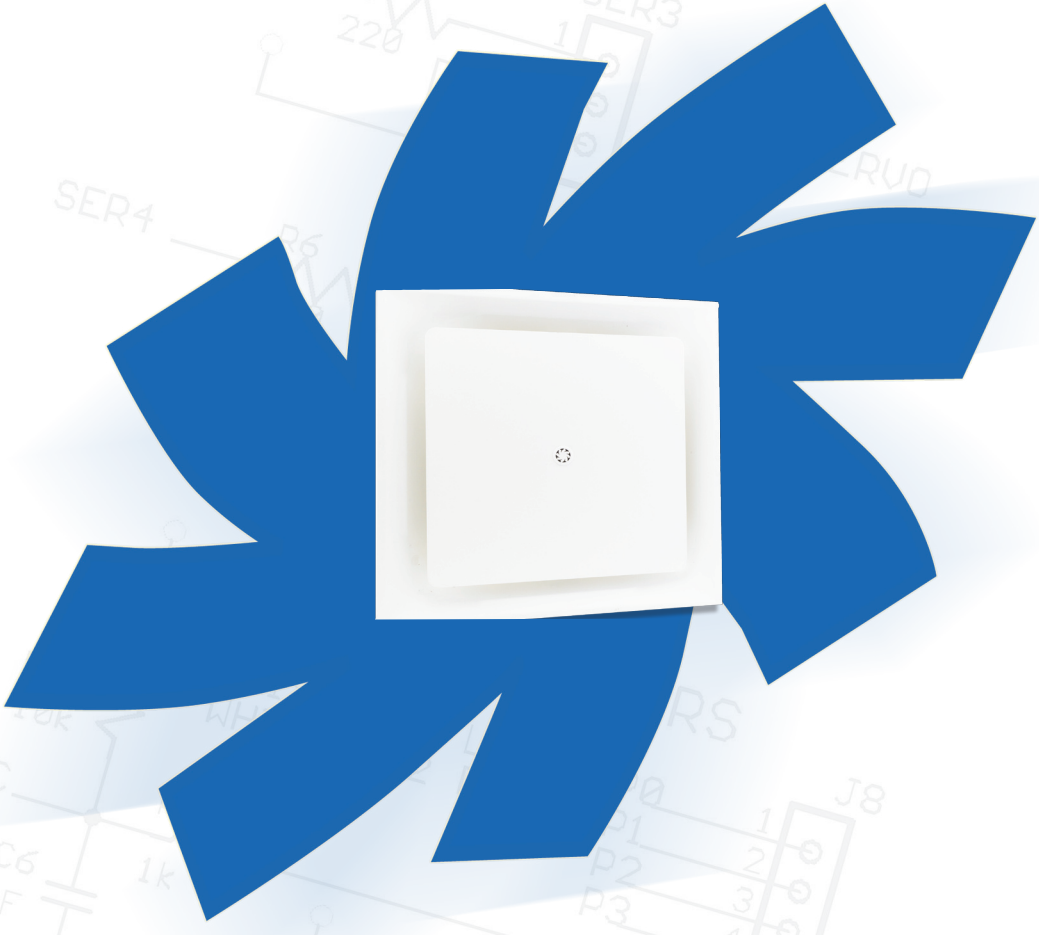
RICKARD®

INTELLIGENT COMFORT CONTROL



VSD-4

U.S. GREEN BUILDING COUNCIL MEMBER℠

1401 N. Plano Rd
Richardson, TX 75081
p. 972-744-9090
f. 972-238-0641
www.rickardus.com

DIFFUSERS - VARIABLE VOLUME

VSD-4

Features & Benefits

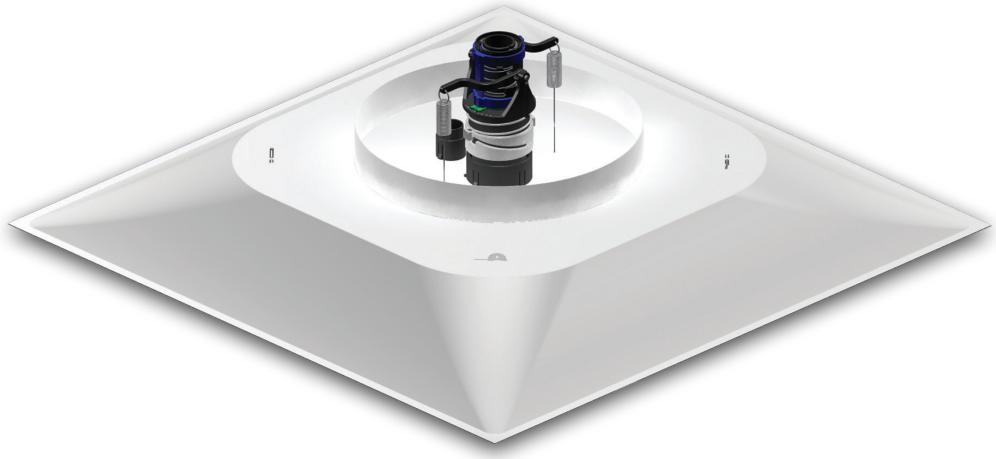
- No electric requirements
- Reversing change-over
- No routine maintenance
- AHRI certified performance
- Fully self-contained
- ISTA certified packaging

General Information

The Rickard variable volume ceiling diffuser is designed for general building zones where uniform radial discharge is the most suitable and desirable supply air distribution pattern. The basic diffuser is available in a wide range of options to suit every individual requirement. Optimum performance in terms of uniform air distribution and low noise levels has been combined with simple construction and an aesthetically pleasing appearance to provide a unit which is both functional and reliable.

