50 series booster

Air/Gas Pressure Booster

Shop air driven

No electricity is required

Explosion proof

Aluminum construction

Stainless steel hardware

MPS MIDWEST PRESSURE SYSTEMS

Midwest Pressure Systems, Inc.
850 Transport Drive
Valparaiso, IN 46383
www.midwestpressuresystems.com

Phone 219-462-0070
Fax 219-318-2277
sales@midwestpressuresystems.com

Booster Specifications

Gas Boost Cylinder Specifications	Model Number 54AAV24	Model Number 53AAV34	Model Number 52AAV70
Bore diameter & stroke - in (mm)	4 (102) & 4.8 (122)	3 (76) & 4.8 (122)	3 (51) & 4.8 (122)
Maximum gas discharge pressure - psi (bar)	348 (24)	493 (34)	1,015 (70)
Gas temperature range - ºF (ºC)	-15 to 250 (-26 to 121)		
Maximum recommended cycle rate - cpm **(Note 1)**	100		
Gas displacement per cycle - cf (l)	0.069 (1.95)	0.038 (1.07)	0.17 (.481)
Maximum gas displacement - cfm (lpm)	6.9 (195)	3.8 (107)	1.7 (48.1)
Operating pressure boost ratio (multiple of drive air pressure) **(Note 2)**	1.25	2.22	5.0
Maximum pressure boost ratio (multiple of drive air pressure) **(Note 3)**	1.56	2.78	6.25
Gas inlet and discharge connection FNPT	3/8	3/8	1/4
Seal vent connections FNPT	1/8		
Air Drive Cylinder Specifications			
Bore diameter & stroke - in (mm)	5 (127) & 4.8 (122)		
Maximum drive pressure - psi (bar) **(Note 4)**	125 (8.6)		
Air temperature range - ºF (ºC)	32 to 167 (0 to 75)		
Air displacement per cycle - cf (l)	0.108 (3.06)		
Maximum air displacement - cfm (lpm)	10.8 (306)		
Drive air inlet connections FNPT	1/2		
Drive air exhaust connections FNPT	1/2		
Booster Specifications			
Certification	CE 0575 Ex II 2 G T4 (Non-electrical equipment)		
Weight - pounds (kilograms)	37 (16.8)		
Ambient temperature range - ºF (ºC) **(Note 5)**	-15 to 167 (-26 to 75)		

Note 1: A cycle consists of a forward and reverse stroke.
Note 2: The nominal operating pressure boost ratio is the boost ratio the booster will achieve while delivering flow. The higher the required flow rate the lower the operating pressure boost ratio. Inversely, the lower the flow rate the higher the operating pressure boost ratio.
Note 3: The maximum pressure boost ratio occurs when there is no demand (i.e. no flow).
Note 4: Nitrogen or clean inert gas may also be used for the drive gas.
Note 5: Where ambient temperatures fall below 32ºF (0ºC) a heater is required for the drive air.

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Booster Operation

The piston in the drive cylinder is attached to the piston in the boost cylinder. As the drive piston reciprocates, it compresses the gas in the boost cylinder. Please visit www.midwestpressuresystems.com/animation/booster-animation.htm for an animation of how the booster operates.

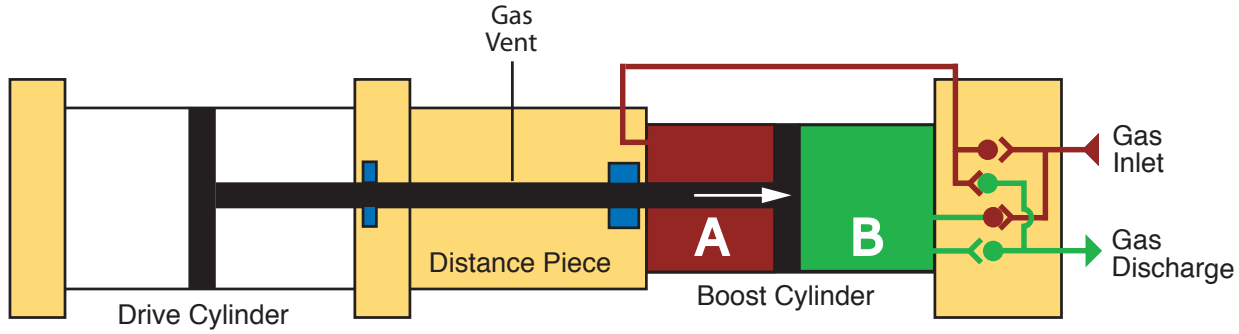
The boost cylinder is double-acting, i.e., it pulls gas in on one side while pumping it out on the other. The maximum pressure boost ratio is equal to the drive piston area divided by the boost piston area. For example: A booster with a five inch diameter drive piston and a three inch diameter boost piston has in a maximum pressure boost ratio of 2.78. The maximum discharge pressure (MDP) is equal to the maximum boost ratio (MBR) times the drive air pressure (DAP) plus the supply air/gas pressure (SP), see Equation1 below.

