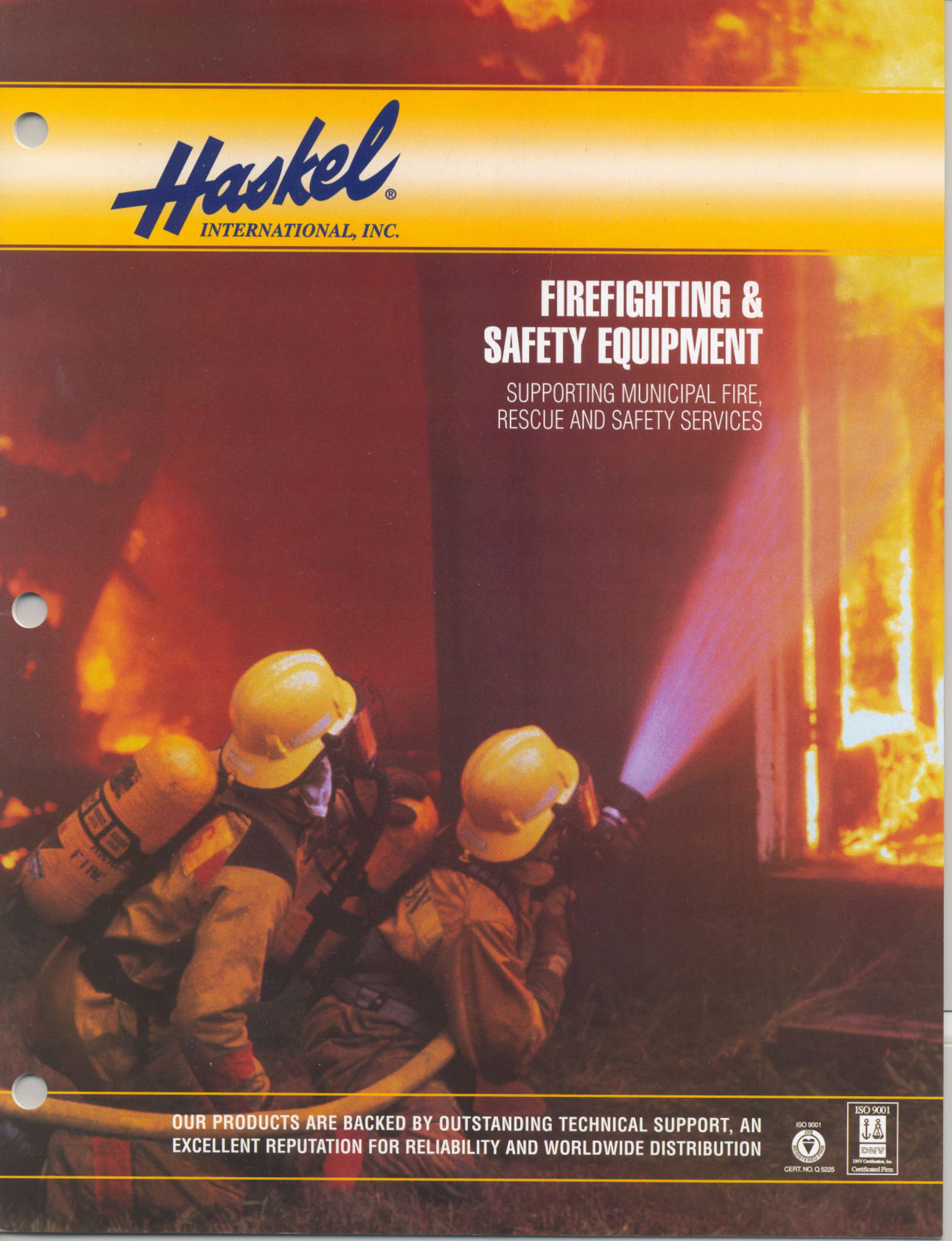




Haskel[®]
INTERNATIONAL, INC.

FIREFIGHTING & SAFETY EQUIPMENT

SUPPORTING MUNICIPAL FIRE,
RESCUE AND SAFETY SERVICES



**OUR PRODUCTS ARE BACKED BY OUTSTANDING TECHNICAL SUPPORT, AN
EXCELLENT REPUTATION FOR RELIABILITY AND WORLDWIDE DISTRIBUTION**

ISO 9001



CERT. NO. Q 5225

ISO 9001



DNV Certification, Inc.
Certified Firm



Haskel International, Inc. • Burbank, California, USA

Haskel International, Inc., has over 50 years of experience in the support of fire, rescue, and safety services that include a wide range of standard and customized systems that are used to transfer and pressurize liquids and liquefied gases in a variety of applications.

The SafetyAmp Series was primarily developed for municipal fire departments who operate a multi-stage mechanical compressor with purification and storage cylinders. Additionally, the air-driven oxygen booster units have multiple applications for filling O₂ cylinders within the commercial airline, military scuba diving, and industrial markets.

Haskel also offers pumps and boosters for halon and CO₂ filling and recovery for fire extinguishers.

Haskel International, Inc., through dedication and a continuous investment in the most modern machinery and technology ensures that Haskel remains a leader in providing the necessary equipment needed by all fire, rescue, and safety organizations.



