

## DMX 227

Ⓒ Installation and operating instructions

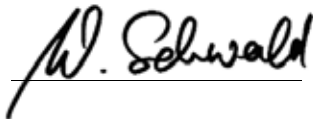


## Declaration of Conformity

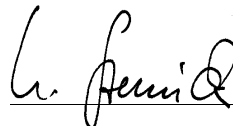
We **Grundfos Aildos** declare under our sole responsibility that the products **DMX 227**, to which this declaration relates, are in conformity with the Council Directives on the approximation of the laws of the EC Member States relating to

- Machinery (98/37/EC).  
Standard used: EN ISO 12100.
- Electromagnetic compatibility (89/336/EEC).  
Standards used: EN 61000-3-2: 1995, + A1 + A2, EN 61000-3-3: 1995 and EN 61326: 1997, + A1 + A2, Class B.
- Electrical equipment designed for use within certain voltage limits (73/23/EEC) [95].  
Standard used: EN 61010-1: 2002.

Pfinzthal, 1st April 2008



W. Schwald  
Managing Director



Ulrich Stemick  
Technical Director

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### Warning

*These complete installation and operating instructions are also available on [www.Grundfosalldos.com](http://www.Grundfosalldos.com).*



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

## 1. General information

### 1.1 Introduction

These installation and operating instructions contain all the information required for starting up and handling the DMX 227 dosing pump.

If you require further information or if any problems arise, which are not described in detail in this manual, please contact the nearest Grundfos Alldos company.

### 1.2 Service documentation

If you have any questions, please contact the nearest Grundfos Alldos company or service workshop.

## 2. Installation data

Note

*Please fill in the data below after commissioning.  
It will help you and your Grundfos Alldos service partner to make subsequent adjustments to the installation.*

Owner:

Grundfos Alldos customer number:

Order number:

Product number:

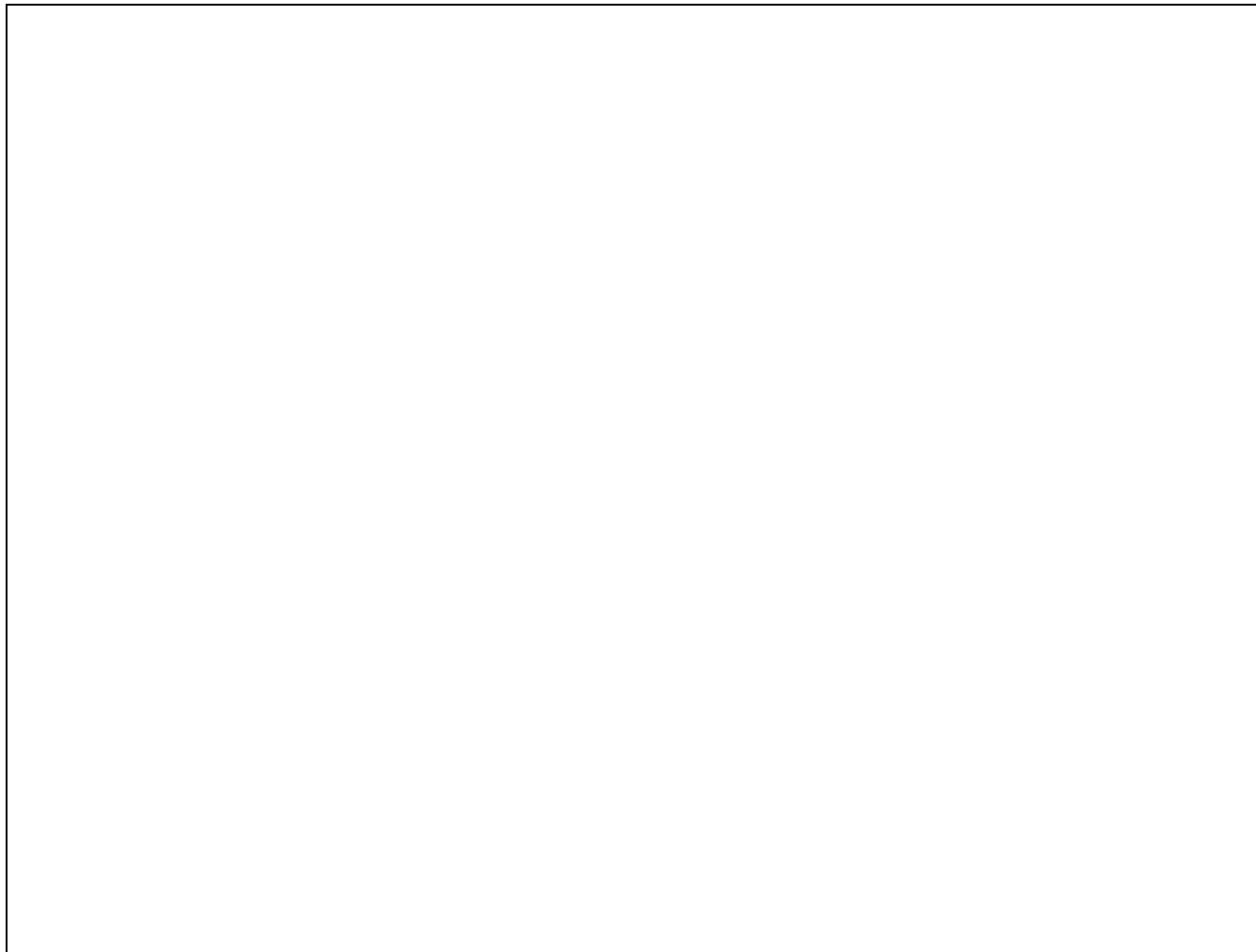
Pump serial number:

Put into service on:

Location of pump:

Used for:

## 3. Installation sketch



## 4. General information

### 4.1 Applications

The DMX 227 pump is suitable for liquid, non-abrasive and non-flammable media strictly in accordance with the instructions in this manual.

The DMX 227 dosing pumps have **not** been approved according to the EC directive 94/9/EC, the so-called ATEX directive. The application of these pumps in potentially explosive environments according to ATEX directive is therefore not permitted.



#### **Warning**

**Other applications or the operation of pumps in ambient and operating conditions, which are not approved, are considered improper and are not permitted. Grundfos Alldos accepts no liability for any damage resulting from incorrect use.**

### 4.2 Warranty

Warranty in accordance with our general terms of sale and delivery is only valid

- if the pump is used in accordance with the information within this manual.
- if the pump is not dismantled or incorrectly handled.
- if repairs are carried out by authorised and qualified personnel.
- if original spare parts are used for repairs.

## 5. Safety

This manual contains general instructions that must be observed during installation, operation and maintenance of the pump. This manual must therefore be read by the installation engineer and the relevant qualified personnel/operators prior to installation and start-up, and must be available at the installation location of the pump at all times.

It is not only the general safety instructions given in this "Safety" section that must be observed, but also all the specific safety instructions given in other sections.

### 5.1 Identification of safety instructions in this manual

If the safety instructions or other advice in this manual are not observed, it may result in personal injury or malfunction and damage to the pump. The safety instructions and other advice are identified by the following symbols:



#### **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.**

Information provided directly on the pump, e.g. labelling of fluid connections, must be observed and must be maintained in a readable condition at all times.

### 5.2 Qualification and training of personnel

The personnel responsible for the operation, maintenance, inspection and installation must be appropriately qualified for these tasks. Areas of responsibility, levels of authority and the supervision of the personnel must be precisely defined by the operator.

If the personnel do not have the necessary knowledge, the necessary training and instruction must be given. If necessary, training can be performed by the manufacturer/supplier at the request of the operator of the pump. It is the responsibility of the operator to make sure that the contents of this manual are understood by the personnel.

### 5.3 Risks when safety instructions are not observed

Non-observance of the safety instructions may have dangerous consequences for the personnel, the environment and the pump. If the safety instructions are not observed, all rights to claims for damages may be lost.

Non-observance of the safety instructions may lead to the following hazards:

- failure of important functions of the pump/system
- failure of specified methods for maintenance
- harm to humans from exposure to electrical, mechanical and chemical influences
- damage to the environment from leakage of harmful substances.

### 5.4 Safety-conscious working

The safety instructions in this manual, applicable national health and safety regulations and any operator internal working, operating and safety regulations must be observed.

