Operating and Installation Instructions

UNITEC Series

B I O C O R

B 20 / B 32

ought to be studied before installing the pump

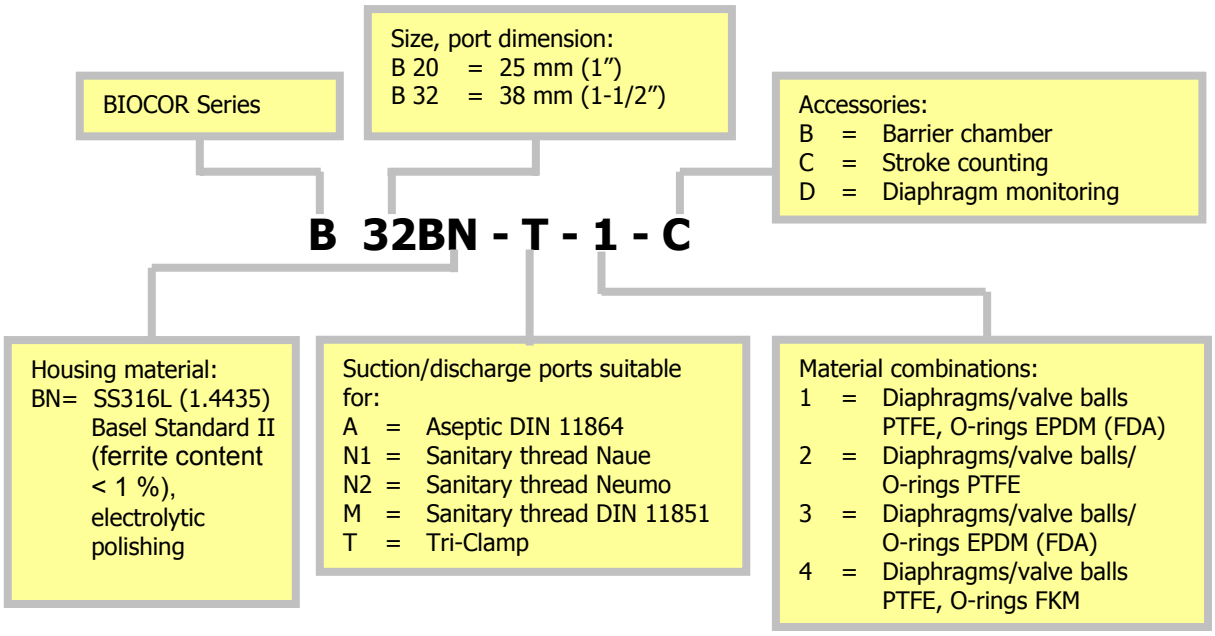
CONTENTS

Introduction

Any pump of the UNITEC BIOCOR-Series has to undergo an extended final control, before release for dispatch. The performance data registered during this are archived in our records and can be read back at any time. The item number, the serial number and the year of construction of the pump are noted on the identification plates on the pump itself.

Before putting any pump into operation, make sure, that the materials of construction are resistant to the chemical to be pumped. To check this, the exact pump code is required.

Designation system



The housing material is SS 316 L according to Basel Standard II with a ferrite content < 1 %. A material which is highly recommended for BIOCOR applications.

The number in brackets, which is added to every part mentioned in the following explanations, refers to its position in the spare part list and the exploded view.

Operation in explosion-proof areas and for inflammable liquids (Reg.-No. PTB: 03 ATEX D004)

For inflammable liquids as well as for applications in explosion-proof areas, BIOCOR pumps have to be grounded to one of the M6 tapping holes located in the frame [7]. All other housing parts are connected in a conductive way; therefore it is not necessary to ground single parts. Piping systems and product connections have to be conductive and grounded separately. To avoid ignition hazards the formation of dust deposits on the pumps must be prevented. In explosion-proof areas repair working only after careful inspection of the practicability and only with appropriate tools. The "X" in the following marking stands for the max. operating temperature, which is 80°C for the BIOCOR series.