Haskel Energy Systems, Ltd. • Sunderland, England, UK

Located in Burbank, California, USA, with an additional manufacturing plant in Sunderland, U.K., the company also has strategically placed subsidiaries, regional offices, and dedicated distributors throughout the world.

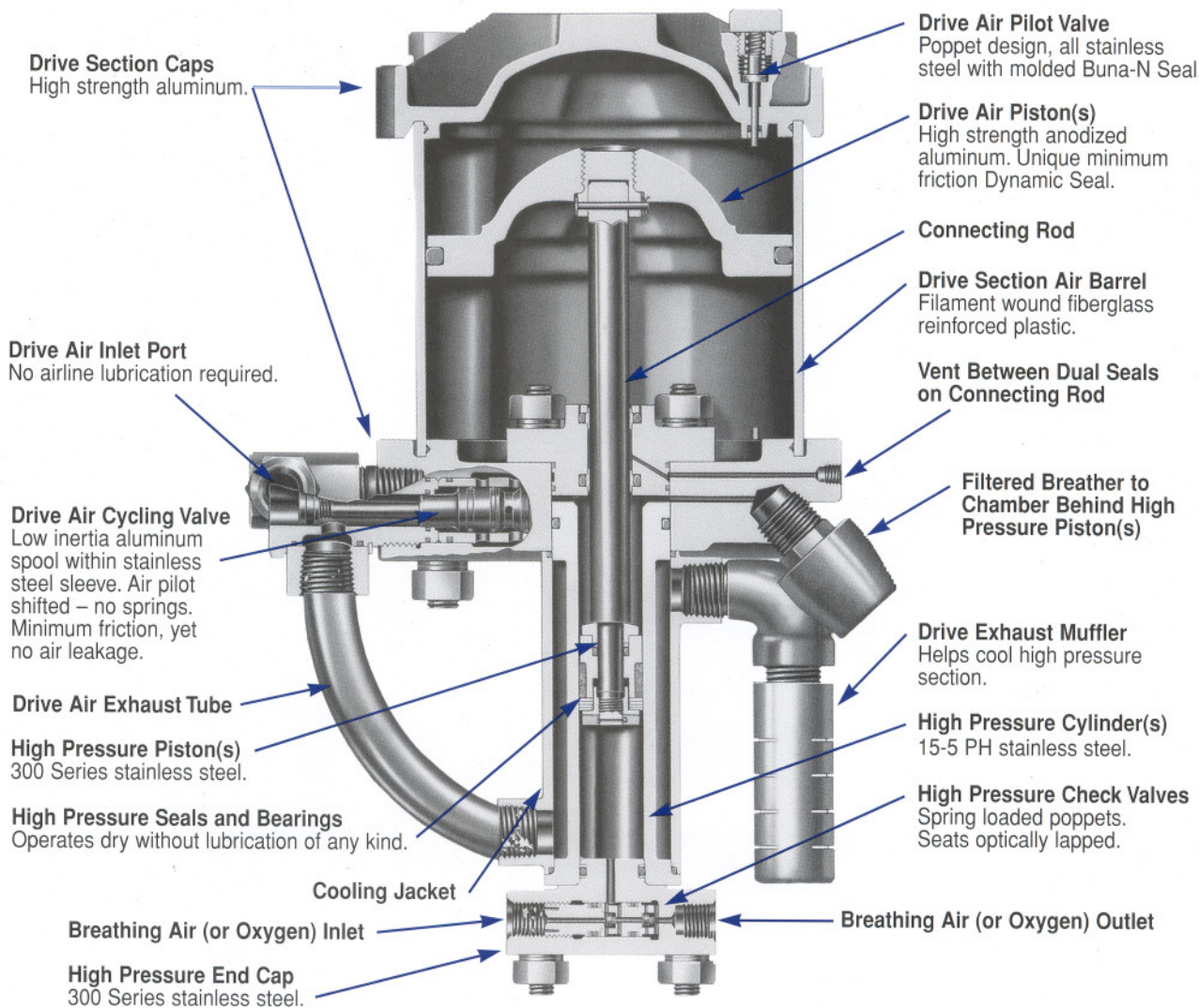
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The Heart of the System

Oil-Free Air-Driven Gas Boosters

Haskel Gas Boosters consist of a large area reciprocating air-drive directly coupled by a connecting rod to a small area gas piston. The gas piston operates in a high pressure gas barrel section. Each gas barrel end cap contains high pressure inlet and outlet check valves. The air-drive section includes a cycling spool and pilot valves that provide continuous reciprocating action when air is supplied to the air-drive inlet.

Isolation of the gas compression chambers from the air-drive section is provided by three sets of dynamic seals. The intervening two chambers are vented to atmosphere. This design prevents air-drive contamination from entering the gas stream. Cooling is provided by routing the cold exhausted drive air through an individual jacket surrounding the gas barrel and also through an intercooler on the interstage line (two-stage models only).