### 5.5 Safety instructions for the operator/user

Hazardous hot or cold parts on the pump must be protected to prevent accidental contact.

Leakages of dangerous substances (e.g. hot, toxic) must be disposed of in a way that is not harmful to the personnel or the environment. Legal regulations must be observed.

Damage caused by electrical energy must be prevented (for more details, see for example the regulations of the VDE and the local electricity supply company).

### 5.6 Safety instructions for maintenance, inspection and installation work

The operator must ensure that all maintenance, inspection and installation work is carried out by authorised and qualified personnel, who have been adequately trained by reading this manual.

All work on the pump should only be carried out when the pump is stopped. The procedure described in this manual for stopping the pump must be observed.

Pumps or pump units which are used for media that are harmful to health must be decontaminated.

All safety and protective equipment must be immediately restarted or put into operation once work is complete.

Observe the points described in the initial start-up section prior to subsequent start-up.



#### **Warning**

**Electrical connections must only be carried out by qualified personnel!**

**The pump housing must only be opened by personnel authorised by Grundfos Alldos!**

### 5.7 Unauthorised modification and manufacture of spare parts

Modification or changes to the pump are only permitted following agreement with the manufacturer. Original spare parts and accessories authorised by the manufacturer are safe to use. Using other parts can result in liability for any resulting consequences.

## 5.8 Improper operating methods

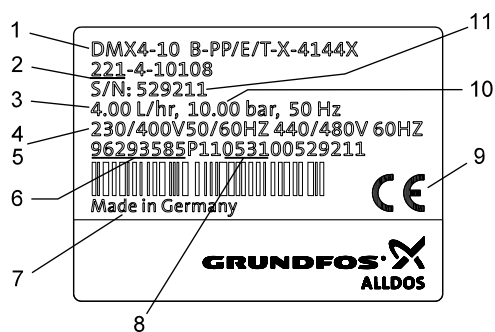
The operational safety of the supplied pump is only ensured if it is used in accordance with section 6. *Technical data*. The specified limit values must under no circumstances be exceeded.

## 5.9 Safety of the system in the event of a failure in the dosing system

DMX 227 dosing pumps are designed according to the latest technologies and are carefully manufactured and tested. However, a failure may occur in the dosing system. Systems in which dosing pumps are installed must be designed in such a way that the safety of the entire system is still ensured following a failure of the dosing pump. Provide the relevant monitoring and control functions for this.

## 6. Technical data

### 6.1 Identification



TMO3 8599 2207

Fig. 1 DMX 227 nameplate

Pos.	Description
1	Type designation
2	Model
3	Maximum capacity [l/h]
4	Voltage [V]
5	Frequency [Hz]
6	Product number
7	Country of origin
8	Year and week code
9	Marks of approval, CE mark, etc.
10	Maximum pressure [bar]
11	Serial number

## 6.2 Type key

Example:		DMX 2000 - 3 D PP /E /PP -X -J 2 TT X E0										
<b>Type range</b>												<b>Motor variant</b>
DMX												E0 PTC motor for frequency control, 3 x 400 V
<b>Maximum flow [l/h]</b>												E6 PTC motor with frequency control, 3 x 400 V
<b>Maximum counter-pressure [bar]</b>												<b>Mains plug</b>
<b>Control variant</b>												X No plug
D No control unit												<b>Connection, suction/discharge</b>
<b>Dosing head variant</b>												R Flange, DN 65, with connector for PVC pipe, 65/75 mm
PP Polypropylene												T Flange, DN 65, with connector for PP pipe, 65/75 mm
PVC Polyvinyl chloride												U Flange, DN 65, with connector for SS pipe, 65/75 mm
SS Stainless steel, DIN 1.4401												Y Flange, DN 65
PP-L PP + integrated diaphragm leakage detection												Z Flange, ANSI, 2 1/2"
PVC-L PVC + integrated diaphragm leakage detection												<b>Valve type</b>
SS-L SS + integrated diaphragm leakage detection												Spring-loaded
<b>Gasket material</b>												2 0.1 bar suction opening pressure 0.1 bar discharge opening pressure
E EPDM												<b>Supply voltage</b>
V FKM												0 Without motor, flange for single pump: IEC BG90 B14 double pump: IEC BG100 B14
<b>Valve ball material</b>												F Without motor, NEMA flange 145C (US)
PP Polypropylene												J 220-240 V / 380-420 V, 50/60 Hz
PVC Polyvinyl chloride												<b>Control panel position</b>
SS Stainless steel, DIN 1.4401												X No control panel

## 6.3 Pump types

Pump type		Dosing head size	Motor		Stroke volume [ml]
Single pump	Double pump		Single pump [kW]	Double pump [kW]	
DMX 430-5	DMX 430-5/430-5	1	1.5	2.2	256
DMX 860-5	DMX 860-5/860-5	1	1.5	2.2	256
DMX 1120-5	DMX 1120-5/1120-5	1	1.5	2.2	256
DMX 770-3	DMX 770-3/770-3	2	1.5	2.2	457
DMX 1520-3	DMX 1520-3/1520-3	2	1.5	2.2	457
DMX 2000-3	DMX 2000-3/2000-3	2	1.5	2.2	457

## 6.4 Pump performance

### 6.4.1 Accuracy

- Dosing flow fluctuation: less than  $\pm 2\%$  within the control range 1:10.

Applies to:

- water as dosing medium
- fully deaerated dosing head
- measurement according to Grundfos Alldos factory standard no. 0010/0011
- standard pump version.

### 6.4.2 Performance

Applies to:

- maximum counter-pressure
- water as dosing medium
- flooded suction 0.5 mWC
- fully deaerated dosing head
- three-phase 400 V motor.

Pump type	p max.*		50 Hz		60 Hz		100 Hz**			
			Q	Max. stroke rate	Q	Max. stroke rate	Q	Max. stroke rate		
Single pump	[bar]	[psi]	[l/h]	[n/min]	[l/h]	[gal/h]	[n/min]	[l/h]	[gal/h]	[n/min]
DMX 430-5	5	73	430	28	516	136	34	860	227	56
DMX 860-5			860	56	1032	273	67	1720	454	112
DMX 1120-5			1120	73	1344	355	88	2240	592	146
DMX 770-3	3	44	770	28	924	244	34	1540	407	56
DMX 1520-3			1520	56	1824	482	67	3040	803	112
DMX 2000-3			2000	73	2400	634	88	4000	1057	146

Pump type	p max.*		50 Hz		60 Hz		100 Hz**			
			Q	Max. stroke rate	Q	Max. stroke rate	Q	Max. stroke rate		
Double pump	[bar]	[psi]	[l/h]	[n/min]	[l/h]	[gal/h]	[n/min]	[l/h]	[gal/h]	[n/min]
DMX 430-5/430-5	5	73	860	63	1032	273	76	1720	454	126
DMX 860-5/860-5			1720	120	2064	545	144	3440	909	240
DMX 1120-5/1120-5			2240	168	2688	710	202	4480	1184	336
DMX 770-3/770-3	3	44	1540	63	1848	488	76	3080	814	126
DMX 1520-3/1520-3			3040	120	3648	964	144	6080	1606	240
DMX 2000-3/2000-3			4000	168	4800	1268	202	8000	2114	336

\* Maximum counter-pressure

\*\* Operation with frequency converter



## 6.5 Suction heights

- Data in mWC.

Applies to:

- non-degassing and non-abrasive media
- Newtonian liquids
- temperature of 20 °C
- standard pump version.

### 6.5.1 Media with a viscosity similar to water

Maximum suction height: 3 mWC.

### 6.5.2 Suction heights for media with maximum permissible viscosity

Flooded suction: 1-3 mWC.

## 6.6 Ambient and operating conditions

- Permissible ambient temperature: 0 °C to +40 °C.
- Permissible storage temperature: -20 °C to +50 °C.
- Permissible air humidity: max. relative humidity: 95 % (non-condensing).

**The installation site must be under cover!**  
**Ensure that the enclosure class of motor and pump are not affected by the atmospheric conditions.**

**Caution**

**Pumps with electronics are only suitable for indoor use! Do not install outdoors!**

### Warning

**Risk of hot surfaces!**

**Pumps with AC motors may become hot.**  
**Allow a minimum space of 100 mm above the fan cover!**



- Sound pressure level: ± 55 dB(A), testing according to DIN 45635-01-KL3.
- Minimum counter-pressure: 1 bar at the pump discharge valve.  
Pay attention to the pressure losses along the way to the injection point inclusively.
- Minimum pressure on the suction side: 1 bar.

