

Gas Boosters and Systems

- Works off compressed air supplies
- Operates quietly
- Features mechanical separation between air drive and boosted gas
- Compatible with most gases

The PowerStar™4B gas booster is a reciprocating, single or double or dual stage air operated unit. It uses an air-piloted unbalanced type air directional valve to cycle the booster.



The Principles of Operation

The PowerStar™4B gas booster operates on the differential piston area principle. A large area piston, driven at low air pressures, drives a small area compression piston which converts input gas to higher pressure. The output gas or discharge pressure is determined by the ratio between the area of the drive piston, the operating air pressure and the available precharge pressure supply.

The function of the precharge pressure is to charge the high pressure cylinder inside the booster with gas, reducing the time needed to reach higher pressures. In double-ended gas boosters, the precharge gas adds power to the compression stroke.

The Actual Operation

The PowerStar™4B gas booster works rapidly at first, then slows and stops at a pressure balance. The booster holds the pressure balance indefinitely, assuming no leakage. When a pressure imbalance occurs, the booster automatically restarts and restores the pressure balance. During operation, exhaust air from the air drive section cools the high pressure boosting chamber.

The Gas Booster in Action

Whether you use gas above normal cylinder pressure or require continuous high pressure and want to get the most out of the cylinder's gas supply, the PowerStar™4B Series is for you! It assures the optimum use of commercially-bottled gas. Some units draw a vacuum.

The applications for this versatile gas booster are endless and include:

Aviation and Aerospace

- Static and dynamic testing of valves and components at overhaul facilities
- Inflating high pressure aircraft tires
- Instrument calibration

Automotive

- Air bag testing
- Gas spring charging systems for die and mold manufacturers
- Accumulator charging

Petrochemical

- Heel recovery from cylinders for gas transfer
- Gas blanketing

Diving

- Filling air tanks from larger cylinders
- Testing air pressure regulators
- Gas mixing

Fire Protection

- Filling breathing air cylinders
- Mobile filling stations for firefighters
- Halon and CO₂ charging

Fluid Power

- Testing hoses and valves
- Testing and calibrating gas components
- Accumulator charging

