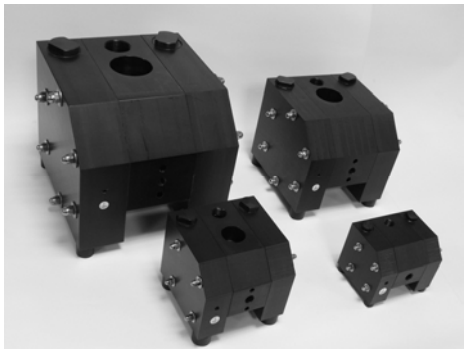


ALMATEC Series CX

CX 10 – CX 130

Operating and Installation Instructions

CE

ought to be studied before installing the pump

The ALMATEC Maschinenbau GmbH is certified as a modern, quality-orientated enterprise according to DIN EN ISO 9001:2000. Before release for dispatch, any pump has to undergo an extended final control.

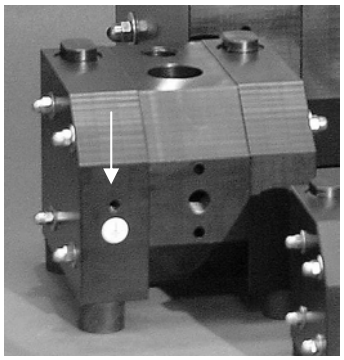
Before putting any pump into operation, make sure, that the materials of construction are resistant to the chemical to be pumped. To check this, the exact pump code is required. This code, the serial number and the year of construction are noted on the identification plates on the pump itself

Example to clarify the ALMATEC pump code:

CX	50	E	T	T		
					Type and material of product valves:	E Ball valves, EPDM
						N Ball valves, NBR
						S Ball valves, stainless steel
						T Ball valves, PTFE
						Z Cylinder valves, PE
					Diaphragm material:	E EPDM
						N NBR
						T PTFE/EPDM-compound
					Housing material:	E PE-conductive
					Size, connection	

ALMATEC Pneumatic diaphragm pump, Series CX

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, only pumps with housings and fittings in conductive plastic materials may be used. Pneumatic diaphragm pumps of the CX series with the housing material PE-conductive meet this requirement. The pump has to be grounded. A connection to ground the pump is included in the side housing (see arrow). All other housing parts are connected to the side housing, therefore it is not necessary to ground single parts. Piping systems and product connections have to be 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 70°C for the CX series.

