

Catalog HASLEL

Air-Driven Liquid Pumps



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.33 hp (.25 kW) M Series Pump Models



Key Features

- Choice of 5 models, 9 ratios, 27 possible combinations
- Flows to 2 gpm (7.5 l/min)
- Choice of wetted materials
- Single air head
- Drive pressure 25 to 125 psi (1.8 to 9 bar)
- Pressures to 25000 psi (1724 bar)
- All Hydraulic fluids, water (plain or DI), solvents, mild chemicals, liquefied gases

Optional Modifications

Number	Description
-HP	Hand pump attachment (with handle). Provides manual operation of pump for precision pressure control or use without air power.
26082	Handle only.
26220-2	With handle.
26220-3	Without handle.
	Kits for converting existing units.
-V	Manual release with relief valve. For M and MS pumps only. Provides high pressure needle valve with internal adjustable safety relief downstream of pump outlet checks. Tank return is 1/4" NPT in pump body.
26063-3	Dead Man valve. 1/4" NPT port.
26064-3	Combination air regulator/filter with gauge. 1/4" NPT port.
26065-3	Speed control valve. 1/4" NPT port.
26065-3 plus 26064-3	-C air controls installed on pump. 1/4" NPT port.
28320	Manifold mount inlet port. Provides O-ring boss in aluminum block to enable mounting on side of tank below oil level. Modification applies to M-21 through M-188 only.
28590	Palm or foot start/stop button drive. Spring loaded shut.
28700-1	Air OP release valve.
28926	Remote start/stop control. Provides 1/8" NPT bleed signal port for single line remote control.
29002	Viton air drive.
29697	Single stroke from remote air pulse. Useful for metering applications. One stroke per air pulse signal; eliminates automatic cycling. 1/8" NPT signal port.
51331	EPR seals for liquid section for 29723-XX ratio pumps.
51788	Piped exhaust – standard. Provides connection ports for drive and pilot exhausts. Enables under tank top mounting and/or natural gas drive.
51794	Piped exhaust – sour gas. With hand pump (HP).
51794-2	Piped exhaust – sour gas. Without hand pump (HP).
51804	Muffler (for use with piped exhaust modifications below). 1/4" NPT male port.

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
M, MDSTV	-5	625 psi (43 bar)	.83 cu in (13.6 ml)
M, MS ⁽³⁾	-7 -12	900 psi (62 bar) 1500 psi (103 bar)	.6 cu in (9.8 ml) .36 cu in (5.9 ml)
M, MS ⁽³⁾ , 29723 ^{(3)**}	-21 -36 -71 -110 -188	2600 psi (179 bar) 4500 psi (310 bar) 8800 psi (607 bar) 13500 psi (931 bar) 15000 psi (1034 bar)	.2 cu in (3.3 ml) .12 cu in (2.0 ml) .06 cu in (1.0 ml) .039 cu in (0.6 ml) .023 cu in (.4 ml)
MS	-220	25000 psi (1723 bar)	.021 cu in (.34 ml)

** Not available in 188 ratio

(3) Maximum intermittent pressure for stainless steel in the MS and 29723 is 10000 psig (690 bar.)

For service codes, see page 17.

For weights and dimensions, see page 18.

Number	Description
51809	Normally open air operated release with relief valve. Provides highest release flow capacity. Will hold full pump psi piloted from drive air. Vents are not threaded. Ref. drawing 56643 for tank top mounting parts.
51809-1	Normally closed air operated release with relief valve. Used to hold hydraulic jacks. Will release up to 11000 psi (using 100 psi air). Vents are not threaded. Ref. drawing 56643 for tank top mounting parts. Not available in 188:1 ratio.
51810	Safety relief valve. Relief is upstream of outlet check. Vent hole 1/16 NPT M or MS series -21 through 188.
51811	External air pilot. Provides 1/8" NPT port for external air to pilot for remote start/stop.
52340	Solid air cap.
52950	Electric stroke counter provision. Micro switch (BZE6-2RQ) mounted on upper cap trips with each cycle.
53175	Level II cleaning.
53304	High pressure outlet port. Fits 1/4" O.D. high pressure threaded and coned tube.
53784	Piped exhaust (drive only). For field conversion of any .33 HP pump. Provides 1/4" NPT exhaust port.
53935	Low temperature drive. Enables operation down to 5°F. Some sacrifice of seal life at normal temperature. M or MS series.
54179	Stroke adjuster (includes 29697 above). Useful for metering applications. Knurled knob with vertical scale on pump cap.
57905	No return spring. Provides improved fill on suction stroke pumping liquefied gases by utilizing the inlet pressure. Only available on M and MS series.
59888	Cycle timer installed.
80103	Noise reduction kit fitted.
80348	SAE outlet for M-pumps, 3/8" SAE, 6500 psi (448 bar) max.
81499	EPR Seals for M and MS series for Liquid Section.
82367	SS trim for 1/2 hp drive
82500	ATEX Modification (Available on MS & 29723 but not M series).
85630	Conversion kit, new style exhaust muffler.
86337	Extended life air drive.

.75 hp (.56 kW) Pump Models



Key Features

- One model available in 9 ratios
- Output pressures to 15000 psi (1034 bar)
- Flows to 1.5 gpm (5.7 l/min)
- Choice of wetted materials
- Single air head
- Drive pressure 3 psi to 100 psi (.2 to 7 bar)

Optional Modifications

Number	Description
-C	Air drive controls.
56564	Extreme cycling service. Not recommended for long stall periods.
56594	External air pilot port 1/8" NPT. Allows remote start/stop of pump.
57639	Low drive air pressure. Allows user to regulate drive air to as low as 3 psi (.2 bar).
57960	Single acting drive. Used for pumping liquefied gases under pressure.
58475	1/8" NPT port on drive for recycle valve connection.
59354	Noise reduction kit fitted.

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
4B	-14	1500 psi (103 bar)	.9 cu in (14.8 ml)
	-21	2300 psi (159 bar)	.6 cu in (9.8 ml)
	-25	2700 psi (186 bar)	.5 cu in (8.2 ml)
	-30	3200 psi (221 bar)	.43 cu in (7.1 ml)
	-37	3800 psi (262 bar)	.35 cu in (5.7 ml)
	-55	6000 psi (414 bar)	.22 cu in (3.6 ml)
	-75	7800 psi (538 bar)	.17 cu in (2.8 ml)
	-100	10600 psi (731 bar)	.13 cu in (2.1 ml)
	-150	15000 psi (1034 bar)	.088 cu in (1.4 ml)

For service codes, see page 17.

For weights and dimensions, see page 19.

Number	Description
59888	Cycle timer installed.
80637	SAE outlet fitting for ratio 37 to 100, 1/4" SAE, 6500 psi (448 bar) max.
82104	Viton air drive.
82500	ATEX modification.
86337	Extended life air drive.



1.5 hp (1.12 kW) Pump Models



Key Features

- Choice of 11 models, 13 ratios, 48 possible combinations
- Output pressures to 50000 psi (3448 bar)
- Flows to 22 gpm (83.0 l/min)
- Choice of wetted materials
- Single air head
- Drive pressure 3 to 150 psi (.2 to 10 bar)

Optional Modifications

Number	Description
-C	Air controls (filter, regulator, gauge, shut-off). ½" NPT.
-CP	Air controls with precision regulator. ½" NPT.
-CO	Air controls with recycle button. ½" NPT.
-CPO	Air controls with precision regulator and recycle button. ½" NPT.
-B	Bottom Inlet (designate "B" before ratio dash number, "BR" on -B10, -B15, -B22 and -B32) 1.5 hp and 2 hp pumps (not applicable to high output, chemical, 2.2 hp, or AWD series pumps).
-W	Additional upper foot bracket.
16821	Low air pressure control feature. For operating at air pressures as low as 3 to 4 psi (.2 to .3 bar). Includes 28881 modification.
16831	Low temperature modification. For special sealing in air drive for operating temperatures from as low as -20°F up to normal +120°F.
16834	Exhaust adapter. With back pressure balance piston.
17860	Electrical stroke counter provision. Includes BZE6-2RQ microswitch.
25721	Mechanical stroke counter, installed (6 digit).
27964	Interconnecting inlet-outlet tubing. ½" female for 4:1 ratio series pumps (ATV-4 or DTV-4).
28000	Threaded vent (or purge) ports on standard distance piece. Except 1.5:1 ratio.
28003	Test port. Provides access port in pump's body between inlet and outlet check valves for 1.5 hp and 2 hp pumps. -10 ratio or higher, single acting.
28881	Air pilot modification. ¼" NPT. Allows remote start/stop of pump.
29376	Three-way cycling spool. For 1.5 hp and 2 hp single acting pumps, for use with CO ₂
29702	Single stroke modification.

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
DSTV ⁽¹⁾	-1.5	160 psi (11 bar)	31.9 cu in (513.0 ml)
ATV, DTV ⁽¹⁾	-4	1200 psi (83 bar)	20.0 cu in (328.0 ml)
AW, ASF, DF, DSF, DSTV	-B10	1600 psi (110 bar)	4 cu in (66.4 ml)
	-B15	2400 psi (165 bar)	2.7 cu in (44.3 ml)
	-25	4000 psi (276 bar)	1.6 cu in (26.6 ml)
	-35	5700 psi (393 bar)	1.2 cu in (19 ml)
	-60	9800 psi (676 bar)	.7 cu in (11 ml)
AW, ASF, DF, DSF, DSTV	-100	16500 psi (1138 bar)	.4 cu in (6.7 ml)
	-150	20000 psi (1375 bar)	.28 cu in (4.5 ml)
HF, HSF, DSHF	-151	25000 psi (1724 bar)	.28 cu in (4.5 ml)
	-225	37000 psi (2551 bar)	.18 cu in (3.0 ml)
	-300	50000 psi (3448 bar)	.14 cu in (2.3 ml)
HF	-450	45000 psi (3403 bar)	.09 cu in (1.5 ml)

(1) These series are "Lift" pumps and maximum outlet pressure is (air drive x pump ratio) + inlet pressure

For service codes, see page 17.

For weights and dimensions, see page 20.

Number	Description
29806	Double distance piece. For 1.5 hp and 2 hp pumps only, except 1.5:1 ratio.
51050	Extreme service cycling modification. Not recommended for long stall periods.
51056	Exhaust/pilot vent combination.
51331	EPR (Ethylene propylene) static seals in wetted section. Applies to distance piece pumps only.
51345	Sour gas drive provision to N.A.C.E. specifications. 1.5 hp to 2.2 hp distance piece pumps only, single air head and double air head.
52788	Viton seals air drive.
53925	Severe Arctic low temperature service. -25, -35, -60, -100, -150, -151, -225, -300, -450 ratios.
54885	Rotate pump body 90° from standard.
54935	SS trim for 5/3 air drive.
55305	Tube ports. ⅝" SAE inlet and outlet. For 1.5 hp to 2 hp pumps. 15 pump minimum.
55516	Polyurethane ("W") seal. For F or TV series pumps, except high output models.
55630	Stainless steel (AISI-316) distance piece. For 1.5 hp to 2 hp pumps.
59353	Noise reduction kit fitted. Not available on AFD, DFD, ASFD or DSFD.
82460	HNBR seals in air drive section.
82500	ATEX modification (not available on AW or DSXHW pumps).
82958	⅝" High pressure outlet converts medium ratio 10-122 outlet ½ port to high pressure port.
86337	Extended life air drive.

1.5 hp (1.12 kW) High Output Flow Pumps

Available in a choice of 3 models, these high output, low ratio pumps are capable of pressures to 1200 psi (82 bar) and flow rates of up to 22 gpm (83 l/min). These are "lift" pumps whereby the outlet pressure equals the air drive x the pump ratio plus the inlet pressure.

Model DSTV-1.5 has a maximum air drive of 150 psi (10 bar) and is capable of pressures up to 160 psi (11 bar). The model ATV and DTV-4 work on a maximum air drive of 150 psi (10 bar) and have a maximum pressure rating of 1200 psi (83 bar). A noise reduction modification is available for applications where noise level is an issue.

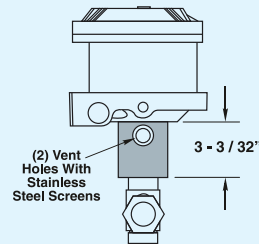
Distance Piece (Separation)

Pumps with prefix "D" in the model number have aluminum distance piece between the air drive and pump section (except DSTV-1.5). Vent holes can be threaded 1/2" NPT female at extra cost. Specify modification number 28000. Horizontal mounting is recommended for non-exchange of contaminants.

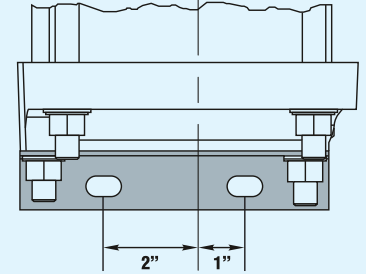
Mounting Brackets

All series mounting brackets have 7/16" holes (slots) for 3/8" bolts. Upper mounting brackets are not furnished as standard on single air head non-distance piece units.

Dimensional Data



Mounting Brackets

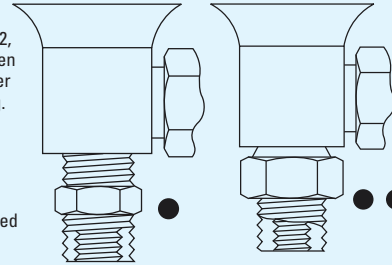


Optional Pump Inlets for Tank Mounting

To specify ratios -10, -15, -22 or -32, add "BR" between the model number and the ratio, e.g. AW-BR10.

Inlet externally threaded 1 1/4" NPT male

Internally threaded 1" NPT female



To specify ratios -25 through -903, add "B" between the model number and the ratio, e.g. AW-B25.

Inlet on the bottom and externally threaded 1" NPT male

Internally threaded 1/2" NPT female

Drive inlet and exhaust are 1/2" NPT female. Drive inlet also includes a 1/2" NPT male x 1/2" NPSM female (straight pipe thread) swivel adapter (connecting male nipple should include 30° inside bevel for proper fit).



2 & 2.2 hp (1.49 & 1.64 kW) Pump Models



Key Features

- Choice of 16 models, 13 ratios, 46 possible combinations
- Output pressures to 100000 psi (7000 bar)
- Flows to 5 gpm (15 l/min)
- Choice of wetted materials
- Double and triple air heads
- Drive pressure 3 to 100 psi (.2 to 7 bar)

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
AW, ASF, DF, DSF, DSTV	-B22	3200 psi (221 bar)	4 cu in (66.4 ml)
	-B32	4800 psi (331 bar)	2.7 cu in (44.3 ml)
	-52	8000 psi (552 bar)	1.6 cu in (26.6 ml)
	-72	11000 psi (758 bar)	1.2 cu in (19 ml)
	-122	19000 psi (1310 bar)	.7 cu in (11 ml)
HF, HSF, DHF, DSHF	-202	33000 psi (2275 bar)	.4 cu in (6.7 ml)
	-302	50000 psi (3448 bar)	.28 cu in (4.5 ml)
DXHF, DSXHF	-452	70000 psi (4827 bar)	.18 cu in (3.0 ml)
	-602	75000 psi (5171 bar)	.14 cu in (2.3 ml)
DXHF, DSXHF	-683	70000 psi (4827 bar)	.18 cu in (3.0 ml)
	-903	75000 psi (5171 bar)	.14 cu in (2.3 ml)
DSXHW	-1373	100000 psi (6895 bar)	.09 cu in (1.4 ml)
AFD, DSFD, DFD, ASFD	-B60	6500 psi (448 bar)	1.3 cu in (22 ml)

For service codes, see page 17.

For weights and dimensions, see page 20.

3 hp (2.24 kW) Pump Models



Key Features

- One model available in 8 ratios
- Output pressures to 33000 psi (2275 bar)
- Flow rates to 8 gpm (30 l/min)
- Single air head
- Drive pressure 3 to 150 psi (.2 to 10 bar)

Model	Nominal Ratio	Maximum Working Pressure*	Displacement per Cycle
ASFD	10	1600 psi (110 bar)	8.1 cu in (132.8 ml)
	15	2400 psi (165 bar)	5.4 cu in (88.6 ml)
	25	4000 psi (276 bar)	3.3 cu in (53.2 ml)
	35	5700 psi (393 bar)	2.3 cu in (38 ml)
	60	9800 psi (676 bar)	1.3 cu in (22 ml)
	100	16500 psi (1138 bar)	.8 cu in (13.4 ml)
	150	20000 psi (1379 bar)	.6 cu in (9 ml)
	202	33000 psi (2275 bar)	.8 cu in (13.4 ml)

* Continuous/Intermittent

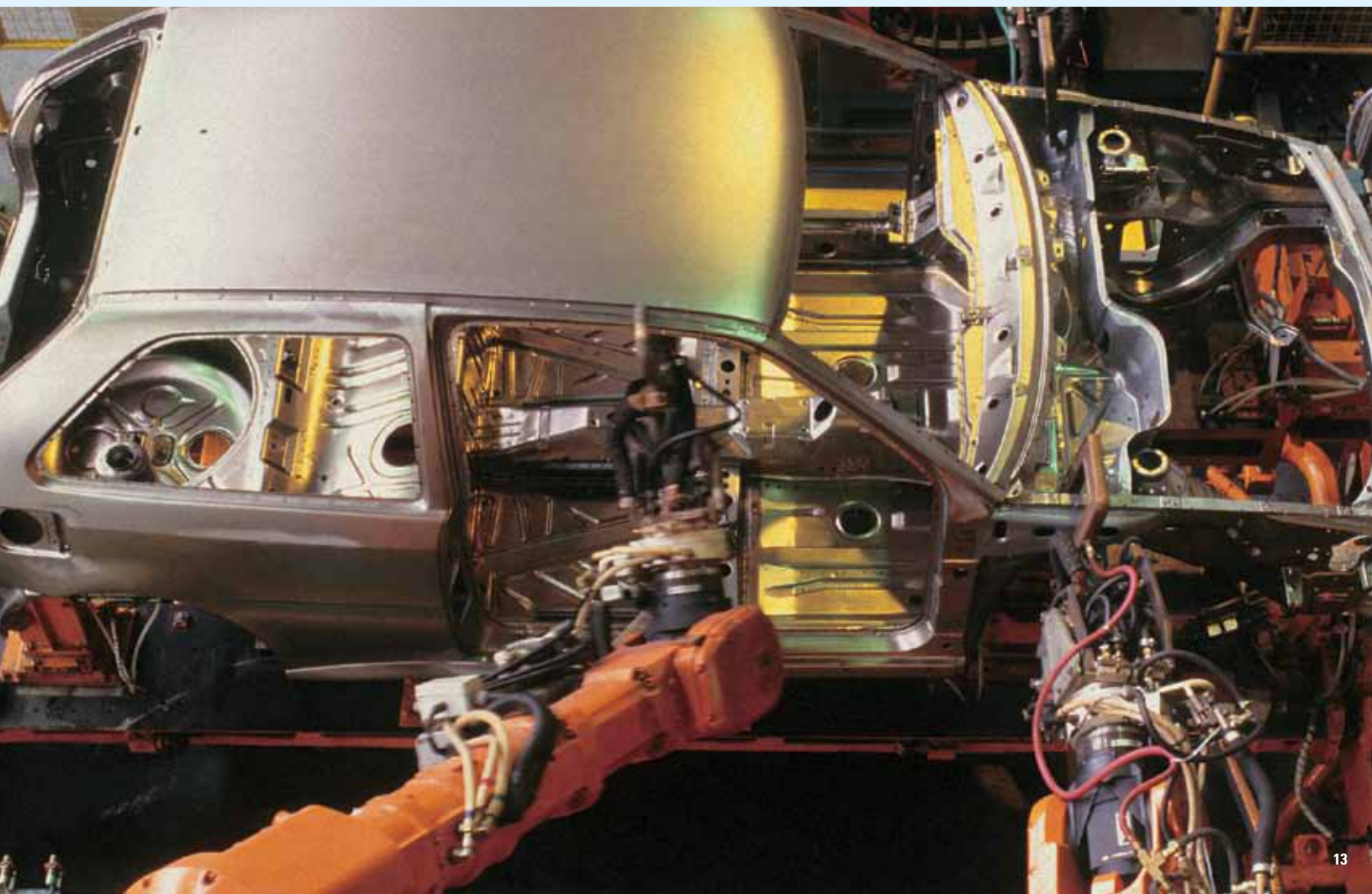
For service codes, see page 17.

For weights and dimensions, see page 21.

Optional Modifications (for 2 hp, 2.2 hp and 3 hp pump models)

Number	Description
-C	Air controls (filter, regulator, gauge, shut-off. ½" NPT.
-CP	Air controls with precision regulator. ½" NPT.
-CO	Air controls with recycle button. ½" NPT.
-CPO	Air controls with precision regulator and recycle button. ½" NPT.
-B	Bottom Inlet (designate "B" before ratio dash number, "BR" on -B10, -B15, -B22 and -B32) 1.5 hp and 2 hp pumps (not applicable to high output, chemical, 2.2 hp, or AWD series pumps)
16821	Low air pressure control feature. For operating at air pressures as low as 3 to 4 psi (.2 to .3 bar).
16831	Low temperature modification. For special sealing in air drive for operating temperatures from as low as -20°F up to normal +120°F.
16834	Exhaust adapter. With back pressure balance piston.
17860	Electrical stroke counter provision. Includes BZE6-2RQ microswitch.
25721	Mechanical stroke counter. Installed (6 digit).
27964	Interconnecting inlet-outlet tubing. ½" female for 4:1 ratio series pumps (ATV-4 or DTV-4).
28000	Threaded vent (or purge) ports on standard distance piece. Except 1.5:1 ratio and 3 hp pump.
28003	Test port. Provides access port in pump's body between inlet and outlet check valves for 1.5 hp and 2 hp pumps, -10 ratio or higher, single acting.
28881	Air pilot modification. ½" NPT – Allows remote start/stop of pump.
29376	Three-way cycling spool. For 1.5 hp and 2 hp single acting pumps.
29702	Single stroke modification. Except 3 hp pump.
29806	Double distance piece. For 1.5 hp and 2 hp pumps only, except 1.5:1 ratio.

Number	Description
51050	Extreme service cycling modification. Not recommended for long stall periods.
51056	Exhaust/pilot vent combiner.
51331	EPR (Ethylene propylene) static seals in wetted section. Applies to distance piece pumps only.
51345	Sour gas drive provision to N.A.C.E. specifications. 1.5 hp to 2.2 hp distance piece pumps only, single air head and double air head.
52788	Viton seals. Air drive only – 1.5 hp to 2.2 hp pumps only.
53925	Severe Arctic low temperature service. -25, -35, -60, -100, -150, -151, -225, -300, -450 ratios except 3 hp pump.
54885	Rotate pump body 90° from standard. Except 3 hp pump.
54935	SS trim for 5/3 air drive.
55191	Mounting ring kit for AWD series.
55192	3/4 NPT inlet port installed on AWD series (in place of threaded port).
55193	Extra foot bracket installed.
55305	Tube ports. ⅝" SAE inlet and outlet – for 1.5 hp to 2 hp pumps, 15 pump minimum.
55465	Ceramic Plunger -60 Ratio.
55516	Polyurethane "W" seal in "F" series pumps-except high output models.
55630	Stainless steel (SS-316) distance piece – for 1.5 thru 2 hp pumps.
59353	Noise reduction kit fitted. Not available on AFD, DFD, ASFD or DSFD.
59888	Cycle timer installed.
82460	HNBR Seals in air drive section.
82500	ATEX modification (not available on AW or DSXHW pumps).
86337	Extended life air drive.



6 hp (4.47 kW) Pump Models



Key Features

- Choice of 10 models, 4 ratios, 20 possible combinations
- Output pressures to 10000 psi (690 bar)
- Flow rates to 21 gpm (80 l/min)
- Choice of wetted materials
- Single air head – double acting
- Drive pressure 3 to 125 psi (.2 to 9 bar)
- All hydraulic fluids, water (plain or DI), solvents

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
GWD, GSFD, DGFD ⁽¹⁾ , DGSFD ⁽¹⁾ , DGSTVD ⁽¹⁾	-12	4000 psi (276 bar)	15.9 cu in (260 ml)
GW, GSF, DGF, DGSF, DGSTV	-35	4375 psi (302 bar)	6.0 cu in (98 ml)
	-60	7500 psi (517 bar)	3.5 cu in (57 ml)
	-100	10000 psi (690 bar)	2.1 cu in (34.5 ml)

(1) Double Acting "Lift" Pumps

For service codes, see page 17.

For weights and dimensions, see page 22.

Incorporating 10 models, this heavy duty range of double acting pumps provide pressures up to 10000 psi (690 bar) and flow rates up to 4 gpm (15 l/min).

Designed to operate with air drive pressures between 40 and 125 psi (2.8 and 9 bar). For drive pressures 3 to 40 psi (.2 to 2.8 bar), order 51875-1 mod.

8 hp (5.97 kW) Pump Models



Key Features

- Choice of 6 models, 5 ratios, 9 possible combinations
- Pressures to 22500 psi (1530 bar)
- Flow rates to 11.5 gpm (44 l/min)
- All hydraulic fluids, water (plain or DI), solvents, liquefied gases
- Choice of wetted materials
- Single air head – double acting
- Drive pressure 3 to 125 psi (.2 to 9 bar)

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
8SFD, 8DFD, 8DSFD, 8DSTVD, 8FD	-25 ⁽¹⁾	4000 psi (276 bar)	14 cu in (229 ml)
8SFD, 8DSFD	-40	6000 psi (408 bar)	9 cu in (145.3 ml)
	-65	10000 psi (690 bar)	5.4 cu in (88.2 ml)
	-100 ⁽¹⁾	10000 psi (690 bar)	3.5 cu in (57.5 ml)
8HSFD	-225 ⁽¹⁾	22500 psi (1530 bar)	1.6 cu in (25.5 ml)

(1) Double Acting "Lift" Pumps

For service codes, see page 17.

