GRUNDFOS **CR**

INNOVATION INSIDE

BE › THINK › INNOVATE ›

GRUNDFOS

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.

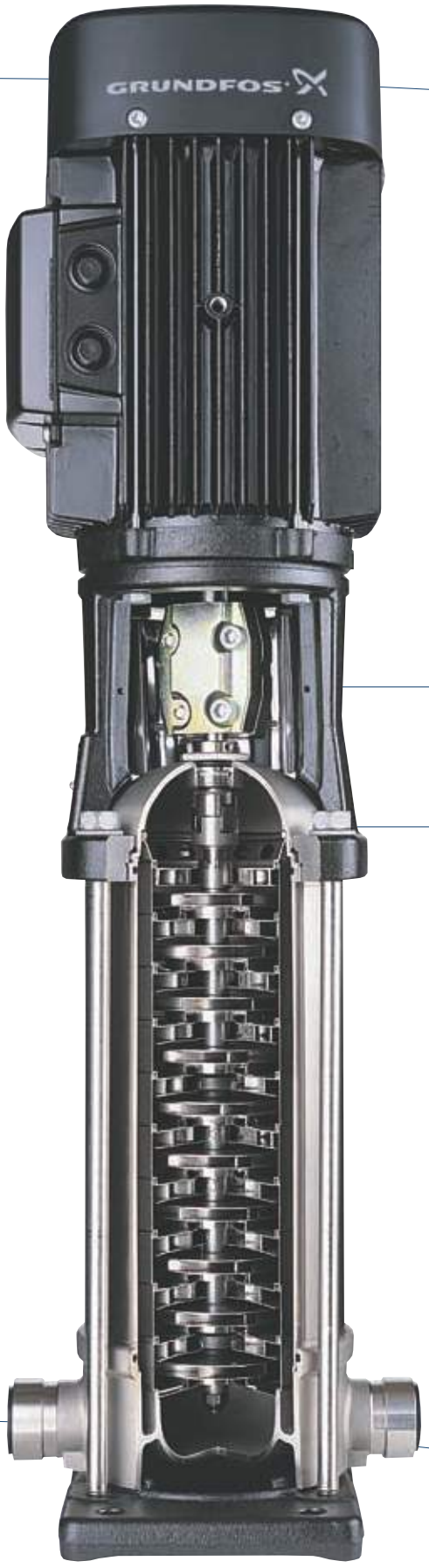
Dry-running sensor
The patented Grundfos LiqTec system eliminates the risk of breakdowns due to dry running. If there is no liquid in the pump, the LiqTec will immediately stop it.

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.

It’s reliable. And we can prove it.

The boiler feeding process reads like a shortlist of extreme pump conditions: high temperatures, long operating hours, frequent starts/stops, pressure pulsing, and poor inlet conditions. This makes it even more remarkable that the Grundfos CR is the first choice for such operations worldwide.

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.

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.

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

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.

Let’s talk money!

All Grundfos products are built to last. Our customers demand long-term solutions, so Grundfos pumps bring you the lowest total life-cycle costs. For example, we have reduced the CR’s electricity consumption so much that all 3-phase motors are marked EFF1 for their efficiency..

Reduce the real costs

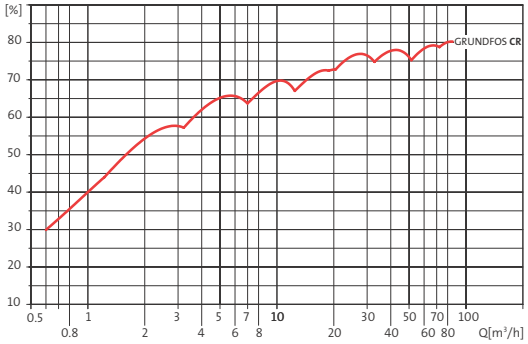
Electricity is the most expensive part of any pump. This simple fact is often overlooked when pumps and prices are compared, so it is worth repeating here.

It may still surprise some to learn that the purchase price and maintenance costs account for less than 15% of the total lifetime 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 EFF! 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 tolrate 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.

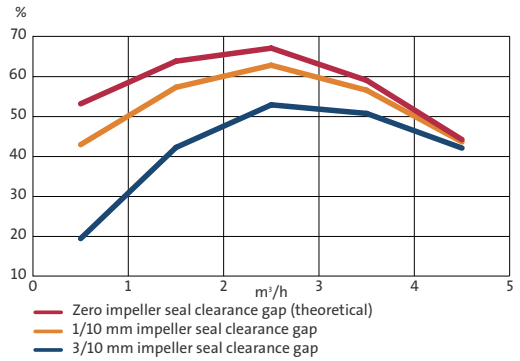
EFFICIENCY

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.