$$MDP = (MBR * DAP) + SP$$

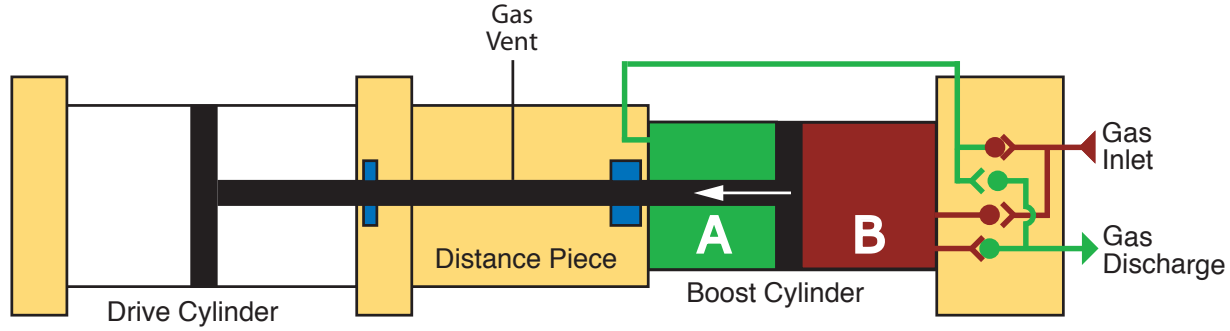
Equation 1: Maximum Boost Pressure Equation

Continuing with the example above, with an 80 psi drive air pressure and an 80 psi supply gas pressure the maximum discharge pressure is 302 psi. With an 60 psi drive air pressure and a 100 psi gas supply pressure, the maximum discharge pressure would be 267 psi. When the booster attains the maximum discharge pressure, the forces inside the booster are balanced and the booster stalls. When the discharge pressure drops below the maximum pressure, the booster automatically restarts.

The pistons below are traveling to the right and compressing the gas in chamber "B" while pulling gas into chamber "A".



The pistons below are traveling to the left and compressing the gas in chamber "A" while pulling gas into chamber "B".