## 6.7 Dosing medium

**In the event of questions regarding the material resistance and suitability of the pump for specific dosing media, please contact Grundfos Alldos.**

**Caution**

The dosing medium must have the following basic characteristics:

- liquid
- non-abrasive
- non-inflammable.

### 6.7.1 Permissible media temperature

Dosing head material	Temperature range p < 10 bar
PVC	0 °C to +40 °C
Stainless steel, DIN 1.4571*	-10 °C to +70 °C
PP	0 °C to +40 °C

\* For SIP/CIP applications: A temperature of 145 °C at a counter-pressure of max. 2 bar is permitted for a short period (15 minutes).

**Caution**

**Observe the freezing and boiling points of the dosing medium!**

## 6.7.2 Maximum permissible viscosity

Applies to:

- non-degassing and non-abrasive media
- Newtonian liquids
- temperature of 20 °C
- standard pump version.

Single pump	Double pump	Viscosity [mPa s]	
		50 Hz	60 Hz
DMX 430-5	DMX 430-5/430-5	1000	800
DMX 860-5	DMX 860-5/860-5	800	400
DMX 1120-5	DMX 1120-5/1120-5	400	200
DMX 770-3	DMX 770-3/770-3	800	400
DMX 1520-3	DMX 1520-3/1520-3	400	200
DMX 2000-3	DMX 2000-3/2000-3	200	100

## 6.8 Electrical data

### 6.8.1 Enclosure class

The enclosure class depends on the motor variant selected, see motor nameplate.

The specified enclosure class can only be ensured if the power supply cable is connected with the same degree of protection.

### 6.8.2 Motor

Version: see motor and pump nameplates.

## 6.9 Materials

### Pump

- Pump housing: Al 226
- Diaphragm flanges: GG 25.

### Optoelectronic diaphragm sensor

- Housing: ABS.

## 6.10 Weights

Single pumps	Approx. weight [kg]
DMX 430-5 - DMX 2000-3	50
Double pumps	
DMX 430-5/430-5 - DMX 2000-3/2000-3	90

## 6.11 Dimensional sketches

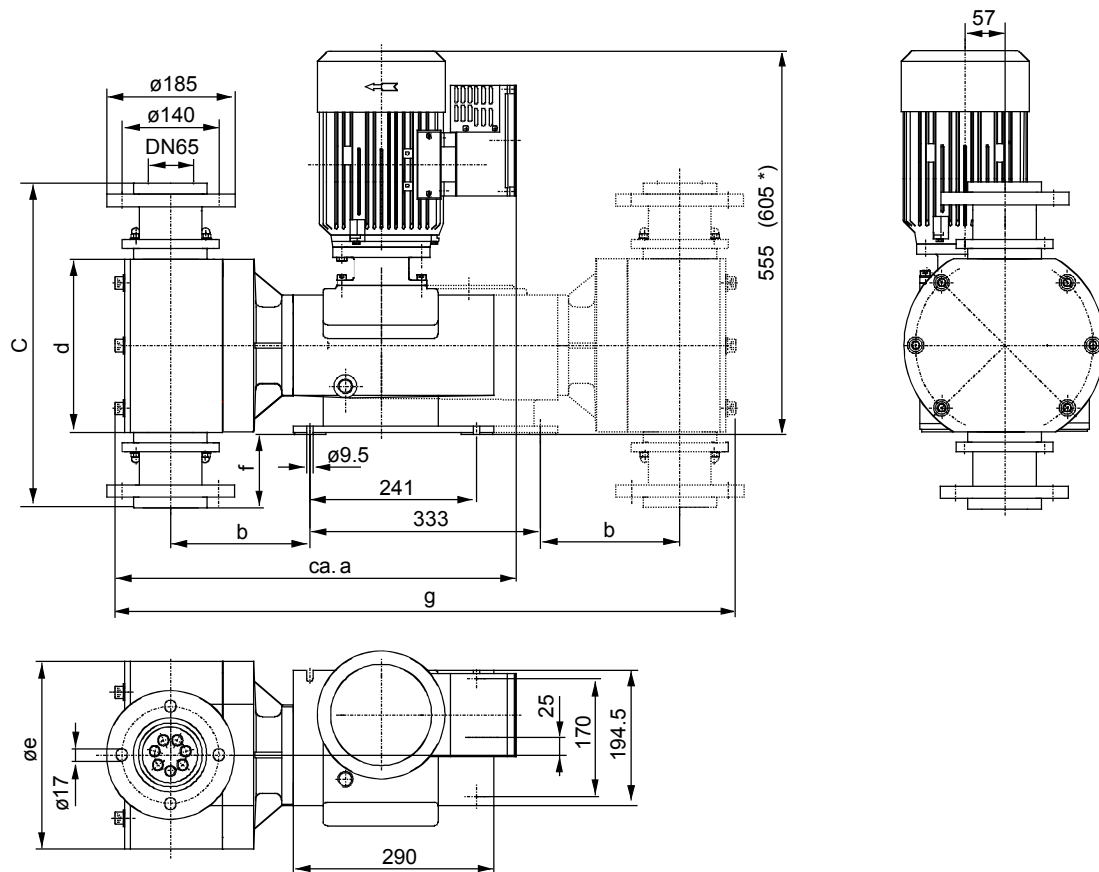


Fig. 2 Dimensional sketches of DMX 227

Single pump	Double pump	a	b	c	d	e	f	g
DMX 430-5	DMX 430-5/430-5	573	191	446	228	270	95	880
DMX 860-5	DMX 860-5/860-5	573	191	446	228	270	95	880
DMX 1120-5	DMX 1120-5/1120-5	573	191	446	228	270	95	880
DMX 770-3	DMX 770-3/770-3	580	201	468	250	270	106	910
DMX 1520-3	DMX 1520-3/1520-3	580	201	468	250	270	106	910
DMX 2000-3	DMX 2000-3/2000-3	580	201	468	250	270	106	910

\* Dimension with double pump

Measurements in mm.

## 7. Transport and storage

*Do not throw or drop the pump.*

*Store the pump in a dry and cool place.*

*Store the pump in upright position so that the gear oil cannot leak out.*

**Caution**

*Do not use the protective packaging as transport packaging.*

*Observe the permissible storage temperature!*

### 7.1 Delivery

The DMX 227 dosing pumps are supplied in different packaging, depending on pump type and the overall delivery. For transport and intermediate storage, use the correct packaging to protect the pump against damage.

### 7.2 Intermediate storage

- Permissible storage temperature: -20 °C to +50 °C.
- Permissible air humidity: max. relative humidity: 92 % (non-condensing).

### 7.3 Unpacking

Retain the packaging for future storage or return, or dispose of the packaging in accordance with local regulations.

### 7.4 Return

Return the pump in its original packaging or equivalent.

The pump must be thoroughly cleaned before it is returned or stored. It is essential that there are no traces of toxic or hazardous media remaining on the pump.

**Caution**

***Grundfos Alldos accepts no liability for damage caused by incorrect transportation or missing or unsuitable packaging of the pump!***

Before returning the pump to Grundfos Alldos for service, the **safety declaration** at the end of these instructions must be filled in by authorised personnel and attached to the pump in a visible position.

**Caution**

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

If Grundfos Alldos is requested to service the pump, it must be ensured that the pump is free from substances that can be injurious to health or toxic. If the pump has been used for such substances, the pump must be cleaned before it is returned.

If proper cleaning is not possible, all relevant information about the chemical must be provided.

If the above is not fulfilled, Grundfos Alldos can refuse to accept the pump for service. Possible costs of returning the pump are paid by the customer.

The safety declaration can be found at the end of these instructions.

