



Roots

22 URAI

Part Number - 65102020



- Detachable steel mounting feet
- Rigid one-piece cast iron casing
- Connections in standard pipe sizes
- Straight, precision machined two-lobe impellers
- Splash oil lubricated gears
- Carburized and ground alloy steel spur timing gears
- Anti-Friction gears
- Ground steel shafts
- Center Timed for rotation in either direction

Also Available in:

- URAI-Metric

Equivalent to:

Sutorbilt Model 2MP

Tuthill Model 2002



816-741-0282



Quick Specs

Flow Range	to 71 CFM
Max ΔPressure	12 PSI
Max ΔVacuum	15" Hg
Maximum RPM	5275
Minimum RPM	1530
Max ΔT	225°F
Connection Size	1" FPT
Shaft Dia.	0.625"
Min Sheave Dia.	4"
Drive End Lubrication	Grease
Gear End Lubrication	Oil
Oil Sump Gear End Horiz Config	~6.1 oz
Oil Sump Gear End Vert Config	~3.4 oz
Bare Unit Weight	32 lbs
Shipping Weight	36 lbs
Shipping Container	Box
Box Size (L x W x H)	17" x 16" x 12"
Can Ship via	UPS Insured

Universal RAI Series Blowers Parts List 2-1/2" – 5" Gear Diameter

(Refer to drawing #64720023)

Item #	Part Name	Qty.
1	Headplate Gear End	1
2	Headplate Drive End	1
3	Gearbox	1
4	Timing Gears	2
5	Cover-Blind (Plug Opening)	1
7	Gasket, Gear Box	1
11	Cylinder	1
12	Impeller & Shaft Drive	1
13	Impeller & Shaft Driven	1
14	Bearing, Ball	3
15	Bearing, Roller	1
16	Pin, Dowel	4
17	Gear Nut	2
19	Key	1
21	Plug, Pipe	3
23	Screw Hex	6
25	Breather (Plug Vent)	1
26	Screw, Hex	*
27	Seal, Lip Bearing	4
31	Screw, Hex, Nylock	4
32	Screw, Hex	6
33	Seal Lip-Drive	1
34	Clamp Plate	2
35	Foot	2
37	Fitting, Grease	2
38	Fitting, Relief	2
39	Washer Mounting	4
40	Screw Socket	2
42	Screw Hex	2

*Quantities vary by blower.

Table 2 - Recommended Oil Grades

Ambient* Temperature °F (°C)	ISO Viscosity No.
Above 90° (32°)	320
32° to 90° (0° to 32°)	220
0° to 32° (-18° to 0°)	150
Below 0° (-18°)	100

*Ambient temperature is defined as the temperature of the space in which the blower and drive are located.

Due to sludge build-up and seal leakage problems, Roots recommendation is DO NOT USE Mobil SHC synthetic oils in ROOTS blowers.

- When servicing drive end bearings of a AIR (Non Gas) blower, use the specified and recommended Shell Darina SD 2 NLGI #2 product code 5067628.
- Lithium based greases are not compatible with the specified and recommended Shell Darina SD 2 grease used when assembling the blower. **Lithium based grease is not approved for any ROOTS blowers.**

Repair Kits

Repair kits are bundled with the parts you need to complete a standard repair. It is more cost effective to buy a repair kit than to purchase individual parts. However, if you need parts not listed in the kit, it is recommended that you call Pathfinder Systems for parts pricing.

