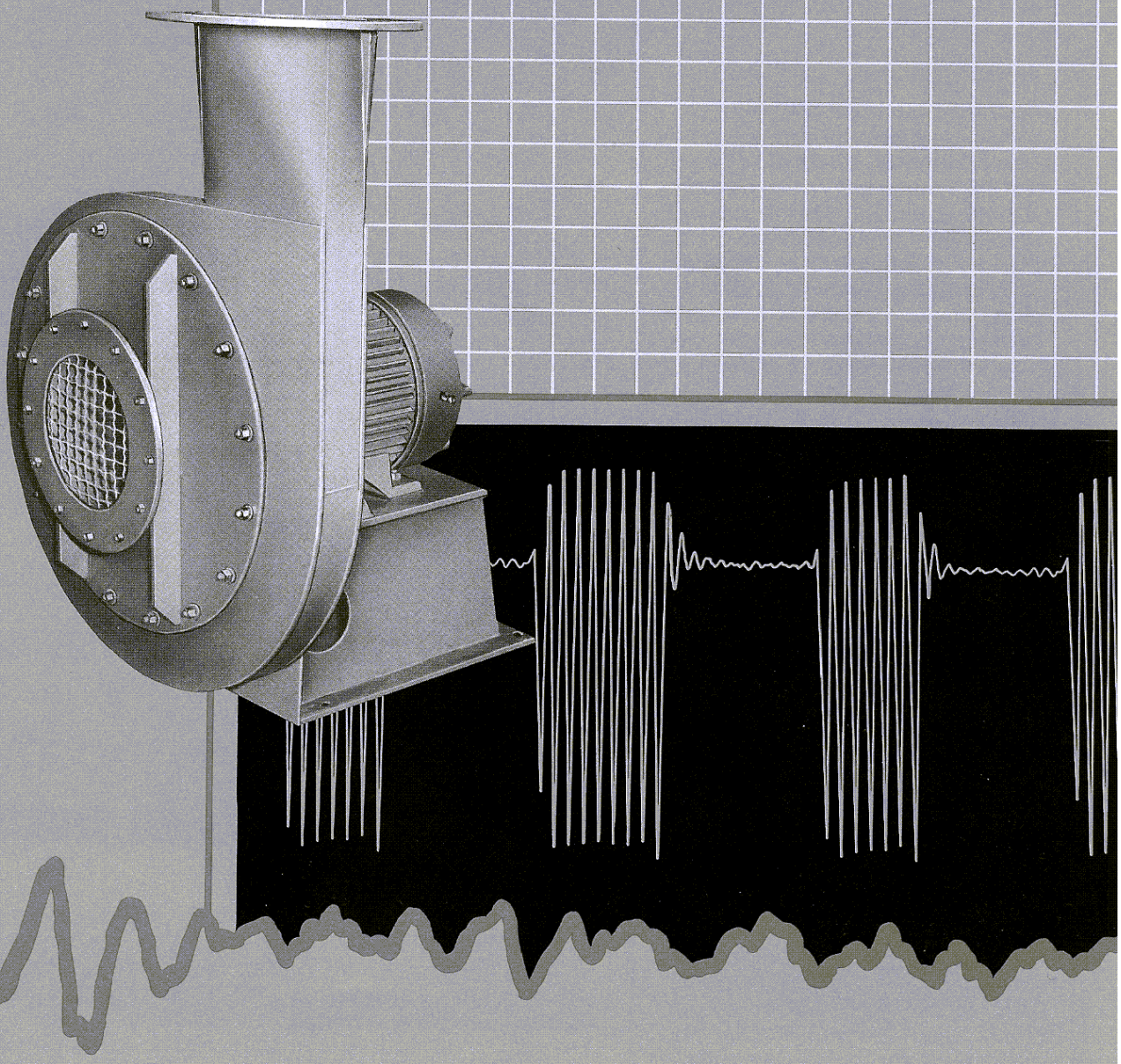
ROBINSON

BULLETIN 1000
November 1997



Surgeless Centrifugal Blowers

U.S. Patent No. 4,708,593

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Minimizes possibility of surge, even in tough environments

Tackling a stubborn problem

In many heavy-duty equipment applications, centrifugal blowers **must** perform consistently and reliably over a range of operations at or near constant turndown pressure. Unfortunately, in this situation, conventional centrifugal blowers consistently fall short of reliable performance as a result of **surge,** which is an instability that develops between the blower and duct system during reduced flows and is generally characterized by periodic pressure fluctuations of 25 percent or more of the blower static pressure. Surge is responsible for a host of inefficiencies and problems, including:

- housing, wheel and foundation cracks
- failure of inlet and outlet connections
- unstable system airflow affecting burner pilots, process operations, flow measuring equipment and vibration detectors
- high, irregular noise at fan inlet

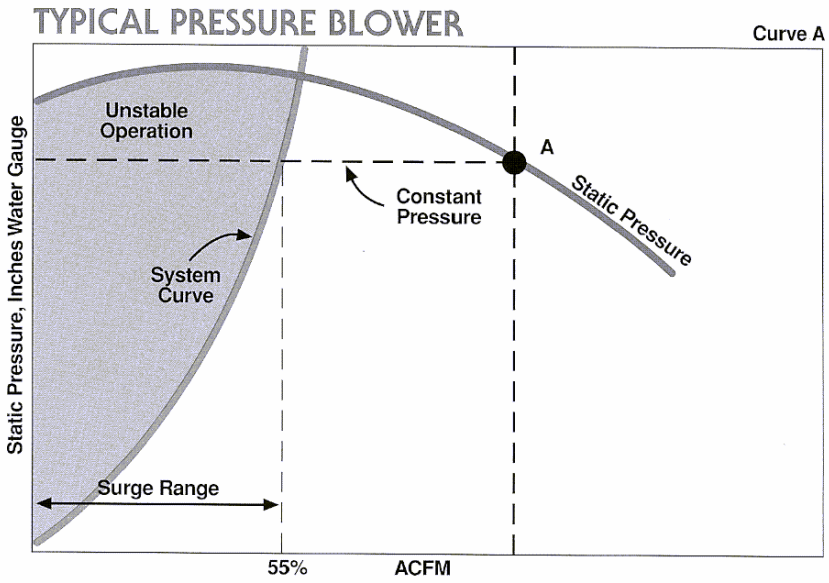
Finding a lasting solution:

The Robinson Surgeless Blower

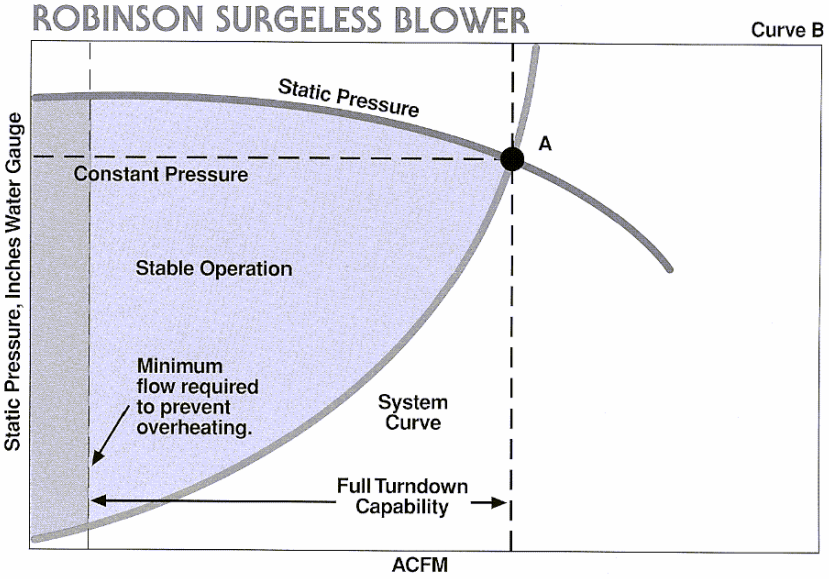
Engineers have wrestled with the problem of surge for decades, trying to find a method or a device to prevent it or counteract its effects. More recent attempts to reduce surge by recirculating air internally or redirecting excess air to an external vent have **not** been completely successful, as they waste valuable energy.

