LEWA process diaphragm pumps

LEWA triplex® and LEWA ecoflow® for process engineering.
Industry: Oil & Gas
Installation location: Saudi Arabia
Application: MEG injection, flow rate of 1,189 gph at a pressure of 7,759 psig (API10000 design)
LEWA solution:
- Quintuplex process diaphragm pump in modular design
- Space-saving M800-PTFE pump heads
- Pump heads and piping made of super duplex SS material (API10000)
LEWA triplex and LEWA ecoflow process diaphragm pumps set the standard for process engineering, allowing even critical, toxic, or flammable fluids to be conveyed safely.

These pumps are also able to handle extremely low-viscosity, non-lubricating fluids, and abrasive suspensions without any problems, and feature a pressure range up to 17,400 psig. LEWA’s ongoing development of diaphragm pump technology ensures that it keeps on setting benchmarks.

Reliable components are one of the keys to safe processes. LEWA process diaphragm pumps are based on the robust technology that LEWA is renowned for. As a result, they are also easily able to fulfill the strict safety requirements of API 675 (American Petroleum Institute). The pumps use key components from LEWA’s proven range – like the PTFE sandwich diaphragm with diaphragm monitoring, the patented DPS diaphragm protection system and flow efficient check valves.

– LEWA triplex is the world’s most compact process diaphragm pump in any branch of industry. Its space and weight saving monoblock design also makes it suitable for any application with very little installation space.

– LEWA ecoflow is the most advanced process diaphragm pump in the world, offering maximum safety for production and the environment. The perfect solution for your application requirements can be configured from a wide variety of standardized assemblies. LEWA combines various pump heads and drive units with a variable modular construction, in line and boxer designs.
Industry: Refineries
Installation location: Germany
Application: Conveying methanol, flow rate of 2,510 gph at a pressure of 638 psig
LEWA solution:
– Hermetically tight process diaphragm pump for conveying poisonous, highly flammable fluids
– Compact design
– Designed for continuous operation
LEWA process diaphragm pumps.
The advantages at a glance.

1. **Hermetically tight**
   Diaphragm pumps work without dynamic seals, due to their design. This permits a hermetically tight working area. There are no external emissions and contamination of the fluid is impossible.

2. **Maximum operational safety**
   Secure against misuse and against impermissible operating states, resulting in outstanding system availability. A monitoring system indicates possible diaphragm damage immediately. The pump can still be operated for a limited time.

3. **Compact design**
   Thanks to the extremely space-saving and weight-saving monoblock design of the LEWA triplex, these process pumps are also ideal for applications with very little installation space.

4. **Custom-made solutions**
   The modular system permits a wide variety of solution options – from the flexible modular construction, to the space-saving monoblock design, all the way through to special solutions. LEWA specializes in demanding applications.

5. **Lowest life cycle costs**
   LEWA develops pumps for long service life. The assemblies run for decades in continuous operation. Our pumps achieve the highest efficiency of any pump technology.

6. **Worldwide service**
   LEWA is globally organized. Spare parts and service are quickly available worldwide.
References from customized process diaphragm pumps

