DMX 226

Dosing pump

Installation and operating instructions

Further languages

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Original installation and operating instructions

CONTENTS

Warning

These complete installation and operating instructions are also available on www.grundfos.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 226 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 226 pump is suitable for liquid, non-abrasive and non-flammable media strictly in accordance with the instructions in this manual.

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.

If a pump is explosion-proof, it is marked on the pump and motor nameplates.

Note

The declaration of conformity supplied with explosion-proof pumps approved according to the 2014/34/EU directive replaces the declaration of conformity in this manual.

Warning

When using explosion-proof pumps in potentially explosive areas according to the 2014/34/EU directive, the instructions "ATEX-approved pumps" as well as the instructions in this manual must be observed.

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 226 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

TM03 8599 4313

Fig. 1 DMX 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

3.2 Type key

Example:	DMX	765	- 3	B	PP	/E	/T	-X	-E	1	QQ	X	E0

Type range

DMX

Maximum flow [l/h]

Maximum counterpressure [bar]

Control variant

B	Standard
AR**	Analog/pulse control
AT0	Prepared for servomotor
AT3	Servomotor, 1 x 230 V, 50/60 Hz supply, 4-20 mA control
AT5	Servomotor, 1 x 115 V, 50/60 Hz supply, 4-20 mA control
AT6	Servomotor, 1 x 230 V, 50/60 Hz supply, 4-20 mA control, EEx d II BT 4
AT7	Servomotor, 1 x 115 V, 50/60 Hz supply, 4-20 mA control, EEx d II BT 4
AT8	Servomotor, 1 x 230 V, 50/60 Hz supply, 1 kΩ potentiometer control
AT9	Servomotor, 1 x 115 V, 50/60 Hz supply, 1 kΩ potentiometer control

Dosing head variant

PP	Polypropylene
PV	PVDF (polyvinylidene fluoride)
PVC	Polyvinyl chloride
SS	Stainless steel 1.4571*
PV-R	PVDF + integrated relief valve
PVC-R	PVC + integrated relief valve
PP-L	PP + integrated diaphragm leakage detection
PV-L	PVDF + integrated diaphragm leakage detection
PVC-L	PVC + integrated diaphragm leakage detection
SS-L	SS + integrated diaphragm leakage detection
PV-RL	PVDF + integrated relief valve and diaphragm leakage detection
PVC-RL	PVC + integrated relief valve and diaphragm leakage detection

Gasket material

E	EPDM
V	FKM
T	PTFE

Valve ball material

G	Glass
T	PTFE
SS	Stainless steel 1.4401*

Motor variant

E0	PTC motor for frequency control
E1	Motor type II 2G EEx e II T3, 3 x 400 V, 50 Hz (only DMX-B)
E2	Motor type II 2GD EEx de IIC T4, 3 x 400 V, 50 Hz (only DMX-B)

Mains plug

X	No plug
F	EU (Schuko)
B	USA, Canada
I	Australia, New Zealand
E	Switzerland

Connection, suction/discharge

B9	Tube 19/27 mm, PVC
Q	Tube 19/27 mm and 25/34 mm
A1	Threaded Rp 3/4
A2	Threaded Rp 1 1/4
A3	Threaded 3/4" NPT
A7	Threaded 3/4" NPT, male
A4	Threaded 1 1/4" NPT
A8	Threaded 1 1/4" NPT, male
K	Cementing ∅40 mm
B2	Tube 13/20 mm/ cementing ∅25 mm
B4	Welding ∅25 mm
B5	Welding ∅40 mm

Valve type

1	Standard
4	Spring-loaded, discharge side only
5	Valves for abrasive media

Supply voltage

0	Without motor, IEC flange
G	1 x 230 V, 50/60 Hz
H	1 x 120 V, 50/60 Hz
E	230/400 V, 50/60 Hz or 440/480 V, 60 Hz
F	Without motor, NEMA flange (US)
5	3 x 230/460 V, 60 Hz

Control panel position

X	No control panel
F	Front-mounted
W	Wall-mounted

* According to EN 10027-2.

** Only pumps up to and including 525 l/h and only pumps with single-phase motors.

3.3 Pump types

Pump type		Dosing head size	Motor [kW]	Stroke volume [ml]
Single pump	**Double pump**			
DMX 24-8	DMX 24-8/24-8	1	0.18	13.8
DMX 52-8	DMX 52-8/25-8			
DMX 100-8	DMX 100-8/100-8			
DMX 142-8	DMX 142-8/142-8			
DMX 37-5	DMX 37-5/37-5	2		22
DMX 82-5	DMX 82-5/82-5			
DMX 160-5	DMX 160-5/160-5			
DMX 224-5	DMX 224-5/224-5			
DMX 60-3	DMX 60-3/60-3	3		36
DMX 130-3	DMX 130-3/130-3			
DMX 255-3	DMX 255-3/255-3			
DMX 380-3	DMX 380-3/380-3			
DMX 67-10	DMX 67-10/67-10	1	0.37*	18.5
DMX 132-10	DMX 132-10/132-10			
DMX 190-10	DMX 190-10/190-10			
DMX 190-8	DMX 190-8/190-8			
DMX 95-8	DMX 95-8/95-8	2		27.8
DMX 199-8	DMX 199-8/199-8			
DMX 280-8	DMX 280-8/280-8			
DMX 280-6	DMX 280-6/260-6			
DMX 152-6	DMX 152-6/152-6	3		44.6
DMX 321-6	DMX 321-6/321-6			
DMX 321-4	DMX 321-4/321-4			
DMX 460-6	DMX 460-6/460-6			
DMX 460-3.5	DMX 460-3.5/460-3.5			
DMX 249-3	DMX 249-3/249-3	4		73
DMX 315-3	DMX 315-3/315-3			
DMX 525-3	DMX 525-3/525-3			
DMX 765-3	DMX 765-3/765-3			

* With PTC thermistor: 0.55 kW.

3.4 Pump performance

3.4.1 Accuracy

- Dosing flow fluctuation: ± 1.5 % within the control range 1:10.
- Linearity deviation: ± 4 % of the full-scale value.
  Adjustment from max. to min. stroke length, within the control range 1:5.

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	50 Hz				60 Hz				100 Hz		
	Q	Max. stroke rate	p max.*		Q	Max. stroke rate	p max.*		Q	Max. stroke rate	p max.*
			3 AC	1 AC			3 AC	1 AC			
Single pump	**[l/h]**	**[n/min]**	**[bar]**	**[bar]**	**[l/h]**	**[n/min]**	**[bar]**	**[bar]**	**[l/h]**	**[n/min]**	**[bar]**
DMX 24-8	24	29	8	8	28	34.8	8	8	48	58	8
DMX 52-8	52	63	8	8	62	75.6	8	8	104	126	8
DMX 100-8	100	120	8	8	120	144	8	8	-	-	-
DMX 142-8	142	168	8	8	-	-	-	-	-	-	-
DMX 37-5	37	29	5	5	45	34.8	5	5	75	58	5
DMX 82-5	82	63	5	5	98	75.6	5	5	164	126	5
DMX 160-5	160	120	5	5	192	144	5	5	-	-	-
DMX 224-5	224	168	5	5	-	-	-	-	-	-	-
DMX 60-3	60	29	3	3	72	34.8	3	3	120	58	3
DMX 130-3	130	63	3	3	156	75.6	3	3	260	126	3
DMX 255-3	255	120	3	3	306	144	3	3	-	-	-
DMX 380-3	380	168	3	3	-	-	-	-	-	-	-
DMX 67-10	67	57	10	10	80	68.4	10	10	134	114	10
DMX 132-10	132	120	10	10	158	144	10	10	-	-	-
DMX 190-10	190	175	10	-	-	-	-	-	-	-	-
DMX 190-8	190	175	-	8	-	-	-	-	-	-	-
DMX 95-8	95	57	8	8	114	68.4	8	8	190	114	8
DMX 199-8	199	120	8	8	239	144	8	8	-	-	-
DMX 280-8	280	175	8	-	-	-	-	-	-	-	-
DMX 280-6	280	175	-	6	-	-	-	-	-	-	-
DMX 152-6	152	57	6	6	182	68.4	6	6	304	114	6
DMX 321-6	321	120	6	-	385	144	6	-	-	-	-
DMX 321-4	321	120	-	4	385	144	-	4	-	-	-
DMX 460-6	460	175	6	-	-	-	-	-	-	-	-
DMX 460-3.5	460	175	-	3.5	-	-	-	-	-	-	-
DMX 249-3	249	57	3	3	299	68.4	3	3	498	114	3
DMX 315-3	315	72	3	3	378	86.4	3	3	630	144	3
DMX 525-3	525	120	3	3	630	144	3	3	-	-	-
DMX 765-3	765	175	3	-	-	-	-	-	-	-	-

* Maximum counterpressure.

Pump type	50 Hz				60 Hz				100 Hz		
	Q	Max. stroke rate	p max.*		Q	Max. stroke rate	p max.*		Q	Max. stroke rate	p max*
			3 AC	1 AC			3 AC	1 AC			
Double pump	**[l/h]**	**[n/min]**	**[bar]**	**[bar]**	**[l/h]**	**[n/min]**	**[bar]**	**[bar]**	**[l/h]**	**[n/min]**	**[bar]**
DMX 24-8/24-8	48	29	8	8	56	34.8	8	8	96	58	8
DMX 52-8/52-8	104	63	8	8	125	75.6	8	8	208	126	8
DMX 100-8/100-8	200	120	8	8	240	144	8	8	-	-	-
DMX 142-8/142-8	284	168	8	8	-	-	-	-	-	-	-
DMX 37-5/37-5	74	29	5	5	90	34.8	5	5	148	58	5
DMX 82-5/82-5	164	63	5	5	197	75.6	5	5	328	126	5
DMX 160-5/160-5	320	120	5	5	384	144	5	5	-	-	-
DMX 224-5/224-5	448	168	5	5	-	-	-	-	-	-	-
DMX 60-3/60-3	120	29	3	3	144	34.8	3	3	240	58	3
DMX 130-3/130-3	260	63	3	3	312	75.6	3	3	520	126	3
DMX 255-3/255-3	510	120	3	3	612	144	3	3	-	-	-
DMX 380-3/380-3	760	168	3	3	-	-	-	-	-	-	-
DMX 67-10/67-10	134	57	10	10	161	68.4	10	10	268	114	10
DMX 132-10/132-10	264	120	10	10	317	144	10	10	-	-	-
DMX 190-10/190-10	380	175	10	-	-	-	-	-	-	-	-
DMX 190-8/190-8	380	175	-	-	-	-	-	-	-	-	-
DMX 95-8/95-8	190	57	8	8	228	68.4	8	8	380	114	8
DMX 199-8/199-8	398	120	8	8	478	144	8	8	-	-	-
DMX 280-8/280-8	560	175	8	-	-	-	-	-	-	-	-
DMX 280-6/260-6	560	175	-	6	-	-	-	-	-	-	-
DMX 152-6/152-6	304	57	6	6	365	68.4	6	6	608	114	6
DMX 321-6/321-6	642	120	6	-	770	144	6	-	-	-	-
DMX 321-4/321-4	642	120	-	4	770	144	-	4	-	-	-
DMX 460-6/460-6	920	175	6	-	-	-	-	-	-	-	-
DMX 460-3.5/460-3.5	920	175	-	3.5	-	-	-	-	-	-	-
DMX 249-3/249-3	498	57	3	3	598	68.4	3	3	996	114	3
DMX 315-3/315-3	630	72	3	3	756	86.4	3	3	1260	144	3
DMX 525-3/525-3	1050	120	3	3	1260	144	3	3	-	-	-
DMX 765-3/765-3	1530	175	3	-	-	-	-	-	-	-	-

* Maximum counterpressure.

