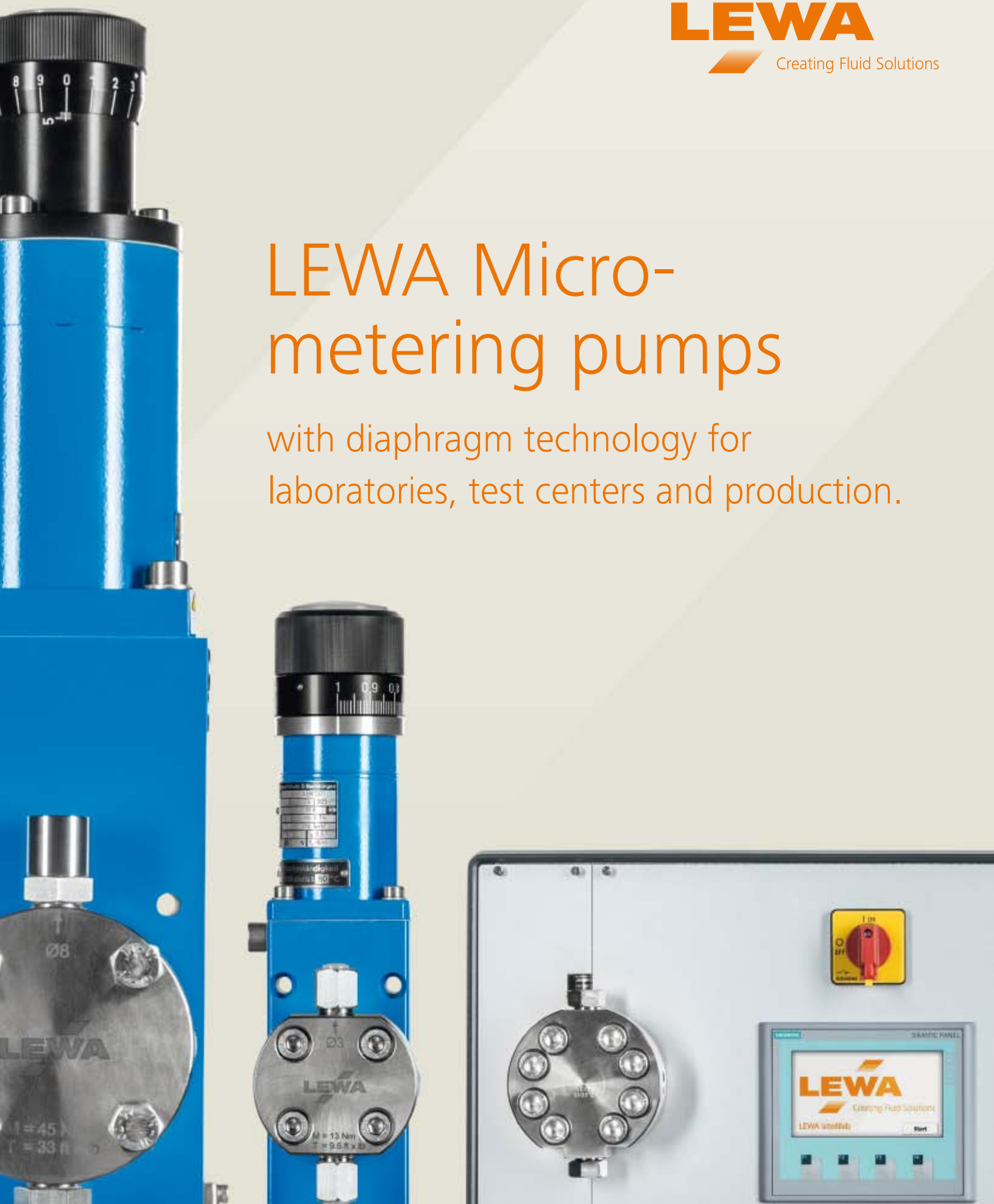
LEWA
Creating Fluid Solutions

LEWA Micro-metering pumps

with diaphragm technology for laboratories, test centers and production.



LEWA offers a comprehensive line of micro-metering pumps with diaphragm technology for metering fluids in laboratories and test centers.