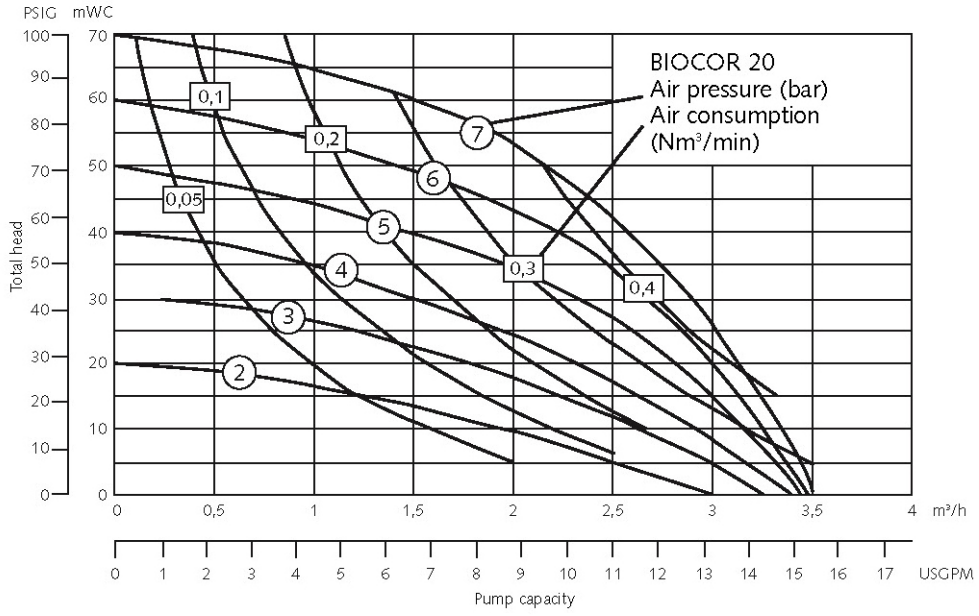
Marking Ex according to 94/9/EG

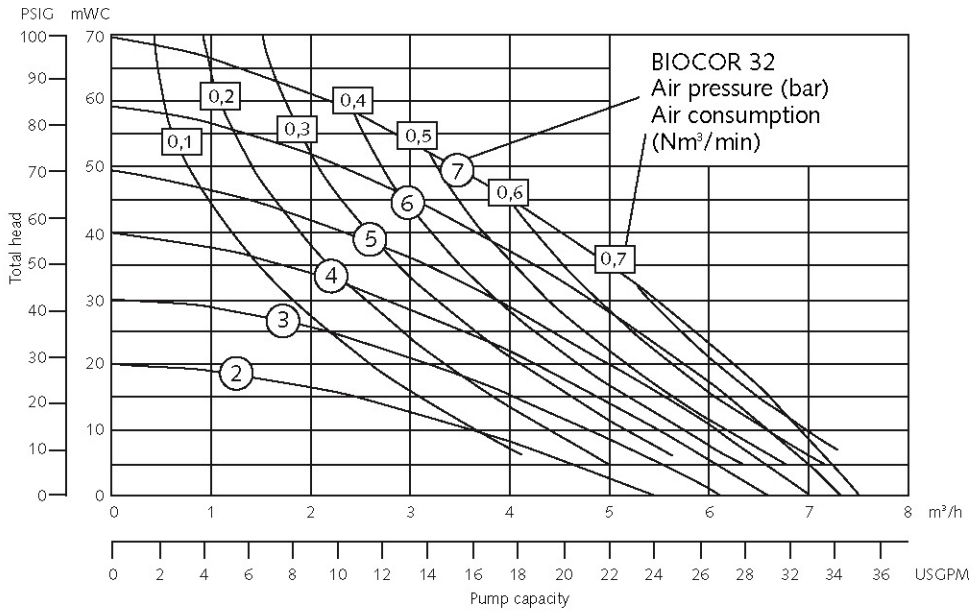
CE Ex II 2G X

Technical data		B 20	B 32
Dimensions mm (“):	depth width height	150 (5.9) 244 (9.6) 381 (15.0)	200 (7.9) 284 (11.2) 484 (19.1)
Nominal port size Air connection	Tri-Clamp® BSP	1” 1/4"	1-1/2” 1/4"
Weight kg (lbs)		12 (27)	26 (57)
Max. particle size of solids mm (“)		3 (0.12)	5 (0.20)
Suction lift, dry mWC (‘): Suction lift, wet mWC (‘)	EPDM ball valves	2 (6.6) 9 (29.5)	2,5 (8.2) 9 (29.5)
Max. driving and operating pressure bar (psig)		7 (100)	7 (100)
Max. operating temperature °C (°F)		80 (176)	80 (176)
Max. flow rate lpm (gpm)		58 (15.4)	125 (33)

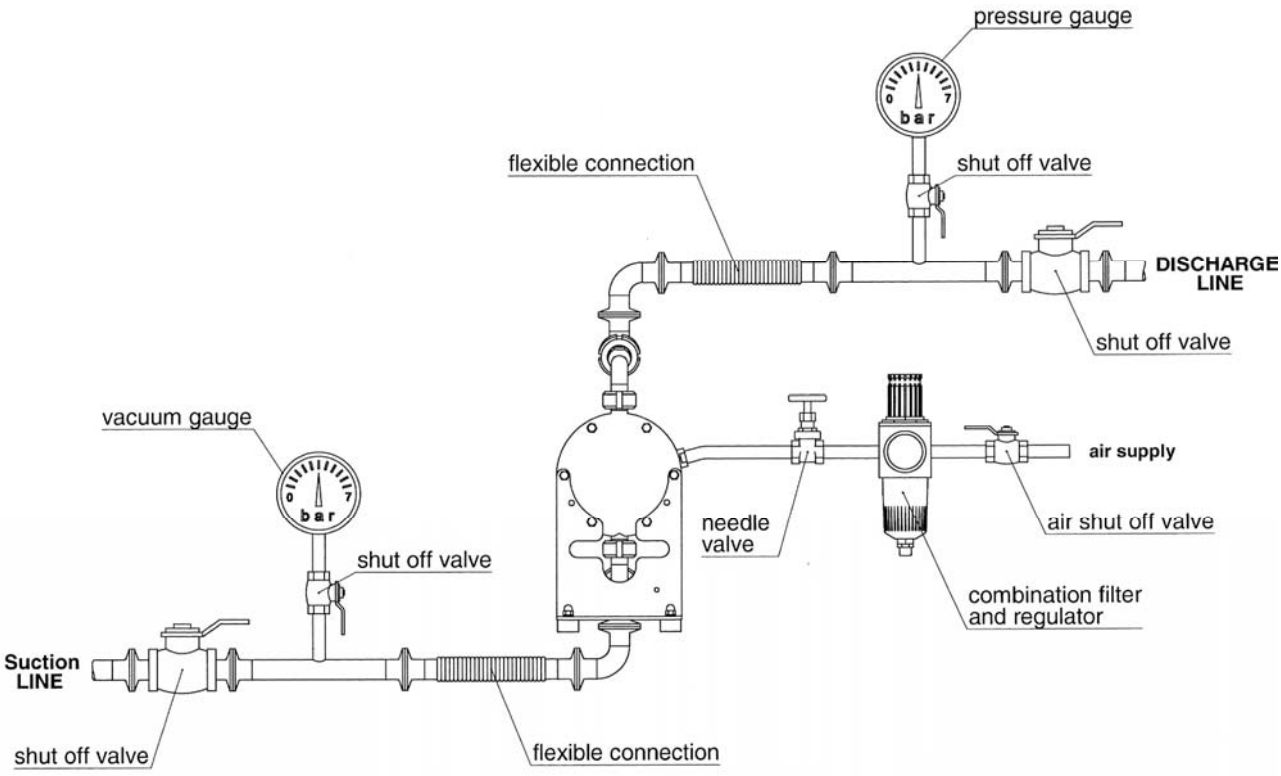
Performance curves

The data refer to water (20°C), without using of a pulsation dampener.





Recommended installation



Installation and operation

In general, the pump has to be connected load free. Neglecting this causes leakage and maybe even damages. To avoid vibrations, pulsation dampers and compensators are recommended. Before connecting the pump, take the yellow blind plugs out of the suction and discharge connections [4,6] as well as the air inlet [23].