3.5 Suction heights

3.5.1 Media with a viscosity similar to water

Applies to:

- counterpressure of 1.5 to 3 bar
- non-degassing and non-abrasive media
- temperature of 20 °C
- stroke length 100 %
- standard pump version.

Pump type		50 Hz		60 Hz		100 Hz		Max. suction line length
Single pump	Double pump	Suction height*	Suction lift**	Suction height*	Suction lift**	Suction height*	Suction lift**	
		[mWC]	[mWC]	[mWC]	[mWC]	[mWC]	[mWC]	[m]
DMX 24-8	DMX 24-8/24-8	3	1	2.5	1	2.5	1	4
DMX 52-8	DMX 52-8/25-8	3	1	2.5	1	2.5	1	4
DMX 100-8	DMX 100-8/100-8	3	1	2.5	1	-	-	4
DMX 142-8	DMX 142-8/142-8	3	1	-	-	-	-	4
DMX 37-5	DMX 37-5/37-5	3	1	2.5	1	2	1	3
DMX 82-5	DMX 82-5/82-5	3	1	2.5	1	2	1	3
DMX 160-5	DMX 160-5/160-5	3	1	2.5	1	-	-	3
DMX 224-5	DMX 224-5/224-5	3	1	-	-	-	-	3
DMX 60-3	DMX 60-3/60-3	2	1	2	1	1.5	1	3
DMX 130-3	DMX 130-3/130-3	2	1	2	1	1.5	1	3
DMX 255-3	DMX 255-3/255-3	2	1	2	1	-	-	3
DMX 380-3	DMX 380-3/380-3	2	1	-	-	-	-	3
DMX 67-10	DMX 67-10/67-10	3	1	2.5	1	2.5	1	4
DMX 132-10	DMX 132-10/132-10	3	1	2.5	1	-	-	4
DMX 190-10	DMX 190-10/190-10	3	1	-	-	-	-	4
DMX 190-8	DMX 190-8/190-8	3	1	-	-	-	-	4
DMX 95-8	DMX 95-8/95-8	3	1	2.5	1	2	1	3
DMX 199-8	DMX 199-8/199-8	3	1	2.5	1	-	-	3
DMX 280-8	DMX 280-8/280-8	3	1	-	-	-	-	3
DMX 280-6	DMX 280-6/260-6	3	1	-	-	-	-	3
DMX 152-6	DMX 152-6/152-6	2	1	2	1	1.5	1	3
DMX 321-6	DMX 321-6/321-6	2	1	2	1	-	-	3
DMX 321-4	DMX 321-4/321-4	2	1	2	1	-	-	3
DMX 460-6	DMX 460-6/460-6	2	1	-	-	-	-	3
DMX 460-3.5	DMX 460-3.5/460-3.5	2	1	-	-	-	-	3
DMX 249-3	DMX 249-3/249-3	1.5	1	1	0.5	1	0.5	2
DMX 315-3	DMX 315-3/315-3	1.5	1	1	0.5	-	-	2
DMX 525-3	DMX 525-3/525-3	1	0.5	1	0.5	-	-	2
DMX 765-3	DMX 765-3/765-3	0	0	-	-	-	-	2

* Suction line and dosing head filled (continuous operation).
With stronger restoring spring, the values for dosing head size 1 are increased by 2 metres, and for dosing head sizes 2 and 3 by 1 metre.

** Suction line and dosing head not filled, but dosing head and valves moistened (start-up).

3.5.2 Suction heights for media with maximum permissible viscosity

Applies to:

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

Pump type		Max. stroke rate	Maximum viscosity	Intake height
Single pump	**Double pump**	**[n/min]**	**[m Pas]**	**[mWC]**
DMX 24-8	DMX 24-8/24-8	29	1000	1
DMX 52-8	DMX 52-8/25-8	63	700	1
DMX 100-8	DMX 100-8/100-8	120	400	1
DMX 142-8	DMX 142-8/142-8	168	200	0
DMX 37-5	DMX 37-5/37-5	29	600	1
DMX 82-5	DMX 82-5/82-5	63	500	1
DMX 160-5	DMX 160-5/160-5	120	200	0
DMX 224-5	DMX 224-5/224-5	168	150	0
DMX 60-3	DMX 60-3/60-3	29	500	0
DMX 130-3	DMX 130-3/130-3	63	400	0
DMX 255-3	DMX 255-3/255-3	120	100	0
DMX 380-3	DMX 380-3/380-3	168	50	0
DMX 67-10	DMX 67-10/67-10	57	700	1
DMX 132-10	DMX 132-10/132-10	120	400	1
DMX 190-10	DMX 190-10/190-10	175	200	0
DMX 190-8	DMX 190-8/190-8	175	200	0
DMX 95-8	DMX 95-8/95-8	57	500	1
DMX 199-8	DMX 199-8/199-8	120	200	0
DMX 280-8	DMX 280-8/280-8	175	150	0
DMX 280-6	DMX 280-6/260-6	175	150	0
DMX 152-6	DMX 152-6/152-6	57	400	0
DMX 321-6	DMX 321-6/321-6	120	100	0
DMX 321-4	DMX 321-4/321-4	120	100	0
DMX 460-6	DMX 460-6/460-6	175	50	0
DMX 460-3.5	DMX 460-3.5/460-3.5	175	50	0
DMX 249-3	DMX 249-3/249-3	57	100	0
DMX 315-3	DMX 315-3/315-3	72	100	0
DMX 525-3	DMX 525-3/525-3	120	50	0
DMX 765-3	DMX 765-3/765-3	175	10	0

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.

Caution

The installation site must be under cover!

Ensure that the enclosure class of motor and pump are not affected by the atmospheric conditions.

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 counterpressure: 1 bar at the pump discharge valve. Pay attention to the pressure losses along the way to the injection point inclusively.

Pumps with AR control unit only

Maximum permissible mains impedance: 0.084 + j 0.084 Ω (testing according to EN 61000-3-11).

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
PVDF	-10 °C to +60 °C
	+70 °C at 9 bar

* For SIP/CIP applications (not with ATEX): 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!

3.8 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.

Pumps with electronics: The enclosure class is only met if the sockets are protected! The data regarding the enclosure class applies to pumps with correctly inserted plugs or screwed-on caps.

3.8.2 Motor

Version: see motor and pump nameplates.

3.9 AR control unit

Functions of pumps with electronics:

- "Continuous operation" button for function test and dosing head deaeration
- memory function (stores a maximum of 65,000 pulses)
- two-stage tank-empty signal (e.g. via Grundfos tank empty sensor)
- stroke signal/pre-empty signal (adjustable), e.g. as a feedback to the control room
- dosing controller function (only with sensor - optional)
- diaphragm leakage detection (only with sensor - optional)
- access-code-protected settings
- remote on/off
- hall sensor
- operating hours counter
- motor monitoring.

Operating modes:

- manual
  Stroke frequency: manually adjustable between zero and maximum
- contact signal control
  Multiplier (1:n) and divisor (n:1)
- current signal control 0-20 mA / 4-20 mA
  Adjustment of stroke frequency proportional to the current signal.
  Weighting of current input.

3.9.1 Inputs and outputs

Inputs	
Contact signal	Maximum load: 12 V, 5 mA
Current 0-20 mA	Maximum load: 22 Ω
Remote on/off	Maximum load: 12 V, 5 mA
Two-stage tank-empty signal	Maximum load: 12 V, 5 mA
Dosing controller and diaphragm leakage sensor	

Outputs	
Current 0-20 mA	Maximum load: 350 Ω
Error signal	Maximum ohmic load: 50 VDC / 75 VAC, 0.5 A
Stroke signal	Contact time/stroke: 200 ms
Pre-empty signal	Maximum ohmic load: 50 VDC / 75 VAC, 0.5 A

AR control unit factory settings

- Inputs and outputs: NO (normally open)
  or
- inputs and outputs: NC (normally closed).

3.10 Materials

Pump

- Pump housing: Al 226
- Diaphragm flanges: GG 25
- Stroke-length adjustment knob: ABS.

AR control unit enclosure

- Upper part of enclosure: PPO blend
- Lower part of enclosure: aluminium.

