

# **POSITIVE DISPLACEMENT BLOWER** **AERZEN HIGH VACUUM BLOWER**

For moving practically any gases in a high vacuum



**AERZEN**

# POSITIVE DISPLACEMENT BLOWER FOR INDUSTRIAL HIGH VACUUM TECHNOLOGY. FROM AERZEN, OF COURSE.

With experience in the construction of positive displacement blowers since 1868, AERZEN continues to set new standards in quality and innovation in relation to twin-shaft positive displacement machines. As a result, AERZEN belongs to the pioneers in compressor technology, and is now one of the leading manufacturers worldwide.

## Customer benefit thanks to technical progress.

AERZEN can look back on over 70 years of experience, particularly in the field of vacuum technology. Technical competence, experienced employees and continuous exchange with customers form an excellent basis for successful new developments by AERZEN. AERZEN always gives priority to customer benefit. Innovative products by AERZEN ensure that plant manufacturers and plant operators can achieve sustainable success in the market.

## Application fields and use.

AERZEN HV-type blowers are designed for moving almost any gas and are especially used in industrial high-vacuum technology.

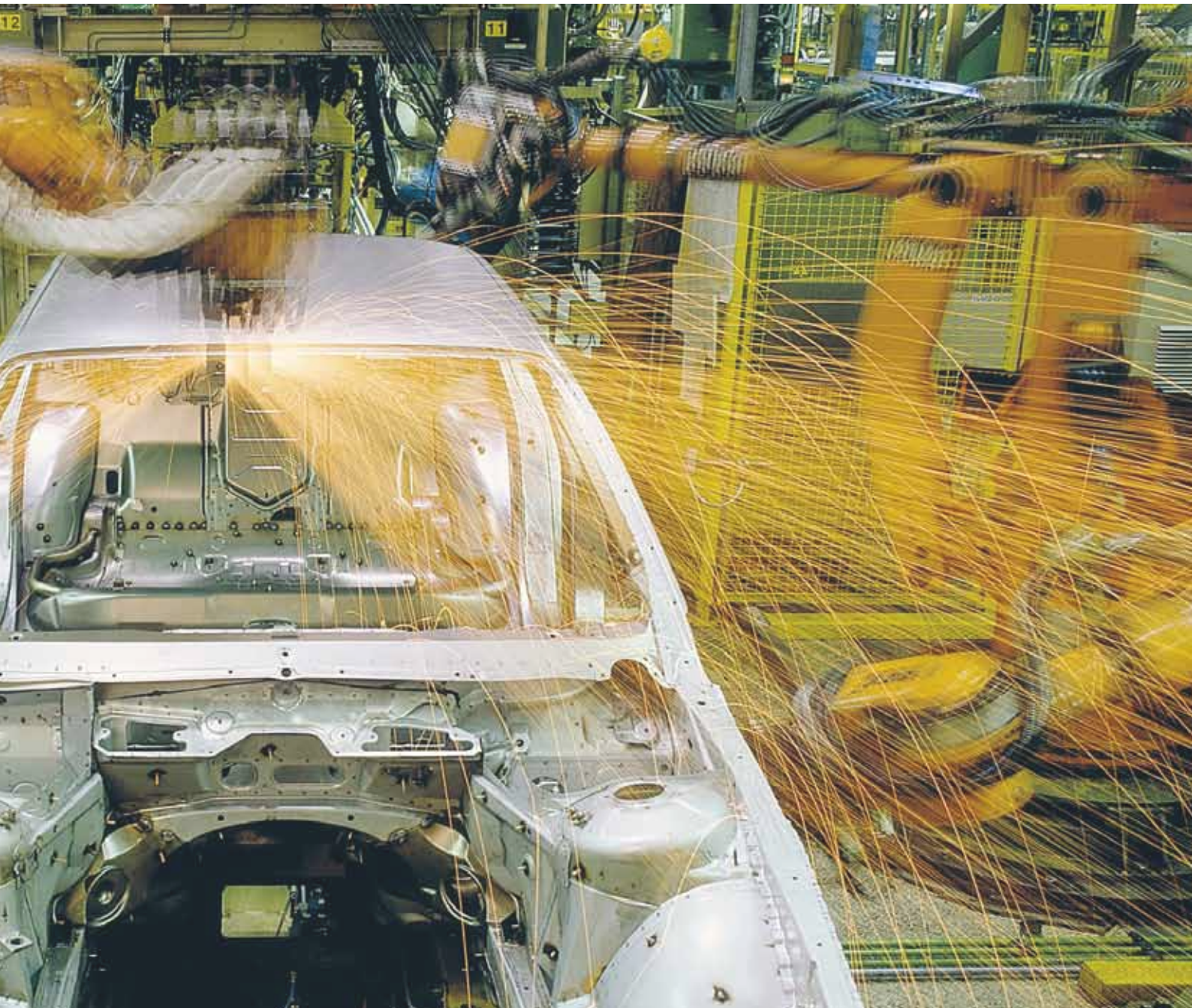
With a total of 19 sizes, the blowers cover nominal displacement intake volume flows from 180 m<sup>3</sup>/h to 97,000 m<sup>3</sup>/h and pressure ranges from 10<sup>-3</sup> mbar abs. up to approx. 200 mbar abs.



