MPS
MIDWEST
PRESSURE
SYSTEMS

Technical Manual

Model S43N12

Gas Pressure Booster System

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1. Design Specifications

Midwest Pressure Systems, Inc. (MPS) gas pressure boosters are designed for ease of operation and maintenance. Experience has shown that an MPS booster will normally provide years of satisfactory performance with minimal maintenance. Carefully review this manual which is designed to provide information on installation, start up, operation and maintenance. If you have questions, please contact Midwest Pressure Systems, Inc.

Model S43N12 Engineering Specifications	
Maximum operating discharge pressure - psi (bar)	230 (15.8)
Gas temperature range - ˚F (˚C)	-15 to 300 (-26 to 149)
Maximum cycle rate - cycles per minute (Note 1)	100
Gas displacement per cycle - cf (liters)	.038 (1.076)
Maximum gas displacement - cfm (liters per minute)	3.8 (107.6)
Pressure boost (multiple of drive air pressure) (Note 2)	1.4
Gas inlet connection FNPT	1/4
Gas outlet connection FNPT (located on the receiver tank)	3/8
Maximum drive pressure - psi (bar) (Note 3)	150 (10.3)
Air temperature range - ˚F (˚C)	32 to 167 (0 to 75)
Air displacement per cycle - cf (liters)	.069 (1.95)
Maximum air displacement - cfm (liters per minute)	6.9 (195)
Drive air inlet connection FNPT	1/2
Drive air exhaust connection FNPT	1/2
ASME receiver tank capacity - gallons (liters)	12 (45.4)
Safety relief valve (located on receiver tank) set point - psi (bar)	235 (16.2)
Overall dimensions (LxWxH) - inches (cm)	29x15x24.5 (74x38x63)
Weight - pounds (kilograms)	91 (41.4)
Ambient Temperature - ˚F (˚C) (Note 4)	5 to 140 (-15 to 60)

Note 1: A cycle consists of a forward and reverse stroke.

Note 2: This is a nominal operating pressure boost ratio, not the maximum pressure boost ratio.

Note 3: Nitrogen may also be used for the drive gas.

Note 4: Where ambient temperatures fall below 0˚C (32˚F) a heater is required for the drive air .

2. Materials of Construction and Torque Specifications

Process gas wetted materials
Anodized Aluminum

Pneumatic drive materials exposed to the environment
Anodized aluminum for excellent general environmental corrosion resistance

External bolts, nuts, and washers
18-8 SS for excellent marine and general environmental corrosion resistance

Dynamic seal material
Carbon-fiber-filled Teflon piston rings and rod seals

Gas wetted static seals
Viton

Air drive seals
Buna-N

12 gallon ASME receiver tank
Steel, exterior powder-coated

Pipe fittings and components
Brass and aluminum (air filter and regulator)