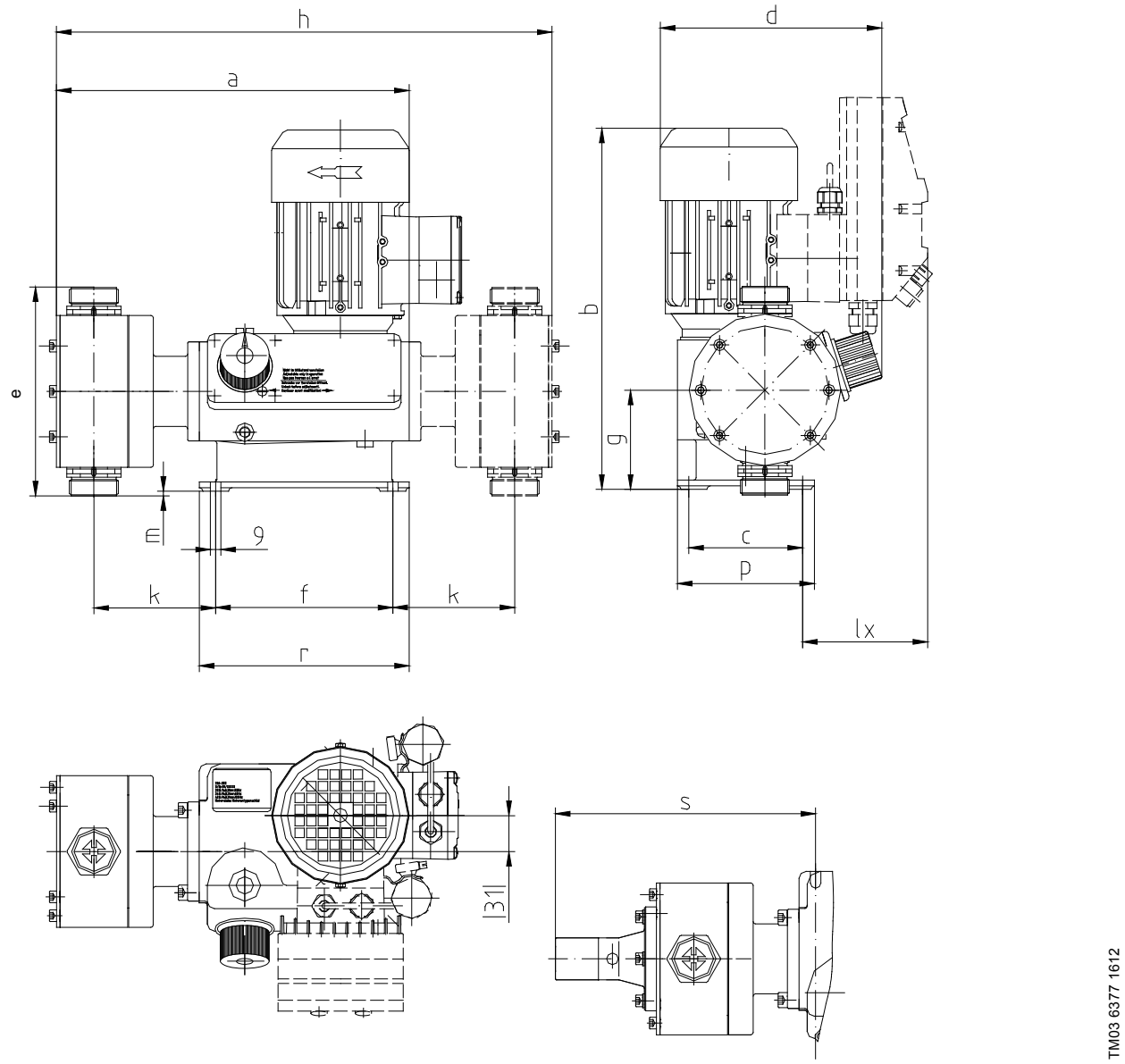
Optoelectronic diaphragm sensor

- Housing: ABS.

3.11 Weights

Single pump	Approx. weight		Double pump	Approx. weight	
	PVC	Stainless steel		PVC	Stainless steel
	[kg]	[kg]		[kg]	[kg]
DMX 24-8	15	21	DMX 24-8/24-8	24	36
DMX 52-8	15	21	DMX 52-8/25-8	24	36
DMX 100-8	15	21	DMX 100-8/100-8	24	36
DMX 142-8	15	21	DMX 142-8/142-8	24	36
DMX 37-5	15	21	DMX 37-5/37-5	24	36
DMX 82-5	15	21	DMX 82-5/82-5	24	36
DMX 160-5	15	21	DMX 160-5/160-5	24	36
DMX 224-5	15	21	DMX 224-5/224-5	24	36
DMX 60-3	15	21	DMX 60-3/60-3	24	36
DMX 130-3	15	21	DMX 130-3/130-3	24	36
DMX 255-3	15	21	DMX 255-3/255-3	24	36
DMX 380-3	15	21	DMX 380-3/380-3	24	36
DMX 67-10	21	30	DMX 67-10/67-10	30	48
DMX 132-10	21	30	DMX 132-10/132-10	30	48
DMX 190-10	21	30	DMX 190-10/190-10	30	48
DMX 190-8	21	30	DMX 190-8/190-8	30	48
DMX 95-8	21	30	DMX 95-8/95-8	30	48
DMX 199-8	21	30	DMX 199-8/199-8	30	48
DMX 280-8	21	30	DMX 280-8/280-8	30	48
DMX 280-6	21	30	DMX 280-6/260-6	30	48
DMX 152-6	21	30	DMX 152-6/152-6	30	48
DMX 321-6	21	30	DMX 321-6/321-6	30	48
DMX 321-4	21	30	DMX 321-4/321-4	30	48
DMX 460-6	21	30	DMX 460-6/460-6	30	48
DMX 460-3.5	21	30	DMX 460-3.5/460-3.5	30	48
DMX 249-3	21	30	DMX 249-3/249-3	30	48
DMX 315-3	21	30	DMX 315-3/315-3	30	48
DMX 525-3	21	30	DMX 525-3/525-3	30	48
DMX 765-3	21	30	DMX 765-3/765-3	30	48

3.12 Dimensional sketches



TM03 6377 1612

Fig. 2 Dimensional sketches of DMX 226 (part 1)

Pump type	a	b	c	d	e	f	g	h	i	k	m	n	p	r	rx	s
DMX 24-8	302	310	97.5	190	178	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 52-8	302	310	97.5	190	178	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 100-8	302	310	97.5	190	178	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 142-8	302	310	97.5	190	178	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 37-5	302	310	97.5	190	188	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 82-5	302	310	97.5	190	188	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 160-5	302	310	97.5	190	188	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 224-5	302	310	97.5	190	188	152	85.5	425	208	104.5	4	G 1 1/4	118	180	180	198
DMX 60-3	302	310	97.5	190	208	152	85.5	425	208	106.5	4	G 1 1/4	118	180	180	198
DMX 130-3	302	310	97.5	190	208	152	85.5	425	208	106.5	4	G 1 1/4	118	180	180	198
DMX 255-3	302	310	97.5	190	208	152	85.5	425	208	106.5	4	G 1 1/4	118	180	180	198
DMX 380-3	302	310	97.5	190	208	152	85.5	425	208	106.5	4	G 1 1/4	118	180	180	198

Values in brackets apply to pumps with Ex motor.

Measurements in mm.

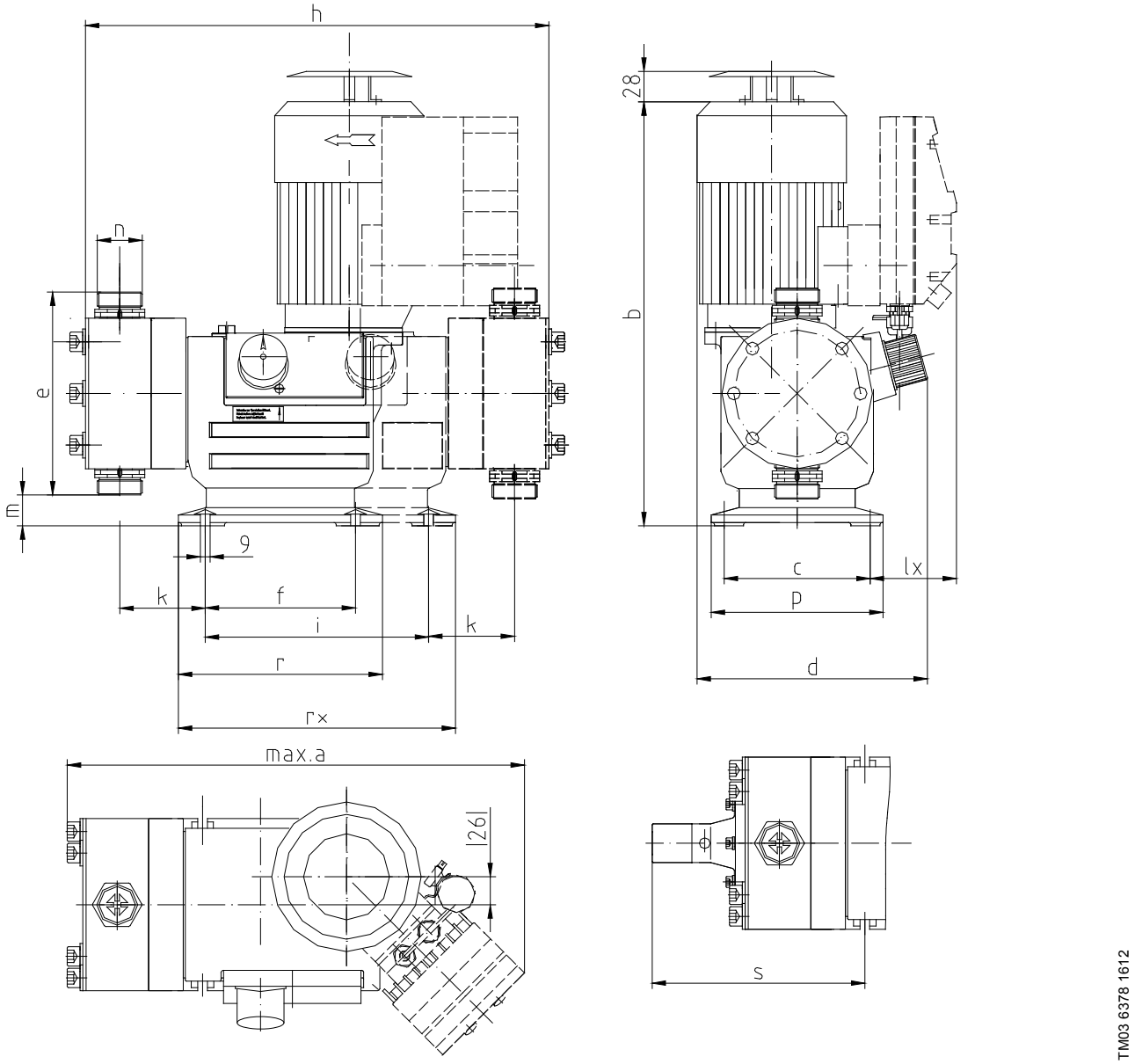


Fig. 3 Dimensional sketches of DMX 226 (part 2)

Pump type	a	b	c	d	e	f	g	h	i	k	m	n	p	r	rx	s
DMX 67-10	380	372	136	222	178	140	123	440	208	80	34	G 1 1/4	160	190	258	223
DMX 132-10	380	372	136	222	178	140	123	440	208	80	34	G 1 1/4	160	190	258	223
DMX 190-10	380	372	136	222	178	140	123	440	208	80	34	G 1 1/4	160	190	258	223
DMX 190-8	380	372	136	222	178	140	123	440	208	80	34	G 1 1/4	160	190	258	223
DMX 95-8	380	372	136	222	188	140	123	444	208	80	29	G 1 1/4	160	190	258	223
DMX 199-8	380	372	136	222	188	140	123	444	208	80	29	G 1 1/4	160	190	258	223
DMX 280-8	380	372	136	222	188	140	123	444	208	80	29	G 1 1/4	160	190	258	223
DMX 280-6	380	372	136	222	188	140	123	444	208	80	29	G 1 1/4	160	190	258	223
DMX 152-6	380	372	136	222	188	140	123	444	208	80	29	G 1 1/4	160	190	258	223
DMX 321-6	380	372	136	222	208	140	123	453	208	83	19	G 1 1/4	160	190	258	223
DMX 321-4	380	372	136	222	208	140	123	453	208	83	19	G 1 1/4	160	190	258	223
DMX 460-6	380	372	136	222	208	140	123	453	208	83	19	G 1 1/4	160	190	258	223
DMX 460-3.5	380	372	136	222	208	140	123	453	208	83	19	G 1 1/4	160	190	258	223
DMX 249-3	389	390	136	222	240	140	123	498	208	92	3	G 2	160	190	258	-
DMX 315-3	389	390	136	222	240	140	123	498	208	92	3	G 2	160	190	258	-
DMX 525-3	389	390	136	222	240	140	123	498	208	92	3	G 2	160	190	258	-
DMX 765-3	389	390	136	222	240	140	123	498	208	92	3	G 2	160	190	258	-

Measurements in mm.

