

# DMX 227

Dosing pump

Installation and operating instructions



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## Original installation and operating instructions

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## 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 Grundfos.

## 1.2 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 2014/34/EU, 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 accepts no liability for any damage resulting from incorrect use.



## Warning

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

## 2. 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.

### 2.1 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.

### 2.2 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.

### 2.3 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.

### 2.4 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.

### 2.5 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).

### 2.6 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!

### 2.7 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.

### 2.8 Improper operating methods

The operational safety of the supplied pump is only ensured if it is used in accordance with section 3. *Technical data*. The specified limit values must under no circumstances be exceeded.

### 2.9 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.

### 3. Technical data

#### 3.1 Identification

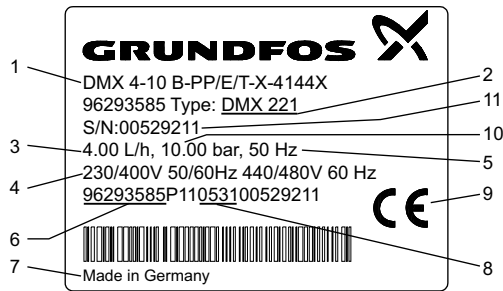


Fig. 1 DMX nameplate

TMD3 8599 4313

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

#### 3.2 Type key

Example:	DMX 2000 -3 D PP /E /PP -X -E 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 counterpressure [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 1.4571*											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											E 220-240 V / 380-420 V, 50/60 Hz
PVC Polyvinyl chloride											<b>Control panel position</b>
SS Stainless steel 1.4401*											X No control panel

\* According to EN 10027-2

### 3.3 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

### 3.4 Pump performance

#### 3.4.1 Accuracy

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

Applies to:

- water as dosing medium
- fully deaerated dosing head
- standard pump version.

#### 3.4.2 Performance

Applies to:

- maximum counterpressure
- 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	5	73	860	56	1032	273	67	1720	454	112
DMX 1120-5	5	73	1120	73	1344	355	88	2240	592	146
DMX 770-3	3	44	770	28	924	244	34	1540	407	56
DMX 1520-3	3	44	1520	56	1824	482	67	3040	803	112
DMX 2000-3	3	44	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	28	1032	273	34	1720	454	56
DMX 860-5/860-5	5	73	1720	56	2064	545	67	3440	909	112
DMX 1120-5/1120-5	5	73	2240	73	2688	710	88	4480	1184	146
DMX 770-3/770-3	3	44	1540	28	1848	488	34	3080	814	56
DMX 1520-3/1520-3	3	44	3040	56	3648	964	67	6080	1606	112
DMX 2000-3/2000-3	3	44	4000	73	4800	1268	88	8000	2114	146

\* Maximum counterpressure

\*\* Operation with frequency converter

### 3.5 Suction heights

- Data in mWC.

Applies to:

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

#### 3.5.1 Media with a viscosity similar to water

Maximum suction height: 3 mWC.

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

Flooded suction: 1-3 mWC.

### 3.6 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 (non-condensing): 70 % at 40 °C, 90 % at 35 °C.

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: 70 ± 5 dB(A), testing according to DIN 45635-01-KL3.
- Minimum counterpressure: 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.

### 3.7 Dosing medium

#### Caution

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

The dosing medium must have the following basic characteristics:

- liquid
- non-abrasive
- non-flammable.

#### 3.7.1 Permissible media temperature

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

\* For SIP/CIP applications, a temperature of 145 °C at a counterpressure of max. 2 bar is permitted for a short period (15 minutes).

#### Caution

Observe the freezing and boiling points of the dosing medium!

### 3.7.2 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

### 3.8 Electrical data

#### 3.8.1 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.

#### 3.8.2 Motor

Version: see motor and pump nameplates.

### 3.9 Materials

#### Pump

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

#### Optoelectronic diaphragm sensor

- Housing: ABS.

