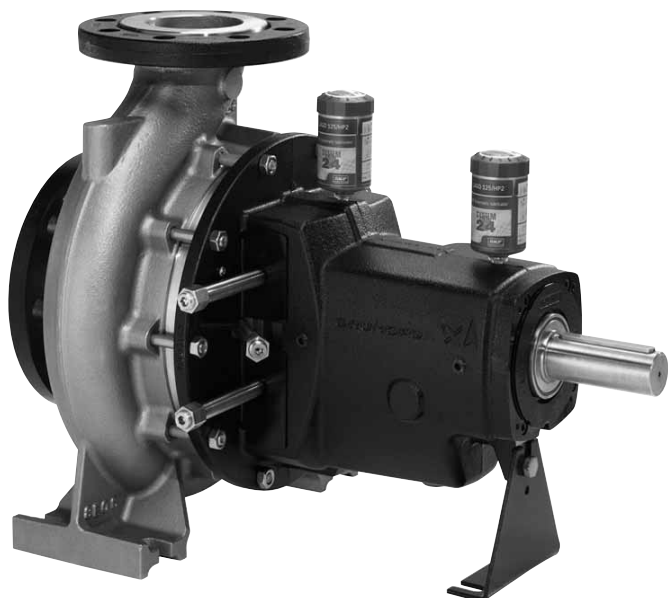


# NKG

Double seal (back-to-back)

安装和使用说明书





<b>中文 (CN)</b>	
安装和使用说明书 .....	4
<b>English (GB)</b>	
Installation and operating instructions .....	11

Original installation and operating instructions.

CONTENTS

	Page
1. Symbols used in this document	11
2. General information	11
3. Product description	11
4. Applications	11
5. Operating conditions	12
5.1 Barrier fluid	12
6. Installation	12
6.1 Barrier fluid connection	12
6.2 Pressure sources	13
7. Start-up	15
7.1 Pump with dosing pump	15
7.2 Pressure intensifier	16
8. Maintenance	17
9. Operation	17
9.1 Periods of inactivity and frost protection	17
10. Service	17
10.1 Service kits and service instructions	17
11. Disposal	17



**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!*



**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. General information

These installation and operating instructions are a supplement to installation and operating instructions for NK, NKG pumps.

3. Product description

This type of double seal consists of two shaft seals mounted in a back-to-back arrangement in a separate seal chamber or of a cartridge seal.

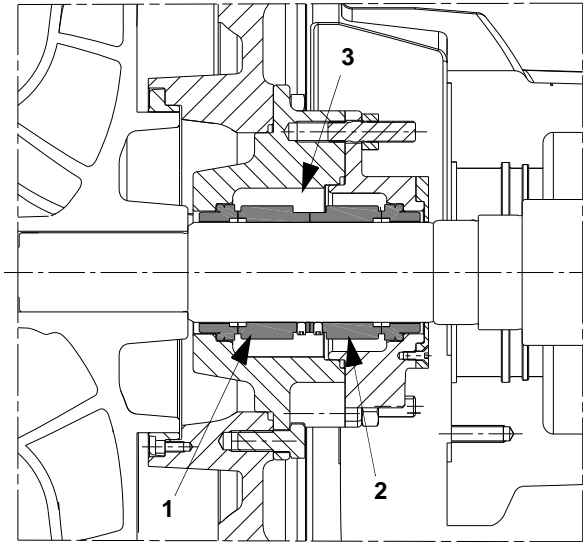


Fig. 1 Back-to-back seal arrangement consisting of two shaft seals

Pos.	Description
1	Primary shaft seal
2	Secondary shaft seal
3	Seal chamber, containing barrier fluid

The back-to-back seal arrangement is suitable for applications where leakage of the pumped liquid to the environment is unacceptable. The back-to-back double seal protects the surrounding environment and the people working near the pump. In back-to-back seal arrangements, the pressure in the seal chamber must be higher than the pumped liquid pressure in order to prevent the pumped liquid from leaking through the shaft seal to the environment.

The back-to-back shaft seal arrangement is particularly suitable for liquids with many abrasive particles. The seal arrangement prevents the pumped liquid from entering the seal gap and, consequently, prevents excessive wear. In this case a single-seal arrangement would either wear out or be damaged.

Pumps with a back-to-back shaft seal arrangement require a pressurising system providing the correct pressure to the barrier fluid in the barrier fluid chamber.

4. Applications

The back-to-back double-seal arrangement is the optimum solution in these cases:

- The pump is pumping toxic and explosive liquids.
- The pump is pumping aggressive and abrasive liquids.
- The pump is pumping hardening liquids, e.g. oil products.
- The pump is pumping sticky liquids, e.g. paint and varnishes.
- The pump is operating with a negative inlet pressure (vacuum) of 0.7 - 0.9 bar compared to the pressure in the barrier fluid chamber.

The back-to-back seal arrangement can handle a pumped liquid temperature up to 140 °C.

## 5. Operating conditions

The operating conditions stated in the installation and operating instructions for NK, NKG pumps also apply for back-to-back shaft seal pumps.

### 5.1 Barrier fluid

The barrier fluid must be clean.

