

Addition to the
OPERATING AND INSTALLATION MANUAL
of the ALMATEC E-Series

Option Code EC Pneumatic Expansion Compensation



Original Instruction
Read carefully before pump installation

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INTRODUCTION

This manual merely serves as an addition to the manual for the pumps of the E-Series. Each person working on the ALMATEC air-operated diaphragm pumps concerning installation, start-up, handling or maintenance must read this annex and in addition the standard pump manual completely and in an attentive way and has to follow all mentioned procedures and safety notes.

USAGE OF PNEUMATIC EXPANSION COMPENSATION (option code EC)

Physical Background

Every material responds to a change in temperature by changing its geometric dimensions.

When the temperature rises, every material expands. The length, area and volume dimensions increase (thermal expansion). When this process is reversed by cooling, materials contract again. The length, area and volume dimensions decrease (thermal contraction).

The physical process of thermal expansion and thermal cooling can be described by mathematical formulas.

Each material has an individual coefficient of expansion. Therefore, each material reacts differently to thermal variation.

In an assembly consisting of different materials, the solid dimensions of the components will change for each material in different degrees during the process of thermal variations.

If you apply this basic physical principle to compressed air diaphragm pumps, the uneven change in the dimensions of the parts due to varying thermal loads (ambient temperature, medium temperature) has different effects on the non-positively clamped housing parts.

For this reason (among other things) the specified tightening torque of the housing bolts must be checked regularly for all compressed air diaphragm pumps (regardless of the manufacturer).

Operating principle

The ALMATEC pneumatic expansion compensation is designed to comply with high safety standards and is available only for the ALMATEC pumps of the E-Series.

The pneumatic expansion compensation will be delivered assembled with the pump directly from the factory. The Thermal Expansion System can optionally also be retrofitted to already installed pumps.

A piston system inside the expansion compensation is powered with compressed air. This air-loaded piston system ensures constant preloading of the housing parts over the entire permissible temperature range of the pump. Changes in the geometric dimensions of the housing due to thermal effects are continuously compensated pneumatically, comparable to spring preloading.

TECHNICAL DATA	EC 15	EC 25	EC 40	EC 50
Additional with increases to the E-Series (mm)	60	65	80	95
Air Connection (BSP)	R 1/4	R 1/4	R 1/4	R 1/4
Max. operating temp. (°C):				
in combination with PE-Pumps	70	70	70	70
in combination with PTFE-Pumps*	120	120	120	120
Maximum operating pressure (bar)	7	7	7	7

* PTFE-Pumps with NBR-equipment 80°C

STORAGE AND LONG-TERM USAGE

In general, the ALMATEC pump respectively the Expansion Compensation Retrofit-Kit is delivered operational and packaged. If the unit is not installed right away, proper storage conditions are important for a trouble-free operation later. The pump has to be protected from wetness, coldness, dirtying, UV-radiation and mechanical influences. The following storage conditions are recommended:

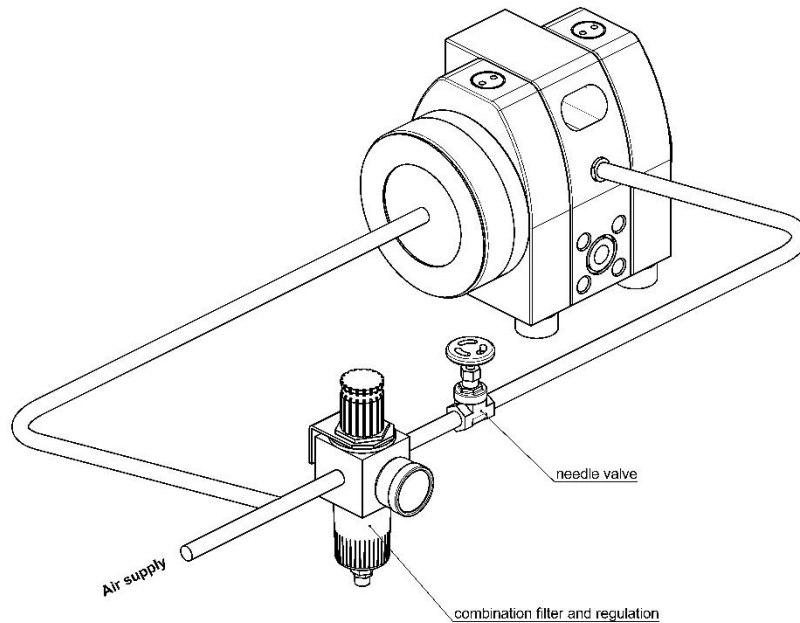
- Steady ventilated, dust and vibration free storage room
- Ambient temperature between 15°C (59°F) and 25°C (77°F) with a relative humidity below 65%
- Prevention of direct thermal influences (sun, heating)

Plastic materials are subject to aging processes depending on material, surrounding conditions and application parameters. Chemical contact and/or increased temperature can amend material characteristics on the long run, especially mechanical capabilities. For safety reasons, we do therefore recommend as part of every maintenance (resp. in case of no maintenance till then after two years and then every six month): A careful visual check of all pump parts for visible damages, a tactile check of all sealing surface (e.g. by moving a finger along the surface after cleaning), a shape-check of the housing parts (e.g. by laying a drawer on plain surfaces) and a movability check of all threads. Any eventually damaged part needs to be replaced!

