

CR, CRI, CRN 1s-255

50/60 Hz IEC



CR, CRI, CRN 1s-255
Installation and operating instructions
Other languages
<http://net.grundfos.com/qr/i/99078486>



CR, CRI, CRN 1s-255
Safety instructions
(all available languages)
<http://net.grundfos.com/qr/i/99262913>



CR, CRI, CRN 1s-255

English (GB)

Installation and operating instructions 4

Appendix A. 41

安全上のご注意. 53

English (GB) Installation and operating instructions

Original installation and operating instructions

Table of contents

1. General information	4
1.1 Hazard statements	5
1.2 Notes	5
2. Product introduction	5
2.1 Intended use	5
2.2 Pumped liquids	6
2.3 Identification	7
3. Receiving the product	9
3.1 Transporting the product	9
3.2 Inspecting the product	9
3.3 Lifting the product	10
4. Installation requirements	13
4.1 Location	13
4.2 Foundation	13
4.3 Vibration dampening	14
5. Mechanical installation	15
5.1 Positioning the product	16
5.2 Mounting the product	16
5.3 Tightening torques for base plate and flange	18
5.4 Flange force and torque limits	19
6. Electrical connection	21
6.1 Drive-end motor bearing	22
6.2 Maximum absorbed current	22
6.3 CRN 95, 125, 155 high-pressure range	22
6.4 Motors for Variable Frequency Drive (VFD)	23
6.5 Changing the terminal box position	23
6.6 Tightening torques for terminal box cover	23
6.7 Cable entry, screwed connection	23
6.8 Motor protection	24
6.9 Frequency converter operation	24
7. Starting up the product	25
7.1 Bypass valve, CR, CRI, CRN 1s-5	25
7.2 Priming the product	25
7.3 Checking the direction of rotation	26
7.4 Venting the product	26
7.5 Shaft seal run-in	27
7.6 Operating the product	27
7.7 Pumping flammable, combustible or explosive liquids	28
8. Servicing the product	30
8.1 Maintenance	31
8.2 Contaminated products	32

9. Taking the product out of operation	32
9.1 Draining the pump	32
9.2 Taking the product permanently out of operation	33
10. Fault finding the product	34
10.1 The motor does not run when started	35
10.2 The motor-protective circuit breaker trips immediately when the power supply is switched on	35
10.3 The motor-protective circuit breaker trips occasionally	35
10.4 The motor-protective circuit breaker has not tripped but the motor does not run	35
10.5 The pump performance is not constant	35
10.6 The pump runs but gives no water	36
10.7 The pump runs backwards when switched off	36
10.8 There is leakage from the shaft seal	36
10.9 The motor produces unexpected noise	36
11. Technical data	37
11.1 Operating conditions	37
11.2 Other technical data	40
12. Disposing of the product	40
13. Document quality feedback	40

1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.



Read the installation and safety information specific for the motor in the corresponding motor instructions.

CR, CRI, CRN

Motor make	Motor instructions
Grundfos MG	Included in this publication
Innomotics	Supplied with the pump
Other motor make	Supplied with the pump

Bare-shaft pumps

Follow the instructions from the selected motor supplier.

Further motor documentation



Grundfos MG
Installation and operating instructions
<http://net.grundfos.com/qri/98079951>

Service documentation for Grundfos pumps and motors is available in Grundfos Product Center at <http://productselection.grundfos.com>. For motors of other makes, contact the motor manufacturer.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:



SIGNAL WORD

Description of the hazard

- Consequence of ignoring the warning
- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or gray circle with a white graphical symbol indicates that an action must be taken.



A red or gray circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

2. Product introduction

These instructions are valid for Grundfos CR, CRI, CRN 1s to 255 multistage in-line centrifugal pumps delivered as bare-shaft or with a pre-mounted 50 Hz or 60 Hz IEC motor, 0.37 to 200 kW.

2.1 Intended use



Use the product only in accordance with the specifications stated in the installation and operating instructions.

This appliance shall not be used by children. Children shall not play with the appliance. Cleaning and user maintenance shall not be carried out by children.



Appliances can be used by persons with reduced physical, sensory, or mental capabilities, as well as persons with a lack of experience and knowledge. This requires that they are given supervision or instruction concerning the use of the appliance in a safe way and that they understand the hazards involved.

Grundfos CR, CRI, CRN multistage in-line centrifugal pumps are designed for a wide range of applications, from pumping potable water to pumping chemicals. CR, CRI, CRN pumps are suitable for industrial applications such as the following:

- water supply
- pressure boosting
- cooling
- heating
- water treatment
- liquid transfer of cold or hot clean liquids
- special liquids transfer.

2.2 Pumped liquids



Only use the product according to the specifications stated in the installation and operating instructions.



Do not use the product for pumping liquids that may chemically attack the pump materials, as this may result in leakage. Contact Grundfos if in doubt.

The product is suitable for pumping thin and clean liquids not containing solid particles or fibres.

When pumping liquids with a density or viscosity higher than that of water, use motors with correspondingly higher outputs, if required.

Whether a pump is suitable for a particular liquid depends on a number of factors, the most important of which are chloride content, pH value, temperature, and content of chemicals and oils. See further information in the Grundfos pumped liquid guide at <https://product-selection.grundfos.com/pumped-liquid-guide>.



Consult Grundfos for information about which pump types are suitable for a specific liquid.

Flammable, combustible or explosive liquids

The pump with pre-mounted standard motor is intended for use in non-hazardous locations only.

Grundfos recommends using a pump with an ATEX-certified motor when pumping flammable, combustible or explosive liquids.



It is the responsibility of the owner and installer to decide whether a standard pump and motor are suitable for the application or a pump with an ATEX-certified motor is required.



Follow the instructions in the section on pumping flammable, combustible or explosive liquids before startup and during operation.



Do not use the product for pumping flammable, combustible or explosive liquids if the product is installed in a hazardous area classified as an explosive atmosphere, unless the product is ATEX-approved.

Related information

[7.7 Pumping flammable, combustible or explosive liquids](#)

2.3 Identification

2.3.1 Nameplate

Nameplate example for CR, CRI, CRN pumps.

Note that in some regions, for example in Japan, the nameplate is different.

GRUNDFOS
DK-8850 Bjerringbro, Denmark

Model-PN-SN ①—②—③		
Type ④		
Hz ⑤	rpm ⑥	ex.motor ⑦ kg
kWp2 ⑧	m³/h ⑨	↺ ⑩
H/H max ⑪	m ⑫	MEI≥ ⑬ ηp= ⑭ %
pmax/tmax ⑮		bar/°C ⑯
Tech file No ⑰		⑱
P code: ⑲		⑳

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Pos.	Description
1	Model
2	Product number
3	Serial number
4	Type designation
5	Frequency
6	Rated speed
7	Weight, excluding motor
8	Power at rated flow rate and rated speed
9	Rated flow rate
10	Direction of rotation: CCW: Counterclockwise CW: Clockwise
11	Head at rated flow rate / Maximum head
12	Minimum Efficiency Index
13	Hydraulic efficiency at rated flow rate
14	Maximum operating pressure; maximum liquid temperature Note that this field may have two sets of data separated by a semicolon.
15	Technical file number (stated if the pump is ATEX-classified) or customer-specific information
16	Country of origin

Pos.	Description
17	Approval marks
18	Production code
19	ATEX category (stated if the pump is ATEX-classified)

Related information

[7.7 Pumping flammable, combustible or explosive liquids](#)

[11.1.5 Maximum inlet pressure and flow rate](#)

[11.1.3 Maximum operating pressure and liquid temperature](#)

2.3.2 Type key

Example: CRE 32-3-2 A-F-A-E-HQQE

Code	Explanation
CR	Type range: CR, CRI, CRN
E	Pump with integrated frequency converter
32	Flow rate [m³/h]
3	Number of impellers
2	Number of reduced-diameter impellers
A	Code for pump version
F	Code for pipe connection
A	Code for materials
E	Code for rubber parts
	Code for shaft seal:
H	Shaft-seal type designation
Q	Seal-face material, rotating seal face
Q	Seal-face material, stationary seal face
E	Secondary seal material (rubber parts)

Related information

[6.1 Drive-end motor bearing](#)

2.3.3 Key to codes

Code	Description
Pump version	
A	Basic version
B	Oversize motor
C	CR compact
D	Pump with pressure intensifier
E	Pump with certificate
F	Pump for high temperatures (with air-cooled top)
G	E-pump without operating panel
H	Horizontal version
I	Different pressure rating
J	E-pump with a different maximum speed
K	Pump with low NPSH
L	Pump including Grundfos CUE and certificate
M	Magnetic drive
N	With sensor
O	Cleaned and dried
P	Undersize motor
Q	High-pressure pump with high-speed MGE motor
R	Belt-driven pump
S	High-pressure pump
T	Thrust-handling device
U	ATEX-approved pump
V	Cascade function
W	Deep-well pump with ejector
X	Special version
Y	Electropolished
Z	Pumps with bearing flange
Pipe connection	
A	Oval flange
B	NPT thread
CA	FlexiClamp
CX	TriClamp
F	DIN flange
FC	DIN 11853-2 flange (collar flange)
FE	EN 1092-1, type E

Code	Description
G	ANSI flange
J	JIS flange
N	Changed diameter of ports
P	PJE coupling (Victaulic type)
X	Special version
Materials	
A	Basic version
C	Carbon-free pump
D	Carbon-graphite-filled PTFE (bearings)/tungsten carbide
E	Carbon-free/tungsten carbide rotating bearing (only for Japan)
H	Flanges and base plate EN 1.4408
K	Bronze (bearings)/tungsten carbide
L	Motor stool, base plate and flanges EN 1.4408
M	Motor stool, base plate, coupling and flanges EN 1.4408 and coupling guards in cobber Bolts, nuts and spacing pipes EN 1.4401 or higher grade
N	Flanges EN 1.4408
P	PEEK neck ring
Q	Silicon carbide/silicon carbide bearing in pump and silicon carbide/silicon carbide seal faces in thrust-handling device
R	Silicon carbide/silicon carbide bearing
S	PTFE neck rings
T	Base plate EN 1.4408
U	Silicon carbide/silicon carbide bearing in pump and silicon carbide/tungsten carbide seal faces in thrust-handling device
W	Tungsten carbide/tungsten carbide
X	Special version
Rubber parts in pump	
E	EPDM
F	FXM (Fluoraz®)
K	FFKM (Kalrez®)
N	CR (Neoprene)
V	FKM (Viton®)
Shaft seal type designation	
A	O-ring seal with fixed driver

Code	Description
H	Balanced cartridge seal with O-ring
O	Double seal, back-to-back
P	Double seal, tandem
X	Special version
Seal face material (rotating and stationary seal face)	
B	Carbon, synthetic resin-impregnated
U	Cemented tungsten carbide
Q	Silicon carbide
X	Other ceramics
Secondary seal material (rubber parts)	
E	EPDM
F	FXM (Fluoraz®)
K	FFKM (Kalrez®)
V	FKM (Viton®)

3. Receiving the product

3.1 Transporting the product

WARNING

Falling objects

Death or serious personal injury



- Secure the product during transport to prevent it from tilting or falling down.
- Use lifting equipment approved for the weight of the product.
- Wear personal protective equipment.

3.2 Inspecting the product

Before installing the product, perform the following steps:

1. Verify that the product is as ordered.
2. Confirm that the product and its parts are undamaged.
3. If parts are damaged or missing, contact your local Grundfos sales company.

3.2.1 Unpacking the product

WARNING

Falling objects

Death or serious personal injury



- Keep the product in a stable position during unpacking.
- Wear personal protective equipment.

Do not unpack the product beyond what is necessary to verify that the equipment is complete and undamaged unless it is to be installed immediately. As a precaution, leave the product in the packaging until you are ready to install it.

3.3 Lifting the product

WARNING

Falling objects

Death or serious personal injury

- Follow the lifting instructions.
- Use lifting equipment approved for the weight of the product.
- When lifting the entire pump with motor, only use the motor eyebolts if the pump is fitted with a Grundfos MG or MGE motor.
- Keep a safe distance from the product during lifting operations.
- Wear personal protective equipment.



Make sure that the terminal box does not come into contact with the lifting equipment.

Follow the lifting instructions applicable to the specific lifting situation.

Follow the specific instructions on how to use the lifting brackets or motor eyebolts.

Related information

[3.3.1 Position of lifting brackets](#)

[3.3.2 Lifting pumps fitted with MGE, MGEC motors](#)

[3.3.3 Horizontal or vertical lifting position](#)

[3.3.4 Raising or laying down the product](#)

[3.3.5 Lifting the motor on or off the pump](#)

[5. Mechanical installation](#)

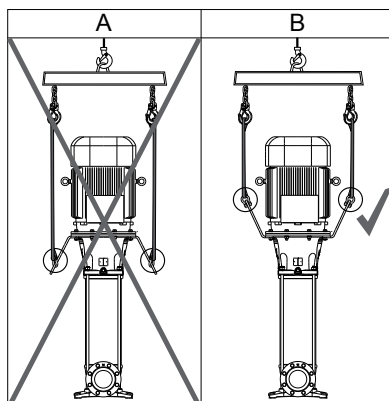
[5.2 Mounting the product](#)

[8. Servicing the product](#)

[9.2 Taking the product permanently out of operation](#)

3.3.1 Position of lifting brackets

It is valid for products delivered with lifting brackets.



TM072254

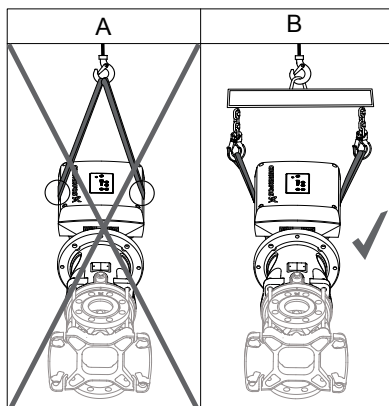
Related information

[3.3 Lifting the product](#)

3.3.2 Lifting pumps fitted with MGE, MGEC motors



Make sure that the terminal box does not come into contact with the lifting equipment when lifting a pump fitted with a motor that contains an integrated frequency converter.