This includes solenoid-driven diaphragm metering pumps covering an extensive range of applications with seven different solenoid power sizes. In addition, we offer a pump plus control system installed in a space-saving housing for your laboratory bench. The innovative LEWA intellilab is a high-pressure micro-metering pump with integrated drive and control technology. The motorized FC micro-metering pumps put the finishing touch on our portfolio. All of the models are capable of a wide variety of tasks.
Development of this product line is driven by close collaboration with users.

LEWA diaphragm pumps for the smallest metered flows.
The advantages at a glance.

1

High pressure levels
The micro-metering pumps can be used at pressure levels up to 8,120 psig. This is made possible by the hydraulic actuation of the diaphragm pump heads.

2

Leak-proof and reliable
The pump is hermetically sealed by the diaphragm's static seal, making it incredibly reliable. The metal diaphragm is absolutely impervious to leaks caused by diffusion, completely eliminating the chance of leaks from pumped fluid or hydraulic oil.

3

Precise
Drive units free of backlash with a precise stroke length setting, optimized valves and hydraulically actuated metal diaphragms ensure maximum metering accuracy.

4

Reliable
The pumps are designed for continuous operation. Hydraulic actuation allows our metal diaphragms to achieve an outstanding service life. The same applies to the displacement pistons running under optimal lubricating conditions in the hydraulic oil.

5

Resistant materials
All parts in contact with fluid are made of high-quality stainless steel or nickel alloys. This ensures the best resistance to all fluids used in laboratory settings and a long service life.

6

Global service
LEWA is a global company. Spare parts and service are quickly available throughout the world.

Application examples in laboratories and test centers.

Oil and gas industry
Metering corrosion inhibitors and anti-foaming agents

Gas odorization
Metering mercaptan or THT for adding an odor to gas

Refineries
Metering DMDS for fuel reforming

Chemical industry
Metering for high-pressure hydrogenation, high-pressure synthesis and polymerization

Plastics
Metering of binders and peroxides

Petrochemicals
Metering of conductivity enhancers

Personal care
Metering of fragrances in creme production

Pharmaceuticals and biotechnology
Metering of buffer solutions for chromatography

Energy utilities
Metering of oxygen binders

LEWA micro-metering pumps with solenoid actuator.

LEWA solenoid-driven diaphragm metering pumps from the M, MAH/MBH and MLM series cover a comprehensive range of applications with seven different solenoid power sizes.

Control systems specifically developed for this line permit adaptation to a wide variety of different tasks. They are installed in test center systems or laboratory rigs. Integration into higher-level process control systems is easy to implement. The M series consists of a pump plus control system installed in a space-saving housing for your laboratory bench.

Performance data

	M series	MAH/MBH series	MLM series
Discharge pressure	15 to 725 psig	15 to 725 psig	15 to 8,120 psig
Flow rate	0 to 0.48 gph	0 to 0.63 gph	0 to 14.53 gph

Advantages

Maximum metering accuracy (at constant basic conditions: +/- 1%)

Extremely wide control range up to 1:1000 for maximum metering flexibility

Unique, high-performance stroke solenoids tried and tested for more than 30 years

Simple operation

Absolutely odor-tight and free of leaks

Absolutely dry-run safe for maximum process safety

Ideal for clean, hazardous, toxic and viscous (max. 50 cp) fluids

Metering flow setting from 0 to the maximum using two control variables:

– Using the stroke length with finely scaled handwheel

– M series: Using the stroke frequency by means of an integrated control system. The stroke frequency can also be set externally, via analog input or using pulses. This also makes it possible to trigger individual strokes at large intervals.

– MAH/MBH and MLM series: Using the stroke frequency by means of a control system set up separately (MSG)

Compliance with typical standards such as DVGW G280

Maximum reliability and availability even after operating errors or in extreme operating states (such as high inlet pressure, closed discharge or suction line)

Low-maintenance and low-wear (we recommend routine maintenance 1x per year)

Minimum life cycle costs thanks to high energy efficiency, low maintenance costs and extremely long service life of diaphragm and process valves

Additional advantages of the M, MAH/MBH series:

Precision valves made of ceramics and ruby for outstanding leak tightness and wear resistance

Pump heads can be heated and cooled

Pump heads can be sterilized

Easy to put into operation thanks to self-venting hydraulic system

Low-noise operation thanks to integrated damping system

Options:

– Complementary control systems (MSG) for Ex or non-Ex zone
– Complementary flow meters available
– Sandwich diaphragm with diaphragm monitoring (only MLM)
– Special valves, e.g. oxide-ceramics for valve seat and ball
– Special materials, such as Hastelloy


1 09 08 07
Nm

MSG control system for micro-metering pumps with solenoid actuator.