### 3.10 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

3.11 Dimensional sketches

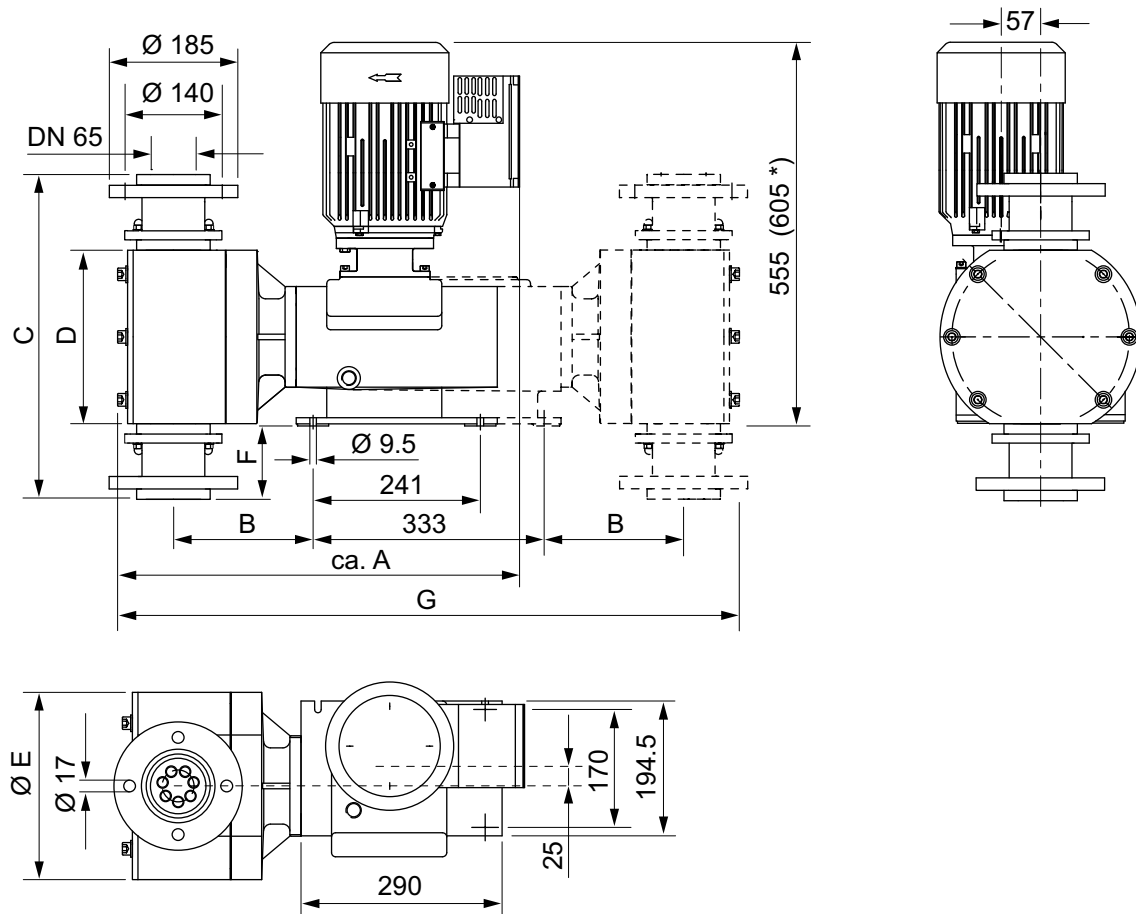


Fig. 2 Dimensional sketches of DMX 227

Single pump	Double pump	A	B	C	D	ØE	F	G
DMX 430-5	DMX 430-5/430-5	567	185	446	228	270	95	880
DMX 860-5	DMX 860-5/860-5	567	185	446	228	270	95	880
DMX 1120-5	DMX 1120-5/1120-5	567	185	446	228	270	95	880
DMX 770-3	DMX 770-3/770-3	580	201	468	250	290	106	910
DMX 1520-3	DMX 1520-3/1520-3	580	201	468	250	290	106	910
DMX 2000-3	DMX 2000-3/2000-3	580	201	468	250	290	106	910

\* Dimension with double pump

Measurements in mm.

TM03 6437 1612

## 4. 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!

### 4.1 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.

### 4.2 Intermediate storage

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

### 4.3 Unpacking

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

### 4.4 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 accepts no liability for damage caused by incorrect transportation or missing or unsuitable packaging of the pump!

Before returning the pump to Grundfos 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 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 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 service workshop.