#### Caution

**The barrier fluid should be selected according to the application and must not chemically attack the materials of the pump and the shaft seal.**

Examples:

Application	Liquids mixed into the barrier fluid
Heat transfer / hot applications	Monoethyleneglycol (without additives)
Chemistry / industry	Customer wish

As the barrier fluid has a higher pressure than the pumped liquid, it serves as lubricating liquid for both primary and secondary seal faces. The barrier fluid will seep through the primary shaft seal and be mixed with the pumped liquid. Consequently, the barrier fluid chosen must always be compatible with the pumped liquid. Barrier fluid seeping through the secondary shaft seal evaporates.



#### Warning

**If the shaft seal is used in applications where special safety precautions must be observed due to hazardous liquids, the customer bears full responsibility!**

#### 5.1.1 Prescribed overpressure of barrier fluid

The barrier fluid pressure must be minimum 1.5 bar or 10 % above the pumped liquid pressure close to the seal.

#### 5.1.2 Maximum barrier fluid pressure and temperature

Due to the shaft seal design, the pressure in the seal chamber/cartridge seal must not exceed 25 bar. The maximum permissible temperature of the barrier fluid depends on the rubber material of the shaft seal.

Shaft seal rubber	Max. permissible temperature of barrier fluid [°C]
EPDM	+120
FFKM	+140
FKM	+80
FXM	+140
HNBR	+90

These values apply to water as barrier fluid. If other barrier fluids are used, contact Grundfos for the max. permissible temperature of the barrier fluid.

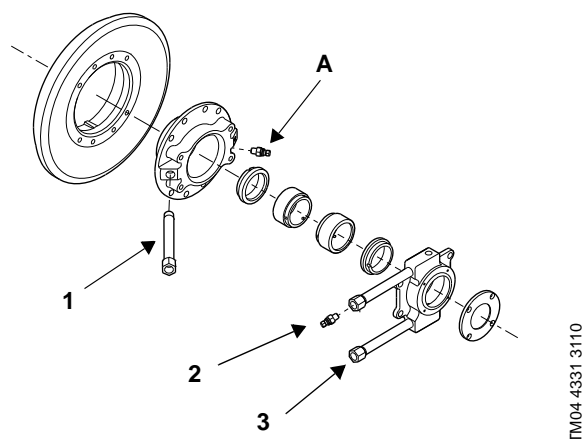
#### 5.1.3 Barrier fluid evaporation point

The back-to-back seal arrangement can handle a pumped liquid temperature up to 140 °C. In order to ensure proper liquid lubrication in the the seal gap, it is very important that the evaporation point of the barrier fluid is at least 10-15 °C higher than the temperature of the pumped liquid.

## 6. Installation

### 6.1 Barrier fluid connection

#### 6.1.1 Back-to-back seal arrangement with two separate shaft seals in a seal chambe

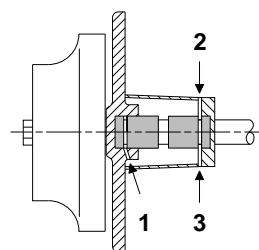


**Fig. 2** Back-to-back seal arrangement with two separate shaft seals in a seal chamber

Pos.	Description
A	Vent screw for pumped liquid
1	Primary shaft seal pipe connection -3/8"
2	Secondary shaft seal pipe connection with vent screw for venting of seal chamber -3/8"
3	Secondary shaft seal pipe connection -3/8"

In this back-to-back shaft seal arrangement the seal chamber has three connections. See fig. 2 and fig. 3. Pos. 1 leads to the pumped liquid side of the shaft seal, and pos. 2 and 3 lead to the seal chamber. All connections are close to the seal faces of the shaft seal.

#### Connections



**Fig. 3** Direction of barrier fluid

#### Dead-end solutions (See 6.2 Pressure sources)

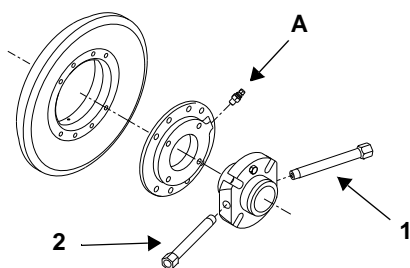
Use only connection 1 or 3.  
Connection 2 must be plugged.

**Note:** Automatic venting of the seal chamber must be considered for the application. Connection 2 can be used for this.

#### Circulating solutions (See 6.2 Pressure sources)

Use two connections. We recommend to use connection 1 as inlet and 2 as outlet. This will create a crossflow, have a cooling effect on the shaft seals, and at the same time provide automatic venting of the seal chamber. Connection 3 must be plugged.

### 6.1.2 Back-to-back seal arrangement with cartridge seal



TM04 4330 3110

Fig. 4 Back-to-back seal arrangement with cartridge seal

Pos.	Description
A	Vent screw for pumped liquid
1	Cartridge seal inlet pipe connection - 3/8"
2	Cartridge seal outlet pipe connections - 3/8"

### 6.2 Pressure sources

The overpressure in the barrier fluid in the seal chamber in relation to the pumped liquid pressure can be maintained by various pressure sources:

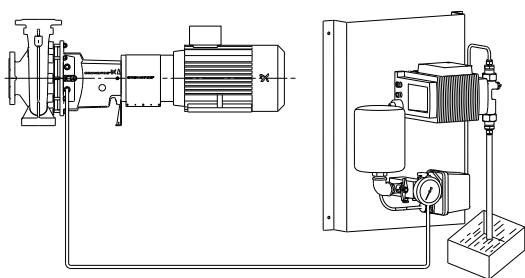
- an existing pressure source (many applications incorporate pressurised systems)
- a separate pressure source (e.g. a dosing pump unit)
- a pressure intensifier.

