

GRUNDFOS **MPC**
INTELLIGENT CONTROL
FOR WATER SUPPLY
APPLICATIONS

MAINTAINING HIGH EFFICIENCY OVER A BROAD FLOW RANGE

The consumption profile, in municipal water systems can experience peaks and valleys throughout the day. Although sufficient flow could be supplied by a single large pump, multiple pumps have proven to be more economical. This as higher efficiency is achieved at realistic flow rates that are encountered compared to designed flow. Pumping systems achieve higher efficiency throughout the entire flow range, even at lower flow rates which can be the greatest percentage of time.

THE “BRAIN” BEHIND THE SYSTEM

Optimizing your energy savings lies with the use of highly advanced controls. The Grundfos CU 352 control unit is the “brain” behind Hydro MPC systems. Specially designed for control of parallel connected pumps, the CU 352 is easy to operate and monitor.

NUMBER OF PUMPS RUNNING

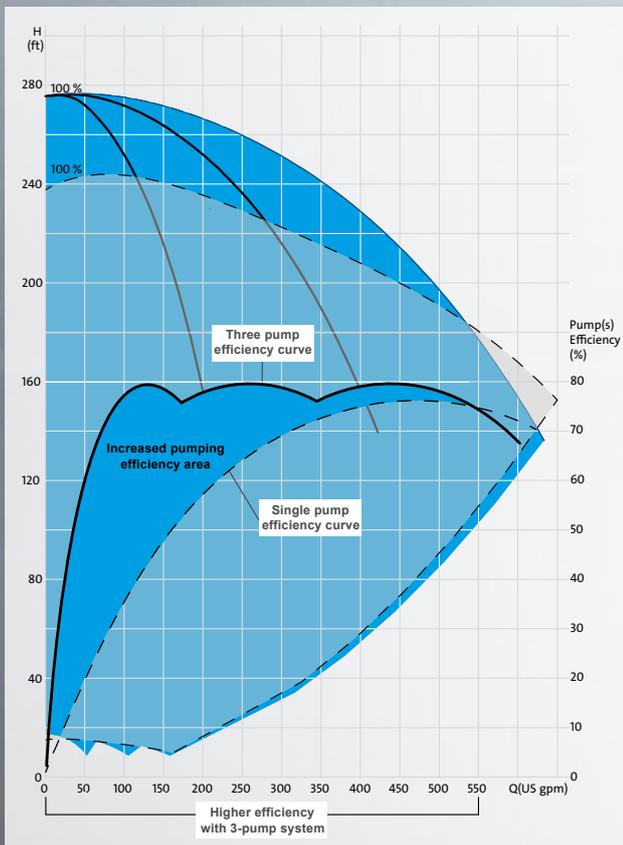
The method of evaluating the number of pumps that should be running is unique in the Hydro MPC. The pump curve data loaded into the controller ensures the pump system can determine an estimated measurement of flow rate very precisely. Together with curve data, flow rate, pressures and power the CU 352 calculates the optimal start speed of the pumps and number of pumps in operation to maintain the most efficient operation.

PROPORTIONAL PRESSURE

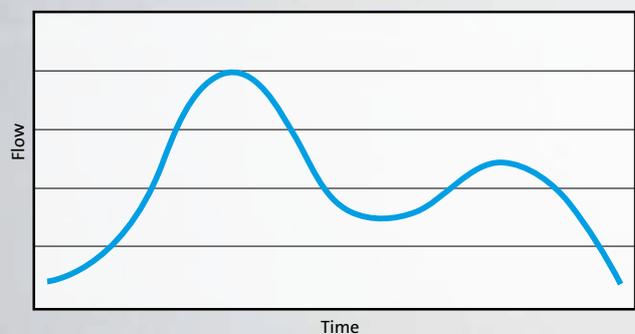
Municipal water systems tend to have a substantial amount of requirement dedicated to pipe friction loss. Combine VFD pump control and proportional pressure control (pipe friction loss compensation) and large savings can be realized.

