

LEWA metering and mixing systems

Complete solutions from a single source.





Industry: Energy utilities

Installation location: Middle East

Application: Metering of liquid ammonia and phosphate solution for treating of boiler feedwater, volume flow up to 30 l/h at a max. pressure of 130 bar

LEWA solution:

- Complete system with LEWA diaphragm pumps
- Electrical cabinet with control system
- Storage container with agitator and exhaust air scrubber



In many manufacturing plants, the metering and mixing of liquids plays an important role as a procedural step that ensures the quality of the end product.

LEWA develops and supplies customized metering and mixing systems for numerous industries and a wide variety of application areas. The performance spectrum ranges from laboratory tests and design, all the way to the commissioning of the entire operational system. We advise you in all project phases using our breadth of process engineering expertise. In doing so, we make use of modern tools such as a lab with measurement data recording, 3D CAD systems, calculation programs for pipelines and comprehensive databases for system components. In addition to process technology and our knowledge regarding intelligent process control, we also boast many years of experience in the associated measurement technology and control engineering areas. At our facilities, we can design and optimize control systems using LEWA software solutions and offer process visualization and integration into higher-level process control systems.

Title page image:**Industry:** Cleaners and detergents**Installation location:** Germany**Application:** Fully automatic production of fabric softeners, total output 15 t/h**LEWA solution:**

- Complete system with LEWA diaphragm pumps
- Storage tanks with pipework and fittings
- Heat exchangers
- Mass-flow meter
- Electrical control system with process visualization, recipe management and continuous logging





Industry: Food & Beverages

Installation location: Switzerland

Application: Homogenizing special milk for maximum food safety at a pressure of 500 bar

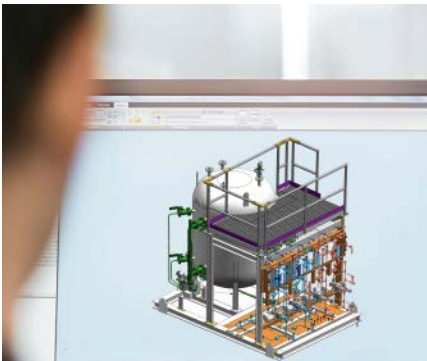
LEWA solution:

- Complete homogenizer with LEWA triplex diaphragm pump in hygienic design
- With a two-stage homogenization valve (80/500 bar)
- 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 $R_a < 0.8 \mu\text{m}$, mechanically polished

LEWA metering and mixing systems.

The advantages at a glance.

1



Customized

We design and produce customized solutions for everything from pumps to turnkey systems. In this process, all components are synchronized with one another and optimized. With LEWA diaphragm pumps, flow rates between 10 ml/h and 180 m³/h and discharge pressures up to 1200 bar are possible.

2



Complete

We deliver everything from a single source. From fluid evaluations and detailed pipeline calculations in advance, all the way to our own software developments for control systems and process visualization. Our highly skilled employees are available to you throughout the entire service life of the systems.

3



Precise

We prefer to use LEWA diaphragm metering pumps in our systems. They offer a high level of metering accuracy, an infinitely variable stroke length and stroke frequency setting for a large adjustment range. Pumping characteristics are nearly pressure-independent for easy, precise monitoring.

4



Safe

LEWA systems are designed in accordance with the required safety standards and meet the most stringent requirements. We developed the LEWA smart control to provide optimum monitoring of metering systems. Its integrated diagnostic function ensures additional safety.

5



Proven and reliable

LEWA has over 70 years of experience in numerous industries. Our systems and pumps operate around the clock in many application areas.

6



Global

LEWA is globally organized. Fast spare part deliveries, specialized maintenance and repairs are available on-site all over the world.

Customized metering and mixing systems.

Customized metering and mixing systems from LEWA come from a single source.

All components are precisely synchronized to one another and ensure a high level of availability and operating reliability in the systems. LEWA designs, builds and delivers a wide variety of solutions: from a metering pump with installed accessories and metering systems, all the way to complete turnkey systems. A design that is cost-effective and technically optimized is always our number one priority. Of course, our customized solutions comply with the legal regulations and standards.

We take care of all the details. We use the latest technologies to develop the ideal customized metering or mixing system and guarantee proper functioning. As the leading pump manufacturer, we do not compromise on the quality of the components.

