Introduction

This data booklet deals with CR, CRI and CRN as well as CRE, CRIE and CRNE pumps.

Fig. 1 CR, CRI and CRN pumps

CR, CRI, CRN pumps are vertical multistage centrifugal pumps. The in-line design enables the pump to be installed in a horizontal one-pipe system where the suction and discharge ports are in the same horizontal plane and have the same pipe dimensions. This design provides a more compact pump design and pipework.

Grundfos CR pumps come with various pump sizes and various numbers of stages to provide the flow and the pressure required.

CR pumps are suitable for a variety of applications from pumping of potable water to pumping of chemicals. The pumps are therefore used in a wide variety of pumping systems where the performance and material of the pump meet specific demands.

The CR pumps consist of two main components: the motor and the pump unit. The motor on a CR pump is a heavy-duty Grundfos specified motor.

The pump unit consists of optimized hydraulics, various types of connections, an outer sleeve, a top and various other parts.

CR pumps are available in various material versions according to the pumped liquid.

CRE, CRIE, CRNE pumps

Fig. 2 CRE, CRIE and CRNE pumps

CRE, CRIE, CRNE pumps are built on the basis of CR, CRI, CRN pumps.

CRE, CRIE, CRNE pumps belong to the so-called E-pump family and are referred to as E-pumps.

The difference between the CR and the CRE pump range is the motor. CRE, CRIE, CRNE pumps are fitted with an E-motor, i.e. a motor with built-in frequency control.

The motor of the CRE pump is a Grundfos MLE motor.

Frequency control enables continuously variable control of motor speed, which makes it possible to set the pump to operation at any duty point. The aim of continuously variable control of the motor speed is to adjust the performance to a given requirement.

CRE, CRIE and CRNE pumps are available with an integrated pressure sensor connected to the frequency control.

The pump materials are the same as those of the CR, CRI, CRN pump range.

Selection a CRE pump

Select a CRE pump if:

- controlled operation is required, i.e. consumption fluctuates;
- constant pressure is required,
- communication with the pump is required.

Adaptation of performance through frequency-controlled speed control offers obvious advantages:

- Energy savings.
- Increased comfort.
- Control and monitoring of the pump performance.

Pump

The CR and CRE pump is a non-self-priming, vertical multistage centrifugal pump. The pumps are available with a Grundfos standard motor (CR pumps) or a frequency-controlled motor (CRE pumps).

The pump consists of a base and a pump head. The chamber stack and the outer sleeve are secured between the pump head and the base by means of staybolts. The base has suction and discharge ports on the same level (in-line).

All pumps are equipped with a maintenance-free mechanical shaft seal of the cartridge type.

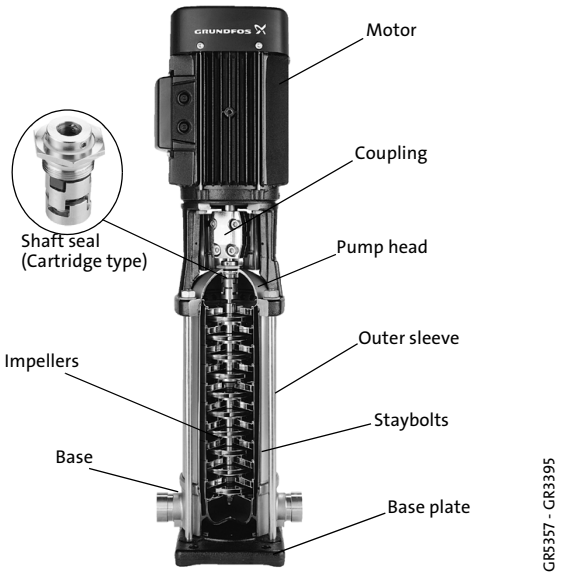


Fig. 3 CR pump

Motor

Grundfos standard motors - ML and Baldor® motors

CR, CRI and CRN pumps are fitted with a Grundfos specified motor. The motors are all heavy-duty 2-pole, NEMA C-face motors.

