ALMATEC®
A DOVER COMPANY

Operating and Installation Instructions

E-Series
E 08 - E 50

Air-Operated Diaphragm Pumps made of Plastic

ought to be studied before installing the pump

CE

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Introduction and appropriate use

The ALMATEC Maschinenbau GmbH is certified as a modern, quality-orientated enterprise according to DIN EN ISO 9001:2008 and 14001:2005. Before release for dispatch, any pump of the E-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.

The appropriate use of an Almatec air-operated diaphragm pump of the E-Series refers to the liquid transport taking account of the operation parameter mentioned in this manual and in compliance of the given terms for commissioning, operation, assembly, disassembly and maintenance.

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:

E 15 T T T - B

Optional equipment (partial separate manual):
- B Barrier chamber system
- C Stroke counting
- D Diaphragm monitoring
- F Flange connection PN 10
- P Diaphragm made of modified PTFE
- R Draining system
- W ANSI product ports
- Z External controlled

Type and material of product valves:
- E Ball valves, EPDM
- N Ball valves, NBR
- T Ball valves. PTFE
- S Ball valves, stainless steel
- Z Cylinder valves, PTFE

Diaphragm material:
- E EPDM
- N NBR
- T PTFE/EPDM compound

Housing material:
- E PE
- F PE conductive
- T PTFE
- U PTFE conductive

Size, port dimension

ALMATEC air-operated diaphragm pump, E-Series

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, only pumps with housings and fittings in conductive plastic materials may be used. Pneumatic diaphragm pumps of the A-Series with the housing codes F (PE conductive) and U (PTFE conductive) meet this requirement. The pump has to be grounded. A connection to ground the pump is included in the center housing [4]. All other housing parts are connected to the center housing; therefore it is not necessary to ground single parts.
ALMATEC E-Series pumps made of electrically conductive PE/PTFE are suitable to be used in explosion areas of the category 2 and 3, atmosphere G/D, which are liable to the 94/9/EG. Conductive diaphragms (liquid side) are applicable without restrictions for transferring liquids of any explosion-group.

When using non-conductive diaphragm materials, the following exemplary protection measures have to be respected:
- The pump is always used for the transfer of exclusively fluids which are conductive or soluble in water or
- Dry-running is avoided by action steps within the facility and/or its control or
- The system is inertisated in case of dry running by nitrogen, water, carbon dioxide etc. when the fluid transfer ends.

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. For the marking according to 94/9/EG please see the attached conformity declaration.

Technical data		**E 08**	**E 10**	**E 15**	**E 25**	**E 40**	**E 50**
Dimensions, mm (in.):	length width height	88 (3.5) 128 (5.0) 129 (5.1)	110 (4.3) 147 (5.8) 169 (6.7)	166 (6.5) 189 (7.4) 240 (9.4)	220 (8.7) 255 (10.0) 320 (12.6)	304 (12.0) 353 (13.9) 432 (17.0)	399 (15.7) 430 (16.9) 552 (21.7)
Nominal port size Air connection	NPT BSP	1/4“ R 1/8	3/8“ R 1/8	1/2“ R 1/4	1“ R 1/4	1 1/2“ R 1/2	2“ R 1/2
Weight, kg (lb):	PE PTFE	- 2 (4)	- 5 (11)	7 (15) 12 (26)	15 (33) 29 (64)	34 (75) 69 (152)	66 (146) 131 (289)
Max. particle size of solids for pumps with ball valves	mm (in.)	2 (0.08)	3 (0.12)	4 (0.16)	6 (0.24)	9 (0.35)	11 (0.43)
Suction lift dry, mWC (ft): Suction lift wet, mWC (ft)	cylinder valves ball valves	1 (3.3) 0,5 (1.6) 9 (29.5)	2 (6.6) 1 (3.3) 9 (29.5)	3 (9.8) 2 (6.6) 9,5 (31.2)	4 (13.1) 3 (9.8) 9,5 (31.2)	5 (16.4) 4 (13.1) 9,5 (31.2)	5 (16.4) 4 (13.1) 9,5 (31.2)
Max. driving and operating pressure, bar (psig)		7 (100)	7 (100)	7 (100)	7 (100)	7 (100)	7 (100)
Max. operating temperature, °C (F):	PE PTFE	- 100 (212)	- 100 (212	70 (158) 120 (248)	70 (158) 120 (248)	70 (158) 120 (248)	70 (158) 120 (248)
Theoretical displacement volume per single stroke (l)		0,0075	0,0215	0,1	0,34	0,98	2,6
Sound power level L_{WA} [dB (A)]:**							
driving pressure 3 bar		77,5-84,0	79,5-81,0	77,0-89,0	74,0-84,2	82,2-86,6	66,6-84,9
driving pressure 5 bar		80,0-86,5	79,5-85,0	75,0-94,0	68,6-87,8	72,2-95,5	73,5-91,5
driving pressure 7 bar		80,2-87,0	79,5-86,0	74,0-96,0	70,0-91,0	68,5-94,4	67,3-96,0
Sound pressure level L_{pf}, 1 m [dB (A)]:***							
driving pressure 3 bar		64,1-70,3	65,9-67,5	63,2-74,9	61,7-71,9	69,5-73,9	53,4-71,7
driving pressure 5 bar		66,2-73,1	65,7-70,8	60,9-80,1	56,3-75,5	59,5-82,8	60,3-78,3
driving pressure 7 bar		66,8-73,8	65,7-72,1	60,3-82,0	57,7-78,8	55,8-81,7	54,1-82,8

* PTFE pumps with NBR equipment 80°C

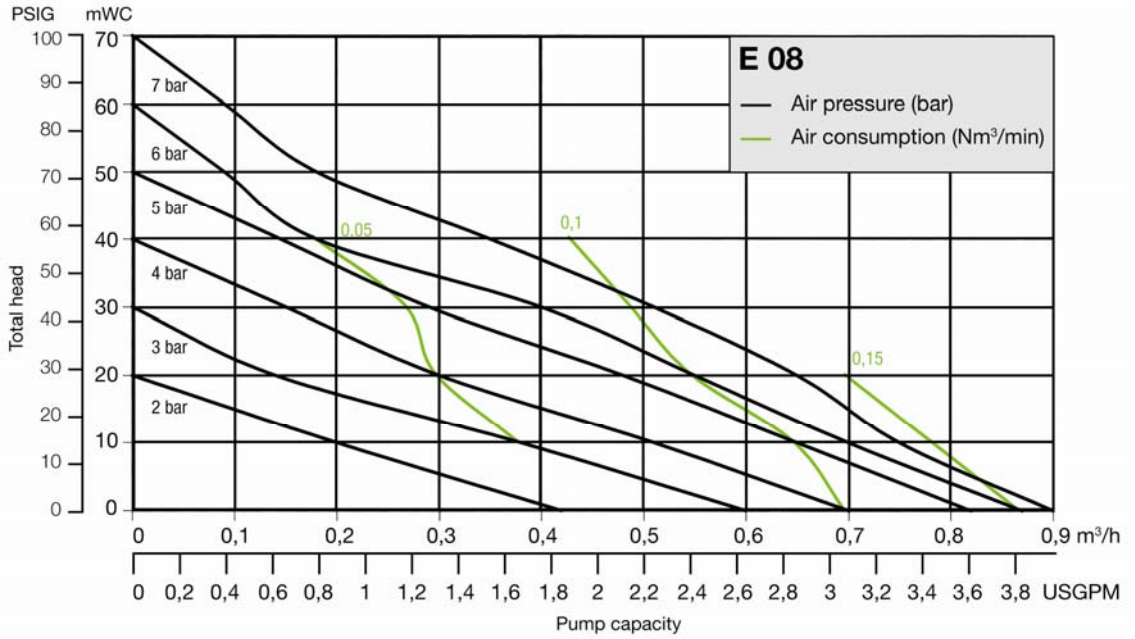
** determined in sound power level measurements according to EN ISO 3744 respectively EN ISO 9614 in laboratory and practise conditions

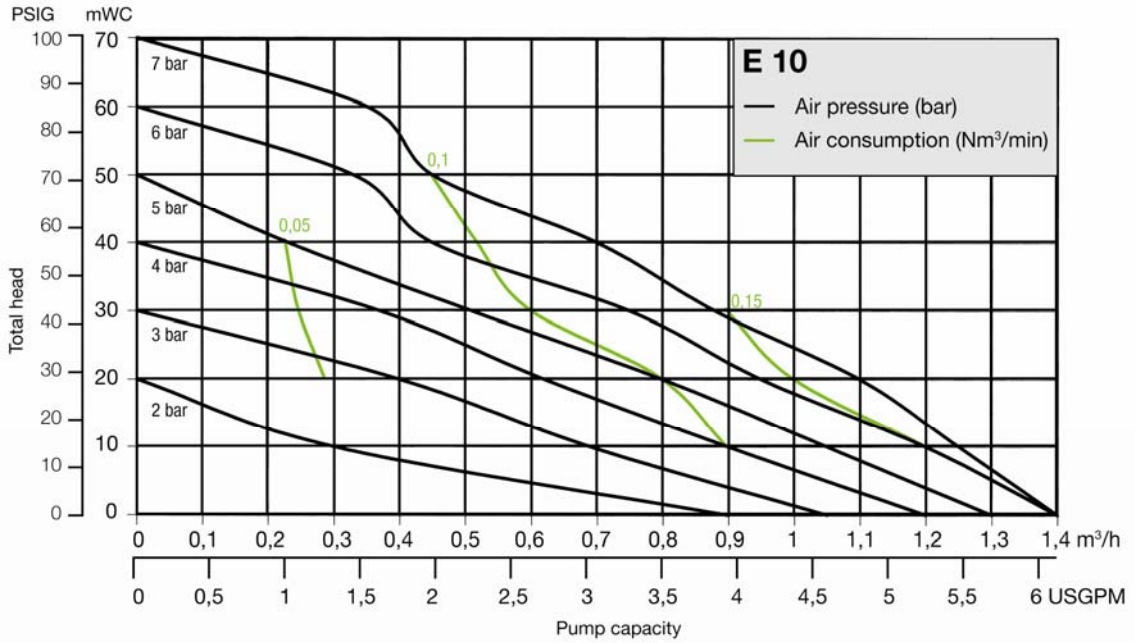
*** sound pressure levels as average location-independent values calculated norm-conformous from the location of the sound power levels listed above

