# GRUNDFOS iSOLUTIONS FOR INDUSTRIAL APPLICATIONS

GRUNDFOS iSOLUTIONS




be
think
innovate

GRUNDFOS

# FROM SPEED-CONTROLLED PUMPS TO INTELLIGENT SYSTEM SOLUTIONS

A pump doesn't exist in isolation. It's always part of a larger system, working together with a whole range of other components. That's why we think beyond the pump and take the entire system into account when developing new solutions. Our E-solutions and Grundfos iSOLUTIONS are both testimony to that.

**Grundfos E-solutions – integrated intelligence**
A Grundfos E-solution features the pump, motor and frequency drive all in one product. As the frequency drive constantly adapts pump speed according to demand, it's possible to achieve significant pump energy savings.

**Grundfos iSOLUTIONS – optimising your pump system**
Grundfos iSOLUTIONS is the latest addition to the Grundfos portfolio and takes intelligence to a whole new level. Where an E-solution primarily focuses on the product level, Grundfos iSOLUTIONS will extend savings to the entire system, optimising the way pumps, drives, controls, protection, measurement and communication units work together.

According to US and EU energy savings studies, the biggest savings potential lies in better system control. In fact, a holistic approach will on average cut as much as 20% of the total energy consumption of your application.

In this brochure, you'll be able to see how E-solutions can benefit selected applications and how Grundfos iSOLUTIONS can take performance even further.

## WHY FOCUS ON SYSTEM INTELLIGENCE?

- **IMPROVED SYSTEM RELIABILITY:**
  Reduced downtime and maintenance costs
- **BETTER SYSTEM PERFORMANCE:**
  Optimised process control through targeted functionality and extended measuring capability
- **INCREASED SIMPLICITY:**
  Built-in functionalities substitute external components and control equipment
- **BEST-IN-CLASS ENERGY EFFICIENCY:**
  Reduced energy consumption in the entire installation

**PUMP**
PRODUCT APPROACH
Standard pumps and external controls with one purpose: Moving liquid from one place to another

1993


**E-SOLUTIONS**
EXTENDED PRODUCT APPROACH
Integrated controls enable pumps to adapt to changing demands. Result: Increased comfort and lower energy consumption per pump.

2007

**GRUNDFOS iSOLUTIONS**
SYSTEM APPROACH
Optimising the way pumps, drives, controls and protection, measurement and communication units work together as part of one system. Result: System energy savings, component savings, better communication, extended customisation, increased user-friendliness.

# UNIQUE SOLUTIONS FOR UNIQUE DEMANDS

"By choosing Grundfos iSOLUTIONS, we have obtained a fully customised solution with innovative functionalities that will secure our technology leading position many years ahead. Our customers all operate in the food processing industry and place high demands on efficiency and reliability in order to minimize downtime. We believe that Grundfos truly lives up to these demands, which is why we actively use "Powered by Grundfos blueflux®" in our communication. In close cooperation with Grundfos, we have made unique pump solutions that are delivered to us fully customised and optimised to match our customers' requirements."

**Tommy Rysholt Andersen**
**CEO FOAMICO**

FOAMICO®

Industrial applications operate in demanding conditions. These unique demands require unique and intelligent solutions that can be customised for every system. Grundfos iSOLUTIONS utilises intelligent pumps, cloud connectivity and on-demand digital services to achieve a new level of system optimisation and monitoring. So, no matter the industrial application, you can reduce system stress, downtime, maintenance and system complexity, while lowering life-cycle costs.

## GRUNDFOS iSOLUTIONS


### INTELLIGENT PUMPS

Intelligent pumps can react and operate autonomously based on system demands in order to optimise the entire system's performance. They are easily connected to the Grundfos iSOLUTIONS cloud or your own monitoring system.

### INTUITIVE CLOUD DASHBOARDS

The Grundfos iSOLUTIONS cloud gathers system data into one intelligent cloud platform that performs advanced data processing for industrial applications. The cloud delivers the output to simple and intuitive dashboards on your laptop, tablet or smartphone. And it's based on the trusted Microsoft Azure platform, providing full data security.

