



# INNOVATION INSIDE

# The Inside Story

## › Motor

Grundfos provides many motor solutions depending upon the application and demand. In addition, Grundfos makes its own motors to ensure maximum performance. The ML motors\* are remarkably quiet and highly efficient. They are also available in the self-regulating MLE configuration, featuring an integrated variable frequency drive.

## › 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 and double seal configurations and can handle temperatures from -40°F to +356°F (-40°C to +180°C).

## › Connection options

The Grundfos CR can be connected to any piping 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 maximized 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

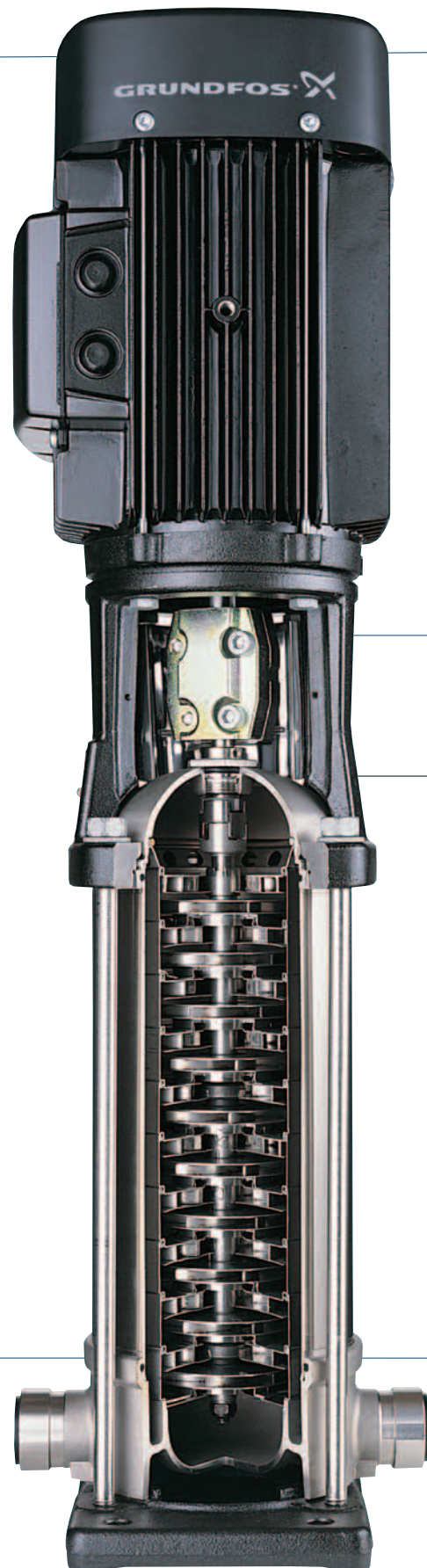
The CR is available in four different materials: AISI 304/cast iron, stainless steel AISI 304, stainless steel AISI 316, and titanium.

## › Wide range of sizes

The CR comes in 11 hydraulic 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.*

\* Grundfos ML motors are not available in Canada.





## 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

### Reliability in real life

The CR is well known 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.

The virtually endless range of standard and customized CR pumps means that you can find the right CR to provide reliable operation for most any requirement.

#### 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.

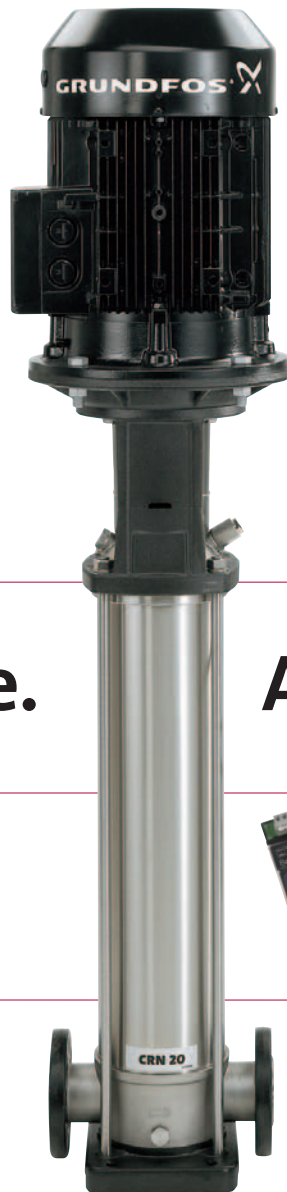
The Grundfos CR is different. As part of our constant dedication to innovation, we have tested new and alternative materials to bring you the best possible solution. This means that we can equip CR