The position of the control disc is varied by means of a wax filled thermal element which responds to changes in sensed temperature. The wax contained in the thermal element melts at the formulated temperatures to expand or contract. With a rise in sensed temperature, the expanding wax extends the plunger, causing the amplifying lever-arm mechanism to move the control disc such that the supply air volume is changed to the extent that is required to maintain constant room temperature. When the wax cools, the plunger retracts under the action of the return spring, causing the control disc to move in the opposite direction to counter the change in sensed temperature.

The Thermo-Disc is reliable and requires no routine preventative maintenance. The absence of electrical or pneumatic equipment and accessories also means less maintenance and fewer potential problems. All moving components are easily accessible from below the ceiling. The entire control mechanism can be removed from below in seconds.



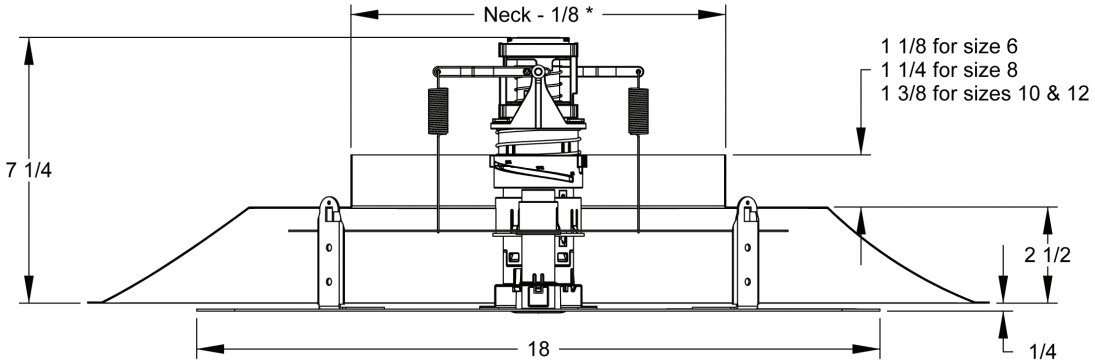
RICKARD® INTELLIGENT COMFORT CONTROL

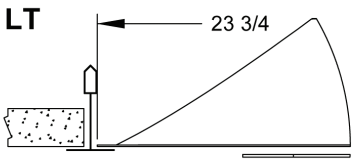
VSD-4

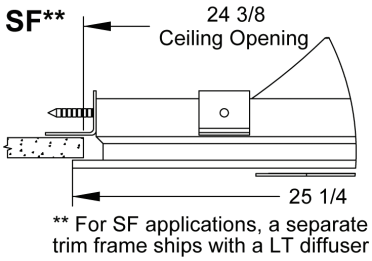
DIFFUSERS - VARIABLE VOLUME

Product Dimensions

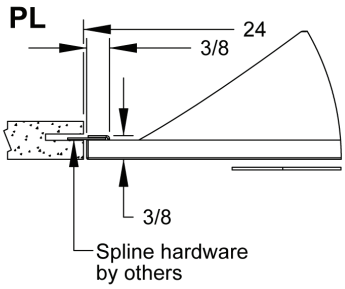
Module Size	Available Neck Sizes
24x24	6, 8, 10, 12

