

INNOVATION INSIDE



The Inside Story

› Grundfos motor

Grundfos makes its own motors to ensure maximum performance. The MG motors are remarkably silent and highly efficient. They are also available in the self-regulating MGE configuration, featuring an integrated frequency converter.

› Cartridge seal

The specially designed cartridge seal increases reliability, ensures safe handling and enables easy service and access.

› Shaft seal solutions

The cartridge shaft seal configuration comes in a wide choice of materials. It is available in flushed seal, double seal and magnetic drive configurations. Handles temperatures from -40°C to 180°C.

› Connection options

The Grundfos CR can be connected to any system.

› Dry-running sensor

The patented Grundfos LiqTec system eliminates the risk of breakdowns due to dry running. If there is no liquid in the pump, the LiqTec will immediately stop it.

› High-performance hydraulics

Pump efficiency is maximised by state-of-the-art hydraulic design and carefully crafted production technology.

› Durable bearings

The CR bearings are remarkably long-lived thanks to hard-wearing materials and a wide range of options for difficult liquids.

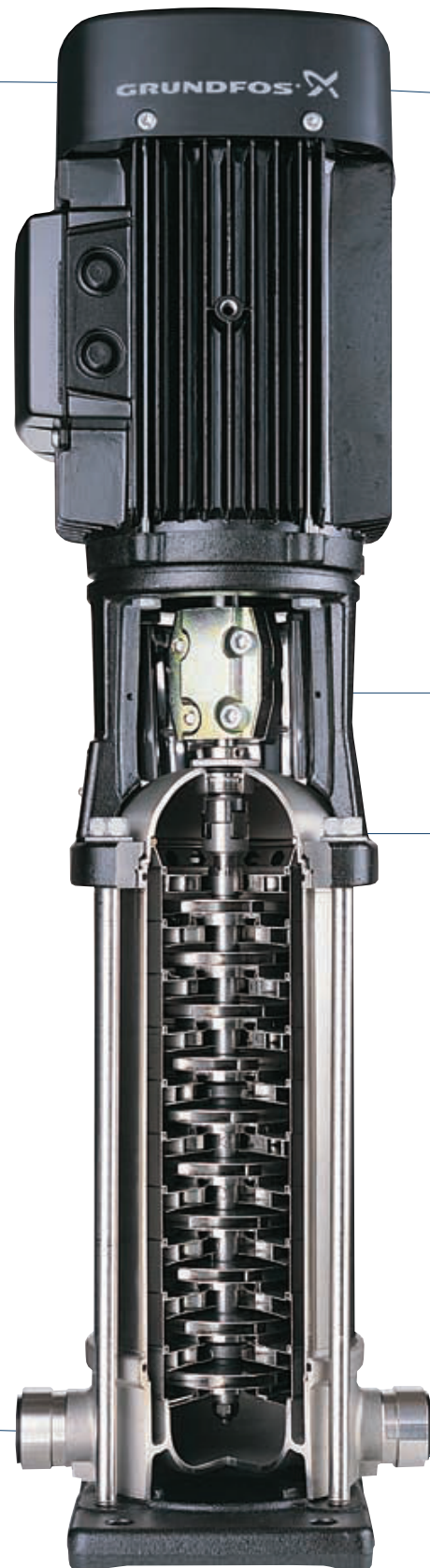
› Material options

The CR is available in four different materials: titanium, stainless steel AISI 316, stainless steel AISI 304, and AISI 304/cast iron.

› Wide range of sizes

The CR comes in 11 flow sizes and hundreds of pressure sizes, ensuring that you can always find exactly the right pump for the job.

To many, innovation is just a buzzword. At Grundfos, innovation is an integrated feature of all our products. After all, it's what's inside that matters.





The **complete** Grundfos CR range:

The last word in multistage pump technology

Grundfos was the first pump manufacturer ever to create a multistage in-line pump. Known as the CR pump, this innovative design has inspired followers all over the world. Even so, continuous development and innovation ensure that the Grundfos CR remains unmatched.

