



Bulletin Z05



ZEPHYR | Model: Z
Ceiling Fan

MOVING YOUR WAY

CERTIFIED RATINGS

Zephyr Fans



PennBarry certifies that the Zephyr models shown on pages 4, 5, 13, 14 and 16 are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.



PennBarry certifies that the Zephyr models shown on pages 3, 4 and 12 are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.

UL and CSA Certification

Zephyr fans carry the UL label, UL 705, (ZACT), File #E28413.



Zephyrs are also certified by the Canadian Standard Association (File #LR13309).



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FANSIZER®

Product Selection Software

FanSizer software allows you to select the best centrifugal or axial unit for your application. Input CFM, static pressure, and FanSizer will make the optimum selection. It allows you to complete job schedules which you can store, modify and print in seconds. Features include: on-line help, on-screen product drawings and dimensions, and complete text specifications. In addition, you can convert job schedules to ASCII code for use with other programs like word processing.

FANCAD®

Library of CAD Drawings

FanCad is a library of drawings for use with computer-aided design (CAD) systems. FanCad's pre-drawn details can save hours of drafting time. Included are all popular PennBarry fans and related items.

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Following publication of this catalog changes may have been made in standard equipment, options and the like that would not be included. We reserve the right to make changes at any time, without notice, to models, specifications, options, availability, etc. This bulletin illustrates the appearance of PennBarry products at the time of publication and we reserve the right to make changes in design and construction at anytime without notice. Your local sales representative is the best source for current information.

Zephyrette & Zephyr Jr.

Zephyr Low Profile Fans



Features:

- Quiet operation – low sone level, non-overloading low power consumption design
- Lek-Trol™- variable speed controller can be built into fan housing for precise system balancing and energy conservation
- Thermal overload protection integral with motor
- Rustless, durable housing of galvanized steel
- UL approved

Performance and Dimensional Data

Model Number	Max Watts	Motor 60Hz AC	Motor RPM	Shipping Weight (lbs.)	FAN CAPACITY – CUBIC FEET PER MINUTE								
					SP	0.0"	.10"	.125"	.250"	.375"	.500"	.625"	.750"
ZT	48	115/1	1200	19	CFM	91	88	88	85	75	49	–	–
					SONES	1.8	2.2	2.3	2.8	3.0	3.2	–	–
					RPM	840	930	970	1110	1280	1460	–	–
ZJ1	125	115/1	1200	19	CFM	149	156	157	158	160	153	138	117
					SONES	2.0	2.3	2.4	3.0	3.4	3.4	3.6	3.5
					RPM	760	1000	1020	1150	1240	1360	1450	1520

Performance shown is for installation type A - Free inlet, Free outlet. Performance ratings include the effects of inlet grille and backdraft damper in the airstream. Speed (RPM) shown is nominal. Performance is based on actual speed of test. The sound ratings shown are loudness values in fan sones at 5' (1.5m) in a hemispherical free field calculated per AMCA std. 301. Values shown are for installation Type A: free inlet fan sone levels. The AMCA Certified Ratings Seal applies to air performance ratings only.

Installation Options

Typical Ceiling Installation

1. Blower Housing
2. Duct Connection Sleeve
3. Discharge Duct
4. Finished Ceiling
5. Backdraft Damper
6. Removable Deluxe Face Grille
7. Electrical Leads for Conduit
8. Adjustable Mounting Flanges

Through the roof

Through the wall

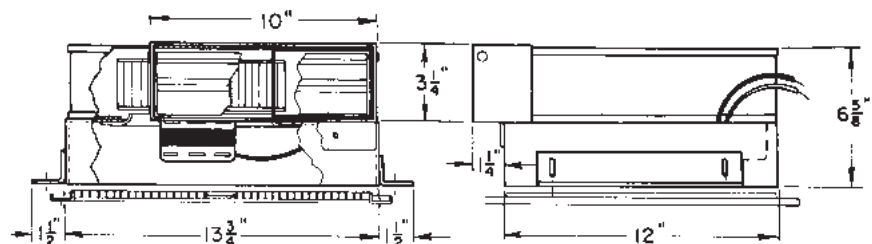
Through the eave or into attic spaces

Suggested Specifications

All ceiling and/or wall mounted fans indicated on the plans and schedule shall be Zephyr Jr., or Zephyrette models by PennBarry, 1401 North Plano Road, Richardson, TX 75081. Air deliveries and maximum sone levels shall be as indicated on the plans. Fans shall be listed with Underwriters Laboratories. Fans shall feature true steel centrifugal wheels and the galvanized steel fan casing shall incorporate an integral backdraft damper. Motor speed shall not exceed listed RPM. Grille shall be of white egg-crate shape design, comply with OSHA requirements and provide 85% free open area. Terminal box shall be provided with cord, plug and receptacle. Entire fan, motor and wheel assembly shall be removable without disturbing the housing.

Optional Accessories

Flat Roof Cap	WCF8
Sloped Roof Cap	SL20
Wall Cap	WC10
Speed Control	LT30
Timer Switch	AM12
Ceiling Radiation Damper	DDA6



Zephyr Transfan

Wood or coal burning stoves, gas or oil fired space heaters and fireplaces do an excellent job of economically heating the surrounding space. The PennBarry Transfan is now available to move that heated air through partitions or ceilings to other rooms in your home or office. The Transfan spreads the value of your stove or heater. It's easy to install, quiet and economical, and effectively moves heated air to remote rooms.



Each PennBarry Transfan has an integral Lek-Trol™ speed controller to modulate airflow. Capacity can be varied from 50 to 255 cubic feet of air per minute. Power consumed is less than 60 watts making the Transfan a great energy stretcher.

Features:

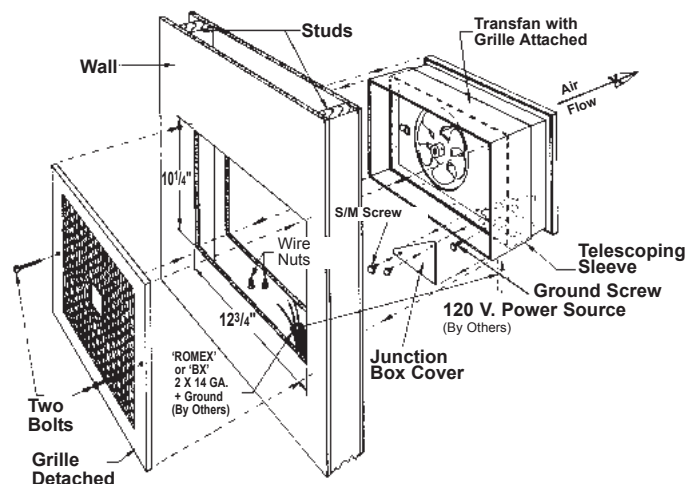
- Fits easily between wall studs or ceiling joists
- Variable speed controller is built-in for individual comfort adjustment
- Attractive face grilles diffuse air evenly
- Moves up to 255 cubic feet of air every minute
- Installs in walls 3 3/4" to 5" thick with adjustable sleeve
- Runs quietly even at top speed
- 490 rpm fan speed
- 115 volts single phase
- 255 CFM air capacity at 0" S.P.
- 60/50 Hz
- 2.2 sones quiet operation
- 9.5 lb., shipping weight

NOTE: Performance shown is for installation type A - Free inlet, Free outlet. Performance ratings include the effects of inlet and outlet grilles installed. Speed (RPM) shown is nominal. Performance is based on actual speed of test. The sound ratings shown are loudness values in fan sones at 5' (1.5m) in a hemispherical free field calculated per AMCA std. 301. Values shown are for installation Type A: free inlet fan sone levels. The AMCA Certified Ratings Seal applies to air performance ratings only.

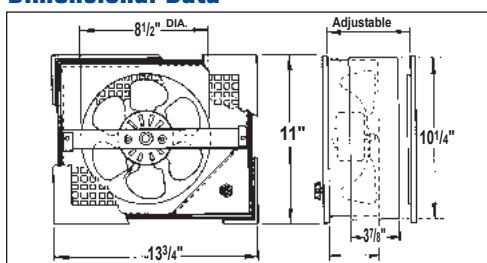
Compact Transfans Are Easy To Install

Installation Instructions:

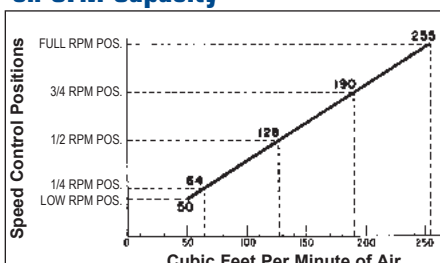
1. Cut 12 3/4" wide x 10 1/4" high openings between wall studs or ceiling joists (template provided).
2. Run 115/1/60 (house current) to the opening.
NOTE: The Transfan has its own built-in, on-off, variable speed controller so a separate switch is not needed if the Transfan is located within arm's reach.
3. Measure the wall thickness and slide the telescoping sleeve to its required depth. Standard Transfans fit openings 3 3/4" to 5" thick. For thinner walls, add a frame around the opening.
4. Place the Transfan in the wall and draw UL listed wire through the bottom hole of the junction box. Make secure electrical connection with two wire nuts and replace junction box cover.
5. Slide the Transfan into its permanent position (be sure the grille that was shipped attached to the unit-with knob is facing the room into which airflow is to be directed) and install the unattached grille.



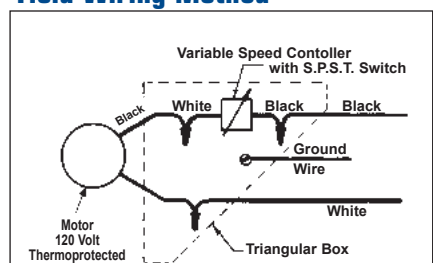
Dimensional Data



Effect Of Speed Control on CFM Capacity



Field Wiring Method



Z1

Compact Economical Fan

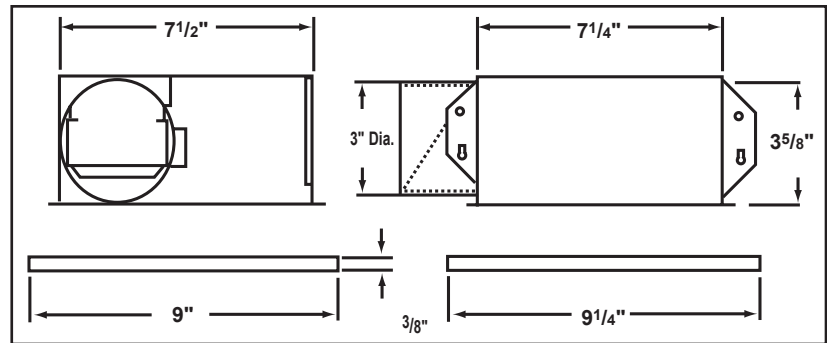
Features:

- 56 CFM, 3.4 Sones @ 0.0" Ps
- Quiet-designed durable blower wheels
- Torsion spring grille mounting – no tools needed
- Compact housings fit easily between wall studs
- Double strength steel mounting flanges with keyhole lots for fast, sturdy installation
- UL listed for use over bathtubs and showers when connected to a GFCI protected branch circuit
- AMCA licensed for both air and sound



