THREE LOBES ROOTS BLOWER

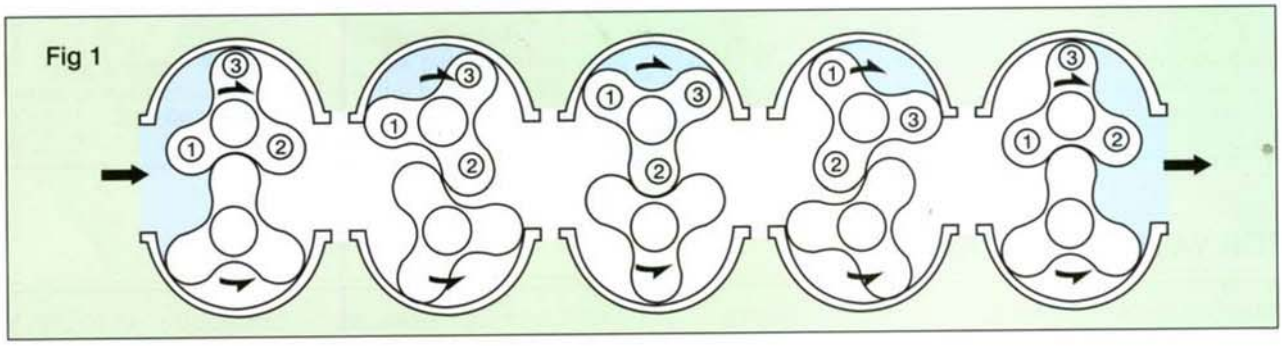
GENERAL

ALVEST 3 LOBES ROOTS BLOWERS, Know also as POSITIVE DISPLACEMENT ROTARY LOBE PUMPS, are used in conditions ranging from strong vacuum to high pressure in all branches of industry, especially in waste water treatment plant. The simple design, easy handling, and stable performance make possible a wide range of applications. Their main characteristic is to produce a constant flow of gas at different pressure and efficiencies are normally high.
Another important feature is that the pumped gas does not get contaminated because there are no lubricants in the area in which the compression occurs.
The blowers consist of a cast-iron casing in which two rotors with conjugate shape rotate and are sync-hronized by a set of timing gears. During the rotation, there is no contact either between the lobes or between the lobes and the casing.
Two front and rear side covers close each casing : the bearing of the shafts and the sealing devices to avoid gas leakage are located there.

OPERATING PRINCIPLE

The two three-lobe rotors rotate one opposite to the other; their movement is synchronized by a set of timing gears.
The geometric configuration of the lobes allows them to have, at any moment, a generatrix in common; due to very low machine tolerance, this common generatrix acts also as a seal device for both rotors. During the operation, one or two lobes of each rotor come into contact with the internal surface of the casing : this create a chamber in which the gas is trapped.
As the rotation continues, the trapped gas moves along until it reaches the position of discharging port. The two rotors make six intake and exhaust cycles per revolution; therefore the capacity of the ALVEST roots blower is determined by its operating speed and increase proportionally with the speed, but is independent from the pressure differential between inlet and outlet ports.

Fig 1

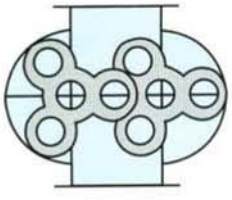


ADVANTAGES OF 3 LOBES DESIGN

Owing to new 3 lobes' rotor design, the reverse flow pressure variation period is only 2/3 of that of a conventional 2 lobes' rotor, the peak pressure value is also lower. So the noise and pressure pulsation are greatly limited.
Advantages of ALVEST 3 LOBES ROOTS BLOWER are as follows :

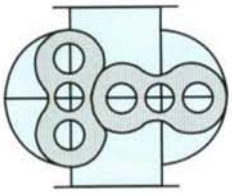
1. Less back flow, steady air flow rate, lower vibration and noise.
2. Discharge pressure pulsation are reduced, so lighter loading of bearings and timing gears ensures the long servicing life.
3. Running on the same operating speed, the 3 lobes blower can deliver large air flow and volume than conventional 2 lobes type.
4. Adequate clearance between the rotors and the rotors with the casing ensure no contact during operation, and this make the efficiency even higher.
5. The precision of rotors is fully controlled and variation of precision between blowers is almost nil because the rotors are produced by utilizing a precision NC machine.
6. The rotors are dynamically balanced in the fabrication stage already, so these rotors are almost free from vibrations ◦