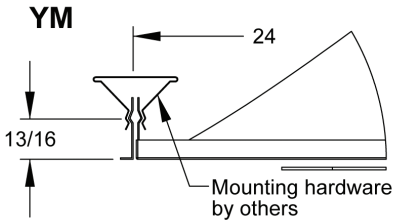


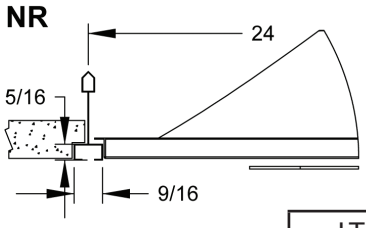




** For SF applications, a separate trim frame ships with a LT diffuser







LT	Lay In
SF	Surface Mount
YM	Snap In
NR	Narrow Regress
PL	Spline

***Duct dimensions change with optional relief ring**

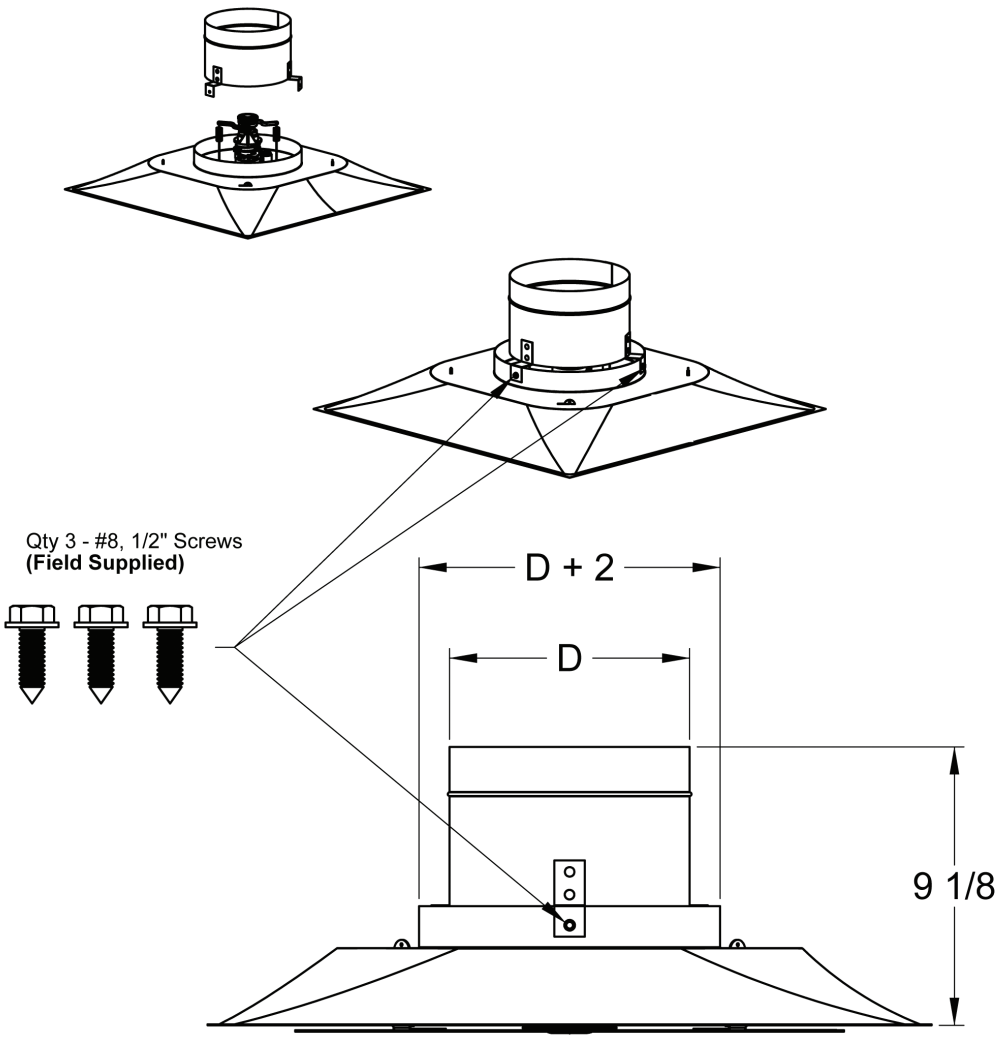
Dimensions in inches

DIFFUSERS - VARIABLE VOLUME

Product Dimensions cont.