To facilitate the installation and maintenance shut off valves should be installed right before and after the pump. The nominal width of the connection pipes has to be chosen in accordance to the connections of the pump. A smaller piping can cause cavitation (suction line) as well as a loss of performance (suction and discharge line). In case the pipe is too big, the dry suction capacity of the pump can decrease. Connect the suction line to the lower manifold [4]. Hosepipes should be suitably armoured. A suction line continuously rising will prevent the formation of air locks in the line which would affect the suction lift. The discharge line has to be connected to the upper manifold [4].

The air inlet [23] is located in the middle of the center block [20]. Before installation, make sure that the air supply pipe is free of solids. To supply the pump with driving air sufficiently, the pipe diameter should match the size of the air inlet. Take care that no dirt or particles can intrude into the pump during the connection, as these can accumulate inside the pump and can cause malfunctions. An air filter [22] directly behind the air inlet [23] prevents the entry of bulk particles.

The integrated air control system UNI-FLO [22] is a precision-control that requires oil-free, dry and clean compressed air for optimal function. If humidity is expected, a water separator or air dryer has to be fitted to protect the pump from blocking by ice. The ideal condition is the dewpoint of air at -20°C (-4°F). In humid surroundings, icing from the outside may occur despite the driving air is dried. If so, a prolonged waste-air-exhaust (ca. 500mm/20” by pipe or hose) can be helpful. When installing the pump into boards or cabinets, it has to be ensured that cold air does not get caught behind the muffler.

The pressure of the driving air has to be limited to the amount required to meet the performance needed. Excessive pressure increases both the air consumption and the wear of the pump. The pump is regulated by tuning the flow rate of the air. An empty pump has to be driven slowly (e.g. via a needle-valve). The pump starts automatically. Pumps of the BIOCOR series are self-priming when dry, thus it is not necessary to fill the suction line of the pump. The suction lift capacity of a liquid-filled pump, however, is much higher. The pump is appropriate for running dry during slow operation. Dry running at high stroke frequency causes

premature wear. The maximum permissible stroke frequencies can be found in the following table. The pumps can briefly (up to max. one hour) be operated against a closed discharge line. Throttling on the suction side may damage the pump.

Pump size	B 20	B 32
Max. number of strokes/min. during nominal performance	280	200

- Before putting the pump into operation as well as after some hours of operation, the housing bolts [8,9] have to be fixed according to the torque data of the following schedule, as the elements of construction "settle". Fixing the bolts is necessary as well after longer periods of stoppage, at extreme temperature variations, after transport and dismantling the pump.

Pump size	B 20	B 32
Torque values for housing bolts Nm (ft lbs)	15 (11)	27 (20)

- Installation, operation, and maintenance by qualified staff only.
- Pressure tests of the plant a pump is included in may only be carried out with the pump disconnected from the pressure on both ports or by using the pressure the pump develops while operating. The load of a pressure in the plant may damage the pump.
- Pneumatic diaphragm pumps must not be operated with a positive suction pressure.
- Depending on the conditions of operation, the liquid conveyed might escape from the pump through the muffler in case of a diaphragm rupture (muffler has to be renewed). For further safety requirements the optional equipment diaphragm monitoring and barrier chamber system are recommended.
- The state of the muffler has to be inspected regularly, as a blocked muffler can be forced out of the pump. If this happens, damages of properties and/or persons cannot be excluded.
- If the product tends to settle, the pump has to be flushed regularly. For larger solids a filter has to be installed in the suction line.
- The relevant effective security advises have to be respected.
- Pumps of the BIOCOR series must not be submerged.
- Pools of liquid which appear in the near outer area of the pump have to be inspected on danger potential, if necessary safety measures are to be taken.
- Chemical and biological reactions in the product chamber of the pump (mixture of different substances) and the freezing of the liquid have to be avoided.
- Especially when deliver critical liquids, wear parts, like diaphragms, should be replaced within a preventive maintenance.
- The use of non-original UNITEC spare parts and structural changes lead to the lapse of the warranty immediately. When operating such a pump, damages of properties and/or persons cannot be excluded.
- The operation of the pump with nitrogen as driving gas is possible. In closed rooms a sufficient ventilation must be provided.
- According to the requirements of our 14001-certification, every unit which is send to the pump manufacturing plant for diagnosis or maintenance reasons has to be accompanied by a filled out decontamination-sheet. Otherwise a processing is not possible. The decontamination-sheet is enclosed to this manual. Please pay attention to the further safety regulations.

3-A approval

BIOCOR pumps with the material combination 2 or 4 equipped with the option D (diaphragm monitoring, see page 15) are 3-A approved. Please pay attention to the following additional hints:

- The pump has to be installed with a minimum distance of 100 mm (4”) between the floor and the suction port and 50 mm (2”) between the floor and the frame.
- The function of the leak detection sensor can be tested easily by approaching the sensor to any kind of liquid. The operating signal of the sensor has to be used for fail save to assure a well operating sensor at any time. If the leak detection sensor triggers an alarm, the air supply to the pump has to be stopped immediately.

Usage of the valve lifting magnets

Valve lifting magnets are attached to every BIOCOR pump. These can be mounted at the position location of the four ball valves from the outside to the pump housing. The ball valves are raised up magnetically out of their seats and the pump is drained entirely without having to be dismounted.

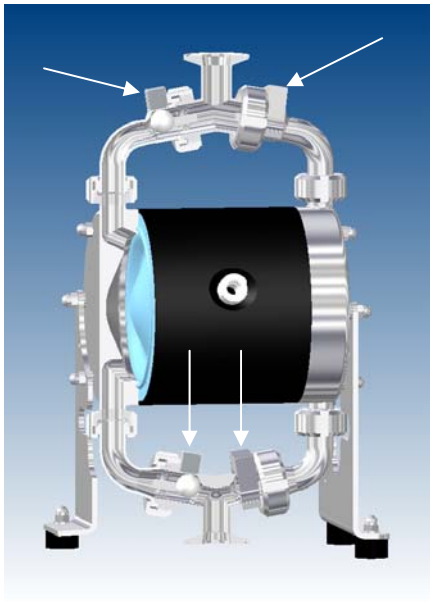


figure 6.1

The used magnets are strong NdFeB magnets. Therefore an appropriate safety distance (500mm/20”) must absolutely be kept to all devices and objects, which can be damaged by magnetism or impaired in their function. This applies in particular to persons with cardiac pacemakers; the manufacturer data of the implant are to be considered. Further endangered devices and objects: Credit cards, EC cards, hearing aids, data media, televisions, monitors, computers, video tapes, mechanical clocks, and loudspeakers. Colliding of the magnets is to be avoided, due to their brittleness these can break.

