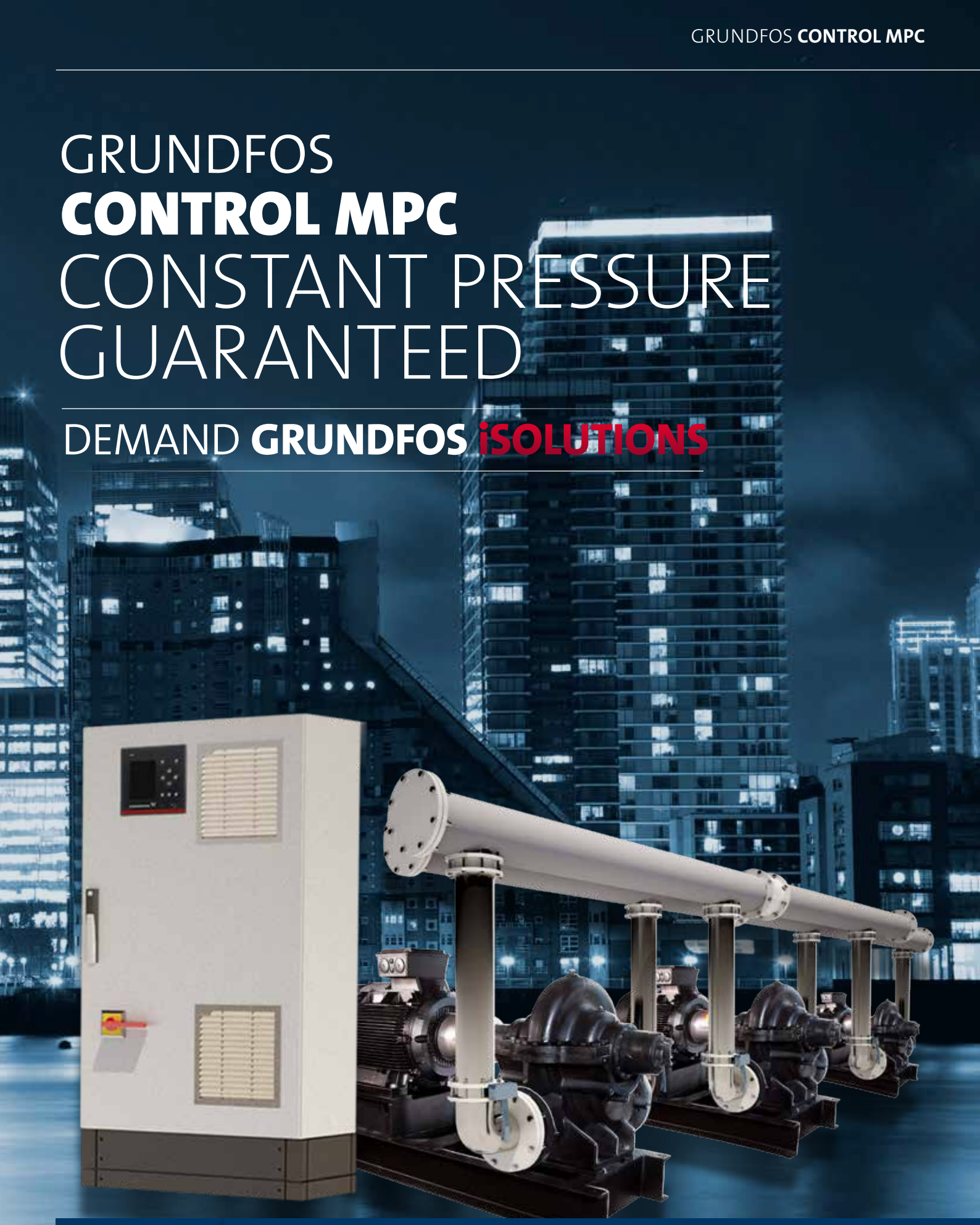
GRUNDFOS **CONTROL MPC** CONSTANT PRESSURE GUARANTEED

DEMAND **GRUNDFOS iSOLUTIONS**



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GRUNDFOS

PERFECT CONTROL FOR ANY PUMPS

With a Control 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

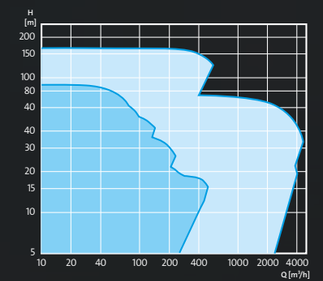
2- 6 pumps in parallel
0.37 – 75 kW*
Available as:
E: All pumps with integrated frequency converter
EC: All pumps connected to CUE
F: One pump connected to frequency converter
S: All pumps fixed speed pumps
*Larger systems available on request

