

Hygienic Pump

Vitalobe

Type Series Booklet



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Type Series Booklet Vitalobe

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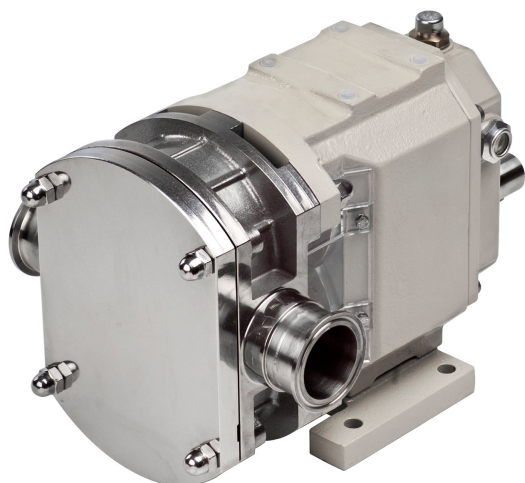
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Hygienic pump

Rotary lobe pump

Vitalobe



Product benefits

- Sturdily designed for high operating reliability
- Flexible configuration of rotors and process connections
- Maximum precision owing to drive shafts running in two bearings and precisely synchronised gear unit
- Bi-directional flow

Fluids handled

- Food and beverages industry
 - Dairy products: milk, soft cheese, yogurt, butter, whey, cream, curd
 - Food: Fruit and vegetable preserves, sauces, yeast, dough, fats and oils, soups, pudding, baby food, jelly, syrup, honey, chocolate
 - Beverages: beer, wine, soft drinks, must, fruit juices, fruit concentrates, yeast, wort, liqueur
- Pharmaceutical industry and cosmetics
 - Pastes, plasma, ointments, glucose, soap, gels, cream, lotions
- General industry and chemical industry
 - Paints/varnishes, emulsions, glue, lubricants, oil, adhesives, resins, Vaseline

Main applications

- Food and beverage industry
- Pharmaceutical industry
- Cosmetic industry
- General industry
- Chemical industry

Operating data

Operating properties

Characteristic		Value
Flow rate	Q	up to 300 m ³ /h (5,000 l/min)
Differential/Discharge pressure	p _D	up to 20 bar
System/Operating pressure	p _S	up to 30 bar
Fluid temperature	t	-40 °C to +200 °C
Viscosity	ν	≤3 000 000 cP
Volume displaced	V _V	max. 10.5 l/revolution

Designation

Example: Vitalobe B440/220 2 G H T

Key to the designation

Code	Description
Vitalobe	Type series
B	Design standard
440	Size
220	Motor rating (220 = 22 kW x 10)
2	Number of motor poles
G	Shaft seal design
H	Position of connections
T	Rotor type

Design details

Pump

- Hygienic rotary lobe pump
- Tri-lobe, bi-lobe or bi-wing rotors
- Wetted components made of 316L stainless steel
- High surface quality thanks to special polishing techniques
- Highly suitable for CIP/SIP routines

Drive

The motor speed is usually adjusted to the required pump speed by means of a gearbox or frequency inverter.

- Self-cooling IEC squirrel-cage motor
- Winding
 - up to 4 kW: 230 V/400 V – 50 Hz
 - 5.5 kW and above: 400 V/690 V – 50 Hz
- B3 type of construction
- Enclosure IP 55
- Thermal class F
- Mode of operation: Continuous operation S1
- Other motors on request

Bearings

The drive shafts run in two ball bearings each, whose design differs depending on the pump size.

Size 100: axial needle ball bearing and needle bearing

Sizes 110 - 490: angular contact ball bearing

Sizes 550 - 680: cylindrical roller bearing and two-row deep-groove ball bearing

The bearings are lubricated by the gearbox oil and do not require separate lubrication.