MSG solenoid-driven pump control system

Inexpensive solution specifically developed for the MAH/MBH and MLM series

Can be used as internal and external control system:

– The drive solenoid is controlled by the integrated stroke frequency generator with linear setting characteristic curve
– An external standard analog signal from 0 or 4 to 20 mA is used for control
– Passive external pulses are used for control

Stroke length setting with linear characteristic curve enables customized optimization of stroke volume and stroke frequency

The external inputs enable integration of the pumps into higher-level control loops or proportional coupling with external reference variables. The stroke length setting is then used as an additional ratio setter

Optionally for switch panel-mounting, workbench housing or as plug-in unit for 19” installation frame

LEWA intellilab high-pressure micro-metering pump.

LEWA intellilab is a high-pressure micro-metering pump with integrated drive and control technology.
It is designed specifically for applications in high-pressure laboratories where new small-scale process technologies are developed and verified. Its strength lies in the hermetically sealed metering of critical and toxic fluids.

LEWA intellilab performance data	
Discharge pressure	145 to 7,250 psig
Flow rate	0.0026 to 0.1321 gph

Advantages

Extremely precise thanks to:
– Automatic adjustment to operating pressure and compressibility
– Hydraulically actuated diaphragm pump head with optimized efficiency
– Diffusion-resistant metal diaphragm

Compact design in workbench housing

Proven pump technology with the latest LEWA intellidrive drive and control technology for highly dynamic regulation of the angular speed during ongoing operation

Metered flow profiles can be programmed and run later

Touch panel for intuitive operability and straightforward evaluation


FLOW
LEWA

LEWA FC micro-metering pumps.

The FC micro-metering pump was developed specifically for laboratories and test centers.

The motorized pump meets the highest demands for accuracy, reproducibility, cleanliness and adjustment range. Multiple pump heads and drives can also be combined as desired to form multiplex pumps.

FC series performance data	
Discharge pressure	Piston pump head: max. 2,320 psig
	Diaphragm pump head: max. 5,800 psig
Flow rate	Piston pump head: 0 to 17.17 gph
	Diaphragm pump head: 0 to 0.40 gph

Advantages

- High metering accuracy of +/- 1%
- Beneficial drive unit kinematics (cam and spring drive) for the smallest metered flows
- Wider adjustment range with consistently high efficiency and rigid compression curve
- Control system and monitoring electronics tuned to the respective application
- Accurately operating drive units with an electric drive and a plunger spring return that is friction-locking and absolutely free of play
- Oil lubrication of all moving parts, with protection from severe weather and splash water
- Low-noise, ideal for laboratory work
- Can be sterilized
- Pressure relief valve integrated into the diaphragm design
- Superior metal diaphragm technology, hermetically sealed and resistant to excess pressure
- Dry-run safe and featuring diaphragm design free of dynamic seals

Pump heads

Type	Pressure	Flow rate	Temperature	Viscosity
M213	5,800 psig	0 - 0.40 gph	-22.0/+248.0 °F	50 mPa·s
K110	2,320 psig	0 - 17.17 gph	-94.0/+752.0 °F	1,000 mPa·s

Options:

Available with piston or diaphragm design

Multiplex capability

As a single drive unit or multiplex drive unit with space-saving vertically attached motor

Multiplex drive units with identical output can be combined
(for pulsation reduction or recipe metering, for example)

Ex-protected design

Heating/cooling jacket

Special coatings

Complete control system/regulation product line, suitable for PLC integration

Assortment of material and valve variants

Electrical and pneumatic stroke adjustment

Comprehensive documentation, testing protocols, pressure samples, pump diagrams and approvals

Accessories and technical data.