But Robinson Industries has developed a new centrifugal blower that eliminates surge and its damaging effects. Pressure fluctuations will be reduced to 10 percent or less of the blower static pressure. While most conventional blowers perform well at normal ratings, they experience surge during the "turndown" many applications require. In most cases, surge occurs when a conventional blower operates at less than 55 percent of its rated capacity. Unlike conventional blowers, the Surgeless Blower offers stability during **all** operation cycles.

The following curves illustrate the striking difference between the Surgeless Blower and a conventional blower's response to changes in operation. And, unlike other blowers, the Robinson Surgeless has **no** recirculation loop, **no** blow-down cycle and **no** electronic sensor controls to cause maintenance problems or waste energy.



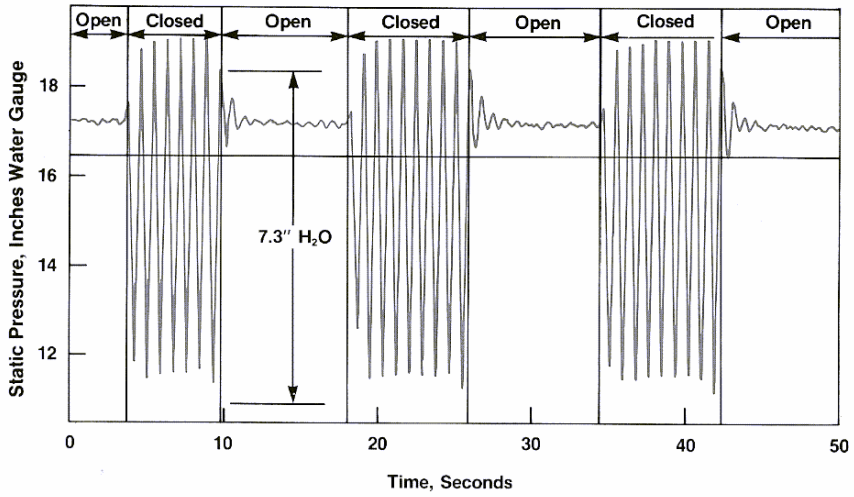
This is a typical operational curve for conventional blowers. It shows surge occurring below 55 percent of blower capacity.



Starting with normal rating point A, the Robinson Surgeless Blower operates satisfactorily and remains stable at any reduced flow.

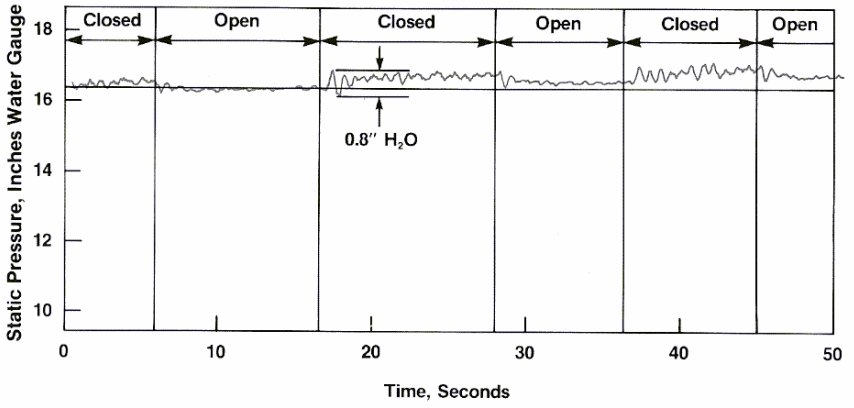
Laboratory tests conducted at Robinson Industries recorded the reactions of a conventional blower connected to a surge chamber and compared them to reactions of a Surgeless Blower connected to the same chamber. In both tests, an outlet damper was used to "turn down" the blower. The results were dramatic:

CONVENTIONAL BLOWER



Here, the transducer measurement indicates stable airflow at normal conditions; however, at partially dampered conditions, large pulsations (or surge) occur.

ROBINSON SURGELESS BLOWER



With the Robinson Surgeless Blower, stable, surge-free operation is recorded at all conditions — from normal rating through almost 100 percent turndown.

For demanding applications in diverse industries

The Surgeless Centrifugal Blower will minimize the problem of surge in all types of industries, for a wide range of applications. The Surgeless Blower can be built to stand tough in corrosive, abrasive and high-temperature environments. In forced draft service, the blower performs reliably in heat recovery, incineration, air pollution and waste-to-energy systems, as well as in boiler, fluidized bed, combustion air and process air operations.

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Standard and optional features

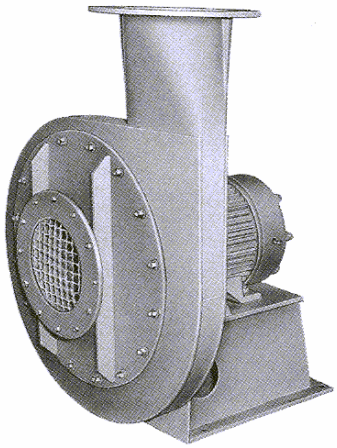
Robinson blower housings are manufactured from high-grade steel material. Cast aluminum wheels with taper lock hub construction are standard with the Surgeless Blower, as are a fixed inlet screen, outlet flange and fixed housing. Inlet or outlet dampers and silencers are optional items. All blowers are statically and dynamically balanced.

For high-temperature conditions or applications requiring extra corrosion resistance, housings and wheels fabricated from special alloys are available.

Fan drive arrangement #4, designed for direct drive, is standard on the Surgeless Blower. This standard arrangement operates in temperatures to 180° F, but higher temperature units are also available in arrangement #8 or #1. Please consult the factory or your Robinson representative for more information.

Other options include:

- shaft seals
- silencer
- inlet filter
- inlet damper
- flexible connector
- inlet flange



Arrangement #4 is a compact, economical assembly for direct drive which features a wheel overhung on prime mover shaft. Needs no auxiliary transmission equipment. In applications exceeding 180° F, consult Robinson Industries for information on other available arrangements.

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How to select the right surgeless centrifugal blower for your application

1. Find the required static pressure and volume in the shaded area on the upper section of the selection chart.
2. Follow up from this point along the corresponding system resistance curve until it intersects a fan curve. Several arbitrary system resistance curves are shown dotted in for reference.
3. The intersected curve represents the performance of the blower size required. The point of intersection will be the actual operating performance of the blower in your system.
4. Read straight down from this point to the corresponding BHP curve on the lower section of the selection chart. This point of intersection shows the actual BHP that the blower will require in operating your system.

