

# Taking your pump system efficiency to new heights

Install Grundfos MPC with the CU 352 multi-pump controller and experience how:

- Perfect cascade control removes the difficulties, caused by variation in consumption throughout the day, when deciding how many pumps to run and when to cut in/cut-out for an efficient operation
- Proportional pressure maintains a constant system pressure and overcomes the friction losses in pipes



# Make the right decision, right at the start

When deciding to invest in a new pump or booster system for applications in buildings, the focus is very often on the initial purchase price – the lifetime ownership and maintenance costs are either not a priority or not considered. This creates a very wrong impression of what your actual system cost is.

Furthermore, an estimated 10 % of the world's energy consumption is spent on running pumps. This number could be reduced by 30-50 % by replacing inefficient pumps with

energy-optimised pumps or, even better, with complete Grundfos multi-pump booster systems.

These offer not only an optimised pumping solution, but also include the CU 352 controller, which adds intelligent and highly efficient pump control. The CU 352 controller ensures far greater efficiency than the traditional way of running pumps via a BMS system.

## Two reasons why Grundfos pump systems are more efficient

### 1. Perfect cascade control

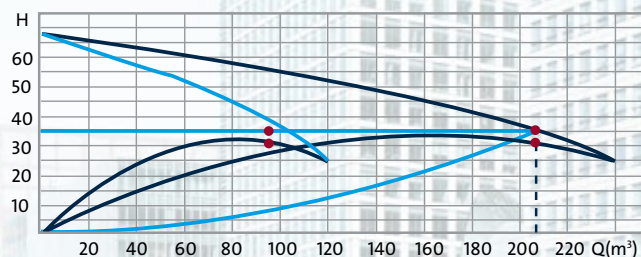
Fluctuating consumption throughout the day makes it very difficult to decide on how many pumps to run and when to cut-in/cut-out for an efficient operation. This is a recognised and understood issue, however you can do something about it.

Optimal operation of the system and minimal energy consumption

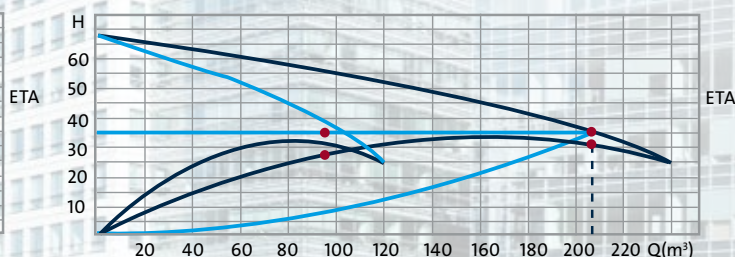
are not just a matter of high-efficiency pumps – system control is just as important. The Control MPC incorporates pump curve data to optimise the performance of the system.

This is done using advanced calculations to determine the most efficient number of pumps in operation at any giving duty point.

Efficiency with 1 pump running



Efficiency with 2 pumps running

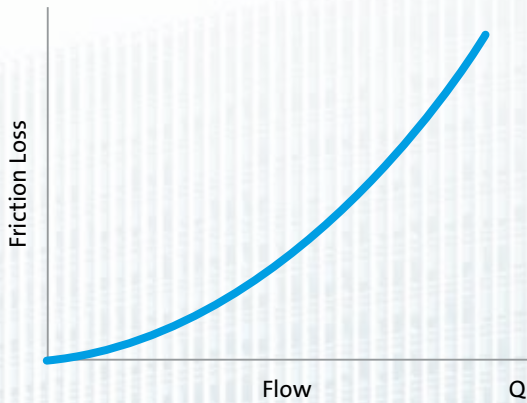


*You get reduced energy consumption and lower energy bills, because the entire system now operates more efficiently – all guess work about staging your pumps is removed.*

## 2. Real constant system pressure

In a typical operation mode, maintaining a constant pressure and overcoming friction losses in pipes is not always easy. Not least because the term 'constant pressure' is in fact misleading, as this refers to discharge pressure, and constant pressure operation can be achieved in optimal conditions only.

