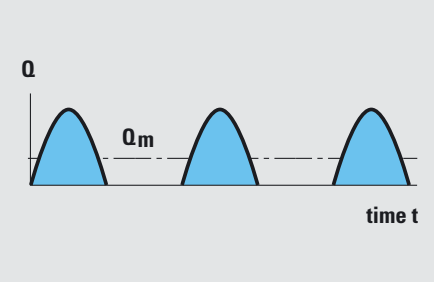
Information concerning the installation of LEWA ecodos® metering pumps.

Reciprocating positive displacement pumps produce a pulsating output. The metered fluid in the pipeline is accelerated to the maximum velocity and then decelerated to standstill again during each stroke.
For single cylinder pumps this velocity is 3,2 times as high as for a pump with identical, but continuous, output Q_m (see fig. 1).

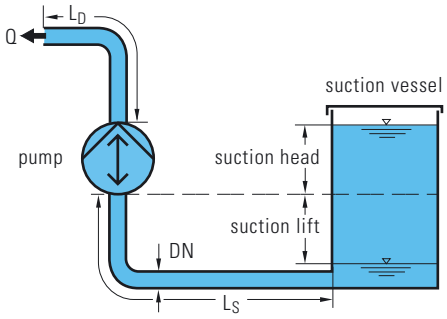


1 Output characteristics for a reciprocating positive displacement pump

Friction and mass forces of the pulsating output cause pressure fluctuations in the pipeline. Therefore the pipelines for reciprocating positive displacement pumps must be dimensioned following different criteria as for centrifugal pumps.

Dimensioning of pipelines

Properly dimensioned pipelines are a basic requirement for the trouble-free function of any precision metering pump.
The permissible pipeline lengths, L_S and L_D (see fig. 2) depend on the maximum flow-rate, the internal diameter DN of the pipe, the suction lift and the viscosity of the fluid metered. It is easy to determine these dimensions from the diagrams. Longer or more narrow pipelines, higher suction lifts and higher viscosities can be handled by e.g. reducing the pump stroking speed, or by installing a pulsation damper. A calculation of the installation however, is required. If desired this can be carried out by LEWA at a nominal fee if all information required is available.

