Pump – Challenges & Solutions

Keith Schwertner – Grundfos Pumps

GRUNDFOS

Possibility in every drop

Challenges

- Type of Pump
- Application – Suction side
- Booster Size – How many pumps do I need?
- Do not forget about me, please!

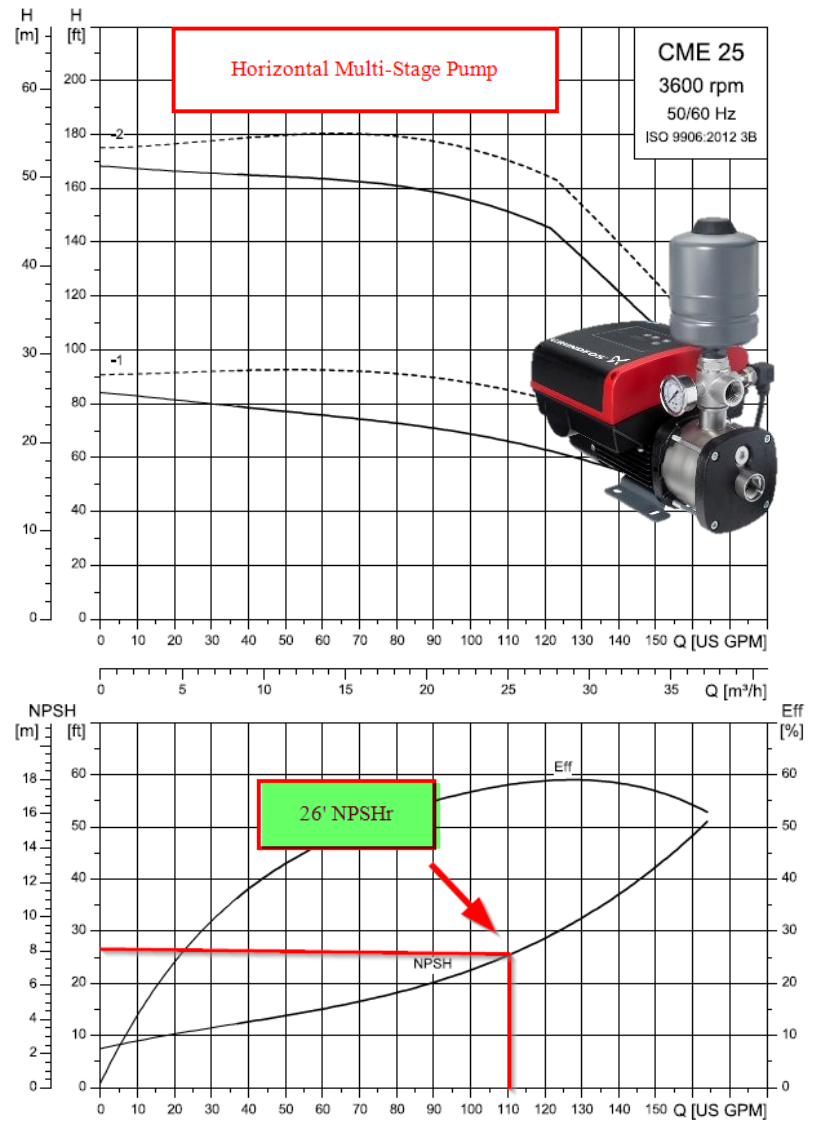
Why does it matter?

