

CUSTOMISED PUMP SOLUTIONS
Optimised for water treatment

Get upgraded. Twice.

A double upgrade for water treatment

Your first upgrade: The CRE with three-phase motors

You already know the electronically controlled CRE pump range and how it combines reliability and efficiency thanks to the integrated frequency converter in its MGE motor.

You have also heard that the new generation of CRE pumps are fitted with three-phase, dual-voltage MGE motors specially designed by Grundfos.

These new CRE pumps:

are even more efficient
are even more robust
have a very wide power supply range
incorporate a duty/standby function, and
seriously improve stock management.

You may even have heard that they are matched to different pump applications with a range of different functional modules.

But there's even more in store for you.

Your second upgrade: Software to optimise water treatment

The improved MGE motors are good news for everyone. You, however, are a special case. You already know the benefits of using CRE pumps for water treatment:

- High pressure
- Reliable pumping
- Minimum downtime
- Energy savings

Now you get even more. The Grundfos experts can now add sophisticated software to further customise the CRE range to specific situations. And water treatment of all sorts – including desalination and concentrating food liquids – has received special attention.



More wants more ...

Water treatment specialists can derive great benefits from the full range of Grundfos solutions for water treatment applications. Highlights include the Grundfos Alldos dosing pumps and booster modules developed specifically for SWRO. The full water treatment portfolio for measurement and control is also worthy of note.





Designed to solve challenges

Challenge	Solution	See page
Combining high pressure with accurate control Ensuring the required NPSH	Water treatment requires very high pressure. With the right software and sensors, your customised CRE will monitor e.g. media levels and saturation, ensuring that any dosing is kept smooth – and the pressure high.	5, 11
Achieving smooth curve characteristics	A customised solution can monitor the load at all times – e.g. with secondary sensors – and adjust performance to prevent problems	5, 7
Saving energy	The software compensates for unstable curves, always choosing the right setpoint for optimum performance	6, 11
Maintaining long membrane lifetime	A pressure exchanger will let you recover much of the energy created by water let out at high pressure	5
Withstanding high temperatures	A customised CRE can be set to start slowly, prolonging membrane life. After the gentle start, it moves into oversynchronous operation to meet your pressure demands.	5
Getting full control	Excellent tolerance for high ambient temperatures. Automated derating optional.	9
System integration/BUS communication	Embed the functionalities and get the data readouts you want. Full access to BUS communication for constant information and control.	5, 9
System design	Getting more power from your pump lets you design more compact systems	5





The pumps are perfected.

The customisation options of the CR range goes even further than a choice of materials, connection options, and details. Now, CRE speed-controlled pumps can be optimised with special software, too.

Now go for complete control.

Sophisticated code optimises your pumps

After decades of development, the mechanics of your Grundfos pumps and motors are virtually as good as they can get. So our design team went on to harness the power of computers.

Always adapting, always efficient

Inside the customised CRE pumps, digital wonders work tirelessly to analyse input and make small adjustments all the time, helping you get more efficient water treatment. It's that simple on the outside. But rather complex on the inside. See below for more – and turn to “The Science Bits” on p. 8 for details.

High pressure meets accurate control

Reverse-osmosis water treatment requires high pressure, which the right CR pump can certainly deliver. But it takes more to be truly successful: getting the right pressure above the membrane is crucial for efficiency – and for the results. For example, the pump should be able to adjust performance at the onset of clogging.

With the right software and sensors, your customised CRE will monitor and respond to the parameters of your choice, such as media levels and saturation. This is useful in many contexts, e.g. when mixing liquids from several sources: limit levels are met, smooth dosing is kept right on target at all times, and so on.

Control parameters include:

- Constant permeate condensate flow
- Constant pressure above membrane
- Constant flow
- Constant pressure at output

The wealth of control options also helps maintain the required net positive suction head (NPSH), eliminating problems with cavitation.

Pressure exchanger recovers energy

In reverse osmosis, reject is also let out at high pressure. That pressure represents a lot of energy which could be recovered.

We might, for example, recommend using a pressure exchanger to essentially swap the water inside the system, making you system much more efficient. This process requires careful control, prompting our engineers to come up with the very best – e.g. ceramic parts with tolerances down to 1/1000 mm.

