

# TWIN DUAL FLOW

**AXO-TWIN**

Dual Flow High Induction Swirl Diffuser for VAV Systems

**EFFECTIVE**  
HVAC

## AXO-TWIN SERIES

### Dual Flow High Induction Swirl Diffuser for VAV Systems



More constant throw, velocity and NC in VAV applications



Provides optimal performance for air volumes between 70 and 320 cfm



Prevents cold air dropping and hot air stratification at lower cfm, while preserving thermal comfort at higher cfm



Maintains a higher induction ratio even at lower cfm



High induction causes rapid reduction of air velocity and temperature difference for improved thermal comfort and energy efficiency



Individually adjustable high induction mixing vanes available in black or white



Only requires 12" height in the ceiling to be installed



**AXO-TWIN**  
by **MADEL®**

**Patent  
Pending**

AXO-TWIN Dual Flow High Induction Swirl Diffuser by EffectiV HVAC™ and MADEL® is designed to achieve greater air mixing, thermal comfort and energy efficiency in VAV installations. AXO-TWIN provides an optimal performance for air volumes varying between 70 cfm and 320 cfm.

Thanks to the innovative design of its dual chamber plenum, AXO-TWIN diffuser self-adjusts in order to let the air pass through more or fewer induction vanes based on the volume of air, resulting in a more stable performance in VAV applications. At low cfm, the air is diffused through the outer circle of induction vanes. At high cfm, the inner chamber opens and the air is diffused through the entire surface of the diffuser. The adjustment is completely autonomous and doesn't require any special configuration, controls nor electricity.

The direct outcome is a more stable throw, air velocity, induction ratio and NC in VAV applications.

When designing a system, engineers select diffusers based on maximum air volume, trying to reach the occupied zone with limited air velocity to properly mix the room air while avoiding thermal discomfort. When VAV systems supply lower air volumes, however, the diffusion performance is seriously affected. At lower velocity, cold air tends to drop from the ceiling and hot air tends to stick to the ceiling. Hot and cold spots are created in the room and the air may fail to reach to occupied zone. Energy consumption and occupants' comfort are automatically impacted. The lack of air mixing may also increase the concentration of contaminants – CO<sub>2</sub>, gases, viruses and other airborne particles – accumulated in the room's air.

With AXO-TWIN, we limit the diffuser's free area in order to ensure enough discharge velocity to maintain a higher discharge velocity, a higher induction ratio and more stable throw distances at low cfm. The ultimate benefits are: significantly increased thermal comfort, energy efficiency, and improved ventilation for indoor air quality.

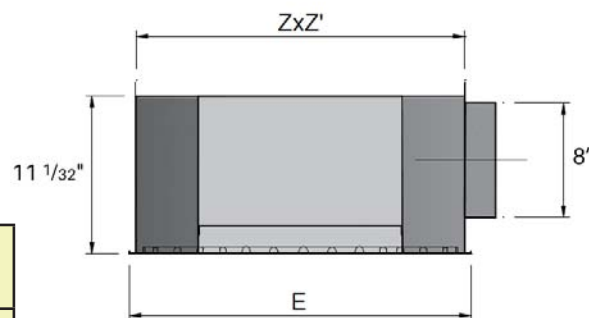
The high induction vanes and pressurization of the air in the plenum create a very even swirl diffusion pattern by default. The vanes are individually adjustable to make it possible to adapt the airflow.

AXO-TWIN diffusers allow an optimal performance despite flow variations of up to 75% while keeping the air stream stable. For optimal conditions, AXO-TWIN diffusers may be used in ceilings 8.5 up to 13 feet (2.6 up to 4 meters) high, with a temperature differential up to 27°F (15°C).