Tubing
Copper

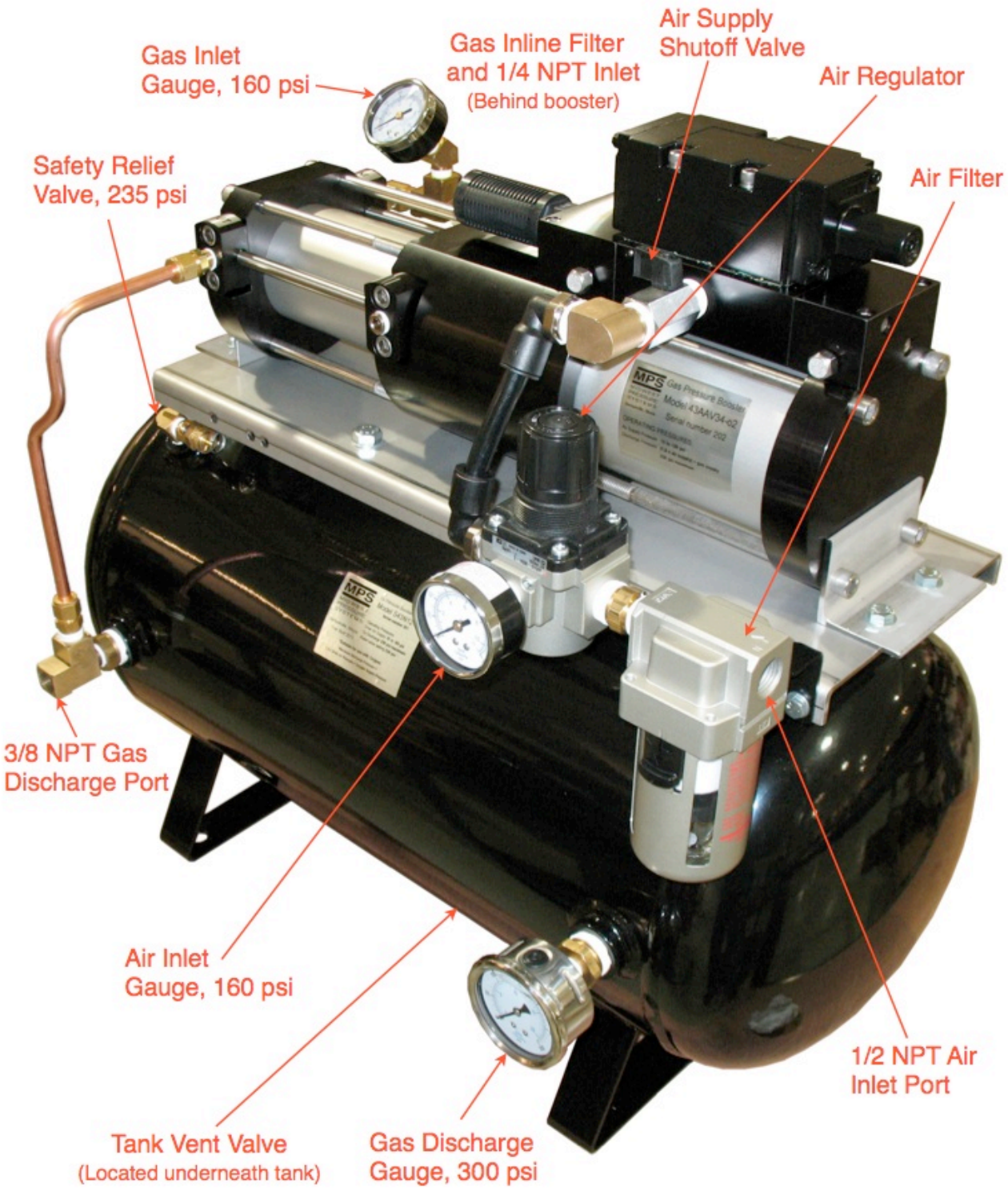
Fastener Torque Specifications

This booster utilizes high strength fasteners. Replacement fasteners must be of the same grade and material or the booster could fail.

Fastener Description	Size Inch TPI	Type	Torque Lb-Ft (N•m)
Piston Rod Nuts	3/8-16 UNC	18-8 SS hex head locknut • 11/16 wrench	30 (40.7)
1” Long SHC Screws	3/8-16 UNC	18-8 SS hex head nut • 5/16 wrench	25 (34)
7” Long SHC Screws	3/8-16 UNC	18-8 SS hex head nut • 5/16 wrench	15 (20.3)
Air Manifold Mounting Screws	10-32 UNC	18-8 SS socket head cap screw • 5/32 wrench	3 (4.1)
Control Valve Mounting Screws	1/4-20 UNC	18-8 SS socket head cap screw • 3/16 wrench	8 (10.8)

3. System Layout

Use this layout to learn component locations and refer back to it for topics discussed in later sections.



4. Installation

1 Mounting

1a Mount the S43N12 gas booster system on a horizontal and stable surface. Other mounting orientations are not recommended. The booster system vibrates while operating, so use the four 1/2" mounting holes spaced in a rectangular pattern of 16.5" (41.9 cm) by 10" (25.4 cm) to bolt it to a solid surface.

The booster must be well-supported. The booster vibrates during operation. Inadequate mounting supports can put stress on the piping connections. Piping stresses can cause a leak or component failure.

2 Air Supply Connection

2a Connect your shop air pressure to the female 1/2 inch NPT port on the air filter on the front of the system. The piping should be installed to prevent stresses from acting on the air inlet port which could cause a pilot leak and booster operating failure. The booster drive air must be ISO 8573.1 CLASS 2 or better. Lower quality air can cause the formation of ice in the cycling valve and exhaust mufflers which will cause the booster stop running or run erratically. If ambient temperatures fall below freezing, the drive air must be dried or heated to prevent ice formation on the exhaust mufflers which would cause the booster to stop running or run erratically. Maximum inlet pressure is 150 psig.

The air controls and drive portion of the booster are rated for a maximum pressure of 150 psig. Inlet pressures higher than 150 psig could result in an air leak, control malfunction, or an air component failure.

2b A shutoff valve can be installed upstream of the filter for convenient removal of the system for maintenance.

2c The unit is permanently lubricated. Use of an inlet lubricator will void the warranty.

3 Gas Supply Connection

3a Connect the gas line to the 1/4" FNPT inline filter located behind the booster. Supply piping should have an inside diameter of 1/4" or greater.