P/N 651020RK Kit without Gears for 22, 24 URAI and URAI Metric

Item	Qty	2" Kit Description	P/N
5	1	PLUG,OPENING FOR 1.575	12957001
7	2	GSKT,GRBX 2-1/2 URAI TS9	62791021
14	3	BRG,BALL	10987010
15	1	BRG,ROLLER	10222032
17	2	NUT,HEX ESNA ½-20	10319022
27	4	SEAL,LIP(VITON) 11/16	10005171
31	4	SCR,CAP HEXH NYL 1/4-20X	11540003
33	1	SEAL,LIP for GREASE LUBE	12091008

P/N 651010RK Kit with Gears for 22, 24 URAI and URAI Metric

Item	Qty	2" Kit Description	P/N
4	1	GEAR,ASSY 2-1/2 URAI	64905021
5	1	PLUG,OPENING FOR 1.575	12957001
7	2	GSKT,GRBX 2-1/2 URAI TS9	62791021
14	3	BRG,BALL	10987010
15	1	BRG,ROLLER	10222032
17	2	NUT,HEX ESNA ½-20	10319022
27	4	SEAL,LIP(VITON) 11/16	10005171
31	4	SCR,CAP HEXH NYL 1/4-20X	11540003
33	1	SEAL,LIP for GREASE LUBE	12091008

ROOTS® Synthetic Oil: ISO-VG-320 Grade

	Part Number
Quart	13106004
Gallon	13106005
Case (12 qts)	13106007

ROOTS® Synthetic Oil: ISO-VG-220 Grade

	Part Number
Quart	13106001
Gallon	13106002
Case (12 qts)	13106008

ROOTS® Synthetic Oil: ISO-VG-150 Grade

	Part Number
Quart	13106020
Gallon	13106021
Case (12 qts)	13106023
5 Gallon Pail	13106022
55 Gallon Drum	13106025

ROOTS® Synthetic Oil: ISO-VG-100 Grade

	Part Number
Quart	13106011
Gallon	13106012
Case (12 qts)	13106014
5 Gallon Pail	13106013
55 Gallon Drum	13106016

NOTES:

A- INSTALL ITEM #20 (SCREW) IN ASSEMBLY

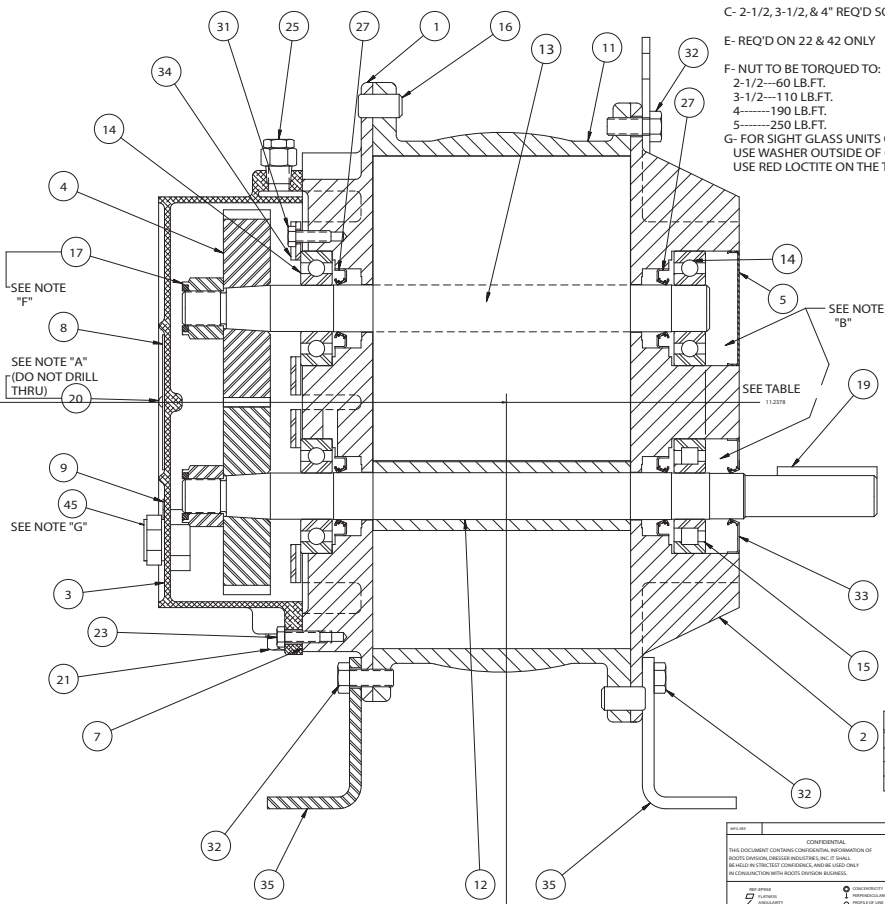
B- SEE OPERATING MANUAL IRB-180 FOR LUBRICATION INSTRUCTION

C- 2-1/2, 3-1/2, & 4" REQ'D SOC. HD. ON G.E. ONLY

E- REQ'D ON 22 & 42 ONLY

F- NUT TO BE TORQUED TO:
 2-1/2---60 LB.FT.
 3-1/2---110 LB.FT.
 4---190 LB.FT.
 3---250 LB.FT.

G- FOR SIGHT GLASS UNITS ONLY.
 USE WASHER OUTSIDE OF GEARBOX.
 USE RED LITTE ON THE THREADS.



SEE NOTE "F"

SEE NOTE "A" (DO NOT DRILL THRU)

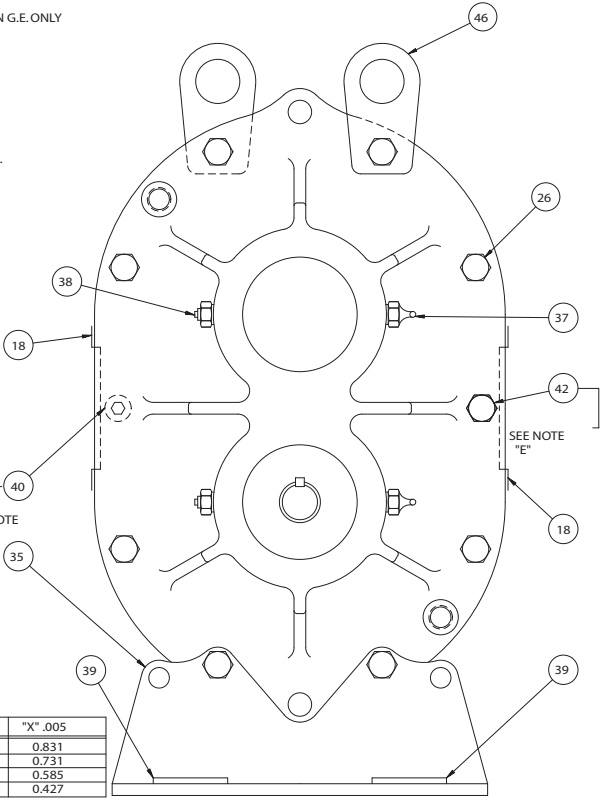
SEE NOTE "G"

SEE NOTE "B"

SEE TABLE 112378

SEE NOTE "C"

SIZE	"X" .005
5	0.831
4	0.731
3-1/2	0.585
2-1/2	0.427



SEE NOTE "E"

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REV	DATE	BY	CHKD	APP'D	DESCRIPTION
1					ADD LEAK TIGHT LUGS (ITEM #6)
2					ADD 1/8" DIA. HOLES FOR HOSE CLAMP UNITS
3					GRADED ITEM #1
4					REVISED FOR ECN
5					INCREASE ASSESSMENT RISK TORQUE
6					ITEM #20 NOT TO BE DRILLED
7					LUBRICATION NOTE & REVISED
8					REWORKING
9					ITEM #42 MODIFIED
10					NEW PART NUMBER