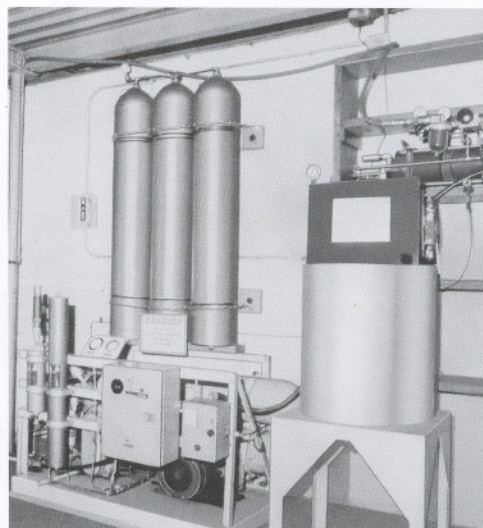
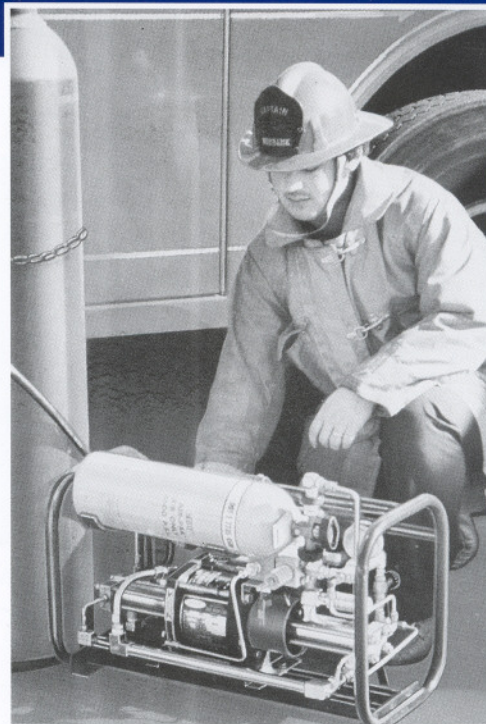
The SafetyAmp Series

Non-Lube, Oil-Free Oxygen Boosters for Pure Breathing Oxygen in Fire and Mine Rescue

SafetyAmp Series Oxygen Booster Systems were designed primarily for fire departments utilizing the O₂ SCBA back packs. However, various other applications have been realized outside of municipal fire, rescue and safety services such as underground mine rescue stations using the O₂ SCBA units.

All two stage oxygen booster models are designed to boost and transfer *pure breathing oxygen* from unregulated supply cylinders, 3,000 psi or less. Within each system, two stages of compression permit pump-down of supply cylinder(s) to as low as 150 psi, while boosting to output pressures as high as 5,000 psi. This eliminates any need to "cascade".

Each system includes all the necessary interconnecting tubing, fittings, booster, controls and gauges to provide a complete system for direct fill of one to six high-pressure O₂ bottles. All systems come installed in a tubular frame suitable for floor or bench mounting.



SafetyAmp Series Oxygen Booster System Model 29653 (shown with firefighter) and the Models 51632 or 29140 (above, right).

Controls included for unattended operation:

- Automatic stop control adjustable to any pre-selected pressure up to maximum rating of the model plus automatic stop at supply pressure decrease to 150 psi.
- Independent safety relief valve.

Installation Details:

- Inlet: 72" stainless steel braided TFE core (3,000 psi) hose with CGA-540 standard oxygen connector.
- Air Drive Power: 1/2" NPT from plant or truck shop (70 - 150 maximum psi).

Size: 28" x 24" x 14"

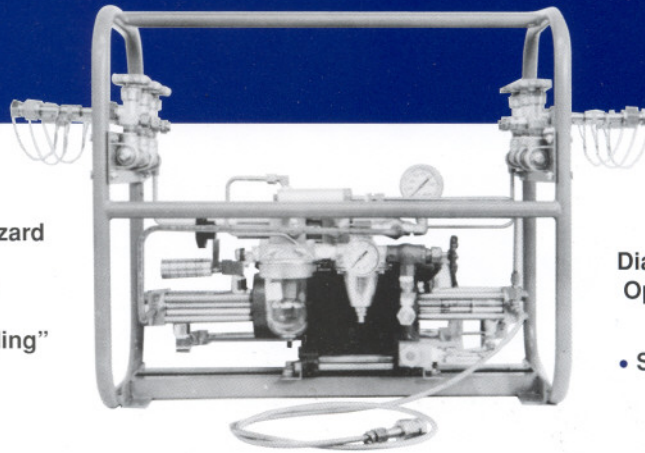
Approximate Shipping Weight: 75 lbs.

CAUTION:

High pressure gas can be dangerous if improperly handled.