### DIGITAL SERVICES ON DEMAND

Grundfos iSOLUTIONS also offers a range of service packages. These include remote control, predictive maintenance, historical data trending, alarms and warnings, as well as installation and application performance.

### COMPLETE CUSTOMISATION COMES WITH THE FOLLOWING BENEFITS

**MODULAR APPROACH**
Using our standard components to make tailor-made solutions for your system means that customisation is fast and easy.

**BUILDING FROM SCRATCH**
In co-operation with your development team our engineers can handle complex customisation challenges and provide the right, customer-specific solution for the job.

**EASY RE-ORDERING**
Customised solutions receive their own product numbers and as such become standard solutions to you .

TEMPERATURE CONTROL:

# REGULATE SPEED STABILISE COSTS

- COOLING TOWER
- HEATING
- CHILLER UNITS
- HEATING UNITS
- SOLAR PANELS
- GEO THERMAL

In industrial applications, ensuring the right process temperature is essential to production efficiency, reliability and the quality of the end products. But too often, systems are unnecessarily complex and operate at full speed no matter the load. With our intelligent solutions, you will get full control of temperatures with fewer components and a complete overview of your system's performance.

## E-SOLUTIONS

**CONSTANT OPERATION TEMPERATURE**
Maintain constant temperatures in the process, for instance in moulding tool applications, to ensure even material flow and short curing time.

**CONSTANT FEED TEMPERATURE**
Ensure constant feed temperatures to, for instance, heat exchangers, boiler shunts and assisting chemical/biological processes.

**CONSTANT RETURN TEMPERATURE**
Ensure that boilers and heat exchangers do not operate below desired operating temperature.

**CONSTANT DIFFERENTIAL TEMPERATURE**
Regulate the differential temperature across a heat exchanger, hydronic heating system or cooling tower to maintain an even temperature transfer or provide stable conditions for secondary regulating devices

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Monitor a long range of process parameters and connect directly to the overall process control through digital and analogue signals.

**LIMIT EXCEED**
Enable your system to change operating patterns or notify you directly if a specific process parameter exceeds a pre-set limit.

**CONTROL OF EXTERNAL EQUIPMENT**
Control external equipment according to the pumps' operating points, i.e. three-way valve.

**MULTIPLE TEMPERATURE MEASUREMENT**
Use one measuring point for three purposes: Primary control parameter, differential temperature measurement and limit-exceed response.

**VALVE CONTROL**
Control the opening and closing of motor valves with the timer functions in the pump.


WASH & CLEAN:

# GET THE PRESSURE YOU NEED TO GET THE JOB DONE

- HYGIENIC CLEANING
- PROCESS WASHING
- PART WASHING

In wash and clean applications, challenges are plentiful: How to fit powerful pumps in small cabinets? How to prepare the system for sudden variations in flow? How to cope with hostile environments? Grundfos solves all these challenges and more by adding intelligence to the process.

## E-SOLUTIONS

**HIGH SPEED – OVERSYNCHRONOUS OPERATION**
Get a high RPM in a very compact pump design. Ideal for installations where space is limited, such as portable equipment and installation in cabinets.

**RUN AT POWER LIMIT**
Get full load power output, but optimal overload protection. Allows for operation with undersized motors.

**HIGH AMBIENT TEMPERATURE**
Pumps operate at ambient temperatures of up to 60°C. The system initiates self-protection measures if limits are exceeded.

**ENVIRONMENTAL RATING SUITABLE FOR TOUGH ENVIRONMENT**
Motors are delivered in IP55 environmental rating, but can be opened to IP54 where large variations at ambient temperatures occur. Also available in real outdoor version NEMA 4 or in an IP65 environmental rating.

## GRUNDFOS iSOLUTIONS

**DRY-RUNNING PROTECTION**
Avoid overheating and pump damage caused by dry-running. The direct connected Liqtec dry-running protection detects lack of water and too high liquid temperatures.

**SET POINT INFLUENCE**
Avoid cavitation or excess pressure across the chamber stack by adjusting the set point of the pump. Parameters include pre-pressure, flow, temperature, etc.