## 5. Installation

### 5.1 Optimum installation

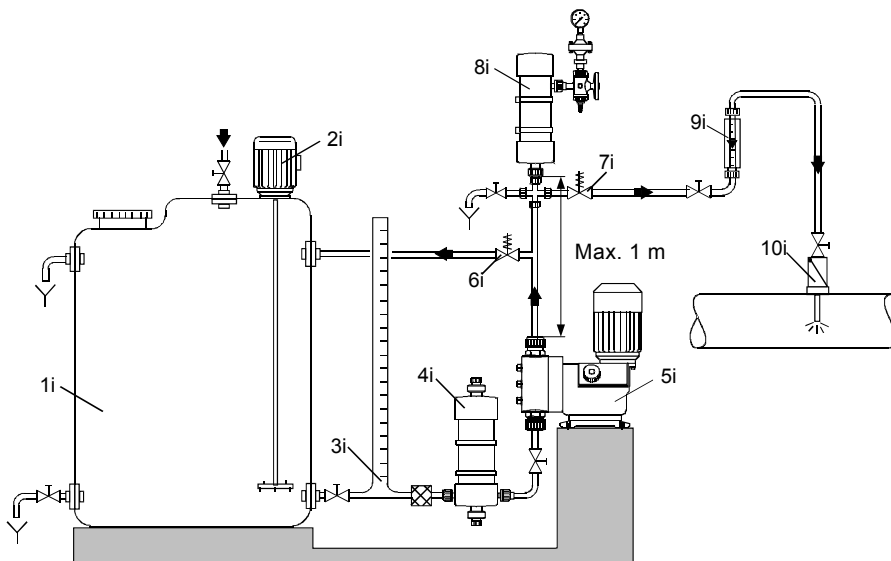


Fig. 3 Example of optimum installation

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.

### 5.2 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.

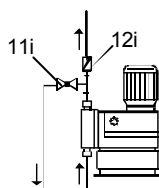


Fig. 4 Installation with ball valve and non-return valve

- 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.

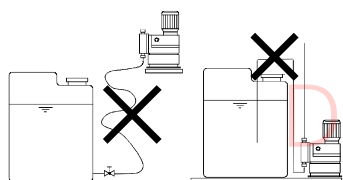


Fig. 5 Installation of suction line

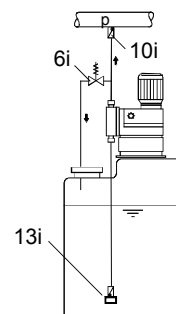


Fig. 6 Tank installation

- 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.

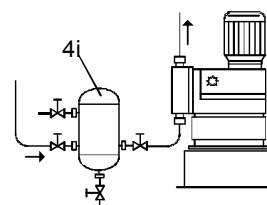


Fig. 7 Installation with suction-side pulsation damper

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TM03 6299 4506

TM03 6297 4506

TM03 6300 4506

TM03 6298 4506

- 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.

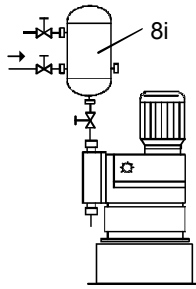


Fig. 8 Installation with discharge-side pulsation damper

- 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.

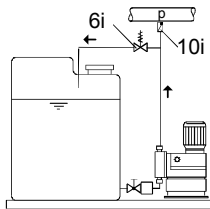


Fig. 9 Installation with relief valve

**With open outflow of the dosing medium or a counterpressure 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 counterpressure 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.

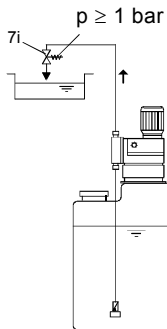


Fig. 10 Installation with pressure-loading valve

- 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.

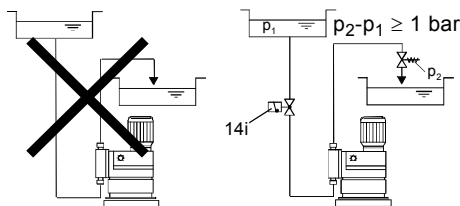


Fig. 11 Installation to avoid the siphon effect



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

**5.3 Mounting**

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

**5.4 Pipe lines**

**5.4.1 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!  
 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!

**5.5 Connecting the suction and discharge lines**



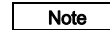
**Warning**  
 All lines must be free from strain!  
 Only use the prescribed line types!