4. Transport and storage

Do not throw or drop the pump.

Store the pump in a dry and cool place.

Caution Store the pump in upright position so that the gear grease cannot leak out.

Do not use the protective packaging as transport packaging.

Observe the permissible storage temperature!

4.1 Delivery

The DMX 226 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.

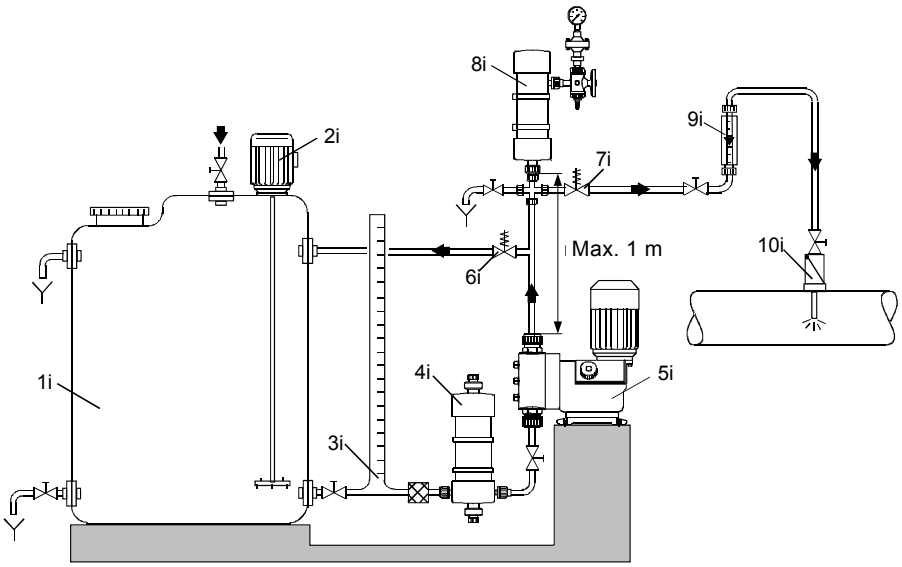
If the above is not fulfilled, Grundfos can refuse to accept the pump for service. Possible costs of returning the pump are paid by the customer.

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



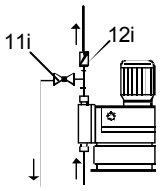
TM03 6296 4506

Fig. 4 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

5.2 Installation tips

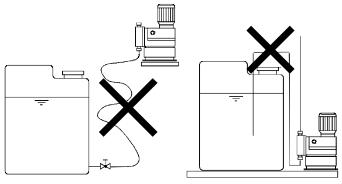
- For easy deaeration of the dosing head, install a ball valve (11i) with bypass line (back to the dosing tank) immediately after the discharge valve.
- In the case of long discharge lines, install a non-return valve (12i) in the discharge line.



TM03 6297 4506

Fig. 5 Installation with ball valve and non-return valve

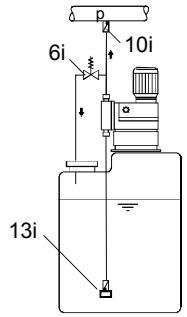
- When installing the suction line, observe the following:
  – Keep the suction line as short as possible. Prevent it from becoming tangled.
  – If necessary, use swept bends instead of elbows.
  – Always route the suction line up towards the suction valve.
  – Avoid loops which may cause air bubbles.



TM03 6298 4506

Fig. 6 Installation of suction line

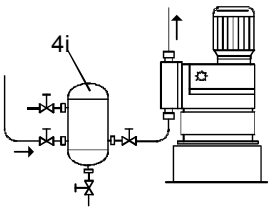
- For non-degassing media with a viscosity similar to water, the pump can be mounted on the tank (observe the maximum suction height).
- Flooded suction preferred.
- For media with a tendency to sedimentation, install the suction line with filter (13i) so that the suction valve remains a few millimetres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



TM03 6299 4506

Fig. 7 Tank installation

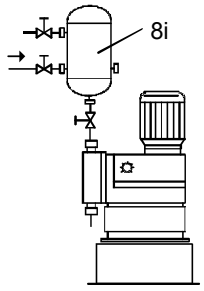
- Note for suction-side installation: In dosing systems with a suction line longer than 1 metre, depending on the dosing flow, it may be necessary to install a properly sized pulsation damper (4i) immediately before the pump suction valve.



TM03 6300 4506

Fig. 8 Installation with suction-side pulsation damper

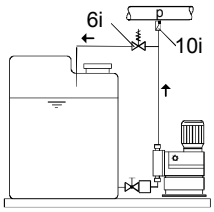
- Note for discharge-side installation: To protect the piping, use a pulsation damper (8i) for rigid piping longer than 3 metres and tubing longer than 5 metres.



TM03 6301 4506

Fig. 9 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.



TM03 6302 4506

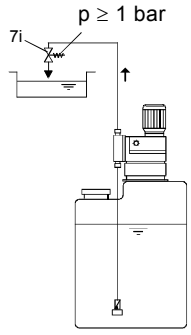
Fig. 10 Installation with relief valve

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.

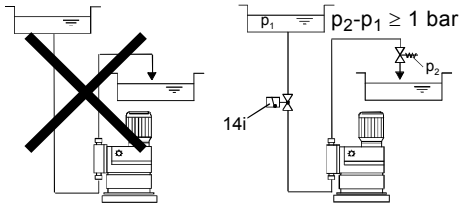
- If this cannot be ensured, install a pressure-loading valve (7i) in the discharge line.



TM03 6303 4506

Fig. 11 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.



TM03 6304 4506

Fig. 12 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.
- Replace the screw plugs by the deaeration screws supplied with the pump.

Caution Gently tighten the screws in order not to damage the plastic enclosure!

5.4 Hose / 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!
Avoid loops and buckles in the hoses!
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!

Caution 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

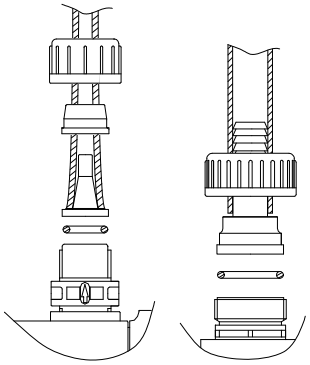
All lines must be free from strain!

Only use the prescribed line types!

- Connect the suction line to the suction valve.
  - 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.

Connection of hose lines

- Push the hose firmly onto the connection nipple and, depending on the connection, secure using a connection counterpart or hose support clip.
- Fit the gasket.
- Screw onto the valve using the union nut.

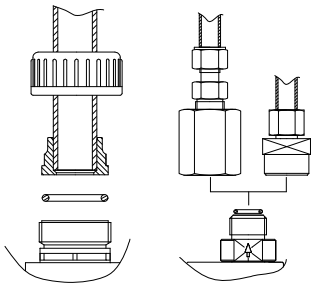


TM03 6456 4506

Fig. 13 Connection of hose lines

Connection of DN 20 pipe lines

- Depending on the pipe material and connection, glue it (PVC), weld it (PP, PVDF or stainless steel) or press it in (stainless steel).
- Fit the gasket.
- Screw onto the valve using the union nut.

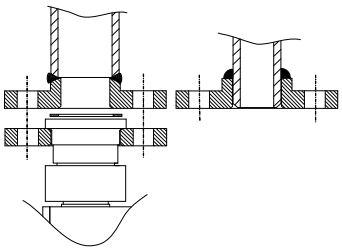


TM03 6457 4506

Fig. 14 Connection of DN 20 pipe lines

Connection of DN 32 pipe lines

- Depending on the pipe material, fit the pipe to the welding neck flange and weld it (stainless steel) or insert it into the headed bush and weld it (PP, PVDF).



TM03 6458 4506

Fig. 15 Connection of DN 32 pipe lines

Using a dosing controller

- Screw the dosing controller onto the discharge valve.
- Connect the discharge line to the dosing controller.

TM03 6379 0911

Fig. 16 Dosing controller

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.

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.

6.1 Versions with mains plug

- Insert the mains plug in the mains socket.

6.2 Versions without mains plug

- 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. This is also necessary for versions with AR control unit!

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

Caution

Before start-up, replace the screw plug by the deaeration screw!

During transport, the deaeration opening must be closed with the screw plug!

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

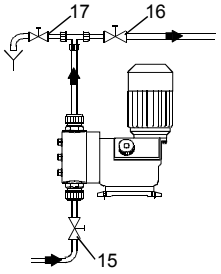
Caution

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

Maximum torque: 6 Nm.

1. Open the suction and discharge isolating valves (15, 16), if installed.
2. Open the deaeration valve (17), if installed, in the discharge line, or relieve the pressure on the discharge side so that the medium can run out without a counterpressure.
3. Switch on the power supply.
4. Pumps with AR control unit only: Press the "Start/Stop" button and keep it pressed.
   – The pump switches to continuous operation.
5. Set the stroke-length adjustment knob to 100 %.
6. Leave the pump running until the dosed medium is free of air bubbles.
7. Close the deaeration valve (17), if installed.

The pump is now ready for operation.



TM03 6307 4506

Fig. 17 Initial start-up

8. Operation

Caution

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.

8.1 Description of the pump

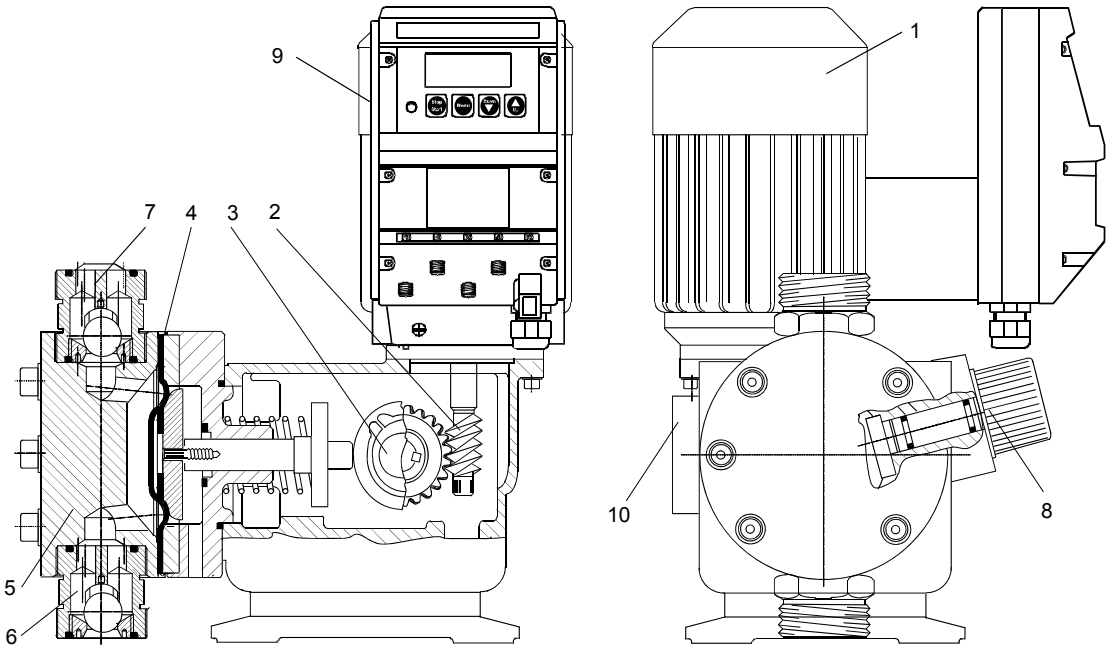


Fig. 18 DMX 226

Pos.	Components
1	Motor
2	Gears
3	Eccentric
4	Dosing diaphragm
5	Dosing head
6	Suction valve
7	Discharge valve
8	Stroke-length adjustment knob
9	AR control unit (optional)
10	Stroke sensor

Functional principle

- Reciprocating positive displacement pump with electric motor and mechanical diaphragm control.
- The rotation of the motor is transformed into the reciprocating movement of the dosing diaphragm by the eccentric and the tappet.
- The dosing flow can be set by adjusting the stroke length of the tappet.