**BREAK TANK AND FEED PUMP CONTROL**
Control one or more feed pumps as well as the level in the feed tank from the main pump control.

**CONTROL OF EXTERNAL EQUIPMENT**
The operating point of the pump can control external equipment, i.e. compressors for air injection and/or dosing pump for detergent and disinfection agent during foam dispensing.

BOILERS AND SYSTEMS:

# MAKE VALVES REDUNDANT

- STEAM BOILER FEED
- HOT WATER BOILER
- CONDENSATE PUMPING
- SHUNT
- THERMAL OIL BOILER
- MAKE UP SYSTEMS
- STEAM GENERATORS

As much as 70% of all boiler systems run inefficiently. And often this can be traced back to the level control system in the boiler feed. With our E-Solutions you can reduce pressure loss across feeding valves, or you can go with a Grundfos iSOLUTION and control the level directly. This will make valves redundant and make your boiler system more simple and efficient.

## E-SOLUTIONS

**CONSTANT PRESSURE**
Frequency drives allow you to maintain constant pressure in boiler systems operating with feed valves on one or multiple boilers.

**CONSTANT LEVEL**
Set the pump for direct level control and eliminate both feed valve and bypass. This allows for smaller pumps, because the pumps do not have to compensate for pressure loss in the feed valve and flow through the bypass.

**PUMP CURVE STABILIZING**
Unstable pump curves can be stabilized with the built-in pump control. You avoid the regulating challenges associated with flat pump curves.

**RUN AT POWER LIMIT**
Run pumps at full load power output but with optimal overload protection. This allows for operation with undersized motors.

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Monitor the process, get useful data to improve performance and connect directly to the overall process control.

**FEED PUMP CONTROL**
Control one or more feed pumps from the main pump control.

**CONTROL OF EXTERNAL EQUIPMENT**
Control external equipment, e.g. bypass valves, according to the pumps' operating points.

**SET POINT INFLUENCE**
The boiler pressure may influence the set point of the pump. Reduce the pump's discharge pressure when the boiler pressure is low to avoid cavitation during start-up and blow out.

**DUTY STANDBY/DUTY ASSIST**
Manage boiler feed systems with two pumps in duty/standby configuration directly or set the pumps up to assist each other when the nominal flow is exceeded in order to prevent cavitation.


DESALINATION:

# FILTER AWAY UNNECESSARY COSTS

- FEED WATER SYSTEM
- PRE-TREATMENT
- RO-FILTRATION
- BACK WASH
- FLUSHING SYSTEMS

Designing an efficient desalination system is no easy feat. Constant variations in water quality, flux rates, fouling, etc. make it difficult to keep membrane performance high and maintenance low. Our intelligent solutions help you overcome these challenges by offering you a highly flexible system that adapts to the operating conditions, while protecting the membranes and guaranteeing a high yield.

## E-SOLUTIONS

**CONSTANT PRESSURE**
Maintain constant pressure for membrane filtration systems to keep the flux stable even under scaling and fouling conditions. Avoid pressure hammers with soft start function for membrane protection and enhanced lifetime.

**PRECISE RAMP CONTROL**
Fast acceleration to just below operating pressure and a gentle regulation to duty pressure protects thrust bearings and avoid pressure shocks to the diaphragm.

**PRE-SET OPERATING POINTS**
The E-pump can be set up to operate with several predefined set points, in order to provide the necessary pressure for either production, flushing or backwash.

**BALANCED FLOW**
The E-pump can be set up to mix flow from two sources in a constant ratio, i.e. mix concentrate water back in the feed line on an RO-system in a ratio 1:3.

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Monitor the entire process and connect directly to the overall process control through a variety of industrial busses. Processes, not directly related to the pump operation, can be measured through an abundance of both digital and analogue inputs and outputs.

**SET POINT INFLUENCE**
Actual regulation parameter i.e. pressure or flow, can be influenced by temperature, concentration and other parameters in order to operate the filtration unit at highest efficiency.

**LIMIT EXCEED**
Enable your system to change operating patterns or notify you directly if a specific process parameter exceeds a pre-set limit, i.e. pressure drop across membrane, flow or power consumption.

