INNOVATION INSIDE

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GRUNDFOS

The Inside Story

Grundfos motor
Grundfos makes its own motors to ensure maximum performance and low noise operation up to and including 22 kW. They are also available in the MGE configuration which is a GRUNDFOS MG motor with integrated frequency converter. All motors delievered from Grundfos (0.75-75 kW) are IE3 as standard.

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 offers a wide range of materials. Shaft seal solutions are available in tandem seal, back-to-back seal and magnetic drive configurations and it can handle temperatures from -40°C to 180°C (oil up to 240°C).

Connection options
The Grundfos CR range offers many variant of connections like DIN, ANSI and JIS flanges, PJE (Victaulic), clamp etc.

Dry-running sensor
The patented Grundfos LiqTec system (optional) eliminates the risk of breakdowns due to dry running. If there is no liquid in the pump, the LiqTec will immediately stop the operation. If the motor is provided with PTC sensor they can be connected to the PTC relay in the Liqtec.

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 wear resistant 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 13 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 the essence of all our products.

After all, it's what's inside that matters.

The complete Grundfos CR range:
The latest word in multistage pump technology

Grundfos was the first pump manufacturer ever to create a multistage in-line pump. Although much copied, 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.

The latest innovations inside the CR range:

CR 120 + 150
A single CR can now pump up to 180 m3/h with IE3 motors up to 75 kW. The biggest of its kind!

CRN MAGDrive
A uniquely efficient magnetic drive developed exclusively for the CRN. For when the pump must never leak.

CR Monitor
24/7 monitoring and supervision of critical parameters in your process. This unique monitor predicts pump failures long before they occur.

For more information go to **www.grundfos.com/cr**

SUPERIOR RELIABILITY

UNMATCHED COST EFFICIENCY

THE MOST EXTENSIVE RANGE ON THE MARKET

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 low NPSH. 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.

Take the shaft seal as an example. It is the most critical component in any centrifugal pump and the cause of as many as three out of four pump failures.

To make the shaft seal more wear resistant, Grundfos developed new materials that can take more punishment from heat, abrasion, corrosion or whatever.

All seals will still fail eventually, so we also developed the first cartridge seal for much faster and very simple replacement.

Incomparable dry-running protection
One in every four pump failures is caused by dry-running. A shaft seal and bearing system that can withstand extreme heat and friction for longer periods of time is a good start. On a CR, the seal and bearings are much more forgiving if the pump should run dry.

But to prevent dry-running completely, we have the Grundfos LiqTec. The ever-vigilant LiqTec constantly checks that there is liquid in the pump. If there's no liquid, it stops the pump immediately. Available with all CR pumps, the LiqTec is front line technology at its very best.

If the pump runs dry, the Grundfos LiqTec immediately shuts it down before the 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. Unique advantages in almost every feature ensure extra reliability.

The durable seal is made from hardwearing materials that 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 sensitive to pressure.

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

When the seal needs changing, the cartridge design is fast to replace. This minimises downtime and translates into significant savings.

The innovative cartridge seal ensures the seal components are never assembled wrongly, vastly improving operating reliability.

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

Now, it is no longer necessary to remove heavy motors to replace the seal. An innovative spacer coupling is unique to the CR range:

it means that all motors weighing more than 35 kg can be left in place when replacing the shaft seal.

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 lifetime. 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 its mark on the metal surface.

Reliability in production

At Grundfos, we leave nothing to chance in the production process. Our production is certified in accordance with the strictest international standards (ISO 9001) and subjected to rigorous process control.

To be absolutely sure, every single CR pump is tested before leaving the factory. They are tested for performance, power consumption and static pressure. This is the only way we can 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 designed to bring you the lowest total life cycle costs. IE3 motors, state-of-the-art hydraulics and the wide range of sizes make CR a leader in pump efficiency.

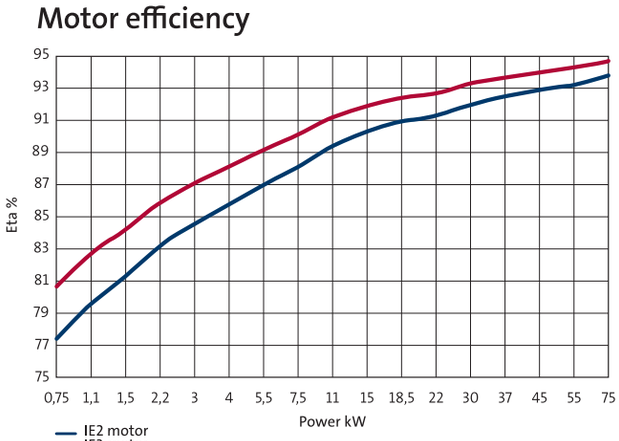
Reduce the real costs

It may still surprise some to learn that electricity accounts for a staggering 85% or more of the total cost of a pump. The purchase price and maintenance costs account for less than 15%.

