CRT

Installation and operating instructions

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CRT

Original installation and operating instructions

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Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

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

Note Notes or instructions that make the job easier and ensure safe operation.

2. Handling

When lifting the entire pump with motor, follow these instructions:

- Pump with motor sizes 0.37 - 5.5 kW:
  Lift the pump in the motor flange by means of straps or the like.
- Pump with motor sizes 7.5 - 18.5 kW:
  Lift the pump by means of the lifting brackets on the motor side.

Note The eyebolts on the motor side must only be used for lifting.

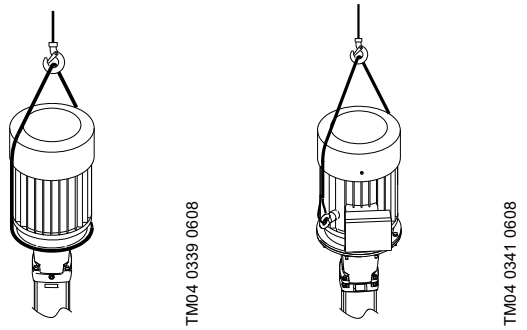


Fig. 1 Correct lifting of a CRT pump

In the case of a CRT pump with another motor make than MG, we recommend you to lift the pump by means of straps in the motor flange.

3. Type designation

3.1 Type key

Example	**CRT**	**8 -**	**12-**	**X -**	**X -**	**X -**	**X-**	**XXXX**
Type range								
Rated flow rate in m^3/h								
Number of impellers								
Code for pump version								
Code for pipework connection								
Code for materials, excluding plastic and rubber parts (A = basic version)								
Code for rubber parts								
Code for shaft seal								

4. Applications

Grundfos multistage in-line centrifugal pumps, type CRT, are designed for a wide range of applications. Reliable and cost-efficient, CRT pumps handle a variety of liquids from seawater to sodium hypochlorite.

Pumped liquids

Thin, clean, non-flammable, non-combustible or non-explosive liquids, not containing solid particles or fibres. The liquid must not attack the pump materials chemically.

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

5. Technical data

5.1 Ambient temperature and altitude

Motor power [kW]	Motor make	Motor efficiency class	Maximum ambient temperature [°C]	Maximum altitude above sea level [m]
0.37 - 0.55	Grundfos MG	-	+40	1000
0.75 - 18.5	Grundfos MG	IE3	+60	3500

If the ambient temperature exceeds the above temperature values or the pump is installed at an altitude exceeding the above altitude values, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the 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.

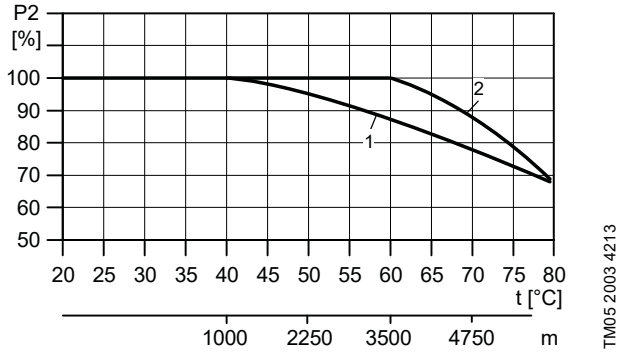


Fig. 2 Motor output depends on temperature/altitude

Pos.	Motor power [kW]	Motor make
1	0.37 - 0.55	MG
2	0.75 - 22	MG

Example

Figure 2 shows that the load of an IE3 motor at an ambient temperature of 70 °C must not be loaded more than 89 % of the rated output. If the pump is installed 4,750 metres above sea level, the motor must not be loaded more than 89 % of the rated output.

In cases where both the maximum temperature and the maximum altitude are exceeded, the derating factors must be multiplied (0.89 x 0.89 = 0.79).

Note For motor bearing maintenance at ambient temperatures above 40 °C, see section *9. Maintenance*.

5.2 Maximum operating pressure and temperature limits

Maximum operating pressure: 25 bar.

Temperature range: -20 to +120 °C.

See also *Appendix* on page 145, which shows the relationship between liquid temperature and maximum operating pressure.

Note The maximum operating pressure and liquid temperature ranges apply to the pump only.

Note Liquid temperatures above +120 °C may involve the risk of periodic noise from the shaft seal and reduce shaft seal life.

CRT pumps are not suitable for the pumping of liquids hotter than +120 °C for long periods.

5.3 Minimum inlet pressure

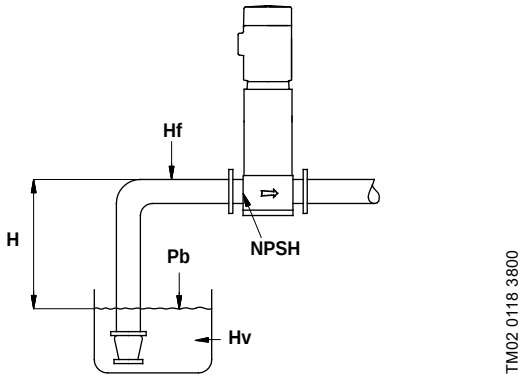


Fig. 3 Schematic view of open system with a CRT pump

The maximum suction lift "H" in metres head can be calculated as follows:

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$

p_b = Barometric pressure in bar.
(Barometric pressure can be set to 1 bar.)
In closed systems, p_b indicates the system pressure in bar.

NPSH = Net Positive Suction Head in metres head (to be read from the NPSH curve on page 148 at the highest flow the pump will be delivering).

H_f = Friction loss in suction pipe in metres head at the highest flow the pump will be delivering.

H_v = Vapour pressure in metres head.
See *Fig. E* on page 147.
t_m = Liquid temperature.

H_s = Safety margin = minimum 0.5 metres head.

If the calculated "H" is positive, the pump can operate at a suction lift of maximum "H" metres head.

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required. There must be a pressure equal to the calculated "H" during operation.

Example

p_b = 1 bar.
Pump type: CRT 16, 50 Hz.
Flow rate: 16 m^3/h.
NPSH (from page 148): 1.5 metres head.
H_f = 3.0 metres head.
Liquid temperature: +60 °C.
H_v (from *Fig. E* on page 147): 2.1 metres head.

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$ [metres head].

$H = 1 \times 10.2 - 1.5 - 3.0 - 2.1 - 0.5 = 3.1$ metres head.

This means that the pump can operate at a suction lift of maximum 3.1 metres head.

Pressure calculated in bar: 3.1 x 0.0981 = 0.304 bar.

Pressure calculated in kPa: 3.1 x 9.81 = 30.4 kPa.

5.4 Maximum operating pressure

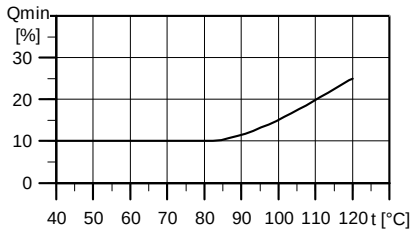
Fig. B on page 146 shows the maximum inlet pressure. However, the actual inlet pressure + maximum pump pressure (at no flow) must always be lower than the values stated in *Appendix* on page 145.