The SafetyAmp Series

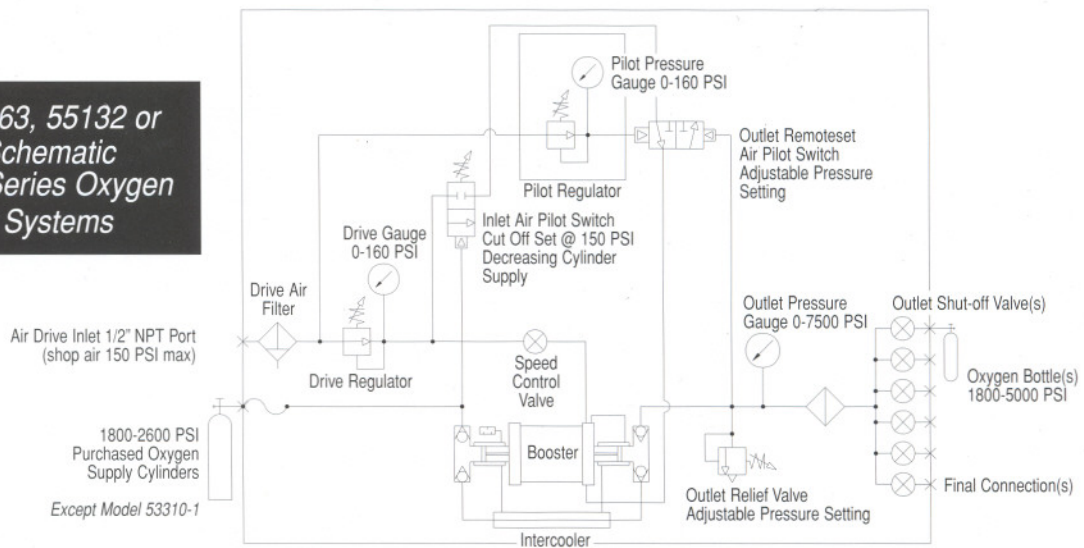
Non-Lube, Oil-Free Oxygen Boosters for Pure Breathing Oxygen in Fire and Mine Rescue



- No Electrical Hazard
- One-man Portable Unit
- Eliminates "Cascading"

- No High-Pressure Diaphragms (Boost sections Operate Hydrocarbon-Free)
- Self Cooling - No Fans or Water Connections

Basic 51563, 55132 or 53310 Schematic SafetyAmp Series Oxygen Booster Systems



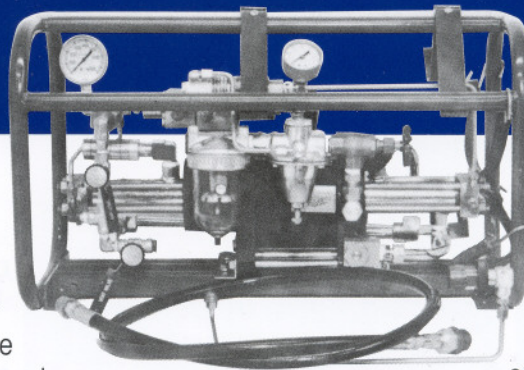
SafetyAmp Series Oxygen Booster Systems

Model	Maximum Output Pressure	Output Connection(s)	Number of Final Connections	Output Vent Valve(s)	Typical Applications
51563	3400 psi	CGA-540	1	NO	FIRE, MINE, SCBA
51563-1	3400 psi	CGA-540	3	NO	FIRE, MINE, SCBA
51563-2	3400 psi	CGA-540	6	NO	FIRE, MINE, SCBA
51563-11	3400 psi	MALE 1/4 NPT	1	NO	FIRE, MINE, SCBA
51563-33	3400 psi	MALE 1/4 NPT	3	NO	FIRE, MINE, SCBA
51563-66	3400 psi	MALE 1/4 NPT	6	NO	FIRE, MINE, SCBA
53310	2600 psi	MALE 1/4 NPT	1	NO	FIRE, MINE, SCBA
53310-1*	2600 psi	MALE 1/4 NPT	1	NO	MEDICAL BOTTLES
55132-11	5000 psi	1/4 NPT	1	YES	MEDICAL BOTTLES
53132-33	5000 psi	1/4 NPT	3	YES	MINE SELF RESCUE
53132-66	5000 psi	1/4 NPT	6	YES	MINE SELF RESCUE

*Designed for liquid oxygen vaporizer supply. 100 psi minimum. 300 psi maximum. Maximum inlet O₂ supply.

The SafetyAmp Series

Breathing Air Booster Systems for Industrial Fire Departments



The Model 29653 Two Stage Boost is designed primarily for industrial plant fire and safety departments or other small fire departments who purchase pure air in 2,000 - 2,600 psi supply cylinders. Two stages of compression permit pump-down of a supply cylinder to as low as 150 psi while boosting to 5,000* psi output, non-lubricated, oil-free.

The Model 29653 is a complete system including the proper CGA connectors for both the supply cylinder and one 4,500 psi tank, with all necessary interconnecting tubing, fittings, booster, controls and gauges. The system comes installed in a tubular frame suitable for floor or bench mounting and includes cradle to hold one 4,500 psi 30 minute tank. With proper adapters, the unit may also be used to fill remotely positioned SCBA tanks and/or "escape" units.

The Model 29653 (like an air tool) is driven by any plant or truck shop air compressor (70-150 psi), with no electrical connections.

Controls Included for Unattended Operation

- Automatic stop control set at any pre-selected pressure up to 5,000 psi, plus automatic stop if supply pressure decreases to 150 psi.
- Independent safety relief valve. High pressure shut-off and vent valves. 0-7,500 psi gauge.