Components used *

LEWA metering or process pumps
Storage tank
Transfer or barrel pumps
Base frame
Cooling and heating elements
Agitators
Static or dynamic mixers
Piping
Isolation- and control valves
Filters or strainers
Pressure relief or safety valve
Electrical cabinet with control system and process visualization
Flow meters
Pressure monitoring or measurement
Level measurement
Temperature measurement

* depending on the application



Industry: Oil & Gas

Installation location: Great Britain

Application: Chemical injection package for crude oil extraction

LEWA solution:

- Multi-head pumps (hermetically sealed LEWA diaphragm pumps)
- Separable overall system for transport and installation



Performance overview	
Pump types with usable discharge pressure	up to 1,200 bar
Flow rate	10 ml/h up to 180 m³/h*
Temperature	- 40 to + 400 °C*
Viscosity	up to 1,500,000 mPa·s

* depending on the type and boundary conditions

Perfect controller:
LEWA smart control



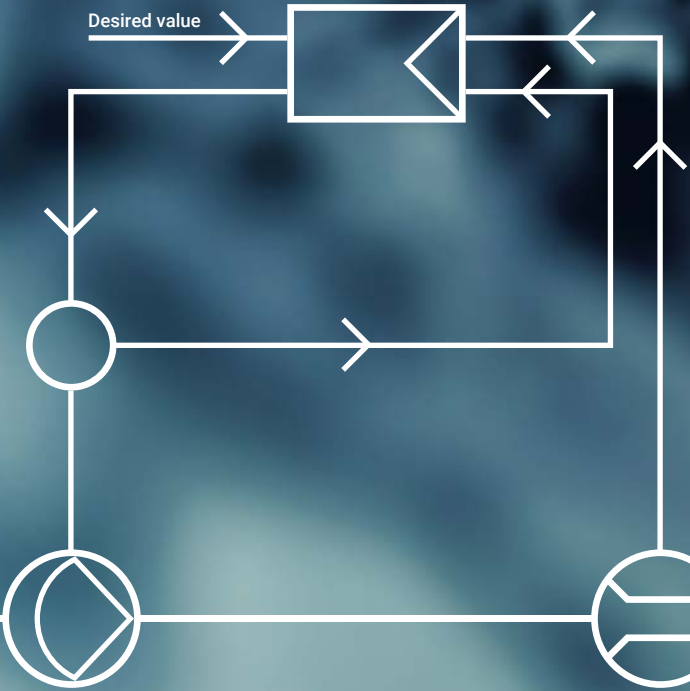
Exact adjustment:
via the stroke length
and/or speed



Precision right from
the beginning:
LEWA metering pumps
or a suitable alternative



Monitored metered flow:
Different flow meters
can be used



The most important components for cost-effectiveness and safety.

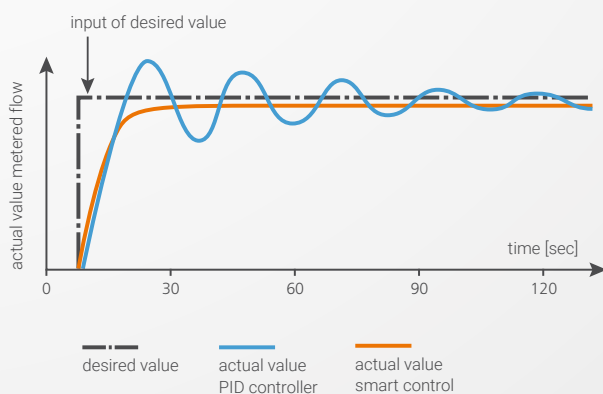


The compact controller LEWA smart control

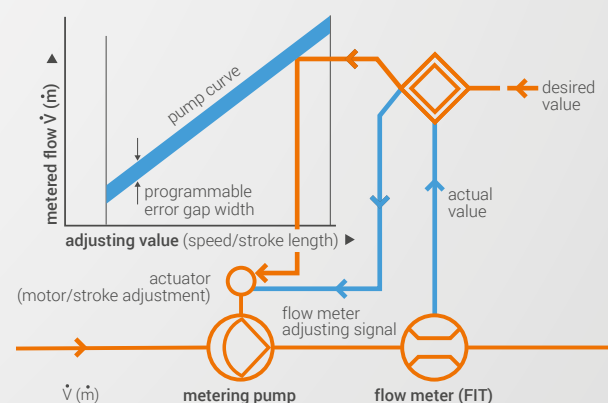
For optimum monitoring of metering systems, we provide the LEWA smart control, which has been developed specifically for this reason:

- The software allows you to store the characteristic curve of the pump, including the error spectrum and control range.
- The programmed adaption function – the adaptive control – ensures that the actual value is adjusted quickly without causing substantial transient oscillation that is common in conventional PID controllers.
- The pump adjusting value (motor speed and/or stroke length) and flow meter signal are compared and continuously checked for plausibility
- Integrated diagnostic functions indicate deviations and malfunctions. This allows their causes to be found efficiently, which ensures high system availability.
- Operation via a 7" touch panel in the language of the customer

Comparison: control behaviour of PID controllers to LEWA smart control triplex



LEWA smart control



In the basic version, LEWA smart control controls a metering line. The frequency converter and external communication are integrated in a similar manner.



Continued: LEWA smart control

The following expansions are available:

- Upgrade to bus communication (e.g. Profibus-DP, Profinet, Ethernet, Modbus TCP-IP)
- Larger touch panel (optional also for use in potentially explosive zones I and II)
- Modular expansion to a second metering line and/or to the electric stroke adjustment (EHV) to expand the adjustment range
- Monitoring of additional parameters (e.g. fill level, conductivity) using additional sensors
- In case of more control loops: Expansion to a larger control system with the same function

Application examples:

- Control of the metered flow: Specification and maintenance of a continuous mass or volume flow
- Batch metering: Filling or refilling processes of an adjustable metering quantity X (e.g., topping up to fill level (e.g., tank), metering of a specific quantity)
- Manual metering: Setting the speed, starting/stopping at will
- Mixing processes (e.g., dilution of caustic soda): Control of two metered flows in the correct ratio to each other

Advantages

Assisted by up to four actuators, the controller manages one or two closed control loops. This way you can control either one redundant system or two independent systems. Metering pumps and measuring systems of nearly any type can be used

The operator can use a 7" touch panel to choose between various layouts and overviews (target/actual value, curve display, etc.)

Easy to commission, thanks to preconfiguration at the factory

Compliance with international standards such as EN standards, UL, EMC



The pumps

The pump is the heart of the LEWA system. We prefer using diaphragm metering pumps from our own production. These provide:

- Continuous adjustment of stroke length and frequency, ensuring an accurate and wide adjustment range
- Pressure has virtually no influence on the pumping characteristics, which makes monitoring easy and precise
- High metering accuracy paired with flow measurement/monitoring ensures reliable and reproducible production

Our expertise also helps when it comes to integrating other pump types, provided that these lead to a better result based on the application, flow rate or composition of the pumping fluid: All components are optimally matched to your requirements.