NON-REVENUE WATER

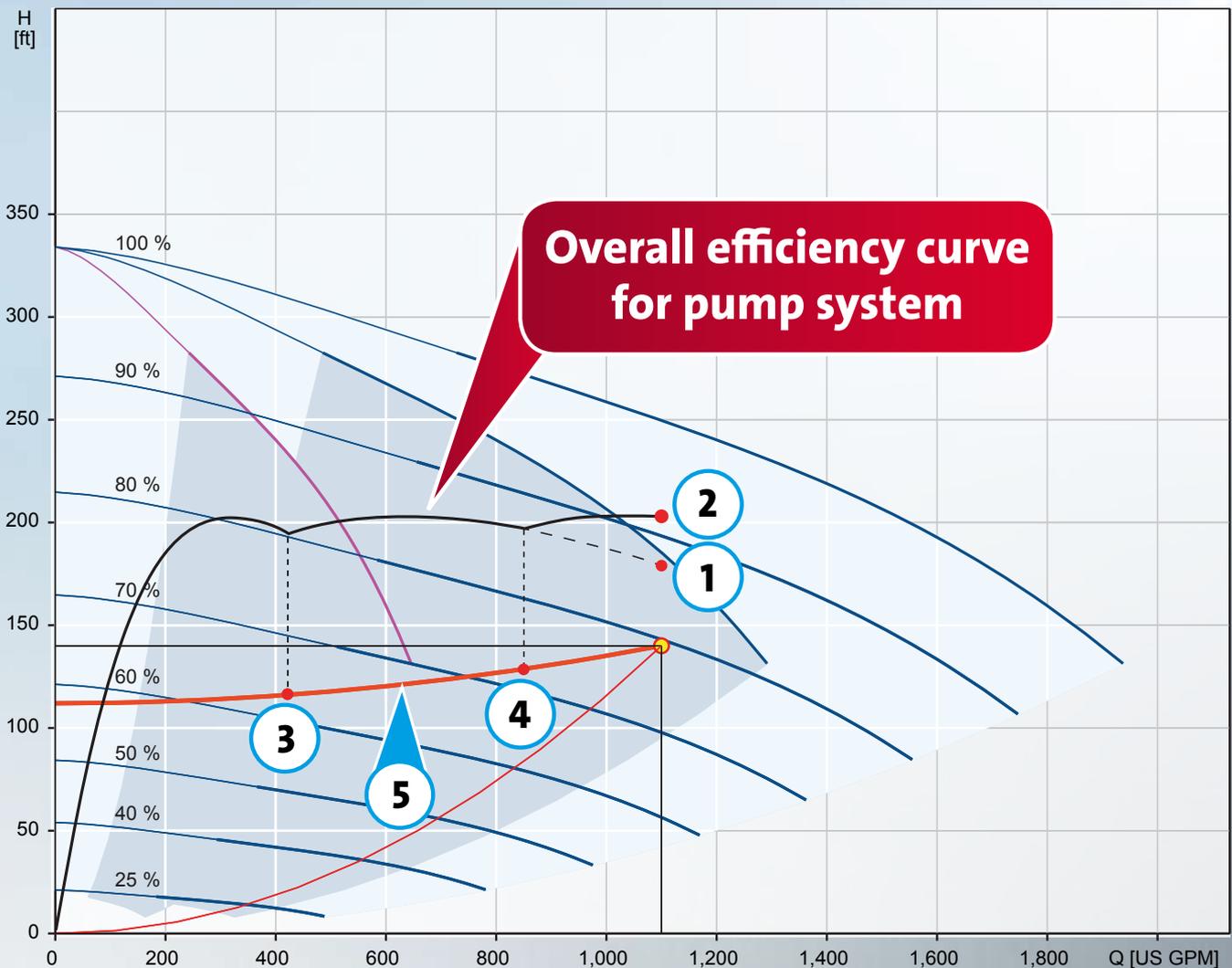
The amount of non-revenue water (in network piping leakage) can be drastically reduced through proportional pressure control. The amount of non revenue water varies from 10% in very efficient systems to 40-50% in older systems. By lowering the pressure in periods of low consumption, the leaking and wearing of pipes is reduced, thus also reducing costs of both energy and maintenance.



Consumption Profile



*Typically, the maximum designed flow is only required for a small percentage of time. High efficiency in part-load conditions is key to saving energy cost.



Systems today often use on/off pump solutions based on capacity and do not consider operating efficiency. Operating costs can be optimized by running the most efficient combination of pumps. The figure above, shows how three pumps in operation can reduce the energy at a particular operating point by 12% over two pumps in operation even when two pumps could meet the requirement based on capacity alone.