Marking Ex according to 94/9/EG

CE Ex II 2G X

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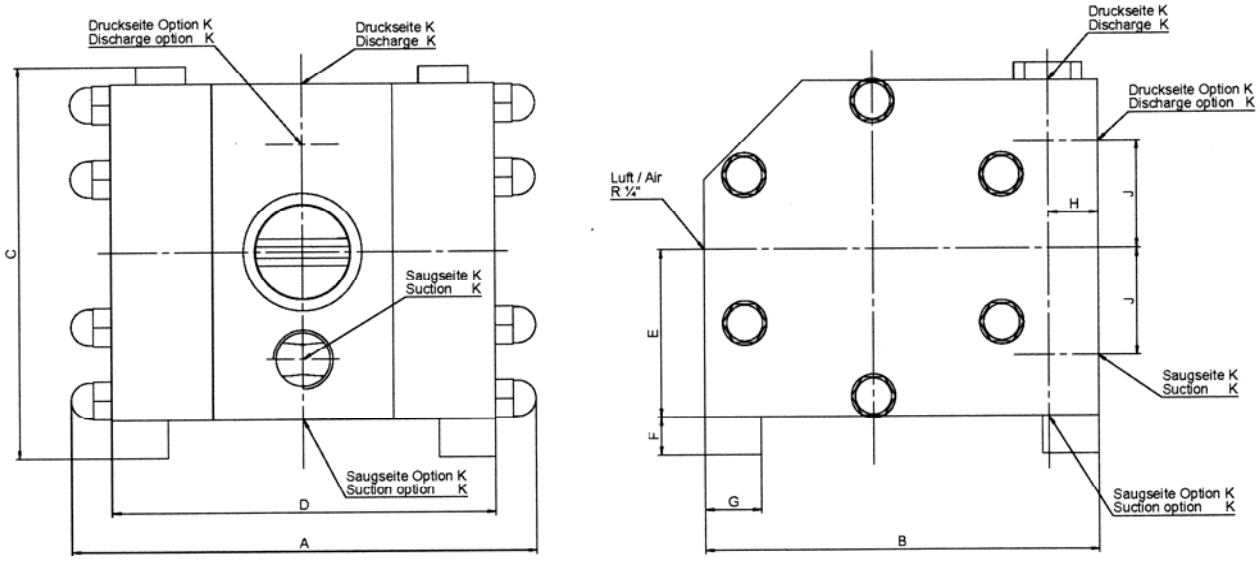
Technical Data		CX 10	CX 20	CX 50	CX 130
Dimensions (mm):	Length	86	124	175	240
	Width	137	155	206	269
	Height	96	128	173	225
Nominal port size (NPT) Air connection (BSP)		3/8" R 1/4	1/2" R 1/4	3/4" R 1/4	1 1/4" R 1/4
Weight (kg)		1.2	2	4.5	10
Max. particle size of solids (mm) for pumps with ball valves		1.5	2	3	4
Suction height, dry (mWC):					
	with cylinder valves	0,7	2	3,5	4,5
	with ball valves in EPDM	0,5	0,5	2	2,5
	with ball valves in PTFE	0,5	0,5	2	2,5
	with ball valves in stainless steel	0,3	1	2	2,5
Suction height, wetted (mWC)		8	8	9	9
Max. driving and operating pressure (bar)		7	7	7	7
Max. operating temperature (X) (°C)		70	70	70	70
Max. viscosity (cP)		3000	6000	10000	15000
Sound pressure level acc. to DIN 45635, part 24, depending on the operating data [dB (A)]:	driving pressure 3 bar	68-70	68-70	68-71	69-71
	driving pressure 5 bar	71-74	71-73	73-75	71-75
	driving pressure 7 bar	71-76	72-75	74-78	73-76

Dimensions



mm	A	B	C	D	E	F	G	H	J	K
CX 10	137	86	96	113	41	8	15	15	27	NPT 3/8”
CX 20	155	124	128	125	53	17	25	19	34	NPT 1/2”
CX 50	206	175	173	170	75	17	25	22	48	NPT 3/4”
CX 130	269	240	225	225	100	17	25	33	63	NPT 1-1/4”