Machine Tools

- Power clamping
- Quick die change

Plastics

- Ejecting parts from molds
- Gas injection

Packaging

- Injecting nitrogen into aerosol cans

TABLE 1 GAS BOOSTER PERFORMANCE

Approximate performance based on a maximum air consumption of **50 SCFM**

| Gas Booster Model Number | Inlet Port Precharge Pressure psi | Outlet Port Pressure (w/100 psi driving air) | DISCHARGE CAPACITY-Standard Cubic Inches per Minute (SCIM) | | | | | | | | | | | |
|--------------------------|-----------------------------------|--|--|-------|-------|-------|------|------|------|------|------|------|------|------|
| | | | DISCHARGE PRESSURE-psi | | | | | | | | | | | |
| | | | 200 | 400 | 600 | 800 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 |
| P4BS010 | 100 | 1000 | 4593 | 4176 | 3854 | 3533 | | | | | | | | |
| P4BS010 | 200 | 1000 | 8598 | 7815 | 7215 | 6614 | | | | | | | | |
| P4BS034 | 400 | 3400 | | | 4388 | 4342 | 4296 | 3683 | 3314 | | | | | |
| P4BS034 | 500 | 3400 | | | 5447 | 5390 | 5332 | 4571 | 4114 | | | | | |
| P4BS050 | 400 | 5000 | | | 2747 | 2709 | 2517 | 2382 | 2248 | 2171 | | | | |
| P4BS050 | 500 | 5000 | | | 3410 | 3362 | 3124 | 2957 | 2790 | 2694 | | | | |
| P4BS080 | 600 | 8000 | | | | | | | 2353 | 2186 | 2002 | 1919 | 1852 | |
| P4BS080 | 1000 | 8000 | | | | | | | 3883 | 3608 | 3305 | 3167 | 3057 | |
| S010P4BS010 | 50 | 1050 | 4405 | 4004 | 3696 | 3388 | | | | | | | | |
| S010P4BS010 | 100 | 1100 | 7808 | 7099 | 6552 | 6006 | | | | | | | | |
| S010P4BS010 | 200 | 1200 | 14617 | 13286 | 12266 | 11244 | | | | | | | | |
| S034P4BS034 | 300 | 3700 | | | 5661 | 5602 | 5542 | 4752 | 4276 | | | | | |
| S034P4BS034 | 400 | 3800 | | | 7460 | 7381 | 7303 | 6261 | 5634 | | | | | |
| S034P4BS034 | 500 | 3900 | | | 9260 | 9163 | 9064 | 7771 | 6994 | | | | | |
| S050P4BS050 | 400 | 5400 | | | 4670 | 4605 | 4279 | 4049 | 3822 | 3691 | 2117 | | | |
| S050P4BS050 | 500 | 5500 | | | 5797 | 5715 | 5311 | 5027 | 4743 | 4580 | 2627 | | | |
| S080P4BS080 | 600 | 8600 | | | | | | | 4000 | 3716 | 3403 | 3262 | 3148 | 1889 |
| S010P4BS034 | 100 | 3840 | | | 3109 | 3109 | 3053 | 2855 | 2533 | | | | | |
| S010P4BS050 | 100 | 5600 | | | 3109 | 3109 | 3053 | 2855 | 2691 | 2533 | 2329 | | | |
| S010P4BS080 | 100 | 8900 | | | 3109 | 3081 | 3053 | 2940 | 2883 | 2770 | 2657 | 2544 | 2431 | 2318 |

TABLE 2 GAS BOOSTER PERFORMANCE

Approximate performance based on a maximum air consumption of **50 SCFM**

| Gas Booster Model Number | Inlet Port Precharge Pressure psi | Outlet Port Pressure (w/100 psi driving air) | Time required in minutes to fill a 100 cubic inch air receiver to listed discharge | | | | | | | | | | | |
|--------------------------|-----------------------------------|--|--|-----|-----|-----|------|------|------|------|------|------|------|------|
| | | | DISCHARGE PRESSURE-psi | | | | | | | | | | | |
| | | | 200 | 400 | 600 | 800 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 |
| P4BS010 | 100 | 1000 | | 0.4 | 0.8 | 1.2 | 1.7 | | | | | | | |
| P4BS010 | 200 | 1000 | | 0.2 | 0.4 | 0.7 | 0.9 | | | | | | | |
| P4BS034 | 400 | 3400 | | | | 0.8 | 1.1 | 3.0 | 5.3 | | | | | |
| P4BS034 | 500 | 3400 | | | | 0.4 | 0.9 | 2.5 | 4.3 | | | | | |
| P4BS050 | 400 | 5000 | | | | 1.0 | 1.5 | 4.4 | 7.6 | 11.1 | 15.1 | | | |
| P4BS050 | 500 | 5000 | | | | 0.6 | 1.0 | 3.3 | 5.9 | 8.7 | 11.9 | | | |
| P4BS080 | 600 | 8000 | | | | | | | 6.9 | 10.0 | 14.7 | 18.8 | 23.1 | 27.9 |
| P4BS080 | 1000 | 8000 | | | | | | | 3.5 | 5.4 | 8.1 | 10.6 | 13.1 | 16.0 |
| S010P4BS010 | 50 | 1050 | | 0.5 | 0.9 | 1.4 | 1.9 | | | | | | | |
| S010P4BS010 | 100 | 1100 | | 0.3 | 0.5 | 0.7 | 1.0 | | | | | | | |
| S010P4BS010 | 200 | 1200 | | 0.1 | 0.2 | 0.3 | 0.5 | | | | | | | |
| S034P4BS034 | 300 | 3700 | | | | 0.6 | 0.9 | 2.4 | 4.1 | 10.0 | | | | |
| S034P4BS034 | 400 | 3800 | | | | 0.4 | 0.6 | 1.7 | 3.0 | 7.4 | | | | |
| S034P4BS034 | 500 | 3900 | | | | 0.2 | 0.4 | 1.3 | 2.4 | 5.8 | | | | |
| S050P4BS050 | 400 | 5400 | | | | 0.6 | 0.9 | 2.6 | 4.4 | 6.5 | 8.9 | | | |
| S050P4BS050 | 500 | 5500 | | | | 0.4 | 0.6 | 2.0 | 3.4 | 5.1 | 7.0 | | | |
| S080P4BS080 | 600 | 8600 | | | | | | | 4.1 | 5.9 | 8.7 | 11.1 | 13.6 | 16.4 |
| S080P4BS080 | 1000 | 9000 | | | | | | | 2.5 | 3.6 | 5.2 | 6.7 | 8.2 | 10.0 |
| S010P4BS034 | 100 | 3840 | | | | 1.5 | 2.0 | 4.4 | 7.2 | 11.4 | | | | |
| S010P4BS050 | 100 | 5600 | | | | 1.5 | 2.0 | 4.4 | 7.2 | 10.0 | 13.7 | | | |
| S010P4BS080 | 100 | 8900 | | | | 1.5 | 2.0 | 4.3 | 6.7 | 9.4 | 12.3 | 15.4 | 18.9 | 22.6 |