3-Lobes Cylinder



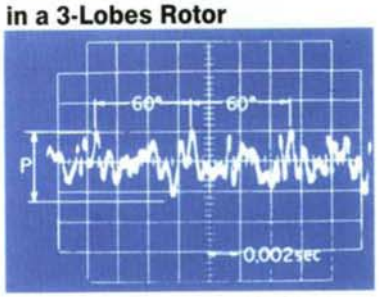
(Fig.1)

2-Lobes Cylinder

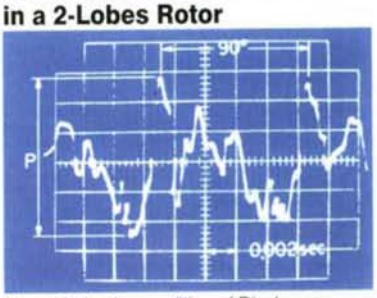


(Fig.2)

Discharge Pressure Variation in a 3-Lobes Rotor



Discharge Pressure Variation in a 2-Lobes Rotor



Note: Under the condition of Discharge Pressure at 5000 mmAq and Revolution of 1560 r.p.m. for both blowers.

CHARACTERISTICS

RL

RECOMMENDED PRESSURE OPERATION RANGE :
RL: 1000~8000mmAq

■ MAXIMUM PERFORMANCE

1 atm = 10333mmAq = 760 mmHg

	SINGLE STAGE	DOUBLE STAGE
TYPE	RL	RL
MAXI. PRESSURE	10,000mmAq (1.0kg/cm^2)	15,000mmAq (1.5kg/cm^2)
MAXI. VACUUM	-6,700mmAq (-500mmHg)	-8,100mmAq (-600mmHg)

■ STRUCTURE ANALYSIS

	OIL LUBRICATION
FRONT BEARING	RL
REAR BEARING	RL
REAR BOX	RL

SPECIFICATIONS

RL : Blower Body ONLY.
RLC, : Complete Set. - Blower Body With Standard Accessories For Pressure Operation.
RLV : Complete Set. - Blower Body With Standard Accessories For Pressure Operation.
Please refer to page 3 for the picture of complete set.

TYPE	BORE (mm)	BLOWER BODY	COMPLETE SET FOR PRESSURE OPERATION	COMPLETE SET FOR VACUUM OPERATION
RL	40	RL-40	RLC-40	–
	50	RL-50	RLC-50	RLV-50
	65	RL-65	RLC-65	RLV-65
	80	RL-80	RLC-80	RLV-80
	100	RL-100	RLC-100	RLV-100
	125	RL-125	RLC-125	RLV-125
	150	RL-150	RLC-150	RLV-150
	200	RL-200	RLC-200	RLV-200
	250	RL-250	RLC-250	RLV-250
	300	RL-300	RLC-300	RLV-300

COMPLETE SET ROOTS BLOWER INSTALLATION : with standard accessories

■ PRESSURE OPERATION (RLC)