Keeps membranes fit for longer

With the right software, your CRE pump can be set to start slowly, which is much gentler on the membrane. After the gentle start, the pump will gradually go into oversynchronous operation to meet your pressure demands – and give you all the other benefits that greater power from a smaller pump entails.

Withstand rough environments

The CRE pump is very robust in itself, and its updated electronics let it withstand temperatures up to 65 degrees Celsius. Customised software adds to the strength with the automated derating option that responds to excessive heat by having the pump operate at lower power. A tough pump just got tougher.

Connect and control with BUS communication

A Grundfos CRE solution lets you stay informed and keep full control of your process. You can get connected via GeniBUS, Profibus, MODbus, LON Works and much more. The Grundfos PC tool also gives access to highly detailed fine-tuning, moving in behind the scenes to control every last detail.

Make no compromises. Save money anyway.

Getting the right, customised E-pump solution can save you money on energy recovery. On maintenance. On membrane replacement. And it also lets you save on the initial investment. By integrating the motor, pump, and frequency converter, Grundfos CRE pumps eliminate the need to combine separate valves and bypass systems – often expensive and very demanding in terms of servicing – with external controllers and standard pumps.

With a customised CRE, you get a solution that's more compact, easier to install, and perfectly integrated. In a new, upgraded version that withstands higher temperatures and has even greater scope for customisation. You get Grundfos quality, but you actually end up paying less.

Physical adjustments? Of course!

For special applications, we might recommend certain changes to the pump itself. For example, a titanium version might be preferable to ensure corrosion-resistance and hygiene, or special ceramic parts for perfect control. As the CR is designed to be fully customisable, all this can be done with ease at our factory. For recommendations on material choice, seal materials, etc., contact us.



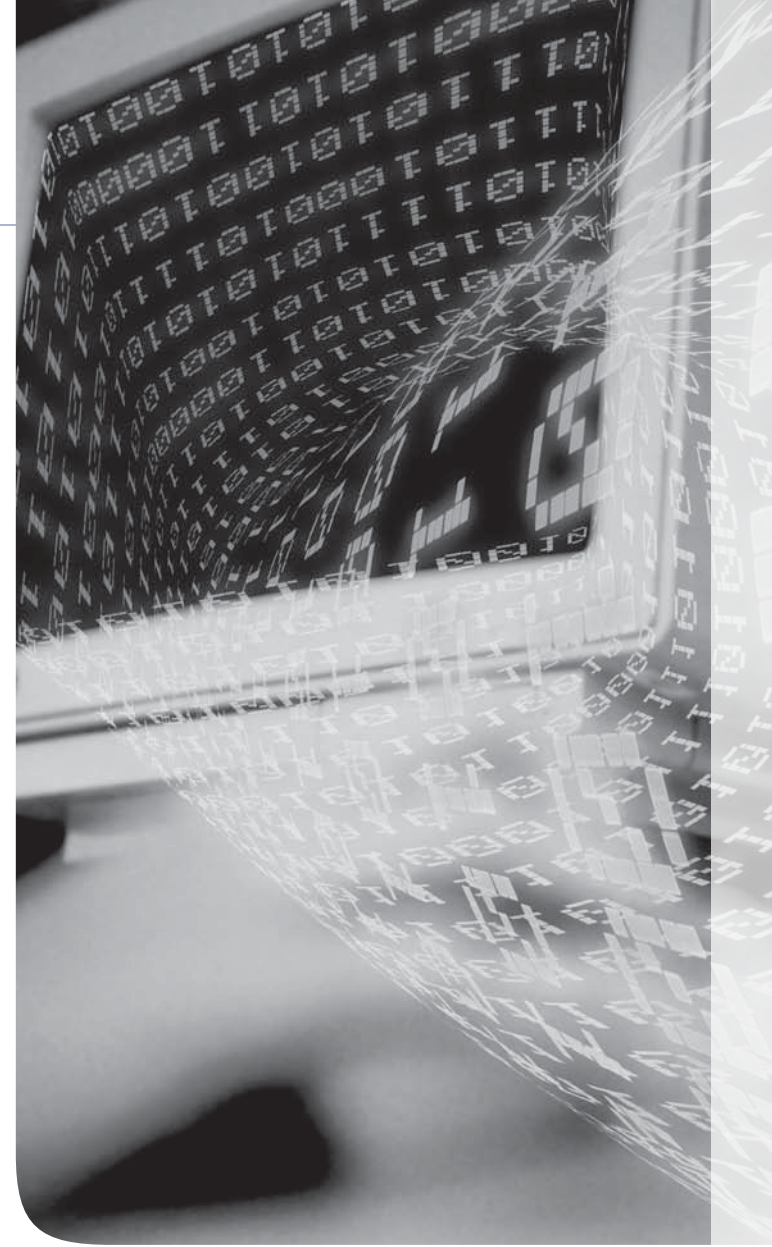
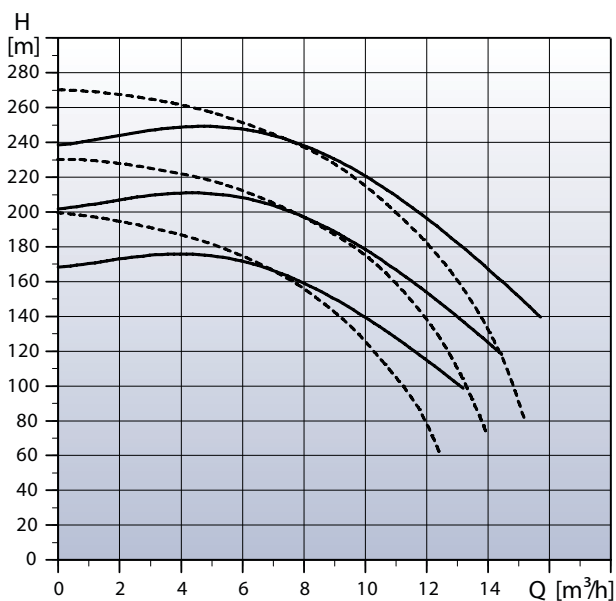
Optimising water treatment pumps with software