Relief Ring Accessory

VSD-4



Part Number	D (Duct Connection)	Required Diffuser Neck Size
31636601	3 7/8	6
31636602	5 7/8	8
31636603	7 7/8	10
31636604	9 7/8	12

Dimensions in inches

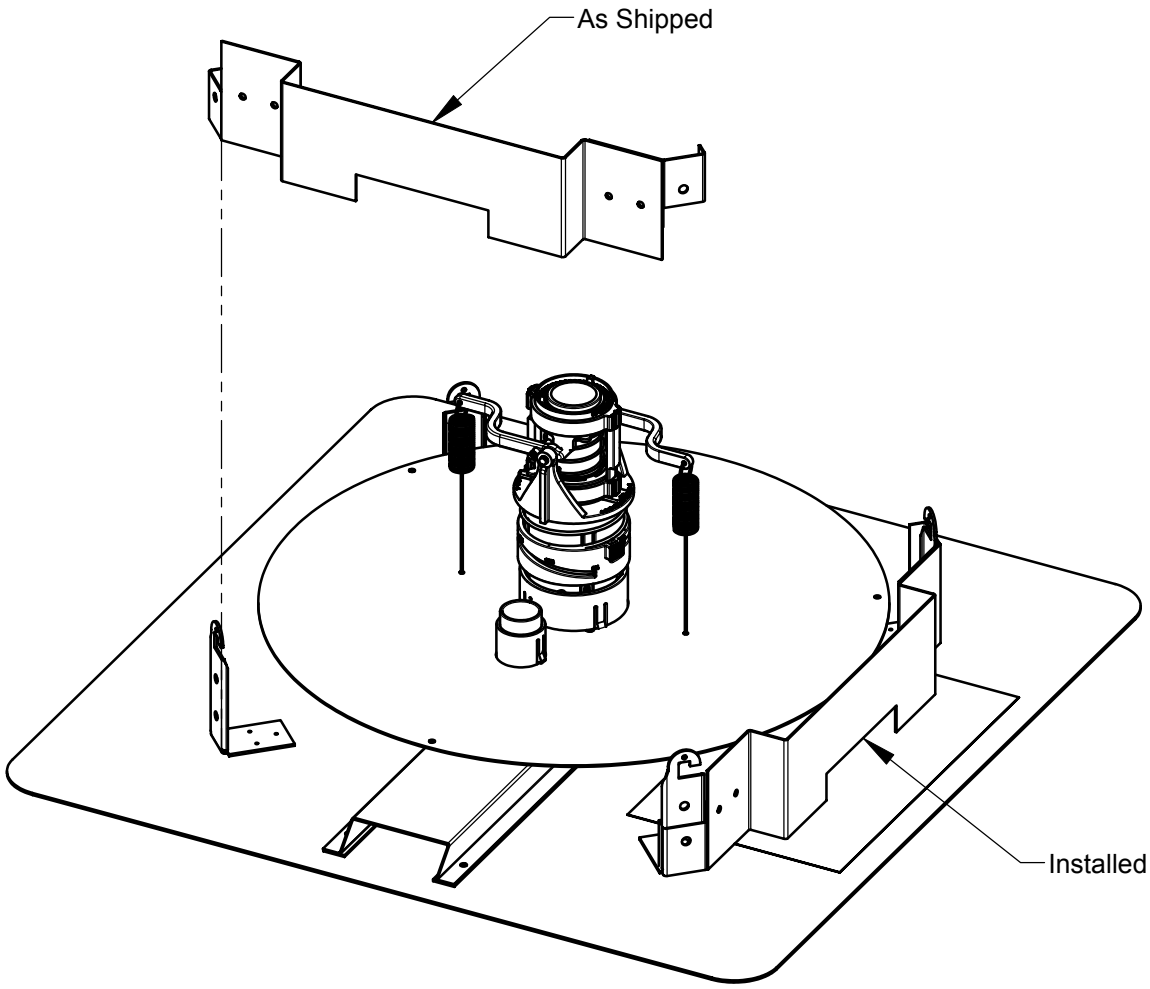
RICKARD® INTELLIGENT COMFORT CONTROL

VSD-4

DIFFUSERS - VARIABLE VOLUME

Product Dimensions cont.

