

The damper calculation is based on the change of state of gas in the damper.
The same changes occur on the liquid side.

To achieve an optimal effect, dampers must be correctly dimensioned and fitted in the right place.

To be able to calculate the necessary damper volume, one must first determine the technical features of the system to be protected.

Calculation of the pump stations (figure 1)

Requested technical data:

- Description of the installation/principle scheme
- Pump specifications Number, single/parallel drive, underwater pump(s), dry installation, centrifugal mass
- Q_{\max} max. flow rate in m^3/h
- H_{mano} manometric height of the pump(s) in m water column
- H_{geo} geodetic height difference in m water column
- Pipe specifications \varnothing , length, wall thickness, material, rated pressure
- Length/height profile of the pressure pipe
- Conveyed medium Water, waste water, other
- Temperature in $^{\circ}C$

Fig. 1

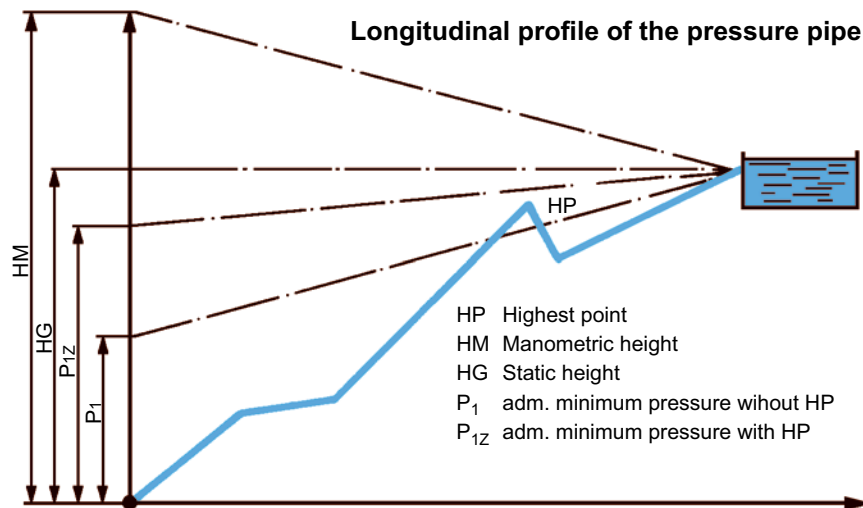
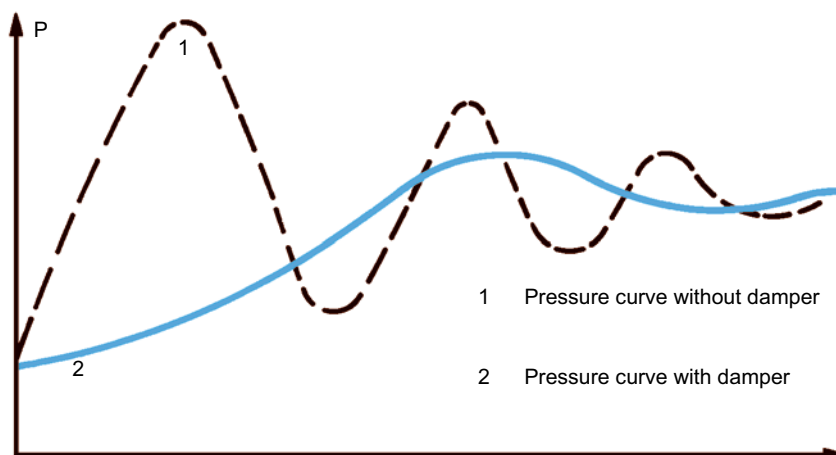


Fig. 2



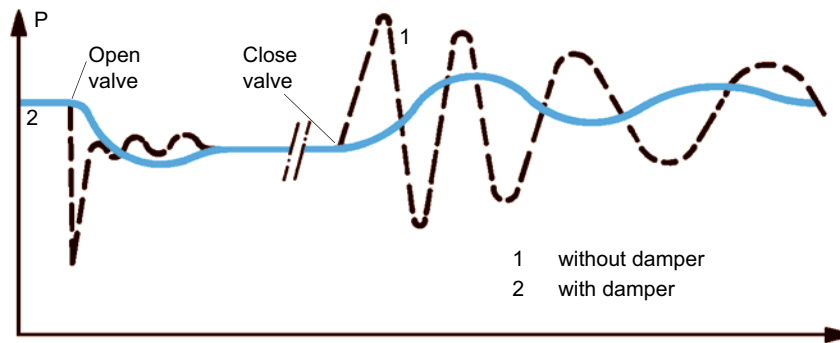
Permissible pressure fluctuation when switching on and off the pump(s) on the suction and pressure side (Fig. 2).

Calculation of quick closing fittings

Requested technical data:

- Description of the installation/principle scheme
- Fittings Magnetic or ball valve
- Q_{\max} Max. flow rate in m^3/h
- P_{dyn} Flow pressure in bar
- P_{stat} Resting pressure in bar
- Pipe specifications \varnothing , length, wall thickness, material, rated pressure
- Conveyed medium Water, chemical liquids, others
- Temperature in $^{\circ}\text{C}$
- Closing time in s

Fig. 3



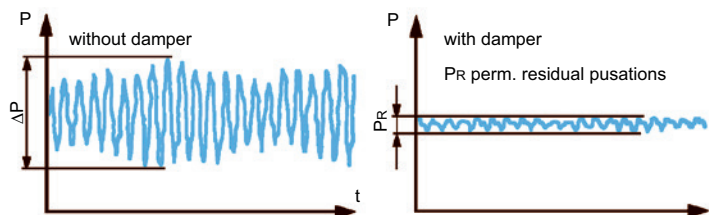
Permissible pressure fluctuations when switching on and off the fitting(s) (Fig. 3).

Calculation of the pulsation damping

Requested technical data:

- Pump specifications Piston or membrane pump, number of pistons
- Mode of action Single, dual
- Q_{\max} Max. flow rate in m^3/h
- P Operating pressure in bar
- Nb of strokes/piston rpm
- Pipe specifications \varnothing , material, rated pressure
- Conveyed medium Water, chemical liquids, others
- Temperature in $^{\circ}\text{C}$

Fig. 4



Permissible residual pulsations in the system (Fig. 4).

Calculation of the volume compensation

Requested technical data:

- System capacity in litres
- P_{\min} min. operating pressure
- P_{\max} max. permissible op. pressure
- T_{\min} min. operating temperature
- T_{\max} max. operating temperature
- Pipe specifications \varnothing , material, rated pressure
- Conveyed medium Water, others
- Volume expansion coefficient of the liquid

A special software called Flowmaster has been developed to determine the necessary damper volume. One can then proceed to the selection of the correct damper type and determine the ideal mounting place of the damper. ORELL also offers the possibility of measuring and recording pressures, as well as displaying any pressure variation in the network graphically. The observed values will be implemented in the calculations. ORELL also offers commissioning of installations.