Gas Boosters and Systems

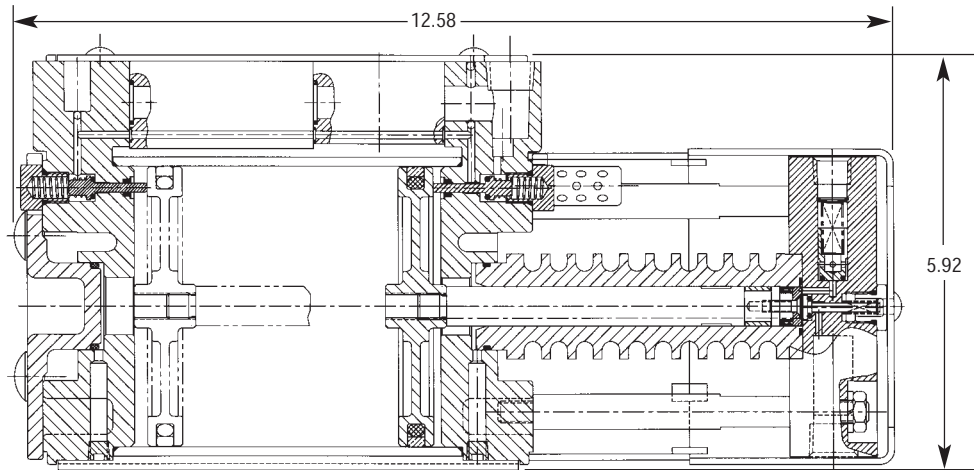
MODELS

| Single Ended Ratio Non Separated | Double Ended Ratio Non Separated | Dual Ratio Non Separated | Single Ended Ratio Separated | Double Ended Ratio Separated | Dual Ratio Separated |
|-------------------------------------|-------------------------------------|-----------------------------|---------------------------------|---------------------------------|-------------------------|
| P4B010 | 010P4B010 | 010P4B034 | P4BS010 | S010P4BS010 | S010P4BS034 |
| P4B034 | 034P4B034 | 010P4B050 | P4BS034 | S034P4BS034 | S010P4BS050 |
| P4B050 | 050P4B050 | | P4BS050 | S050P4BS050 | S010P4BS080 |
| | | | P4BS080 | S080P4BS080 | |