Shaft seal

A variety of mechanical seals (designs, materials) with standardised dimensions to EN 12756 (DIN 24960) can be used:

- Single

- Double
- With or without flushing system
- Internal or external

Mechanical seal material combinations

Code	Design	Material combination
G	Single external mechanical seal, balanced (standard design)	316/CARB/EPDM; TUC/CARB/EPDM; TUC/TUC/EPDM; CER/CARB/EPDM; CER/RUL/EPDM; SIC/SIC/EPDM; SIC/CARB/EPDM
VG	Single external mechanical seal, balanced, with flushing system	316/CARB/EPDM; TUC/CARB/EPDM; TUC/TUC/EPDM; CER/CARB/EPDM; CER/RUL/EPDM; SIC/SIC/EPDM; SIC/CARB/EPDM
Q	Double, external mechanical seal with flushing system	316/CARB/EPDM; TUC/CARB/EPDM; TUC/TUC/EPDM; CER/CARB/EPDM; CER/RUL/EPDM; SIC/SIC/EPDM; SIC/CARB/EPDM

Apart from EPDM, the elastomer seals of the mechanical seal are also available in NBR, FPM, PTFE, FFPM and FEP materials.

Key

Code	Material
CER	Ceramics
CARB	Graphite
EPDM	Ethylene propylene diene rubber
TUC	Tungsten carbide
SiC	Silicon carbide
316	Stainless steel AISI 316
RUL	Rulon
NBR	Nitrile rubber
FPM	Fluoroelastomer (Viton)
FFPM	Polytetrafluoroethylene
PTFE	Perfluoroelastomer
FEP	Fluorocarbon (PTFE-encapsulated silicone)

- FKM - Fluoroelastomer (Viton)
- FEP – Perfluoroethylene/propylene
- FFKM – Perfluoroelastomer

Connections

Standard: threaded connection to DIN 11851

Other types of connection:

- SMS thread
- Threaded to IDF/ISS standard
- Threaded to BS RJT standard
- Threaded connection to DIN 11864
- Tri-Clamp connections
- BSP connections
- Flanges to EN 1092-1
- Flanges to DIN 11864
- Other variants on request.

Gland packing

The gland packing consists of teflon rings sliding against a bush fitted on the rotating shaft. It is used above all for handling sticky fluids or fluids liable to solidify, whose lack of lubricating properties would destroy a mechanical seal. The gland packing can also be fed with a flushing or barrier liquid. This protects the gland packing against overheating and also constitutes a hydraulic barrier between the fluid handled and the atmosphere.

Lip seal

The seal seal consists of a joint ring made of FKM (Viton) or thermoplastic polyurethane (S1-Ecopur). The lip seal can either be designed to replace a mechanical seal, or fitted in the pump from the front end (i.e. rotor end) for greater ease of maintenance.

Static seals

The static seal elastomers are available in the following materials:

- NBR - Nitrile butadiene rubber
- EPDM - Ethylene propylene diene rubber

Materials

Overview of available materials

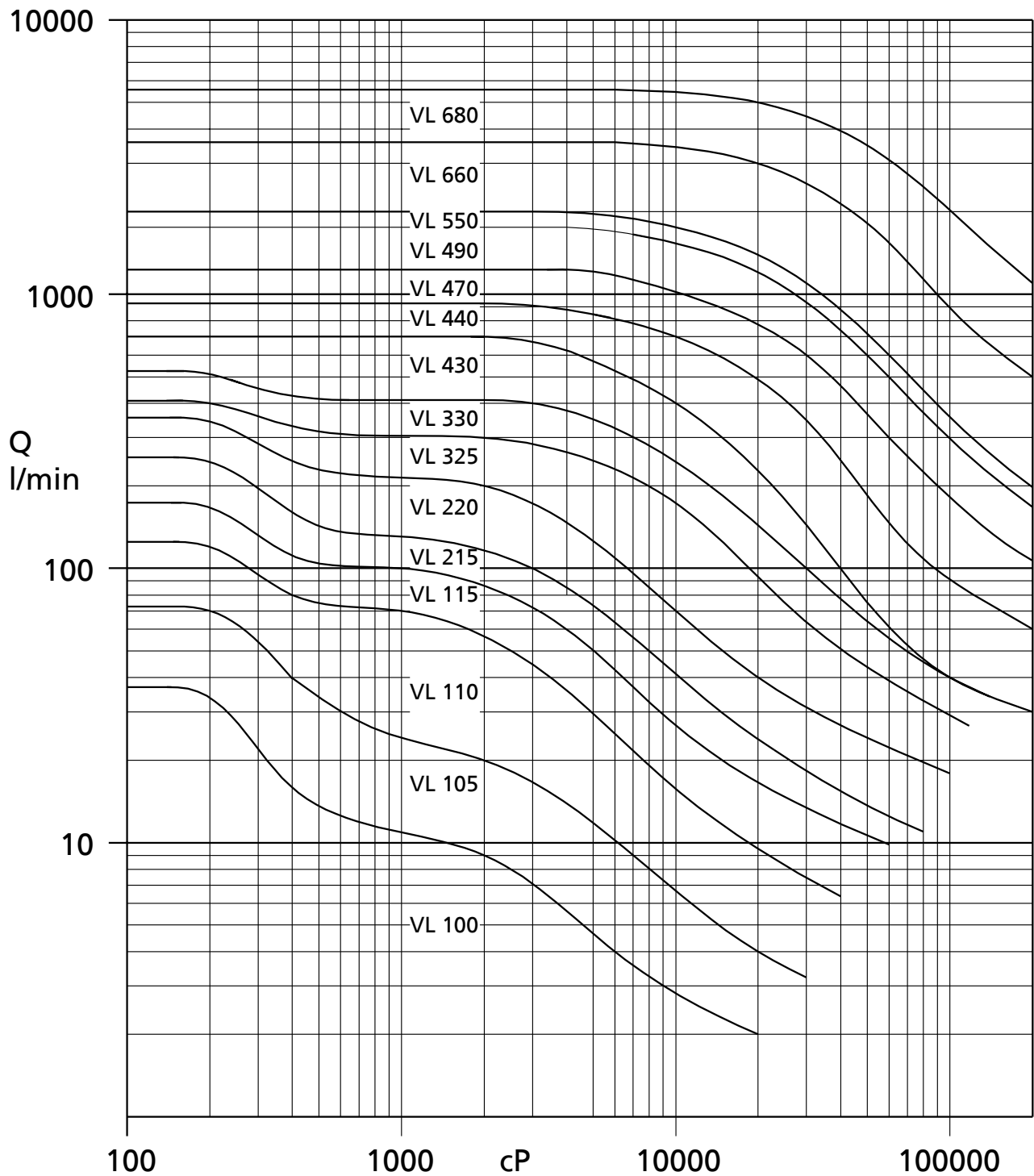
Component	Material
Rotor casing	1.4409 (AISI 316L)
Casing cover	1.4409 (AISI 316L)
Rotors	1.4404 (AISI 316L)
Rotor screws	1.4404 (AISI 316L)
Bearing bracket, gear housing	Cast iron, nickel-plated or painted
Drive shafts	1.4404 (AISI 316L)

Certifications and approvals

Certified quality management to ISO 9001

FDA-approved elastomers

Selection chart



For individual characteristic curves, refer to Vitalobe characteristic curve booklet 1969.56-10.