The pumps are pressure-tested at a pressure of 1.5 times the values stated in *Fig. B* on page 146.

5.5 Minimum flow rate

Due to the risk of overheating, do not use the pump at flows below the minimum flow rate.

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



TM02 8290 4903

Fig. 4 Minimum flow rate

Caution The pump must not run against a closed discharge valve.

5.6 Electrical data

See motor nameplate.

5.7 Frequency of starts and stops

Motor size [kW]	Maximum number of starts per hour
≤ 2.2	250
3-4	100
5.5 - 11	50
18.5 - 22	40

5.8 Dimensions and weights

Dimensions: See *Fig. C* on page 146.

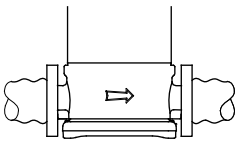
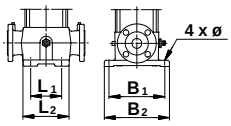
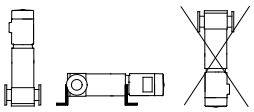
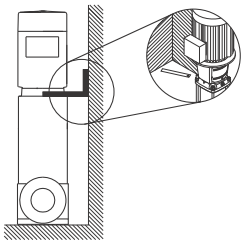
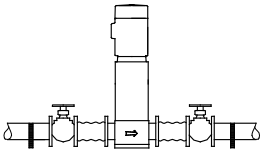
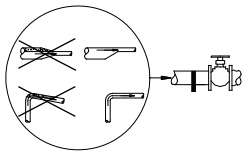
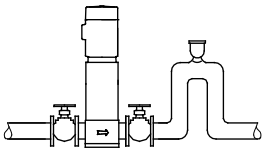
Weights: See label on the packing.

5.9 Sound pressure level

See *Fig. C* on page 147.

6. Installation

The pump must be secured to a horizontal, plane and solid foundation by bolts through the holes in the base plate. When installing the pump, follow the procedure below in order to avoid damaging the pump.

Step	Action
1  TM02 0013 3800	Arrows on the pump base show the direction of flow of liquid through the pump.
2  TM00 2256 3393	These pieces of information are stated in *Fig. C* on page 146: • port-to-port lengths • dimensions of the base • pipework connections • diameter and position of foundation bolts.
3  TM01 1241 4097	The pump can be installed vertically or horizontally. However, the motor must neither fall below the horizontal plane nor be installed upside down. Ensure that an adequate supply of cool air reaches the motor cooling fan. Motors above 4 kW must be supported.
3a  TM05 7705 1013	(Additional support for ships' use) To minimize pump vibrations, additional support brackets can be mounted. The brackets can be fitted from the motor or the motor stool to the bulkhead of the ship. Mount the bracket in horizontal position. To minimize further vibration mount the bracket at an angle of 30-40 ° to the wall.
4  TM02 0116 3800	To minimise possible noise from the pump, we advise you to fit expansion joints on either side of the pump. The foundation/ installation must be carried out as described in section *6.1*. 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. Always protect the pump against backflow by means of a non-return valve (foot valve).
5  TM02 0114 3800	Install the pipes so that airlocks do not occur, especially on the suction side of the pump.
6  TM02 0115 3800	Fit a vacuum valve close to the pump if the installation has one of these characteristics: • The discharge pipe slopes downwards away from the pump. • There is a risk of siphon effect. • Protection against backflow of unclean liquids is needed.

6.1 Foundation

Note

The foundation/installation must be carried out in accordance with the following instructions.

Non-compliance may result in functional faults which will damage the pump components.

Grundfos recommends to install the pump on a concrete foundation which is heavy enough to provide permanent and rigid support to the entire pump. The foundation must be capable of absorbing any vibration, normal strain or shock. The concrete foundation must have an absolutely level and even surface.

Place the pump on the foundation, and fasten it. The base plate must be supported on the whole area.

The following instruction applies when mounting the pump in vertical and horizontal position.

Place the pump on the foundation, and fasten it. See fig. 5.

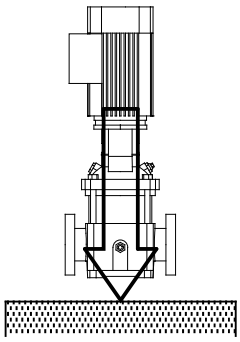


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Fig. 5 Correct installation

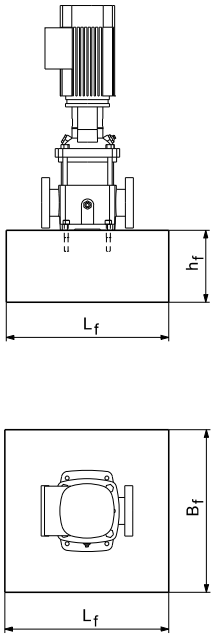

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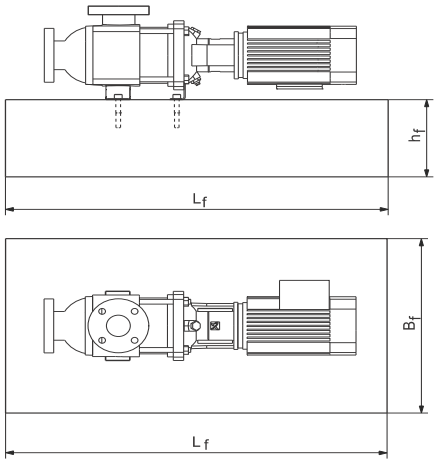
Fig. 6 Foundation, vertical mounting

The recommended length and width are shown in fig. 6. Note that the length and width of the foundation for pumps with motor size ≤ 30 kW must be 200 mm larger than the base plate.

For pumps with motor size ≥ 37 kW, the length and width must always be 1.5 x 1.5 (L_f x B_f) metres.



TM05 9579 4113

Fig. 7 Foundation, horizontal mounting

The foundation length and width should always be 200 mm larger than the length and width of the pump. See fig. 7.

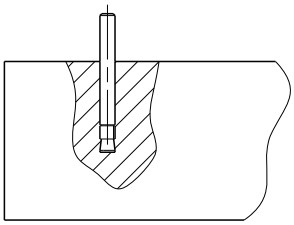
The mass of the foundation must be at least 1.5 times the total mass of the pump. The minimum height of the foundation (h_f) can then be calculated:

$$h_f = \frac{m_{pump} \times 1.5}{L_f \times B_f \times \delta_{concrete}}$$

The density (δ) of concrete is usually taken as 2,200 kg/m^3.

In installations where noise-less operation is particularly important, we recommend you to use a foundation with a mass up to 5 times that of the pump.