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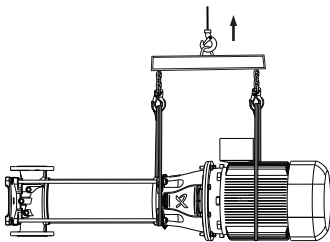
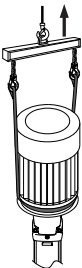
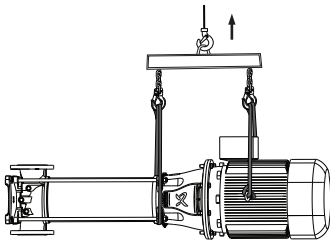
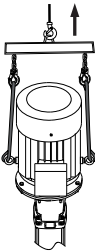
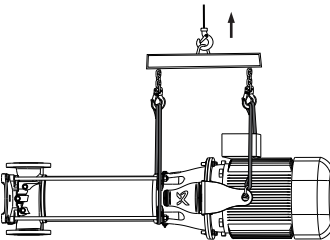
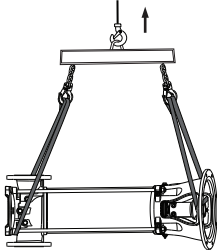
Related information

[3.3 Lifting the product](#)

[3.3.3 Horizontal or vertical lifting position](#)

[3.3.4 Raising or laying down the product](#)

3.3.3 Horizontal or vertical lifting position

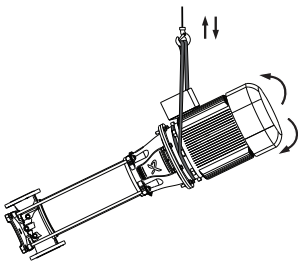
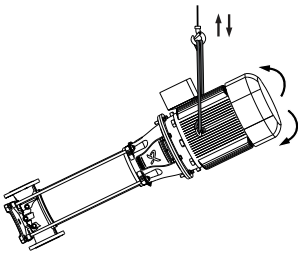
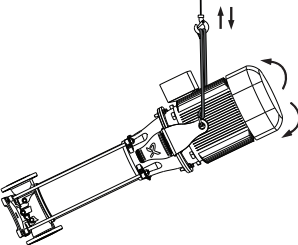
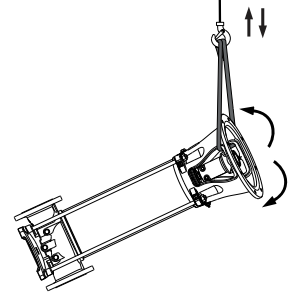
Motor type	Correct horizontal lift	Correct vertical lift
0.37 - 5.5 kW motors without motor eyebolts or lifting brackets		
3 - 5.5 kW Grundfos MGEC motors delivered with motor eyebolts 7.5 - 26 kW Grundfos MG and MGE motors delivered with motor eyebolts		
7.5 - 200 kW motors delivered with lifting brackets		
Do not use motor eyebolts to lift both pump and motor when lifting brackets are included.		
Bare-shaft pumps		

Related information

[3.3 Lifting the product](#)

[3.3.2 Lifting pumps fitted with MGE, MGEC motors](#)

3.3.4 Raising or laying down the product

Motor type	Correct raising or laying down
0.37 - 5.5 kW motors without motor eyebolts or lifting brackets	 TM068744
3 - 5.5 kW Grundfos MGEC motors delivered with motor eyebolts 7.5 - 26 kW Grundfos MG, MGE motors delivered with motor eyebolts	 TM068743
7.5 - 200 kW motors delivered with lifting brackets  Do not use motor eyebolts to lift both pump and motor when lifting brackets are included.	 TM068742
Bare-shaft pumps	 TM068745

Related information

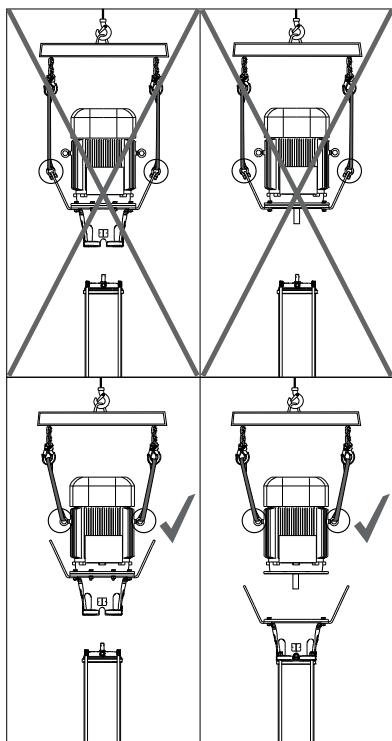
[3.3 Lifting the product](#)

[3.3.2 Lifting pumps fitted with MGE, MGEC motors](#)

3.3.5 Lifting the motor on or off the pump



Do not use lifting brackets to lift the motor as this may cause the motor to tilt.



TM089697

Related information

[3.3 Lifting the product](#)

[8. Servicing the product](#)

[9.2 Taking the product permanently out of operation](#)

4. Installation requirements

4.1 Location

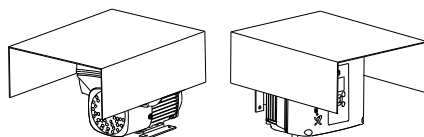
The product is intended for indoor use. If you install the product outdoors, follow the requirements stated below.

Outdoor installation

When the pump is installed outdoors, we recommend that you provide the motor with a rain cover. We also recommend that you open one of the drain holes in the motor flange.



Opening the drain hole reduces the motor enclosure class below the standard rating.

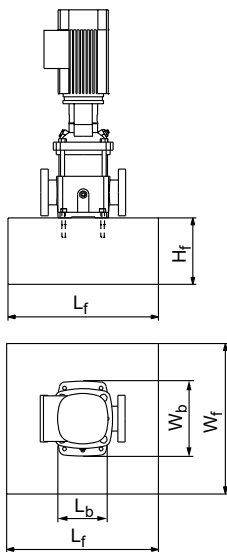


TM 053496

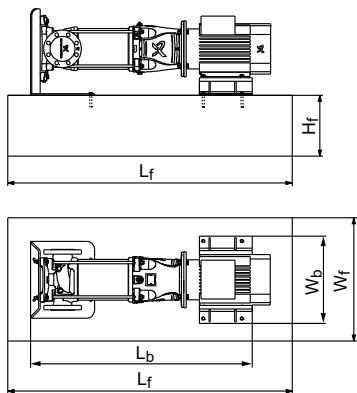
4.2 Foundation

The pump must be installed on a concrete foundation that meets the following requirements:

- heavy and solid enough to provide permanent and rigid support for the entire weight of the product
- large enough to support the entire surface of the base plate and support brackets
- capable of absorbing any vibration, normal strain or shock
- has a level and flat surface
- has anchor bolts for fixing the base plate.



Foundation, vertical mounting



Foundation, horizontal mounting

Length and width of the foundation

The foundation must extend at least 100 mm beyond the base frame on all sides. Consequently, the overall foundation length (L_f) and width (W_f) must be at least 200 mm greater than the length (L_b) and width (W_b) of the base plate, including any support brackets used for horizontal mounting.

For vertical mounting, we recommend the following length (L_f) and width (W_f) of the foundation:

Motor size [kW]	L_f [mm]	W_f [mm]
0.37 - 11	$L_b + 200$	$W_b + 200$
15-55	$L_b + 600$	$W_b + 600$
75-200	$L_b + 1000$	$W_b + 1000$



The details of the base plate for vertical mounting are available in the section on dimensions in the appendix.

Height of the foundation

The height of the foundation must be between 100-600 mm, depending on the local installation. The mass of the foundation must be at least 1.5 times the total mass of the pump with motor.

Calculate the minimum height of the foundation (H_f) with the following formula.

$$H_f = \frac{M_p \times 1.5}{L_f \times W_f \times \delta_{\text{concrete}}}$$

M_p : Total mass of the product [kg]

δ_{concrete} : Density of concrete, for example 2200 kg/m³

L_f : Length of the foundation [m]

W_f : Width of the foundation [m]



To achieve low-noise operation, use a foundation with a mass of up to five times that of the product.

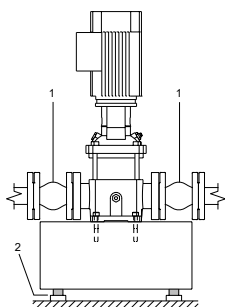
Related information

5.2 Mounting the product

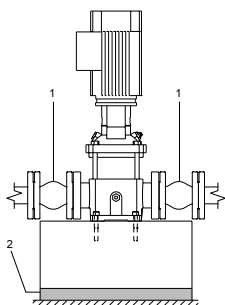
4.3 Vibration dampening

The following measures are recommended to minimise noise and vibration:

- Use a concrete foundation with a mass at least 1.5 times the total mass of the pump. Where particularly low noise levels are required, the foundation mass may be increased to up to five times the pump mass.
- Install vibration dampers under the foundation. This solution is suitable for pumps with motor outputs from 0.37 to 30 kW.
- Install a Sylomer® plate under the foundation. This solution is suitable for pumps with motor size 37 to 200 kW.
- Fit expansion joints on either side of the pump.



Pump on vibration dampers (2) and with expansion joints (1)



Pump on a Sylomer® plate (2) and with expansion joints (1)

Related information

5.2 Mounting the product

5. Mechanical installation

WARNING

Falling objects

Death or serious personal injury

- Follow the lifting instructions.
- Use lifting equipment approved for the weight of the product.
- When lifting the complete pump and motor assembly, use the motor eyebolts only if the pump is fitted with a Grundfos MG or MGE motor.
- Keep a safe distance from the product during lifting operations.
- Keep the product in a stable and fixed position when working on it.
- Fasten the pump securely to a solid and even foundation in accordance with the mounting instructions.
- Wear personal protective equipment.



WARNING

Rotating parts

Death or serious personal injury

- When fitting the motor on a bare-shaft pump, make sure to install the coupling guards securely to the pump with the screws intended for this purpose.



WARNING

Pressurised system

Death or serious personal injury

- Always use accessories that comply with the pump specifications and are suitable for the pumped liquid.



CAUTION

Contamination

Minor or moderate personal injury

- Before the pump is used for supplying drinking water, flush the pump thoroughly with clean water.
- Do not use the pump for drinking water if any internal parts have been in contact with particles or substances not suitable for water intended for human consumption.



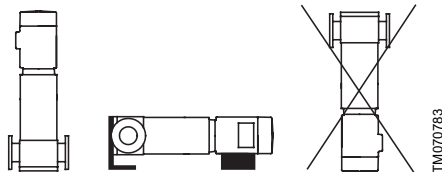
The pump must be installed according to national water regulations and standards.

Related information

3.3 Lifting the product

5.2 Mounting the product

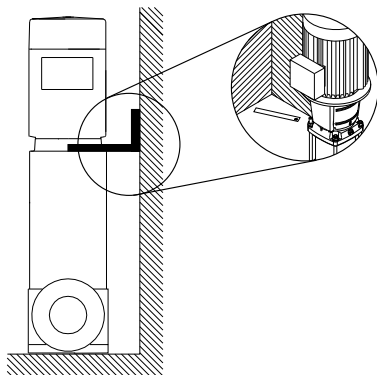
5.1 Positioning the product



Correct vertical and horizontal position of a CR, CRI, CRN pump

Support brackets for vertical position

For vertical installations in earthquake-prone areas or mobile systems such as ships and vehicles, we recommend installing a support bracket between the motor stool to a wall or similar to limit movement and vibration.



Support brackets for horizontal position

For horizontal installations, order a pump with a foot-mounted motor and factory-fitted support brackets.

5.2 Mounting the product

DANGER

Falling objects

Death or serious personal injury



- Make sure that the foundation supports the entire surface of the base plate and support brackets.
- Tighten the base plate anchor bolts and flange bolts according to the specified torque values.

WARNING

Falling objects

Death or serious personal injury



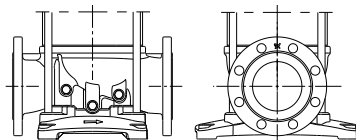
- Keep the product in a stable and fixed position when working on it.
- Make sure that the foundation is solid and can support the weight of the product.
- Make sure that the foundation is level and flat.
- Wear personal protective equipment.



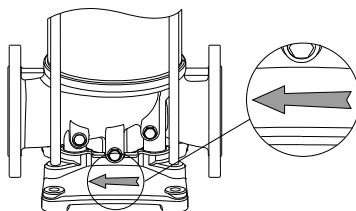
Remove the plastic plugs or stickers from the pump inlet and outlet before installing the pump. Be aware that water leakage may occur when removing the sealing plugs or stickers.

1. Refer to the appendix for details. Check the dimensions shown below before mounting the pump:

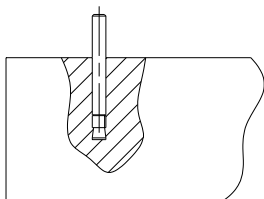
- port-to-port lengths
- dimensions of the base plate
- pipe connections
- diameter and position of anchor bolts.



2. Arrows on the pump base plate indicate the direction of liquid flow through the pump.

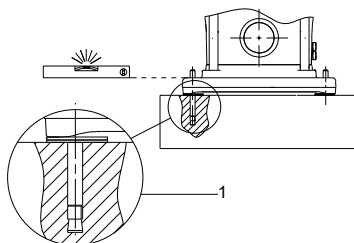


3. Prepare the foundation according to the instructions in the section on foundation.
4. Insert anchor bolts in the foundation for fixing the base plate in the centre. When the anchor bolts are in position, place the pump on the foundation.



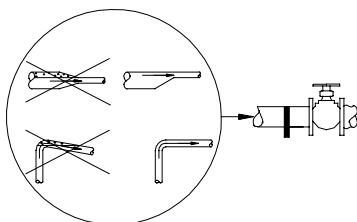
TM034589

5. Ensure that the product is installed in a fully horizontal position. Use shims (1) to align the base plate and support brackets.