*4-stage vacuum plant with 2 x 30,000 m<sup>3</sup>/h intake volume flow in steel degassing*



*3-stage pumping set for 2 x 12,000 m<sup>3</sup>/h in vacuum coating technology*



**Fields of application:**

- Vacuum coating technology
- Chemical processes
- Metallurgy/ construction of melting furnaces
- Steel degassing
- Packing industry
- Central vacuum systems
- Helium leak detection units
- Manufacture of light bulbs and tubes
- Drying technology
- Machine construction
- Electronics
- Automotive industry and much more

# ENERGY EFFICIENCY IS A CATCH-PHRASE OF OUR TIMES – AND AT AERZEN, IT IS STANDARD.

**AERZEN standards for blowers and compressors have always been high. And now, they are being applied to drive units, too. IE 3 motors ensure maximum energy efficiency.**

**And AERZEN standard motors are already certified for use in several markets, including the US, Canada and Russia, and are suitable for frequency converters.**

## **Design and construction**

AERZEN vacuum blowers are provided with fluoro rubber (FKM) O-ring seals at the casing flanges. Further important advantages of the blower stage are vacuum tightness and air cooling. Lubrication oil is supplied by splash lubrication. The lubricant can be mineral oil, as well as PFPE oil, which is mostly used for conveying oxygen. The HV series is equipped with a special oil slinger-piston ring-labyrinth seal between the conveying chamber and the bearing chambers. Additionally, an amply dimensioned neutral chamber with condensate channels is installed. In addition, the neutral chamber can be purged with seal gas, in order to achieve an increased sealing effect. The sealing of the drive shaft is guaranteed by double radial seal rings (FKM) with an oil chamber. The blower is driven by direct coupling with motor. The driving unit consists of a cast connecting piece with perforated plate cover, flexible coupling and flanged B5-motor, equipped as per IEC standard and additionally with 3 PTC resistors. As standard, IE 3 motors are used for maximum energy efficiency. AERZEN standard motors are already certified for use in several markets, including the US, Canada and Russia, and are suitable for frequency converters.

## **Modifications: Options**

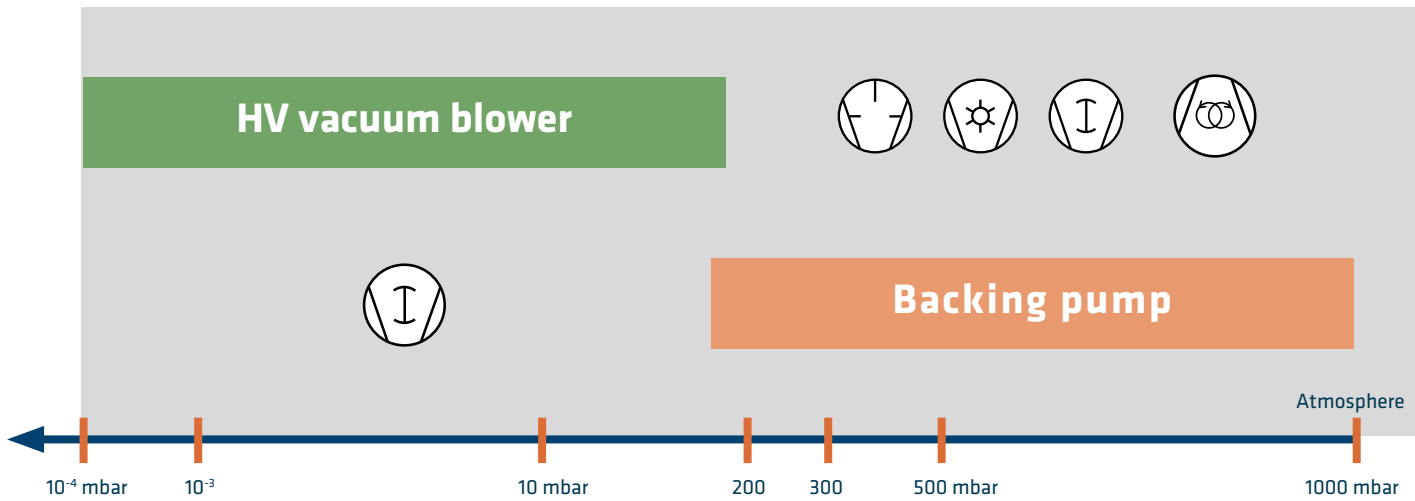
- ATEX approval as per 94/9/EG for zones 0 (internal), 1 (internal + external), 2 (internal + external)
- Housing parts constructed of nodular cast iron
- Rotary pistons and housing parts made of steel casting and CrNi steel casting
- Pressure-proof housing
- wHV series heatable blowers
- Gastightly closed rotary pistons
- Water-cooled seal ring housings
- Use of oxygen-compatible lubricants and seals approved for oxygen
- Teflon sealed housing flange connections
- Special designs for helium applications