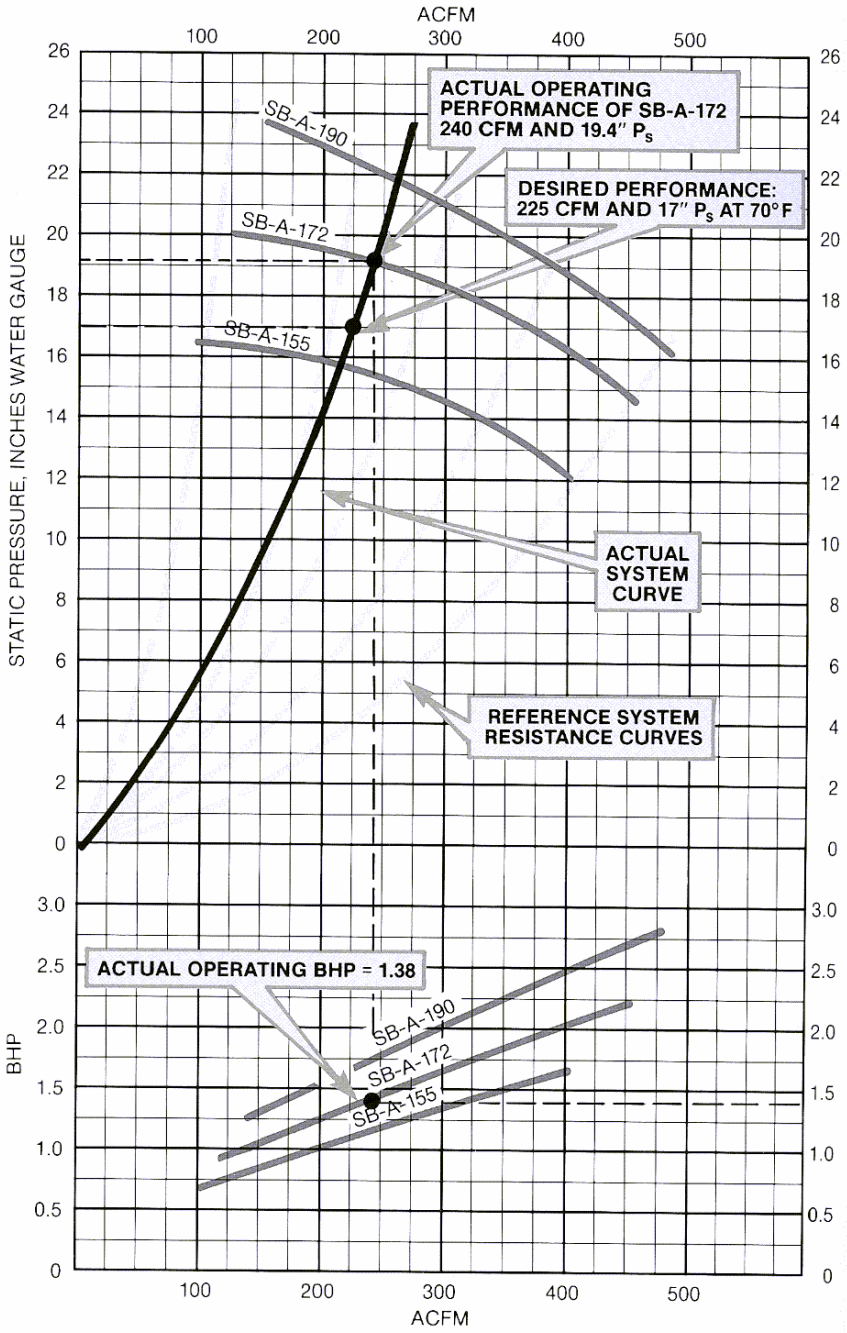
Example:

1. Required: 225 cfm and 17" P_S at 70° F.
2. Follow up system resistance curve to SB-A-172 curve.
3. Actual operation will be 240 cfm and 19.4" P_S.
4. The required power of the SB-A-172 blower at 240 cfm is 1.38 BHP.

Note: Due to variations in system resistance, inlet density and other operating conditions, Robinson recommends that a motor be selected with at least 10 percent more HP capacity than the required blower BHP.

Sample Selection Chart

NOTE: PERFORMANCE SHOWN BASED ON STANDARD AIR (70° F AND .075 LB./FT.^{3}) AT 3550 RPM



Model SB-A

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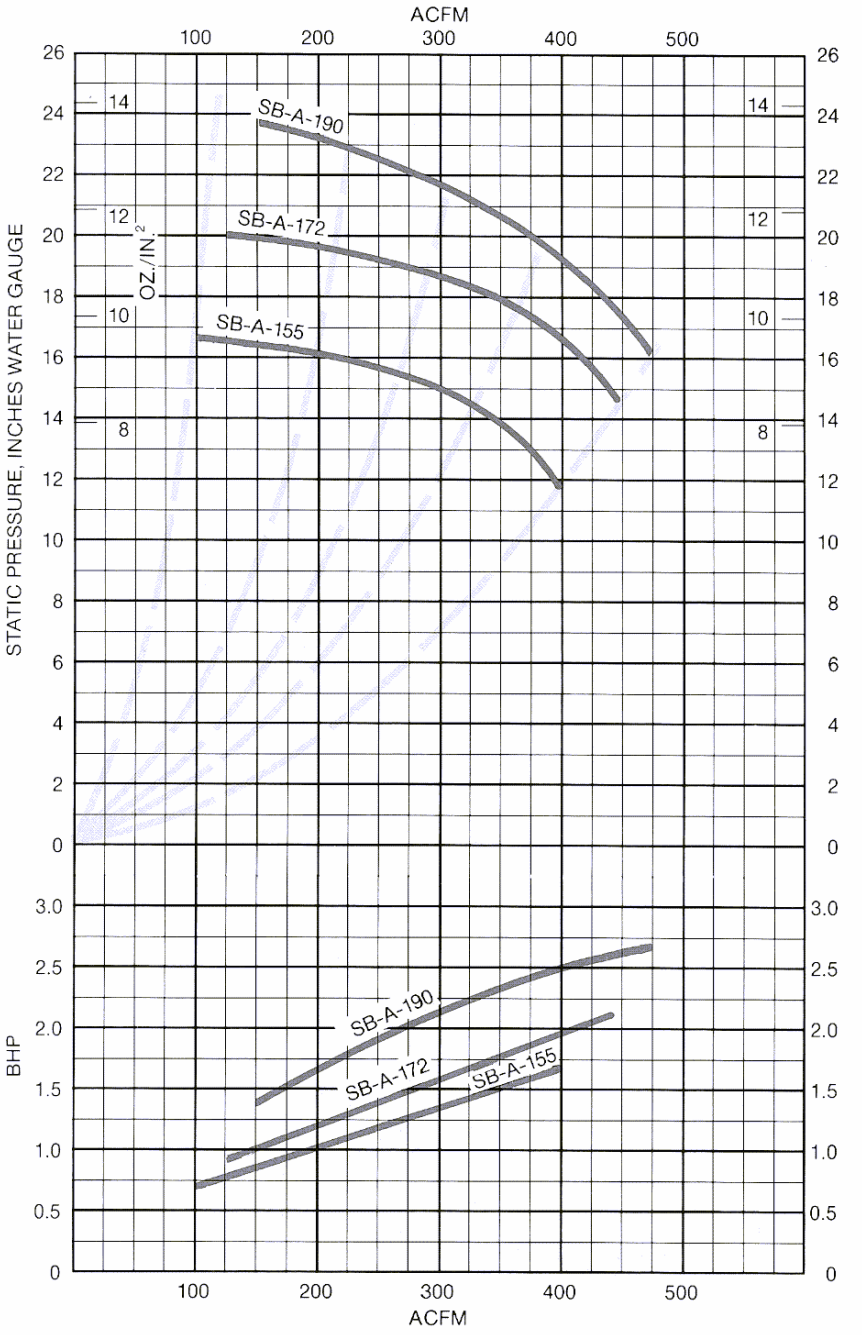
Selection Chart Model SB-A	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.²)	Min. Motor HP for ≤ 20 Sec. Start Time	Approximate Start Time (Sec.)
	Open Inlet	With Inlet Silencer*			
SB-A-155	83	58	2.6	1½	9
SB-A-172	90	64	3.8	1½	13
SB-A-190	96	68	5.4	2	15

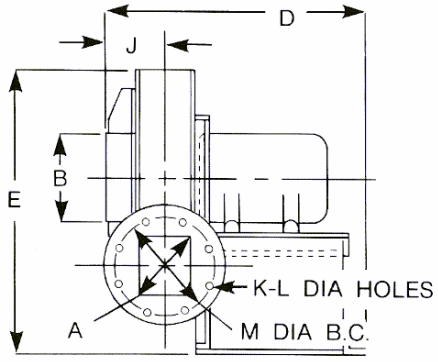
- Information shown is for steel impellers. Aluminum is also available.
- Starting time based on full-voltage, across-the-line, zero airflow condition.