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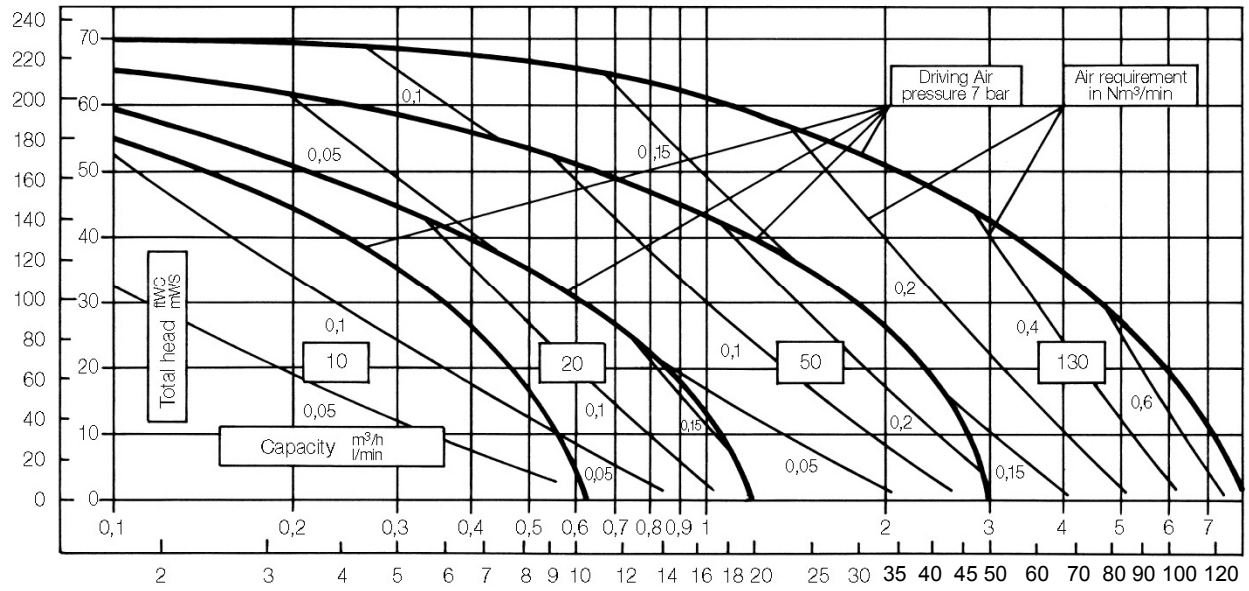
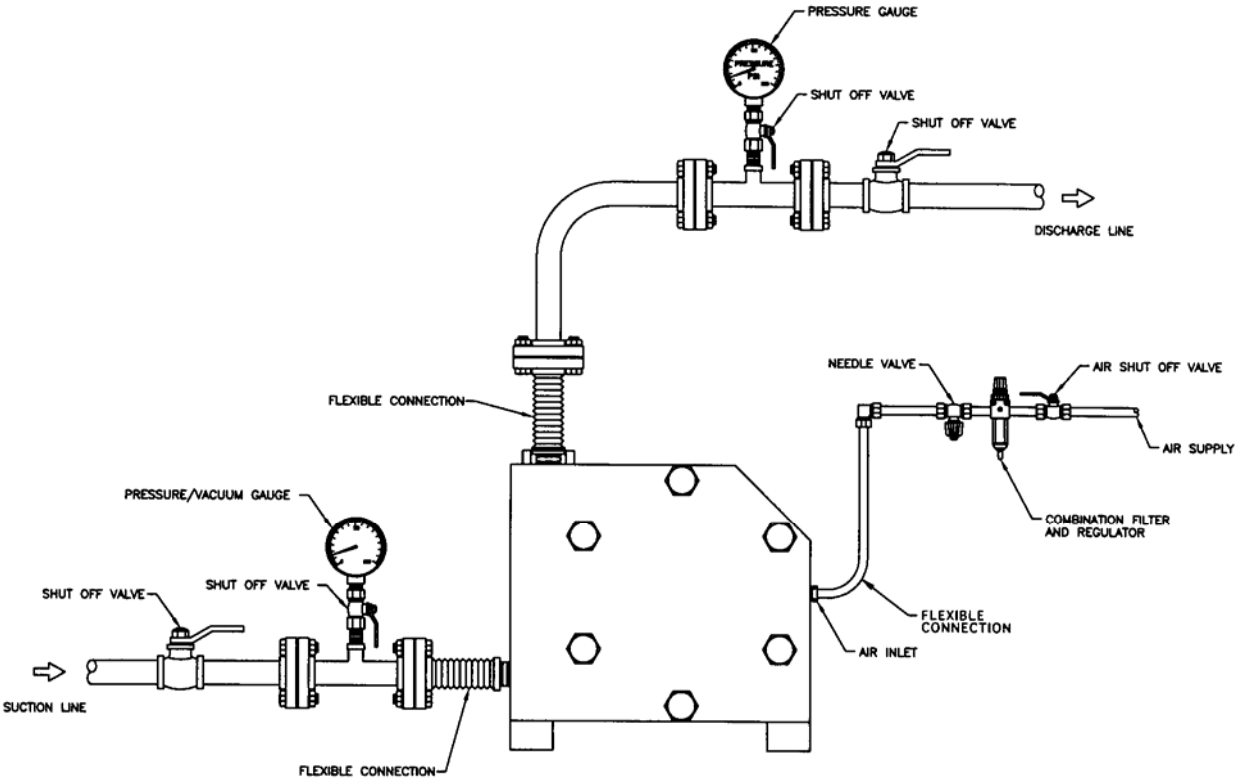
Performance chart (data refer to water with a temperature of 20°C)



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 blind plugs out of all connections. The connections of ALMATEC CX-pumps have slightly tapered threads. Use threadseal only sparingly, otherwise the connections could be damaged.