pumps with a shaft seal and bearing system that can withstand extreme heat and friction for longer periods of time. This makes them more forgiving if the pump does run dry.

#### Grundfos LiqTec checks 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.



It's reliable.

And we can prove it.



In the event of dry running, the Grundfos LiqTec™ immediately shuts down the pump before damage occurs

### Unique cartridge seal design

The seal used in the CR line combines the best features of standard seals, wrapped up in an ingenious cartridge design. All of these ensure extra reliability.

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

We know, however, that even the best of materials are subject to wear. 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.

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

The cartridge design also enables rapid replacement when the seal ultimately does need changing. All in all, downtime is minimized, which translates into significant savings for your business.

### Spacer coupling minimizes downtime too

Minimizing downtime is part of a 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. With the innovative spacer coupling, all motors weighing more than 75 lbs. can be left in place during seal replacement.



With unfailing attention to reliability, the Grundfos engineers have designed an innovative cartridge seal that can be replaced within minutes — 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.*



## EFFICIENCY

### Reduce the **real costs**

Electricity is the most expensive part of any pump—a simple fact that is often overlooked when pumps and prices are compared.

It may be surprising that the purchase price and maintenance costs account for less than 15% of the total lifetime cost of a pump. Electricity accounts for a staggering 85% or more of the total costs. So if you want to save money, that’s where you should look.

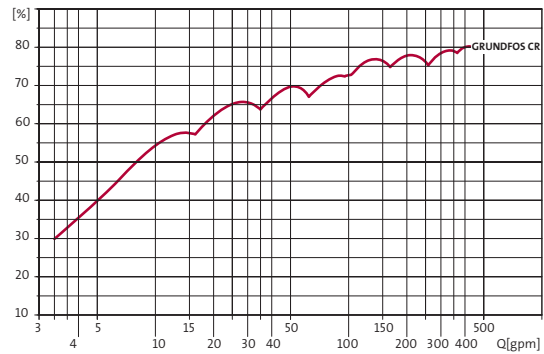
The Grundfos CR makes a real difference; the table below shows just how much electricity CR can save you annually.

These savings will continue for years and years – for every pump you own. Its low lifetime cost makes a CR pump a very sensible investment.

*The table at right shows the unique efficiency of the Grundfos CR range.*



CR pump efficiency



## Let’s talk money.

### How much difference does a CR make?

| Application type                | Typical duty point | Operating hours per day | Average kWh reduction per year with CR |
|---------------------------------|--------------------|-------------------------|--|
| Water supply                    | 350 gpm @ 85 psi   | 24 hours                | 18,500 kWh                             |
| Boiler feed                     | 175 gpm @ 225 psi  | 15 hours                | 12,700 kWh                             |
| Water treatment                 | 10 gpm @ 225 psi   | 15 hours                | 3,200 kWh                              |
| Industrial washing and cleaning | 25 gpm @ 225 psi   | 5 hours                 | 1,600 kWh                              |
| General industrial pump task    | 25 gpm @ 145 psi   | 10 hours                | 2,200 kWh                              |

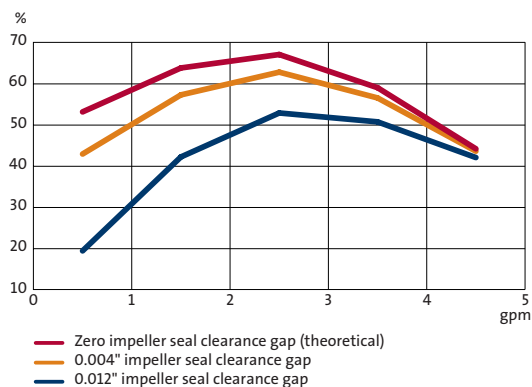
# Efficiency saves money year after year

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-sized pumps.