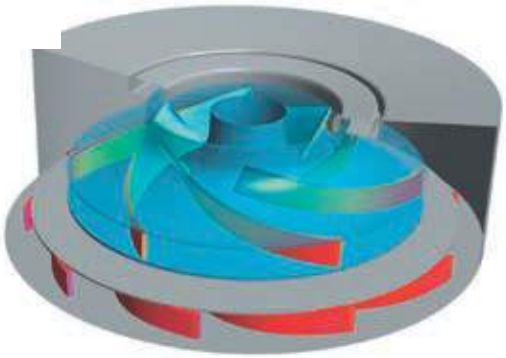


1

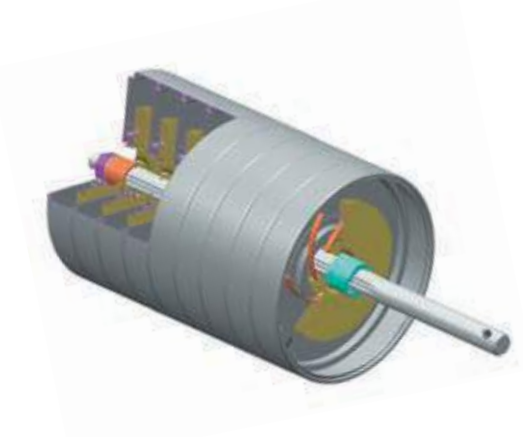
Internal leakage caused by pressure differentials within the pump was minimised. Tests on pumps similar to a CR3 have shown that an impeller seal clearance gap of just 0.1 mm between the impeller and the chamber causes a 5% drop in efficiency. The reason for this efficiency loss is quite simply that 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.

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.



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.

What you need. Guaranteed.

Tough pumps for difficult liquids: the Grundfos CR pump series is so wide ranging and offers so many opportunities for customised solutions that even the most extreme of requirements can be met.

All your needs covered

Choosing the right pump can be quite hard. While it is easy enough to find a pump that will do the job, it gets trickier when you want an exact match. And there are many good reasons to avoid over-capacity, with energy conservation coming in right at the top of the list. The CR programme lets you choose pumps which exactly match your system demands.

Infinite variety

The CR range is without parallel on the world market. Available in 11 pump sizes, four basic materials and a number of configurations near the one million mark, the CR programme is the most extensive and comprehensive around. You can get CR pumps with magnetic drives, with air-cooled shaft seal chambers, with double shaft seals, etc. Special CR pumps are available for high-pressure performance, for aggressive liquids, and much more. And there is a CR pump for almost any liquid you could possibly want to pump.

The CR range meets all challenges	
Aggressive or corrosive liquids	Seawater, hypochlorites, hydrochloric acid, ferric chloride, nitric acid, chromic acid
Abrasive liquids	Metasilicate, abrasive cleaners/degreasers, phosphates
Toxic or explosive liquids	Trichloroethylene, toluene, petrol, ethyl alcohol, methyl alcohol
High-viscosity liquids	Glycols, lubricating oils, vegetable oils
Hardening liquids	Paints
Crystallising liquids	Glycol additives, naphthalene, sugar products (e.g. dextran), salts
High pressures	Water treatment, cleaning/washing
Extreme temperatures	Oils, boiler feed, secondary coolants

The CR range is available in four different basic materials:

CR
Stainless steel AISI 304 with a cast iron top and base.

CRI
Stainless steel AISI 304 throughout.

CRN
High-grade AISI 316 stainless steel throughout.

CRT
Titanium throughout.

The Grundfos CRE: Ultimate solutions

Add the final touch with a variable-speed motor
Some matches are truly made in heaven. To accommodate the many situations where the required flows and pressures vary considerably over time, the CR pumps can be supplied with a variable-speed motor that continually adapts pump performance to match current conditions. Known as the CRE series, these pumps combine the very best of pump technology with sophisticated motors developed by Grundfos with optimum efficiency in mind. The result is a range of pumps without peer in the market today.

The CRE pumps represent a happy union between high-quality pumps and superior variable-speed motors.
Here, a variable-speed motor is used to give the final touch.

Intelligent solutions to complex situations
Grundfos makes its own motors. That means you can be sure of a perfect match between all the technologies involved. And the net result is intelligent solutions that will take care of everything you need, carefully controlling even the most complex of processes and delivering the exact flow and pressure required.