SECTIONAL ASSEMBLY
 2-1/2 THRU 5" U-BALL BLOWERS
 TAPER ROSE GEARS

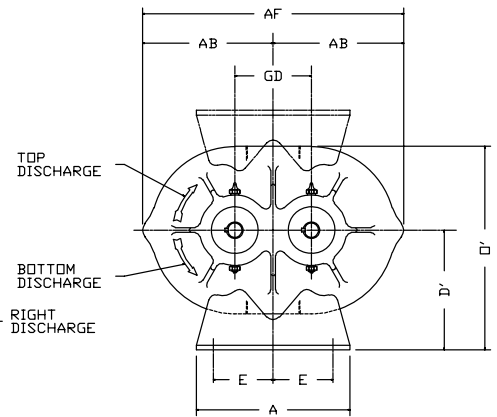
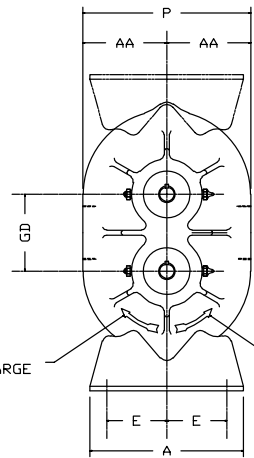
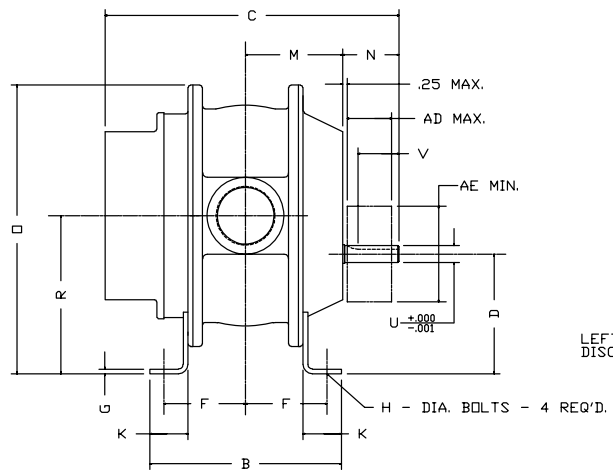
DRESSER OILFIELD SERVICES, DRESSER, INC.
 HOUSTON, TX

64720023

REV J

FRAME	APPROX. OIL CAPACITY	
	VERTICAL	HORIZONTAL
2-1/2	3.4 FL. OZ.	6.1 FL. OZ.
3-1/2	8.5 FL. OZ.	16 FL. OZ.
4	12.7 FL. OZ.	22.8 FL. OZ.
5	16.0 FL. OZ.	27.6 FL. OZ.

No. REQ'D.	PART NAME	PATT. No. PART No.	MAT'L.



W - INLET & DISCHARGE
 AD - SHEAVE WIDTH
 AE - SHEAVE DIAMETER

ALL DIMENSIONS IN INCHES

UNIVERSAL[®] RAI BLOWER

FRAME SIZE	GD	A	B	C	D	D'	E MIN.	E MAX.	F MIN.	F MAX.	G	H	K	M	N	O	O'	P	R	U	KEYWAY	W NPT.	V	AA	AB	AD	AE	AF	APPROX. WT. LBS
22	2.5	5.13	5.00	9.75	3.75	3.75	1.50	2.00	2.00	2.00	.25	.38	1.25	2.63	2.50	9.63	6.88	6.25	5.00	.625	.188x.094	1"	1.81	3.13	4.63	1.75	4.00	9.25	32
24			7.00	11.75					3.00	3.00				3.63							2"								43
32	3.50	7.25	6.75	11.25	5.00	5.00	2.50	2.88	2.56	2.81	.25	.44	1.75	3.38	2.44	12.81	8.88	7.75	6.75	.750	.188x.094	1-1/4"	1.63	3.88	6.06	1.91	5.00	12.13	69
33			7.63	12.13					3.00	3.25				3.81							2"								74
36			10.00	14.63					4.18	4.44				5.00	2.56						2-1/2"	1.75							102
42	4.00	8.00	7.25	13.00	6.25	6.25	3.00	3.13	2.50	3.13	.31	.44	2.00	3.68	3.18	15.06	10.63	8.75	8.25	.875	.188x.094	1-1/2"	2.31	4.38	6.81	2.31	5.00	13.63	88
45			10.00	15.50					3.56	4.25				5.06	2.94						2-1/2"	2.13							109
47			11.75	17.63					4.63	5.38				5.94	3.31		10.50	8.50			3"	2.50	4.25						128
53	5.00	10.50	8.38	15.38	6.25	6.75	3.50	3.50	3.18	3.68	.25	.50	1.88	4.50	3.68	17.38	11.88	10.25	8.75	1.125	.25 x.125	2-1/2"	2.75	5.13	8.63	3.06	6.00	17.25	143
56			11.00	17.50					4.25	5.00				5.81	3.38		12.25	11.00			4"	2.50	5.50						170
59			14.00	21.00					6.00	6.50				7.31	3.88						4"	3.00							204