DESCRIPTION OF POINTS ON SYSTEM CURVE

1. Efficiency curve for two pumps in operation, each at 94% speed, pump efficiency at 68.9%, brake horsepower at 56.4 HP.
2. Efficiency curve for three pumps in operation, each at 81% speed, pump efficiency at 78.2%, brake horsepower at 49.7 HP. This option provides an additional savings of 12%.
3. Conditions on “control curve” where two pumps in operation are more efficient than a single pump.
4. Point on “control curve” where three pumps are more efficient than two pumps in operation.
5. Proportional pressure “control curve” displays pressure boosting requirement as it varies with flow rate.



CONSTANT PRESSURE

By continuously adapting the speed of the pumps to the flow demand, the required pressure is kept constant despite of fluctuations in flow. This ensures a minimum of wear and tear of the pipe network. Starting and stopping the speed controlled pumps are done in a matter that minimizes pressure surges and protects the piping. The days of water hammer are over.



EASY TO OPERATE

The most advanced controller on the market does not have to be the most complicated. The CU 352 is equipped with a big color screen that communicates in plain text and with intuitive icons. The start up wizard makes commissioning quick and easy and the help texts ensure that explanatory text is never further away than the press of a button.



ENERGY REDUCING

Using the best pumps and motors is no guarantee for low energy consumption. The ability to chose the most optimum number of running pumps and continuously optimizing the energy usage is just as important. The CU 352 uses the pump curve data to determine the most efficient speed and number of pumps in order to meet the desired flow an pressure.



APPLICATION OPTIMIZED FUNCTIONS

The CU 352 is more than parallel operation of pumps at best efficiency. The CU 352 is filled with special features that makes sure that the system performs perfect in any application. These special features can be set up so that the behavior of the system fits exactly to the needs of the application.

CU 352 BENEFITS

- The CU 352 offers perfect control over your pumps:
- Constant pressure
- Easy to operate
- Monitoring
- Communication
- Energy Reduction
- Optimized application functions



MONITORING

The CU 352 incorporates a log feature that makes it possible to monitor the performance of the system. The logged data can be shown on the large color screen or exported to a PC for further analysis. Monitoring the performance makes it possible to react on problems before they occur and give valuable data about changes in demand that could be caused by a pipe burst.



COMMUNICATION

The CU 352 controller communicates via the most common Field-Bus protocols via optional communication cards. But besides that, the built in Ethernet connection makes it possible to access the controller via a web browser to see the status and modify the settings of the controller. Further more the controller can be equipped with GRM communication for logging and monitoring via a mobile network -you can even control it from your iPad.



REDUNDANCY

With the CU 352 controller it is possible to assign one or more standby pumps. These will take over in case of failure on the other pumps. It is also possible to have an extra primary sensor installed and the CU 352 will then continuously monitor the sensors for discrepancy. Further more it is possible to define how the system should react in case all sensors should fail.

PERFECT CONTROL FOR ANY PUMPS

With MPC you can combine great pumps with the perfect control of the CU 352. This means you not only get high efficiency pumps, but also control that ensures they are operated as optimally as possible.

CONTROL MPC

2- 6 pumps in parallel

0.37 – 75 kW*

Available as:

E: All pumps with integrated frequency converter

EC: All pumps connected to CUE

F: One pump connected to frequency converter

S: All pumps fixed speed pumps

*Larger systems available on request



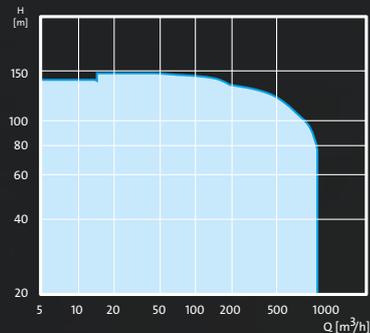
HYDRO BOOSTER



Motor size: 0.55 - 75 kW
 Max flow: 1080 m³/h
 Max head: 155 m

Typical applications:

- Raw water intake
- Drinking water treatment
- Water distribution



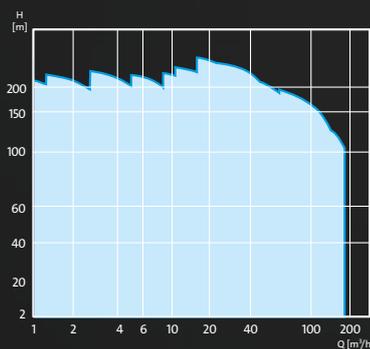
CR



Motor size: 0.37 to 75 kW
 Max flow: 180 m³/h
 Max head: 500 m

Typical applications:

- Water distribution
- Flood control
- Wastewater treatment



TP/TPE

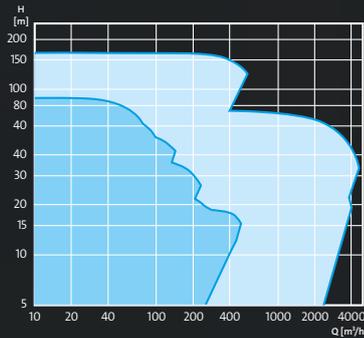


50Hz:

From 0.12 kW to 630 kW - TPE up to 22 kW
 Capacities of up to more than 4500 m³/h
 Head up to 170 m

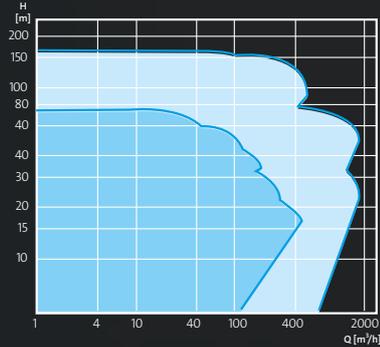
Typical applications:

- Water utilities
- Industry processes,
- Sea water,
- Water transportation,
- Irrigation



60Hz:

From 0.37 kW to 315 kW - TPE up to 22 kW
 Capacities of up to more than 1250 m³/h
 Head up to 235 m



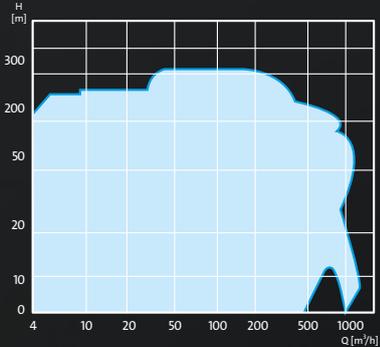
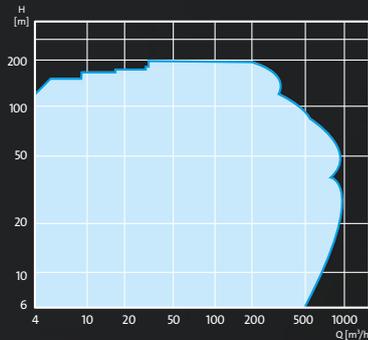
NB(E) / NK(E)

Motor size: 0.25 – 460 kW
 Max flow: 1350 m³/h
 Max head: 240 m



Typical applications:

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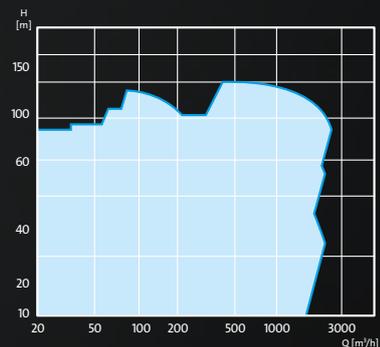
HS



Motor size: 1.5 – 630 kW
 Max flow: 2500 m³/h
 Max head: 148 m

Typical applications:

- Water supply systems
- Air-conditioning systems
- Cooling systems
- Irrigation systems
- Other industrial systems



FUNCTIONALITY OVERVIEW

Application related functions:

- Soft pressure built-up
- Proportional pressure
- Defect non-return valve detection
- Fallback Sensor
- Multi Sensor
- Redundant Sensor
- Setpoint ramping
- Dry-run protection
- Emergency run
- Limit exceeded – measure all analog values
- Start-up Wizard

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Controller facts:

- Energy optimized cascade control related on pump data (pump curves)
- Up to 6 pumps
- Pilotpump
- E-system for Grundfos E-pumps
- EC-system for pumps with CUE
- F-system for one external VFD, rest fixed speed pumps
- EF-system for external VFD to control non-Grundfos pumps
- S-systems for fixed speed pumps
- 3 analogue inputs (can be extended up to 7)
- 3 digital inputs (can be extended)
- 2 digital outputs (can be extended)
- Analogue output (optional up to 4)
- CIM-communication to most common Field-Bus protocols
- Built-in VNC server
- Back-up battery
- 33 languages