

# ROOTS

Blowers Compressors Exhausters

## ROOTS™ RAM™-DVJ WHISPAIR™ Dry Vacuum Exhausters

Frames 406J, 412J and 616J

RAM™ stands for Reliability, Availability and Maintainability. Today, more than ever, Roots is committed to supplying our customers with reliable products manufactured with state-of-the-art CNC machine tools. Production and inventory are being scheduled and controlled to ensure these units will be available when you need them. Design improvements such as repositionable rugged steel mounting feet and die-cast aluminum drive end covers and gear covers help to reduce installation costs and make normal maintenance easier.

### BASIC BLOWER DESCRIPTION

ROOTS™ RAM™-DVJ WHISPAIR™ dry exhausters have an exclusive discharge jet plenum design which allows cool, atmospheric air to flow into the cylinder. This unique design permits continuous operation at vacuum levels to blank-off with a single stage unit.

Standard dry vacuum exhausters are limited to approximately 16" Hg vacuum because operation at higher vacuum levels can cause extreme discharge temperatures resulting in casing and impeller distortion and possible failure. The RAM™ vacuum exhauster's integral cooling design eliminates the problems caused by high discharge temperatures at vacuum levels beyond 16" Hg.

The basic model is designed using integral-shaft ductile iron impellers with an involute profile. The casing and headplates are grey iron, while the drive end cover and gear cover are aluminum. Carburized and ground alloy steel spur timing gears are taper mounted on the shafts, secured with a locknut. Cylindrical roller bearings are splash lubricated at both the gear end and the drive end.

Piston rings reduce air leakage through the headplate bores and lip-type oil seals prevent lubricants from entering the air chamber. Units can be equipped with mechanical seals for gas applications.

All units are designed with rugged steel mounting feet which permit in-field adaptability to either vertical or horizontal installation requirements.

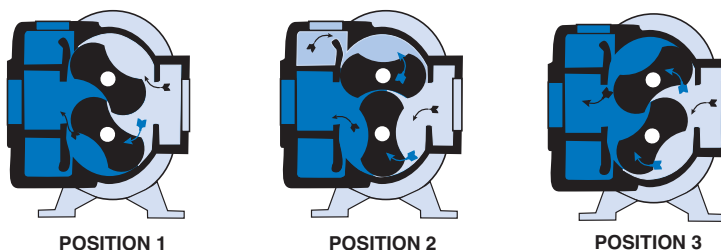


ROOTS™ DVJ WHISPAIR™ exhausters can be arranged to operate in two and three stage systems to achieve vacuum levels down to 1 Torr.

### DESIGN AND CONSTRUCTION FEATURES

1. Single stage operation to 27" HGV
2. No valves, vanes or Teflon rings to wear
3. Alloy steel timing gears
4. Cylindrical roller bearings
5. Piston ring air seals
6. Lip-type oil seals (optional mechanical seal)
7. Splash oil lubrication
8. Horizontal and vertical configurations available

### OPERATING PRINCIPLE

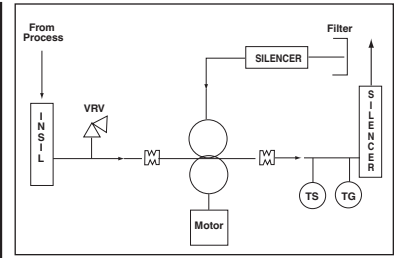


**Position 1:** Incoming air is trapped between the impellers. Simultaneously, pressurized air is being discharged. **Position 2:** As the upper impeller passes the jet plenum, cooled, pressurized air flows into the space between the impeller and cylinder. This cools the trapped air, helps control thermal growth and allows higher discharge pressures. **Position 3:** The trapped air is then moved into the discharge flange (left). Backflow is reduced, resulting in lower operating noise level and reduced shock loading on the impellers.