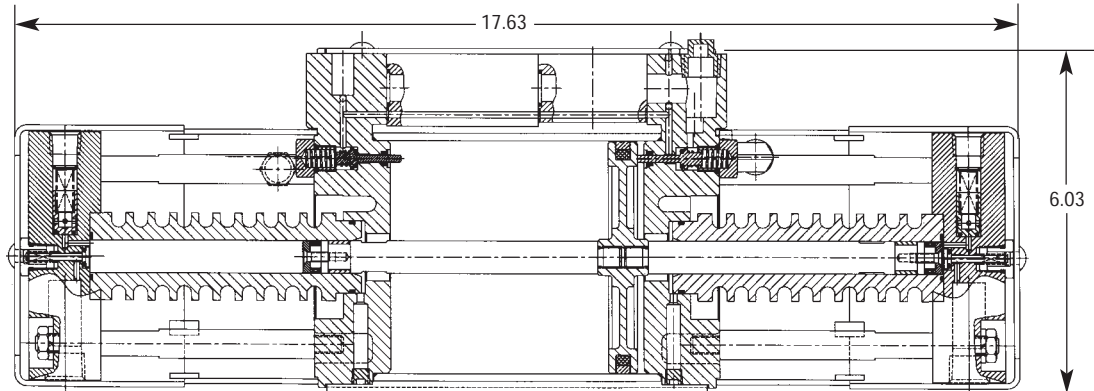
PORTING

| Gas Booster Model | Inlet Ports Gas | Outlet Ports Gas | Inlet Ports Air | Shipping Weight Approx. |
|-------------------|-----------------|------------------|-----------------|-------------------------|
| All single-ended | 3/8" NPT | 1/4" NPT | 3/8" NPT | 20 lbs. |
| All double-ended | 3/8" NPT | 1/4" NPT | 3/8" NPT | 25 lbs. |

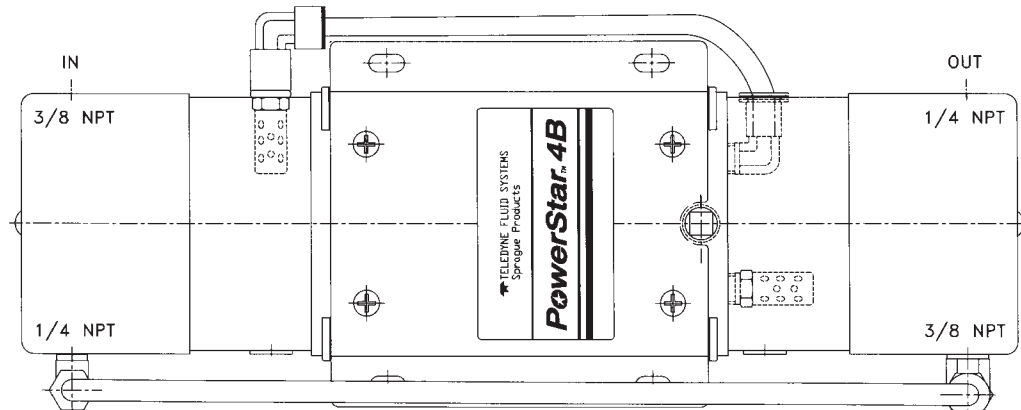
DIMENSIONS



Single-ended Booster



Double-ended Booster

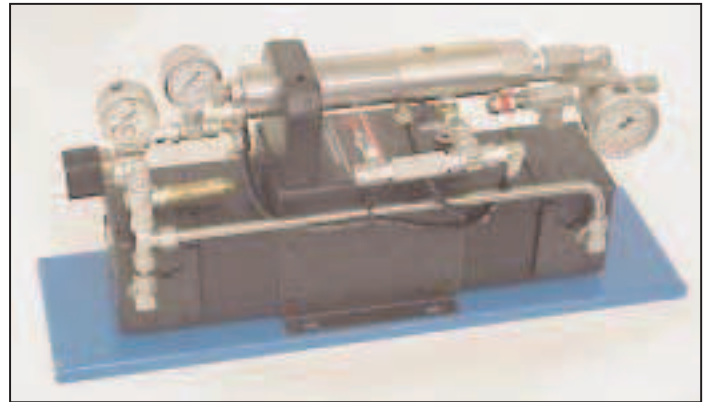


Dual Ratio Booster

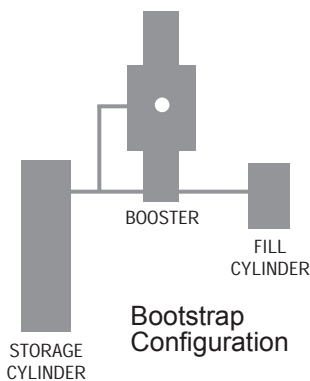
Breathable Air Booster and Oxygen Service Booster



