Operating Instructions

Rietschle

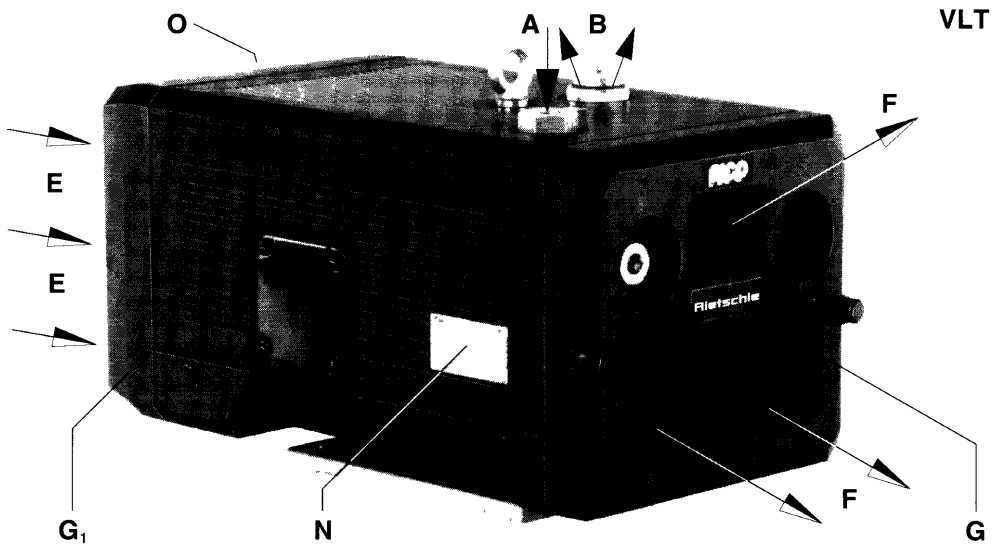
Vacuum pumps

VLT

PICO

VLT 6
VLT 10
VLT 15
VLT 25
VLT 40
VLT 60

VLT (01)



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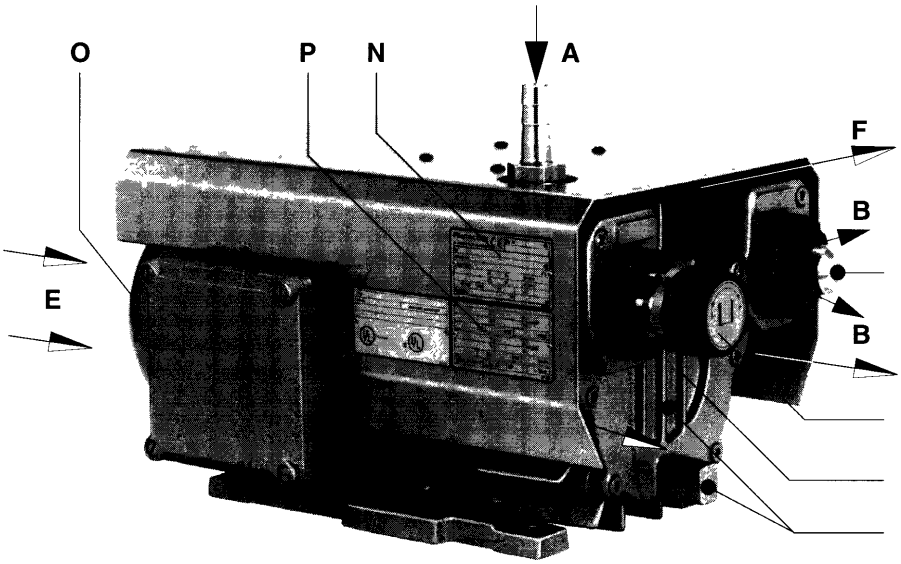
VLT (13)



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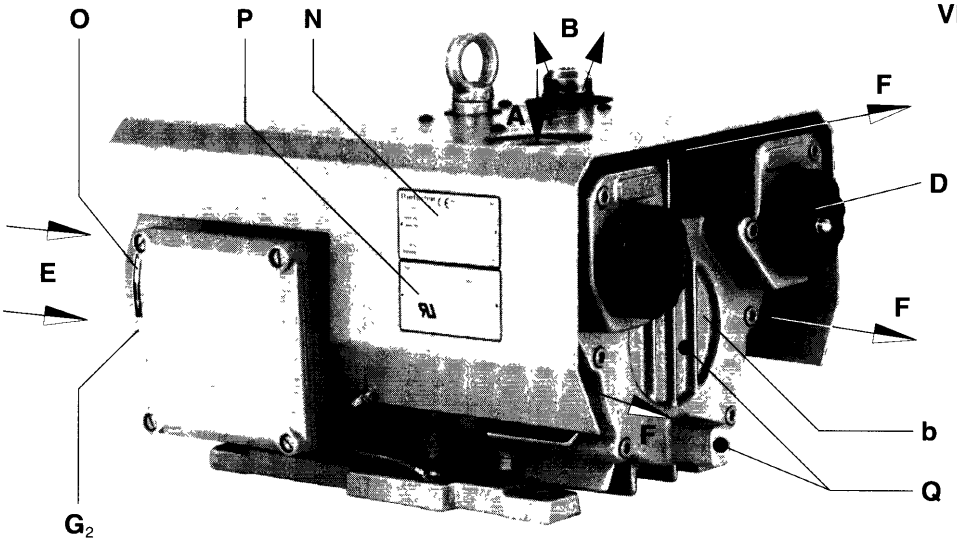
VLT (14)



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BE 280

1.1.96

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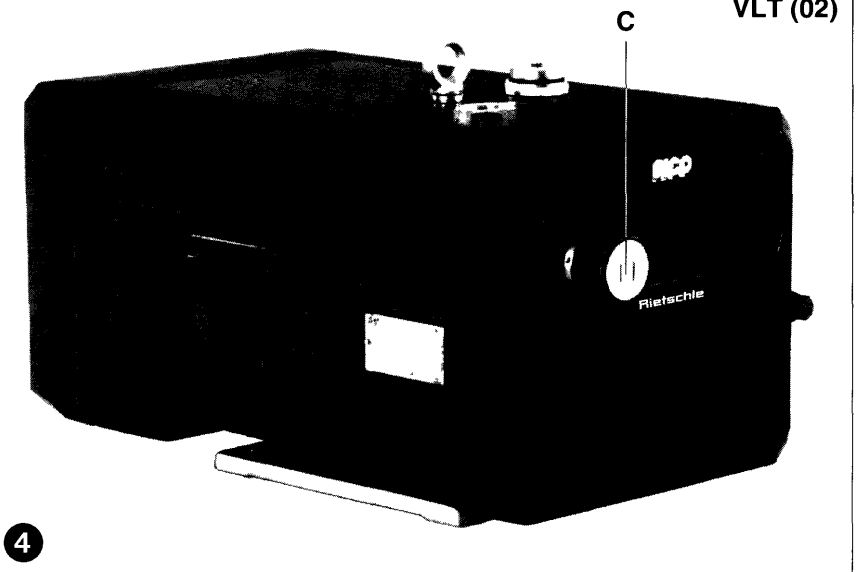
Pump ranges
These operating instructions concern the following dry running rotary vane vacuum pumps: Models VLT 6 to VLT 60.
The vacuum capacities at atmosphere are 6, 10, 15, 25, 40 and 60 m³/hr operating on 50 cycles. The pumping curves which show capacity against pressure, can be found in data sheet D 280.