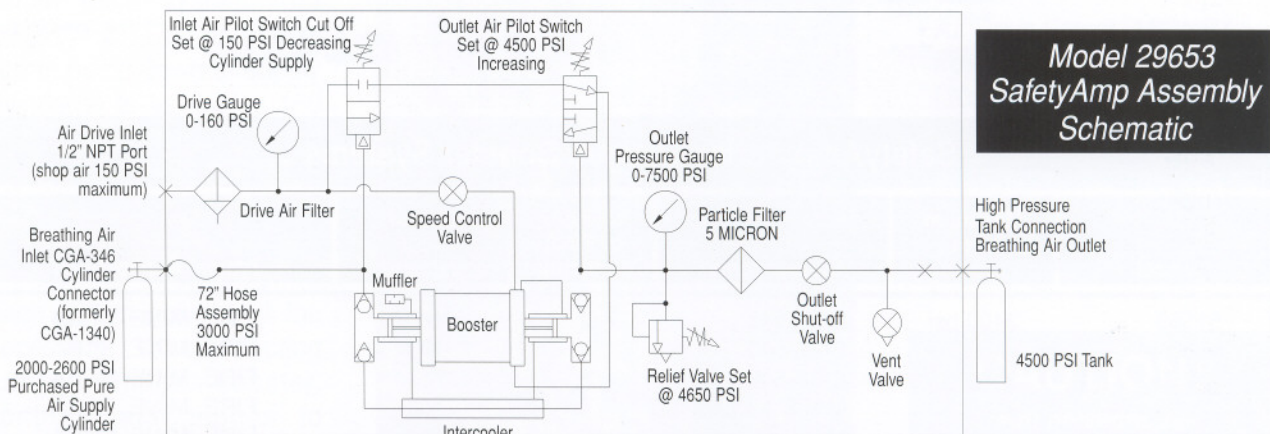
Installation, 3 Connections

- Inlet: 72" (4,000 psi) hose with CGA-346 supply cylinder connector.
- Outlet: 4,500 psi SCBA tank connector assembly.
- Air Drive Power: 1/2" NPT (70-150 psi).

Size: 28" x 16" x 14"

Approximate Shipping Weight: 75 lbs.

*Easily readjusted for 1,900 to 3,000 psi SCBA units.



**Model 29653
SafetyAmp Assembly
Schematic**

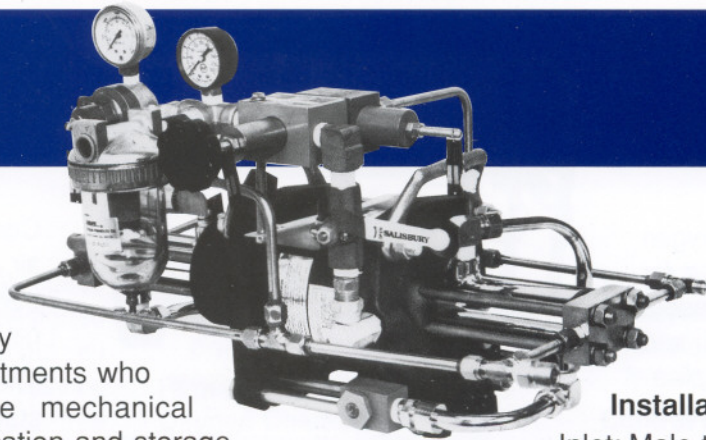
Approximate Fill Time for One 45 cu. ft. High Pressure Breathing Air Tank to 4,500 psi

Supply Cylinder Pressure	2,000 PSI	1,000 PSI	500 PSI	200 PSI
Time* to Fill to 4,500 psi	2 Minutes	3 1/2 Minutes	8 Minutes	20 Minutes
Approximate Fill Rates	13 SCFM	10 SCFM	5 SCFM	2 SCFM

*Based on drive power from a 10hp shop compressor. Smaller drive power compressor source will increase time proportionately.

The SafetyAmp Series

Breathing Air Booster System for Municipal Fire Departments



The Model 51632 and Model 29140* are designed primarily for municipal fire departments who operate a multi-stage mechanical compressor with purification and storage cylinders. Storage cylinder pressure can drop as low as 1,000 psi and still enable the booster to produce output fill pressures to 4,500 psi, eliminates the need for cascade valving. Existing medium pressure purifiers and storage cylinders are used as on the inlet side of the Model 51632. The SafetyAmp (non-lube, oil-free) then boosts to final pressure.

Controls Include:

- Automatic stop control adjusted to any pre-selected pressure up to 5,000 psi.
- Manual Stop - Start.
- Independent safety relief valve.

Gauges Include:

- Inlet from storage: 0-3,000 psi.
- Air Drive: 0-300 psi.

Powered By:

- Model 51632 can be powered by truck shop air (up to 150 psi) or "Bootstrap" directly from storage system (drive regulator is provided).

*Model 29140 is available at a lower cost for systems with large storage volume that can maintain a pressure range of 2,300 psi minimum to 5,000 psi maximum.