# PERFORMANCE TABLE

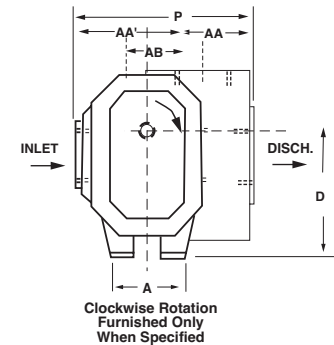
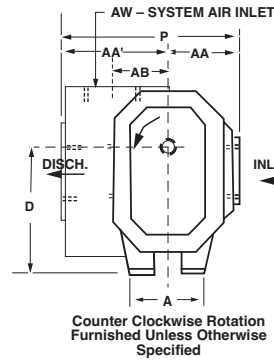
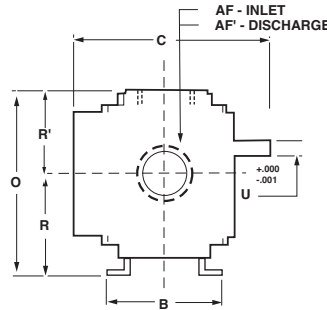
Frame Size	Speed RPM	Maximum Free Air CFM	12" HGV		16" HGV		20" HGV		24" HGV		27" HGV		
			CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	
406 DVJ	2320	668	266	10.3	229	13.5	178	16.7	80	20.0	47	22.4	
	2695		329	12.2	292	15.9	241	19.6	143	23.2		26.0	
	3564		474	16.7	437	21.5	386	26.2	288	31.0		34.5	
	4000		547	19.2	510	24.4	459	29.7	361	34.9		120	38.8
412 DVJ	2320	1332	531	20.2	457	26.7	355	33.2	160	39.7	94	44.5	
	2695		656	23.7	581	31.2	480	38.7	285	46.2		51.8	
	3564		945	32.0	871	41.7	769	51.5	574	61.3		68.6	
	4000		1091	36.3	1016	47.2	914	58.1	719	68.9		239	77.1
616 DVJ	1750	2367	1016	35.8	903	47.5	750	59.1	455	70.8	24	79.6	
	2124		1311	43.7	1198	57.8	1045	71.9	750	86.0		96.6	
	2437		1558	50.5	1445	66.6	1292	82.7	997	98.8		110.9	
	2860		1892	59.8	1779	78.6	1625	97.4	1331	116.2		605	130.3
	3000		2002	63.0	1889	82.6	1736	102.3	1441	121.9		715	136.7



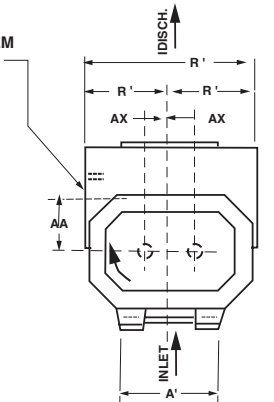
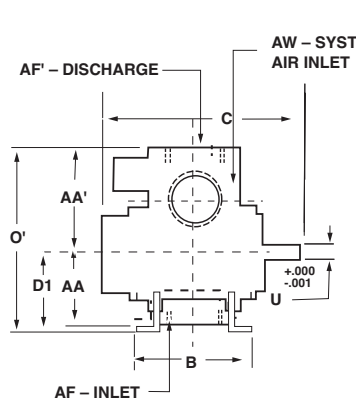
- NOTES:**
- Vacuum ratings based on inlet and jet air at standard temperature of 68°F, discharge and jet pressure of 30" HGV and specific gravity of 1.0.
  - Refer to Factory for performance guarantee above 24" HGV.
- \* Denotes blank-off.

## OUTLINE DRAWING & DIMENSIONAL TABLE

### VERTICAL CONFIGURATION (Horizontal Air Flow)



### HORIZONTAL CONFIGURATION (Vertical Air Flow)



Horizontal Orientation  
Top Discharge Only

Frame Size	A	A'	B	C	Drive Shaft Location		O	O'	P	P'	R	R'	U	Keyway	AA	AA'	AB	AF	AF'	AW	AX	Approx. Net Wt (lbs)
					D	D1																
406J	8.00	11.00	10.75	20.50	11.25	7.50	16.38	18.00	17.75	14.75	9.00	7.38	1.500	.375 x .188	7.25	10.50	6.75	4 NPT	5 NPT	4 NPT	2.25	365
412J	8.00	11.00	16.75	26.50	11.25	7.50	16.63	19.25	17.75	15.25	9.00	7.63	1.500	.375 x .188	6.00	11.75	6.50	6 FLG	6 FLG	5 FLG	2.25	575
616J	10.00	16.00	21.44	32.50	15.00	9.00	21.63	22.75	21.25	19.25	12.00	9.63	2.000	.500 x .250	7.50	13.75	6.75	8 FLG	10 FLG	8 FLG	3.00	975

- NOTES:**
- All dimensions are in inches
  - Weights are in pounds, and are approximate

## WARRANTY PERIOD

Twelve (12) months from date of original unit start-up or 18 months from date of original shipment, whichever occurs first.



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