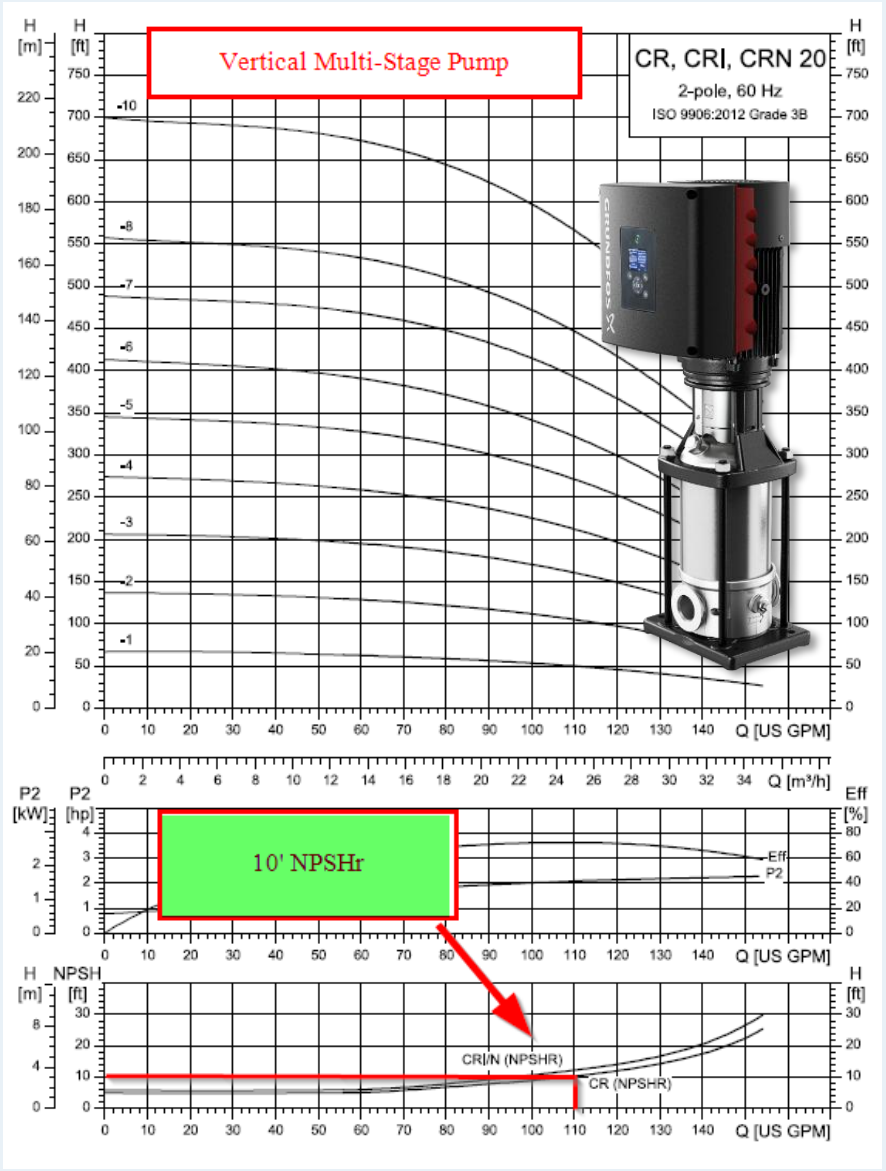
Type of Pump

- Impacts NPSHr
- Efficiency (Pump, motor & VFD) = Energy cost
- Available space
- Initial Cost