Do you need constant pressure? Constant differential pressure? Stable PH levels? Specific temperatures? Carefully timed operation? The E-pumps from Grundfos can give you all this and much more.

Communication options
The E-solutions from Grundfos allow you to define industrial processes down to the smallest detail. They can also be remote-controlled and/or linked to management systems of your choice for perfect interaction. CRE offers unique possibilities of monitoring the performance and the result of the performance as well as controlling the pump performance. Or both in the same solution.

Ultimate efficiency
Variable speed can certainly yield constant benefits. With their ability to change speed to suit the demand, no more and no less, you never spend energy generating pressure you do not require. The electronically controlled motors also give the final touch to the already highly efficient Grundfos CR immersible pumps, saving even more energy. Naturally, this contributes to a very low total Cost of Ownership.

Available in all variants
The entire CR range can be fitted with a variable speed motor, meaning that you can enjoy the benefits of the CRE model regardless of what your other requirements may be.

In short, the combination of Grundfos motor technology and pump expertise guarantees ultimate efficiency. The CRE is a perfect example of the whole being even greater than the sum of its parts.

Create your own

The CR pump can be customised to meet individual requirements with unparalleled ease. This is due to the Grundfos "mix and match" approach to customisation, where the many pump features and options should be regarded as modules that can be combined to create the ideal pump for the job at hand.

In everyday production, Grundfos manufactures a so-called standard range of CR pumps. This in no way represents the full potential of the CR technology, but should simply be regarded as a reflection of general market demands. In effect, the standard range is a shortlist of the most popular and widely applicable multistage solutions around today.

Special designs on request
It is more than likely that we will be able to create exactly the right pump for you by combining the elements and options already available within the CR range. But if you have special requirements or a specific design in mind, let us know. We will do our best to provide full satisfaction.

Motor options
CR motors are available in many different configurations to meet the requirements presented by the power supply, the pumping environment and/or the pumped liquid itself.

- Power supply systems vary in terms of both frequency and voltage, and protection methods also differ greatly around the world.
- Your environment may be explosive, very hot and/or very humid. Special conditions also apply at great altitudes.
- The liquid pumped can call for a special motor solution. High or low viscosities and/or high or low densities may require non-standard motor sizes. You may also need an explosion-proof variant.

Shaft seal options
Sometimes extreme liquids call for extreme measures.

- High temperatures damage seal faces unless precautions are taken.
- Concern for safety can necessitate special measures for aggressive, toxic or explosive liquids.
- Liquids can be harmful to shaft seals because they crystallise, harden or are extremely abrasive.

Pump options
The CR pump elements can handle the most demanding of liquids and pressures and be adapted to suit many other requirements.

- Horisontal installation if height is a limitation
- Poor inlet conditions mean that NPSH values must be adjusted to avoid cavitation.
- Very high pressures demand special solutions.
- You may also need special surface treatments or certificates.

Connection options
Your chosen pump elements can be fitted with exactly the connection options you need. All standards are covered, and special connection variants are available for maximum compactness, high liquid pressures, and so on.

MIX AND MATCH – WITH EXPERT ADVICE

The Grundfos CR range offers the perfect way to create a completely customised solution. The highly skilled Grundfos specialists are always ready to help you combine the various modules in the best possible way.

Single phase

Single-phase motors

Four pole

Four pole motors

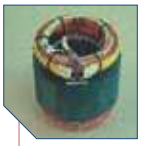
High efficiency

CEMEP Eff1 motors

Explosion proof

ATEX approved

Motor heater



Anti-condensation unit

Seal face

Many seal face materials available

Rubber

Variety of rubber (O-ring) materials

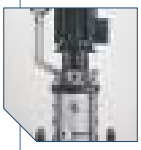
Titanium

All-titanium shaft seal

Non-cartridge solution

Any EN12756 shaft seal

Air-cooled



Liquid up to +180°C

High pressure

Pump pressure up to 45 bar

Horizontal mounting

When height is limited

All stainless steel

Stainless steel base plate, flanges & motor stool

Certificates issued

Many pump & material certificates available

Low temperature

Liquid temperature down to -40°C

CR oval flange

Internal thread (BSP)

CR flange

DIN, JIS and ANSI flange

CRI/CRN PJE

Victaulic coupling

CRI/CRN flange

DIN, JIS and ANSI flange

CRI/CRN clamp

Compact clamp system

Boiler feed

Fire fighting

Industrial washing

Water treatment

Industrial cooling

Harting plug

Industrial multiple plug

CSA/UL approved

Canadian / US approval

Protection

PTC sensor or thermal switch

Oversized or undersized

Alternative viscosity or density

Voltage

Special voltage

Enclosure class

Alternative IP class

Mounting

Alternative terminal box position

MAGdrive

Magnetic coupled pump

Double back-to-back

Leakage-proof double seal design

Intensifier

Barrier fluid solution for back-to-back seal

Barrier fluid, dosing pump

Barrier fluid solution for back-to-back seal

Double, Tandem

Flushed seal (Quench)