We stretch the pump curves for you

By getting software tailor-made for you, you can make your pumps operate outside their set pump curves – and choose the right setpoints to compensate for unstable curves. You get efficiency so high it almost goes against the laws of nature. Basically, the rules don't apply to you anymore. To see how we can stretch pump curves to suit you, turn to "The Science Bits" on p. 11

So how do we get the pump to choose the right point? With computer power. By fiddling with the electronics, our experts persuade the pump to decrease its rpm as the flow demand increases. In effect, the pump mimics a weaker motor when you need it to – e.g. to protect membranes at start-up – but keeps its strength for when you don't.

Over-synchronous operation gives the pump curve the right inclination – you get a flat curve for good efficiency. The customised code creates a smooth curve where there's only one right setpoint, so there's no risk of getting the pressure wrong. From the outside, the pump now has very different characteristics. And is much more efficient. All this by just pulling back a little – otherwise we'd have to use poorer pumps! Sometimes the best results are achieved by pulling your punches. For more details, see "The Science Bits" on p. 11.



Straightening the pump curve optimises the pump for your task.

Maintaining the right pressure above the membrane is crucial to ensure quality processes

The right combination of sensors and software allows you to monitor virtually anything – and to get swift, smooth responses to any changes.

Upgrade your customers

Customised water treatment software gives you many direct benefits. But of course an optimised system also brings advantages that you can pass on to your clients. Here's a list of things you can pass on to your customers when you take the Grundfos CRE upgrade.

- Eff1 motors save energy, generate less heat, may prompt government subsidies and can promote a greener image
- The unbeatable combination of high pressure and high precision ensures reliable processes and high product quality
- No downtime thanks to cutting-edge supervision and protection
- Reduced membrane wear
- Low net positive suction head (NPSH) ensures efficient cavitation prevention; ideal whenever you deal with high temperatures and challenging inlet conditions.
- Superior reliability – a result of high-quality pumps, high ambient temperature tolerance, etc.
- Constant flow through membrane

Of course, you can also pass on the opportunity to have a customised solution to your clients. If they have special requirements or challenges, talk to us. Maybe we can change things with just a few lines of code.