By minimizing 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.

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

## Good things come in threes



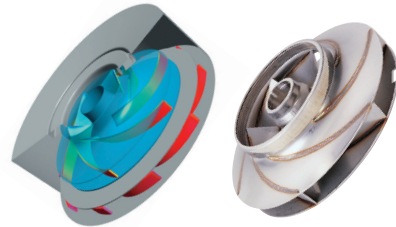
Grundfos achieved a 10% increase in pump efficiency through three innovative improvements to the impeller and seal. These improvements also mean a smaller motor can often be used to power the pump—and that equals savings on both initial investment and running costs.

# 1



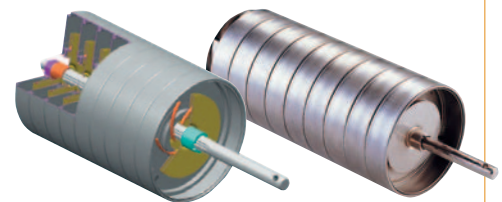
Internal leakage caused by pressure differentials within the pump was minimized. Tests have shown that an impeller seal clearance gap of just 0.016" between the impeller and the chamber causes a 5% drop in efficiency. When liquid seeps out into the pump, precious energy is wasted on circulating that liquid. Grundfos uses a floating seal ring between chambers, providing a nearly perfect seal.

# 2



An enhanced impeller design reduces eddy flow and friction losses. We developed a highly specialized laser-welding technology which brings you impellers of truly superior design and construction.

# 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. The final outcome is products with near-perfect geometries and tolerances, reflecting the care that has gone into the research and development stages.

## The CR range has the right pump for the job

Choosing the right pump can be difficult. It may be easy enough to find a pump that will do the job, but it gets trickier when you want an *exact* match. There are many good reasons to avoid over-capacity, with energy conservation at the top of the list. The CR range lets you choose pumps which exactly match your system demands.

CR is available in 11 hydraulic sizes, four basic materials and about one million configurations. 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 is available in four different basic materials:



**CR**  
AISI 304 stainless steel  
with a cast iron top and base



**CRI**  
AISI 304 stainless steel  
throughout



**CRN**  
AISI 316 stainless steel  
throughout



**CRT**  
Titanium  
throughout

## What can you pump with a CR?

|                                 |   |
|---------------------------------|---|
| Aggressive or corrosive liquids | Seawater, hypochlorites, hydrochloric acid, ferric chloride, nitric acid, chromic acid, phosphoric acid |
| Abrasive liquids                | Metasilicate-containing cleaning agents, abrasive alkaline cleaners, phosphates                         |
| Toxic or explosive liquids      | Trichlorethylene, toluene, petroleum, ethyl alcohol, methyl alcohol                                     |
| High-viscosity liquids          | Glycols, carboxylates (for cooling), lubricating oils, rapeseed oil                                     |
| Hardening liquids               | Water-based paint, glue, vegetable oils   |
| Crystallizing liquids           | Glycol additives, naphthalene, sugar products (e.g. dextran), salts                                     |
| High pressures                  | Water treatment, cleaning/washing   |
| Extreme temperatures            | Petrochemicals, oils, boiler feed, secondary coolants   |

### Motor options

- Special supply voltages and protection methods
- Non-standard motor size (e.g. for pumping high or low viscosities)
- Explosion-proof, dust ignition-proof
- For extreme temperatures, humidity, or altitudes
- Specific approval requirements
- Multi-plug (Harting® Plug)
- Non-Grundfos motor

### Shaft seal options

- Chemical resistant O-rings for aggressive chemicals
- Special seal face or LiqTec™ run-dry sensor to protect against dry running
- Balanced high-pressure shaft seal for 362 to 580 psi
- Air-cooled shaft seal system for extreme high temperatures
- Double shaft seal with pressure chamber for pumping explosive or poisonous liquids