## Dimensions

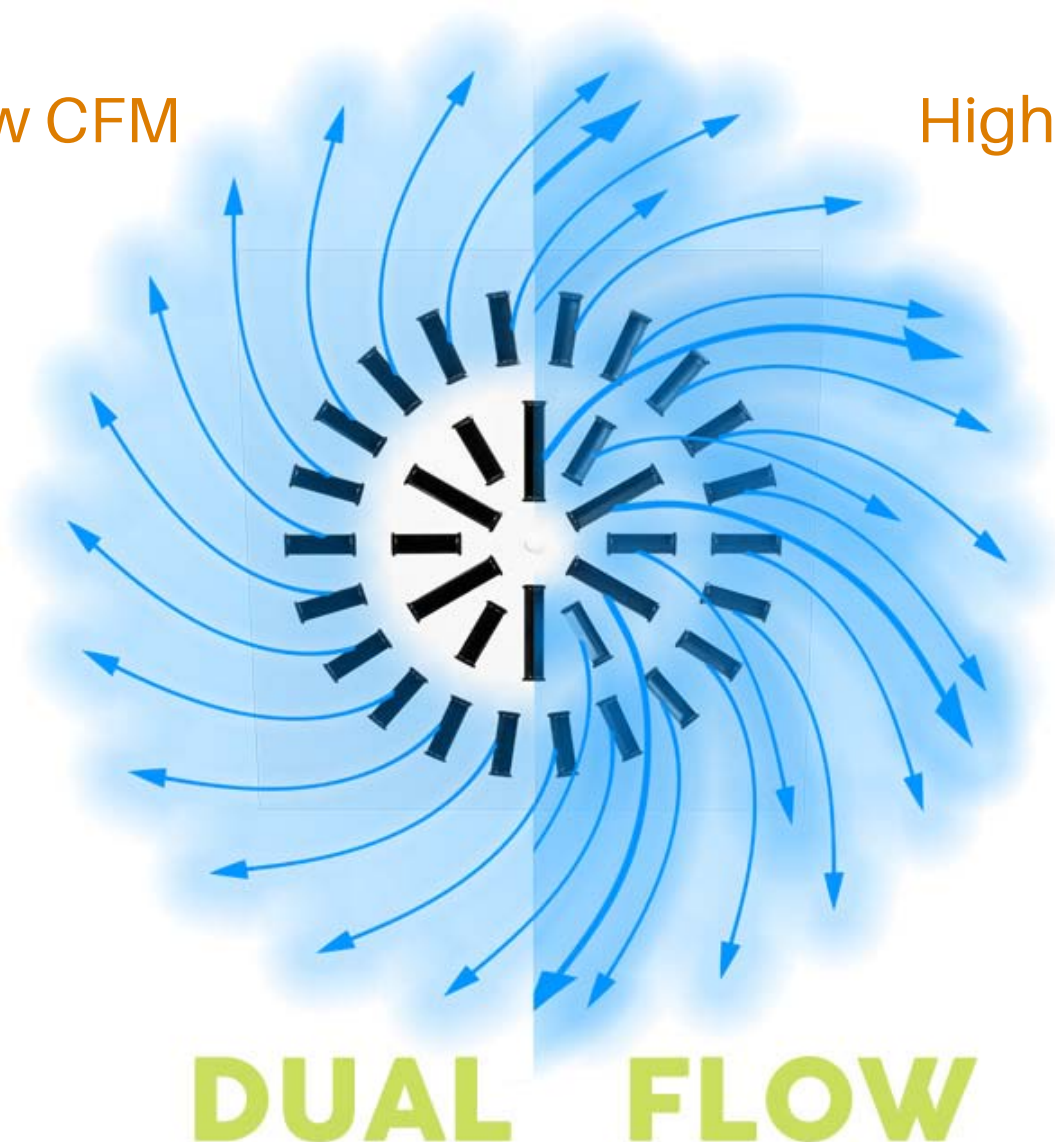
Model	E	Z	Z	Min cfm	Max cfm
AXO-TWIN	23 3/4"	22 43/64"	22 23/64"	<b>70</b>	<b>320</b>

Note: Min cfm and Max cfm are recommended values for optimal performance and can be exceeded



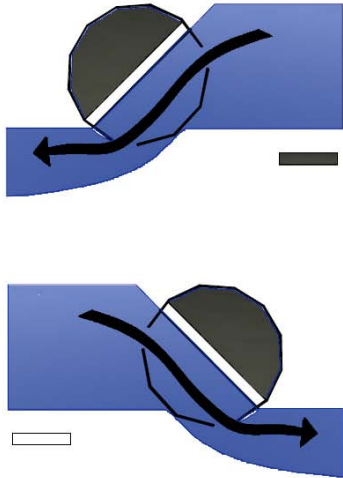
Low CFM

High CFM

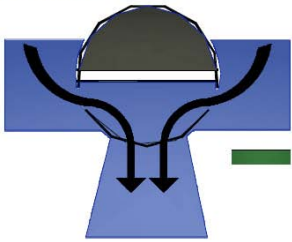


# AXO Vanes Positioning

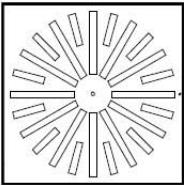
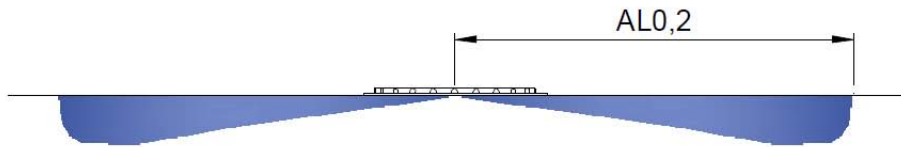
HORIZONTAL SUPPLY.  
POSITION 1.