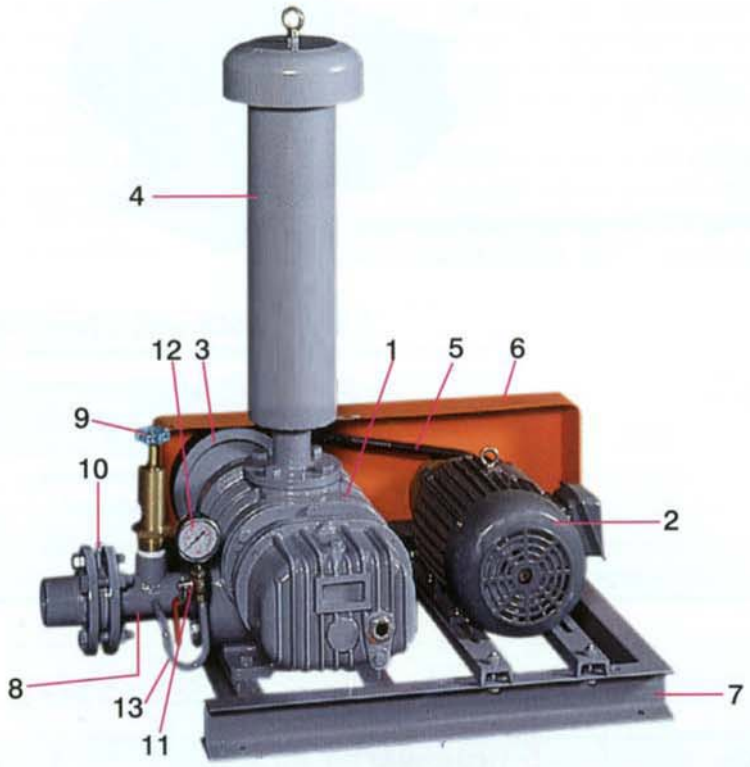


Fig 1

STANDARD ACCESSORIES

NO	NOAME
1	BLOWER BODY
2	MOTOR
3	BLOWER PULLEY
4	SUCTION SILENCER SET (WITH AIRFILTER & COVER)
5	V-BELT
6	BELT COVER
7	BASE PLATE
8	T-TYPE REDUCER
9	PRESSURE SAFETY VALVE
10	CHECK VALVE
11	BALL VALVE
12	PRESSURE GAUGE
13	GAUGE PIPE

■ VACUUM OPERATION (RLV)

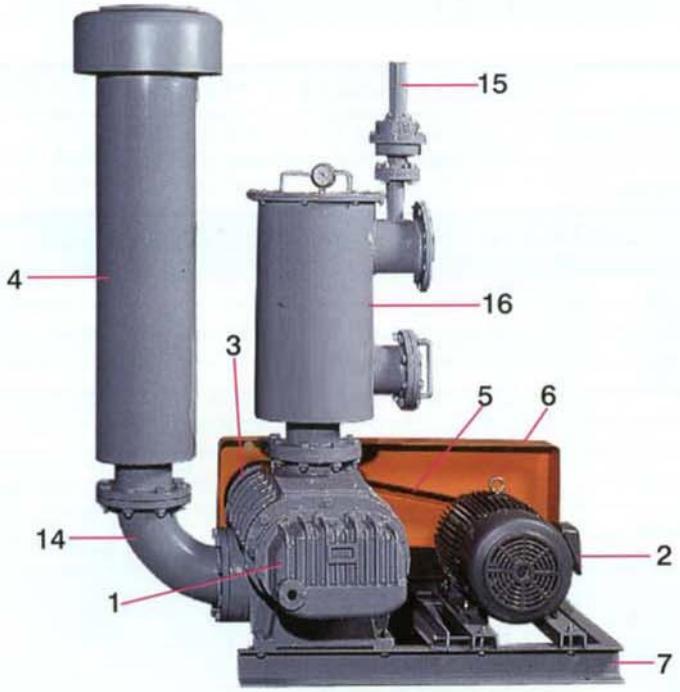


Fig 2

STANDARD ACCESSORIES

NO	NOAME
1	BLOWER BODY
2	MOTOR
3	BLOWER PULLEY
4	SUCTION SILENCER SET (WITH AIRFILTER & COVER)
5	V-BELT
6	BELT COVER
7	BASE PLATE
14	90 ELBOW
15	VACUUM SAFETY VALVE
16	SUCTION FILTER TANK (with VACUUM GAUGE)

Note :
Suctiion silencer set(in Fig 1) and discharge silencer set (in Fig 2) are the same.

HOW TO USE PERFORMANCE TABLES

The performance tables give the model number, bore, r.p.m. , static pressure, air volume and required power of the motor.

1. The air volume in the performance table are the volume of air intake under standard conditions.
   Standard conditions are temperature 20 °C, absolute pressure 1 atm (10333mmAq) and relative humidity 65%.
2. Air volume is generally shown in terms of following three modes. Values can be converted between them.
   1) Air volume at **suction condition**
   Shown in terms of suction pressure, temperature and humidity.
   2) Air volume at **standard condition**
   3) Air volume at **base condition**
   When the temperature is 0 °C, absolute pressure 1 atm and when the air is dry.
3. The air volume conversion formula is as follows :
   $Q_2 = Q_1 \times P_1 / P_2 \times T_2 / T_1$
   Q_1 : air volume(m^3/min)at absolute pressure of P_1 (mmAq)
   and absolute temperature of T_1 (K).
   Q_2 : air volume(m^3/min)at absolute pressure of P_2 (mmAq)
   and absolute temperature of T_2 (K).
4. According to the air volume and static pressure as calculated above, the moldel number, bore, r.p.m. and required power can be found in the performance table.
5. The choice is overlapped depending upon the type of blower. For reference, however, selection should be lower number blowers for the economy and higher number for the sound level.
6. The values for power displayed in the performance table are expressed as required power including drive power for the transmission unit, so there is no need to create a margin when selecting a motor.
7. power (output) can be calculated using the following formula
   $kW = \sqrt{3} \times V \times A \times \cos\theta \times Eff. \times 10^{-3}$
   V : voltage A : current cos. θ : motor power factor
   Eff. : motor efficiency