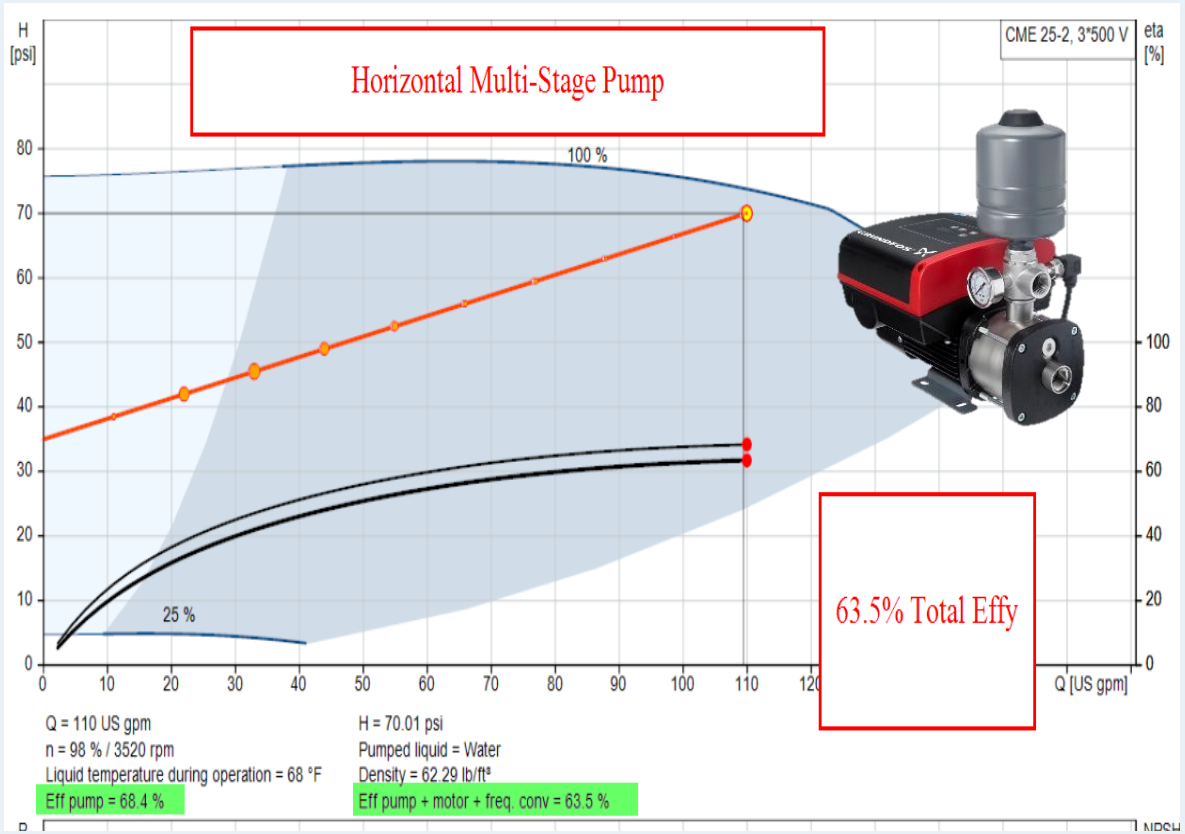
NPSHr (Required) Difference

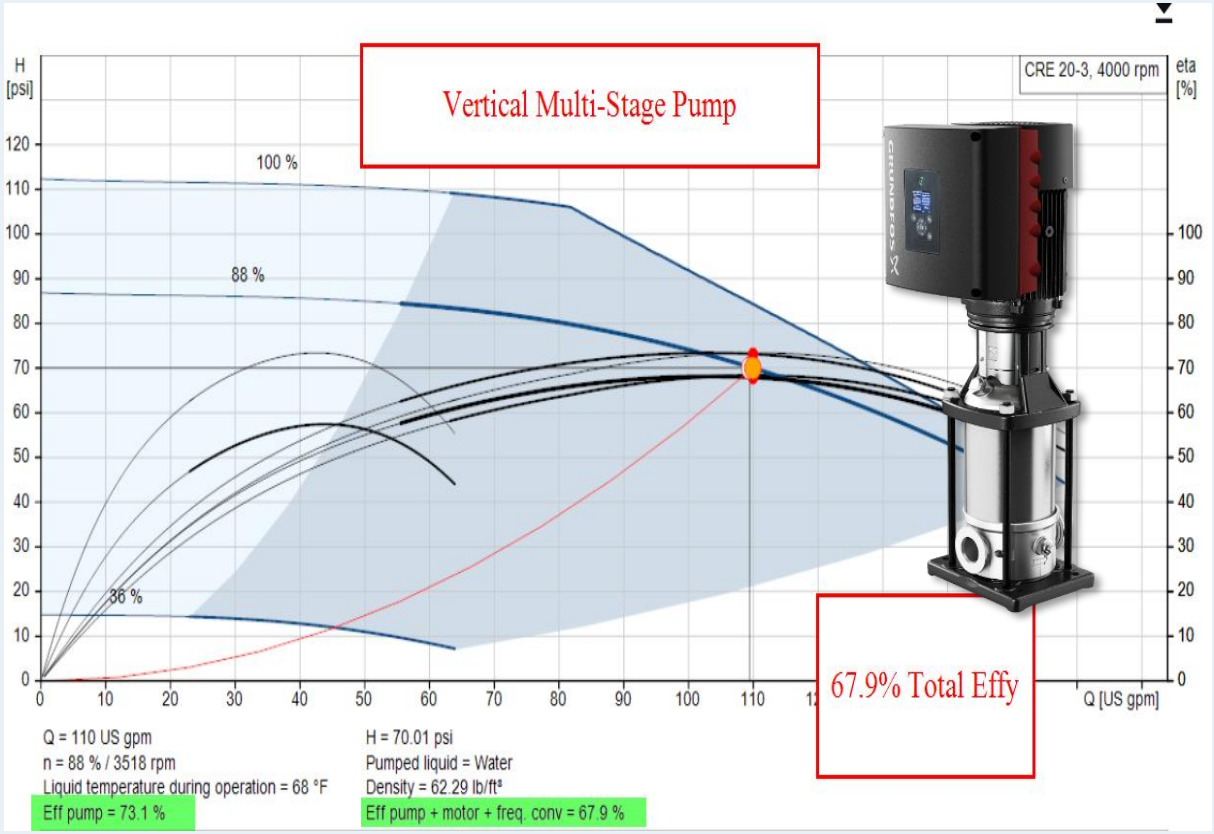
- The NPSHA MUST be GREATER than the NPSHR to avoid CAVITATION. (1.3 X is a good practice)





