

**ALMATEC F-Series
F 10 / F 20
Operating Instructions**



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 of the F-Series has to undergo an extended final control. The performance data registered during this are archived in our records and can be read back at any time. 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, as well as the serial number, can be found in the following. Besides, these data are noted on the identification plates on the pump itself.

Pump code

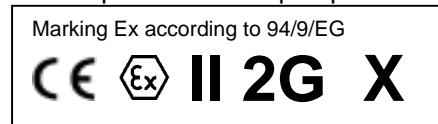
Serial-No.

The housings are made of PE conductive and the valve balls of stainless steel. The diaphragms are available in either EPDM (code F 10 E / F 20 E) and PTFE/EPDM-compound (code F 10 T / F 20 T).

Year of construction

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 F-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 center block. All other housing parts are connected to the center block, 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 marking beside stands for the max. operating temperature, which is 70°C for the F-Series.



Installation and Start-up

The correct installation procedure is based on the „Dimensions and connection plan ALMATEC F 10 and F 20“ on page 6. ALMATEC pumps of the F-Series are pneumatic diaphragm pumps with integrated pulsation damper and two separated product chambers.

The actual transport of the liquid is realized by the delivery chamber. To smoothen the flow, the fluid passes an active pulsation damper on its way. Trouble-free operation of the pulsation damper is only possible with a minimum back pressure of 1 bar and becomes increasingly efficient as the back pressure increases. The integrated needle-valve permits step-less adaptation of the flow rate to the amount required. Once the appropriate air pressure has been chosen, no further regulation of the air supply is necessary.

The second product chamber can be used as an extractor or circulation pump. For the first, ink or glue for example not needed can be sucked from the machine back to the supply container. Another possibility is to have the ink circulated within the supply container. Circulating the ink helps to ensure complete blending and to avoid sedimentation.

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 pumps of the F-Series have slightly tapered threads. Use thread seal only sparingly, otherwise the connections could be damaged.

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 cavitations (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. 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 dew point 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 should 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 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.

Pump size	F 10	F 20
Max. number of strokes/min. during nominal performance	430	240



- 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 have to be fixed. In case a gap is visible between the side housings and the center block, the housing bolts have to be fixed carefully until the side housings contact the center block. A torque value cannot be given because of the nature of the materials of construction. 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 F-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.
- The operation of the pump with nitrogen as driving gas is possible. In closed rooms a sufficient ventilation must be provided.

Technical data	F 10	F 20
Nominal port size (NPT)	1/2"	1/2"
Air connection	R 1/8	R 1/4
Weight (kg)	2.6	6.1
Suction head, dry (mWC)	1.5	2.5
Suction head, wet (mWC)	9	9
Max. permissible driving and operating pressure (bar)	7	7
Max. permissible operating temperature (X) (°C)	70	70
Max. permissible viscosity of the fluid (cP)	6000	10000
Max. sound pressure level at full load acc. to DIN 45635, part 24, depending on the operating data of the pump [dB(A)]	75	78

Disassembly and Assembly Advises

A plastic tool designed for the mounting of the air control system 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 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.

Screw the set screws (F 20 only) into the diaphragms and tighten them. Fix the diaphragms completely into the shaft with the set screws. Adjust the bores in the center block to the diaphragm on both sides (turn slightly backwards if necessary). The sealing surfaces of the diaphragms and the side housings 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.