Pattern Baffle Accessory



DIFFUSERS - VARIABLE VOLUME

Selection Procedure

VSD-4

GENERAL

The first consideration when designing a system is to calculate the required air volume and temperature to satisfy room conditions at maximum heat loads. It is recommended that ducting is sized using the static-regain method. Velocities in branch ducts should be in the range 650 - 1200 ft/min. Thereafter the following should be considered:

THROW

This is the distance from the diffuser at which the air velocity has slowed to 50 ft/min when measured 1 in. below the ceiling (or from the wall) with the diffuser in the fully open position. Coning occurs when two airstreams traveling in opposite directions meet and result in a downward moving cone of air. Ideally diffusers should be spaced such that the distance between two diffusers is slightly less than the sum of their throws. Throw remains essentially constant throughout the range of air flow rates, which is a feature of the variable geometry diffuser.

DUCT STATIC PRESSURE

Diffuser performance has been established using diffuser neck total pressure, although what is normally known and controlled is duct static pressure. What happens between the duct and the diffuser depends on the length and type of flexible duct. For simplicity, it can be assumed that duct static pressure approximates diffuser neck total pressure. This is a valid assumption for systems where flexible duct lengths are not excessive. The above can be explained briefly as follows: The static pressure loss due to friction in the flexible duct (±0.05 in.w.g.) would normally be about the same as the velocity pressure in the diffuser neck and since total pressure is the sum of static and velocity pressures, we can say that neck total pressure is approximately the same as duct static pressure. Although the tables give diffuser performance for neck total pressures ranging from 0.08 - 0.40 in.w.g., caution should be exercised when selecting diffusers outside the range of 0.16 - 0.32 in.w.g. At lower pressures, air movement and induction may be insufficient, and at higher pressures, drafts and excessive noise may result. Best results are obtained when diffusers are selected at pressures of 0.20 - 0.30 in.w.g. Bear in mind that all diffusers on a particular branch will operate at the same static pressure as controlled by the pressure control damper. Diffusers which are able to supply more air than required will be driven partially closed by the temperature controller and the system will self balance.

NOTE: Avoid placing restrictions (such as manually operated dampers or pinched flexible ducts) at any point in branch ducts. The result is that at maximum flow these restrictions create a significant static pressure loss (which for some cases may be desirable) but at minimum flow conditions offer virtually no resistance, which will result in the static pressure at the diffuser being too high.

DIFFUSERS - VARIABLE VOLUME

Engineering Data

VSD-4

VSD Maximum Flow Selection Table

Inlet Size		Neck Velocity	400	500	600	700	800	900	1000
		Velocity Pressure	0.010	0.016	0.022	0.031	0.040	0.050	0.062
6"		Static pressure	0.016	0.024	0.037	0.048	0.064	0.082	0.100
		Total Pressure	0.026	0.04	0.059	0.079	0.104	0.132	0.162
		CFM	79	98	118	137	157	177	196
		NC	5	10	14	17	20	23	25
		Throw, ft	1-2-3	1-2-4	2-3-5	2-3-6	2-3-7	3-4-7	3-4-8
8"		Static pressure	0.021	0.032	0.047	0.063	0.083	0.106	0.130
		Total Pressure	0.031	0.048	0.069	0.094	0.123	0.156	0.192
		CFM	140	175	209	244	279	314	349
		NC	8	13	17	20	23	25	28
		Throw, ft	2-3-5	2-3-7	2-4-8	3-5-9	3-5-10	4-6-10	4-7-11
10"		Static pressure	0.030	0.047	0.069	0.093	0.122	0.155	0.190
		Total Pressure	0.040	0.063	0.091	0.124	0.162	0.205	0.252
		CFM	218	273	327	382	436	491	545
		NC	14	19	23	26	29	31	34
		Throw, ft	3-4-8	4-5-10	4-6-11	5-8-12	6-9-13	6-10-14	7-10-14
12"		Static pressure	0.048	0.075	0.109	0.147	0.192	0.244	0.301
		Total Pressure	0.058	0.091	0.131	0.178	0.232	0.294	0.363
		CFM	314	393	471	550	628	707	785
		NC	24	29	33	36	39	41	44
		Throw, ft	4-6-11	5-8-12	6-9-13	7-10-14	8-11-15	9-11-16	10-12-17