Procedure: Pump has to run slowly; take the magnets out of the box separately and put them individually on the pump (positions see arrows in figure 6.1). The pump runs dry after a few strokes and can be turned off. Pull the magnets individually off the pump and put them with the magnet part first back into the box.

CIP and SIP cleaning

Basic condition for the delivery of hygienic perfect and high-quality liquids is a clean pump. The construction of the EHEDG certified BIOCOR pumps permits the CIP as well as the SIP cleaning. Despite the general restriction of temperature of 80°C (176°F) a brief operating (max. 30 minutes) to 130°C (266°F) for purification processes is permitted, in these cases the pump must run slowly. During sterilization with steam, a steam pressure to approx. 1 bar (15 psig) is permissible. If a cleaning liquid is used, this should be sucked by the pump itself without external pressure in the system.

Disassembly

The general design of the BIOCOR pumps is simple. A plastic tool designed for the mounting of the air-valve [22] is delivered along with every pump. Further special tools are not required. Please find the part number for any part in the spare part list.

- Before starting to disassemble the pump, take care that the pump has been emptied and rinsed. Further the pump has to be cut off from any energy on the air and product side. If the pump is being removed from the plant, a reference sheet about the delivered liquid has to be attached.
- Please respect the relevant additional security advices, if the pump has been used for aggressive, dangerous or toxic liquids.
- Before putting the pump back into operation, the tightness of the pump has to be checked.

First unscrew the muffler [25] out of the center block [20]. Loosen the four union nuts of the suction and discharge ports [4,6] with a hook wrench (figure 7.1), but do not unscrew complete. Loosen the two union nuts, which connect the two pipe bends discharge side [5] with the pump housings [1], to take off the whole discharge side of the pump. Remove O-rings pump housing [2]. Lay the pump on its back and unscrew the nuts of the housing bolts [8,9] on one side using a socket wrench and take off the frame [4]. Loosen the two union nuts, which connect the two pipe bends suction side [3] with the pump housings [1], to take off the whole suction side of the pump. Remove O-rings pump housing [2] followed by the pump housing [1] itself. So the complete discharge side, one pump housing [1], one frame [7] and the complete suction side are dismantled (figure 7.2). Turn off the union nuts at the suction and discharge sides, so that the pipe bends [3,5] and the suction and discharge ports [4,6] are separated. Remove valve stops [17], O-rings valve stop [19] and valve balls [16].

figure 7.1

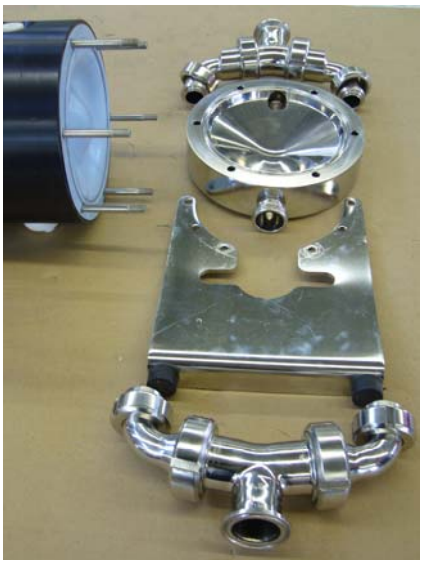


figure 7.2

figure 7.3

Work carefully to ensure that the sealing surfaces in contact to the diaphragms are not damaged. Screw one diaphragm [15] left-turning off the shaft [13]. Carefully pull out the housing bolts [8,9], so the second pump housing [1] and the second frame [7] are also dismantled. Take the other diaphragm [15] along with the shaft [13] out of the center block [20]. Unscrew the set screws shaft [14] off the diaphragms [15] (figure 7.3). Remove piston rings and O-rings of the shaft piston rings [21] from their grooves carefully (figure 8.1); do not damage the edges in the center block [20]. A re-assembly of the same piston rings is impossible, they have to be replaced. Unscrew the air inlet [23] and the air filter [24] out of the center block [20]. To remove the UNI-FLO air control system [22], screw off both end caps using the plastic mounting tool supplied with the pump (figure 8.2). Take out main and pilot piston. Push out the air valve housing with the mounting tool turned around (figure 8.3).

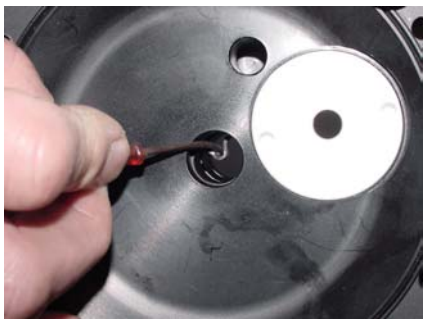


figure 8.1

figure 8.2

figure 8.3

Hints for assembly

The re-assembly of the components is principally carried out vice-versa to the dismantling. Here are some additional hints.

For the installation of the UNI-FLO [22] air control system, first screw in one end cap flushly into the center block [20]. Turn the center block [20] and insert one of the six O-rings air-valve housing [29] into the end cap from the inside of center block [20]. Moisture the four O-rings [29] of the air-valve housing with a bit of water and push the housing into the center block [20] using the mounting tool. Take care that it slips in softly. Do never insert the housing violently with a hammer. In case the housing cocks or hardly gets in, take it out again completely and start again. Insert the main piston and the pilot piston. Lay the sixth O-ring [29] on the edge of the air valve housing and screw in the second end cap.

figure 8.4

To assemble a new piston ring of the shaft piston ring [21], carefully shape them like kidneys with locking ring pliers and insert the rings into the grooves in the center block [20] (figure 8.4); completely press the rings into the grooves smoothly using some round tool.