For weights and dimensions, see page 23.

10 hp (7.46 kW) Pump Models



Key Features

- Choice of 4 models, 4 ratios, 4 possible combinations
- Pressures to 36000 psi (2500 bar)
- Flow rates to 3 gpm (11 l/min)
- Drive pressure 3 to 125 psi (.2 to 9 bar)
- All hydraulic fluids, water (plain or DI), solvents, liquefied gases
- Choice of wetted materials

Optional Modifications (for 6 hp, 8 hp and 10 hp pump)

Number	Description
C	Air controls.
17860	Electrical stroke counter provision (includes BZE6-2RQ micro switch).
25721	Mechanical stroke counter installed (6 digit).
29077	Interconnecting tubing – 6 hp and 8 hp pumps, double ended.
29077-1	Interconnecting tubing – 6 hp and 8 hp pumps, double ended low ratio pumps.
29078	Same as 29077, 29077-1 double ended w/distance piece.
29078-1	Same as 29077, 29077-1 double ended w/distance piece low ratio pumps.
29079	Interconnecting tubing – 10 hp pumps.
29125	External pilot modification – for 6 hp thru 10 hp pumps.
51875-1	Low air pressure control – for 6 hp thru 10 hp pumps.
54030	Sour gas air drive provision to NACE spec. 6 hp distance piece pumps only.

Model	Nominal Ratio	Maximum Working Pressure	Displacement per Cycle
D14STD	125 ⁽¹⁾	16000 psi (1103 bar)	8.8 cu in (144.2 ml)
	315 ⁽¹⁾	36000 psi (2482 bar)	3.5 cu in (57.4 ml)
D14SFD	125 ⁽¹⁾	16000 psi (1103 bar)	8.8 cu in (144.2 ml)
	315 ⁽¹⁾	36000 psi (2482 bar)	3.5 cu in (57.4 ml)

(1) Double Acting "Lift" Pumps

For service codes, see page 17.

For weights and dimensions, see page 23.

Incorporating two basic models, this heavy duty range of double acting pumps provide pressures up to 36000 psi (2482 bar) and output flow rate up to 3 gpm (11 l/min).

Operating from a maximum air drive pressure of 125 psi (9 bar), these pumps are designed for medium to high pressure service with minimum maintenance.

These large, slow speed pumps approach a seal life as high as 5 times that of many smaller pumps and this advantage becomes ever greater in heavy duty service involving water, or other liquids with negligible lubricity.

Number	Description
54312	Extreme service cycling modification – for 6 hp thru 10 hp pumps.
54936	Exhaust/pilot vent combiner.
55330	Interconnecting tubing 8DSFD-100 low pressure inlet.
55330-1	Interconnecting tubing 8DSFD-100 high pressure inlet.
55366	Interconnecting tubing 8DSFD-225.
57002	Viton seals – air drive only – 6 hp.
57944	Viton seals – air drive only – 8 hp.
59888	Cycle timer installed.
82500	ATEX modification available for 6 hp only, not available on 8 hp or 14 hp drive, nor on GW, GSF, DGSF, GSF, or DGSFD models.
86337	Extended life air drive.

Air-Driven Refrigerant Pumps



Refrigerant Pumps

Air Driven Positive-Displacement Piston Pumps

Models 59015 and 59025/59020

Haskel Refrigerant Recovery Pumps transfer refrigerants across all pressure ranges up to 1,200 psi, including pulling a vacuum down to 27" Hg to remove all remnants from the supply bottle.

With plenty leverage to condensate the common refrigerant without a condenser, these high-pressure pumps efficiently pump the liquid first, then the vapor, then vacuum to 23"-27" HG - with one pump. Their flexibility enables users to speed completely variable from zero to maximum lbs (kg)/minute, stall against load, start against load and run dry, with no need for unloaders or bypass valving.

Applications

Designed for recovery or recharge of refrigerants. Haskel refrigerant pumps are safe, proven reliable and energy saving for recovery or recharge of fluids, regardless of phase – liquid or gas.

Features and Benefits

- Flexibility – Add gages and hoses to suit your application
- Cool Operation – No heat generated during liquid transfer. Minor warming during vapor transfer. No refrigerant heating from the motor
- Safety – Pneumatically driven. Operates from an air hose like an air tool. No electrical hazard.
- Portability – An integral pump with linear air motor assembly weighing from 13 lbs (6kg) to 24 lbs (11kg).
- Clean – No lubrication required in the gas section. Nothing is added to the refrigerant, liquid or vapor
- ATEX certified version available

General Specifications

Model	Weight	Pump Displacement per Cycle	Air Drive Bore x Stroke	Seals Pumps		Seals Drive	Wetted Section Metals
59015	13 lbs (6 kg)	8.9 cu. in.	4 x 2-1/2	Standard	Neoprene & PTFE	Buna	Aluminum and Stainless Steel
59025/59020	25 lbs (11 kg)	10 cu. in.	5-3/4 x 2	Add -2 after part number	Buna N & PTFE		
				Add -3 after part number	Viton & PTFE		

Compatibility Table

Refrigerant	O-Ring Compatibility	Recommended Models
R-12, R-22, R-32, R-123, R-134A, R-1230 R-254, R-290, R-404, R-407, R-410, R-500, R-502, FM200, HFO-1234YF	Neoprene	59015, 59020, 59025, 82410
R-11, R-113, R-114, R-124, R-142	Buna N	59015-2, 59020-2, 59025-2, 82410-2
R-23, R-112, R-143	Viton	59015-3, 59020-3, 59025-3, 82410-3



Model 59025

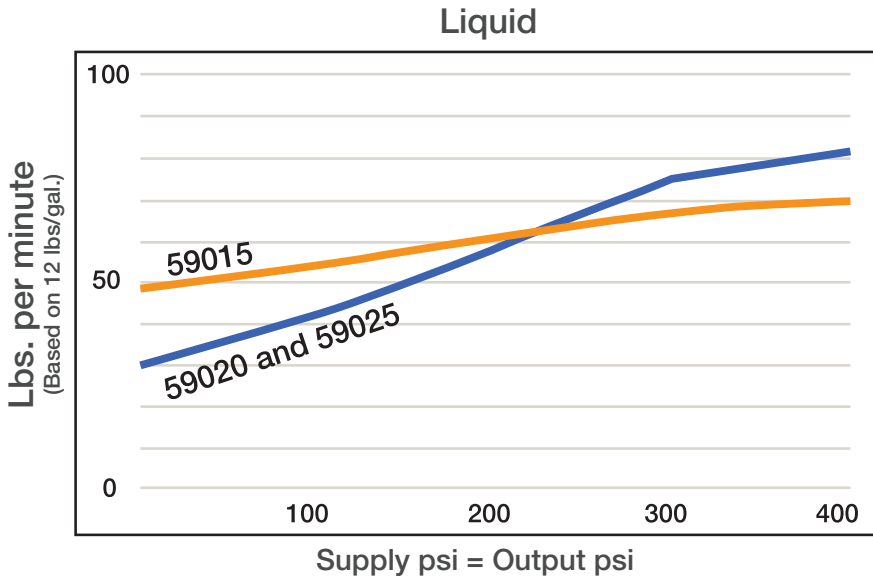


Model 59015

Approximate Performance Capability

Model	Vapor with constant output resistance of			
	15 psi and inlet falling from		250 psi and inlet falling from	
	15 psi (1 bar) ▶ 0 psi	0 psi ▶ 27" HG	50 psi (3 bar) ▶ 0 psi	0 psi ▶ 23" HG
59015	Averages 1.4 scfm	Averages .11 scfm	Averages 1.5 scfm	Averages .11 scfm
59025	Averages 1.5 scfm	Averages .15 scfm	Averages 1.6 scfm	Averages .14 scfm

CMM = SCFM x 0.0283

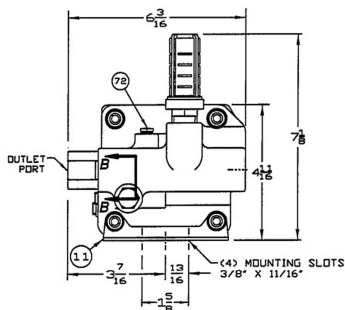


Actual flow rates will depend on the liquid or vapor phase of the refrigerant, the inlet pressure and outlet pressure required
100 psi = approx. 7 bar, 25 lbs = 11 kgs

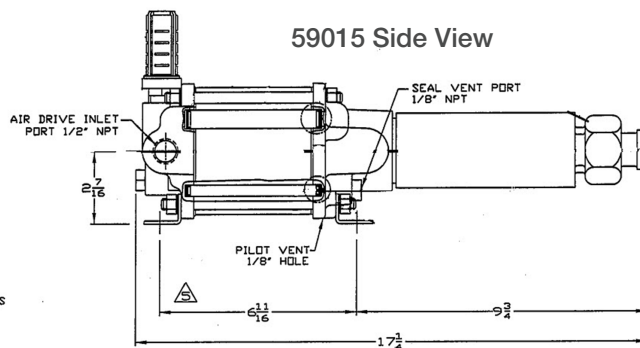
1. Air Drive Input: Data assumes approximately 100 psi (7 bar) at 40 scfm (1.132 Nm³/min) (10 HP compressor. Smaller air drive compressors will produce proportionally lower output rates (e.g. If air source is a 1 HP, 100 psi (7 bar) compressor output rates will be about 10% above.
2. Suction of Plumbing: Data assumes 3/8 NPT inlet piping without restrictions. In many refrigerant recovery applications, severe restriction of inlet supply cannot be avoided and will starve the pump reducing output rates.
3. Safety and Relief Valves are recommended downstream since either pump at stall is capable of intensifying output pressures beyond normal refrigerant piping and receiving working pressure.

Dimensions

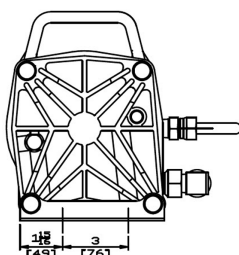
59015 End View



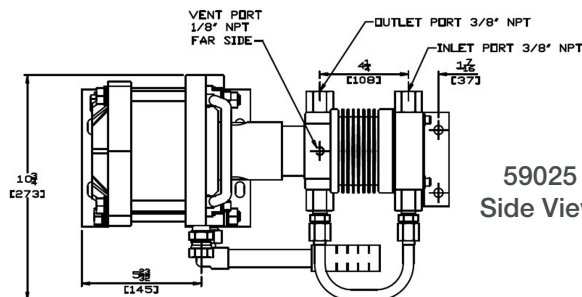
59015 Side View



59025 Top View



59025 Side View



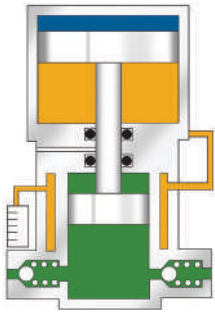
A distance piece on the 59025 provides an atmospheric chamber between the air drive and the refrigerant sections to insure no possibility of refrigerant contamination if contaminated air is used for drive.

Pneumatic-Driven Gas Boosters

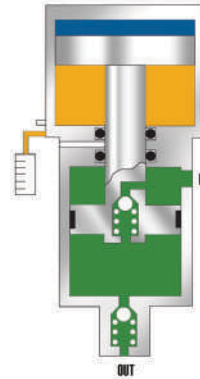


Pneumatic Driven Gas Booster Configurations

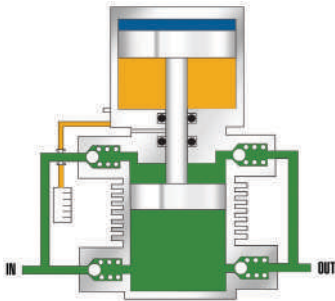
Single acting, single stage boosters are the smallest and lightest with pressures to 39,000 psi.
 Double acting, single stage provides twice the delivery of a single acting single stage booster.
 Two stage models are used for high gas compression ratios.



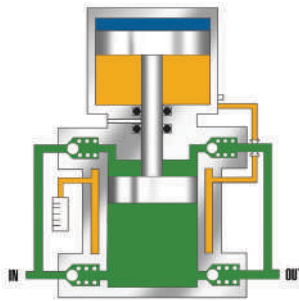
Model AG
Single Stage, Single Acting



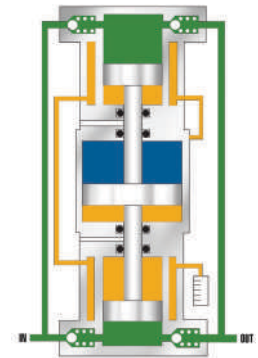
Model AG
Single Stage, Single Acting,
Flow Thru Piston



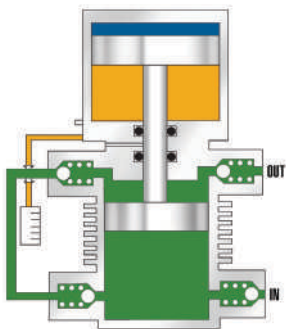
Model AGD
Single Stage, Double Acting,
Cooling Fins



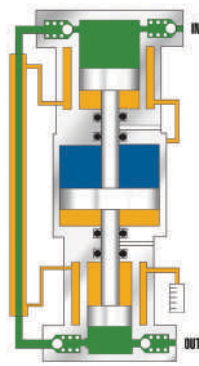
Model AGD-4 (only)
Single Stage, Double Acting,
Cooling Jacket



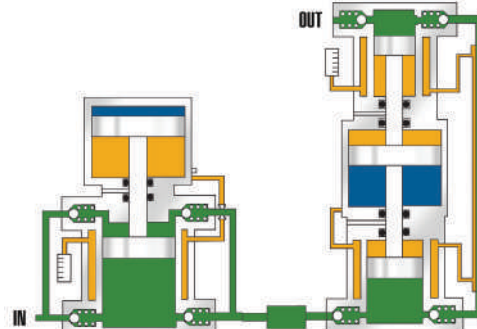
Model AGD
Single Stage, Double Acting,
Cooling Jackets



Model AGT
Two Stage, Cooling Fins



Model AGT
Two Stage, Cooling Jackets



Model AGD-4 feeding into Model AGT-x/x

Multi stage - Two boosters.
More than one booster
of the same ratio
may be used for each stage.

Blue=Compressed Air Yellow=Exhaust Drive Air Green=Gas Media



AG-50 High-ratio gas
booster, single stage,
single acting



AGD-30 - Medium-ratio
gas booster, single
stage double acting,
single air head



AGT-30/75- Two stage
gas booster single air head,
cooling jacket

Metric Conversion Table

Multiply	By	To Obtain
PSI	0.0703	Kg/Cm2
SCFM	0.0283	Cu. Meters/min.
Inches	25.4	Millimeters
Pounds	0.453	Kilograms

Selecting a Pneumatic Driven Gas Booster

Air driven gas boosters have seven significant operating parameters that determine their selection for any application. These are as follows:

1. Maximum discharge pressure?
2. Flowrate
 - a. Is it constant?
 - i. What is flowrate required?
 - b. Is it filling a vessel?
 - i. What is vessel size (water volume)?
 - ii. What is fill time required?
3. Supply
 - a. Is it at constant pressure?
 - b. Is it decreasing?
 - i. What is initial pressure?
 - ii. What is the minimum pressure?
4. Air drive pressure available?
5. Air drive volume available?
6. What is the gas?
7. What is the application?

The selection of the proper booster for any application starts with determining which booster "series" will provide the amount of flow and pressure required. The ability of the booster to *generate pressure* is a function of the drive pressure, multiplied by the nominal booster ratio. The ability to *generate flow* is a function of the quantity of air available to drive it, the displacement per cycle of the booster, and volumetric efficiency.

Within each booster series, there are standard materials of construction available. For applications involving aggressive gases, such as Hydrogen, Helium and CO₂, some material substitutions are required.

Single Acting Single Stage "AG" boosters provide economical

means of boosting pressure for testing or small components and similar applications where volume is small and efficiency is not important. Control of maximum outlet pressure is accomplished with the use of an air drive pressure regulator. Maximum outlet pressure is drive area ratio multiplied by air pressure.

Double Acting Single Stage "AGD" boosters not only pump twice the volume of a Single Acting, Single Stage Booster per cycle, but also require less air drive since the inlet gas pressure is assisting the air drive in each direction, providing a substantial portion of the required driving force. These models provide efficient means of boosting large volumes of gas at low to medium compression ratios. Maximum outlet pressure is drive area ratio times air drive pressure PLUS gas supply pressure.

Two-Stage "AGT" boosters provide efficient means of boosting to a high gas compression ratio since the ratio per stage is low. Maximum outlet pressure with these models is drive area ratio multiplied by air drive pressure plus supply pressure multiplied by the area ratio of the two gas pistons.

Since these models have interconnected gas pistons, they multiply supply pressure during the "interstage" stroke by the area ratio of the two gas pistons. If supply pressure is too high, the booster may have "interstage stall" at an outlet pressure substantially less than that obtainable on the "output" stroke. This limitation does not apply if outlet pressure is less than the "maximum supply" times the area ratio of the two gas pistons. Remember, this condition only applies to two stage models.

Specific performance information for your application may be obtained by referring to the **Sample Performance Chart** on page 8 of this catalog, or from a Haskel distributor. To locate a Haskel distributor near you, view the Distribution link on our website at

Model Number Configuration

8 - AGT - 15/75 - C - 28881

Nominal Diameter of Air "Driven" Piston (Inches). Used if diameter is other than 5-3/4" (standard).

Base Model
AG=Single Stage, Single Acting
AGD=Single Stage, Double Acting
AGT=Two Stage

Area Ratio – Nominal
XXX/XXX (on AGT models)
shows nominal area ratio for both first and second stages

Air controls Installed
1. Air Drive Filter
2. Regulator w/gage
3. Shut off/speed control valve

C
C8
C13
17860
25721
28881
29125
29376
29702
50341
50606
51050
54312
56611
56611-2
57875
54827
59888
80862
86337
82500

Controls: airline filter, reg w/gauge and manual start/stop
On 5-3/4" drive 1/2 NPT
On 8" or 14" drive 3/4 NPT
Electrical stroke counter provision (Includes BZE6-2RQ) micro switch
Mechanical stroke counter-installed (6 digit)
External pilot modification - for 5-3/4" series
External pilot modification - for 8" or 14" series
Three way cycling spool for 5-3/4" series and 14" series
Single stroke modification for 5-3/4" series and 14" series pump
5-3/4" low permeability seals for CO₂ gas service
8" low permeability seals for CO₂ gas service
Extreme service cycling modification for 5-3/4" series pump
Extreme service cycling modification for 8" or 14" series
Vent purge with 15 psi relief - single end models
Vent purge with 15 psi relief for 5-3/4", 8" or 14" series
Panel with regulator for mounting remote APS
Level II cleaning and certification of gas sections.
Cycle Timer
Viton air drive
Extended life air drive seals
ATEX Modification

Model Selection Chart

LEGEND: Ps = Gas Supply Pressure, Pa = Drive Pressure, Po = Outlet Pressure

	Model Number	Maximum Rated Gas Supply		Min. Gas Supply Pressure		Maximum Rated Gas Outlet						Static Outlet Stall Pressure Formula	Piston Displacement Per Cycle		Gas Inlet/Outlet Connections	Weight
						Inert Gas		Oxygen		Hydrogen			Cu. In.	ML		
		PSIG	BAR	PSIG	BAR	PSIG	BAR	PSIG	BAR	PSIG	BAR					
Single Acting Single Stage Model / AG	4AG-25	4500	310	25	1.7	4500	310	4500	310	N/A	N/A	25 Pa	1.23	20.2	3/8" SAE Both Ports	12 (5)
	AG-4	1250	86	ATM	ATM	1250	86	1250	86	N/A	N/A	4 Pa	10	163.9	3/8" NPT Both Ports	25 (11)
	AG-7	1050	72	25	1.7	1050	72	1050	72	N/A	N/A	7 Pa	13.2	216.3	3/8" NPT Both Ports	30 (14)
	AG-15	2250	155	50	3.5	2250	155	2250	155	N/A	N/A	15 Pa	6.2	101.6	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	27 (12)
	AG-30	4500	310	100	7	4500	310	4500	310	4500	310	30 Pa	3.1	50.8	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	27 (12)
	AG-50	7500	517	100	7	7500	517	5000	345	N/A	N/A	50 Pa	1.96	32.1	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	27 (12)
	AG-62	9000	620	200	14	9000	620	5000	345	9000	620	60 Pa	3.1	50.8	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	35 (16)
	AG-75	11250	775	250	17	11250	775	5000	345	11250	775	75 Pa	1.2	19.6	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	27 (12)
	AG-102	7500	517	100	7	15000	1034	5000	345	N/A	N/A	100 Pa	1.96	32.1	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	35 (16)
	AG-152	20000	1380	250	17	20000	1380	5000	345	15000	1034	150 Pa	1.2	19.6	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	27 (12)
	AG-233	22500	1551	250	17	22500	1551	N/A	N/A	N/A	N/A	225 Pa	1.2	19.6	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	40 (18)
	AG-303	39000	2690	500	34	39000	2690	N/A	N/A	N/A	N/A	300 Pa	0.89	14.6	1/4" - H/P (BuTech) both ports	44 (20)
Double Acting Single Stage Model AGD	AGD-1.5	300	21	ATM	ATM	300	21	300	21	N/A	N/A	1.5 Pa+Ps	60	983.2	Inlet Port 3/4" NPT Outlet Port 1/2" NPT	44 (20)
	AGD-4	1250	86	ATM	ATM	1250	86	1250	86	N/A	N/A	4 Pa+Ps	19.3	316.3	3/8" NPT Both Ports	31 (14)
	AGD-7	2500	172	25	1.7	2500	172	2500	172	2500	172	7 Pa+Ps	26.4	432.6	Inlet Port: 3/8" NPT Outlet Port: 3/8" NPT 2 ea./ inlet & outlet	35 (16)
	AGD-14	5000	345	25	1.7	5000	345	5000	345	N/A	N/A	14 Pa+Ps	26.4	432.6	Inlet Port: 3/8" NPT Outlet Port: 3/8" NPT	49 (22)
	AGD-15	5000	345	50	3.5	5000	345	5000	345	4000	276	15 Pa+Ps	12.4	203.2	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	35 (16)
	AGD-30	9000	620	100	7	9000	620	5000	345	9000	620	30 Pa+Ps	6.2	101.6	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	38 (17)
	AGD-32	5000	345	50	3.5	5000	345	5000	345	4000	276	30 Pa+Ps	12.4	203.2	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	49 (22)
	AGD-50	15000	1034	100	7	15000	1034	5000	345	N/A	N/A	50 Pa+Ps	3.9	63.9	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	39 (18)
	AGD-62	5000	345	200	14	9000	620	5000	345	9000	620	60 Pa+Ps	6.2	101.6	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	49 (22)
	AGD-75	12000	827	250	17	12000	827	5000	345	15000	1034	75 Pa+Ps	2.4	39.3	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	39 (18)
	AGD-102	15000	1034	100	7	15000	1034	5000	345	15000	1034	100 Pa+ Ps	3.9	63.9	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	49 (22)
	AGD-152	25000	1724	250	17	25000	1724	N/A		15000	1034	150 Pa+Ps	2.4	39.3	Interchangeable 3-3/8" SAE or 1/4" - H/P both Ports. 2 ea. inlet & outlet	49 (22)
Two Stage Model / AGT	AGT-4	1250	86	1/4 ATM	1/4 ATM	1250	86	1250	86	N/A		4 Pa+Ps	10	164	3/8" NPT Both Ports	25 (11)
	AGT-7/15	6 Pa to 2500 ¹	6 Pa to 172 ²	25	1.7	5000	345	5000	345	4000	276	15 Pa+2 Ps	13.2	216.3	Inlet Port: 3/8" NPT Outlet Port: 3/8" SAE or 1/4" H/P (BuTech)	40 (18)
	AGT-7/30	2 Pa to 2500 ¹	2 Pa to 172 ²	25	1.7	9000	620	5000	345	9000	620	30 Pa+4 Ps	13.2	216.3	Inlet Port: 3/8" NPT Outlet Port: 3/8" SAE or 1/4" H/P (BuTech)	41 (19)
	AGT-14/32	12 Pa to 2500 ¹	12 Pa to 172 ²	25	1.7	5000	345	5000	345	4000	276	30 Pa+2 Ps	13.2	216.3	Inlet Port: 3/8" NPT Outlet Port: 3/8" SAE or 1/4" H/P (BuTech)	46 (21)
	AGT-14/62	4 Pa to 2500 ¹	4 Pa to 172 ²	25	1.7	9000	620	5000	345	9000	620	60 Pa+4 Ps	13.2	216.3	Inlet Port: 3/8" NPT Outlet Port: 3/8" SAE or 1/4" H/P (BuTech)	41 (19)
	AGT-15/30	15 Pa to 2500 ¹	15 Pa to 172 ²	50	3.5	9000	620	5000	345	9000	620	30 Pa+2 Ps	6.2	101.6	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	39 (18)
	AGT-15/50	6.5 Pa to 5000 ¹	6.5 Pa to 345 ¹	100	7	15000	1034	5000	345	15000	1034	50 Pa+3.3 Ps	6.2	102	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	38 (17)