### Pump options

- Horizontal position for height limitations
- Low NPSH pumps
- High-pressure pumps
- Special surface treatments or approvals
- Pumps for extreme temperatures
- Silicone-free pumps
- Corrosion-free titanium CRT pumps for sea water or highly corrosive liquids
- Wide variety of connections



# The Grundfos CRE: Ultimate solutions

## Variable-speed motor

To accommodate the many situations where the required flows and pressures vary considerably over time, CRE pumps have a variable-speed motor that continually adapts pump performance to match current conditions. CRE pumps combine the very best of pump technology with sophisticated motors developed by Grundfos with optimum efficiency in mind.

Do you need constant pressure? Constant differential pressure? Stable pH levels? Specific temperatures? Carefully timed operation? Grundfos CRE can give you all this and much more.

## Communication options

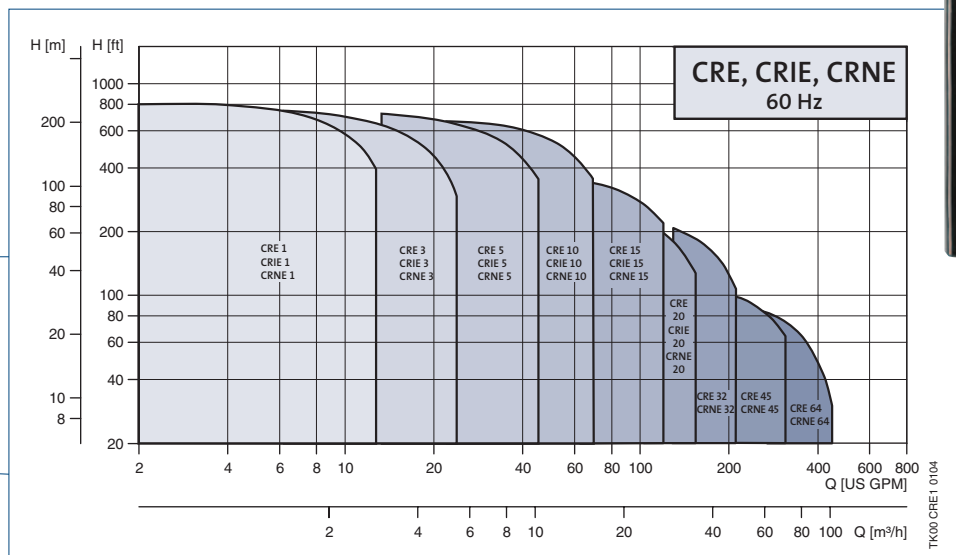
CRE can be remote-controlled and/or linked to management systems of your choice for perfect interaction. CRE offers unique possibilities of monitoring the performance and the result of the performance as well as controlling the pump performance. Or both in the same solution.

## Ultimate efficiency

CRE variable speed pumps yield constant benefits. With their ability to change speed to suit the demand, you never spend energy generating pressure you do not require. The electronically controlled motors complement the already highly efficient Grundfos CR pumps, saving even more energy and contributing to a very low total cost of ownership.