Installation, 2 Connectors

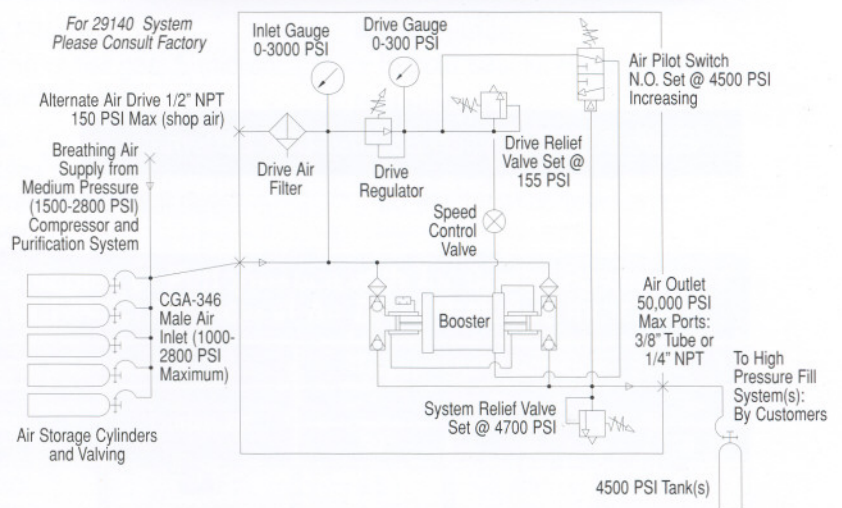
- Inlet: Male thread adapter for CGA-346 connector.
- Outlet: 3/8" O.D. tube port (1/4" NPT optional) for customer connection to hp fill manifold or directly to SCBA.

If truck shop air for drive only is used (70-150 psi), connection is 1/2" NPT female.

Size: 17" x 15" x 20"

Approximate Shipping Weight: 55 lbs.

Model 51632 SafetyAmp Assembly Schematic



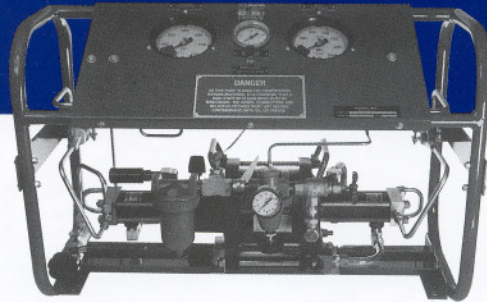
Approximate Fill Time* for One 45 cu. ft. High Pressure Breathing Air Tank to 4,500 psi

MODEL	System Pressure After Equalizing	Minimum Fill Time	Approx. Fill Rates	Drive Air Exhaust
51632	1,500 psi	95 seconds	19 SCFM	80 Cu. Ft.
	2,000 psi	58 seconds	26 SCFM	39 Cu. Ft.
	2,800 psi	20 seconds	51 SCFM	18 Cu. Ft.

*Based on drive power from a 10hp shop compressor. Smaller drive power compressor source will increase time proportionately.

Model 26968 Oxygen Booster Unit

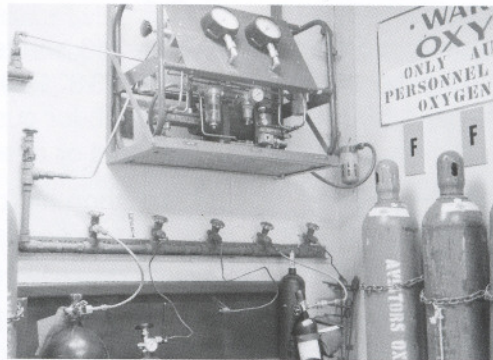
Air Driven Oxygen Booster Units for Commercial, Military and Private Life Support



Oxygen Booster Unit - Model 26968

The Model 26968 Oxygen Booster Unit is designed for the use of filling O₂ cylinders for use in commercial and military scuba diving applications, has come to realize broader applications in the transferring of O₂ into various high pressure receivers many industrial applications.

This model will pump from high or medium pressure sources and will also function effectively to collect and transfer the gas from partially depleted supply cylinders to "top off" other cylinders in order to maximize pressure.