INSTALLATION

ALMATEC's pneumatic expansion compensation has its own/separate air connection. This must be connected to the compressed air supply line. The compressed air supply must be unthrottled, not reduced and permanently.

When the compressed air diaphragm pump does not work (closed needle valve, disconnected from the compressed air network), the expansion compensation still has to remain connected to the compressed air line, in order to compensate thermal contractions even when the pump is in non-operating mode. This ensures a safety restart of the pump.



OPERATION IN EXPLOSION-PROOF AREAS AND FOR FLAMMABLE LIQUIDS

X = CAUTION! = Special operating conditions apply!



For pumping flammable liquids or in Ex-areas, only pumps with housing parts and internals made of conductive plastic may be used. Air-operated diaphragm pumps of the E series with housing codes F (PE conductive) and U (PTFE conductive) meet this requirement. They must generally be grounded via a connection on the central housing [4]. The ground connection must have a minimum cross-section of 6 mm². All other housing parts are conductive and connected to each other.

ALMATEC air-operated diaphragm pumps made of electrically conductive PE/PTFE are suitable for use in potentially explosive atmospheres of category 2 and 3 ("Zone 1" and "Zone 2" respectively), atmosphere G/D, which are subject to the scope of EU Directive 2014/34/EU. Conductive diaphragms (material code 68, 70, 72) can be used without restriction for pumping liquids in all explosion groups. If non-conductive diaphragm materials are used (material code 67, 98), explosion group IIB applies within the pump for pump size E 08 up to including E 25 (regardless of the installation site). Following protective measures must be taken for pump size E 40 and E 50 as examples:

- exclusive use of water-miscible or conductive pump media or
- Avoidance of dry running through operational measures or
- inerting during dry running with nitrogen, water, carbon dioxide, etc. following the pumping operation.

Pipelines and product connections must be grounded separately. To avoid ignition hazards, the formation of dust deposits on the units must be prevented. Repairs in hazardous areas may only be carried out after careful examination of the feasibility and only with appropriate tools and by trained specialist personnel.

The ATEX marking according to Directive 2014/34/EU can be found in the enclosed Declaration of Conformity and the corresponding sticker on the pump or damper.

The interfaces for electrical accessories have been considered and do not represent a new potential ignition source.

The type of protection "c = design safety" was applied in accordance with guideline EN ISO 80079-37.

SPECIAL OPERATING CONDITIONS		E 15	E 25	E 40	E 50
Permissible ambient temperature °C (°F)		-10 – 50 (14 – 122)			
Permissible temperature of driving air °C (°F)		0 – 50 (32 – 122)			
Maximum driving/operating pressure bar (psi)		7 (101,5)			
Maximum operating temperature(X) °C (°F)					
	PE pumps °C (°F)	70 (158)	70 (158)	70 (158)	70 (158)
	PTFE pumps °C (°F)	120 (248)	120 (248)	120 (248)	120 (248)
	PTFE pumps with NBR-internals °C (°F)	80 (176)	80 (176)	80 (176)	80 (176)
	PTFE pumps with barrier chamber system °C (°F)	80 (176)	80 (176)	80 (176)	80 (176)

ATEX MARKING FOR GASES AND DUSTS IN ACCORDANCE TO 2014/34/EU

In order to enable the optimum and flexible design of an ATEX pump to the customer-specific application, a differentiation is made in the marking between the installation location of the pump (hazardous area outside the pump) and the inside of the pump (hazardous area inside the pump).

Equipment category G (gases, mists, vapors)

Installation site: Category G

Inside the pump: Category G

Conductive ALMATEC air-operated diaphragm pumps may generally be used in explosion group IIC at the installation site (potentially explosive area outside the pump), since the solid housings are made of dissipative materials and the entire pump is grounded.

ATTENTION! Inside the pump, the permitted explosion group varies depending on the diaphragm material used:

When using *non-conductive diaphragms*, explosion group IIB applies inside the pump:

⊕ II 2/2 G Ex h IIB/IIC T6...T4 Gb/Gb X (inside the pump/installation site)

When using *conductive diaphragms*, explosion group IIC applies inside the pump:

⊕ II 2/2 G Ex h IIC/IIC T6...T4 Gb/Gb X (inside the pump/installation site)

Equipment category D (dusts)

Installation site: Category D

Inside the pump: Category G

Conductive ALMATEC air-operated diaphragm pumps may generally be used in dust group IIIC at the installation site (potentially explosive area outside the pump; equipment category D).