Description
All models are complete with a vacuum connection and an exhaust silencer on the outlet. All the air handled is filtered by a built-in micro-fine filter.
Both the motor and pump have a common shaft.
The VLT (01) to (11) are encased in a rugged black plastic sound enclosure. The cooling fan is located inside the sound enclosure (pictures ❶ and ❹).
The VLT (13) to (50) are located in a sheet metal cover. The motor fan provides the cooling (pictures ❷ and ❸).
The VLT (14) has on the pressure side a vent valve (D) (picture ❸).
The VLT (02) and (13) have as standard a vacuum regulating valve (C), which can be adjusted to the level required, however it is limited to a maximum point (pictures ❷ and ❹).



❹

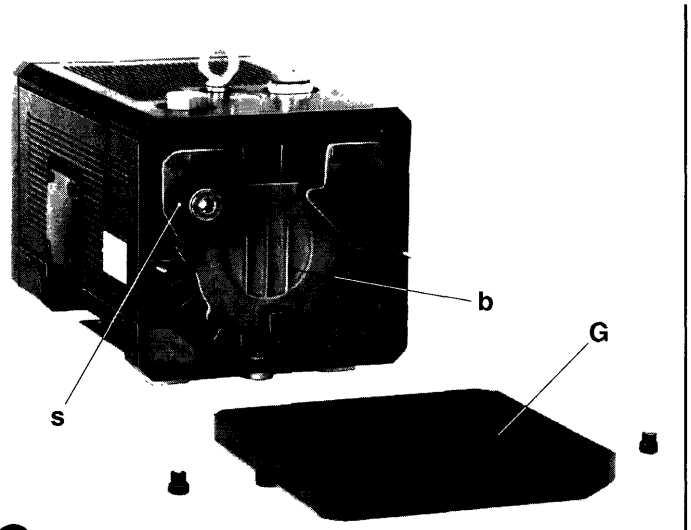
Optional extras (as required): Vacuum regulating valve (ZRV), non return valve (ZRK), motor starter (ZMS) and pipe connection (ZSA)

Suitability
The VLT can be used for the evacuation of a closed system or for a permanent vacuum from: 150 to 1000 mbar (abs.)
⚠ **The ambient and suction temperatures must be between 5 and 40°C. For temperatures outside this range please contact your supplier.**
These dry running vacuum pumps are suitable for use with air of a relative humidity of 30 to 90%.
⚠ **No dangerous mixtures (i.e flammable or explosive gases or vapours), extremely humid air, water vapour, aggressive gases or traces of oil and grease can be handled.**
For all applications where an unplanned shut down of the vacuum pump could possibly cause harm to persons or installations, a corresponding safety backup system must be installed.

Handling and Setting up (pictures ❶ to ❺)
⚠ **Pumps that have reached operating temperature may have a surface temperature at position (Q) of more than 70°C. WARNING! Do Not Touch.**
There must be a minimum space of 30 cm in front of the exhaust grid (G), suction grid (G_1) and housing cover (b) for servicing. The cooling air entries (E) and the cooling air exits (F) must have a minimum distance of 10 cm from any obstruction. The discharged cooling air must not be re-circulated.
The VLT pumps can only be operated reliably if they are installed horizontally.
⚠ **For installations that are higher than 1000 m above sea level there will be a loss in capacity. For further advice please contact your supplier.**
When the pumps are installed on a solid base, they do not need to be fixed down. If the pumps are installed on a base plate we would recommend fitting anti-vibration mounts. This range of vacuum pumps are almost vibration free in operation.

Installation (picture ❶ to ❸)
⚠ **For operating and installation follow any relevant national standards that are in operation.**
1. Vacuum connection at (A).
   The air handled can be exhausted into the atmosphere through the exhaust port (B) or by utilising a pipe connection and pipeline.
⚠ **Long and/or small bore pipework should be avoided, as this tends to reduce the capacity of the pump.**
2. The electrical data can be found on the data plate (N) or the motor data plate (P). The motors correspond to DIN/VDE 0530 and have IP 54 protection and insulation class F. The connection diagram can be found in the terminal box on the motor (unless a special plug connection is fitted). Check the electrical data of the motor for compatibility with your available supply (voltage, frequency, permissible current etc).
3. Connect the motor via motor starter. It is advisable to use thermal overload motor starters to protect the motor and wiring. All cabling used on starters should be secured with good quality cable clamps.
   We recommend that motor starters should be used that are fitted with a time delayed trip resulting from running beyond the amperage setting. When the unit is started cold overamperage may occur for a short time.

⚠ **Electrical connections should only be made by qualified electricians.**



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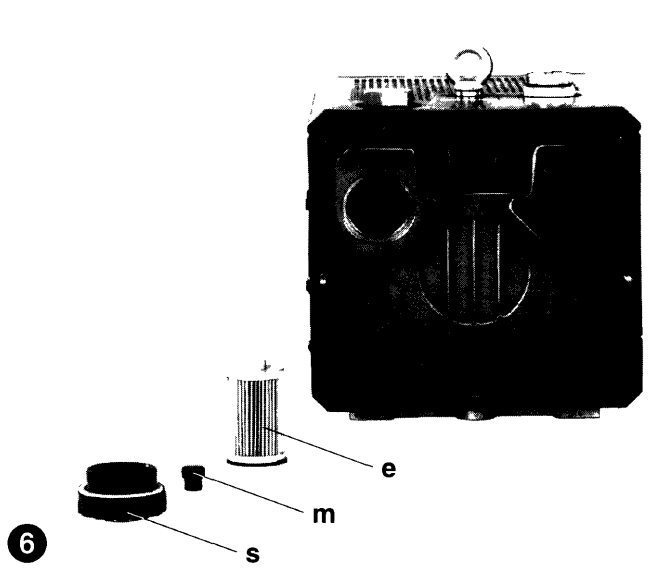

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Initial Operation (pictures ❶ to ❹)

1. Initially switch the pump on and off for a few seconds to check the direction of rotation against the direction arrow (O).
   Note: On this initial start the suction pipework should not be connected. If the pump runs backwards with the pipework connected a pressure could build up within the housing which could result in damaged rotor blades.
2. Connect the suction pipe at (A).
   ⚠ **For pipework longer than 3 m we recommend using non-return valves (ZRK), to avoid reverse rotation when the units are switched off.**
3. Vacuum regulating valve:
   The vacuum can be adjusted by turning the regulating valve (C) according to the symbols on the top of the regulating valve.