*See Page 7 for notes

DIFFUSERS - VARIABLE VOLUME

Engineering Data

AHRI Certification Points

VSD-4

AHRI Rating Data				Inlet Size	6" Inlet	8" Inlet	10" Inlet	12" Inlet
Standard Ratings Sound Power Level, dB	3. Airflow, cfm				147	262	409	589
	4. Min. Operating Pressure, in H_20				0.091	0.108	0.142	0.204
	5. Max. Inlet Static Pressure				0.116	0.196	0.392	0.565
	6. Rated with Pressure Relief, yes/no				n	n	n	n
	Discharge	Standard Airflow Fully open damper	Minimum Differential Static Pressure,	Octave Band Frequency (Hz) 125	36	38	46	53
				250	37	40	48	56
				500	34	36	42	50
				1000	30	34	39	44
				2000	21	29	32	36
				4000	+	19	23	28
	Discharge	Standard Airflow Throttled Damper	Max. Inlet Static Pressure, in H_2O	125	+	44	46	50
				250	36	52	54	55
				500	40	57	58	60
				1000	34	51	55	58
				2000	23	44	48	52
				4000	+	37	42	47

NOTE: Sound Power levels below values shown in this table shall be listed as below significance.

Hz Octave Band	125	250	500	1000	2000	4000
Sound Power Level, dB	36	29	26	22	19	17

Notes:

1. Test were conducted in accordance with AHRI Standard 880-98.
2. Sound power levels are referenced to 10^{-12} watt.
3. Octave bands 2-7 correspond to 125 to 4000 Hz.
4. Performance data is presented for the VSD diffuser with the internal VAV damper in full open position

Noise Criteria (NC) Notes:

1. A plus (+) indicates the NC is lower than 15.
2. Noise Criteria (NC) were found using AHRI Standard 885-98 Appendix E (2002 Addendum)

AHRI CERTIFIED™ www.ahridirectory.org AHRI Standard 880

RICKARD® INTELLIGENT COMFORT CONTROL

VSD-4

DIFFUSERS - VARIABLE VOLUME

Specifications

The thermally powered VAV diffusers shall be the Rickard model VSD-4.

The diffuser shall be thermally powered to vary the supply of air into the space in either heating or cooling mode, by means of modulating a variable aperture damper known as a control disc, vertically within the diffuser. Primary air from the diffuser shall be discharged horizontally in a 360° pattern. The thermal room sensing element shall be located behind an induction cap in the center of the diffuser panel bearing the Rickard brand identifier and shall provide no more than 1°F thermal dead-band between induced temperature and zone temperature.

Each diffuser shall be individually adjustable to sense room temperature within the space between 68°F and 77°F. Each diffuser control disc actuating mechanism shall be individually adjustable for minimum airflow from 0 to 30%. Each diffuser is to be fitted with a single thermal supply air sensing element to automatically toggle between cooling and heating mode and be able to vary the supply of air into the space in either mode. Each diffuser shall be self-contained and require no external power source to maintain space temperature throughout the range of operation. The diffusers shall carry the manufacturer's 10-year warranty.

Ceiling diffusers shall be square, architectural, panel face diffusers. The diffuser shall have an unitary face panel mounted on a one piece, seamless back pan. The diffuser face panel must be field removable by means of four positive locking clips. The exposed surface of the face panel shall be smooth, flat and free of visible fasteners. The face panel cannot project more than 1/4-inch below the outside border of the diffuser back pan.

The diffuser neck shall have a minimum 1 1/8-inch depth available for duct connection.

Finish shall be an anodic acrylic baked type, baked at 315°F.

All test data shall be obtained in accordance with ANSI/ASHRAE Standard 70–1991, and AHRI Standard 880–98. The diffuser shall carry an active AHRI certification.