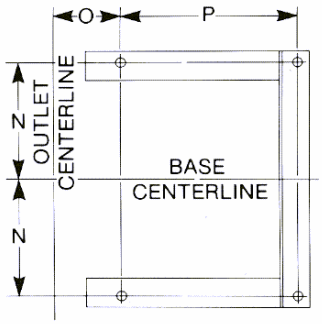
*Based on a typical industrial silencer. Other models are available.

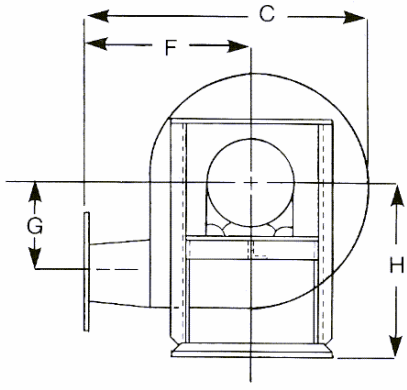
**__Note:__ These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

Note: Performance shown based on standard air (70°F and .075 lb./ft.³) at 3550 rpm.









DIMENSIONS, IN.	
A	6
B	5 ID
C	26⅝
D	17²⁹⁄₃₂
E	29
F	14⅞
G	9²⁵⁄₃₂
H	18

DIMENSIONS, IN.	
J	2⅝
K	8
L	7/8
M	9½
N	8
O	4¹⁵⁄₃₂
P	10

Model SB-B

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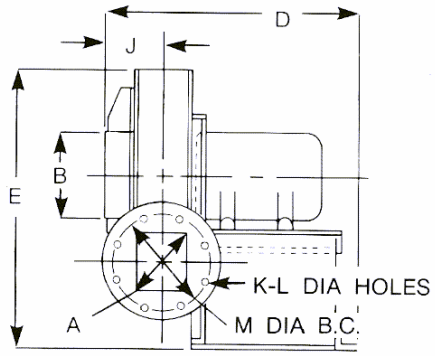
Selection Chart Model SB-B	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.²)	Min. Motor HP for ≦ 20 Sec. Start Time	Approximate Start Time (Sec.)
	Open Inlet	With Inlet Silencer*			
SB-B-198	91	67	9.1	3	18
SB-B-220	99	73	13.2	5	16
SB-B-242	104	76	19.1	7½	17

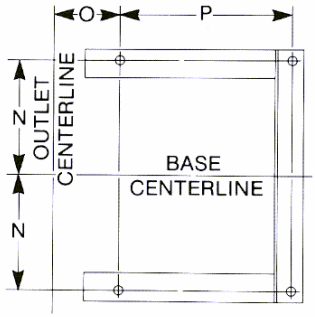
- Information shown is for steel impellers. Aluminum is also available.
- Starting time based on full-voltage, across-the-line, zero airflow condition.

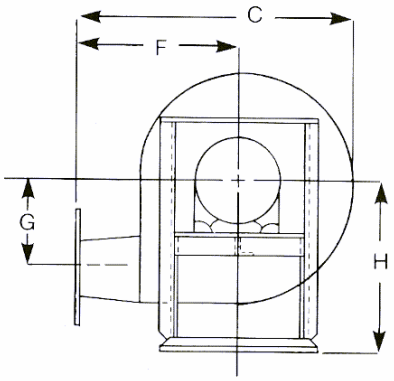
* Based on a typical industrial silencer. Other models are available.

** **Note:** These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

Note: Performance shown based on standard air (70°F and .075 lb./ft.³) at 3550 rpm.