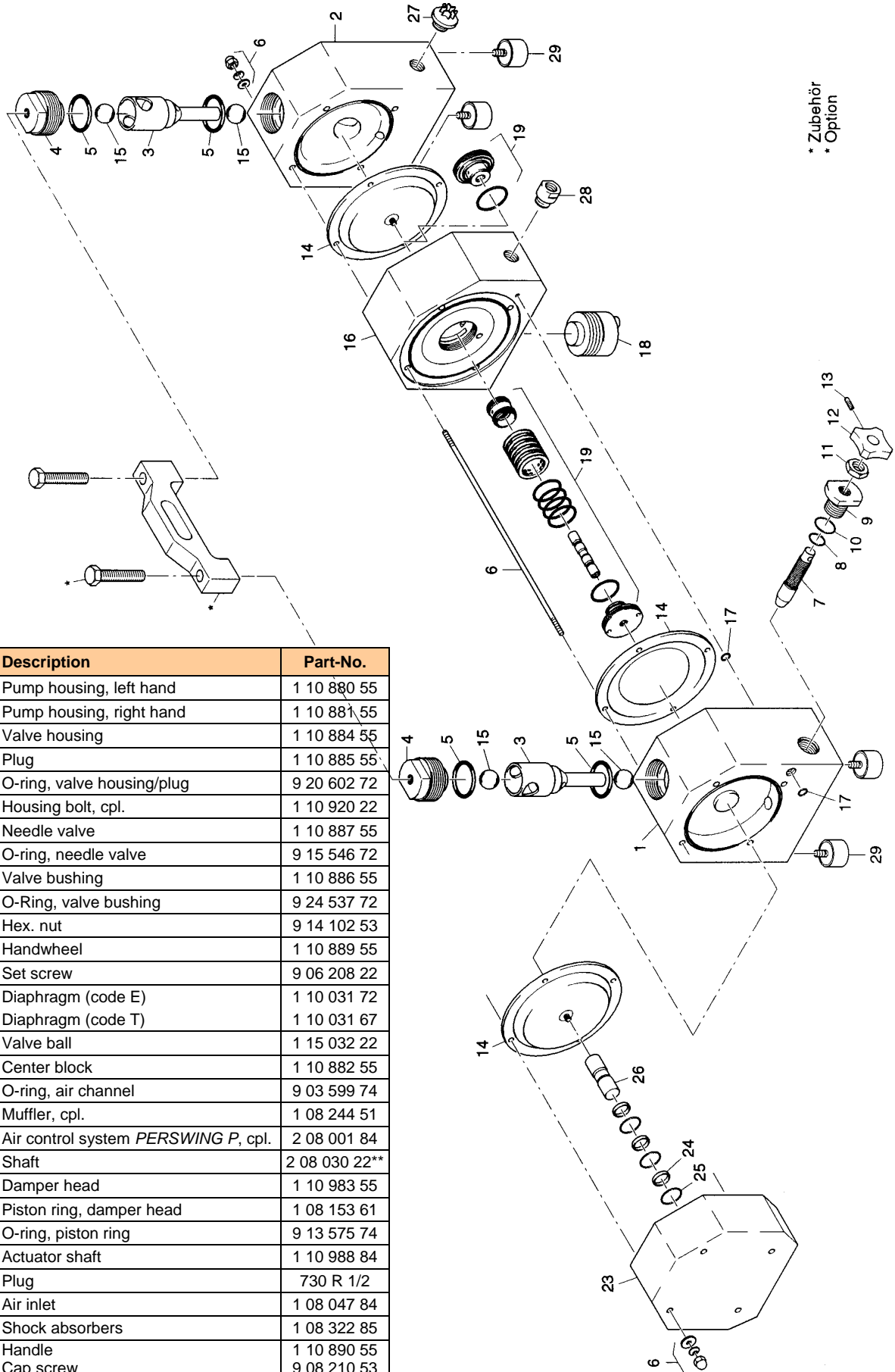
For taking out the *PERSWING P*® air control system, first unscrew both end caps using the plastic mounting tool. Take out main and pilot piston, shove out the valve housing carefully using the tool as well. To install the air control system again, first screw in one end cap flushly into the center block. Insert one of the six O-rings, air-valve housing into the end cap from the inside. Moisture the four O-rings 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 on the edge of the air-valve housing and screw in the second end cap.

A re-assembly of the same piston rings is impossible; they have to be replaced. To assemble new piston rings, carefully shape them like kidneys with locking ring pliers and insert the rings into the grooves; completely press the rings into the grooves smoothly using some round tool.

When assembling the pump, it is absolutely essential to ensure that the product and air channels are clear and the sealing elements (O-rings) are correctly seated. Before putting the pump back into operation, the tightness of the pump has to be checked.