## **Advantages for the customer**

- Largest vacuum blower series with 19 sizes and volume flows of 180 m<sup>3</sup>/h up to 97,000 m<sup>3</sup>/h
- ATEX certification as per 94/9/EG even for zone 0 (internal)
- Energy-saving thanks to IE 3 motors
- Easily select the right blower for you thanks to fine-structured steps of volume flows
- Due to high mechanical loading capacity (stage up to 200 mbar - in case of drive, depending on selected motor rating up to 140 mbar) considerable reduction of pumping-down times
- Variable adaptation to special applications through a wide variety of possible modifications
- Vertical and horizontal installation position
- Variable direction of flow (up to 2,800 m<sup>3</sup>/h even both-sided)
- AERZEN's reliability and experience (more than 35,000 vacuum blowers in use world-wide)
- World-wide sales and service system
- Excellent price-/performance ratio
- Quality – Made in Germany



*Certified safety: ATEX compliant design*



**ATEX**

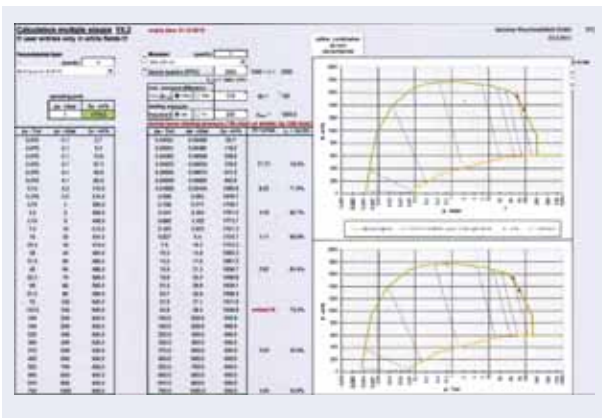
AERZEN HV series vacuum blowers, as well as CM series blowers with canned motor drives are type-tested (according to Guideline 94/9/EG) and certified for ATEX-zone 0 (internal), temperature class T3 (200 °C). Externally, the blowers are approved for zone I, temperature T4 (135 °C).

*Vacuum blower stage GMa 13.f7 HV with ATEX design with oil level and vibration monitoring*