The foundation must be provided with bolts for fixing the base plate. See fig. 8.



TM03 4589 2206

Fig. 8 Bolt in foundation

When the foundation bolts are in position, the pump can be placed on the foundation. The base plate can now be aligned using shims, if necessary, so that it is completely horizontal. See fig. 9.

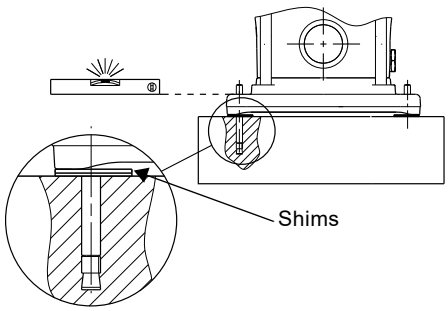


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Fig. 9 Alignment with shims

6.2 Vibration dampening

If vibration dampers are used, they must be installed under the foundation.

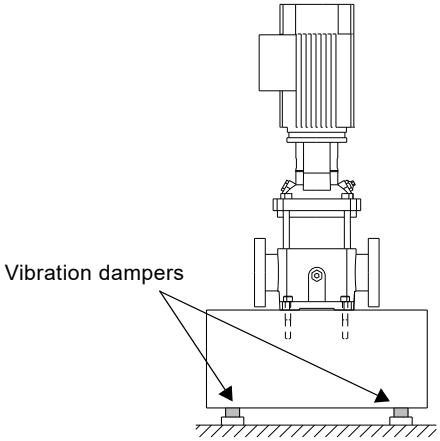

Fig. 10 Pump on vibration dampers

6.3 Outdoor installation

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

6.4 Hot surfaces

Warning

When pumping hot liquids, care should be taken to ensure that persons cannot accidentally come into contact with hot surfaces.

Figure 11 shows which pump parts get as hot as the pumped liquid.

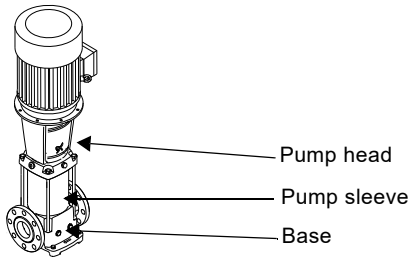

Fig. 11 Hot surfaces on a CRT pump

6.5 Torques

The table shows the recommended torques for bolts in base and flanges.

CRT	Base [Nm]	Flange [Nm]
2, 4	40	50-60
8, 16	50	60-70

6.6 Flange forces and torques

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

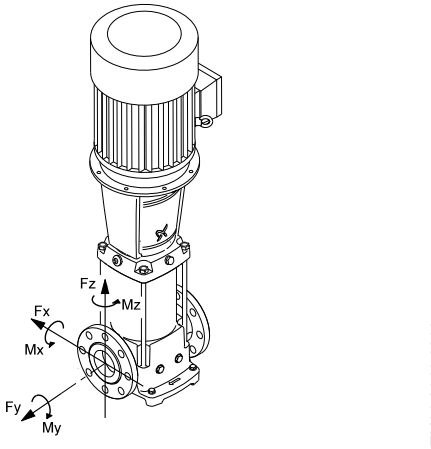

Fig. 12 Flange forces and torques

Y-direction: Inlet/outlet

Z-direction: Direction of chamber stack

X-direction: 90 ° from inlet/outlet

Forces

Flange, DN [mm]	CRT	Force, Z-direction [N]	Force, X-direction [N]	Force, Y-direction [N]
32	2, 4	760	1170	780
50	8, 16	1350	1650	1500

Torques

Flange, DN [mm]	CR, CRI, CRN	Torque, Z-direction [Nm]	Torque, X-direction [Nm]	Torque, Y-direction [Nm]
32	2, 4	820	970	1220
50	15, 20	100	1150	1400

7. Electrical connection

The electrical connection should be carried out by an authorised electrician in accordance with local regulations.

Warning

The CR pump must be connected to an external mains switch placed close to the pump and to a motor-protective circuit breaker or a CUE frequency converter. It must be possible to lock the mains switch in OFF position (isolated). Type and requirements as specified in EN 60204-1, 5.3.2.

Warning

Before removing the terminal box cover and before removing/dismantling the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Caution

The user is to consider whether it is necessary to install an emergency stop switch.

The operating voltage and frequency are marked on the motor nameplate. Make sure that the motor is suitable for the power supply on which it will be used and the motor terminal connection is correct. You will find a wiring diagram in the terminal box.

7.1 Cable entry/screwed connection

All motors are supplied without screwed cable entries. The table below shows the numbers and sizes of cable entry holes of the terminal box (standard: EN 50262).

Motor [kW]	Number and size of cable entries	Description
0.25 - 0.55	2 x M20 x 1.5	The holes have precast threads and are closed with knock-out cable entries
0.75 - 3.0	2 x M20	The holes are closed with knock-out cable entries
4.0 - 7.5	4 x M25	The holes are closed with knock-out cable entries
11 - 18.5	2 x M20 4 x M40	The holes are closed with knock-out cable entries

7.2 Three-phase connection

	Mains supply [V]		
	Delta connection		Star connection
50 Hz	220-240	/	380-415
	380-415	/	660-690
60 Hz	220-277	/	380-480[1)]
	380-480	/	660-690

1) 60 Hz motors, 0.37 - 1.1 kW: 220-277/380-440 V.

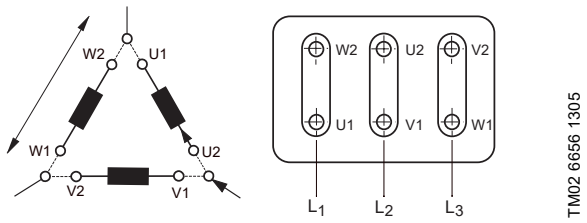

Fig. 13 Delta connection

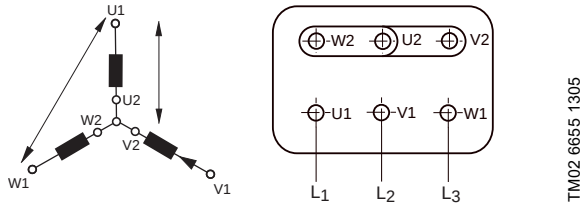

Fig. 14 Star connection

If the motor is provided with PTC sensors or PTO contacts, the connection must be in accordance with the wiring diagram in the terminal box.

Three-phase motors must be connected to a motor-protective circuit breaker.