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

- Pipe and flange made of stainless steel: 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.

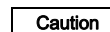


Pulsation dampers should be fitted on both the suction and discharge sides.



A positive pressure difference of 10 mWC is required for correct operation of the dosing pump. If the total of the counterpressure 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.

- 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).



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

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

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TM03 6302 4506

TM03 6303 4506

TM03 6304 4506

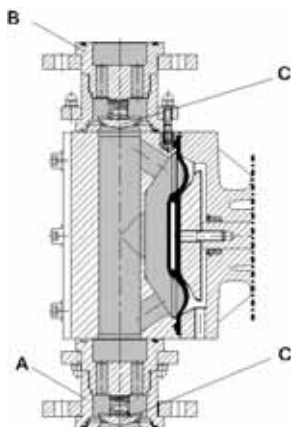


Fig. 12 Connecting the suction and discharge lines

TM03 6438 4506

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

## 6. 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!

### 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.

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

### Note

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

## 6.1 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.

## 7. Commissioning

### 7.1 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.

### 7.2 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.

#### 7.2.1 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.

#### 7.2.2 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 [8.3 Adjustment of dosing flow using a frequency converter](#).

The pump is now ready for operation.

## 8. Operation

In the event of a diaphragm leakage, the dosing liquid may leak out of the hole in the intermediate flange between the pump and the dosing head. The parts inside the housing are protected from the dosing liquid for a short time (depending on the type of liquid) by the housing sealing. It is necessary to check regularly (daily) if liquid is leaking out of the intermediate flange. For maximum safety, we recommend the pump version with diaphragm leakage detection.

### Caution

### 8.1 Description of the pump

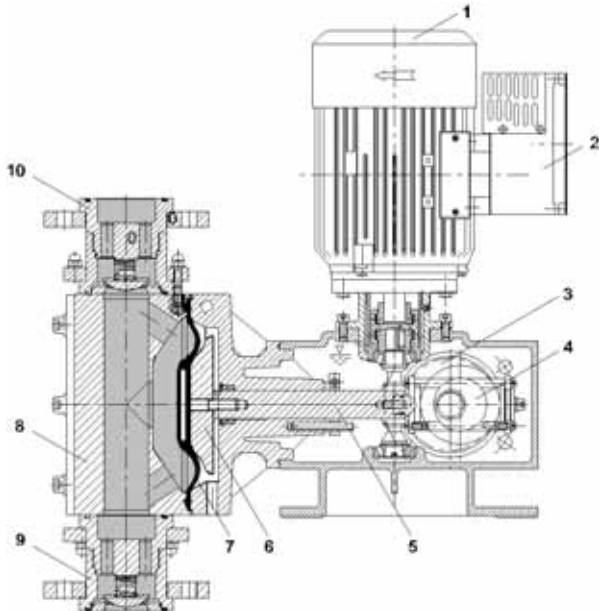


Fig. 13 DMX 227

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.

### 8.2 Switching on/off

#### Caution

Before switching on the pump, check that it is installed correctly. Refer to sections 5. *Installation* and 7. *Commissioning*.

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

### 8.3 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 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!

## 9. Operation with electronics

#### Caution

First refer to the general section 8. *Operation*. This section only describes the additional functions.