Alternative colour

Customised paint finish

Bearing flange

For high inlet pressures

Rubber parts

Variety of rubber (sleeve sealing)

Low NPSH

For poor inlet conditions

LiqTec sensor

For dry running/ motor protection

Pulley head

For non-electric driver, e.g. diesel

Bearing materials

Variety of pump bearing materials

Surface treatment

Electro polished, cleaned or silicone-free

CRI/CRN oval flange

Internal thread (BSP)

CRN TriClamp

Pharmaceutical/ food industries

CRI/CRN union

External thread (+GF+)

CRT PJE

Victaulic coupling, all-titanium

Custom connection

Customer specified solutions

Car washing

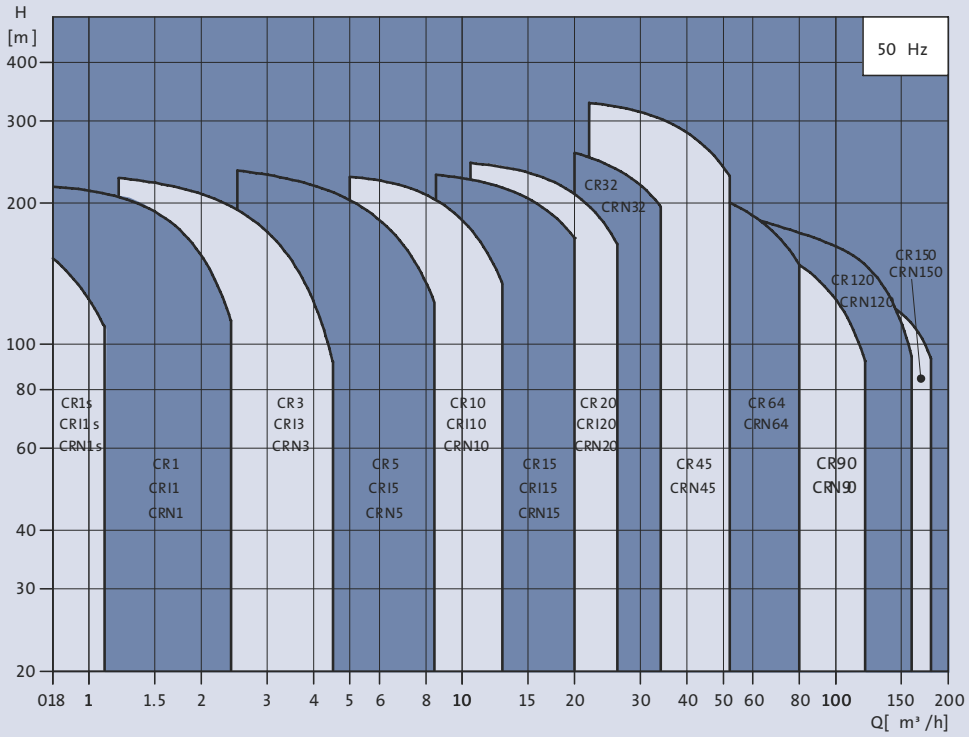
Bleach factory

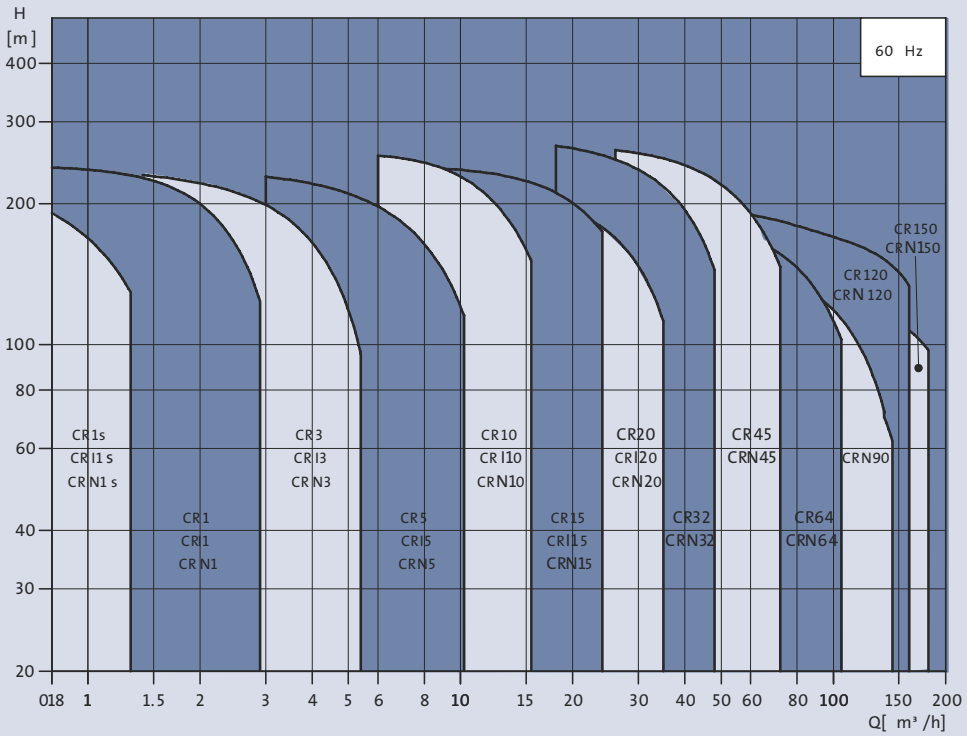
Petro-chemical

Sea water

Chemical liquids

CR Performance Range





Performance curves and technical data

	CR 1s	CR 1	CR 3	CR 5	CR 10	CR 15	CR 20	CR 32	CR 45	CR 64	CR 90	CR 120	CR 150
Range:													
Temperature range (°C)	–20 to +120							–30 to +120					
On request (°C)	–40 to +180							–40 to +180					
Max. pump efficiency (%)	35	48	58	66	70	72	73	78	79	80	81	75	72
Flow range (m³/h)	0.3-1.1	0.7-2.4	1.2-4.5	2.5-8.5	5-13	9-24	11-29	15-40	22-58	30-85	45-120	60-160	75-180
Version:													
CR (AISI 304/Cast Iron)	x	x	x	x	x	x	x	x	x	x	x	x	x
CRI (AISI 304)	x	x	x	x	x	x	x						
CRN (AISI 316)	x	x	x	x	x	x	x	x	x	x	x	x	x
CRT (Titanium)		x*	x*	x*	x*	x*							
CR pipe connection:													
Oval flange (BSP)	Rp 1	Rp 1	Rp 1	Rp 1¼	Rp 1½	Rp 2	Rp 2½						
On request (BSP)	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1	Rp 1¼ Rp 2	Rp 2½	Rp 2						