Optional Accessories

FLAT ROOF CAP	WCF8
SLOPED ROOF CAP	SL20
WALL CAP	WC10
SPEED CONTROL	LT 30
TIMER SWITCH	AM12
CEILING RADIATION DAMPER	NA



Performance Data

Model No.	SONES at 0.0" Ps	CFM at Static Pressure (P _S - Inches of H ₂ O)						Volts	Watts	Nominal RPM	Duct Dia.
		0.0	.1	.125	.25	.375	.5				
Z1	3.4	56	51	50	46	41	32	120	55	1700	3"

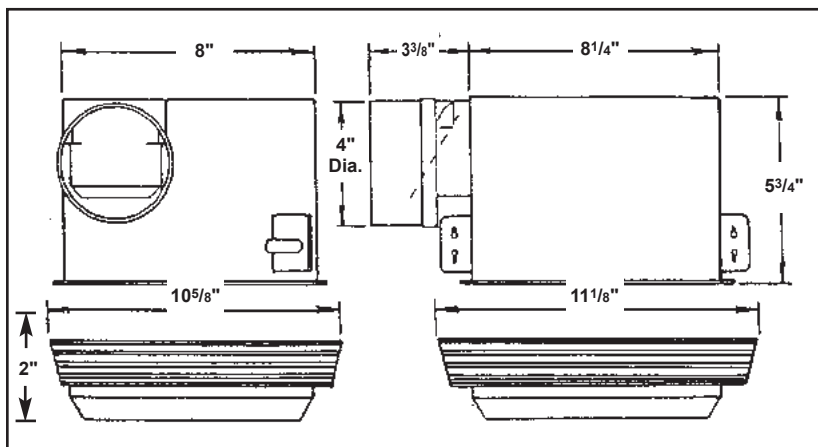
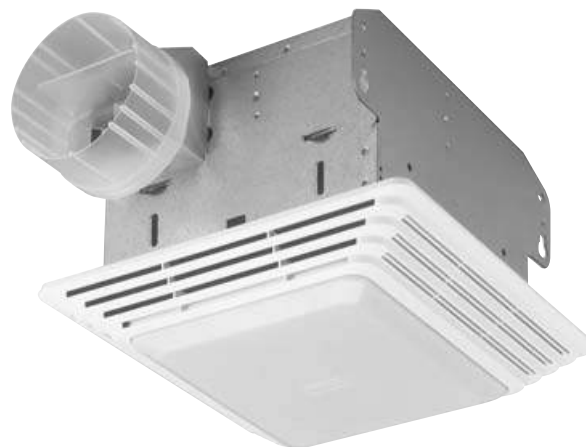
Performance shown is for installation type B - Free inlet, ducted outlet. Performance ratings include the effects of inlet grille and backdraft damper in the airstream. Speed (RPM) shown is nominal. Performance is based on actual speed of test. The sound ratings shown are loudness values in fan sones at 5' (1.5m) in a hemispherical free field calculated per AMCA std. 301. Values shown are for installation Type B: free inlet fan sone levels.

ZL1 & ZL2

Ceiling Fans with Light

Features:

- 62 CFM, 1.9 Sones @ 0.0" Ps – Model ZL1
- 97 CFM, 4.0 Sones @ 0.0" Ps – Model ZL2
- 100 watt lighting (bulb not included)
- Totally enclosed low RPM motor with permanently sealed bearings
- Centrifugal blower wheel
- White molded polymeric grille with unbreakable light lens
- Plug-in receptacles for fan and light
- Rugged steel housing with built-in mounting brackets
- 4" polymeric duct connector
- Durable damper quietly eliminates backdrafts – no metallic clatter
- UL listed for use over bathtubs and showers when connected to a GFCI protected branch circuit
- AMCA licensed for both air and sound



Optional Accessories

FLAT ROOF CAP	WCF8
SLOPED ROOF CAP	SL20
WALL CAP	WC10
SPEED CONTROL	LT 30
TIMER SWITCH	AM12
CEILING RADIATION DAMPER	NA

Performance Data

Model No.	Sones at 0.0" Ps	CFM at Static Pressure (Ps - Inches of H ² O)						Volts	Watts	Nominal RPM	Duct Dia.
		0.0	.1	.125	.250	.37	.500				
ZL1	1.9	62	51	49	32	9	-	120	30	1070	4"
ZL2	4	97	87	84	69	50	19	120	50	1380	4"

Performance shown is for installation type B - Free inlet, ducted outlet. Performance ratings include the effects of inlet grille and backdraft damper in the airstream. Speed (RPM) shown is nominal. Performance is based on actual speed of test. The sound ratings shown are loudness values in fan sones at 5' (1.5m) in a hemispherical free field calculated per AMCA std. 301. Values shown are for installation Type B: free inlet fan sone levels.

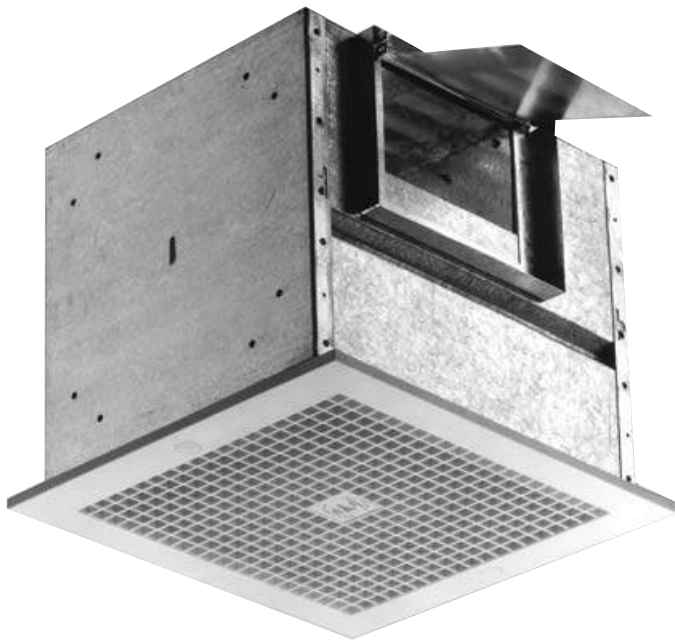
Features & Benefits

Zephyr Fans

Zephyr ceiling and inline fans are designed and constructed to create a quiet and reliable product. Each unit is fully assembled and tested prior to shipment. Extensive combinations of wheel sizes and speeds enable the Zephyr to cover a wide range of CFM.

Complete Range Of Performance

PennBarry provides the most ceiling fan options of any manufacturer. With 17 different models spaced evenly across the CFM and static pressure spectrums, there is a Zephyr to meet each of your requirements.



Infinite Speed Adjustment

Zephyr performance can be precisely adjusted with the use of a Lek-Trol™ speed control. Mounted either on the unit or remotely, Lek-Trols™ can be used to accommodate variable ventilation needs.

Low Sound

For sound critical applications, the Zephyr S series delivers the lowest sound ratings. All Zephyrs feature acoustically insulated housings, custom designed blower and motor pairings, motors mounted on vibration isolators, and for all but the smallest Zephyr-Z3H, dual inlet blowers.

High Static Pressures

When higher static pressures are encountered, the Zephyr H series fans excel. Faster RPM allow these fans to better sustain airflow as static pressure increases. This makes them well suited for inline applications.

EasyTap Speed Selection

Selected Zephyrs (Z6S/H, Z8S/H, and Z10S/H) are provided with dual speed motors designed to run at nominal speeds of 1050 and 1550 RPM. By simply changing one wire tap, a fan's speed can be switched. This ability to alter speed and air flow allows on the spot adjustments to deal with unforeseen circumstances. Systems deficiencies can be accommodated in the field quickly and without the added cost of replacing a fan.

Quick Access Wiring

Wiring the Zephyr is quick and easy. Access to the motor leads is through a panel in the side of the unit; there is no need to remove the power pack. However, if the need to remove the power pack ever arises, a quick connect plug makes the process simple and easy.

Construction

Motors

All units have permanently lubricated motors manufactured to PennBarry's exacting specifications. Motors feature built in overload protection and plug in disconnects.

Grilles

Constructed of attractive molded white plastic, aerodynamically designed grilles feature an 85% free area. To make for easy removal and cleaning, the grilles are held in place with spring clips. An optional metal face grille with a white finish is available.

Wheels

Wheels are dynamically balanced and performance matched with the motor. On models Z5H and larger dual inlet blowers are employed to minimize sound levels.

Housings

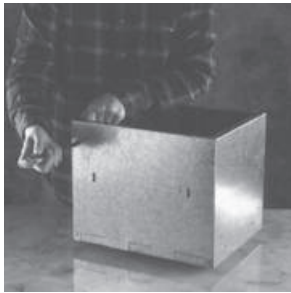
Housings are fabricated of galvanized steel. Acoustical insulation is used to minimize sound.

Field Conversion

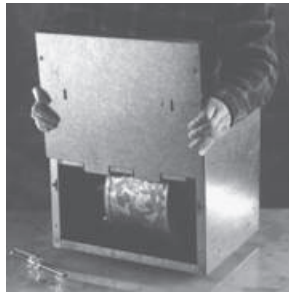
The Zephyr cabinet is designed for quick transition from right angle discharge to top discharge or into an inline configuration. Simply remove two (or four depending upon model) sheet metal screws, switch positions of the access panel and top panel, re-attach screws, and a right angle discharge becomes a top discharge fan.

There is no need to remove the power pack. The blower remains oriented in one position while the panels change places. The transformation to an inline fan is accomplished by the replacement of the grille with an access panel. Again, only two (or four) screws are involved in the process.

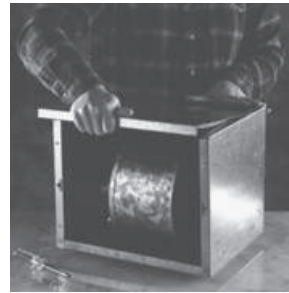
Changing From Right Angle To Top Discharge



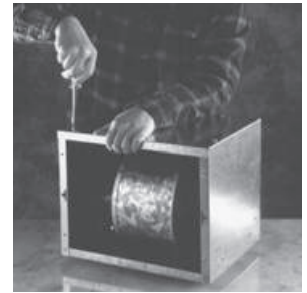
Step 1A. Remove screws.



Step 1B. Remove access panel.



Step 1C. Rotate access panel 90°.

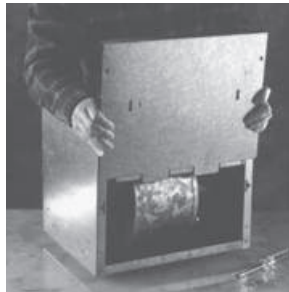


Step 1D. Reinstall screws.

Changing From Ceiling Mount To Inline Configuration



Step 2A. Discard grille and remove access panel screws.



Step 2B. Remove access panel.



Step 2C. Install optional TDA panel and four screws.



Step 2D. Reinstall access panel and screws.

For Ultra Quiet Installations

PennBarry Zephyr fans are quiet ceiling fans. However, consideration must be given to the installation of the product to assure full benefit of this Zephyr feature.

Location is one such consideration. While Zephyr fans are quiet enough to be placed directly over the listener, the further the fan is located from the listener the quieter the fan will seem.