On delivery, the liquid connections of all CX-pumps are situated as follows:
Suction port horizontal at the bottom, discharge vertical on top

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By turning the center block by 180° by its longitudinal axis – after unscrewing and taking out the housing bolts – the configuration can be changed to:

Suction port vertical at the bottom, discharge horizontal on top

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. Seal the suction line diligently; 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 air inlet is located at the front of the pump in the middle of the center block [13]. 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.

The integrated air control system *PERSWING P*® 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. In humid surroundings, icing from the outside may occur despite the driving air is dried. If so, a prolonged waste-air-exhaust (ca. 500 mm 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.

ALMATEC pneumatic diaphragm pumps 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.

Size	**CX 10**	**CX 20**	**CX 50**	**CX 130**
Max. number of strokes/min. during nominal performance	500	430	240	160

Size	**CX 10**	**CX 20**	**CX 50**	**CX 130**
Torque values for housing bolts (Nm)	3	4	6	8

- Installation, operation, and maintenance by qualified staff only.
- Before putting the pump into operation as well as after some hours of pumping, the housing bolts [9] have to be fixed according to the torque data. Fixing the bolts is necessary as well after longer periods of stoppage, at extreme temperature variations, after transport and dismantling the pump.
- 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).
- 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 CX 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 ALMATEC 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.
- 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 deported from the plant, a reference about the delivered liquid has to be attached.
- The relevant additional security advises ought to be respected, 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.
- 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 ALMATEC 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.

Disassembly and assembly advises

The general design of the ALMATEC CX-pumps is simple. A plastic tool designed for the mounting of the air control system [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.

After loosening the housing bolts [9], the pump housings right hand [1] and left hand [2] can be taken away from the center block [13]. To remove the diaphragms, unscrew them one diaphragm [12] carefully leftwards off the shaft [11] and pull the other diaphragm [12] together with the shaft [11] out of the center block [13]. For CX 50/130 only: Remove both parts of the shaft piston rings [14] from their grooves carefully (do not damage the edges in the center block; a re-assembly of the same piston rings is impossible; they have to be replaced).

For taking out the *PERSWING P*® air control system [22], first unscrew both end caps using the plastic mounting tool. Take out main and pilot piston, shove out the valve housing carefully using the tool as well. To install the air control system [22] again, first screw in one end cap flushly into the center block [13]. Insert one of the six O-rings, air-valve housing [24] into the end cap from the inside. Moisture the four O-rings [24] of the air-valve housing with a bit of water and push the housing into the center block 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 [24] on the edge of the air-valve housing and screw in the second end cap.
To re-install the diaphragms [12], fix one diaphragm onto the shaft [11] (for CX 50 and CX 130, first screw the set screws, shaft [11a] into the diaphragms [12] and tighten them beforehand). Shove it into the center block and fit the second diaphragm to the other end of the shaft. Adjust the bores in the center block [13] to the diaphragms on both sides (turn slightly backwards if necessary). The sealing surfaces of the diaphragms [12] and the pump housings [1,2] have to be absolutely clean and undamaged; mere small scratches can cause leaking (if necessary, smoothen the housing surfaces carefully with fine sandpaper). Moisture all O-rings for assembly, push them in carefully, do not bend any ring. When changing the product valves [5] take care that the axial bore-holes of the valve housing [6] are completely aligned with the holes in the side housings of the pump; check position after laying in the O-rings valve stop [8] and fixing the valve stops [7].

In case the flow rate of the pump decreases after some time of operation without any obvious reason, this is frequently due to a muffler blocked by heavily soiled driving air: take out the muffler [15] and replace it, if necessary; clean the air-valve carefully without any solvents and install an air filter to clean the driving air before entering the pump.