Frequency-controlled motors - MLE motors

CRE, CRIE and CRNE pumps are fitted with a totally enclosed, fan-cooled, 2-pole frequency-controlled motor.

From 0.5 Hp to 1.5 Hp Grundfos offers CRE pumps fitted with single-phase MLE motors (1 x 208-230 V).
From 1.0 Hp to 10 Hp Grundfos offers CRE pumps fitted with three-phase MLE motors (3 x 460-480 V).

Electrical data

Mounting designation	NEMA
Insulation class	F & B
Efficiency class*	Standard efficiency Energy efficient / EPAct - on request Premium efficiency - on request
Enclosure class	TEFC - Totally Enclosed Fan Cooled (Grundfos standard) ODP - Open Drip Proof - on request
60 Hz Standard voltages	1 x 115/208-230 V 3 x 208-230/460 V 3 x 575 V
Approvals	The motors are rated for:

* 1, 1.5 and 2 HP ML motors are premium efficiency as standard

Optional motors

The Grundfos standard range of motors covers a wide variety of application demands. However, for special applications or operating conditions, custom-built motor solutions can be provided.

For special applications or operating conditions, Grundfos offers custom-built motors such as:

- explosion proof motors,
- motors with anti-condensation heating unit,
- low-noise motors,
- energy efficient and premium efficiency motors,
- motors with thermal protection.

Motor protection

Single-phase Grundfos motors have a built-in thermal overload switch.

Three-phase motors **must** be connected to a motor starter in accordance with local regulations.

Terminal box positions

As standard the terminal box is mounted on the suction side of the pump.

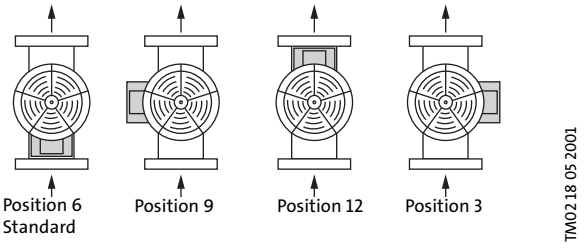
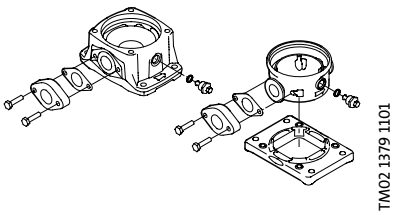
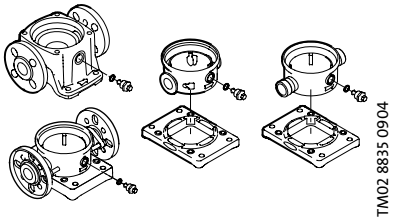