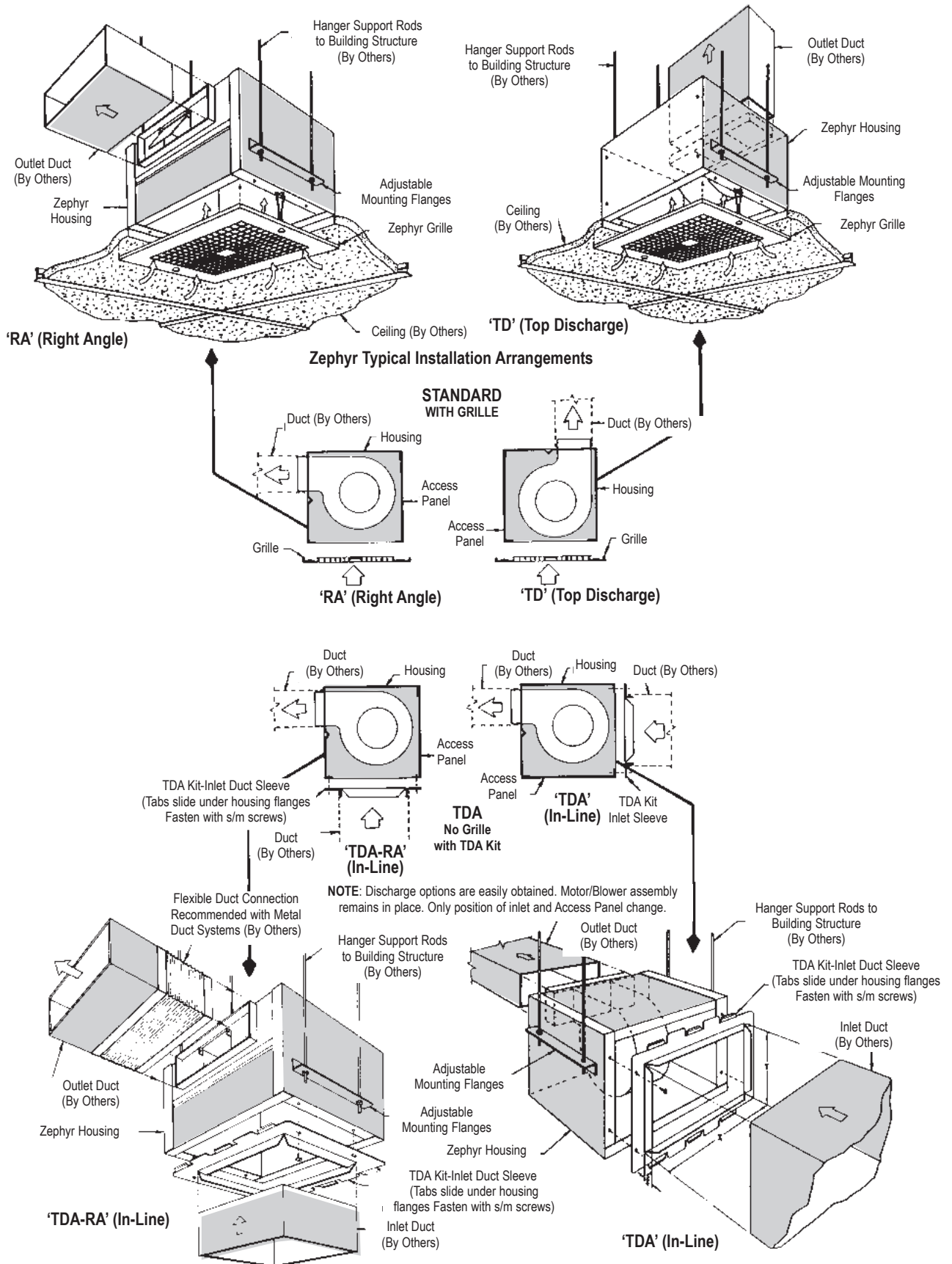
Frequently, other equipment such as pumps, air conditioners, etc. can transmit vibrations through building structure. In

order to isolate the fan from the building structure the use of vibration isolators is recommended. This prevents any building resonance from being transmitted to the fan housing.

The use of fiberglass ductboard generally results in the lowest installed noise levels. When metal ductwork is used, flexible duct connectors (by others) should be included on the outlet and inlet (Inline models - TDA). In critical applications an Inline Zephyr model TDA provides the lowest possible sound level.

Features & Benefits

Zephyr Installation



Accessories Matrix

Model	Roof Caps			Wall Cap	Brick Vent	Switches		Radiation [‡] Damper	Metal Face Grill
	Flat	Curb Mnt.	Slope			Speed Ctrl.	Time Delay		
Z3H	WCF06	WCC06	SL20+	WC10	B68	LT30	AM12	DDA3	MFG6
Z5H	WCF06	WCC06	SL20+	WC10	B68	LT30	AM12	DDA3	MFG6
Z6S/H	WCF06	WCC06	SL20+	WC10	B68	LT30**	AM12	DDA3	MFG6
Z8S/H	WCF08	WCC08	SL20+	WC10	B68	LT30	AM12	DDA8	MFG8
Z81S	WCF08	WCC08	SL20+	WC10	B68	LT30	AM12	DDA8	MFG8
Z10S/H	WCF08	WCC08	SL20+	SL20+	B100	LT50	AM12	DDA10	MFG10
Z101S	WCF10	WCC10	WCF10†	***	B120	LT30	AM12	DDA12	MFG12
Z102S	WCF10	WCC10	WCF10†	***	B120	LT50	AM12	DDA12	MFG12
Z12S	WCF12	WCC12	WCF12†	***	B120	LT50	AM12	DDA12	MFG12
Z121S	WCF12	WCC12	WCF12†	***	B120	LT40	AM12	DDA12	MFG12
Z102H	WCF14	WCC14	WCF14†	***	B120	LT40	AM12	DDA12	MFG12
Z12H	WCF14	WCC14	WCF14†	***	B120	LT40	AM12	DDA12	MFG12
Z14	WCF20	WCC20	CF	***	B120	LT40	AM12	--	MFG14*
Z15	WCF20	WCC20	CF	***	B150	LT35	--	--	MFG15*

+ Manufactured of galvanized steel. All other accessories manufactured of aluminum.

* Specify MFG (perforated metal) or MCG (aluminum core).

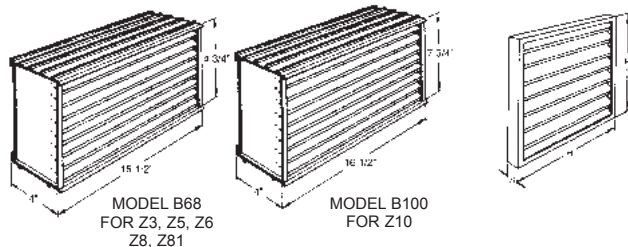
‡ Kit is field installed, shipped separate from fan.

** Z6H unit only. ***Use brick vent. †4 in 12 max. pitch.

Brick Vents

MODELS B120, B150

FOR	MODEL	H	S
Z101, Z12, Z121, Z102, Z14	B120	24	2
Z15	B150	30	



Sized to replace multiples of standard size brick or concrete block. Made of extruded aluminum with insect screens, stormproof features and a protective finish, they are superior vents and ideal for installation in masonry walls.

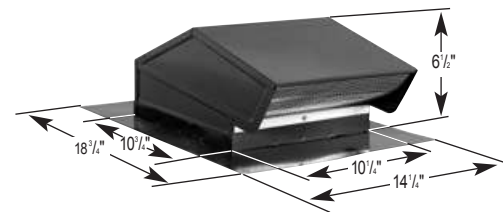
Lek-Trol™ Speed Controller

Lek-Trol™ Speed Controllers permit unlimited air control. They use solid state “quadrac” circuitry and insure not only complete speed range control and extra long life reliability but also a savings in the cost of electricity. Lek-Trols™ can be installed and connected within the fan casing, permitting precise system balancing.



Sloped Roof Caps

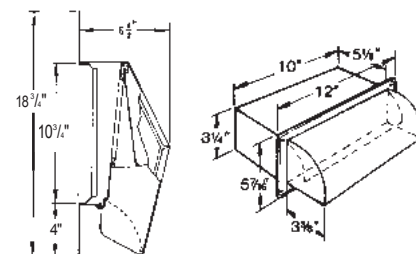
Caps are available for sloped roof applications. Minimum height model SL20 is durable and has an extra backdraft damper. Models WCF/WCC10, 12, 14, 20 are suitable for mounting on sloped roof 4" in 12" pitch or less.



MODEL SL20

Wall Caps

Inconspicuous but efficient wall outlets for the Zephyr fans are provided through the use of the Wall Cap. Architectural values are not diminished by this tastefully designed accessory and, when properly installed, it is both watertight and effective.



MODEL SL20

MODEL WC10

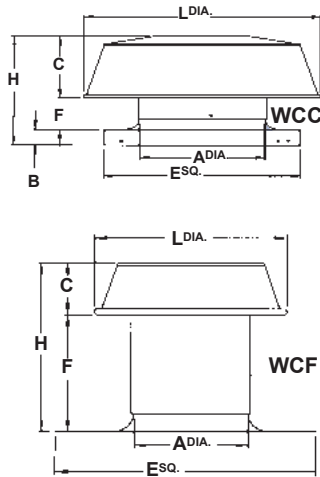
See page 10 for pressure drop information.

Accessories

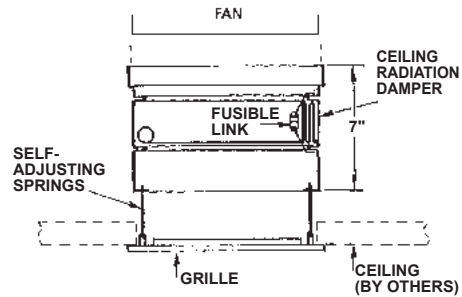
Zephyr Fans

Roof Caps

These spun aluminum, rustproof, seamless vents provide a discharge cap for flat roof mounting. Unobtrusive and furnished with integral bird screen, they are designed for simple, safe flashing directly to the roof. Mounting flanges are also available turned down as cap flashing when installation on roof curbs is desired. See the PennBarry Weathercap Bulletin for more information.



Ceiling Radiation Damper



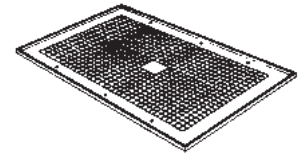
For areas where local codes require fire dampers for compliance with National Fire Protection Standard 90A, PennBarry offers a UL approved damper. The dampers are rated for 3 hours and are activated at 165 degrees F. Compact in design, the dampers add only 7" in height when mounted between the fan and the grille. Static pressure created by the damper is negligible.

For Use With	Model	A(Throat Dia)	B	C	ESQ	F	H	L-Dia	Damper SQ
Z1, ZL1, ZL2, ZT, ZJ1, Z3H, Z5H, Z6S/H	WCF06	7	N/A	3 1/2	16 7/8	8	11 1/2	12	NA
Z8S/H, Z81S, Z10S/H	WCF08	9	N/A	5 1/2	21 1/4	8	13 1/2	18 1/2	NA
Z101S, Z102S	WCF10	11	N/A	5 1/2	21 1/4	10	15 1/2	21	NA
Z12S, Z121S	WCF12	13	N/A	7	24	10	17	25	NA
Z102H, Z12H	WCF14	15	N/A	7	28	10	17	28	NA
Z14, Z15	WCF20	21	N/A	10 1/2	32	12	22 1/2	37	NA
Z1, ZL1, ZL2, ZT, ZJ1, Z3H, Z5H, Z6S/H	WCC06	7	1	3 1/2	15	4	8 1/2	12	8 3/4
Z8S/H, Z81S, Z10S/H	WCC08	9	1-1/2	5 1/2	18 1/2	4	11	18 1/2	11 1/4
Z101S, Z102S	WCC10	11	1 1/2	5 1/2	18 1/2	4	11	21	11 1/4
Z12S, Z121S	WCC12	13	2	7	20 1/2	4	13	25	15 3/4
Z102H, Z12H	WCC14	15	2	7	24 3/4	4	13	28	15 3/4
Z14, Z15	WCC20	21	2	10 1/2	28 1/2	5 1/2	18	37	19 3/4

ALL DIMENSIONS IN INCHES

Optional Metal Face Grille

For when the design calls for a more architecturally appealing grille, an optional metal face grille (MFG) is available. Attractive perforated metal design with overall white finish. (Not available for Z1, ZL1 & ZL2).

