

DVB Series Roots Vacuum Pump

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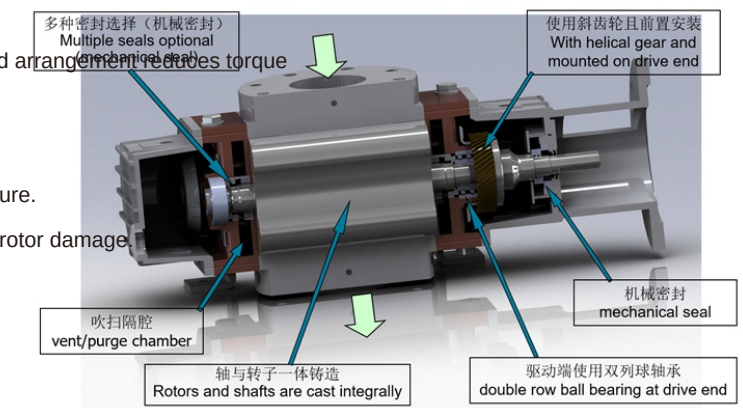
The DVB Series Roots Vacuum Pump is a positive-displacement vacuum pump, also known as a mechanical booster, and is one of the principal vacuum-generating devices for medium and high vacuum. It is highly effective for pumping large gas volumes and must be connected in series with a slide-valve vacuum pump, liquid ring vacuum pump, rotary vane vacuum pump or other dry vacuum pump to form a system. This extends the pump performance and enables higher pumping speed and a deeper ultimate vacuum.

The DVB Series Roots Vacuum Pump is suitable for chemical, pharmaceutical, semiconductor, new-energy and food-processing industries, as well as vacuum furnaces, dryers and many other general low- and medium-vacuum industrial applications.

Functions and advantage

Design features

- Mechanical seals ensure long service life and high operating performance.
- Precision synchronising helical gears ensure quiet and reliable operation; the drive-end arrangement reduces torque loading.
- A five-point mechanical seal is available for leak-free sealing.
- Vertical gas flow reduces the risk of rotor imbalance when liquid is entrained.
- A proven robust design is suitable for reliable operation at high temperature and pressure.
- The rotor and shaft are cast as one piece; the large shaft diameter reduces the risk of rotor damage.
- Special rotor manufacture enables dynamic balancing to minimise vibration and noise.
- The unique rotor design provides high volumetric efficiency.



Technical parameters

Model	Pumping speed	Speed	Motor	Cooling-water flow	Inlet / outlet port	Lubricant volume	Pump-head weight
DVB 550	550 m ³ /h	2900 r/min	3 kW [100L-2-B5]	5 l/min	DIN 100	0.6 L	86 Kg
DVB 720	720 m ³ /h	2910 r/min	4 kW [112M-2-B5]	8 l/min	ANSI 100	1.5 L	108 Kg
DVB 1000	1100 m ³ /h	2910 r/min	4 kW [112M-2-B5]	8 l/min	ANSI 100	1.5 L	140 Kg
DVB 1500	1500 m ³ /h	2940 r/min	5.5 kW [132S-2-B5]	12 l/min	DIN 150	3.6 L	253 Kg
DVB 2000	2200 m ³ /h	2940 r/min	5.5 kW [132S-2-B5]	12 l/min	DIN 150	3.6 L	310 Kg
DVB 3000	3000 m ³ /h	2940 r/min	7.5 kW [132S-2-B5]	12 l/min	DIN 200	3.6 L	405 Kg
DVB 4500	4500 m ³ /h	2945 r/min	11 kW [160M-2-B5]	15 l/min	DIN 250/150	6.5 L	680 Kg
DVB 6500	6500 m ³ /h	2950 r/min	18.5 kW [160L-2-B5]	25 l/min	DIN 300/200	10 L	1160 Kg
DVB 9000	9000 m ³ /h	2960 r/min	22 kW [180M-2-B5]	25 l/min	DIN 350/250	10 L	1450 Kg
DVB 11000G	11000 m ³ /h	2960 r/min	22 kW [180M-2-B5]	33 l/min	DIN 300	10 L	1700 Kg
DVB 13500	13500 m ³ /h	1480 r/min	30 kW [200L-4-B5]	50 l/min	DIN 350/250	20 L	2200 Kg
DVB 18000	18000 m ³ /h	1480 r/min	30 kW [200L-4-B5]	50 l/min	DIN 400/300	20 L	2800 Kg
DVB 20000G	20000 m ³ /h	1480 r/min	30 kW [200L-4-B5]	65 l/min	DIN 400	20 L	3800 Kg
DVB 40000G	40000 m ³ /h	2900 r/min	37 kW [200L-2-B5]	65 l/min	DIN 400	20 L	3800 Kg