**BACKWASH CONTROL**
Enable system to initiate back wash sequence, controlling main pump, back wash pump, dosing pump and valves by measuring the condition of the filter. The sequence can be set up through a combination of measurements and timer function.

WATER TREATMENT:

# RELIABILITY IN EVERY STEP OF THE PROCESS

- AERATION
- COAGULATION
- FLOCCULATION
- PARTICLE REMOVAL
- DISINFECTION
- STABILISATION
- WATER QUALITY
- MEASUREMENT

Water treatment is the process of preparing water for a specific end-use and the range of applications is as wide as the range of water sources. But whether you are looking to treat aggressive media like seawater or produce ultrapure water for medical use, an intelligent pump system will ensure that you get the perfect results every time – with increased efficiency and system reliability.

## E-SOLUTIONS

**CONSTANT LEVEL**
Set pumps to direct level control, keeping constant level in a process, sedimentation or flocculation tank. Variable speed level control offers continuous flow to the tank, without the disturbances associated with on/off control.

**BALANCED FLOW**
Set up pumps to mix flow from two sources in a constant ratio, i.e. mix recovered water with fresh water in a specific ratio, i.e. 1:5.

**CONSTANT PRESSURE**
Maintain constant pressure at all times regardless of shifting flow demands.

**PRESSURE LOSS COMPENSATION**
Set pumps to compensate for pressure loss in pipes, valves, heat exchangers, etc. – either by internal flow estimation or by actual flow measurement.

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Grundfos iSOLUTIONS opens for monitoring and surveillance of additional process parameters, and the ability to connect directly to the overall process control through a variety of industrial busses. Processes, not directly related to the pump operation, can be measured through an abundance of both digital and analogue inputs and outputs.

**PROCESS SURVEILLANCE**
Get a full overview of the entire water treatment process. Monitor a long range of relevant parameters and program the system to react when necessary, i.e initiate a backwash sequence in a filter application in case of clogging.

**EXTERNAL CONTROL**
Set up a multi-pump unit to operate and appear as one single pump (open loop) and be controlled from external control system – or simply operate at constant set point feed from the central process control.

**BREAK TANK AND FEED PUMP CONTROL**
Control of level in the feed tank and constant pressure from the feed pump can be operated from the main pump control.

INDUSTRIAL WASTEWATER:

# DON'T WASTE YOUR TIME ON INEFFICIENT PUMP SYSTEMS

- PUMPING STATIONS
- PRIMARY CLARIFICATION
- BIOLOGICAL PROCESS
- SECONDARY CLARIFICATION
- FILTERERING
- CHEMICAL TREATMENT
- WASTEWATER TRANSPORT
- BACK WASH
- FLUSHING SYSTEMS

Designing an efficient desalination system is no easy feat. Constant variations in water quality, flux rates, fouling, etc. make it difficult to keep membrane performance high and maintenance low. Our intelligent solutions help you overcome these challenges by offering you a highly flexible system that adapts to the operating conditions, while protecting the membranes and guaranteeing a high yield.

## E-SOLUTIONS

**CONSTANT LEVEL**
Direct level control offers continuous flow to the tank and a constant water level at all times.

**BALANCED FLOW**
Set up pumps to mix flow from two sources in a constant ratio, i.e. mix recovered water with fresh water in a specific ratio, i.e. 1:5.

**CONSTANT PRESSURE**
Maintain constant pressure from min. to max. flow – and below min. flow if combined with a diaphragm tank. Pressure response to various shifting flow demands can be trimmed to any process or load profile.

**PRESSURE LOSS COMPENSATION**
Set pumps to compensate for pressure loss across filters and mixers, etc. – either by flow estimation or by remote pressure measurement.

**PARALLEL-COUPLED PUMPS**
Connect up to four pumps and operate as one. The control will secure smooth pump switching in and out, while maintaining low energy consumption.

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Monitor a long range of process parameters and connect directly to the overall process control through digital and analogue signals.

**PROCESS SURVEILLANCE**
Secondary parameters can be measured and trigger events, i.e. initiate a high flow sequence through a pipeline if sedimentation is detected.