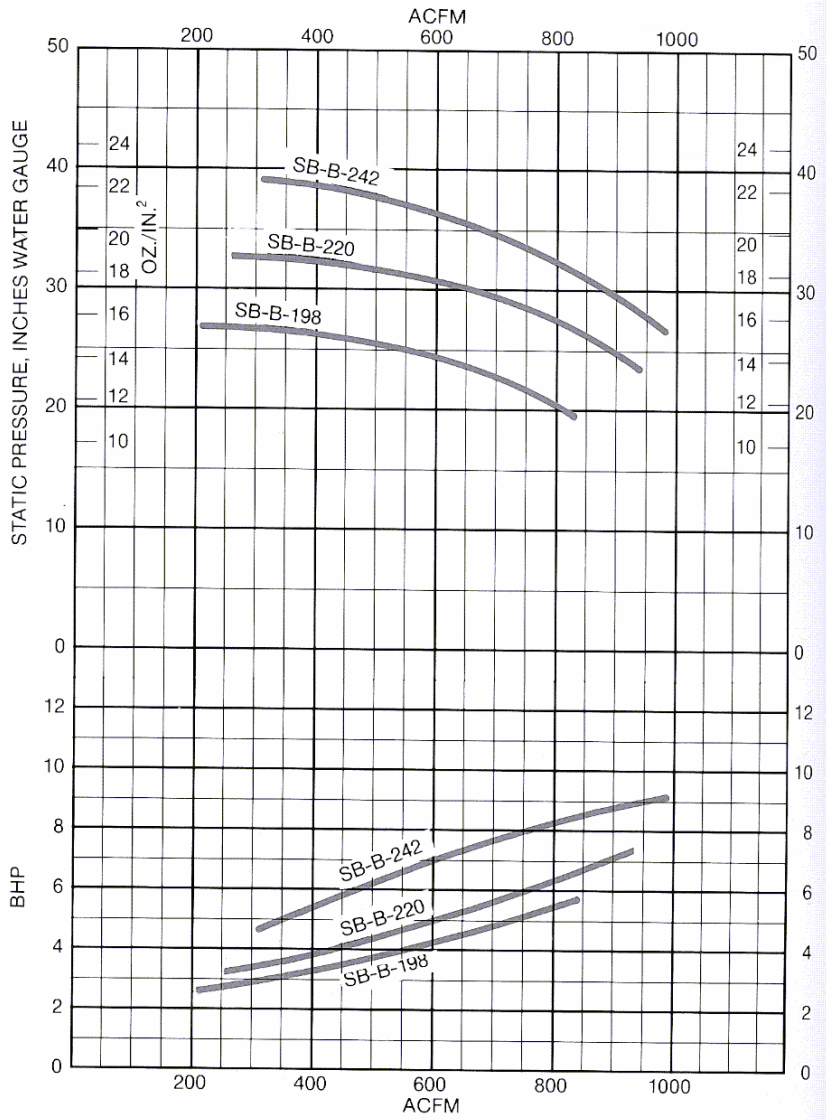






DIMENSIONS, IN.	
A	7⅜
B	6⅜ ID
C	33 13/16
D	25⅛
E	35
F	19
G	12 15/32
H	21

DIMENSIONS, IN.	
J	4 11/16
K	8
L	⅞
M	11¾
N	9
O	4¾
P	16



Model SB-C

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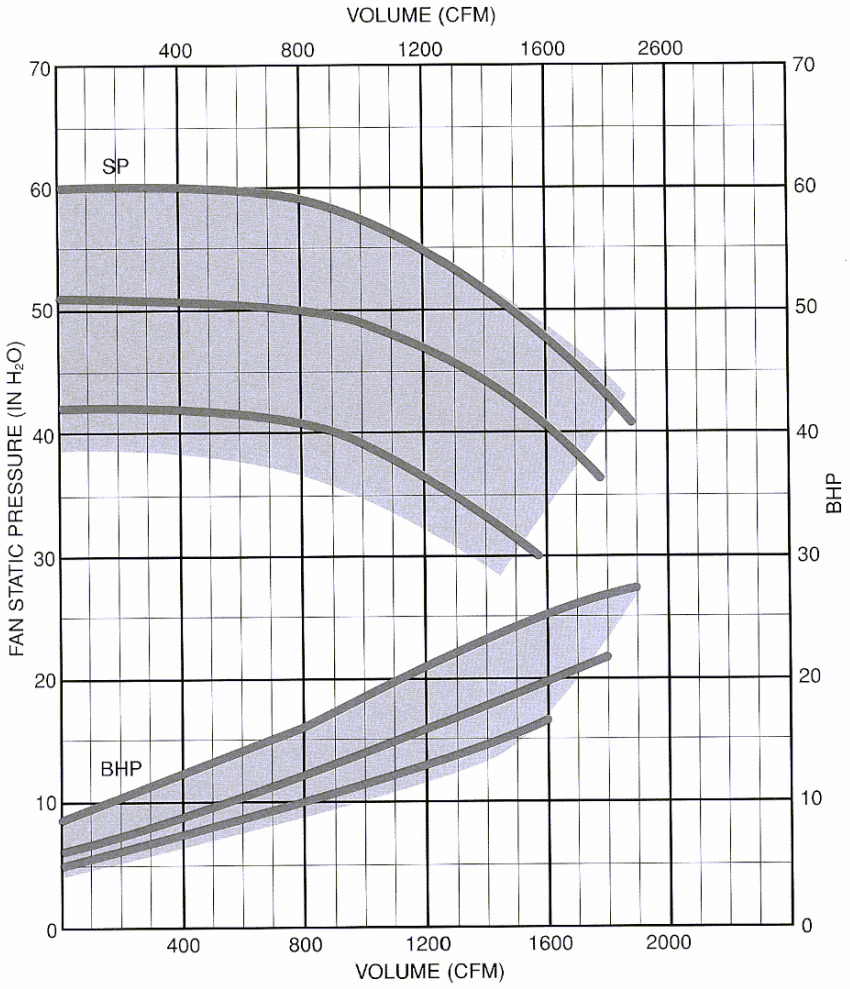
Selection Chart Model SB-C	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.²)		Min. Motor HP for ≦ 20 Sec. Start Time	Approximate Maximum Start Time (Sec.)
	Open Inlet	With Inlet Silencer*	Steel	Aluminum		
SB-C-247	97	73	21.9	8.5	10	15
SB-C-274	105	79	32.4	12.2	15	14
SB-C-301	110	82	46.2	17.4	20	16

- Information shown is for steel and aluminum impellers.
- Starting time based on full-voltage, across-the-line, zero airflow condition for steel impellers.

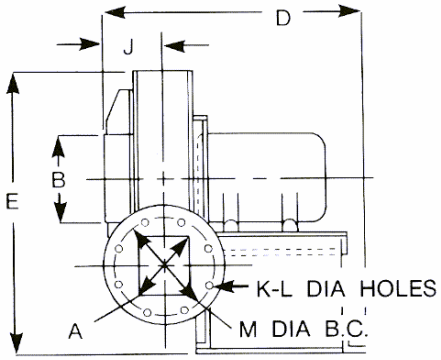
* Based on a typical industrial silencer. Other models are available.

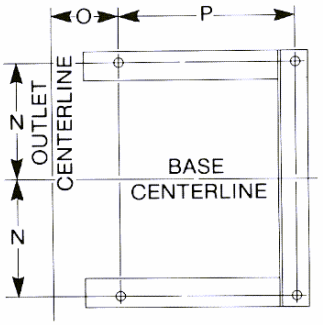
** **Note:** These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

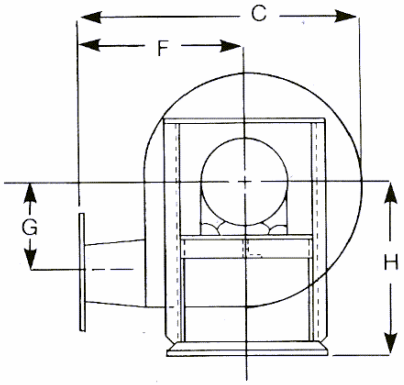
Note: Performance shown based on standard air (70°F and .075 lb./ft.³) at 3550 rpm.



Note: Shaded area indicates fan performance range available with cast aluminum wheel construction.







DIMENSIONS, IN.	
A	9½
B	8 ID
C	42⁵⁄₁₆
D	28½
E	42⁷⁄₃₂
F	23⅝
G	15⁹⁄₁₆
H	25

DIMENSIONS, IN.	
J	4³⁄₁₆
K	12
L	1
M	14¼
N	11
O	5⁵⁄₁₆
P	18

Model SB-D

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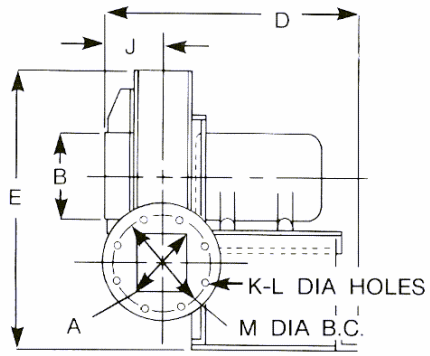
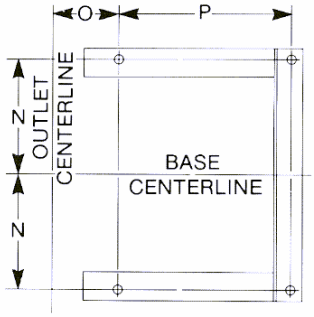
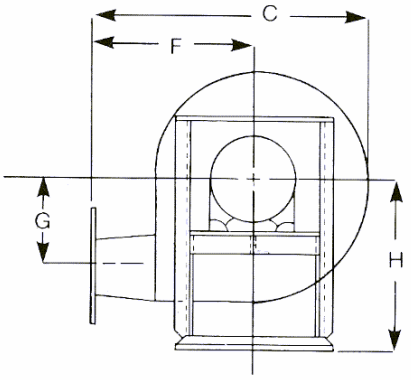
Selection Chart Model SB-D	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.²)	Min. Motor HP for ≦ 20 Sec. Start Time	Approximate Start Time (Sec.)
	Open Inlet	With Inlet Silencer*			
SB-D-146	101	84	2.0	3	4
SB-D-162	104	85	4.2	5	6
SB-D-179	108	88	5.8	7½	5

• Information shown is for steel impellers. Aluminum is also available.
• Starting time based on full-voltage, across-the-line, zero airflow condition.
* Based on a typical industrial silencer. Other models are available.
** **Note:** These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

Note: Performance shown based on standard air (70°F and .075 lb./ft.³) at 3550 rpm.