#### 6.2.1 Existing pressure source

**Standard shaft seals:** The existing system may provide both the barrier fluid and the overpressure. It can be either a dead-end or a circulating solution. In both cases the barrier fluid pressure must be fixed at a prescribed overpressure level, see section 5.1.1.

**Cartridge seal:** The existing system may provide both the barrier fluid and the overpressure. A cartridge seal is **not** for use with a dead-end solution. The barrier fluid pressure must be fixed at a prescribed overpressure level, see section 5.1.1.

#### 6.2.2 Pump with dosing pump unit (dead-end solution)



TM04 4334 1209

Fig. 5 Pump with dosing pump unit

**Standard shaft seals:** The setpoint pressure of the barrier fluid can be set by means of the pressure switch on the dosing pump. When the pressure drops below the setpoint, the dosing pump will start and thus maintain the overpressure in the seal chamber. The dosing pump unit solution is mainly used in dead-end applications where cooling of primary shaft seal is sufficient without the cooling effect of recirculation.

**Note** One dosing pump unit can supply several pumps with back-to-back seal arrangements.

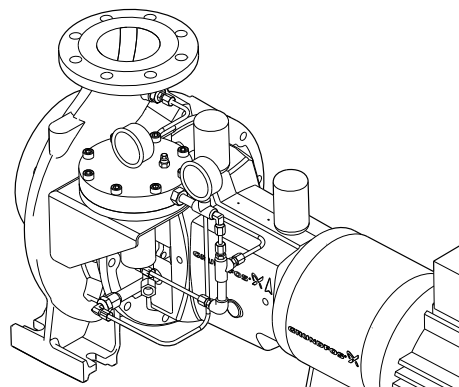
Maximum operating pressure in seal chamber: 16 bar.

Dosing unit outlet: 1 x Rp 1/4.

**Note** Connecting pipes or hoses are not included.

**Cartridge seal:** A cartridge seal is not for use with a dead-end connection.

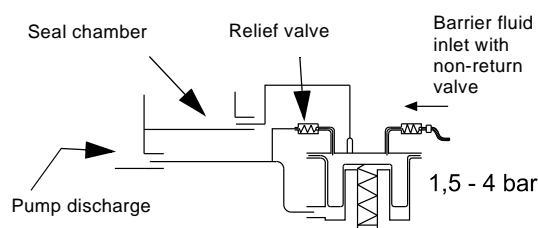
### 6.2.3 Pump with pressure intensifier (dead-end solution)



TM04 4333 1209

Fig. 6 Pump with pressure intensifier

**Standard shaft seals:** The Grundfos pressure intensifier maintains a pressure that is 1.5 - 4 bar higher than the pumped liquid pressure, independent of the specific pumped liquid pressure.



TM04 4465 1309

Fig. 7 Principle sketch of intensifier connections

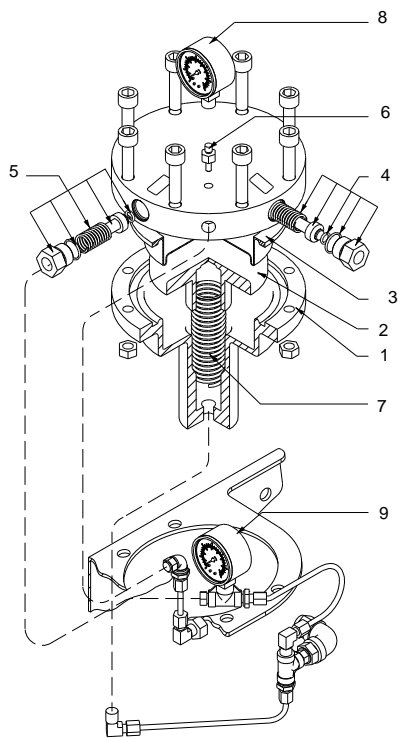
The system maintains the overpressure automatically - from standstill to max. operating pressure. The barrier fluid seeps through the primary shaft seal and evaporates through the secondary shaft seal. In this way the barrier fluid in the intensifier is consumed over time, and the intensifier has to be refilled manually. The barrier fluid inlet must be fitted with a non-return valve to avoid back pressure to the source.

**Note** One intensifier can only supply one pump. The intensifier is mounted on the pump from factory.

Maximum operating pressure of the pump discharge pressure at the pressure intensifier: 25 bar.