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 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.

Exploded view and spare part list F 10

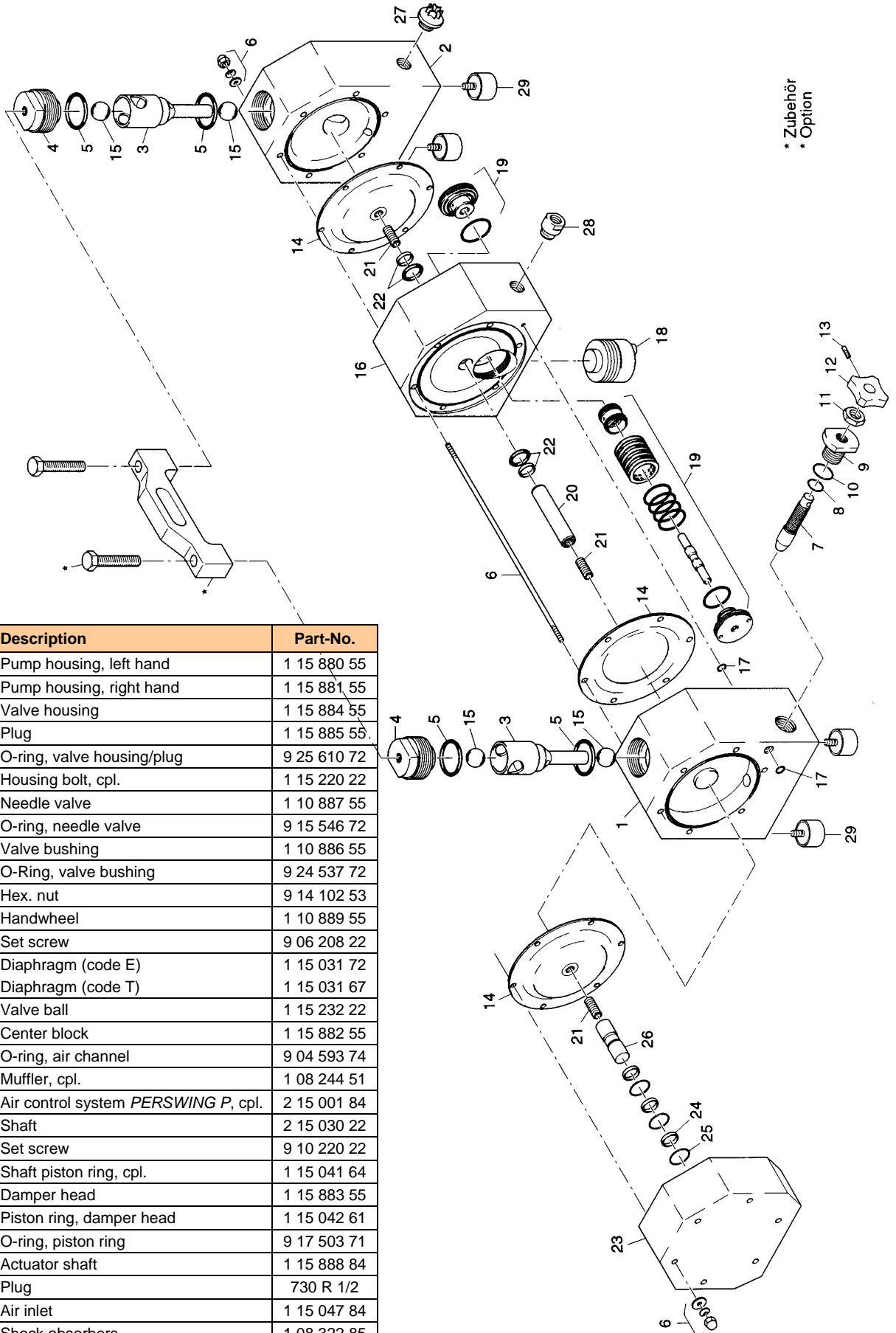


* Zubehör
* Option

Item	Pc.	Description	Part-No.
1	1	Pump housing, left hand	1 10 880 55
2	1	Pump housing, right hand	1 10 881 55
3	2	Valve housing	1 10 884 55
4	2	Plug	1 10 885 55
5	4	O-ring, valve housing/plug	9 20 602 72
6	4	Housing bolt, cpl.	1 10 920 22
7	1	Needle valve	1 10 887 55
8	1	O-ring, needle valve	9 15 546 72
9	1	Valve bushing	1 10 886 55
10	1	O-Ring, valve bushing	9 24 537 72
11	1	Hex. nut	9 14 102 53
12	1	Handwheel	1 10 889 55
13	1	Set screw	9 06 208 22