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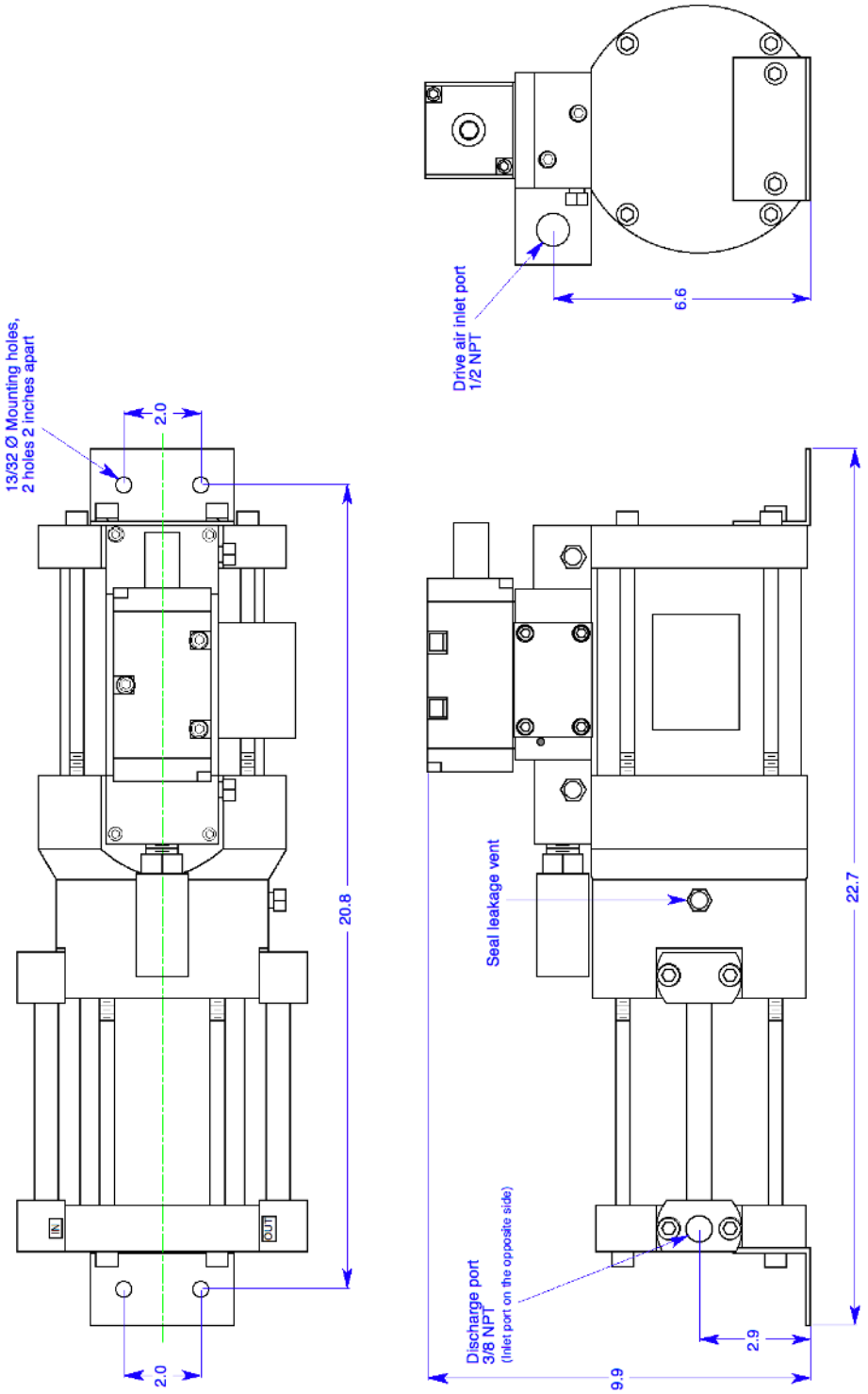
Booster Diagrams

Booster Model: 54AAV24



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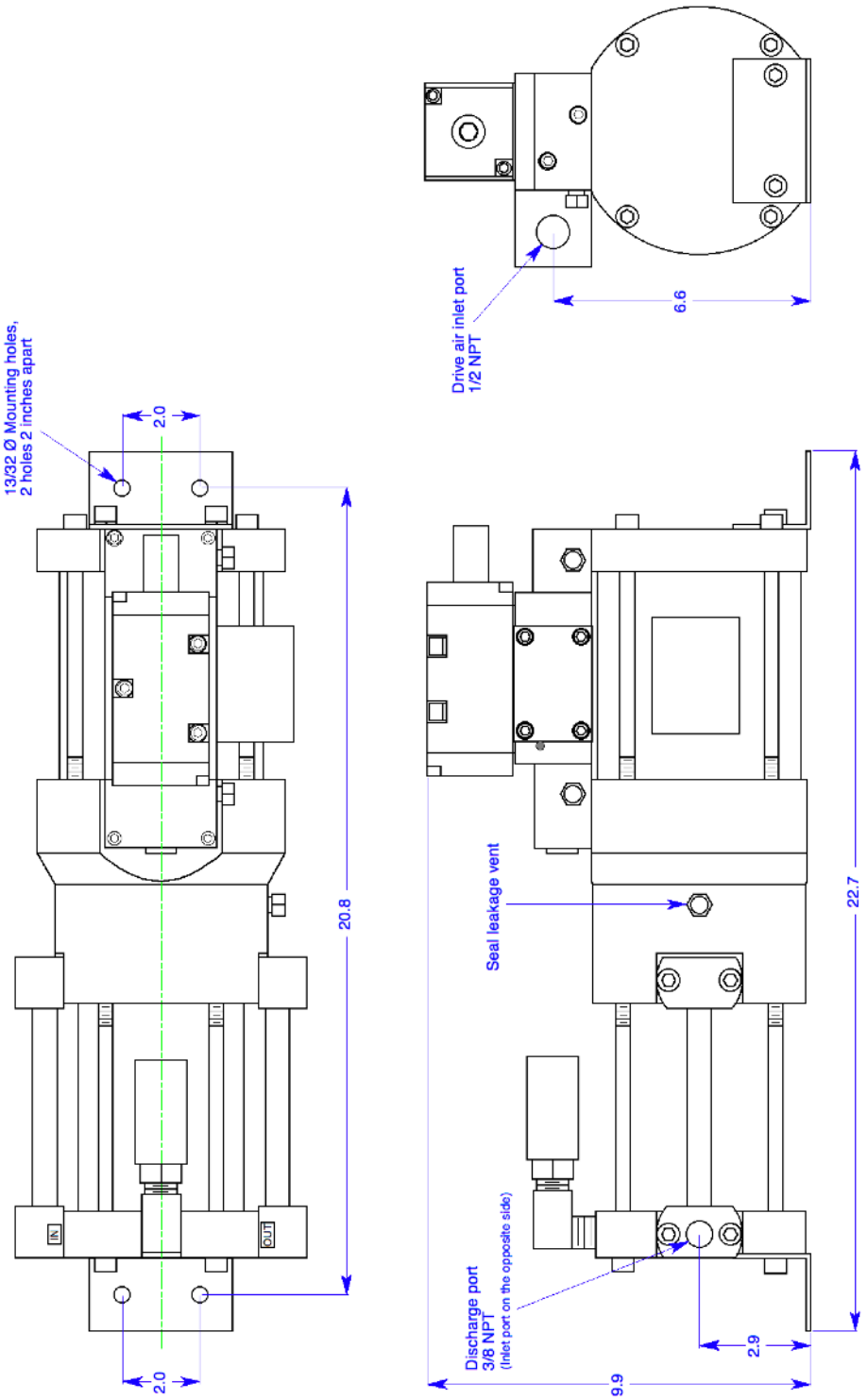
Booster Diagrams