**Cartridge seal:** A cartridge seal is **not** for use with a dead-end connection.

# Components of pressure intensifier

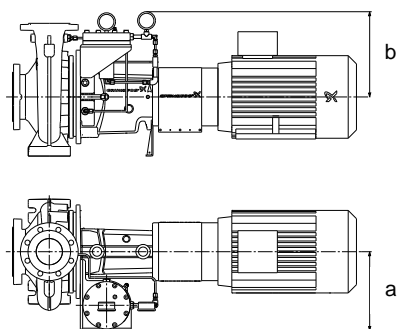


TM04 4770 2009

**Fig. 8** Exploded view of pressure intensifier

Pos.	Designation
1	Pressure intensifier
2	Piston
3	Diaphragm
4	Non-return valve
5	Relief valve, opening pressure 25 bar
6	Vent screw
7	Spring for piston
8	Pressure gauge (barrier fluid)
9	Pressure gauge (pumped liquid)

## Dimensions of pump with pressure intensifier



TM04 4335 1209

**Fig. 9** Pump with pressure intensifier

Dimensions apply to all NKG pump sizes

	Shaft seal diameter				
	28	38	48	55	60
a [mm]	-	-	383	300	300
b [mm]	-	-	310	380	380

## 7. Start-up

### 7.1 Pump with dosing pump



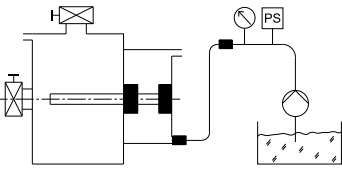
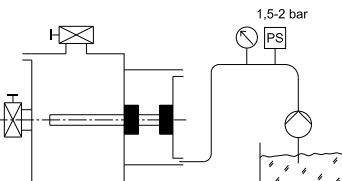
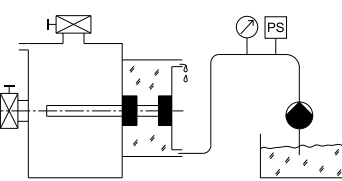
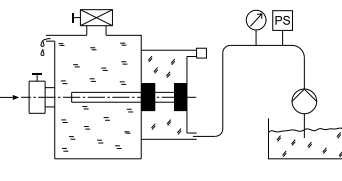
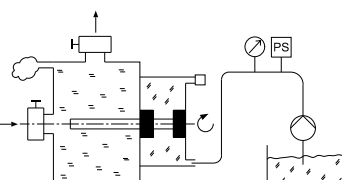
#### Warning

Pay attention to the orientation of the vent holes, and take care to ensure that the escaping liquid does not cause personal injury or damage to the motor or other components.

When handling hot or hazardous liquids, special attention should be paid to the risk of personal injury.

When pumping flammable liquids, beware of static discharges. The funnel, for instance, should be earthed!

The seal chamber/cartridge seal must always be filled with barrier fluid during operation. Dry-running will destroy the shaft seal.

Illustration	Step	Action
	1	<b>Connecting the barrier fluid supply pipe</b> <ul style="list-style-type: none"> <li>Connect one end to the seal chamber (pos. 1, fig. 2) or to the cartridge seal (pos. 1, fig. 4).</li> <li>Connect the other end to the outlet of the dosing pump.</li> </ul>
	2	<b>Recommended pressure</b> <ul style="list-style-type: none"> <li>Set the start pressure of the dosing pump to a pressure 1.5 to 2 bar above the highest pressure the pump can deliver.  <math>(P_{\text{pump}} + P_{\text{inlet}} + P_{1.5-2.0} &lt; P_{\text{dosing max.}})</math> </li> </ul>
	3	<b>Filling with barrier fluid</b> <ul style="list-style-type: none"> <li>Start the dosing pump.</li> <li>Fill with barrier fluid.</li> </ul> <p>Seal chamber: Loosen the vent screw at the top of the seal chamber (pos. 2, fig. 2), and fill the seal chamber with barrier fluid through the inlet (pos. 3, fig. 2). When the liquid starts running out of the vent hole, immediately close the vent screw.</p> <p>Cartridge seal: Fill the cartridge seal with barrier fluid through one of the connections (pos. 1 or 3, fig. 4). When the liquid starts running out of the vent hole, immediately close the vent screw.</p> <p>The dosing pump will stop automatically when the pressure set in step 2 has been reached.</p>
	4	<b>Operation with positive inlet pressure</b> <ul style="list-style-type: none"> <li>Loosen the vent screw (pos. A, fig. 2 or fig. 4) in the cover.</li> <li>Close the isolating valve on the discharge side.</li> <li>Open the isolating valve on the inlet side.</li> <li>Slowly fill the pump with the liquid to be pumped.</li> <li>When the liquid starts running out of the vent hole, immediately close the vent screw.</li> </ul> <p><b>Operation with suction lift</b></p> <ul style="list-style-type: none"> <li>Loosen the vent screw (pos. A, fig. 2 or fig. 4) in the cover.</li> <li>Close the isolating valve on the discharge side.</li> <li>Fill the pump and the inlet pipe with the liquid to be pumped using a funnel.</li> <li>When the liquid starts running out of the vent hole, immediately close the vent screw.</li> </ul> <p><b>Note:</b> A non-return valve must be fitted to the inlet pipe.</p>
	5	<b>Starting up the pump</b> <p>See also installation and operating instructions for NK, NKG pumps.</p> <ul style="list-style-type: none"> <li>Open the isolating valve on the discharge side.</li> <li>Start the pump, and check the direction of rotation.</li> <li>See the correct direction of rotation on the motor fan cover.</li> <li>After a few minutes, vent the pump again by means of the air vent screw (pos. A, fig. 2 or fig. 4).</li> </ul>