The Science Bits:
More details for those who want them

Your upgrades explained

The “Science Bit” is exactly what it says: It is where those with a keen interest in technical matters can check out how your dedicated system upgrade was created.

Creative software. Made for you.

The latest advances in software allow us to create completely customised solutions with very compact object code. Basically, that means our designers are free to think creatively about how water treatment can be improved. And because it's all done with software, they can target your challenges very, very specifically, making the hardware do exactly what is best for you. Nothing else.

Essentially, we change the hardware without touching it. You won't see any difference. Your installations remain the same. But it feels like you have a different, more powerful and more accurate pump installed.

Customised software optimises your system

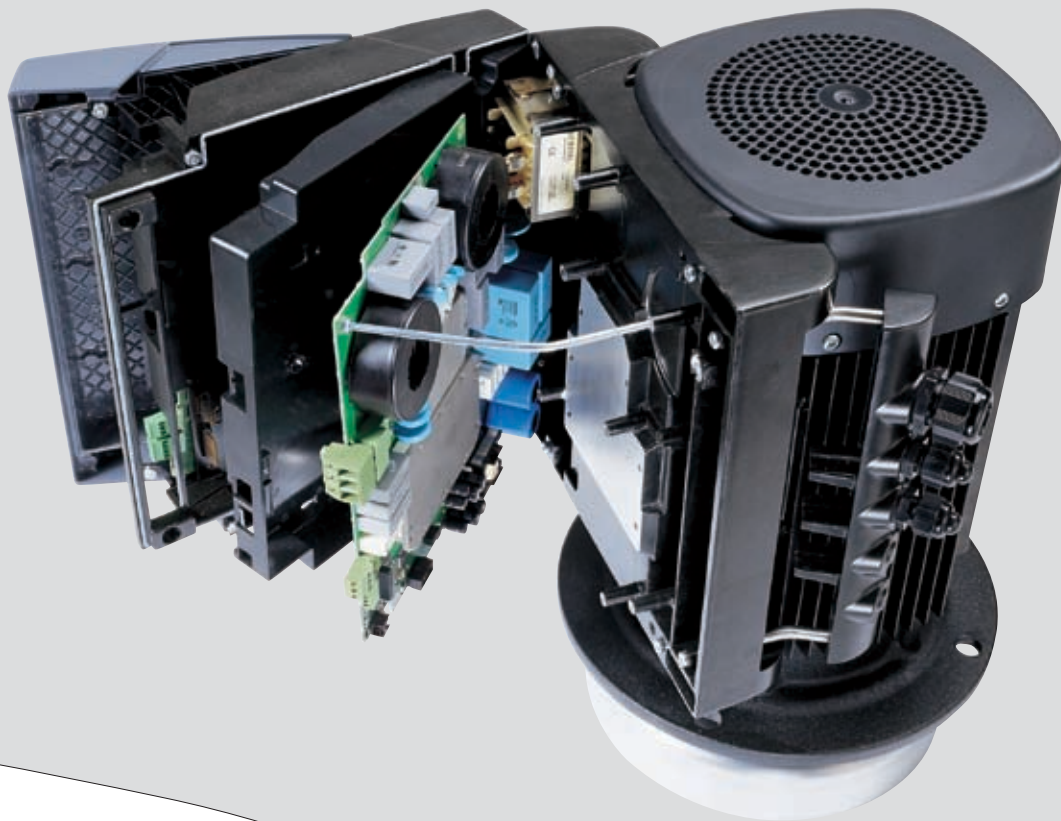
You can have code made just for you. That means we check out your system and find out exactly what the pumps need to do to – for example to keep the pressure high and addition of chemicals even. Then we set them up to respond to sensor inputs by increasing or decreasing their speed.