	Model Number	Maximum Rated Gas Supply		Min. Gas Supply Pressure		Maximum Rated Gas Outlet						Static Outlet Stall Pressure Formula	Piston Displacement Per Cycle		Gas Inlet/Outlet Connections	Weight LB (KG)
						Inert Gas		Oxygen		Hydrogen			Cu. In.	ML		
		PSIG	BAR	PSIG	BAR	PSIG	BAR	PSIG	BAR	PSIG	BAR					
Two Stage Model AGT	AGT-15/75	3.5 Pa to 5000 ¹	3.5 Pa to 345 ¹	100	7	15000	1034	5000	345	15000	1034	75 Pa+5 Ps	6.2	101.6	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	39 (18)
	AGT-30/50	45 Pa to 9000 ¹	45 Pa to 620 ¹	100	7	15000	1034	5000	345	15000	1034	50 Pa+1.6 Ps	3.1	50.8	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	38 (17)
	AGT-30/75	20 Pa to 9000 ¹	20 Pa to 620 ¹	100	7	15000	1034	5000	345	15000	1034	75 Pa+2.5 Ps	3.1	50.8	Interchangeable 3-3/8" SAE or 1/4" - H/P (BuTech) Both Ports	39 (18)
	AGT-32/62	30 Pa to 2500 ¹ 5000 ²	30 Pa to 172 ¹ (345)	100	7	9000 5000 ²	620 (345)	5000	345	9000	620	60 Pa+2 Ps	6.2	101.6	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	49 (22)
	AGT-32/102	13 Pa to 9000 ¹	13 Pa to 620 ¹	100	7	15000	1034	5000	345	15000	1034	75 Pa+3.3 Ps	6.2	101.6	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	49 (22)
	AGT-32/152	7 Pa to 5000 ¹	7 Pa to 345 ¹	100	7	15000	1034	5000	345	15000	1034	150 Pa+5 Ps	6.2	101.6	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	39 (18)
	AGT-62/102	90 Pa to 9000 ¹	90 Pa to 620 ¹	100	7	15000	1034	5000	345	15000	1034	100 Pa+1.6 Ps	3.1	50.8	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	39 (18)
	AGT-62/152	40 Pa to 3600 ¹ 9000 ²	40 Pa to 248 ¹ (621)	100	7	20000 9000 ²	1379 (621)	N/A	N/A	15000	1034	150 Pa+2.5 Ps	3.1	50.8	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	49 (22)
	AGT-62/152H	40 Pa to 3600 ¹ 9000 ²	40 Pa to 248 ¹ (621)	100	7	25000 9000 ²	1723 (621)	N/A	N/A	N/A	N/A	150 Pa+2.5 Ps	3.1	50.8	Interchangeable 3/8" SAE or 1/4" H/P (BuTech) Both Ports	51 (23)
Double Acting Single Stage 8" Model AGD	8AGD-1	300	21	ATM	ATM	300	21	300	21	N/A	N/A	1.5 Pa+Ps	400	6554.8	3/4" NPT Both Ports	121 (55)
	8AGD-2	300	21	ATM	ATM	300	21	300	21	N/A	N/A	2 Pa+Ps	200	3277	3/4" NPT Both Ports	121 (55)
	8AGD-2.8	800	55	ATM	ATM	800	55	800	55	N/A	N/A	2.8 Pa+Ps	125	2048	1/2" NPT (2 ea) Inlet/Outlet Ports	121 (55)
	8AGD2-2.8	800	55	ATM	ATM	800	55	800	55	N/A	N/A	2.8 Pa+Ps	125	2048	1/2" NPT (2 ea) Inlet/Outlet Ports	156 (71)
	8AGD-5	2500	172	50	3.5	2500	172	2500	172	N/A	N/A	5 Pa+Ps	71.4	1170	Inlet Port 3/4" NPT Outlet Port 1/2" NPT	121 (55)
	8AGD-14	5000	345	50	3.5	5000	345	5000	345	5000	345	14 Pa+Ps	26.7	437.5	Inlet Port 3/4" NPT Outlet Port 1/2" NPT	121 (55)
	8AGD-30	5000	345	50	3.5	5000	345	5000	345	5000	345	30 Pa+Ps	12.4	203.2	1/4" NPT Both Ports	121 (55)
	8AGD-60	9000	620	50	3.5	9000	620	5000	345	9000	345	60 Pa+Ps	6.2	101.6	1/4" NPT Inlet Port, 1/4" HP (BuTech) Port Outlet	121 (55)
	8AGD-150	20000	1378	50	3.5	20000	1378	5000	345	N/A	N/A	150 Pa+Ps	2.4	39.3	1/4" -H/P (BuTech) Both Ports	121 (55)
Two Stage AGT Series 8" & 14" Model AGT	8AGT-5/14	2.8 Pa to 2500 ¹	2.8 Pa to 172 ¹	25	1.7	2500	172	2500	172	N/A	N/A	14 Pa+2.8 Ps	35.7	585	Inlet Port 1/2" NPT Outlet Port 1/4" NPT	121 (55)
	8AGT-5/30	1 Pa to 2500 ¹	1 Pa to 172 ¹	25	1.7	5000	345	5000	345	N/A	N/A	30 Pa+6 Ps	35.7	585	Inlet Port 1/2" NPT Outlet Port 1/4" NPT	121 (55)
	8AGT-14/30	12 Pa to 1190 ¹ 2500 ²	12 Pa to 82 ¹ (172)	25	1.7	5000 2500 ²	345 (172)	5000	345	4000	276	30 Pa+2.1 Ps	13.2	216.3	Inlet Port 3/8" NPT Outlet Port 1/4" NPT	121 (55)
	8AGT-14/60	4.3 Pa to 2500 ¹	4.3 Pa to 172 ¹	25	1.7	9000	620	5000	345	N/A	N/A	60 Pa+4.3 Ps	13.2	216.3	3/8" NPT Inlet Port 1/4" -HP (BuTech) Port Outlet	121 (55)
	8AGT-30/60	30 Pa to 2500 ¹ 5000 ²	30 Pa to 172 ¹ (345)	25	1.7	9000 5000 ²	620 (345)	5000	345	9000	620	60 Pa+2 Ps	6.2	101.6	1/4" NPT Inlet Port 1/4" -HP (BuTech) Port Outlet	121 (55)
	8AGT-60/150	40 Pa to 3600 ¹ 9000 ²	40 Pa to 248 ¹ (621)	25	1.7	20000 9000 ²	1378 (621)	N/A	N/A	N/A	N/A	150 Pa+2.5 Ps	3.1	50.8	1/4" NPT Inlet Port 1/4" -HP (BuTech) Port Outlet	121 (55)
	14AGT-125/315	82 Pa to 6000 ¹ 15000 ²	82 Pa to 414 (1034)	1000	6.9	35000 15000 ²	2413 (1034)	N/A	N/A	N/A	N/A	315 Pa+2.5 Ps	4.44	72.8	3/8" -H/P (BuTech) Both Ports	154 (70)
Double Acting Single Stage 14" AGT	14AGD-315	35000	2413	1000	6.9	35000	2413	N/A	N/A	N/A	N/A	315 Pa+Ps	3.53	57.	3/8" -H/P (BuTech) Both Ports	154 (70)

1. Two-stage model: Supply pressure also limited by factor x air drive (Pa) to avoid interstage stall

2. If outlet pressure exceeds Maximum 1st stage pressure and supply pressure simultaneously exceeds pressure limit above the line, install interstage relief valve set at this pressure.

Port Information and Additional Notes

- a. Air Drive Inlet Port = 1/2" FNPT all 4" & 5 3/4" Models
- b. Air Drive Inlet Port = 3/4" FNPT all 8" & 14" Models
- c. Refer to pages 19-32 for dimensional drawings of all models
- d. 20 psi minimum air drive pressure for all units
- e. Maximum air drive is 150 psig all models except AG-233, AG-303, AGD-1.5(130 psig)
- f. 130 psig maximum drive pressure for all 8" and 14" models.
- g. Gas Boosters for Hydrogen applications must be specifically certified for use in Hydrogen Application
- h. Each two stage Gas Booster has a maximum allowable inlet gas pressure to avoid a condition known as "Interstage Stall." Refer to the Knowledge Library link on the Haskel website,

Suggested Cycling Speeds for Maximizing Seal Life

AG, AGD, AGT Series	60 CPM
8AG, 8AGT Series	50 CPM
14AGD, 14AGT Series	40 CPM

Refer to pages 18-32 for dimensional drawings of all models.

Sample Gas Booster Flow Rate Performance (SCFM)

Flow and Pressure Performance

Sample performance shown below is used for general reference only; consult Haskel Technical Sales or your Haskel Representative for specific performance information.

Cubic Meters Per Minute = SCFM x 0.0283

Catalog Number	PA=90 psi			
	Qa	Ps	Po	Q
AG-4	25	200	300	6.2
	25	120	300	3.6
	25	80	300	2.3
	25	40	300	1
AG-7	21	240	600	3.4
	21	180	600	2.5
	21	120	600	1.6
	21	60	600	0.7
AG-15	30	600	1200	6.2
	30	500	1200	5.1
	30	400	1200	4
	30	300	1200	3
AG-30	40	1300	2000	9.4
	40	1000	2000	7.2
	40	700	2000	4.9
	40	400	2000	2.6
AG-50	35	1700	4000	6
	35	1300	4000	4.5
	35	900	4000	3
	35	500	4000	1.7
AG-62	25	2000	5000	5.2
	25	1500	5000	3.9
	25	1000	5000	2.5
	25	500	5000	1.1
AG-75	30	2000	6000	3.8
	30	1500	6000	2.9
	30	1000	6000	1.8
	30	500	6000	0.8
AG-102	32	4000	8000	8.5
	32	3000	8000	8
	32	2000	8000	4
	32	1000	8000	2
AG-152	20	6500	13000	3.6
	20	5000	13000	3
	20	3500	13000	2.3
	20	2000	13000	1.3
AG-233	20	10000	20000	3.2
	20	8000	20000	2.8
	20	6000	20000	2.4
	20	4000	20000	1.8
AG-303	40	12500	24000	6
	40	10000	24000	5
	40	7500	24000	3.5
	40	5000	24000	2.5
AGD-1.5	30	100	200	18.2
	30	75	160	15.1
	30	50	140	10
	30	25	100	6.2
AGD-4	30	500	800	33
	30	350	600	25.4
	30	200	400	16
	30	50	200	4.5
AGD-7	30	700	1300	16
	30	500	1000	18.8
	30	300	800	11.2
	30	100	500	4
AGD-14	48	2100	3000	80
	40	1500	2500	48.4
	32	900	2000	22.5
	40	300	1000	10.4
AGD-15	40	2100	3000	50.3
	40	1500	2400	36.1
	40	900	1800	21.5
	40	300	1200	6.7
AGD-30	40	2850	4200	35.6
	40	2250	4200	25.5
	40	1550	3200	19
	40	850	2800	9.6
AGD-32	50	2950	4400	57.7
	40	2250	4400	33.2
	28	1550	4000	15.4
	33	850	3200	9.7
AGD-50	50	3000	6000	24
	50	2300	6000	12
	45	1600	5000	10
	30	900	5000	4

Catalog Number	PA=90 psi			
	Qa	Ps	Po	Q
AGD-62	50	4000	7500	35.6
	41	3250	7500	23.6
	25	2500	7500	11
	45	1000	5000	8
AGD-75	45	5000	10000	21.5
	45	3000	8000	14.3
	50	2000	6000	11.3
	50	1000	5000	5.5
AGD-102	52	8000	12000	26
	52	6000	12000	20
	52	4000	10000	16
	35	2000	10000	6
AGD-152	40	11000	22000	19.1
	25	7000	20000	6.6
	40	5000	16000	12.1
	52	3000	12000	10.7
AGD-152H	30	12000	24000	15.5
	40	10000	21000	18.3
	40	7000	18000	15
	40	5000	16000	12.1
AGT-4	20	100	400	2.7
	20	75	400	2
	20	25	200	1.2
	20	5	200	0.55
AGT-7/15	35	200	1500	4.4
	25	120	1500	1.8
	35	80	1000	2.1
	35	40	1000	1.1
AGT-7/30	32	150	3000	2.6
	40	100	2500	2.3
	40	75	2000	1.9
	40	50	2000	1.2
AGT-14/32	54	400	3000	5.8
	56	240	3000	3.7
	54	200	2400	3
	58	160	2000	2.6
AGT-14/62	54	350	6000	5.0
	56	275	5000	4.2
	54	175	4000	2.6
	58	125	4000	2.4
AGT-15/30	40	900	4000	9.7
	40	500	3000	5.8
	40	300	2000	3.9
	40	100	2000	1.2
AGT-15/50	42	400	5000	3.7
	42	250	5000	2.3
	55	150	4000	2
	55	100	4000	1.2
AGT-15/75	48	230	6000	2.7
	42	150	6000	1.4
	55	110	4000	1.5
	55	70	4000	0.8
AGT-30/50	50	850	5000	6
	50	600	5000	3.5
	62	350	4000	2
	62	100	4000	0.8
AGT-30/75	48	1300	8000	8.4
	25	700	8000	2.3
	45	400	6000	2.4
	55	100	4000	0.69
AGT-32/62	45	1700	7500	14.3
	28	1300	7500	6.7
	56	900	5000	9.8
	45	500	5000	4.3
AGT-32/102	35	1200	9500	5.1
	45	600	9500	3.3
	48	550	6500	3.3
	56	375	6500	2.6
AGT-32/152	23	450	15000	1.6
	52	250	10000	2.1
	50	150	10000	1
	55	50	3000	0.46
AGT-62/102	55	1600	10000	6
	55	1200	10000	4.5
	50	800	10000	3
	60	400	9000	1.5

Catalog Number	PA=90 psi			
	Qa	Ps	Po	Q
AGT-62/152	30	2400	18000	6.6
	35	1400	15000	4.6
	47	900	12000	4
	51	400	10000	1.8
AGT-62/152H	23	2500	19000	4.8
	25	1800	17000	4.1
	20	1200	16000	2
	20	800	15000	1.3
8AGD-1	75	130	180	128
	75	110	180	91
	75	90	160	76
	75	70	140	60
8AGD-2	75	130	250	56
	75	110	200	55
	75	90	200	41
	75	70	200	29
8AGD-2.8	70	500	700	109
	70	300	500	65
	90	200	400	55
	90	100	300	28
8AGD2-2.8	100	500	700	215
	100	300	500	131
	125	200	400	106
	125	100	300	54
8AGD-5	70	600	900	96
	70	450	800	66
	65	300	700	37
	65	100	500	12
8AGD-14	75	1000	2000	55
	75	800	1800	44
	75	500	1200	33
	75	200	1000	11
8AGD-30	75	2500	4000	76
	75	1800	3500	52
	75	1200	2800	36
	65	600	1800	18
8AGD-60	75	4000	7500	53
	75	2800	6800	36
	75	1800	5200	26
	65	1000	3800	14
8AGD-150	75	10000	18000	38
	75	8000	16000	33
	75	6000	14000	28
	65	4000	12000	20
8AGT-5/14	75	150	1200	12
	70	90	1000	8
	50	60	600	6
	40	30	400	3
8AGT-5/30	60	60	2800	1.4
	75	40	2400	0.7
	75	30	1800	0.9
	75	20	1500	0.5
8AGT-14/30	75	700	3500	19.7
	75	400	3000	10.4
	75	250	2500	6.6
	75	100	1800	2.7
8AGT-14/60	57	250	6000	3.7
	75	200	5500	3.5
	75	100	4500	1.2
	75	50	3000	0.31
8AGT-30/60	75	1700	7500	23
	75	1300	6800	17
	75	900	5000	13.8
	75	500	4000	7.8
8AGT-60/150	71	2500	18000	14.2
	75	1500	15000	9.4
	75	1000	12000	7
	75	500	8000	4
14AGD-315	150	16000	32000	25.3
	150	13000	28000	23
	150	9000	24000	18.1
	150	5000	18000	10.2
14AGT-125/315	115	4100	32000	14.9
	133	3100	28000	13
	150	2200	24000	10
	150	1000	18000	4.2
4AG-25	2	2000	2250	0.75
	2	1500	2250	0.6
	2	1000	2250	0.5
	2	500	2250	0.2

LEGEND

Pa = Air Drive Pressure
Ps = Gas Supply Pressure

Qa = Air Drive Quantity
Po = Gas Outlet Pressure
Q = Gas Outlet Flow Rate

Alternative Gas Booster and System Models

Specialty Gas Booster Models

Standard Model Number	Oxygen Booster Model Number	Hydrogen Booster Model Number	Standard Model Number	Oxygen Booster Model Number	Hydrogen Booster Model Number
4AG-25	86921		AGT-15/50		
AG-4	28596		AGT-15/75	28595	86993
AG-7	29818		AGT-30/50	86915	
AG-15	28598		AGT-30/75	17599	86994
AG-30	17445	87083	AGT-32/62	27267	86995
AG-50	86911		AGT-32/102		
AG-62	17436	86979	AGT-32/152		
AG-75	17418	86980	AGT-62/102		
AG-102	86912		AGT-62/152		
AG-152	29877	86981	AGT-62/152H	26180	
AG-233			8AGD-1	58808	
AG-303			8AGD-2	58675	59060
AGD-1.5	52618		8AGD-2.8	80642	
AGD-4	26266		8AGD2-2.8		
AGD-7	51147	86982	8AGD-5	52623	
AGD-14	83008		8AGD-14	52612	87218
AGD-15	27962	86983	8AGD-30	52619	87201
AGD-30	17495	86984	8AGD-60	80867	87185
AGD-32	52570	86985	8AGD-150		
AGD-50	86913		8AGT-5/14	52624	
AGD-62	27961	86986	8AGT-5/30	52630	
AGD-75	51269	86987	8AGT-14/30	52622	
AGD-102	86914		8AGT-14/60		
AGD-152		86988	8AGT-30/60	58979	
AGT-4	28597		8AGT-60/150		
AGT-7/15	51308	86989	14AGD-315		
AGT-7/30	52065	86990	14AGT-125/315		
AGT-14/32					
AGT-14/62		83007			
AGT-15/30	28007	86992			

Inert Gas Booster System Models

Standard Model Number	Standard System Model Number	Oxygen System Model Number	Standard Model Number	Standard System Model Number	Oxygen System Model Number
4AG-25	87114	82880	AGT-15/50		
AG-4			AGT-15/75	53748	53796
AG-7			AGT-30/50		
AG-15			AGT-30/75	52031	53742
AG-30			AGT-32/62	29498	53150
AG-50			AGT-32/102		
AG-62			AGT-32/152	80509	
AG-75			AGT-62/102		
AG-102			AGT-62/152	80511	
AG-152			AGT-62/152H	80512	
AG-233			8AGD-1		
AG-303			8AGD-2	80413	80533
AGD-1.5	80501	80523	8AGD-2.8	80414	80534
AGD-4	59933	80524	8AGD2-2.8		
AGD-7	82101	80525	8AGD-5	80515	80535
AGD-14	80502	80526	8AGD-14	80516	80536
AGD-15	80503	80527	8AGD-30	80517	80537
AGD-30	80504	52341	8AGD-60	81266	
AGD-32	80505	80528	8AGD-150		
AGD-50			8AGT-5/14	80518	80538
AGD-62	80506	80529	8AGT-5/30	80519	80539
AGD-75	80507	80530	8AGT-14/30	54895	53398
AGD-102			8AGT-14/60	80520	80540
AGD-152	80508		8AGT-30/60	56131	80541
AGT-4	80004	80531	8AGT-60/150		
AGT-7/15	54961	80532	14AGD-315		
AGT-7/30	53353	53343	14AGT-125/315		
AGT-14/32					
AGT-14/62	85431				
AGT-15/30	29068	26968			

Hydraulic Driven Gas Boosters



H-Drive

The Future of Gas Booster Technology

The Haskel H-Drive Booster has been designed to compress a wide range of gases safely, reliably and economically, meeting demands for high-pressure compression and other critical high-pressure gas boosting applications.

H-Drive dramatically improves the most important aspects of handling gas at high-pressures. Constructed of materials recognized by leading regulatory agencies as the best for safe lifetime continuous operation, it delivers the highest flows and lowest maintenance cost ever in a hydraulic driven gas booster. It introduces interchangeable modular gas sections, with levels of safety and reliability in line with what you would expect from the world leader in high-pressure generation and containment.

At the heart of the design is Haskel's proven experience in high pressure gas sealing and compression. The unique seal design delivers gas tight, non-contaminating compression*. The unique specially designed seals are self lubricating and need no further lubrication ensuring the cleanliness of the gas.

Delivering high-pressure exactly when and where you need it.

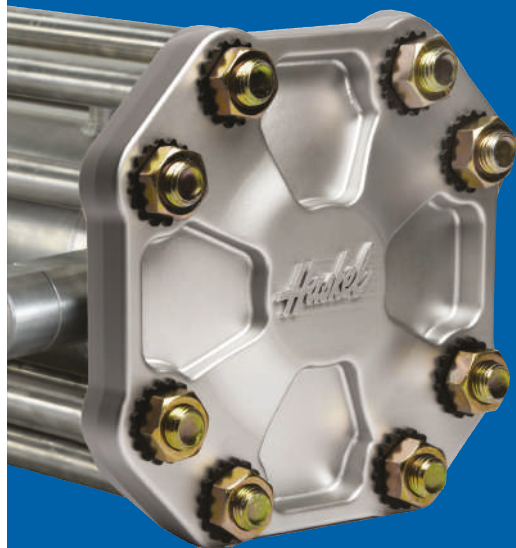
Whether working with Hydrogen, CNG, Nitrogen, Argon, Helium or other gases, from alternative vehicle fueling, to tube trailer supply and Helium blanketing, H-Drive sets the standard in reliability.

This state-of-the-art product range also sets the standard in flexibility, with a modular design that allows for greater flexibility in system design and easy upgrades to custom configurations as needs progress.

*Minuet gas leakage is normal on all gas piston seals.

As the seals wear micro particles will pass into the gas outlet but these are easily trapped by installation of micronic filters.

Features and benefits



- Designed specifically for high-pressure gas applications with a wide range of gases
- Hydrogen compatible materials resist hydrogen embrittlement
- Meet Hydrogen fueling station requirements with minimum number of boosters
- Robust design suitable for continuous heavy-duty applications
- Modular design. 3 interchangeable gas sections yield 6 configurations
- Leak free, non-contaminating compression
- Ease of maintenance – Requires no lubrication and minimal cleaning
- More economical than diaphragm compressors
- No Start/Stop issues
- Available as a turnkey booster compressor station or as booster modules for seamless incorporation into OEM packages.
- Service and support available through a global service network.
- ATEX certified as standard
- CE marked

Performance

H-Drive has been designed to deliver optimum performance at a range of different operating pressures, with efficiency and serviceability in mind. Seals have been designed for extended life. The resultant technology ensures the very best performance throughout continuous heavy-duty applications.

With optimal functionality for a wide range of applications, including hydrogen gas service,

a range of modular double acting single stage and two stage models allow compression up to 15,000 psi (1,034 bar).

Available as a single unit or integrated into standard or custom engineered skids, H-Drive delivers at high pressures, without the need for diaphragm compressors, making it the smart choice for Hydrogen fuel stations.

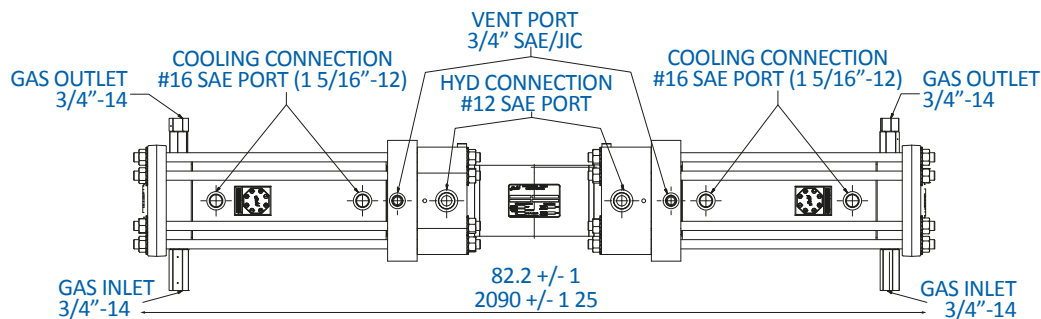
Performance Table

Model	Performance			Typical Performance Cycle (speeds between 15 and 22 cycles/min)					
	Min. Inlet	Max Outlet	Recommended	Inlet	Outlet	Flow	Inlet	Outlet	Flow
	psi (bar)	psi (bar)	Max Cr	psi (bar)	psi (bar)	scfm (m ³ /hr)	psi (bar)	psi (bar)	scfm (m ³ /hr)
HGD-150	50 (3.45)	4500 (312)	6:1	200 (14)	1000 (70)	100 (170)	800 (55)	3200 (221)	310 (487)
HGD-90	50 (3.45)	9000 (621)	6:1	500 (35)	2900 (200)	87 (148)	1400 (97)	6400 (441)	189 (297)
HGD-63	100 (6.9)	15000 (1034)	6:1	3350 (231)	12700 (876)	205 (348)	6000 (413)	13050 (900)	400 (680)
HGT-150/90	50 (3.45)	9000 (621)	36:1	130 (9)	4700 (324)	30 (51)	290 (20)	7500 (517)	61 (103)
HGT-150/63	50 (3.45)	15000 (1034)	36:1	290 (20)	6500 (448)	59 (100)	400 (28)	10000 (690)	80 (136)
HGT-90/63	50 (3.45)	15000 (1034)	36:1	700 (48)	12700 (876)	51 (87)	1200 (82)	13050 (900)	88 (150)

For detailed hydraulic drive requirements and cooling requirements please contact the factory

Dimensions and Connections

Model	Connections				
	Hydraulic Inlet & Outlet Connections	Gas Inlet Connection	Gas Outlet Connection	Cooling Fluid Connections	Nominal weight – Lbs (kgs)
All Models	#12 SAE	3/4"-14 NPSM	3/4"-14 NPSM	#16 SAE	1200 (545)



Model Number Configuration

HGT-150/63

Ratio: -XX = Dbl. acting,
-XX/XX = Two Stage Switch

Type: HGD = Double Acting, Single Stage
HGT = Two Stage

Ratio	Double Acting	Two Stage
HGD	-150	
HGD	-90	
HGD	-63	
HGT		-150/90
HGT		-150/63
HGT		-90/63

Proximity Switch - Explosion Proof Switch available as separate. 2 are required per booster.