VERTICAL SUPPLY.  
POSITION 2.

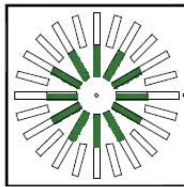
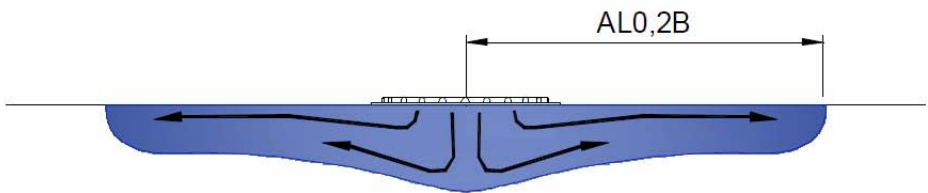


TYPE A. 100% POSITION 1.



POSITION 1.

TYPE B. 50% POSITION 1 AND 50% POSITION 2.



POSITION 2.  
POSITION 1.

$AL_{0.2}$  = Distance at which velocity reaches 40 fpm

Type B Throw Correction Factor	
Dim	Correction Factor
24" x 24" (605mm)	0.75

Type B = 50% position 1, 50% position 2

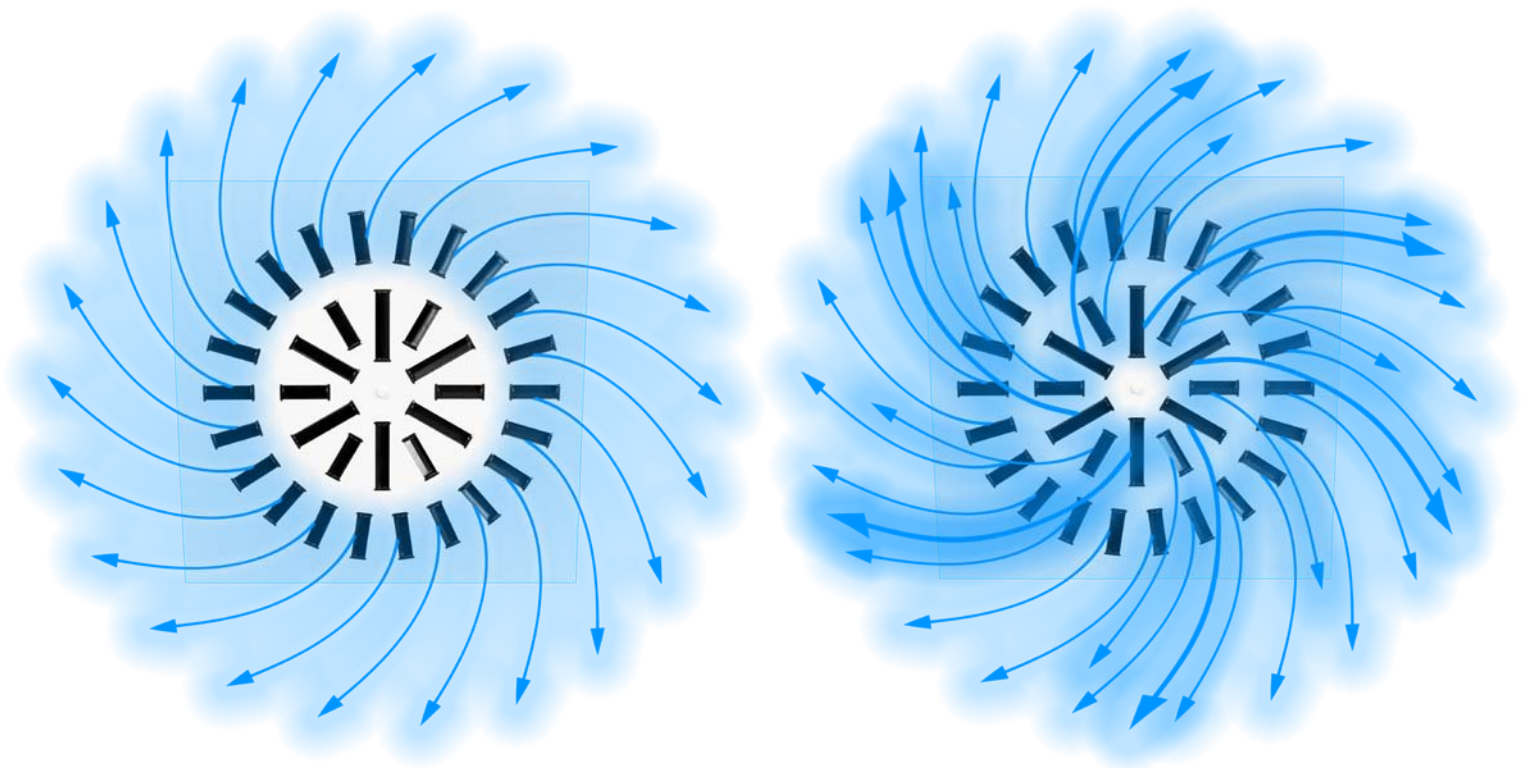


## AXO-TWIN Performance Data

Dimension	Neck (fpm) Velocity	200	300	400	500	600	700	800	900	1000	1200
24" x 24"	CFM	70	105	140	175	209	244	279	314	349	419
	Pressure Loss (in.w.g.)	0.013	0.027	0.046	0.069	0.094	0.126	0.16	0.199	0.24	0.335
	NC	< 15	< 15	< 15	< 20	< 20	< 25	< 30	< 35	> 40	> 40
	Throw (ft) - Coanda Effect	2-3-4	2-4-5	3-4-7	3-5-8	4-6-9	4-7-10	4-7-11	5-8-12	5-9-13	6-10-15
	Throw (ft) - No Ceiling	1-2-3	2-3-4	2-3-5	2-4-6	3-4-7	3-5-8	3-6-8	4-6-9	4-7-10	5-8-11
	Induction Ratio - Coanda	8 - 13	11 - 16	15 - 22	17 - 26	20 - 29	22 - 32	24 - 35	26 - 39	28 - 42	32 - 48
	Induction R. - No Ceiling	6 - 9	8 - 13	11 - 16	13 - 18	15 - 22	17 - 26	17 - 26	20 - 29	22 - 32	24 - 35

### Performance Notes

- NC Value based on 10 db room attenuation.
- Throw Values are based on isothermal air and terminal velocities of **100 fpm, 60 fpm and 40 fpm** respectively.
- Induction ratio values are for Type A and Type B diffusion patterns, in order.



Delta T Correction Factors		
$\Delta T$ (F)	Kh	KI
0	.036	1
-2	.041	.985
-4	.046	.975
-6	.052	.965
-8	.058	.95
-10	.065	.935
-12	.072	.925
-15	.084	.91

$bv = kh \times \text{Throw}$   
 $\text{Throw}'(\Delta T) = KI \times \text{Throw}$