Booster Model: 53AAV34



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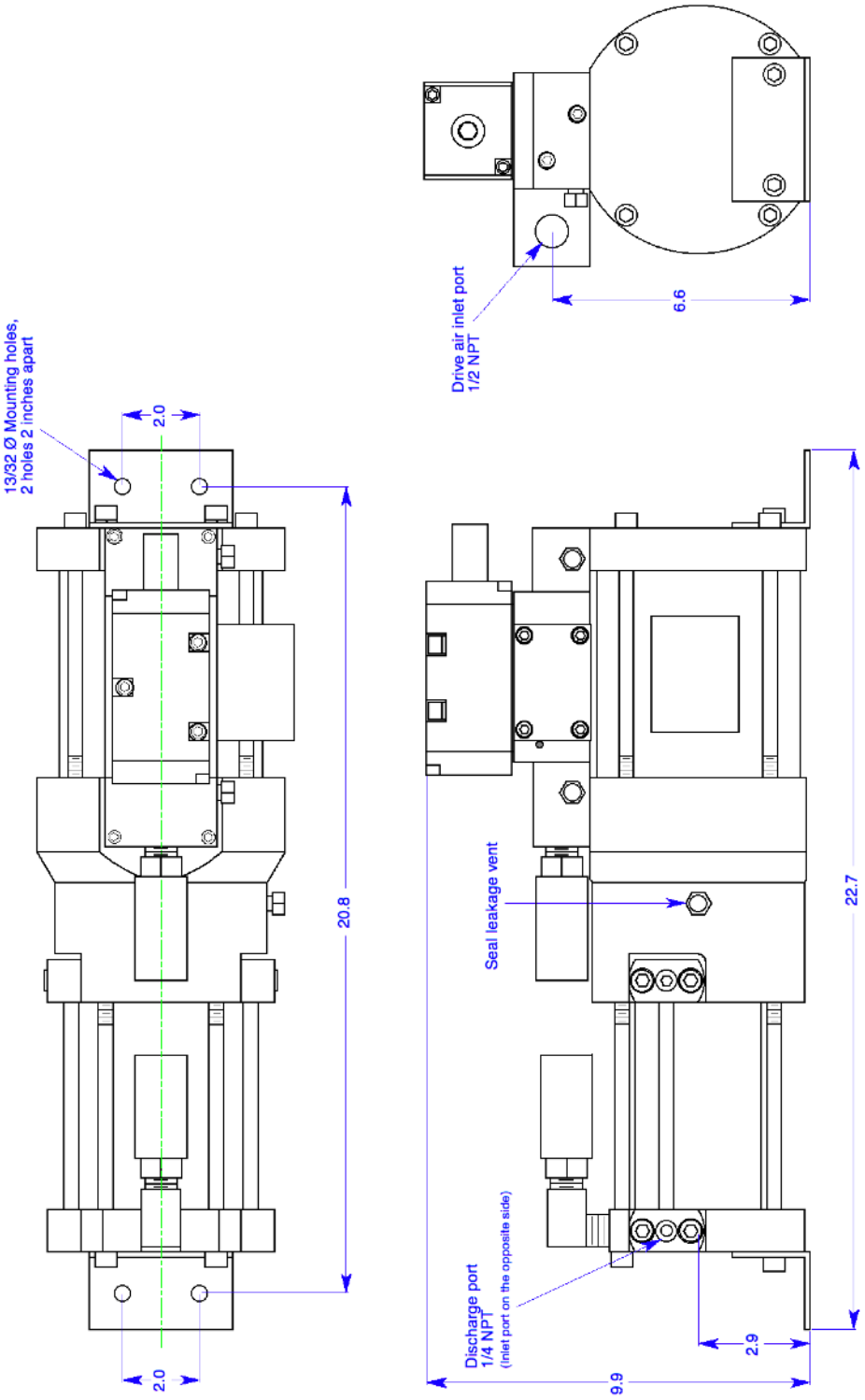
Booster Diagrams