**Caution**

***The replacement of the supply cable must be carried out by an authorised Grundfos Alldos service workshop.***

## 8. Installation

### 8.1 Optimum installation

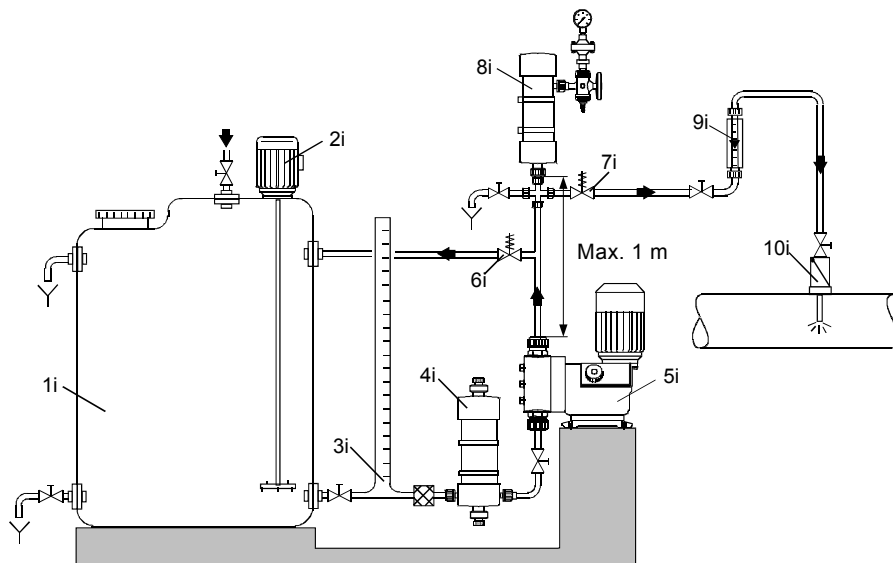


Fig. 3 Example of optimum installation

Pos.	Components
1i	Dosing tank
2i	Electric agitator
3i	Extraction device
4i	Suction pulsation damper
5i	Dosing pump
6i	Relief valve
7i	Pressure-loading valve
8i	Pulsation damper
9i	Measuring glass
10i	Injection unit

- For non-degassing media with a viscosity similar to water, the pump can be mounted on the tank (observe the maximum suction height).
- Flooded suction preferred.
- For media with a tendency to sedimentation, install the suction line with filter (13i) so that the suction valve remains a few millimetres above the possible level of sedimentation.

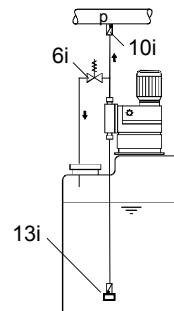


Fig. 6 Tank installation

### 8.2 Installation tips

- For easy deaeration of the dosing head, install a ball valve (11i) with bypass line (back to the dosing tank) immediately after the discharge valve.
- In the case of long discharge lines, install a non-return valve (12i) in the discharge line.

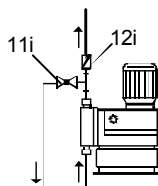


Fig. 4 Installation with ball valve and non-return valve

- When installing the suction line, observe the following:
  - Keep the suction line as short as possible. Prevent it from becoming tangled.
  - If necessary, use swept bends instead of elbows.
  - Always route the suction line up towards the suction valve.
  - Avoid loops which may cause air bubbles.

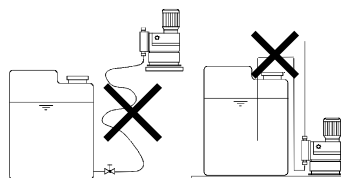


Fig. 5 Installation of suction line

- Note for suction-side installation: In dosing systems with a suction line longer than 1 metre, depending on the dosing flow, it may be necessary to install a properly sized pulsation damper (4i) immediately before the pump suction valve.

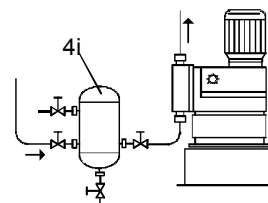
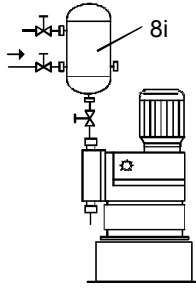


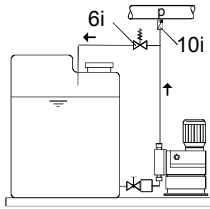
Fig. 7 Installation with suction-side pulsation damper

- Note for discharge-side installation: To protect the piping, use a pulsation damper (8i) for rigid piping longer than 3 metres and tubing longer than 5 metres.



**Fig. 8** Installation with discharge-side pulsation damper

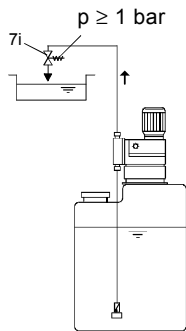
- For degassing and viscous media: flooded suction.
- To protect the dosing pump and the discharge line against excessive pressure build-up, install a relief valve (6i) in the discharge line.



**Fig. 9** Installation with relief valve

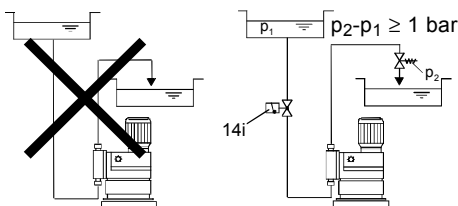
**With open outflow of the dosing medium or a counter-pressure below 1 bar**

- Install a pressure-loading valve (7i) immediately before the outlet or the injection unit.
- A positive pressure difference of at least 1 bar must be ensured between the counter-pressure at the injection point and the pressure of the dosing medium at the pump suction valve.
- If this cannot be ensured, install a pressure-loading valve (7i) in the discharge line.



**Fig. 10** Installation with pressure-loading valve

- To avoid the siphon effect, install a pressure-loading valve (7i) in the discharge line and, if necessary, a solenoid valve (14i) in the suction line.



**Fig. 11** Installation to avoid the siphon effect



**Warning**

**Risk of hot surfaces!**

**Pumps with AC motors may become hot. Allow a minimum space of 100 mm to the fan cover!**

**8.3 Mounting**

- Mount the pump horizontally on the tank or on a console using four M8 screws.

**8.4 Tube / pipe lines**

**8.4.1 General**

**Warning**

**To protect the dosing pump against excessive pressure build-up, install a relief valve in the discharge line.**

**Only use the prescribed line types!**

**All lines must be free from strain!**

**Avoid loops and buckles in the tubes!**

**Keep the suction line as short as possible to avoid cavitation!**

**If necessary, use swept bends instead of elbows. Observe the chemical manufacturer's safety instructions when handling chemicals!**

**Make sure that the pump is suitable for the actual dosing medium!**

**The flow must run in the opposite direction to gravity!**

**The resistance of the parts that come into contact with the media depends on the media, media temperature and operating pressure. Ensure that parts in contact with the media are chemically resistant to the dosing medium under operating conditions!**



**Caution**

**8.5 Connecting the suction and discharge lines**



**Warning**

**All lines must be free from strain!**

**Only use the prescribed line types!**

Depending on the material of the connection flanges (counter flanges):

- Pipe and flange made of stainless steel, DIN 1.4571: Weld the pipe to the blanking flange.
- Pipe and flange made of PP: Weld the pipe to the flange sleeve.
- Pipe and flange made of PVC: Adhere the pipe to the flange sleeve.
- The internal diameter of the lines, adapters and connectors should not be smaller than DN 65. If necessary, use bends instead of elbows.
- The suction lines must be designed in such a way that cavitation is avoided.

**Caution**

**Pulsation dampers should be fitted on both the suction and discharge sides.**

**A positive pressure difference of 10 mWC is required for correct operation of the dosing pump. If the total of the counter-pressure and the static difference in height between the suction valve and the dosing point is less than 10 mWC, a pressure-loading valve must be installed directly upstream of the dosing point.**

**Note**

- Connect the suction line to the suction valve (A).
  - Install the suction line in the tank so that the foot valve remains 5 to 10 mm above the bottom of the tank or the possible level of sedimentation.
- Connect the discharge line to the discharge valve (B).

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TM03 6303 4506

TM03 6304 4506

To protect the dosing pump against excessive pressure build-up, install a relief valve in the discharge line.

**Caution**

Make sure that the valves are seated correctly – position of valve disk (C)!

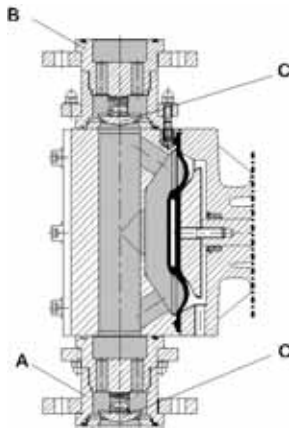


Fig. 12 Connecting the suction and discharge lines

TM03 6438 4506

Pos.	Components
A	Suction valve
B	Discharge valve
C	Valve disk

## 9. Electrical connections

Make sure that the pump is suitable for the electricity supply on which it will be used.