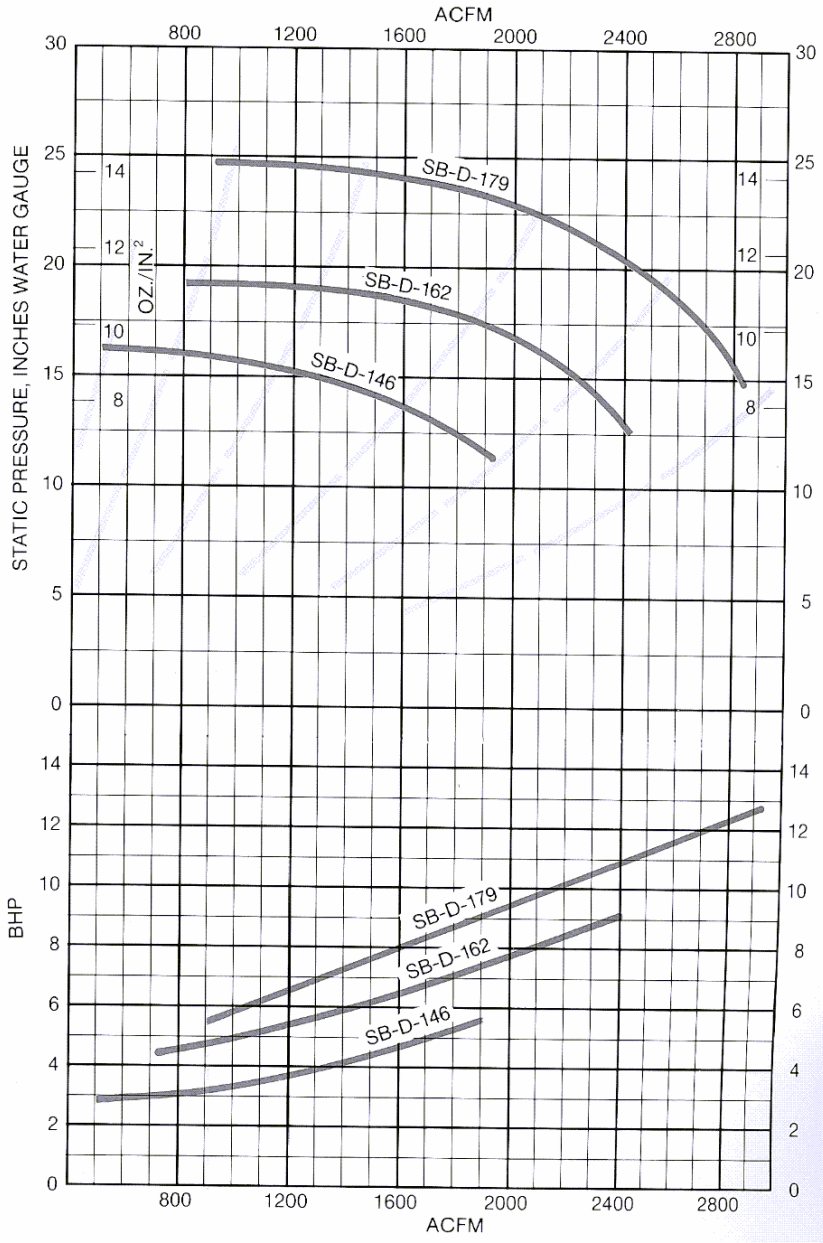






DIMENSIONS, IN.	
A	9
B	9¾ ID
C	29 11/16
D	27 11/16
E	32¼
F	16
G	9 21/32
H	20

DIMENSIONS, IN.	
J	5⅞
K	12
L	1
M	14¼
N	10
O	5 11/16
P	15



Model SB-E

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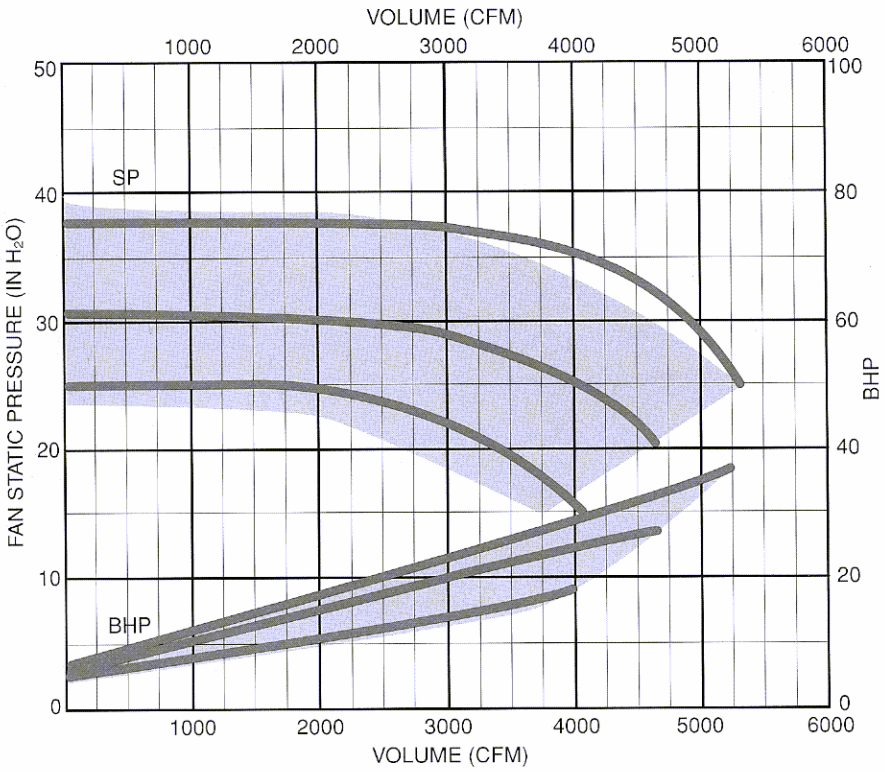
Selection Chart Model SB-E	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.²)		Min. Motor HP for ≦ 20 Sec. Start Time	Approximate Maximum Start Time (Sec.)
	Open Inlet	With Inlet Silencer*	Steel	Aluminum		
SB-E-182	108	91	8.6	4.0	10	7
SB-E-202	111	92	12.2	5.8	15	6
SB-E-224	115	95	17.2	8.2	20	6

- Information shown is for steel and aluminum impellers.
- Starting time based on full-voltage, across-the-line, zero airflow condition for steel impellers.

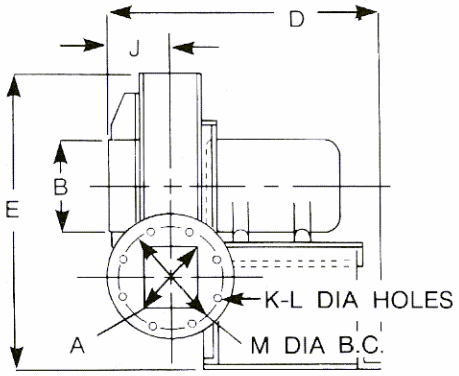
* Based on a typical industrial silencer. Other models are available.