**BACK WASH CONTROL**
Enable system to initiate back wash sequence, controlling main pump, back wash pump, dosing pump and valves by measuring the condition of the filter. The sequence can be set up through a combination of measurements and timer function.

**BREAK TANK AND FEED PUMP CONTROL**
Control of one or more feed pumps can be operated from the main pump control. Level control in the break tank can be controlled and supervised from the main pumps.

**EXTERNAL CONTROL**
A pump unit can do surveillance and monitoring, and feed process data to the process control, while it simply operates at constant set point feed from the overall control system.

INDUSTRIAL WATER SUPPLY:

# THE WATER YOU NEED – WHERE YOU NEED IT AND WHEN YOU NEED IT

- PRESSURE BOOSTING
- SYSTEM CONTROL
- LIQUID TRANSPORT
- LEVEL CONTROL
- FILTRATION
- MEMBRANE FILTRATION
- SEDIMENTATION
- FLOCCULATION
- MICROFILTRATION
- ULTRAFILTRATION
- REVERSE OSMOSIS

Ensuring sufficient and reliable water supply throughout an industrial facility at all times demands an intelligent water supply system – whether the challenge is pressure boosting or liquid transport. Our intelligent solutions have been carefully developed to offer you the water you need when you need it – regardless of the application and your water consumption pattern.

## E-SOLUTIONS

**CONSTANT PRESSURE**
Maintain constant pressure from min. to max. flow – and below min. flow if combined with a diaphragm tank. Pressure response to various shifting flow demands can be trimmed to any process or load profile.

**CONSTANT LEVEL**
Set pumps to direct level control, keeping constant level in a process, sedimentation or flocculation tank. Variable speed level control offers continuous flow to the tank, without the disturbances associated with on/off control.

**BALANCED FLOW**
Set up pumps to mix flow from two sources in a constant ratio, i.e. mix recovered water with fresh water in a specific ratio, i.e. 1:5.

**PRESSURE LOSS COMPENSATION**
Set pumps to compensate for pressure loss in pipes, valves, heat exchangers, etc. – either by internal flow estimation or by actual flow measurement.

**PARALLEL-COUPLED PUMPS**
Connect multiple pumps and operate as one. The control will secure smooth pump switching in and out, while maintaining low energy consumption.

## GRUNDFOS iSOLUTIONS

**COMMUNICATION**
Grundfos iSOLUTIONS opens for monitoring and surveillance of additional process parameters, and the ability to connect directly to the overall process control through a variety of industrial busses. Processes, not directly related to the pump operation, can be measured through an abundance of both digital and analogue inputs and outputs.

**PROCESS SURVEILLANCE**
Get a full overview of the entire water treatment process. Monitor a long range of relevant parameters and program the system to react when necessary, i.e initiate a backwash sequence in a filter application in case of clogging.

**EXTERNAL CONTROL**
Set up a multi-pump unit to operate and appear as one single pump (open loop) and be controlled from external control system – or simply operate at constant set point feed from the central process control.

**BREAK TANK AND FEED PUMP CONTROL**
Control of level in the feed tank and constant pressure from the feed pump can be operated from the main pump control.

MACHINING INDUSTRY:

# PRECISION IS EVERYTHING

- CNC MACHINES
- TURNING
- DRILLING
- MILLING
- GRINDING
- EDM
- LIFTING STATIONS
- FILTRATION
- CONVEYORS
- PART WASHING
- COOLING

Machining industry is a challenging area with a high demand for precise and fast pump control. Even the smallest imprecision in flow or pressure might reduce the quality of the end-products, increase the wear on tools and slow down production – especially when cooling CNC or grinding tools. Grundfos E-Solutions and Grundfos iSOLUTIONS will ensure that your production runs trouble-free and at full speed, while offering you full control at all times.

## E-SOLUTIONS

**CONSTANT PRESSURE**
The E-pump is able to quickly start and deliver constant pressure in any operating point required by selected tools

**HIGH SPEED – OVERSYNCHRONOUS OPERATION**
High rpm for very compact pump design, suitable for installations where space is limited, i.e. installation in cabinets or machine centers.