MFG. REF.	CONFIDENTIAL	DATE	8/29/84
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REF: EP938	REVISION ON 'C' FROM 18.00 TO 17.50	APP. FCR	
⊖ CONCENTRICITY	D UPDATED TITLE BLOCK 9/25/91	DBV	
□ FLATNESS	C CORRECTED FRAME 36 REM 8/14/90	SCALE	
∠ ANGULARITY	B ADDED FRAME 32 RVE 6/22/90	CAD FILE / DIRECTORY	
∥ PARALLELISM	A REV. FRAM 59 REM 6/9/88		
⊕ TRUE POSITION			
— STRAIGHTNESS			
⊙ PERPENDICULARITY			
— PROFILE OF LINE			
— PROFILE OF A SURFACE			
∅ DIAMETER			
✓ FINISH IN MICRO INCHES			
/PARTS/XXAD 62795a21			

DO NOT SCALE FOR DIMENSIONS
 ALL DIMENSIONS SHOWN IN BRACKETS () ARE MILLIMETERS

ORDER No.

ASSY DIM 22-59 URAI VH

ROOTS DIVISION
 DRESSER EQUIPMENT GROUP
 A HALLIBURTON COMPANY
 CONNERSVILLE, IN USA

DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED
 FINISHED DIMENSIONS
 TWO PLACE DECIMALS 000--.005 FRACTIONAL---1/64
 THREE PLACE DECIMALS 0000--.005

62795021

REV E

ROOTS™ UNIVERSAL RAI® ROTARY POSITIVE BLOWERS

Frames 22 thru 718

BASIC BLOWER DESCRIPTION

Universal RAI® blowers are heavy-duty rotary blowers designed with detachable rugged steel mounting feet that permit easy, in-field adaptability to vertical or horizontal installation requirements.

Because of the detachable mounting feet, these units can be easily adapted to any of four drive shaft positions: right, left, bottom, or top. The compact, sturdy design is engineered for continuous service when operated in accordance with speed and pressure ratings.

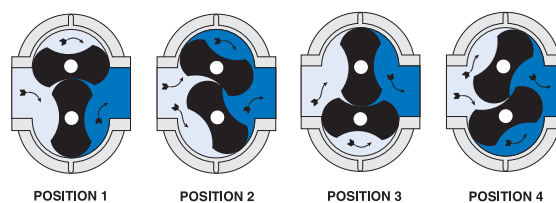
The basic model consists of a cast iron casing, carburized and ground alloy steel spur timing gears secured to steel shafts with a taper mounting and locknut, and cast iron involute impellers. Oversized antifriction bearings are used, with a cylindrical roller bearing at the drive shaft to withstand V-belt pull. The Universal RAI® features splash oil lube on the gear end and grease lube on the drive end. ROOTS'



exclusive "figure-eight" gearbox design improves oil distribution to maximize gear and bearing life. After testing, the unit is sprayed with a protective paint, and boxed or skid mounted for delivery.

Available accessories include driver, relief valve, inlet and discharge silencers, inlet filter, check valve, extended base, V-belt or flexible coupling and drive guards.