Maximum discharge pressure / volume displaced

Discharge pressure in bar, volume displaced in litres/revolution

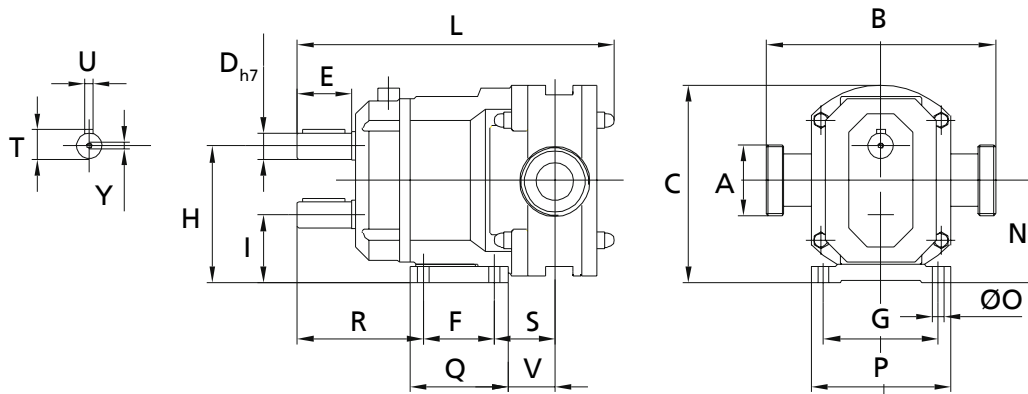
Vitalobe	Max. discharge pressure				Possible rotor type - volume displaced		
	Standard clearances		Increased clearances		Tri-lobe (316L) ¹⁾	Bi-lobe (316L)	Bi-wing (acetone)
	316L ¹⁾	Duplex steel	316L	Duplex steel			
100	7	10	-	-	0.035 ²⁾	0.035	-
105	10	13	15	18	0.075 ²⁾	-	0.07
110 ³⁾	10	13	15	18	0.138	-	0.124
115	7	10	12	15	0.204	0.2	0.19
215 ³⁾	10	13	15	18	0.274	0.274	0.244
220	7	10	12	15	0.39	0.39	0.34
325 ³⁾	10	13	15	18	0.62	0.62	0.55
330	7	10	12	15	0.79	0.79	0.7
390	5	7	10	12	1.0	1.0	0.9
430 ³⁾	10	13	15	18	1.31	1.3	1.17
440	7	10	12	15	1.75	1.74	1.56
470 ³⁾	10	13	15	18	2.38	2.36	2.1
490	7	10	12	15	3.27	3.24	2.88
550	5	-	7	-	4.0	4.0	3.8
660	7	-	-	-	7.6	-	-
680	5	-	-	-	11.4	-	-

Other configurations possible on request.