Potential risks for operating personnel

Noise Emission: The worst noise levels taking into consideration direction and intensity measured according to DIN 45635 part 3 (as per 3. GSGV), are shown in the table at the back. When working permanently in the vicinity of an operating pump, we recommend wearing ear protection to avoid any damage to hearing.

Maintenance and Servicing

⚠ **When maintaining these units and having such situations where personnel could be hurt by moving parts or by live electrical parts, the pump must be isolated by totally disconnecting the electrical supply. It is imperative that the unit cannot be re-started during the maintenance operation. Do not maintain a pump that is at its normal operating temperature as there is a danger from hot parts.**

1. Lubrication

The VLT pumps have bearings that are greased for life. They need not be serviced

2. Air filtration (pictures ❺ and ❻)

⚠ **The capacity of the pump could be reduced if the air inlet filters are not maintained correctly.**

The filter cartridge (e) for vacuum air has to be cleaned depending on the amount of contamination. This is achieved by blowing compressed air from the inside of the cartridge outwards. Even if the cartridges are cleaned their separating efficiency deteriorates. We would therefore recommend exchanging the cartridges every six months.

Changing the filter:

VLT (01) - (11) → remove exhaust grid (G). Take off screw cap (s) and milled knob (m). Pull filter cartridge (e) off and clean or exchange. Re-assemble in reverse order.

3. Blades (pictures ❺ and ❼)

Checking blades: VLT 6 - 25 have 6 blades whilst the VLT 40 / 60 have 7 blades. The blades have a low but permanent wear factor.

VLT 6, VLT 10 and VLT 15: first check after 7,000 operating hours, thereafter every 1,000 operating hours.

VLT 25, VLT 40 and VLT 60. first check after 5,000 operating hours, thereafter every 1,000 operating hours.

VLT (01) - (11) → remove exhaust grid (G) Take off housing cover (b) from housing. Remove blades (d) for inspection. All blades must have a minimum height (X):

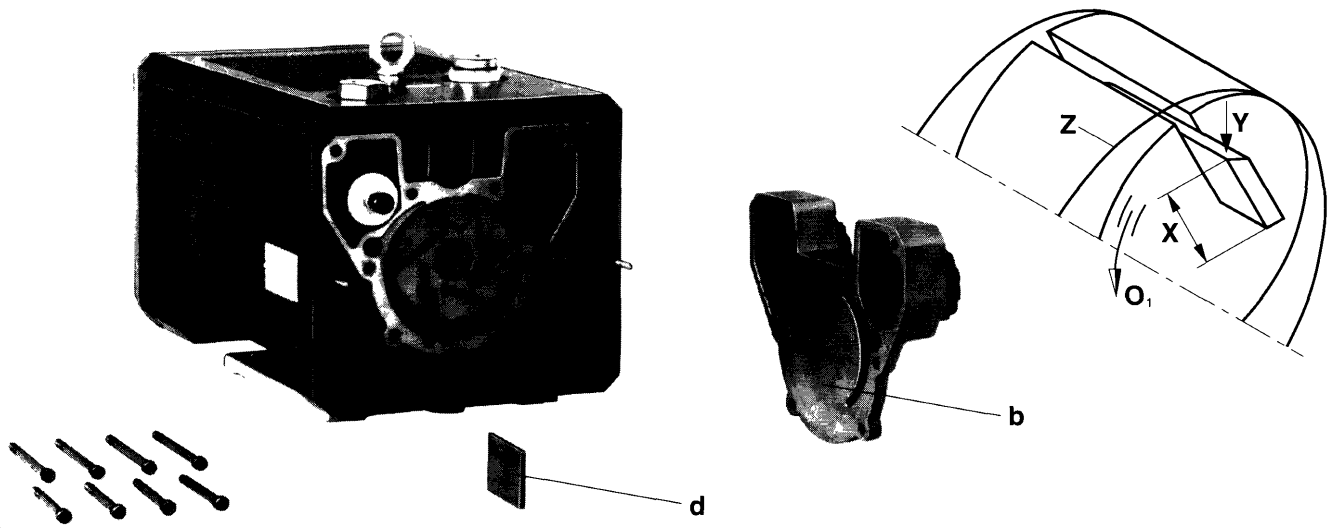
Model	X (minimum height)
VLT 6	20 mm
VLT 10	20 mm
VLT 15	24 mm
VLT 25	24 mm
VLT 40	35 mm
VLT 60	35 mm

⚠ **Blades must be changed completely.**

Changing blades: if the minimum height is reached, then the whole set of rotor blades should be changed.

Before fitting new blades clean the housing and rotor slots with compressed air. Place the blades with the radius outwards (Y) such that the bevel is in the direction of rotation (O_1) and corresponds with the radius of the housing (Z).

Fix end cover (b) and exhaust grid (G). Before restarting the pump check free movement of the blades by turning the motor cooling fan before refitting the cooling grid (G_1) or fan cover (G_2)



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Trouble Shooting:

1. Motor starter cuts out vacuum pump:

1.1 Check that incoming voltage and frequency corresponds with the motor data plate.
1 2 Check the connections on the motor terminal block.
1.3 Incorrect setting on the motor starter.
1.4 Motor starter trips too fast.
Solution: Use a motor starter with a time delay trip (version as per IEC 947-4).
1.5 Back pressure on the exhaust pipework is excessive

2. Insufficient suction capacity:

2.1 Inlet filters are obscured.
2.2 Suction pipework is too long or too small.
2.3 Leak on the pump or on the system.
2.4 Blades are damaged.

3. Vacuum pump does not reach ultimate vacuum:

3.1 Check for leaks on the suction side of the pump or on the system.
3.2 Blades are worn or damaged.

4. Vacuum pump operates at an abnormally high temperature:

4.1 Ambient or suction temperature too high
4.2 Cooling air flow is restricted.
4 3 Problem as per 1.5.

5. Unit emits abnormal noise:

5.1 The pump cylinder is worn.
Solution: send your complete unit off for repair to the supplier or approved service agent.
5.2 The regulating valve (if existing) is noisy.
Solution· replace valve.
5.3 Blades are damaged.

Appendix:

Repair on Site: For all repairs on site an electrician must disconnect the motor so that an accidental start of the unit cannot happen.
All engineers are recommended to consult the original manufacturer or one of the subsidiaries, agents or service agents. The address of the nearest repair workshop can be obtained from the manufacturer on application.
After a repair or before re-installation follow the instructions as shown under the headings "Installation and Initial Operation".

Lifting and Transport: To lift and transport the VLT 15 - VLT 60 the eye bolt on the pump must be used.
The weight of the pumps are shown in the accompanying table.

Storage. VLT units must be stored in dry ambient conditions with normal humidity We recommend for a relative humidity of over 80% that the pump should be stored in a closed container with the appropriate "drying" chemicals.