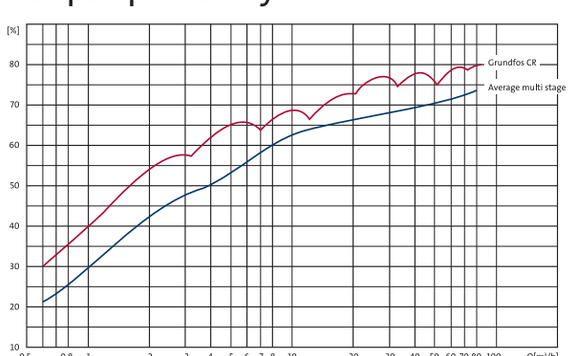
Pump and motor efficiency are a central factor here; you should therefore compare efficiency values to be sure you are getting the solution that best saves energy – and money.

Grundfos Blueflux®
– OPTIMISED TO CUT OUT THE WASTE
The Grundfos Blueflux® technology label represents the best from Grundfos within energy efficient motors and variable frequency drives (MG motors, MGE motors and CUE drives). Grundfos Blueflux® solutions either meet or exceed legislative requirements such as the EuP IE3 grade.

Motor efficiency



CR pump efficiency



The narrow interval between pump sizes contributes to maintaining a high overall efficiency across the range.

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 IE3 motors	Total reduction per year
Water supply	80 m^3/h at 6 bar	24 hours	18500 kWh	5200 kWh	23700 kWh
Water treatment	2 m^3/h at 15 bar	15 hours	3200 kWh	600 kWh	3800 kWh
General industry	6 m^3/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 IE3 motors, the savings really add up. This table shows you the savings you can expect – year after year.

EFFICIENCY

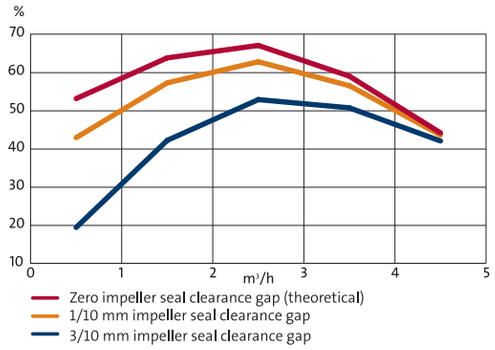
Improve efficiency with the right pump
The narrow interval between CR pump sizes allows you to eliminate the efficiency drop associated with over-dimensioned pumps.

By minimising the difference between pump capacity and the required pressure and volume, you get a pump that runs as close to its optimum duty point as possible. That makes it as cost-efficient as possible.

Top research behind real improvements
The Grundfos hydraulic engineering teams are acknowledged experts in fluid dynamics. In a field where extremely small margins determine efficiency outcomes, these specialists are uniquely equipped to break new ground and find new ways to improve pump efficiency.

This development work has resulted in a reduction in power consumption of up to 15-20% for CR pumps. When pumps are in operation many hours a day, such improvements provide substantial savings year in and year out.

The increase in pump efficiency very often means that a smaller motor can be used to power the CR at a given duty point. A smaller motor means savings on both initial investment costs and running costs.

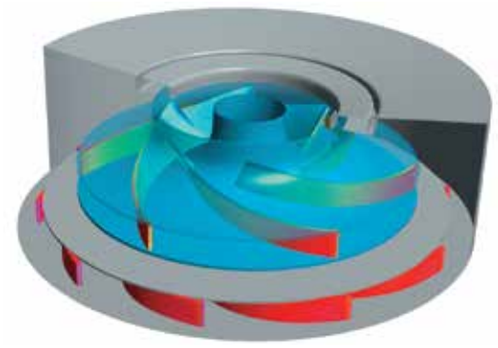


Three outstanding innovations

World-class pump efficiency is an impressive result, and it was not achieved in one go. It took three innovative improvements to create the total effect.