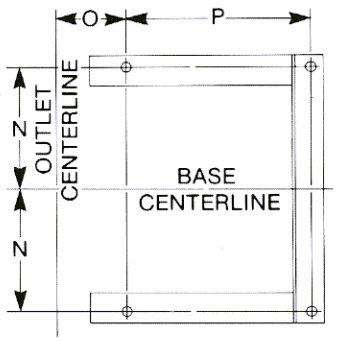
** **Note:** These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

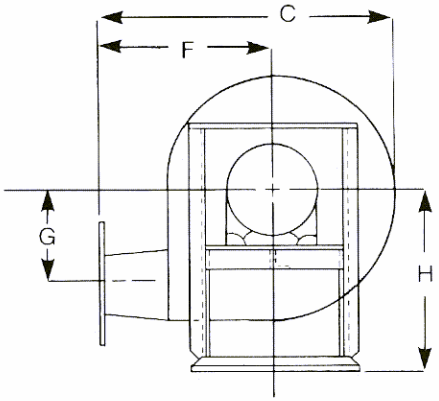
Note: Performance shown based on standard air (70°F and .075 lb./ft.³) at 3550 rpm.



Note: Shaded area indicates fan performance range available with cast aluminum wheel construction.







DIMENSIONS, IN.	
A	11
B	12⅛ ID
C	36⅝
D	32 11/16
E	39⅛
F	19¾
G	12 1/16
H	24

DIMENSIONS, IN.	
J	7 5/16
K	12
L	1
M	17
N	12
O	6⅜
P	18

Model SB-F

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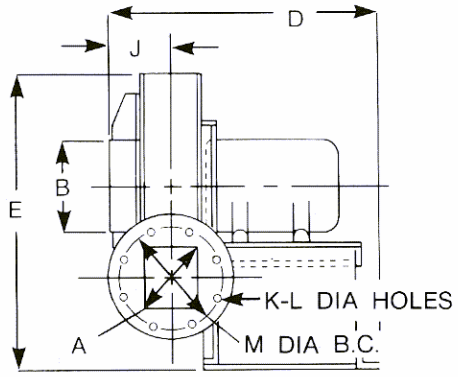
Selection Chart Model SB-F	Sound Pressure Level (Nearfield; in dB_A ±3)**		Impeller WR^2 (lb.-ft.^{2})		Min. Motor HP for ≤ 20 Sec. Start Time	Approximate Maximum Start Time (Sec.)
	Open Inlet	With Inlet Silencer*	Steel	Aluminum		
SB-F-230	115	98	22.2	11.6	40	4
SB-F-255	118	99	31.3	16.3	40	6
SB-F-280	121	102	43.0	22.5	40	7

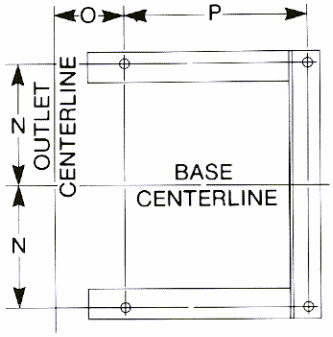
- Information shown is for steel and aluminum impellers.
- Starting time based on full-voltage, across-the-line, zero airflow condition for steel impellers.

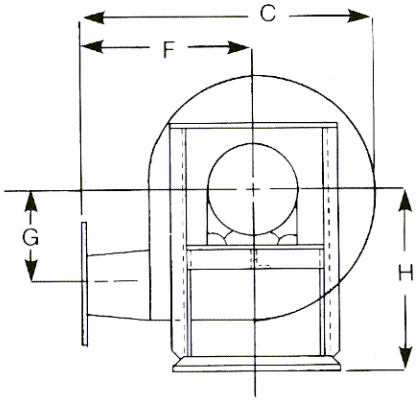
* Based on a typical industrial silencer. Other models are available.

** **Note:** These are estimated values based on standard construction and operating conditions. Consult factory for specific applications. All data assumes a ducted outlet of the same material and thickness as the fan casing walls and acoustically treated expansion joints, if any. Motor and other auxiliary equipment sound is not included.

Note: Performance shown based on standard air (70°F and .075 lb./ft.^{3}) at 3550 rpm.

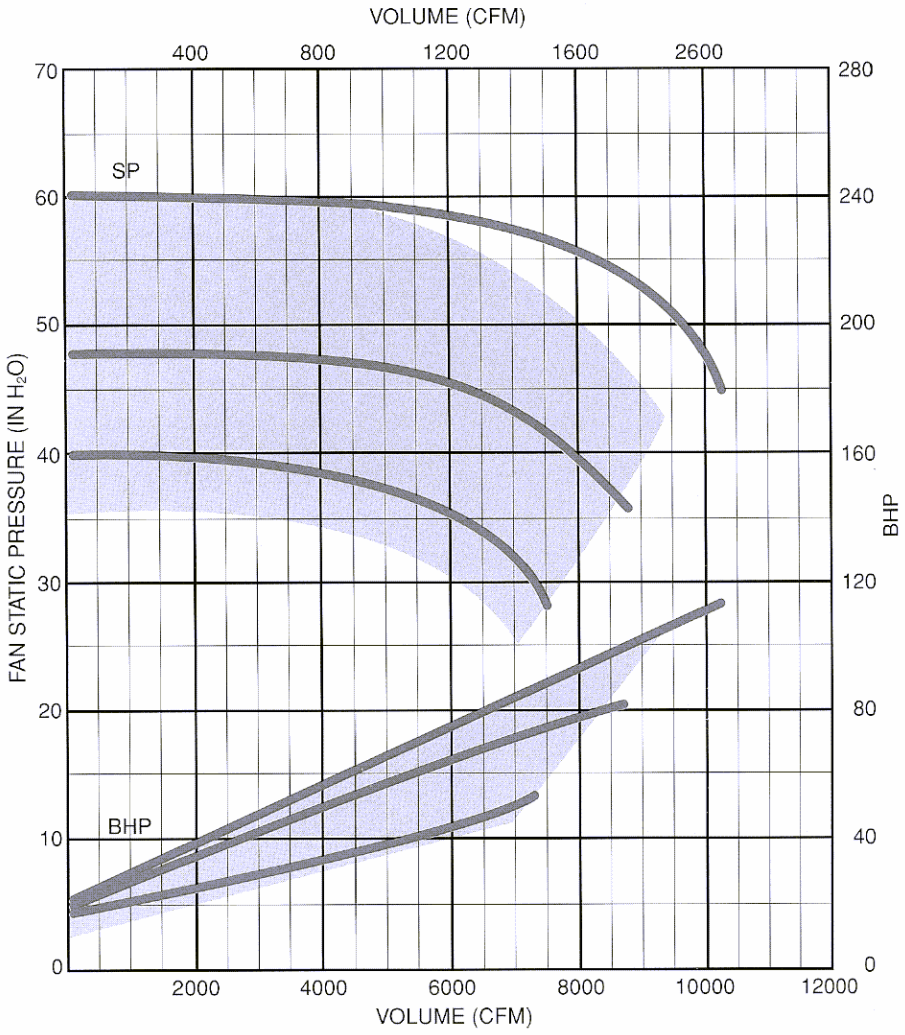






DIMENSIONS, IN.	
A	14
B	15 5/16 ID
C	45 7/8
D	41 7/8
E	46 7/8
F	25
G	15 3/16
H	28

DIMENSIONS, IN.	
J	9 3/16
K	12
L	1 1/8
M	21 1/4
N	15
O	11 5/8
P	24



Note: Shaded area indicates fan performance range available with cast aluminum wheel construction.

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Repair and rebuilding services

Robinson also repairs and rebuilds our own fans and those manufactured by others to provide years of additional, trouble-free service. Robinson uses the same quality workmanship and materials in fan repair and rebuilding as in our new equipment. Yet the savings can be substantial.

The company maintains repair facilities in Lakeland, Florida and Salt Lake City, Utah as well as at the company's flagship plant in Zelienople, Pennsylvania.