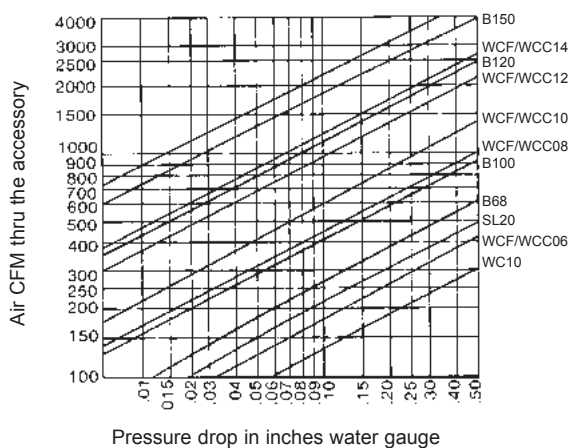


Inline Conversion (TDA) Kit

Adapter panel with integral duct flange allows conversion from ceiling fan (RA/TD) to inline fan (TDA). Adapter can be installed to provide for straight through (Inline) or 90° (Right Angle Inline) application. Use of the fan in Right Angle configuration allows the fan to replace an elbow in the duct system. This eliminates the pressure loss of the elbow and simplifies the installation for the contractor.

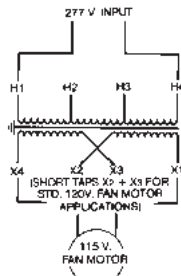
INLINE CONVERSION KIT	PART NO.
Z3, Z5, Z6	20722
Z8, Z81	20723
Z10	20724
Z12, Z101, Z102, Z121	20725

Static Pressure Drop Chart For Accessories



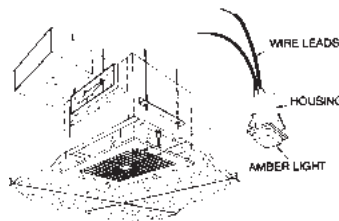
277 Volt Transformer

To meet local requirements voltage transformers are available for all Zephyrs.

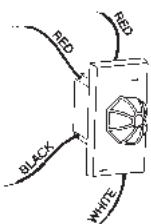


Pilot Light

This amber colored light easily snaps into any opening in the Zephyr grille. The light will indicate when the fan is in operation and is ideal when fan is not interlocked with lights.



Motion Sensor

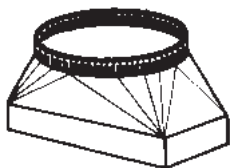


For applications where automated operation of the fan is required, a motion detector can be used to turn the fan on or off. The sensor features full scanning capabilities and can be placed anywhere within the room. The sensor also offers adjustable shutoff feature with delays of up to 15 minutes.

Square To Round Transition

Duct Transition	Part No.	Units	Round Dia.
ZT, ZJ1, Z3, Z5, Z6	56337-0	3 1/4 x 10	6
Z8, Z81, Z10	56340-0	6 x 8	8
Z12, Z101, Z102, Z121*	56385-0	6 x 8	8

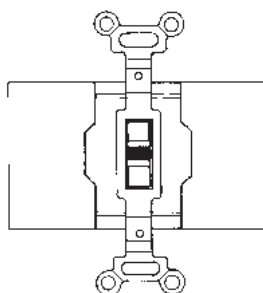
* Includes two (2) pieces.



Designed to make the installation of flex duct quick and easy. Available to accommodate the most common flex duct sizes.

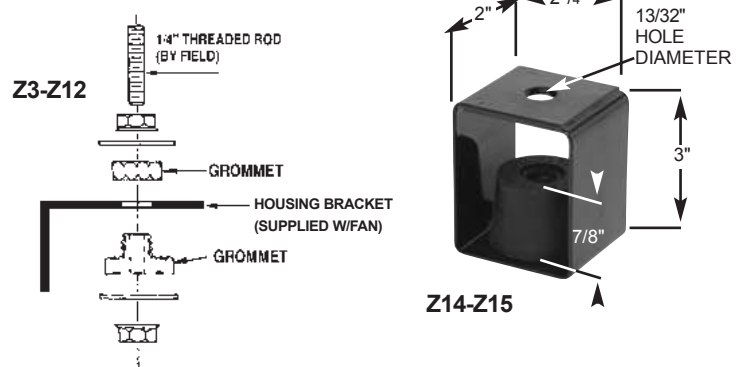
Two Speed Switch

A PennBarry Exclusive. The decorator, three position center off, two speed switch is designed to work with PennBarry's EasyTap Dual Speed Motors (models Z6S/H, Z8S/H & Z10S/H). Adjust from low (S) to high (H) with the flick of a switch. Manually adjust for changes in room and static pressure conditions.



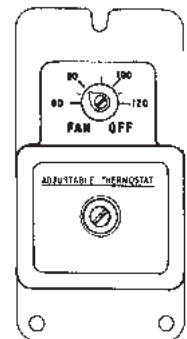
Vibration Hanger

Hanger vibration eliminators feature rubber-in-shear type and are available for use with all units.



Temperature Sensing Two Speed Switch

Yet another PennBarry Exclusive. Designed to work with PennBarry's EasyTap Dual Speed Motors (models Z6S/H, Z8S/H & Z10S/H), this switch is optimized for areas in which temperature levels and room conditions vary. An adjustable thermostat, mounted within the housing, automatically switches the fan from low (S) to high (H) speed. Simply set the thermostat to the desired temperature and the fan will adjust automatically to meet your needs. A great alternative to the Two Speed Switch.



Time Delay Switch AM12



The Airminder Time Delay Switch is a UL listed, inexpensive, single gang toggle switch and time delay relay that operates both the fan and room light. Airminder AM12 uses 120 volt power and ventilates the room even after the occupants leave. SNAP ON: Light and fan on immediately. SNAP OFF: Light goes off immediately. Fan is set at factory to run for 4.5 minutes, to clear the air after the room is left vacant. However, time interval is field adjustable to run from 0 to 10 minutes. The Airminder can also be used with a separate light switch or no light at all to provide the same features as described above. PennBarry also makes a Combination Lek-Trol™ Airminder (2 gang box required) for variable speed and time delay.

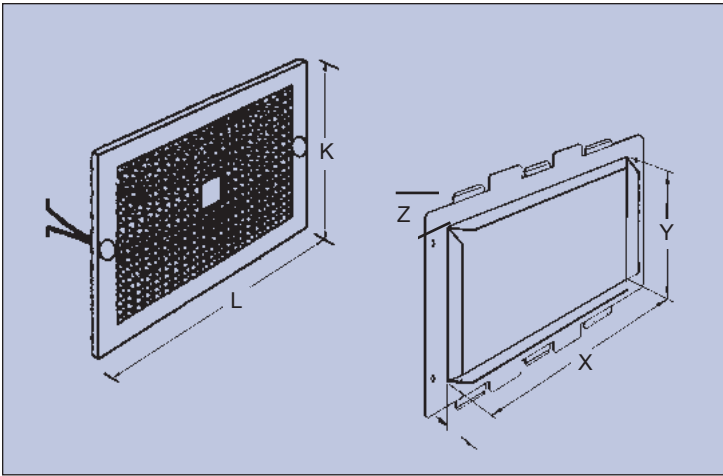
Dimensional Data

Zephyr Fans

RA/TD Zephyrs

Model	Housing							Outlet Duct			Grill		TDA Panel		
	A	B	C	D	E	E'	F	G	H	J	K	L	X	Y	Z
Z3,5,6	12 1/2	9 1/8	16	9 1/8	1 1/4	1 1/4	5 3/8	10	3 1/4	3/4	11	13 3/4	10	6	1 5/8
Z8,81	13 7/8	11 3/8	17 3/8	11 3/8	1 7/8	4	5 1/4	8	6	3/4	13 1/4	14 7/8	10	8	1 9/16
Z10	18	14 1/8	21 1/2	14 1/8	3 5/8	6 3/8	8	8	6	3/4	15 1/2	19 3/8	14	10	2
Z12, 101, 102, 121	24	14 1/8	27 1/2	14 1/8	1	1	8	22	6	3/4	15 1/2	25	20	10	2

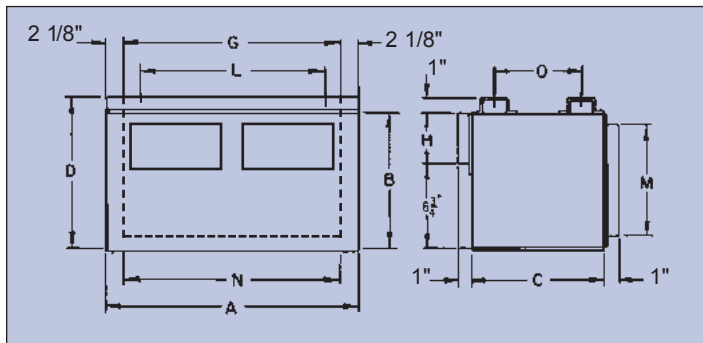
ALL DIMENSIONS IN INCHES



Large Capacity Zephyrs

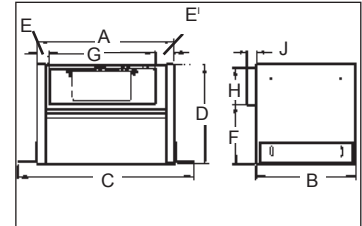
Model	A	B	C	D	L	O	Outlet		Inlet	
							G	H	M	N
Z14	38	14 1/2	14 1/2	15 1/2	26 1/2	7 5/8	33 3/4	7 3/4	12 1/2	36
Z15	45 1/2	16 1/2	16 1/2	17 1/2	31 3/4	10	41 1/4	9 3/4	14 1/2	43 1/2

ALL DIMENSIONS IN INCHES

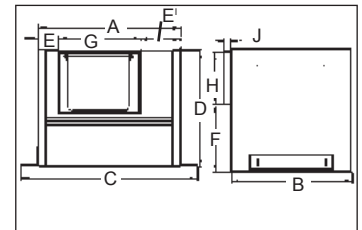


TDA/TDA-RA Zephyrs

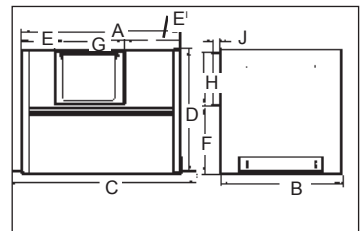
Z3, Z5, Z6



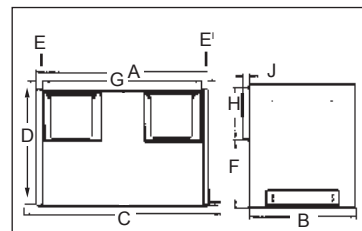
Z8, Z81



Z10



Z101, Z102, Z12, Z121



Performance Data - RA/TD

Zephyrs Ceiling Mounted Models with Grills



- Adjustable Air Flow
- Low Sound Level
- Decorator Deluxe Grille is Standard
- Economical – Excellent Value
- Easy to Install and Maintain