7.3 Single-phase connection

	Mains supply [V]		
	"Low voltage"		"High voltage"
50 Hz	220-230	/	240

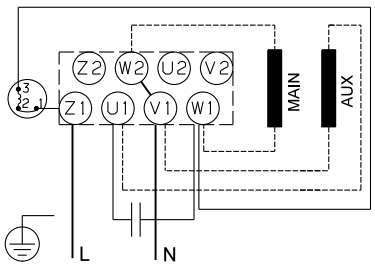

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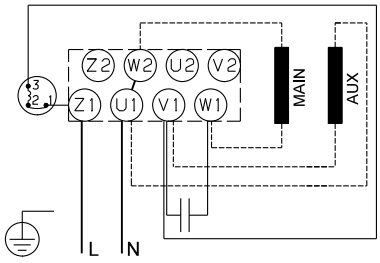
Fig. 15 Connection, "low voltage", 0.37 - 0.75 kW



TM04 1694 1008

Fig. 16 Connection, "high voltage", 0.37 - 0.75 kW

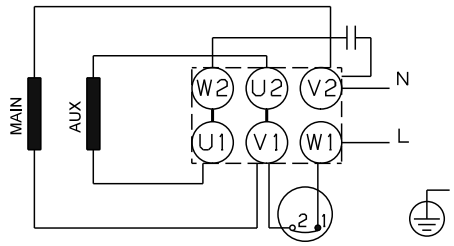


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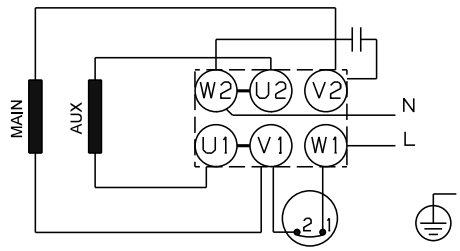
Fig. 17 Connection, "low voltage", 1.1 - 2.2 kW



TM04 0344 0608

Fig. 18 Connection, "high voltage", 1.1 - 2.2 kW

Single-phase Grundfos motors incorporate a thermal switch and require no additional motor protection.

7.4 Terminal box positions

The terminal box can be turned to four positions, in 90 ° steps. Follow this procedure:

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. Fit and tighten the bolts.
5. Fit the coupling guards.
6. Carry out the electrical connection as shown in the diagram inside the terminal box cover.

7.5 Frequency converter operation

7.5.1 Motors supplied by Grundfos

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

7.5.2 Phase insulation MG 71 and 80

MG motors, frame sizes 71 and 80, do not have phase insulation as standard. The motors are not suitable for frequency converter operation as they are not protected against the voltage peaks caused by the frequency converter operation. Only motors with a rated voltage equal to or above 460 V have phase insulation.

Caution Grundfos motors, types MG 71 and MG 80, for supply voltages up to and including 440 V without phase insulation (see motor nameplate) must be protected against voltage peaks above 650 V (peak value) between the supply terminals.

We recommend you to protect all other motors against voltage peaks higher than 1200 V by 2000 V/µsec.

The above disturbances, i.e. both increased acoustic noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.

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

Other motor makes than those supplied by Grundfos

Please contact Grundfos or the motor manufacturer.

8. Startup

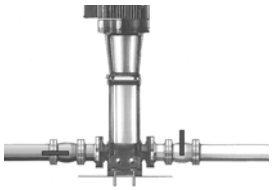
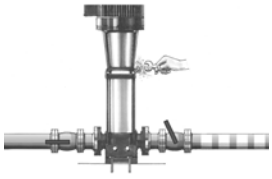
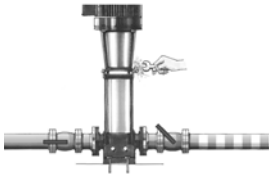
Caution

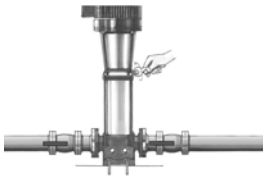
Do not start the pump until it has been filled with liquid and vented. If the pump runs dry, the pump bearings and the shaft seal may be damaged.

Warning

Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.

In hot-water installations, pay special attention to the risk of injury caused by scalding hot water.

Step	Action
1  TM01 1403 4497	Close the isolating valve on the discharge side of the pump and open the isolating valve on the suction side.
2  TM01 1404 4497	Remove the priming plug from the pump head and slowly fill the pump with liquid. Fit and tighten the priming plug.
3  TM01 1405 4497	See the correct direction of rotation of the pump on the motor fan cover.
4  TM01 1406 4497	Start the pump and check the direction of rotation.
5  TM01 1407 4497	Vent the pump by means of the vent valve in the pump head. At the same time, open the discharge isolating valve a little.
6  TM01 1408 4497	Continue to vent the pump. At the same time, open the discharge isolating valve a little more.

Step	Action
7  TM01 1409 4497	Close the vent valve when a steady stream of liquid runs out of it. Completely open the discharge isolating valve.

CRT 2 and 4

For these pumps, we advise you to open the bypass valve during startup. See fig. 19. The bypass valve connects the suction and discharge sides of the pump, thus making the filling procedure easier. Close the bypass valve again when the operation is stable.

When pumping liquids containing air, we advise you to leave the bypass valve open if the operating pressure is lower than 6 bar.

Close the bypass valve if the operating pressure constantly exceeds 6 bar. Otherwise the material at the opening will be worn because of the high liquid velocity.

8.1 Shaft seal run-in

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

When the pump is started up for the first time, or when a new shaft seal is installed, 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, i.e. every time the operating conditions change, a new run-in period will be started.

Under normal conditions, the leaking liquid will evaporate.

As a result, no leakage will be detected.

However, liquids such as kerosene will not evaporate.

The leakage may therefore be seen as a shaft seal failure.

9. Maintenance

Warning

Before starting work on the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Pump bearings and shaft seal are maintenance-free.

Motor bearings

Motors without grease nipples are maintenance-free.

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

In the case of seasonal operation (motor is idle for more than six months of the year), we recommend you to grease the motor when the pump is taken out of operation.

Depending on the ambient temperature, the motor bearings must be replaced or lubricated according to the table below. The table applies to 2-pole motors. The number of operating hours stated for bearing replacement is a guideline only.

Motor size [kW]	Bearing replacement interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
0.37 - 0.55	18,000	-	-	-	-
0.75 - 7.5	20,000	15,500	12,500	10,000	7,500
Motor size [kW]	**Lubrication interval [operating hours]**				
	40 °C	45 °C	50 °C	55 °C	60 °C
11 - 18.5	4,500	3,400	2,500	1,700	1,100

Intervals for 4-pole motors are twice as long as those for 2-pole motors.

If the ambient temperature is lower than 40 °C, bearings must be replaced/lubricated at the intervals mentioned under 40 °C.

10. Frost protection

Pumps which are not being used during periods of frost should be drained to avoid damage.

Drain the pump by loosening the vent screw in the pump head and by removing the drain plug from the base.

Warning

Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.

In hot-water installations, pay special attention to the risk of injury caused by scalding hot water.

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

CRT 2 and 4

Before replacing the drain plug in the base, screw the bypass valve out against the stop. See fig. 19.