TM040362

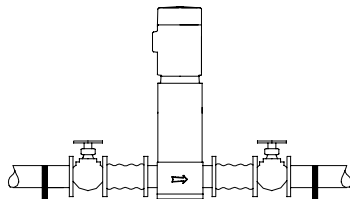
6. Tighten the anchor and flange bolts according to the specified torque values. See the section on tightening torques for base plate and flange.
7. Install the pipes in such a way that air pockets are avoided.



TM020114

8. Always fit a non-return valve to protect the pump against backflow.

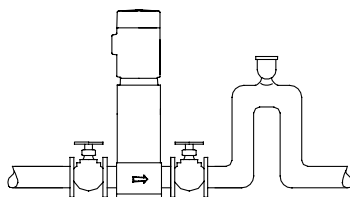
9. Fit isolating valves on either side of the pump to avoid draining the system if the pump needs to be removed for cleaning, repair or replacement.



TM020116

10. Fit a vacuum valve close to the pump if the installation has one of the following characteristics:

- The outlet pipe slopes upwards away from the pump.
- There is a risk of siphon effect.
- The system must be protected against backflow of contaminated liquids.



TM020115

Related information

[3.3 Lifting the product](#)

[4.2 Foundation](#)

[4.3 Vibration dampening](#)

[5. Mechanical installation](#)

[5.3 Tightening torques for base plate and flange](#)

5.3 Tightening torques for base plate and flange

WARNING

Pressurised system

Death or serious personal injury



- Tighten the flange bolts according to the specified torque values to prevent flange gasket blowout.

WARNING

Falling objects

Death or serious personal injury



- Tighten the base plate anchor bolts according to the specified torque values.

The tables show the specified torque values for base plate anchor bolts and flange bolts for CR, CRI, CRN pumps.

Bolt quality class

Pump type	Minimum
1s, 1, 3, 5, 10, 15, 20, 32, 45, 64	8.8
95 with optional small base plate	8.8
95, 125, 155, 185, 215, 255	5.8

Base plate anchor bolts

Pump type	Bolt size	Bolt diameter [mm], free hole	Torque [Nm]
1s, 1, 3, 5	M10, M12	Ø13	40
10, 15, 20	M12	Ø13	50
32, 45, 64	M12	Ø14	65
95 with optional small base plate	M12	Ø14	65
95	M16	Ø18	100
125, 155	M20	Ø22	90 ¹⁾ 190 ²⁾
185, 215, 255	M24	Ø26	130

1) Valid for pumps fitted with motors up to and including 55 kW

2) Valid for pumps fitted with motors of 75 kW and up

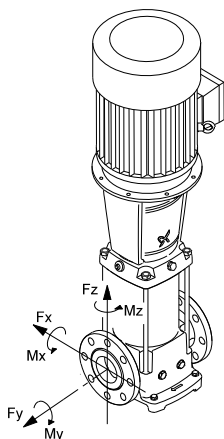
Flange bolts

Pump type	Bolt size	Torque [Nm]	
		DIN, JIS, ANSI	Oval
1s, 1, 3, 5	M10	-	50-60
	M12	60	-
10, 15, 20	M12	60	60-70
	M16	100	70-80
32, 45, 64	M20	150	-
	M24	200	-
95	M16	100	-
	M20	150	-
125, 155	M20	150	-
	M24	230	-
185, 215, 255	M20	150	-
	M24	230	-
	M27	300	-

Related information

[5.2 Mounting the product](#)

5.4 Flange force and torque limits



TM040346

Direction	Description
Y	Inlet or outlet
Z	Direction of chamber stack
X	90° from inlet or outlet



If not all loads reach the maximum permissible values specified in the tables below, one of these values may exceed the normal limit. Contact Grundfos for further information.

Force limits according to material quality

Pump type	Flange DN [mm]	CR Cast-iron pump housing			CRI, CRN Stainless-steel pump housing		
		Direction					
		Y	Z	X	Y	Z	X
		Force [N]					
1s, 1, 3, 5	25/32	338	394	319	675	788	638
10	40	413	469	375	825	938	750
15, 20	50	563	581	506	1125	1163	1013
32	65	694	788	638	1388	1575	1275
45	80	938	769	844	1875	1538	1688
64, 95	100	1256	1013	1125	2513	2025	2250
125, 155	150	1875	1519	1688	3750	3038	3375
185, 215, 255	200	2513	2025	2250	5025	4050	4500

Torque limits according to material quality

Pump type	Flange DN [mm]	CR Cast-iron pump housing			CRI, CRN Stainless-steel pump housing		
		Direction					
		Y	Z	X	Y	Z	X
		Torque [Nm]					
1s, 1, 3, 5	25/32	300	175	125	600	350	250
10	40	400	275	200	800	550	400
15, 20	50	450	325	250	900	650	500
32	65	500	350	300	1000	700	600
45	80	325	400	550	650	800	1100
64, 95	100	375	475	625	750	950	1250
125, 155	150	625	775	1000	1250	1550	2000
185, 215, 255	200	900	1075	1375	1800	2150	2750

6. Electrical connection

WARNING

Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.
- Connect the product to an external supply disconnecting device incorporated in the fixed wiring according to the local wiring rules.

WARNING

Electric shock

Death or serious personal injury



- Protect the motor against overload by means of an external motor-protective circuit breaker with IEC trip class 20. Adjust the current setting of the motor-protective circuit breaker to the nominal current stated on the motor nameplate.
- Alternatively, protect the motor by means of a frequency converter with built-in overload protection, such as Grundfos CUE.

WARNING

Electric shock

Death or serious personal injury



- Connect the product to the same protective-earth (PE) potential as the motor if both motor bearings are of the insulated type such as ceramic bearings.



All electrical connections must be carried out by a qualified electrician in accordance with local regulations.



Make sure that the supply voltage and frequency correspond to the values stated on the product nameplate.



Carry out the electrical connections as described in the corresponding motor instructions.

Make sure that the motor is suitable for the power supply on which it is used and that the motor terminal connection is correct.

MG three-phase motors

Three-phase motors can be connected in delta (D) or star (Y) system according to IEC 60034-8. Voltage and connection is stated on the nameplate. See the wiring diagram located inside the terminal box cover.

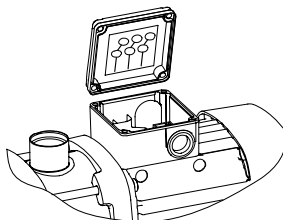
Frequency [Hz]	Delta (D)	Star (Y)
	Mains supply [V]	
50	220-240	380-415
	380-415	660-690
60	220-277	380-480 ³⁾
	380-480	660-690

³⁾ 60 Hz motors, 0.37 - 1.1 kW: 220-277 / 380-440 V.

Note that in some countries voltages differ by area, for example in Japan. For further information, contact the nearest Grundfos company or service workshop.

MG single-phase motors

Connect single-phase motors to the mains in accordance with the wiring diagram instructions located inside the terminal box cover.



Wiring diagram inside a terminal box cover

TM038781

6.1 Drive-end motor bearing

Make sure to use the correct type of drive-end (DE) motor bearing for the bare-shaft pump. Check the specific pump range and pump version stated on the nameplate, and select the corresponding DE bearing.

Pump version ⁴⁾	CR 1-64		CR 95-255	
	Deep-groove ball bearing (62/63xx)	Angular contact bearing (73xx)	Deep-groove ball bearing (62/63xx)	Angular contact bearing (73xx)
A Standard pump	0.37 - 3 kW	4-45 kW	75-200 kW	5.5 - 55 kW
T Pump with thrust-handling device (THD) ⁵⁾	-	-	11-55 kW	Not allowed
Z Pump with bearing flange ⁵⁾	0.37 - 45 kW	Not allowed	5.5 - 200 kW	Not allowed

⁴⁾ Refer to the codes for pump version described in the section on type key.

⁵⁾ Factory product variants (FPV).

Related information

2.3.2 Type key

6.2 Maximum absorbed current



Some motors can absorb a maximum current which is larger than the full-load current $I_{1/1}$ stated on the nameplate.

Motor type according to the nameplate	Upper limit for absorbed current
- Motors marked with both of the below: - full-load current $I_{1/1}$ - maximum current I_{max}	I_{max}
- Grundfos MMG-E motors - Grundfos MMG-G motors - Grundfos MMG-H motors	$1.1 \times I_{1/1}$
- Motors marked only with the below: - full-load current $I_{1/1}$	$I_{1/1}$

6.3 CRN 95, 125, 155 high-pressure range



The pump sizes listed below are only to be used with a soft starter or a frequency converter.

50 Hz	60 Hz
CRN 95-8	CRN 95-5
CRN 95-9	CRN 95-6-1
CRN 95-10	CRN 95-7
CRN 95-11	CRN 125-7
CRN 95-12	CRN 125-8
CRN 125-11	CRN 125-9-3
CRN 125-12	CRN 155-5
CRN 155-8	CRN 155-6-3
CRN 155-9	CRN 155-6
CRN 155-10	CRN 155-7-3
CRN 155-11-1	CRN 155-7
-	CRN 155-8-3

6.4 Motors for Variable Frequency Drive (VFD)

To avoid bearing current when operating the pump with VFD, Grundfos recommends using an isolated bearing system for the following motor sizes:

- 2-pole motors: ≥ 45 kW
- 4-pole motors: ≥ 37 kW.



Some installations may require protection at a lower motor power due to either insufficient grounding, liquid influencing the grounding of the motor, or the combination of motor make and frequency converter.

6.5 Changing the terminal box position

WARNING

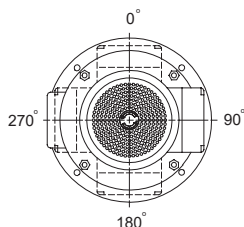
Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.

The terminal box can be positioned in four different directions by turning the motor in 90° steps.



TM004257

Terminal box positions, top view

Follow the steps below to change the terminal box position:

1. If necessary, remove the coupling guards.



Do not remove the coupling.

2. Remove the bolts securing the motor to the pump.
3. Turn the motor to the required position.
4. Refit and tighten the bolts.
5. Refit the coupling guards.

6.6 Tightening torques for terminal box cover

Motor	Material	Screw diameter [mm]	Torque [Nm]
MG71/80	Composite	5	2
MG71/80		5	1.8-2.2
MG90/100		5	3-4
MG112/132		5	3-4
MG160/180		6	4-6
MGE Model H, I		5	5-6
MGE Model J, K	BMC	5	4.5-5
		5	4
		6	7
		8	20
Other makes		10	35

6.7 Cable entry, screwed connection

Screwed cable entries are not supplied with the motor.

Cable entry holes on the terminal box

Motor [kW]	Number and size	Cable entry closing
0.25 - 0.55	2 × M20 × 1.5	Precast threads with knock-out cable entries
0.75 - 3	2 × M20	Knock-out cable entries
4 - 7.5	4 × M25	Knock-out cable entries
11-22	2 × M20 4 × M40	Knock-out cable entries
30-45	2 × M50 × 1.5	Blanking plug
55-200	2 × M63 × 1.5	Blanking plug



Note that the standard cable entries are different in some regions, for example in Japan. For further information, contact the nearest Grundfos company or service workshop.

6.8 Motor protection

Grundfos MG motors

Single-phase motors have a built-in thermal overload switch (IEC 34-11, TP 211) and require no additional motor protection.

Three-phase motors must be connected to a motor-protective circuit breaker according to local regulations. Three-phase motors from 3 to 22 kW have a built-in thermistor (PTC) according to DIN 44082 (IEC 34-11, TP 211).

Other motor makes supplied by Grundfos

See the corresponding motor instructions supplied with the pump.

6.9 Frequency converter operation

Three-phase motors as defined in IEC 60034 can be operated with frequency converters, provided that the mains-voltage-dependent conditions and phase insulation requirements are met.



All motors used with frequency converters must be protected against voltage peaks and dU/dt transients in accordance with IEC 60034-17.

MG motors

All three-phase MG motors with phase insulation can be connected to a frequency converter.

Insulated bearings are recommended for motors from frame size 225 (45 kW/2-pole, 30 kW/4-pole and 22 kW/6-pole).

Other motor makes supplied by Grundfos

See the corresponding motor instructions supplied with the pump. If in doubt, contact Grundfos or the motor supplier.

Related information

[10.9 The motor produces unexpected noise.](#)

6.9.1 Mains-voltage-dependent conditions

This section specifies the requirements for motor protecting frequency-converter-operated MG motors, as defined in IEC 60034, against voltage peaks.

200-240 V

For mains voltages up to 240 V, no output filters are required.

380-500 V

For power cable lengths of less than 25 m and a mains supply voltage of up to 460 V, no additional motor protection is required.

For power cable lengths of more than 25 m or a mains supply voltage higher than 460 V, sine-wave filters are required.

500 V and higher

For 500 V or higher voltages, sine-wave filters are always required.



Motors with reinforced insulation can be supplied as an option. These motors comply with IEC 60034-25, therefore, there is no need for sine-wave filters. This does not eliminate the requirement for insulated bearings from frame size 225.

Exception

- MG71 and MG80 motors (up to 1.1 kW/2-pole and up to 0.75 kW/4-pole) without phase insulation must be protected against voltage peaks exceeding 650 V between the supply terminals when operated at supply voltages up to and including 440 V.
- For MG71 and MG80 motors without phase insulation and with input voltages above 240 V, install sine-wave filters at the output of the frequency converter.



Phase-insulated MG 71 and MG 80 motors are available for operation with variable-frequency drives (VFDs).

6.9.2 Phase insulation, MG 71 and 80

MG motors in frame sizes 71 and 80 are not equipped with phase insulation as standard. Consequently, these motors are not suitable for frequency-converter operation, as they are not protected against the voltage peaks generated by frequency converters. Phase insulation is only provided on motors with a rated voltage of 460 V or higher.



Frequency converter operation of the MG motors without phase insulation may lead to damage to the motor.

We recommend that you protect all other motors against voltage peaks higher than 1200 V by 2000 V/ μ sec.

You can eliminate increased acoustic noise and detrimental voltage peaks by fitting an LC filter between the frequency converter and the motor.

For further information, contact the frequency converter supplier or the motor supplier.