### Warning



**Electrical connections must only be carried out by qualified personnel!**

**Disconnect the power supply before connecting the power supply cable and the relay contacts! Observe the local safety regulations!**



### Warning

**The pump housing must only be opened by personnel authorised by Grundfos Alldos!**



### Warning

**Protect the cable connections and plugs against corrosion and humidity.**

**Only remove the protective caps from the sockets that are being used.**

**Caution**

**The power supply must be electrically isolated from the signal inputs and outputs.**

**Note**

**The pump is switched off by switching off the power supply.**

**Do not switch on the power supply until the pump is going to be started.**

## 9.1 Connecting the motor

- Connect the motor according to the wiring diagram in the terminal box.

**Observe the direction of rotation!**

**A motor protector, adjusted to the rated motor current, must be provided by the customer.**

**Caution**

**When the pump is used with a frequency converter, the jumpers in the terminal box have to be set according to the converter voltage.**

**The jumpers of three-phase motors are factory-set for star connection.**

## 10. Commissioning

### 10.1 Checks before start-up

- Check that the rated voltage stated on the pump nameplate corresponds to the local conditions!
- Check that all connections are secure and tighten, if necessary.
- Check that the dosing head screws are tightened with the specified torque and tighten, if necessary.
- Check that all electrical connections are correct.

### 10.2 Start-up

**After initial start-up and after each time the diaphragm is changed, tighten the dosing head screws.**

**Caution**

**After approximately 6-10 operating hours or two days, cross-tighten the dosing head screws using a torque wrench.**

**Maximum torque: 70-80 Nm.**

#### 10.2.1 Filling with gear oil

The pump has been tested in the factory, and the oil has been drained prior to shipping. Before starting, fill the pump with the supplied special oil as follows:

- Make sure that the pump is switched off.
- Slacken and remove the oil-filling screw with oil dipstick.
- Slowly add the gear oil through the oil-filling opening until the oil reaches the mark on the oil dipstick.
  - Gear oil for single pumps: 5.0 litres.
  - Gear oil for double pumps: 7.5 litres.
- Switch on the pump.
- Switch off the pump after approx. 10 minutes, check the oil level, and add oil, if necessary.
- Refit the oil-filling screw with dipstick.

#### 10.2.2 Starting the pump

- Switch on the power supply.
- Pumps with frequency converter: Set the dosing rate to 100 %. See installation and operating instructions for the frequency converter and section [11.3 Adjustment of dosing flow using a frequency converter](#).

The pump is now ready for operation.

# 11. Operation

## 11.1 Description of the pump

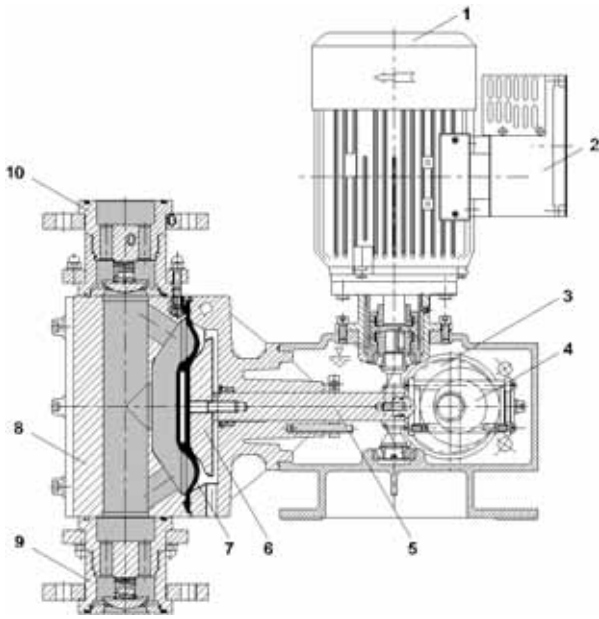


Fig. 13 DMX 227

Pos.	Components
1	Motor
2	Frequency converter
3	Worm wheel
4	Eccentric
5	Tappet
6	Support disk
7	Dosing diaphragm
8	Dosing head
9	Suction valve
10	Pressure valve

### Functional principle

- Oscillating positive displacement pump with electric drive, mechanical diaphragm deflection, and constant stroke length.
- Following reduction of the motor speed by a worm gear, the rotation of the drive is converted into the suction and compression movement of the diaphragm by means of an eccentric and tappet. A defined volume (stroke volume) of the dosed medium is thus sucked into the dosing head via the suction valve, and displaced into the dosing line by the discharge valve.
- The dosing flow can be adjusted in the range 1:10 if a frequency converter is installed.

### 11.2 Switching on/off

**Caution** Before switching on the pump, check that it is installed correctly. Refer to sections 8. Installation and 10. Commissioning.

- To start the pump, switch on the power supply.
- To stop the pump, switch off the power supply.

### 11.3 Adjustment of dosing flow using a frequency converter

The dosing rate can only be adjusted in the range 1:10 if a frequency converter is installed. See installation and operating instructions for the frequency converter!



#### Warning

Observe the manufacturer's instructions!

The connections must be carried out according to these instructions.

### Settings of frequency converter when used with Grundfos Alldos dosing pumps

Pay special attention to the following parameters of the frequency converter:

- P013 (maximum motor frequency):
  - Set the frequency converter to maximum 100 Hz.
  - Due to this setting, the maximum stroke frequency of the pump cannot be exceeded.
- P086 (motor current limit):
  - Do not change the default setting (150 %).
  - The motor is protected by a PTC resistor. Therefore, this parameter is not necessary.
- P081 - P085 (motor data):
  - Set these parameters to the values stated on the motor nameplate.
  - Observe the manufacturer's instructions!

## 12. Operation with electronics

First refer to the general section 11. Operation.

#### Caution

This section only describes the additional functions.

### 12.1 Electronic diaphragm leakage sensor

#### 12.1.1 Technical data

Model 230 V (+ 10 %/– 10 %)

Model 115 V (+ 10 %/– 10 %)

- Contact load: 250 V / 6 A, max. 550 VA
- Power consumption: 1.15 VA
- Enclosure class: IP 65
- Permissible temperature range: 0 °C to +40 °C.

#### 12.1.2 Dimensional sketch (electronics enclosure)

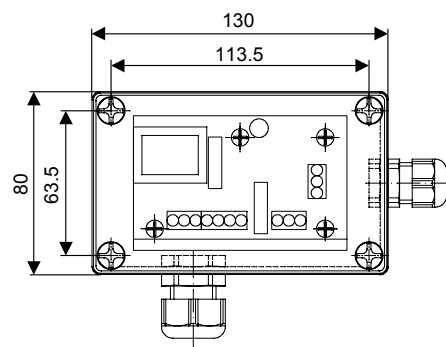


Fig. 14 Electronics enclosure

TM03 6381 4506

### 12.1.3 Function

Pumps prepared for diaphragm leakage detection:

- Special dosing head flange for inserting the optoelectronic sensor
- The optoelectronic sensor contains
  - infrared sender
  - infrared receiver.

#### In case of a leaking diaphragm

- The dosing liquid penetrates the dosing head flange.
  - The light refraction will be changed.
- The sensor produces a signal.
  - The electronics switches two contacts. These contacts can for instance be used to trigger an alarm device or to switch off the pump.

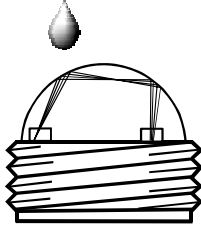


Fig. 15 Diaphragm leakage sensor

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### 12.1.4 Electrical connection of the electronics



#### Warning

**Electrical connections must only be carried out by qualified personnel!**

**Disconnect the power supply before connecting the power supply cable and the relay contacts!**

**Observe the local safety regulations!**

**Protect the cable connections and plugs from corrosion and moisture.**

**Before connecting the power supply cable, check that the supply voltage stated on the pump nameplate corresponds to the local electricity supply. An incorrect power supply could destroy the unit!**

#### Caution

To ensure electromagnetic compatibility (EMC), the input cables and current output cables must be screened.

1. Connect the screen at one end to PE.
  - Refer to the connection diagram!
2. Route input cables, current output cables and power supply cables in separate ducts.
3. Connect the device to the power supply according to the connection diagram.
4. Connect the electronics with the sensor according to the connection diagram.