Booster Model: 52AAV70



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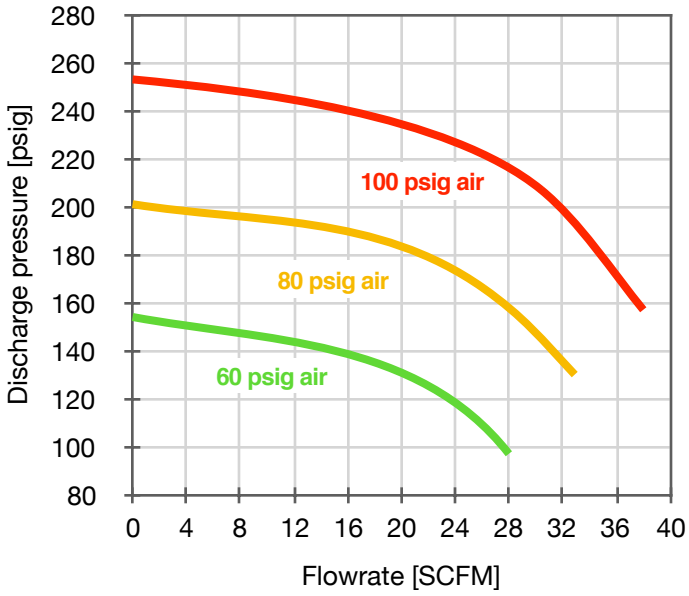
Air Pressure Boosting

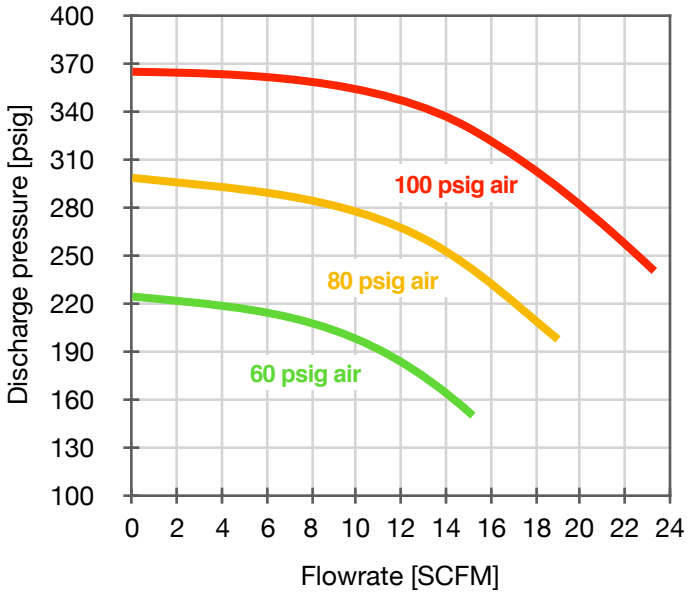
Drive air pressure and process gas supply pressure are equal: 60 to 100 psig