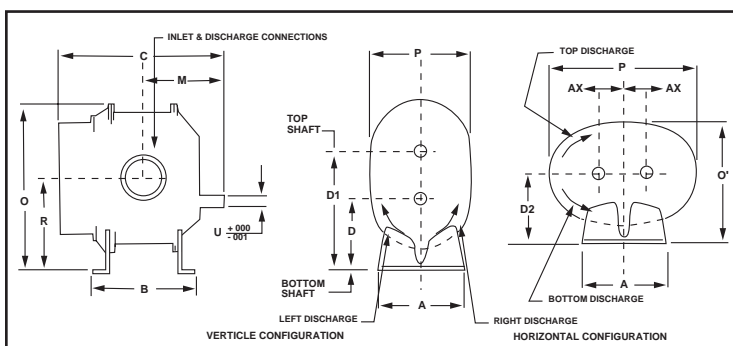
OPERATING PRINCIPLE



POSITION 1 POSITION 2 POSITION 3 POSITION 4

Two figure-eight lobe impellers mounted on parallel shafts rotate in opposite directions. As each impeller passes the blower inlet, it traps a definite volume of air and carries it around the case to the blower outlet, where the air is discharged. With constant speed operation, the displaced volume is essentially the same regardless of pressure or temperature.

Timing gears control the impellers relative positions and maintain small but definite clearances. This allows operation without lubrication requirements inside the unit casing.



Frame	A	A'	B	C	D	D1	D2	M	O	O'	P	P'	R	U	INLET DISCH.	AX	WGT
22U	5.13	5.13	5.00	9.75	3.75	6.25	3.75	5.13	9.63	6.88	6.25	9.25	5.00	.625	1.0 NPT	1.25	32
24U	5.13	5.13	7.00	11.75	3.75	6.25	3.75	6.13	9.63	6.88	6.25	9.25	5.00	.625	2.0 NPT	1.25	43
32U	7.25	7.25	6.75	11.25	5.00	8.50	5.00	5.81	12.81	8.88	7.75	12.13	6.75	.750	1.25 NPT	1.75	69
33U	7.25	7.25	7.63	12.13	5.00	8.50	5.00	6.25	12.81	8.88	7.75	12.13	6.75	.750	2.0 NPT	1.75	74
36U	7.25	7.25	10.00	14.63	5.00	8.50	5.00	7.56	12.81	8.88	7.75	12.13	6.75	.750	2.5 NPT	1.75	102
42U	8.00	8.00	7.25	13.00	6.25	10.25	6.25	6.86	15.06	10.63	8.75	13.63	8.25	.875	1.5 NPT	2.00	88
45U	8.00	8.00	10.00	15.50	6.25	10.25	6.25	8.00	15.06	10.63	8.75	13.63	8.25	.875	2.5 NPT	2.00	109
47U	8.00	8.00	11.75	17.63	6.25	10.25	6.25	9.25	15.06	10.50	8.50	13.63	8.25	.875	3.0 NPT	2.00	128
53U	10.50	10.50	8.38	15.38	6.25	11.25	6.75	8.18	17.38	11.88	10.25	17.25	8.75	1.125	2.5 NPT	2.50	143
56U	10.50	10.50	11.00	18.00	6.25	11.25	6.75	9.19	17.38	12.25	11.00	17.25	8.75	1.125	4.0 NPT	2.50	170
59U	10.50	10.50	14.00	21.18	6.25	11.25	6.75	11.19	17.38	12.25	11.00	17.25	8.75	1.125	4.0 NPT	2.50	204
65U	11.00	11.00	10.00	18.38	8.75	14.75	8.75	9.19	21.63	15.13	12.75	19.75	11.75	1.375	3.0 NPT	3.00	245
68U	11.00	11.00	13.00	21.38	8.75	14.75	8.75	10.82	21.63	15.13	12.75	19.75	11.75	1.375	5.0 NPT	3.00	285
615U	11.00	11.00	20.00	28.38	8.75	14.75	8.75	14.32	21.63	16.25	15.00	19.75	11.75	1.375	6.0 FLG	3.00	425
76U	14.00	21.00	11.75	19.94	11.00	18.00	11.00	10.00	26.13	20.69	19.38	23.25	14.50	1.562	4.0 NPT	3.50	400
711U	14.00	21.00	16.75	25.19	11.00	18.00	11.00	12.75	26.13	19.50	17.00	23.25	14.50	1.562	6.0 FLG	3.50	530
718U	14.00	21.00	23.75	32.19	11.00	18.00	11.00	16.25	26.13	19.50	17.00	23.25	14.50	1.562	8.0 FLG	3.50	650