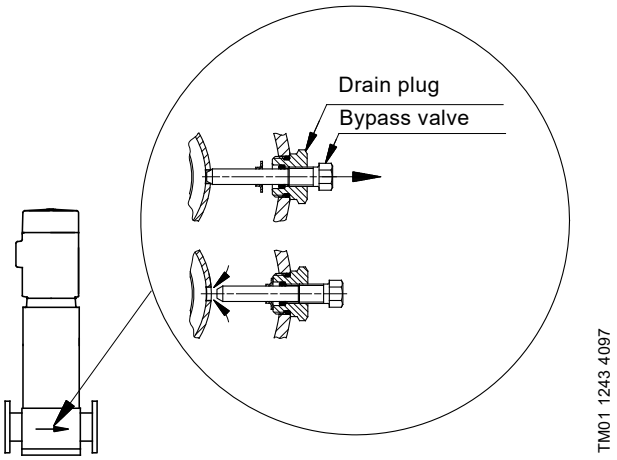


Fig. 19 Location of drain plug and bypass valve

Fit the drain plug by tightening the large union nut followed by the bypass valve.

CRT 8 and 16

Fit the drain plug in the base.

11. Service

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

Note

If a pump has been used for a liquid which is toxic or injurious to health, the pump will be classified as contaminated.

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise, Grundfos can refuse to accept the pump for service.

Possible costs of returning the pump are to be paid by the customer.

However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are toxic or injurious to health.

11.1 Service kits and manuals

See www.grundfos.com (WebCAPS), WinCAPS or Service Kit Catalogue.

12. Fault finding

Warning

Before removing the terminal box cover and before removing/dismantling the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Cause	Remedy
1. Motor does not run when started.	a) Supply failure.	Connect the power supply.
	b) Fuses are blown.	Replace fuses.
	c) Motor-protective circuit breaker has tripped.	Reactivate the motor-protective circuit breaker.
	d) Thermal protection has tripped.	Reactivate the thermal protection.
	e) Main contacts in motor-protective circuit breaker are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	f) Control circuit is defective.	Repair the control circuit.
	g) Motor is defective.	Replace the motor.
2. Motor-protective circuit breaker trips immediately when power supply is switched on.	a) One fuse/automatic circuit breaker is blown.	Replace the fuse/cut in the circuit breaker.
	b) Contacts in motor-protective circuit breaker are faulty.	Replace motor-protective circuit breaker contacts.
	c) Cable connection is loose or faulty.	Fasten or replace the cable connection.
	d) Motor winding is defective.	Replace the motor.
	e) Pump mechanically blocked.	Remove the mechanical blocking of the pump.
	f) Motor-protective circuit breaker setting is too low.	Set the motor-protective circuit breaker correctly.
3. Motor-protective circuit breaker trips occasionally.	a) Motor-protective circuit breaker setting is too low.	Set the motor-protective circuit breaker correctly.
	b) Low voltage at peak times.	Check the power supply.
4. Motor-protective circuit breaker has not tripped but the pump does not run.	a) Check 1 a), b), d), e) and f).	
5. Pump performance not constant.	a) Pump inlet pressure is too low (cavitation).	Check the suction conditions.
	b) Suction pipe/pump partly blocked by impurities.	Clean the suction pipe/pump.
	c) Pump draws in air.	Check the suction conditions.
6. Pump runs but gives no water.	a) Suction pipe/pump blocked by impurities.	Clean the suction pipe/pump.
	b) Foot or non-return valve blocked in closed position.	Repair the foot or non-return valve.
	c) Leakage in suction pipe.	Repair the suction pipe.
	d) Air in suction pipe or pump.	Check the suction conditions.
	e) Motor runs in the wrong direction of rotation.	Change the direction of rotation of the motor.
7. Pump runs backwards when switched off.	a) Leakage in suction pipe.	Repair the suction pipe.
	b) Foot or non-return valve defective.	Repair the foot or non-return valve.
8. Leakage in shaft seal.	a) Shaft seal is defective.	Replace the shaft seal.
9. Noise.	a) Cavitation.	Check the suction conditions.
	b) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.	Adjust the pump shaft.
	c) Frequency converter operation.	See section *7.5 Frequency converter operation*.

13. Disposal

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 wheelie 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.

Fig. A

GB Maximum permissible operating pressure:

DK Maks. tilladeligt driftstryk:

DE Max. zulässiger Betriebsdruck:

GR Μέγιστη επιτρεπτή πίεση λειτουργίας:

ES Presión máxima de funcionamiento permitida:

FR Pression de fonctionnement maxi autorisée:

IT Massima pressione di esercizio possibile:

NL Maximaal toelaatbare werkdruk:

PT Pressão máxima de funcionamento permissível:

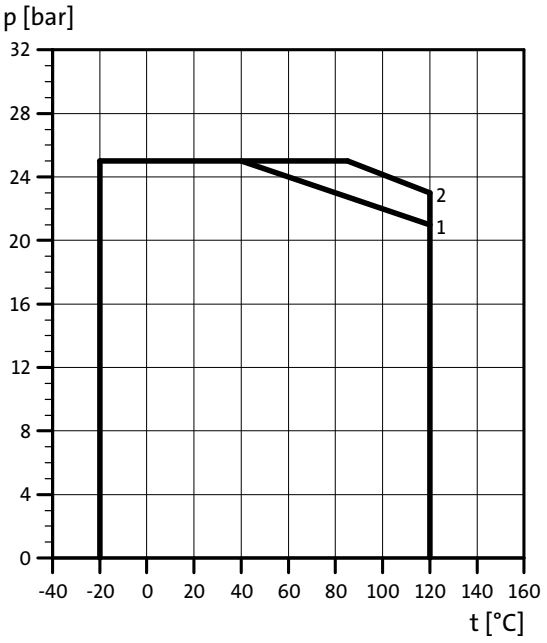
RU Максимально допустимое рабочее давление:

RO Presiune de funcţionare maximă admisibilă:

FI Suurin sallittu käyttöpaine:

SE Max. tillåtet driftstryck:

Frequency Frekvens Frequenz Συχνότητα Frecuencia Fréquence Frequenza Frequentie Frequência Частота Frecvenţă Taajuus Frekvens	Pump type Pumpetype Pumpentyp Τύπος αντλίας Tipo de bomba Type de pompe Pompa tipo Pomptype Modelo da bomba Тип насоса Tip pompă Pumpputyyppi Pumptyp	Curve Kurve Kurve Καμπύλη Curva Courbe Curva Curve Curva Характеристика Curbă Käyrä Kurva
50 Hz	CRT 2-2 → 2-15 CRT 2-18 → 2-26	1
	CRT 4-1 → 4-16 CRT 4-19 → 4-22	1
	CRT 8-1 → 8-12 CRT 8-14 → 8-20	1 2
	CRT 16-2 → 16-8 CRT 16-10 → 16-17	1 2
60 Hz	CRT 2-2 → 2-11 CRT 2-13 → 2-18	1
	CRT 4-1 → 4-10 CRT 4-12 → 4-16	1
	CRT 8-1 → 8-8 CRT 8-10 → 8-14	1 2
	CRT 16-2 → 16-7 CRT 16-8 → 16-10	1 2



