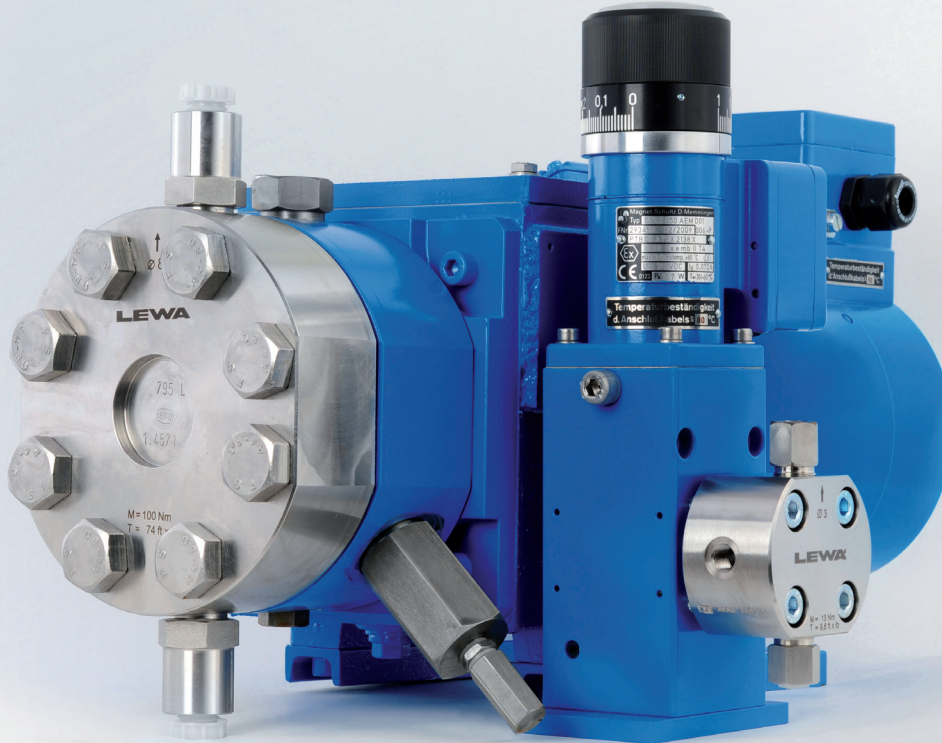


LEWA MICROFLOW-METERING PUMPS: SOLENOID OPERATED DIAPHRAGM PUMPS



- zero leakage, low maintenance
- exact, reliable
- from 5 ml/h to 40 l/h
- pressures up to 560 bar
- analogous or pulse controlled

Solenoid operated diaphragm metering pumps are a very economical solution for metering a liquid component proportionally to a variable command signal. The metering flow follows the command signal via the stroke frequency of the solenoid drive in a very wide adjustment range. In addition, the metered flow can be adapted to the requirements by adjusting the stroke length manually (ratio setter).

LEWA solenoid operated diaphragm metering pumps, with five different performance sizes, cover a broad range of application. The smaller pump types are also available with non-explosion proof solenoids. These can operate against higher pressure.

Adaption to different applications is possible by the two controls especially developed for this programme.

Typical applications:

- Proportional addition of fluids into variable main streams, e.g. inline blending, natural gas odorizing, injection of additives
- Control of physical property values of main streams or high volumes with proper mixing in main control circuits, e.g. dyeing, viscosity, pH-value

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Sound pump technology for hazardous areas

Precisely working drive elements

All drive elements operate with solenoid drive and free of play spring return. The hydraulic damping results in quiet operation. The finely scaled, linear stroke adjustment, as second variable, facilitates the exact setting of the metered flow and can be utilized to expand the adjustment range downwards and as ratio setter.

Safely dimensioned drive solenoids

The drive solenoids are built for continuous operation and low-maintenance. They are built according to EExellT4 and come with a certificate of conformity.

Superior metal diaphragm technology

This principle of the hydraulically coupled metal diaphragm represents the state-of-the-art for metering, especially for low flow rates.

Advantages:

- Leakage to the outside and air contact of the fluid metered are impossible. The impermeable metal diaphragm seals the fluid hermetically against the atmosphere and the hydraulic displacer system
- Stuffing box problems simply don't exist. Compared with plunger pumps the displacer system operates free of wear and maintenance in hydraulic oil
- The hydraulic actuation is very pressure stable, that is the pressure's influence on the metered flow is minimal

Heatable or coolable

All MAH and MBH pump heads have connections to pass through coolant or heat transfer fluid on the sides; for MLM pump heads available on request.