Note: Models with the suffix ?G? are fully jacket-water-cooled Roots vacuum pumps.

The differential pressure and compression ratio between the suction and discharge sides of a Roots vacuum pump are limited. In the rough-vacuum range ($P > 10$ mbar), maximum differential pressure is meaningful; in the medium-vacuum range ($P < 1$ mbar), the achievable compression ratio is more meaningful. Maximum differential pressure is measured under specific conditions and must not be used alone for selection. The actual matching of the Roots pump and backing pump should be assessed by the Roots-pump temperature rise. Please consult DV Vacuum engineers for selection under specific operating conditions.

Materials

Pump housing: HT250 cast iron

End cover: HT250 cast iron

Rotor: QT500-7 ductile iron

Shaft: ductile iron, integral with rotor

Drive shaft: forged alloy steel

Gears: heat-treated and precision-ground alloy steel

Coating

The pump housing, end covers and rotors are supplied with nickel plating as standard; Hastelloy alloy coating is available as an option.

Ultimate vacuum

DVB Series Roots vacuum pumps are normally used in the 0.01-30 mbar vacuum-pressure range where high pumping speed is required. They must not be used alone or started at atmospheric pressure. A backing vacuum pump is required and must first reduce the Roots-pump inlet pressure to the permitted starting level. Typical backing pumps include oil-sealed, liquid-ring and dry screw vacuum pumps. The table below shows typical ultimate vacuum levels achieved by series combinations of Roots pumps and backing pumps.

	1-stage Roots pump + single-stage rotary (or slide-valve) pump	1×10^{-2} Pa
	1-stage Roots pump + two-stage rotary (or slide-valve) pump	1×10^{-3} Pa
	1-stage Roots pump + dry screw pump	0.5 Pa
	1-stage Roots pump + liquid ring pump	400 Pa
	2-stage Roots pump + liquid ring pump	25 Pa
	3-stage Roots pump + liquid ring pump	0.5 Pa

Ultimate vacuum: the highest stable vacuum reached at the pump inlet under closed-inlet conditions with zero gas flow.

In general, adding a Roots vacuum pump can reduce the system ultimate pressure to approximately 1/10-1/20 of the ultimate pressure of the backing pump. A two-stage Roots arrangement with a suitable backing pump can reach the 10⁻² mbar class, and in some cases no additional high-vacuum pump, such as a turbomolecular or diffusion pump, is required.

Selection guide

Roots vacuum pump model

250, 550, 720, 1000, 1500, 2000, etc. The number identifies the selected pump model.