Accessories for micro-metering pumps

– Filter with gas trap
  – Ideal for metered flows of up to 0.53 gph
  – Separates out suction-side contaminants and gas
– Pressure retaining valves with startup venting (for MAH/MBH and M series)
  – Prevents excessive pumping
  – Enables venting of the pump head during startup
  – Required if the operating pressure is 15 psig above the suction pressure
– KMM1 micro flow meter for measuring flow rate

M series technical data

Pump type		M3	M5	M8
Metered flow	Q [gph]	0 to 0.0660	0 to 0.1849	0 to 0.4755
Operating pressure	$p_D$min [psig]	15	15	15
	$p_D$max [psig]	725	232	87
Intake pressure	$p_s$min [psig abs.]	15	15	15
	$p_s$max [psig]	363	218	73
Stroke volume at full stroke	[ml]	0.022	0.063	0.16
Stroke frequency	[rpm]	0 to 185		
Metering accuracy at constant basic conditions		+/- 0.5 to 1%		

Material in contact with fluid

	Standard	Hastelloy C
Diaphragm body	1.4571	2.4610
Diaphragm	1.4401 K	2.4610 K
Valve seats	Al_2O_3 (OK1)	
Valve balls	Ruby	
Valve seals	PTFE, filled	
Valve springs	1.4571	2.4610

Temperature limits

Fluid temperature	+50.0 °F to +176.0 °F
Heating medium temperature	+212.0 °F max
Sterilization temperature	+302.0 °F for 30 min

Connections

Suction/discharge side	ISO 228 G 1/8
Heating/Cooling	ISO 228 G 1/8
Housing flushing (device rear side)	6 mm (0.24") ID hose connection. for flushing with inert gas (0.29 psig max)
Power connection (Schuko plug)	230 V/50 Hz/25 W max

External activation signals

Analog	0/4 to 20 mA, 250 ohm load
Digital	Frequency of 0 to 185/min Passive contactor
Degree of protection	IP 40
Housing dimensions	H x W x D [inch]: 10.71 x 5.79 x 10.31

Accessories included:

1 m PTFE suction line with screwed fitting
1 set of valve seals
2 valve springs Δp = 1.5 psig
1 power cable

MAH, MAH Ex, MBH Ex technical data

Pump type		MAH 3	MAH 3 Ex	MAH 5	MAH 5 Ex	MAH 8	MAH 8 Ex	MBH 8 Ex	MBH 10 Ex
Metered flow	Q [gph]	0 to 0.05		0 to 0.16		0 to 0.42		0 to 0.45	0 to 0.63
Operating pressure	$p_D$min [psig]	15		15		15		15	15
	$p_D$max [psig]	725	435	232	145	87	58	725	580
Intake pressure	$p_S$min [psig abs.]	15		15		15		15	15
	$p_S$max [psig]	363		218	131	73	44	290	290
Stroke volume (can be set using handwheel)	[ml]	0 to 0.022		0 to 0.063		0 to 0.160		0 to 0.251	0 to 0.392
Stroke frequency (controlled externally)	[rpm]	0 to 185						0 to 130	0 to 130
Metering accuracy at constant basic conditions		+/- 0.5 to 1%						+/- 1%	+/- 1%

Material in contact with fluid	For material variants	Stainless steel	Hastelloy	Stainless steel	Stainless steel
Diaphragm body		1.4571	2.4610	1.4571	—
Diaphragm		1.4401 K	3.4610 K	1.4401K	—
Valve seats		Al_2O_3	Al_2O_3	1.4571	—
Valve balls		Ruby (Al_2O_3)	Ruby (Al_2O_3)	OK1	OK1
Valve seals		PTFE, filled	PTFE, filled	PTFE, filled	PTFE, filled
Valve springs (only as needed)		1.4571	2.4610	1.4571	—
Temperature limits	Fluid temperature	+50.0 to +176.0 °F		+50.0 to +176.0 °F	+50.0 to +176.0 °F
	Heating medium temperature	+212.0 °F max		+212.0 °F max	+212.0 °F max
	Sterilization temperature	+302.0 °F for 30 min		—	—
Connections	Suction/discharge side	ISO 228 G 1/8		ISO 228 G 3/8	ISO 228 G 3/8
	Heating/Cooling	ISO 228 G 1/8		ISO 228 G 1/8	ISO 228 G 1/8
Degree of protection		IP 55		IP 55	IP 55
Ex protection class		II 2G c IIC T1-T4		II 2G c IIC T1-T4	II 2G c IIC T1-T4
Dimensions	H x W x D [inch]	10.63 x 4.41 x 4.06		20.08 x 6.14 x 6.50	20.08 x 6.14 x 6.50
Weights	[lbs]	MAH 3 (Ex): 9; MAH 5 (Ex): 10; MAH 8 (Ex): 10		44 - 49	44 - 49
Associated control system		Type MSG		—	—