Industry: Chemicals
Installation location: China
Application: Conveying vinyl acetate, flow rate of 2,378 gph at a pressure of 4,490 psig
LEWA solution:
- LEWA process diaphragm pump in boxer design
- Hermetically tight diaphragm pump heads
- Extremely wide control range
Industry: Pharma & Biotech
Installation location: Germany
Application: High-pressure extraction with CO₂,
flow rate of 1,849 gph with a pressure of 3,190 psig
LEWA solution:
– LEWA triplex process diaphragm pump
  in compact design
– Pump heads optimized to reduce dead space
– Hygienic materials
– In accordance with FDA and NSF
Industry: Chemicals
Installation location: Japan
Application: Wet oxidation for process wastewater, flow rate of 4,755 gph at a pressure of 2,320 psig
LEWA solution:
- LEWA triplex process diaphragm pump with a compact monoblock design
- Hermetically tight diaphragm pump heads made of 1.4404
- Including pipe resonator and drip pan
- Technical design in accordance with API 675 and local guidelines
Industry: Oil & Gas
Installation location: Norway
Application: Injection of hydrogen sulfide/carbon dioxide, flow rate of 26,417 gph at a pressure of 3,110 psig
LEWA solution:
– Largest process diaphragm pump in the world (136,685 lbs)
– Two quadruplex process diaphragm pumps, which can alternate as a stand-by pump
– Ball resonators for pulsation damping
– Hermetically tight pump
–Insensitive to dry running or particles in CO$_2$
– High efficiency over a wide operating range
Industry: Petrochemicals
Installation location: China
Application: Metering
ethylene oxide, flow rate of 1,347 gph at a pressure of 1,550 psig and a temperature of 41.0°F
LEWA solution:
– LEWA triplex process diaphragm pump with a compact monoblock design
– Hermetically tight diaphragm pump heads
– Valves and pump heads made of special material for an outstanding long service life
Examples of customized process diaphragm pumps

Industry: Petrochemicals
Installation location: Germany
Application: Metering the melt when filling the high-pressure reactor, flow rate of 607.6 gph at a pressure of 3,620 psig
LEWA solution:
– LEWA triplex process diaphragm pump with a compact monoblock design
– Hermetically tight diaphragm pump heads
– Wetted parts are heated with steam
– Pump synchronization of both process pumps for maximum availability

Industry: Refineries
Installation location: Germany
Application: Conveying washing water with H₂S, flow rate of 2,113 gph with a pressure of 2,810 psig
LEWA solution:
– LEWA triplex process diaphragm pump with a compact design
– Design in accordance with API 675
– Reliable, hermetically tight pump with long service life, suitable for critical fluids
Industry: Petrochemicals
Installation location: Germany
Application: Production of biofuels, flow rate of 1,849 gph at a pressure of 1,300 psig and 501.8°F
LEWA solution:
- LEWA triplex process diaphragm pump with metal diaphragm
- Remote head design for metering extremely hot fluids
- Particularly high hydraulic output with hermetically tight pump
- Very long service life
Industry: Food & Beverages
Installation location: Switzerland
Application: Homogenizing special milk for maximum food safety at a pressure of 7,250 psig
LEWA solution:
- Complete homogenizer with LEWA triplex diaphragm pump in hygienic design
- With a two-stage homogenization valve (1160/7,250 psig)
- Water-cooled synchronous torque motor
- Hygienic and aseptic design, with FDA approval and in accordance with EHEDG
- CIP and SIP-capable
- Wetted parts in stainless steel, surface roughness Ra < 0.8 μm, mechanically polished
LEWA process diaphragm pumps are available in the compact LEWA triplex series and in the LEWA ecoflow modular construction.

High performance with minimum footprint:
Drive units

LEWA triplex up to G3R: Monoblock design with integrated gear

LEWA triplex G3U and G3T with external gear

LEWA ecoflow with modular construction

LEWA ecoflow in boxer design
**LEWA triplex**
LEWA triplex drive units are designed with a compact monoblock design. It offers the following advantages:
- Extremely space-saving and weight-saving
- Solid, rugged overall design
- Very smooth running plus low-vibration operation thanks to even eccentric offset
- Sturdy slide bushings for eccentric shaft and plunger rod drive pin
- Integrated worm gear and vertical flange motor (up to G3R size)
- No base frame required (up to G3R size)
- Low-pulsation design thanks to overlapping partial flows
- Precise, reproducible flow setting using motor speed for adjustment

**LEWA ecoflow**
This highly flexible range, featuring a modular construction, makes it possible to cater to a whole variety of customer requirements. It offers the following advantages:
- Designed specifically for mixture control and highly variable flow rates
- Wide control range up to 1:100
- Precise, reproducible flow setting using stroke length and rotational speed
- For conveying processes combined with metering tasks
- Multiple individual elements, even with different sizes, can be combined
- Duplex, triplex, quadruplex, or sextuplex pumps in boxer design (LDG and LDHB)
- Solid overall design
For compactness and safety. The LEWA triplex technology.