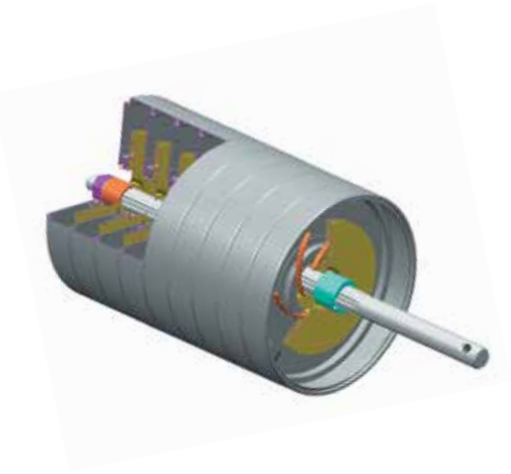
1

To reduce internal leakage to an absolute minimum, Grundfos uses a floating seal ring between the chamber and impeller neck. This provides a close to perfect seal. 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 drop in efficiency of five percentage points.



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. Grundfos has developed its own highly specialised laser-welding technology to achieve an unmatched accuracy.



3

State-of-the-art production technology and product testing further raise the bar for multistage pump efficiency and performance. We develop our own tools and processes, reflecting the care that has gone into the research and development stages. Every CR is tested before leaving the factory.

What you need. Guaranteed.

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

All your needs covered

The CR range is without parallel on the world market. Thirteen pump sizes, four basic materials and over a million unique configurations make the CR programme the most comprehensive available.

There is a CR pump for almost any liquid you could possibly want to pump. Special CR solutions are available for high pressure, high temperature, aggressive liquids, and much more. The key is that you describe what you need; we will then provide a CR that can deliver. And if we don't already have a solution, we'll make one.

The CR range is available in four different basic ranges with a wide variety of different materials for shaft seals, O-rings etc to suit the industrial application.

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 flammable 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

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

CRE pumps represent the union between high quality pumps and superior variable-speed motors. This plays a vital role in process control, surveillance and protection.

Add the final touch with a variable-speed motor
In the many situations where flow and pressure vary considerably, CR pumps can be equipped with variable-speed MGE motors. CRE pumps can continually adapt pump performance to match changing process requirements.

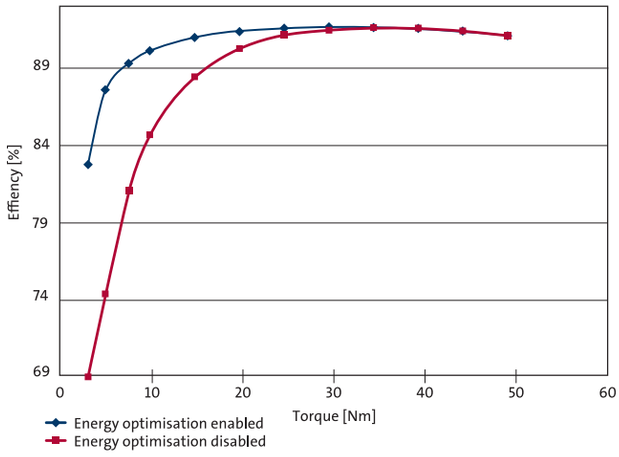
The CRE series combines the very best of pump technology with high efficiency motors and variable speed drive. The result is a range of pumps that is without peer - it doesn't get any better!

What do you need to control? Constant pressure? Constant differential pressure? Specific temperatures? Stable PH levels? Carefully timed operation? Process monitoring and protection? The CRE can give you all this and much more due to advanced control features and integrated PID controller.

Ultimate efficiency
Variable-speed motors yield constant benefits by changing speed to suit the demand, – no more and no less. You will never use more energy than you need.

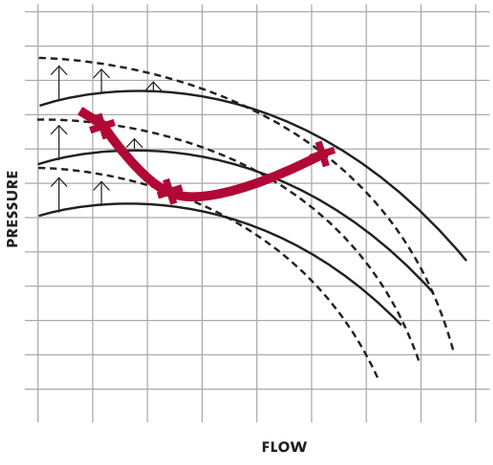
An Energy Optimizing Function gives the already highly efficient pumps and motors an extra edge to save even more energy. This not only contributes to a very low total lifecycle costs, but also minimises heat generation. The temperature of system and components are kept lower, prolonging the lifetime of the equipment.