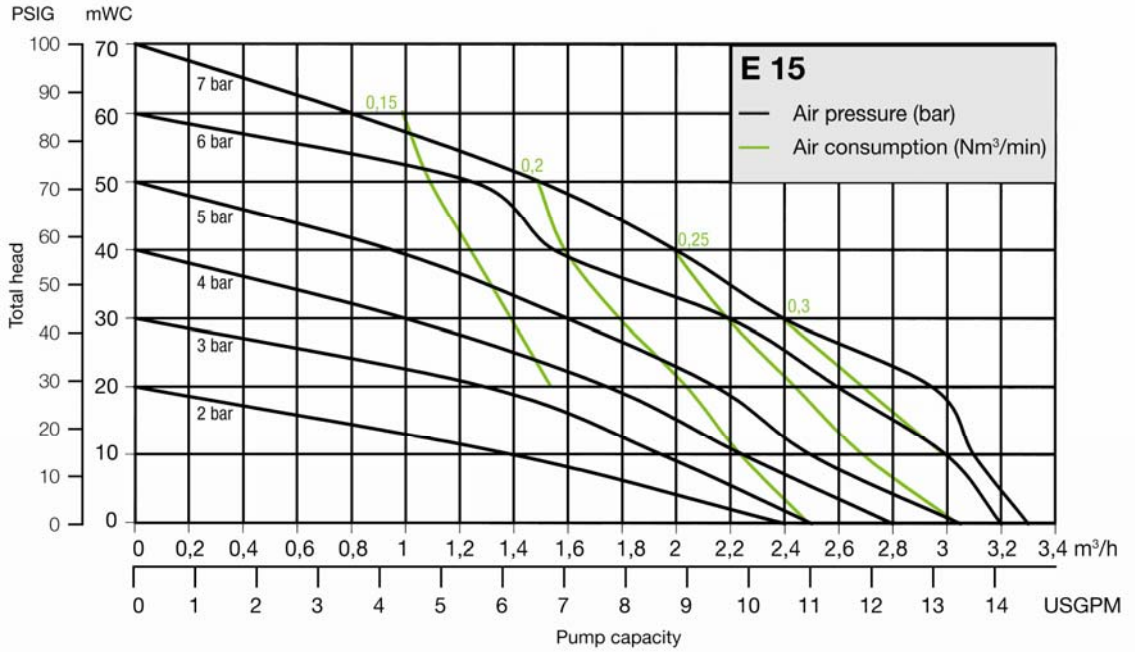
These technical data refer to ALMATEC E-Series pumps without optional equipment.

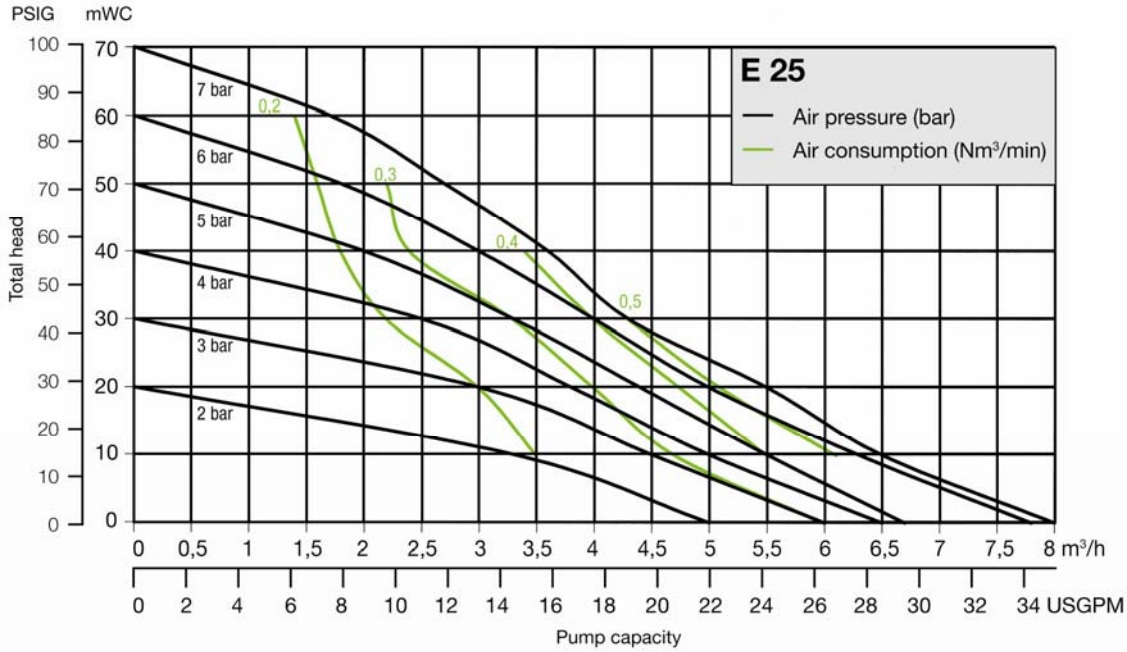
Performance charts

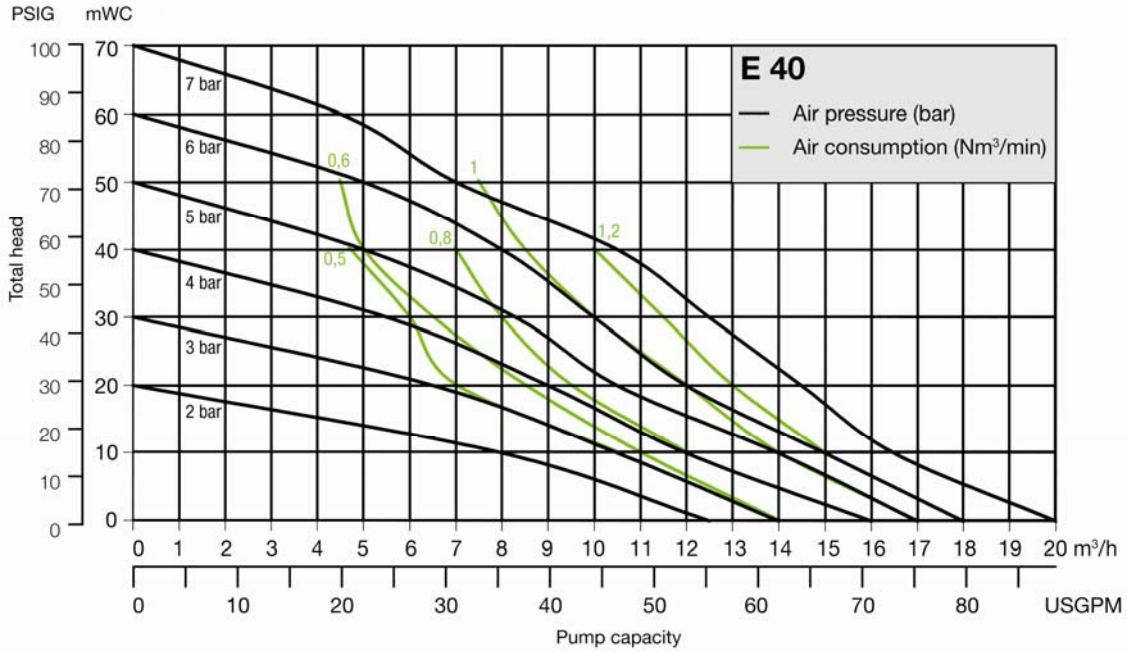
The data refer to water (20°C), under using of different variations (e.g. ball valve model, damper preparation etc.), a compressor Atlas Copco VSG30 and calibrated measuring equipment. The specified performance data are warranted by ALMATEC in accordance with DIN EN ISO 9906.

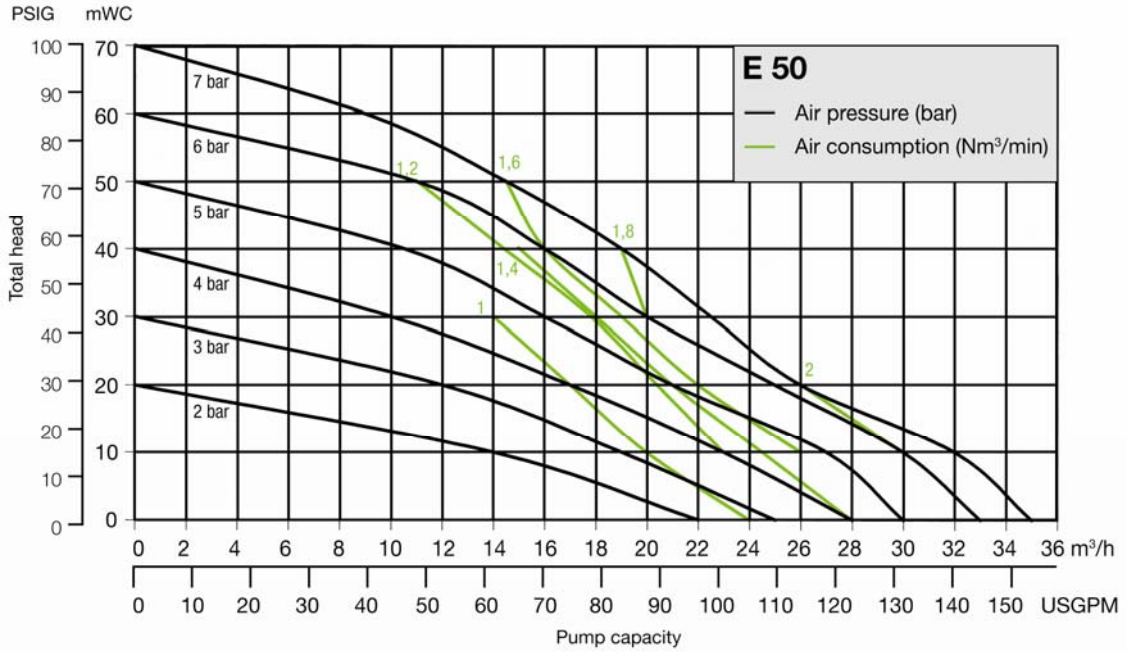

PSIG
mWC
E 08
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
0,05
0,1
0,15
Total head
0 0,1 0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 m³/h
0 0,2 0,4 0,6 0,8 1 1,2 1,4 1,6 1,8 2 2,2 2,4 2,6 2,8 3 3,2 3,4 3,6 3,8 USGPM
Pump capacity