Zephyr ⁴ Model No.	MAX. WATT	Amps	RPM ¹	FAN CAPACITY - CUBIC FEET PER MINUTE								
				SP	0.000"	0.125"	0.250"	0.375"	0.500"	0.625"	0.750"	
Z3H	39	0.5	1550	CFM	109	83						
				SONES ²	1.7	2.3						
Z5H	79	1	1550	CFM	192	163	128	93				
				SONES ²	2.5	2.7	2.8	2.8				
Z6S ⁵	47	0.6	1050	CFM	123	101	82					
				SONES ²	0.9	1.4	1.8					
Z6H ⁵	108	1.4	1550	CFM	230	196	166	122				
				SONES ²	3.3	3	3	3.1				
Z8S ⁶	77	1	1050	CFM	272	247	231	217	199			
				SONES ²	2.1	2.4	2.9	3.3	3.6			
Z81S	77	0.9	1050	CFM	310	273	239	213	182	136	73	
				SONES ²	2.5	2.7	2.9	3.3	3.7	4.2	4.3	
Z8H ⁶	130	1.6	1550	CFM	426	401	377	357	341	328	304	
				SONES ²	4.5	4.7	4.7	5.1	5.6	5.8	5.8	
Z10S ⁷	243	2.5	1050	CFM	469	441	423	403	387	367	347	
				SONES ²	4.5	4.8	5.1	5.4	5.6	5.8	6	
Z101S	153	1.6	1050	CFM	612	537	467	405	222	116		
				SONES ²	3.9	3.6	3.9	4.6	5.5	6		
Z10H ⁷	390	3.6	1550	CFM	728	694	664	638	613	591	565	
				SONES ²	8.6	8.6	8.6	8.7	8.6	8.8	8.8	
Z102S	269	4.5	1050	CFM	816	747	691	602	335			
				SONES ²	5.8	5.8	5.4	5	4.9			
Z12S	260	2.9	1050	CFM	901	855	812	755	683	552		
				SONES ²	5.8	5.9	6.3	6.5	6.5	6		
Z121S	370	3.6	1050	CFM	1083	1062	1024	949	838	686	270	
				SONES ²	7	6.9	6.6	6.1	5.7	5.3	4.6	
Z102H	812 (BHP 0.53)	7.5	1550	CFM	1435	1385	1338	1294	1247	1203	1163	
				SONES ²	11.8	11.7	11.9	11.9	11.7	11.3	11	
Z12H	851 (BHP 0.65)	7.9	1550	CFM	1566	1511	1464	1417	1364	1307	1251	
				SONES ²	13.5	13.3	12.9	12.7	12.3	12	11.7	

1 Speed (RPM) shown is nominal. Performance is based on actual speed of test.

2 Performance shown is for installation type B - Free Inlet, Ducted Outlet. Performance ratings include the effects of an inlet grille and backdraft damper in the airstream.

The sound ratings shown are loudness values in fan sones at 5ft. (1.5m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type B: free inlet fan sone levels.

4 Specify discharge configuration. Standard types are RA, TD, TDA and TDA-RA.

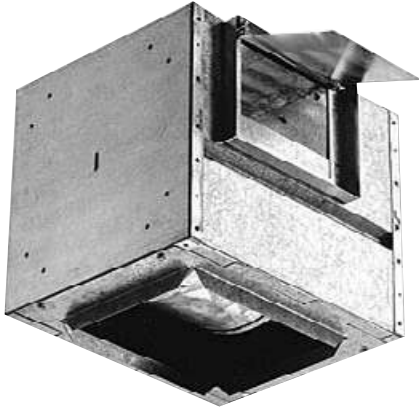
5 Z6S and Z6H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

6 Z8S and Z8H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

7 Z10S and Z10H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

TDA/TDA-RA - Performance Data

Zephyr Inline Fans



- Extensive Capacity Range
- Ultra Quiet Operation
- Quality Construction Throughout
- Adjustable Air Flow

Zephyr ⁴ Model	MAX. WATT	Amps	RPM ¹	FAN CAPACITY - CUBIC FEET PER MINUTE											
				SP	0.000"	0.125"	0.250"	0.375"	0.500"	0.625"	0.750"	1.000"	1.250"	1.500"	
Z3H (TDA)	42	0.5	1550	CFM	107	81									
				SONES ³	1.7	1.9									
Z5H (TDA)	83	1	1550	CFM	199	171	143	104							
				SONES ³	1.9	2	2.1	2.1							
Z6S (TDA) ⁵	46	0.6	1050	CFM	127	93	66								
				SONES ³	0.9	1.2	1.6								
Z6H (TDA) ⁵	108	1.4	1550	CFM	227	192	157	113							
				SONES ³	2.7	2.7	2.8	2.9							
Z8S (TDA) ⁶	75	1	1050	CFM	255	228	208	190	165	139	110				
				SONES ³	1.8	1.9	2.4	2.8	3.3	3.6	3.7				
Z81S (TDA)	84	0.9	1050	CFM	307	274	252	228	198	152	95				
				SONES ³	2.2	2.2	2.5	2.9	3.1	3.3	3.5				
Z8H (TDA) ⁶	132	1.6	1550	CFM	402	376	350	335	318	301	277				
				SONES ³	4.1	3.9	3.9	4.2	4.4	4.6	4.9				
Z10S (TDA) ⁷	234	2.5	1050	CFM	456	423	391	367	350	337	320	268	128		
				SONES ³	4.1	4.5	4.7	4.9	5.2	5.4	5.7	6.2	6.4		
Z101S (TDA)	152	1.6	1050	CFM	609	521	438	373	272	130					
				SONES ³	3.2	3.4	4.3	4.6	5.2	5.6					
Z10H (TDA) ⁷	372	3.6	1550	CFM	700	661	626	593	558	528	504	455	368		
				SONES ³	8	8	7.9	7.9	8	8.2	8.1	8	7.8		
Z102S (TDA)	273	4.5	1050	CFM	780	720	660	592	336						
				SONES ³	4.6	5.7	5.6	4.8	4.7						
Z12S (TDA)	263	2.9	1050	CFM	886	829	786	735	660	526	180				
				SONES ³	5.5	5.7	5.6	5.8	5.7	5.3	4.7				
Z121S (TDA)	344	3.6	1050	CFM	1089	1043	981	899	802	672	404				
				SONES ³	6.5	6.5	6.3	6	5.7	5.3	4.4				
Z102H (TDA) (BHP 0.53)	810	7.5	1550	CFM	1397	1348	1301	1253	1206	1162	1121	1034	916	611	
				SONES ³	10.7	10.5	10.7	10.6	10.4	10.1	9.9	9.6	9.4	9	
Z12H (TDA) (BHP 0.53)	812	7.9	1550	CFM	1519	1475	1430	1386	1343	1300	1254	1146	1017	697	
				SONES ³	12.7	12.4	12.2	11.7	11.5	11.2	10.9	10.5	10.2	9.6	

1 Speed (RPM) shown is nominal. Performance is based on actual speed of test.

3 Performance shown is for installation type D - Ducted inlet, Ducted outlet. Performance ratings do not include the effects of appurtenances in the airstream.

The sound ratings shown are loudness values in fan sones at 5ft. (1.5m) from the test inlet duct in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installations Type D: ducted inlet ducted outlet. Ratings do not include the effect of duct end correction.

4 Specify discharge configuration. Standard types are RA, TD, TDA and TDA-RA.

5 Z6S and Z6H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

6 Z8S and Z8H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

7 Z10S and Z10H is the same unit shipped with EASYTAP dual speed motor. Wired on S (low) speed.

Performance Data

Large Capacity Zephyr Fans



- Quiet Design with Insulated Housing
- Performance Range to 3290 CFM
- Versatile Discharge Directions
- Install Easily in Confined Spaces
- Optional Grille Available
- Easy Access Panel

Model No.	RPM	Inlet Area	Outlet Area	Wheel Size		FAN CAPACITY - CUBIC FEET PER MINUTE											
				Dia.	Circum.	SP	0.100"	0.125"	0.250"	0.375"	0.500"	0.625"	0.750"	0.875"	1.00"		
Z14 115/1/60 1/2 HP	1150	0.5	1550	8"	2.09'	CFM	2200	2195	2050	1870	1685	1425	880	285			
						SONES	7.9	7.9	7.6	7.1	6.8	6.7	6.6	6.4			
						BHP	0.56	0.56	0.54	0.49	0.45	0.39	0.26	0.15			
	1060	1	1550	8"	2.09'	CFM	2025	2015	1835	1645	1400	880					
						SONES	7.2	7.2	6.9	6.4	6.3	6					
						BHP	0.44	0.43	0.4	0.36	0.33	0.22					
	980	0.6	1050	8"	2.09'	CFM	1865	1845	1630	1410	1015	280					
						SONES	6.6	6.6	6.2	5.8	5.7	5.3					
						BHP	0.34	0.34	0.31	0.28	0.2	0.1					
	880	1.4	1550	8"	2.09'	CFM	1660	1605	1375	1055	255						
						SONES	5.8	5.8	5.4	4.8	4.6						
						BHP	0.25	0.24	0.21	0.17	0.07						
Z15 230/1/60 1 HP	1030	0.9	1050	9"	2.36'	CFM	3290	3260	3100	2920	2720	2510	2260	1930	1140		
						SONES	9.5	9.5	9.4	9	8.7	8.6	8.3	8.2	8.1		
						BHP	1.1	1.1	1.05	1	0.96	0.91	0.85	0.75	0.52		
	1000	1.6	1550	9"	2.36'	CFM	3185	3155	2990	2800	2590	2365	2085	1625			
						SONES	9.4	9.4	9.2	8.7	8.4	8.3	8	7.7			
						BHP	1	1	0.95	0.91	0.86	0.81	0.73	0.61			
	950	2.5	1050	9"	2.36'	CFM	3015	2980	2805	2600	2375	2115	1755				
						SONES	8.8	8.8	8.6	8.2	7.8	7.6	7.4				
						BHP	0.86	0.85	0.81	0.77	0.72	0.66	0.56				
	880	1.6	1050	9"	2.36'	CFM	2775	2735	2535	2305	2045	1715					
						SONES	8	7.9	7.8	7.4	7.1	6.9					
						BHP	0.68	0.68	0.63	0.59	0.54	0.46					

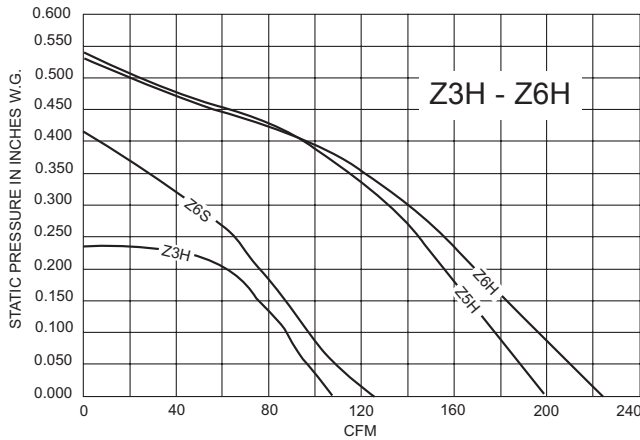
Speed (RPM) shown is nominal. Performance is based on actual speed of test. Other speeds listed are obtainable by using Lek-Trol™ model LT40 for fan model Z14 and Lek-Trol™ LT35 for fan model Z15. Sone ratings are in accordance with AMCA Bulletin 301-90. Performances shown is for installation type B - Free inlet, Ducted outlet. The AMCA Certified Ratings Seal applies to air capacities only. Performance ratings do not include the effects of appurtenances in the airstream. See pages 9 through 11 for accessories.