### 9.1 Electronic diaphragm leakage sensor

#### 9.1.1 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: IP65
- Permissible temperature range: 0 °C to +40 °C.

#### 9.1.2 Dimensional sketch (electronics enclosure)

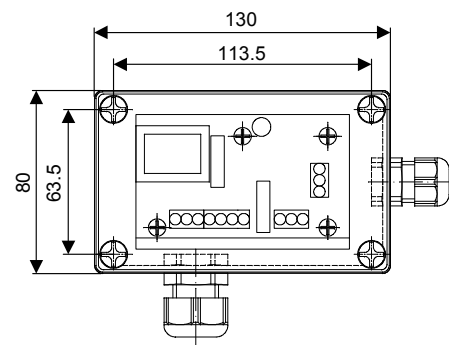


Fig. 14 Electronics enclosure

### 9.1.3 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.

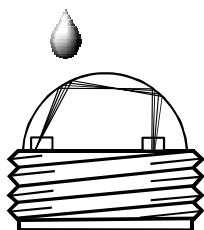


Fig. 15 Diaphragm leakage sensor

### 9.1.4 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 6. [Electrical connections](#).

### 9.1.5 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.

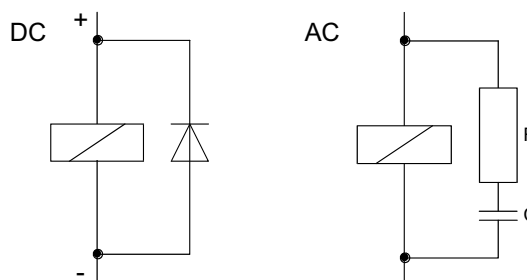


Fig. 16 Suppressor circuit DC/AC

**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.

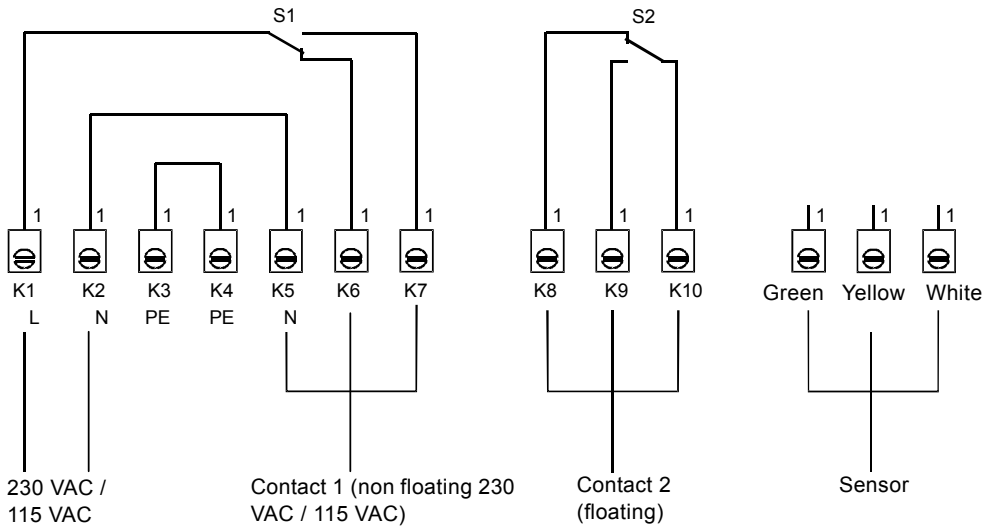


Fig. 17 Electrical connection of the electronics

**9.1.6 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.

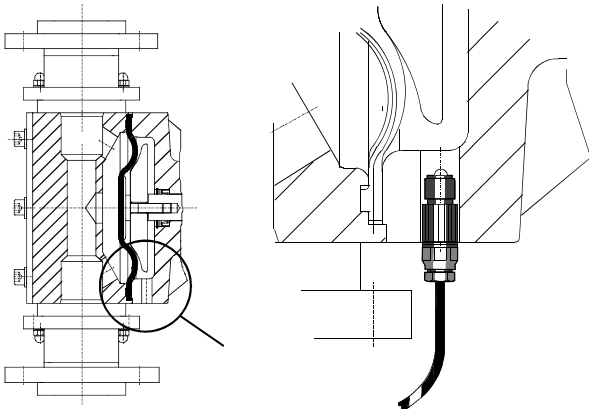


Fig. 18 Screwing the sensor into the dosing head

**9.1.7 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 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 service.



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

**9.1.8 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.

**9.1.9 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.

**9.1.10 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 service.

TM03 6385 4506

TM03 6440 4506

## 10. Maintenance

### 10.1 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!

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!

### 10.2 Cleaning and maintenance intervals

In the event of a diaphragm leakage, the dosing liquid may leak out of the hole in the intermediate flange between the pump and the dosing head. The parts inside the housing are protected from the dosing liquid for a short time (depending on the type of liquid) by the housing sealing. It is necessary to check regularly (daily) if liquid is leaking out of the intermediate flange. For maximum safety, we recommend the pump version with diaphragm leakage detection.

#### Caution

### 10.2.1 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 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.

### 10.2.2 Cleaning the diaphragm and valves

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.

### 10.3 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 supporting ring (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.