PSIG
mWC
E 10
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
0,05
0,1
0,15
Total head
0 0,1 0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 1 1,1 1,2 1,3 1,4 m³/h
0 0,5 1 1,5 2 2,5 3 3,5 4 4,5 5 5,5 6 USGPM
Pump capacity

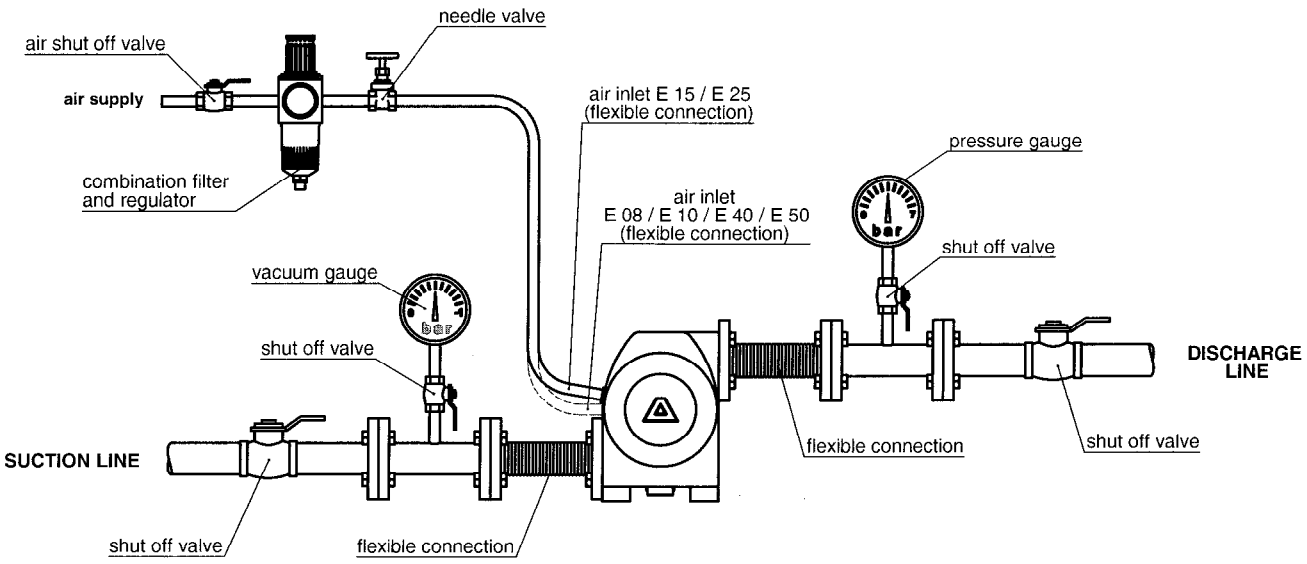

PSIG
mWC
E 15
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
0,15
0,2
0,25
0,3
Total head
0 0,2 0,4 0,6 0,8 1 1,2 1,4 1,6 1,8 2 2,2 2,4 2,6 2,8 3 3,2 3,4 m³/h
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 USGPM
Pump capacity


PSIG
mWC
E 25
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
0,2
0,3
0,4
0,5
Total head
m³/h
USGPM
Pump capacity


PSIG
mWC
E 40
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
0,5
0,6
0,8
1
1,2
Total head
m³/h
USGPM
Pump capacity


PSIG
mWC
E 50
Air pressure (bar)
Air consumption (Nm³/min)
7 bar
6 bar
5 bar
4 bar
3 bar
2 bar
1
1,2
1,4
1,6
1,8
2
Total head
m³/h
USGPM
Pump capacity

Recommended installation



Product ports

The product ports are integrated into the center housing [4]. Different port configurations can be obtained (without using of a screwed pulsation damper only). The standard configuration of the E-Series at delivery is with the suction inlet horizontally at the bottom and the discharge outlet horizontally at the top (figure 7.1). Further possible configurations:

- Suction inlet vertically at the bottom, the discharge outlet horizontally at the top (figure 7.2)
  To obtain this configuration, the plug of the center housing [13] has to be removed and set in the standard inlet.
- Suction inlet horizontally at the bottom, the discharge outlet vertically at the top (figure 7.3)
  Unscrew the housing bolts [19], take off the side housings [1] and turn the center housing [4]. Remount the pump and adjust the plug [13] accordingly.

fig. 7.1

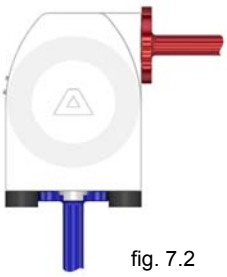


fig. 7.2

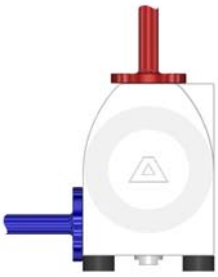


fig. 7.3

Installation, operation and maintenance

UV-radiation can damage the housing parts of pumps made of PE (material code E). 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 as well as the air inlet [23] in the center housing [4]. The connections of ALMATEC air-operated diaphragm pumps made of plastic have slightly tapered threads. Use threadseal 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 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 connection in the center housing [4]. 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 [19] is located in the middle of the center housing [2]. 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 [24] directly behind the air inlet [23] (not included in E 08 and E 10) prevents the entry of bulk particles.

The integrated air control system *PERSWING P*® [26] 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. In applications with a tendency to freezing at the waste air exhaust, good experiences in practise have been achieved by pre-heating the driving air to increase the distance to the dew point of the air. Doing so, it has to be considered that the driving air temperature generally may not exceed 50°C to avoid expansion and sticking effects on the air side. This max. air temperature is a well valid when using a compressor producing warm air which is e.g. often true for truck compressors.

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 is regulated by tuning the flow rate of the air. For a proper operation at the lower performance range the regulation via a needle valve is recommended. An empty pump has to be driven slowly (e.g. via a needle-valve). The pump starts automatically. Pumps of the E-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 pumps can briefly (up to max. one hour) be operated against a closed discharge line. Throttling on the suction side may damage the pump. When the pump operation has been stopped by a closed discharge, the pressure equilibrium of the diaphragms must be ensured. This can be achieved by keeping the pump connected to the air supply pressure; for longer stoppage, the pump must be released from the pressure within the system on both fluid side and air supply side.

Pump size	**E 08**	**E 10**	**E 15**	**E 25**	**E 40**	**E 50**
Torque values for housing bolts (Nm):						
PE pumps	-	-	8,5	14	18	23
PTFE pumps	2	4,5	6,5	11	15	19

- Immediately before putting the pump into operation as well as after some hours of pumping, the housing bolts [19] have to be fixed according to the torque data of the above schedule, as the elements of construction "settle". The valve stops discharge valve [9] and the plugs [11/13] have to be fixed too. Fixing all these parts is necessary as well after periods of stoppage, at temperature variations, after transport and dismantling the pump.
- 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.
- Pump 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 (in this case muffler has to be replaced). For further safety requirements the optional equipment diaphragm monitoring and barrier chamber system are recommended.
- In case of a diaphragm rupture, it might be possible fort he fluid pumped to intrude into the air side of the pump. In very adverse conditions - e.g. pressure within the fluid system during stopped air supply - the fluid might as well find its way into the air supply lines. To protect other devices like pulsation dampers or even pneumatic valves, it is recommended to protect the air supply line accordingly, e.g. via a non-return valve. This would as well avoid polluting the air supply line.
- 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.
- In case of delivery of hot liquids the wetted pump must not standstill for a longer time,

because it could lead to temporary leaks in the valve area and to a blockade of the air control system.

- The relevant effective security advises have to be respected.
- 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 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.

Using as submersible pump

Consider the following advises when using an E-Series pump as a submersible pump: When immersing an air-operated diaphragm pump, it must generally be ensured that the waste air is deducted above the fluid level with a pipe or similar. The pump must be located vertically upright to guarantee proper function. Minute leakage on the air inlet or outlet can block the air valve. The pump must be disconnected from the pressure within the system during standstill. When choosing the pump type, it must be taken into consideration that all external parts - even those non-wetted during standard operation - like covers, shock absorbers, connections etc. must be resistant to the fluid pumped. Please consider as well that depending on the material, the pump must be weight down resp. fixed.

Additional temperature hints

The temperature and pressure limitations listed on page 4 are solely based on mechanical temperature limits of the housing material used. Depending on the fluid pumped, the maximum safe operating temperature of the housing material can be reduced significantly.

A general aspect of lower temperatures is, that below 0°C cold-brittling of the elastomers used within the pumps can results in accelerated wear. Regarding the housing materials, please note that PE - other than PP - keeps its mechanical strengths at low temperatures and PTFE keeps mechanically stable as well for an extended temperature range. ALMATEC pumps of the E-Series can therefore be operated safely as well within low-temperature installations: However, with liquids below 0°C accelerated wear of internal parts has to be accepted. Moreover, freezing, bogging or crystallisation of the fluid pumped must be avoided, especially within the pump. Emptying the pump via the drainage system (optional equipment code R) may be a useful tool to assist this.

Please consider, that viscosity and specific gravity of most fluids change with temperature (most often increasing at lower temperature). Depending on the application, this fact may not only result in result in a reduced flow rate, the pump may even be unable to prime the thicker and/or “heavier“ fluid any more.

In case of varying application temperatures, the housing bolt tension has to be controlled very thoroughly, as variations like these can change the effective tension of the housing bolts via the different thermal expansion characteristics of single.

Providing spare parts

We recommend having spare part kits S on stock. These include the relevant spare parts for your pump.

Disassembly

Among the different sizes of the E-Series - E 15 to E 50 - only the number of housing bolts [19] varies. Besides, for the sizes E 08 and E 10 the shaft [20] additionally functions as the pilot piston for the air-valve. In these pumps E 08 and E 10, there are no shaft piston rings [22] and no set screws [21] nor an air filter [24]. Please keep these differences in construction in mind when reading the following dismantling instructions.

The general design of the ALMATEC E-Series is simple. Two tools are delivered along with every pump. The plastic one of these is designed for the mounting of the air-valve [26], the other one for the mounting of valve seat [16]. Further special tools are not required.

- 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.
- 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.