Screw the set screws shaft [14] into the diaphragms [15] and tighten them. Screw one diaphragm [15] with set screw shaft [14] into the shaft [13], insert it into the center block [20], adjust the bores in the center block [20] to the diaphragm (turn slightly backwards if necessary) and fix it with the housing bolts [8,9] (figure 8.5), pay attention to the two different length of the housing bolts [8,9]. The sealing surfaces of the diaphragms [15] and the pump housings [1] have to be absolutely clean and undamaged; mere small scratches can cause leaking (if necessary, smoothen the housing surfaces carefully with fine sandpaper). Push the pump housing [1] onto the housing bolts [8,9] (figure 8.6), pay attention to the right direction of the suction and discharge side of the pump housing [1]. The hole at the suction side has nearly a right angle, the discharge one is obviously flatter. Push the discs onto the lower and longer housing bolts [9] and install the frame [7] (figure 8.7).

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figure 8.5

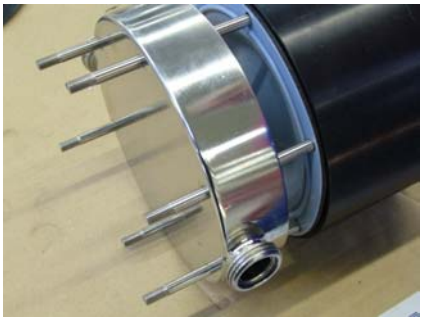


figure 8.6

figure 8.7

Screw the second diaphragm [15] into the shaft [13], adjust with the bores in the center block [20] (turn slightly backwards if necessary) and carefully push the housing bolts [8,9] complete through the center block [20]. Install the second pump housing [1], pay attention to the flow direction again. If necessary carefully compress the pump housings [1] and the center block [20] by using a screw clamp. Mount the second frame [7] (do not forget the disc) and tighten the housing bolts [8,9] only loose.

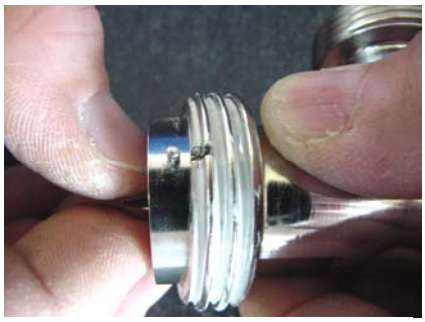


figure 9.1

Spray the threads of the ports [4,6] and the pump housing [1] with Teflon-Spray. Carefully insert O-rings valve stop [17] into the suction [4] and discharge ports [6] as well as into the pipe bends [3,5] (buckling has to be avoided). On the suction side place the ball valves [16] in the suction port [4] and on the discharge side in the pipe bend [5]. To install the valve stops [17] insert the pin of the valve stop [17] in the appropriate notch of suction [4] or discharge port [6] (figure 9.1). Screw the union nuts of the pipe bends [3,5] on the suction [4] and discharge ports [6] loose by hand

Insert O-rings pump housing [2]. Screw the complete pre-installed suction and discharge sides with the corresponding union nuts onto the pump housings [1] loosely. First lightly screw housing bolts [8,9], then tightly all eight union nuts with a hook wrench. Now fix the housing bolts [8,9] crosswise evenly according to the given torque values (see page 4) until the pump housings [1] are situated on the center block [20]. Any further tightening of the bolts does not improve sealing but can deform the housing! Finally screw all eight union nuts again with a hook wrench.

Before putting the pump back into operation, the tightness of the pump has to be checked.

Notes

Troubleshooting

Malfunction	Possible Reason	Solutions/Remarks
pump does not operate	no air supply	open air supply
	air supply line blocked/closed	clean/open air supply
	muffler blocked	clean/replace muffler
	working chambers blocked	remove blockage
	air control system defective	replace air valve system
	discharge line blocked/closed	clean/open line
pump operates unsteadily	piston rings worn	replace piston rings
	air control system worn	replace air control system
	diaphragm rupture	replace diaphragm, clean pump
	air control system soiled	clean/replace air control system
	ball valve blocked	cleaning, removal of bulk particles
	icing	improve air processing
air within liquid	suction line leaky	seal suction line
	container with liquid empty	fill/new container
	diaphragm rupture	replace diaphragm
	cavitation	adapt suction lift, possibly install suction pressurised air chamber
insufficient discharge pressure	insufficient pressure/amount of driving air	increase air supply
	air supply line leaky	check/repair air supply
	air control system leaky	replace air control system
	ball valve worn	check/replace ball valve
	more air consuming components	increase pressure/amount of air
output decreases	air control system soiled	clean/replace air control system
	icing	improve air processing: dryer/filter
	air pressure drop	ensure sufficient supply of air
	suction line/inlet strainer soiled	cleaning
	discharge line/outlet strainer soiled	cleaning
	muffler blocked	replace the muffler
	ball valve worn	replace valve
	change in viscosity	change back/adjust pump
	more air consuming components	increase pressure/amount of air
pump stops itself	icing of the air control system	improve air processing: dryer/heater etc.
	air pressure to low	increase air pressure
	air pressure drop	ensure sufficient air supply
	discharge line blocked	clean discharge line
	air filter blocked	clean air filter
	valve closed	open valve
	air control system defective	replace air control system
	wear/leaking of air control system	replace air control system
	diaphragm rupture	replace diaphragm, clean pump
	ball valve blocked/worn	clean/replace ball valve

Malfunction	Possible Reason	Solutions/Remarks
pumps operates, however suction capacity insufficient	pump operates too fast	start more slowly
	operation beyond physical limits	adjust installation
	cavitation	check installation, check temperature, cool down
	operation beyond pump capacity	adjust installation resp. install bigger pump
	air cushion within suction/discharge line	bleed the line
	dry suction against discharge pressure	wet pump, start without pressure
	valve filter within suction line closed	open valve/clean filter
	valve filter within discharge line closed	open valve/clean filter
	container with liquid empty	fill/new container
	vacuum inside the container	bleed container
	wear of the check valves	replace valves
	suction line leaky	seal suction line
	suction line blocked	clean suction line
	air pressure cushion at discharge	bleed discharge line
	ball valve blocked	clean/replace valve
insufficient suction capacity after pump repair	connections tighten incompletely	tighten/seal connections, clean sealing area
diaphragm overstrained	pressure within the plant/system	ensure that pressure is only developed by the pump itself, check plant/valves, replace diaphragms
	inadmissible vacuum	check suction line, open valve
	icing	improve air processing
leaking between housing parts	housing bolts loosened	disassemble the pump, clean sealing area, tighten housing bolts according to the torque values
	diaphragms attacked chemically	replace diaphragms
	diaphragms overstrained	replace diaphragms
	tension installation/pipework	loosen, eliminate tension, use of a compensator
muffler grey	driving air too humid, icing	improve quality of driving air
muffler black	soiled, oily air	improve quality of driving air, install sensitive filter in suction line
pump is connected to air but does not operate	air control system blocked	clean/replace air control system
	bulk particles/dirt	clean pump, replace necessary parts, improve air quality
	chemical influence (O-rings swollen)	check, replace damaged parts
	valve closed in discharge line	open valve