## 7.2 Pressure intensifier

### Warning

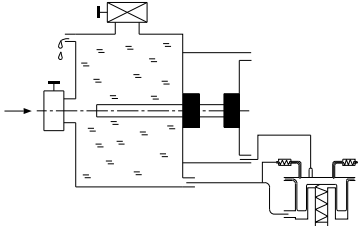
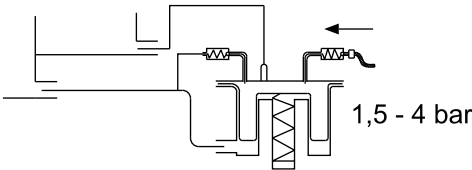
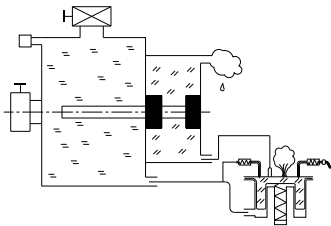
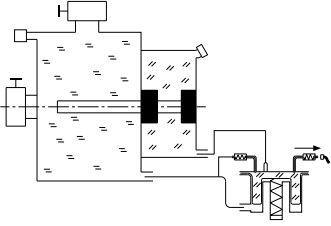
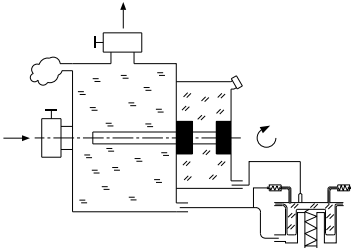


**Pay attention to the orientation of the vent holes, and take care to ensure that the escaping liquid does not cause personal injury or damage to the motor or other components.**

**When handling hot or hazardous liquids, special attention should be paid to the risk of personal injury.**

**When pumping flammable liquids, beware of static discharges. The funnel, for instance, should be earthed!**

**The seal chamber/cartridge seal must always be filled with barrier fluid during operation. Dry-running will destroy the shaft seal.**

Illustration	Step	Action
		<b>Operation with positive inlet pressure</b> <ul style="list-style-type: none"> <li>Loosen the vent screw (pos. A, fig. 2 or fig. 4) in the cover.</li> <li>Close the isolating valve on the discharge side.</li> <li>Open the isolating valve on the inlet side.</li> <li>Slowly fill the pump with the liquid to be pumped.</li> </ul>
	1	<b>Operation with suction lift</b> <ul style="list-style-type: none"> <li>Loosen the vent screw (pos. A, fig. 2 or fig. 4) in the cover.</li> <li>Close the isolating valve on the discharge side.</li> <li>Fill the pump and the suction pipe with the liquid to be pumped using a funnel.</li> <li>When the liquid starts running out of the vent hole, immediately close the vent screw.</li> </ul>
		<b>Note:</b> A non-return valve must be fitted to the suction pipe.
	2	<b>Filling with barrier fluid</b> <ul style="list-style-type: none"> <li>Fill the intensifier and the seal chamber/cartridge seal with barrier fluid, and connect the barrier fluid supply pipe to the unused inlet of the intensifier (pos. 4, fig. 8). The pressure in the seal chamber/cartridge seal must always be 1.5 to 4 bar higher than the pump pressure when the pump is not operating.</li> </ul> $p_f = p_s + 1.5 \text{ to } 4 \text{ bar.}$ <p> <math>p_f</math> = To be read on the pressure gauge on the intensifier (pos. 8, fig. 8).  <math>p_s</math> = Inlet pressure when the pump is not operating; it must always be 0.1 to 5 bar higher than the atmospheric pressure.            To be read on the pressure gauge in the connection pipe (pos. 9, fig. 8) between intensifier and pump.         </p>
		<b>Venting</b> <p>During filling, the seal chamber/cartridge seal and the intensifier must be vented:</p> <ul style="list-style-type: none"> <li>Seal chamber: Vent the seal chamber by means of the vent screw at the top of the seal chamber (pos. 2, fig. 2).</li> <li>Cartridge seal: The cartridge seal is self venting.</li> <li>Intensifier: Vent the intensifier by means of the vent screw at the top of the intensifier (pos. 6, fig. 8).</li> </ul>
	3	
		<b>Disconnecting the barrier fluid supply pipe</b> <ul style="list-style-type: none"> <li>Disconnect the barrier fluid supply pipe from the intensifier.</li> </ul>
	4	
		<b>Starting up the pump</b> <p>See also installation and operating instructions for NK, NKG pumps.</p> <ul style="list-style-type: none"> <li>Start the pump, and check the direction of rotation. See the correct direction of rotation on the motor fan cover.</li> <li>After a few minutes, vent the pump again by means of the vent screw (pos. A, fig. 2 or fig. 4).</li> </ul>
	5	

## 8. Maintenance

See installation and operating instructions for NK, NKG pumps.

### Dosing pump

See the installation and operating instructions for the dosing pump.

### Pressure intensifier

The pressure intensifier is maintenance-free.