Take the cover [3] out of the side housings [1], to get access to the housing bolts [19]. Unscrew the housing bolts [19] on one side using a socket wrench, remove tension disc [2] first and side housing [1] second. Work carefully to ensure that the sealing surfaces in contact to the diaphragms are not damaged. Carefully draw the housing bolts [15] out of the pump and remove the second cover [2]. The center housing [4] and both side housings [1] are removeable now. Remove the sleeve [5] out from the side housing [1]. Take the O-rings sleeve [6] out of the center housing [4] and both side housings [1] for a possible renewal.

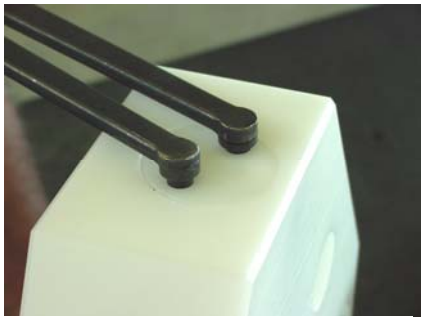


fig. 10.1

For further dismantling of the side housings [1], screw out the valve stop, discharge valve [9] with an appropriate wrench (figure 10.1). Alternatively, you can stick two housing bolts [19] into the holes in the valve stop [9] and loosen the valve stop with a third housing bolt [19] fixed in between the others. Take out the ball valve [15] resp. cylinder valve [15] and the O-ring, valve stop, discharge valve [10].

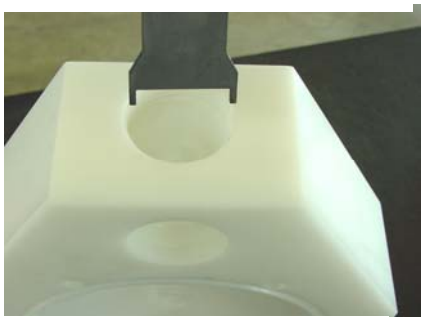


fig. 10.2

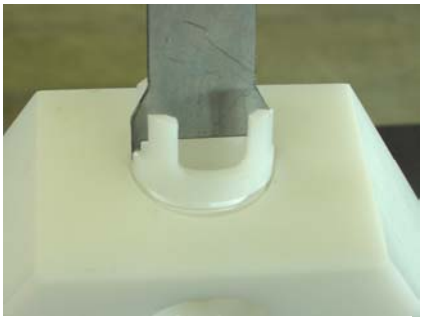


fig. 10.3

fig. 10.4

Use the metallic mounting tool to unscrew the valve seat [16] (figure 10.2/10.3). The plug, side housing [11] can be unscrewed the same way as described for the valve stop [9]. Take care of O-ring plug side housing [12]. Loosen the thread bolt [8] with a screw-driver. Remove lock bolt [7] and afterwards ball/cylinder valve [15]. Turn the mounting tool and screw the valve seat [16] into the side housing [1] (figure 10.4). The valve seat [16] can now be removed from inside the side housing.

fig. 10.5

Screw one diaphragm [18] left-turning off the shaft [20] and pull the other diaphragm [18]] together with the shaft [20] out of the center housing [4]. Take out set screws shaft [21] of the diaphragms [18] by using a hexagon socket key (figure 10.5). Remove both parts of the shaft piston rings [22] from their grooves carefully (figure 11.1); do not damage the edges in the center housing, a re-assembly of the same piston rings is impossible, they have to be replaced. Unscrew the muffler [25], the air inlet [23] and the air filter [24] out of the

Optional equipment

For special requirements ALMATEC pneumatic diaphragm pumps of the A-Series can be furnished with several optional equipment. The pump code informs, which of these are included in the pump. The code is noted on the identification plate on the pump.

Stroke counting (option code C 2, C 3, C 4, C 9, C 10)

Code C 2 / C 3 / C 4

A sensor [50] is installed in the center pump housing [4] to count the strokes. The diaphragm movement is scanned without contact by this sensor: a safe form of monitoring totally independent of external influences and the pump's mode of operation. The issued sensor pulses can be output to existing detectors or to a stroke counter (can also be supplied). When the preset value is reached, the stroke counter outputs a signal which can then be processed further, for instance in order to shut down the pump via a solenoid valve.

The stroke counting system is available in three variations:

- C 2 Stroke sensor (Namur), also for explosion-proof zone
- C 3 Stroke counting system complete with sensor and stroke counter
- C 4 Stroke counting system complete with sensor, stroke counter and controller for explosion-proof zone

In case only the sensor is included (code C 2), it has to be connected to an existing controller with Namur inlet. For applications an explosion-proof device is required for (code C 4) the intrinsically safe controller has to be installed between the sensor and the counter. The wiring diagram and technical data can be found on the electric units themselves. For further details, please refer to the data delivered by the manufacturers of the components. The controllers have to be installed in a suitable cabinet.

Code C 9 / C 10

Differently from the optional equipment codes C 2 - C 4, the strokes of the pump are registered pneumatically on the codes C 9 / C 10. 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.

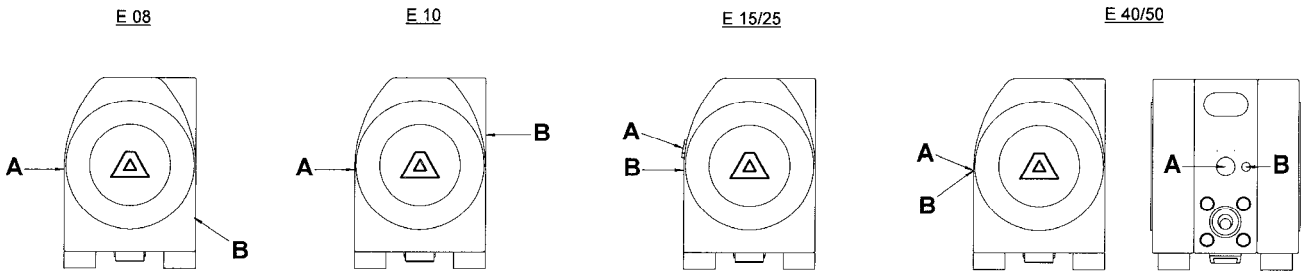
The pneumatic stroke counting system is available in two types:

- C 9 consist of:
  pressure switch, cpl. mounted, 1 – 10 bar
  socket with cable 5 m
  adaptor elbow NPT ¼ (or adaptor straight for pump sizes E 08 / E 10)
  hose DN 4/6, 2,5 m
- C 10 consist of:
  as C 9 and a stroke counter

For assembly screw the adaptor elbow (or adaptor straight for pump sizes E 08 / E 10) into the additional air connection of the pump (it is possible that the adaptor is already installed). The position of the air inlet varies depending on the pump type and the pump size (see comments below). 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 (code C 9) resp. to the enclosed stroke counter (code C 10). Technical data, connection schemes and further details can be found in the technical documentation delivered by the manufacturers of the pressure switch and the stroke counter.

The pneumatic stroke counting system requires a minimum air pressure of 1.5 bar for optimal function!

The air inlet for the pneumatic stroke counting system must not be confused with the actual air inlet of the pump. Therefore, you will find some advises adapted to the pump type and the pump size.



A = Air inlet for the pump, B = Air inlet for the pneumatic stroke counting system

Spare part list Stroke Counting					E 10	E 15	E 25	E 40	E 50
Code	**Item**	**Pc.**	**Description**	**Material**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**
C2	4*	1	Center housing for sensor, code E..	PE	-	7 15 111 51	7 25 111 51	7 40 111 51	7 50 111 51
			Center housing for sensor, code F..	PE conductive	-	7 15 111 55	7 25 111 55	7 40 111 55	7 50 111 55
			Center housing for sensor, code T..	PTFE	-	7 15 111 60	7 25 111 60	7 40 111 60	7 50 111 60
			Center housing for sensor, code U..	PTFE conductive	-	7 15 111 65	7 25 111 65	7 40 111 65	7 50 111 65
	50	1	Stroke sensor, Namur	diverse	-	1 00 072 99	1 00 072 99	1 00 072 99	1 00 072 99
	-	1	O-ring, stroke sensor	NBR	-	9 25 535 71	9 25 535 71	9 25 535 71	9 25 535 71
C3			as C 2, but additional:						
	-	1	Clamp amplifier	diverse	-	1 00 171 99	1 00 171 99	1 00 171 99	1 00 171 99
	-	1	Stroke counter	diverse	-	1 00 071 99	1 00 071 99	1 00 071 99	1 00 071 99
C4			as C 2, but additional:						
	-	1	Controller	diverse	-	1 00 370 99	1 00 370 99	1 00 370 99	1 00 370 99
	-	1	Stroke counter	diverse	-	1 00 071 99	1 00 071 99	1 00 071 99	1 00 071 99
C9	4*	1	Center housing with additional air connection R 1/4, code E..	PE	-	7 15 311 51	7 25 311 51	7 40 311 51	7 50 311 51
			Center housing with additional air connection R 1/4, code F..	PE conductive	-	7 15 311 55	7 25 311 55	7 40 311 55	7 50 311 55
			Center housing with additional air connection R 1/4, code T..**	PTFE	7 10 311 60	7 15 311 60	7 25 311 60	7 40 311 60	7 50 311 60
			Center housing with additional air connection R 1/4, code U..***	PTFE conductive	7 10 311 65	7 15 311 65	7 25 311 65	7 40 311 65	7 50 311 65
	-	1	Adaptor elbow (E 10 adaptor streight)	PP	1 00 877 51	1 00 875 51	1 00 875 51	1 00 875 51	1 00 875 51
	-	1	Hose	PE	1 00 876 51	1 00 876 51	1 00 876 51	1 00 876 51	1 00 876 51
	-	1	Pressure switch cpl.	diverse	1 00 972 99	1 00 972 99	1 00 972 99	1 00 972 99	1 00 972 99
	-	1	Socket with cable	diverse	1 00 973 99	1 00 973 99	1 00 973 99	1 00 973 99	1 00 973 99
C10			as C 9, but additional:						
	-	1	Stroke counter	diverse	1 00 071 99	1 00 071 99	1 00 071 99	1 00 071 99	1 00 071 99

* Part-No. for center housings with ANSI connections on request

** Pump size E 08: 7 08 311 60 *** Pump size E 08: 7 08 311 65

Diaphragm monitoring (option code D 1, D 3)

Although ALMATEC diaphragms with integrated metal core are designed for an optimum service life, the diaphragm remains a wear part. If it breaks, liquid can leak into the center housing and possibly emerge through the muffler. This can be prevented simply and effectively with the ALMATEC diaphragm monitoring.