PRESSURE	atm	kpa	mbar	ℓbf/m²(psi)	kgf/cm²	in Hg	ft Aq	mmHg(Torr)	mmAq
1 atm	1	101.325	1013.25	14.696	1.0333	29.921	33.914	760	10333
1 kpa	0.0099	1	10	0.145	0.0102	0.295	0.335	7.5	102
1 mbar	0.00099	0.1	1	0.0145	0.00102	0.0295	0.0335	0.75	10.198
1 ℓbf/m²(psi)	0.069	6.894	68.965	1	0.0703	2.036	2.308	51.71	703
1 kgf/cm²	0.968	98.062	980.392	14.228	1	28.96	32.82	735.53	10000
1 inHg	0.0334	3.3863	33.898	0.491	0.0345	1	1.133	25.4	345.3
1 ftAq	0.0295	2.99	29.851	0.434	0.0305	0.882	1	22.42	304.8
1 mmHg(Torr)	0.013	0.1338	1.333	0.019	0.0014	0.04	0.045	1	13.6
1 mmAq	0.000097	0.0098	0.09803	0.0014	0.0001	0.003	0.003	0.074	1

CAPACITY	m³/min	ℓ/min	cm³/sec	in³/sec	ft³/min(CFM)	U.S. GPM
1m³/min	1	1000	16667	1016	35.288	264.172
1ℓ/min	0.001	1	16.67	1.02	0.0353	0.2641
1cm³/sec	0.00006	0.06	1	0.061	0.002	0.0158
1in³/sec	0.00098	0.983	16.39	1	0.035	0.2589
1ft³/min(CFM)	0.028	28.32	471.957	28.8	1	7.4836
1U.S. GPM	0.003785	3.4785	63.0915	3.8460	0.13360	1

Pressure Conversion Formula

1 kpa=1000 pa=1000 N/M²

1 bar=1000 mbar=100 kpa

1 mbar=100 N/M²

RLC (RL) PERFORMANCE TABLE (FOR PRESSURE OPERATION)