Coating

- N Nickel coating
- H Hastelloy alloy coating

Seal type

- R Rotor: oil-slinger seal | Drive: mechanical seal
- L Rotor: composite lip seal | Drive: mechanical seal
- M Rotor: labyrinth + mechanical seal | Drive: mechanical seal

Cooling

- W water-cooled
- A air-cooled

Motor

- LM Bare pump, motor not included
- CM Standard non-explosion-proof motor, 380 V / 50 Hz
- EM Standard explosion-proof motor, 380 V / 50 Hz, Ex d IIB T4
- SM Motor according to special requirements

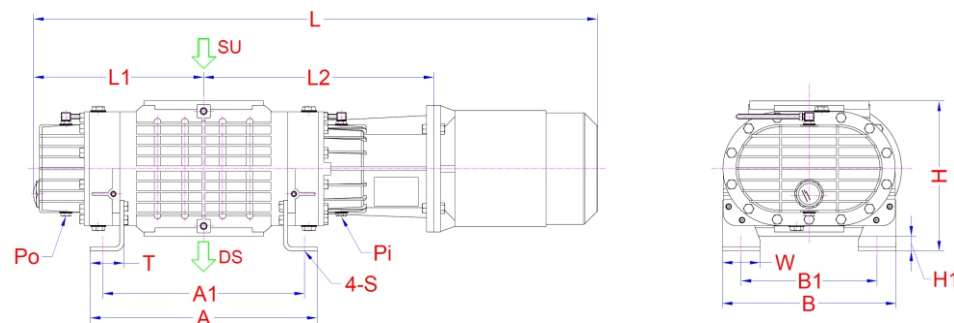
Example:

DVB -550-N-M-W-EM → DVB550-N/M/W/EM

Seal type: Mechanical seal on the drive shaft; rotating oil-slinger seal (R), composite lip seal (L) or mechanical seal (M) can be selected for the rotor shaft.

Mechanical seal materials: rotating ring ? graphite; rotating ring ? tungsten carbide as standard or silicon carbide as an option; O-ring ? fluoroelastomer as standard, or perfluoroelastomer (F) / PTFE (TF) as options.

Outline dimensions



SU: Suction
DS: Discharge
Pi: Cooling-water in
Po: Cooling-water out
S S: Foundation hole

	L	L1	L2	A	A1	B	B1	H	H1	W	T	S	Pi/Po	SU	DS	Flange standard
DVB 250	825	197	337	360	320	255	200	248	32	55	50	ø14	M10*1	65	65	DIN , PN16
DVB 550	1045	277	427	520	480	255	200	248	32	55	50	ø14	M10*1	100	100	DIN , PN16
DVB 720	1030	270	405	382	332	292	227	290	30	65	60	ø14	M10*1	100	100	ANSI, 150LB
DVB 1000	1180	345	480	532	482	292	227	290	30	65	60	ø14	M10*1	100	100	ANSI, 150LB
DVB 1500	1245	355	500	545	485	414	324	355	35	90	80	ø18	G1/4	150	150	DIN , PN16
DVB 2000	1345	405	550	595	535	414	324	355	35	90	80	ø18	G1/4	150	150	DIN , PN16
DVB 3000	1545	505	650	695	630	414	324	355	35	90	80	ø18	G1/4	200	200	DIN , PN16
DVB 4500	1735	503	757	541	475	520	455	475	9	78	76	ø19	G1/2	250	150	DIN , PN10
DVB 6500	1940	610	752	590	470	710	630	650	50	100	120	ø22	G1/2	300	200	DIN , PN10
DVB 9000	2105	690	832	750	630	710	630	650	50	100	120	ø22	G1/2	350	250	DIN , PN10
DVB 13500	2330	820	943	785	615	1100	1000	980	65	160	180	ø30	G3/4	350	250	DIN , PN10
DVB 18000	2560	925	1050	1000	836	1100	1000	980	65	160	180	ø30	G3/4	400	300	DIN , PN10
DVB 11000G	2092	676	826	780	620	660	580	600	55	120	150	ø22	G1/2	300	200	DIN , PN10
DVB 20000G	2665	932	1073	1090	780	1080	960	990	70	200	215	ø30	G3/4	350	250	DIN , PN10
DVB 40000G	2665	932	1073	1090	780	1080	960	990	70	200	215	ø30	G3/4	350	250	DIN , PN10

Note: Product dimensions may change due to technical improvements. Please consult DV Vacuum engineers when the latest dimensions are required.