High precision valves

The lower the metered flow, the more important is the tightness of the valves. Smaller MAH pump types are therefore equipped with precision valves of ceramic and ruby. Their high resistance to deformation, to wear and tightness allow to meter low flow rates at high accuracy and reproducibility.

Comment: The metering of contaminated fluids or suspensions at low flow rates is not possible. We recommend to install a micro filter at the inlet. When metering higher flow rates with MLM types, the metering of suspensions is possible within limits. For this kindly inquire, stating exact details.

...and matching controls outside of the hazardous area

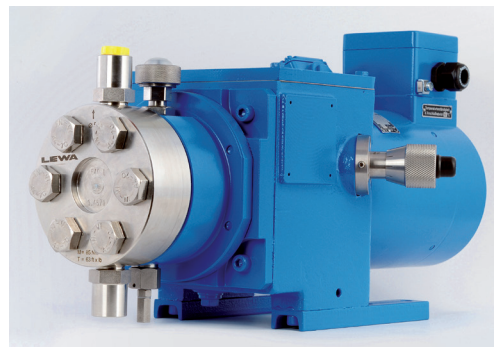
Solenoid pump control MSG for pump types MAH, MAH Ex and MBH

The economical solution was especially developed for the smaller MAH pump types. It offers all possibilities for an internal and remote control. The linear stroke length adjustment available, facilitates the optimization of stroke volume and stroke frequency to the respective application.

"Internal" control: The drive solenoid is controlled by the internal stroke frequency generator with linear characteristic.

"Remote" analogous control: The pump is controlled remotely by a standard analogous signal of 0 or 4-20 mA (switchable).

"Remote" pulse control: The pump is controlled by passive remote pulses (1 pulse = 1 stroke).



MLM 15 (explosion proof)



Control MSG in desktop design

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Via the remote inputs the MAH pumps can be integrated into main control circuits or proportionally coupled to remote command signals. The stroke length adjustment can be utilized as additional ratio setter.

The front panel contains all controls and LED display elements:

- Master switch with LED display "operation"
- Selector switch "Remote/Internal"
- Desired value potentiometer for the stroke frequency produced internally
- LED display of pump stroke

The control is available either for instrument panels, in desktop design or as 19" rack system.



MAH 5 and MAH 3 (explosion proof)

Reliable control of the metering pump proportional to the gas flow

Control of LEWA solenoid operated pumps with control OLK comprises the following technical possibilities:

- Standard power supply 230 VAC or 24 VDC (for emergency operation)
- Power output for the solenoid pump ~200 VDC at 230 VAC power supply or 24 VDC at 24 VDC power supply
- Two pulse inputs which can be added
- Input pulses can be divided or multiplied in the range of 1 to 100
- Simple balancing of the 0/4-20 mA analog signal from the converter, the pump's stroke duration and the generator's processing frequency. During balancing, the corresponding values are shown in the display
- The signal "common alarm" is issued via a voltage free relay contact
- External reset input

Input card ExOT7 for MLM

This card feeds the OLK control circuits for solenoid shut-off of the MLM pump according to class Ex(i).

Applications:

- Intrinsically safe supply of all input contacts required
- Assembly with 4 or 8 Ex inputs

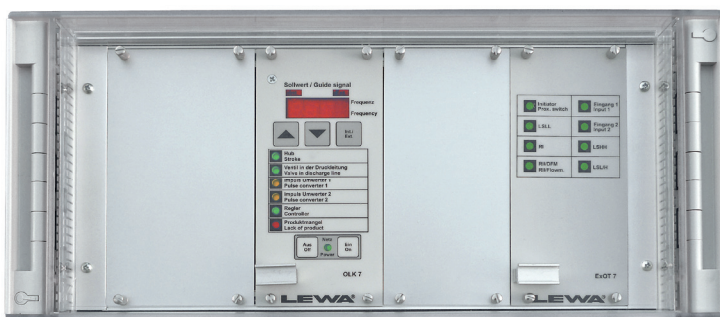
Ex inputs are:

- Proximity switch on metering pump
- Lack of product in reserve tank
- Reed contacts at the micro flow meter
- Others as required

The front panel contains LED indications for the input circuits' operating condition. The input board is available either in plug-in design for the wall mountable housing of the OLK control or in 19" rack design.