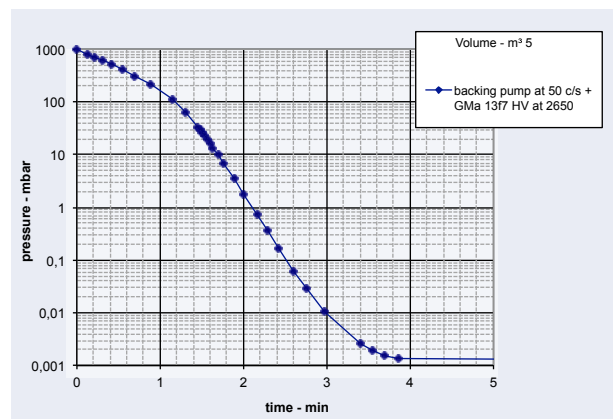


# DESIGN IS OUR STRENGTH! CHALLENGE US.

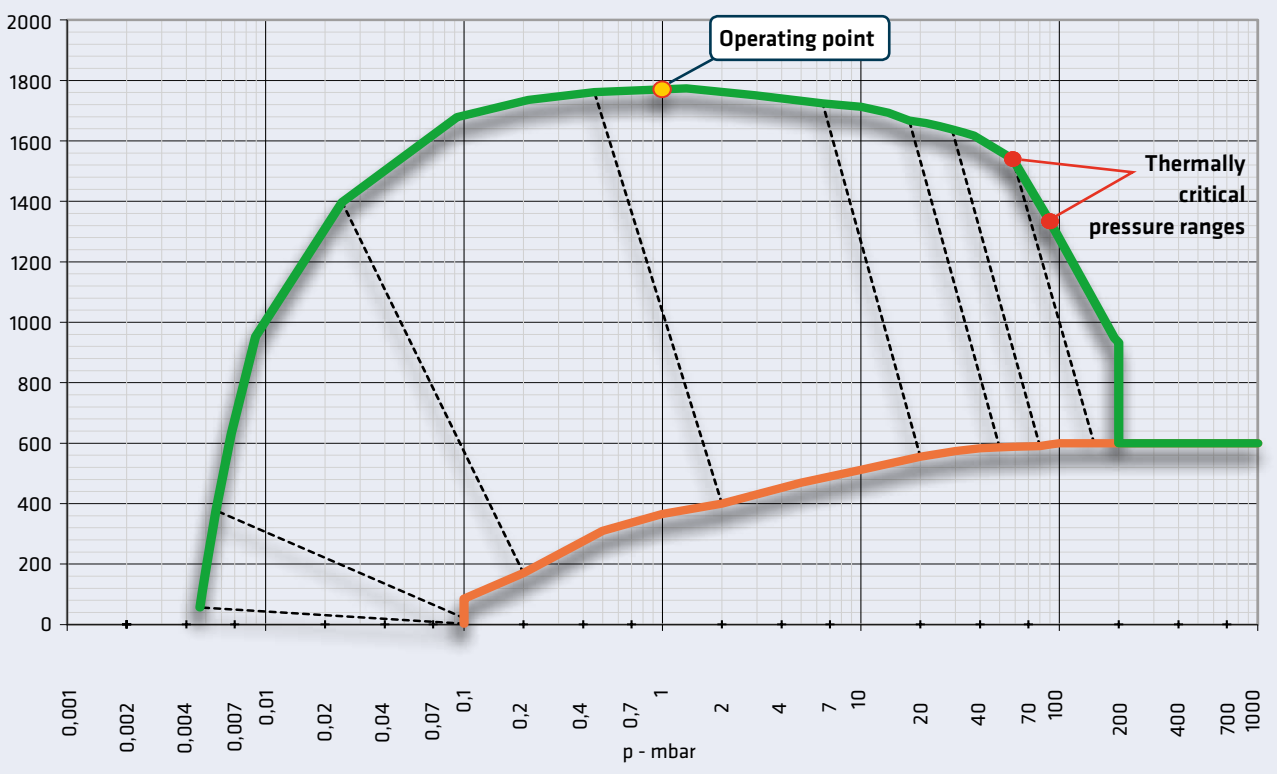
Using extensive software, we review the combination of booster pump and other AERZEN vacuum stages specified or planned by the pump set by the vacuum system design engineer. We pay special attention to thermally critical pressure ranges and optimize the step ratios for energy efficiency.



Programs for designing pump sets ascertain ...