Spare part list

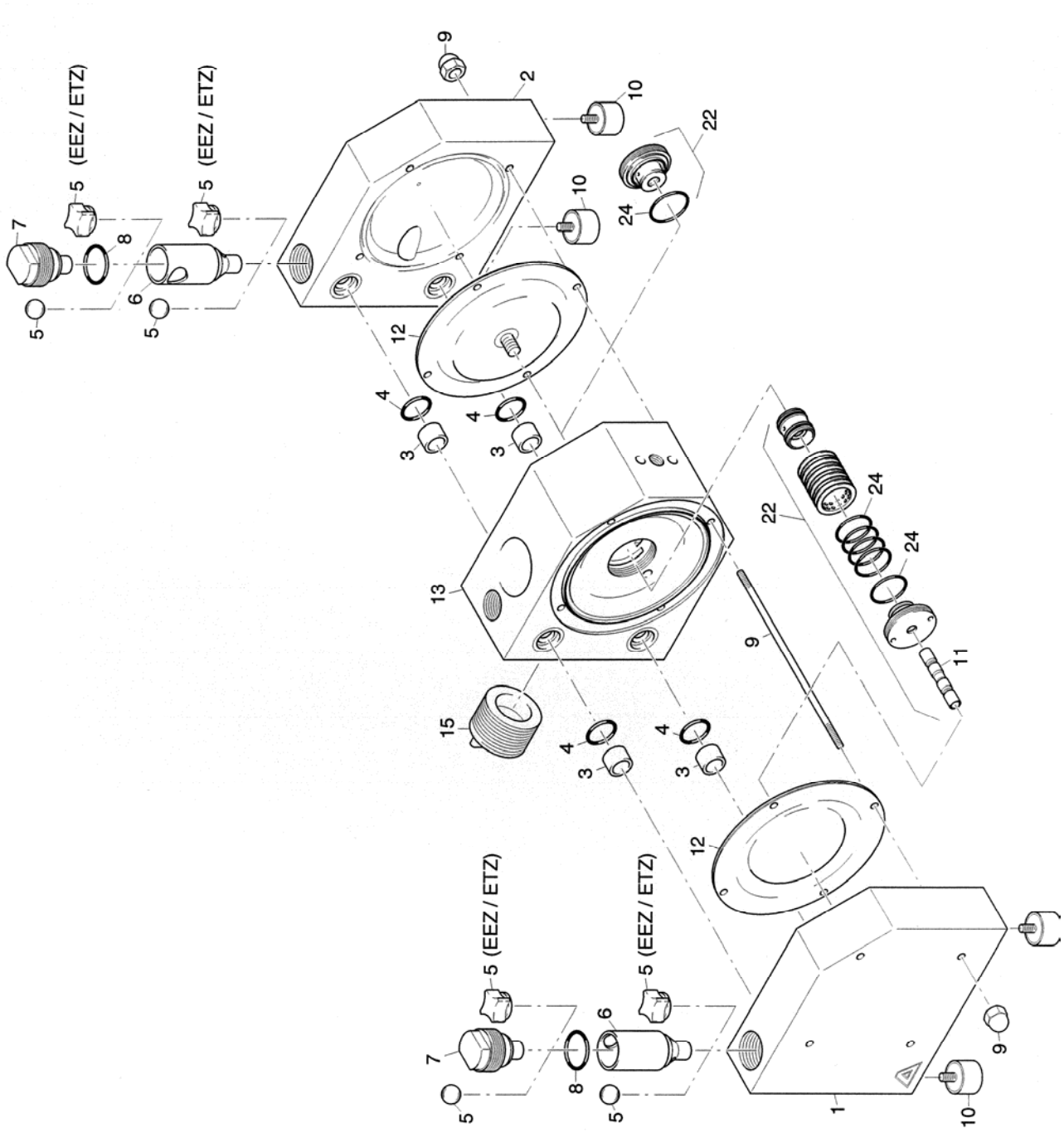
Pump size				CX 10	CX 20	CX 50	CX 130
Item	Piece	Description	Material	Part number	Part number	Part number	Part number
1	1	Pump housing, right hand	PE conductive	4 10 310 55	4 15 310 55	4 20 310 55	4 32 310 55
2	1	Pump housing, left hand	PE conductive	4 10 311 55	4 15 311 55	4 20 311 55	4 32 311 55
3	4	Sleeve	PE conductive	4 10 312 55	4 15 312 55	4 20 312 55	4 32 312 55
4	4	O-ring, sleeve (code EE.)	EPDM	9 12 619 72	9 14 617 72	9 20 502 72	9 33 526 72
		O-ring, sleeve (code EN.)	NBR	-	9 14 617 71	9 20 502 71	9 33 526 71
		O-ring, sleeve (code ET.)	FEP / FKM	9 12 619 59	9 14 617 59	9 20 552 59	9 33 553 59
5	4	Valve ball (code E.E)	EPDM	1 10 032 72	4 15 032 72	1 15 032 72	1 25 032 72
		Valve ball (code E.N)	NBR	-	4 15 032 71	1 15 032 71	1 25 032 71
		Valve ball (code E.S)	Stainless steel	1 10 032 22	4 15 032 22	1 15 032 22	1 25 032 22
		Valve ball (code E.T)	PTFE	1 10 032 60	4 15 032 60	1 15 032 60	1 25 032 60
		Check valve (code E.Z)	PE	4 10 313 52	4 15 313 52	4 20 313 52	4 32 313 52
6	2	Valve housing	PE conductive	4 10 314 55	4 15 314 55	4 20 314 55	4 32 314 55
7	2	Valve stop	PE conductive	4 10 317 55	4 15 317 55	4 20 317 55	4 32 317 55