Solenoid operated metering pump MBH



Control OLK for wall mounting (ExOT 7 only for MLM)

LEWA MICROFLOW-METERING PUMPS: SOLENOID OPERATED DIAPHRAGM PUMPS

Performances MAH, MLM, MBH

Technical data MAH, MAH Ex, MBH

| Pump type | MAH 3 | MAH 3 Ex | MAH 5 | MAH 5 Ex | MAH 8 | MAH 8 Ex | MBH 8 | MBH 10 |
|----------------------------------------------------------------------------------|---------------|----------|------------|----------|------------|----------|------------|------------|
| Metering flow Q [l/h] | 0 to 0,2 | | 0 to 0,6 | | 0 to 1,6 | | 0 to 1,7 | 0 to 2,4 |
| Operating pressure p _D min [bar] | 1,0 | | 1,0 | | 1,0 | | 1,0 | 1,0 |
| p _D max [bar] | 50 | 30 | 16 | 10 | 6 | 4 | 50 | 40 |
| Suction pressure p _S min [bar abs.] | 1,0 | | 1,0 | | 1,0 | | 1,0 | 1,0 |
| p _S max [bar] | 25 | | 15 | 9 | 5 | 3 | 20 | 20 |
| Stroke volume (adjustable at front-side handwheel) [ml] | 0 to 0,022 | | 0 to 0,063 | | 0 to 0,160 | | 0 to 0,251 | 0 to 0,392 |
| Stroke frequency (external and local manual control) [min ⁻¹] | 0 to 185 | | | | | | 0 to 130 | 0 to 130 |
| Metering accuracy at constant ambient conditions | +/- 0,5 to 1% | | | | | | +/-1% | +/-1% |

| Wetted materials | for material selection | Stainless steel | Hastelloy | Stainless steel | Stainless steel |
|-------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------|-----------------------------------|-----------------------------------|
| Diaphragm pump body | | 1.4571 | 2.4610 | 14571 | = |
| Diaphragm | | 1.4401 K | 3.4610 K | 1.4401K | = |
| Valve seats | | Al ₂ O ₃ | Al ₂ O ₃ | 1.4571 | = |
| Valve balls | | ruby (Al ₂ O ₃) | ruby (Al ₂ O ₃) | OK1 | OK1 |
| Valve seals | | PTFE, filled | PTFE, filled | PTFE, filled | PTFE, filled |
| Valve springs (only when necessary) | | 1.4571 | 2.4610 | 1.4571 | = |
| Temperature limits | Fluid temperature Heat transfer fluid temperature Sterilization temperature | +10 to +80°C +100°C max +150°C over 30 min | | +10 to +80°C +100°C max --- | +10 to +80°C +100°C max --- |
| Connections | Suction/discharge side Heating/cooling | ISO 228 G 1/8 ISO 228 G 1/8 | | ISO 228 G 3/8 ISO 228 G 1/8 | ISO 228 G 3/8 ISO 228 G 1/8 |
| Enclosure | | 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 [mm] | 270 x 112 x 103 | | 510x156x165 | 510x156x165 |
| Weights | [kg] | MAH 3 (Ex): 4,0; MAH 5 (Ex): 4,4; MAH 8 (Ex): 4,4 | | 20 - 22 | 20 - 22 |
| Control system | | Types MSG or OLK | | = | = |

Technical data MLM

| Pump type | | | MLM 15 | MLM 40 | |
|----------------------------------|------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------|-------------------|--------|
| Plunger diameter [mm] | Swept volume adjustable [ml] | Metering flow ¹⁾ at max. 90 strokes/min Q _{theor} [l/h] | Head type | M210 | M210 |
| | | | Material ³⁾ | 3/3L/4 | 3/3L/4 |
| | | | Operating pressure p _D max [bar] ²⁾ | | |
| 3 | 0-0,106 | 0-0,57 | 212 | 560 | |
| 5 | 0-0,294 | 0-1,59 | 76 | 205 | |
| 8 | 0-0,754 | 0-4,07 | 30 | 80 | |
| 10 | 0-1,18 | 0-6,36 | 19 | 51 | |
| 12 | 0-1,70 | 0-9,16 | 13 | 35 | |
| 16 | 0-3,02 | 0-16,3 | 7,5 | 20 | |
| 20 | 0-4,71 | 0-25,4 | - | 13 | |
| 25 | 0-7,36 | 0-39,7 | - | 8,2 | |
| 30 | 0-10,6 | 0-57,5 | - | 5,7 | |
| Enclosure | | | IP 55 | | |
| Ex protection | | | II 2G c IIC T1-T4 | II 2G c IIC T1-T4 | |
| Dimensions H x W x D [mm] | | | 230 x 290 x 326 | 230 x 290 x 394 | |
| Weights [kg] | | | 23-25 | 23-32 | |