#### Warning

**The potential-loaded contact 1, terminals 6 and 7, is loaded with supply voltage.**

**Switch off the power supply before connecting contact 1!**

**The contacts have no protective circuits. Only pure ohmic loads may be switched. For switching the pump motor, a contactor has to be connected inbetween.**

#### Caution

5. Connect contacts 1 and 2 according to individual needs. See section 9. [Electrical connections](#).

### 12.1.5 Relay outputs

#### Note

**The relay output connection depends on the application and the connected actuators.**

- Interference suppression is required for inductive loads (also relays and contactors).
- If this is not possible, protect the relay contacts using a suppressor circuit as described below.

#### With AC voltage

Current up to	Capacitor C	Resistor R
60 mA	10 $\mu$ F, 275 V	390 $\Omega$ 2 W
70 mA	47 $\mu$ F, 275 V	22 $\Omega$ 2 W
150 mA	100 $\mu$ F, 275 V	47 $\Omega$ 2 W
1.0 A	220 $\mu$ F, 275 V	47 $\Omega$ 2 W

#### With DC voltage

- Connect the free-wheeling diode parallel to the relay or contactor.

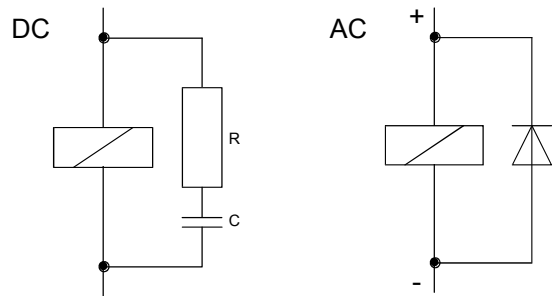


Fig. 16 Suppressor circuit DC/AC

TM03 7209 4506

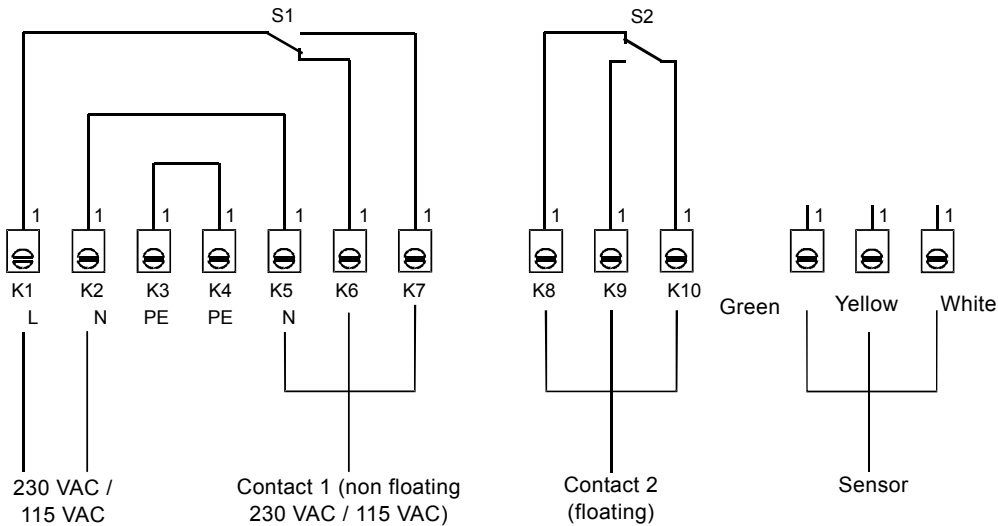
#### Caution

**Provide relay outputs on site with an appropriate back-up fuse!**

#### Note

**These connections depend on the type of actuator used and should only be understood as guidelines. Refer to actuator documentation.**



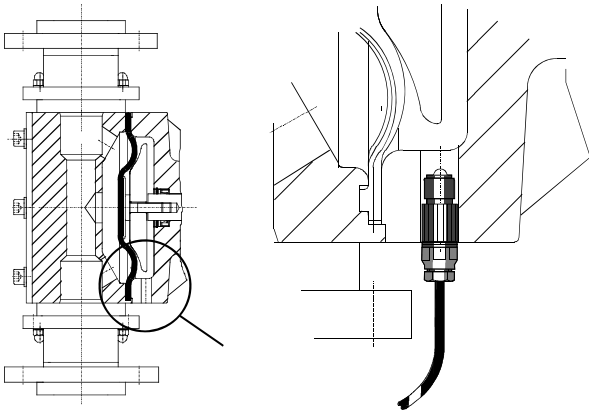


TM03 6385 4506

**Fig. 17** Electrical connection of the electronics

**12.1.6 Screwing the sensor into the dosing head**

- Screw the sensor from the lower side into the hole of the dosing head flange (M14 x 1.5).
  - Now the diaphragm leakage sensor is ready for start-up.



**Fig. 18** Screwing the sensor into the dosing head

TM03 6440 4506

**12.1.7 Start-up**

**Caution** Carry out a functional check before start-up!

**Functional check**

- Dip the sensor into water.
  - Green and red LEDs are on: Sensor and electronics are ready for operation!
  - One or more LEDs are off: Sensor or electronics is defective! Call Grundfos Alldos service.
- Carefully dry the sensor.
  - Only the green LED is still on: Sensor and electronics are ready for operation!
  - The red LED is still on: Sensor or electronics is defective! Call Grundfos Alldos service.

**Warning**  
 Do not open the electronics or sensor!  
 Repairs must only be carried out by authorised and qualified personnel!

**12.1.8 Using the contacts**

- Terminals 6 and 7 (potential-loaded)
  - for instance for switching off the pump in case of a diaphragm leakage.
- Terminals 8, 9 and 10 (potential-free)
  - for instance for triggering an alarm device.

**12.1.9 Description of the device**

There are a green and a red light-emitting diode (LED) at the electronics.

- Green LED
  - shows that the system is ready for operation.
  - The LED is only on when the sensor is connected to the electronics.
  - If the LED is off in this case, either the sensor or the cable is defective or wrongly connected.
- Red LED
  - shows that a diaphragm leakage has been detected.
  - The green LED is still on.

**12.1.10 Maintenance**

**Warning**  
 Do not open the electronics or sensor!  
 Repairs must only be carried out by authorised and qualified personnel!

**Sensor**

- Optoelectronic sensor with 3 metres cable.
- Clean the sensor in case of malfunction.
- If the sensor still does not operate correctly, replace it.

**Electronics**

- No maintenance is possible by the user.
- If the electronics does not operate correctly, call Grundfos Alldos service.

## 13. Maintenance

### 13.1 General notes

**Warning**

When dosing dangerous media, observe the corresponding safety precautions!



**Risk of chemical burns!**

Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines!

Do not allow any chemicals to leak from the pump. Collect and dispose of all chemicals correctly!

**Warning**

The pump housing must only be opened by personnel authorised by Grundfos Alldos! Repairs must only be carried out by authorised and qualified personnel!



Switch off the pump and disconnect it from the power supply before carrying out maintenance work and repairs!

### 13.2 Changing the gear oil

**Warning**

The gear oil must only be changed by authorised and qualified personnel.



For this purpose, send the pump to Grundfos Alldos or an authorised service workshop.

To ensure trouble-free operation, it is recommended to regularly change the gear oil.

**Use exclusively original gear oil.**

**Caution**

When changing the gear oil, check the dosing diaphragm and, for safety reasons, replace, if necessary.

### 13.3 Cleaning and maintenance intervals

Clean the diaphragm and valves, and replace, if necessary (with stainless-steel valves: inner valve parts):

- At least every 12 months or after 3,000 operating hours.
- In the event of a fault.

### 13.4 Cleaning the suction and discharge valves

**Caution**

If possible, rinse the dosing head, e.g. by supplying it with water.

If the pump loses capacity, clean the suction and discharge valves as follows:

See fig. 19.

1. Loosen the cap nuts (8) on the flange (1).
2. Remove the valve housing (2/9) and other parts of the valve.
3. Remove the other internal parts, and clean or replace, if necessary.
4. Re-assemble the valve according to the exploded view below.
5. Refit the valve.