Custom products

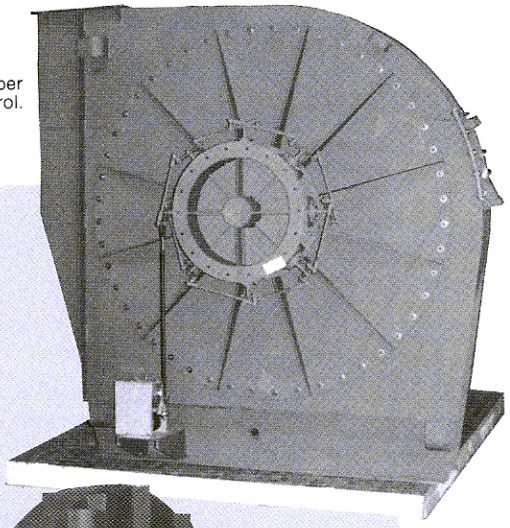
In addition to the standard line of Surgeless Blowers featured in this bulletin, we will engineer and build custom units to suit **your** temperature, pressure and volume requirements. Special alloy construction is available. Robinson also offers the RL line of pressure blowers for heavy-duty combustion air applications.

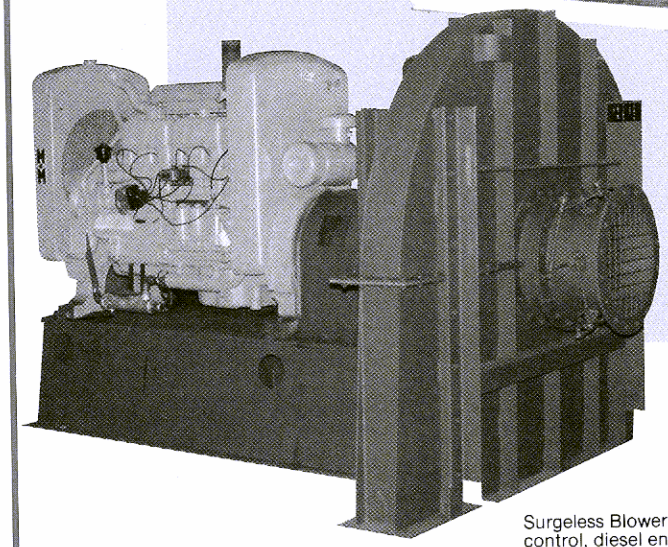
Robinson: a brief history

Founded in 1892 by J. R. Robinson, the company originally manufactured ventilation equipment for the mining industry. Today, Robinson is a fully integrated manufacturer, engineering and fabricating forced and induced draft fan equipment for dependable service in virtually every major industry.

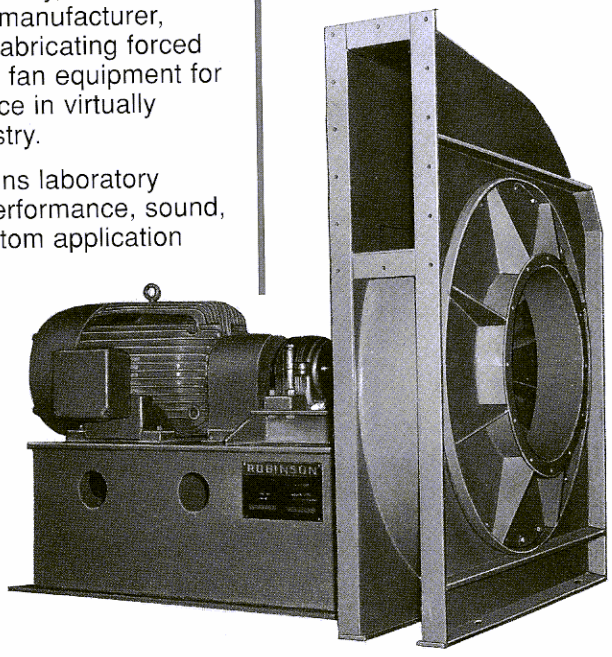
Robinson maintains laboratory facilities for air performance, sound, vibration and custom application testing.

Surgeless Blower with radial inlet damper flow control.



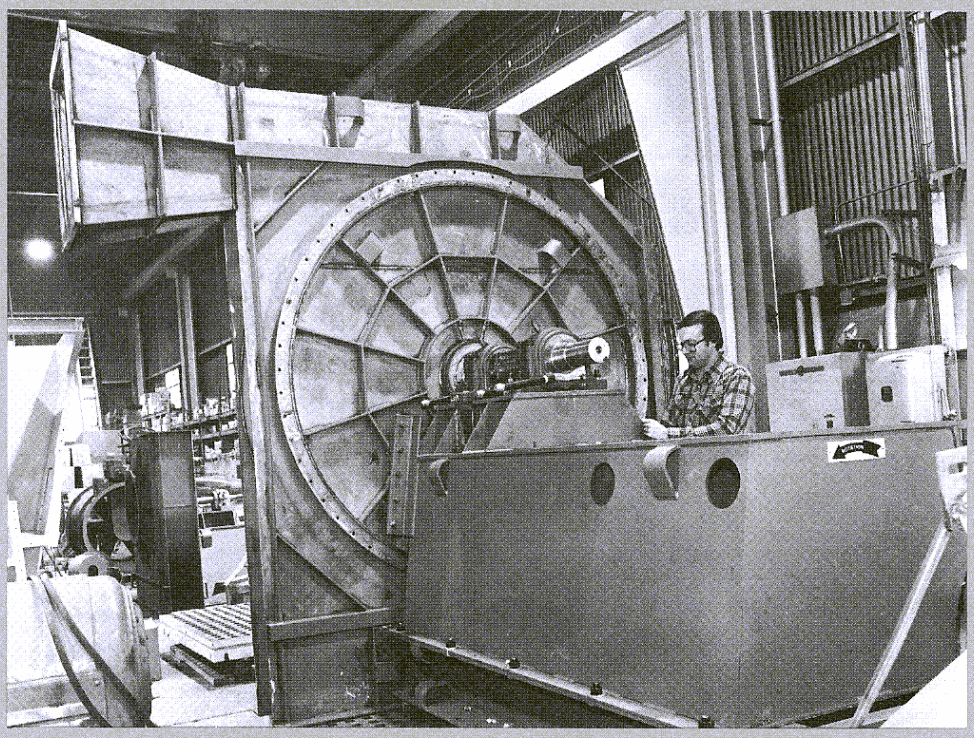


Surgeless Blower with radial inlet damper flow control, diesel engine drive, arrangement #8.



Arrangement #8 is a heavy-duty assembly complete with anti-friction bearings. Designed for direct drive by a prime mover through a coupling device, this arrangement is available for 3600 and 1800 rpm blowers. Please consult the factory.

Surgeless Blower, arrangement #8, 1000 HP,
600° design, gas tight construction.



ROBINSON
INDUSTRIES, INC.

P.O. Box 100 • Zelienople, PA 16063-0100
(412) 452-6121 (24 hours a day) • Fax: (412) 452-0388

ROBINSON FANS FLORIDA, INC.
P.O. Box 6260
Lakeland, FL 33807-6260
(941) 646-5270 (24 hours a day)
Fax: (941) 646-1712

ROBINSON FANS SERVICE AND EQUIPMENT CO. INC.
P.O. Box 707 • Trussville, AL 35173
(205) 655-8312 (24 hours a day)
Fax: (205) 655-8327

ROBINSON FANS WEST, INC.
P.O. Box 27477
Salt Lake City, UT 84127-0477
(801) 972-3303
Fax: (801) 972-3445