14	3	Diaphragm (code E) Diaphragm (code T)	1 10 031 72 1 10 031 67
15	4	Valve ball	1 15 032 22
16	1	Center block	1 10 882 55
17	2	O-ring, air channel	9 03 599 74
18	1	Muffler, cpl.	1 08 244 51
19	1	Air control system <i>PERSWING P</i> , cpl.	2 08 001 84
20	1	Shaft	2 08 030 22**
23	1	Damper head	1 10 983 55
24	3	Piston ring, damper head	1 08 153 61
25	3	O-ring, piston ring	9 13 575 74
26	1	Actuator shaft	1 10 988 84
27	1	Plug	730 R 1/2
28	1	Air inlet	1 08 047 84
29	4	Shock absorbers	1 08 322 85
Option	1	Handle	1 10 890 55
	2	Cap screw	9 08 210 53

** included in Pos. 19

Exploded view and spare part list F 20



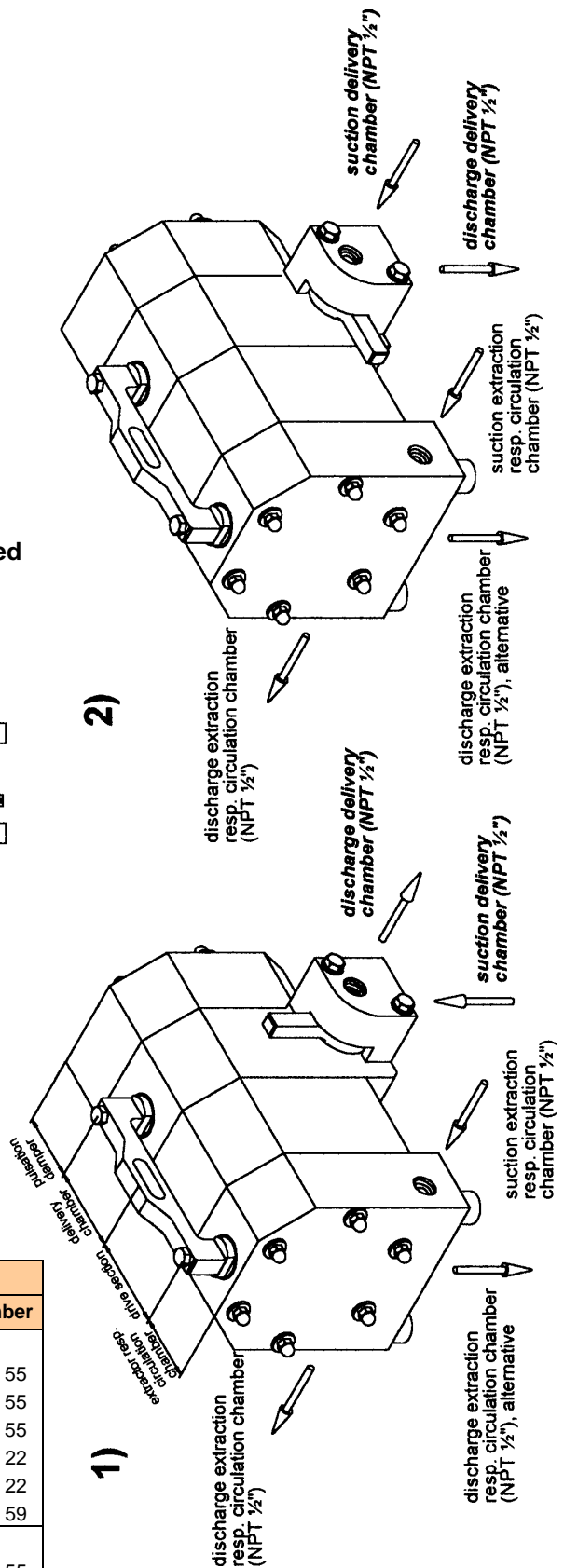
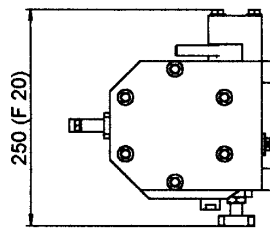
* Zubehör
* Option