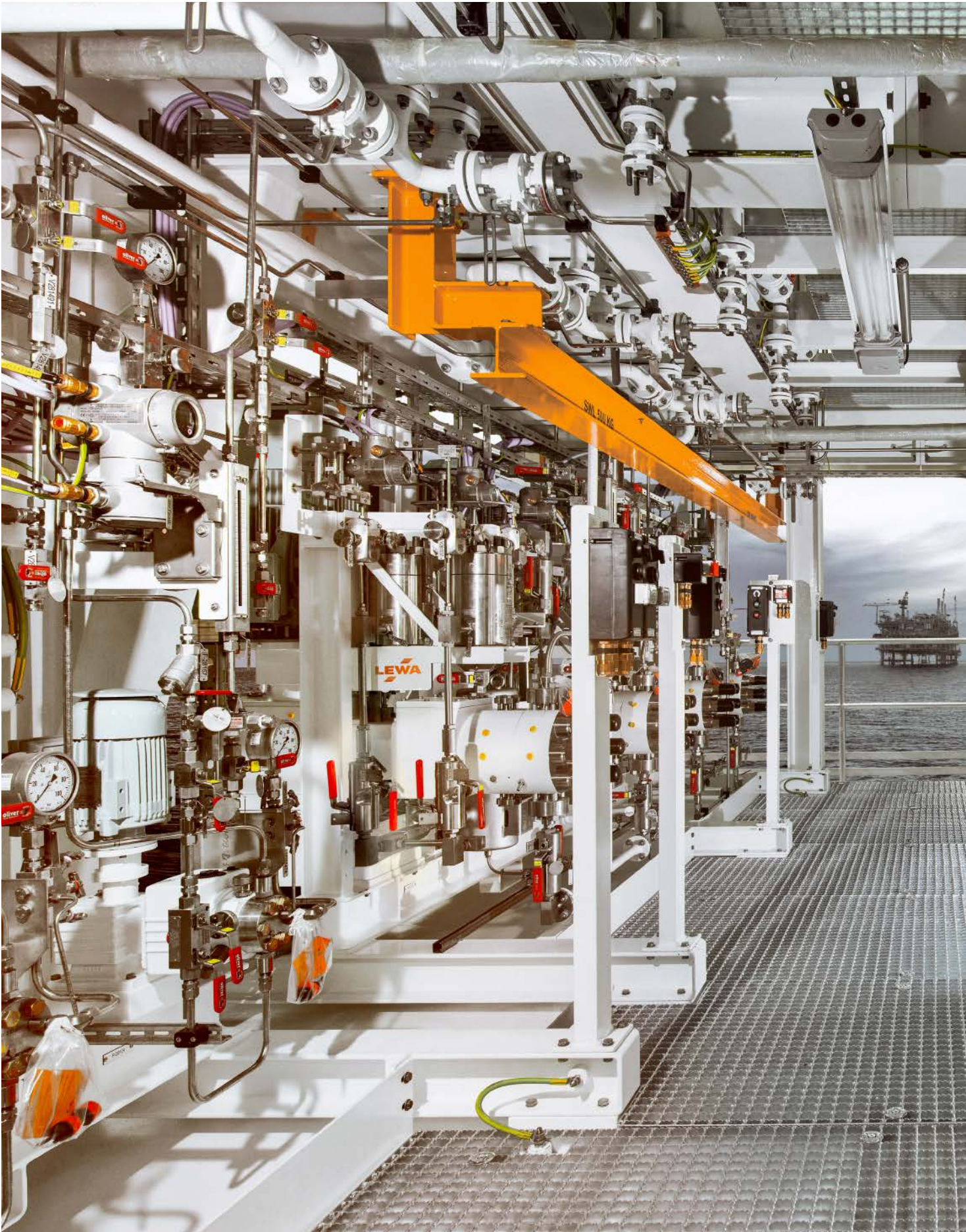


The flow meters

Flow meters measure the volume flow or mass flow and transmit the measured actual value to the controller. We select the flow meters suitable for the application accordingly.

Everything is perfectly matched and from a single source

Pumps, measuring instruments (e.g., flow meters), control technology and engineering, as well as fittings and pipes need to be perfectly matched. This is LEWA's core competency. Components are selected based on cost-effectiveness and technology. Only process-engineering quality products are used, which have been tested to make sure they work together in the system without a hitch.





Industry: Oil & Gas
Installation location: Great Britain

Application: Chemical injection
on offshore platform

LEWA solution:

- Design, procurement and installation
- Diaphragm pumps for maximum pressure (600 bar)
- Built for ambient temperatures from -6 to +40°C





Industry:

Pharmaceuticals & Biotechnology

Installation location: Germany

Application: Metering of liquids for applications with pharmaceutical extruders, volume flow of 10 l/h at a pressure of 50 bar

LEWA solution:

- Complete system with heated storage tank, magnetic agitator and control system
- LEWA ecoflow triplex diaphragm metering pump for low-pulsation metering
- Developed while taking into account all qualification and validation steps (cGMP, GAMP)



Industry: Food & Beverages

Installation location: Germany

Application: Continuous metering and mixing of gelatine, flavoring agents and dyes as well as citric acid, total output 2.5 t/h

LEWA solution:

- Complete system with LEWA multiple-piston pump
- Tank with pipework and fittings
- Mass-flow meter
- Electrical control system with process visualization and recipe management



References from customized metering and mixing systems.