Disposal: The fast wearing parts (as listed in the spare parts lists) should be disposed of with due regard to health and safety regulations.

Spare part lists:
E 280 → VLT 6 - VLT 60 (01) - (11)
E 281 → VLT 15 (13)
E 282 → VLT 15 (14)

VLT			6	10	15	25	40	60
Noise level (max.)	dB(A)	50 Hz	63	65	68	71	73	79
		60 Hz	65	68	70	74	75	82
Weight (max.)	kg	3 ~	16	18	26	30	38	40
		1 ~	17	20	28	32	40	-

VLT (01) - (11)		6	10	15	25	40	60
Length	mm	370	390	442	473	545	545
Length + ZRV	mm	402	422	476	507	593	593
Width	mm	209	209	241	241	269	269
Height	mm	208	208	246	246	272	272

VLT		15 (13)	15 (14)	15 (15)	10 (50)
Length	mm	427	382	413	318
Width	mm	248	248	248	204
Height	mm	230	215	194	195

		Grundteile	**Basic parts**	**Eléments de base**	**Parti fondamentali**
1		Gehäuse	Housing	Corps	Corpo pompa
2		Rotor	Rotor	Rotor	Rotore
3	V	Lamelle	Blade	Palette	Paletta
4		Stutzscheibe	Disc	Disque	Disco
5		Scheibe	Disc	Disque	Disco
6		Federscheibe	Spring shim	Rondelle ressort	Disco elastico
7		Sechskantschraube	Hexagon head screw	Boulon six pans	Vite con testa esagonale
8		Gehäusedeckel	End cover	Couvercle de corps	Coperchio corpo pompa
9		Stiftschraube	Threaded pin	Vis filetée	Vite prigioniera
10		Druckfeder	Spring	Ressort	Molla a pressione
11	V	Micro-Top-Patrone	Filter cartridge	Cartouche filtre	Cartuccia filtrante
		komplett	complete	complet	completo
13		Randelknopf	Milled knob	Molette crénelé	Pomello della zigrinato
22		Scheibe	Disc	Disque	Disco
		Anschlußdeckel	**Connection cover**	**Couvercle raccordement**	**Coperchio di collegamento**
30		Anschlußdeckel	Connection cover	Couvercle raccordement	Coperchio di collegamento
31	D	Dichtring	Sealing ring	Anneau d'étanchéité	Anello guarnizione
32		Stutzring	Supporting ring	Anneau support	Anello d'appoggio
33	V	Rillenkugellager	Deep groove ball bearing	Roulement aiguille	Cuscinetto a sfera
36		Schwingmetallpuffer	Rubber foot	Silen bloc	Piedini antivibrante
37		Parabelpuffer	Rubber foot	Silen bloc	Piedini antivibrante
38		Sechskantmutter	Hexhead screw	Ecrou six pans	Dado con testa esagonale
39		Schwingmetallpuffer	Rubber foot	Silen bloc	Piedini antivibrante
40		Fuß	Foot	Socle	Piedistallo
41		Halterung	Mounting	Fixation	Supporto
42		Ringschraube	Lifting eye	Piton	Golfare
		Antrieb	**Drive**	**Entraînement**	**Azionamento**
45		Motor (3~)	Motor (3~)	Moteur (3~)	Motore (3~)
46		Motor (1~)	Motor (1~)	Moteur (1~)	Motore (1~)
47		Antriebswelle (3~)	Drive shaft (3~)	Arbre d'entraînement (3~)	Albero di azionamento (3~)
48		Antriebswelle (1~)	Drive shaft (1~)	Arbre d'entraînement (1~)	Albero di azionamento (1~)
49	V	Rillenkugellager	Deep groove ball bearing	Roulement aiguille	Cuscinetto a sfera
50		Kondensator	Condenser	Condensateur	Condensatore

		Kühlung	**Cooling**	**Refroidissement**	**Raffreddamento**
55		Ventilator	Fan	Ventilateur	Ventilatore
56		Ventilatornabe	Fan hub	Noyau ventilateur	Mozzo ventilatore
57	V	Toleranzring	Tolerance ring	Entretoise	Anello di tolleranza
58		Luftleitblech	Air guiding plate	Tôle guide d'air	Deflettore dell'aria
59		Scheibe	Disc	Disque	Disco
		Box	**Box**	**Boîte**	**Scatola**
70		Unterteil	Lower part	Elément inférieur	Parte inferiore
71		Seitenteil	Side part	Elément latérale	Parte laterale
72		Seitenteil	Side part	Elément latérale	Parte laterale
73		Stiftschraube	Threaded pin	Vis filetée	Vite prigioniera
74		Oberteil	Upper part	Elément supérieur	Parte superiore
75		Ausblasgitter	Exhaust grid	Grille refoulement	Griglia di scarico
76		Ansauggitter	Suction grid	Grille d'aspiration	Griglia di aspirazione
77		Puffer	Buffer	Antivibratoire	Antivibrante
		Schilder	**Labels**	**Plaques signalétiques**	**Targhette**
80		Datenschild	Data plate	Etiquette caractéristique	Targhetta dati
		Anbauteile	**Assembly parts**	**Eléments de montage**	**Elementi di montaggio**
90		Anschlußnippel	Connection nipple	Embout raccordement	Nipplo di collegamento
91	D	Dichtring	Sealing ring	Anneau d'étanchéité	Anello guarnizione
92		Schraubdeckel	Screwed cover	Couvercle filetée	Coperchio di filettato
93	D	Dichtring	Sealing ring	Anneau d'étanchéité	Anello guarnizione
94		Vakuum-Regulierventil	Vacuum regulating valve	Valve réglage vide	Valvola regolazione vuoto
		Variante (02)	Variant (02)	Variante (02)	Variante (02)
96		Schraubdeckel	Screwed cover	Couvercle filetée	Coperchio di filettato
98		Ausblas-Schalldämpfer	Exhaust silencer	Silencieux refoulement	Silenziatore di scarico
99		Verschlußschraube	Plug	Bouche obturateur	Vite di chiusura
201		Schrauben	Screws	Vis	Viti
↓					
209					

Bei Bestellungen folgendes angeben: Typ, Fabrikations-Nr., Positions-Nr., Motor (kW, V, Hz)
To order please indicate: model, serial-no , item-no., motor (kW, V, Hz)
En cas de commande préciser: type, d'appareil, no. de position des pièces, moteur (kW, V, Hz)
Nell'ordine indicare: tipo, il numero di matricola, il numero di posizione dei recambi, il motore (kW, V, Hz)

V = Verschleißteile **D** = Dichtungen
V = Fast-wearing parts **D** = Seals
V = Pièces d'usure **D** = Joints
V = Parti usurabili **D** = Guarnizioni