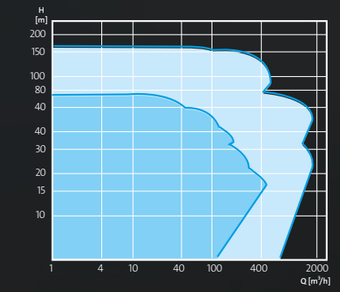
TP/TPE

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

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

Typical applications:
- Water utilities
- Industry processes,
- Sea water,
- Water transportation,
- Irrigation





NB(E) / NK(E)

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

Typical applications:
- Water utilities
- Industry processes,
- Sea water,
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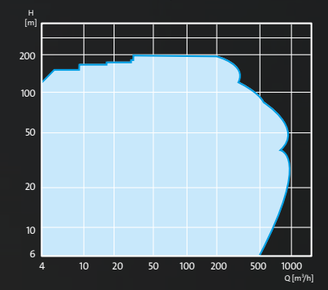
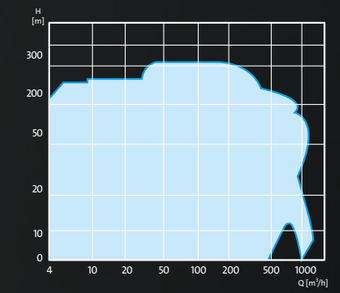
- Irrigation

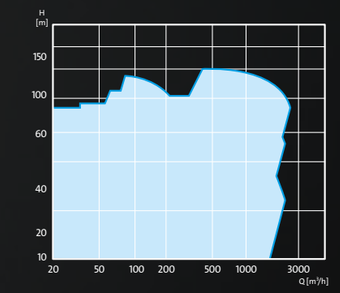




HS

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



CONSTANT PRESSURE

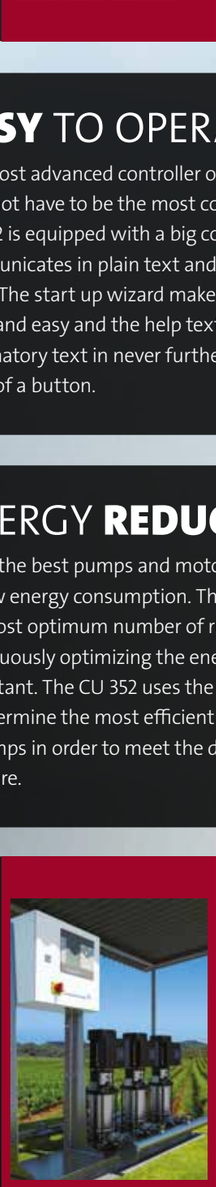
By continuously adapting the speed of the pumps to the flow demand, the required pressure is kept constant despite of fluctuations in flow. This ensures the consumer the highest comfort at any time of the day. Starting and stopping the speed controlled pumps are done in a matter that minimizes pressure 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 in 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.

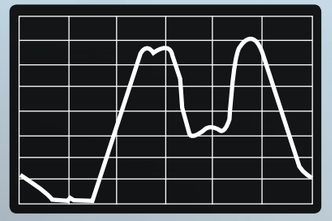
REDUNDANCY

With the CU 352 controller it is possible to assign one or more standby pumps. These will take over incase 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.

DESCRIPTION OF **SELECTED FUNCTIONS**

Proportional Pressure

The flow demand in a typical installation is not static. It varies depending of the time of day, time of week or time of year.



Since the friction loss in the pipe system is dependent of the flow demand the required discharge pressure from the booster is not static either.

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

h_l = Head Loss due to friction, given units of length
f = friction factor (Darcy-Weisbach friction coffecient)
L = Pipe Diameter
V = Flow velocity
g = Gravitational Constant

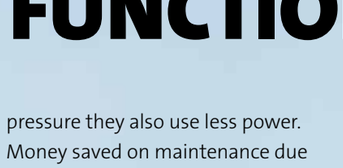
By automatically adapting the discharge pressure to the flow demand the pressure can normally be lowered 18 – 20 hours each day while still delivering the required pressure to the end-users.

Benefit:
Money saved on energy since the pumps are operated at a lower pressure they also use less power. Money saved on maintenance due to the fact that the lowered pressure in the piping network leads to less pipe bursts.

Perfect cascade control

To achieve optimal operation of the system and minimum energy consumption, it is not enough to have high efficient pumps. The control of the system is just as important.