■ RLC - Complete Set ■ RL - Blower Body only

TYPE	Bore	Revolution	1000mmAq 9.8kpa		2000mmAq 19.6kpa		3000mmAq 29.4kpa		4000mmAq 39.4kpa		5000mmAq 49.0kpa		6000mmAq 58.8kpa		7000mmAq 68kpa		8000mmAq 78.4kpa	
	Inch(mm)	R.P.M.	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw
40	1½ (40)	800	0.70	0.25	0.56	0.50	0.45	0.77	0.35	0.94	0.26	1.14	0.21	1.34	0.15	1.52	0.10	1.70
		900	0.85	0.28	0.71	0.56	0.61	0.81	0.50	1.05	0.42	1.27	0.36	1.50	0.30	1.71	0.26	1.91
		1000	1.01	0.31	0.87	0.62	0.75	0.90	0.67	1.16	0.58	1.43	0.50	1.67	0.46	1.90	0.40	2.12
		1100	1.17	0.35	1.03	0.68	0.92	0.99	0.82	1.34	0.73	1.57	0.67	1.84	0.61	2.09	0.56	2.34
		1200	1.32	0.36	1.19	0.74	1.08	1.08	0.98	1.40	0.88	1.71	0.83	2.01	0.77	2.29	0.72	2.45
		1300	1.48	0.41	1.34	0.80	1.23	1.17	1.14	1.52	1.05	1.86	0.98	2.18	0.93	2.47	0.88	2.56
		1400	1.64	0.44	1.51	0.86	1.40	1.26	1.29	1.63	1.22	1.99	1.14	2.34	1.08	2.66	1.04	2.66
		1500	1.80	0.47	1.66	0.92	1.56	1.35	1.45	1.75	1.36	2.14	1.30	2.51	1.24	2.85	1.20	2.98
		1600	1.96	0.50	1.82	0.98	1.72	1.44	1.61	1.87	1.52	2.28	1.46	2.67	1.41	3.04	1.36	3.30
		1700	2.13	0.57	1.98	1.05	1.87	1.53	1.77	1.99	1.68	2.42	1.61	2.84	1.55	3.23	1.52	3.67
		1800	2.29	0.57	2.14	1.11	2.03	1.62	1.93	2.11	1.83	2.56	1.77	3.01	1.71	3.42	1.67	3.93
		1900	2.45	0.60	2.30	1.20	2.19	1.71	2.09	2.23	1.99	2.70	1.92	3.18	1.86	3.61	1.82	4.26
50	2(50)	800	1.16	0.42	0.92	0.83	0.75	1.29	0.58	1.56	0.44	1.90	0.34	2.22	0.24	2.53	0.17	2.83
		900	1.42	0.47	1.18	0.93	1.00	1.35	0.84	1.75	0.70	2.12	0.60	2.50	0.50	2.85	0.43	3.19
		1000	1.68	0.52	1.45	1.03	1.26	1.50	1.10	1.94	0.96	2.38	0.85	2.78	0.76	3.17	0.68	3.54
		1100	1.94	0.58	1.72	1.13	1.53	1.65	1.37	2.24	1.21	2.62	1.11	3.06	1.02	3.49	0.94	3.90
		1200	2.21	0.63	1.99	1.23	1.80	1.79	1.63	2.33	1.48	2.85	1.37	3.34	1.29	3.81	1.20	4.08
		1300	2.47	0.69	2.26	1.33	2.06	1.95	1.90	2.53	1.74	3.09	1.64	3.62	1.55	4.11	1.46	4.27
		1400	2.73	0.74	2.51	1.44	2.33	2.10	2.15	2.72	2.01	3.32	1.90	3.89	1.81	4.44	1.74	4.44
		1500	3.00	0.79	2.78	1.54	2.59	2.25	2.42	2.92	2.27	3.56	2.17	4.17	2.07	4.76	2.00	4.96
		1600	3.27	0.84	3.04	1.64	2.86	2.40	2.69	3.12	2.54	3.80	2.43	4.45	2.34	5.08	2.27	5.46
		1700	3.55	0.90	3.30	1.75	3.12	2.55	2.94	3.32	2.80	4.03	2.69	4.73	2.59	5.39	2.53	6.12
		1800	3.81	0.95	3.57	1.85	3.39	2.70	3.21	3.52	3.06	4.26	2.95	5.01	2.85	5.70	2.78	6.56
		1900	4.08	1.00	3.84	1.95	3.65	2.85	3.48	3.72	3.31	4.49	3.21	5.29	3.11	6.01	3.04	7.09
65	2½ (65)	800	1.95	0.58	1.78	1.14	1.61	1.66	1.46	2.16	1.33	2.62	1.21	3.07	1.12	3.49	1.03	3.91
		900	2.28	0.79	2.11	1.28	1.94	1.86	1.79	2.42	1.65	2.95	1.54	3.45	1.45	3.93	1.35	4.40
		1000	2.63	1.14	2.46	1.42	2.29	2.06	2.12	2.69	1.99	3.28	1.89	3.83	1.78	4.35	1.69	4.89
		1100	2.97	1.29	2.80	1.57	2.62	2.28	2.47	2.96	2.34	3.61	2.23	4.22	2.12	4.81	2.03	5.38
		1200	3.27	1.44	3.14	1.71	2.96	2.49	2.80	3.23	2.68	3.93	2.56	4.60	2.46	5.24	2.36	5.86