The CR of today reflects the needs and requirements of customers worldwide. We know this, because we asked you first. All development work at Grundfos is carried out with the end-users in mind; never for its own sake. The latest improvements provide:

Superior reliability

Unmatched cost efficiency

The most extensive range on the market

The new generation of Grundfos CR pumps features a full range of sizes and limitless scope for combinations to suit your specific needs. At Grundfos, innovation is about making things better. And we focus our effort where it matters: inside.

Reliability in real life

The CR is renowned for its reliability. And rightly so. The CR design has all the durability that customers expect from a high-quality multistage pump – and then some. We have added unique features to ensure unsurpassed reliability: dry-running protection, a unique cartridge seal, and a full-titanium variant.

Extreme conditions call for extreme reliability. Less demanding applications need fewer special features. The virtually endless range of standard and customised CR pumps means that you can always find the right pump, no matter what your requirements may be.

Superior dry-running protection

Dry running is the most common cause of pump failure. In most pumps, the shaft seal and bearings will burn out almost immediately if liquid stops flowing in the pump.

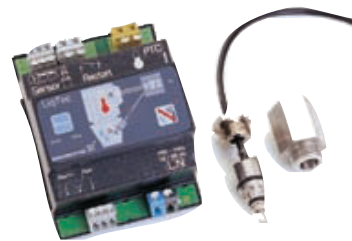
The Grundfos CR is different. As part of our constant dedication to innovation, we have tested new and alternative



materials to bring you the best possible solution. This means that we can equip CR pumps with a shaft seal and bearing system that can withstand extreme heat and friction for longer periods of time. This makes them less unforgiving if the pump does run dry.

The Grundfos LiqTec: checking for liquid 24 hours a day

For those who need to avoid dry-running altogether, the Grundfos LiqTec is the answer. Available with all CR pumps, the LiqTec is plug-and-play technology at its very best. Ever vigilant, the LiqTec constantly checks that there is liquid in the pump. If there isn't, it stops the pump immediately. With the Grundfos LiqTec, you always have someone watching your pump.



In the event of dry running, the Grundfos LiqTec immediately shuts down the pump before any damage is done

RELIABILITY

Unique cartridge seal design

The CR deserves an outstanding seal. So do you. The seal used in the CR line combines the best features of standard seals, wrapped up in an ingenious cartridge design that provides unique advantages. All of these ensure extra reliability.

The durable seal is made from hardwearing materials which prevent downtime and prolong the lifetime of the seal. All axial movement has been eliminated, preventing wear of the shaft and rubber parts – a typical problem area for traditional seals. The cartridge seal is a balanced type seal, a fact which makes it less insensitive to pressure.

We know, however, that even the best of materials are not necessarily enough to guarantee success in real life. That is why the innovative team at Grundfos set out to eliminate the small, yet crucial, factors that can have a negative impact on pump reliability. Many of these have to do with handling, assembly and service.

Safe and easy handling

The peerless cartridge design ensures that the seal components will never be assembled wrongly, the spring will never be incorrectly preloaded, and that sensitive surfaces will never be subjected to greasy fingers or dirt. All these factors are common causes of short seal lifetimes in other pumps.

The cartridge design also enables rapid replacement when the seal ultimately does need changing after a long period of service. All in all, downtime is minimised. Naturally, this translates into significant savings for your business.

The cartridge design allows you to replace the seal in minutes – without special tools and without dismantling the pump.



With unfailing attention to reliability, the Grundfos engineers have designed an innovative cartridge seal that can be replaced within minutes. And that is just one of the remarkable benefits it offers.





All Grundfos pumps are thoroughly tested before they leave the factory.