Fan Curves

Zephyr Fans

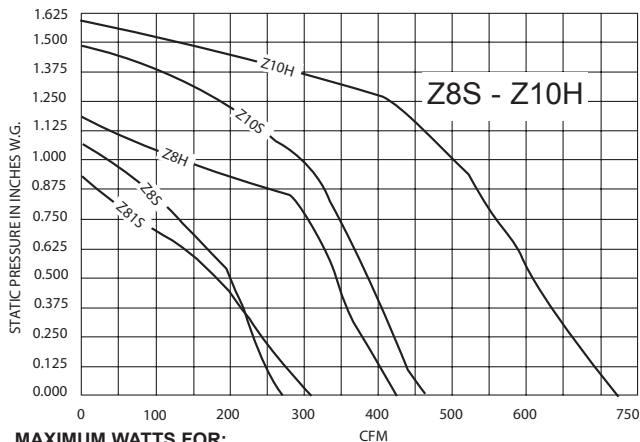
All Zephyr fan curves are based on laboratory tests conducted in accordance with AMCA standards. The curves shown below summarize the sizes and speeds of units available.

RA Models



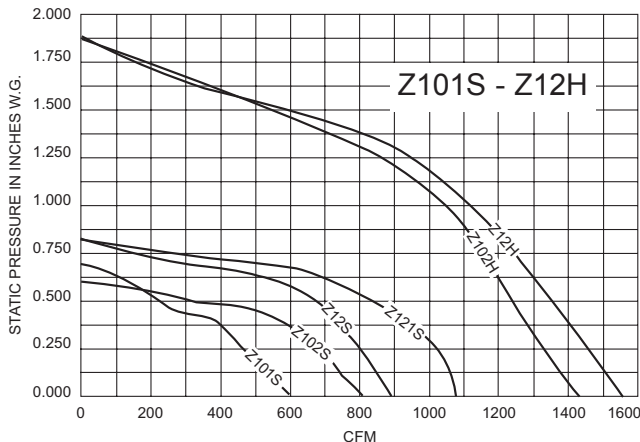
MAXIMUM WATTS FOR:

MODEL Z3H - 39	MODEL Z6S - 47
MODEL Z5H - 79	MODEL Z6H - 108



MAXIMUM WATTS FOR:

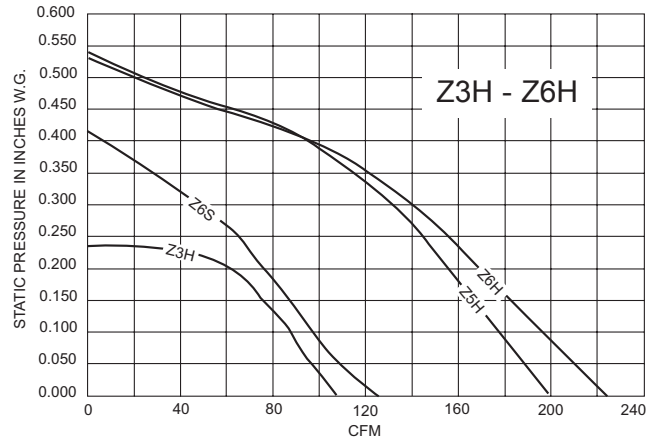
MODEL Z8S - 77	MODEL Z8H - 130
MODEL Z81S - 77	MODEL Z10S - 108
MODEL Z10H - 390	



MAXIMUM WATTS FOR:

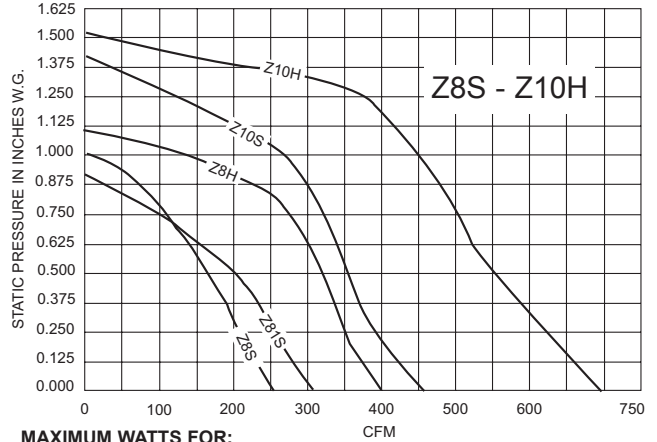
MODEL Z101S - 153	MODEL Z121S - 370
MODEL Z102S - 269	MODEL Z102H - 812
MODEL Z12S - 260	MODEL Z12H - 851

TDA Models



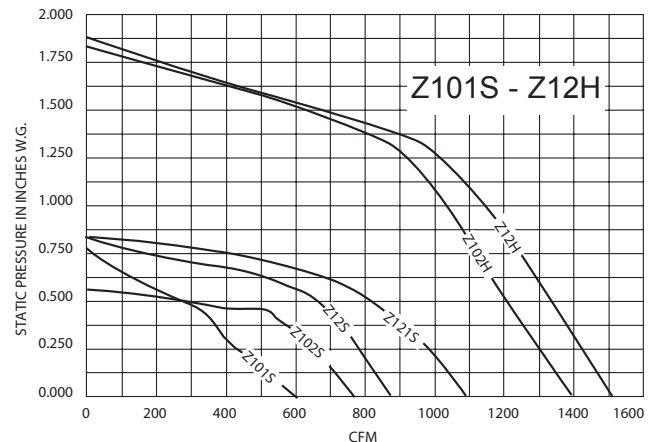
MAXIMUM WATTS FOR:

MODEL Z3H - 42	MODEL Z6S - 46
MODEL Z5H - 83	MODEL Z6H - 108



MAXIMUM WATTS FOR:

MODEL Z8S - 75	MODEL Z8H - 132
MODEL Z81S - 84	MODEL Z10S - 234
MODEL Z10H - 372	



MAXIMUM WATTS FOR:

MODEL Z101S - 152	MODEL Z121S - 344
MODEL Z102S - 273	MODEL Z102H - 810
MODEL Z12S - 263	MODEL Z12H - 855

Since any mechanical power generates some sound energy into the air, fans will create some noise. Because of the great number of factors influencing sound output, it is invalid to compare fans based on RPM, tip speed or outlet velocity. The only accurate basis of comparison is the sound power level generated by the fan at the required point of operation.

System designers use many methods to predict acoustic acceptability of an occupied space. The A-weighted sound pressure level provides a single number that corresponds well to the human judgement of relative loudness. OSHA bases requirements regarding exposure to noise on A-weighted sound pressure levels. The disadvantage of this method is that A-weighted sound pressure levels do not provide information as to the quality of the sound. Noise Criteria (NC) curves are also widely used. To determine the NC level, the sound power spectrum is compared to defined limits. Other methods include RC curves, sones, SIL and Noise Rating Curves.

Each method relies on sound pressure level information because the human ear “hears” sound pressure fluctuations, not sound power (Watts). Sound pressure is a function of the attenuation of the space and the distance from the source. Consider a 100 watt light bulb. It provides adequate light for a closet, but not a classroom. And in a stadium it would be imperceptible. While the light source was the same power (100 watts), the brightness level changed dramatically. Similarly, the same sound power level (acoustical energy) produces greatly different sound pressure levels (noise).

In addition to sound power levels, PennBarry has provided sone ratings to allow designers to make an educated judgement as to the noise level a fan will develop in a space. Sone ratings are a loudness index developed from sound power level data. The calculation is at 5' from the fan inlet and in front of a reflecting plane (hard wall). Sones are weighted similarly to the A-weighting scale in that more weight is given to frequencies that people hear “well” and less weight to frequencies that people do not hear “well”. Another feature of the sone scale is that it is linear rather than logarithmic. This means that 40 sones is 33% louder than 30 sones, as opposed to 40 dB being twice as loud as 30 dB.

Since the sone rating is determined from well defined assumptions and is linear in nature, it is ideal for comparing different fans moving air at the same CFM and SP. When using sones for this purpose, differences of 3 sones are considered negligible. The suggested loudness level chart below is a practical guideline for acceptable installed performance.

Sound power levels shown in this catalog were measured and certified using AMCA Standard 300 Reverberant Room Method for Sound Testing of Fans. The values shown are for the eight octave bands defined in this standard, which agree with ANSI 61.11-1986. One-third octave band sound power levels are available upon request. The sound power levels shown are rated in decibels (dB) using 10-12 Watts as a reference. The sone values shown in this catalog are based on the sound power levels determined above, and calculated in accordance with AMCA Standard 301 “Methods for Calculating Fan Sound Ratings from Laboratory Test Data”.

Since any mechanical power generates some sound energy into the air, fans will create some noise. Because of the great number of factors influencing sound output, it is invalid to compare fans based on RPM, tip speed or outlet velocity. The only accurate basis of comparison is the sound power level generated by the fan at the required point of operation.

Having sound power levels for a specific fan at a specific operating point allows the system designer to determine the theoretical sound pressure level at any point in the occupied space. AMCA Publication 303 and the ASHRAE Guides provide more information on this process. Another use of sound power levels is to compare similar fans. Generally differences of 6 dB in the 63 Hz band and 4 dB in all other bands are considered insignificant. Sound power levels shown in this catalog were measured and licensed using AMCA Standard 300 Reverberant Room Method for Sound Testing of Fans. Values shown are for the eight octave bands defined in this standard, which agree with ANSI 61.11-1986. One-third octave band sound power levels are available upon request. The sound power levels shown are rated in decibels (dB) using 10-12 Watts as a reference. Sone values shown in this catalog are based on sound power levels determined above, and calculated in accordance with AMCA Standard 301 “Methods for Calculating Fan Sound Ratings from Laboratory Test Data”.

Engineering Notes

Zephyr Fans

The following section includes engineering and technical data, guidelines and system explanations related to air moving and control devices. Fan laws and system descriptions are consistent with industry standards, definitions and accepted practices. They are provided to assist system designers in sizing, selecting and defining their air moving and control systems as well as explaining variables inherent in system design.

Flow And Static Pressure

For any change in static pressure (SP), a squared relationship is applied to the flow ratio. This is expressed by the formula:

$$\frac{P_2}{P_1} = \left(\frac{CFM_2}{CFM_1} \right)^2$$

Where P_1 is the original static pressure,

P_2 is the desired static pressure,

CFM_1 is the original flow rate in cu. ft. per minute, and

CFM_2 is the desired flow rate in cu. ft. per minute.