		1300	3.63	1.54	3.48	1.85	3.29	2.70	3.14	3.50	3.01	4.26	2.90	4.98	2.80	5.68	2.70	6.35
		1400	3.99	1.64	3.82	1.99	3.64	2.91	3.50	3.77	3.36	4.59	3.24	5.37	3.15	6.12	3.04	6.84
		1500	4.34	1.74	4.16	2.13	3.98	3.11	3.83	4.04	3.70	4.91	3.58	5.75	3.48	6.55	3.38	7.32
		1600	4.67	1.84	4.51	2.27	4.32	3.32	4.17	4.31	4.03	5.24	3.92	6.13	3.82	6.98	3.72	8.28
		1700	5.02	1.94	4.86	2.42	4.66	3.53	4.52	4.57	4.37	5.57	4.26	6.51	4.17	7.42	4.07	8.30
		1800	5.36	2.04	5.20	2.56	5.00	3.73	4.86	4.85	4.71	5.89	4.60	6.89	4.50	7.85	4.41	8.78
		1900	5.71	2.14	5.53	2.70	5.34	3.94	5.19	5.12	5.05	6.22	4.94	7.27	4.84	8.28	4.75	9.27
80	3(80)	800	2.91	1.40	2.55	2.12	2.23	2.81	1.93	3.51	1.67	4.31	1.42	5.43	1.21	6.55	1.02	7.67
		900	3.51	1.50	3.25	2.32	2.93	3.14	2.63	3.84	2.36	4.64	2.12	5.76	1.89	6.88	1.70	8.00
		1000	4.21	1.60	3.95	2.53	3.63	3.47	3.33	4.25	3.06	5.52	2.82	6.64	2.61	7.06	2.42	8.18
		1100	4.91	1.70	4.65	2.75	4.33	3.80	4.03	4.70	3.76	5.71	3.52	6.83	3.31	7.95	3.12	9.07
		1200	5.40	1.80	5.14	2.91	4.82	4.03	4.52	5.04	4.29	6.05	4.07	7.17	3.84	8.29	3.65	9.41
		1300	6.05	1.90	5.75	3.20	5.43	4.25	5.13	5.60	4.95	6.72	4.69	7.84	4.48	8.96	4.29	10.08
		1400	6.53	2.00	6.27	3.47	5.95	4.59	5.65	5.82	5.38	7.05	5.14	8.28	4.93	9.56	4.74	10.81
		1500	7.00	2.10	6.74	3.50	6.42	5.04	6.12	6.27	5.85	7.50	5.61	8.96	5.40	10.42	5.21	11.88
		1600	7.76	2.20	7.50	3.92	7.18	5.26	6.86	6.66	6.61	8.06	6.37	9.52	6.16	10.98	5.97	12.44
		1700	8.26	2.32	8.00	4.15	7.67	5.53	7.36	7.04	7.08	8.53	6.83	10.04	6.61	11.54	6.42	13.04
		1800	8.83	2.42	8.52	4.37	8.17	5.87	7.86	7.49	7.59	8.98	7.33	10.59	7.12	12.21	6.92	13.82
		1900	9.32	2.52	8.97	4.83	8.64	6.20	8.33	7.82	8.06	9.43	7.81	11.15	7.59	12.63	7.39	14.14
100	4(100)	800	5.08	1.37	4.51	2.65	4.00	3.80	3.54	4.88	3.14	5.68	2.79	6.78	2.48	7.62	2.20	8.43
		900	5.91	1.55	5.33	3.00	4.82	4.31	4.36	5.52	3.96	6.55	3.60	7.67	3.29	8.63	3.01	9.54
		1000	7.08	1.83	6.47	3.52	5.93	5.06	5.44	6.48	5.02	7.79	4.64	9.00	4.31	10.13	4.02	11.18
		1100	7.92	2.01	7.31	3.87	6.77	5.56	6.28	7.12	5.86	8.67	5.48	9.90	5.15	11.14	4.75	12.29
		1200	8.76	2.19	8.15	4.22	7.61	6.07	7.12	7.77	6.70	9.55	6.32	10.80	5.99	12.15	5.70	13.41
		1300	9.60	2.38	8.99	4.57	8.45	6.58	7.96	8.42	7.54	10.43	7.16	11.70	6.83	13.17	6.54	14.53
		1400	10.44	2.56	9.83	4.92	9.29	7.08	8.86	9.07	8.38	11.31	8.00	12.60	7.67	14.18	7.38	15.69
		1500	11.34	2.67	10.75	4.93	10.23	7.59	9.75	9.72	9.25	12.22	8.88	13.50	8.56	15.19	8.28	16.75
		1600	12.17	2.89	11.58	5.45	11.05	8.09	10.58	10.37	10.17	12.73	9.80	14.40	9.48	16.20	9.20	17.87
		1700	13.00	3.12	12.41	5.97	11.88	8.60	11.40	11.01	11.00	13.23	10.63	15.30	10.31	17.21	10.03	18.99
		1800	13.83	3.34	13.42	6.50	13.01	9.10	12.53	11.66	12.12	13.87	11.70	16.20	11.37	18.22	11.06	20.11
		1900	14.65	3.57	14.15	7.03	13.75	9.61	13.32	12.31	12.91	14.25	12.54	17.10	12.22	19.23	11.94	21.23