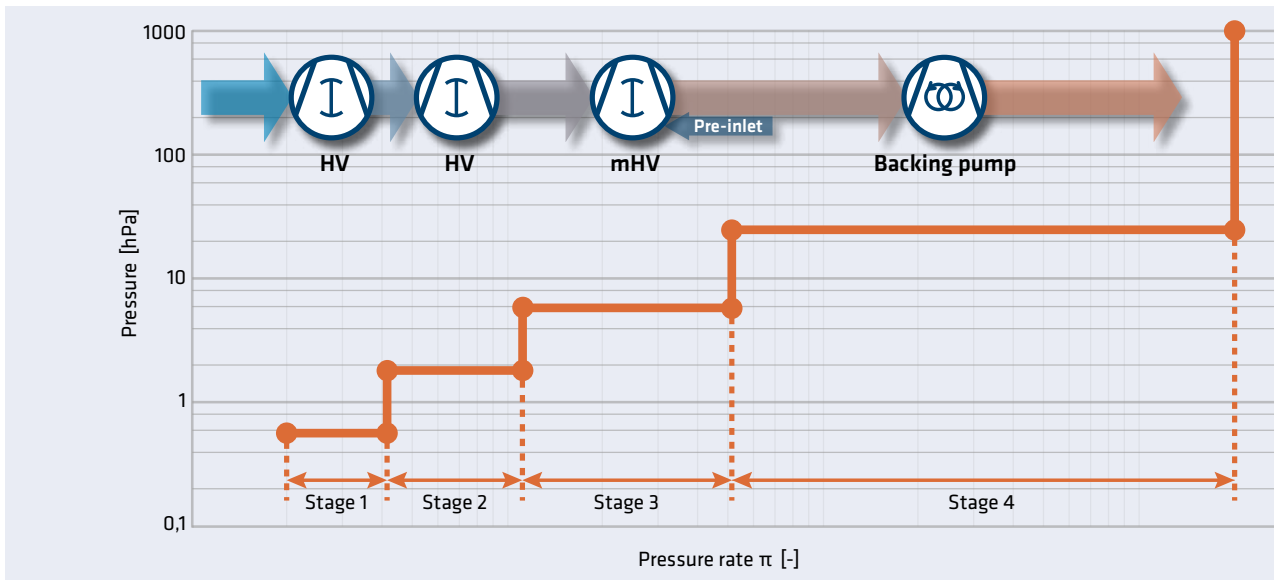


... pump-down times appropriate for the specified flow volume



- Backing pump at 50 Hz
- AERZEN vacuum blower GMa13f7 HV with 2850 rpm, differential pressure\_max: 110 mbar, p\_start: 200 mbar
- Critical point
- Operating point

AERZEN vacuum blowers being used for steel degassing at a steel plant.



Example of a 4-stage pump set: stages 1 and 2 with HV blower



4-stage vacuum system with  $2 \times 30,000 \text{ m}^3/\text{h}$  intake volume  
in steel degassing

# INDIVIDUALIZED DESIGN SIGNIFICANTLY EXPANDS THE RANGE OF APPLICATIONS.

Thanks to a comprehensive modular system, various motor frame sizes can be fitted on standard model AERZEN vacuum blowers.

### Example:

Required is a Roots type blower with a theoretical intake volume of 375 m<sup>3</sup>/h at  $\Delta p = 140$  mbar.

### Selection:



Theor. intake volume  $Q_0 = 375$  m<sup>3</sup>/h > 400 m<sup>3</sup>/h selected  
planned  $\Delta p = 120$  mbar > 160 mbar selected

### Result:

GMa 10.2 HV with 3250 rpm and a 2,2 kW motor frame size 90 L.

theor. intake volume flow $S_{th}$ [ m <sup>3</sup> /h ]	max. permissible differential pressure $\Delta p$ [ mbar ]	Machine type HV blower	Speed [ rpm ]	Motor size	Motor rating [ kW ]
90	200	GMa 10.0 HV	1500	80	0,75
110	200	GMa 10.0 HV	1850	80	0,75
150	200	GMa 10.0 HV	2500	80	1,10
200	110	GMa 10.0 HV	3300	80	0,75
	170	GMa 10.0 HV	3300	80	1,10
	200	GMa 10.1 HV	2450	90 S	1,50
250	80	GMa 10.1 HV	3050	80	0,75
	130	GMa 10.1 HV	3050	80	1,10
	160	GMa 10.2 HV	2050	90 S	1,50
	190	GMa 11.3 HV	1500	90 L	1,50
	220	GMa 11.3 HV	1500	90 L	2,20
300	70	GMa 10.1 HV	3650	80	0,75
	110	GMa 10.1 HV	3650	80	1,10
	160	GMa 10.1 HV	3650	90 S	1,50
	200	GMa 10.1 HV	3650	90 L	2,20
	50	GMa 10.2 HV	3250	80	0,75
400	80	GMa 10.2 HV	3250	80	1,10
	120	GMa 10.2 HV	3250	90 S	1,50
	160	GMa 10.2 HV	3250	90 L	2,20
500	180	GMa 11.3 HV	2400	90 L	2,20
	220	GMa 11.3 HV	2400	90 L	3,00
	90	GMa 11.4 HV	2050	90 S	1,50
500	140	GMa 11.3 HV	3000	90 L	2,20
	200	GMa 11.3 HV	3000	100 L	3,00