Electric Driven Gas Boosters





Q-DRIVE

Redefining what a gas booster can do

Q-Drive, a smart, electric servo actuated G Compression System transforms gas compression through a unique combination of proven technologies and unprecedented 4.0 intelligence. Optimize performance with unparalleled controls that improve visibility of real-time operations, increase efficiency and limit downtime. Q-Drive delivers unmatched value and best-in-industry performance.



ADVANCED GAS COMPRESSION WITH PROVEN TECHNOLOGIES

- Clean compression, oil-free non-lubricated gas piston
- Quiet operation, <85 dB operating Simplified maintenance, reduced downtime
- Smart, virtual self-diagnostics Maximized efficiency with servo motor and high-level control
- Adjustable profile for maximum output Infinite controllability
- Lower operating costs, reduced power consumption
- Self-correcting intelligence fewer points of failure
-



Remote Operation & Monitoring

Intuitive programming & network connectivity for remote control and monitoring.



Autonomous Operation

Internal operation monitors for overheating & over-pressurization — no unnecessary stoppage.



Turnkey System

Ready-to-go system with valves, sensors, drives, and controls — just connect gas, power & coolant.



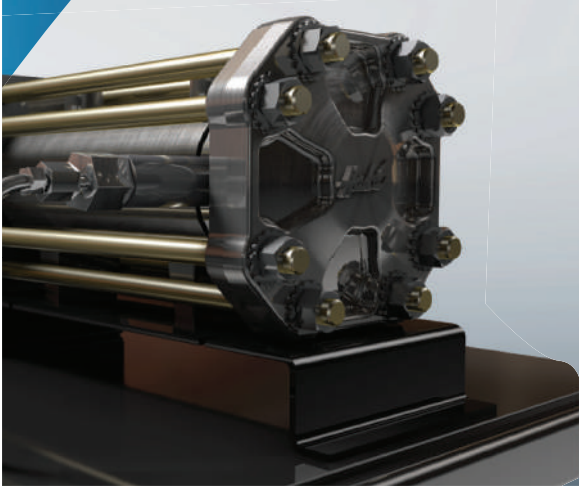
Optimal Performance & Safety

20+ sensing elements for optimal performance, reliability, and safety.

ELECTRIC SERVO DRIVE

The combination of two proven technologies, Haskel gas sections with electric servo drive technology, revolutionizes gas compression.

Q-Drive's electric servo drive motor creates linear actuation, providing greater process control and high precision movement.



-
-
- Smaller footprint without lost flow rate and pressure Superior design with quick-change seal components, the fastest in the industry
- 25% less energy required for cooling than standard hydraulic intensifiers
- Highest energy efficiency in the gas compression industry Electric servo motor up to 96% efficient
- Automatic force and velocity control to maximize efficiency and flow
- Fewer points of failure and maintenance requirements than hydraulic or diaphragm technologies

INTUITIVE USER INTERFACE FOR ADVANCED MONITORING

Q-Drive's human machine interface (HMI) optimizes user capabilities and safety for improved functionality. Acting as a built-in facility manager, the digital interface is designed to reduce risk and operational downtime. The user interface is fully programmable and adjustable for easy access to diagnostics and troubleshooting.

KEY FEATURES:

- Remote access - alerts can be received off-site
- Self-correcting functionality - controls map to system
- Predictive maintenance - reduced costs through automated reminders
- Reduced disruption - system runs at lower levels rather than full shutdown
- Multiple account access levels - Supervisor, Operator, Service



Model	Min Inlet (psig)	Max Inlet (psig)	Max Outlet (psig)	Max Flow N2 Flow (SCFM)	Max Flow CO2 Flow (SCFM)	Max Flow Helium Flow (SCFM)	Max Flow Argon Flow (SCFM)
QGD-150	75	1150	1150	292.6	361.3	287	302
QGD-90	75	3200	3200	286.3	107.1	247	299
QGD-63	75	6500	6500	267.2	660.1	256	297
QGT-150/90	75	425	3200	106.8	209.3	105	110
QGT-150/63	75	200	6500	48.4	104.3	48	49
QGT-90/63	75	1400	6500	125.4	315.4	120	131

Q-Drive is suitable for all inert gases. The chart above is an example of performance by certain gases.

Air Pressure Amplifiers



Introduction

Haskel air pressure amplifiers offer the most comprehensive range in the industry combining simple principles of operation with rugged construction suitable for the most demanding industrial applications.

Why use Haskel Air Amplifiers?

An alternative to the purchase of a dedicated high pressure compressor, Haskel air amplifiers are compact, require no electrical or mechanical drive connections, are powered by the same air that they amplify, and can be mounted in any position.

Key Features

- Long seal life and easy maintainance
- No heat, flame or spark risk.
- Wide range of models, controls, and options.
- No air line lubrication required eliminating oily exhaust.
- Infinitely variable outlet pressure and flow capability.
- Wide range of standard and custom systems.
- Control of maximum pressure by means of inexpensive air drive pressure regulators.

What is a Haskel Air Amplifier?

An Air Pressure Amplifier is an air pump that is driven by part of the incoming compressed air supply enabling it to cycle and pump the balance of the supply to a higher output pressure. Pressure is generated by the use of a differential area piston assembly (Fig 1). Low pressure air applied to a large area creates high pressure air on the small area. Cycling is achieved through the use of two pilot valves that alternately pilot and vent the large area end of an unbalanced cycling spool. The small area end of the cycling spool uses a permanent air spring. This unbalanced cycling spool ensures that the air amplifier cycles on demand.

Unique seal technology enables the drive section of its pressure generating products to operate without air line lubrication. No lubrication of any kind is used in the high pressure sections where non-metallic bearings and wear compensating seals are employed.

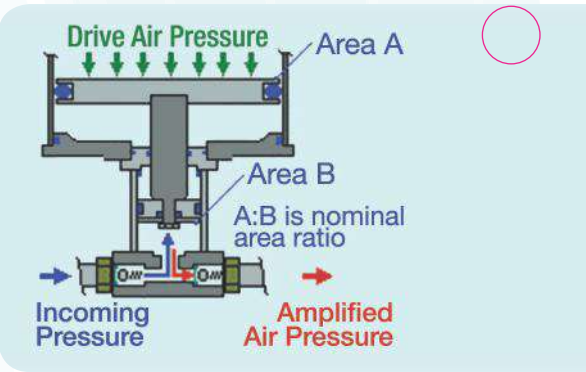
The ratio of the areas between the connected pistons is called the area ratio and is the dash number used in all model codes. This ratio and the available air drive source pressure determines the maximum outlet pressure of the air amplifier.

The completely sealed air amplifier will “stall” at its maximum capable outlet pressure and consume no energy or generate any heat while doing so. When pressure drop is seen at the air amplifier outlet, the unbalanced spool ensures cycling to make up the pressure loss and will again “stall” after having done so.

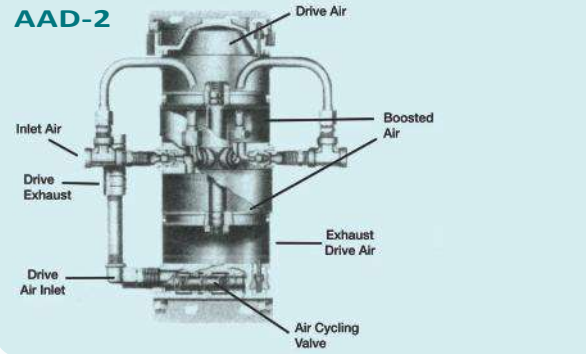
Double acting and two stage models are available which provide increased output and efficiency as well as using input air directly on the high pressure piston(s) in both stroke directions to increase drive force and output pressure capability.

A proven range of horsepower sizes is available to meet most high pressure air requirements; from our 1/3 HP for low flow/static applications to our 8 HP used for high flow dynamic applications.

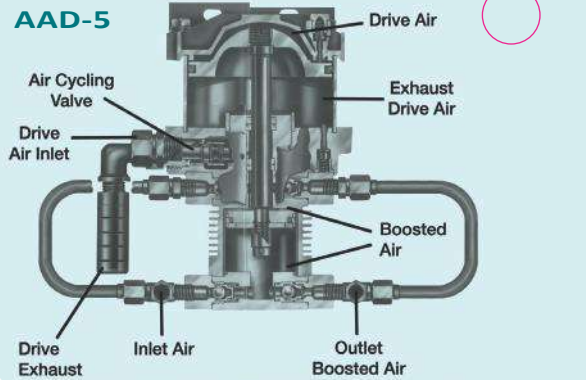
Figure 1



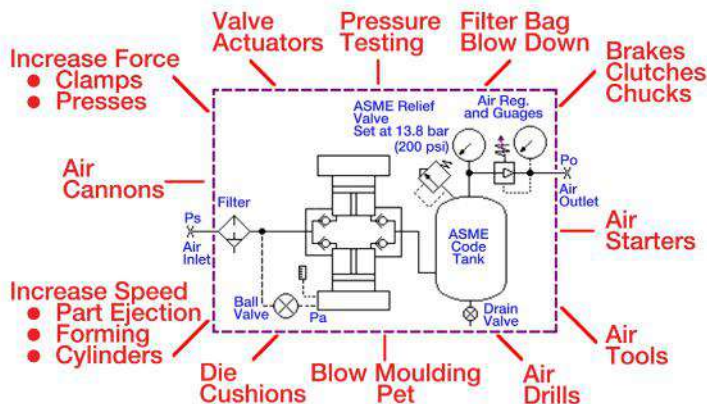
AAD-2



AAD-5



Typical Applications



Sizing Air Amplifiers

Several factors are involved in the proper sizing of Haskel air amplifiers. Some involve the specific parameters of the application while some involve the application itself.

Specific parameters include:

- What is the outlet pressure required (Po)?
- What is the minimum available air drive pressure (Pa)?
- What is the available air drive flow (Qa)?
- What is the supply pressure (Ps)? (In most cases, Pa = Ps)
- What is the required flow (Q) at the outlet pressure?

Application data includes:

- What is the duty cycle?
- What is the high pressure required for?

Testing — what is the volume of the vessel and time required?

Part Ejection — what is the cycle of volume requirements?

Actuation — what is the bore & stroke of the actuator(s)?

— single or double acting?

— is high pressure air required on each stroke (double acting)?

— Which stroke?

— is high pressure air required for the entire stroke length(s)?

— what are the cycle requirements?

Selecting Required Ratio

Dividing the outlet pressure (Po) by the drive pressure (Pa) will provide us with the minimum area ratio of the amplifier(s). The dash number in the model code represents the area ratio.

More than one amplifier may be required: in certain high flow or heavy duty applications two or more amplifiers can be used in parallel; in certain higher flow/high pressure applications, a two-stage amplifier or multiple amplifiers can be used in series. Haskel offers a range of standard multipump units. Multipump units are most effective when the models selected produce the same flow for their respective pressure amplification.

Multi Pump Units

AAD-2-D5-C
AAD-5-15-C
AAD-5-D25-C
AAD-5-30-C
AAD-5-D30-C
AAD-5-15/30-C

Determining Flow

We should verify the of flow required (Q) by evaluating the application data. Finding that high pressure air is required only at the end of stroke or only on one stroke of the cycle may reduce the initial assessment of flow (Q).

Another consideration will be whether an air receiver used downstream can reduce the size of the amplifier required when the system cycle is taken into account (use high pressure air from the receiver during the on cycle and recharge the receiver during the off cycle) or enable momentary high flow requirements that initially are thought to exceed the capacity of our units. Haskel offers system options that include air receivers and controls.

Operation Guidelines

While Haskel manufactures air amplifiers for a wide range of pressures, care must be taken when sizing units for high outlet pressure applications. All air contains moisture and as you compress air, the moisture level does not reduce along with the volume of the air. The result is the same volume of moisture in a reduced volume of air. This saturation can lead to excessive maintenance for the air amplifier and the system. Dry, inexpensive gases such as nitrogen can be effectively used in the high pressure sections for these higher outlet pressure requirements (600PSIG and higher for example). For critical gas quality, refer to the use of our gas booster compressors which feature separation between drive and high pressure sections.

Other considerations include cycling rate and operation in unloaded conditions (i.e., before supply pressure has equalized or with small differential between supply and outlet pressures).

Cycling rate will be a factor of outlet pressure but can also be controlled by “throttling” the air drive volume. Various manual and

automatic controls are available to prevent “no load runaway” and are illustrated in sections of this catalog pertaining to their respective drive series (see Controls and Options Pg. 10 for details).

Cycle Rates

The maximum outlet flow and cycling speed are represented on the performance curves at the point where the outlet pressure and supply/drive curves intersect. These maximum cycling rates are not recommended for continuous duty (where the pressure and flow requirements for a system are constant) and the air amplifier performance should be derated for these applications to approximately 50% of maximum. Cycling speed at a given outlet flow can be calculated by dividing the outlet flow by the ‘free air volume’ displacement per cycle. The ‘free air volume’ for each air amplifier model can be calculated from the Piston Displacement per cycle (Db).

Piston Displacement per cycle data is shown in the Model Selection chart.

When the maximum outlet flow from a performance curve has been determined, it can be converted to cycling speed by dividing the outlet flow by the ‘free air volume’ displacement per cycle. This cycling speed can be then de-rated for a for a continuous duty application and converted to rated continuous outlet flow (multiply ‘free air volume’ displacement per cycle x de-rated cycle speed) for improved seal life.

Multiple units can be used in parallel if necessary to meet required outlet flows and maintain acceptable cycle rates for continuous duty applications.

Guidelines for Continuous Duty Applications for Maximizing Seal Life Performance

Air Amplifier Series	Maximum Cycles per minute
HAA31	325
4AAD-225	225
AA, AAD & AAT	80
8AAD-2	50

Examples:

$$N \text{ Liters/Cycle} = Db \times \frac{Ps + 1.0}{1.0} \times 0.85$$

Where: Db = Piston Displacement per cycle (Liters)
 Ps = Supply Pressure (bar)
 Adding & dividing by 1.0 converts to Absolute Atmospheres
 0.85 = Efficiency factor (approximate)

$$SCF / \text{Cycle} = \frac{Db}{1728} \times \frac{Ps + 14.7}{14.7} \times 0.85$$

Where: Db = Piston Displacement per cycle (cu. in.)
 Ps = Supply Pressure (psi)
 Adding & dividing by 14.7 converts to Absolute Atmospheres
 0.85 = Efficiency factor (approximate)

Model Selection Chart

Model	Drive Size In (mm)	Max Air Drive PSIG (BAR)	Ratio	Max Inlet PSIG (BAR)	Max Outlet PSIG (BAR)	Displ/Cycle In ³ Cu. In. (nL)
HAA31-2.5	2.87 (73)	125 (9)	2.5:1	125 (9)	320 (22)	2.40 (39.3)
HAA31-3.5	2.87 (73)	125 (9)	3.5:1	125 (9)	450 (31)	1.77 (29.0)
HAA31-4.5	2.87 (73)	125 (9)	4.5:1	125 (9)	600 (41)	1.35 (22.1)
4AAD-2	4 (102)	125 (9)	2:1	250 (1723)	250 (17)	62.5 (1024)
AA-8	5.75 (146)	150 (10)	8:1	1250 (86)	2500 (172)	13.2 (216)
AA-15	5.75 (146)	150 (10)	15:1	2250 (155)	2250 (155)	6.2 (101)
AA-30	5.75 (146)	150 (10)	30:1	4500 (310)	4500 (310)	3.1 (51)
AAD-2	5.75 (146)	150 (10)	2:1	300 (20)	300 (20)	201 (3294)
AAD-5	5.75 (146)	150 (10)	*5:1 (4:1)	1250 (86)	1250 (86)	19.3 (316)
AAD-15	5.75 (146)	150 (10)	15:1	2500 (172)	2500 (172)	12.4 (203)
AAD-30	5.75 (146)	150 (10)	30:1	4500 (310)	4500 (310)	6.2 (101)
AAT-7/30	5.75 (146)	150 (10)	7/30	300 (20)	4500 (310)	13.2 (216)
AAT-15/30	5.75 (146)	150 (10)	15/30	1000 (69)	4500 (310)	6.2 (101)
AAT-30/50	5.75 (146)	150 (10)	30/50	3000 (206)	5000 (344)	3.1 (51)
8AAD-2	8 (203)	130 (896)	2:1	300 (20)	300 (20)	400 (6555)

Using Performance Curves

All Haskel air amplifiers are variable pressure, variable flow devices within the limits of their sizes and ratios. Outlet pressure can be controlled by regulating the air drive and/or air supply pressure (depending on model) while outlet flow can be controlled by adjusting the air flow to the drive piston with a corresponding change in cycle rate.

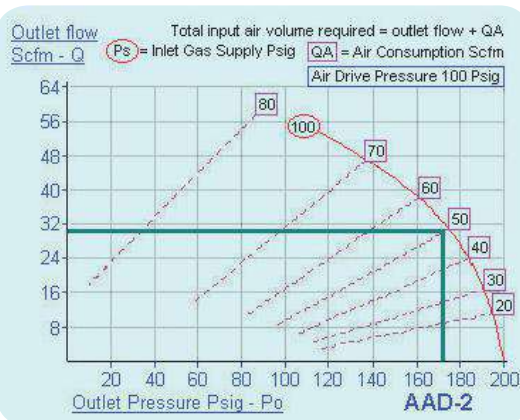
Performance curves are provided for the various ratios for each horsepower size. The curves provide performance data for the most commonly requested parameters. Performance values for other parameters can either be interpolated from the curves provided or your local Haskel representative can assist you.

Note that as the outlet pressure increases, flow decreases. The maximum outlet pressure is a zero flow condition known as "stall" where the amplifier is maintaining pressure downstream. When it senses a drop in the downstream pressure, it will automatically cycle (the benefit of the unbalanced cycling spool) to raise the system pressure to the "stall" condition again, provided the consumption of air resulting in the pressure drop is within the flow capacity of the model selected.

The curves are easily read by comparing the required outlet pressure with the (available) air drive/supply curve and meeting the corresponding outlet air flow. The total required air volume will be the sum of both the outlet flow and the air drive consumed to cycle the air amplifier ($Q + Q_a = \text{total air volume required}$).

In the example shown: $P_s = 100\text{PSIG}$, $P_o = 170\text{PSIG}$, $Q = 30\text{SCFM}$, $Q_a = 50\text{SCFM}$ (total air volume required is 80SCFM).

Performance Curves



Model Number Codes

HAA31 & AA

Single acting, single stage air pressure amplifier.

Maximum Po ("Stall") = Pa x Ratio

AAD

Double acting, single stage air pressure amplifier provides outlet flow on each stroke of cycle and gains "lift" from inlet pressure.

Maximum Po ("Stall") = Pa x Ratio + Ps (*Often Pa = Ps)

AAT

Two-stage air pressure amplifier provides two high pressure pistons of different ratios within a single unit for maximum efficiency at higher outlet pressures.

Maximum Po ("Stall") = Pa x Ratio 2nd Stage + Ps x Ratio Stages

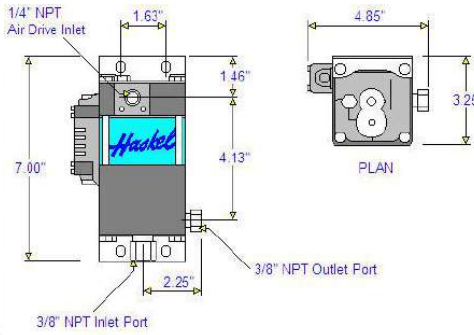
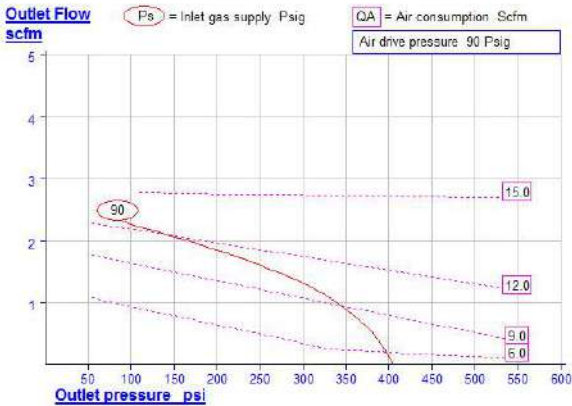
Legend

Pa = Air Drive Pressure
Po = Outlet Pressure
Ps = Supply Inlet Pressure

HAA31 Series, Single Acting, Single Stage

Performance Curves

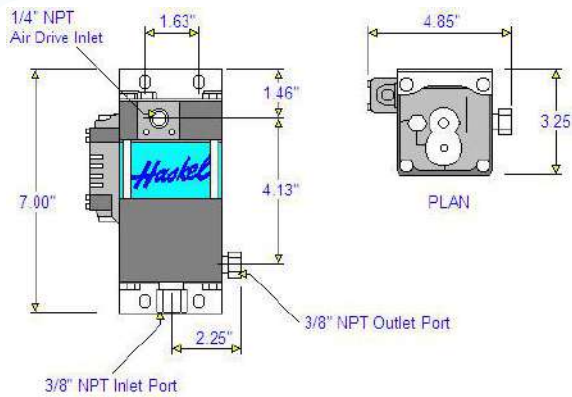
HAA31-4.5



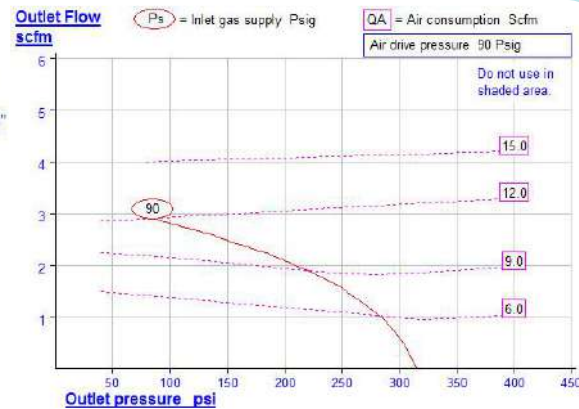
- Economical means of boosting pressure, where volume is small
- Maximum outlet pressure area ratio x drive pressure



HAA31-2.5



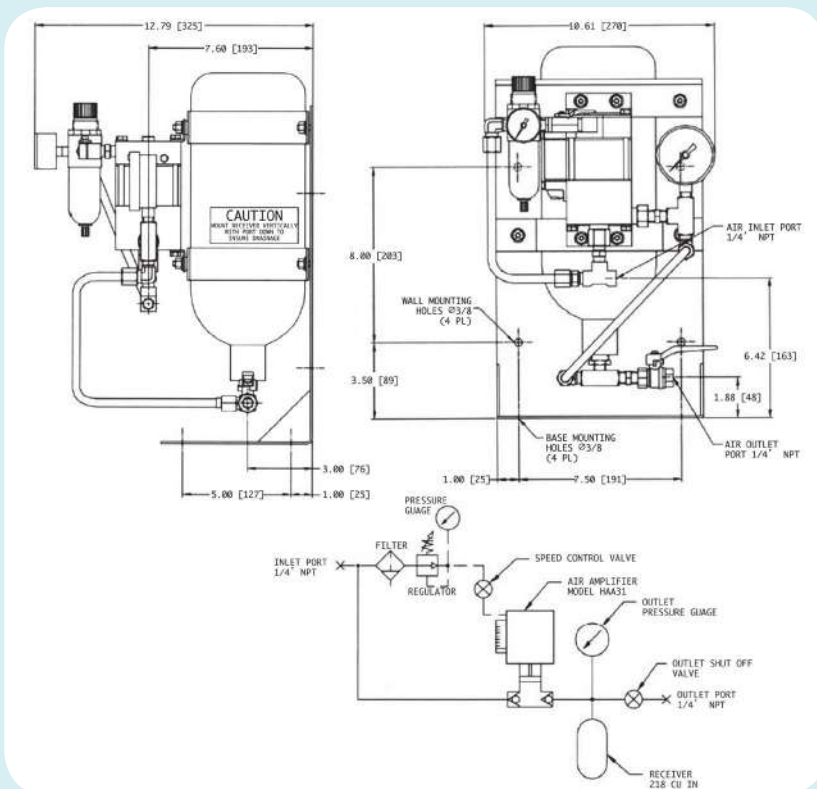
HAA31-3.5



Optional Modifications

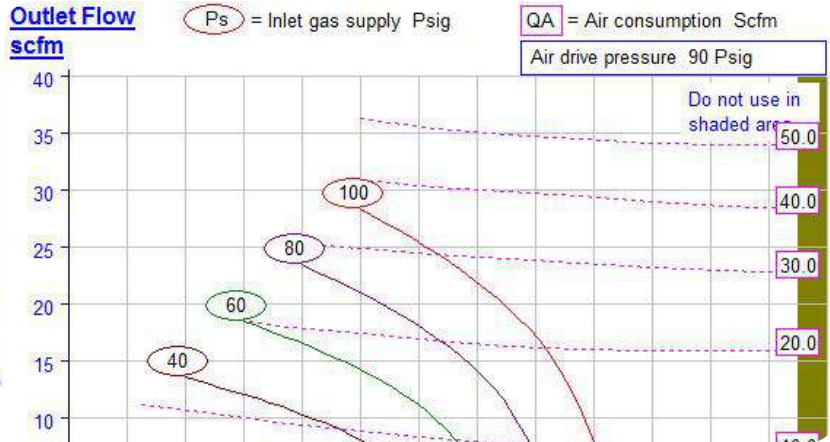
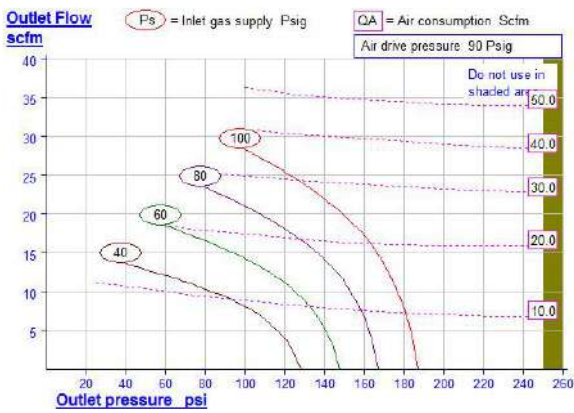
Number	Description
-C	Air Controls