## 9. Operation

A very small quantity of the barrier liquid (less than 1.5 ml per operating hour) will flow into the pumped liquid.

The flow will increase with:

- increasing start/stop frequency
- discharge pressure fluctuations
- poor shaft seal assembly
- worn shaft seal faces.

### Dosing pump

The pressure of the barrier fluid must always be at least 1.5 bar or 10 % higher than the pressure of the pumped liquid. This is automatically checked by the pressure switch/transmitter fitted together with the dosing pump.

### Pressure intensifier

To ensure optimum function and performance, check that the barrier fluid pressure (read pressure gauge pos. 8 in fig. 8) is always at least 1.5 bar or 10 % higher than the pressure of the pumped liquid (read pressure gauge pos. 9 in fig. 8). As the barrier fluid is consumed over time, the pressure intensifier has to be refilled.

### 9.1 Periods of inactivity and frost protection

#### Warning



**Pay attention to the directions of the vent holes, and take care to ensure that the escaping liquid does not cause injury to persons or damage to the motor or other components.**

**When handling hot or hazardous liquids, special attention should be paid to the risk of injury caused by scalding hot liquid or hazardous liquid.**

**Local safety regulations must be observed.**

### Pump

For general guidelines, see installation and operating instructions for NK, NKG pumps.

### Seal chamber

Unscrew the two connections (pos. 2 and 3, fig. 2).

The lower barrier fluid connection functions as drain.

### Cartridge seal

1. Unscrew the connections (pos. 1 and 3, fig. 4).
2. Empty the cartridge seal. This can be done in two ways:
  - Blow out remaining liquid by means of an air gun or a similar device. The pressure must not exceed the pressure rating of the cartridge seal.
  - Flush the cartridge seal by means of a glycol-water solution, if applicable for the application. The pressure must not exceed the pressure rating of the cartridge seal.

### Dosing pump

For frost protection, see installation and operating instructions for the dosing pump.

## 10. Service

When ordering spare parts, always state the pump nameplate data to ensure that the correct parts are delivered.

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.

### 10.1 Service kits and service instructions

See [www.grundfos.com](http://www.grundfos.com) (WebCAPS), WinCAPS or Service Kit Catalogue.

## 11. 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.

## Argentina

Bombas GRUNDFOS de Argentina S.A.  
Ruta Panamericana km. 37.500 Lote  
34A  
1619 - Garin  
Pcia. de Buenos Aires  
Phone: +54-3327 414 444  
Telefax: +54-3327 411 111

## Australia

GRUNDFOS Pumps Pty. Ltd.  
P.O. Box 2040  
Regency Park  
South Australia 5942  
Phone: +61-8-8461-4611  
Telefax: +61-8-8340 0155

## Austria

GRUNDFOS Pumpen Vertrieb  
Ges.m.b.H.  
Grundfosstraße 2  
A-5082 Grödig/Salzburg  
Tel.: +43-6246-883-0  
Telefax: +43-6246-883-30

## Belgium

N.V. GRUNDFOS Bellux S.A.  
Boomsesteenweg 81-83  
B-2630 Aartselaar  
Tél.: +32-3-870 7300  
Télécopie: +32-3-870 7301

## Belorussia

Представительство ГРУНДФОС в  
Минске  
220123, Минск,  
ул. В. Хоружей, 22, оф. 1105  
Тел.: +(37517) 233 97 65,  
Факс: +(37517) 233 97 69  
E-mail: grundfos\_minsk@mail.ru

## Bosnia/Herzegovina

GRUNDFOS Sarajevo  
Trg Heroja 16,  
BiH-71000 Sarajevo  
Phone: +387 33 713 290  
Telefax: +387 33 659 079  
e-mail: grundfos@bih.net.ba

## Brazil

BOMBAS GRUNDFOS DO BRASIL  
Av. Humberto de Alencar Castelo  
Branco, 630  
CEP 09850 - 300  
São Bernardo do Campo - SP  
Phone: +55-11 4393 5533  
Telefax: +55-11 4343 5015

## Bulgaria

Grundfos Bulgaria EOOD  
Slatina District  
Iztochna Tangenta street no. 100  
BG - 1592 Sofia  
Tel. +359 2 49 22 200  
Fax. +359 2 49 22 201  
email: bulgaria@grundfos.bg

## Canada

GRUNDFOS Canada Inc.  
2941 Brighton Road  
Oakville, Ontario  
L6H 6C9  
Phone: +1-905 829 9533  
Telefax: +1-905 829 9512

## China

GRUNDFOS Pumps (Shanghai) Co. Ltd.  
50/F Maxdo Center No. 8 XingYi Rd.  
Hongqiao development Zone  
Shanghai 200336  
PRC  
Phone: +86-021-612 252 22  
Telefax: +86-021-612 253 33

## Croatia

GRUNDFOS CROATIA d.o.o.  
Cebini 37, Buzin  
HR-10010 Zagreb  
Phone: +385 1 6595 400  
Telefax: +385 1 6595 499  
www.grundfos.hr

## Czech Republic

GRUNDFOS s.r.o.  
Čajkovského 21  
779 00 Olomouc  
Phone: +420-585-716 111  
Telefax: +420-585-716 299