54AAV24

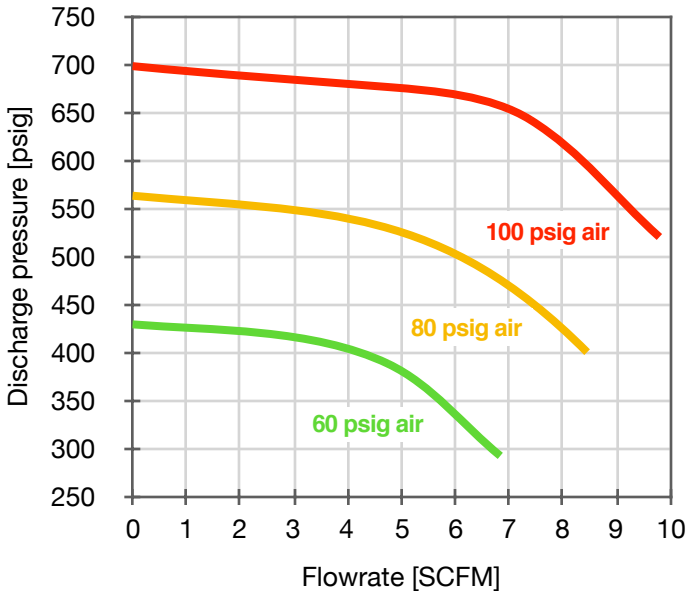


The following graphs show the booster's maximum discharge flowrate for a given set of operating conditions. The drive air pressure and the process gas supply pressure are equal.

53AAV34



52AAV70



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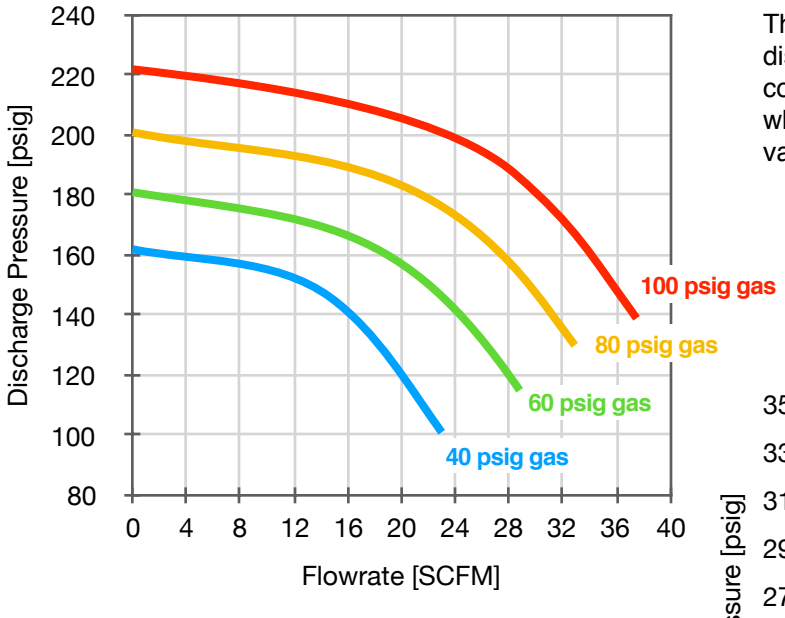
Gas Pressure Boosting

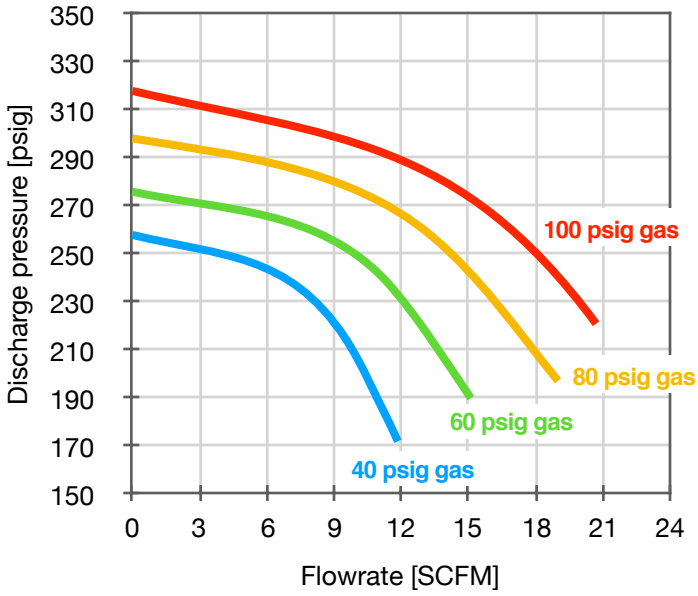
Drive air pressure: 80 psig - Process gas supply pressure: 40 to 100 psig