7. Starting up the product

DANGER

Fire and explosion

Death or serious personal injury



- If the pump is used for flammable, combustible or explosive liquids, make sure to follow the instructions for pumping such types of liquids.



Before you start the pump, fill it with liquid. Dry running damages the pump bearings and shaft seals.

1. Prime the pump.
2. Start the motor and check the direction of rotation.
3. Vent the pump.
4. Check the shaft seal for leakage during the run-in period.

Related information

[7.2 Priming the product](#)

[7.3 Checking the direction of rotation](#)

[7.4 Venting the product](#)

[7.5 Shaft seal run-in](#)

[7.7 Pumping flammable, combustible or explosive liquids](#)

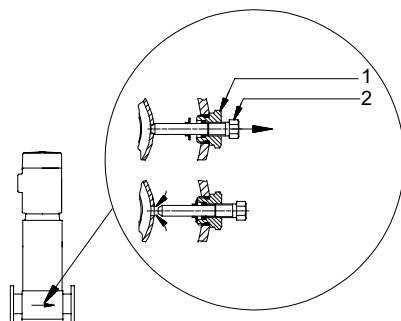
7.1 Bypass valve, CR, CRI, CRN 1s-5

CR, CRI, CRN 1s, 1, 3, 5 pumps include a built-in bypass valve connecting the inlet and outlet sides of the pump.

During startup, open the bypass valve to facilitate the filling procedure. Close it again when the operation is stable.

When pumping liquids containing air:

- If the operating pressure is below 6 bar, leave the bypass valve open.
- If the operating pressure constantly exceeds 6 bar, close the bypass valve. Otherwise, the high liquid velocity may cause wear at the opening.



Location of drain plug (1) and built-in bypass valve (2) on a CR, CRI, CRN 1s-5 pump

TM011243

7.2 Priming the product

WARNING

Toxic or corrosive liquid

Death or serious personal injury



- Wear personal protective equipment.
- Pay attention to the direction of the vent hole. Make sure that escaping liquid cannot cause injury to persons.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.

WARNING

Hot or cold liquid

Death or serious personal injury

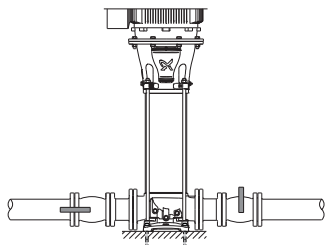


- Wear personal protective equipment.
- Pay attention to the direction of the vent hole. Make sure that escaping liquid cannot cause injury to persons.



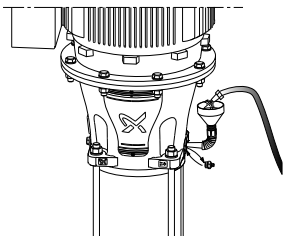
Make sure that escaping liquid cannot cause damage to the motor or other components.

1. To prime the pump, close the isolating valve on the outlet side of the pump and open the isolating valve on the inlet side.



TM066882

2. Remove the priming plug from the pump head and slowly fill the pump with liquid.



TM066883

3. Reinsert the priming plug and tighten it securely.

Related information

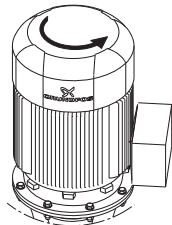
7. Starting up the product

7.3 Checking the direction of rotation



Before you start the pump, fill it with liquid. Dry running damages the pump bearings and shaft seals.

1. See the correct direction of rotation shown by arrows on the motor fan cover.



TM066884

2. Start the pump and check the direction of rotation.
3. If the direction of rotation is wrong, interchange two phases to the motor in the power supply.

Related information

7. Starting up the product

7.4 Venting the product

WARNING

Toxic or corrosive liquid

Death or serious personal injury

- Wear personal protective equipment.
- Pay attention to the direction of the vent hole. Make sure that escaping liquid cannot cause injury to persons.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.



WARNING

Hot or cold liquid

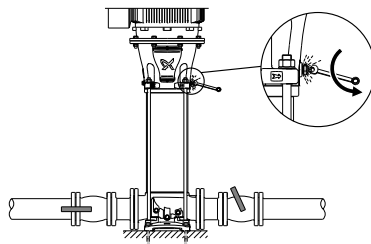
Death or serious personal injury

- Wear personal protective equipment.
- Pay attention to the direction of the vent hole. Make sure that escaping liquid cannot cause injury to persons.



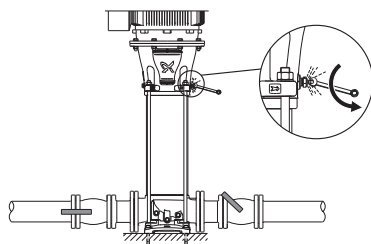
Make sure that escaping liquid cannot cause damage to the motor or other components.

1. Vent the pump by the vent valve in the pump head. Start by partly opening the outlet isolating valve.



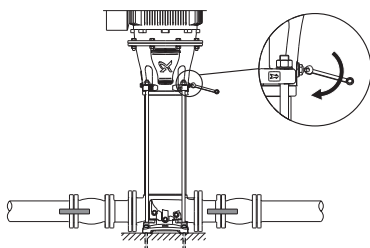
TM066886

2. Continue to vent the pump. At the same time, open the outlet isolating valve a little more.



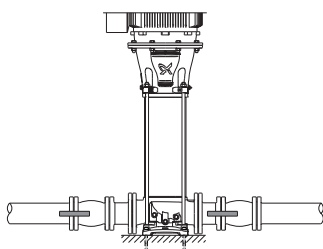
TM066887

3. Close the vent valve when a steady stream of liquid runs out of it.



TM066888

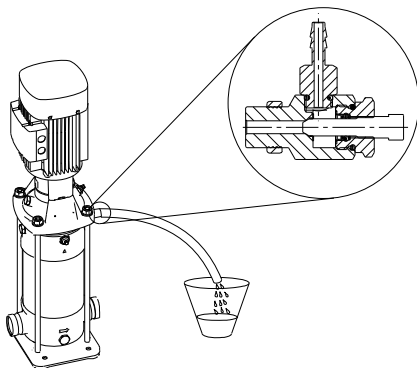
4. Completely open the outlet isolating valve.



TM072337



An optional vent valve equipped with a connecting pipe is also available.



Optional vent valve with connecting pipe

TM051160

Related information

7. Starting up the product

7.5 Shaft seal run-in

WARNING

Toxic or corrosive liquid

Death or serious personal injury



- Wear personal protective equipment.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.

WARNING

Hot or cold liquid

Death or serious personal injury



- Wear personal protective equipment.



Make sure that leakage of corrosive liquids cannot cause damage to the equipment.

The seal faces are lubricated by the pumped liquid, meaning that there may be a certain amount of leakage from the shaft seal.

When you start the pump for the first time, or when you install a new shaft seal, a certain run-in period is required before the leakage is reduced to an acceptable level. The time required for this depends on the operating conditions, that is, every time the operating conditions change, a new run-in period is started.

Under normal conditions, the leaking liquid evaporates. As a result, no leakage is detected.

The continuous leakage rate of a shaft seal includes up to 30 ml per hour due to evaporation and up to 0.5 ml per hour of visible leakage during operation. For some liquids, leakage may not be visible due to evaporation. During the run-in period, leakage may increase to up to 0.8 ml per hour. Liquids such as oil or glycol-water mixtures evaporate more slowly than water and leave residues.

Related information

7. Starting up the product

7.6 Operating the product

WARNING

Airborne noise

Death or serious personal injury



- Wear personal protective equipment.
- Observe the airborne sound pressure levels emitted by the motor.

WARNING**Toxic or corrosive liquid**

Death or serious personal injury



- Wear personal protective equipment.
- Do not run the pump against a closed outlet valve.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.
- Do not use the product for pumping liquids that may chemically attack the pump materials, as this may cause leakage. Contact Grundfos if in doubt.

WARNING**Hot or cold liquid**

Death or serious personal injury



- Wear personal protective equipment.
- Do not run the pump against a closed outlet valve.

CAUTION**Hot or cold surface**

Minor or moderate personal injury



- Make sure that no one can accidentally come into contact with hot or cold surfaces.

CAUTION**Contamination**

Minor or moderate personal injury



- Before the pump is used for supplying drinking water, flush the pump thoroughly with clean water.
- Do not use the pump for drinking water if any internal parts have been in contact with particles or substances not suitable for water intended for human consumption.

Do not exceed the maximum system pressure and maximum liquid temperature stated on the nameplate.

Observe the operating conditions.

Related information

11.1.1 Minimum flow rate

11.1.2 Ambient temperature and installation altitude for Grundfos MG and Innomotics motors

11.1.4 Minimum inlet pressure, NPSH

11.1.5 Maximum inlet pressure and flow rate

11.1.6 Maximum number of starts

11.1.3 Maximum operating pressure and liquid temperature

7.7 Pumping flammable, combustible or explosive liquids**DANGER****Fire and explosion**

Death or serious personal injury



- Grundfos recommends using a pump with an ATEX-certified motor when pumping flammable, combustible or explosive liquids.
- Do not use the product for pumping flammable, combustible or explosive liquids in applications where such pumped liquids could form an explosive atmosphere.
- Do not use the product in hazardous areas classified as an explosive atmosphere.
- The auto-ignition temperature of the pumped liquid must be above the maximum surface temperature of the pump.
- Follow the instructions below before starting up the product and during operation.



If the product is to be used for flammable, combustible or explosive liquids, the installer and owner are responsible for the following:

1. Make the zone-classification calculation to determine whether or not the motor is in a hazardous area.
2. Decide whether a standard pump and motor is suitable for the application or whether a pump with an ATEX-certified motor is required.

For zone-classification calculations, the mechanical shaft seal is considered a source of both primary and secondary grades of release.

Determine the primary grade of release from the mechanical shaft seal on the continuous leakage rate. The continuous leakage rate comprises visible leakage of up to 0.5 ml per hour and evaporation of up to 30 ml per hour.

Determine the secondary grades of release from the mechanical shaft seal, flanges, connections, and pipe fittings in accordance with EN IEC 60079-10-1.



Install ATEX-approved dry-running protection. The installer or owner must check the functions of the dry-running protection, such as flow rate, sealing pressure and temperature of the barrier or flushing liquid.

Follow the instructions in this checklist before startup and during operation.

1. Verify that the pump has been filled with liquid and vented. The pump must never run dry.
2. Re-vent the pump in either of the following situations:
 - a. The pump has been stopped for a period of time.
 - b. Air has accumulated in the pump.
3. Check if the shaft seal components, rubber parts and seal surfaces are suitable for the pumped liquid.
 - a. Increased leakage rate can indicate damaged elastomers and rubber parts in the pump.
 - b. Unsuitable elastomers and rubber parts affects the calculation of the zone classification.
4. Confirm that the shaft can rotate freely. There must be no mechanical contact between the impeller and the chamber.
5. Make sure to apply the correct inlet pressure. See the section on minimum inlet pressure, NPSH.
6. Avoid overheating of the pump.
 - a. Operation against a closed outlet valve may cause overheating. Install a bypass with a pressure-relieving non-return valve.
 - b. Check for abnormal noise during operation.
7. Maximum pump-surface temperature:
 - a. The auto-ignition temperature of the pumped liquid must be above the maximum surface temperature of the pump.
 - b. Confirm that the liquid temperature does not exceed the maximum liquid temperature ($t_{\max}$) stated on the nameplate.
 - c. Calculate the maximum pump-surface temperature by adding the temperature rise in the shaft seal to the maximum liquid temperature. See the section on surface temperature calculation.
8. Ensure sufficient ventilation around the pump.
 - a. Maintain the correct ventilation degree to secure that the zone-classification calculations are valid at all times. The zone-classification calculations include the secondary sources of release such as mechanical seals, flanges, connections and pipe fittings.
9. Pump with single seal or double seal:
 - a. Make sure that the pump is always filled with pumped liquid during operation. Install appropriate monitoring, such as ATEX-approved dry-running protection, to stop the pump in case of malfunction.
 - b. Replace the shaft seal if increased leakage is observed.

- c. Confirm that the shaft seal screws are correctly tightened. See the section on shaft seal tightening torques.
- d. For pumps with back-to-back double seal, always keep the chamber pressurized during operation.
- e. For pumps with tandem double seal, always completely fill the seal chamber with flushing liquid during operation.

Related information

2.2 Pumped liquids

2.3.1 Nameplate

7. Starting up the product

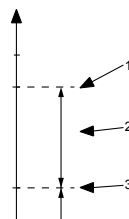
7.7.3 Shaft-seal tightening torques

7.7.1 Surface temperature calculation

11.1.4 Minimum inlet pressure, NPSH

7.7.1 Surface temperature calculation

The illustration below shows the maximum surface temperature of the pump resulting from the maximum liquid temperature and the temperature rise in the shaft seal.



TM064445

Pos.	Description
1	Maximum surface temperature of the pump
2	Temperature rise in the shaft seal (calculated by Grundfos)
3	Maximum liquid temperature

CRN MAGdrive

The surface temperature rise of all CRN MAGdrive pumps is 10 °C above the liquid temperature.

Related information

7.7 Pumping flammable, combustible or explosive liquids

7.7.2 Shaft-seal temperature rise

7.7.2 Shaft-seal temperature rise

The tables below show the temperature rise in the shaft seal for various shaft diameters, pressure values, and media classes, for use in calculating the pump surface temperature and temperature class.