This formula is based upon performance of a fan at one point on a system. This data can be used to calculate a fan performance curve indicative of all five points from 0" SP (maximum flow) to maximum SP (0 flow).

$$\frac{CFM_2}{CFM_1} = \frac{RPM_2}{RPM_1} \quad \frac{P_2}{P_1} = \left(\frac{CFM_2}{CFM_1} \right)^2 \quad \frac{HP_2}{HP_1} = \left(\frac{CFM_2}{CFM_1} \right)^3$$

$$\frac{CFM_2}{CFM_1} = \frac{RPM_2}{RPM_1} \quad \frac{P_2}{P_1} = \left(\frac{RPM_2}{RPM_1} \right)^2 \quad \frac{HP_2}{HP_1} = \left(\frac{RPM_2}{RPM_1} \right)^3$$

NOTE: Direct drive fans can change speed only through the use of a speed controller and cannot increase speed beyond catalog maximum. Fans must operate on single phase in order to change speed.

Air Systems

An air system may consist simply of fan with ducting connected to either the inlet or discharge or to both. A more complicated system may include a fan, ductwork, air control dampers, cooling coils, heating coils, filters, diffusers, noise attenuators, turning vanes, etc. The fan is the component in the system which provides energy to the airstream to overcome the resistance to flow of the other components.

Component Losses

Every system has a combined resistance to flow which is usually different from every other system and is dependent upon the individual components in the system.

The determination of the "pressure loss" or "resistance to flow", for the individual components can be obtained from the component manufacturers. The determination of pressure losses for ductwork and branch piping design is well documented in standard handbooks such as the ASHRAE

Handbook of Fundamentals and SMACNA Duct Design Manual.

The System Curve

At a fixed volume flow rate (CFM) through a given air system a corresponding pressure loss, or resistance to this flow, will exist. If the flow rate is changed, the resulting pressure loss, or resistance to flow, will also change. The relationship governing this change for most systems is:

$$\frac{\text{PRESSURE}_C}{\text{PRESSURE}} = \left(\frac{Q_C}{Q} \right)^2$$

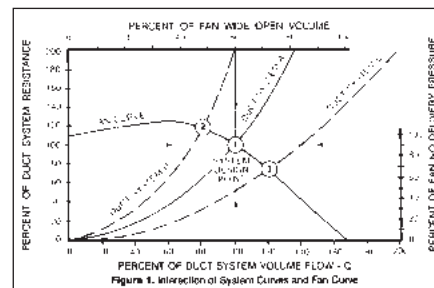
$$Q = \text{CFM} \quad C = \text{change}$$

Interaction Of System And Fan Performance Curve

If the system characteristic curve, composed of the resistance to flow of the system and the appropriate System Effect Factors have been accurately determined, then the fan selected will develop the equivalent and necessary pressure to meet the system requirements; i.e. the fan will deliver the designated flow rate when installed in the system.

The point of intersection of the system curve and the fan performance curve determines the actual flow volume. If the system resistance has been accurately determined and the fan properly selected, their performance curves will intersect at the design flow rate. Refer to Figure 1. The normalized Duct System A from Figure 1 has been plotted with a normalized fan performance curve.

Figure 1



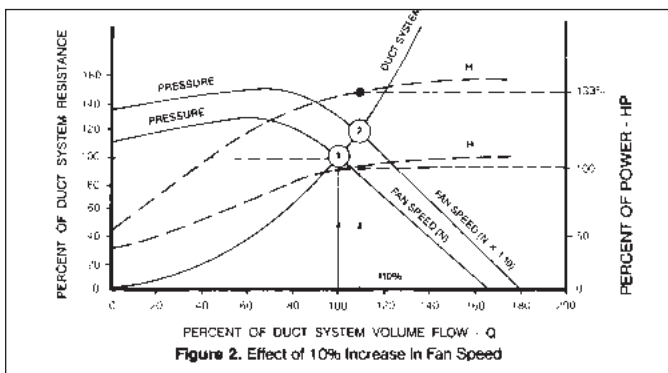
The volume flow rate through the system in a given installation may be varied by changing the system resistance. This is usually accomplished by using fan dampers, duct dampers, mixing boxes, terminal units, etc. Figure 1 shows the volume flow rate may be varied from 100% design Q (Point 1, Duct System A), to approximately 80% of the design q by increasing the resistance to flow, thus changing the system curve characteristics to Duct System B. This results in fan operation at Point 2 (the intersection of the fan curve and the new Duct System B). Similarly, the volume flow rate can be increased to approximately 120% of the design Q by decreasing the resistance to flow, thus changing the system curve characteristic to Duct System C. This results in fan operation at Point 3 (the intersection of the fan curve and the new Duct System C).

Effect Of Changes In Speed

Increases or decreases in fan speed will alter the volume flow rate through a system. Figure 2 illustrates the increase in flow rate when the fan speed increases 10% to Point 2. The 10% increase in flow rate, however, extracts a severe power penalty. According to the fan laws (see below), the power increase is 33%. This fact is often startling to the system designer who finds a flow deficiency. Only 10% more air is needed but the connected motor horsepower is not capable of a 33% increase in load. (Note that the increased power requirements are the result of increased work done).

The greater air volume flow rate moved by the fan against the resulting higher system resistance to the flow is a measure of the increased work done. In the same system, the power increases as the cube of the speed ratio; the fan efficiency remains the same at all points on the same system curve.

Figure 2



Effect Of Change In Speed

(Fan Size and Gas Density Remaining Constant)

For the same size fan, $D_c = D$ and, therefore, $(D_c / D) = 1$. When the density does not vary, $\rho_c = \rho$ and the density $(\rho_c / \rho) = 1$.

$$Q_c = Q (RPM_c / RPM) \quad P_{vc} = P_v (RPM_c / RPM)^2$$

$$P_{tc} = P_t (RPM_c / RPM)^2 \quad HP_c = HP_c (RPM_c / RPM)^3$$

$$P_{sc} = P_s (RPM_c / RPM)^2$$

- D = diameter
- HP = horsepower
- Q = CFM
- P = static pressure
- ρ = density
- c = change
- t = total
- s = static
- v = velocity

NOTE: Direct drive fans can change speed only through the use of a speed controller and cannot increase speed beyond catalog maximum. Fans must operate on single phase in order to change speed.

Effect Of Density On System Resistance

The resistance of a duct system is dependent upon the density of the gas flowing through the system. A gas density of 0.075 lb/ft³ is standard in the fan industry. Figure 3 illustrates the effect on the fan performance of a density variation from the standard value.

The pressure and horsepower vary directly as the ratio of the gas density at the fan inlet to standard density. This density ratio must always be considered when selecting fans from manufacturers' catalogs or curves.

Effect Of Change on Density

(Fan Size and Speed Remaining Constant)

When the speed of the fan does not change, $RPM_c = RPM$ and, therefore $(RPM_c / RPM) = 1$. The fan size is also fixed, $D_c = D$ and therefore $(D_c / D) = 1$.

$$Q_c = Q$$

$$P_{tc} = P_t (\rho_c / \rho)$$

$$HP = HP (\rho_c / \rho)$$

$$P_{sc} = P_s (\rho_c / \rho)$$

$$P_{vc} = P_v (\rho_c / \rho)$$

- D = diameter
- HP = horsepower
- Q = CFM
- P = static pressure
- ρ = density
- c = change
- t = total
- s = static
- v = velocity

See Table 1, which provides air density adjustment factors, so fans can be selected to account for non-standard density.

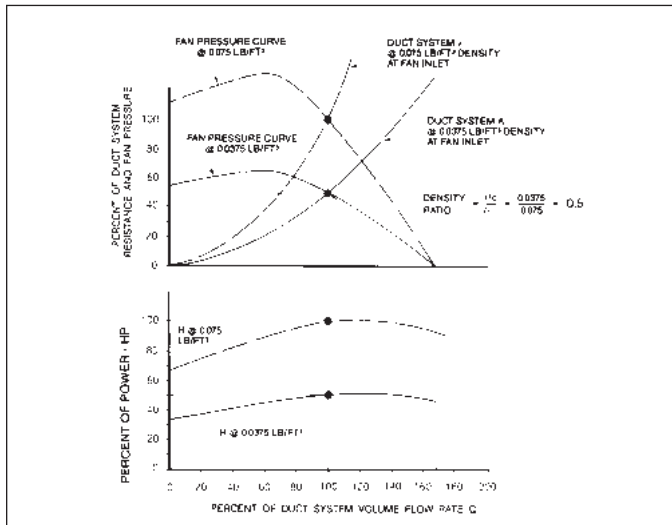
NOTE: PennBarry's Fansizer software can make density corrections for you.

Table 1. Unity Basis = Standard Air Density of .075 lb/ft³
At sea level (29.92 in. Hg barometric pressure) this is equivalent to dry air at 70° F.

Air Temp. °F	Altitude in Feet Above Sea Level												
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	15000	20000
	Barometric Pressure in Inches of Mercury												
	29.92	28.86	27.82	26.82	25.84	24.9	23.98	23.09	22.22	21.39	20.58	16.89	13.75
70	1	0.964	0.93	0.896	0.864	0.832	0.801	0.772	0.743	0.714	0.688	0.564	0.46
100	0.946	0.912	0.88	.848	0.818	0.787	0.758	0.73	0.703	0.676	0.651	0.534	0.435
	Air Density Ratios												

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Figure 3

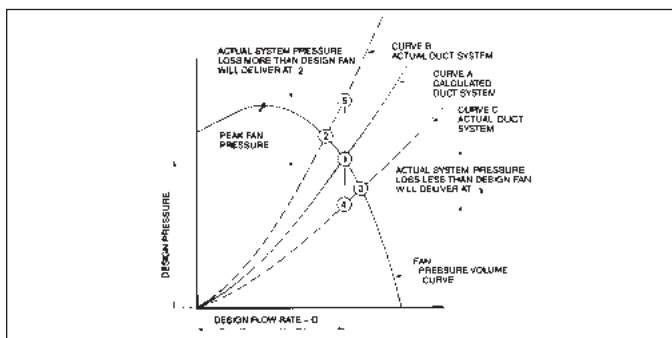


Effects Of Errors In Estimating System Resistance

Higher System Resistance. Actual Duct System B in Figure 4 shows a situation where an actual system has more resistance to flow than was calculated. This condition is generally the result of an inaccurate estimate of system resistance to flow. All losses must be considered when calculating system pressure losses or the final system will be more restrictive than designed; the actual flow rate will be less than expected, (Point 2). If the actual duct system pressure loss is greater than design, an increase in fan speed may be necessary to achieve Point 5, the design volume flow rate.

NOTE: Direct drive fans can only change speed through the use of a speed controller and can not increase speed beyond catalog maximum. Fans must operate on single phase in order to change speed.

Figure 4



Lower System Resistance

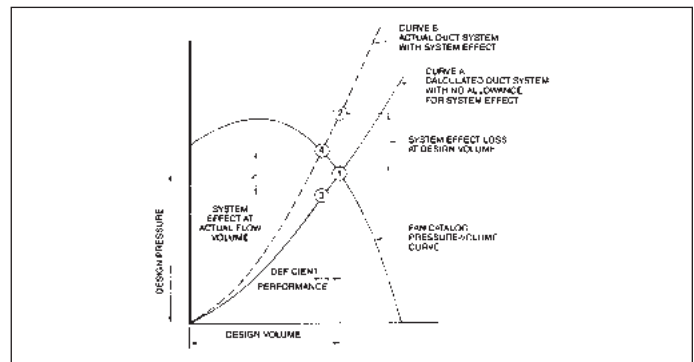
Actual duct system C in Figure 4 shows a situation where a system has less resistance to flow than was expected; the actual flow rate will be more than expected, (Point 3) unless changed by the use of a speed controller.