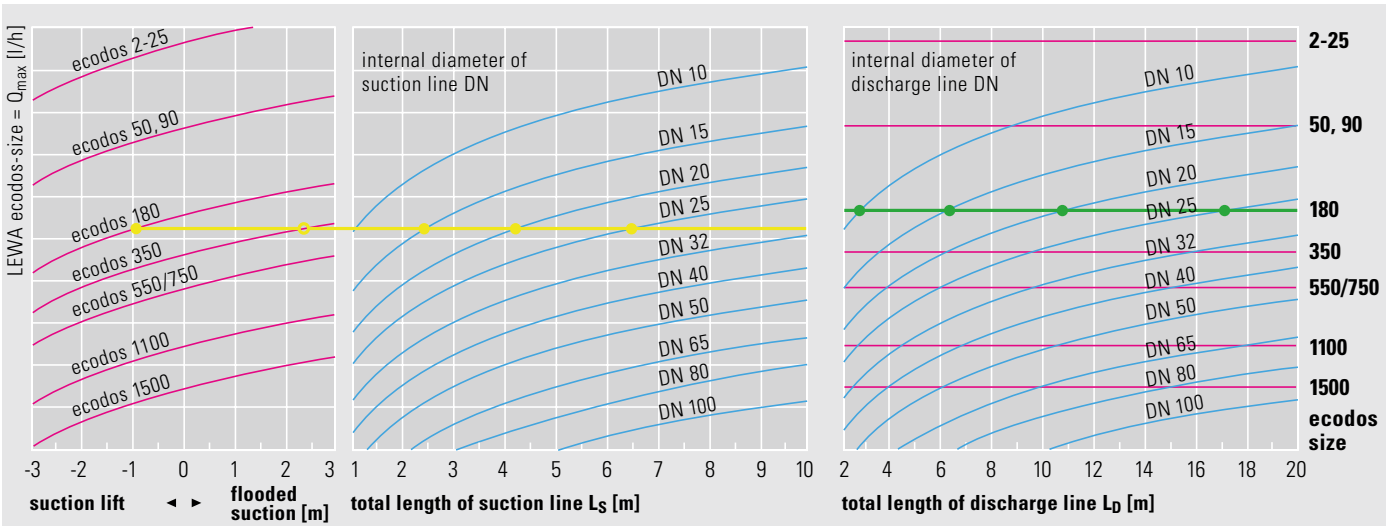


2 Installation schematic

Diagrams:

Dimensioning of the suction pipeline

Dimensioning of the discharge pipeline



The diagrams are valid for fluids similar to water (density ρ = 1 g/cm³, viscosity $\eta \leq$ 10 mPas, vapour pressure ≤ 0,1 bar). Higher viscosities mandate bigger pipe sizes (DN) resp. a calculation of the pipeline.

Example: Suction line for ecodos 180 (yellow)

At a suction lift of 1 m the maximum length of the suction line is 2,4 m for DN 15, 4,2 m for DN 20 and 6,4 m for DN 25. The same values apply to ecodos 350 with 2,3 m suction head.

Example: Discharge line for ecodos 180 (green)

The total length of the discharge line must not exceed 2,7 m for DN 10, 6,3 m for DN 15, 10,8 m for DN 20 and 17,1 m for DN 25.

What must be considered?

Avoid the following during installation:

- Excessive suction lift.
- Thin walled hoses, which can contract, as suction line.
- Pipes which are hard to vent, the air enclosed is slowly carried along and leads to metering errors.
- Drawing from the lowest point of the tank when the protection against dirt is insufficient, e. g. by a suction basket and a strainer.
- Long, vertical riser pipes directly after the discharge flange of the pump. During shut-down periods contaminations settle in the discharge valve and which leads to problems.

The pumphead must be filled with the fluid metered at start-up and vented by this procedure!

Metering pumps with a low stroke volume have a rather low compression ratio only. The self-priming capabilities with the suction pipe empty are very limited because of this.

- When the pump must be started up against pressure a start-up piping arrangement similar to figure 3 is recommended. First the fluid metered is circulated until pump and piping are filled. Then the 3-way valve is switched over for delivery into the discharge line.
- When the pump must draw from the top of a tank a lifter pipe (fig. 4) is recommended. During start-up metered fluid is filled in until suction pipe and pump are vented.

Minimum differential pressure

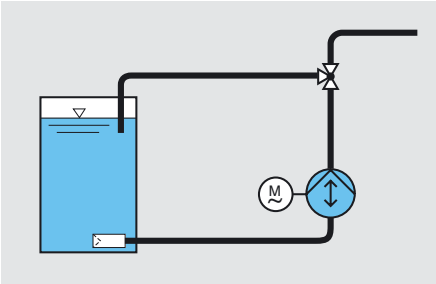
Proper valve function is guaranteed at a pressure of at least 1 bar above the suction pressure. An external back pressure valve is recommended if this is not possible at all operating conditions.

Minimum operating pressure

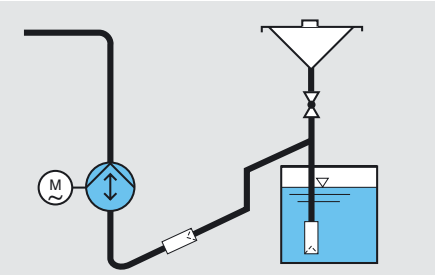
When a diaphragm rupture sensor is installed a minimum operating pressure of 1.5 bar is required, to trigger a diaphragm rupture signal.

Protection against overpressure

The permissible operating pressure of the pump must not be exceeded to protect the pump. Therefore a safeguard must be installed on site by e. g. mounting a safety valve.



3 Start-up arrangement



4 Suction lift via a lifter pipe

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