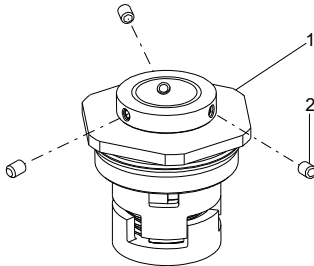
Shaft seal				HQQx/HUUx/HQUx AUUx/AQQx/DQQx 2900/3500 rpm
Shaft diameter [mm]	Pressure [MPa]			Shaft-seal temperature rise [°C]
	1	2.5	4	
12	22	24	26	
16				
22				
28				
36				

Shaft seal				HQBx/HUBx 2900/3500 rpm	
Shaft diameter [mm]	Pressure [MPa]			Shaft-seal temperature rise [°C]	
	1	2.5	4		
12	18	20	22		
16					
22					
28					
36					

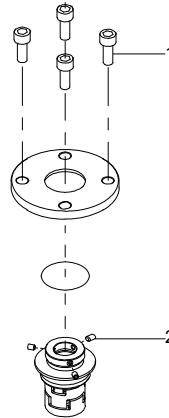
Related information

[7.7.1 Surface temperature calculation](#)

7.7.3 Shaft-seal tightening torques



Shaft seal (1) and shaft seal screws (2) for CR, CRI, CRN 1s-20 and CR, CRN 95-255



Shaft-seal flange screws (1) and shaft seal screws (2) for CR, CRN 32-64

Pump type	Tightening torque [Nm]	
	Shaft seal	Shaft-seal screws ⁶⁾
1s, 1, 3, 5	35	2.5
10, 15, 20	35	2.5
32, 45, 64	62 ⁷⁾	6
95, 125, 155, 185, 215, 255	100 150	6

⁶⁾ Shaft seal screws (2): 3 pcs

⁷⁾ Shaft seal flange screws (1): 4 pcs

Related information

[7.7 Pumping flammable, combustible or explosive liquids](#)

8. Servicing the product

DANGER

Electric shock

Death or serious personal injury

- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.
- Close the inlet and outlet valves to prevent flow through the pump, which could cause the pump to act as a turbine and generate current in the motor.



DANGER**Falling objects**

Death or serious personal injury



- Follow the specific instructions on how to lift the motor on or off the pump.
- Follow the specific instructions on how to lift, raise and lay down a bare-shaft pump.

WARNING**Pressurised system**

Death or serious personal injury



- Depressurize the system before you start any work on the product. Drain the system or close the isolating valves on either side of the pump.
- Always use accessories that comply with the pump specifications and are suitable for the pumped liquid.
- Apply correct torque during reassembly. See the values in the service instructions.

WARNING**Falling objects**

Death or serious personal injury



- Keep the product in a stable and fixed position when working on it.
- Follow the lifting instructions.
- Use lifting equipment approved for the weight of the product.
- When lifting the entire pump with motor, only use the motor eyebolts if the pump is fitted with a Grundfos MG or MGE motor.
- Keep a safe distance from the product during lifting operations.
- Wear personal protective equipment.

WARNING**Toxic or corrosive liquid**

Death or serious personal injury



- Wear personal protective equipment.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.
- Always use original spare parts suitable for the pumped liquid.

WARNING**Rotating parts**

Death or serious personal injury



- Install the coupling guards securely to the pump with the screws intended for this purpose.

WARNING**Hot or cold liquid and surface**

Death or serious personal injury



- Wear personal protective equipment.
- Make sure that no one can accidentally come into contact with hot or cold surfaces.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.

CAUTION**Contamination**

Minor or moderate personal injury



- Before the pump is used for supplying drinking water, flush the pump thoroughly with clean water.
- Do not use the pump for drinking water if any internal parts have been in contact with particles or substances not suitable for water intended for human consumption.
- Always use original spare parts suitable for drinking water.

We recommend that you repair pumps with motors of 7.5 kW and up at the installation site. Necessary lifting equipment must be available.

Related information

[3.3.5 Lifting the motor on or off the pump](#)

[3.3 Lifting the product](#)

8.1 Maintenance**8.1.1 Pump maintenance**

The pump bearings and the shaft seal are maintenance-free.

8.1.2 Motor maintenance

Perform maintenance as described in the instructions for the motor supplied with the pump.

Motors not fitted with grease nipples are maintenance-free.

Motors fitted with grease nipples must be lubricated with a high-temperature, lithium-based grease. See the instructions on the fan cover.

In case of seasonal operation where the motor is idle for more than 6 months of the year, grease the motor when you take the pump out of operation.

Depending on the ambient temperature, replace or lubricate the motor bearings according to the tables below.

- The tables apply to 2-pole motors.
- Intervals for 4-pole motors are twice as long as those for 2-pole motors.

If the ambient temperature is lower than 40 °C, replace or lubricate the bearings at the same intervals as for 40 °C.

Bearing replacement intervals for 2-pole MG motors

Motor size [kW]	Bearing replacement interval [operating hours ⁸⁾]				
	40 °C	45 °C	50 °C	55 °C	60 °C
0.37 - 0.75	18000	-	-	-	-
1.1 - 7.5	20000	15500	12500	10000	7500

⁸⁾ The number of operating hours stated for bearing replacement are guidelines only.

Lubrication intervals for 2-pole MG motors

Motor size [kW]	Lubrication interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
11 - 18.5	4500	3400	2500	1700	1100
22	4000	3100	2300	1500	1000
30-45	4000	3000	2000	1500	-

8.2 Contaminated products

CAUTION Biological hazard

Minor or moderate personal injury

- Flush the pump thoroughly with clean water and rinse the pump parts in water after disassembling.

The product is classified as contaminated if it has been used for liquid that is injurious to health or toxic. If you request Grundfos to service the product, provide details of the pumped liquid before returning it. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the pumped liquid.

Clean the product in the best possible way before you return it. Costs of returning the product are to be paid by the customer.

9. Taking the product out of operation

9.1 Draining the pump

WARNING

Toxic or corrosive liquid

Death or serious personal injury

- Wear personal protective equipment.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.



WARNING

Hot or cold liquid and surface

Death or serious personal injury

- Wear personal protective equipment.
- Make sure that no one can accidentally come into contact with hot or cold surfaces.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.



Make sure that liquid escaping during draining cannot cause damage to the motor or other components.



Drain pumps that are not used during periods of frost to avoid damage.

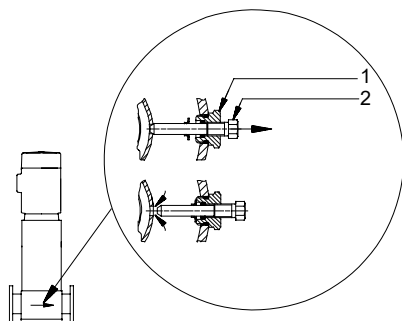
1. Loosen the vent screw in the pump head.
2. Remove all drain plugs from one side of the pump base.



Do not tighten the vent screw and remount the drain plug until the pump is to be used again.

CR, CRI, CRN 1s, 1, 3, 5

1. Screw the bypass valve out against the stop.
2. Remount the drain plug in the base.
3. Fit the drain plug by tightening the large union nut followed by the bypass valve.



TM011243

Location of drain plug (1) and built-in bypass valve (2)

9.2 Taking the product permanently out of operation

Observe the following if the pump is to be permanently taken out of operation and removed from the pipe system.

DANGER

Electric shock

Death or serious personal injury

- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.
- Close the inlet and outlet valves to prevent flow through the pump, which could cause the pump to act as a turbine and generate current in the motor.



DANGER

Falling objects

Death or serious personal injury

- Follow the specific instructions on how to lift the motor on or off the pump.
- Follow the specific instructions on how to lift, raise and lay down a bare-shaft pump.



WARNING

Falling objects

Death or serious personal injury

- Follow the lifting instructions.
- Use lifting equipment approved for the weight of the product.
- When lifting the entire pump with motor, only use the motor eyebolts if the pump is fitted with a Grundfos MG or MGE motor.
- Keep a safe distance from the product during lifting operations.
- Keep the product in a stable and fixed position when working on it.
- Wear personal protective equipment.

WARNING

Toxic or corrosive liquid

Death or serious personal injury

- Wear personal protective equipment.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.



WARNING

Hot or cold liquid and surface

Death or serious personal injury

- Wear personal protective equipment.
- Make sure that no one can accidentally come into contact with hot or cold surfaces.
- Pay attention to the direction of the vent hole and drain plug when draining the pump. Make sure that escaping liquid cannot cause injury to persons.



Related information

[3.3.5 Lifting the motor on or off the pump](#)

[3.3 Lifting the product](#)

10. Fault finding the product

WARNING

Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product. Make sure that the power supply cannot be switched on accidentally.

WARNING

Falling objects

Death or serious personal injury



- Keep the product in a stable and fixed position when working on it.

WARNING

Toxic or corrosive liquid

Death or serious personal injury



- Wear personal protective equipment.
- Collect and safely dispose of pumped liquid drained from or leaking from the pump to prevent intoxication.

WARNING

Hot or cold liquid and surface

Death or serious personal injury



- Wear personal protective equipment.
- Make sure that no one can accidentally come into contact with hot or cold surfaces.

10.1 The motor does not run when started.

Cause	Remedy
There is a power supply failure.	Connect the power supply.
One or more fuses are blown.	Replace the fuses.
The motor-protective circuit breaker has tripped.	Reset the motor-protective circuit breaker.
The thermal protection has tripped.	Reactivate the thermal protection.
The main contacts in the motor-protective circuit breaker are not making contact, or the coil is faulty.	Replace the contacts or the magnetic coil.
The control circuit is defective.	Repair the control circuit.
The motor is defective.	Replace the motor.

10.2 The motor-protective circuit breaker trips immediately when the power supply is switched on.

Cause	Remedy
A fuse is blown or the motor-protective circuit breaker has tripped.	Replace the fuse or reset the motor-protective circuit breaker.
The contacts in the motor-protective circuit breaker are faulty.	Replace the motor-protective circuit breaker contacts.
The cable connection is loose or faulty.	Fasten or replace the cable connection.
The motor winding is defective.	Replace the motor.
The pump is mechanically blocked.	Remove the mechanical blocking of the pump.
The overload setting for the motor-protective circuit breaker is too low.	Set the motor-protective circuit breaker correctly.

10.3 The motor-protective circuit breaker trips occasionally.

Cause	Remedy
The overload setting for the motor-protective circuit breaker is too low.	Set the motor-protective circuit breaker correctly.
The voltage is low at peak times.	Ensure a constant power supply.

10.4 The motor-protective circuit breaker has not tripped but the motor does not run.

Cause	Remedy
There is a power supply failure.	Connect the power supply.
One or more fuses are blown.	Replace the fuses.
The thermal protection has tripped.	Reactivate the thermal protection.
The main contacts in the motor-protective circuit breaker are not making contact, or the coil is faulty.	Replace the contacts or the magnetic coil.
The control circuit is defective.	Repair the control circuit.

10.5 The pump performance is not constant.

Cause	Remedy
The pump inlet pressure is too low.	Check the inlet conditions. Check if cavitation has occurred.
The inlet pipe or pump is partly blocked by impurities.	Clean the inlet pipe or pump.

Cause	Remedy
The pump draws in air.	Check the inlet conditions.

10.6 The pump runs but gives no water.

Cause	Remedy
The inlet pipe or pump is blocked by impurities.	Clean the inlet pipe or pump.
The foot or non-return valve is blocked in closed position.	Repair the foot or non-return valve.
There is a leakage in the inlet pipe.	Repair the inlet pipe.
There is air in the inlet pipe or pump.	Check the inlet conditions.
The motor runs in the wrong direction of rotation.	Change the direction of rotation of the motor.

10.7 The pump runs backwards when switched off.

Cause	Remedy
There is a leakage in the inlet pipe.	Repair the inlet pipe.
The foot or non-return valve is defective.	Repair the foot or non-return valve.

10.8 There is leakage from the shaft seal.

Cause	Remedy
The shaft seal is defective.	Replace the shaft seal.

10.9 The motor produces unexpected noise.

Cause	Remedy
Insufficient inlet pressure results in cavitation.	Check the inlet conditions.
The pump shaft position is incorrect and causes frictional resistance when the pump rotates.	Adjust the pump shaft.
The frequency converter operation can cause increased acoustic noise from the motor.	Make sure to protect the motor against voltage peaks and dU/dt according to IEC 60034-17. For noise-critical applications, fit an output filter between the motor and the frequency converter to reduce the voltage peaks. For particularly noise-critical applications, fit a sinusoidal filter. Observe Grundfos recommendations on frequency-converter operation.

Related information

[6.9 Frequency converter operation](#)

11. Technical data

11.1 Operating conditions

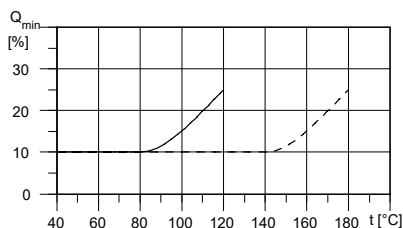
11.1.1 Minimum flow rate



The pump risks overheating at flow rates below the minimum flow rate.

The curves show the minimum flow rate as a percentage of the rated flow rate in relation to the liquid temperature.

The dotted line shows a CR pump fitted with an air-cooled top assembly.



TM012816

Minimum flow rate

Related information

[7.6 Operating the product](#)

11.1.2 Ambient temperature and installation altitude for Grundfos MG and Innomotics motors

The table shows the maximum permissible ambient temperature at full load and the maximum permissible installation altitude above sea level at full load.

Power [kW]	Motor	[°C]	[m]
0.37 - 0.55	Grundfos MG	40	1000
0.75 - 22	Grundfos MG	60	3500
30-200	Innomotics	55 ⁹⁾	2750

⁹⁾ The maximum ambient temperature for Innomotics motors operated by a frequency converter is 40 °C.



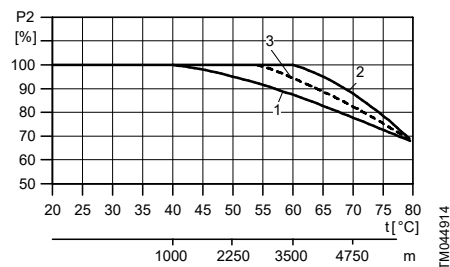
If the maximum permissible ambient temperature is not stated on the motor nameplate, do not use the motor at ambient temperatures above 40 °C.

Motor output derating factors

If the ambient temperature exceeds the maximum permissible temperature or the pump is installed at an altitude exceeding the maximum permissible altitude, the motor must not be fully loaded due to risk of overheating. Overheating may result from excessive ambient temperatures or low density and consequently low cooling effect of the air.

In such cases, it may be necessary to use a motor with a higher rated output.