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 Adjusting the dosing flow via the stroke length

Caution

Adjust the stroke length only while the pump is running!

- Slacken the locking screw (A) on the stroke-length adjustment knob (8) a little using a screwdriver.
- To increase the dosing flow, turn the stroke-length adjustment knob (8) slowly to the left until the desired dosing flow is reached.
- To decrease the dosing flow, turn the stroke-length adjustment knob (8) slowly to the right until the desired dosing flow is reached.
- Gently retighten the locking screw (A) using a screwdriver.

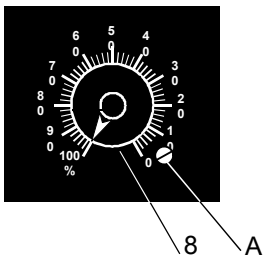


Fig. 19 Stroke-length adjustment knob

8.4 Stroke-length adjustment

Warning

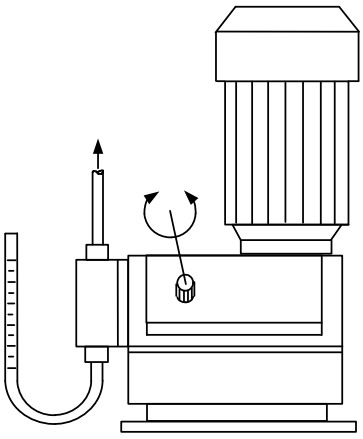
Wear protective clothing (gloves and goggles) when working on the dosing head, connections or lines!

Caution Adjust the stroke length only while the pump is running!

The zero point (no dosing) of the dosing pump is factory-set to a counterpressure of 3 bar. See section *13. Dosing curves*.

If the operating counterpressure at the injection unit deviates considerably from this value, it is advisable to readjust the zero point to obtain more precise values.

1. Install a graduated pipe at the suction valve.
   – If such a pipe is not available, insert the suction line into a graduated measuring jug.
2. Start the dosing pump.
3. Set the dosing flow to 15 %.
4. For pumps with tank-empty indication, remove the electric plug of the tank-empty indication.
5. Remove the locking screw (A) from the stroke-length adjustment knob (8) using a screwdriver. See fig. 19.
6. Turn the adjustment knob slowly clockwise (towards the zero point) until the medium level stops falling in the measuring jug or pipe.
7. Remove the plug with a small screwdriver without changing the position of the adjustment knob and unscrew the cheese-head screw together with the flat spiral spring.
8. Gently pull off the adjustment knob and fit it on the adjusting spindle so that the zero line on the scale and the mark on the adjustment knob coincide.
9. Screw in the cheese-head screw and the spiral spring until the spring is preloaded, but does not block. Even when adjusted to 100 %, the spring of the adjustment knob must remain preloaded.
10. Insert the locking screw (A) using a screwdriver and tighten gently.



TM03 6310 4506

Fig. 20 Stroke-length adjustment

8.5 Adjustment of stroke rate using a frequency converter

If a frequency converter is connected, the stroke rate can only be adjusted in the range 10-100 % of max. stroke rate. 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!

8.6 Using the AR control unit

When using the AR control unit, observe the installation and operating instructions supplied with the unit in addition to the instructions in this manual.

9. Operation with other electronics

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

9.1 Electronic version stroke sensor

Pump type with inductive-proximity switch of two-wire design according to NAMUR DIN 19234 for signalling the strokes.

The sensor can be installed in potentially explosive atmospheres if PTB-approved isolating switching amplifiers with an intrinsically safe control circuit [EExia] or [EExib] are connected. The sensor can be used up to zone 1 depending on the isolating amplifier. The specifications in the declaration of conformity for the isolating amplifier must be observed.

Supply voltage U_B: 7.7 to 10 V.

9.2 Electronic diaphragm leakage sensor

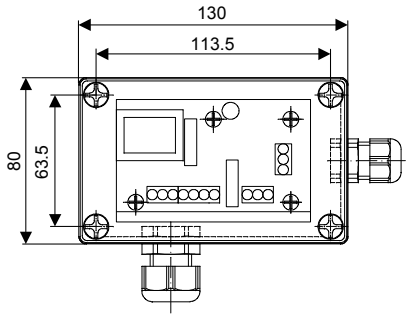
9.2.1 Technical data

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.

9.2.2 Dimensional sketch (electronics enclosure)



TM03 6381 4506

Fig. 21 Electronics enclosure

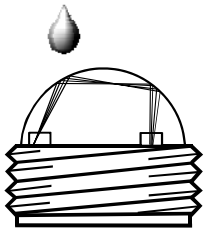
9.2.3 Function

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.



TM03 6382 4506

Fig. 22 Diaphragm leakage sensor

9.2.4 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.

Caution

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!

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!

Caution

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.

5. Connect contacts 1 and 2 according to individual needs.

See section *6. Electrical connections*.

9.2.5 Relay outputs

Note

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

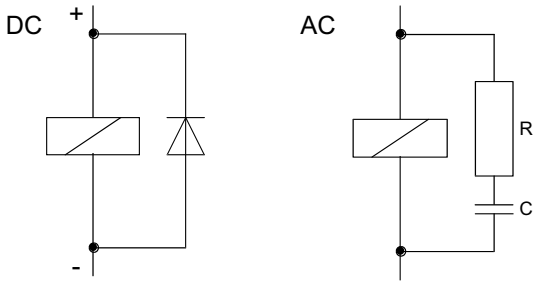
- Interference suppression is required for inductive loads (also relays and contactors).
- If this is not possible, protect the relay contacts using a suppressor circuit as described below.

With AC voltage

Current up to	Capacitor C	Resistor R
60 mA	10 µF, 275 V	390 Ω, 2 W
70 mA	47 µF, 275 V	22 Ω, 2 W
150 mA	100 µF, 275 V	47 Ω, 2 W
1.0 A	220 µF, 275 V	47 Ω, 2 W

With DC voltage

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



TM03 7209 4513

Fig. 23 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.

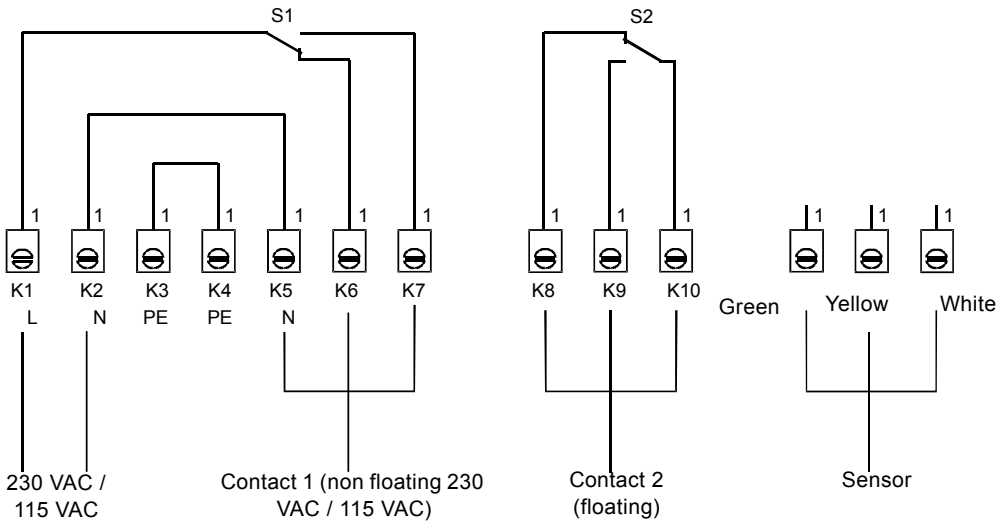


Fig. 24 Electrical connection of the electronics

9.2.6 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.

9.2.7 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!

9.2.8 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.

9.2.9 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.

9.2.10 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.

10. Integral relief valve

10.1 Function

If the pump is the only pump in the system, the integral relief valve (optional) protects the complete discharge side of the discharge line system from an excessive pressure build-up.

The valve opens if the pressure rises above its set opening pressure, and the dosing medium can return to the dosing tank.

In contrast to relief valves connected in series, the integral valve also provides pump protection if the discharge valve is dirty or blocked.

10.2 Permissible media

Warning

Dosing heads with integral relief valve must not be used for abrasive or crystallising media.

10.3 Connections

1. Connect the suction line to the suction valve (A).
2. Connect the discharge line to the discharge valve (B).
3. Connect the overflow line to the relief valve (C) and allow the medium to flow by gravity into the tank or to an appropriate overflow.

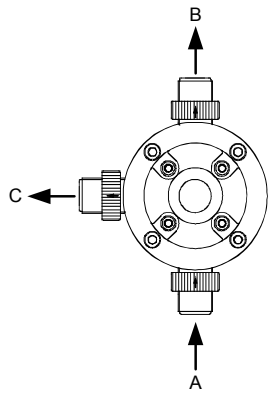


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Fig. 25 Connections

Warning

Never start the pump if the overflow line is not correctly connected to the relief valve.

10.4 Setting of opening pressure

10.4.1 General

The opening pressure can only be set if a pressure gauge is installed in the system between the pump and the next isolating valve or pressure-loading valve.

Warning

Settings on the relief valve must only be carried out by authorised and qualified personnel!

The opening pressure of the relief valve is factory-set to the maximum pump counterpressure specified in the technical data. The opening pressure during operation depends on various factors, e.g. the flow, the stroke frequency of the pump, or the counterpressure. If an exact setting is required, the relief valve must be adapted to the local conditions.

Warning

Never set the opening pressure to values higher than the maximum permissible operating pressure of the dosing system and dosing pump.

Warning

When dosing dangerous media, observe the corresponding safety precautions!

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

10.4.2 Setting the valve opening pressure

To change the factory-set opening pressure, proceed as follows:

The pump must be running.

1. Remove the cap from the top part of the relief valve.
2. Close the isolating valve after the pressure gauge.
3. When overflowing of the dosing medium is heard, read the current opening pressure on the pressure gauge.