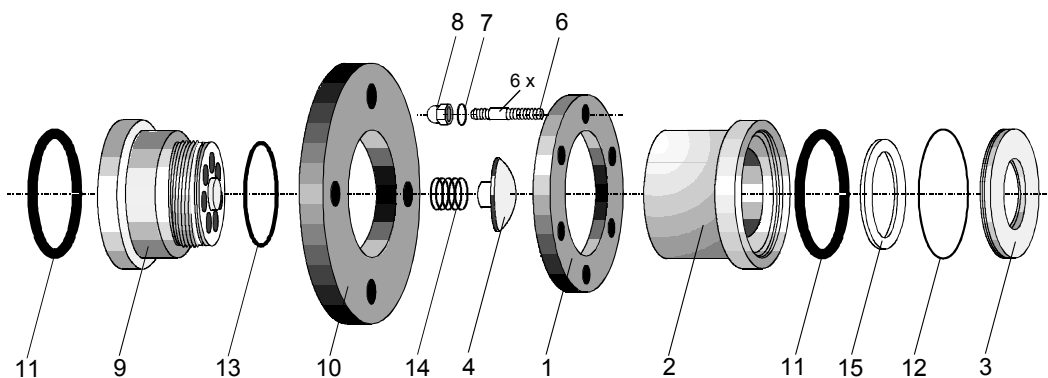


Fig. 19 Exploded view of the valves

Pos.	Components
1	Supporting ring
2	Valve housing
3	Valve seat
4	Valve disk
6	Double-end stud
7	Washer
8	Cap nut
9	Valve housing
10	Flange
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.

## 10.4 Replacing the diaphragm

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

### 10.4.1 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.

### 10.4.2 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.

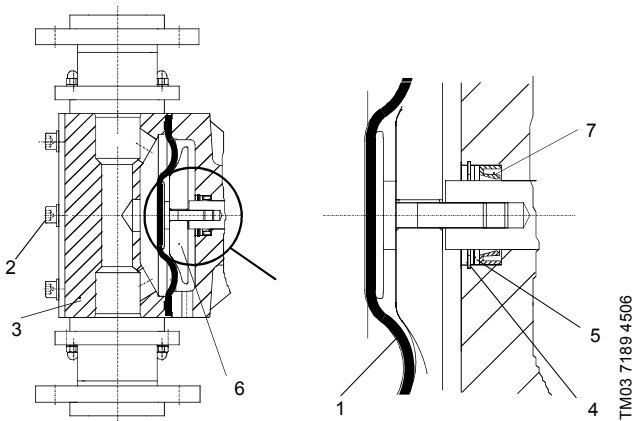


Fig. 20 Replacing the diaphragm

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.

## Grundfos gear oil

Order no	Description
96607809 (555-305)	5.0 I DHG 68
96729684 (555-306)	7.5 I DHG 68

## Alternative special oil for DHG 68

Manufacturer	Designation
ARAL	Degol BMB 68
BP	BP-Energol GR-XP 68
Chevron	Chevron NL gear compound 68
ESSO	Spartan BP 68
Fina	Fina Giran 68
Mobil Oil	Mobilgear 626
Texaco	Texaco Meropa 68
Shell	Tellus 68
elf	reductelf SP 68



## 11. Fault finding chart

Fault	Cause	Remedy
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 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) Counterpressure 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 counterpressure).		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.