## Denmark

GRUNDFOS DK A/S  
Martin Bachs Vej 3  
DK-8850 Bjerringbro  
Tlf.: +45-87 50 50 50  
Telefax: +45-87 50 51 51  
E-mail: info\_GDK@grundfos.com  
www.grundfos.com/DK

## Estonia

GRUNDFOS Pumps Eesti OÜ  
Peterburi tee 92G  
11415 Tallinn  
Tel: + 372 606 1690  
Fax: + 372 606 1691

## Finland

OY GRUNDFOS Pumpat AB  
Mestarintie 11  
FIN-01730 Vantaa  
Phone: +358-3066 5650  
Telefax: +358-3066 56550

## France

Pompes GRUNDFOS Distribution S.A.  
Parc d'Activités de Chesnes  
57, rue de Malacombe  
F-38290 St. Quentin Fallavier (Lyon)  
Tél.: +33-4 74 82 15 15  
Télécopie: +33-4 74 94 10 51

## Germany

GRUNDFOS GMBH  
Schlüterstr. 33  
40699 Erkrath  
Tel.: +49-(0) 211 929 69-0  
Telefax: +49-(0) 211 929 69-3799  
e-mail: infoservice@grundfos.de  
Service in Deutschland:  
e-mail: kundendienst@grundfos.de

## Greece

GRUNDFOS Hellas A.E.B.E.  
20th km. Athinon-Markopoulou Av.  
P.O. Box 71  
GR-19002 Peania  
Phone: +0030-210-66 83 400  
Telefax: +0030-210-66 46 273

## Hong Kong

GRUNDFOS Pumps (Hong Kong) Ltd.  
Unit 1, Ground floor  
Siu Wai Industrial Centre  
29-33 Wing Hong Street &  
68 King Lam Street, Cheung Sha Wan  
Kowloon  
Phone: +852-27861706 / 27861741  
Telefax: +852-27858664

## Hungary

GRUNDFOS Hungária Kft.  
Park u. 8  
H-2045 Törökbálint,  
Phone: +36-23 511 110  
Telefax: +36-23 511 111

## India

GRUNDFOS Pumps India Private Lim-  
ited  
118 Old Mahabalipuram Road  
Thoraiakkam  
Chennai 600 096  
Phone: +91-44 2496 6800

## Indonesia

PT GRUNDFOS Pompa  
Jl. Rawa Sumur III, Blok III / CC-1  
Kawasan Industri, Pulogadung  
Jakarta 13930  
Phone: +62-21-460 6909  
Telefax: +62-21-460 6910 / 460 6901

## Ireland

GRUNDFOS (Ireland) Ltd.  
Unit A, Merrywell Business Park  
Ballymount Road Lower  
Dublin 12  
Phone: +353-1-4089 800  
Telefax: +353-1-4089 830

## Italy

GRUNDFOS Pompe Italia S.r.l.  
Via Gran Sasso 4  
I-20060 Truccazzano (Milano)  
Tel.: +39-02-95838112  
Telefax: +39-02-95309290 / 95838461

## Japan

GRUNDFOS Pumps K.K.  
Gotanda Metalion Bldg., 5F,  
5-21-15, Higashi-gotanda  
Shiagawa-ku, Tokyo  
141-0022 Japan  
Phone: +81 35 448 1391  
Telefax: +81 35 448 9619

## Korea

GRUNDFOS Pumps Korea Ltd.  
6th Floor, Aju Building 679-5  
Yeoksam-dong, Kangnam-ku, 135-916  
Seoul, Korea  
Phone: +82-2-5317 600  
Telefax: +82-2-5633 725

## Latvia

SIA GRUNDFOS Pumps Latvia  
Deglava biznesa centrs  
Augusta Deglava ielā 60, LV-1035, Rīga,  
Tālr.: + 371 714 9640, 7 149 641  
Fakss: + 371 914 9646

## Lithuania

GRUNDFOS Pumps UAB  
Smolensko g. 6  
LT-03201 Vilnius  
Tel: + 370 52 395 430  
Fax: + 370 52 395 431

## Malaysia

GRUNDFOS Pumps Sdn. Bhd.  
7 Jalan Peguam U1/25  
Glenmarie Industrial Park  
40150 Shah Alam  
Selangor  
Phone: +60-3-5569 2922  
Telefax: +60-3-5569 2866

## México

Bombas GRUNDFOS de México S.A. de  
C.V.  
Boulevard TLC No. 15  
Parque Industrial Stiva Aeropuerto  
Apodaca, N.L. 66600  
Phone: +52-81-8144 4000  
Telefax: +52-81-8144 4010

## Netherlands

GRUNDFOS Netherlands  
Veluwezoom 35  
1326 AE Almere  
Postbus 22015  
1302 CA ALMERE  
Tel.: +31-88-478 6336  
Telefax: +31-88-478 6332  
E-mail: info\_gnl@grundfos.com

## New Zealand

GRUNDFOS Pumps NZ Ltd.  
17 Beatrice Tinsley Crescent  
North Harbour Industrial Estate  
Albany, Auckland  
Phone: +64-9-415 3240  
Telefax: +64-9-415 3250