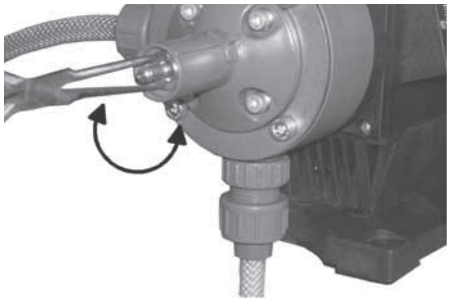

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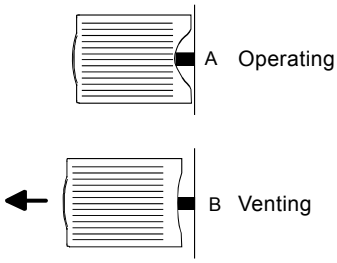
Fig. 26 Setting of opening pressure

4. Change the pressure as follows:
   – To increase the pressure, turn the knob clockwise using pointed pliers until the desired opening pressure is reached.
   – To reduce the pressure, turn the knob counter-clockwise using pointed pliers until the desired opening pressure is reached.
5. Open the isolating valve after the pressure gauge.
6. Refit the cap.

10.5 Venting

The relief valve can also be opened manually, thus serving as a venting valve at the same time. If manual venting is required (e.g. nduring start-up or when the tank has been replaced), proceed as follows:

- Turn the knob so that the smaller cut-out rests on the nub of the dosing head (the rotary knob is then further away from the dosing head). The valve spring is unloaded (position B).
- Once the pump has been completely vented, turn the knob back into position A "Operating".



TM03 6313 4506

Fig. 27 Knob position

10.6 Fault finding chart

Fault	Cause	Remedy
Permanent output from the relief valve.	Discharge line blocked.	Check and possibly correct the discharge-side dosing system.
	Relief valve incorrectly set (too low).	Set the relief valve to a higher opening pressure.
	Diaphragm faulty.	Replace the diaphragm.
	Relief valve dirty.	Clean the relief valve.

11. Maintenance

11.1 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!

Caution

During transport, the deaeration opening must be closed with the screw plug!

Before start-up, replace the screw plug by the deaeration screw!

11.2 Cleaning and maintenance intervals

Caution

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.

11.2.1 Changing the gear grease

Warning

The gear grease 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 have the gear grease changed after five years or after 20,000 operating hours.

11.2.2 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 4,000 operating hours. When operating with a counterpressure of 16 bar, every six months or after 2,000 operating hours.
- In the event of a fault.

11.3 Cleaning the suction and discharge valves

Caution

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

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

1. Unscrew the valve.
2. Unscrew the screw part resp. valve seat with round pliers.
3. Clean all parts. Replace faulty parts by new ones.
4. Re-assemble the valve.
5. Replace the O-rings by new ones. Refit the valve. Observe the direction arrow on the valve.

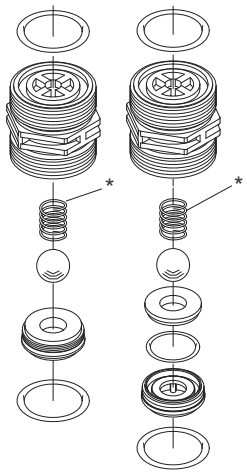


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Fig. 28 Stainless-steel or plastic valve DN 20,
* spring-loaded as an option

Caution

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

Observe the flow direction (indicated by an arrow on the valve)!

11.4 Maintenance of the relief valve

11.4.1 Cleaning and maintenance intervals

Clean the relief valve, and replace the diaphragm, if necessary.

- At least every 12 months or after 8,000 operating hours.
- In the event of a fault.

11.4.2 Replacing the diaphragm of the relief valve

1. Switch off the pump and disconnect it from the power supply.
2. Make it impossible for a return flow or overpressure to occur.
3. Loosen the four screws on the top part of the relief valve.
4. Remove the top part of the relief valve.
5. Remove the diaphragm.
6. Insert a new diaphragm.
7. Refit the top part of the relief valve and cross-tighten the screws.
   Maximum torque: 6 Nm.
8. Start up the dosing system.
9. Tighten the screws on the top part of the relief valve after 48 operating hours.
   Maximum torque: 6 Nm.

11.5 Replacing the diaphragm

Caution — Adjust the stroke length only while the pump is running!

Caution — During transport, the deaeration opening must be closed with the screw plug!

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

11.5.1 Switching off the pump

1. While the pump is running, set the stroke-length adjustment knob to 100 %.
2. Switch off the pump and disconnect it from the power supply.
3. Depressurise the system.
4. Take suitable steps to ensure that the returning dosing medium is safely collected.

11.5.2 Replacing the diaphragm

1. Loosen the six dosing head screws.
2. Remove the dosing head.
3. Turn the fan blades until the diaphragm reaches the front dead centre (the diaphragm detaches itself from the diaphragm flange).
4. Unscrew the diaphragm by manually turning it counter-clockwise.
5. Check the parts and replace by new ones, if necessary.
6. Screw in the new diaphragm completely. Then turn it back until the holes in the diaphragm and the flange coincide.
7. Turn the fan blades until the diaphragm reaches the bottom dead centre (the diaphragm is pulled onto the diaphragm flange).
8. Refit the dosing head carefully and cross-tighten the screws. Maximum torque: 6 Nm.
9. Deaerate and start the dosing pump.

Caution — Before start-up, replace the screw plug by the deaeration screw!

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: 6 Nm.

12. 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 empty indication has responded.	Remove the cause.
	e) 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) Buckled suction line.	Install the suction line correctly. Check for damage.
	f) Crystalline deposits in the valves.	Clean the valves.
	g) Diaphragm broken or diaphragm tappet torn out.	Replace the diaphragm.
3. Dosing pump does not dose.	a) Air in the suction line and dosing head.	Wait until the pump has deaerated.
	b) Stroke-length adjustment knob set to zero.	Turn the adjustment knob in the "+" direction.
	c) Viscosity or density of medium too high.	Check the installation.
	d) Crystalline deposits in the valves.	Clean the valves.
	e) Valves not correctly assembled.	Assemble the inner valve parts in the right order and check and possibly correct the flow direction.
	f) Injection point blocked.	Check and possibly correct the flow direction (injection unit), or remove the obstruction.
	g) 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.	Repeat the deareation.
	b) Degassing medium.	Check the installation.
	c) Parts of the valves covered in dirt or incrusted.	Clean the valves.
	d) Zero point misadjusted.	Adjust the zero point to the actual counterpressure.
	e) Counterpressure fluctuations.	Install a pressure-loading valve and a pulsation damper.
	f) Suction height fluctuations.	Keep the suction level constant.
	g) Siphon effect (inlet pressure higher than counterpressure).	Install a pressure-loading valve.
	h) Leaking or porous suction line or discharge line.	Replace the suction line or discharge line.
	i) Parts in contact with the medium are not resistant to it.	Replace with resistant materials.
	j) Dosing diaphragm worn (incipient tears).	Replace the diaphragm. Also observe the maintenance instructions.
	k) Supply voltage fluctuations.	Decrease the counterpressure of the pump.
	l) Variation of the dosing medium (density, viscosity).	Check the concentration. Use an agitator, if necessary.

Caution For further error signals for the control unit, refer to the relevant section.

13. 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 dosing medium,
- zero point of pump Q_0 for specified pressure, see table below,
- standard pump version.

Abbreviation	Description
Q	Dosing flow
Q_0	Zero point of the pump The pumps are calibrated so that Q is 0 at 3 bar.
h	Stroke length

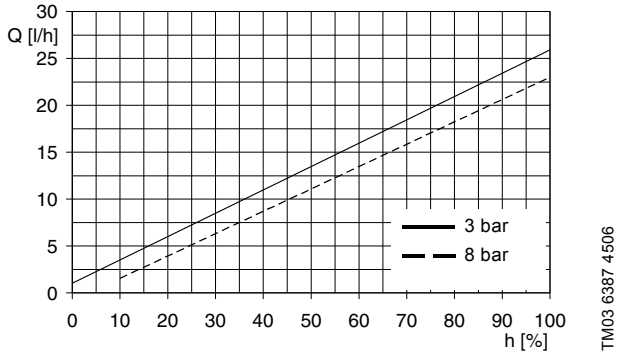

Fig. 29 DMX 24-8 (50 Hz)

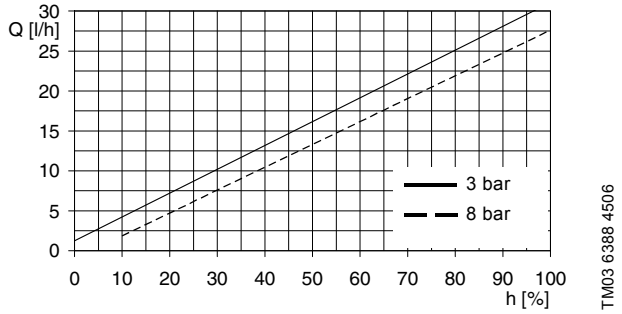

Fig. 30 DMX 24-8 (60 Hz)

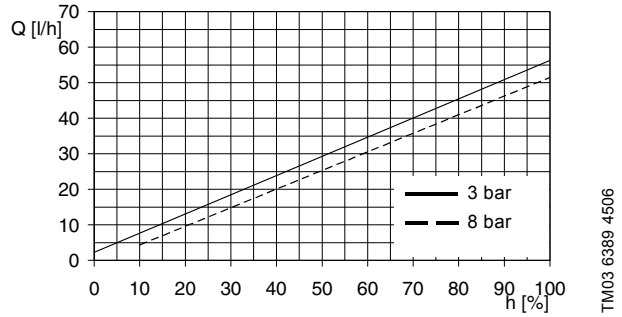

Fig. 31 DMX 52-8 (50 Hz)

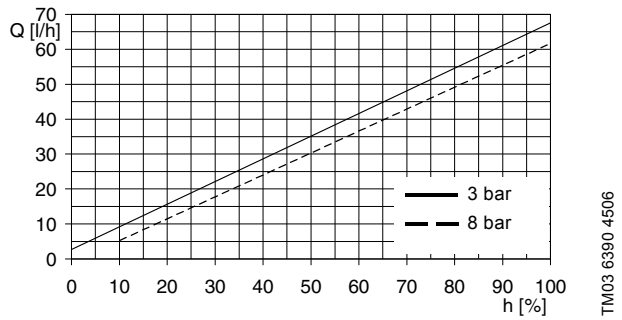

Fig. 32 DMX 52-8 (60 Hz)

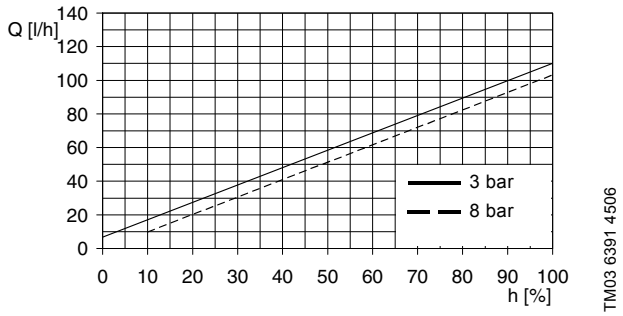

Fig. 33 DMX 100-8 (50 Hz)