Motor load for MG and Innomotics motors



TM044914

Maximum motor output in relation to ambient temperature and altitude

Curve	Power [kW]	Motor	Efficiency class
1	0.37 - 0.55	Grundfos MG	IE3
2	0.75 - 22	Grundfos MG	IE3
3	30-200	Innomotics	IE3/IE4

Example of maximum motor load

Pump with a 2.2 kW IE3 motor (derating curve 2):

- If this pump is installed 4750 m above sea level, the motor must not be loaded more than 88 % of the rated output.
- At an ambient temperature of 75 °C, the motor must not be loaded more than 78 % of the rated output.
- If the pump is installed 4750 m above sea level at an ambient temperature of 75 °C, multiply the derating factors. The motor must not be loaded more than 88 % multiplied by 78 %, equaling 68.6 % of the rated output.



Make sure to reduce the motor load if the ambient temperature or installation altitude is exceeded. Failure to do so reduces motor lifetime and voids the warranty.

Related information

[7.6 Operating the product](#)

11.1.3 Maximum operating pressure and liquid temperature

Pump

The maximum permissible operating pressure and liquid temperature are indicated on the pump nameplate.

The relation between the maximum permissible operating pressure and liquid temperature for different flange types and pump types is specified in the appendix.

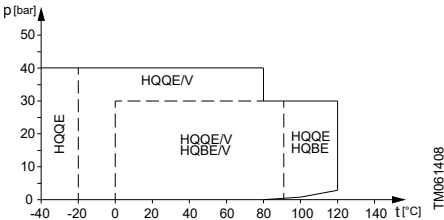
 Make sure not to exceed the maximum permissible operating pressure. Otherwise the conical bearing in the motor may be damaged and the life of the shaft seal reduced.

Shaft seal

If the operating range is exceeded, the lifetime of the shaft seal may be reduced.

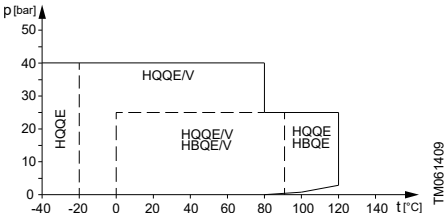
The operating range of the shaft seal depends on the operating pressure (p), the liquid temperature (t), the pump type and the type of the shaft seal. See the type key on the nameplate. The diagrams below apply to clean water and water with anti-freeze liquids.

Ø12, Ø16 and Ø22 shaft seals (0.37 - 55 kW)



Operating range of standard shaft seals for CR, CRI, CRN 1-255 with 0.37 to 55 kW motors

Ø28 and Ø36 shaft seals (75-200 kW)



Operating range of standard shaft seals for CR, CRN 125-255 with 75 to 200 kW motors

Standard shaft seal	Description
HQQE	O-ring (cartridge) (balanced seal), silicon carbide/silicon carbide, EPDM
HQQV	O-ring (cartridge) (balanced seal), silicon carbide/silicon carbide, FKM
HQBE	O-ring (cartridge) (balanced seal), silicon carbide/carbon, EPDM
HQBV	O-ring (cartridge) (balanced seal), silicon carbide/carbon, FKM

Related information

[2.3.1 Nameplate](#)

[7.6 Operating the product](#)

11.1.4 Minimum inlet pressure, NPSH

To avoid cavitation, maintain a minimum inlet pressure during operation. The required minimum inlet pressure is indicated by the NPSH on the pump curves.

We recommend calculating the maximum suction lift H in the following situations:

- The liquid temperature is high.
- The flow is significantly higher than the rated flow.
- Water is drawn from depths.
- Water is drawn through long pipes.
- Inlet conditions are poor.

Maximum suction lift H:

- If the calculated H is positive, the pump can operate at a suction lift of maximum H meters head.
- If the calculated H is negative, the inlet pressure is too low. Redesign the system to avoid cavitation.

Use the following equation to calculate the maximum suction lift H in meters head.

$$H = P_b \times 10.2 - \text{NPSH} - H_f - H_v$$

P_b = Barometric pressure in bar:

P_b can be set to 1 bar at sea level.

In closed systems, P_b indicates the system pressure in bar.

10.2 converts bar to meters of water column.

(1 bar = 0.1 MPa)

NPSH = Net Positive Suction Head in meters head:

It is to be read from the NPSH curve at the highest flow rate the pump delivers.

Note that the NPSH curves include a safety margin of 0.5 meters.

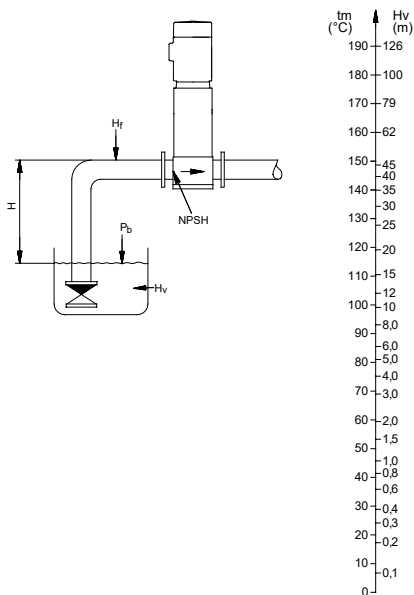
H_f = Friction loss in the inlet pipe in meters head (at the highest flow rate the pump delivers)

H_v = Vapour pressure in meters head
 H_v depends on the liquid temperature t_m , and is to be read from the vapour pressure scale for the pumped liquid.

Maximum suction lift calculation example

In the following, there is an example of how to calculate the maximum suction lift H in meters head for a CR pump in an open system where the pumped liquid is water.

If the pumped liquid is not water, then use the vapour pressure the pumped liquid.



Vapour pressure scale for water showing the relation between liquid temperature t_m and vapour pressure H_v

Example

$P_b = 1$ bar

Pump type: CR 15, 50 Hz

Flow rate: 15 m³/h

NPSH, see curve charts in the appendix: 1.1 m head.

$H_f = 3.0$ m head

Liquid temperature: 60 °C

H_v : 2.1 m head

$H = P_b \times 10.2 - \text{NPSH} - H_f - H_v$ [m head]

$H = 1 \times 10.2 - 1.1 - 3.0 - 2.1 = 4$ m head

This means that the pump can operate at a suction lift of maximum 4 m head.

Pressure calculated in bar: $3.5 \times 0.0981 = 0.343$ bar

Pressure calculated in kPa: $3.5 \times 9.81 = 34.3$ kPa



Always check the NPSH of the pump at the highest possible flow rate. Do not select a pump with a duty point too far to the right on the NPSH curve.

Related information

[7.6 Operating the product](#)

[7.7 Pumping flammable, combustible or explosive liquids](#)

11.1.5 Maximum inlet pressure and flow rate

The section on maximum permissible inlet pressure and flow rate for vertically mounted pumps is available in the appendix.

Note that the outlet pressure, that is, the actual inlet pressure plus the pressure provided by the pump, must always be lower than the maximum permissible pressure stated on the nameplate.

The pumps are pressure-tested at 1.5 times the maximum permissible system pressure.

Related information

[2.3.1 Nameplate](#)

[7.6 Operating the product](#)

11.1.6 Maximum number of starts

It is valid for pumps fitted with a Grundfos MG or Innomotics motor.

Motor size [kW]	Maximum number of starts per hour
0.37 - 2.2	250
3-4	100
5.5 - 11	50
18.5 - 22	40
30	90
37	50
45	80
55	50
75-90	50
110-200	30

For motors of other makes supplied by Grundfos, refer to the instructions provided with the pump.

Related information

[7.6 Operating the product](#)

11.2 Other technical data

Technical data	Location
Electrical data	See the motor nameplate.
Dimensions	See the appendix.
Weight	See the label on the packaging. See the pump and motor nameplates.
Sound pressure level	See the section on the sound pressure level in the appendix.

12. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheellie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at www.grundfos.com/product-recycling.

13. Document quality feedback

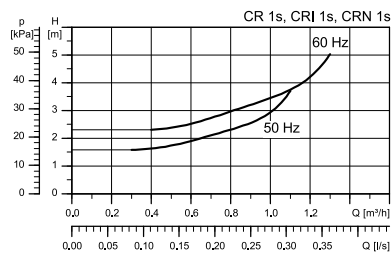
To provide feedback about this document, scan the QR-code using your phone's camera or a QR code app.



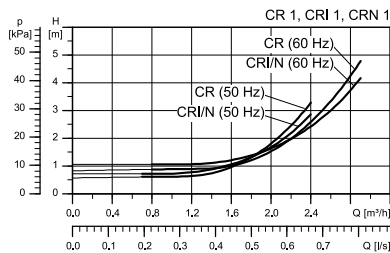
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Appendix A

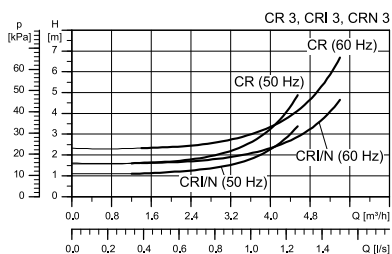
A.1. NPSH



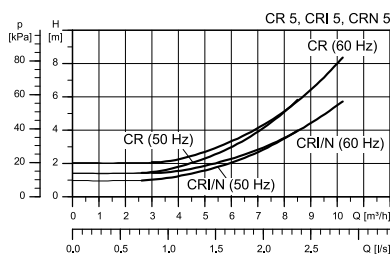
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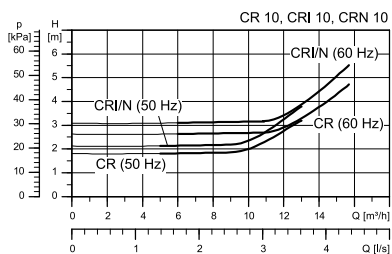
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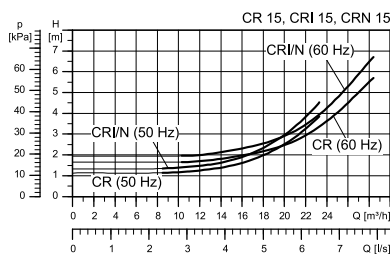
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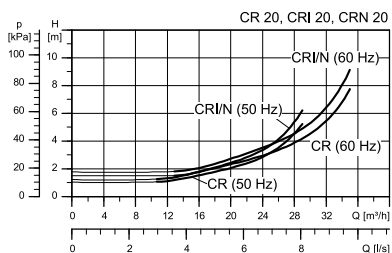
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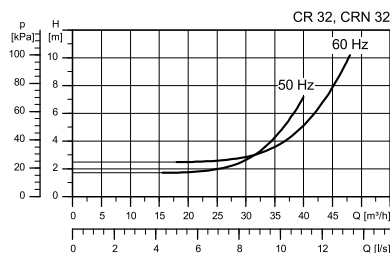
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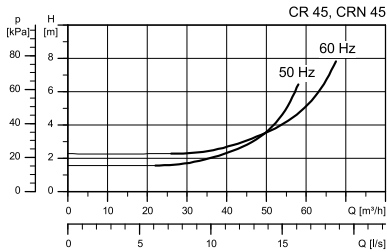
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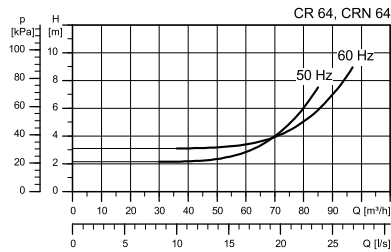
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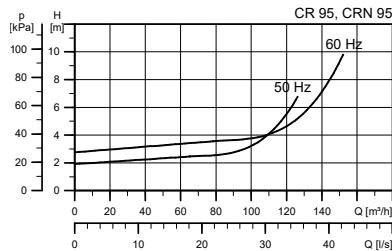
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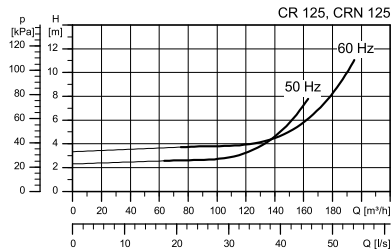
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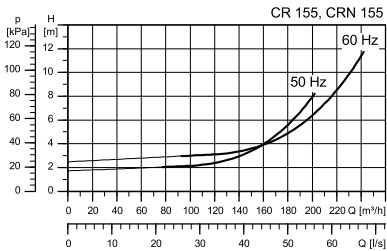
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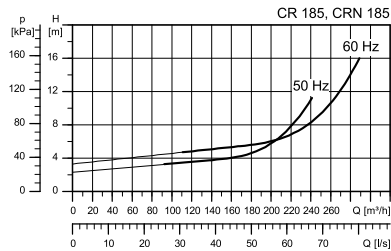
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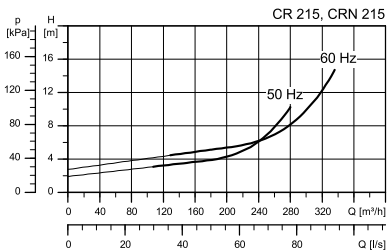
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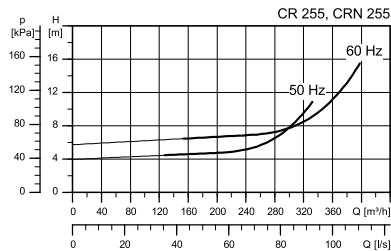
TM069623