## 12. 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 counterpressure of 3 bar
- standard pump version.

Abbreviation	Description
Q	Dosing flow
f	Drive frequency

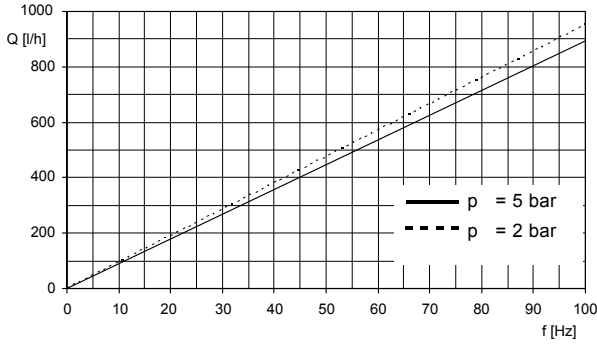


Fig. 21 DMX 430-5

TM03 6442 4506

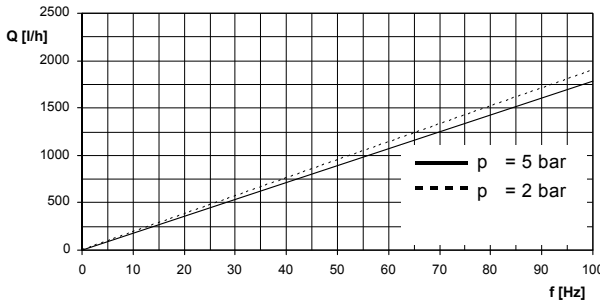


Fig. 22 DMX 860-5

TM03 6443 4506

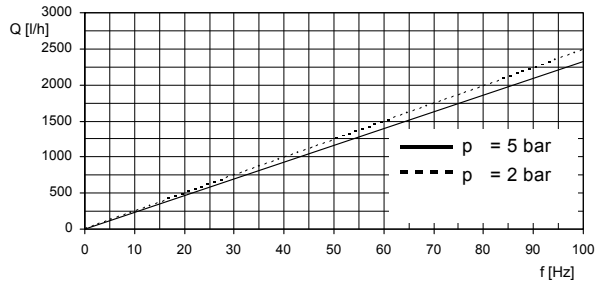


Fig. 23 DMX 1120-5

TM03 6444 4506

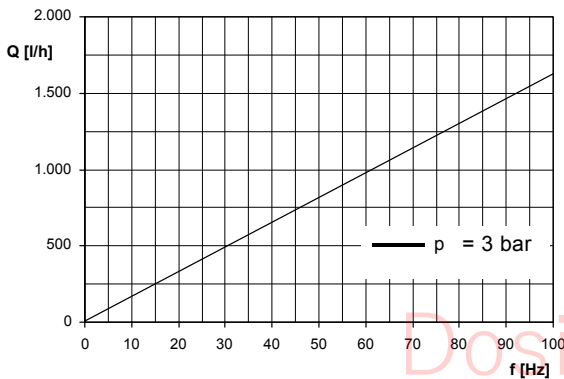


Fig. 24 DMX 770-3

TM03 6445 4506

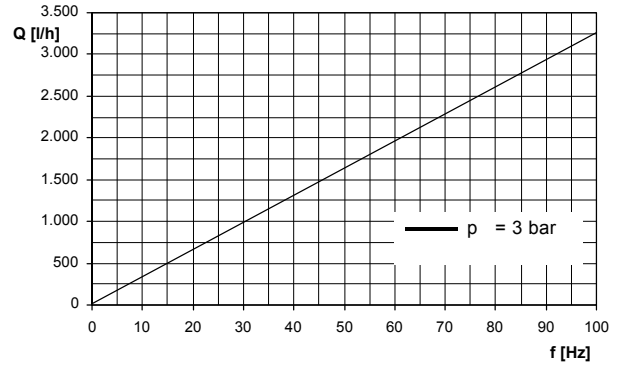


Fig. 25 DMX 1520-3

TM03 6446 4506

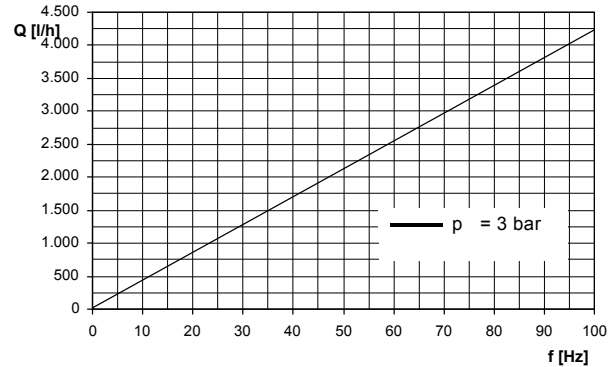


Fig. 26 DMX 2000-3

TM03 6447 4506

## 13. Disposal

This product or parts of it must be disposed of in an environmentally sound way. Use appropriate waste collection services. If this is not possible, contact the nearest Grundfos company or service workshop.

# Safety declaration

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

**Note**

Fill in this document using English or German language.

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

DosingPump.ir

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