## Norway

GRUNDFOS Pumper A/S  
Strømsveien 344  
Postboks 235, Leirdal  
N-1011 Oslo  
Tlf.: +47-22 90 47 00  
Telefax: +47-22 32 21 50

## Poland

GRUNDFOS Pompy Sp. z o.o.  
ul. Klonowa 23  
Baranowo k. Poznania  
PL-62-081 Przeźmierowo  
Tel: (+48-61) 650 13 00  
Fax: (+48-61) 650 13 50

## Portugal

Bombas GRUNDFOS Portugal, S.A.  
Rua Calvet de Magalhães, 241  
Apartado 1079  
P-2770-153 Paço de Arcos  
Tel.: +351-21-440 76 00  
Telefax: +351-21-440 76 90

## România

GRUNDFOS Pompe România SRL  
Bd. Biruintei, nr 103  
Pantelimon county Ilfov  
Phone: +40 21 200 4100  
Telefax: +40 21 200 4101  
E-mail: romania@grundfos.ro

## Russia

ООО Грундфос  
Россия, 109544 Москва, ул. Школьная  
39  
Тел. (+7) 495 737 30 00, 564 88 00  
Факс (+7) 495 737 75 36, 564 88 11  
E-mail  
grundfos.moscow@grundfos.com

## Serbia

GRUNDFOS Predstavništvo Beograd  
Dr. Milutina Ivkovića 2a/29  
YU-11000 Beograd  
Phone: +381 11 26 47 877 / 11 26 47  
496  
Telefax: +381 11 26 48 340

## Singapore

GRUNDFOS (Singapore) Pte. Ltd.  
24 Tuas West Road  
Jurong Town  
Singapore 638381  
Phone: +65-6865 1222  
Telefax: +65-6861 8402

## Slovenia

SIA GRUNDFOS d.o.o.  
Šlandrova 8b, SI-1231 Ljubljana-Črnuče  
Phone: +386 1 568 0610  
Telefax: +386 1 568 0619  
E-mail: slovenia@grundfos.si

## South Africa

Corner Mountjoy and George Allen  
Roads  
Wilbart Ext. 2  
Bedfordview 2008  
Phone: (+27) 11 579 4800  
Fax: (+27) 11 455 6066  
E-mail: lsmart@grundfos.com

## Spain

Bombas GRUNDFOS España S.A.  
Camino de la Fuentecilla, s/n  
E-28110 Algete (Madrid)  
Tel.: +34-91-848 8800  
Telefax: +34-91-628 0465

## Sweden

GRUNDFOS AB  
Box 333 (Lunnagårdsgatan 6)  
431 24 Mölndal  
Tel.: +46(0)771-32 23 00  
Telefax: +46(0)31-331 94 60

## Switzerland

GRUNDFOS Pumpen AG  
Bruggacherstrasse 10  
CH-8117 Fällanden/ZH  
Tel.: +41-1-806 8111  
Telefax: +41-1-806 8115

## Taiwan

GRUNDFOS Pumps (Taiwan) Ltd.  
7 Floor, 219 Min-Chuan Road  
Taichung, Taiwan, R.O.C.  
Phone: +886-4-2305 0868  
Telefax: +886-4-2305 0878

## Thailand

GRUNDFOS (Thailand) Ltd.  
92 Chaloom Phrakiat Rama 9 Road,  
Dokmai, Pravej, Bangkok 10250  
Phone: +66-2-725 8999  
Telefax: +66-2-725 8998

## Turkey

GRUNDFOS POMPA San. ve Tic. Ltd.  
Sti.  
Gebze Organize Sanayi Bölgesi  
İhsan dede Caddesi,  
2. yol 200. Sokak No. 204  
41490 Gebze/ Kocaeli  
Phone: +90 - 262-679 7979  
Telefax: +90 - 262-679 7905  
E-mail: satis@grundfos.com

## Ukraine

ТОВ ГРУНДФОС УКРАЇНА  
01010 Київ, Вул. Московська 86,  
Тел.: (+38 044) 390 40 50  
Факс.: (+38 044) 390 40 59  
E-mail: ukraine@grundfos.com

## United Arab Emirates

GRUNDFOS Gulf Distribution  
P.O. Box 16768  
Jebel Ali Free Zone  
Dubai  
Phone: +971-4- 8815 166  
Telefax: +971-4-8815 136

## United Kingdom

GRUNDFOS Pumps Ltd.  
Grovebury Road  
Leighton Buzzard/Beds. LU7 8TL  
Phone: +44-1525-850000  
Telefax: +44-1525-850011

## U.S.A.

GRUNDFOS Pumps Corporation  
17100 West 118th Terrace  
Olathe, Kansas 66061  
Phone: +1-913-227-3400  
Telefax: +1-913-227-3500

## Uzbekistan

Представительство ГРУНДФОС в  
Ташкенте  
700000 Ташкент ул.Усмана Носира 1-й  
тулик 5  
Телефон: (3712) 55-68-15  
Факс: (3712) 53-36-35

97618835 1110
Repl. 97618835 0410

ECM: 1067585

The name Grundfos, the Grundfos logo, and the payoff Be-Think-Innovate are registered trademarks owned by Grundfos Management A/S or Grundfos A/S, Denmark. All rights reserved worldwide.