Item	Pc.	Description	Part-No.
1	1	Pump housing, left hand	1 15 880 55
2	1	Pump housing, right hand	1 15 881 55
3	2	Valve housing	1 15 884 55
4	2	Plug	1 15 885 55
5	4	O-ring, valve housing/plug	9 25 610 72
6	6	Housing bolt, cpl.	1 15 220 22
7	1	Needle valve	1 10 887 55
8	1	O-ring, needle valve	9 15 546 72
9	1	Valve bushing	1 10 886 55
10	1	O-Ring, valve bushing	9 24 537 72
11	1	Hex. nut	9 14 102 53
12	1	Handwheel	1 10 889 55
13	1	Set screw	9 06 208 22
14	3	Diaphragm (code E) Diaphragm (code T)	1 15 031 72 1 15 031 67
15	4	Valve ball	1 15 232 22
16	1	Center block	1 15 882 55
17	2	O-ring, air channel	9 04 593 74
18	1	Muffler, cpl.	1 08 244 51
19	1	Air control system <i>PERSWING P</i> , cpl.	2 15 001 84
20	1	Shaft	2 15 030 22
21	3	Set screw	9 10 220 22
22	2	Shaft piston ring, cpl.	1 15 041 64
23	1	Damper head	1 15 883 55
24	3	Piston ring, damper head	1 15 042 61
25	3	O-ring, piston ring	9 17 503 71
26	1	Actuator shaft	1 15 888 84
27	1	Plug	730 R 1/2
28	1	Air inlet	1 15 047 84
29	4	Shock absorbers	1 08 322 85
Op- tion	1	Handle	1 15 890 55
	2	Cap Screw	9 08 210 53

Back sucking system as special equipment (code R1 / R2)