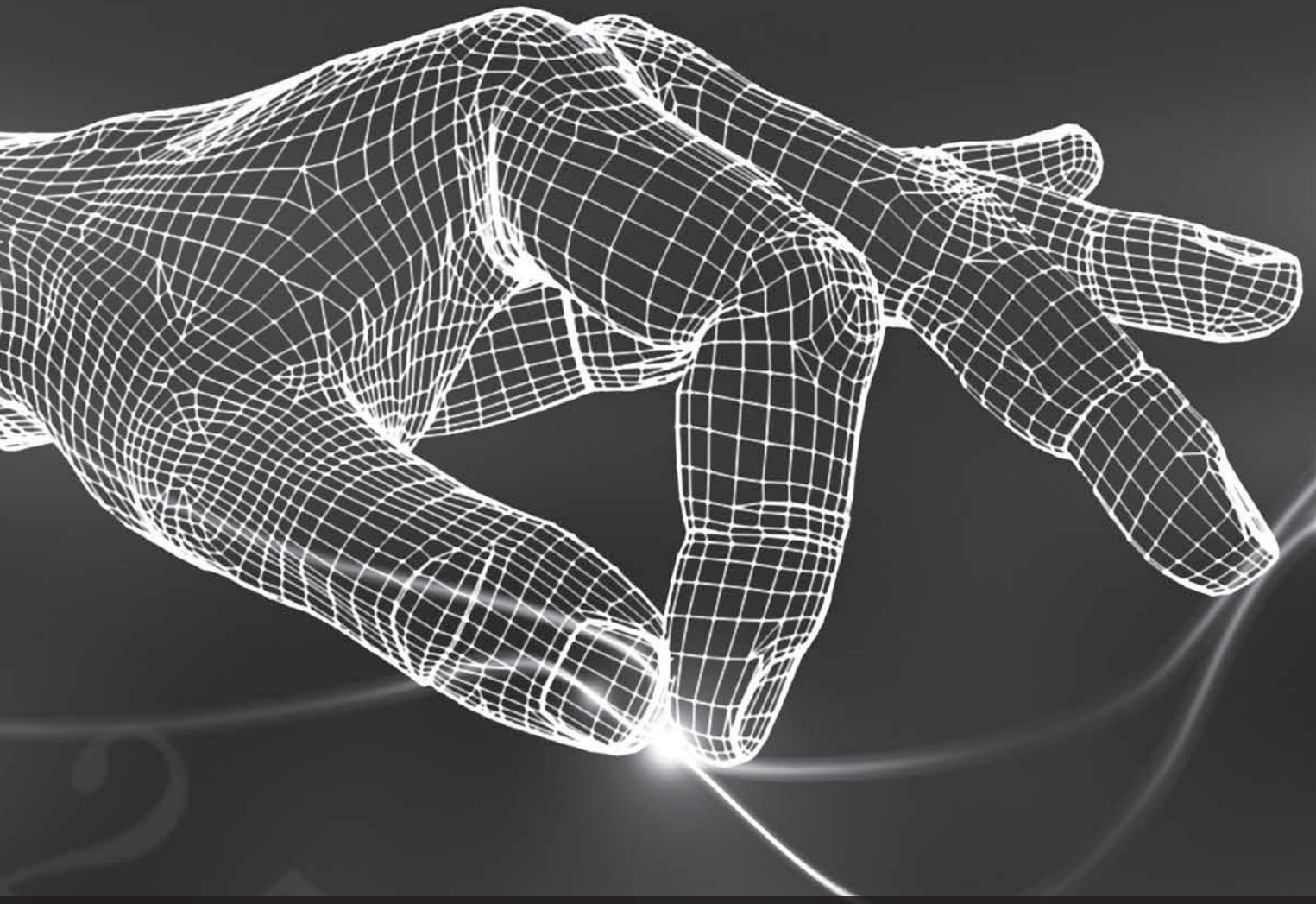
You're welcome!

Customised software does more than optimise efficiency. It also essentially puts down the welcome mat and say “Come on in!” You get the functionalities you want embedded into the motor. And access to the data you want. Some customers prefer to let the MGE handle the operation loop, while others go for other control options. You can get it all from us.

Be your own expert with the Grundfos PC tool!

For those who want to carry out their own adjustments, the Grundfos PC tool gives you full access to optimising your software.





The Science Bits:

Push and pull the pump curve with software

Pressure and precision. All the time.

Water treatment by means of reverse osmosis requires high pressure and high accuracy.