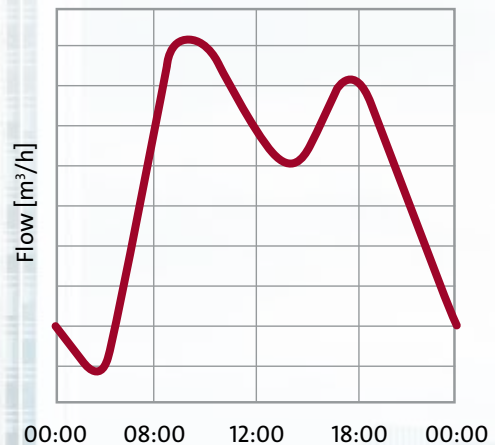
The reality is that no system runs optimally – there are always losses. The higher the flow, the higher the friction loss. This is because the friction in the system is dependent on the flow demand, and since the flow demand never is constant, the pressure out in the system is not constant either.



$$h_f = f \left( \frac{L}{D} \right) \left( \frac{V^2}{2g} \right)$$

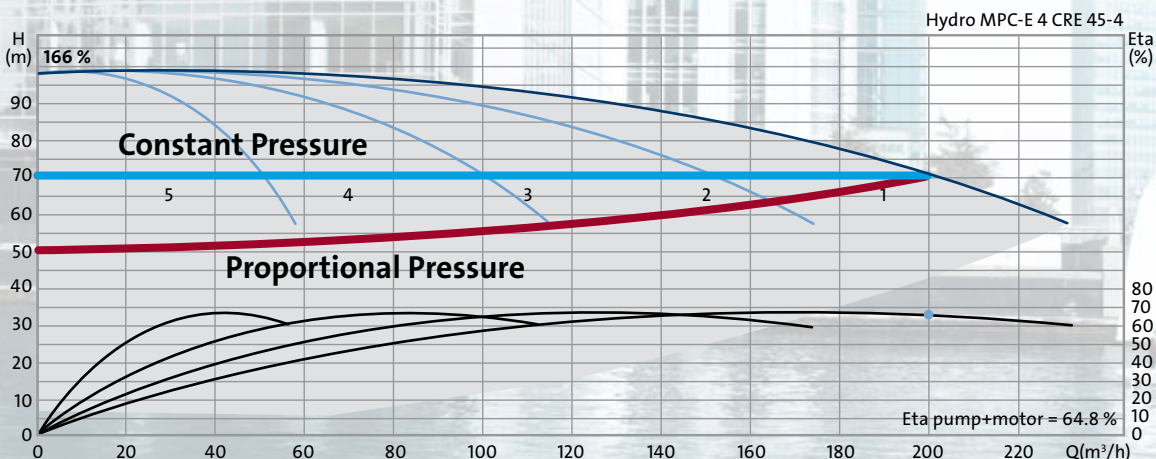
$h_f$  = Head Loss due to friction, given units of length  
 $f$  = friction factor (Darcy-Weisbach friction coefficient)  
 $L$  = Pipe diameter  
 $V$  = Flow velocity  
 $g$  = Gravitational constant

To overcome the friction loss, the pressure is normally set to the highest flow demand to ensure adequate pressure in the system. This will result in too high pressure for 18-20 hours each day, which is wasted energy and puts extra stress on pipes and the system. Furthermore, keeping the discharge pressure constant means the system pressure will fluctuate in accordance with the flow demand.



Proportional pressure control is the Grundfos solution. This ensures a real constant system pressure, as the discharge pressure automatically adapts to the demand, thus lowering the pressure for 18-20 hours each day while still maintaining a constant pressure in the system. The lowered pressure also means less stress on pipes, which directly translates to fewer pipe bursts.

**You get reduced energy consumption and lower energy bills, because the pumps are now operating at a lower pressure for 80-90 % of the time. You get reduced costs for maintenance as well, because the lowered pressure in the piping network leads to fewer pipe bursts.**



## Grundfos – for smarter multi-pump systems

Grundfos offers a premium range of multi-pump controllers that are designed to maximise efficiency.

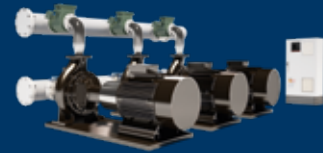
### Hydro MPC Booster

A complete plug-and-pump system, which is tested and ready to run with all the intelligence from CU 352 controller.



### Control MPC

A control panel with the CU 352 controller for custom-built solutions and variable-speed control, for all pump types.



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