Industry:

Pharmaceuticals & Biotechnology

Installation location: Switzerland

Application: Inline dilution system with diaphragm metering pumps for flexible buffer production with highly variable volume flows

LEWA solution:

- LEWA solution: Metering system including piping, fittings, and instrumentation
- Hermetically tight LEWA ecodos diaphragm pumps in hygienic design
- Wide adjustment range from 40 to 2,500 l/h



Industry:

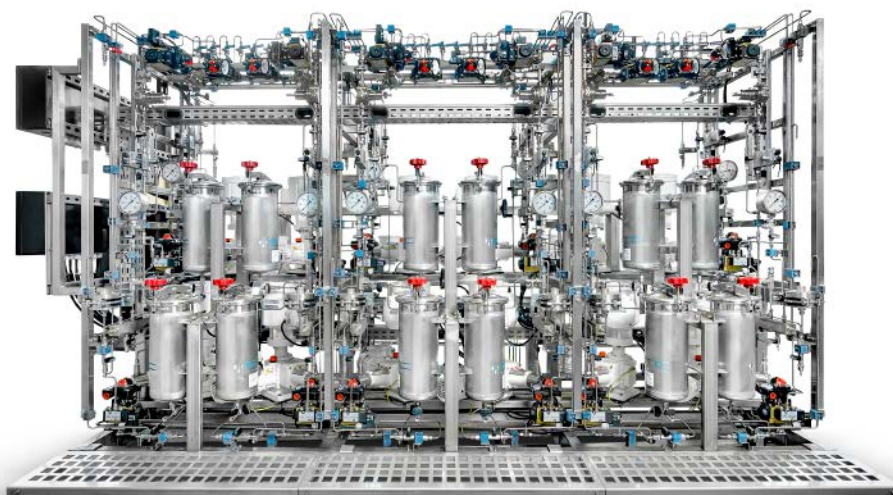
Food & Beverages

Installation location: Italy

Application: Metering of high-viscosity food coloring as well as low-viscosity coloring and flavoring agents for the production of jelly sweets

LEWA solution:

- Metering system with twelve single-head pumps, each with its own electric stroke drive for parallel metering of six coloring and six flavoring agents in parallel
- Compact design





Industry: Oil & Gas
Installation location: Saudi Arabia
Application: Chemical injection package for injecting corrosion inhibitors
LEWA solution:

- Hermetically sealed diaphragm pumps
- Pumps accessible from the front for maintenance
- Optimized for low space requirements
- On-site control unit



Industry: Refineries
Installation location: Middle East
Application: Metering of corrosion inhibitors, anti-foaming agents, deposit inhibitors, volume flow 150 l/h at a pressure of 40 bar
LEWA solution:

- Metering system complete with storage tank, piping, fittings and instrumentation
- Hermetically sealed LEWA ecoflow diaphragm pumps
- Storage tanks with nitrogen blanketing and design in accordance with ASME



Industry: Oil & Gas
Installation location: Oman
Application: Chemical injection Package for injecting highly concentrated scale inhibitor
LEWA solution:

- Hermetically sealed LEWA diaphragm pumps
- Unit with frame, drip tray, tank, and roof for outdoor installation
- Instrumentation and local control panel
- Power control and cabling



References from customized metering and mixing systems.



Industry: Petrochemicals

Installation location: Germany

Application: Metering of additives for improving the polymer end product, flow rate 2 x 1 l/h at a pressure of 45 bar

LEWA solution:

- Metering system completely installed into the safety cabinet
- Hermetically sealed LEWA diaphragm pumps with pneumatic stroke adjustment
- Storage container, fittings and pipework
- Control cabinet with closed control loop and mass-flow meter



Industry: Plastics

Installation location: Germany

Application: Melting and metering of flame retardants

LEWA solution:

- Metering system in thermal cabinet
- Melting tank with agitator
- Operating temperature 80°C
- Electrically heated





Preconfigured metering packages and systems.

In addition to the entirely customized metering and mixing systems, for certain industries, we also provide preconfigured systems that have the same main components, which means they can be implemented even more cost-effectively. Of course, we can also take into account specific requirements here.

LEWA ecofoam – The metering system for blowing agents in extrusion processes

In the extrusion process, metering of blowing agents is of great importance for ensuring constant quality of the end product. LEWA ecofoam is a system for metering blowing agents such as butane, CO₂, halogenated hydrocarbons, pentane and propane into the plastic melt of an extrusion process.