LEWA triplex is a hydraulically actuated process diaphragm pump. The design principle ensures that the diaphragm of the pump head always works in the defined range.

Diaphragm pumps are used when leak tightness, operational reliability and safety are demanded. Especially for fluids that are hazardous, abrasive, environmentally harmful, or sensitive. To keep the load on the diaphragm as low as possible, it is hydraulically actuated in the LEWA triplex.

Minimum dead space
Pump head design with high-performance diaphragm optimized to minimize dead space

Pressure relief valve
A pressure relief valve in the hydraulic part of the pump prevents any overload occurring in the pump. It is individually adjustable. (Type-tested version also available)

The right material for every application
Materials are selected in collaboration with the customer and with the fluid properties taken into account.

Low-wear valves for a variety of tasks
Operational reliability and service life are decisively dependent on valve quality. The valve design is therefore adapted to the specific application.

Highly precise hydraulic control
The hydraulic valve ensures stable, precise operating conditions.
High-performance drives for continuous operation
Frequency-controlled 3-phase motors for low and medium voltage. Special solutions available.

Overall design for low-vibration operation
This avoids the use of shock absorbers.

Monitoring
the temperature of the drive unit oil

Solid crank shaft
for maximum hydraulic output

Lubrication
All moving parts run with immersion splash lubrication

Low space requirement
Compact foundation dimensions thanks to vertical motor installation

Multi-chamber system
for separating hydraulic and drive unit oil
For a wide variety of requirements.
The LEWA pump heads.

Series

M900

The universal choice for fluids of any kind
Innovative diaphragm pump head is the latest generation for maximum operational reliability. The patented LEWA DPS technology also enables a suction capacity that is globally unique in the field of hydraulically actuated diaphragm pumps.

Series

M800

The compact choice for highest pressures
The special geometry of the diaphragm clamping system enables the use of PTFE diaphragms for pressure ranges up to 14,500 psig resulting in a very compact design.
Series M500

The proven choice for high flow rates
Universal diaphragm pump head for high flows. Proven, durable, reliable, and with patented diaphragm position control.

Series M400

The extreme choice for high temperatures
M400 pump heads have a metal diaphragm and are designed for high temperatures and pressures up to 17,400 psig. Also suitable when a high degree of permeation resistance is required.
For fluids of any kind. Universal M900 diaphragm pump heads.

The innovative M900 pump head is the latest generation of pump head, with PTFE sandwich diaphragm for maximum operational reliability.

As a further development to the M500 series, it is just as durable and proven, however has more safety reserves, especially when starting the pump. The patented DPS technology also enables a suction lift capability that is globally unique in the field of hydraulically actuated diaphragm pumps.

Technical data

- Discharge pressure up to 7,250 psig
- Flow rate up to 1,585 gph per pump head
- Temperatures of -4.0 to +302.0°F
- Viscosity up to 100,000 cP
- 316/316L, special materials
- Can be installed on all ecoflow drive units and all triplex drive units ≤ G3G

Outstanding advantages

- Globally unique suction lift capability
- Suitable for vacuum extraction
- Simple, reliable start-up, even under extreme conditions
- Patented DPS diaphragm protection system
- Very low maintenance costs and long service intervals
-Insensitive to particles in the fluid
- Dry run safe
- Integrated pressure relief valve
For highest pressures.  
Compact M800 diaphragm pump heads.

The M800 pump head is a diaphragm pump head with PTFE sandwich diaphragm.

The special geometry of the diaphragm clamping system enables the use of PTFE diaphragms for pressure ranges up to 14,500 psig and resulting in a compact design. Very economical solution in the range of high pressures, especially in comparison to pump heads with metal diaphragms.