TM01 4869 3203

Fig. B

GB Maximum inlet pressure:

DK Maks. tilløbstryk:

DE Max. Zulaufdruck:

GR Μέγιστη πίεση εισόδου για:

ES Presión máxima de entrada:

FR Pression maximum d'entrée:

IT Massima pressione in aspirazione:

NL Maximale inlaatdruk:

PT Pressão máxima de admissão:

RU Максимально допустимый подпор:

RO Presiune maximă de aspiraţie:

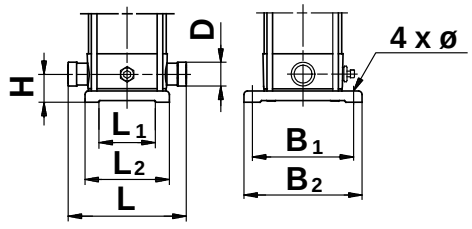
FI Suurin tulopaine:

SE Max. tilloppstryck:

50 Hz		
CRT 2-2	→ 2-11	10 bar
CRT 2-13	→ 2-26	15 bar
CRT 4-1	→ 4-12	10 bar
CRT 4-14	→ 4-22	15 bar
CRT 8-1	→ 8-20	10 bar
CRT 16-2	→ 16-17	10 bar
60 Hz		
CRT 2-2	→ 2-6	10 bar
CRT 2-7	→ 2-18	15 bar
CRT 4-1	→ 4-7	10 bar
CRT 4-8	→ 4-16	15 bar
CRT 8-1	→ 8-14	10 bar
CRT 16-2	→ 16-10	10 bar

Fig. C

PJE



TM00 2256 3393

Pump type	L [mm]	H [mm]	D [mm]	L_1 [mm]	L_2 [mm]	B_1 [mm]	B_2 [mm]	Ø [mm]
CRT 2	210	50	424	100	150	180	210	13
CRT 4	210	50	424	100	150	180	210	13
CRT 8	261	80	603	130	199	215	247	14
CRT 16	261	80	603	130	199	215	247	14

Fig. D

GB Airborne noise emitted by pumps with motors fitted by Grundfos:

DK Luftbåren støj fra pumper med motorer monteret af Grundfos:

DE Luftschallemission von Pumpen mit Motoren, die von Grundfos montiert sind:

GR Θόρυβος που εκπέμπεται στον αέρα από αντλίες εφοδιασμένες με κινητήρες από τη Grundfos:

ES Nivel de ruido producido por bombas con motores montados por Grundfos:

FR Bruit aérien émis par les pompes avec moteurs montés par Grundfos:

IT Rumore aereo emesso da pompe dotate di motori installati da Grundfos:

NL Geluidsdruk van pompen met een door Grundfos gemonteerde motor:

PT Ruído emitido pelas electrobombas montadas pela Grundfos:

RU Уровни шума для насосов, снабженных двигателями Grundfos:

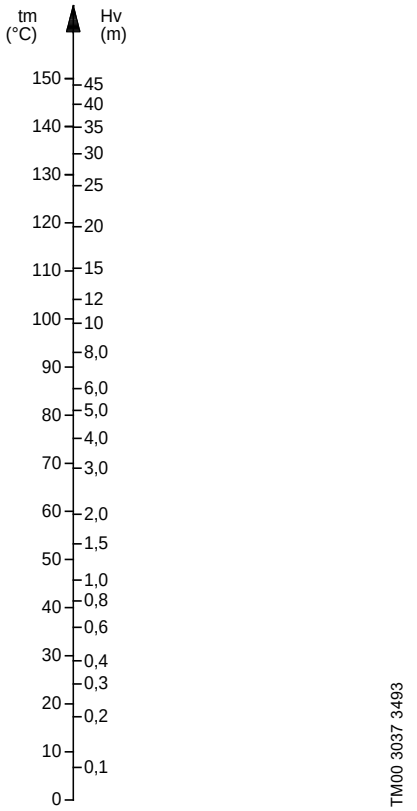
RO Zgomot emis de pompe cu motoare echipate de Grundfos:

FI Ilmassa kantautuva ääni Grundfos'in asentamilla moottoreilla:

SE Ljudtrycksnivå från pumpar med motorer monterade av Grundfos:

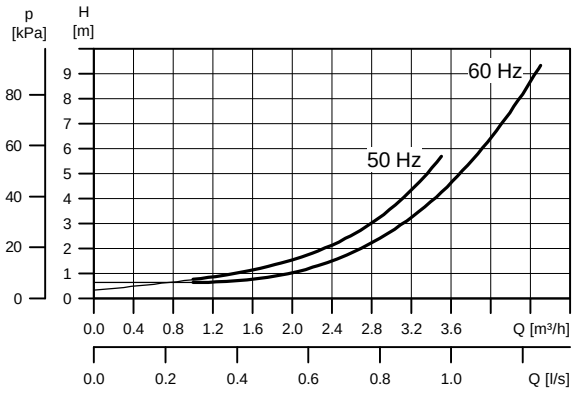
Motor [kW]	50 Hz	60 Hz
	$\overline{L}_{pA}$ [dB(A)]	$\overline{L}_{pA}$ [dB(A)]
0.37	50	55
0.55	50	53
0.75	50	54
1.1	52	57
1.5	54	59
2.2	54	59
3.0	55	60
4.0	62	66
5.5	60	65
7.5	60	65
11	60	65
15	60	65
18.5	60	65