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 monitoring system is available in two variations:

- D 1 Diaphragm sensor (Namur), also for explosion proof area
- D 3 Diaphragm monitoring system complete with sensor and controller

The diaphragm sensor can either be connected to an existing controller with Namur inlet (code D 1) or to the controller included (code D 3). The wiring diagram and technical data can be found on the controller itself. For further details, please refer to the data delivered by the manufacturers of the components. The controllers have to be installed in a suitable cabinet.

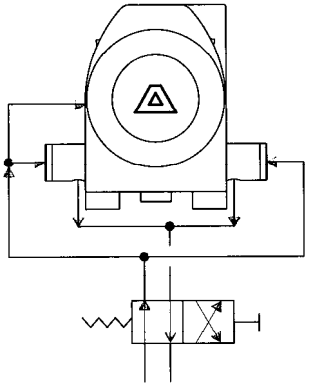
Spare part list Diaphragm Monitoring					E 10	E 15	E 25	E 40	E 50
Code	**Item**	**Pc.**	**Description**	**Material**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**
D1	51	1	Diaphragm sensor, Namur	diverse	1 00 773 99	1 00 773 99	1 00 773 99	1 00 773 99	1 00 773 99
D3	51	1	Diaphragm sensor, Namur	diverse	1 00 773 99	1 00 773 99	1 00 773 99	1 00 773 99	1 00 773 99
	-	1	Controller	diverse	1 00 370 99	1 00 370 99	1 00 370 99	1 00 370 99	1 00 370 99

Flange connections (option code F 3, F 4, F 5)

This version offers the possibility to use flange connectors according to DIN/PN 10. Thread bushings made of stainless steel (code F 3/F 4/F 5) to fix the flanges are included in the center housing. The O-rings attached have to be inserted into the grooves of the manifolds to improve sealing before connecting the pump. The O-rings, flanges [30] are made of EPDM (code F 3), FEP (code F 4) or NBR (code F 5).

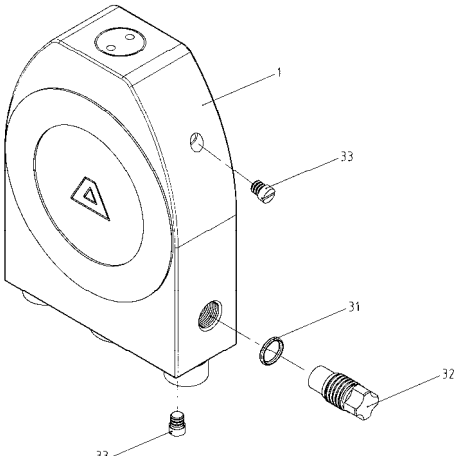
Spare part list Flange Connection					E 15	E 25	E 40	E 50
Code	**Item**	**Pc.**	**Description**	**Material**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**
F3	-	12	Thread bushing, center housing DIN	1.4305	2 15 169 22	2 15 169 22	2 40 169 22	2 40 169 22
	30	2	Flange-O-ring, center housing DIN	EPDM	9 33 632 72	9 50 633 72	9 62 634 72	9 73 635 72
F3w	-	12	Thread bushing, center housing ANSI	1.4305	3 15 069 22	3 15 069 22	3 15 069 22	3 25 069 22
	30	2	Flange-O-ring, center housing ANSI	EPDM	9 23 588 72	9 40 613 72	9 62 634 72	9 73 635 72
F4	-	12	Thread bushing, center housing DIN	1.4305	2 15 169 22	2 15 169 22	2 40 169 22	2 40 169 22
	30	2	Flange-O-ring, center housing DIN	FEP/FKM	9 33 632 59	9 50 633 59	9 62 634 59	9 73 635 59
F4w	-	12	Thread bushing, center housing ANSI	1.4305	3 15 069 22	3 15 069 22	3 15 069 22	3 25 069 22
	30	2	Flange-O-ring, center housing ANSI	FEP/FKM	9 23 588 59	9 40 613 59	9 62 634 59	9 73 635 59
F5	-	12	Thread bushing, center housing DIN	1.4305	2 15 169 22	2 15 169 22	2 40 169 22	-
	30	2	Flange-O-ring, center housing DIN	NBR	9 33 632 71	9 50 633 71	9 62 634 71	-
F5w	-	12	Thread bushing, center housing ANSI	1.4305	3 15 069 22	3 15 069 22	3 15 069 22	-
	30	2	Flange-O-ring, center housing ANSI	NBR	9 23 588 71	9 40 613 71	9 62 634 71	-

Draining system (option code R 1, R 2, R 3, R 4, R 5, R 6)

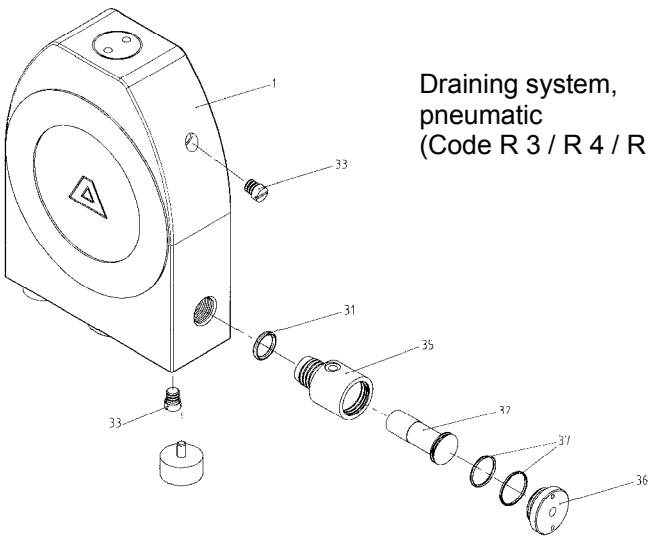


A pump equipped with the unique ALMATEC draining system can be emptied along with an inclining discharge line while being installed within the plant. The system is not appropriate to flush the pump with another liquid, nor from suction nozzle nor from discharge connection. It consists of a bypass-system in the side housings [1], which can be activated by manual valves (code R 1/R 2/R 5) or pneumatically (code R 3/R 4/R 6). Open the manual valves (code R 1/R 2/R 5) by approx. 10 mm by turning to the left (Attention: As there is no blocking of the valves, it has to be ensured not to take them out completely). The pump should be kept in operation meanwhile. Slow down the pump slowly and finally stop it. The drawing on the left illustrates the connection schedule for the air supply of a pump with the pneumatic draining system (code R 3/R 4/R 6, minimum air pressure 3 bar). By attaching a 4-2-way valve (not included in the delivery), the draining system can be activated automatically when cutting off the pump. The O-rings side housing are made of EPDM (code R 1/R 3), FEP (code R 2/R 4) or NBR (code R 5/R 6).

Spare part list Draining System					E 15	E 25	E 40	E 50
Code	**Item**	**Pc.**	**Description**	**Material**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**
R1	1	2	Side housing for back flushing system, code E..	PE	7 15 110 51	7 25 110 51	7 40 110 51	7 50 110 51
			Side housing for back flushing system, code F..	PE conductive	7 15 110 55	7 25 110 55	7 40 110 55	7 50 110 55
			Side housing for back flushing system, code T..	PTFE	7 15 110 60	7 25 110 60	7 40 110 60	7 50 110 60
			Side housing for back flushing system, code U..	PTFE conductive	7 15 110 65	7 25 110 65	7 40 110 65	7 50 110 65
	31	2	O-ring, side housing	EPDM	9 20 631 72	9 20 631 72	9 33 632 72	9 33 632 72
	32	2	Drain plug	PTFE	2 15 023 60	2 15 023 60	2 40 023 60	2 40 023 60
	33	2	Plug	PTFE	7 15 022 60	7 15 022 60	7 40 022 60	7 40 022 60
R2			as R 1, but:					
	31	2	O-ring, side housing	FEP/FKM	9 20 631 59	9 20 631 59	9 33 632 59	9 33 632 59
R3			as R 1, but:					
	32	2	Piston	PTFE	2 15 024 60	2 15 024 60	2 40 024 60	2 40 024 60
	35	2	Piston housing	PE conductive	2 15 025 55	2 25 025 55	2 40 025 56	2 50 025 56
	36	2	Piston cover	PE conductive	2 15 026 55	2 15 026 55	2 40 026 55	2 40 026 55
	37	4	O-ring, piston and piston cover	NBR/EPDM	9 28 534 71	9 28 534 71	9 37 603 72	9 37 603 72
R4			as R 3, but:					
	31	2	O-ring, side housing	FEP/FKM	9 20 631 59	9 20 631 59	9 33 632 59	9 33 632 59
R5			as R 1, but:					
	31	2	O-ring, side housing	NBR	9 20 631 71	9 20 631 71	9 33 632 71	-
R6			as R 3, but:					
	31	2	O-ring, side housing	NBR	9 20 631 71	9 20 631 71	9 33 632 71	-



Draining system, hand-operated
(Code R 1 / R 2 / R 5)



Draining system,
pneumatic
(Code R 3 / R 4 / R 6)

Diaphragm made of modified PTFE (option code P)

For media with increased diffusion tendency (e.g. benzene, solvents) as well as for application with priming out of a vacuum PTFE/EPDM compound diaphragms made of modified PTFE are available.