Model 85291 Mini System with Receiver and Controls

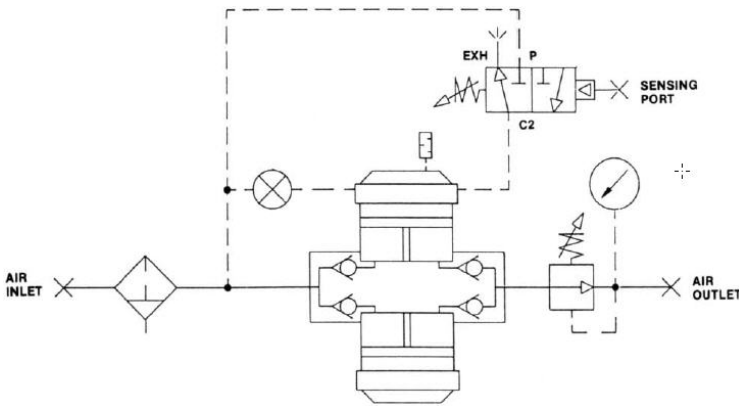


4AAD-2 Series Double Acting, Single Stage

Performance



Model 56569 Modification Schematic

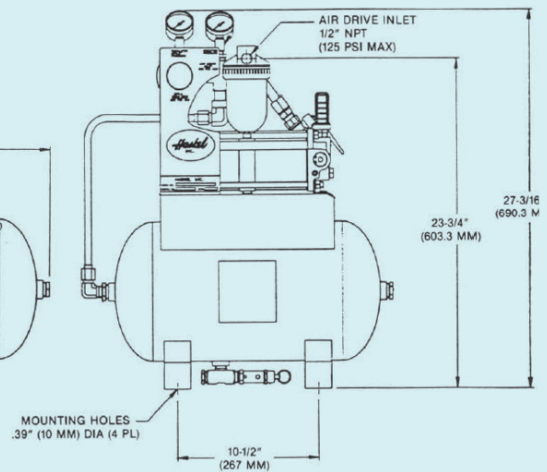
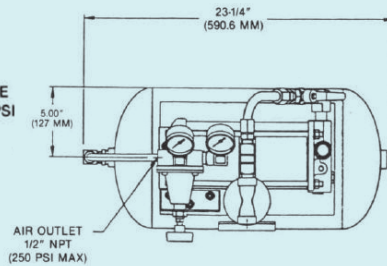
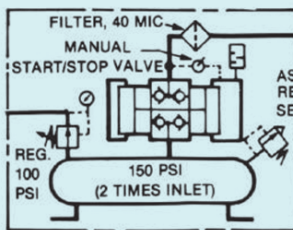


Optional Modifications

Number	Description
-C	Air Controls
56594	External Pilot
56569	No Load Run Away & Regulator
56564	Extreme Service Cycling
56570	Receiver & Controls

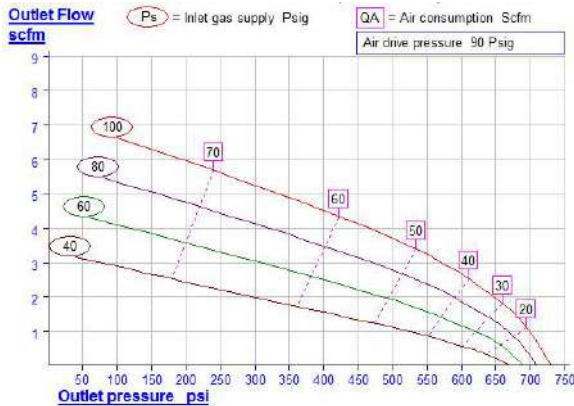
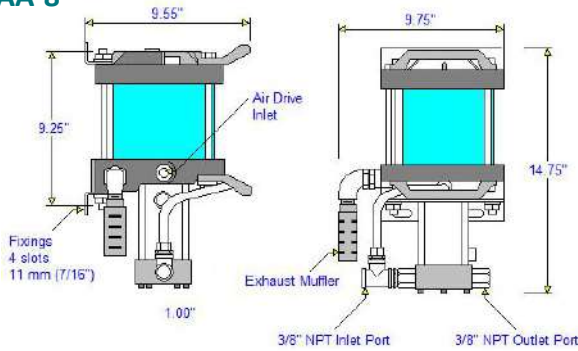
Model 56570

4" system on 5 3/4 gal., 290 psi ASME code receiver with controls and ASME relief valve



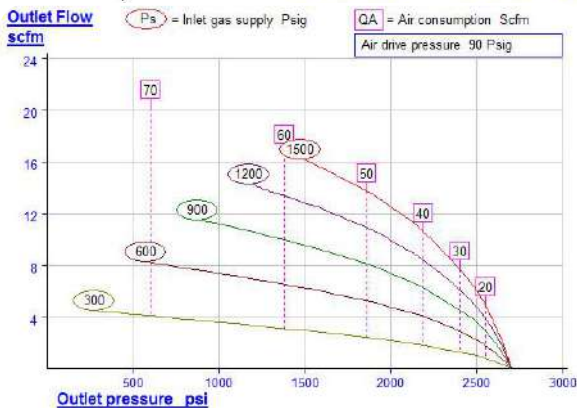
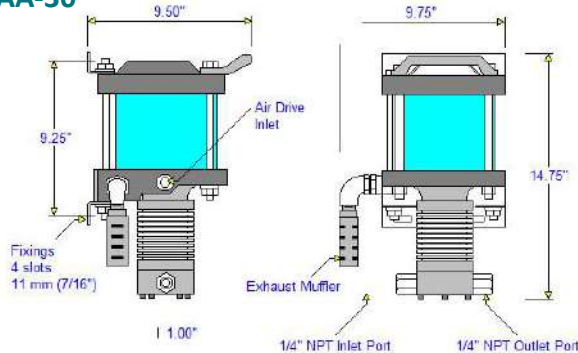
AA Series Single Acting, Single Stage

AA-8

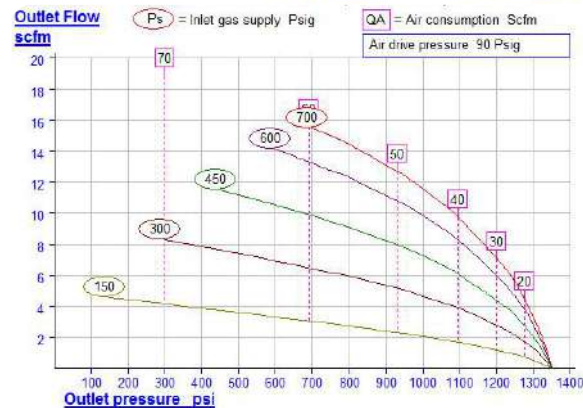
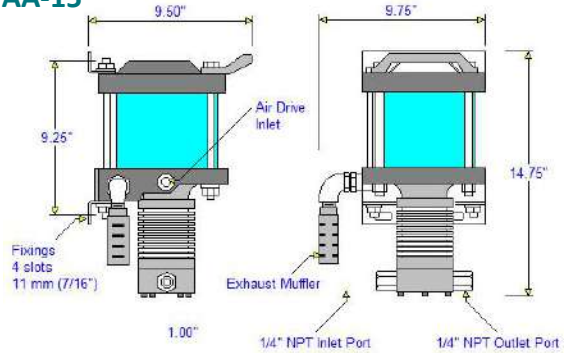


- Pressure outputs up to 4500 psi (310 bar)
- Maximum outlet pressure area ratio x drive pressure

AA-30



AA-15



Optional Modifications

Number	Description	Number	Description	Number	Description
-C	Air Controls	29702	Single Stroke Modification	53375-1	200PSIG Downstream Regulator AAD-2
28881	External Pilot Modification	51050	Extreme Service Cycling	53376	Regulator, Air Pilot Switch, & Relief Valve AAD-5
17860	Electrical Stroke Counter	53375	125PSIG Downstream Regulator AAD-2		
25721	Mechanical Stroke Counter				
29376	Three Way Cycling Spool				

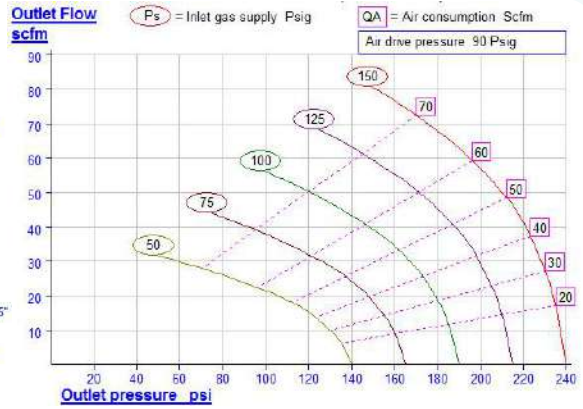
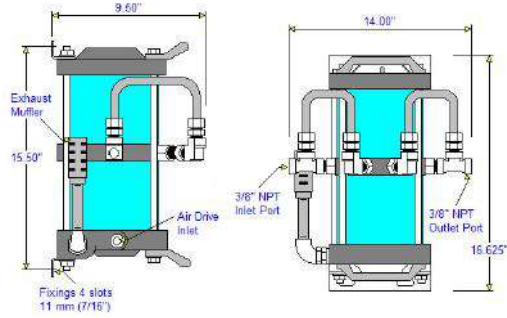
AAD Series, Double Acting, Single Stage

- Efficient means of increasing air pressure
- Pressure outputs up to 4500 psi (310 bar)
- Maximum outlet pressure area ratio + supply pressure
- Pump twice volume per cycle of AA range
- Requires less air drive since the inlet air pressure itself provides a substantial portion of the driving force

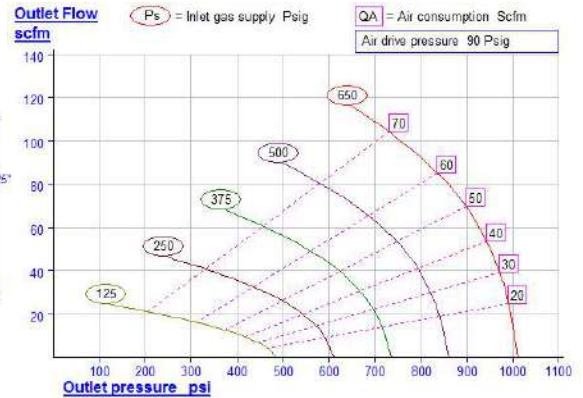
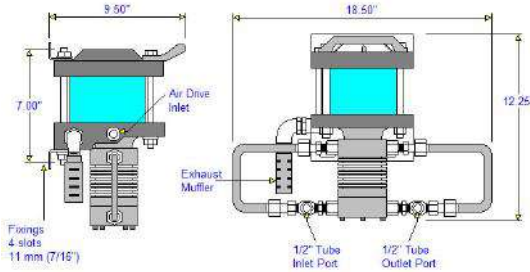


AAD-2

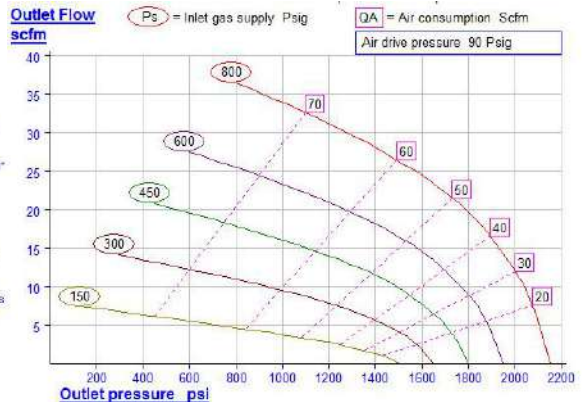
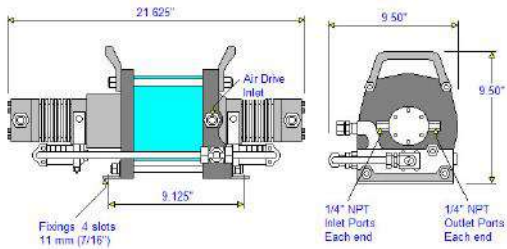
AAD-2



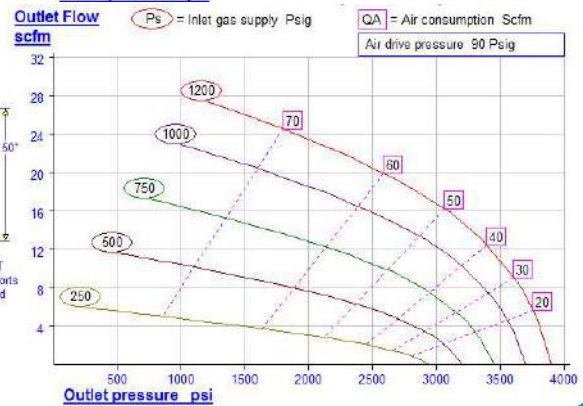
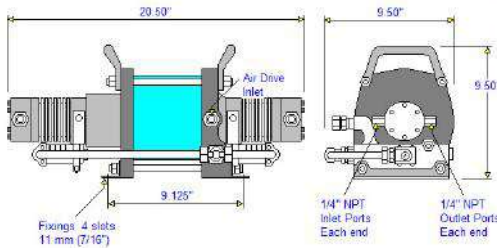
AAD-5



AAD-15



AAD-30



Optional Modifications

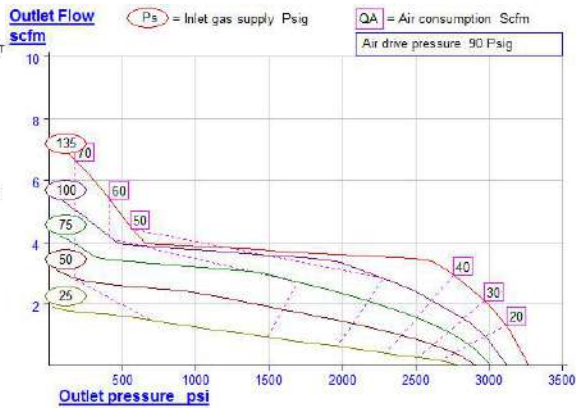
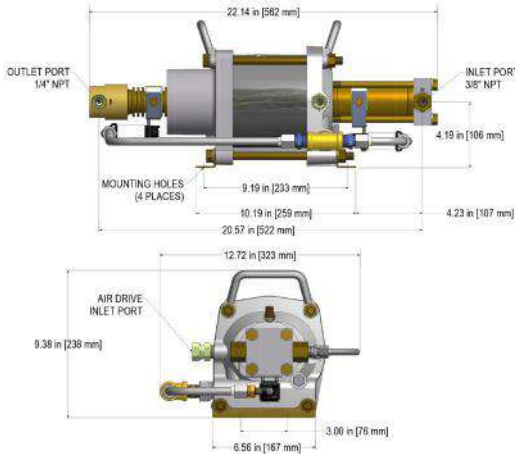
Number	Description
-C	Air Controls
28881	External Pilot Modification
17860	Electrical Stroke Counter
25721	Mechanical Stroke Counter
29376	Three Way Cycling Spool

Number	Description
29702	Single Stroke Modification
29960	Receiver and Controls AAD-2
51050	Extreme Service Cycling
53375	125PSIG Downstream Regulator AAD-2

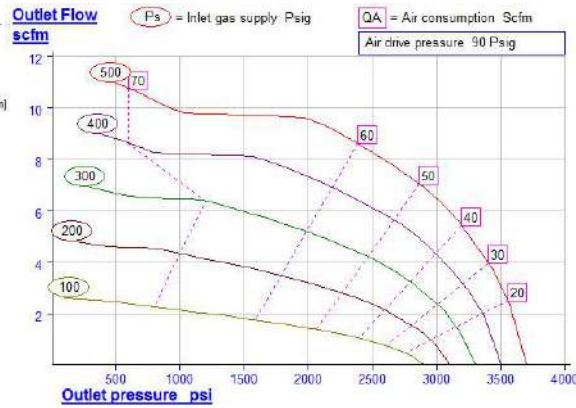
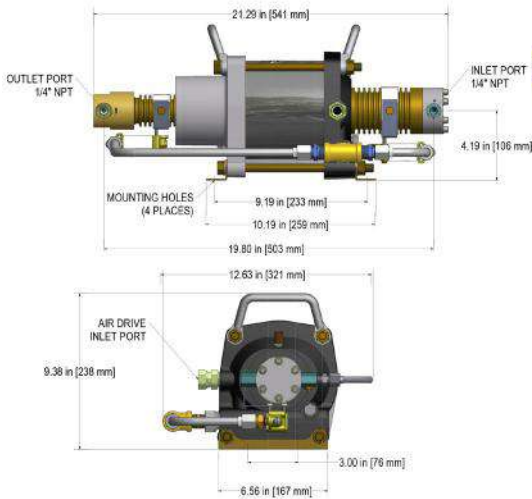
Number	Description
53375-1	200PSIG Downstream Regulator AAD-2
53376	Regulator, Air Pilot Switch, & Relief Valve AAD-5

AAT Series, Double Acting, Two Stage

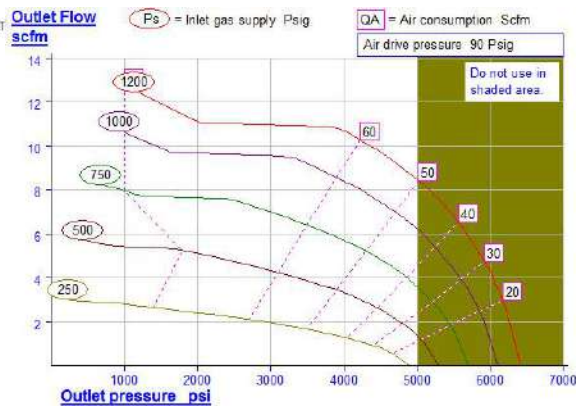
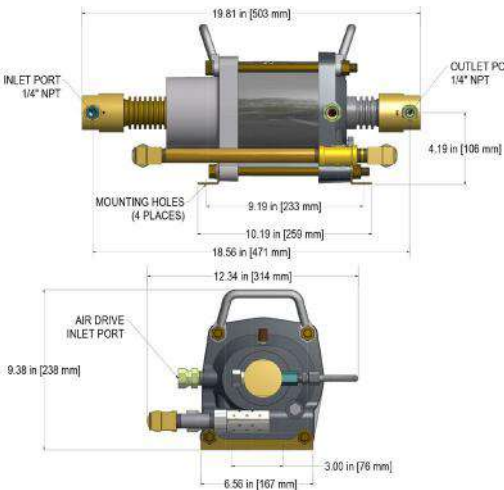
AAT-7/30



AAT-15/30



AAT-30/50



- Pressure output up to 5000 psi (345 bar)
- Requires less air drive since the inlet pressure itself provides a substantial portion of the driving force.
- AAT-7/30 Maximum Outlet Pressure 20 Pa + 4 Ps
- AAT-15/30 Maximum Outlet Pressure 30 Pa + 2 Ps
- AAT-30/50 Maximum Outlet Pressure 50 Pa + 1.6 Ps



Optional Modifications

Number	Description
-C	Air Controls
28881	External Pilot Modification
17860	Electrical Stroke Counter
25721	Mechanical Stroke Counter
29376	Three Way Cycling Spool

Number	Description
29702	Single Stroke Modification
29960	Receiver and Controls AAD-2
51050	Extreme Service Cycling
53375	125PSIG Downstream Regulator AAD-2

Number	Description
53375-1	200PSIG Downstream Regulator AAD-2
53376	Regulator, Air Pilot Switch, & Relief Valve AAD-5

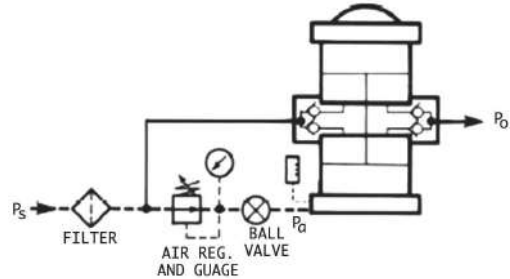
Standard Vertical Air Amplifier Systems

A complete pneumatic system designed to provide amplified pressure and momentary high flow. Vertical receiver reduces footprint, saving floor space. Utilizes available plant air (up to 95 psi) to both the supply and drive inlets which automatically stalls once the storage tank has been filled to about double the supply pressure. The amplifier will sense any use of air from the tank, and resume operation again to stall at about 5 times supply pressure. The regulator on the tank output is provided to control the output pressure and flow, up to about (momentarily) 150 scfm. Also included is an ASME coded safety relief valve on the tank set at 400 psig.

All models are available with optional factory installed controls. Control option details will vary depending on pressures, application requirements and which amplifier models are used. The schematics and charts below describe the most common options. Any model can be converted to cycle with external pilot air.

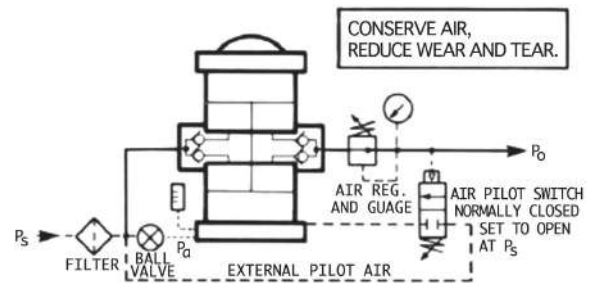
Standard Air Controls for all AA series models

Specify using -C after model number. Provide rough max, P_o control by regulating the P_a only if P_s is constant. Regulation of P_a will reduce peak performance.



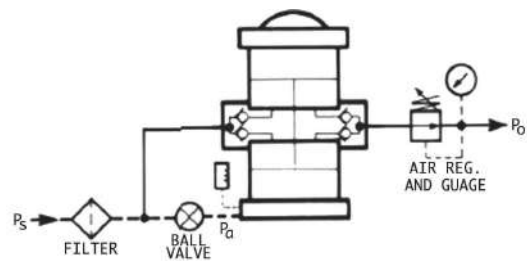
Normally Closed Air Pilot Switch for all AA series Models To Prevent No-Load Runaway

Specify MA-1 (after model number) and requested setting within 50-180 psi (increasing) range. e.g.: AAD-2-MA-1 set at 70 psi increasing



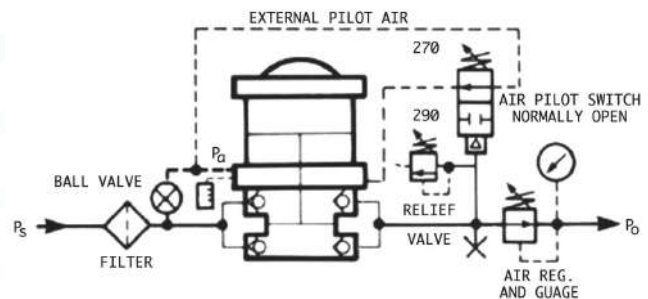
Semi-Standard Air Controls AAD-2 Model Only

Specify using -53375 before model number AAD-2-C. Provides good max P_o control with peak performance max. reg. P_o 124 psi, 200 psi spring optional. Optional 200 psi spring.