Fig. E



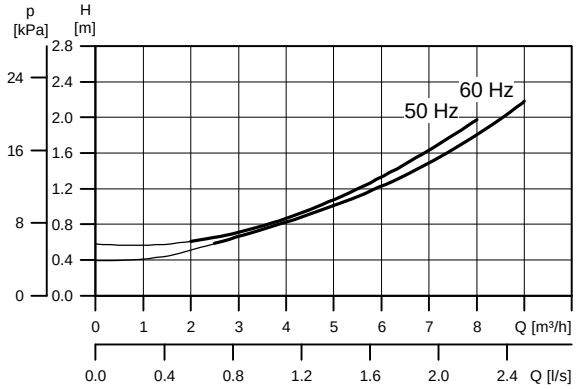
NPSH

CRT 2



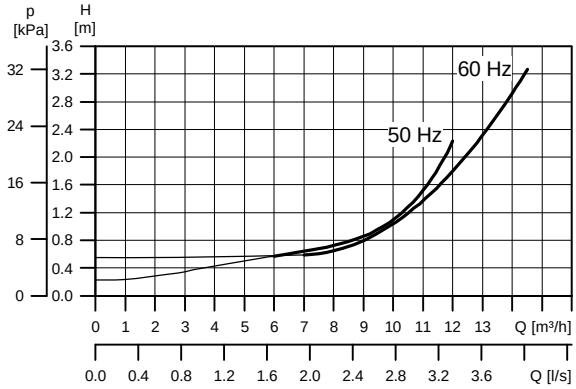
TM00 1625 4597

CRT 4



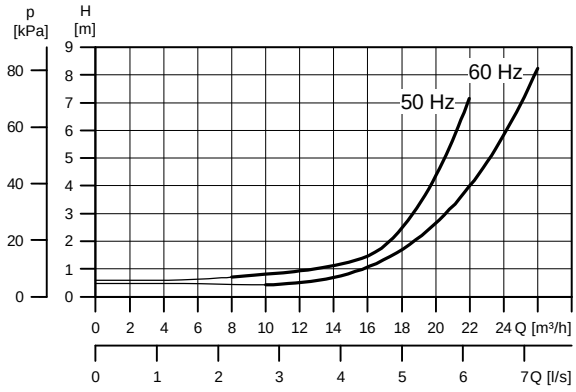
TM00 1626 4597

CRT 8



TM00 1627 4597

CRT 16



TM00 1628 4597

1. 中国 RoHS

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴联苯醚 (PBDE)
泵壳	X	O	O	O	O	O
紧固件	X	O	O	O	O	O
管件	X	O	O	O	O	O
定子	X	O	O	O	O	O
转子	X	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制

O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
X： 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 该规定的限量要求。

该产品环保使用期限为 10 年，标识如左图所示。
此环保期限只适用于产品在安装与使用说明书中所规定的条件下工作

GB: EC/EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the products CR, CRI, CRN, CRT, to which the declaration below relates, are in conformity with the Council Directives listed below on the approximation of the laws of the EC/EU member states.

DE: EG-/EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass die Produkte CR, CRI, CRN, CRT, auf die sich diese Erklärung beziehen, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-/EU-Mitgliedsstaaten übereinstimmen.

ES: Declaración de conformidad de la CE/UE

Grundfos declara, bajo su exclusiva responsabilidad, que los productos CR, CRI, CRN, CRT a los que hace referencia la siguiente declaración cumplen lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la CE/UE.

FR: Déclaration de conformité CE/UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que les produits CR, CRI, CRN, CRT, auxquels se réfère cette déclaration, sont conformes aux Directives du Conseil concernant le rapprochement des législations des États membres CE/UE relatives aux normes énoncées ci-dessous.

NL: EG/EU-conformiteitsverklaring

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat de producten CR, CRI, CRN, CRT, waarop de onderstaande verklaring betrekking heeft, in overeenstemming zijn met de onderstaande Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgeving van de EG/EU-lidstaten.

RO: Declaraţia de conformitate CE/UE

Noi Grundfos declarăm pe propria răspundere că produsele CR, CRI, CRN, CRT, la care se referă această declaraţie, sunt în conformitate cu Directivele de Consiliu specificate mai jos privind armonizarea legilor statelor membre CE/UE.

SE: EG/EU-försäkran om överensstämmelse

Vi, Grundfos, försäkrar under ansvar att produkterna CR, CRI, CRN, CRT, som omfattas av nedanstående försäkran, är i överensstämmelse med de rådsdirektiv om inbördes närmande till EG/EU-medlemsstaternas lagstiftning som listas nedan.

DK: EF/EU-overensstemmelseserklæring

Vi, Grundfos, erklærer under ansvar at produkterne CR, CRI, CRN, CRT som erklæringen nedenfor omhandler, er i overensstemmelse med Rådets direktiver der er nævnt nedenfor, om indbyrdes tilnærmelse til EF/EU-medlemsstaternes lovgivning.

GR: Δήλωση συμμόρφωσης ΕΚ/ΕΕ

Εμείς, η Grundfos, δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα CR, CRI, CRN, CRT, στα οποία αναφέρεται η παρακάτω δήλωση, συμμορφώνονται με τις παρακάτω Οδηγίες του Συμβουλίου περί προσέγγισης των νομοθεσιών των κρατών μελών της ΕΚ/ΕΕ.

FI: EY/EU-vaatimustenmukaisuusvakuutus

Grundfos vakuuttaa omalla vastuullaan, että tuotteet CR, CRI, CRN, CRT, joita tämä vakuutus koskee, ovat EY/EU:n jäsenvaltioiden lainsäädännön lähentämiseen tähtäävien Euroopan neuvoston direktiivien vaatimusten mukaisia seuraavasti.

IT: Dichiarazione di conformità CE/UE

Grundfos dichiara sotto la sua esclusiva responsabilità che i prodotti CR, CRI, CRN, CRT, ai quale si riferisce questa dichiarazione, sono conformi alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri CE/UE.

PT: Declaração de conformidade CE/UE

A Grundfos declara sob sua única responsabilidade que os produtos CR, CRI, CRN, CRT, aos quais diz respeito a declaração abaixo, estão em conformidade com as Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da CE/UE.

RU: Декларация о соответствии нормам ЕЭС/ЕС

Мы, компания Grundfos, со всей ответственностью заявляем, что изделияCR, CRI, CRN, CRT, к которым относится нижеприведённая декларация, соответствуют нижеприведённым Директивам Совета Евросоюза о тождественности законов стран-членов ЕЭС/ЕС.

CN: 欧盟符合性声明

我们，格兰富，在我们的全权责任下声明，产品 CR, CRI, CRN, CRT 系列，其制造和性能完全符合以下所列欧盟委员会指令。

- Machinery Directive (2006/42/EC).
  Standard used: EN 809:1998, A1:2009.
- Ecodesign Directive (2009/125/EC).
- RoHS Directives: 2011/65/EU and 2015/863/EU Standard used: EN IEC 63000:2018
- ATEX Directive (2014/34/EU)
  (Applies only to products with the ATEX mark on the nameplate).
  Standards used: EN 80079-36:2016 and EN 80079-37:2016
  (Declaration of conformity and installation and operating instructions of the motor are enclosed). Notified body holding copy of technical file: DEKRA Certification B.V., Meander 1051/P.O. Box 5185, 6825 MJ ARNHEM / 6802 ED ARMHEM, The Netherlands.

This EC/EU declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 400599).

Bjerringbro, October 1, 2021

Jimm Feldborg
Head of PD Industry
Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro, Denmark
Person authorised to compile the technical file and empowered to sign the EC/EU declaration of conformity.

UK declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, is in conformity with UK regulations, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:
CR, CRI, CRN, CRT

- Supply of Machinery (Safety) Regulations 2008.
  Standard used: BS EN 809:1998, A1:2009.
- The Ecodesign for Energy-Related Products and Energy Information Regulations 2021.
- The Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations 2019.
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2019.
  Standard used: BS EN IEC 63000:2018.