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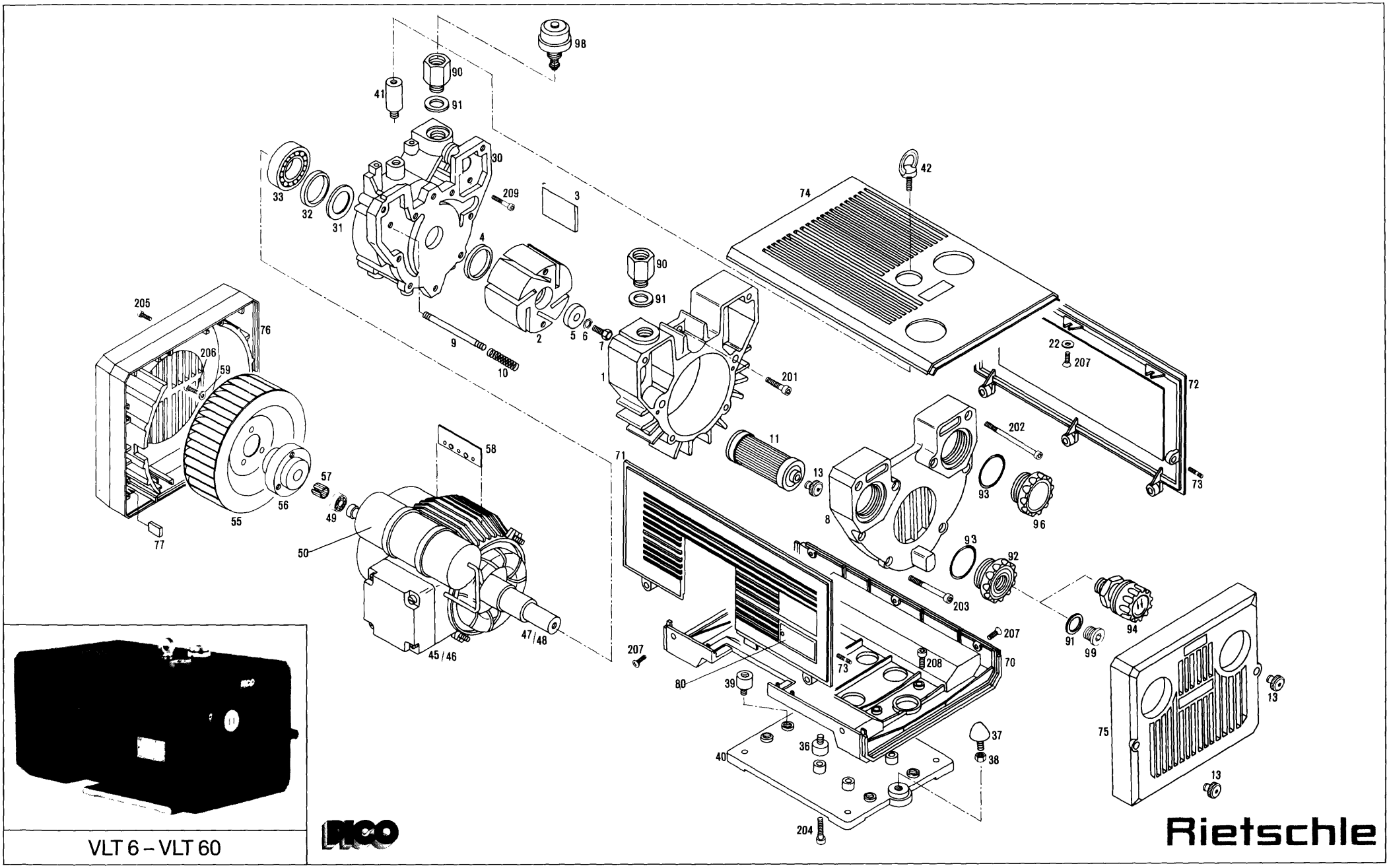

VLT 6 – VLT 60

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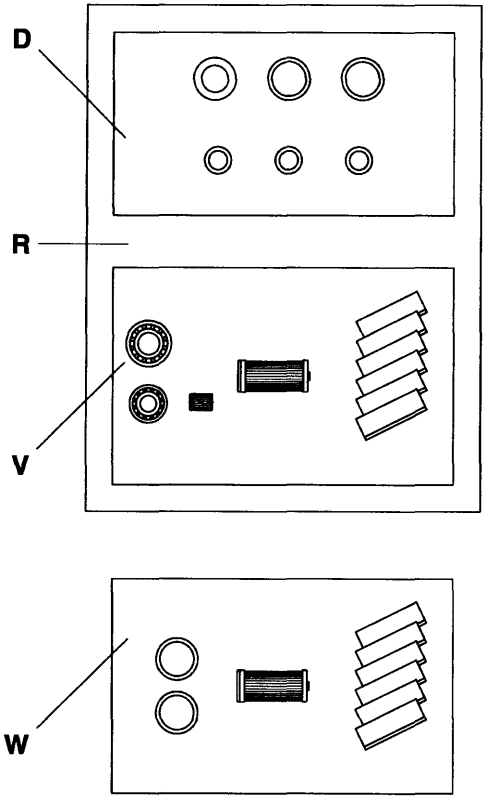
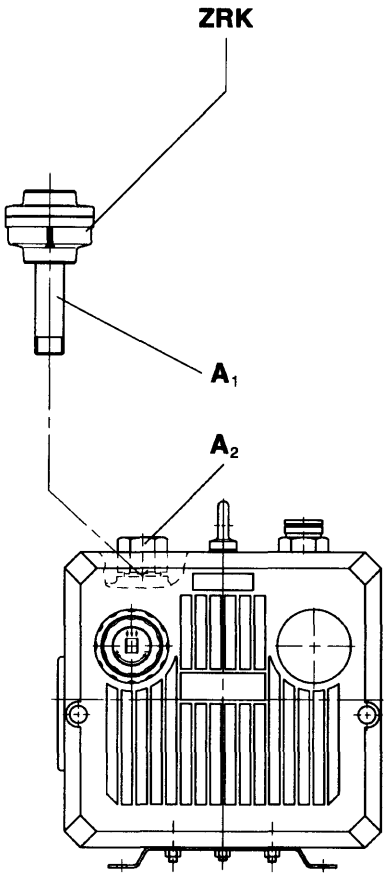
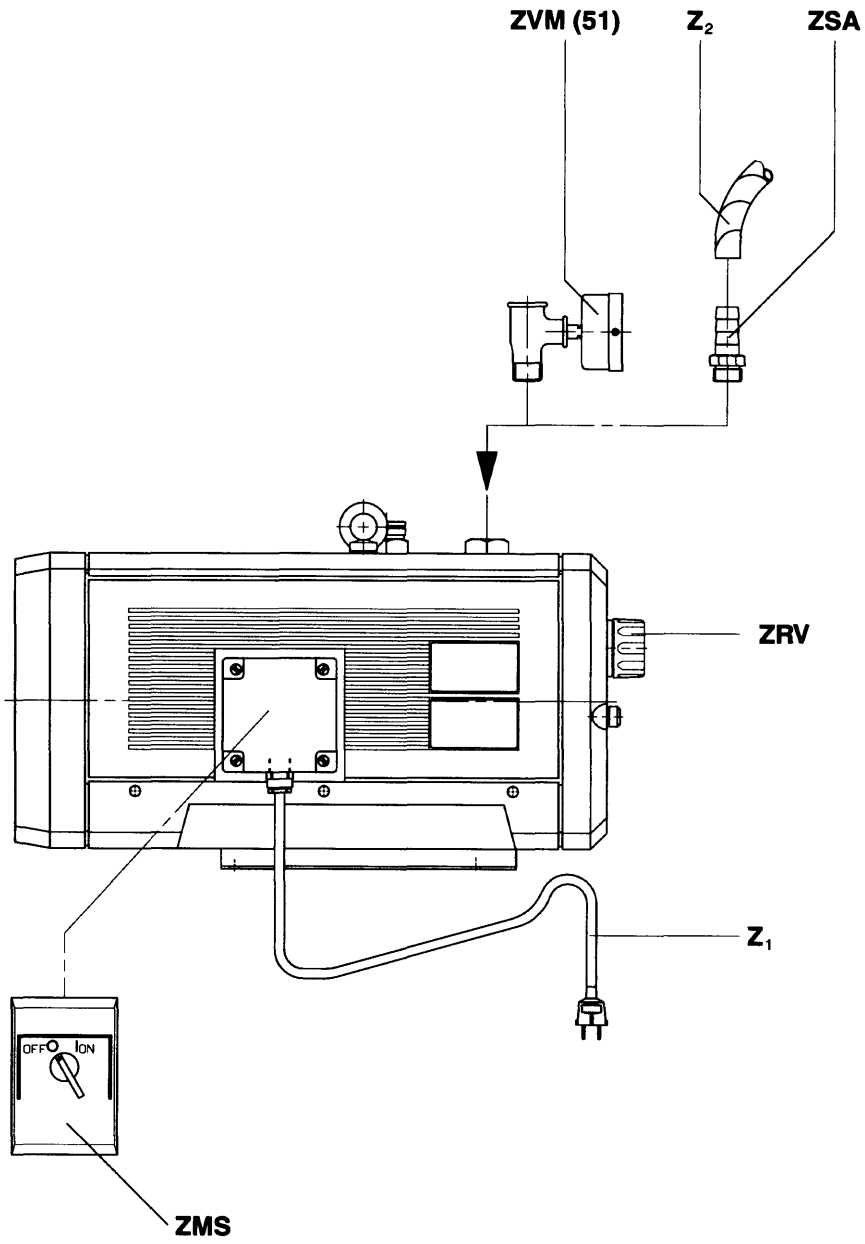
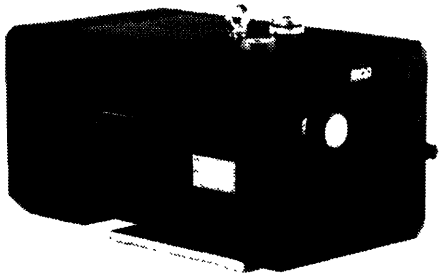