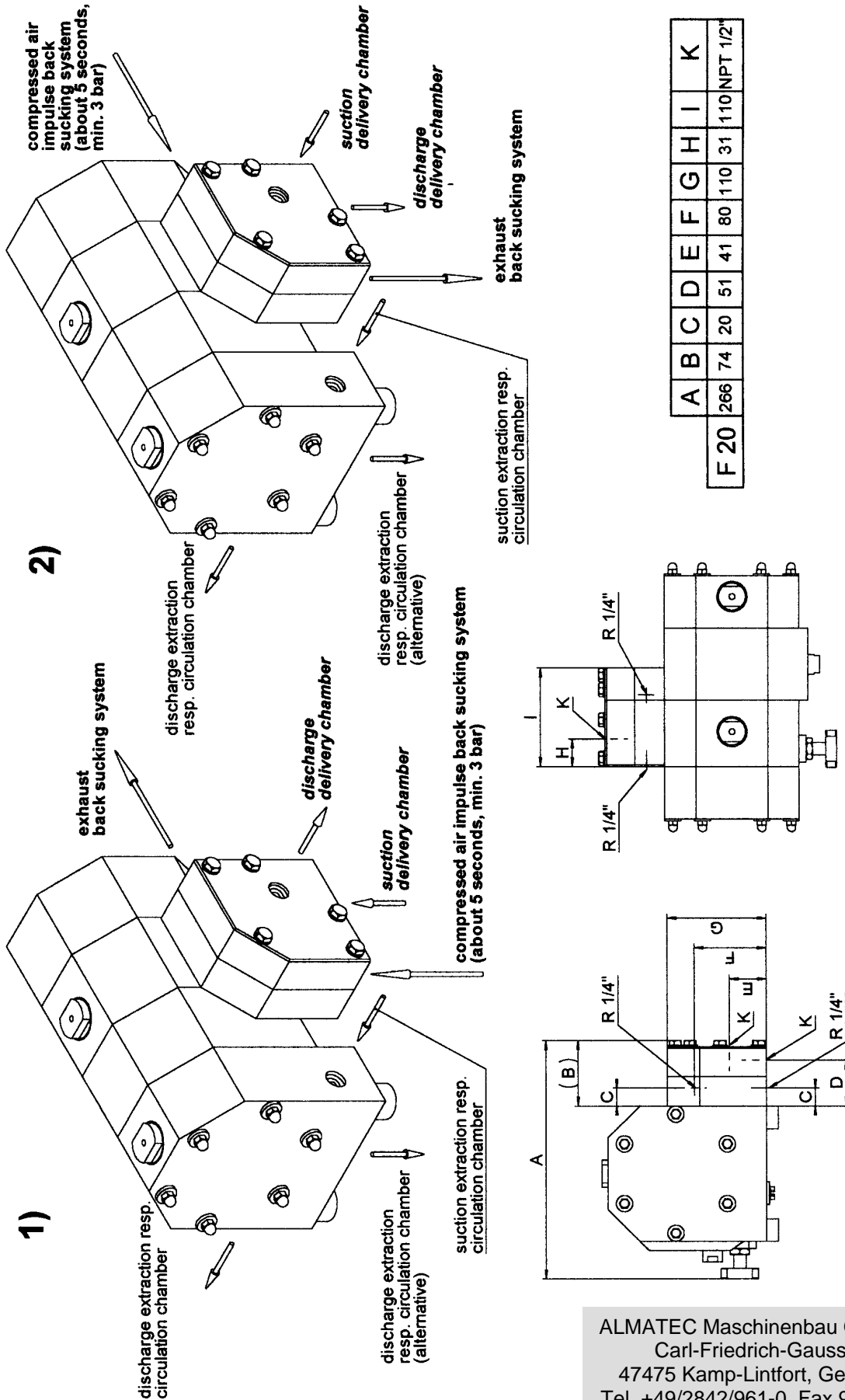
The pump size F 20 can optionally be equipped with a hand-operated (code R1) or a pneumatical back sucking system (Code R2). By actuating the handle (R1) resp. a compressed air impulse (R2, about 5 seconds, min. 3 bar) the transport direction in the delivery chamber will be reversed. That means for the ink example: After the printing procedure the ink can be led back out of the doctor chamber, the piping and the pump into the supply container.

Dimensions and connection plan Back sucking system, hand operated (code R1)



Spare part list, back sucking systems				F 20
	Piece	Description	Material	Part number
Back sucking system, hand-operated (code F 20 E/T-R1):				
1	1	Pump housing, left hand	PE conductive	1 15 891 55
32	1	Housing	PE conductive	1 15 892 55
33	1	Handle	PE conductive	1 15 893 55
34	2	Cap screw	1.4301	9 08 213 22
35	2	Washer	1.4301	9 08 151 22
36	2	O-ring, handle	FEP/FKM	9 38 626 59
Back sucking system (code F 20 E/T-R2):				
1	1	Pump housing, left hand	PE conductive	1 15 891 55
32	1	Outer housing	PE conductive	1 15 896 55
33	1	Handle	PE conductive	1 15 895 55
34	3	Cap screw	1.4301	9 08 216 22
35	5	Washer	1.4301	9 08 151 22
36	2	O-ring, handle	FEP/FKM	9 38 626 59
37	2	Cap screw	1.4301	9 08 211 22
38	1	Inner housing	PE conductive	1 15 894 55

Dimensions and connection plan, back sucking system, pneumatical (code R2)



	A	B	C	D	E	F	G	H	I	K
F 20	266	74	20	51	41	80	110	31	110	NPT 1/2"

Subject to change without notice, 2003/06

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