**Technical data**

Discharge pressure up to 14,500 psig  
Flow rate up to 290.6 gph per pump head  
Temperatures of +14.0 to +140.0°F  
Viscosity up to 100,000 cP  
1.4313 or 1.4462 (Duplex)  
Can be installed on all ecoflow drive units ≥ LDF and all triplex drive units

**Outstanding advantages**

Extremely high operating pressures possible  
Compact design and smallest possible use of materials by using PTFE diaphragms even in the high-pressure range (and so having smaller outer diameters in comparison with metal diaphragm pump heads)  
Insensitive to particles in the fluid  
Dry run safe  
Integrated pressure relief valve
For high flow rates.  
Proven M500 diaphragm pump heads.

The M500 diaphragm pump head with PTFE sandwich diaphragm is universally applicable. It is perfect for high flow rates.

The M500 has been in successful use for decades. Its advantages are robustness, reliability, and its patented diaphragm position control.

---

**Technical data**

- Discharge pressure up to 5,070 psig
- Flow rate up to 5,019 gph per pump head
- Temperatures of -58.0 to +302.0°F
- Viscosity up to 100,000 cP
- 316/316L, plastics PVC or PVDF, special materials
- Can be installed on all ecoflow drive units ≥ LDE and all triplex drive units

**Outstanding advantages**

- High suction capacity due to diaphragm position control
- Very low maintenance costs and long service intervals
- Suitable for high flow rates
- Insensitive to particles in the fluid
- Dry run safe
- Integrated pressure relief valve
For high temperatures.
M400 diaphragm pump heads for extreme requirements.

The M400 pump head with metal diaphragm is selected for highest pressures and temperatures. It is also suitable when a high degree of permeation resistance is required.

The diaphragm is working between two contour plates, limiting the deflection of the diaphragm and providing an extreme level of operational reliability. The diaphragm monitoring system offers a plus for safety by immediately displaying the damage of a diaphragm layer.

Technical data

- Discharge pressure up to 17,400 psig
- Flow rate up to 211.3 gph per pump head
- Temperatures of -40.0 to +392.0°F
- Viscosity up to 500 cP
- 1.4313, 316/316L, special materials

Outstanding advantages

- Extremely high operating pressures possible
- Extremely high operating temperatures possible
- Diffusion-tight metal diaphragm
- Dry run safe
- Integrated pressure relief valve

The M400 can be installed on all ecoflow drive units ≥ LDF and all triplex drive units ≤ G3G
For the optimum configuration.
Overview options.

Instrumentation, control, and monitoring

Integration of the pump into the process control systems for control, regulation, and condition monitoring
Diagnostic connection for the online readout of measurement data from the pump head and drive
Diaphragm monitoring systems to spec with pressure switches, manometers, contact manometers, and pressure transmitters
Pump synchronization
Converter and control cabinets
On-site control panel

Pump head designs

Special materials by customer request, such as Hastelloy, duplex, titanium, plastics
Diverse connection geometries
CIP and SIP capability
Hygienic design
Heating and cooling jacket
Fully heated pump heads (including valves) for melting
Remote head design for extreme temperatures

Accessories

Pulsation damper
Safety valve
Pressure retention valve
Flow meter
Base plate
Collecting pipe
**Industry:** Energy utilities  
**Installation location:** Germany  
**Application:** Compressing liquefied gases with diaphragm pump skid, flow rate of 634.0 gph at a pressure of 899 psig  
**LEWA solution:**  
- Engineering, assembly, and commissioning from a single source  
- Process diaphragm pump complies with stringent safety requirements  
- Designed for low inlet pressure levels  
- Enables compression in a single stage  
- High energy efficiency
Performance overview of LEWA ecoflow and LEWA triplex process diaphragm pumps

Flow rate $Q_{\text{ theor}}$ per pump at maximum stroke

Performance overview to determine drive unit size. The characteristics apply to a single pump.
LEWA process diaphragm pumps — Technical data