VLT 6 - 60



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VLT	6	10	15 / 25	40 / 60
ZRK	209807	201679	209808	209809
A_1	640057	640057	640060	640063
A_2	523040	523040	522999	523413

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	Deutsch	English	Francais	Italiano	Nederlands
D	Dichtungssatz	Gasket set	Pochette de joints	Serie guarnizioni	Pakkingset
V	Verschleißteilsatz	Wearing parts set	Kit pièces d'usure	Serie parti usurabili	Set slijtdelen
R	Reparatursatz	Repair set	Kit d'entretien	Set revisione	Reparatie set
W	Wartungssätze	Maintenance sets	Kit de première intervention	Set manutenzione	Service set
ZMS	Motorschutzschalter	Motor starter	Disjoncteur moteur	Interruttore magnetotermico	Motor beveiliging schakelaar
ZRK	Rückschlagventil	Non return valve	Clapet anti-retour	Valvola di non ritorno	Terugslagklep
ZRV	Vakuum-Regulierventil	Vacuum regulating valve	Valve réglage vide	Valvola regolazione vuoto	Vacuüm regelventiel
ZSA	Schlauchanschluß	Hose connection	Raccord tuyau	Attacco portagomma	Slangpilaar
ZVM	Vakuummeter	Vacuum gauge	Vacuomètre	Vacuometro	Vacuüm meter
Z_1	Anschlußkabel mit Stecker	Connection cable with plug	Câble raccordement avec fiche	Cavo di collegamento con prese	Aansluitsnoer met stekker
Z_2	Schlauch	Flexible pipe	Tuyau flexible	Tubo flessibile	Slang

	Español	Português	Dansk	Svensk	Suomi
D	Kitt de juntas	Jogo de juntas	Pakningssæt	Packningssats	Tiivistesarja
V	Kitt partes desgastables	Jogo de peças de desgaste	Sliddelssæt	Slitdelssats	Kulutusosasarja
R	Kitt de revisión	Jogo de revisão geral	Reparationssæt	Renoveringssats	Korjaussarja
W	Kitt de mantenimiento	Jogo de manutenção	Servicesæt	Servicesats	Huolto-osasarja
ZMS	Interruptor guarda motor	Discontactor para motor	Motorværn	Motorskyddsbrytare	Moottorin suojakytkin
ZRK	Válvula de retención	Válvula anti-retorno	Tilbageslagsventil	Backventil	Takaiskuventtiili
ZRV	Válvula reguladora de vacio	Válvula de regulação de vácuo	Vakuumreguleringsventil	Vakuumreglerventil	Alipalneen säätöventtiili
ZSA	Racord conexión	Ponteira para tubo flexível	Slangestuds	Slangnippel	Letkuliitin
ZVM	Vacuómetro	Vacuómetro	Vakuumeter	Vakuumeter	Alipainemittari
Z_1	Cable conector con clavija	Cabo com ficha de ligação	Kabel med stik	Kabel med stickpropp	Liitäntäkaapeli
Z_6	Tubo flexible	Tubo flexível	Slange	Slang	Joustava liitos

Bei Bestellungen folgendes angeben: Typ, Baugröße, Motordaten
To order please indicate: Model, size, motor data
En cas de commande préciser: Type, série, caractéristique moteur
Nell'ordine indicare: Tipo, grandezza construttiva, dati motore
Bij bestelling vermelden: Type, bouwgrotte, motorgegevens

En caso de pedido precisamos: Modelo, serie, caracteristicas del motor
Ao encomendar indique: Modelo, tamanho, características do motor
Ved bestilling opgiv: Type, størrelse og motordata
Vid beställning ange: Typ, storlek, motordata
Tilattaessa mainittava: Tyyppi, koko, moottorin tiedot

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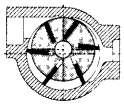
7025476, 7025490, 7025506, 7025518