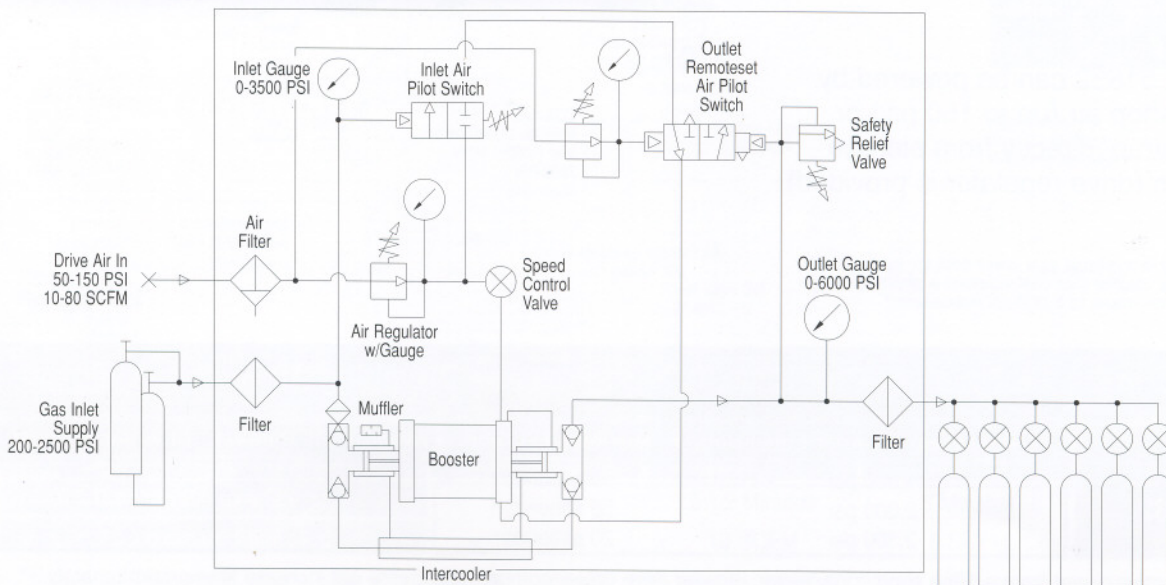


Model 26968 shown in actual use inside the bay of a U.S. airline.

Conventional compressed air sources are used for all power and control. No electrical connections are required.

The basic booster is two-stage. A pneumatic control package continually monitors both inlet cylinder pressure and outlet receiver pressure, stopping the booster automatically when desired outlet or minimum inlet pressure is reached, thus permitting unattended operation.

Basic 26968 Oxygen Booster Unit Schematic



Model 26968 Oxygen Booster Unit

Oxygen Booster Systems for Industrial Fire Departments

Model 26968 Features

Drive is low friction, slow speed cycling air cylinder, designed for continuous duty without air line lubrication. Vented distance pieces insure hydrocarbon-free gas section operation. High pressure oxygen seals are wear compensating, immune to sudden failure and operate completely non-lube, oil free.

Very cold air (as low as -20°F) is a natural by-product from the air powered drive exhaust. This frigid exhaust air is channeled through a system of cooling jackets and interstage cooler, resulting in high pressure cylinder temperatures well below limits needed for long life of critical parts.

Inlet gas supply pressure acts directly through the opposed piston construction to assist the air drive during the compression stroke, conserving power required by the drive in direct proportion to the gas supply pressure.

(A) Outlet stall (maximum *outlet* pressure is: Air drive psi x 30 plus 2 x gas inlet psi).

(B) Interstage stall (maximum gas *inlet* pressure is air drive psi x 15 *if* outlet exceeds air drive psi x 30. *If it does not*, maximum gas inlet is air drive psi x 30).

(C) If less air flow is available, outlet gas flow rates will decrease proportionately.

Specifications

Booster

- Air driven, balanced opposed piston type, two stage.

High Pressure

Oxygen Chambers

- Non-lube, hydrocarbon-free, triple sealed and vented from the drive air section.

High Pressure Sections, Tubing & Fittings

- Stainless steel, 5,000 psi maximum oxygen working pressure.

Air Driven Section

- No oiling required, corrosion resistant, factory lubed at assembly, 150 psi maximum drive pressure.

Particle Filters

- Inlet and outlet gas: 5 micron. All stainless steel.

Gauges

- Stainless steel tube, solid front 4 1/2" dial size.

Port Sizes

- Inlet and outlet gas: 1/4" NPT female; Air Drive: 1/2" NPT female.

Control Range Adjustment

- Inlet minimum: 150 to 850 psi cutout
- Outlet maximum: 800 to 5,000 psi cutout
- Safety relief (outlet): 800 to 5,000 psi

Cooling

- With air exhaust to both stages and intercooler.

Noise

- 80 db range pulses, depending on working pressure (measured at 30 inches from booster).

Maintenance

- Simple seal kit replacement.

Installation

- No special foundation, no tie down required, and no electrical connections.

Examples of Performance with Air Driven Power of 50 SCFM (C) Air Flow at Air Drive Pressure Indicated

Oxygen Gas Pressure - PSI		Oxygen Outlet Gas Flow - SCFM		
Inlet	Outlet (B)	Air Drive PSI		
		60	80	100
250	1500	3.5	4.0	4.0
250	2000	2.1	3.6	3.6
250	3000	(A)	(A)	2.5
1000	1500	8.7	14.7	15
1000	2500	(B)	9.7	13.7
1000	3500	(B)	9.6	13.6
1500	2000	(B)	14.7	20.7
1500	2500	(B)	(B)	16.1
1500	3000	(B)	(B)	(B)
2000	2500	(B)	(B)	21.6

Liquid and Gas Pump Systems

Liquid and Gas Systems for Fire, Rescue and Safety Services

Haskel offers a wide range of standard and customized systems that are used to transfer and pressurize liquids and liquefied gases in a variety of applications in direct support of fire, rescue and safety services.