Efficiency Difference





Suction Side – Why is it so important?

Application

- Tank Water Level – Flooded Suction
- Indoor/Outdoor - Ants
- Ventilation – Chemicals
- Higher Altitude
- Most Pump issues
  - Water Quality
  - Availability
  - Power

Make it Last – Install Once

Location

The system is only designed for indoor installation and must not be exposed to direct sunlight.

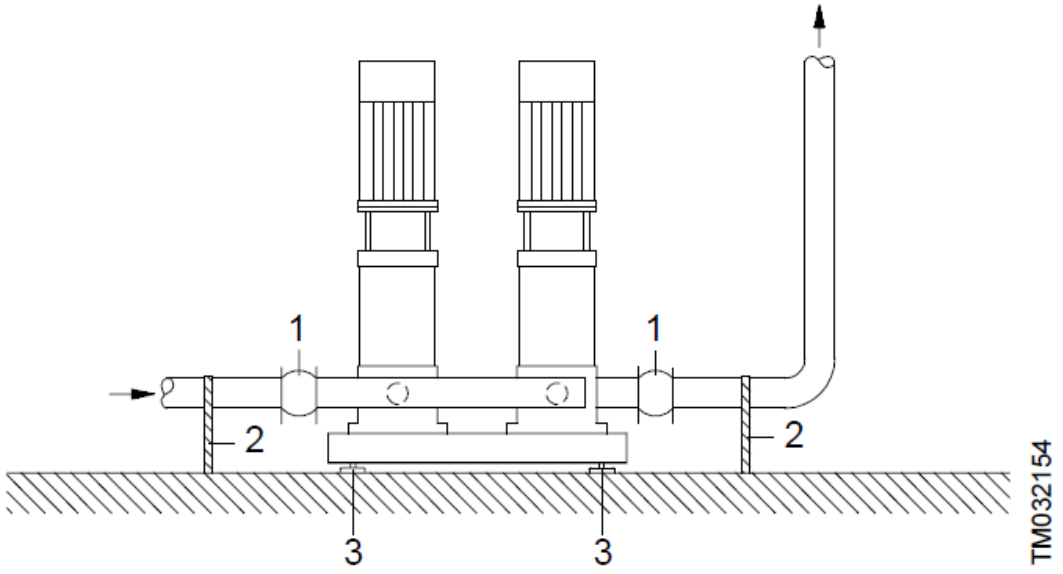
- Install the system in a well-ventilated room to ensure sufficient cooling of the control cabinet and pumps.
- Install the system with a one-meter (3 ft) clearance on all sides for inspection and removal.

Dry-running protection

This function is one of the most important ones, as dry running may damage bearings and shaft seals.

The inlet pressure of the system or the water level in a tank, if any, on the inlet side is monitored. If the inlet pressure or the water level is too low, all pumps stop.

Level switches, pressure switches or analog sensors indicating water shortage at a set level can be used. The system can also be reset and restarted manually or automatically after water shortage.