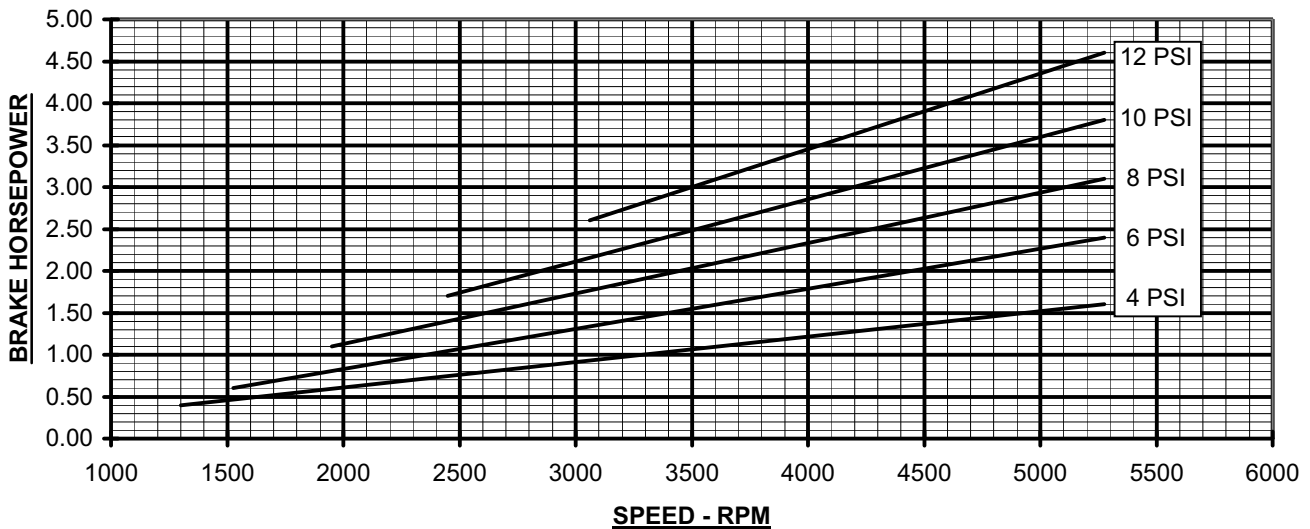
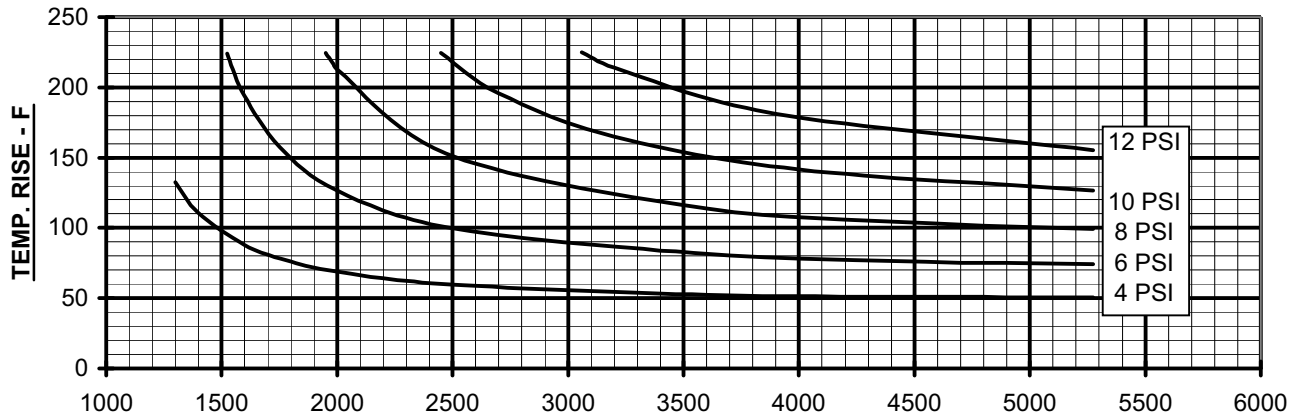
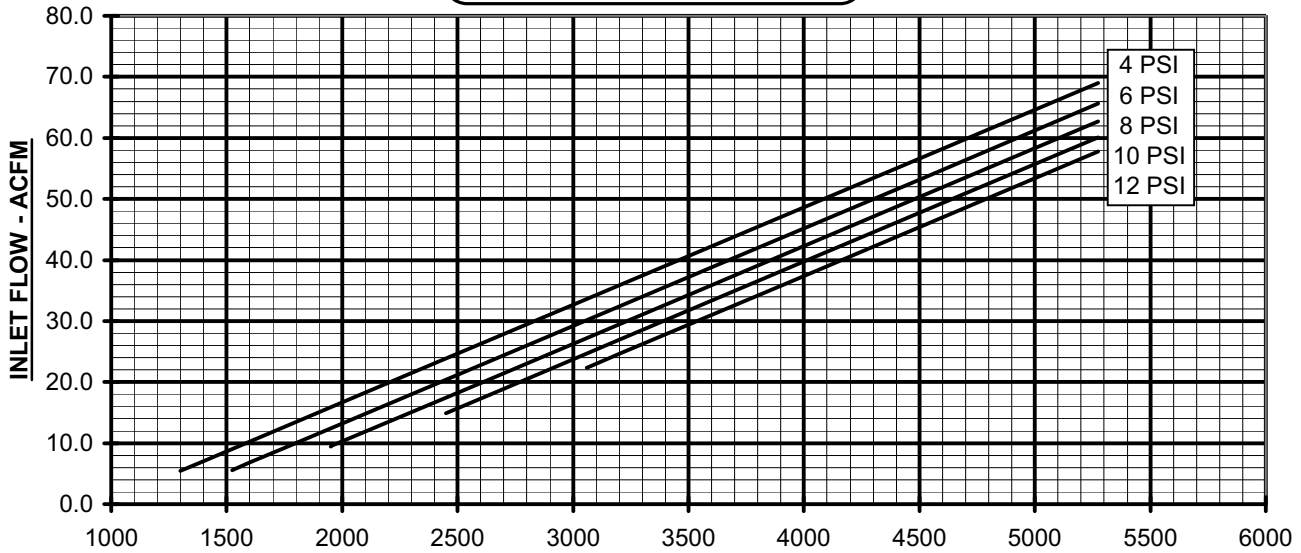


Roots



PERFORMANCE BASED ON AIR,
INLET AT 14.7 PSIA & 68°F
DECEMBER 2004

PRESSURE PERFORMANCE
FRAME 22 U-RAI
MAX. PRESSURE RISE = 12 PSI
MAX. SPEED = 5275 RPM





VACUUM PERFORMANCE
FRAME 22 U-RAI
 MAX. VACUUM = 15" HG
 MAX. SPEED = 5275 RPM

PERFORMANCE BASED ON AIR,
 INLET AT 68°F
 DISCHARGE PRESSURE = 30" HG ABS.
 DECEMBER 2004