Applications

- Halon filling and recovery of fire extinguisher
- CO₂ filling of fire extinguisher and emergency slide inflation systems on aircraft
- Oxygen filling of life support and resuscitation bottles
- Breathing air filling of life support systems in offshore survival craft
- Pressure and volumetric stretch testing of fire extinguisher and gas containers in accordance with the *Pressure Systems and Transportation Gas Container Regulation of 1989*

Features

- Haskel pumps and boosters can be made to stall at any predetermined pressure and hold that pressure without consuming power
- No heat, flame or spark risk with compressed air-drive
- Infinitely variable cycling speed and fluid output
- Easily adapted to automatic and remote control operation
- Reliable, robust, compact and easily maintained
- No adverse effect from continuous stop-start applications
- Pressures up to 100,000 psi (7,000 bar) liquid and 35,000 psi (2,500 bar) gas



Halon Pump Systems

A fire extinguisher filling and recovery system that, because of its unique *two stage* design, allows the handling of Halon in either its liquid or gaseous state. It can

evacuate a supply container or fire extinguisher (for recovery) down to a partial vacuum and pressurize a container up to 500 psi (35 bar).

Liquid flow rates of up to 25 LPM (equal to 45 Kg of Halon). Gaseous flow rate of up to 4 NM³/hr can be achieved depending upon operating conditions.

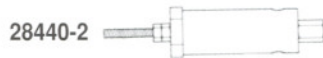
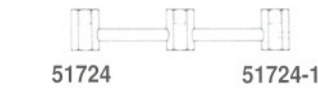
CO₂ Pump Systems

Designed for filling CO₂ cylinders from large storage cylinders used in fire extinguisher, aircraft emergency slide inflation systems, etc. The pump is designed to prevent the CO₂ changing to gas during transfer and pressurization.

Breathing Air Booster Pump Systems

Boost a compressed air supply of 100 psi (7 bar) up to the desired fill pressure of breathing air cylinders installed in survival craft and condition the air to breathing quality. The unit can be supplied in a fixed or portable design.

Accessories



29000 Hose Assembly - Breathing Air Service

3/8" I.D. x 72" long, polyurethane cover, nylon core working pressure 4,000 psi. Male pipe 1/4" NPT one end, 3/8" tube SAE 37° flare (JIC) 9/16" - 18 female swivel other end.

28738-72 Hose Assembly - Oxygen Service

3/16" I.D. x 72" long, stainless steel braid cover, TFE core, working pressure 3,000 psi. Coupled SAE 37° flare (JIC) female swivel for 1/4" tube one end, 1/4" NPT female pipe other end.

51724 High Pressure Manifold - Oxygen Service

Stainless steel construction, working pressure 5,000 psi, proof 10,000 psi. Three parallel ports 1/2" NPT female, one inlet port 1/4" NPT female.

51724-1 Same as 51724 Except Air Service Only, Working Pressure 6000 PSI

51743 Shut-off Valve - Breathing Air Service

Stainless steel construction, working pressure 6,000 psi. 1/4" NPT female ports, soft seal design.

51667 Shut-off Valve - Oxygen Service

Forged brass construction, working pressure 3,400 psi. Inlet port 1/2" NPT male pipe, outlet port male CGA-540. Frangible safety disc 3,600 psi nominal.

28440-2 Adjustable Relief Valve - Breathing Air Service

Adjustable 600 - 6,000 psi, two 1/4" NPT high pressure ports inline. Exhaust port 1/4" NPT. Valve may be also used as back pressure regulator.

51530 High Pressure Air Regulator - Breathing Air Service

Socket head adjustment screw. Three 1/4" NPT outlet ports rated at 0 - 500 psi maximum, two 1/4" NPT inlet ports rated at 3,600 psi maximum. Example of flow rate: 70 SCFM nominal with 2,000 psi inlet, 130 psi outlet. (51530-1 rated up to 6,000 psi inlet.)

28728-1 High Pressure Particle Filter - Air Breathing Service

Stainless steel element, working pressure 6,000 psi, and maximum differential pressure 1,000 psi. Ports 1/4" NPT female.

28728-10 High Pressure Particle Filter - Oxygen Service

Stainless steel element, working pressure 5,000 psi, and maximum differential pressure 1,000 psi. Ports 1/4" NPT female.

52012 2 1/2" Pressure Gauge - Breathing Air Service

0 - 7,500 psi supplied with blow out back for increased safety. Drawn brass, polished finish, brass movement. 1/4" NPT male.

52012-1 Same as 52012 Except for Oxygen Service

28271 2" Pressure Gauge - Breathing Air Service

0 - 3,000 psi. Other specifications same as 52012.

52013 CGA-346 Connector - Breathing Air Service

Brass right hand female nut and 1/4" NPT x 2 1/4" long nipple.

52014 CGA-540 Connector - Oxygen Service

Stainless steel right hand female nut and 1/4" NPT x 2 1/2" long nipple.

51834 High Pressure Fill Connector - Breathing Air Service

Stainless steel, modified CGA-346 swivel nut to fit Scott, Survivair, and Robertshaw 4,500 psi tanks, nipple ends in SAE 37° male flare (JIC) 7/16" - 20 thread for 1/4" tube.

61020-4C High Pressure Coupling - 5,000 PSI Working Pressure

Stainless steel 1/4" NPT female both sides.



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