		AERZENER MASCHINENFABRIK MADE BY WEG		12140518		
~3 112M-02		IP55	INS	CL F	Δ T 80 K S1	SF 1.00 AMB 40°C
V	Hz	kW	RPM	A	PF	Eff
380 Δ / 660 Y	50	4	2890	7.75 / 4.46	0.88	IE3
400 Δ / 690 Y			2900	7.50 / 4.35	0.86	
415 Δ / -			2905	7.39 / -	0.84	
460 Δ / -	60		3505	6.67 / -	0.85	88.5
NEMA Eff 88.5%		5.5HP	460 V	60Hz	3505 RPM	6207-ZZ
6.67 A PF 0.85		Des A	Code K	SF 1.15	CC029A	6206-ZZ
		MOBIL POLYREX EM		ALT 1000 m.a.s.l. 46 kg		
		MOD.TE1BFOX0\$		VDE 0530 IEC 60034		
						

IE 3 motors are standard at AERZEN

### Performance data for AERZEN vacuum booster HV-units - HV powered units

(performance data by way of example and non-binding!)

Model	theor. intake volume flow $S_{th}$ when operating at 50 Hz / 60 Hz	max. allowable differential pressure based on motor rating	Oil fill quantity for		Motor rating at 50 Hz / 60 Hz	Motor size	Speed at 50 Hz / 60 Hz	Supply voltage at		
			GMa/b	GLa/b				50 Hz	60 Hz	
	[ m³/h ]	[ mbar ]	[ litre ]	[ litre ]	[ kW ]		[ rpm ]	[ V ]	[ V ]	
GMa / GLa	10.0 HV	180 / 220	130	0,9	0,7	0,75	80	3000 / 3600	230/400	460
GMa / GLa	10.1 HV	250 / 300	140	0,9	0,7	1,1	80	3000 / 3600	230/400	460
GMa / GLa	10.2 HV	365 / 450	130	0,9	0,7	1,5	90 S	3000 / 3600	230/400	460
GMa / GLa	11.3 HV	500 / 600	140	1,1	0,8	2,2	90 L	3000 / 3600	230/400	460
GMa / GLa	11.4 HV	750 / 900	130	1,1	0,8	3	100 L	3000 / 3600	400/690	460
GMa / GLa	12.5 HV	1000 / 1200	130	1,5	1,1	4	100 L	3000 / 3600	400/690	460
GMa / GLa	12.6 HV	1430 / 1700	130	1,5	1,1	5,5	112 M	3000 / 3600	400/690	460
GMa / GLa	13.f7 HV	2000 / 2400	110	2,5	2,1	7,5	132 S	3000 / 3600	400/690	460
GMa / GLa	13.8 HV	2900 / 3450	90	2,5	2,1	11	160 M	3000 / 3600	400/690	460
GMb / GLb	14.9 HV	3900 / 4700	80	7	3,5	11	160 M	3000 / 3600	400/690	460
GMb / GLb	15.10 HV	5600 / 6700	80/53	12	5,4	15	160 M	3000 / 3600	400/690	460
GMb / GLb	15.11 HV	7500 / 9000	80/53	12	5,4	18,5	160 L	3000 / 3600	400/690	460
GMb / GLb	16.f13 HV	8150 / 9800	75	11	7,6	18,5	180 M	1500 / 1800	400/690	460
GMb / GLb	16.13 HV	9750 / 11700	75	11	7,6	22	180 L	1500 / 1800	400/690	460
GMb / GLb	17.15 HV	16000 / 18825	35	18,5	---	30	200 L	1500 / 1800*	400/690	460

Different motor size possible

\* = only with rotors made of EN-GJS-400-15 (GGG-40)