¹⁾ Standard design
²⁾ Gear-shaped rotor
³⁾ Also available in 20 bar design

Dimensions

Standard design



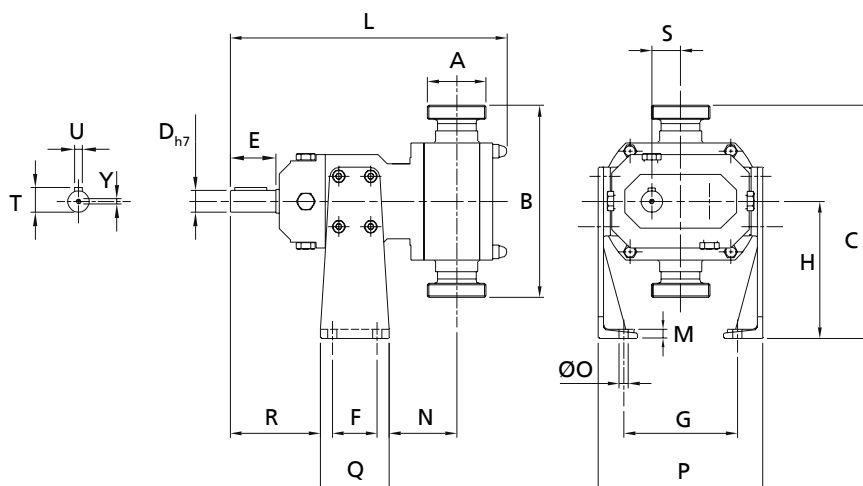
Dimensions in mm

Vitalobe	C	D	E	F	G	H	I	L	N	O	P	Q	R	S	T	U	V	Y	[kg]
100	115.5	18	45	65	105	80	-	265	58.6	9	125	85	108	52	20.5	6	42	-	10.5
105	181	24	50	65	105	125	62	290.5	93.5	10	128	90	115.5	55.5	27	8	42.5	M6	20
110	181	24	50	65	105	125	62	290.5	93.5	10	128	90	115.5	55.5	27	8	42.5	M6	20
115	181	24	50	65	105	125	62	302.5	93.5	10	128	90	115.5	67	27	8	54	M6	21
215	235.5	28	55	90	125	165	90	365.5	127.5	12	152	130	136.5	78	31	8	52	M8	41
220	235.5	28	55	90	125	165	90	380.5	127.5	12	152	130	136.5	87	31	8	61	M8	43
325	270	35	65	120	140	190	100	459	145	14	174	170	167	94	38.5	10	62	M10	63
330	270	35	65	120	140	190	100	474	145	14	174	170	167	103	38.5	10	71	M10	65
390	270	35	65	120	140	190	100	494	145	14	174	170	167	123	38.5	10	91	M10	69
430	367.5	48	85	140	190	255	130	543.5	192.5	18	235	195	206.5	109	52	14	76.5	M12	130
440	367.5	48	85	140	190	255	130	563.5	192.5	18	235	195	206.5	116.5	52	14	84	M12	135
470	442.5	55	110	150	250	300	160	654	230	22	300	255	255	143.5	60	16	63.5	M12	225
490	442.5	55	110	150	250	300	160	684	230	22	300	255	255	173	60	16	93	M12	233
550	515	55	110	200	300	350	178	637	264	19	350	250	227	106.5	60	16	81.5	M12	270
660	690	80	140	300	400	480	250	807	365	26	460	360	283	122	85	22	92	M16	610
680	690	80	140	300	400	480	250	867	365	26	460	360	283	152	88	22	122	M18	670

Dimensions in mm

Vitalobe	Connection													
	BSP		Flanges to DIN 2278, PN 16		DIN 11851		SMS		IDF/SMS		RJT		Tri-Clamp	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
100	1	160	DN 25	165	DN 25	160	25	143	DN 25	146	DN 25	157	1"	160
105	1" 1/2	170	DN 40	186	DN 40	210	38	210	DN 38	210	DN 38	210	1" 1/2	210
110	1" 1/2	170	DN 40	186	DN 40	210	38	210	DN 38	210	DN 38	210	1" 1/2	210
115	1" 1/2	170	DN 40	186	DN 40	210	38	210	DN 38	210	DN 38	210	1" 1/2	210
215	1" 1/2	208	DN 40	224	DN 40	248	38	248	DN 38	248	DN 38	248	1" 1/2	248
220	2	208	DN 50	228	DN 50	248	51	248	DN 51	248	DN 51	248	2"	248
325	1" 2/2	236	DN 65	256	DN 65	296	63	296	DN 63	296	DN 63	290	2" 1/2	293
330	3	236	DN 80	256	DN 80	296	76	296	DN 76	276	DN 76	286	3"	290
390	3	236	DN 80	256	DN 80	296	76	296	DN 76	276	DN 76	286	3"	290
430	3	335	DN 80	355	DN 80	395	76	395	DN 76	375	DN 76	385	3"	389
440	4	335	DN 100	355	DN 100	395	101	395	DN 101	378	DN 101	389	4"	392
470	4	385	DN 100	405	DN 100	445	101	445	DN 101	428	DN 101	439	4"	442
490	4	385	DN 100	405	DN 100	445	101	445	DN 101	428	DN 101	439	4"	442
550	-	-	DN 125	566	DN 125	632	-	-	-	-	-	-	-	-
660	-	-	DN 150	680	-	-	-	-	-	-	-	-	-	-
680	-	-	DN 200	670	-	-	-	-	-	-	-	-	-	-