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50	DN 65	DN 80	DN 100	DN 100	DN 125	DN 125
On request					DN 50	DN 65	DN 65	DN 80	DN 100	DN 125	DN 125	DN 150	DN 150
CRI pipe connection:													
Oval flange (BSP)	Rp 1	Rp 1	Rp 1¼	Rp 1¼	Rp 1½	Rp 2	Rp 2						
On request (BSP)	Rp 1¼	Rp 1¼	Rp 1	Rp 1	Rp 2								
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50						
On request					DN 50	DN 65	DN 65						
PJE coupling (Victaulic)	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1¼	Rp 2	Rp 2	Rp 2						
	DN 32	DN 32	DN 32	DN 32	DN 50	DN 50	DN 50						
Clamp coupling (L-coupling)	Ø48.3	Ø48.3	Ø48.3	Ø48.3	Ø60.3	Ø60.3	Ø60.3						
Union (+GF+)	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2¾	Rp 2¾	Rp 2¾						
CRN pipe connections:													
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50	DN 65	DN 80	DN 100	DN 100	DN 125	DN 125
On request					DN 50	DN 65	DN 65	DN 80	DN 100	DN 125	DN 125	DN 150	DN 150
PJE coupling (Victaulic)	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1¼	Rp 2	Rp 2	Rp 2	Rp 3	Rp 4	Rp 4	Rp 5	Rp 5	Rp 5
	DN 32	DN 32	DN 32	DN 32	DN 50	DN 50	DN 50						
Clamp coupling	x	x	x	x	x	x	x						
Union (+GF+)	x	x	x	x	x	x	x						
CRT pipe connections:													
PJE coupling (Victaulic)		x*	x*	x*	x*	x*							
Flange (on request)		x*	x*	x*	x*	x*							

*CRT 2,4,8 and 16.

BE > THINK > INNOVATE >

Being responsible is our foundation
Thinking ahead makes it possible
Innovation is the essence

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.

VENTURE I/S
V716 9660 0803