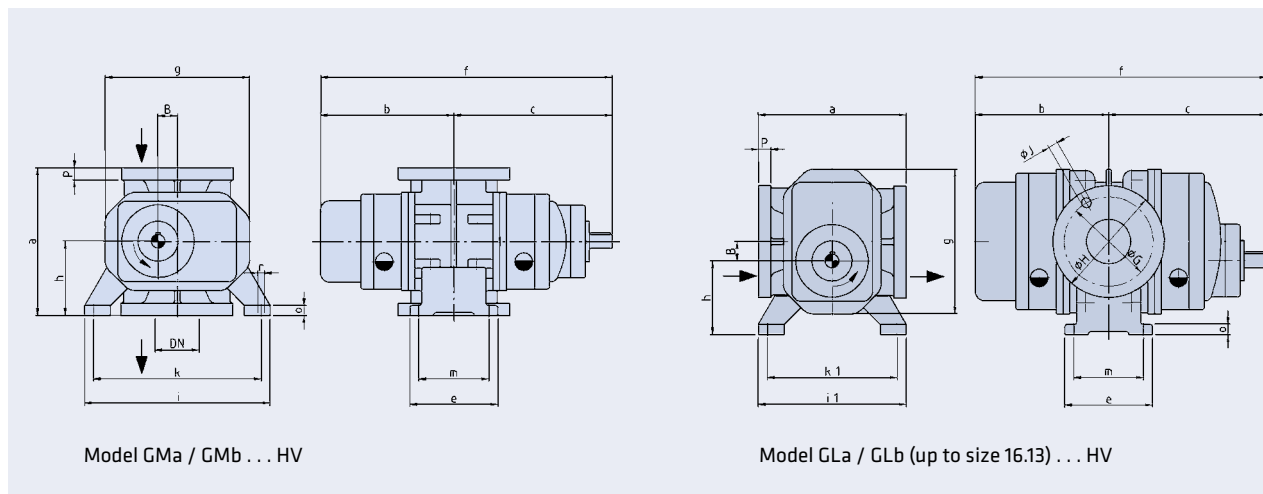
# GETTING TO THE POINT. THE OPERATING AND PERFORMANCE DATA.

AERZEN high vacuum blowers are sturdy standardized products and designed to suit a wide variety of applications. The largest vacuum blower product group comprises 19 sizes in 11 connecting flange sizes from DN 50 to DN 800 and features intake volume flows from 180 to 97,000 m<sup>3</sup>/h.

Operating and performance diagrams for AERZEN high vacuum blowers (performance data are non-binding!)

For sizes	50 Hz - operation			60 Hz - operation		
	Volume flow S <sub>th</sub> [m <sup>3</sup> /h]	Speed [rpm]	Drawing no. Performance diagram	Volume flow S <sub>th</sub> [m <sup>3</sup> /h]	Speed [rpm]	Drawing no. Performance diagram
GMa / GLa 10.0 HV	185	3000	4 TG - 4161	220	3600	4 TG - 4169
GMa / GLa 10.1 HV	250	3000	4 TG - 3708	300	3600	4 TG - 4136
GMa / GLa 10.2 HV	375	3000	4 TG - 4149	450	3600	4 TG - 4145
GMa / GLa 11.3 HV	505	3000	4 TG - 3709	605	3600	4 TG - 4137
GMa / GLa 11.4 HV	750	3000	4 TG - 4150	895	3600	4 TG - 4146
GMa / GLa 12.5 HV	1015	3000	4 TG - 3710	1215	3600	4 TG - 4138
GMa / GLa 12.6 HV	1430	3000	4 TG - 4151	1720	3600	4 TG - 4147
GMa / GLa 13.f7 HV	2045	3000	4 TG - 3711	2455	3600	4 TG - 4139
GMa / GLa 13.8 HV	2890	3000	4 TG - 4152	3465	3600	4 TG - 4148
GMb / GLb 14.9 HV	1950	1500		2345	1800	4 TG - 3858
GMb / GLb 14.9 HV	3910	3000	4 TG - 3712	4690	3600	4 TG - 3859
GMb / GLb 15.10 HV	2775	1500	4 TG - 4174	3330	1800	4 TG - 4206
GMb / GLb 15.10 HV	5550	3000	4 TG - 3713	6660	3600	4 TG - 4052
GMb / GLb 15.11 HV	3740	1500	4 TG - 4216	4485	1800	4 TG - 4007
GMb / GLb 15.11 HV	7475	3000	4 TG - 3714	8970	3600	4 TG - 4053
GMb / GLb 16.12 HV	5435	1500	4 TG - 3715	6520	1800	4 TG - 4208
GMb / GLb 16.f13 HV	8165	1500	4 TG - 3716	9800	1800	4 TG - 4209
GMb / GLb 16.13 HV	9730	1500	4 TG - 3717	11675	1800	4 TG - 4210
GMb 17.15 HV	10670	1000		12800	1200	4 TG - 4215
GMb 17.15 HV	16000	1500	4 TG - 3718	19200	1800	4 TG - 4211
GMb 18.17 HV	21900	1000		26280	1200	4 TG - 4255
GMb 18.17 HV	32850	1500		32850	1500	
GMa 19.19 HV	39540	1000	4 TG - 3774	47450	1200	
GMa 20.21 HV	97000	950				