Regulation must be carried out within a narrow window; you need fast, yet smooth responses to changes in operating conditions – e.g. clogging. That presents special challenges. And is often costly.

Sensors and software meet specific demands

Grundfos has met those challenges with a combination of sensors and customised software. For example, we might use a level sensor to monitor water levels or saturation instead of pressure – our experts know that it's impossible to get an accurate "spot" reading of pressure. Combined with software to make the pumps take appropriate countermeasures, such a system can seriously reduce costs. All thanks to a lot of expertise, ingenious use of sensors, and a little bit of code.

The rules don't apply to you anymore

Go beyond the set pump curves with Grundfos software

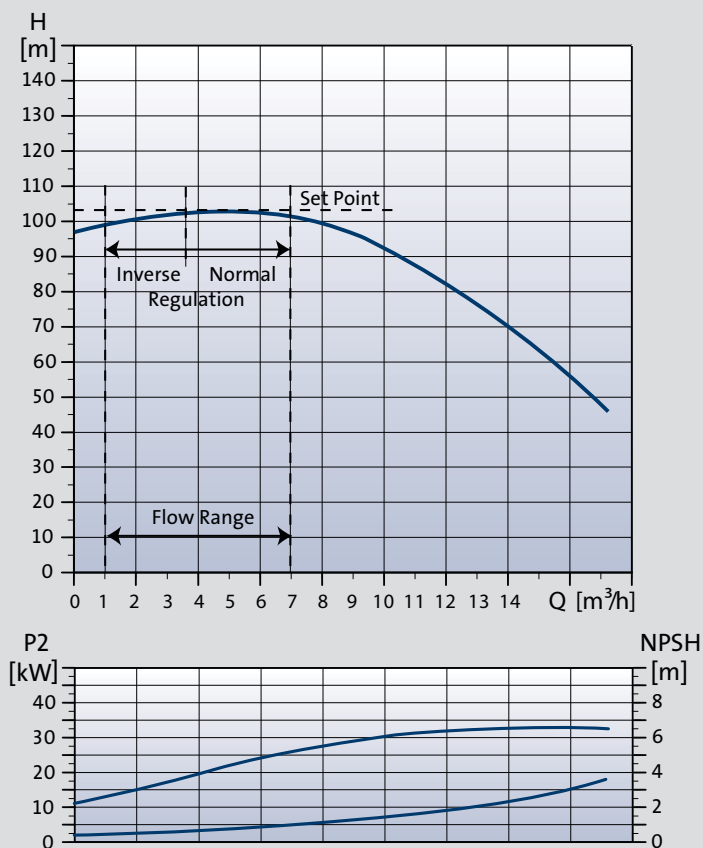
A very important benefit of the Grundfos software is its ability to compensate for so-called 'unstable' pump curves. Effectively, it lets you go beyond the "official" pump curves to combine high pressure with high efficiency.

One of the unique features of water treatment in RO systems is that you want very high, yet adaptable pressure. In most applications, you would strive to reach a position on the right-hand side of the pump curve. But in water treatment, the demand for high pressure means you want to be near the vertical axis. That presents certain challenges.



Two matching setpoints? Your CRE picks the right one.

These days, a desire to make standard pumps as efficient as possible in standard applications means that they have unstable pump curves: the pressure falls as the curve approaches the vertical axis. As a result, you get two points that would match theoretically the pressure setpoint. But getting the wrong one could disrupt the treatment process. But with customised software, your CRE will pick the right one every time.



The CR range from Grundfos

Grundfos was the first company ever to develop a multistage in-line pump. The present-day CR pump series is the most extensive in-line pump programme on the market and remains second to none. With many innovative features unique to Grundfos, CR pumps provide superior reliability and the lowest possible cost of ownership to customers worldwide.

Customisation made easy

In order to meet all customer requirements with complete precision, Grundfos has developed a unique mix-and-match approach to customised pumps. The elements of the CR range can be combined any which way to create the solution that is exactly right for you.

Grundfos: a pump for every purpose

Impressive as the CR range is, Grundfos offers much more. A complete range of pump solutions means that all applications – industrial and domestic – can benefit from the Grundfos touch.

Customers can always rely on our complete dedication to quality and service.