System Effect

Figure 5 illustrates deficient fan/system performance resulting from one or more undesirable flow conditions. It is assumed that the system pressure losses, shown in system curve A, have been accurately determined, and a suitable fan selected for operation at Point 1. However, no allowance has been made for the effect of the system connections on the fan's performance. To compensate for this System Effect it will be necessary to add a System Effect Factor (SEF) to the calculated system pressure losses to determine the actual system curve. The SEF for any given configuration is velocity dependent and will, therefore, vary across the range of flow volumes for the fan.

In Figure 5 the point of intersection between the fan performance curve and the actual system curve B is Point 4. The actual flow volume will, therefore, be deficient by the difference from 1-4. To achieve design flow volume a SEF equal to the pressure difference between Point 1 and 2 should have been added to the calculated system pressure losses and the fan selected to operate at Point 2. Note that because the System Effect is velocity related, the difference represented between Points 1 and 2 is greater than the difference between Points 3 and 4.

Figure 5



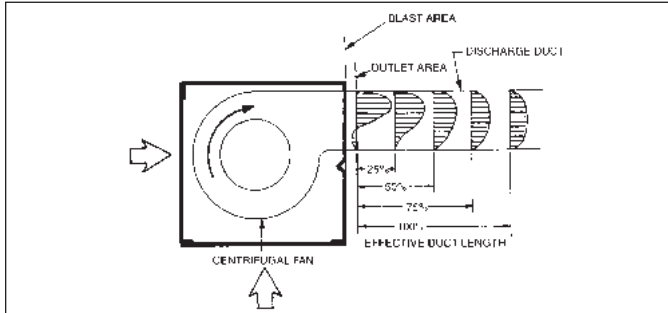
The SEF includes only the effect of the system configuration on the fan's performance.

System Effect Factor

A System Effect Factor is a pressure loss which recognizes the effect of fan inlet restrictions, fan outlet restrictions, or other conditions influencing fan performance when installed in the system.

Outlet System Effect Factors

Figure 6

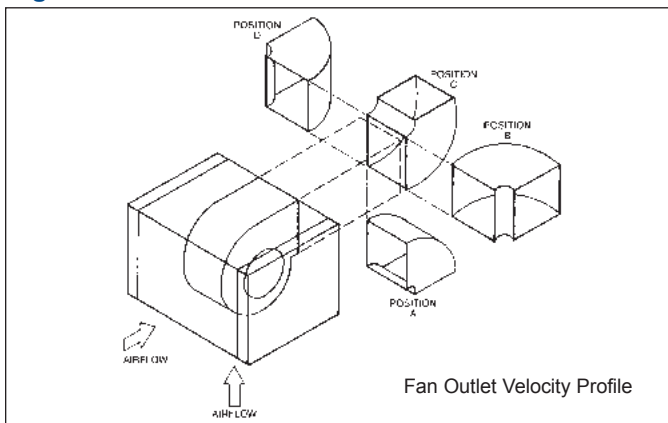


To calculate 100% effective length, assume a minimum of 2 1/2 duct diameters for 2500 FPM or less. Add 1 duct diameter for each additional 100 FPM.

Example: 500 FPM = 5 equivalent duct diameters. If the duct is rectangular with side dimensions a and b, the equivalent duct diameter is equal to $(4ab/\pi)^{0.5}$.

Controlled diffusion and establishment of a uniform velocity profile in a straight length of outlet duct.

Figure 7



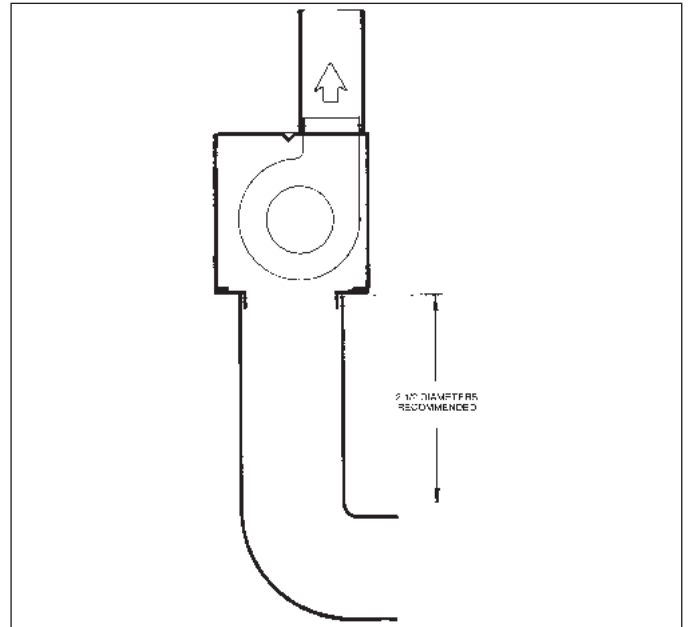
Outlet Duct Elbows

Centrifugal Fans Outlet Duct Elbows. The outlet velocity of centrifugal fans is generally higher toward one or adjacent sides of the rectangular duct (See Figure 6). If an elbow must be located near the fan outlet it should have a minimum radius to duct diameter ratio of 1.5, and should be arranged to give the most uniform airflow possible. Refer to Figure 7. PennBarry Zephyr flexibility eliminates the need for many outlet elbows. See "Typical Applications".

Turning Vanes. Turning vanes will usually reduce the pressure loss through an elbow. However, where a non-uniform approach velocity profile exists, such as at a fan outlet, the vanes may actually serve to continue the non-uniform profile beyond the elbow. This may result in increased losses in other system components downstream of the elbow.

Inlet Duct Elbows

Non-uniform flow into a fan inlet is the most common cause of deficient fan performance. An elbow located at, or in close proximity to the fan inlet will not allow the air to enter the impeller uniformly. The result is less than cataloged air performance.



Suggested Specifications

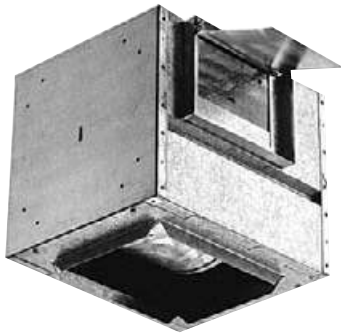
Zephyr Fans

CEILING AND CABINET FANS shall be PennBarry Zephyrs manufactured by PennBarry, Richardson, Texas 75081. Fans shall have acoustically insulated galvanized steel housings and shall not exceed sound level ratings shown. Fans shall bear the AMCA Certified Ratings Seal and UL label. Integral backdraft damper (except Z14 and Z15) shall be chatter proof. Fans shall have true centrifugal wheel or wheels. Face grille shall be of aerodynamic white egg crate design and provide 85% free area.

Fans shall be provided with cord, plug, and receptacle inside the housing. Entire fan, motor and wheel assembly shall be removable. Fans shall be direct driven and motor speed shall not exceed RPM of specified models. Fan motors shall be suitably grounded and mounted on vibration isolators.



RA/TD Zephyrs Ceiling Mounted Models with Grills



Inline Model



Large Capacity Zephyr

One Year Limited Warranty

Zephyr Fans

What Products Are Covered

PennBarry Fans and Ventilators (each, a “PennBarry Product”)

One Year Limited Warranty For PennBarry Products

PennBarry warrants to the original commercial purchaser that the PennBarry Products will be free from defects in material and workmanship for a period of one (1) year from the date of shipment.

Exclusive Remedy

PennBarry will, at its option, repair or replace (without removal or installation) the affected components of any defective PennBarry Product; repair or replace (without removal or installation) the entire defective PennBarry Product; or refund the invoice price of the PennBarry Product. In all cases, a reasonable time period must be allowed for warranty repairs to be completed.

What You Must Do

In order to make a claim under these warranties:

1. You must be the original commercial purchaser of the PennBarry Product.
2. You must promptly notify us, within the warranty period, of any defect and provide us with any substantiation that we may reasonably request.
3. The PennBarry Product must have been installed and maintained in accordance with good industry practice and any specific PennBarry recommendations.

Exclusions

These warranties do not cover defects caused by:

1. Improper design or operation of the system into which the PennBarry Product is incorporated.
2. Improper installation.
3. Accident, abuse or misuse.
4. Unreasonable use (including any use for non-commercial purposes, failure to provide reasonable and necessary maintenance as specified by PennBarry, misapplication and operation in excess of stated performance characteristics).
5. Components not manufactured by PennBarry.

Limitations

1. In all cases, PennBarry reserves the right to fully satisfy its obligations under the Limited Warranties by refunding the invoice price of the defective PennBarry Product (or, if the PennBarry Product has been discontinued, of the most nearly comparable current product).
2. PennBarry reserves the right to furnish a substitute or replacement component or product in the event a PennBarry Product or any component of the product is discontinued or otherwise unavailable.
3. PennBarry's only obligation with respect to components not manufactured by PennBarry shall be to pass through the warranty made by the manufacturer of the defective component.

General

The foregoing warranties are exclusive and in lieu of all other warranties except that of title, whether written, oral or implied, in fact or in law (including any warranty of merchantability or fitness for a particular purpose).

PennBarry hereby disclaims any liability for special, punitive, indirect, incidental or consequential damages, including without limitation lost profits or revenues, loss of use of equipment, cost of capital, cost of substitute products, facilities or services, downtime, shutdown or slowdown costs.

The remedies of the original commercial purchaser set forth herein are exclusive and the liability of PennBarry with respect to the PennBarry Products, whether in contract, tort, warranty, strict liability or other legal theory shall not exceed the invoice price charged by PennBarry to its customer for the affected PennBarry Product at the time the claim is made.

Inquiries regarding these warranties should be sent to: PennBarry, 1401 North Plano Road, Richardson, TX 75081

OTHER PENNBARRY PRODUCTS

CENTRIFUGAL PRODUCTS



Domex
Centrifugal
Roof Exhausters



Fumex Fatrap
Kitchen Hood Centrifugal
Roof Exhausters



Zephyr
Ceiling and Inline Fans



Dynamo
Centrifugal Blowers



Centrex Inliner
Centrifugal Inline Fans



LC Dynafan
Low Contour Centrifugal
Roof Exhausters

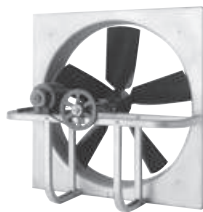


ESI
Efficient Silent
Inline Fan



Fume Exhaust
Curb Mounted
Centrifugal Fans

AXIAL / GRAVITY PRODUCTS



Breezeway
Propeller Wall Fans



HI-EX
Power Roof Ventilator



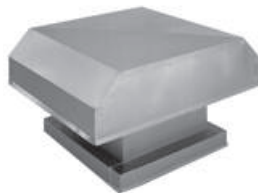
Tubeaxial
Inline Fans



Vaneaxial
Inline Fans



Powered Airette
Axial Roof Ventilators



Airette
Gravity Intake/Relief Hood



Domex Axial
Axial Roof Ventilators



Axcentrix
Bifurcator Fan

For more information contact your local PennBarry Sales
Manufacturer Representative or visit us at www.PennBarry.com

