

PRESS RELEASE

LEWA: Process pumps for upstream processes in the oil and gas industry

Process diaphragm pumps with PTFE diaphragm for pressures up to 1.000 bar

PTFE diaphragm permits compact construction and offers cost advantages

On offshore drilling platforms, drilling ships, and FPSO (*Floating Production Storage Offloading*) space is scarce, and space saved is worth cash money. Operators therefore prefer compact, lightweight system components. But how can a process diaphragm pump, for example, stay compact when the operator needs ever higher process pressures at the same time?

The space requirements and weight of a high-pressure process diaphragm pump are primarily determined by the diameter of the pump head. This depends in turn on the geometry of the diaphragm. At first glance, it's surprising that PTFE-diaphragms need a smaller diameter than metal diaphragms for the same pump power. This is due to the fact that a high-elasticity PTFE-diaphragm can be deformed to a greater extent (has a larger stroke volume) than a comparatively stiff metal diaphragm. Their smaller displacement requires a greater diameter.

But inclusion of a PTFE-diaphragm in a high pressure design is not simple, and requires very special fabrication expertise and knowledge of materials. Lewa solves this task by means of a patented pressure-supported diaphragm fixation system. Its special feature is that the fixation is structurally prevented from expanding during the pressure stroke. No additional auxiliary seal is thus required – even at pressures up to 1000 bar. Therefore Lewa is the only pump manufacturer, that works with a PTFE-diaphragm inside the M800 pump head series at pressures between 400 and up to 1000 bar.

The fixation geometry developed for this purpose was calculated using the Finite Element Analysis (FEA). FEA is used among other things for the investigation and clarification of the following questions:

- Deformation and relative movement of components during assembly and in operation
- Calculation of contact behavior of components
- Optimization of multi-axis stress distribution in the components to avoid local overloads and simultaneously use materials evenly
- Consideration of the nonlinear behavior of the materials under alternating loads
- Fatigue evaluation and/or the expected long-term creep resistance

The advantages of a PTFE-diaphragm with respect to a metal diaphragm are impressive. In addition to the obvious space and weight advantages, process pumps equipped in this manner are also char-

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acterized by longer diaphragm lifetime and greater tolerance to particles. NPSH requirements are lower due to the good suction capability. The cost advantages due to materials and size should also not be forgotten.

The M800 pump head with PTFE-diaphragm is used in the Lewa ecoflow and Lewa triplex series (flow rates or volume flows between 0.1 and 1 m³/h per pump head; viscosity of the medium up to 100,000 mPas; temperature range between -20 and +80 °C).

Practical operational experiences with this pump head technology exceed expectations. For example, extremely high diaphragm lifetimes were achieved during operation of a pump to convey a mixture of different hydrocarbons at BASF AG in Ludwigshafen in continuous operation at pressures of 700 bar. Service lifetimes are thus absolutely comparable with the diaphragm lifetimes of low-pressure applications – continuous operation for over a year is feasible.

Where PTFE-diaphragms hit their limits, that is, at higher temperatures, with media that attack the PTFE chemically such as fluorine, and when a high diffusion resistance is required, Lewa also offers pump heads with metal diaphragms.

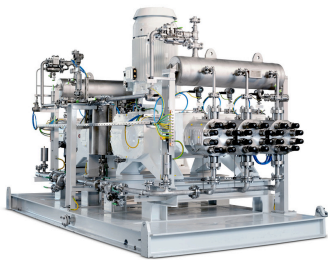


Fig. 1:

LEWA triplex pump G3G with M800 pump head with PTFE-diaphragm for pressures up to 1.000 bar.

Pictures and digital text can be found at www.lewa.com/press

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- Prozess-Membranpumpen
- Plungerpumpen
- Tieftemperatur-Tauchmotorpumpen
- Dosier- u. Mischanlagen
- On- & Offshore Anlagen & Systeme
- Odorieranlagen
- Mechatronische Systeme
- Condition Monitoring Systeme
- Weltweiter Service
- Partnerprodukte – Vertrieb für Deutschland
 - Chemineer Mischtechnologie
 - Pomac Hygienepumpen
 - Viking Zahnradpumpen
 - Wilden Pumpen

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- *Process diaphragm pumps*
- *Plunger pumps*
- *Cryogenic submerged motor pumps*
- *Metering and mixing systems*
- *On- & offshore skids, systems & packages*
- *Odorizing systems*
- *Mechatronic systems*
- *Condition monitoring systems*
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 - *Pomac hygienic pumps*
 - *Viking gear pumps*
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Key industries:

- *Oil & Gas*
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- *Personal Care*
- *Food & Beverages*
- *Plastics*
- *Cleaning & Detergents*
- *Energy & Environment*
- *Gas Odorization*

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