LEWA lab – high performance products for fluid metering in laboratories and pilot plants

LEWA lab is an innovative approach to solving your laboratory and pilot plant scale metering requirements. LEWA lab products include pumps, controllers, flow meters and accessories for total metering capability. It is a broad, coherent program designed to provide you with the best possible technology for fluid metering.

CONTENTS

LEWA lab metering pumps	
Series M	3
Series MAH and MAH Ex	4
Series MLM	5
K3 series	7
Series FCMK	8
LEWA lab control systems	
MSG for Series MAH	6
SLK for Series MLM	6
FIS dialogue controller	11
LEWA lab flow meters	12
LEWA lab accessories	9
Complete LEWA lab metering systems	10, 11

Benefits of LEWA lab metering pumps

All pumps have hydraulically actuated, metal diaphragms (1)
Metal diaphragms (stainless steel or Hastelloy) are corrosion-resistant to nearly all metered fluids, and eliminate the process fluid diffusion problem common with PTFE-coated elastomer diaphragms.

Long life and pressure stiff, even at high pressures
The hydraulically actuated diaphragm minimizes the effect of pressure on the metered flow rate, and the resultant hydraulic balancing ensures long service life, even at high pressures.

Leak-free and safe in operation (2)
With a hermetically sealed operating chamber, there is zero emission, and valve operation cannot be impaired by particles from packing abrasion. There is no contact between the fluid metered and the atmosphere.

Reliable, service-free
Metal diaphragms are designed for fatigue-free operation. The displacer pistons are packless, and operate under optimal lubricating conditions in hydraulic oil (3).

Accurate
Zero play drive units with precision stroke length adjustment, the rapid displacer piston acceleration of the solenoid drive, and valves (4) of optimal design and material selection, combine to guarantee excellent metering accuracy.

For a complete range of accessories for LEWA lab metering pumps, see page 9.

Benefits of LEWA lab metering systems

Safe, reliable and precise micrometering
The metering flow is constantly measured, and deviations or transient disturbances are compensated for in the closed-loop control system. The main problem of micrometering, variations caused by contamination or vaporization in the metering fluid, are eliminated.

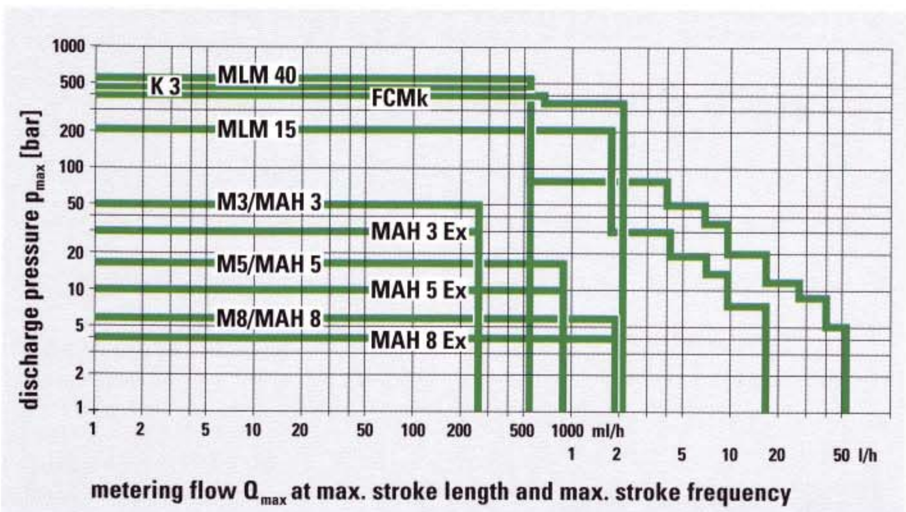
Accurately record disturbances, and annunciate failures
When a LEWA metering system with its built-in internal control system can no longer balance a disturbance or deviation, or when the control procedure is no longer plausible, an alarm is triggered.

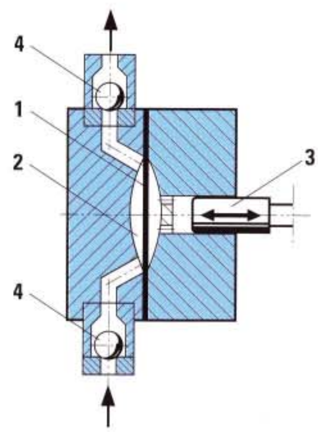
Can meter undiluted, original concentrations
The high precision and hermetically sealed design of LEWA lab metering systems often enables the elimination of carrier fluids and their associated environmental problems.

Enable fully automated experiments
Standard interfaces make it possible to integrate the micrometering system into larger systems, such as with PLC's and data recording equipment.