Note: 1. The values are expressed as required power including drive power for the transmission unit.

2. The rated range for the air volume at specified ± 5%.

3. When the design pressure is 8000 mmAq and above

RLC (RL) PERFORMANCE TABLE (FOR PRESSURE OPERATION)

■ RLC - Complete Set ■ RL - Blower Body only

TYPE	Bore	Revolution	1000mmAq 9.8kpa		2000mmAq 19.6kpa		3000mmAq 29.4kpa		4000mmAq 39.4kpa		5000mmAq 49.0kpa		6000mmAq 58.8kpa		7000mmAq 68kpa		8000mmAq 78.4kpa	
	inch(mm)	R.P.M.	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw	m³/min	kw
125	5(125)	700	9.94	3.31	9.06	5.36	8.38	7.31	7.90	9.35	7.40	11.31	6.91	13.35	6.55	15.31	6.19	17.27
		800	11.52	3.78	10.57	6.07	9.84	8.38	9.32	10.68	8.79	12.98	8.27	15.29	7.86	17.59	7.52	19.89
		900	13.14	4.20	12.29	6.73	11.56	9.36	10.93	11.98	10.40	14.61	9.99	17.13	9.56	19.65	9.19	22.18
		1000	15.05	4.55	14.02	7.45	13.34	10.34	12.74	13.24	12.20	16.03	11.72	18.92	11.79	21.92	10.67	24.82
		1100	16.72	5.10	15.80	8.25	15.10	11.29	14.42	14.55	13.90	17.81	13.38	21.07	12.92	24.98	12.40	28.90
		1200	18.45	5.32	17.51	8.86	16.79	12.31	16.23	15.74	15.74	19.18	15.26	22.93	14.80	26.69	14.30	30.44
		1300	20.11	5.77	19.15	9.62	18.40	13.27	17.87	17.32	17.32	20.75	16.79	24.81	16.37	28.88	15.86	32.19
		1400	21.77	6.23	20.78	10.28	20.01	14.22	19.47	18.27	18.93	22.97	18.38	27.35	17.94	30.63	17.42	33.91
		1500	23.49	6.65	22.50	10.97	21.73	15.30	21.05	19.50	20.51	24.38	20.06	28.82	19.61	35.46	19.08	37.69
		1600	25.27	7.06	24.33	11.59	23.70	16.21	23.06	20.74	22.54	26.33	21.98	30.54	21.59	34.75	21.24	38.97
		1700	27.01	7.38	26.05	12.35	25.32	17.19	24.79	23.21	24.27	27.43	23.73	32.71	23.31	36.92	22.93	41.43
		1800	28.74	8.17	27.79	13.11	27.05	18.18	26.52	24.30	26.00	29.59	25.46	34.87	25.08	39.04	24.71	43.20
150	6(150)	700	13.09	3.99	11.97	6.65	11.25	9.21	10.54	11.77	9.93	14.42	9.41	16.98	8.98	19.54	8.66	22.09
		800	15.06	4.62	13.96	7.59	13.19	10.44	12.41	13.41	11.76	16.38	11.21	19.45	10.71	22.53	10.36	25.60
		900	17.32	4.96	16.22	8.38	15.34	11.81	14.56	15.12	14.01	18.43	13.35	22.06	12.89	25.70	12.35	29.34
		1000	19.54	5.65	18.46	9.33	17.59	13.03	16.93	16.72	16.29	20.41	15.64	23.89	15.09	27.36	14.80	30.95
		1100	21.89	6.15	20.75	10.26	19.84	14.36	19.04	18.47	18.47	22.57	17.78	27.38	17.31	32.20	16.94	37.00
		1200	23.97	6.67	22.88	11.05	21.99	15.53	21.34	19.92	20.69	25.17	20.14	29.55	19.69	33.93	19.33	38.30
		1300	26.16	7.19	24.93	12.58	24.14	16.73	23.35	21.56	22.79	26.95	22.12	31.44	21.67	35.93	21.33	40.42
		1400	28.24	7.69	27.09	12.86	26.18	18.03	25.49	24.07	24.80	28.71	24.22	34.45	23.79	40.19	23.41	46.94
		1500	30.48	8.26	29.32	13.72	28.39	19.31	27.57	25.59	26.99	31.41	26.41	37.22	25.93	43.04	25.57	48.86
		1600	32.83	8.74	31.73	14.59	30.85	20.56	30.07	27.64	29.52	33.16	28.96	37.73	28.52	43.26	28.17	48.79
		1700	34.99	9.19	33.88	15.50	33.00	21.85	32.34	28.79	31.67	35.44	31.11	40.97	30.61	46.41	30.26	52.05