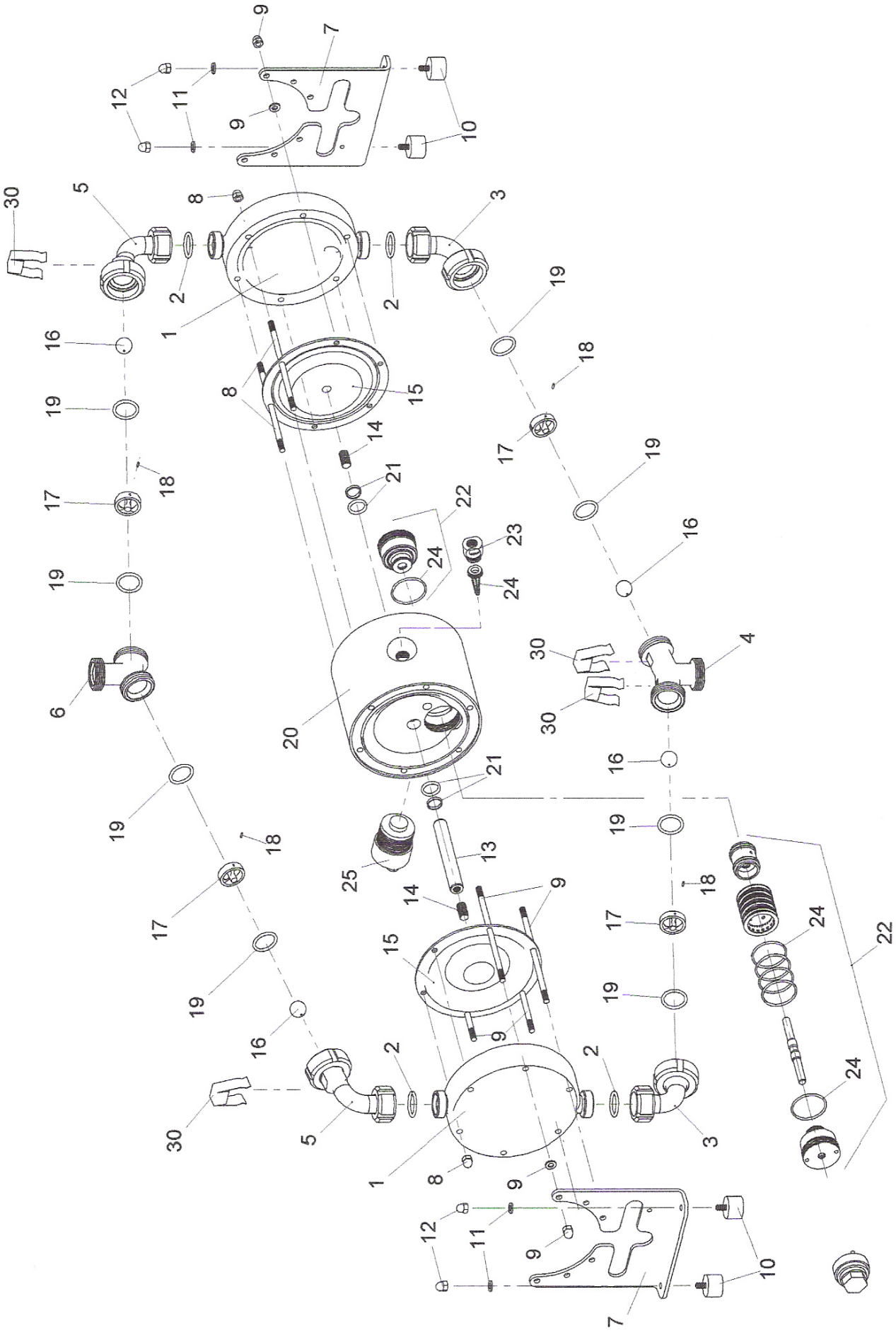
Spare part list

Pump size				B 20	B 32
Item	Pc.	Description	Material	Part number	Part number
1	2	Pump housing	SS 316 L	5 20 140 40	5 32 140 40
2	4	O-ring, pump housing*	EPDM (FDA)	9 17 557 73	9 23 668 73
	4	O-ring, pump housing*	PTFE	9 17 557 60	9 23 668 60
3	2	Pipe bend, suction side	SS 316 L	5 20 138 40	5 32 138 40
4	1	Suction port, code A (DIN 11864)	SS 316 L	5 20 441 40	5 32 441 40
	1	Suction port, code N1 (Naue)	SS 316 L	5 20 041 40	5 32 041 40
	1	Suction port, code N2 (Neumo)	SS 316 L	5 20 141 40	5 32 141 40
	1	Suction port, Code N2X (Neumo Connect S)	SS 316 L	5 20 541 40	5 32 541 40
	1	Suction port, code M (DIN 11851)	SS 316 L	5 20 241 40	5 32 241 40
	1	Suction port, code T (Tri-Clamp)	SS 316 L	5 20 341 40	5 32 341 40
5	2	Pipe bend, discharge side	SS 316 L	5 20 139 40	5 32 139 40
6	1	Discharge port, code A (DIN 11864)	SS 316 L	5 20 442 40	5 32 442 40
	1	Discharge port, code N1 (Naue)	SS 316 L	5 20 042 40	5 32 042 40
	1	Discharge port, code N2 (Neumo)	SS 316 L	5 20 142 40	5 32 142 40
	1	Discharge port, Code N2X (Neumo Connect S)	SS 316 L	5 20 542 40	5 32 542 40
	1	Discharge port, code M (DIN 11851)	SS 316 L	5 20 242 40	5 32 242 40
	1	Discharge port, code T (Tri-Clamp)	SS 316 L	5 20 342 40	5 32 342 40
7	2	Frame	SS 316 L	5 20 143 23	5 32 143 23
8	2	Housing bolt, cpl., short	SS	5 20 154 22	5 32 154 22
9	4	Housing bolt, cpl., long	SS	5 20 156 22	5 32 156 22
10	4	Shock absorber	EPDM	1 15 022 78	1 15 022 78