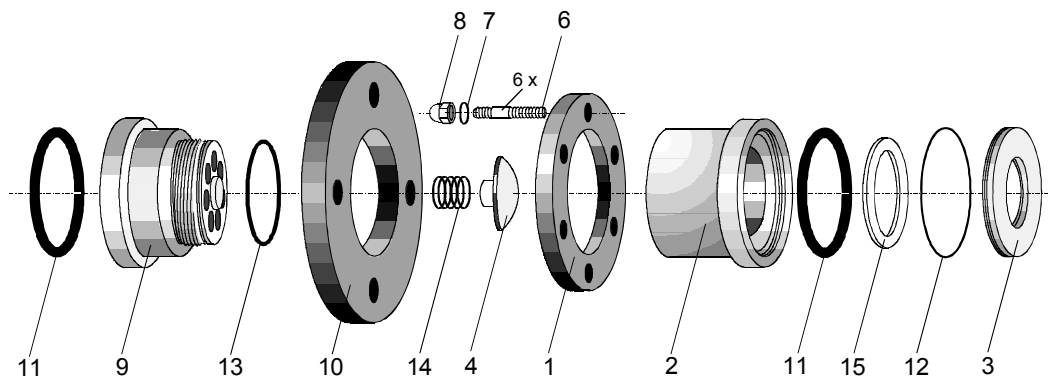


Fig. 19 Exploded view of the valves

Pos.	Components
1	Flange
2	Valve housing
3	Valve seat
4	Valve disk
6	Double-end stud
7	Washer
8	Cap nut
9	Valve housing
10	Supporting ring
11	O-ring
12	O-ring
13	O-ring
14	Spring
15	Valve disk

**Caution**

The O-rings must be correctly placed in the specified groove.

### 13.5 Replacing the diaphragm

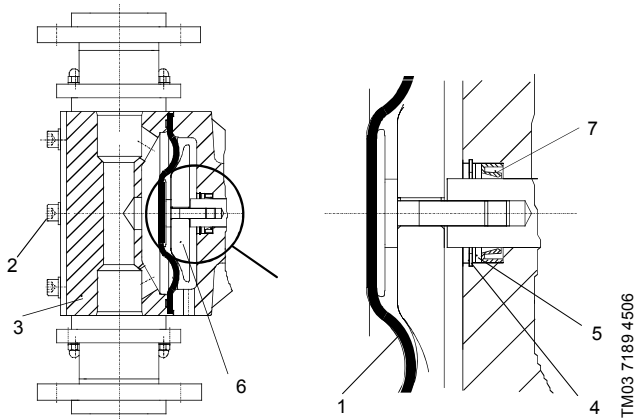
**Note** *If possible, rinse the dosing head, e.g. by supplying it with water.*

#### 13.5.1 Switching off the pump

1. Switch off the pump and disconnect it from the power supply.
2. Depressurise the system.
3. Take suitable steps to ensure that the returning dosing medium is safely collected.

#### 13.5.2 Replacing the diaphragm

1. Loosen the six dosing head screws.
2. Remove the dosing head.
3. Unscrew the diaphragm by manually turning it counter-clockwise.
4. Refit the retaining ring (4), shim ring (5), lip seal (7) and supporting ring (6). Replace faulty parts.
5. Screw in the new diaphragm completely.
6. Remove the motor fan cover, and turn the fan blades until the diaphragm reaches the bottom dead centre.
7. Refit the dosing head carefully, and cross-tighten the screws. Maximum torque: 70-80 Nm.
8. Deaerate and start the dosing pump.



**Fig. 20** Replacing the diaphragm

Pos.	Components
1	Diaphragm
2	Dosing head screws
3	Dosing head
4	Retaining ring
5	Shim ring
6	Supporting ring
7	Lip seal

*After initial start-up and after each time the diaphragm is changed, tighten the dosing head screws.*

**Caution** *After approximately 6-10 operating hours or two days, cross-tighten the dosing head screws using a torque wrench. Maximum torque: 70-80 Nm.*

## 14. Fault finding chart

<b>Fault</b>	<b>Cause</b>	<b>Remedy</b>
1. Dosing pump does not run.	a) Not connected to the power supply.	Connect the power supply cable.
	b) Incorrect supply voltage.	Replace the dosing pump.
	c) Electrical failure.	Return the pump for repair.
	d) The diaphragm leakage detection has responded.	Replace the diaphragm.
2. Dosing pump does not suck in.	a) Leaking suction line.	Replace or seal the suction line.
	b) Cross-section of the suction line too small or suction line too long.	Check with Grundfos Alldos specification.
	c) Clogged suction line.	Rinse or replace the suction line.
	d) Foot valve covered by sediment.	Suspend the suction line from a higher position.
	e) Crystalline deposits in the valves.	Clean the valves.
	f) Diaphragm broken or diaphragm tappet torn out.	Replace the diaphragm.
	g) Dosing tank is empty.	Change the tank.
3. Dosing pump does not dose.	a) Air in the suction line and dosing head.	Wait until the pump has deaerated.
	b) Viscosity or density of medium too high.	Check the installation.
	c) Crystalline deposits in the valves.	Clean the valves.
	d) Valves not correctly assembled.	Assemble the inner valve parts in the right order and check and possibly correct the flow direction.
	e) Injection point blocked.	Check and possibly correct the flow direction (injection unit), or remove the obstruction.
	f) Incorrect installation of lines and peripheral equipment.	Check the lines for free passage and correct installation.
	4. Dosing flow of the pump is inaccurate.	a) Dosing head not fully deaerated.
b) Degassing medium.		Check the installation.
c) Parts of the valves covered in dirt or incrusted.		Clean the valves.
d) Counter-pressure fluctuations.		Install a pressure-loading valve and a pulsation damper.
e) Suction height fluctuations.		Keep the suction level constant.
f) Siphon effect (inlet pressure higher than counter-pressure).		Install a pressure-loading valve.
g) Leaking or porous suction line or discharge line.		Replace the suction line or discharge line.
h) Parts in contact with the medium are not resistant to it.		Replace with resistant materials.
i) Dosing diaphragm worn (incipient tears).		Replace the diaphragm. Also observe the maintenance instructions.
j) Variation of the dosing medium (density, viscosity).		Check the concentration. Use an agitator, if necessary.

## 15. Dosing curves

The dosing curves on the following pages are trend curves.

They apply to:

- performance of single pump (the flow rate is doubled for the double pump)
- water as the dosing medium
- zero point of pump  $Q_0$  at a counter-pressure of 3 bar
- standard pump version.

Abbreviation	Description
Q	Dosing flow
f	Drive frequency

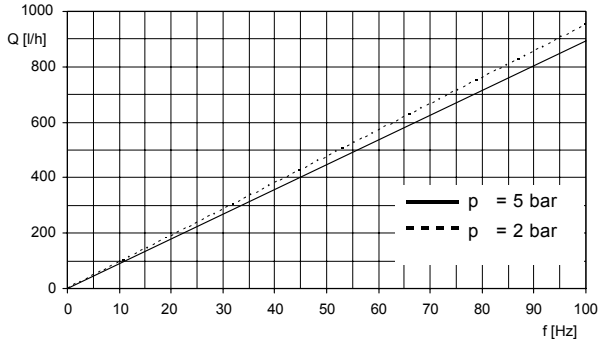


Fig. 21 DMX 430-5

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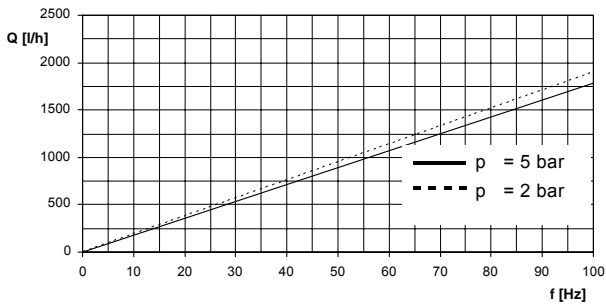