4 Discharge Connection

4a The discharge connection is located on the 12 gallon ASME receiver tank. Connect your discharge line to the female 3/8 inch NPT port on the front of the tank.

4b This system is protected by a safety relief valve rated at 235 psi (16.2 bar). The maximum working pressure of the system is rated for 230 psi (15.8 bar). If the maximum working pressure can exceed the pressure rating of downstream components or piping, an additional safety relief valve must be installed.

This booster system can reach a maximum design pressure of 230 psi. Downstream components must be rated to meet this pressure or be protected by an additional safety relief device.

4c A filter should be installed downstream of the system to protect components from seal/booster particles and scale from the tank.

5. Startup

1 Supply Gas to the Booster

1a Open the inlet valve located behind the booster. Supply the process gas to the booster. The gas will flow through the booster's check valves pressurizing the tank and the discharge line.

2 Supply Air to the Booster

2a The maximum allowable working pressure for the system is 230 psi (15.8 bar). The discharge pressure of the booster system is calculated by multiplying the regulated drive air pressure by 1.8 and adding that number to the gas supply pressure (i.e., If the drive pressure is 60 psi and gas supply is 80 psi, the maximum discharge pressure will be(1.8*60)+80=188psi). The 300 psi gauge mounted on the tank indicates discharge pressure.

2b Close the air supply shutoff valve and supply air to the booster. Set the drive air regulator to desired pressure. The regulated drive pressure is set on the pressure regulator found on the front of the system. Pull up on the knob to unlock it. Adjust the knob by turning it to raise or lower the regulated drive air pressure. Drive air pressure is read on the gauge attached to the regulator. Push down on the regulator's knob to lock it into position.

2c Open the air supply shutoff valve and the booster will start to cycle. After the booster has stalled, check the entire booster system for leaks.

⚠ Operating temperatures or pressures outside the recommended range for the booster can cause a leak or the system to operate sporadically.

⚠ Do not allow combinations of the the regulated drive air and gas supply pressures to create a maximum discharge pressure greater than 230psi.

6. Operation

1 Operating Conditions

1a For more precise pressure control, set the drive air regulator for a higher discharge pressure than required, and install a filter and secondary regulator on the discharge line of the accumulator. This allows for greater accumulator storage capacity, and minimizes pressure fluctuations downstream of the system. Make sure that any downstream components are rated for the accumulator pressure, or are protected by a relief valve in case the secondary regulator fails.

1b Make sure the drive air exhaust silencer is installed. Boosters without silencers can produce sound levels above 85 decibels.

2 Operating Characteristics

2a The booster will cycle as long as drive air is supplied and process gas flow is required. The booster cycle rate will automatically adjust to meet the required flow rate.

2b The accumulator is rated for 235 psi and includes a relief valve set for 235psig. At pressures above 230 psig, the relief valve can open or leak.

⚠ Operation of the booster without drive air exhaust silencers may cause hearing damage to exposed workers.

⚠ If the 230 psi design pressure rating is exceeded the safety relief valve will discharge process gas into the atmosphere.

⚠ With discharge pressures above 230 psi, the safety relief valve will open and make a loud noise.

6. Operation - continued...

3 Operating Life

3a The operating life of the booster seals is related to the distance the seals travel. At a 70 cycle per minute operating speed, the booster seals can provide over 2000 hours of service.

7. Maintenance and Warranty

1 Lubrication

1a All of the booster dynamic seals are carbon fiber filled Teflon and the control valve dynamic components are made from honed and lapped stainless steel with no elastomeric seals. No lubrication of any kind is required for the booster.

2 Filters

2a The air inlet and gas inlet filters should be checked and replaced as necessary.

3 Repairs

3a The booster seals and valves can be replaced after they have worn out. Use seal kit Model Number K43AAV34. Always perform pressure, leak and functional tests on a repaired booster before returning it to service.

An improperly assembled booster could cause a leak or component failure.

3b The booster has been designed to utilize high strength fasteners. If it becomes necessary to replace any of the tie rods, tie rod nuts or socket head cap screws on the booster, the replacement fasteners must be of the same grade.

Use of the wrong fasteners on the booster could cause a gas leak or component failure.

3c When rebuilding the booster, use the torque values listed in Section 2.

Improper torque values can cause a failure.

3d Use proper assembly and disassembly techniques. Tie rods should be incrementally tightened and loosened using a cross-pattern. Static o-rings should be lightly greased to aid installation. Surfaces in contact with the filled-Teflon rod seals and piston seals should not be greased.