Oxygen service booster P/N 93992-034-OX



Breathable air booster HPU-1200

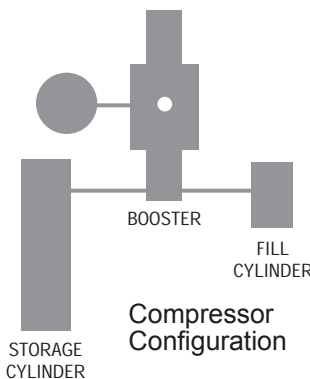


Bootstrap Configuration - Number of Fills

| Storage cylinder Pressure/Volume psig/scf | SCBA cylinder to be filled Pressure/Volume psig/scf | | | | |
|---|---|---------|---------|---------|---------|
| | 2216/45 | 4500/45 | 4500/88 | 2250/72 | 3000/80 |
| 2400/260 | 3.2 | 1.6 | 0.8 | 2.2 | 1.2 |
| 4500/444 | 8.1* | 4.5** | 2.3 | 5.0 | 3.6 |
| 5000/450 | 9.0 | 5.1 | 2.6 | 5.6 | 3.9 |
| 6000/509 | 11.0 | 6.7 | 3.4 | 6.9 | 4.6 |

*represents an increase in total fills from 6.5 to 8.1 when using a booster.

**represents an increase in total fills from 0 to 4.5 when using a booster.



Compressor Configuration - Number of Fills

| Storage cylinder Pressure/Volume psig/scf | SCBA cylinder to be filled Pressure/Volume psig/scf | | | | |
|---|---|---------|---------|---------|---------|
| | 2216/45 | 4500/45 | 4500/88 | 2250/72 | 3000/80 |
| 2400/260 | 6.2 | 5.5 | 2.8 | 3.9 | 3.4 |
| 4500/444 | 12.0* | 10.2** | 5.2 | 7.5 | 6.4 |
| 5000/450 | 12.4 | 10.3 | 5.3 | 7.6 | 6.5 |
| 6000/509 | 14.0 | 11.8 | 6.0 | 8.8 | 7.3 |

*represents an increase in total fills from 6.5 to 12.0 when using a booster.

**represents an increase in total fills from 0 to 10.2 when using a booster.

Fill Times (Minutes)

| Inlet Pressure psig | SCBA cylinder to be filled Pressure/Volume psig/scf | | | | |
|---------------------------|---|---------|---------|---------|---------|
| | 2216/45 | 4500/45 | 4500/88 | 2250/72 | 3000/80 |
| 500 | 28.5 | 32.9 | 64.2 | 45.8 | 54.7 |
| 1000 | 10.3 | 14.6 | 28.5 | 16.6 | 22.2 |
| 1500 | 4.0 | 8.4 | 16.4 | 6.7 | 11.1 |
| 2000 | 0.9 | 5.2 | 10.3 | 1.7 | 5.6 |

Notes:

- The booster will operate using a small compressor that is continuously rated from 1.5 HP/6 SCFM to 10 HP/50 SCFM at 100 psi.
- Fills and times are based on empirical and laboratory data, and can be adversely affected by plumbing configuration, leaks, cylinder capacities, etc.
- All tables are based on 100 psi drive air pressure, 500 psi minimum inlet pressure, 500 psi initial fill cylinder pressure, average air motor consumption of 13 SCFM, and using the PowerStar S050P4B050 booster.