8	2	O-ring, valve stop (code EE.)	EPDM	9 16 623 72	9 20 602 72	9 25 610 72	9 40 613 72
		O-ring, valve stop (code EN.)	NBR	-	9 20 602 71	9 25 610 71	9 40 613 71
		O-ring, valve stop (code ET.)	FEP / FKM	9 16 623 59	9 20 602 59	9 25 610 59	9 40 613 59
9	***	Housing bolt, cpl.	1.4301	4 10 020 22	4 15 020 22	4 20 020 22	4 32 020 22
10	4	Shock absorber	NR	1 08 022 85	1 15 022 85	1 15 022 85	1 15 022 85
11	1	Shaft	1.4301	2 08 030 22**	2 08 030 22**	2 15 030 22	2 25 030 22
11a	2	Set screw, shaft	1.4305	-	-	9 10 220 22	9 12 221 22
12	2	Diaphragm (code EE.)	EPDM	1 08 031 67*	1 10 031 72	1 15 031 72	1 25 031 72
		Diaphragm (code EN.)	NBR conductive	-	1 10 031 70	1 15 031 70	1 25 031 70
		Diaphragm (code ET.)	PTFE	1 08 031 67	1 10 031 67	1 15 031 67	1 25 031 67
13	1	Center block	PE conductive	4 10 340 55	4 15 340 55	4 20 340 55	4 32 340 55
14	2	Shaft piston ring, cpl.	PTFE	-	-	1 15 041 64	1 25 041 64
15	1	Muffler, cpl.	PE	4 15 044 51	4 15 044 51	4 20 044 51	4 20 044 51
22	1	*PERSWING P®* air control system, cpl.	PETP	2 08 001 84	2 08 001 84	2 15 001 84	2 15 001 84
24**	6	O-ring, air valve housing	NBR	9 26 519 71	9 26 519 71	9 35 504 71	9 35 504 71