		1800	37.26	9.20	36.16	16.41	35.27	23.29	34.49	29.95	33.94	36.60	33.26	43.26	32.75	49.91	32.39	56.57
200	8(200)	600	23.52	6.77	21.87	11.52	20.52	16.26	19.45	21.29	18.58	25.16	17.61	30.97	16.84	35.81	16.16	40.65
		700	27.90	7.90	26.20	13.40	24.90	18.90	23.80	24.00	22.80	30.00	21.90	37.00	23.00	44.00	22.30	47.00
		800	32.67	9.06	31.04	15.33	29.69	22.17	28.63	27.95	27.66	35.66	26.89	41.45	26.12	47.23	25.45	53.01
		900	37.26	10.06	35.61	17.13	34.26	24.19	33.19	30.97	32.32	38.71	31.45	45.48	30.68	52.26	30.00	59.03
		1000	41.90	11.05	40.29	19.05	38.95	26.67	37.90	35.24	37.05	42.86	36.19	50.48	35.43	58.10	34.76	65.71
		1100	46.70	12.20	45.00	21.00	43.70	30.00	42.60	39.00	41.60	48.00	40.70	56.00	39.90	65.00	39.20	74.00
		1200	50.98	13.25	49.34	23.04	48.10	31.68	47.04	42.24	46.08	50.88	45.22	60.48	44.45	69.12	43.78	79.68
		1300	55.45	14.28	53.77	24.62	52.49	34.47	51.41	45.30	50.42	55.15	49.54	65.00	48.75	75.83	48.06	86.67
		1400	59.93	15.31	58.22	26.19	56.91	38.27	55.80	48.35	54.79	59.42	53.99	70.50	53.08	81.58	52.05	92.66
250	10(250)	600	31.94	8.82	30.00	15.15	28.55	21.78	27.29	29.05	26.13	34.24	25.06	41.50	24.37	46.68	23.71	51.87
		700	37.80	10.29	35.90	17.69	34.30	25.73	33.00	32.16	32.00	40.74	30.90	48.24	29.90	54.67	29.20	61.10
		800	44.24	11.57	42.22	20.14	40.67	28.92	39.52	37.20	38.46	46.50	37.40	53.73	36.43	62.00	35.93	70.27
		900	50.32	12.97	48.39	22.82	46.94	31.12	45.77	41.50	44.52	50.84	43.45	60.17	42.77	69.50	42.10	78.83
		1000	56.48	14.29	54.67	24.50	53.05	34.71	51.90	45.94	50.76	56.19	49.81	66.55	48.95	77.59	48.19	88.63
		1100	63.00	15.75	61.00	27.87	59.40	39.66	58.10	51.46	57.00	62.18	56.00	73.97	55.00	85.76	54.20	97.55
		1200	68.64	17.09	66.82	29.85	65.28	43.22	64.03	56.46	62.88	66.89	61.92	80.28	61.06	92.62	60.19	104.93
		1300	74.65	18.48	72.78	31.67	71.20	46.46	69.92	59.09	68.74	72.85	67.76	86.57	66.87	99.94	66.08	113.36
		1400	80.68	19.86	78.56	34.55	77.05	49.66	75.90	63.71	74.63	78.82	73.63	93.93	72.52	109.08	71.71	124.19
300	12(300)	600	71.2	18.1	68.0	33.8	65.3	48.1	62.6	61.4	60.5	73.6	58.5	84.9	56.8	95.5	55.3	105.2
		700	85.5	20.8	81.4	39.2	78.7	55.9	76.0	71.4	73.9	85.6	71.9	98.8	70.2	111.1	68.7	122.5
		800	98.5	23.7	94.8	44.7	92.1	63.8	89.4	81.4	87.3	97.7	85.3	112.7	83.6	126.8	82.1	139.8
		900	111.5	26.6	108.2	50.1	105.6	71.6	102.9	91.4	100.8	109.7	98.8	126.7	97.1	142.4	95.6	157.1
		1000	124.5	29.6	121.6	57.0	118.9	80.9	116.2	102.9	114.1	123.3	112.1	142.1	110.4	159.6	108.9	176.0
		1100	138.1	34.5	135.1	63.9	132.4	90.2	129.7	114.4	127.6	136.8	125.6	157.6	123.9	176.9	122.4	194.8
		1200	151.7	39.5	148.5	70.8	145.8	99.5	143.1	125.9	141.0	150.4	139.0	171.9	137.3	194.1	135.8	213.7
		1300	165.3	44.5	162.1	83.6	159.4	108.8	156.7	137.4	154.6	164.0	152.6	188.4	150.9	211.3	149.4	232.6
		1400	178.0	47.9	174.6	90.0	171.7	117.2	168.8	148.0	166.5	176.6	164.3	202.9	162.5	227.6	160.9	250.5