Heavy motors can stay in place with the Grundfos spacer coupling

Minimising downtime is also part of reliable operation. That is why Grundfos has eliminated a major nuisance for owners of large pumps. Now, it is no longer necessary to remove heavy motors to replace the seal: The innovative spacer coupling, unique to the CR range, means that all motors weighing more than 35 kg can be left in place during seal replacement.



When nothing else will do: The titanium CR

After dry running, corrosive liquids are the second-most common cause of pump failure and shortened pump lifetimes. High-grade stainless steel makes the Grundfos CR very resistant to corrosion, but for extremely demanding applications, true reliability requires the titanium touch.

The CR is the only pump of its kind to come in a full-titanium variant. Now a financially viable alternative, titanium offers a reliability which other materials simply cannot match. Not even a decade of full immersion in salt water will leave a blemish on the metal surface.

Reliability in production

At Grundfos, we practice tight control over every aspect of the production process. Absolutely nothing is left to chance. Our production is certified in accordance with the strictest international standards (ISO 9001) and subjected to rigorous process control.

Remarkably, each CR pump is tested before leaving the factory. Every single one. They are tested for performance, power consumption, and static pressure. This careful testing is the only way to be certain that all pumps meet the standards you have a right to expect from a Grundfos CR solution.

Reduce the **real costs**

Electricity is the most expensive part of any pump. This simple fact is often overlooked when pumps and prices are compared, so it is worth repeating here.

It may still surprise some to learn that the purchase price and maintenance costs account for less than 15% of the total life-time cost of a pump. Obviously, this means that electricity accounts for a staggering 85% or more of the total costs. So if you want to save money, that's what you should look at.

Efficiency Class 1 motors – the best efficiency you can get

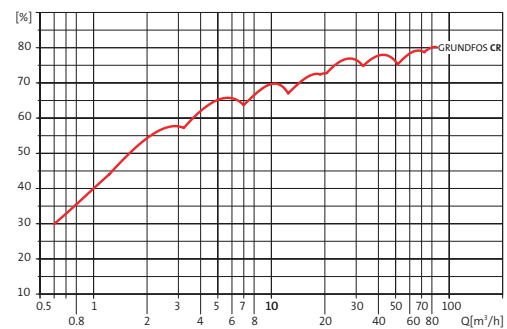
The Grundfos CR makes a real difference. All 3-phase 50Hz motors used in the CR range bear the EFF1 mark; clear proof that they are as efficient as pump motors can get. See the table below to find out just how much electricity you can save.

Other benefits of EFF1 pumps

While energy savings are the main benefit of EFF 1 motors, it's worth noting that they are also quieter than standard motors - they require less cooling, so their fans are smaller and less noisy. The lower motor temperature also means that EFF1 motors tolerate higher ambient temperatures - up to 60C.



CR pump efficiency



This table shows the unique efficiency of the Grundfos CR pump programme.

Efficient pumps, efficient motors

Application type	Typical duty point	Operating hours per day	Average kWh reduction per year with CR	Average kWh reduction per year with MG motors	Total reduction per year
Water supply	80 m³/h at 6 bar	24 hours	18500 kWh	5200 kWh	23700 kWh
Water treatment	2 m³/h at 15 bar	15 hours	3200 kWh	600 kWh	3800 kWh
General industry	6 m³/h at 10 bar	10 hours	2200 kWh	400 kWh	2600 kWh

The hydraulics of the CR pump are very efficient in themselves. When they are combined with EFF1 motors, the savings really add up. This table shows you the savings you can expect – year after year.