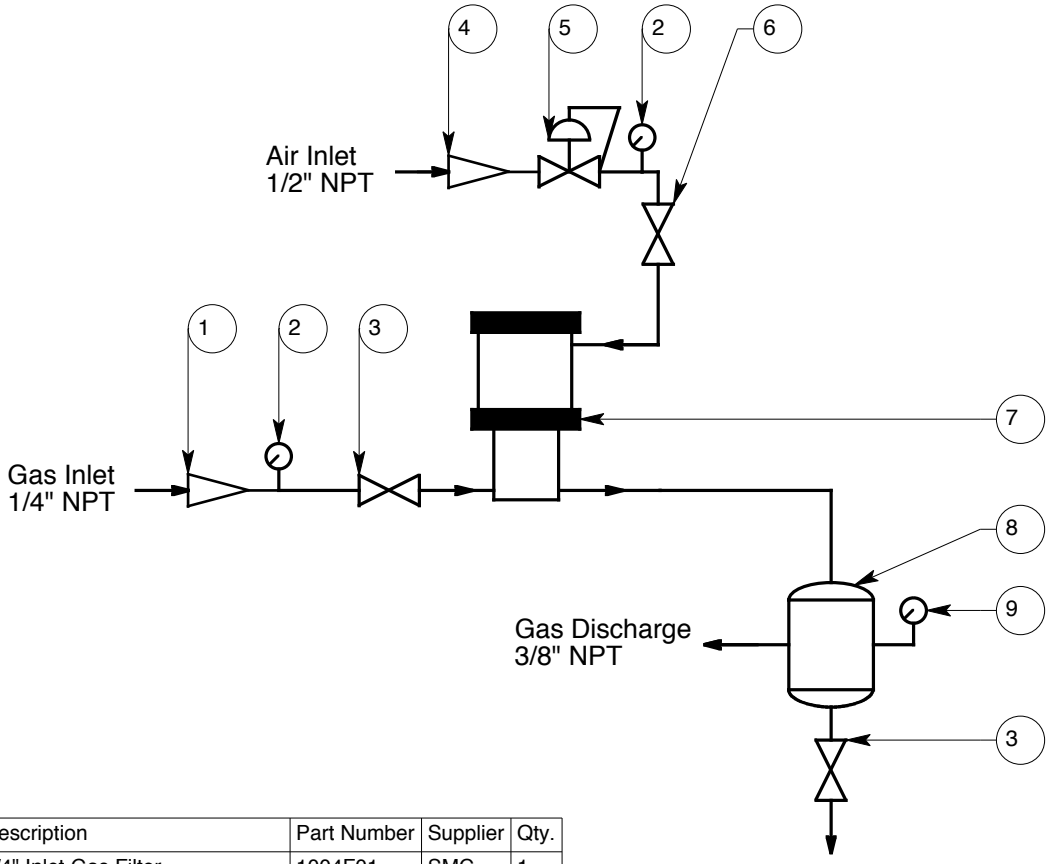
An improperly assembled booster could cause a leak or component failure.

4 Warranty

4a Midwest Pressure Systems, Inc. warrants these booster systems to be free of defects in material and workmanship for a period of one year after installation. We will either repair or replace a failed unit returned by the customer. No other warranty is expressed or implied. Proof of the installation date is required. This warranty does not apply to equipment which has been abused, and is voided by failure to use a well-maintained inlet filter.

8. Piping and Instrumentation Diagram

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



Item	Description	Part Number	Supplier	Qty.
1	1/4" Inlet Gas Filter	1004F01	SMC	1
2	0-160 psi Pressure gauge	1004G02	MPS	2
3	1/4" Ball Valve	1004V13	MPS	2
4	1/2" Inlet Air Filter	1008F02	SMC	1
5	1/2" Drive Air Regulator	1008R01	SMC	1
6	1/2" Ball valve	1008V06	MPS	1
7	2.8:1 Ratio Air Pressure Booster	43AAV34-o2	MPS	1
8	12 Gal ASME Receiver Tank	P0174	MPS	1
9	0-300 psi Pressure Gauge	1004G03	MPS	1

UNLESS OTHERWISE SPECIFIED	SIGNATURES		DATE
DIMENSIONS ARE IN INCHES	DRAWN	CMA	2/22/11
TOLERANCES ON: 2 PL DECIMALS +/- 0.01 3 PL DECIMALS +/- 0.003 ANGLES +/- 0.5˚ FRACTIONS +/- 1/16 32	CHECKED		
	ENGRG		
	ISSUED	RAV	2/24/11
MATERIAL:			

MPS MIDWEST PRESSURE SYSTEMS

Midwest Pressure Systems, Inc.

1035 Entry Drive • Bensenville, IL 60106

Section 8. Piping & Instrumentation

A		DWG NO S43N12 P&ID	REV
SCALE		SHEET	

9. Booster System Assembly Drawing