Installation dimensions

	L in inch	W in inch	ΔW in inch	H in inch
MAH size 3	4.02	2.76	4.33	10.24
MAH size 5	4.02	3.15	4.72	10.24
MAH size 8	4.02	3.15	4.72	10.24
MBH size 8 Ex	6.10	4.72	7.68	20.08
MBH size 10 Ex	6.10	4.72	7.68	20.08

MLM Ex technical data

Pump type				MLM 15 Ex	MLM 40 Ex
			Head type	M210	M210
			Material *3	3/3L/4	3/3L/4
Piston diameter [inch]	Adjustable stroke volume [ml]	Metered flow *1 at max. 90 strokes/min Q_{theor} [l/h] / (gph)		Operating pressure p_D max [psig]*2	
0.12	0-0.106	0-0.57/(0-0.15)		3,070	8,120
0.20	0-0.294	0-1.59/(0-0.42)		1.100	2,970
0.31	0-0.754	0-4.07/(0-1.08)		435	1,160
0.39	0-1.18	0-6.36/(0-1.68)		276	740
0.47	0-1.70	0-9.16/(0-2.42)		189	508
0.63	0-3.02	0-16.3/(0-4.31)		109	290
0.79	0-4.71	0-25.4/(0-6.71)		—	189
0.98	0-7.36	0-39.7/(0-10.49)		—	119
1.18	0-10.6	0-55.0/(0-14.53)		—	83
Degree of protection				IP 55	
Ex protection class				II 2G c IIC T1-T4	II 2G c IIC T1-T4
H x W x D dimensions [inch]				9.06 x 11.42 x 12.83	9.06 x 11.42 x 15.51
Weights [lbs]				51 - 55	51 - 71

*1 Q_{theor} consisting of stroke volume x stroke frequency
Q_{eff} is provided in the design data sheet

*2 Standard pump head connections:
Internal thread in accordance with DIN or NPT
On request: Flange in accordance with DIN, IG, ANSI or BS, dairy pipe fittings or other

*3 Available material variants:
3 = CrNiMo 18/10/2 stainless steel
3L = food-safe design
4 = Hastelloy C
Additional materials on request, such as tantalum, nickel, Hastelloy B, titanium

MLM 15 Ex and MLM 40 Ex installation dimensions

	L in inch	W in inch	H in inch
Size 3	17.72	5.51	10.24
Size 20	17.72	7.09	10.24

Control systems

Control system		MSG 60	Isolating switch unit	Thermistor triggering device
Connection value		230V AC/17 VA 115V AC/17 VA	20 - 250V UC/3W	24 - 240V UCw/2W
Control circuit	Digital input	Floating contact or optocoupler Infeed voltage: 8V DC Current load: 8 mA	Intrinsically safe for MLM proximity switch [Ex ia Ga] IIC [Ex ia Da] IIIC	Infeed for MLM40 thermistor [Ex] II (2) G [Ex] II (2) GD
	Analog input (12-bit resolution)	0/4 - 20 mA Input resistance: 125 ohms	TÜV 04 ATEX 2553	PTB 01 ATEX 3218
	MLM proximity switch	Infeed voltage: approx. 15V DC	Max. infeed voltage: 9.6V DC Max. infeed current: 11 mA	Max. infeed voltage: 2V DC Max. infeed current: 1 mA
	MLM40 PTC sensor			
Output	Power output for solenoid-driven pump	196V DC (at supply of 230V AC) 98V DC (at supply of 115V AC) 24V DC (at supply of 24V DC)	(internally for MSG 60)	(internally for MSG 60)
Temperature range		0 to +140.0 °F (non-condensing)	-4.0 to +158.0 °F (non-condensing)	-4.0 to +140.0 °F (non-condensing)
Design		3.94 x 6.30″ Eurocard; 3 RU	4.09 x 0.71 x 4.33″ attached enclosure	4.09 x 0.89 x 4.33″ attached enclosure
Housing H x W x D	19″ assembly rack 3 RU, 84 HP	5.22 x 19.02 x 9.45″	Installed into 19″ assembly rack	Installed into 19″ assembly rack
	Workbench housing	5.51 x 6.69 x 9.45″	—	—
	CC5000 wall housing	9.33 x 8.15 x 9.29″	Installed into CC5000 wall housing	—
	CC7000 wall housing	9.33 x 13.94 x 9.29″	Installed into CC7000 wall housing	Installed into CC7000 wall housing