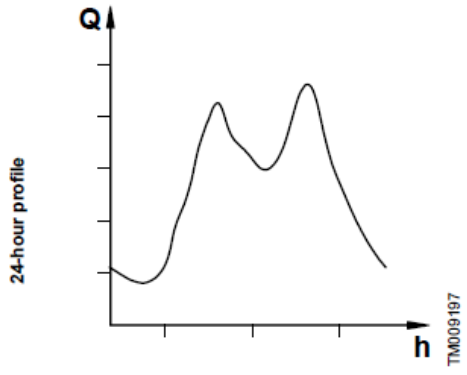
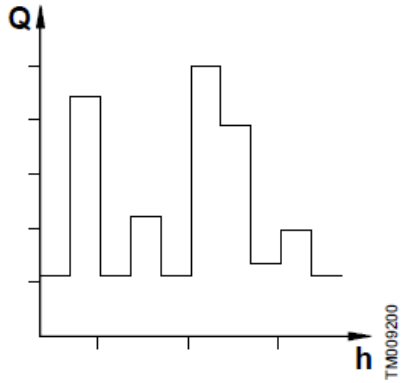
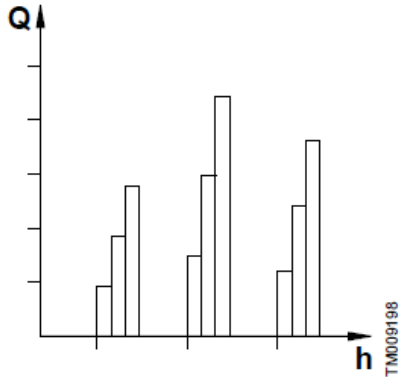
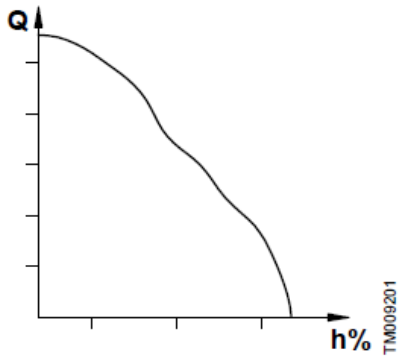
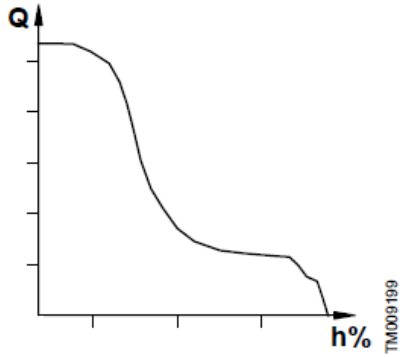
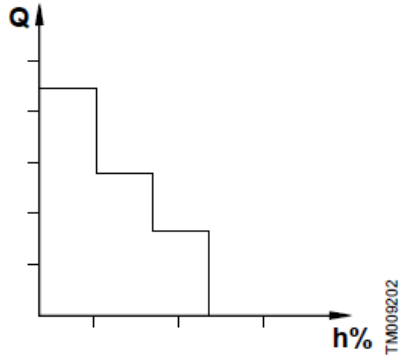


Example showing the position of expansion joints, pipe supports and vibration dampers

Pos.	Description
1	Expansion joint
2	Pipe support (and good location for system isolation valve)
3	Vibration damper

What is my real Design Load

Examples of typical 24-hour consumption profiles and their load profiles:

	Water supply	Industry	Irrigation
24-hour profile			
	Flow rate: Highly variable **Pressure:** Constant	**Flow rate:** Highly variable with sudden changes **Pressure:** Constant	**Flow rate:** Constant and known **Pressure:** Constant
Duty-time profile			
	Consumption is highly variable. Continuously variable speed control of the pumps is recommended.	Consumption is highly variable with sudden changes. Continuously variable speed control of the pumps is recommended.	Variations in consumption are regular, and known. Simple control is recommended.

How many pumps do I need?

Booster Size

- Design Load
  - Reduce starts/stops
- Application – Seasonal Summer vs Winter
- 100/100%, 75/25%, 50/50%, 33/33/33%
- Standby Pump

Help – I need more room! Why is this so hard to work on?

Diaphragm Tanks – Size me right & Check my Pressure

Diaphragm tank

The need for a diaphragm tank is estimated on the basis of the following guidelines:

- Due to the stop function, all systems in buildings must be equipped with a diaphragm tank.
- In water supply applications, a diaphragm tank is usually not required, because miles of piping both provide the necessary capacity and have elasticity to offer sufficient capacity.

To avoid the risk of water hammer, a diaphragm tank may be necessary.