## Dimensions of AERZEN vacuum blower stages type . . . HV



## Dimensions and weights (Right reserved to make technical modifications. Product is subject to technical change).

Model	a	b	c	e	f	g	h	i	i1	k	k1	m	o	r	B	DN	G	H	P	Weight approx. kg
GMa/GLa 10.0 HV	264	224	262	152	486	258	132	332	264	300	232	120	18	M12	34	50	125	165	18	70
GMa/GLa 10.1 HV	264	239	283	157	522	258	132	332	264	300	232	125	18	M12	34	80	160	200	22	80
GMa/GLa 10.2 HV	264	287	324	239	611	258	132	332	264	300	232	207	18	M12	34	80	160	200	22	90
GMa/GLa 11.3 HV	320	280	324	200	604	295	160	390	300	350	260	150	20	M16	426	100	180	220	22	115
GMa/GLa 11.4 HV	320	330	374	290	704	295	160	390	300	350	260	245	24	M16	426	100	180	220	22	135
GMa/GLa 12.5 HV	360	325	380	260	705	360	180	440	336	400	296	210	30	M16	533	100	180	220	22	175
GMa/GLa 12.6 HV	360	381	436	340	817	360	180	500	396	460	356	290	27	M16	533	150	240	285	24	215
GMa/GLa 13.7 HV	400	383	423	330	806	436	200	570	440	510	380	270	35	M20	675	150	240	285	24	260
GMa/GLa 13.8 HV	400	453	493	470	946	436	200	570	440	510	380	410	27	M20	675	150	240	285	24	360
GMb/GLb 14.9 HV	500	470	510	350	980	538	250	652	484	600	432	290	35	M20	84	200	295	340	26	435
GMb/GLb 15.10 HV	630	468	545	360	1013	652	315	800	588	720	508	280	50	M20	106	200	295	340	26	610
GMb/GLb 15.11 HV	630	533	610	490	1143	652	315	800	588	720	508	410	50	M20	106	250	350	395	26	680
GMb/GLb 16.12 HV	710	506	603	442	1109	810	355	910	640	830	560	297	30	M24	135	250	350	395	24	970
GMb/GLb 16.13 HV	710	620	717	670	1337	810	355	910	640	830	560	525	30	M24	135	300	400	445	24	1120
GMb/GLb 16.13 HV	710	685	782	800	1467	810	355	910	640	830	560	655	30	M24	135	300	400	445	24	1160
GMb 17.15 HV	1000	782	825	855	1607	1005	500	930		810		725	50	M30	1675	350	460	505	24	2020
GMb 18.17 HV	1120	950	994	1120	1944	1240	560	1160		1050		900	50	M30	210	500	620	670	34	3400
GMa 19.19 HV	1420	1075	1079	1270	2154	1518	710	1320		1200		1010	50	M30	264	600	725	780	36	5070
GMa 20.21 HV	1800	1567	1468	1965	3039	1879	630	1640		1500		1615	50	M30	320	800	950	1015	44	10400

Allowable mechanical loading capacity acc. to sheet 4 TG - 3381, 4TG - 3382 and 4 TG - 4218

Socket flanges drilled acc. to DIN 2532 and 2533 respectively



**AERZEN. Compression as success factor.**

AERZEN was founded in 1864 as Aerzener Maschinenfabrik. In 1868 we built Europe's first rotary lobe blower. The first turbo blowers followed in 1911, the first screw compressors in 1943, and in 2010 the world's first rotary lobe compressor unit. AERZEN innovations are a driving force behind the development of compressor technology. Today AERZEN is one of the world's oldest and most important manufacturers of rotary lobe blowers, rotary lobe compressors, rotary lobe gas meters, screw compressors, and turbo blowers. And in many areas of application, AERZEN is among the undisputed leaders.

There are more than 2000 experienced AERZEN employees in over 43 subsidiary companies worldwide working hard to advance compressor technology. Their technological expertise, our international network of experts, and the constant feedback from our customers are the basis of our success. AERZEN products and services are setting standards in the industry for reliability, lasting value, and efficiency. Go ahead: challenge us!

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EXPECT PERFORMANCE