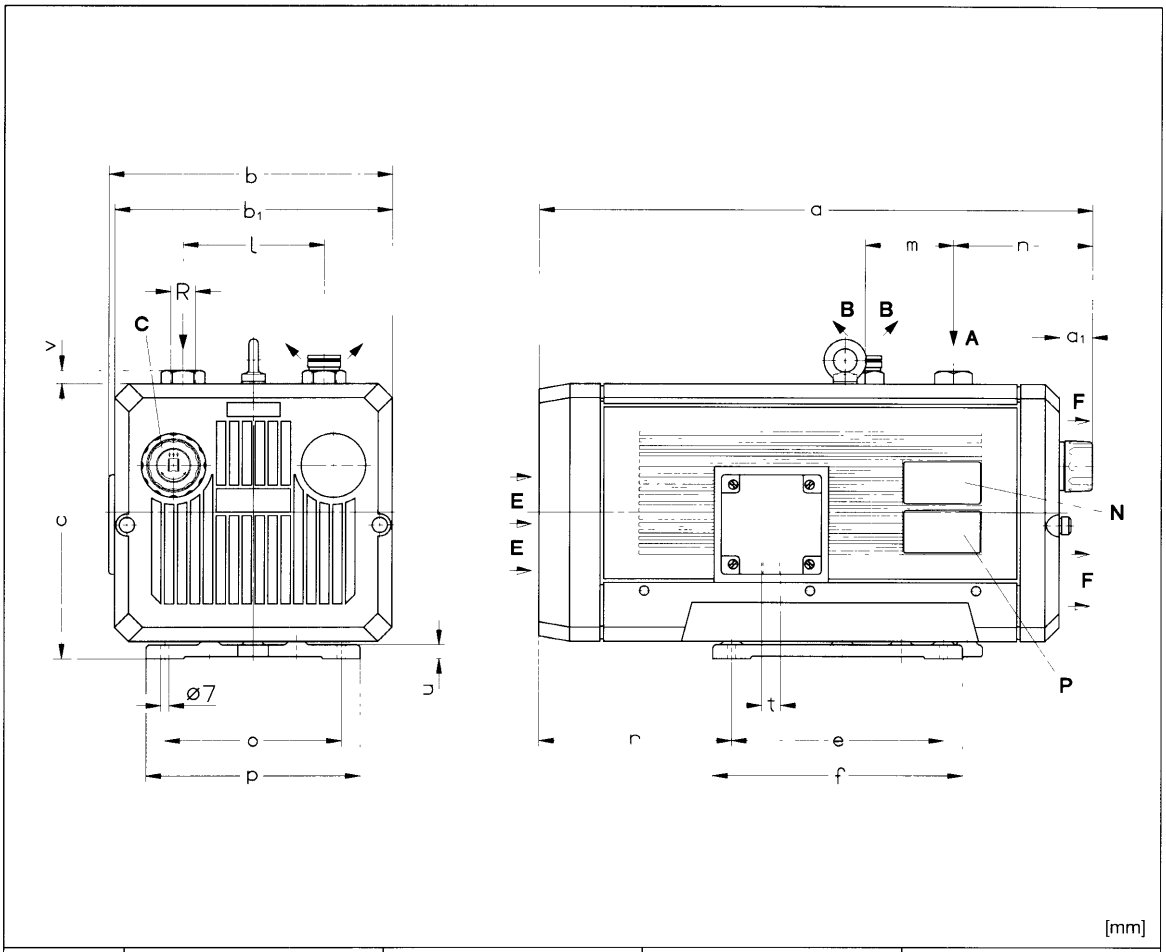
Daten

Rietschle

Vakuum-pumpen | Vacuum Pumps | Pompes à vide | Pompe per vuoto

VLT





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A	Vakuum-Anschluß	Vacuum connection	Raccord du vide	Attacco vuoto
B	Abluft-Austritt	Exhaust	Refoulement	Scarico aria
C	Vakuum-Regulierventil (Zubehör)	Regulation valve (Accessories)	Valve de règlage du vide (Accessoires)	Valvola regolazione vuoto (Accessori)
E	Kühlluft-Eintritt	Cooling air entry	Entrée air refroidissement	Entrata aria di raffredd.
F	Kühlluft-Austritt	Cooling air exit	Sortie air refroidissement	Uscita aria di raffredd
N	Datenschild	Data plate	Etiquette caractéristique	Targhetta dati
P	Motordatenschild	Motor name plate	Etiquette caractérist. moteur	Targhetta dati del motore

VLT		6	10	15	25	40	60
[mm]	a	402	422	476	507	593	593
	a_1	32	32	34	34	48	48
	b	209	209	241	241	269	269
	b_1	200	200	236	236	266	266
	c	200	200	235	235	260	260
	e	150	150	180	180	200	200
	f	182	182	212	212	240	240
	l	94	94	120	120	150	150
	m	58	58	75	75	80	80
	n	108	128	124	155	178	178
	o	140	140	150	150	190	190
	p	172	172	182	182	230	230
	r	135	135	164	164	200	200
	t	Pg 11	Pg 11	Pg 16	Pg 16	Pg 16	Pg 16
	u	12	12	12	12	16	16
	v	8	8	11	11	12	12
	R	G 3/8	G 3/8	G 1/2	G 1/2	G 3/4	G 3/4