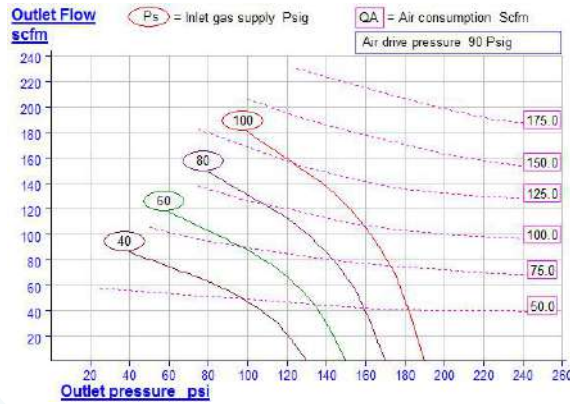
Normally Open Air Pilot Switch with Relief Valve & Air Controls - AAD-5

Specify using -53376 before model number AAD-5. Good max P_o control to 200 psi with port to add 1-1/2 or 5 gal. ASME receiver (290 psi)

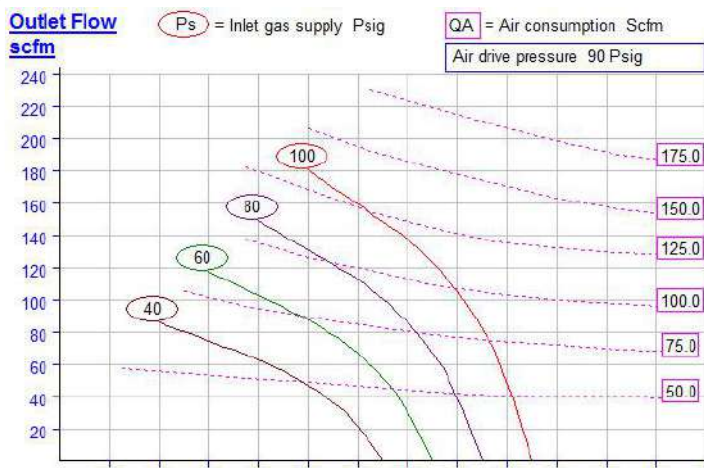


Model AAD-5-VT15-400 Shown

8AAD-2 Series, Double Acting, Single Stage

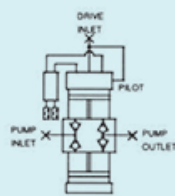


- 8" Drive (203mm)
- High output flow air pressure amplifier
- Pressure outputs up to 20bar (300 psi)
- Maximum outlet pressure is area ratio x drive pressure plus supply pressure
- Requires less air drive since the inlet air pressure itself provides a substantial portion of the driving force

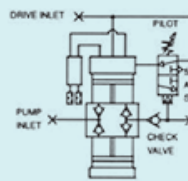


Optional Modifications

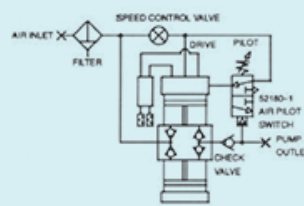
Standard Modification Schematics



Basic 8AAD-2



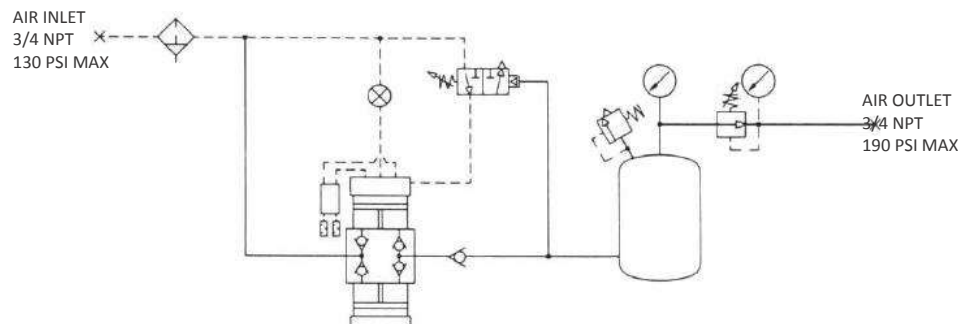
59790- 8AAD-2



59791- 8AAD-2

Number	Description
-C	Air Controls
29125	External Pilot Modification
17860	Electrical Stroke Counter
25721	Mechanical Stroke Counter
29702	Single Stroke Modification
54312	Extreme Service Cycling Mod
59790	NO Load Run Away Mod
59791	59790 With Air Controls
59462	8AAD-2 With Receiver and Controls

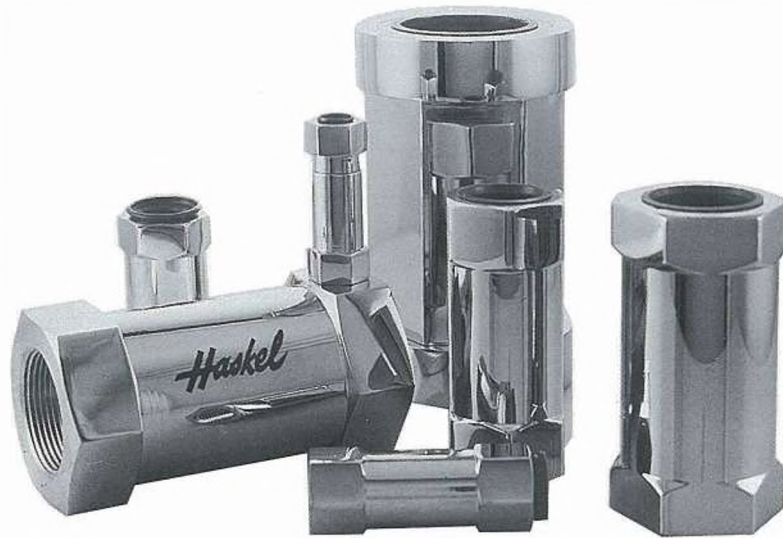
59462-8AAD-2 System



System Components



STAINLESS STEEL CHECK VALVES



Combining the best features of durability and positive sealing, these unique valves are constructed throughout of 316 Series Stainless Steel for the high corrosion resistance essential in the chemical, processing and power generating industries.

PTFE seat seal for positive bubble-tight sealing (with gas) from cryogenic to 375° F (190°C) temperatures. Seals also available for radioactive environments, or up to 500°F steam. Can be furnished without soft seat for higher temperature steam service.

Sizes 1/4" through 1" use a ball, and for reduced inertia, the larger sizes (1-1/4", 1-1/2" and 2") use a poppet. Cracking pressure is 1-4 psi.

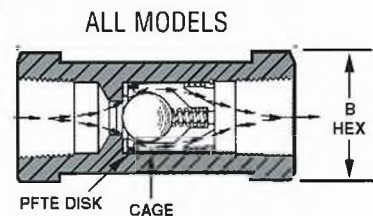
Larger valves can be furnished for flange mounting to customer specifications on special quantity orders. Consult factory.

Semi-soft means the check ball or poppet initially seats on the PTFE, but after the PTFE deflects a slight amount, the ball or poppet comes to rest against the metal seat so the PTFE does not have to absorb the full load of the high pressure.

Internal passages have flow capacity equal to or greater than double extra heavy pipe of the same size that would be required to carry the rated pressure (see CV factor in chart below).

Typical of good Haskel design is the removal of springs from the flow path. The larger spring is outside the flow and simply provides a preload for the disk. The smaller spring, inside the cage, actuates the ball or poppet but the flow, which is routed through the cage windows, misses the spring entirely. This is why the valves will stand extremely high shock loads and have been tested at rapid high shock up to 2 million cycles without failure.

MODEL NUMBER	NPT-SIZE (Other parts optional at extra cost)	DIMENSIONS		MINIMUM ORIFICE	CV	MAX. WORKING PRESSURE @ 375°F MAX.	
		A	B			HYDRAULIC	GAS
28201	1/4"	2-1/2"	13/16"	.156"	.44	15,000 psi	10,000 psi
56790	3/8"	2-7/8"	1"	.250"	1.10	15,000 psi	10,000 psi
28303	1/2"	3-1/8"	1-1/8"	.344"	2.10	15,000 psi	10,000 psi
28624	3/4"	3-1/4"	1-3/8"	.486"	4.20	15,000 psi	10,000 psi
28400	1"	4-1/4"	1-3/4"	.540"	5.20	12,000 psi	8000 psi
54080	1-1/4"	4-5/8"	2-1/4"	.900"	14.50	7500 psi	6000 psi
53520	1-1/2"	5-1/2"	2-3/4"	1.045"	19.60	6000 psi	5000 psi



For oxygen service, add -10 after model no. (e.g., 28303-10) 5000 psi maximum.

AIR PILOT SWITCHES



STYLE A

Externally Adjusted

- 19 models
- Sensing pressures to 25,000 psi
- Air valve* 3-way, 2-way normally open or closed



STYLE B

Remote Air Adjusted "Remoteset"SM

- 4 models
- Sensing pressures to 60,000 psi
- Air valve* 3-way normally closed, 2-way normally closed, normally open



STYLE C

Internally Adjusted

- 34 models
- Sensing pressures to 60,000 psi
- Air valve* 3-way normally closed, 2-way normally closed, normally open

Description

An Air Pilot Switch is a pressure switch. These units produce a pneumatic signal up to 150 psi at any sensing pressure within their adjustment range. The signal valve may be piped normally open, normally closed*, 3-way or 2-way depending on model.

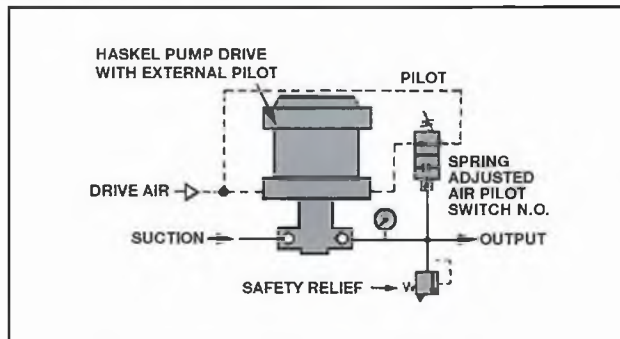
All models use a 2-position poppet-type air signal valve which is shifted from its normal position by a rod from the sensing end which first must overcome an adjustable force spring (styles A and C) or air-regulated dome loader (style B).

* Air valve terminology is the reverse of an electrical switch. Closed means no flow; open means flow.

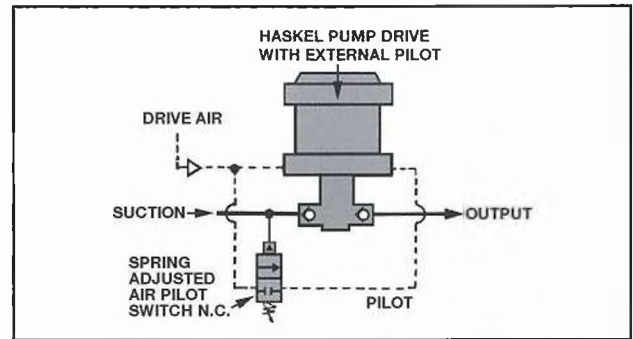
Applications

- Direct automatic start/stop control of any Haskel pump, gas booster, air amplifier or indirectly to the drive of any pump or compressor sensing either output or suction (schematics 1 & 2)
- Valve actuators (schematic 5)
- Pneumatic alarm signals
- Replace an explosion-proof pressure switch in hazardous applications (schematic 6)

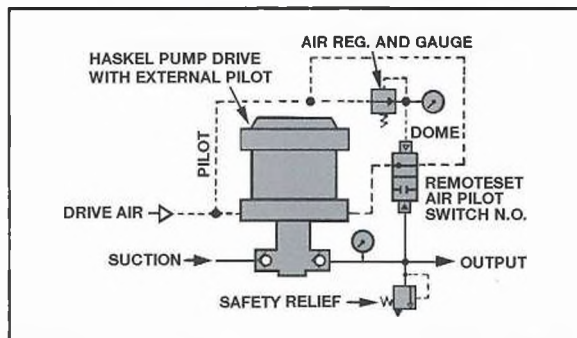
Application Schematics



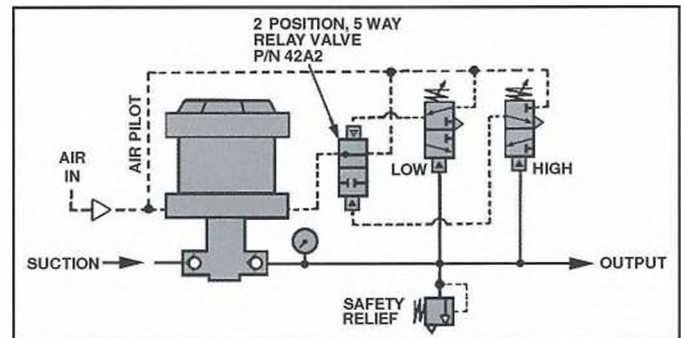
1. Maximum output pressure control, spring adjusted



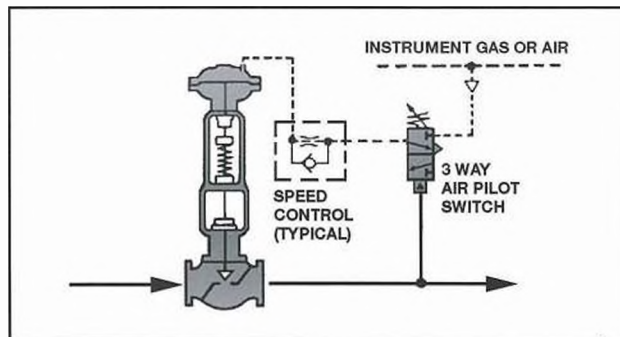
2. Minimum suction pressure control, spring adjusted



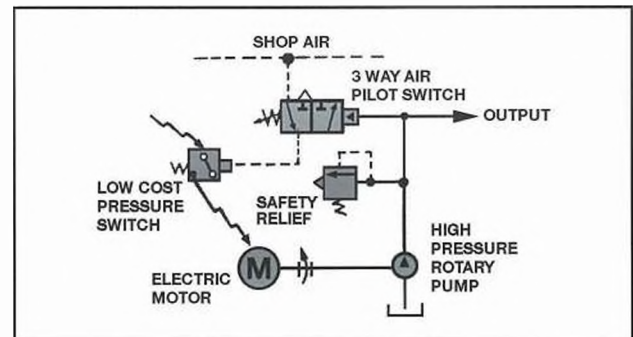
3. Maximum output pressure control remote, air adjusted



4. Wide deadband control with two adjustable air pilot switches plus a two-position valve



5. Process valve control



6. Electric pump/motor control where standard pressure switches are unsuitable at pump output

A word about "deadband"

Users often try to compare the on-off action of the air signal with the action of an electrical switch. They are not really comparable. The air switch has no "snap-over" mechanism required with an electric switch to prevent arcing. Therefore, "on" or "off" before or after a dead tight seal condition can be quite subjective. In other words, if the air pilot switch is turning on a device that not only requires a miniscule leak to start, it will start much sooner than some other larger device that may need a flow of air to start.

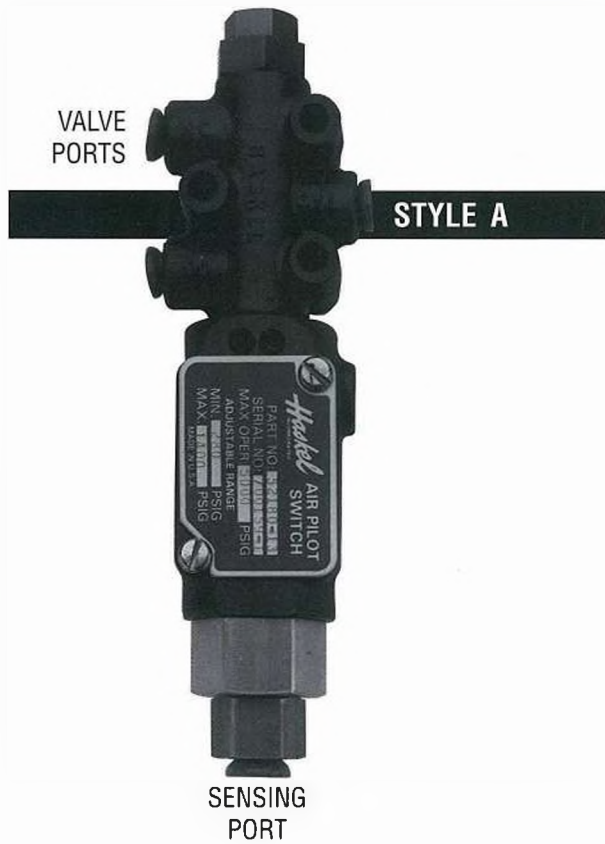
Therefore, it is not possible to publish precise deadband data such as that available for most electric pressure switches.

Style B Remoteset units have the lowest and most consistent deadband (5% - 10% of set pressure) because there is no heavy coil spring to compress.

Styles A and C may vary from 5% to as high as 40% depending on model and the application details.

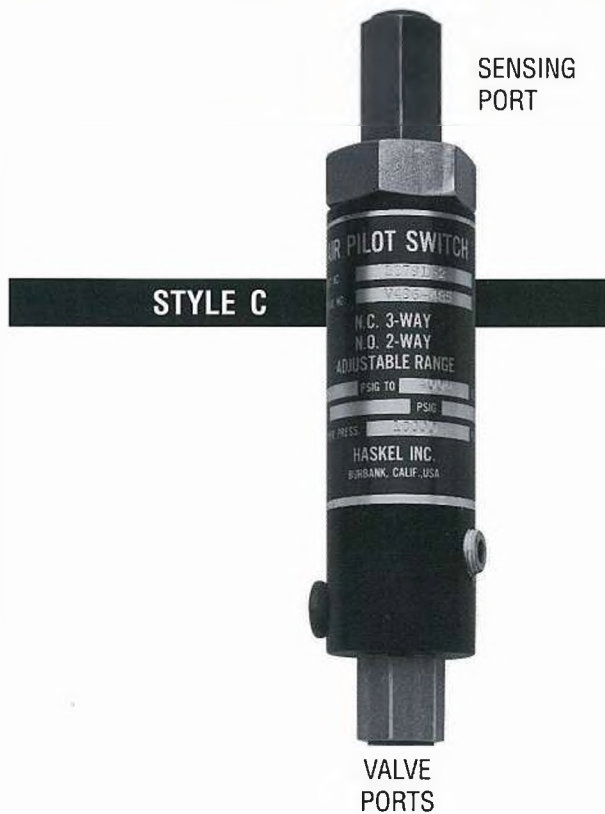
In some applications a wider than normal deadband is needed. Schematic 4 illustrates how to provide this with two air pilot switches and a simple 2-position air valve.

AIR PILOT SWITCHES — SELECTION CHARTS



STYLE	MODEL NO.		MAXIMUM SENSING PRESSURE (PSI)	AIR VALVE	ADJUSTABLE RANGE PSI FACTORY SETTING AT NO CHARGE (Specify if Increasing or Decreasing)		APPROXIMATE DIMENSIONS (inches)		PORTS	
	SERVICE SENSING PORT				NORMALLY OPEN	NORMALLY CLOSED	LENGTH	OUTSIDE DIA.	AIR (2)	SENSING (3)
	LIQUID OR GAS	OXYGEN GAS								
A	51940-1	-11	10,000 Standard 5000 Oxygen	(1) 3-Way. May be piped N.C. or N.O. or 2-Way N.C. or N.O.	2000 - 10,000	3500 - 10,000	8	2	1/8" NPT	1/4" NPT
	51940-2	-12			700 - 4400	1200 - 4800				
	51940-3	-13			200 - 950	500 - 1300				
	52160-1	N/A	25,000		6000 - 11,000	7000 - 12,000	8-5/8		1/4" Super-pressure	
	52160-2				8000 - 25,000	10,000 - 25,000				
	52160-3				3000 - 8500	4000 - 9500				
52180-1	-11	10,000 Standard 5000 Oxygen	60 - 240	150 - 300	7-5/8	1/4" NPT				

B	MODEL NO.	SERVICE SENSING PORT	MAXIMUM SENSING PRESSURE (PSI)	AIR VALVE	ADJUSTABLE RANGE PSI FACTORY SETTING AT NO CHARGE (Specify if Increasing or Decreasing)	LENGTH	OUTSIDE DIA.	AIR (2)	SENSING (3)	RATIO
	55792	N/A	25,000	3-Way. May be piped N.C. or N.O. or 2-Way N.C. or N.O.	4500 - 23,400 with 20-100 Dome Load. Nominal Ratio 245:1	8-3/4	4-1/4	1/8" NPT	1/4" Super-pressure	245:1
	55796	N/A	600		135 - 530 with 20-100 Dome Load. Nominal Ratio 6:1	7-1/2			1/4" NPT	6:1

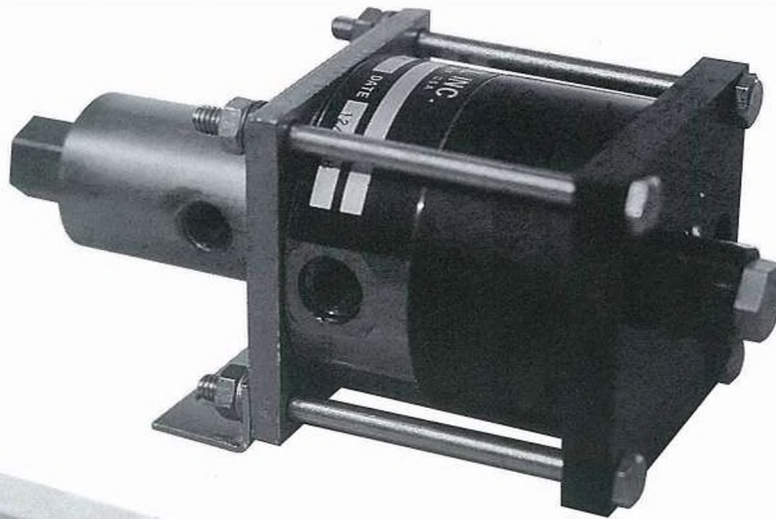


Notes:

- (1) SAFETY: When using N.O. models to limit pump output pressure, also include a backup relief valve. (Ref. schematics 1, 3, 4, 6, page 5.)
- (2) AIR VALVE: Materials are Aluminum, Stainless Steel, Bronze, and Buna suitable for air and most gases. Modification available for sour natural gas to meet NACE SPEC. MR-01-75.
- (3) SENSING SECTIONS: Materials are Stainless Steel, PTFE, Buna (with Viton or Silicone for Oxygen) suitable for most liquids or gases. Modification available for sour natural gas and fire-resistant hydraulic fluids.

STYLE	MODEL NO.		MAXIMUM SENSING PRESSURE (PSI)	AIR VALVE	ADJUSTABLE RANGE PSI FACTORY SETTING AT NO CHARGE (Specify if Increasing or Decreasing)		APPROXIMATE DIMENSIONS (inches)		PORTS	
	SERVICE SENSING PORT				NORMALLY OPEN	NORMALLY CLOSED	LENGTH	OUTSIDE DIA.	AIR (2)	SENSING (3)
	LIQUID OR GAS	OXYGEN GAS								
C	28755-1 28755-2 28755-3 28755-8	-11 -12 -13 -18	10,000 Standard 5000 Oxygen	3-Way N.C.		1500 - 10,000 300 - 3500 150 - 700 800 - 9500	5-11/16	1-3/8	1/8" NPT (Vent not Threaded)	1/4" NPT
	28791-1 28791-2 28791-3 28791-4	-11 -12 -13 -14		(1) 2-Way N.O.	2500 - 10,000 750 - 4000 250 - 750 2000 - 8500	6-1/8	1/4" NPT Out 1/8" NPT In			
	28974-24 28974-25	N/A	25,000	3-Way N.C. 2-Way N.C.		6000 - 25,000	8	2	1/8" NPT (Vent not Threaded)	1/4" Super-pressure
	28974-59 28974-60	N/A	60,000 (Intermittent)	3-Way N.C. 2-Way N.C.		20,000 - 60,000	8			
	29074-25 29074-60	N/A	25,000 60,000 (Intermittent)	(1) 2-Way N.O.	6000 - 25,000 20,000 - 60,000		8			
	55230-1 55230-3	-11 -13	600	3-Way N.C.		12 - 37 17 - 200	6-1/2	2-1/8	1/8" NPT (Vent not Threaded)	1/4" NPT
	55416-1 55416-2	-11 -12		Pipe either (1) 3-Way N.C. or 2-Way N.O.	13 - 47 28 - 200	13 - 47 28 - 200	7		1/4" NPT N.O. 1/8" NPT Others	
	56650-1 56650-2	-11 -12	10,000 Standard 5000 Oxygen	3-Way N.C.		50 - 180 110 - 900	6-5/16	1-3/8	1/8" NPT (Vent not Threaded)	

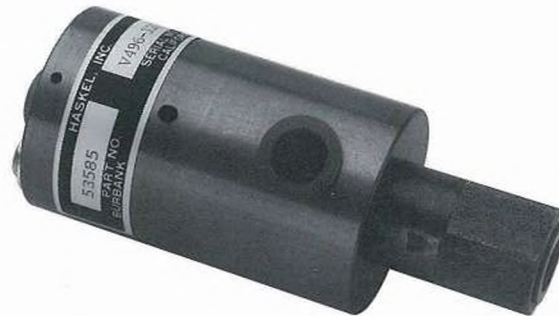
AIR OPERATED DIRECTIONAL CONTROL AND RELEASE VALVES



3-Way Release Valve
Model 50135



Release Valve
Model 28940-1



Release Valve
Model 53585



Release Valve
Model 54416

These directional control valves are basically a family with common characteristics and benefits.

- They are seated poppet or ball design for virtually zero leakage at high pressures with low viscosity fluids. They are not "bubble-tight" on gas.

Note: Normally open models will generally hold a tighter seal on low viscosity liquid or gas because seating force does not depend on inlet pressure.

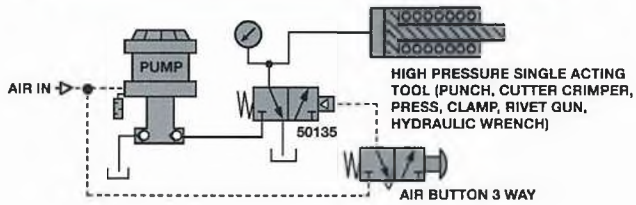
- They are directly air-actuated for ideal system compatibility in wet or hazardous areas, or when used with air driven pumps or boosters. Yet, if electronic or electrical control is preferred, they can be actuated with any of the

wide selection of subminiature 3-way solenoid air valves available from many manufacturers.

- They employ the same basic area ratio principle used in Haskel pumps enabling high forces to be easily and directly controlled from low-pressure plant main or instrument air.
- Although not normally considered for pressure control, all of the normally open 2-way models can do double-duty in a circuit by also providing a safety relief function simply by installing a small air regulator in their pilot line (schematics next page).

AIR PILOTED VALVES — TYPICAL APPLICATIONS

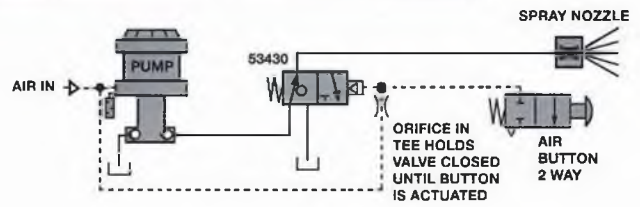
50135 3-WAY NORMALLY CLOSED



NOTES:

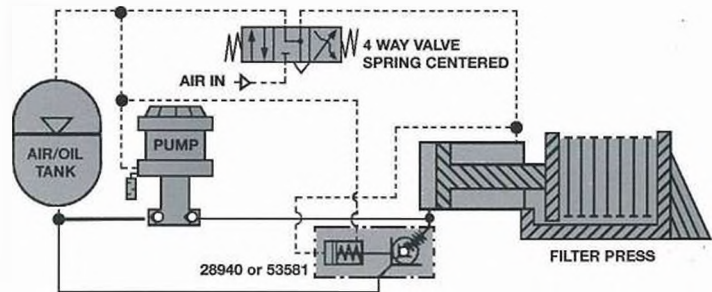
1. IF TOOL IS DOUBLE ACTING, ADD ANOTHER 50135 WITH AIR BUTTON IN PARALLEL.