Performance overview

Discharge pressure	50 bar to 500 bar
Flow rate	0.01 kg/h to 800 kg/h



Benefit to you

Constant quality of the foamed product by means of:

- Exact metering even with fluctuating extruder pressures
- Using the LEWA smart control with a faster response time than conventional PID controllers

High operating reliability through robust and hermetically sealed LEWA ecoflow pump technology

High productivity through long periods between maintenance

High expertise with blowing agents, for example, when switching from butane to CO₂

Application examples

Polystyrene foam (PS foam) – manufacturing of insulation boards and food packaging containers

Polyethylene foam (PE foam) – manufacturing of packaging foils, impact sound insulation and cover seals

Polyurethane foam (PU foam) – manufacturing of insulation boards and pipe insulation

Foam pellets (EPS/EPP/EPE) – reusable transport packaging and molded parts for bumper cores

Essential components:

- LEWA ecoflow diaphragm metering pump
- Strainer in suction line
- Contact pressure gauge for pressure monitoring in the suction- and discharge line
- Safety valve for protecting the metering system from overpressure
- Mass-flow meter
- Control cabinet

For CO₂ applications:

- Heat exchanger in the suction line for cooling the CO₂ before inlet
- Cooling jacket on each pump head
- Compact chiller providing the cooling medium into cooling circuit

These components are piped up and installed on a common base frame. A control cabinet with all of the electrical components, including the specially developed LEWA smart control for operating the metering system, can be integrated on the base frame or delivered separately for installation in the customer's control room.







LEWA odorizing systems

For many decades, LEWA has been developing systems for the odorization of gas, including natural gas, biogas, liquefied gas, and technical gases. They ensure the accurately monitored, quantity-based addition of odorous substances. That is why these special gases have to be processed with hermetically tight systems during distribution, reloading and transport. With LEWA odorizing systems, the appropriate odorant is metered reliably, proportionally and cost-effectively.

Performance overview

Discharge pressure	min. 0.1 bar – max. 300 bar
Flow rate	min. 0 l/h – max. 40 l/h



Benefit to you

Quantity-based system controlled by gas flow with closed control loop Design that complies with applicable guidelines (including the German Federal Water Act (WHG), German Technical and Scientific Association for Gas and Water (DVGW), ATEX, TR CU, ASME, Pressure Equipment Directive, German Technical Instructions on Air Quality Control (TA-Luft), and German Technical Regulations for Combustible Liquids (TRbF))

Maximum metering accuracy, usually better than $\pm 1\%$

LEWA odorizing systems are suitable for all standard odorants. Even sulfur-free substances have been dosed safely and precisely for many years.