11	4	Disc, DIN 125	PTFE	9 06 151 60	9 06 151 60
12	4	Nut, DIN 1587	SS	9 06 106 22	9 06 106 22
13	1	Shaft	SS	5 20 145 22	5 32 145 22
14	2	Set screw, shaft, DIN 913	SS	9 10 220 22	9 12 221 22
15	2	Diaphragm*	PTFE	1 15 031 67	1 25 031 67
	2	Diaphragm*	EPDM (FDA)	1 15 031 73	1 25 031 73
16	4	Valve ball*	EPDM with metal core (FDA)	1 15 032 82	1 25 032 82
		Valve ball*	PTFE with metal core	1 15 032 89	1 25 032 89
17	4	Valve stop	SS 316 L	5 20 044 23	5 32 044 23
18	4	Set screw, DIN 7	SS	9 02 401 22	9 02 401 22
19	8	O-ring, valve stop*	EPDM (FDA)	9 23 668 73	9 37 528 73
		O-ring, valve stop*	PTFE	9 23 668 60	9 37 528 60
20	1	Center block	PE conductive	5 20 053 56	5 32 053 56
21	2	Shaft piston ring, cpl.	PTFE	1 15 041 64	1 25 041 64
22	1	Uni-Flo air control system, cpl.	PETP	5 20 101 84	5 20 101 84
23	1	Air inlet	PETP	1 15 047 84	1 15 047 84
24	1	Air filter	PE	1 15 043 51	1 15 043 51
25	1	Muffler	PE	1 15 244 51	1 15 244 51
29	6	O-ring, air valve housing (included in item 22)	Buna-N	9 35 504 71	9 35 504 71
30	4	Valve lifting magnet	SS/NdFeB	5 20 046 22	5 32 046 22

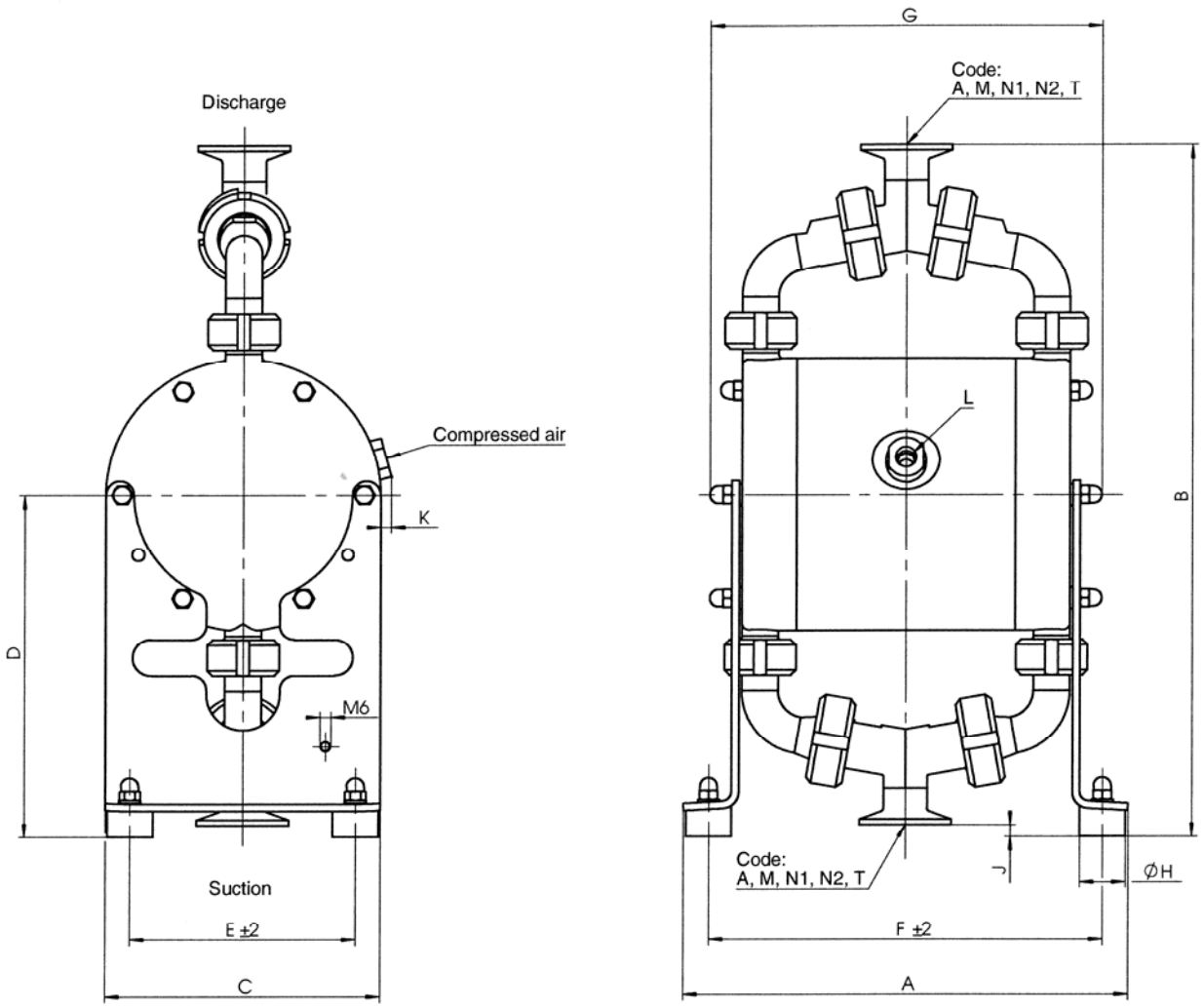
* Material combination 1 = diaphragms/valve balls made of PTFE, O-Rings made of EPDM;
2 = diaphragms/valve balls/O-rings made of EPDM; 3 = diaphragms/valve balls/O-rings made of PTFE
Example for pump code: B 32 BN - T - 1

Please see page 2 for explanation of the pump code. When ordering please state the serial number of the pump.