Vertical design



Dimensions in mm

Vitalobe	C	D	E	F	G	H	L	N	O	P	Q	R	S	T	U	Y	[kg]
105	235	24	50	49	124	150	290	62.5	10.5	180	75	97.5	31.5	27	8	M6	20
110	235	24	50	49	124	150	290	62.5	10.5	180	75	97.5	31.5	27	8	M6	20
115	235	24	50	49	124	150	302	74	10.5	180	75	97.5	31.5	27	8	M6	21
215	259	28	55	87	166	155	365	79	12	240	115	110.5	37.5	31	8	M8	41
220	259	28	55	87	166	155	380	88	12	240	115	110.5	37.5	31	8	M8	43
325	293	35	65	110	192	175	458	107	14	272	140	134	45	38.5	10	M10	63
330	293	35	65	110	192	175	473	116	14	272	140	134	45	38.5	10	M10	65
390	293	35	65	110	192	175	494	136	14	272	140	134	45	38.5	10	M10	69
430	377.5	48	85	135	270	210	543	119	18	360	170	166.5	62.5	52	14	M12	130
440	377.5	48	85	135	270	210	563	126.5	18	360	170	166.5	62.5	52	14	M12	135
470	492.5	55	110	175	-	300	654	-	22	-	-	-	70	60	16	M12	225
490	492.5	55	110	175	-	300	684	-	22	-	-	-	70	60	16	M12	233

Dimensions in mm

Vitalobe	Connection													
	BSP		Flanges to DIN 2278, PN 16		DIN 11851		SMS		IDF/SMS		RJT		Tri-Clamp	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
105	1" 1/2	170	DN 40	186	DN 40	210	DN 38	210	DN 38	210	DN 38	210	1" 1/2	210
110	1" 1/2	170	DN 40	186	DN 40	210	DN 38	210	DN 38	210	DN 38	210	1" 1/2	210
115	1" 1/2	170	DN 40	186	DN 40	210	DN 38	210	DN 38	210	DN 38	210	1" 1/2	210
215	1" 1/2	208	DN 40	224	DN 40	248	DN 38	248	DN 38	248	DN 38	248	1" 1/2	248
220	2	208	DN 50	228	DN 50	228	DN 51	248	DN 51	248	DN 51	248	2"	248
325	2" 1/2	236	DN 65	256	DN 65	296	DN 63	296	DN 63	296	DN 63	290	2" 1/2	293
330	3	236	DN 80	256	DN 80	296	DN 76	296	DN 76	276	DN 76	286	3"	290
390	3	236	DN 80	355	DN 80	395	DN 76	395	DN 76	375	DN 76	385	3"	389
430	3	335	DN 80	256	DN 80	395	DN 76	395	DN 76	375	DN 76	385	3"	389
440	4	335	DN 100	355	DN 100	395	DN 101	395	DN 101	378	DN 101	389	4"	392
470	4	385	DN 100	405	DN 100	445	DN 101	445	DN 101	428	DN 101	439	4"	442
490	4	385	DN 100	405	DN 100	445	DN 101	445	DN 101	428	DN 101	439	4"	442

Description of design principle

The Vitalobe rotary lobe pump is a positive displacement pump designed to meet hygienic requirements. The basic pump design is as follows: Two rotors rotate in precise synchronisation in opposite directions in the rotor casing. Each is driven by its own shaft which runs in two rolling element bearings located in the bearing bracket. Synchronisation of the driven and the driving shaft is effected by a high-precision gearbox, in which one gear is installed in fixed position while the position of the other gear on the shaft can be adjusted by means of a clamping device. Which of the shafts is the driving shaft and thus determines the position of the drive shaft end protruding from the gear housing can be selected to suit the actual requirements.

The shaft passage through the rotor casing is sealed dynamically by a mechanical seal, shaft seal ring or gland packing, either with or without a flushing system. A clearance separating the rotor casing from the bearing bracket prevents unnecessary heat build-up in the pump (thermally-induced dimensional changes) and the fluid handled and prevents contamination of the fluid handled and the lubricants.

The rotor casing has two connections, i.e. one suction and one discharge connection. The connections are positioned either horizontally or vertically. As the connections are welded onto the casing, a wide variety of connections can be supplied. Rotor rotation is reversible, so that the pump can be operated in both directions. At the front, the rotor casing is closed by a casing cover and sealed by means of a joint ring around its circumference.

The rotors are fastened to the shafts by a screw each, and precisely aligned to each other and to the rotor casing/casing cover. To prevent damage to the rotors and the casing (galling), the rotors revolve without making contact with each other and the casing; they are separated by minimal clearances.