1) Q_{theor}, swept volume x stroke frequency
Q_{eff} will be stated on data sheet for operating conditions

2) Based on standard DIN or NPT femal threaded pump head connections. DIN, IG, ANSI or BS flanged or sanitary (tri-clamp) connections also available

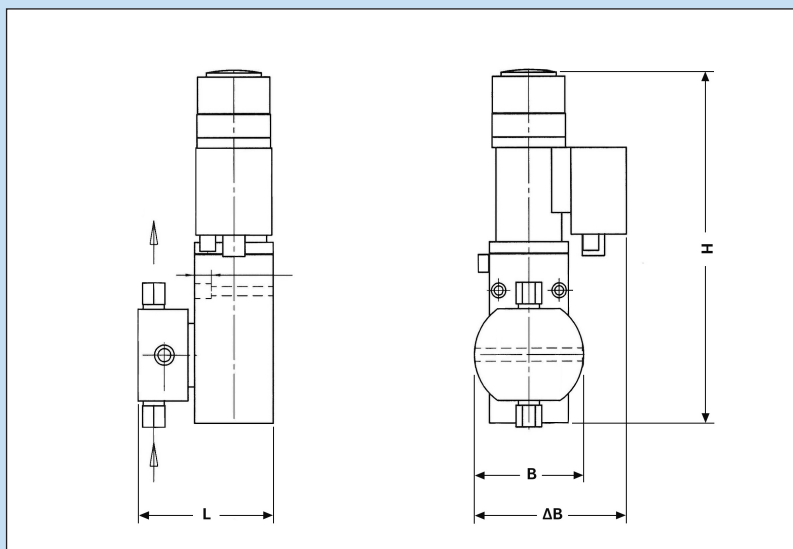
3) 3 = CrNiMo 18/10/2 stainless steel (1,4571)
3L = sanitary design
4 = Hastelloy C
additional metallurgies, e.g. tantalum, nickel, Hastelloy B, titanium also available

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Performance overview

| Control/input board | | MSG 5 | MSG 6 | OLK 7 | OLK 7 | ExOT 7 |
|---------------------|------------------------------------------------------------------------------|-----------------------------------------|-----------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supply | | 230 V/50 Hz/10VA | 230 V/50 Hz/10VA | 230 V/50 Hz/10 VA | 24V DC | 24 V DC /2,5 W |
| Control circuit | E1: potential-free contact supply voltage input resistance | 8 V DC/8 mA 1 kOhm | 8 V DC/8 mA 1 kOhm | 24 V DC/12 mA 2 kOhm | 24 V DC/12 mA 2 kOhm | E1 to E4: 8 V to form a NAMUR circuit, intr. safe (EExia) IIC, PTB 00 ATEX 2210 no-load voltage U0maxDC 12, 7 V; short-circuit current IKmaxDC 21 mA |
| | E2: E3: E4: E5: E6: | - - - - | - - - - | as E1 as E1 as E1 as E1 or prox. switch to NAMUR | as E1 as E1 as E1 as E1 or prox. switch to NAMUR | |
| | E7: analog input load | | | 0/4-20 mA 150 Ohm | 0/4-20 mA 150 Ohm | |
| | Outputs | A1: A2: | 180 V DC/0,5 A - | 180 V DC/0,5 A - | 200 V DC/max. 1,0 A 230 V/50 Hz/0,1 A | |
| | A3: relay output potential-free (contact capacity) A4: relay output | - - | - - | 230 V/50 Hz/1 A or 24 V DC/1 A as A3 | 230 V/50 Hz/1 A or 24 V DC/1 A as A3 | (internal) |
| Temperature range | | 0-60°C | 0-60°C | 5-50°C | 5-50°C | 0-60°C |
| 19" rack system | | Europe size p.c.b.'s 100 x 160 mm, 3 HE | | | | |
| | width | 20 HP | 12 HP | 12 HP | 12 HP | 11 HP |
| | plug connection DIN EN 60603 (previously DIN 41612) | design D | design D | 2 pieces design D | 2 pieces design D | design F48 |
| Desktop unit | H x W x D mm | 140 x 170 x 240 | - | - | - | - |