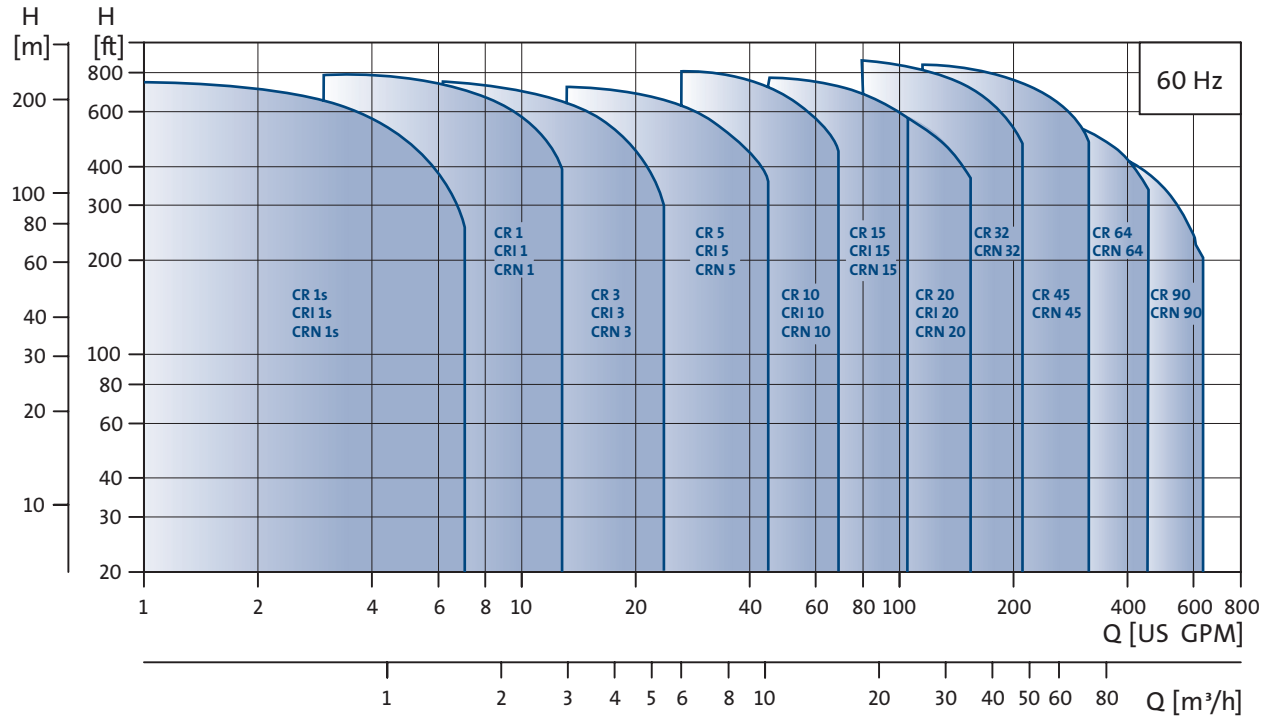
The entire CR range can be fitted with a variable speed motor, meaning that you can enjoy the benefits of the CRE model regardless of what your other requirements may be.

*CRE pumps combine highly efficient Grundfos CR pumps with our variable-speed motors.*