TM069624



TM069625



TM069626

A.2. Maximum permissible inlet pressure and flow rate

DE: Maximal zulässiger Zulaufdruck

ES: Presión máxima admisible de aspiración

FR: Pression d'aspiration maxi admissible

TR: İzin verilen maksimum emme basıncı

CN: 最大允许入口压力

AR: الحد الأقصى لضغط الدخول المسموح به

50 Hz	Maximum inlet pressure		Maximum flow rate
	[bar]	[MPa]	[m³/h]
CR, CRI, CRN 1s			1.1
1s-2 → 1s-36	10	1	
CR, CRI, CRN 1			2.4
1-2 → 1-36	10	1	
CR, CRI, CRN 3			4.5
3-2 → 3-29	10	1	
3-31 → 3-36	15	1.5	
CR, CRI, CRN 5			8.5
5-2 → 5-16	10	1	
5-18 → 5-36	15	1.5	
CR, CRI, CRN 10			13
10-1 → 10-6	8		
10-7 → 10-22	10	0.8	
CR, CRI, CRN 15			24
15-1 → 15-3	8	0.8	
15-4 → 15-17	10	1	
CR, CRI, CRN 20			29
20-1 → 20-17	10	1	
CR, CRN 32			40
32-1-1 → 32-4	4	0.4	
32-5-2 → 32-10	10	1	
32-11-2 → 32-14	15	1.5	
CR, CRN 45			58
45-1-1 → 45-2	4	0.4	
45-3-2 → 45-5	10	1	
45-6-2 → 45-13-2	15	1.5	
CR, CRN 64			85
64-1-1 → 64-2-2	4	0.4	
64-2-1 → 64-4-2	10	1	
64-4-1 → 64-8-1	15	1.5	
CR, CRN 95			120

50 Hz	Maximum inlet pressure		Maximum flow rate
	[bar]	[MPa]	[m³/h]
95-1-1 → 95-1	4	0.4	
95-2-2 → 95-3-2	10	1	
95-3 → 95-6	15	1.5	
95-7 → 95-12	20	2	
CR, CRN 125			160
125-1 → 125-2-1	10	1	
125-2 → 125-4	15	1.5	
125-5 → 125-12	20	2	
CR, CRN 155			200
155-1-1 → 155-1	10	1	
155-2-2 → 155-3	15	1.5	
155-4-1 → 155-11-1	20	2	
CR, CRN 185			240
185-1-1	10	1	
185-1 → 185-2	15	1.5	
185-3-3 → 185-8	20	2	
CR, CRN 215			280
215-1-1 → 215-2-2	15	1.5	
215-2-1 → 215-7-2	20	2	
CR, CRN 255			330
255-1-1 → 255-1	15	1.5	
255-2-2 → 255-6-2	20	2	

60 Hz	Maximum inlet pressure		Maximum flow rate
	[bar]	[MPa]	[m³/h]
CR, CRI, CRN 1s			1.3
1s-2 → 1s-27	10	1	
CR, CRI, CRN 1			2.9
1-2 → 1-25	10	1	
1-27	15	1.5	
CR, CRI, CRN 3			5.4
3-2 → 3-17	10	1	
3-19 → 3-25	15	1.5	
CR, CRI, CRN 5			10.2
5-2 → 5-9	10	1	
5-10 → 5-24	15	1.5	
CR, CRI, CRN 10			16
10-1 → 10-5	8	0.8	
10-6 → 10-17	10	1	
CR, CRI, CRN 15			29
15-1 → 15-2	8	0.8	
15-3 → 15-12	10	1	
CR, CRI, CRN 20			35
20-1	8	0.8	
20-2 → 20-10	10	1	
CR, CRN 32			48
32-1-1 → 32-2	4	0.4	
32-3-2 → 32-6	10	1	
32-7-2 → 32-10-2	15	1.5	
CR, CRN 45			70
45-1-1 → 45-1	4	0.4	
45-2-2 → 45-3	10	1	
45-4-2 → 45-7	15	1.5	
CR, CRN 64			102
64-1-1	4	0.4	
64-1 → 64-2-1	10	1	
64-2 → 64-5-2	15	1.5	
CR, CRN 95			150
95-1-1 → 95-2-2	10	1	
95-2-1 → 95-4-2	15	1.5	
95-4 → 95-7	20	2	
CR, CRN 125			190
125-1-1	10	1	
125-1 → 125-3-2	15	1.5	

60 Hz	Maximum inlet pressure		Maximum flow rate
	[bar]	[MPa]	[m³/h]
125-3-1 → 125-9-3	20	2	
CR, CRN 155			230
155-1-1	10	1	
155-1 → 155-2-1	15	1.5	
155-2 → 155-8-3	20	2	
CR, CRN 185			280
185-1-1 → 185-1	15	1.5	
185-2-1 → 185-6-4	20	2	
CR, CRN 215			336
215-1-1	15	1.5	
215-1 → 215-4-1	20	2	
CR, CRN 255			400
255-1-1 → 255-4-3	20	2	

A.3. Maximum permissible operating pressure and liquid temperature

DE: Maximal zulässiger Betriebsdruck und Medientemperatur

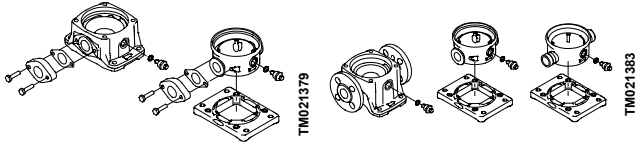
JP: 最大許容運転圧力と許容液温

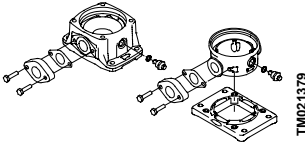
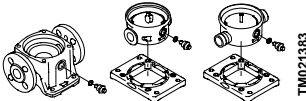
ES: Presión máxima admisible de funcionamiento y temperatura del líquido

CN: 最大工作压力和液体的允许温度

FR: Pression de service maximum admissible et température du liquide

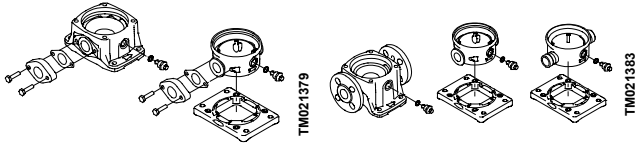
AR: ضغط التشغيل الأقصى ودرجة حرارة السائل القصوى المسموح بهما

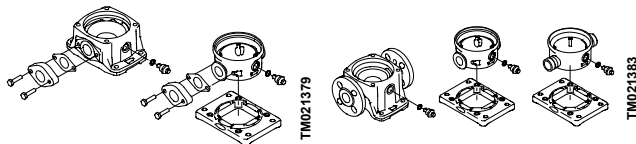
50 Hz	Oval flange		PJE, clamp, union, DIN	
Flange type				
Pump type	Maximum permissible operating pressure ¹⁾ [bar]	Liquid temperature [°C]	Maximum permissible operating pressure ¹⁾ [bar]	Liquid temperature [°C]
CR, CRI, CRN 1s	16	-20 to +120	25	-20 to +120
CR, CRI, CRN 1	16		25	
CR, CRI, CRN 3	16		25	
CR, CRI, CRN 5	16		25	
CR, CRI 10-1 → 10-16	16		16	
CR, CRI 10-17 → 10-22	-	-	25	-20 to +120
CRN 10	-	-	25	
CR, CRI 15-1 → 15-7	10	-20 to +120	-	
CR, CRI 15-1 → 15-10	-	-	16	
CR, CRI 15-12 → 15-17	-	-	25	
CRN 15	-	-	25	-20 to +120
CR, CRI 20-1 → 20-7	10	-20 to +120	-	
CR, CRI 20-1 → 20-10	-	-	16	
CR, CRI 20-12 → 20-17	-	-	25	
CRN 20	-	-	25	
CR, CRN 32-1-1 → 32-7	-	-	16	-30 to +120
CR, CRN 32-8-2 → 32-14	-	-	30	
CR, CRN 45-1-1 → 45-5	-	-	16	
CR, CRN 45-6-2 → 45-11	-	-	30	
CR, CRN 45-12-2 → 45-13-2	-	-	33	

50 Hz	Oval flange		PJE, clamp, union, DIN	
Flange type				
Pump type	Maximum permissible operating pressure ¹⁾	Liquid temperature	Maximum permissible operating pressure ¹⁾	Liquid temperature
	[bar]	[°C]	[bar]	[°C]
CR, CRN 64-1-1 → 64-5	-	-	16	-20 to +120 ²⁾
CR, CRN 64-6-2 → 64-8-1	-	-	30	
CR, CRN 95-1-1 → 95-5	-	-	16	
CR, CRN 95-6 → 95-8	-	-	25	
CRN 95-9 → 95-12	-	-	40	
CR, CRN 125-1 → 125-4	-	-	16	
CR, CRN 125-5 → 125-7	-	-	25	
CRN 125-8 → 125-12	-	-	40	
CR, CRN 155-1-1 → 155-4-1	-	-	16	
CRN 155-5-2 → 155-6	-	-	25	
CRN 155-7 → 155-11-1	-	-	40	
CR, CRN 185-1 → 185-3	-	-	16	
CR, CRN 185-4-3 → 185-5	-	-	25	
CR, CRN 185-6-3 → 185-8	-	-	40	
CR, CRN 215-1-1 → 215-3	-	-	16	
CR, CRN 215-4-2 → 215-5	-	-	25	
CR, CRN 215-6-3 → 215-7-2	-	-	40	
CR, CRN 255-1-1 → 255-3-2	-	-	16	
CR, CRN 255-3 → 255-4	-	-	25	
CR, CRN 255-5-3 → 255-6-2	-	-	40	

1) In standard configurations. For operating conditions outside the standard, contact Grundfos.

2) For operating pressures above 25 bar, see the section on operating range of the shaft seal.

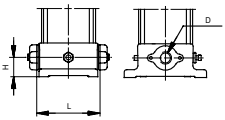
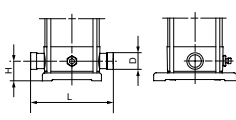
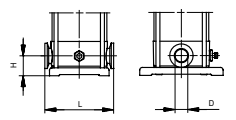
60 Hz	Oval flange		PJE, clamp, union, DIN	
Flange type				
Pump type	Maximum permissible operating pressure ³⁾	Liquid temperature	Maximum permissible operating pressure ³⁾	Liquid temperature
	[bar]	[°C]	[bar]	[°C]
CR, CRI, CRN 1s	16	-20 to +120	25	-20 to +120
CR, CRI, CRN 1	16		25	
CR, CRI, CRN 3	16		25	
CR, CRI, CRN 5	16		25	
CR, CRI 10-1 → 10-10	16		16	
CR, CRI 10-12 → 10-17	-	-	25	-20 to +120
CRN 10	16	-20 to +120	25	
CR, CRI 15-1 → 15-5	10		-	
CR, CRI 15-1 → 15-8	-		16	
CR, CRI 15-9 → 15-12	-		25	
CRN 15	10	-20 to +120	25	-20 to +120
CR, CRI 20-1 → 20-5	10		-	
CR, CRI 20-1 → 20-7	-		16	
CR, CRI 20-8 → 20-10	-		25	
CRN 20	10		25	
CR, CRN 32-1-1 → 32-5	-	-	16	-30 to +120
CR, CRN 32-6-2 → 32-10-2	-	-	30	
CR, CRN 45-1-1 → 45-4	-	-	16	
CR, CRN 45-5-2 → 45-7	-	-	30	
CR, CRN 64-1-1 → 64-3	-	-	16	
CR, CRN 64-4-2 → 64-5-2	-	-	30	-20 to +120 ⁴⁾
CR, CRN 95-1-1 → 95-4-2	-	-	16	
CR, CRN 95-4 → 95-5	-	-	25	
CRN 95-6-1 → 95-7	-	-	40	
CR, CRN 125-1-1 → 125-3-1	-	-	16	
CRN 125-4 → 125-5	-	-	25	-20 to +120 ⁴⁾
CRN 125-6-1 → 125-9-3	-	-	40	
CR, CRN 155-1-1 → 155-3-1	-	-	16	
CRN 155-3 → 155-5-3	-	-	25	

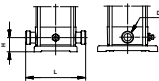
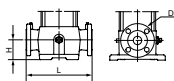
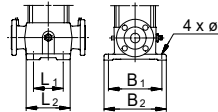
60 Hz	Oval flange		PJE, clamp, union, DIN	
Flange type				
Pump type	Maximum permissible operating pressure ³⁾	Liquid temperature	Maximum permissible operating pressure ³⁾	Liquid temperature
	[bar]	[°C]	[bar]	[°C]
CRN 155-5 → 155-8-3	-	-	40	
CR, CRN 185-1-1 → 185-2	-	-	16	
CR, CRN 185-3-1 → 185-4-3	-	-	25	
CR, CRN 185-4 → 185-6-4	-	-	40	
CR, CRN 215-1-1 → 215-2	-	-	15	
CR, CRN 215-3-3 → 215-4-3	-	-	25	
CR, CRN 215-4-1	-	-	40	
CR, CRN 255-1-1 → 255-2-1	-	-	16	
CR, CRN 255-2 → 255-3	-	-	25	
CR, CRN 255-4-3	-	-	40	

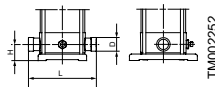
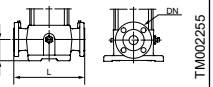
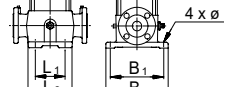
3) In standard configurations. For operating conditions outside the standard, contact Grundfos.

4) For operating pressures above 25 bar, see the section on operating range of the shaft seal.