Fig. 22 DMX 860-5

TM03 6443 4506

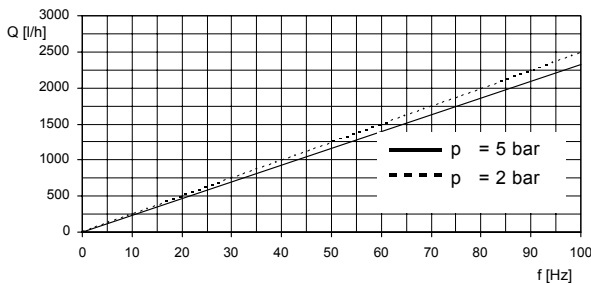


Fig. 23 DMX 1120-5

TM03 6444 4506

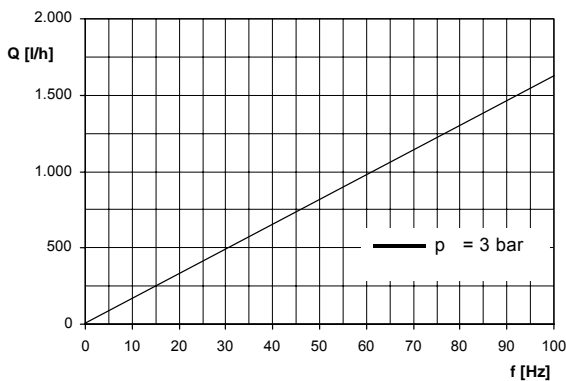


Fig. 24 DMX 770-3

TM03 6445 4506

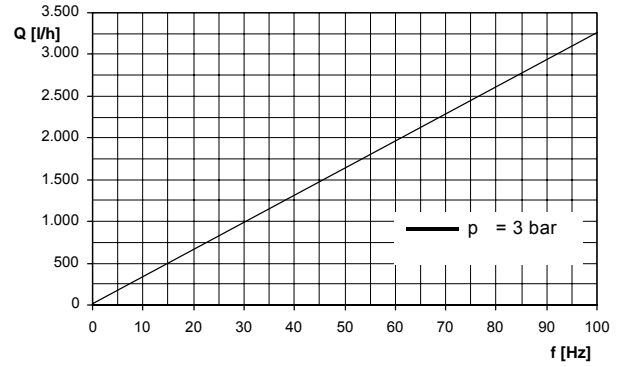


Fig. 25 DMX 1520-3

TM03 6446 4506

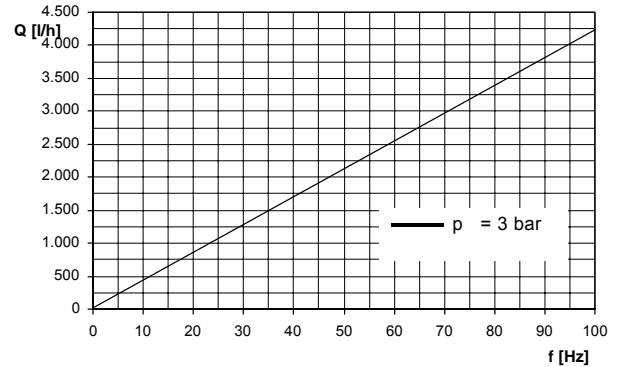


Fig. 26 DMX 2000-3

TM03 6447 4506

## 16. Disposal

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

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

# Safety declaration

Please copy, fill in and sign this sheet and attach it to the pump returned for service.

We hereby declare that this product is free from hazardous chemicals, biological and radioactive substances:

Product type: \_\_\_\_\_

Model number: \_\_\_\_\_

No media or water: \_\_\_\_\_

A chemical solution, name: \_\_\_\_\_

(see pump nameplate)

## Fault description

Please make a circle around the damaged part.  
In the case of an electrical or functional fault, please mark the cabinet.



GrA3470

Please give a short description of the fault:

\_\_\_\_\_  
Date and signature

\_\_\_\_\_  
Company stamp

**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 Alldos**  
**Dosing & Disinfection**  
ALLDOS Oceania Pty. Ltd.  
Unit 3 / 74 Murdoch Circuit  
Acacia Ridge QLD 4100  
Phone: +61 (0)7 3712 6888  
Telefax: +61 (0)7 3272 5188  
E-mail: alldos.au@alldos.com

**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 Gröding/Salzburg  
Tel.: +43-6246-883-0  
Telefax: +43-6246-883-30

**Belgium**

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

**Belorussia**

Представительство ГРУНДФОС в  
Минске  
220090 Минск ул.Олешева 14  
Телефон: (8632) 62-40-49  
Факс: (8632) 62-40-49

**Bosnia/Herzegovina**

GRUNDFOS Sarajevo  
Paromlinska br. 16,  
BiH-71000 Sarajevo  
Phone: +387 33 713290  
Telefax: +387 33 231795

**Brazil**

Mark GRUNDFOS Ltda.  
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 Pumpen Vertrieb  
Representative Office - Bulgaria  
Bulgaria, 1421 Sofia  
Lozenetz District  
105-107 Arsenalniski blvd.  
Phone: +359 2963 3820, 2963 5653  
Telefax: +359 2963 1305

**Canada**

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

**China**

**Grundfos Alldos**  
**Dosing & Disinfection**  
ALLDOS (Shanghai) Water Technology  
Co. Ltd.  
West Unit, 1 Floor, No. 2 Building (T 4-2)  
278 Jinhu Road, Jin Qiao Export Process-  
ing Zone  
Pudong New Area  
Shanghai, 201206  
Phone: +86 21 5055 1012  
Telefax: +86 21 5032 0596  
E-mail: alldos.cn@alldos.com

**China**

GRUNDFOS Pumps (Shanghai) Co. Ltd.  
22 Floor, Xin Hua Lian Building  
755-775 Huai Hai Rd, (M)  
Shanghai 200020  
PRC  
Phone: +86-512-67 61 11 80  
Telefax: +86-512-67 61 81 67

**Croatia**

GRUNDFOS predstavništvo Zagreb  
Cebini 37, Buzin  
HR-10000 Zagreb  
Phone: +385 1 6595 400  
Telefax: +385 1 6595 499

**Czech Republic**

GRUNDFOS s.r.o.  
Čapkovského 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 Pumput AB  
Mestarintie 11  
FIN-01730 Vantaa  
Phone: +358-3066 5650  
Telefax: +358-3066 56550

**France**

**Grundfos Alldos**  
**Dosing & Disinfection**  
ALLDOS S.A.R.L.  
7, rue Gutenberg  
F-67610 La Wantzenau  
Tél.: +33-3 88 59 26 26  
Télécopie: +33-3 88 59 26 00  
E-mail : alldos.fr@alldos.com

**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 Alldos**  
**Dosing & Disinfection**  
ALLDOS Eichler GmbH  
Reetzstraße 85  
D-76327 Pfalzthal (Söllingen)  
Tel.: +49 7240 61-0  
Telefax: +49 7240 61-177  
E-mail: alldos.de@alldos.com

**Germany**

GRUNDFOS GMBH  
Schlüterstr. 33  
D-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 Limited  
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**

SI A GRUNDFOS Pumps Latvia  
Deglava biznesa centrs  
Augusta Deglava ielā 60, LV-1035, Rīga,  
Tāl.: + 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 Alldos**  
**Dosing & Disinfection**  
ALLDOS BV  
Leerlooiersstraat 6  
NL-8601 WK Sneek  
Tel.: +31-51 54 25 789  
Telefax: +31-51 54 30 550  
E-mail: alldos.nl@alldos.com

**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**

GRUNDFOS PUMPEN VERTRIEB  
Ges.m.b.H.,  
Podružnica Ljubljana  
Blatnica 1, SI-1236 Trzin  
Phone: +386 1 563 5338  
Telefax: +386 1 563 2098  
E-mail: slovenia@grundfos.si

**South Africa**

**Grundfos Alldos**  
**Dosing & Disinfection**  
ALLDOS (Pty) LTD  
98 Matroosberg Road, Waterkloof Park  
P.O. Box 36505, Menlo Park 0102  
0181 ZA Pretoria  
E-mail: alldos.za@alldos.com

**Spain**

Bombas GRUNDFOS España S.A.  
Camino de la Fuenteçilla, 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 Alldos**  
**Dosing & Disinfection**  
ALLDOS International AG  
Schöneggstrasse 4  
CH-4153 Reinach  
Tel.: +41-61-717 5555  
Telefax: +41-61-717 5500  
E-mail: alldos.ch@alldos.com

**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 Chaloe 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  
Ihsan 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**

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 Alldos****Dosing & Disinfection**

ALLDOS Ltd.  
39 Gravelly Industrial Park, Tyburn Road  
Birmingham B24 8TG  
Phone: +44-121-3283336  
Telefax: +44-121-3284332  
E-mail: alldos.uk@alldos.com

**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

**Usbekistan**

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



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