Exploded view



Dimensions



mm	A	B	C	D	E	F	G	H	J	K	L
B 20	244	381	150	189	123	216	216	25	6,5	6	R 1/4“
B 32	284	484	200	246	173	256	261	25	17,5	-	R 1/4“

mm	Code A (DIN 11864)	Code M (DIN 11851)	Code N1	Code N2	Code T
B 20	Rd 44 x 1/6“ (DN 20)	Rd 44 x 1/6“ (DN 20)	M 36 x 2 (DN 20)	M 36 x 2 (DN 20)	1“ Tri-Clamp
B 32	Rd 58 x 1/6“ (DN 32)	Rd 58 x 1/6“ (DN 32)	M 52 x 2 (DN 32)	M 52 x 2 (DN 32)	1 1/2“ Tri-Clamp

inch	A	B	C	D	E	F	G	H	J	K	L	Code T
B 20	9.6	15.0	5.9	7.4	4.8	8.5	8.5	1.0	0.25	0.24	1/4” BSP	1“ Tri-Clamp
B 32	11.2	19.1	7.9	9.7	6.8	10.1	10.3	1.0	0.7	-	1/4” BSP	1-1/2“ Tri-Clamp

Accessories

For special requirements pneumatic double diaphragm pump of the series BIOCOR can be furnished with several accessories. The pump code informs, which of these are included in the pump (see page 2).

Stroke counting (specialty code C2)

A sensor integrated in the center block [20] of the pump to monitor the movement of a diaphragm [15] without direct contact. The sensor can be connected to an existing controller.
For further details, please refer to the data delivered by the manufacturers of the components.

Size					B 20	B 32
Code	Item	Piece	Description	Material	Part number	Part number
C 2	20	1	Center block for sensor	PE conductive	5 20 153 56	5 32 150 56
			Center block for sensor, barrier chamber	PE conductive	1 15 340 55	1 25 340 55
	50	1	Stroke sensor, Namur	diverse	1 00 072 99	1 00 072 99

Stroke counting pneumatic (specialty code C9)

Differently from specialty code C2, the strokes of the pump are registered pneumatically on the code C9. The pressure switch registers the changes in pressure within the air chamber behind one of the diaphragms and it converts the pneumatic impulse into an electrical signal.
The pneumatic stroke counting system consists of:

pressure switch, cpl. mounted, 1 – 10 bar
socket with cable 5 m
adaptor elbow NPT ¼"
hose DN 4/6, 2,5 m

For assembly screw the adaptor elbow into the additional air connection of the pump (it is possible that the adaptor is already installed). The air inlet for the pump is located in the middle of the center block. The additional air inlet for the pneumatic stroke counting system can be found sideways to this. Link up the adaptor and the pressure switch with the hose. Connect the socket to the electrical connection plug of the pressure switch and the cable to existing registering devices. Technical data, connection schemes and further details can be found in the technical documentation delivered by the manufacturers of the components.

Size					B 20	B 32
Code	Item	Piece	Description	Material	Part number	Part number
C 9	20	1	Center block with additional air connection	PE conductive	5 20 253 56	5 32 250 56
			Center block, barrier chamber with additional air connection	PE conductive	1 15 440 55	1 25 440 55
	-	1	Adaptor elbow	PP	1 00 875 51	1 00 875 51
	-	1	Hose	PE	1 00 876 51	1 00 876 51
	-	1	Pressure switch cpl.	diverse	1 00 972 99	1 00 872 99
	-	1	Socket with cable	diverse	1 00 973 99	1 00 873 99

Diaphragm monitoring system (option code D1)

A capacitive diaphragm sensor is mounted in the muffler [25] of the pump, which registers any liquid approaching the sensor, no matter whether the liquid is conductive or not. Hence, a fast reaction to a damage of a diaphragm becomes possible. In case of humid surrounding air a false alert may occur despite operating the pump with dried compressed air. The diaphragm sensor can be connected to an existing controller.
For further details, please refer to the data delivered by the manufacturers of the components.

Size					B 20	B 32
Code	Item	Piece	Description	Material	Part number	Part number
D 1	51	1	Diaphragm sensor, Namur	diverse	1 00 773 99	1 00 773 99

Barrier chamber system (specialty code B1)

To comply with high safety standards, the barrier chamber system replaces the standard diaphragm [15] by a tandem arrangement of two diaphragms [15,46] and a barrier chamber [40] of transparent PMMA filled with a non-conductive liquid (De-ionised water) in between. To ensure the correct operation of the pump, the barrier chambers [40] have to be filled completely. In case a diaphragm breaks, the conductivity of the barrier liquid rises which is registered by the conductivity sensors [43]. The minimum conductivity of 22 µS covers a wide range of media. Otherwise, a conductive barrier liquid can be filled into the chamber, so that the liquid emerging in case of a diaphragm rupture causes a decrease in conductivity to be registered. After using for some time the De-ionised water can be pollute with germs. In this case the water needs to be replaced. The sensors can be connected to an existing controller.

For further details, please refer to the data delivered by the manufacturers of the components.

Size					B 20	B 32
Code	Item	Piece	Description	Material	Part number	Part number
B 1	13	1	Shaft	1.4301	5 20 245 22	5 32 245 22
	14	2	Set screw, shaft, barrier chamber	1.4305	9 10 223 22	9 12 224 22
	20	1	Center block	PE conductive	1 15 240 55	1 25 240 55
	22	1	UNI-FLO air controll system, cpl.	PETP	2 15 001 84	2 15 001 84
	40	2	Separation chamber ring	PMMA	5 20 176 58	5 32 176 58
	43	4	Conductivity sensor	PTFE-L	1 10 074 65	1 10 074 65
	44	8	O-ring, separation chamber	EPDM	9 03 509 72	9 03 509 72
	45	4	Plug	PA	1 10 077 53	1 10 077 53
	46	2	Inner diaphragm	EPDM	1 15 131 72	1 25 131 72
	47	2	Spacer	PETP	5 20 178 84	-

WILDEN® A DOVER COMPANY
22069 Van Buren Street, Grand Terrace, CA 92313-5607
Telephone 909-422-1730 · Fax 909-783-3440
www.wildenpump.com