A.4. Dimensions

	Oval			PJE			CLAMP - FlexiClamp		
									
	L [mm]	H [mm]	D [Rp]	L [mm]	H [mm]	D [mm]	L [mm]	H [mm]	D [mm]
CR 1s	160	50	1	-	-	-	-	-	-
CRI, CRN 1s	-	-	-	210	50	42.2	162	50	30
CR 1	160	50	1	-	-	-	-	-	-
CRI, CRN 1	-	-	-	210	50	42.2	162	50	30
CR 3	160	50	1	-	-	-	-	-	-
CRI, CRN 3	-	-	-	210	50	42.2	162	50	30
CR 5	160	50	1 1/4	-	-	-	-	-	-
CRI, CRN 5	-	-	-	210	50	42.2	162	50	30
CR 10	200	80	1 1/2	-	-	-	-	-	-
CRI, CRN 10	-	-	-	261	80	60.1	202	80	50
CR 15	200	90	2	-	-	-	-	-	-
CRI, CRN 15	-	-	-	261	90	60.1	202	90	50
CR 20	200	90	2	-	-	-	-	-	-
CRI, CRN 20	-	-	-	261	90	60.1	202	90	50
CR 32	-	-	-	-	-	-	-	-	-
CRN 32	-	-	-	320	105	88.9	-	-	-
CR 45	-	-	-	-	-	-	-	-	-
CRN 45	-	-	-	365	135	114.3	-	-	-
CR 64	-	-	-	-	-	-	-	-	-
CRN 64	-	-	-	365	135	114.3	-	-	-

UNION				DIN - FGJ							
 TM002254				 TM002255			 TM002256				
	L [mm]	H [mm]	D [G]	L [mm]	H [mm]	DN	L1 [mm]	L2 [mm]	B1 [mm]	B1 [mm]	Ø
CR 1s	-	-	-	250	75	25/3 2	100	145	180	220	13
CRI, CRN 1s	228	50	2	250	75	25/3 2	100	64	180	220	13
CR 1	-	-	-	250	75	25/3 2	100	145	180	220	13
CRI, CRN 1	228	50	2	250	75	25/3 2	100	64	180	220	13
CR 3	-	-	-	250	75	25/3 2	100	145	180	220	13
CRI, CRN 3	228	50	2	250	75	25/3 2	100	64	180	220	13
CR 5	-	-	-	250	75	25/3 2	100	145	180	220	13
CRI, CRN 5	228	50	2	250	75	25/3 2	100	64	180	220	13
CR 10	-	-	-	280	80	40	130	178	215	256	13.5
CRI, CRN 10	-	-	-	280	80	40	130	200	215	248	13
CR 15	-	-	-	300	90	50	130	176	215	256	13.5
CRI, CRN 15	-	-	-	300	90	50	130	200	215	248	13
CR 20	-	-	-	300	90	50	130	176	215	256	13.5
CRI, CRN 20	-	-	-	300	90	50	130	200	215	248	13
CR 32	-	-	-	320	105	65	170	223	240	298	14
CRN 32	-	-	-	320	105	65	170	226	240	298	14
CR 45	-	-	-	365	140	80	190	248	266	331	14
CRN 45	-	-	-	365	140	80	190	251	266	331	14
CR 64	-	-	-	365	140	100	190	248	266	331	14
CRN 64	-	-	-	365	140	100	190	251	266	331	14

PJE				EN - FGJ							
											
	L	H	D	L	H	DN	L ₁	L ₂	B ₁	B ₂	Ø
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
CR 95	-	-	-	380	140	100	225	275	350	419	18.5
CRN 95	380	140	114	380	140	100	225	275	350	419	18.5
CR 125	-	-	-	485	180	150	275	332	425	499	22.5
CRN 125	485	180	168	485	180	150	275	332	425	499	22.5
CR 155	-	-	-	485	180	150	275	332	425	499	22.5
CRN 155	485	180	168	485	180	150	275	332	425	499	22.5
CR 185	-	-	-	615	200	200	350	415	510	599	26.5
CRN 185	615	200	219	615	200	200	350	415	510	599	26.5
CR 215	-	-	-	615	200	200	350	415	510	599	26.5
CRN 215	615	200	219	615	200	200	350	415	510	599	26.5
CR 255	-	-	-	615	200	200	350	415	510	599	26.5
CRN 255	615	200	219	615	200	200	350	415	510	599	26.5

A.5. Sound pressure level

DE: Schalldruckpegel		JP: 騒音レベル	
ES: Nivel de presión sonora		CN: 声压水平	
FR: Niveau de pression sonore		AR: مستوى ضغط الصوت	
50 Hz		60 Hz	
Motor [kW]	LpA [dB(A)] (ISO3743-2 / ISO1680 50 Hz)	Motor [kW]	LpA [dB(A)] (ISO3743-2 / ISO1680 60 Hz)
0.37	53	0.37	58
0.55	53	0.55	56
0.75	53	0.75	57
1.1	53	1.1	58
1.5	58	1.5	64
2.2	60	2.2	65
3	55	3	60
4	63	4	68
5.5	62	5.5	68
7.5	60	7.5	65
11	60	11	65
15	60	15	65
18.5	60	18.5	65
22	66	22	71
30	67	30	72
37	67	37	72
45	67	45	72
55	71	55	75
75	73	75	77
90	73	90	77
110	73	110	77
132	73	132	77
160	77	160	82
200	77	200	82

Valid for pumps fitted with a Grundfos MG or Innomotics motor.

安全上のご注意

1. Japanese warranty and safety statement

安全上のご注意

- ➔ ご使用（据付、運転、保守・点検等）の前に、必ずこの取扱説明書とその他の付属書類をすべて熟読し、正しくご使用ください。機器の知識、安全の情報そして、注意事項のすべてについて習熟してからご使用ください。
- ➔ この取扱説明書では、安全注意事項のランクを「危険」「注意」として区分してあります。

⚠ 危険 : 取扱いを誤った場合、危険な状態が起こりえて、死亡又は重傷を負う可能性が想定される場合。

⚠ 注意 : 取扱いを誤った場合、危険な状況が起こりえて、中程度の傷害や軽傷を負う可能性が想定される場合及び物的損害だけの発生が想定される場合。

なお、**⚠ 注意**に記載した事項でも、状況によっては重大な結果に結びつく可能性があります。

いずれも重要な内容を記載していますので必ず守ってください。

⚠ 危険

（全 般）

- 爆発性雰囲気中では使用しないでください。
- メンテナンス等、保守の目的で作業する場合は、必ず電源を切って作業してください。
- 運搬、設置、配管・配線、運転・操作、保守・点検の作業は、専門知識のある人が実施してください。感電、けが、火災等のおそれがあります。

（配管・配線）

- 電源ケーブルとの結線は、取扱説明書によって行ってください。感電や火災のおそれがあります。
- ポンプの運転は、この取扱説明書に記載されている容量の漏電ブレーカをつけて御使用ください。感電や火災等のおそれがあります。

（据付・調整）

- アース用端子を確実に接地してください。感電のおそれがあります。

（運 転）

- 運転中、回転体（シャフト、カップリング等）へは絶対に接近又は接触しないでください。巻き込まれ、けがのおそれがあります。
- 停電した時は必ず電源スイッチを切ってください。けがのおそれがあります。
- ポンプを締め切り状態や、取扱説明書に記載の最小流量以下での連続運転はしないでください。インペラの摩擦熱によって、液温が急激に上昇し、やけど、液漏れの原因となります。また、吸込み側に逆止弁（フート、チャッキ）を設置し、締めきり状態になった場合、ポンプ内部の圧力が使用圧力よりも急激に上昇することがあるため、ポンプまたは配管等が破裂し、けがをするおそれがあります。
- 空運転（ポンプ内部に搬送液がない時の運転）はしないでください。ポンプ破損の原因となります。



注 意

(全 般)

- ポンプの仕様以外で使用しないでください。感電、けが、破損等のおそれがあります。
- ポンプ及び電動機の開口部に、指や物を入れないでください。感電、けが、火災等のおそれがあります。
- 損傷した電動機を使用しないでください。けが、火災等のおそれがあります。
- お客様による製品の改造は、当社の保証範囲外ですので、責任を負いません。
- 銘板を取り外さないでください。

(輸送・運搬)

- 運搬時は、落下、転倒すると危険ですので、十分ご注意ください。
- 装置に据え付けた後、ポンプのハンドルなどポンプ本体の部分を利用して、装置全体を吊り上げることは避けてください。
吊り上げる前に銘板、梱包箱、外形図、カタログ等により、ポンプの質量を確認し、吊り具の定格荷重以上のポンプは吊らないでください。
- 輸送・運搬時にポンプ本体に衝撃を与えないでください。液漏れ、異音やポンプ破損の原因となります。

(開 梱)

- 天地を確認の上、特に木枠梱包はクギに注意して開梱してください。けがのおそれがあります。
- 現品が注文通りのものかどうか、確認してください。間違った製品を設置した場合、けが、破損等のおそれがあります。

(据付・調整)

- 吸込み配管はポンプ吸込み口径の5倍以上の直管長さ確保してください。
乱流による振動、騒音、ポンプ破損のおそれがあります。
- ポンプは水平で十分に剛性のある面に据付してください。ポンプ破損のおそれがあります。
- ポンプを定常運転する前に本取扱説明書を参考にして、回転方向を確認してください。
けが、装置破損のおそれがあります。
- ポンプには絶対に乗らないようにしてください。ポンプの破損や、けがのおそれがあります。
- スターデルタ始動を行う場合、一次側に電磁開閉器付のもの（3コンダクタ方式）を選定してください。
火災のおそれがあります。
- 遠心ポンプをインバータ駆動する場合、運転周波数はポンプ定格周波数の50%以上に設定してください。
潤滑不良によるメカニカルシールや軸受け破損のおそれがあります。
- 400V級インバータで電動機を駆動する場合、インバータ側で抑制フィルタやリアクトルを設置するか、電動機側で絶縁を強化したものをご使用ください。
絶縁破壊による破損、火災のおそれがあります。
- 電動機の周囲には通風を妨げるような障害物を置いたり可燃物を置かないでください。
冷却が疎外され、異常加熱や火災、やけど等のおそれがあります。
- 運転前にはカップリングの締め付けボルトは確実に締め付けてください。
破片飛散によるけが、装置破損のおそれがあります。
- 電動機単体での回転方向の確認は行わないでください。カップリング取付時にシャフト位置調整が必要な為、シャフト位置不具合によりポンプを破損する原因となります。

(配管・配線)

- 配線は、電気設備技術基準や内線規程にしたがって施工してください。焼損や火災のおそれがあります。
- 電動機保護装置が電動機に内蔵されていません。
過負荷保護装置は電気設備技術基準により取付が義務づけられています。
過負荷保護装置以外の保護装置（漏電遮断器等）も設置することを推奨します。
焼損や火災のおそれがあります。



注 意

(運 転)

- 運転中、電動機はかなり高温になります。手や体を触れないようにご注意ください。やけどのおそれがあります。
- 異常が発生した場合は直ちに運転を停止してください。感電、けが、火災等のおそれがあります。
- 一般仕様のポンプを許容以上の高温液（カタログの許容液温を御参照下さい）には使用しないで下さい。ポンプが故障し、漏電や感電などの原因となります。
- 過多な起動、停止はしないでください。ポンプを早く傷める場合があります。
- 急な温度・圧力・流量変動をなくして運転してください。ポンプの故障の原因となります。
- 使用可能流量域でご使用ください。それ以外での使用はポンプの故障の原因となります。詳しくはカタログをご参照ください。

(保守・点検)

- 絶縁抵抗測定の際は、ポンプ本体に触れないでください。感電のおそれがあります。
- ポンプの本体は高温になるので、素手でさわらないでください。やけどのおそれがあります。
- グリースニップル付の電動機は電動機に取り付けられている潤滑容量に従って、定期的にグリース補給をしてください。

(修理・分解・改造)

- 修理、分解は、必ず専門の人間が行ってください。改造は行わないでください。感電、けが、火災等のおそれがあります。

(廃 棄)

- 電動機及びポンプを廃棄する場合は、一般産業廃棄物として処理してください。

安全のために次のことは必ず守ってください

安全上の注意事項

正しくお使いいただくために、ご使用前に必ず取扱説明書をお読みください。

また安全上、下記事項は特に注意してください。

- (1) この機器の回転部に接触すると重傷を負う可能性がありますので、関係者以外は操作出来ない配慮をしてください。
- (2) 周囲に爆発性、引火性、腐食性ガスのない場所に設置してください。
- (3) ご使用前に必ず接地（アース）を取り付けてください。
- (4) 部品を取り外して他の機器に使用したり、指定以外の商品を使用しないでください。
- (5) 仕様書、契約書、取扱説明書に記載された運転条件以外では、絶対に運転しないでください。
- (6) この製品は8歳以上の子供、身体感覚や精神的能力の低下した人物、または経知識不足の人物であっても適切な管理者から製品の安全な使用について説明を受けた後、それに伴う危険を理解していなければ使用することができません。子供にこの製品で遊ばせないでください。監督なしで子供にクリーニングおよびメンテナンスを行わせないでください。

「安全上のご注意」を逸脱した取扱いによって発生した事故の責任は一切負いません。

保 証

保証期間は納入日より1ヶ年といたします。ただし、保証は日本国内で使用される場合に限りです。

保証期間中に本取扱説明書に従った製品仕様範囲内の正常な使用状態で故障を生じた場合は、故障部分の交換又は修理を無償で行います。この場合、無償交換、修理は、納入品の故障、破損部分の交換又は修理に限られ、その他の費用の負担、損害についての責任は免除させていただきます。

但し、次に該当する場合は、この保証の範囲から除外させていただきます。

- (1) 不適当な取り扱い、使用、ならびに保存により生じた故障、破損
- (2) 納入品以外の機器が原因による故障、破損
- (3) 当社以外の修理、改造による故障、破損
- (4) 当社指定品以外の部品を使用した場合の故障、破損
- (5) 火災、地震、天災などの災害および不可抗力による故障、破損

修 理 ・ ア フ タ ー サ ー ビ ス

納入品に故障があることを発見したときは、直ちに購入先または弊社サービスまでご連絡下さい。

保証期間内にご連絡が無い場合は、故障、破損部分の交換又は修理は有償となります。

また、いかなる場合においても、その他の費用の負担、損害についての責任は免除させていただきます。

故障の連絡の際、銘板記載事項（型式、製造番号など）と故障状況をお知らせください。

消 耗 部 品 と 定 期 点 検

消耗部品交換の目安（清水）

ポンプ部	3～4年に一度
電動機部	1～2年に一度

定期点検

長期に渡り安定した性能を得る為には、1年に一度点検を施し、異常が無いか、変化が無いか以下の点を調査・測定し記録し対策をしてください。

流量、圧力：異常がある場合は、設置・使用状況の確認に加えて、ポンプ部の分解点検をします。

電流値、絶縁抵抗値：電動機交換等の処理をします。

グランドフォス製電動機（標準タイプ）11kW以上、国内メーカー電動機22kW以上は定期的にグリースニップルに指定グリースによる補給が必要です。

補給間隔は、電動機サイズ、種類によって異なる為、電動機取扱説明書あるいは電動機に貼付されている保守銘板で確認してください。

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