VLT 6
VLT 10
VLT 15
VLT 25
VLT 40
VLT 60

D 280

1.6.95

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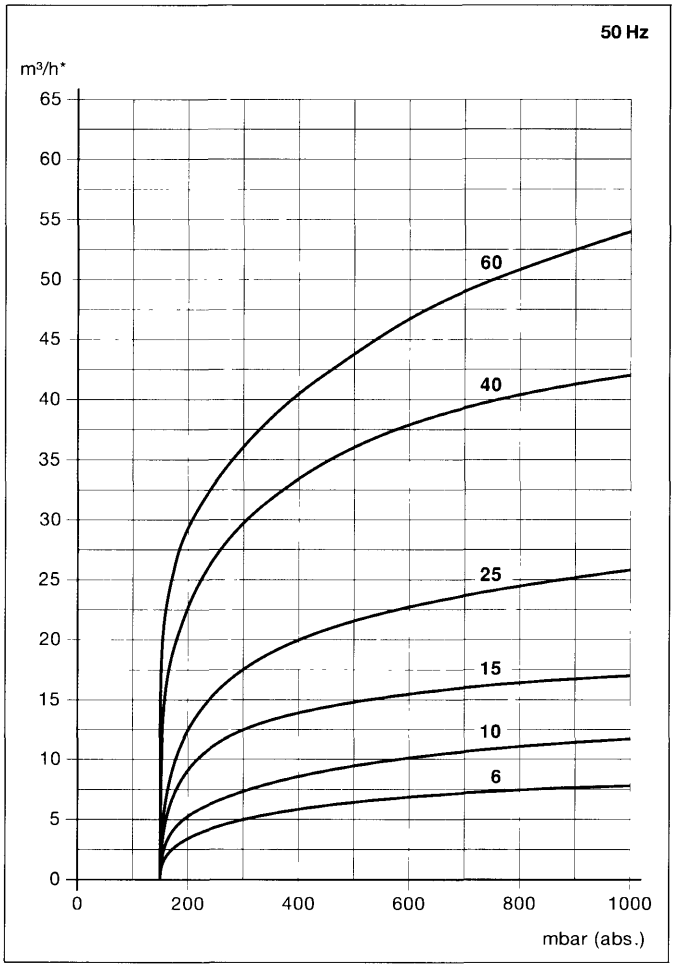
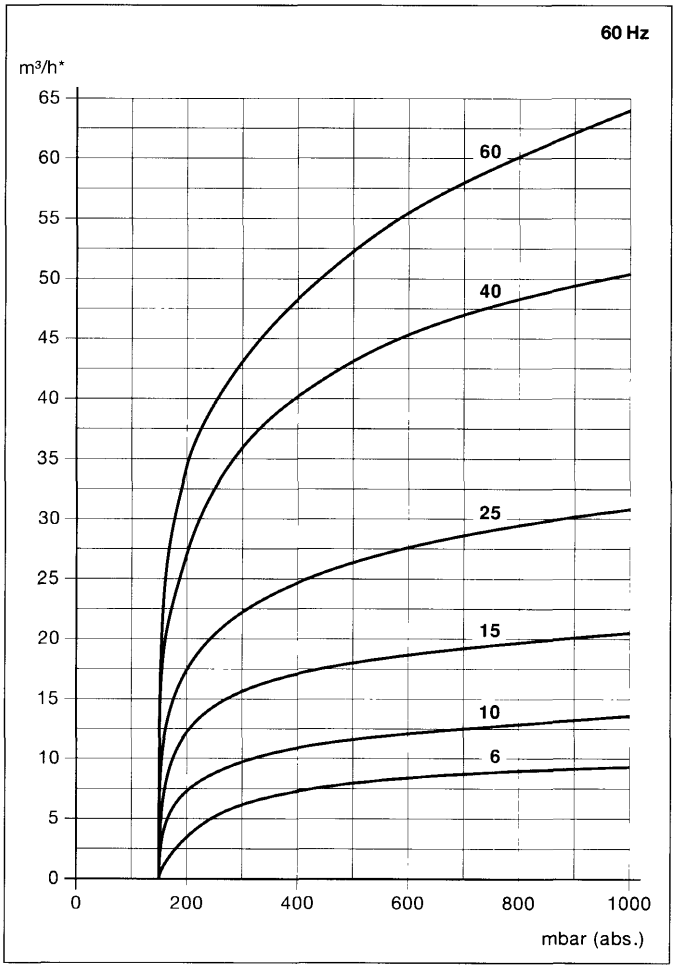
VLT		6	10	15	25	40	60
m^3/h	50 Hz	7,7	11,7	17,0	25,8	42,0	54,0
	60 Hz	9,2	13,5	20,5	30,7	50,4	64,0
mbar (abs)*		150					
3 ~	50 Hz	230/400 V ± 10%					
	60 Hz	220/380 V					
1 ~	50 Hz	230 V ± 10%					-
	60 Hz	220 V ± 10%					-
$kW_{(50\,Hz)}$	3 ~	0,25	0,37	0,55	0,75	1,5	1,85
	1 ~	0,25	0,37	0,55	0,75	1,7	-
$kW_{(60\,Hz)}$	3 ~	0,3	0,44	0,65	0,9	1,8	2,2
	1 ~	0,3	0,44	0,65	0,9	1,85	-
$A_{(50\,Hz)}$	3 ~	#	2,1/1,2	2,77/1,6	3,55/2,05	6,6/3,8	6,9/4,0
	1 ~	3,0	3,2	5,1	6,3	12,0	-
$A_{(60\,Hz)}$	3 ~	#	2,9/1,7	3,3/1,9	4,9/2,8	8,5/4,9	9,8/5,7
	1 ~	2,2	2,9	4,5	6,3	13,0	-
min^{-1}	50 Hz	1450					
	60 Hz	1740					
dB(A)	50 Hz	59	60	62	64	69	73
	60 Hz	60	61	63	66	71	75
kg	3 ~	15,6	18,3	26,2	30,2	37,8	47
	1 ~	16,7	19,8	28,0	31,9	40,3	-
ZRV		12/0	12/0	13/0	13/0	20/0	20/0
ZRK		12 (00)	12 (00)	13 (00)	13 (00)	20 (00)	20 (00)
ZSA		12	12	13	13	20	20
$ZMS_{(50\,Hz)}$	3 ~	#	24/16	40/24	40/24	100/40	100/60
	1 ~	40	40	60	100	160	-
$ZMS_{(60\,Hz)}$	3 ~	#	40/24	40/24	60/40	100/40	100/60
	1 ~	24	40	60	100	160	-

m^3/h	Saugvermogen	Capacity	Débit	Portata
mbar (abs.)*	Enddruck	Ultimate vacuum	Pression limite	Pressione finale
mbar (abs.)	Ansaugdruck	Suction pressure	Pression d'aspiration	Pressione di aspirazione
3 ~/1 ~	Motorausfuhrung	Motor version	Exécution moteur	Esecuzione motore
kW	Motorleistung	Motor rating	Puissance moteur	Potenza motore
A	Stromaufnahme	Current drawn	Intensité absorbée	Corrente nominale
min^{-1}	Drehzahl	Speed	Vitesse rotation	Numero giri
dB(A)	mittlerer Schallpegel	Average noise level	Niveau sonore moyen	Rumorosità media
kg	max. Gewicht	Weight max.	Poids maxi.	Peso massimo
	Zubehor	Optional extras	Accessoires	Accessori
ZRV	Vakuum-Regulierventil	Vacuum regulation valve	Valve de règlage vide	Valvola regolazione vuoto
ZRK	Rückschlagventil	Non return valve	Clapet anti-retour	Valvola di non ritorno
ZSA	Schlauchanschluß	Hose connection	Raccord tuyau	Allaciamento flessibile
ZMS	Motorschutzschalter	Motor starter	Disjoncteur moteur	Interruttore magnetotermico





*bezogen auf den Zustand im Sauganschluß / Related to suction conditions at inlet connection / Relatif à l'état règnant à l'aspiration. / Riferito alle condizioni in aspirazione
Kennlinien und Tabellenangaben beziehen sich auf betriebswarme Vakuumpumpen / Curves and tables refer to vacuum pump at normal operating temperature / Les courbes et tableaux sont etablis, pompe a temperature de fonctionnement / Le curve caratteristiche ed i dati riportati nelle tabelle si riferiscono alle pompe per vuoto con funzionamento a regime
Technische Änderungen vorbehalten! / We reserve the right to alter technical information! / Sous réserve de modification technique / Salvo modifiche tecniche!
auf Anfrage / # on request / # sur demande / # a richiesta