Fig. 4 Terminal box positions

Maximum operating pressure and temperature range

			Oval flange		ANSI, Clamp, PJE	
			 TM02 1379 1101		 TM02 8835 0904	
			Max. permissible operating pressure	Liquid temperature range	Max. permissible operating pressure	Liquid temperature range
CR, CRI, CRN 1s			232 [psi]	−4°F to +248°F	362 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 1			232 [psi]	−4°F to +248°F	362 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 3			232 [psi]	−4°F to +248°F	362 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 5			232 [psi]	−4°F to +248°F	362 [psi]	−4°F to +248°F
CR(E) 10-1	→	CR(E) 10-6	145 [psi]	−4°F to +248°F	-	-
CRI(E), CRN(E) 10-1	→	CRI(E), CRN(E) 10-10	232 [psi]	−4°F to +248°F	-	-
CR(E), CRI(E), CRN(E) 10-1	→	CR(E), CRI(E), CRN(E) 10-10	-	-	232 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 10-12	→	CR(E), CRI(E), CRN(E) 10-17	-	-	362 [psi]	−4°F to +248°F
CR(E) 15-1	→	CR(E) 15-5	145 [psi]	−4°F to +248°F	-	-
CRI(E), CRN(E) 15-1	→	CRI(E), CRN(E) 15-8	232 [psi]	−4°F to +248°F	-	-
CR(E), CRI(E), CRN(E) 15-1	→	CR(E), CRI(E), CRN(E) 15-8	-	-	232 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 15-9	→	CR(E), CRI(E), CRN(E) 15-12	-	-	362 [psi]	−4°F to +248°F
CR(E) 20-1	→	CR(E) 20-5	145 [psi]	−4°F to +248°F	-	-
CRI(E), CRN(E) 20-1	→	CRI(E), CRN(E) 20-7	232 [psi]	−4°F to +248°F	-	-
CR(E), CRI(E), CRN(E) 20-1	→	CR(E), CRI(E), CRN(E) 20-7	-	-	232 [psi]	−4°F to +248°F
CR(E), CRI(E), CRN(E) 20-8	→	CR(E), CRI(E), CRN(E) 20-10	-	-	362 [psi]	−4°F to +248°F
CR(E), CRN(E) 32-1-1	→	CR(E), CRN(E) 32-5	-	-	232 [psi]	−22°F to +248°F
CR, CRN 32-6-2	→	CR, CRN 32-8	-	-	362 [psi]	−22°F to +248°F
CR, CRN 32-9-2	→	CR, CRN 32-11-2	-	-	435 [psi]	−22°F to +248°F
CR(E), CRN(E) 45-1-1	→	CR(E), CRN(E) 45-4-2	-	-	232 [psi]	−22°F to +248°F
CR(E), CRN(E) 45-4-1	→	CR(E), CRN(E) 45-6	-	-	362 [psi]	−22°F to +248°F
CRI, CRN 45-7-2	→	CR, CRN 45-8-1	-	-	435 [psi]	−22°F to +248°F
CR(E), CRN(E) 64-1-1	→	CR(E), CRN(E) 64-3	-	-	232 [psi]	−22°F to +248°F
CR, CRN 64-4-2	→	CR, CRN 64-5-2	-	-	362 [psi]	−22°F to +248°F
CR, CRN 90-1-1	→	CR, CRN 90-3	-	-	232 [psi]	−22°F to +248°F
CR, CRN 90-4-2	→	CR, CRN 90-4-1	-	-	362 [psi]	−22°F to +248°F

Operating range of the shaft seal

The operating range of the shaft seal depends on operating pressure, pump type, type of shaft seal and liquid temperature. The following curves apply to clean water and water with anti-freeze liquids. For selecting the right shaft seal, see 'List of pumped liquids' page 66.