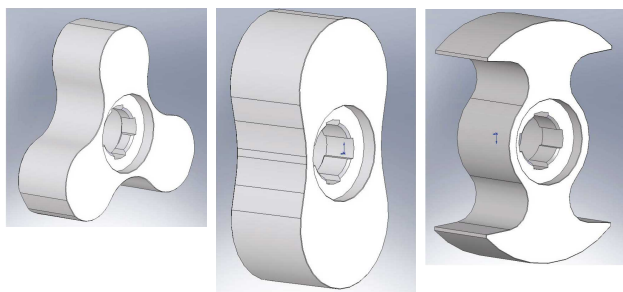
The pump's design allows full cleaning-in-place (CIP) and sterilising-in-place (SIP) without any residues. Vertically installed pumps can be completely drained via the bottom nozzle.

The pump can be supplied either with bare shaft end or as a baseplate-mounted pump set with coupling and geared motor. It can also be mounted on a trolley.

Rotors (rotary lobes):

A range of interchangeable rotary lobe designs allows adjustment to various requirements. The lobes are made of stainless steel 1.4404 (AISI 316L). Depending on the size, the rotors are also available in an "non-galling" alloy (CY5SnBiM) or with a plastic coating (bi-lobe and tri-lobe rotors only).

Rotor types



Tri-lobe rotors

Bi-lobe rotors

Bi-wing rotors

Rotor applications:

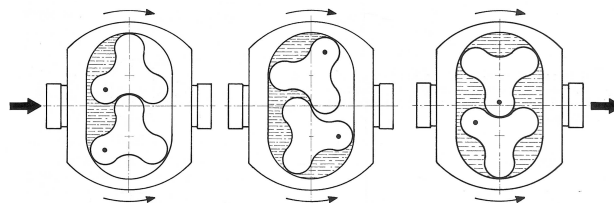
Various rotor types are available to suit the pump's field of application and the fluid to be handled.

Bi-lobe rotors are generally suited to virtually any standard application; however, they are particularly suitable for

handling highly viscous fluids and solids-containing fluids. Tri-lobe rotors enable fluid transport at high rotational speeds and low pulsation as well as very gentle fluid handling. Bi-wing rotors are characterised by good self-priming properties and high efficiency.

Operating principle:

Illustration of operating principle



Two precisely synchronised rotors rotate in opposite directions. As the rotors rotate in opposite directions, the volume trapped on the suction side expands, creating a negative pressure which draws the fluid to be handled into the pump. The fluid handled is trapped between the rotor and the casing and conveyed to the discharge side.

When the fluid reaches the discharge side, the volume is reduced by the re-engaging contra-rotating lobe, which increases the pressure and forces the fluid handled out of the pump.

Owing to its symmetrical design, Vitalobe can be operated in both directions. However, the pump must not be operated against a closed valve as it would continue to build up pressure, which would inevitably destroy the pump.

Description of individual designs

Vitalobe B

Different Vitalobe designs are available to meet specific hygienic requirement levels. In its basic design (design B), the type series meets cleanability levels 1 + 2 to EN 13951. (The pump must comply with all relevant sections of this standard; soils may be visible to the naked eye after cleaning in place. No level of micro-organisms remaining is defined.) The pump can, therefore, be used in general industry and life sciences applications with low hygienic requirements. The hygienic construction of design B is characterised by trowalised surfaces (after machining), non-countersunk rotor screws and FDA-compliant seal materials.

Vitalobe BB

Vitalobe BB meets cleanability levels 3 and 4 to EN 13951 (The pump must comply with all relevant sections of this standard; no soils must be visible to the naked eye after cleaning in place. A specific cleanability level is defined for the micro-organisms remaining.) and can be used in life sciences applications with high hygienic requirements.

The hygienic construction of design BB is characterised by electro-polished surfaces ($\leq 0.8 \mu\text{m}$), casing gasket and rotor fastening method (countersunk screws) in compliance with the 3A Sanitary Standard, a shaft seal designed for improved cleanability and FDA-certified seal materials. These design features make for improved CIP/SIP.

Accessories

- Bypass valve (explosion protection)
- Pump on trolley
- Heatable casing/cover



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