LEWA intellilab technical data

Metered flow		[gph]	0.0026 - 0.1321
Metered flow pre-selection	Local operation		From 0.0026 - 0.1321 gph
	Profile		9 programmable metering segments, from 30 seconds to 10 h long per segment
	External activation		4 - 20 mA; 3 different measuring ranges for optimally adjusting the reference signal to the flow rate range
Metered flow deviation			< +/- 3 %
Max. operating pressure		[psig]	7,250
Min. required operating pressure (automatic mode)		[psig]	145
Max. permitted suction pressure		[psig]	363
Min. required suction pressure		[psig abs]	15
Pressure limits			Automatic, freely configurable pressure shutoff
Material in contact with fluid	Diaphragm body		2.4610
	Metal diaphragm		2.4610 k
	Valve seats		SiN
	Valve balls		Ruby
	Valve seals		Gylon
	Valve springs		2.4610 FH
Connections	Suction/discharge side		G 1/8"
	Heating/Cooling		G 1/8"
Temperature limits	Fluid temperature	[°F]	176.0
	Heating medium temperature	[°F]	212.0
Housing dimensions	L x W x H	[inch]	15.94 x 18.90 x 11.81
Weight		[lbs]	75
Degree of protection			IP 20
Power connection			230 V/50 Hz; 16 amp. termination
Accessories included			Cable set for data exchange (3 m) Operating manual

Installation dimensions

	L in inch	W in inch	H in inch
LEWA intellilab	15.94	18.90	11.81

FC series performance overview

Standard piston diameter [inch]	Q_{theor} [l/h]/(gph) *1 Theoretical metered flow for each pump head at maximum stroke length and stroke frequency n [rpm] *2				Permitted operating pressure of available standard pump heads p [psig of excess pressure] *5		
					Type	Piston pump heads	Diaphragm pump heads
					Type *4	K 110/K 111	M 213
	n = 26	n = 52	n = 80	n = 160	Material *3	2, 3, 3L	3, 4
0.12	0.110 / (0.03)	0.220 / (0.06)	0.339 / (0.09)	0.678 / (0.09)		2,320	5,800
0.20	0.306 / (0.08)	0.612 / (0.16)	0.942 / (0.25)	1.885 / (0.50)		2,320	5,430
0.31	0.784 / (0.21)	1.568 / (0.41)	2.413 / (0.64)	4.825 / (1.27)		2,320	—
0.39	1.225 / (0.32)	2.450 / (0.65)	3.770 / (1.00)	7.540 / (1.99)		1,480	—
0.47	1.764 / (0.47)	3.528 / (0.93)	5.429 / (1.43)	10.86 / (2.87)		1,030	—
0.63	3.136 / (0.83)	6.27 / (1.66)	9.65 / (2.55)	19.30 / (5.10)		580	—
0.79	4.901 / (1.29)	9.80 / (2.59)	15.08 / (3.98)	30.16 / (7.97)		363	—
0.98	7.65 / (2.02)	15.31 / (4.04)	23.56 / (6.22)	47.12 / (6.22)		232	—
1.18	11.03 / (2.91)	22.05 / (5.82)	33.93 / (8.96)	67.86 / (17.93)		160	—

*1 Q_{theor} consisting of stroke volume x stroke frequency
Q_{eff} is listed on the specification sheet
For multiplex pumps, multiply the total metered flow by the number of pump heads to determine the value

*2 Stroke frequencies available at 50 Hz: n = **26, 43, 52, 80, 143, 160** rpm

*3 2 = 13% Cr steel; 3 = CrNiMo 18/10/2 stainless steel
3L = food-safe design; 4 = Hastelloy C
Additional materials on request, such as tantalum, nickel, titanium, Hastelloy B, PTFE carbon

*4 Standard pump head connections: Internal thread in accordance with DIN and NPT
On request: Flange in accordance with DIN, ANSI or BS,
dairy pipe fittings or other