Optimal efficiency and efficiency achieved by standard linear VFD control



Bend the rules
Although the laws of physics will always have the final say, advanced speed control can bend the rules a little. The integrated motor control can tilt, alter or extend the pump curves to fit whatever application or regulation challenge presented. RPMs on a CRE can increase to 4500 or even 6000, effectively creating a compact and powerful unit that can perform like a much larger pump while being only a fraction of the physical size.

For each individual process requirement and functionality, the pumps can be customised with assistance from our Customer Service Units or by using the advanced PC Tool E-Products. Performance, user interface, sensory system and much much more can be set up individually. Customisation can either be set up from factory, on commissioning or after installation.



Intelligent solutions to complex situations
Grundfos has made its own motors with integrated frequency converters since 1992. That means you can be sure of a perfect match between all the pump and motor technologies involved.

Focus on application and communication
Focusing on the challenges faced in the most demanding applications, Grundfos has targeted pumps and controls toward specific industrial areas.

In this development process the CRE has grown from being an important component to take on responsibility for process control, surveillance and protection – in close cooperation with the overall control system. The pump can be remote-controlled and/or linked to the management system of your choice for perfect interaction. The CRE allows you to define industrial processes down to the smallest detail.

The net result is an intelligent solution that will carefully control even the most complex of processes and deliver the exact performance required.

Available for any CR
The entire CR range can be fitted with a variable-speed motor, meaning that the CRE model can meet all other demands you make of your CR pumps.
In short, the combination of Grundfos motor technology, pump expertise and application knowledge guarantees the ultimate solution.

MIX AND MATCH – WITH EXPERT ADVICE

Customisation is standard!

To be sure you get the solution that suits your set-up and your process, tell us what the job is that needs doing. We will put together a CR that matches these needs. The CR that we configure for you may be the only CR we ever build with that configuration. But your assurance is that every component is a standard component – proven, tested and used in other configurations. We can do it because we have so many different alternatives for so many specific purposes.

Motor options

CR motors are available in many different configurations to suit:

- Frequency and voltage, as well as local protection methods
- Explosive, hot, cold and/or very humid environments, and different altitudes
- load characteristics of the pumped liquid: viscosity, density

Single phase

Single-phase motors

Four pole

Four pole motors

High efficiency

IE3 motors

Explosion proof

ATEX approved

Shaft seal options

Extreme liquids call for extremely well-conceived measures so that:

- Seal face withstand very high temperatures
- Aggressive or flammable liquids stay where you want them
- Shaft seal make easier work of crystallising, hardening or extremely abrasive liquids

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

Pump options

The CR pump can be adapted to handle the most demanding of situations and requirements:

- Horizontal installation if height is a limitation
- NPSH and the risk of cavitation
- high pressures
- Special treatments or specific certificates

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

Connection options

Your pump will be fitted with exactly the connection you need. We cover all standards and have special connection variants for maximum compactness, high liquid pressures, and so on.

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

GRUNDFOS INDUSTRIAL SOLUTIONS™

Motor heater

Anti-condensation unit

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

MGE/MLE

Motor with integrated VFD

Bearing

Different bearing options

Air-cooled

Liquid up to +180°C

MAGdrive

Magnetic coupled pump

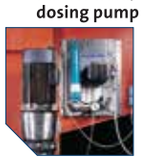
Double back-to-back

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)

Low temperature

Liquid temperature down to -40°C

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 clamp

Compact clamp system

CRI/CRN oval flange

Internal thread (BSP)

CRN TriClamp

Pharmaceutical/ food industries

CRI/CRN union

External thread (+GF+)