53430 3-WAY NORMALLY OPEN

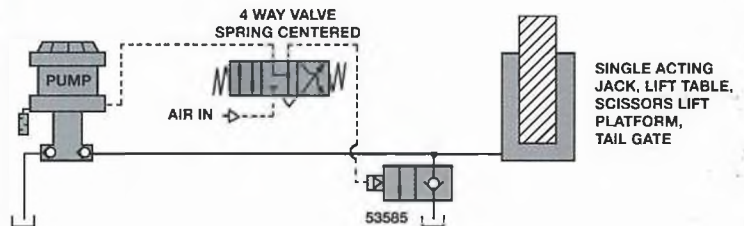


2. IF ADDITIONAL TOOLS ARE TO BE POWERED OFF SAME PUMP, ADD VALVES IN PARALLEL WITH CHECK VALVE AT EACH INLET PORT.

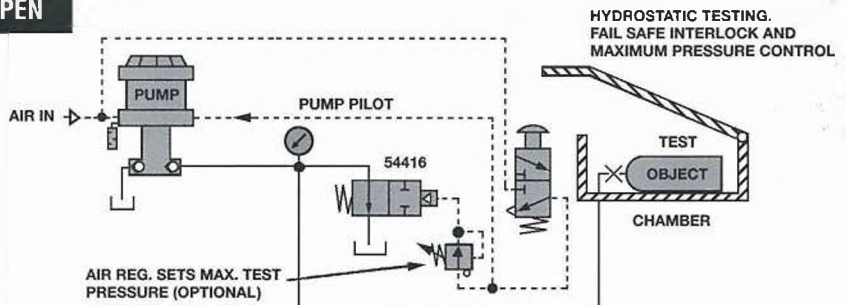
28940 or 53581 2-WAY, NORMALLY CLOSED, 2-STAGE



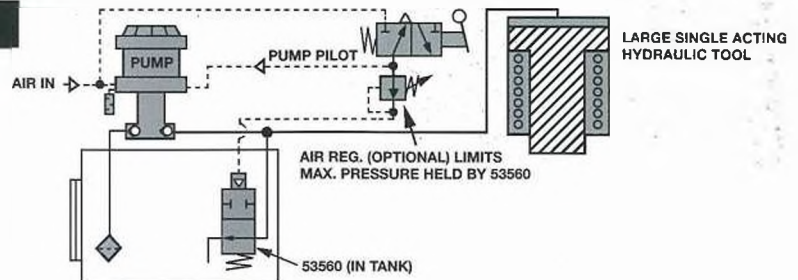
53585 2-WAY NORMALLY CLOSED



54416 or 54492 2-WAY NORMALLY OPEN



53560 2-WAY NORMALLY OPEN



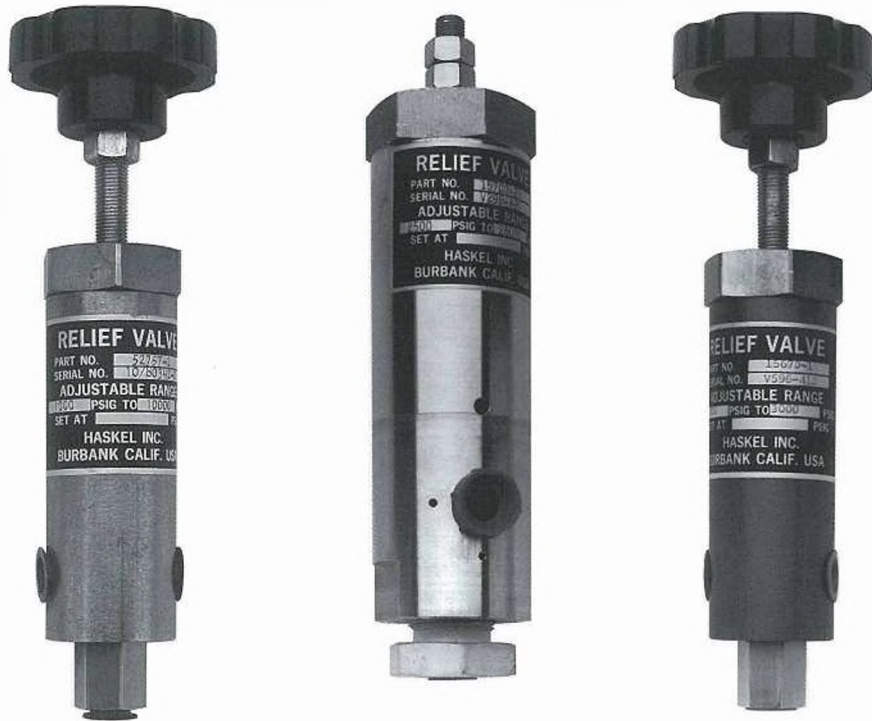
AIR PILOTED VALVES — SELECTION CHARTS

TYPE	NORMAL POSITION	SCHEMATIC WITH APPROXIMATE WEIGHT AND SIZE	MODEL NUMBER	REMARKS	NOMINAL AREA RATIO FOR ACTUATION	MAXIMUM INLET WITH 100 PSIG AIR PILOT	CV (MIN.)	PORT SIZES AND MAXIMUM PRESSURES, PSI		MATERIALS (LIQUID SECTION)
								P, C or B	T or A	
3-WAY	Closed	<p>Weight: 5-3/4 lbs.</p>	50135	<ul style="list-style-type: none"> Closed crossover Dual C porting 	150:1	10,000 psi	P to C .42	1/4" NPT 10,000	3/8" SAE Tube 3000	Plated Steel, Polyurethane, Buna N
			50135-1	<ul style="list-style-type: none"> Same as above and includes manual override 	150:1		C to T .64			
	Open	<p>Weight: 1 lb.</p>	53430-4	<ul style="list-style-type: none"> Open crossover Rated for plain water 	85:1	8500 psi	.3	1/4" NPT 15,000	1/4" NPT 3000	Stainless Steel, Buna N, PTFE
			53430-5		50:1	5000 psi	.6			
			53430-6		40:1	4000 psi	.8			
			53430-7		150:1	12,000 psi	.1			

AIR PILOT PORTS: 150 PSI MAXIMUM ALL MODELS	SIZE	MODELS
	1/8" NPT	54416, 53430, 53585, 28940, 53581 (C)
	1/4" NPT	50135, 53560, 53581 (D)

TYPE	NORMAL POSITION	SCHEMATIC WITH APPROXIMATE WEIGHT AND SIZE	MODEL NUMBER	REMARKS	NOMINAL AREA RATIO FOR ACTUATION	MAXIMUM INLET WITH 100 PSIG AIR PILOT	CV (MIN.)	PORT SIZES AND MAXIMUM PRESSURES, PSI		MATERIALS (LIQUID SECTION)
								P, C or B	T or A	
2-WAY	Closed	<p>RELEASE VALVES MODELS 28940 and 28940-1 Weight: 2-3/4 lbs. MODELS 53581 - Weight: 5 lbs.</p>	28940	<ul style="list-style-type: none"> 2-stage decompression and release Rated for plain water 	250:1 (1st stage) 9:1 (2nd stage)	15,000 psi	1st stage - .1 2nd stage - 1.50	1/2" NPT 15,000	1/2" NPT 10,000	Stainless Steel, Buna N, PTFE
		28940-1	<ul style="list-style-type: none"> 2-stage decompression and release 	150:1 (1st stage) 12:1 (2nd stage)	6000 psi	1st stage - .4 2nd stage - 5.5	1" NPT 6000	3/4" NPT 500	Plated Steel, Buna N, PTFE	
		53581								
		53585	<p>RELEASE VALVE MODEL 53585 Weight: 1 lb.</p>	<ul style="list-style-type: none"> Single-stage release Rated for plain water 	110:1	10,000 psi	.1	1/4" NPT 10,000		
		54416 54492-1	<p>RELEASE VALVE MODEL 54416 Weight: 1 lb.</p>	<ul style="list-style-type: none"> Rated for plain water 54492 is needle type allowing flow in either direction 	55:1	5000 psi	.6	1/4" NPT 15,000	1/4" NPT 3000	Stainless Steel, Aluminum, Buna N
	54416-1 54492				120:1	11,000 psi	.25			
	54416-2 54492-2				160:1	15,000 psi	.15			
	54416-3				90:1	7800 psi	.32			
	54416-4				300:1	25,000 psi	.08	1/4" super-pressure 25,000		
	Open		<p>RELEASE VALVE MODEL 57175 - Weight: 5 lbs.</p>	57175-30	<ul style="list-style-type: none"> Rated for plain water Needle type allows flow in either direction 	600:1	30,000 psi	.15	1/4" super-pressure 30,000	
		<p>RELEASE VALVE MODEL 57175 - Weight: 5 lbs.</p>	57175-60		1200:1	60,000 psi	.09	1/4" super-pressure 60,000		
		<p>RELEASE VALVE MODEL 53560 - Weight: 2 lbs.</p>	53560-12	<ul style="list-style-type: none"> Designed for mounting inside tank 	25:1	2500 psi	5.5	1/2" NPT 3000	5/8" Dia. Vent Hole ATM	Plated Steel, Aluminum, Buna N
			53560-150		160:1	15,000 psi	.85	1/4" NPT 15,000		

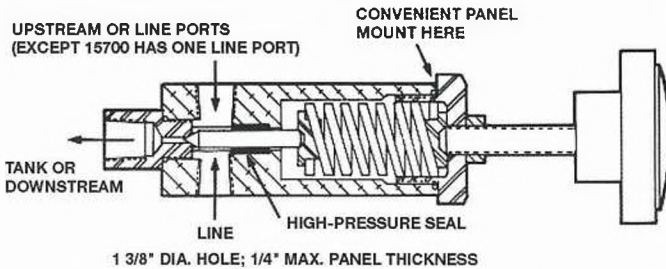
REGULATING RELIEF VALVES



These valves were originally developed in response to the need for accurate regulation of high pressure at low flow without the "chatter" often encountered with valves of this size. They are differential area poppet design with a high ratio between seal and seat area for smooth control, repeatability and low deadband between crack and reseal pressure.

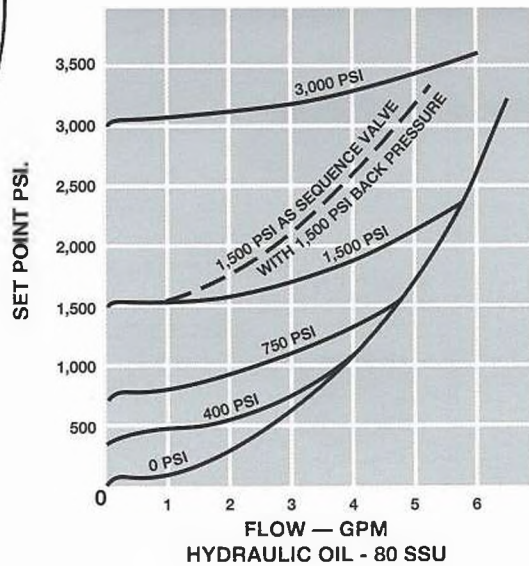
bubble tight, they do an excellent job holding high-pressure gas due to their precision poppet and hardened stainless steel seat with heavy silver plating.

Flow capacity is ultimately determined by the seat orifice and its CV rating as listed in the chart of models. The following curves show the typical effect of the .070" seat orifice as flow increases from the point at which the valve is set to relieve.



The configuration also makes the control settings virtually unaffected by downstream outlet pressure. This enables the valves to be also used for back pressure control (upstream pressure controller) or as a sequence (priority pressure) valve.

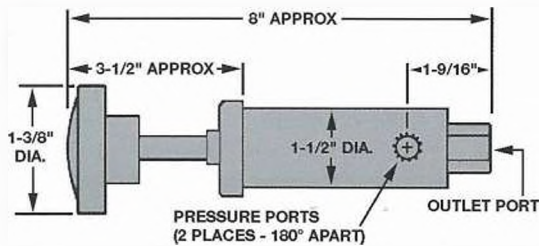
Materials of construction options seen in the chart of model numbers provide selections for most liquids including plain water plus most industrial gases including pure oxygen. Note that the nylon insert seat models are recommended for all gas applications below 10,000 psi. The 15700 series valves for service up to 60,000 psi are normally used as safety valves at these pressures. Although not rated as



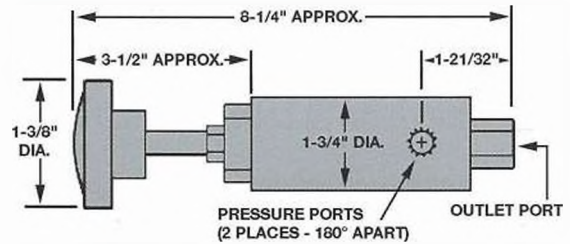
MODEL NUMBER	SERVICE	PRESSURE RANGE	PORTS		MATERIAL			ORIFICE DATA	
			PRESSURE	OUTLET	BODY	SEAT	SEAL	DIA.	CV
15570-1 15570-2 15570-3	Liquid Liquid Liquid	300 - 3000 psi 600 - 6000 psi 1000 - 10,000 psi	1/4" NPT 1/4" NPT 1/4" NPT	1/4" NPT 1/4" NPT 1/4" NPT	Alum. Alum. Steel	St. Steel St. Steel St. Steel	Buna-N Buna-N Buna-N	.070" .070" .070"	.12 .12 .12
15670-1 15670-2	Gas or Liq. Gas or Liq.	300 - 3000 psi 600 - 6000 psi	1/4" NPT 1/4" NPT	1/4" NPT 1/4" NPT	Alum. Alum.	Nylon Nylon	Buna-N Buna-N	.070" .070"	.12 .12
15900-1 15900-2	Gas or Liq. Gas or Liq.	30 - 300 psi 75 - 750 psi	1/4" NPT 1/4" NPT	1/4" NPT 1/4" NPT	Alum. Alum.	Nylon Nylon	Buna-N Buna-N	.156" .156"	.58 .58
15901-1 15901-2	Liquid Liquid	30 - 300 psi 75 - 750 psi	1/4" NPT 1/4" NPT	1/4" NPT 1/4" NPT	Alum. Alum.	St. Steel St. Steel	Buna-N Buna-N	.296" .296"	2.09 2.09
15960-1 15960-2	Liquid Liquid	300 - 3000 psi 150 - 1500 psi	3/8" NPT 3/8" NPT	3/8" NPT 3/8" NPT	Alum. Alum.	St. Steel St. Steel	Buna-N Buna-N	.187" .187"	.83 .83
15700-25 15700-26 15700-60	Liq./Gas ** Liq./Gas ** Liq./Gas **	2500 - 25,000 psi 2500 - 25,000 psi 10,000 - 60,000 psi	1/4" S.P.* 1/4" S.P.* 1/4" S.P.*	1/4" NPT 1/4" S.P.* 1/4" NPT	St. Steel St. Steel St. Steel	St. Steel St. Steel St. Steel	Buna-N Buna-N Buna-N	.070" .070" .070"	.12 .12 .12
27741-1 27741-2 27741-3 27741-4 27741-11 27741-12	Liquid Liquid Gas or Liq. Gas or Liq. Oxygen Oxygen	300 - 3000 psi 1000 - 10,000 psi 300 - 3000 psi 1000 - 10,000 psi 300 - 3000 psi 500 - 5000 psi	1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT	1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT 1/4" NPT	St. Steel St. Steel St. Steel St. Steel St. Steel St. Steel	St. Steel St. Steel Nylon Nylon Nylon Nylon	Viton/PTFE Viton/PTFE EPR/PTFE EPR/PTFE Viton/PTFE Viton/PTFE	.070" .070" .070" .070" .070" .070"	.12 .12 .12 .12 .12 .12

* Superpressure ** Not bubble-tight on gas service

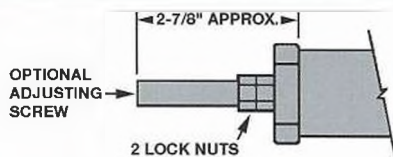
MODELS 15570, 15670, 15900, 15901 & 27741



MODEL 15960



TO ORDER WITH ADJUSTING SCREW (NO KNOB)



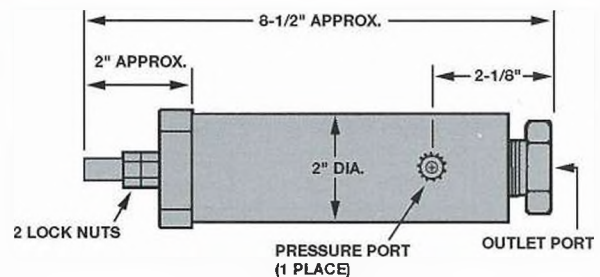
FOR MODELS

15570-1, 2, 3
15670-2, 2
27741-1, 2, 3, 4, 11, 12

ORDER

27560-XX
28440-XX
28580-XX

MODEL 15700



HYDRAULIC ACCUMULATORS AND GAS RECEIVERS



HYDRAULIC ACCUMULATORS

Hydraulic Accumulators for use with Haskel high-pressure hydraulic pumps. Will store large amounts of energy. Suitable for mineral base oils and DC-200 silicon oil. Suitable seals can be furnished on special order for phosphate-ester base liquids.

Each accumulator is proof tested to twice its maximum working pressure. To increase oil storage capacity, Haskel gas receivers can be connected to gas end of accumulators. Always precharge with nitrogen (not air).

Materials: Heat treated chromoly steel; barrel painted on outside, unplated inside; ends nickel plated; pistons are high-strength aluminum; seals are Buna-N with PTFE backups.

GAS RECEIVERS

Gas Receivers are designed for use with Haskel gas booster compressors and as backup gas storage for Haskel accumulators. Suitable for non-corrosive gases (helium, argon, nitrogen, etc.). Oxygen service on special order only, 5000 psi maximum. Not rated for hydrogen.

Each receiver is proof tested hydrostatically to twice its working pressure and tested for gas leakage at maximum working pressure. (This proof test exceeds both ASME and D.O.T.-3AA requirements.)

Since high-pressure gas storage vessels are critical and particularly susceptible to inside flaws, each barrel is carefully honed inside to remove all inclusions and flaws after magnetic inspection.

Materials: Heat treated chromoly steel; nickel plated inside and outside. Seals are Buna-N with PTFE backups.

NOTE: SINCE THESE ACCUMULATORS AND RECEIVERS ARE LESS THAN 6" O.D., ARE NOT WELDED AND DO NOT EXCEED 1/2 CU. FT. DISPLACEMENT, THEY DO NOT REQUIRE ASME CERTIFICATION.

MAXIMUM WORKING PRESSURE (PSI)	ACCUMULATORS			RECEIVERS			OUTSIDE DIAMETER	LENGTH	SUPER-PRESSURE PORT SIZE*
	MODEL NUMBER	OIL VOLUME	APPROX. WEIGHT	MODEL NUMBER	ACTUAL DISPLACEMENT	APPROX. WEIGHT			
10,000	15801-1	366 cu. in.	163 lbs.	15542-1	443 cu. in.	154 lbs.	5-3/4"	39"	9/16"
	15801-2	820 cu. in.	270 lbs.	15542-2	897 cu. in.	261 lbs.		71"	
	15806-1	185 cu. in.	57 lbs.	15706-1	210 cu. in.	54 lbs.	3-3/4"	36"	3/8"
	15811-1	16 cu. in.	11 lbs.	15711-1	21 cu. in.	10 lbs.	2-3/8"	13-1/8"	
	15811-2	31 cu. in.	14 lbs.	15711-2	36 cu. in.	13 lbs.		19-7/8"	
	15711-3	66 cu. in.	22 lbs.	15711-3	66 cu. in.	22 lbs.		32-1/4"	
20,000	15802-2	841 cu. in.	449 lbs.	15545-2	890 cu. in.	444 lbs.	5-3/4"	94"	9/16"
	15807-1	122 cu. in.	82 lbs.	15707-1	134 cu. in.	81 lbs.	3-3/4"	39"	3/8"
	15812-1	16 cu. in.	13 lbs.	15712-1	20 cu. in.	13 lbs.	2-3/8"	14-3/4"	1/4"
	15812-2	31 cu. in.	20 lbs.	15712-2	35 cu. in.	19 lbs.		23-1/4"	
	15712-3	65 cu. in.	32 lbs.	15712-3	65 cu. in.	32 lbs.		40-1/4"	

* Available with pipe thread - special order

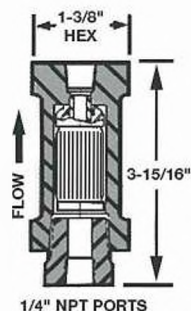
Particle filters — 5 micron nominal

These units are designed as the final protection with gas boosters handling purified gases, or liquid pumps handling pre-filtered clean liquids. The elements do not have sufficient area to be practical for more than occasional particle migration due to pump wear or improperly cleaned piping or containers. They have proven to be good insurance particularly on high-pressure gas systems.

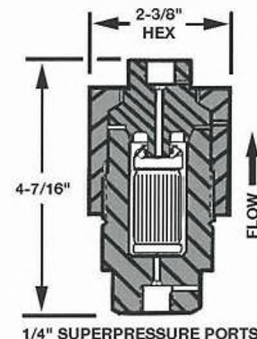
- Filtration: 5 micron nominal
- All stainless steel barstock
- Pressure drop:
 - 25 psi @ 3 gpm MIL-H-5606 oil across paper element.
 - 10 psi @ 100 scfm gas at 3000 psi across stainless steel element



28728 SERIES



28700 SERIES

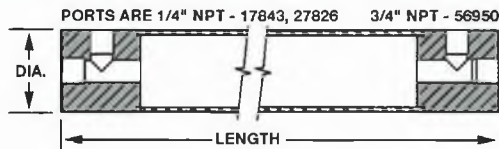


MODEL NUMBER	SERVICE	MAXIMUM RATED OPERATING PRESSURE	ELEMENT
28700-1	Gas/Liquid	30,000 psi	St. Steel
28728-1	Gas	6000 psi	St. Steel
	Liquid	8000 psi	
28728-2	Liquid	8000 psi	Paper
28728-10	Oxygen	5000 psi	St. Steel

PLENUM CHAMBERS



SMALL TUBULAR ALL AISI 300 SERIES STAINLESS STEEL
Used in air amplifier and gas booster assemblies to dampen pulsation between stages.



MODEL NUMBER	VOLUME	WORKING PRESSURE	PROOF PRESSURE	LENGTH	DIAMETER	WEIGHT
17843	25 cu. in.	1400 psi	2800 psi	20"	1-1/2"	4 lbs.
27826	20 cu. in.	5000 psi	10,000 psi	23"	1-1/2"	7 lbs.
56950	100 cu. in.	1250 psi	2500 psi	24"	2-3/4"	12 lbs.

6000 PSI GAS STORAGE CYLINDER

- Manufactured and certified to DOT-E-9909-6000 specifications for 6000 psi gas at 70°F
- Actual volume: 2640 ACI (1.53 ACF).
- Capacities @ 6000 psi:
 - Air-509 SCF. N₂-494 SCF
 - AR-581 SCF. He-525 SCF
- One-piece forged and heat-treated alloy steel construction
- Primed and orange-yellow painted exterior with stainless steel port adapter
- Nominal dimensions: 9.28" O.D. x 52" high



MODEL	PORT	WEIGHT
13687-9-20SS	3/8" MS16142-6	189 lbs.
13687-9-80SS	3/8" Superpressure	
13687-9	3/4" NPT	

Packaged Systems



POWER-PAC 200 SERIES

AIR-DRIVEN HYDRAULIC POWER UNITS

Haskel's 200 series air-driven power-pac is a small, lightweight, easily installed hydraulic power unit which is ideal for high static pressure applications.

Units can be supplied with an optional protective frame for ease of portability or without for static applications.

KEY FEATURES

- The unit is designed to stall at any predetermined pressure and generate no heat while stalled, holding static high pressure. This allows the power-pac to be supplied with a small fluid tank in comparison to electric-drive systems.
- Under stall conditions, the pump consumes no energy.

These two factors reduce the weight, footprint, and amount of oil needed for duty. Operating costs are also substantially reduced by these design features, as well as having a positive environmental impact by reduction in oil and energy waste.

Standard Haskel power units come complete with air filter/regulator, air gauge, and manual on/off valve. The high-pressure outlet circuit is complete with pressure gauge and manual pressure release valve, which can also be offered as actuated valves with electro-pneumatic control.



MOBILE HYDROSTATIC TEST SYSTEM

MODEL J24352

Haskel Hydrostatic Pressure Test Systems are suitable for use with water to generate a maximum outlet test pressure of 22,500 psi.

Pressure is generated by means of three pumps operating in sequence: first pump works as a pre-fill to generate an outlet pressure of 750 psi; once that pressure is achieved, the second pump will operate. This pump will pressurize the test piece up to 3,600 psi, at which the third pump will generate pressures up to 22,500 psi.

Time to pressurize an 820 litre volume to 10,000 psi takes approximately 53 minutes. This is based on an air drive pressure of 80 psi at a flow rate of 180 scfm.

The test system includes locations for two chart recorders (not supplied). These can be used to record pressures generated by the system or from an external test piece through a 1/4" HP fitting found at the rear of the system.

KEY FEATURES

- 3 Haskel air-driven liquid pumps: First stage pre-fill pump model ASFD-10, second stage pump model GSF-60 and final stage high pressure pump model 8HSFD-225
- Common air-drive inlet filter with individual air drive pressure regulator
 - Regulated air pressure gauge
 - Speed control on/off valve to each pump
- Water inlet with shut off valve and suction strainer
- Air pilot switches to automatically start second and final stage pumps as system pressure is developed
- Protection for lower pressure pumps by means of check valves and pressure relief valves
- Outlet pressure gauge
 - Pressure relief valve
- Outlet isolation valve
- Mimic panel



- Downstream of outlet isolation valve connections for customer to fit own supply 12" single pen circular chart recorders (model 53011)
 - One 0-2,000 psi with isolating valve and pressure relief valve protection the other 0-30,000 psi
 - Pressure transducer with digital readout, analogue pressure gauge and manual pressure release valve in outlet

CONNECTIONS

Air inlet	3/4" BSP (F)
Liquid Inlet	1" BSP (F)
Outlet Connection	9/16 HP (F)
External inlet (high pressure)	1/4" HP (F)
Drain connection point	1/2" NPT (F)

STANDARD
GAS BOOSTER
SYSTEMS



WHY CHOOSE HASKEL

Comprehensive systems for demanding high-pressure gas transfer and pressurization solutions.