LEWA lab metering pumps and LEWA lab metering systems offer the highest possible degree of safety, precision and reliability in the field of micrometering.

LEWA lab metering pumps – performance range





Function of the LEWA lab diaphragm pump head

Series FCMk metering pumps

Metering pumps in two performance ranges with electric motor driver for laboratory, pilot plant, or plant.
Sturdy, precise, linearly adjustable, zero-play cam and spring drive for applications into the high pressure range. Up to 12 pumps can be multiplexed horizontally in-line.

Metering flow adjustment
A finely scaled handwheel allows adjustment of stroke length from zero to maximum.

Metering flow control/regulation
For full automation, the stroke frequency can be controlled with a variable speed driver, and/or the stroke length can be controlled with an electric stroke length actuator.

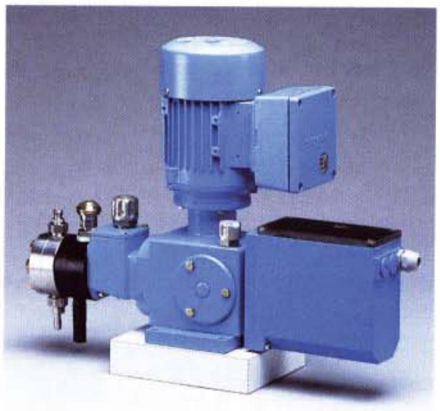
Diaphragm pumphead/material
Extremely pressure stiff, tight precision pumphead designed for high pressures and constructed of stainless steel or Hastelloy C. An internal safety system guards against overpressuring and/or mis-operation.

Precision valves
The valve seats of hardened ceramic (silicon nitride) and ball valves of ceramic oxide (Al_2O_3), seal tightly, are trouble free, and provide long service with clean fluids.
If contaminated, they can be ultrasonically cleaned and reused.

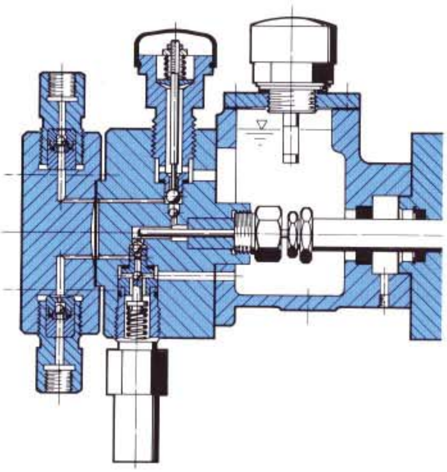
Temperature conditioning (optional)
Connections allow heating or cooling fluid to be circulated.

Sterilizable
The pumphead can be sterilized with steam for a maximum of 30 minutes at up to 150°C.

10 LEWA lab Model FCMk 3



11 LEWA lab Model FCMk with electric stroke actuator.



12 Diaphragm pumphead – sectional

Choice of adjustments
The metering flow can be adjusted by varying the stroke length, the stroke frequency, or both as follows:

Adjusting stroke frequency with a variable speed drive (e.g., inverter)
This approach is preferred with high pressures, and for wide adjustment ranges. (Can be used at up to 400 bar and for as much as a 10:1 turndown, but minimum stroking rates as well as drive characteristics must be observed.)

Adjusting stroke length with an electric stroke actuator
The allowable turndown is dependent on the pressure. For example, at 100 bar, a 10:1 range can be used, while at 400 bar a range of less than 5:1 is suggested.

Using both
A combination of both techniques is the correct approach to achieve a turndown of up to 100:1, and is especially important when metering against high pressures.

Technical data

Type	Displacement Ø [mm]	Swept Volume [ml]	Theoretical metering flow $Q_{theor.}$ [ml/h] 1) by max. stroke length and stroke frequency 26 min^{-1}	52 min^{-1}	80 min^{-1}	160 min^{-1}	Pressure p_{max} [bar]	Connections suction/discharge side
FCMk 3	3	0 - 0,0707	110	220	339	678	400	G 1/8 Female thread
FCMk 5	5	0 - 0,196	306	612	942	1885	375	G 1/8 Female thread
Pumphead material			Stainless steel CrNiMo 18/10/2 und Hastelloy C					
Safety type			IP 54					
Ex-Safety class			Dependent upon integrated elec. motor, not with elec. electric stroke actuator					
Measurements H x W x D [mm]			350 x 140 x 350					
Weight			Simplex pump: approx. 16 kg; each additional element: approx. 8 kg					

1) $Q_{theoretical}$ from swept volume – stroke frequency
$Q_{effective} = \eta \cdot Q_{theoretical}$
For a rough calculation of $Q_{effective}$ with metering fluids of average compressibility (similar to hydraulic oil) $\eta = 1 - (p/1000)$ can be used (p = pressure in bar).