CRT PJE

Victaulic coupling, all-titanium

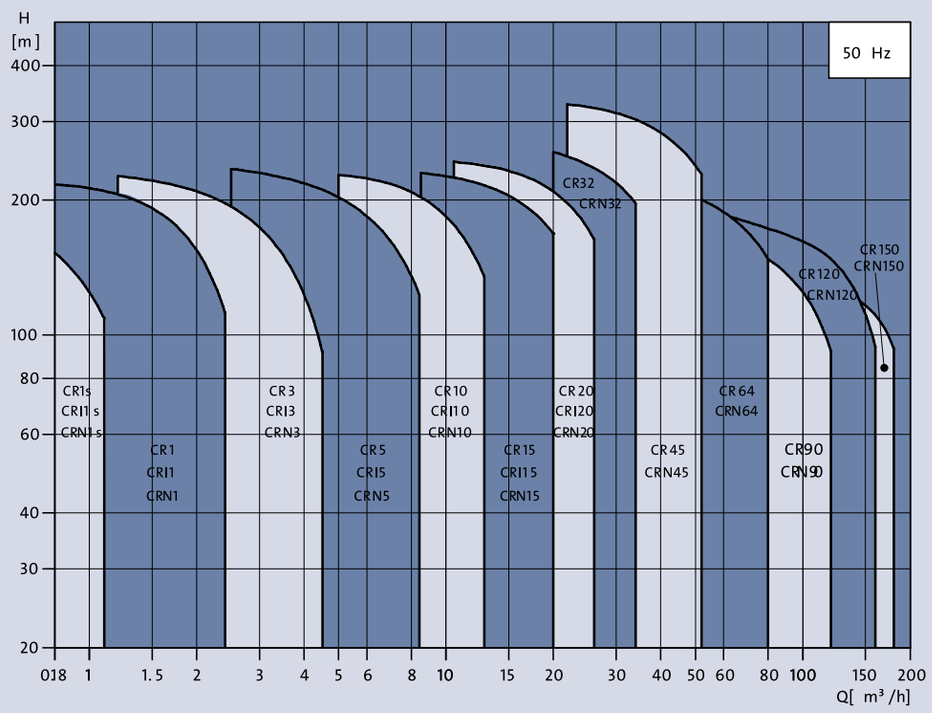
Custom connection

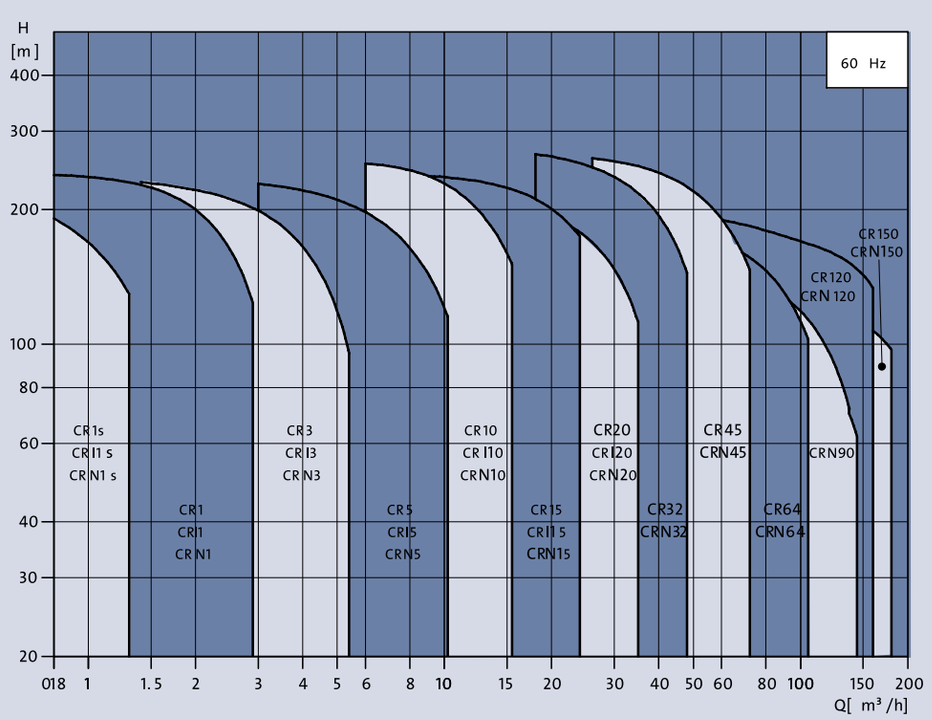
Customer specified solutions

CR-H

ANSI Interchangeable pump-end

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 (m^3/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.

The CR range from Grundfos

Grundfos was the first company ever to develop a multistage 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 require ments. 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.

10/2017

PT GRUNDFOS POMPA
Graha Intirub, Lt 2 dan 3
Jl. Cililitan Besar No. 454
Makasar, Jakarta Timur 13650
Indonesia

www.grundfos.co.id

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