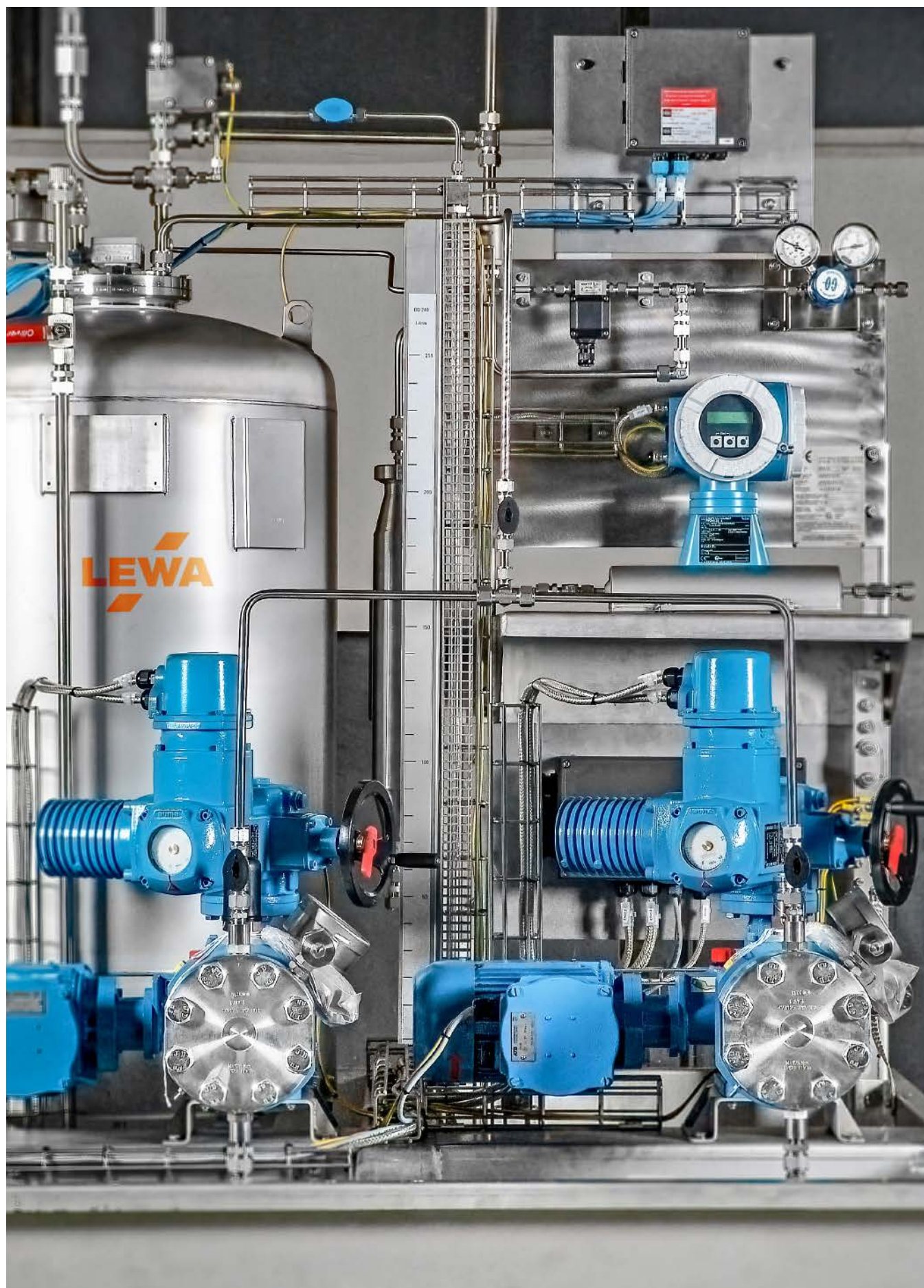
Application examples

LEWA odorization systems are used, for example, at liquefied gas loading stations, gas pressure regulating stations, LNG refueling stations, on shipyards, or in biogas feed-in systems.

Essential components:

- Diaphragm metering pumps for hermetically tight and reliable metering (magnetically, pneumatically or electrically operated)
- The metal diaphragms are absolutely diffusion-proof, reliable, and made of high grade stainless steel
- Tested control systems, even with ex-proof design
- Container with translucent level indicator, which can be used simultaneously while the pump is being calibrated
- The LEWA KMM 1 flow meter is a unique volumetric measuring device that measures even lowest volume flows with highest precision.
- Activated carbon filter for exhaust air purification of the container
- Drip trays in accordance with AwSV regulations for stationary systems for storing water pollutants
- All essential components can be configured individually to meet your requirements





Creating Fluid Solutions. For more value created.

1



Research and Development

2



Feasibility studies

3



Concept/design

4



Consultation and fluid evaluations

5



Preliminary process engineering tests

6



Technical clarification

7



Quotation creation

8

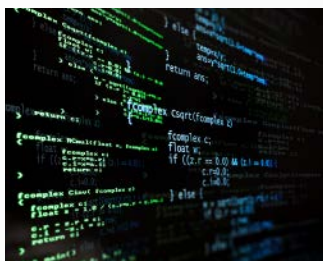


Order fulfillment

Everything from a single source.
LEWA is not just your supplier for metering pumps, process diaphragm pumps and metering or mixing systems. LEWA is also your competent partner throughout all phases of your project.

For us, this means advising you before and after the order placement, engineering the pumps and systems with a final, on-time implementation and complete, global service offering repairs, maintenance and training. We are here for you whenever you need us and offer you our decades of experience.

9



Software development

10



Production

11



Installation

12



Construction of
diagnostic systems

13



On-site commissioning

14



Qualification/validation

15



Training

16



Service and maintenance
contracts worldwide

LEWA GmbH

Ulmer Str. 10
71229 Leonberg
Germany

www.lewa.com

■ Part of Atlas Copco Group