Type MAH



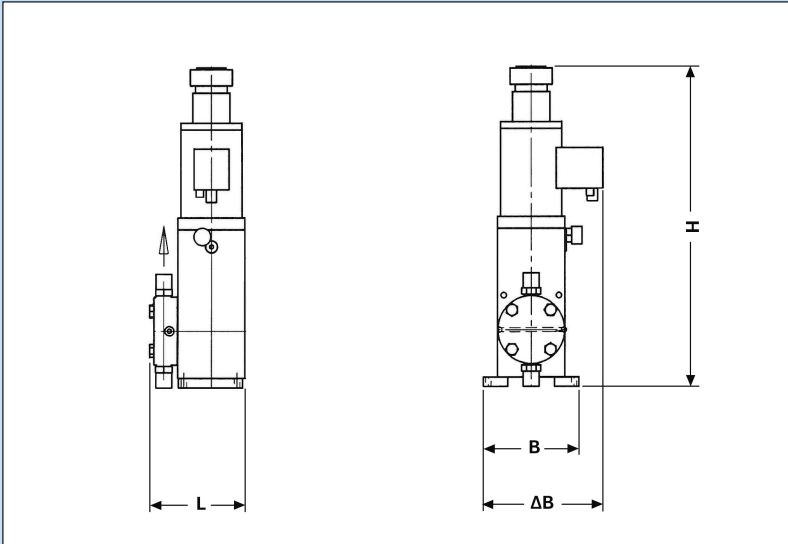
Assembly dimensions:

| Type MAH | L | B | ΔB | H |
|----------|------|------|------|------|
| | [mm] | [mm] | [mm] | [mm] |

| | | | | |
|---------------|-----|----|-----|-----|
| Size 3 | 102 | 70 | 110 | 260 |
| Size 5 | 102 | 80 | 120 | 260 |
| Size 8 | 102 | 80 | 120 | 260 |

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Type MBH

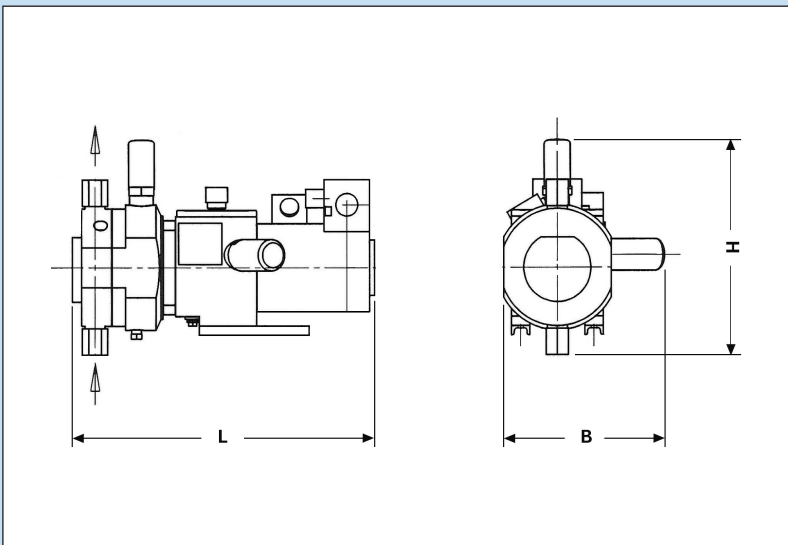


Assembly dimensions:

| Type MBH | L | B | ΔB | H |
|----------|------|------|------|------|
| | [mm] | [mm] | [mm] | [mm] |

| | | | | |
|----------------|-----|-----|-----|-----|
| Size 8 | 155 | 120 | 195 | 510 |
| Size 10 | 155 | 120 | 195 | 510 |

Type MLM 15 and MLM 40



Assembly dimensions:

| Type MLM | L | B | H |
|----------|------|------|------|
| | [mm] | [mm] | [mm] |

| | | | |
|----------------|-----|-----|-----|
| Size 3 | 450 | 140 | 260 |
| Size 20 | 450 | 180 | 260 |

The dimensions differ depending on the pump head fitted.