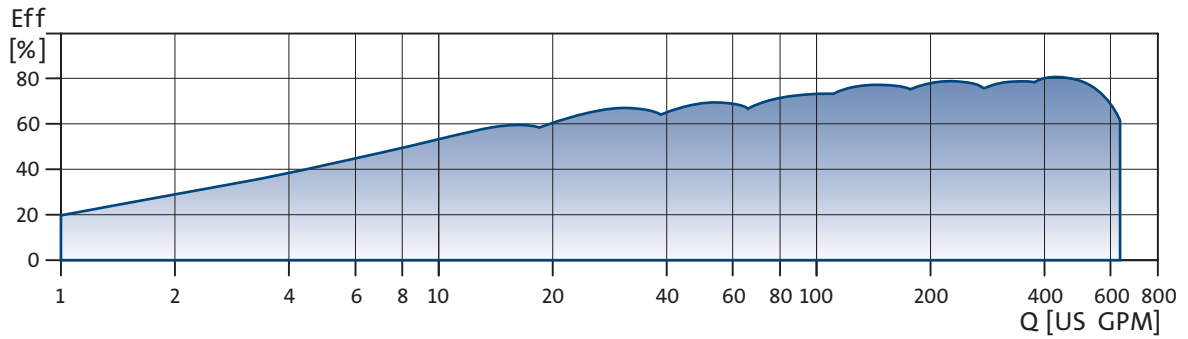


# PERFORMANCE CURVES AND TECHNICAL DATA

## CR Performance Range



## CR Efficiency



## CR Product Range

| Range  | CR 1s       | CR 1,<br>CRE 1 | CR 3<br>CRE 3   | CR 5<br>CRE 5   | CR 10<br>CRE 10 | CR 15<br>CRE 15   | CR 20<br>CRE 20 | CR 32<br>CRE 32 | CR 45<br>CRE 45 | CR 64<br>CRE 64 | CR 90       |
|--|-------------|----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|-------------|
| Nominal flow rate (US GPM)                         | 4.5         | 8.5            | 15              | 30              | 55              | 95                | 110             | 140             | 220             | 340             | 440         |
| Temperature range (°F)                             | -4 to +250  |                |                 |                 |                 |                   |                 | -22 to +250     |                 |                 |             |
| Temperature range (°F) - on request                | -40 to +356 |                |                 |                 |                 |                   |                 | -40 to +356     |                 |                 |             |
| Max. working pressure (psi)                        | 360         | 360            | 360             | 360             | 360             | 360               | 360             | 435             | 435             | 360             | 360         |
| Max. working pressure (psi) - on request           | -           | 725            | 725             | 725             | 725             | 725               | 725             | 580             | 580             | 580             | 580         |
| Max. pump efficiency (%)                           | 35          | 49             | 59              | 67              | 70              | 72                | 72              | 76              | 78              | 79              | 80          |
| <b>CR pumps:</b>                                   |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| CR: Flow range (US GPM)                            | 0.5 - 5.7   | 1 - 12.8       | 1.5 - 23.8      | 3 - 45          | 5.5 - 70        | 9.5 - 125         | 11 - 155        | 14 - 210        | 22 - 310        | 34 - 450        | 44 - 630    |
| CR: Max. pump pressure (H[ft])                     | 760         | 790            | 790             | 780             | 865             | 800               | 700             | 995             | 940             | 565             | 595         |
| CR: Motor power (HP)                               | 1/3 - 2     | 1/3 - 3        | 1/3 - 5         | 3/4 - 7 1/2     | 3/4 - 15        | 2 - 25            | 3 - 25          | 3 - 40          | 7 1/2 - 60      | 7 1/2 - 60      | 15 - 60     |
| <b>CRE pumps:</b>                                  |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| CRE: Flow range (US GPM)                           | -           | 0 - 12.8       | 0 - 23.8        | 0 - 45          | 0 - 70          | 0 - 125           | 0 - 155         | 0 - 210         | 0 - 310         | 0 - 450         | -           |
| CRE: Max. pump pressure (H[ft])                    | -           | 790            | 790             | 780             | 665             | 390               | 270             | 240             | 120             | 100             | -           |
| CRE: Motor power (HP)                              | -           | 1/3 - 3        | 1/3 - 5         | 3/4 - 7 1/2     | 3/4 - 10        | 2 - 10            | 3 - 10          | 3 - 10          | 7 1/2           | 7 1/2           | -           |
| <b>Version:</b>                                    |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| CR, CRE:<br>Cast Iron and stainless steel AISI 304 | ●           | ●              | ●               | ●               | ●               | ●                 | ●               | ●               | ●               | ●               | ●           |
| CR1, CRIE:<br>Stainless steel AISI 304             | ●           | ●              | ●               | ●               | ●               | ●                 | ●               | -               | -               | -               | -           |
| CRN, CRNE:<br>Stainless steel AISI 316             | ●           | ●              | ●               | ●               | ●               | ●                 | ●               | ●               | ●               | ●               | ●           |
| CRT, CRTE:<br>Titanium                             | -           | -              | CRT 2<br>CRTE 2 | CRT 4<br>CRTE 4 | CRT 8<br>CRTE 8 | CRT 16<br>CRTE 16 | -               | -               | -               | -               | -           |
| <b>CR, CRE pipe connection:</b>                    |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| Oval Flange (NPT)                                  | 1"          | 1"             | 1"              | 1 1/4"          | 2"              | 2"                | 2"              | -               | -               | -               | -           |
| Oval Flange (NPT) - on request                     | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1"              | 1 1/2"          | 2 1/2"            | 2 1/2"          | -               | -               | -               | -           |
| ANSI Flange Size                                   | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1 1/4"          | 2"              | 2"                | 2"              | 2 1/2"          | 3"              | 4"              | 4"          |