54AAV24

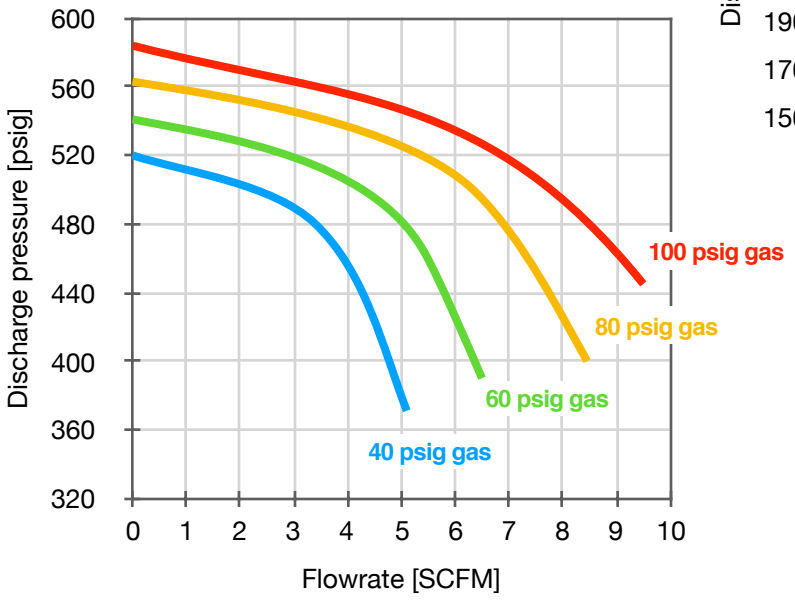


The following graphs show the booster's maximum discharge flowrate for a given set of operating conditions. The drive air pressure is held at 80 psi while the and the process gas supply pressure varies.

53AAV34



52AAV70



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Booster Accessories: Drive air controls

Drive air filter and regulator

Purpose of drive air controls

Drive air controls add a 5 micron filter and regulator to the air supply line. The regulator allows air supply pressure to be reduced before entering the drive section of the booster. Reducing the drive air pressure has two main benefits.

1. **Decrease the discharge pressure**

MPS boosters are designed to deliver the maximum flow and discharge pressure for a given set of operating conditions. For most applications the maximum discharge pressure is higher than required. Reducing the drive air pressure will reduce the discharge pressure of the booster while maintaining the same flow rate.

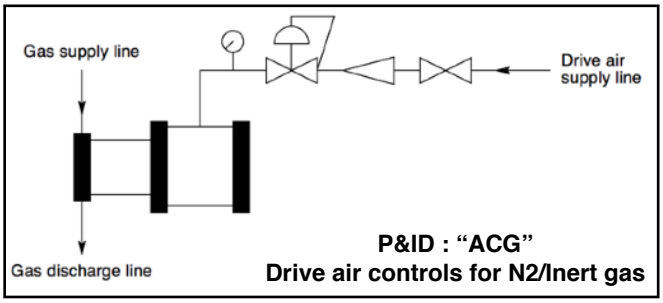
Example: A facility has 100 psi air and requires 300 psi at 10 SCFM. Allowing the booster to operate with the full 100 psi drive air pressure yields a discharge of 350 psi at 10 SCFM. This is 50 psi above the required discharge pressure and may be above downstream pressure ratings. Reducing the drive air pressure to 80 psi yields a discharge of 300 psi at 10 SCFM.

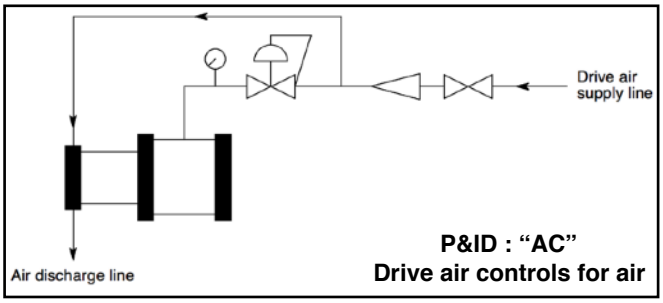
2. **Decrease the air consumption**

Decreasing the drive air pressure reduces the amount of air used to operate the booster. MPS recommends reducing the drive air pressure to the lowest possible pressure while being able to maintain the required discharge pressure and flow rate for the application because this will yield the lowest drive air consumption.

