20	630	11	8	5	41	8	3	1	24
		0.25	720	11	8	6	45	8	4	1	28

• Denotes 750 fpm / 3.81 m/s inlet velocity.

\* Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.

† NC based on L<sub>w</sub>(10<sup>-12</sup> watts reference) -10db

Tested in accordance with ANSI/ASHRAE 70-2006, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.

Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories. (pending)

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 and hybrid systems, the fan should run continuously.

The constant discharge velocity of Therma-Fuser diffusers 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 diffuser 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 diffusers operate well but excessive noise may result. Use minimum flow settings where 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 fan control and bypass dampers. Zone dampers are recommended where several zones share a higher pressure duct or riser.

When designing ducts, if Therma-Fuser diffusers are to deliver nominal volume at inlet SP of .15"wg./37Pa and if a maximum SP of .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.

Manual balancing dampers should be used at the takeoff for each diffuser. Manual balancing dampers may not be required with ducts designed to Acutherm specifications.

Because Therma-Fuser diffusers 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 diffuser. Relocate either the Therma-Fuser diffuser or the light.

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

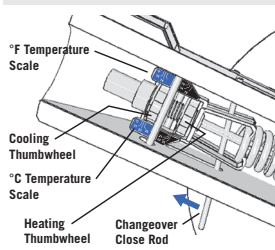


fig.2

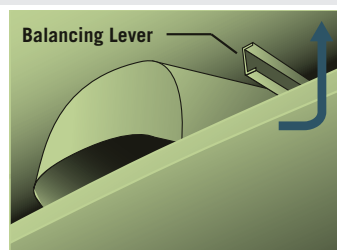


fig.3

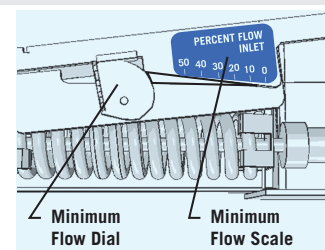


fig.4

## GUIDE SPECIFICATION

(Suitable for Section 23 36 16 Variable-Air-Volume Units of the CSI Master Format). *Material in italics applies only to model STR-HC. Delete the italics for model STR-C.*

- Round thermally powered variable air volume diffusers shall be Therma-Fuser™ model STR manufactured by Acutherm of Hayward, CA.
- Thermally powered VAV diffusers shall be a complete VAV terminal and thermostat self-contained in round 24in / 600mm diameter diffuser. They shall be thermally powered with one room thermostat/actuator and one changeover thermostat/actuator. External wiring or pneumatics shall not be allowed.
- The VAV diffusers shall have a thumbwheel and temperature scale to adjust the cooling set point and a separate thumbwheel and temperature scale for the heating set point. The adjustment shall be right above the hinge down panel and shall require no tools to adjust. 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.
- 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.
- 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.
- 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.
- All VAV diffusers shall warrant that the diffuser shall be free from defects in materials and workmanship for a period of ten years from date of shipment.

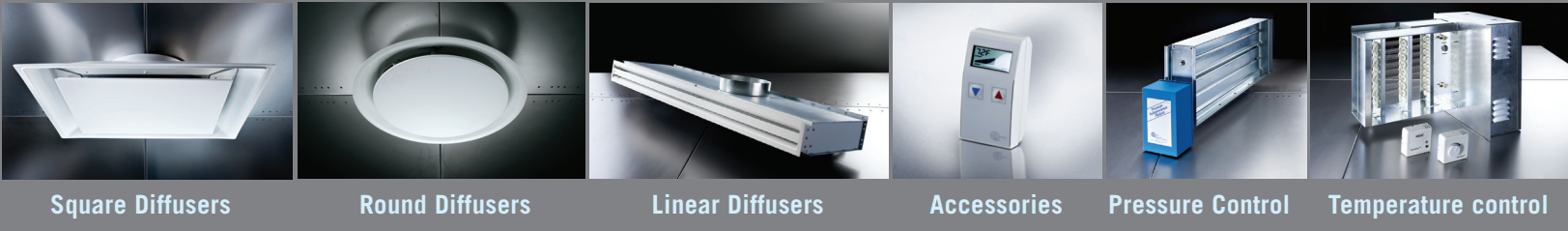


# STR Therma-Fuser™ Round Thermally Powered VAV Diffuser

## TEN YEAR WARRANTY

Acutherm warrants that its STR diffuser, exclusive of any options and accessories (whether factory or field installed) shall be free from defective 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 and proper usage and all parts and controls remain unaltered. Acutherm 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. ACUTHERM'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 ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm 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 of removal or installation.

## ACUTHERM PRODUCT GUIDE



Square Diffusers

Round Diffusers

Linear Diffusers

Accessories

Pressure Control

Temperature control

## PRODUCT INFORMATION DESCRIPTION

Use the following model number nomenclature to order Therma-Fuser diffusers, options and accessories.

### Product

(1) Model	(2) Type	(3) Size
▶ <b>STR</b>		

#### Product

1. Model: **STR** – Round Therma-Fuser diffuser
2. Type: **C** VAV cooling only or **HC** VAV heating and cooling
3. Size: **6, 8, 10, or 12** inch inlet

### Options

(1) Remote Adjust	(2) Security Hanger	(3) 595mm Metric	(4) Silk Screen	(5) Sensor
▶				

#### Options

1. Remote Adjust: **SDA1** or **SDA1M** for Digital Wall Adjuster
2. Security Hanger: **H**
3. 595mm Metric: **595** (dia. round) for metric grid ceilings
4. Silk Screen: **S** for appearance panel pattern
5. Sensor: **SMCS** for SMC or **SENSOR** for 3rd party

### Accessories

(1) Air Lifter	(2) Square Frame
▶	

#### Accessories

1. Air Lifter: **AC-STRAL** Air Lifter or Anti-smudge ring
2. Square Frame: **AC-STRS** Round to square lay-in frame for 2'x2' ceiling grids

## AVAILABLE ONLINE

Access digital brochures, CAD files, performance data and more!

[www.acutherm.com](http://www.acutherm.com)

## CALL US

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## EMAIL SUPPORT

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