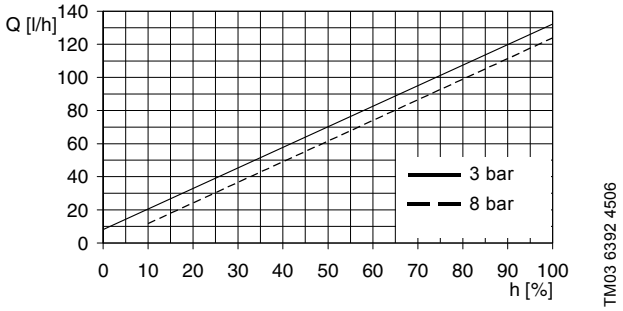

Fig. 34 DMX 100-8 (60 Hz)

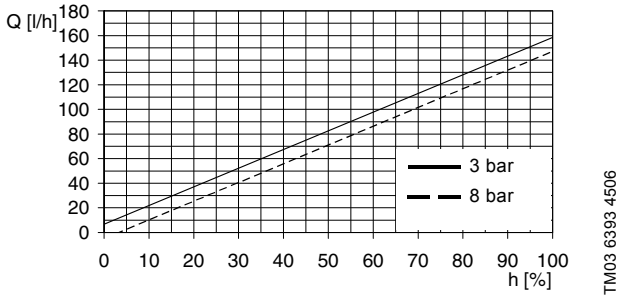

Fig. 35 DMX 142-8 (50 Hz)

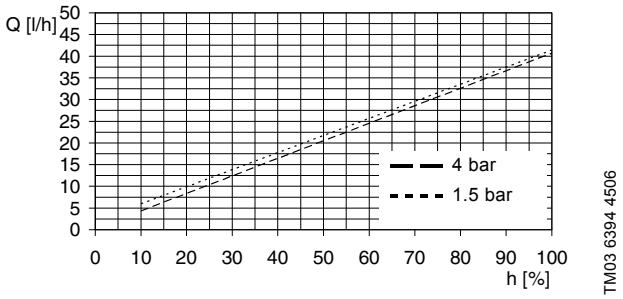

Fig. 36 DMX 37-5 (50 Hz)

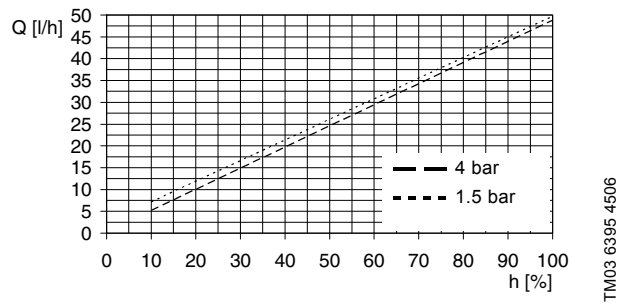

Fig. 37 DMX 37-5 (60 Hz)

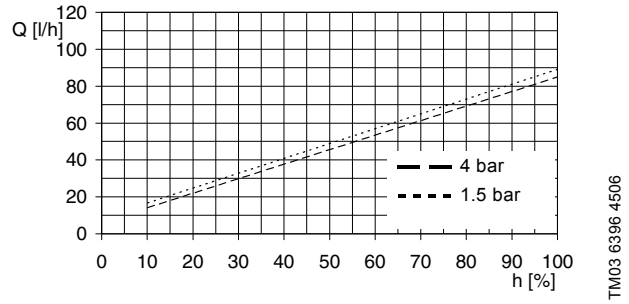

Fig. 38 DMX 82-5 (50 Hz)

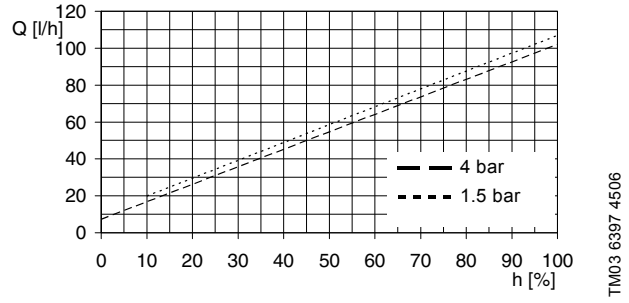

Fig. 39 DMX 82-5 (60 Hz)

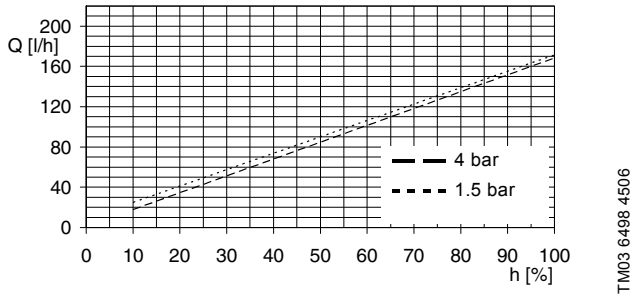

Fig. 40 DMX 160-5 (50 Hz)

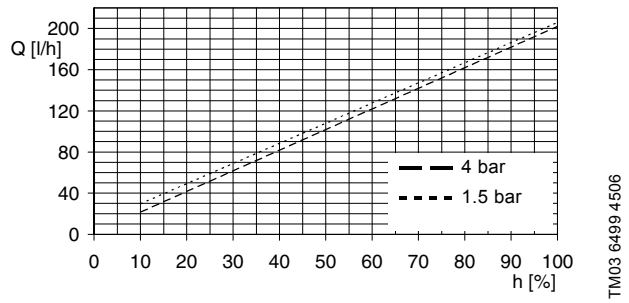

Fig. 41 DMX 160-5 (60 Hz)

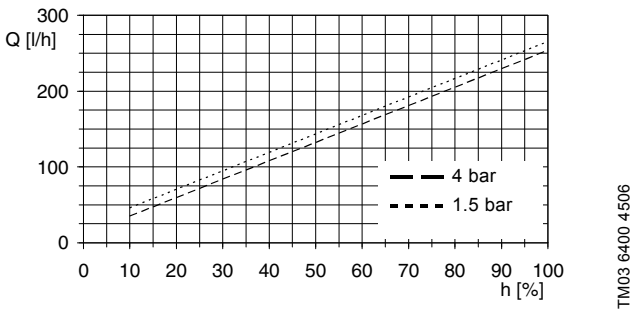

Fig. 42 DMX 224-5 (50 Hz)

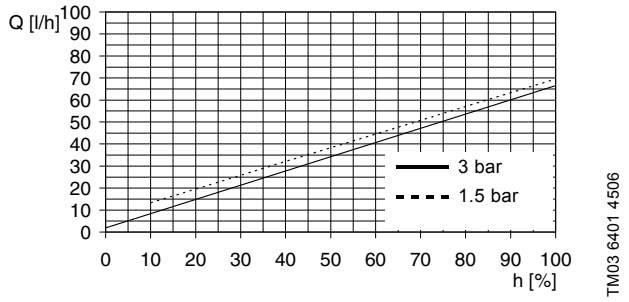

Fig. 43 DMX 60-3 (50 Hz)

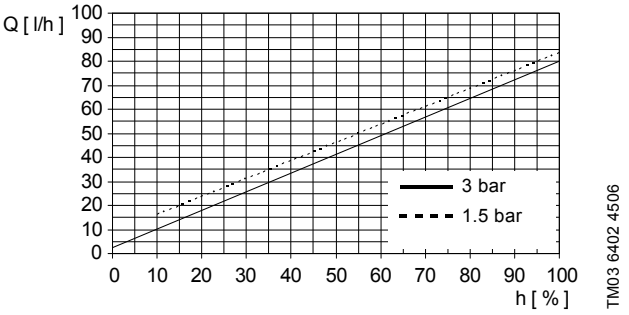

Fig. 44 DMX 60-3 (60 Hz)

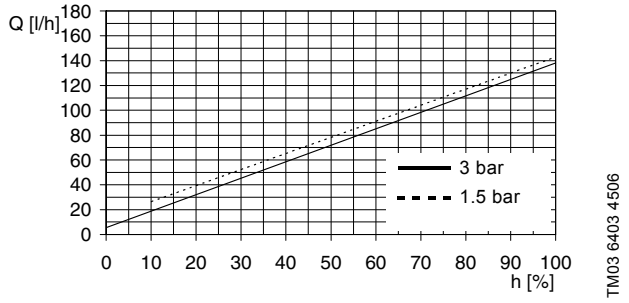

Fig. 45 DMX 130-3 (50 Hz)

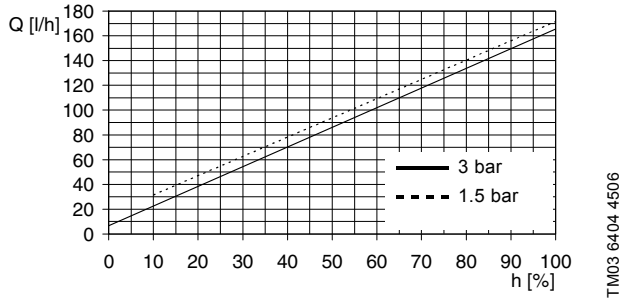

Fig. 46 DMX 130-3 (60 Hz)

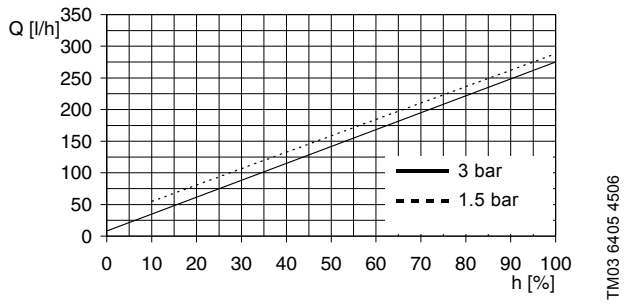

Fig. 47 DMX 255-3 (50 Hz)

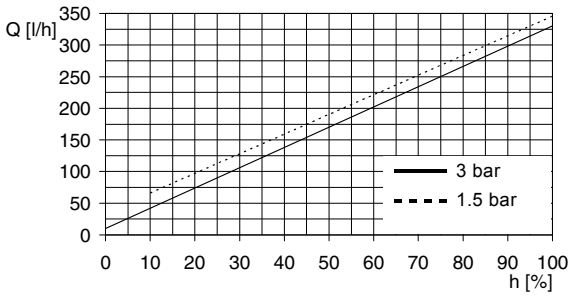

Fig. 48 DMX 255-3 (60 Hz)

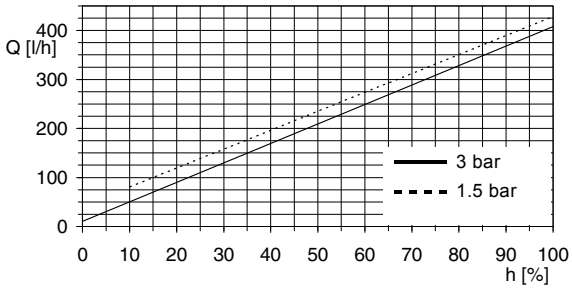

Fig. 49 DMX 380-3 (50 Hz)