Spare part list Code P					E 15	E 25	E 40	E 50
Code	Item	Pc.	Description	Material	Part-No.	Part-No.	Part-No.	Part-No.
P	18	2	Diaphragm made of modified PTFE	PTFE mod.	1 15 031 98	1 25 031 98	1 40 031 98	1 50 031 98

Center housing with ANSI connections (option code W)

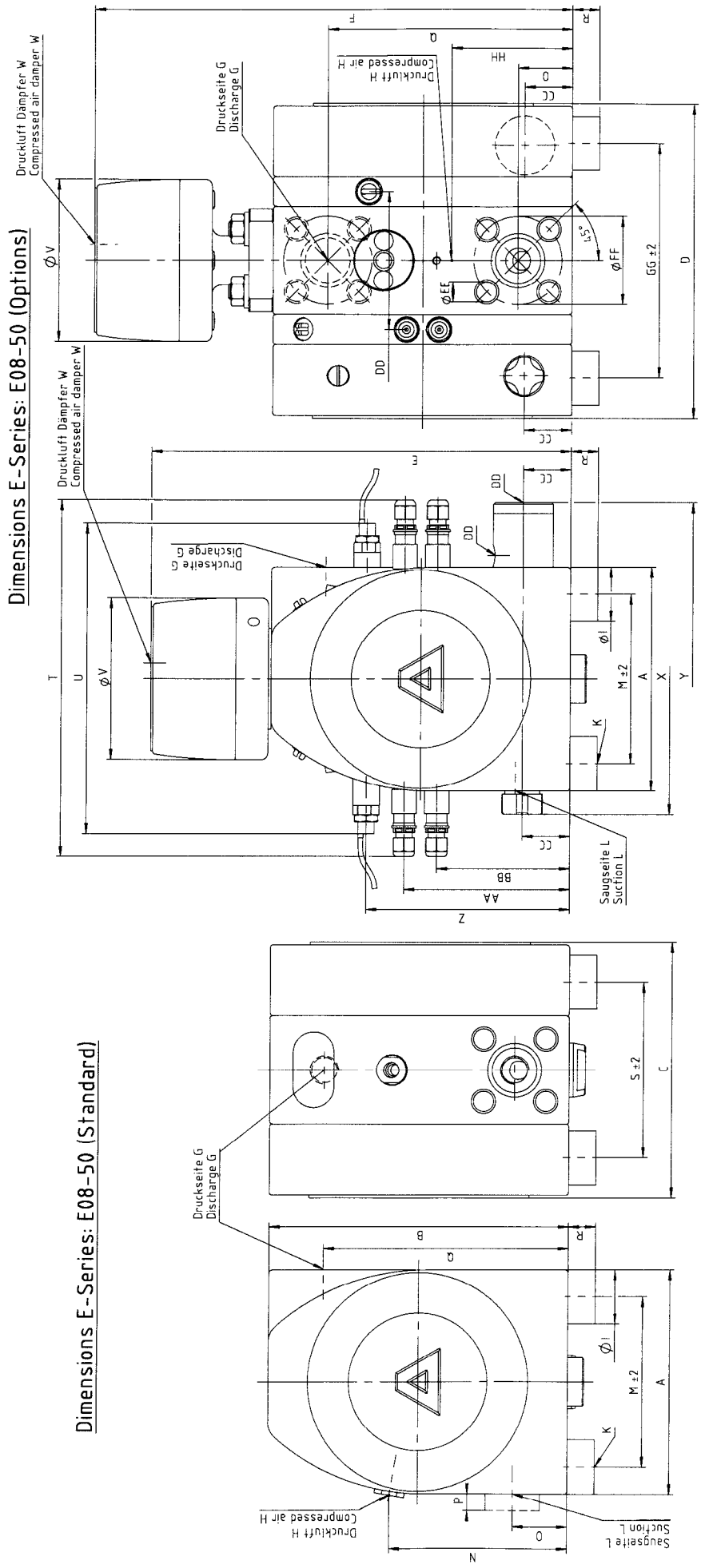
As standard the connections in the center housing [4] are prepared for a DIN flange connection, but it is possible to order a preparation for ANSI flange connection also. So together with the appropiate code F a ANSI flange connection with thread bushings and flange-O-rings is available.

Spare part list ANSI Center Housing					E 15	E 25	E 40	E 50
Code	Item	Pc.	Description	Material	Part-No.	Part-No.	Part-No.	Part-No.
W	4	1	Center housing ANSI, code E..	PE	7 15 411 51	7 25 411 51	7 40 411 51	7 50 411 51
			Center housing ANSI, code F..	PE conductive	7 15 411 55	7 25 411 55	7 40 411 55	7 50 411 55
			Center housing ANSI, code T..	PTFE	7 15 411 60	7 25 411 60	7 40 411 60	7 50 411 60
			Center housing ANSI, code U..	PTFE conductive	7 15 411 65	7 25 411 65	7 40 411 65	7 50 411 65

External control (option code Z)

Such a pump has neither an air control system nor a muffler, but can be controlled externally via a solenoid valve. The center housing has two separate air connections to ventilate and exhaust both working chambers. The solenoid valve is not part of the delivery. If the pump is equipped with this code, a separate spare part list is attached.

Dimensions



	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH
E 08	90	116	128	-	195	-	NPT 1/4"	R 1/8"	25	M 6	NPT 1/4"	50	58	15	10	101	13	84	-	-	85	R 1/8"	-	-	-	-	-	-	-	-	-	58
E 10	110	156	147	189	235	-	NPT 3/8"	R 1/8"	25	M 6	NPT 3/8"	85	78	17	11	139	13	97	208	202	85	R 1/8"	-	-	96	90	66	-	75	-	-	139	78
E 15	166	220	189	233	309	352	NPT 1/2"	R 1/4"	40	M 8	NPT 1/2"	126	131	40	12	180	20	130	264	230	120	R 1/8"	201	262	150	122	98	35	102	M12	65	174	89
E 25	220	300	255	301	433	476	NPT 1"	R 1/4"	40	M 8	NPT 1"	180	178	48	18	252	20	185	318	272	170	R 1/8"	252	316	205	163	137	49	118	M12	85	231	122
E 40	280	412	353	401	574	627	NPT 1 1/2"	R 1/2"	50	M 10	NPT 1 1/2"	230	206	65	18	347	20	270	378	310	220	R 1/4"	316	374	296	219	193	72	154	M16	110	318	206
E 50	360	532	430	482	754	812	NPT 2"	R 1/2"	50	M 10	NPT 2"	310	266	80	18	452	20	340	458	374	285	R 1/4"	392	454	391	279	253	82	186	M16	125	392	266

ALMATEC Pulsation Dampers, ET Series and ET-F Series

The ALMATEC pulsation dampers series ET and ET-F represents the latest generation of active pulsation dampers. They are specially designed to be used along with ALMATEC air-operated double diaphragm pumps of the E-Series. A general aspect to be considered is, that a pulsation damper decreases the total capacity of the system depending on the point of operation.

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

Example of the damper type code:

ET 15 E A E - F

- **F** – Flange connection DIN or ANSI
- **E** – Diaphragm material: E EPDM, N NBR, T PTFE/EPDM compound
- **A** – Material of damper head: A PA, F PE conductive
- **E** – Material of damper housing: E PE, F PE conductive, T PTFE, U PTFE conductive
- **15** – Size, nominal connection size: 10: 3/8“, 15: 1/2“, 25: 1“, 40: 1 1/2“, 50: 2“
- **ET** – ALMATEC pulsation damper, ET series

Air supply connection:	ET 10 - ET 25: R 1/8“, ET 40 / ET 50: R 1/4“
Max. operating pressure:	7 bar
Max. operating temperature:	for damper housing in PE 70°C for damper housing in PTFE size ET 10 100°C, for the other sizes 120°C (with damper head in PE conductive 80°C)

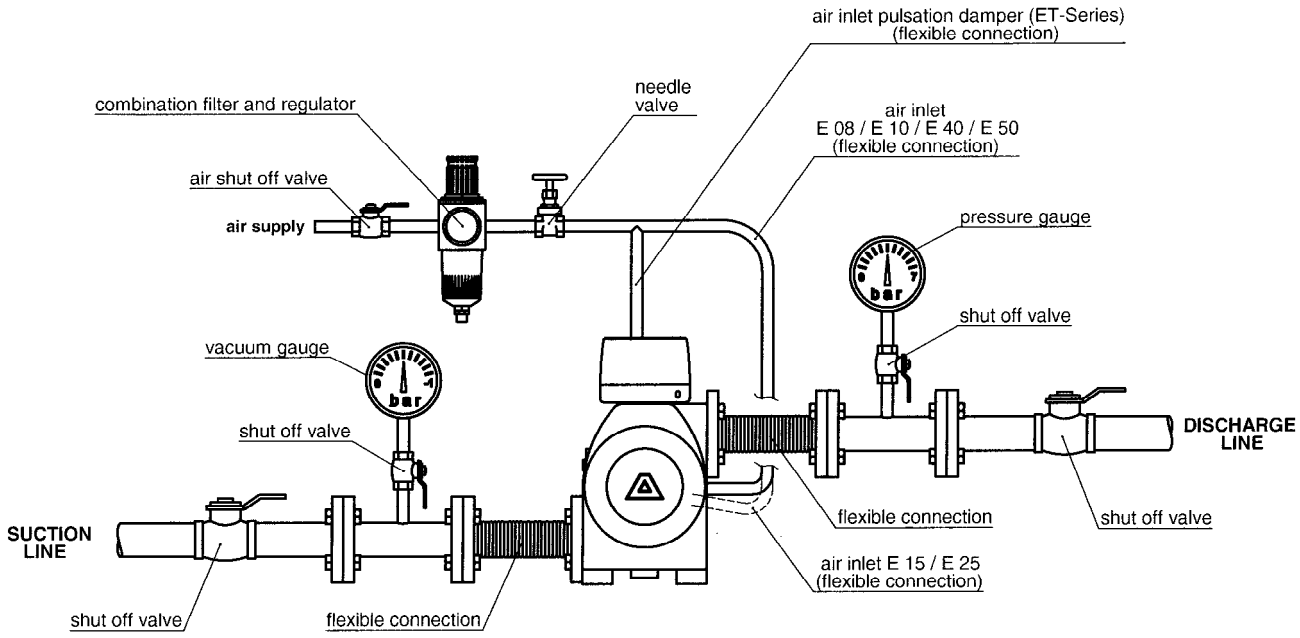
For inflammable liquids as well as for applications in explosion protected areas, only dampers made of conductive plastic materials (code F resp. U) may be used. It is not necessary to ground the damper separately, as the damper is connected conductively to the E-Series pump, which is conductive and has to be grounded itself (please see ATEX hints on page 3).

In general, pump and damper are dispatched completely mounted. Still, they can be packed in separate boxes, especially for the bigger sizes. If so, the damper has to be screwed into the thread at the top of the center housing carefully, but only until the damper is in contact with the pump. Exceeded tightening may damage the thread. Besides, a correct positioning of the O-ring [10] within the groove has to be ensured.