Kh = Correction Factor for Vertical Diffusion  
 KI = Throw Correction Factor  
 $AL_{0.2}$  = Distance at which velocity reaches 40 fpm

Ratios				<b>induced room air = supplied cfm * i</b>  induced room air = cfm mixed for given throw
Throw (ft)	i Type A	i Type B	Delta T Ratio	
4	8	13	0.051	
6	13	18	0.036	
8	17	26	0.03	<b>Delta T (Throw) = Delta T (Supply) * Delta T Ratio</b>  Delta T (Supply) = T (Room) - T (Supply) Delta T (Throw) = T (Room) - T (Throw)
10	22	32	0.026	
15	32	48	0.019	
20	43	70	0.015	
25	54	85	0.01	
30	66	108	-	

## How to Specify AXO-TWIN

Supply and mounting of dual flow high induction swirl diffuser for VAV systems, model AXO-TWIN, with individually adjustable radial vanes. Diffuser must self-adapt to increased cfm in order to let the air pass through more induction vanes, resulting in a more stable performance in VAV applications. Adjustment shall be automatic, without the need for controls nor electricity. Dual-chamber plenum made of galvanized steel, with a polymeric membrane allowing the air to access the inner chamber of the plenum for higher cfm. The diffuser is provided with a gasket on the back to ensure airtight contact with the plenum. Face panel made in galvanized steel powder coated in white M9016. ABS adjustable diffusion vanes shall have airflow straighteners on the back of the vanes. By EffectiV HVAC / MADEL.

## How to Order AXO-TWIN Series

AXO-TWIN	-AB	24	/M9016
		<b>Finish</b>	<b>M9016</b> Powder Coated RAL 9016 <b>RAL</b> Other RAL color
		<b>Dimension</b>	<b>24</b> 23.75" x 23.75" <b>Induction Vanes Color</b>
		<b>AB</b>	White Induction Vanes
		<b>AN</b>	Black Induction Vanes