| ANSI Flange Size - on request                      | -           | -              | -               | -               | -               | -                 | -               | 3"              | 4"              | 5"              | 5"          |
| ANSI Flange Class                                  | 250 lb.     | 250 lb.        | 250 lb.         | 250 lb.         | 250 lb.         | 250 lb.           | 250 lb.         | 125/250 lb.     | 125/250 lb.     | 125/250 lb.     | 125/250 lb. |
| <b>CRI, CRIE pipe connection:</b>                  |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| Oval Flange (NPT)                                  | 1"          | 1"             | 1"              | 1 1/4"          | 2"              | 2"                | 2"              | -               | -               | -               | -           |
| Oval Flange (NPT) - on request                     | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1"              | 1 1/2"          | -                 | -               | -               | -               | -               | -           |
| ANSI Flange Size                                   | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1 1/4"          | 2"              | 2"                | 2"              | -               | -               | -               | -           |
| ANSI Flange Class                                  | 300 lb.     | 300 lb.        | 300 lb.         | 300 lb.         | 300 lb.         | 300 lb.           | 300 lb.         | -               | -               | -               | -           |
| Clamp coupling (NPT) - on request                  | 1", 1 1/4"  | 1", 1 1/4"     | 1", 1 1/4"      | 1", 1 1/4"      | 1 1/2", 2"      | 1 1/2", 2"        | 2", 2 1/2"      | -               | -               | -               | -           |
| Union (NPT ext. thread) - on request               | 2"          | 2"             | 2"              | 2"              | -               | -                 | -               | -               | -               | -               | -           |
| <b>CRN, CRNE pipe connection:</b>                  |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| PJE (Victaulic)                                    | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1 1/4"          | 2"              | 2"                | 2"              | -               | -               | -               | -           |
| PJE (Victaulic) - on request                       | -           | -              | -               | -               | -               | -                 | -               | 3"              | 4"              | 4"              | 4"          |
| ANSI Flange Size                                   | 1 1/4"      | 1 1/4"         | 1 1/4"          | 1 1/4"          | 2"              | 2"                | 2"              | 2 1/2"          | 3"              | 4"              | 4"          |
| ANSI Flange Size - on request                      | -           | -              | -               | -               | -               | -                 | -               | 3"              | 4"              | 4"              | 4"          |
| ANSI Flange Class                                  | 300 lb.     | 300 lb.        | 300 lb.         | 300 lb.         | 300 lb.         | 300 lb.           | 300 lb.         | 150/300 lb.     | 150/300 lb.     | 150/300 lb.     | 150/300 lb. |
| Clamp coupling (NPT) - on request                  | 1", 1 1/4"  | 1", 1 1/4"     | 1", 1 1/4"      | 1", 1 1/4"      | 1 1/2", 2"      | 1 1/2", 2"        | 2", 2 1/2"      | -               | -               | -               | -           |
| Union (NPT ext. thread) - on request               | 2"          | 2"             | 2"              | 2"              | -               | -                 | -               | -               | -               | -               | -           |
| <b>CRT pipe connection:</b>                        |             |                |                 |                 |                 |                   |                 |                 |                 |                 |             |
| PJE coupling (Victaulic)                           | -           | -              | 1 1/4"          | 1 1/4"          | 2"              | 2"                | -               | -               | -               | -               | -           |
| ANSI Flange Size - on request                      | -           | -              | -               | -               | 2"              | 2"                | -               | -               | -               | -               | -           |

- Available
- Not available

### The CR range from Grundfos

Grundfos was the first company to develop a multi-stage in-line pump, and today the CR remains second to none. It is the most extensive in-line pump program on the market, matching customer requirements with many innovative features unique to Grundfos. CR provides superior reliability and the lowest possible cost of ownership to customers worldwide.

Impressive as the CR range is, Grundfos offers much more. Our complete range of pump solutions means that you can rely on Grundfos know-how and our complete dedication to quality and service for all pump applications — industrial and domestic.

|                |           |
|----------------|-----------|
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