An ALMATEC ET-damper can easily be attached to an E-Series pump at any time without changes of the piping, provided that the pump is configurated with product ports both horizontally. Make sure that the plug, center housing (Pos. 13 in the exploded view of the pump) is in the right position. For pumps delivered without dampers, this plug can be found at the bottom side of the pump generally. Therefore, the center housing has to be turned 180°, to get the plug to the top of the pump. Take the plug out, insert the flange-O-ring [10] and screw the damper onto the pump. When dismounting a pump which is already being in use, take care of the warning advices on pages 8/9 of this manual.

Before connecting the pump, take the yellow blind plugs out of air inlet which is located on the top of the damper head [3]. For correct operation, the damper absolutely needs an air-supply of its own, which has to be taken from the air-supply of the pump. Pump and pulsation damper have to be connected to the same air pressure. No stop or regulating valve may be placed between pump and damper. The driving air has to be oil-free, dry and clean. The damper requires a minimum counter pressure of at least 1 bar for optimal function. Together with the pump an empty damper has to be driven slowly. The dampers are self-regulating for all

changing operating conditions.



- Do not use any threadseal for the connection of pump and damper, otherwise the threads could be damaged.
- Before putting the pulsation damper into operation as well as after some hours of operating, the housing bolts [6] have to be tightened according to the torque data of the following schedule, as the elements of construction tend to "settle". Fixing the bolts is necessary as well after longer periods of stoppage, at extreme temperature variations, transport and after dismantling.
- Pressure tests of the plant a pump and a damper are included in may only be carried out with the aggregate (pump and damper) disconnected from the pressure on both ports or by using the pressure the aggregate develops while operating. The load of a pressure in the plant may damage the pump and the pulsation damper.
- Before starting to disassemble the pump, take care that pump and damper have been emptied and rinsed. Further both have to be cut off from any energy on the air and product side. If pump and damper is being deported from the plant, a reference about the delivered liquid has to be attached.
- Please respect the relevant additional security advices, if the pump and the damper have been used for aggressive, dangerous or toxic liquids.
- Before putting the pump and the damper back into operation, the tightness of both has to be checked.
- For further warning instructions, please refer to page 8/9

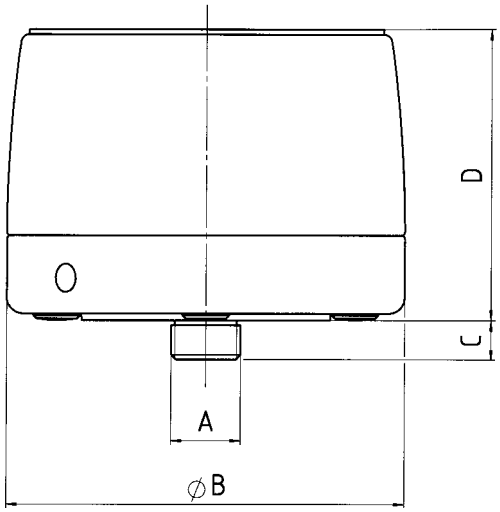
Damper size	ET 10	ET 15	ET 25	ET 40	ET 50
Torque values for housing bolts (Nm):					
PE damper	-	3	6	10	11
PTFE damper	2	3	6	10	11

Hints for disassembly of an ET pulsation damper

Pull out the cover [5]. Unscrew housing bolts [6] carefully. After that, all parts can be removed. Screw the diaphragm [2] off the actuator shaft [7]. A re-assembly of used piston rings [8] is impossible; they have to be replaced including the O-rings underneath. To assemble new piston rings [8] 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.

Spare part list Damper ET				ET 10	ET 15	ET 25	ET 40	ET 50
Item	**Pc.**	**Description**	**Material**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**	**Part-No.**
1	1	Damper housing, code E..	PE	-	7 15 080 52	7 25 080 52	7 40 080 52	7 50 080 52
		Damper housing, code F..	PE conductive	-	7 15 080 56	7 25 080 56	7 40 080 56	7 50 080 56
		Damper housing, code T..	PTFE	7 10 080 69	7 15 080 69	7 25 080 69	7 40 080 60	7 50 080 60
		Damper housing, code U..	PTFE conductive	7 10 080 68	7 15 080 68	7 25 080 68	7 40 080 65	7 50 080 65
2	1	Diaphragm, code ..E	EPDM	-	1 10 031 72	1 15 031 72	1 25 031 72	1 40 031 72
		Diaphragm, code ..N	NBR	-	1 10 031 70	1 15 031 70	1 25 031 70	1 40 031 70
		Diaphragm, code ..T	PTFE	1 08 031 67	1 10 031 67	1 15 031 67	1 25 031 67	1 40 031 67
		Diaphragm, code ..T - P	PTFE-mod.	-	-	1 15 031 98	1 25 031 98	1 40 031 98
3	1	Damper head, code .A.	PA	7 10 081 53	7 15 081 53	7 25 081 53	7 40 081 53	7 50 081 53
		Damper head, code .F.	PE conductive	7 10 081 55	7 15 081 55	7 25 081 55	7 40 081 55	7 50 081 55
4	1	Tension disc	1.4301	7 08 008 22	7 10 008 22	7 15 008 22	7 25 008 22	7 40 008 22
5	1	Cover, code .A.	PE	7 08 009 51	7 10 009 51	7 15 009 51	7 25 009 51	7 40 009 51
		Cover, code .F.	PE conductive	7 08 009 55	7 10 009 55	7 15 009 55	7 25 009 55	7 40 009 55
6	*	Housing bolt, cpl.	1.4301	7 10 083 22	7 15 083 22	7 25 083 22	7 40 083 22	7 50 083 22
7	1	Actuator shaft	1.4301	1 08 482 22	1 10 482 22	1 15 482 22	1 25 482 22	1 40 482 22
8	3	Shaft piston ring, cpl.	PTFE	1 08 041 64	1 08 041 64	1 15 041 64	1 25 041 64	1 40 041 64
9	1	Muffler	PE	1 08 644 51	1 08 644 51	1 15 644 51	1 25 644 51	1 40 644 51
10	1	Flange-O-ring, center housing DIN, code ..E	EPDM	9 20 631 72	9 33 632 72	9 50 633 72	9 62 634 72	9 73 635 72
		Flange-O-ring, center housing DIN, code ..N	NBR	-	9 33 632 71	9 50 633 71	9 62 634 71	9 73 635 71
		Flange-O-ring, center housing DIN, code ..T	FEP/FKM	9 20 631 59	9 33 632 59	9 50 633 59	9 62 634 59	9 73 635 59
		Flange-O-ring, center housing ANSI, code ..E	EPDM	9 20 631 72	9 23 588 72	9 40 613 72	9 62 634 72	9 73 635 72
		Flange-O-ring, center housing ANSI, code ..N	NBR	-	9 23 588 71	9 40 613 71	9 62 634 71	9 73 635 71
		Flange-O-ring, center housing ANSI, code ..T	FEP/FKM	9 20 631 59	9 23 588 59	9 40 613 59	9 62 634 59	9 73 635 59
* ET 10 and ET 15: 4 pieces; ET 25 and ET 40: 6 pieces; ET 50: 8 pieces								

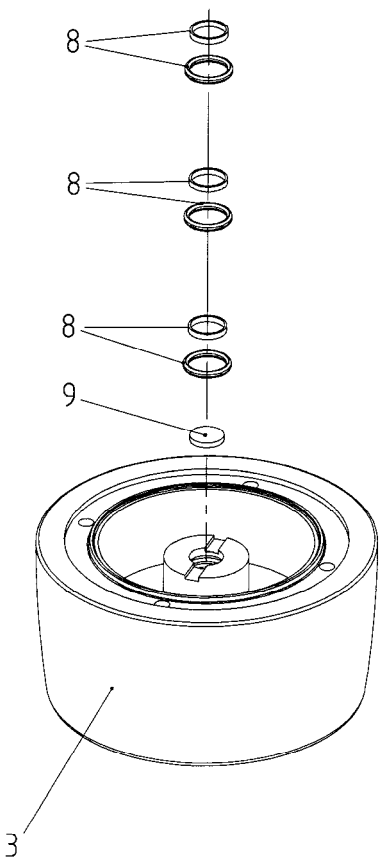
Dimensions pulsation damper ET (in mm)

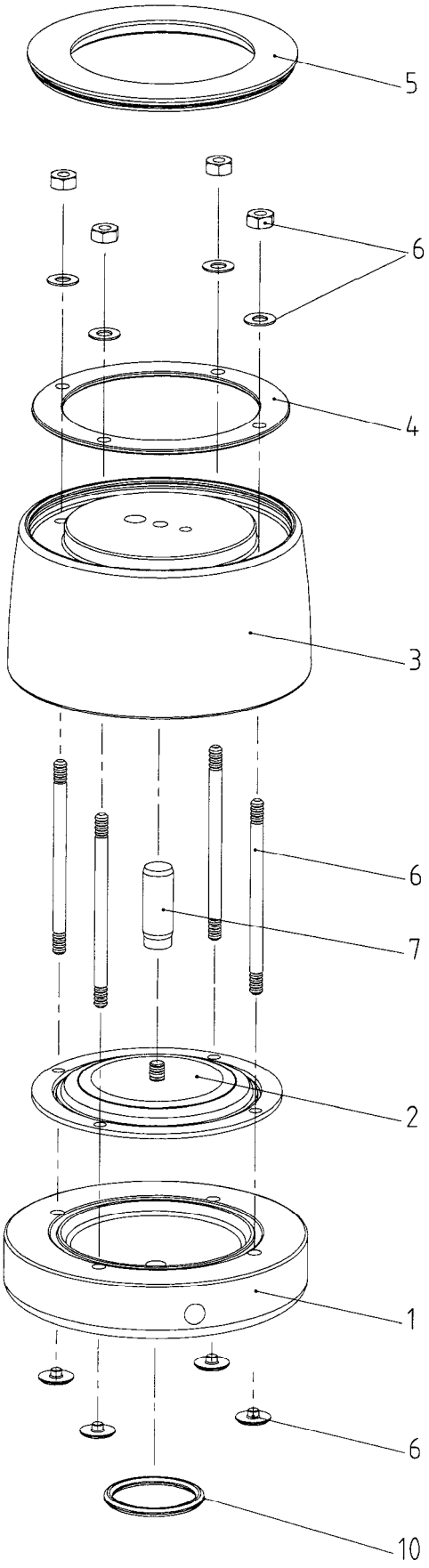


	A	B	C	D
ET 10	NPT 3/8"	85	11	79
ET 15	NPT ½"	120	12	89
ET 25	NPT 1"	170	14	133
ET 40	NPT 1 ½"	220	16	162
ET 50	NPT 2"	285	18	222