The control MPC incorporates pump curve data to optimize the performance of the system



This information makes it possible for the system to calculate the optimal speed and number of pumps to be operating at any time.

Benefit:
Money saved on energy since the complete system efficiency is increased.

Soft pressure build up

If the system haven been stopped either for service reasons or supply failure, the restart of the system of the system should be done slowly to avoid pressure surges and debris in the system.

The soft pressure build up function ensures that. When restarted the system only operates a defined number of pumps at a defined speed until the pipe system is filled.

Once the piping system is filled, the pump speed and number of running pumps will be ramped up dependent of the flow requirement.

Benefit:
Money saved on maintenance since the safe startup reduced the stress on the piping system.

Protective functions

Several function ensures safe and reliable operation of the system.

Limit function
2 independent limit functions can be set to monitor any measured value and either warn the operator or change the operation mode of the system. In example a limit can be set to monitor if the system pressure is below a defined value , which would indicating a pipe burst.

Redundant sensors
The system can be equipped with an extra sensor and in case of sensor failure automatically shift between the sensors. The system even compares the signal from the two sensors and gives the operator a warning if there is dissimilarity between them.

Password lock
The controller incorporates password protection in three levels, to ensure only instructed personnel have access to the settings menu.

Pumps outside duty range protection.
The system can be setup to protect the pumps from running outside their allowed operation area.

Benefit:
Money saved on repairs due to misuse or wrong settings.

Reliable and safe operation ensures longer life time of the pumps.

Clock program

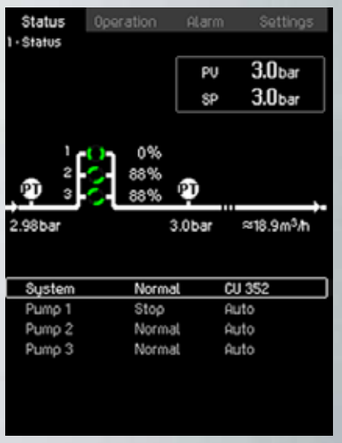
The clock program makes it possible to fine tune the system to the demands of the application.

Upto 7 time dependent set point changes can be defined ensuring the pressure is exactly what your application needs at any time.

Benefits:
Money saved on energy since the setpoint can automatically be reduced to only the required at any given time.

Flow estimation

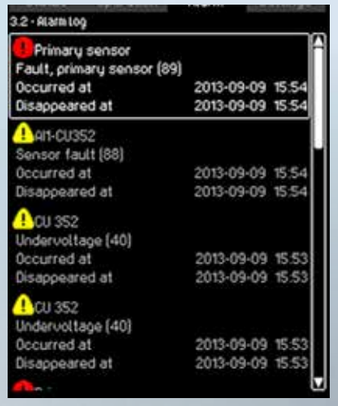
The controller can based on pump curve data estimate the flow, without using a flowmeter. This gives an impression of the performance of the system and hints of any irregular water consumption that could indicate a pipe burst, without having to invest in an expensive flow meter.



Benefits:
Money saved on expensive flow meter and information of consumption available.

Alarm Log and Log Graph

The Alarm Log gives an overview of the current and previous alarms and even suggest counter actions that can be taken.



The Log Graph shows the operation conditions of the system and can be used for analyzing faults.

Benefits:
Money saved on repairs since the down time can be reduced because the alarm log and log graph makes fault analyzing easier and faster.

FUNCTIONALITY OVERVIEW

Cascade Control Functions

- Pump start and stop speed
- Pump stop attempts
- Stop function
- Compensation for start up time
- Min Time between start / stop
- Max. starts pr. Hour
- Pump Test run
- Min. Performance
- Standby pumps
- Forced pump change over

Application optimized functions

- Dry Run protection
- Soft pressure build-up
- Emergency run
- User defined duty
- Alternative set points
- Pump curve data
- Flow estimation
- Min. Pressure
- Max. Pressure
- Limits
- Pumps outside duty range
- Pressure relief
- Password
- Ethernet
- Proportional Pressure
- Set point ramping
- Reduced Operation
- Flow indication in display
- Reduced Operation
- Service Contact Field
- Log
- Alarm Dependent Help Texts
- Specific energy calculation

Controller features

- CU352 controller
- Perfect cascade control of up to 6 pumps
- 22 different display languages
- 3 analogue inputs (can be extended)
- 2 Digital outputs (can be extended)
- 3 Digital inputs (can be extended)
- Bus communication to Grundfos E-pumps
- E, EC, F and S systems
- Color screen
- Backup battery
- CIM-Communication modules
- Pilot Pump
- Analogue output (optional)

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