*5 Permitted inlet pressure on request

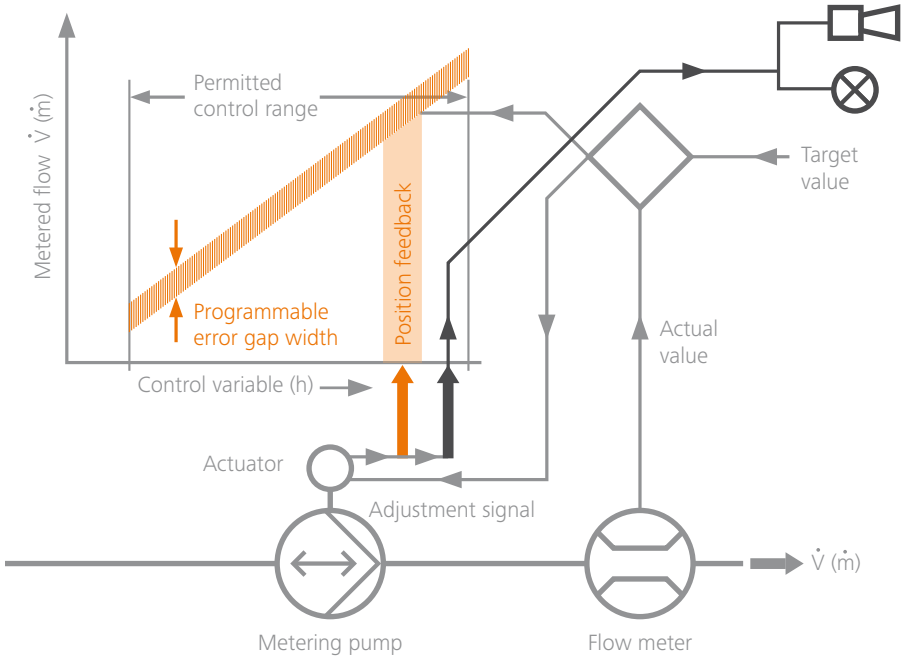
Installation dimensions

	L in inch	W in inch	ΔW in inch	H in inch
FC size 1	14.76	6.46	4.72	15.75
FC size 3	14.76	12.80	11.69	15.87

Integration into systems.

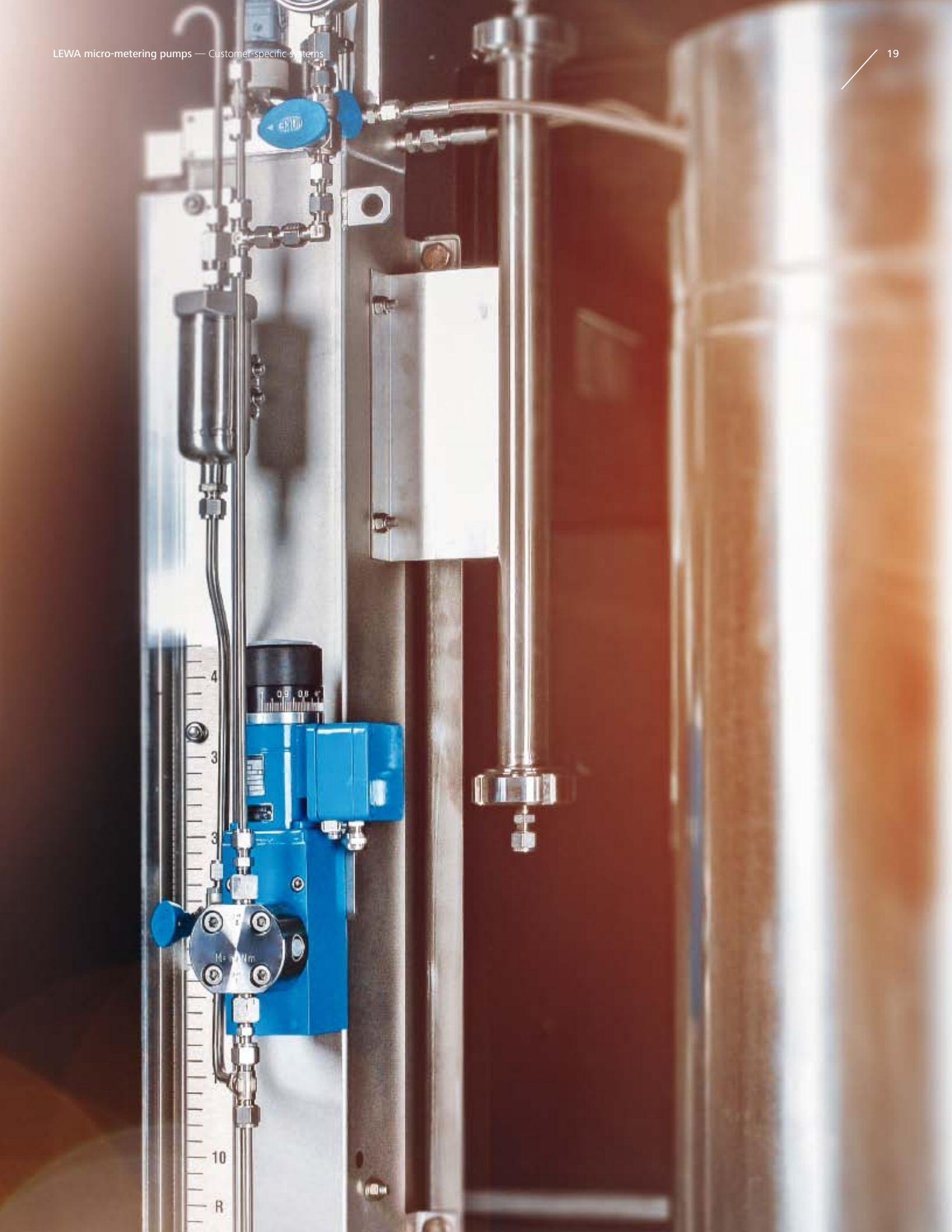
LEWA also offers solutions that go beyond individual micro-metering pumps.
We have been building customized metering systems for decades. Our service ranges from engineering to commissioning – including individualized system control, process display, production data acquisition and external interfacing to the process control system.