From selection and design to manufacturing and installation, standard packages provide precision and performance for gas transfer, charging and storage applications.

Reliability

Haskel gas boosters are designed with the highest quality for longevity and easy maintenance. Haskel gas boosters use patented seal systems to give a long working life, providing the capability of transferring and pressurising a wide variety of gases.

Regular servicing by Haskel authorized service and repair centers extends the life of your equipment for continued optimum performance and can be carried out alongside planned maintenance programs.

Extensive Range

Haskel offers single acting, double acting and two stage models to cover a wide range of operating conditions up to pressures of 20,000 PSI (1379 Bar).

GAS BOOSTER SYSTEM FEATURES

- Pressurize gas from industrial gas bottles (up to 20,000 psi)
- Plumbed for inert gases in single arrangements
- Available in single-stage or two stage styles; selection is made on the grounds of gas pressure and flow requirements
- Supplied with a range of controls: air controls, air pilot switches (optional) for automated stop/start control, relief device, pressure isolation and vent valves
- All components are mounted and plumbed in an open stainless steel frame with a sloped front control panel
- Safety relief devices are standard on all gas booster systems for maximum operational safety
- Allows 90 to 95% use of cylinder gas to maintain process pressure when cylinder pressure drops
- Oxygen Cleaned units available
- Can charge a receiver to even higher-pressure level, thus storing a volume of gas for rapid release



APPLICATIONS

Gas accumulator charging

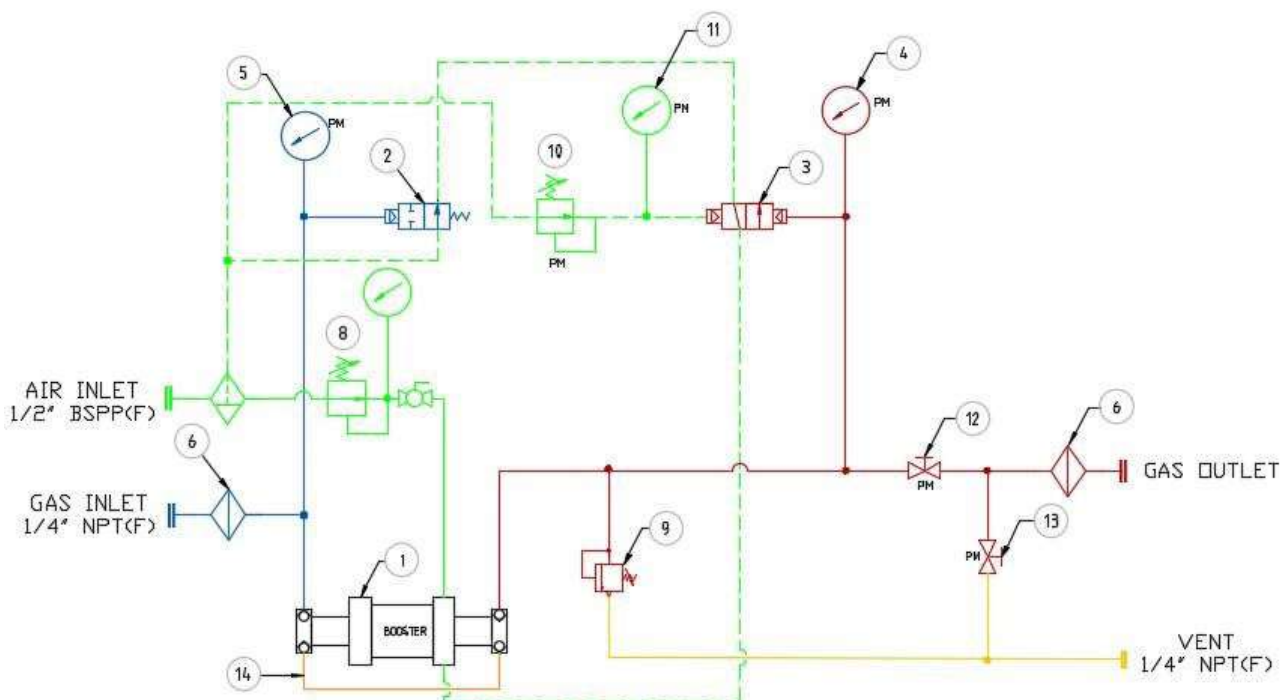
Pressure & leak testing various pressure containing components

Pressurization of gas cylinders

Gas transfer, boosting or mixing

SCOPE OF SUPPLY

1. Air driven gas booster with external pilot air modification to enable use of external air pilot switches to automatically start and stop the booster.
2. Adjustable inlet air pilot switch used to stop booster when the gas supply pressure falls below the adjusted minimum set point (optional).
3. Adjustable remote-set outlet air pilot switch used to stop booster when the outlet pressure reaches the adjusted maximum set point (optional).
4. Outlet pressure gauge, safe case design, 100mm diameter, panel mounted with bar/psi dual scale. Accuracy +/- 1% FSD.
5. Inlet pressure gauge, safe case design, 100mm diameter, panel mounted with bar/psi dual scale. Accuracy +/- 1% FSD.
6. Gas filter, 5 micron rated, used to stop any ingested contamination from entering the booster (e.g. while changing out gas supply bottles).
7. Roll bar frame with sloping operator panel into which the booster and controls are mounted. Frames are a brushed 316 stainless steel.
8. Combined air inlet filter regulator, with integral pressure gauge and on/off control valve. Air filter – in line with 40-micron filtration to maintain air drive quality. Adjustable air regulator used to set the air drive pressure, adjustable between 0 – 150 PSI. 25mm air gauge indicated the regulated air pressure setting. Manual on/off valve and speed control valve, panel mounted, used to adjust the cycling speed at which the booster operates.
9. Adjustable Haskel relief valve used to protect the booster and other components from over pressurization, piped to a common vent connection.
10. Adjustable remote-set air pilot regulator used to change the set point for the remote set outlet air pilot switch (optional).
11. 25mm air gauge, panel mounted, used to indicate the adjustable remote set regulator adjusted pressure.
12. Manually operated BuTech outlet isolation valve, panel mounted, piped to a common vent connection.
13. Manually operated BuTech outlet pressure vent valve, panel mounted, piped to a common vent connection.
14. Interstage cooler. A Haskel design integral tube and shell cooler used to reduce the boosted gas temperature.



⑦ ROLL BAR FRAME & PANEL

HIPPO HOSE TEST RIG

PRESSURE TEST UNIT

The Haskel Hippo Hose Test Rig is a self-contained air driven test system. Initially designed for testing hydraulic hoses, the rig is ideal for testing a range of components — from pipe assemblies flow meters. Each unit comes complete with air-driven pressure generation, a control circuit, and a robust test chamber with an interlocked test well door.

SYSTEM FEATURES

- Test pressure range up to 2,000 bar
- Flow-rate up to 5 litres/min
- Test fluids hydraulic oil, inhibited water, or plain tap water; can be catered for special fluids such as Skydrol
- Manifold connections 1/2" BSP female
- Standard dimensions 160 cm x 60 cm x 130 cm high; special sizes on request
- Test well 120 cm x 60 cm x 70 cm high
- Approx. gross weight 200 KGs
- Air drive required 0.75 Nm³/min at 6 bar
- Electrics 240 volts 50 Hz single phase

Other features vary by model. Contact us to talk through your specific needs.

EQUIPMENT OPTIONS

- Fully PLC/ pneumatically controlled pneumatic rig
- Single outlet port
- Fixed and sliding 3 port manifolds
- Various outlet pressure ranges
- Interior light



MODEL SELECTION CHART

BASED ON 6 BARG AIR DRIVE AVAILABLE **

PUMP MODEL	PRESS RANGE** Barg	FLOW	FLUID SERVICE	MODEL ORDERING CODE	CONFIGURATION
AW-35	10—200	5	OIL	J23376-AW-35	SINGLE OUTLET FOR OIL SERVICE, MILD STEEL PAINTED TEST CHAMBER WITH STAINLESS STEEL BASE PLATE
AW-60	20—400	3	OIL	J23376-AW-60	
AW-150	40—1,000	1	OIL	J23376-AW-150	
HF-300	80—2,000	0.5	OIL	J23376-HF-300	
ASF-35	10—200	5	WATER	J24242 ASF-35	3 PORT FIXED AND SLIDING MANIFOLDS STAINLES STEEL TEST WELL
ASF-60	20—400	3	WATER	J24242 ASF-60	
ASF-150	40—1,000	1	WATER	J24242 ASF-150	
HSF-300	80—2,000	0.5	WATER	J24242 HSF-300	

FLUSH AND TEST RIGS

Haskel manufactures high-pressure flushing and pressure testing equipment for subsea and other systems used in non-contaminating applications where cleanliness and integrity are of paramount importance. The equipment is designed to operate with high flows and pressures using transaqua-type fluids.

Flushing and pressure test systems are housed in free-standing painted steel enclosures with removable panels for maintenance access. Equipment for manual component flushing and pressure testing is contained in the enclosure. Components should be flushed and pressure tested external to the rig.



KEY FEATURES

- Low- and high-flow high-pressure flushing circuit with maximum test pressures of 10,000 psi (700 bar)
- Pump(s) supplied from the main reservoir via a filter and isolation valve
- Outlet(s) have a pressure gauge, pressure switch, and relief valve protecting the line. Fluid passes through a pressure filter and a bypass valve and outlet isolation valve (PLC controlled optional) are fitted prior to the two flushing outlets.
- Flushing return line(s) back to main reservoir
- Stainless steel main reservoir is fitted with fluid level and temperature gauges, a drain valve, breather, low-level switch, a level sensor, and a temperature probe.
- Offline filtration system with recirculating pump and coolers for servicing of reservoir fluid.

SERVICES REQUIRED

- Compressed air supply 80 psi
- Electrical supply 415V 3 Phase & Neutral 50Hz

VALVE TEST BENCHES

SAFE, PROVEN, AND RELIABLE VALVE TESTING SOLUTIONS

Haskel offers a complete range of valve test benches that utilize a patented Valve Clamping Bench (VCB) coupled to a Pressure Generating Module (PGM) for superior operation.

PRODUCT DESCRIPTION

The greatest cost associated with valve inspection, testing, and repair is the time consumed with test system setup and breakdown.

The Haskel Valve Test Bench, operated by one person, can secure the valve, pressure test both seating surfaces, test the bonnet and the stem packing, and release the valve within two to five minutes.

Experience has shown that one operator on a Haskel Valve Test Bench can test valves up to ten times faster than conventional testing methods. In some cases, it is equal to installations using as many as eleven test shop personnel and six work stations.

The compact design of Haskel Valve Test Benches occupies a work area of less than 16 sq. ft. (1.5 sq. meters), minimizing costly floor space while maximizing the efficient flow of valves through the bench. The hydraulic actuation of clamping arms secures the valve on the uniquely designed Table of Pressure seals immediately after the valve has been placed on the bench.

Haskel Valve Test Benches are designed to save time and money, without compromising safety.



APPLICATIONS

- Shut-Off Valve Testing
- Relief Valve Testing
- Swing Check Valve Testing

PORTABLE HYDROSTATIC PRESSURE TEST SYSTEMS

OPEN FRAME DESIGN

Haskel's Portable Hydrostatic Pressure Test Systems offer the advantages of Haskel air-driven liquid pumps and are assembled into robust, lightweight, and portable packages. These systems are ideal for providing hydrostatic pressure for a wide range of pressure testing applications. Our test rigs are designed for easy onsite pressure testing—both in onshore and offshore uses.

From 1/3rd HP up to 10 HP with pressure capabilities up to 7,000 bar, these self-contained units are powered by compressed air and designed for use with a wide range of fluids; however, units for use on water, oil, or soluble oil/water are common.

KEY FEATURES

Each Portable Pressure Test System is supplied with the following:

- Haskel air-driven liquid pump
- Air controls, including air filter, air pressure regulator, air gauge on/off speed control valve, and air exhaust silencer
- Fluid inlet connection located at skid edge*
- Fluid inlet suction strainer
- Outlet pressure gauge, glycerine filled with stainless steel case
- Pressure release valve
- Fluid outlet connection located at edge of frame
- Mounted within a robust stainless portable frame
- All suitably piped and pressure tested

**Many units are available with fluid reservoir c/w sight glass and filler/breather.*



SYSTEM BENEFITS

Haskel portable pressure test systems offer many advantages over conventional electrical driven power units:

- Ability to stall at any predetermined pressure and hold this fixed pressure without consuming power or generating heat
- No heat, flame, or risk of spark
- Infinitely variable cycling speed (flow rate)
- No limit or adverse effect to continuous stop/start applications

MODELS

TEST PAC 33

- 1/3rd HP output with test pressures up to 1,000 bar with oil, 700 bar with water
- Typical flow rate up to 6 litre/min for low pressure units down to 0.2 litres/min for 1,000 bar unit
- Supplied with 4 litre polyethylene tank
- Removable hand pump can be used with this system when compressed air is not available. It also allows for finer control for calibration work.

PORTABLE M POWERPAC

- 1/3rd HP output using the range of pumps in the Test Pac 33
- Configured as a stainless steel carry case with integral stainless steel reservoir, ideal for onsite testing and calibration
- Hand pump option is available for this model

OFFSHORE TEST PAC 200

- 1.5 HP output with pressure capability up to 2,000 bar on both oil and water service
- Mounted within a stainless steel frame with horizontal control panel and 10 litre stainless steel reservoir as standard
- 14 models to choose from

TEST PAC 200

- 1.5 to 2 HP output with pressure capability up to 3,000 bar on both oil and water service
- Mounted within a mild steel painted frame with vertical control panel and 5 litre polypropylene reservoir as standard
- 18 models to choose from

OFFSHORE TEST PAC 300

- 3 HP output with pressure capability up to 1,400 bar on both oil and water service
- Mounted within a stainless steel frame with horizontal control panel and as standard
- 8 models to choose from

TEST PAC 600-SS

- 6 HP output with pressure capability up to 700 bar on both oil and water service
- Mounted within a stainless steel mobile frame with horizontal control panel, with or without 20 litre reservoir as standard
- 6 models to choose from

TEST PAC 1000

- 10 HP output with pressure capability up to 2,000 bar on both oil and water service.
- Mounted within a mild steel base frame with vertical control panel as standard
- 4 models to choose from

DUAL PUMP SYSTEMS

Available with any of the full Haskel range of pumps. Options available for:

- Standby pumping systems
- Low-pressure, high-flow prefill and high-pressure, low-flow test
- With or without fluid storage
- Mobile on fixed skids

Freon, CFC & HCFC Transfer Units

Safe, reliable and energy saving transfer of gases and liquids, including mixtures of both.

One of the major advantages of the Haskel pump is its ability to handle liquids or gases or a mixture of liquid and gas without causing damage to the pump.

In many applications the pumps are able to change the state of the product (condense the gas to liquid) without the need for specialist condensers.

The pumps and transfer systems are compact, lightweight and portable, and are ideal for use on site for reclaiming product from process units or recharging the process units

Powered by compressed gas from a compressor or gas cylinder they are suitable for operation in any location.

Fluids Handled

SF6	R11	R23	R500
Pentane	R12	R114R	R152
Butane	R22	134a	NH ₃

Description

Each unit comprises a mild steel painted frame in which is mounted the following equipment:

- Haskel air driven liquefied gas pump
- Air inlet to air drive controls comprising,
 - Air drive filter
 - Air drive pressure regulator
 - Air pressure gauge
 - On/off speed control valve.
- Inlet hose with gas bulkhead connection & isolation ball valve
- Inlet pressure gauge
- Outlet pressure gauge
- Outlet relief valve
- Outlet hose with gas bulkhead connection & isolation ball valve

All suitably piped & tested for liquid or gas service.



Features

Haskel air driven pumps offer many advantages over electrical driven pumps or compressors on liquefied gas service.

- Ability to pump liquid, gas or a mixture of both without adverse effect on the pump.
- No heat, flame or risk of spark
- Infinitely variable cycling speed (flow rate)
- No limit or adverse effect to continuous stop/start applications
- Liquid/gas seals are self-lubricated requiring no external lubricator
- Reliable, easy to maintain, compact and robust
- Lightweight lends itself for site applications, reclaiming and charging product.

PRODUCT DESCRIPTION

The Haskel 200 series Power-Pac is a robust self-contained unit, complete with the following:

- Haskel air-driven liquid pump (see table below for model options)
- Air controls, including air filter, air pressure regulator, air pressure gauge, on/off speed control valve, and air exhaust silencer
- 12 litre aluminium reservoir, complete with:
 - Sight glass
 - Filler/breather
 - Fluid inlet suction strainer
- 6" outlet dial pressure gauge, glycerine filled with stainless steel case
- Outlet pressure release valve returning fluid to tank
- Fluid outlet connection located near edge of frame
- Suitably piped for oil service
- All mounted on the tank lid and, if required, within a painted steel portable frame for protection (see options in table)
- Approximate dimensions: 39cms x 33cms x 58cms high
- Approximate gross weight: 25 kgs

MODEL SELECTION CHART

BASED ON 7 BARG AIR DRIVE AVAILABLE**

PUMP MODEL	PRESS RANGE** Barg	TYPICAL FLOW CAPACITY Litres/min	MODEL CODE INCLUDING FRAME (Overleaf)	MODEL CODE WITHOUT FRAME (Above)
AW-B10	25-80	Up to 16	J24812-AW-B10	J24812-1-AW-B10
AW-B15	35-120	10	J24812-AW-B15	J24812-1-AW-B15
AW-B25	50-190	6.5	J24812-AW-B25	J24812-1-AW-B25
AW-B35	70-280	5	J24812-AW-B35	J24812-1-AW-B35
AW-B60	120-480	3	J24812-AW-B60	J24812-1-AW-B60
AW-B100	150—700	1.7	J24812-AW-B100	J24812-1-AW-B100
AW-B150	200—1,000	1	J24812-AW-B150	J24812-1-AW-B150
HF-B225	250 - 1,400	0.8	J24812-HF-B225	J24812-1-HF-B225
HF-B300	300—2,000	0.55	J24812-HF-B300	J24812-1-HF-B300

Standard Gas Booster Systems



Pressurize gas from industrial gas bottles (up to 20,000 psi)

Plumbed for inert gases in single arrangements

Available in single-stage or two stage styles; selection is made on the grounds of gas pressure and flow requirements

Supplied with a range of controls: air controls, air pilot switches (optional) for automated stop/start control, relief device, pressure isolation and vent valves

All components are mounted and plumbed in an open stainless steel frame with a sloped front control panel

Safety relief devices are standard on all gas booster systems for maximum operational safety

Allows 90 to 95% use of cylinder gas to maintain process pressure when cylinder pressure drops

Oxygen Cleaned units available

Can charge a receiver to even higher-pressure level, thus storing a volume of gas for rapid release

Haskel Air-Driven Oxygen Booster MODEL 26968



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 chest High-pressure tubing & fittings: Stainless steel, 5,000 psi maximum oxygen working pressure

High-pressure oxygen chambers: Non-lube hydrocarbon-free, triple sealed and vented from the drive air chest High-pressure tubing & fittings: Stainless steel, 5,000 psi maximum oxygen working pressure

Particle filters: Inlet and outlet gas: 5 microns. All stainless steel

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

Port sizes: Inlet and outlet gas: " _ NPT female; Air Drive; _ 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

Portable Nitrogen Charging Unit

Each charging unit comprises a waterproof, robust, injection moulded case mounted:

Haskel Air driven oxygen gas booster featuring:

- Air inlet to air drive controls
- Air drive filter
- Air drive pressure regulator
- Air pressure gauge
- On/off speed control valve
- Inlet gas bulkhead connection
- Inlet 5 micron gas filter
- Inlet pressure gauge (gas safety pattern)
- Outlet pressure gauge (gas safety pattern)
- Outlet relief valve
- Outlet isolation valve
- Outlet gas bulkhead



GAS BOOSTER MODEL USED	NOMINAL MAX PRESSURE based on 100 psi/ 7.0 bar air drive	NOMINAL FLOW CAPACITY based on 500 psi gas supply	MODEL ORDERING CODE
AG-15	100Bar (1,500 psi)	150NI/min (5 scfm)	J24272-AG-15
AG-30	200 Bar (3,000 psi)	110 NI/min (4 scfm)	J24272-AG-30
AG-75	350 Bar (5,000 psi)	50 NI/min (2 scfm)	J24272-AG-75
AG-75	500 Bar (7250 psi)	50 NI/min (2 scfm)	J24272-AG-75-H

Helium Gas Compressor System

Haskel's Helium Gas Compressor Systems begin with a Haskel gas compressor. These compressors are designed with the highest quality for longevity and easy maintenance. Haskel gas compressors use patented seal systems to give a long working life, providing the capability of transferring and pressurizing a wide variety of gases, including helium. Other features include:

- Mounted within stainless steel robust roll bar frame
- Includes a stainless steel control panel
- Panel is finished with color-coded engraved mimic diagram for ease of operation
- Gas safety pressure gauges, pressure controls, and isolation valves come mounted on panel
- Easy installation—Gas cooling comes from the air exhaust within the drive section
- Ideal for onsite pressure testing and gas transfer & pressurization
- Portable design



MODEL	J23625	J23284	J24296
Max Gas Supply Pressure	2,900 psi (200 bar)	2,900 psi (200 bar)	2,900 psi (200 bar)
Min Gas Supply Pressure	145 psi (10 bar)	290 psi (20 bar)	435 psi (30 bar)
Max Gas Outlet Pressure	5,000 psi (345 bar)	8,700 psi (600 bar)	14,500 psi (1,000 bar)
Max Air Pressure	130 psi (9 bar)	130 psi (9 bar)	130 psi (9 bar)
Inlet Air Connection	3/4" BSP Female	3/4" BSP Female	3/4" BSP Female
Inlet Gas Connection	1/2" NPT Female	1/2" NPT Female	1/2" NPT Female
Outlet Gas connection	1/4" NPT Female	1/4" NPT Female	3/8"HP Female

Nitrogen Compressor System Model J24366



The system will compress nitrogen gas from a boil-off supply (100 to 145 psig) to give a final outlet working pressure as high as 15,000 psi. At 11,000 psi, the outlet flow-rate is 40 scfm based on an air drive pressure of 90 psig and volume up to 140 scfm. At 15,000 psi, the outlet flow rate reduces to 28 scfm with 90 psig air drive.

High-pressure nitrogen from a Haskel Nitrogen Booster Compressor simultaneously feeds the test outlet via a bypass circuit and pre-charges the Haskel air-driven booster circuit. When the outlet pressure reaches 4,800 psi, Haskel's AGD-152 gas boosters are switched on automatically and the pressure increases up to the final test pressure controlled by the outlet air pilot switch setting.

Oxygen Compression Systems



Haskel oxygen compression systems are efficient, safe and economical systems for oxygen filling and handling. Turnkey oxygen cleaned compression systems, such as the Model 26868 oxygen booster system for transfer of oxygen into various high-pressure receivers.

Oxygen cleaned equipment is certified to Mil Spec 1330D, the standard practice for precision cleaning and testing of shipboard oxygen, nitrogen, helium-oxygen, helium, and hydrogen systems as established by the U.S. Department of Defense for the Navy.

Portable Oxygen Charger Units

Product Description

Each charging unit includes a waterproof, robust, injection moulded case mounted with the following equipment:

- Haskel air-driven oxygen gas booster, featuring:
 - Air inlet to air drive controls
 - Air drive filter
 - Air drive pressure regulator
 - Air pressure gauge
 - On/off speed control valve
- Inlet oxygen gas bulkhead with plug to prevent dirt ingress
- Inlet 10 micron gas filter
- Inlet pressure gauge (gas safety pattern)
- Outlet pressure gauge (gas safety pattern)
- Outlet relief valve
- Outlet isolation valve
- Outlet vent valve
- Outlet oxygen gas bulkhead with plug to prevent dirt ingress
- All suitably piped, cleaned, and tested for oxygen gas service



Gas Booster Model Used	Nominal Max Pressure based on 100 psi air drive	Nominal Flow Capacity based on 500 psi gas supply	Model Ordering Code
Oxygen Gas Boosters Models Available			
28598-AG-15	100 bar (1,500 psi)	150NI/min (5 scfm)	J24273-AG-15
17445-AG-30	200 bar (3,000 psi)	110 NI/min (4 scfm)	J24273-AG-30
81569-AG-75	350 bar (5,000 psi)	50 NI/min (2 scfm)	J24273-AG-75

Hippo Hose Test Rig

Product Description

- Fully PLC/ pneumatically controlled pneumatic rig
- Single outlet port
- Fixed and sliding 3 port manifolds
- Various outlet pressure ranges
- Interior light



PUMP MODEL	PRESS RANGE** Barg	FLOW	FLUID SERVICE	MODEL ORDERING CODE	CONFIGURATION
AW-35	10—200	5	OIL	J23376-AW-35	SINGLE OUTLET FOR OIL SERVICE, MILD STEEL PAINTED TEST CHAMBER WITH STAINLESS STEEL BASE PLATE
AW-60	20—400	3	OIL	J23376-AW-60	
AW-150	40—1,000	1	OIL	J23376-AW-150	
HF-300	80—2,000	0.5	OIL	J23376-HF-300	
ASF-35	10—200	5	WATER	J24242 ASF-35	3 PORT FIXED AND SLIDING MANIFOLDS STAINLES STEEL TEST WELL
ASF-60	20—400	3	WATER	J24242 ASF-60	
ASF-150	40—1,000	1	WATER	J24242 ASF-150	
HSF-300	80—2,000	0.5	WATER	J24242 HSF-300	

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