Technical data for pump heads

<table>
<thead>
<tr>
<th>Max. discharge pressure [in psig]</th>
<th>Pump head M900</th>
<th>Pump head M800</th>
<th>Pump head M500</th>
<th>Pump head M400</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7,250</td>
<td>14,500</td>
<td>5,070</td>
<td>17,400</td>
</tr>
<tr>
<td>Max. flow rate [in gph]</td>
<td>1,585</td>
<td>290.6</td>
<td>5,019</td>
<td>211.3</td>
</tr>
<tr>
<td>Temperatures [in °F]</td>
<td>-4.0/+302.0</td>
<td>+14.0/+140.0</td>
<td>-58.0/+302.0</td>
<td>-40.0/+392.0</td>
</tr>
<tr>
<td>Max. viscosity [in cP]</td>
<td>100,000</td>
<td>100,000</td>
<td>100,000</td>
<td>500</td>
</tr>
</tbody>
</table>

Applicable on all ecoflow drive units and all triplex drive units ≤ G3G

Assembly dimensions

<table>
<thead>
<tr>
<th>in inch</th>
<th>Type G3S</th>
<th>Type G3F</th>
<th>Type G3G</th>
<th>Type G3M</th>
<th>Type G3R</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>51.18</td>
<td>61.02</td>
<td>86.61</td>
<td>90.55</td>
<td>116.14</td>
</tr>
<tr>
<td>W</td>
<td>45.28</td>
<td>51.18</td>
<td>68.90</td>
<td>74.80</td>
<td>80.71</td>
</tr>
<tr>
<td>H</td>
<td>53.15</td>
<td>72.83</td>
<td>76.77</td>
<td>124.02</td>
<td>153.54</td>
</tr>
</tbody>
</table>

The dimensional specifications differ depending on the pump head installed.

<table>
<thead>
<tr>
<th>in inch</th>
<th>Type G3U</th>
<th>Type G3T</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>129.92</td>
<td>141.73</td>
</tr>
<tr>
<td>W</td>
<td>175.20</td>
<td>194.88</td>
</tr>
<tr>
<td>H</td>
<td>53.15</td>
<td>86.61</td>
</tr>
</tbody>
</table>

The dimensional specifications differ depending on the pump head installed.

<table>
<thead>
<tr>
<th>in inch</th>
<th>Type LDF</th>
<th>Type LDG</th>
<th>Type LDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>44.49</td>
<td>51.18</td>
<td>82.68</td>
</tr>
<tr>
<td>W</td>
<td>35.43</td>
<td>51.18</td>
<td>70.87</td>
</tr>
<tr>
<td>ΔW</td>
<td>16.93</td>
<td>19.29</td>
<td>28.23</td>
</tr>
<tr>
<td>H</td>
<td>37.01</td>
<td>39.37</td>
<td>59.06</td>
</tr>
</tbody>
</table>

The dimensional specifications differ depending on the pump head installed.
Complete solutions from a single source. LEWA packages and systems.

LEWA also offers solutions that go beyond individual process or metering pumps. For decades, we have built customer-specific systems, skids, and packages. Our services range from engineering to commissioning – including custom system controllers, process visualization, operational data collection, and external interfaces to the process control system.

We guarantee the optimum implementation of your requirements with our knowledge of intelligent process control and the controller and regulation technology needed to achieve it.

The basis is the competent selection and combination of system components and their characteristics. As our basic component, we prefer to use LEWA ecoflow metering diaphragm pumps.
Creating Fluid Solutions.
For more value created.

Technical consulting
Fluid and process engineering tests
Lifecycle concepts and energy optimization

Process automation
Pulsation studies and pipeline calculations
System layout and integration

Creative development and refinements
Commissioning and maintenance service
Spare part and service concepts
Creating Fluid Solutions.
Driven by our commitment, our trendsetting products and innovative technologies have set benchmarks for diaphragm pumps and metering systems for over 60 years. We solve complex tasks from a single source. That ranges from custom pump design, basic and system engineering, global project management, and pretesting to commissioning and maintenance on site. Our consistent drive always to develop the best solutions for the customer provides you with a competitive advantage and visible added value.