EFFICIENCY

Improve efficiency with the right pump

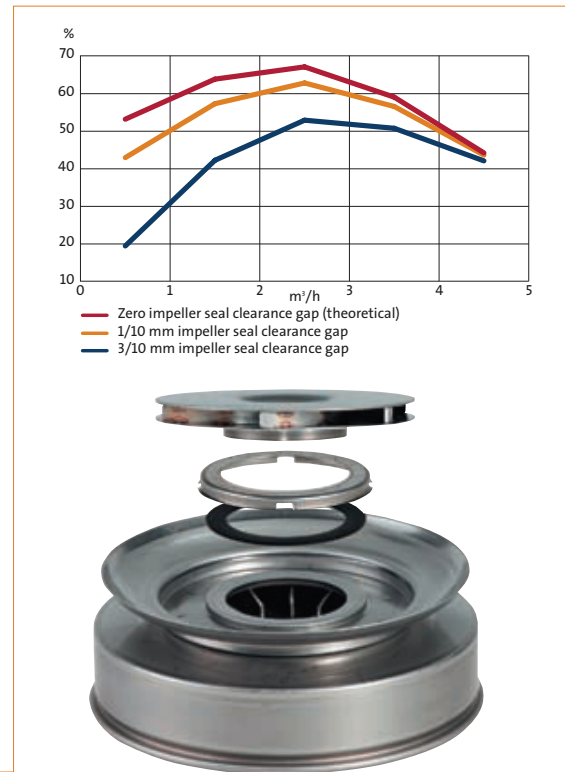
Getting the best possible overall efficiency out of your pump makes financial sense. The narrow interval between CR pump sizes allows you to eliminate the efficiency drop associated with over-dimensioned pumps.

By minimising the difference between pump capacity and the required pressure and volume, you get a pump which runs as close to its optimum duty point as possible. That makes it as cost-efficient as possible. And the CR family is sure to have exactly the right match for you.

Careful research behind real improvements

These days, pumps have evolved to a point where extremely small margins decide their final efficiency level. Always keen to accept a challenge, the Grundfos hydraulic engineering teams have carried out painstaking research into fluid dynamics to break new ground and find new ways to improve the CR.

The result of their development work is very concrete: a **10% increase in pump efficiency**. This translates into a power reduction of 15-20% for the CR pumps. When your pumps are in operation many hours a day, such improvements provide substantial savings – year in and year out.



1

All good things come in threes

A 10% increase in pump efficiency is an impressive result, and it was not achieved in one go. It took three innovative improvements to create the total effect.

Internal leakage caused by pressure differentials within the pump was minimised. Tests on pumps similar to a CR3 have shown that an impeller seal clearance gap of just 0.1 mm between the impeller and the chamber causes a 5% drop in efficiency. The reason for this efficiency loss is quite simply that when liquid seeps out into the pump, precious energy is wasted on circulating that liquid. To reduce internal leakage to an absolute minimum, Grundfos uses a floating seal ring between chambers. This provides a close to perfect seal.



2

An enhanced impeller design ensures a more streamlined flow in the impeller, reducing eddy flow and friction losses. Tiny margins determine the success of the final result, so Grundfos aimed for the very best. We developed a highly specialised laser-welding technology which facilitates unmatched accuracy. This technology literally makes dreams come true, allowing for a seamless transition from the sketchpad to real life. We use it to bring you impellers of truly superior design and construction, aiming for the point of theoretical perfection.



3

State-of-the-art production technology guarantees the best possible results and gives the CR pumps the final edge. At Grundfos, we develop our own tools and processes to ensure a perfect match between what we want to do and the tools we use to do it. We never settle for less than ideal solutions when it comes to making your pumps. The final outcome is products with near-perfect geometries and tolerances, reflecting the care that has gone into the research and development stages.

Does a smaller motor sound good to you?

The 10% increase in pump efficiency caused by these improvements very often means that a smaller motor can be used to power the pump at a given duty point. Of course, smaller motors equal savings on both initial investment costs and running costs.

Innovation with practical applications

When innovative skill is aimed at creating practical results, everybody benefits from it. By continuing to apply new and proven knowledge, the Grundfos CR team raises the bar for multistage pump efficiency and performance. This means that you can rest assured that with a CR pump, you get the best there is.

The CR range from Grundfos

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

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.