We guarantee optimal implementation of your requirements thanks to our knowledge and skills in smart process control and the control and regulation technology it requires. Professional input into the selection and combination of the system components and their features provide the foundation.



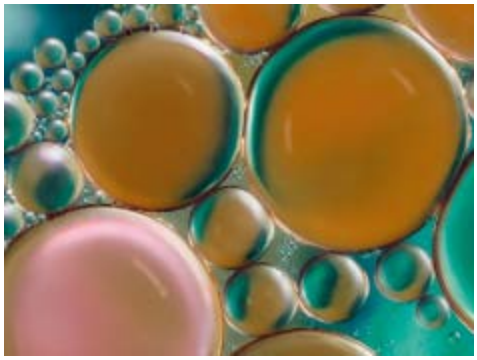
LEWA metering systems for laboratories and test centers offer you:

- Design according to customer requirements
- Safe LEWA micro-metering pumps with metal diaphragm free of leaks
- With or without Ex protection
- Long-term metering accuracy better than +/- 0.5%
- Measurement of effective metered flow
- Regulation of the metered flow in a closed control loop
- Controller for LEWA smart control
- Automatic stabilization of fluctuating operating conditions
- Automatic fault reporting
- Integration into higher-level process control systems



Creating Fluid Solutions.
For more value created.

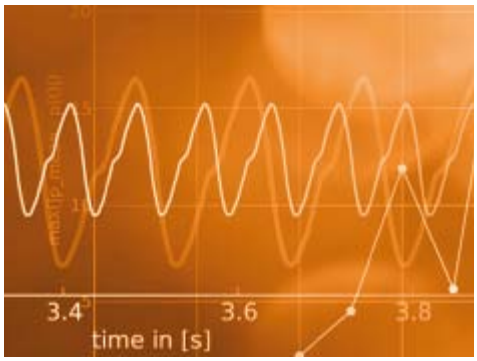
Technical consulting



Fluid and process engineering tests

Lifecycle concepts and energy optimization

Process automation

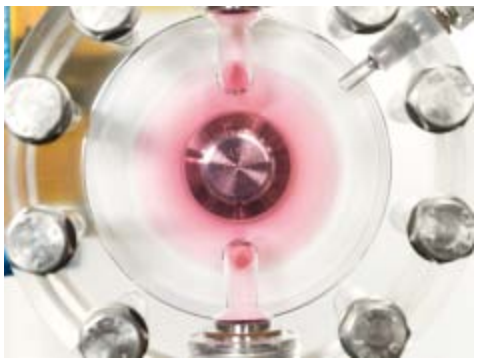


Pulsation studies and pipeline calculations

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.

LEWA
Creating Fluid Solutions

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