**PRE-SET OPERATING POINTS**
Set up the E-pump to operate with several predefined set points to provide the necessary pressure for various demands.

## GRUNDFOS iSOLUTIONS

**LIMIT EXCEED**
Enable your system to change operating patterns or notify you directly if a specific process parameter exceeds a pre-set limit.

**SET POINT INFLUENCE**
Avoid cavitation or excess pressure across the chamber stack by adjusting the set point of the pump. Influence parameters include pressure, flow, etc.

**RUN AT POWER LIMIT**
Get full load power output, but optimal overload protection. Allows for operation with undersized motors.

# WHY CHOOSE GRUNDFOS iSOLUTIONS?

Grundfos iSOLUTIONS is the intelligent approach to optimal pump system and application performance. It offers all the benefits of our pump specific E-Solutions, but adds a whole range of new features based on your specific demands. The result is improved reliability, performance and energy efficiency. Let's have a recap of some of the most prominent ways Grundfos iSOLUTIONS can upgrade your system.

**PROCESS OPTIMISATION**
Monitor pump influencing conditions and control other equipment to ensure optimum operation of the entire process.

**COMMUNICATION**
Open up for monitoring and surveillance of additional process parameters and connect directly to the overall process control through a variety of industrial busses.

**LIMIT EXCEED**
Enable your system to change operating patterns or notify you directly if a specific process parameter exceeds a pre-set limit.

**MULTIPLE TEMPERATURE MEASUREMENT**
Use the same measuring point for three purposes: As a primary control parameter, as part of a differential temperature measurement for set point influence or as a limit exceed response.

**DRY-RUNNING PROTECTION**
Avoid overheating and pump damage caused by dry-running. The directly connected Liqtec dry-running protection detects lack of water and too high liquid temperatures.

**UNDERLOAD DETECTION**
Enable your system to detect cavitation or loss of prime in the pump and stop operation before damage occurs.

**SET POINT INFLUENCE**
Link the primary control parameter to an external signal or internal measurement and automatically adjust it to best suit the process conditions.

**BREAK TANK AND FEED PUMP CONTROL**
Control and supervise the break tank level and the feed pump directly from the motor to save wiring and other control components.

**PROCESS SURVEILLANCE**
Measure a range of secondary para-meters and program a proper response.

**CONTROL OF EXTERNAL EQUIPMENT**
Control external equipment according to the pumps' operating conditions, e.g. open bypass valves, start air injection or control mixing loop.

**VALVE CONTROL**
Avoid overheating and pump damage caused by dry-running. The directly connected Liqtec dry-running protection detects lack of water and too high liquid temperatures.

**BACKWASH CONTROL**
Enable system to initiate backwash sequence, controlling main pump, backwash pump, dosing pump and valves by measuring the condition of the filter. The sequence can be set up through a combination of measurements and timer function.

**SET POINT INFLUENCE**
Avoid cavitation or excess pressure across the chamber stack by adjusting the set point of the pump. Influencing parameters include pre-pressure, flow, temperature, etc.

**BREAK TANK AND FEED PUMP CONTROL**
Control of one or more feed pumps can be operated from the main pump control. Level control in the feed tank can be controlled and supervised from the main pumps.

**EXTERNAL CONTROL**
Set up a multi-pump unit to operate and appear as one single pump (open loop) and be controlled from external control system – or a pump unit can do surveillance and monitoring, and feed process data to the process control, while it simply operates at constant set point feed from the overall control system.

**Global reach. Local presence.**

Grundfos is a global leader in advanced pump solutions and a trendsetter in water technology. We offer a full range of intelligent pumps, motors, drives, sensors and controls designed to optimise pump systems in all applications. By combining pump system expertise with vast application knowledge, we tailor solutions to match your specific demands.

Our mindset might be global, but with more than 50 local sales divisions and 23 production companies, our presence is indeed local. With Grundfos as your partner, you can expect premium solutions, face-to-face consultancy and unmatched service.

To learn more go to
**www.grundfos.com/market-areas/industry**



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