ATTENTION! Inside the pump (equipment category G), the approved explosion group varies depending on the diaphragm material used:

When using *non-conductive diaphragms*, explosion group IIB applies inside the pump:

⊕ II 2/2 D Ex h IIB/IIIC T 70°C...130°C Gb/Db X (inside the pump/installation site)

When using *conductive diaphragms*, explosion group IIC applies inside the pump:

⊕ II 2/2 D Ex h IIC/IIIC T 70°C...130°C Gb/Db X (inside the pump/installation site)

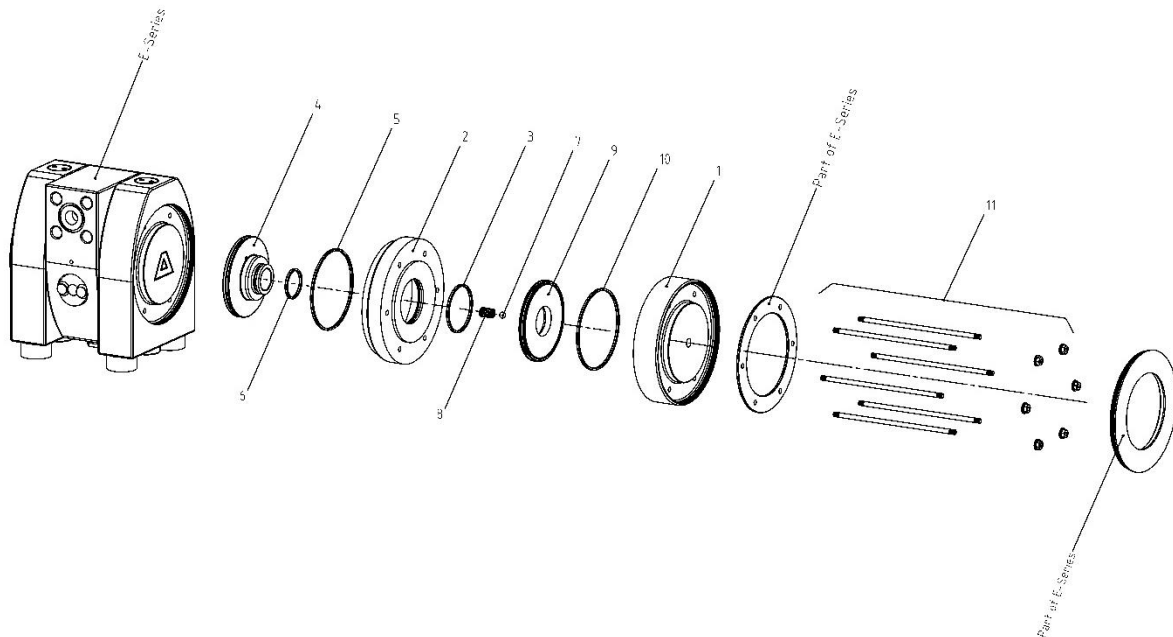
SPARE PARTS AND EXPLODED VIEW

Only use original ALMATEC spare parts for repairs and / or preventive maintenance work. If this is not observed, the CE and ATEX markings, the declaration of conformity (s) and the guarantee claim for the pump will expire.

All work on the pump may only be carried out with the appropriate tools and by trained specialist personnel.

Size					EC 15	EC 25	EC 40	EC 50
Code	Item	Pc.	Description	Material	Part-No.	Part-No.	Part-No.	Part-No.
EC	1	1	Housing	PA-conductive	7 15 004 43	7 25 004 43	7 40 004 43	7 50 004 43
	2	1	Housing ring	PA-conductive	7 15 005 43	7 25 005 43	7 40 005 43	7 50 005 43
	3	1	O-Ring, housing ring	NBR	9 59 563 71	9 99 566 71	9 14 304 71	9 19 904 71
	4	1	Step piston	AL Cu Mg 1	7 15 006 31	7 25 006 31	7 40 006 31	7 50 006 31
	5	1	O-Ring, step piston outside	NBR	9 10 303 71	9 14 103 71	9 20 304 71	9 28 204 71
	6	1	O-Ring, step piston inside	NBR	9 35 594 71	9 78 003 71	9 10 904 71	9 15 304 71
	7	1	Check valve ball	NBR	1 10 132 71	1 10 132 71	1 10 132 71	1 10 132 71
	8	1	Valve spring	1.4301	1 10 009 22	1 10 009 22	1 10 009 22	1 10 009 22
	9	1	Ring piston	AL Cu Mg 1	7 15 007 31	7 25 007 31	7 40 007 31	7 50 007 31
	10	1	O-Ring, ring piston	NBR	9 10 303 71	9 14 103 71	9 20 304 71	9 28 204 71
	11	*	Housing bolt, complete	1.4305	7 15 320 22	7 25 320 22	7 40 320 22	7 50 320 22

* EC 15 and EC 25: 6 pieces; EC 40 and EC 50: 8 pieces





Subject to change without notice, 2021/07

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