Exploded view pulsation damper ET

Pos. / Item 6: ET 10 / ET 15 - 4 x
ET 25 / ET 40 - 6 x
ET 50 - 8 x





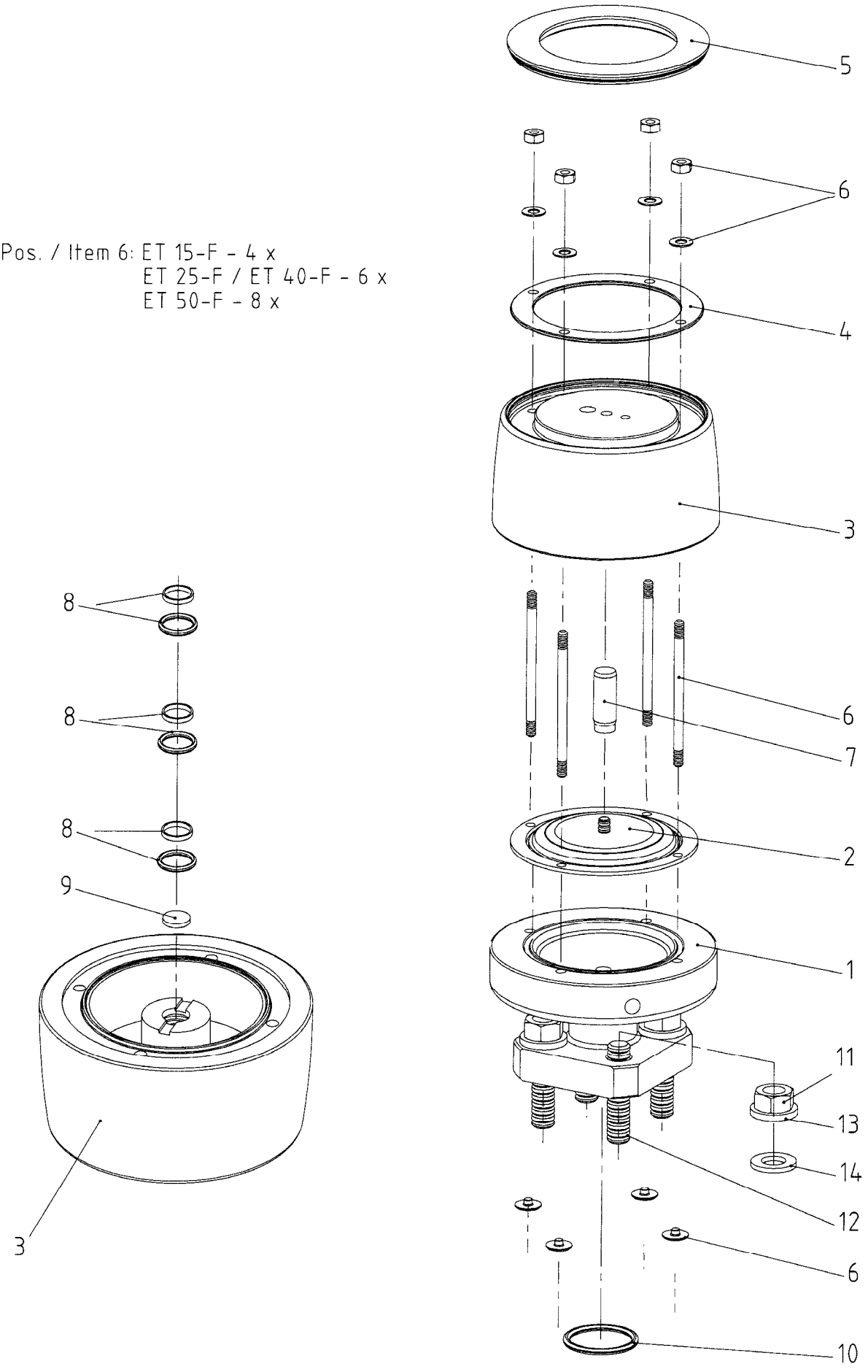
Additional hints for pulsation damper series ET-F (flange version)

Beside the screwed pulsation damper as standard flange versions (series ET-F) are available also. In general, pump and damper are dispatched completely mounted. Still, they can be packed in separate boxes, especially for the bigger sizes. If so, use the attached nuts, set screws, washers and discs [11-14] to flange the damper to the pump.

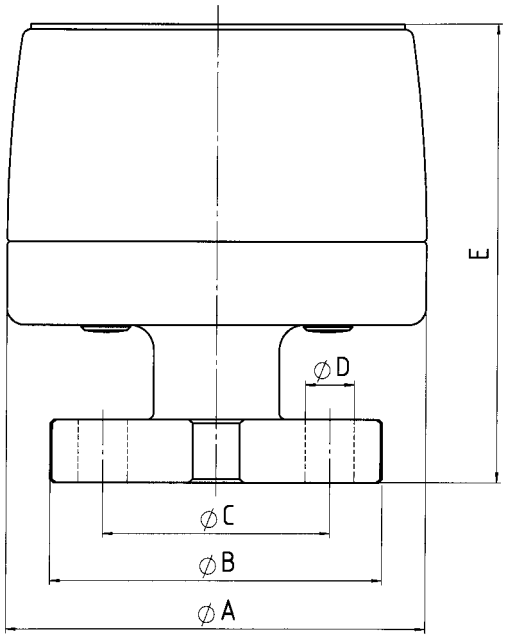
Spare part list Flange Damper ET-F				ET 15 - F	ET 25 - F	ET 40 - F	ET 50 - F
Item	Pc.	Description	Material	Part-No.	Part-No.	Part-No.	Part-No.
1	1	Damper housing DIN, code E..	PE	7 15 180 52	7 25 180 52	7 40 180 52	7 50 180 52
		Damper housing DIN, code F..	PE conductive	7 15 180 56	7 25 180 56	7 40 180 56	7 50 180 56
		Damper housing DIN, code T..	PTFE	7 15 180 69	7 25 180 69	7 40 180 69	7 50 180 69
		Damper housing DIN, code U..	PTFE cond.	7 15 180 68	7 25 180 68	7 40 180 68	7 50 180 68
		Damper housing ANSI, code E..-W	PE	7 15 280 52	7 25 280 52	7 40 280 52	7 50 280 52
		Damper housing ANSI, code F..-W	PE conductive	7 15 280 56	7 25 280 56	7 40 280 56	7 50 280 56
		Damper housing ANSI, code T..-W	PTFE	7 15 280 69	7 25 280 69	7 40 280 69	7 50 280 69
		Damper housing ANSI, code U..-W	PTFE cond.	7 15 280 68	7 25 280 68	7 40 280 68	7 50 280 68
2	1	Diaphragm, code ..E	EPDM	1 10 031 72	1 15 031 72	1 25 031 72	1 40 031 72
		Diaphragm, code ..N	NBR	1 10 031 70	1 15 031 70	1 25 031 70	1 40 031 70
		Diaphragm, code ..T	PTFE	1 10 031 67	1 15 031 67	1 25 031 67	1 40 031 67
		Diaphragm, code ..T - P	PTFE-mod.	-	1 15 031 98	1 25 031 98	1 40 031 98
3	1	Damper head, code .A.	PA	7 15 081 53	7 25 081 53	7 40 081 53	7 50 081 53
		Damper head, code .F.	PE conductive	7 15 081 55	7 25 081 55	7 40 081 55	7 50 081 55
4	1	Tension disc	1.4301	7 10 008 22	7 15 008 22	7 25 008 22	7 40 008 22
5	1	Cover, code .A.	PE	7 10 009 51	7 15 009 51	7 25 009 51	7 40 009 51
		Cover, code .F.	PE conductive	7 10 009 55	7 15 009 55	7 25 009 55	7 40 009 55
6	*	Housing bolt, cpl.	1.4301	7 15 083 22	7 25 083 22	7 40 083 22	7 50 083 22
7	1	Actuator shaft	1.4301	1 10 482 22	1 15 482 22	1 25 482 22	1 40 482 22
8	3	Shaft piston ring, cpl.	PTFE	1 08 041 64	1 15 041 64	1 25 041 64	1 40 041 64
9	1	Muffler	PE	1 08 644 51	1 15 644 51	1 25 644 51	1 40 644 51
10	1	Flange-O-ring, center housing DIN, code ..E	EPDM	9 33 632 72	9 50 633 72	9 62 634 72	9 73 635 72
		Flange-O-ring, center housing DIN, code ..N	NBR	9 33 632 71	9 50 633 71	9 62 634 71	9 73 635 71
		Flange-O-ring, center housing DIN, code ..T	FEP/FKM	9 33 632 59	9 50 633 59	9 62 634 59	9 73 635 59
		Flange-O-ring, center housing ANSI, code ..E	EPDM	9 23 588 72	9 40 613 72	9 62 634 72	9 73 635 72
		Flange-O-ring, center housing ANSI, code ..N	NBR	9 23 588 71	9 40 613 71	9 62 634 71	9 73 635 71
		Flange-O-ring, center housing ANSI, code ..T	FEP/FKM	9 23 588 59	9 40 613 59	9 62 634 59	9 73 635 59
11	4	Hexagon nut DIN 934	1.4305	9 12 101 22	9 12 101 22	9 16 101 22	9 16 101 22
12	4	Set screw DIN 913	1.4305	9 12 225 22	9 12 225 22	9 16 226 22	9 16 227 22
13	4	Spring washer DIN 2093	1.4301	9 12 154 22	9 12 154 22	9 08 154 22	9 08 154 22
14	4	Disc DIN 125	1.4301	9 13 151 22	9 13 151 22	9 17 151 22	9 17 151 22
*ET 15 -F: 4 pieces; ET 25 -F and ET 40 -F: 6 pieces; ET 50 -F: 8 pieces							

Exploded view pulsation damper ET-F (flange version)

Pos. / Item 6: ET 15-F - 4 x
ET 25-F / ET 40-F - 6 x
ET 50-F - 8 x



Dimensions pulsation damper ET-F (flange version) in mm



	A	B	C	D	E
ET-F 15	120	95	65	14	132
ET-F 25	170	115	85	14	176
ET-F 40	220	150	110	18	215
ET-F 50	285	165	125	18	280

Subject to change without notice, 2009/07

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