This UK declaration of conformity is only valid when accompanying Grundfos instructions. UK Importer:

Grundfos Pumps ltd. Grovebury Road, Leighton Buzzard, LU7 4TL.

Bjerringbro, October 1, 2021

Jimm Feldborg
Head of PD Industry
Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro, Denmark

Manufacturer and person empowered to sign the UK declaration of conformity.

10000324406

GB: Moroccan declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, are in conformity with Moroccan laws, orders, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:
CR, CRI, CRN, CRT

Law No 24-09, 2011 Safety of products and services and the following orders:
Order No 2573-14, 2015 Safety Requirements for Low Voltage Electrical Equipment
Standards used: NM EN 809+A1:2015

This Moroccan declaration of conformity is only valid when accompanying Grundfos instructions.

Bjerringbro, 13/12/2019

Erik Andersen
Senior Manager
Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro, Denmark

Manufacturer and person empowered to sign the Moroccan declaration of conformity.

10000268970

FR: Déclaration de conformité marocaine

Nous, Grundfos, déclarons sous notre seule responsabilité que les produits auxquels se réfère cette déclaration, sont conformes aux lois, ordonnances, normes et spécifications marocaines pour lesquelles la conformité est déclarée, comme indiqué ci-dessous :

Valable pour les produits Grundfos :
CR, CRI, CRN, CRT

Sécurité des produits et services, loi n° 24-09, 2011 et décrets suivants :
Exigences de sécurité pour les équipements électriques basse tension, ordonnance n° 2573-14, 2015
Normes utilisées : NM EN 809+A1:2015

Cette déclaration de conformité marocaine est uniquement valide lorsqu'elle accompagne la notice d'installation et de fonctionnement Grundfos.

Bjerringbro, 13/12/2019

Erik Andersen
Senior Manager
Grundfos Holding A/S
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Fabricant et personne habilitée à signer la Déclaration de conformité marocaine.

10000268970

AR: إقـــرار المطابقـــة المغـــربي

نحـــن، جروشـــدفوس، نقـــر تحـــت مســـؤوليتنا وحـــدنا بـــأن المنتجـــات الـــتي يتعلـــق بهـــا الإقـــرار أدنـــاه، تتوافـــق مـــع القـــوانين والقـــرارات والمعـــايير والمواصـــفا المغربيـــة الـــتي تـــم إقـــرار المطابقـــة بشـــأنها، كمـــا هـــو موضـــح أدنـــاه:

ســـار علـــى منتجـــات جروشـــدفوس:
CR, CRI, CRN, CRT

قـــانون رقـــم 24-09، 2011 بشـــأن ســـلامة المنتجـــات والخـــدمات والقـــرارات التاليـــة:
القـــرار رقـــم 2573-14، 2015 متطلبـــات الســـلامة للمعـــدات الكهربائيـــة ذات الجهـــد المنخفـــض
المعـــايير المســـتخدمة:
NM EN 809+A1:2015

يكـــون إقـــرار المطابقـــة المغـــربي صـــالحًا فقـــط عنـــد نشـــره كجـــزء مـــن تعليمـــات جروشـــدفوس.

Bjerringbro, 13/12/2019

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الجهـــة المصـــنعة والشـــخص المفـــوض بتوقيـــع إقـــرار المطابقـــة المغـــربي.

10000268970

99800718 1219
ECM 1276613

GB: Ukrainian declaration of conformity

We, Grundfos, declare under our sole responsibility that the products to which the declaration below relates, are in conformity with Ukrainian resolutions, standards and specifications to which conformity is declared, as listed below:

Valid for Grundfos products:

CR, CRI, CRN, CRT

Resolution No. 62, 2013 - Technical Regulations on Safety of Machines

Resolution No. 533, 2018 - Amendments to some provisions

Standards used: ДСТУ EN 809:2015

Resolution No 804, 2018 - Establishing a Framework for the Setting of Ecodesign Requirements for Energy-related Products

Resolution No. 154, 2019 - Ecodesign Requirements for Water Pumps

Resolution No. 157, 2019 - Ecodesign Requirements for Electric Motors

Standards used: ДСТУ IEC 60034-2-1:2019

Resolution No. 139, 2017 - Technical Regulations on Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Standards used: ДСТУ EN IEC 63000:2020

Valid for Grundfos products:

ATEX approved product: CR, CRI, CRN, CRT

ATEX certificate number: 203104000-0306

Name and address of Notified body (ATEX):

DEKRA Certification B.V., No. 0344, Meander 1051, 6825 MJ Arnhem, The Netherlands.

Resolution No. 1055, 2016 - Technical regulation of the equipment and the protective systems intended for use in potentially explosive environments

Resolution No. 102, 2020 - Amendments to some resolutions of the Cabinet of Ministers of Ukraine

Standards used: ДСТУ EN 80079-36:2016, ДСТУ EN 80079-37:2016

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Email: ukraine@grundfos.com

This Ukrainian declaration of conformity is only valid when accompanying Grundfos instructions.

Declaration of conformity

UA: Українська декларація відповідності

Ми, Grundfos, заявляємо про свою виключну відповідальність за те, що продукція, до якої відноситься ця декларація, відповідає вимогам українським постановам, стандартам та технічним умовам, щодо яких заявлена відповідність, як зазначено нижче:

Дійсно для продуктів Grundfos:

CR, CRI, CRN, CRT

Постанова № 62 від 2013 р., Про затвердження Технічного регламенту безпеки машин

Постанова № 533 від 2018 р., Про внесення змін до деяких положень

Застосовані стандарти: ДСТУ EN 809:2015

Постанова № 804 від 2018 р., Встановлення системи для визначення вимог з екодизайну енергоспоживчих продуктів

Постанова № 154 від 2019 р., Вимоги до екодизайну водяних насосів

Постанова № 157 від 2019 р., Вимоги до екодизайну електродвигунів

Застосовані стандарти: ДСТУ IEC 60034-2-1:2019

Постанова № 139 від 2017 р., Технічний регламент обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні

Застосовані стандарти: ДСТУ EN IEC 63000:2020

Дійсно для продуктів Grundfos:

Продукт, схвалений ATEX: CR, CRI, CRN, CRT

Номер сертифіката ATEX: 203104000-0306

Назва та адреса уповноваженого органу з сертифікації (ATEX):

DEKRA Certification B.V., No. 0344, Meander 1051, 6825 MJ Arnhem, The Netherlands.

Постанова № 1055 від 2016 р., Технічний регламент обладнання та захисних систем, призначених для використання в потенційно вибухонебезпечних середовищах

Постанова № 102 від 2020 р., Про внесення змін до деяких постанов Кабінету Міністрів України

Застосовані стандарти: ДСТУ EN 80079-36:2016, ДСТУ EN 80079-37:2016

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Ця українська декларація відповідності дійсна лише за наявності інструкцій Grundfos.

Bjerringbro, 10-02-2022

Jimm Feldborg

Jimm Feldborg
Head of PD Industry

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