CR 1s - CR 20

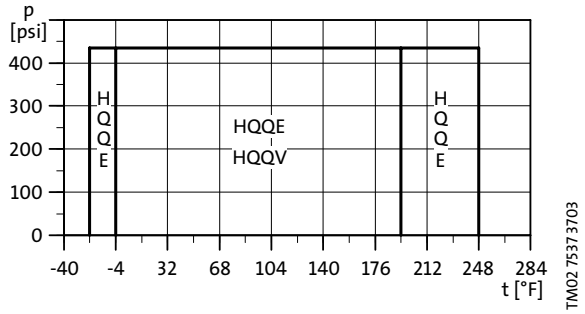


Fig. 14 Operating range of standard shaft seals for CR 1s - CR 20

CR 32 - CR 90

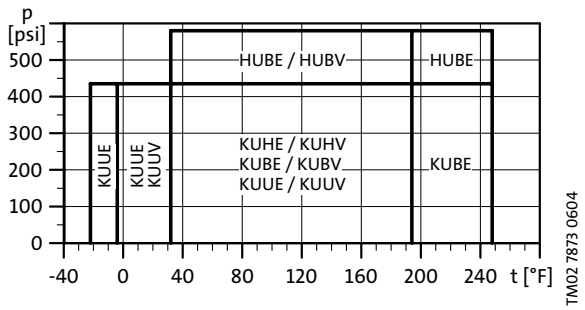


Fig. 15 Operating range of standard shaft seals for CR 32 - CR 90

Shaft seal	Description	Max. temp. range [°F]
HQQE	O-ring (cartridge) (balanced seal), SiC/SiC, EPDM	–22°F to +248°F
HQQV	O-ring (cartridge) (balanced seal), SiC/SiC, FKM	–4°F to +194°F
HUBE	O-ring (cartridge) (balanced seal), TC/carbon, EPDM	+32°F to +248°F
HUBV	O-ring (cartridge) (balanced seal), TC/carbon, FKM	+32°F to +194°F
KUBE	Bellows, metal (cartridge), TC/carbon, EPDM	+32°F to +248°F
KUBV	Bellows, metal (cartridge), TC/carbon, FKM	+32°F to +194°F
KUHE	Bellows, metal (cartridge), TC/Carbon with embedded TC, EPDM	+32°F to +194°F
KUHV	Bellows, metal (cartridge), TC/Carbon with embedded TC, FKM	+32°F to +194°F
KUUE	Bellows, metal (cartridge), TC/TC, EPDM	–22°F to +194°F
KUUV	Bellows, metal (cartridge), TC/TC, FKM	–4°F to +194°F

★ TC= tungsten carbide

In case of extreme temperatures, i.e.

- low temperatures down to –40°F or
- high temperatures up to +356°F,

see "List of variants - on request" page 75.

Operating and inlet pressure

Maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the current inlet pressure + the pressure against a closed valve **must** always be lower than the maximum permissible operating pressure.

If the maximum permissible operating pressure is exceeded, the conical bearing in the motor may be damaged and the life of the shaft seal reduced.

CR, CRI, CRN 1s		
1s-2	→ 1s-27	145 [psi]
CR(E), CRI(E), CRN(E) 1		
1-2	→ 1-25	145 [psi]
1-27		218 [psi]
CR(E), CRI(E), CRN(E) 3		
3-2	→ 3-15	145 [psi]
3-17	→ 3-25	218 [psi]
CR(E), CRI(E), CRN(E) 5		
5-2	→ 5-9	145 [psi]
5-10	→ 5-24	218 [psi]
CR(E), CRI(E), CRN(E) 10		
10-1	→ 10-5	116 [psi]
10-6	→ 10-17	145 [psi]
CR(E), CRI(E), CRN(E) 15		
15-1	→ 15-2	116 [psi]
15-3	→ 15-12	145 [psi]
CR(E), CRI(E), CRN(E) 20		
20-1		116 [psi]
20-2	→ 20-10	145 [psi]
CR(E), CRN(E) 32		
32-1-1	→ 32-2	58 [psi]
32-3-2	→ 32-6	145 [psi]
32-7-2	→ 32-11-2	218 [psi]
CR(E), CRN(E) 45		
45-1-1	→ 45-1	58 [psi]
45-2-2	→ 45-3	145 [psi]
45-4-2	→ 45-8-1	218 [psi]
CR(E), CRN(E) 64		
64-1-1		58 [psi]
64-1	→ 64-2-1	145 [psi]
64-2	→ 64-5-2	218 [psi]
CR(E), CRN(E) 90		
90-1-1	→ 90-1	145 [psi]
90-2-1	→ 90-4-1	218 [psi]

Example of operating and inlet pressures

The values for operating and inlet pressures shown in the tables must not be considered individually but must always be compared, see the following examples:

Example 1:

The following pump type has been selected:
CR 3-10 A-A-A

Max. operating pressure: **232 psi**
Max. inlet pressure: **145 psi**

Discharge pressure against a closed valve: **139.2 psi,** see page 33.

This pump is **not** allowed to start at an inlet pressure of 145 psi, but at an inlet pressure of 232.0 – 139.2 **= 92.8 psi.**

Example 2:

The following pump has been selected:
CR 10-2 A-GJ-A

Max. operating pressure: **232 psi**
Max. inlet pressure: **116 psi**

Discharge pressure against a closed valve:
42 psi (97 H[ft]), see page 41.

This pump is allowed to start at an inlet pressure of 116 psi, as the discharge pressure is only 42 psi, which results in an operating pressure of 116 + 42 **= 158 psi.** On the contrary, the max. operating pressure of this pump is limited to 158 psi, as a higher operating pressure will require an inlet pressure of more than 116 psi.

In case the inlet or operating pressure exceeds the pressure permitted, see "Lists of variants - on request" page 75.