*** CX 10/20: 4 pieces; CX 50/130: 6 pieces ** included in item 22 * PTFE diaphragm

Please see page 1 for explanation of the pump code.

When ordering please state the serial number of the pump.

Exploded view CX 10 / CX 20



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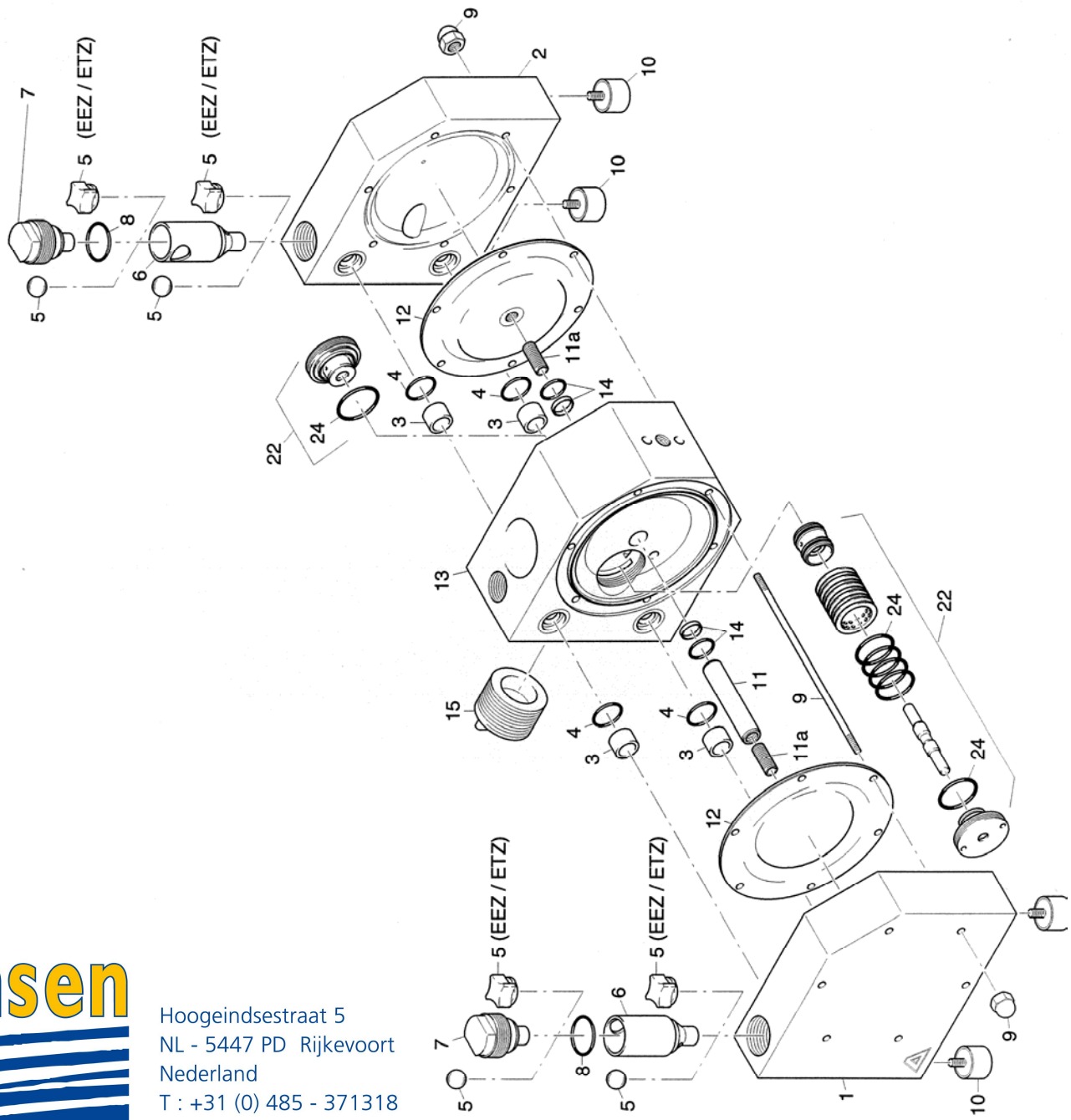
Exploded view CX 50 / CX 130



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ALMATEC MEMBER OF PSG PUMP SOLUTIONS GROUP

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