Example: Continuing with the example to the left, a facility has 100 psi air and requires 300 psi at 10 SCFM. When operating with a 100 psi drive air pressure the booster will consume 32 SCFM of air during operation. When operating with a 80 psi drive air pressure the booster will consume 26 SCFM of air during operation. This is a reduction in drive air consumption of almost 20%.

MPS offers a drive air controls package for boosting the pressure of air, N2 or another inert gas.





Booster Model Numbers

53 A A V 34 - [ ]

Symbol	Booster
54	54AAV24
53	53AAV34
52	52AAV70

Symbol	Pressure rating
24	348 psi (24 bar)
34	493 psi (34 bar)
70	1,015 psi (70 bar)

Symbol	Air Controls
Nil	None
AC	Air controls for air
ACG	Air controls for N2

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Booster Accessories: Receiver tanks

Booster mounted to a receiver tank

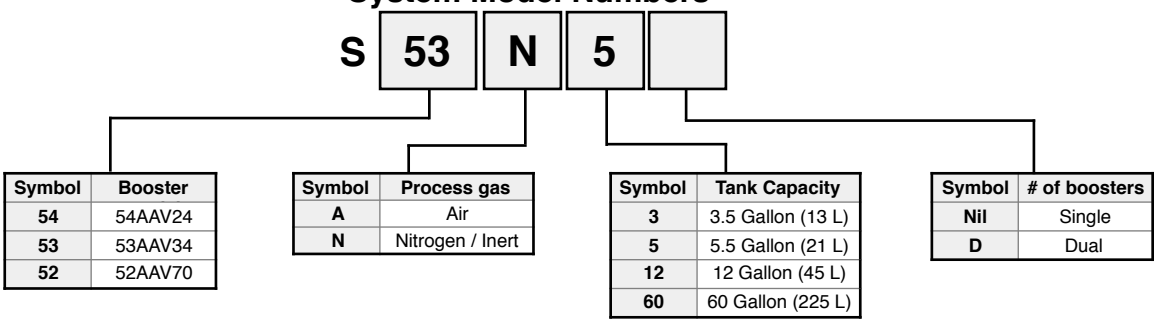
Receiver Tank Benefits

1. **Pulsation Dampening**
   During operating the discharge line will experience about ± 2 psi due to the lag time between piston strokes. The pulsations may effect the consistency of sensitive equipment down stream of the booster. Adding a receiver tank will drastically reduce the pulsations down to ± 0.5 psi. Pulsations can be completely removed from the discharge line by adding a regulator after the receiver tank.
2. **Extra storage**
   A receiver tank allows for excess air/gas storage which helps manage surges or sudden flow rate demands. The excess air/gas in the receiver tank will help maintain pressure during the sudden change in flow rate until the booster adjusts its cycle rate to meet the new demand.
3. **"Blow Down" Applications**
   A receiver tank can reduce the number of boosters required for a "blow down" application. "Blow down" applications require a large amount of flow for a very short amount of time. If the amount of air required for the application can be stored at high pressure in a receiver tank a single booster may be able to meet the applications demands verses a multiple booster system. MPS can help size a receiver tank for "blow down" applications.

MPS offers the following small receiver tanks:

Receiver Tank Specifications:	3.5 Gallon	5.5 Gallon	12 Gallon	60 Gallon
Volume - gallons (liters)	3.5 (13)	5.5 (21)	12 (45)	60 (225)
Pressure rating - psi (bar)	350 (24.1)	625 (43.1)	235 (16.2)	200 (13.8)
Port sizes - FNPT	1/4, 1/2, & 3/4			1/4, 1/2, 3/4, 2
Dimensions - inches (cm)	16.5 x 9.1 x 11.6 (42 x 23 x 29)	29.0 x 19.6 x 11 (74 x 50 x 28)	27.5 x 13.2 x 15.5 (70 x 34 x 39)	30 x 24 x 51.3 (76 x 61 x 130)
Weight - lbs (kg)	22 (10.0)	37 (16.8)	42 (19.0)	184 (83.5)
Material of manufacture	Carbon steel with black powder coat exterior			
Certifications	ASME & CRN			

System Model Numbers



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