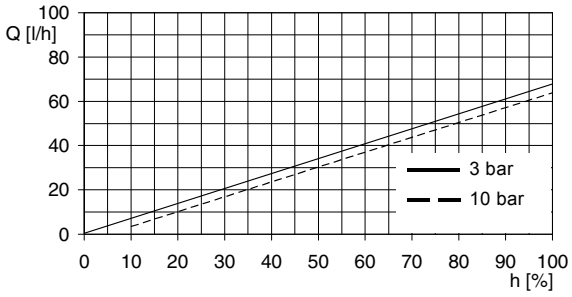

Fig. 50 DMX 67-10 (50 Hz)

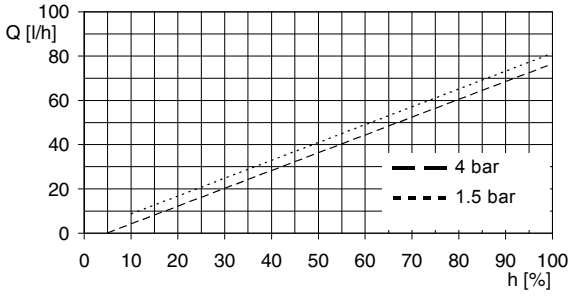

Fig. 51 DMX 67-10 (60 Hz)

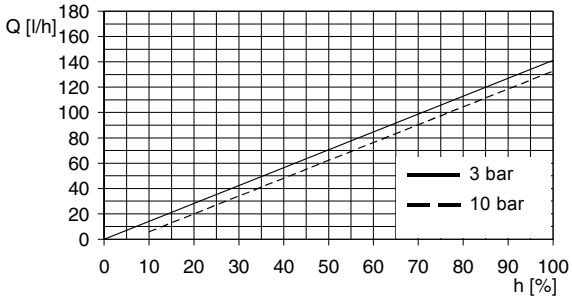

Fig. 52 DMX 132-10 (50 Hz)

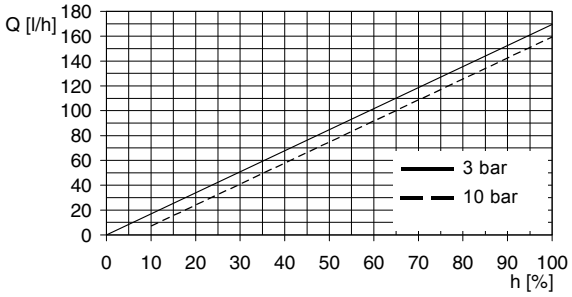

Fig. 53 DMX 132-10 (60 Hz)

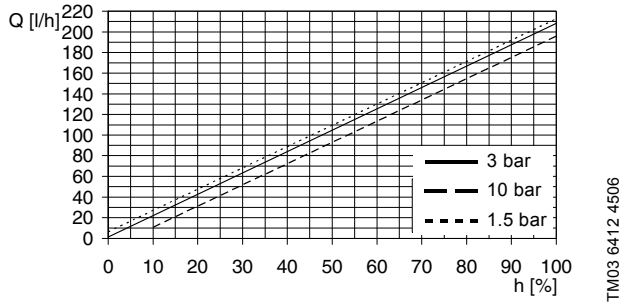

Fig. 54 DMX 190-10 (50 Hz)

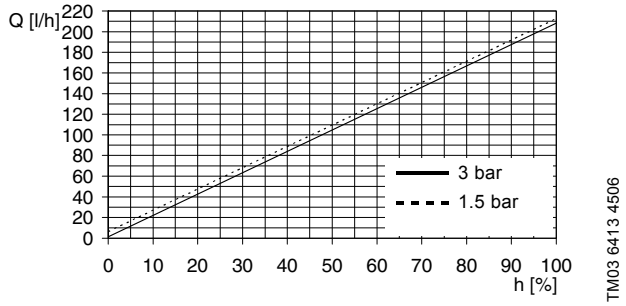

Fig. 55 DMX 190-8 (50 Hz)

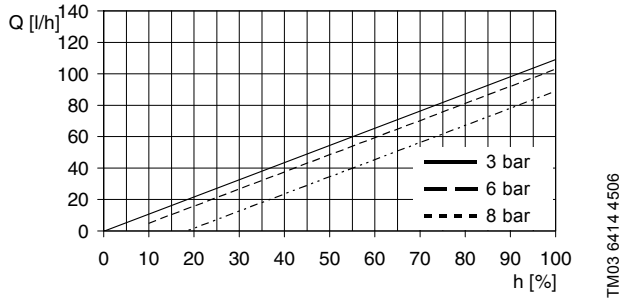

Fig. 56 DMX 95-8 (50 Hz)

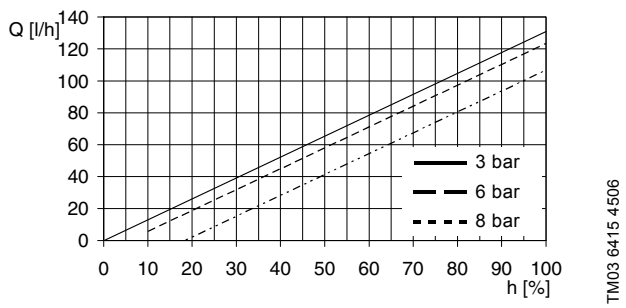

Fig. 57 DMX 95-8 (60 Hz)

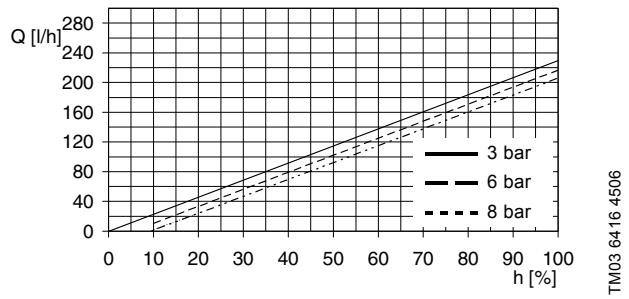

Fig. 58 DMX 199-8 (50 Hz)

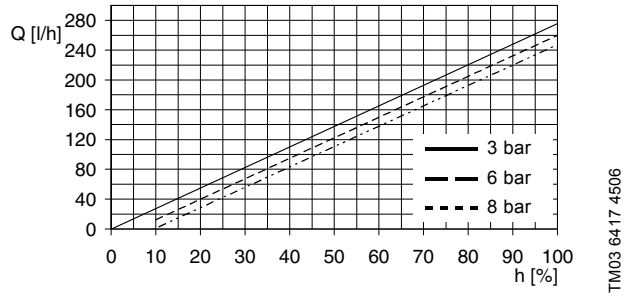

Fig. 59 DMX 199-8 (60 Hz)

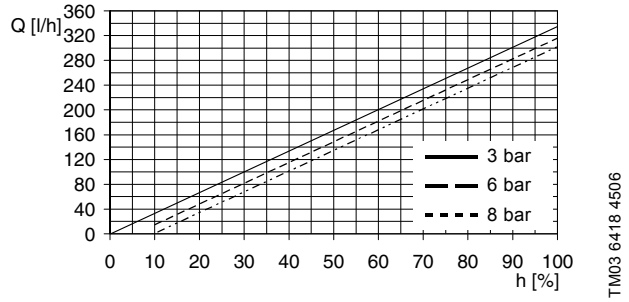

Fig. 60 DMX 280-8 (50 Hz)

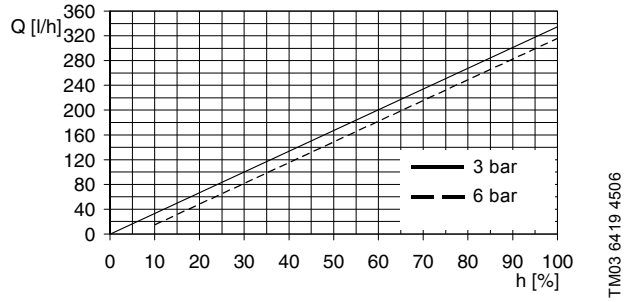

Fig. 61 DMX 280-6 (50 Hz)

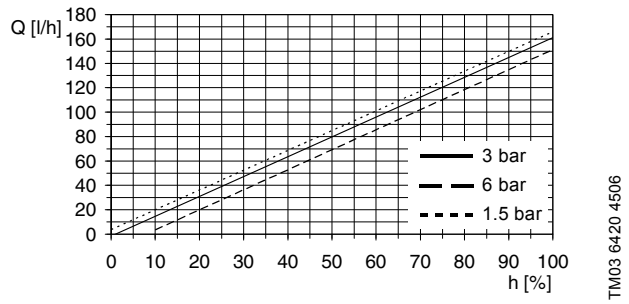

Fig. 62 DMX 152-6 (50 Hz)

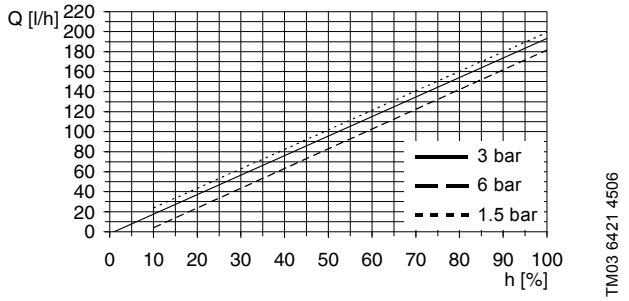

Fig. 63 DMX 152-6 (60 Hz)

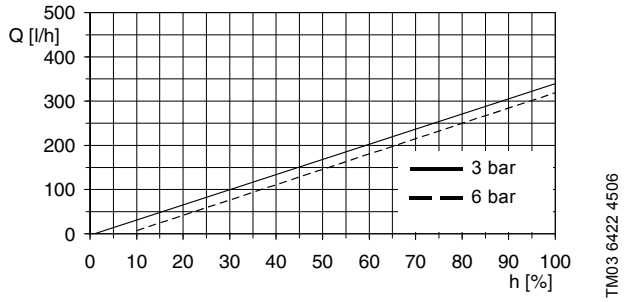

Fig. 64 DMX 321-6 (50 Hz)

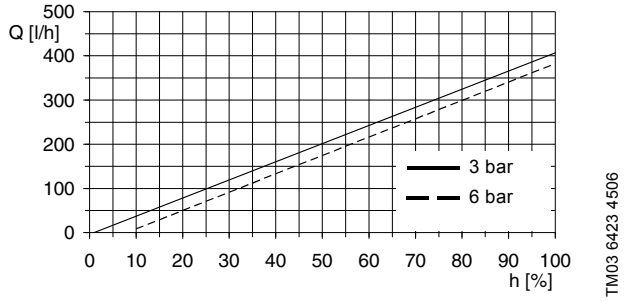

Fig. 65 DMX 321-6 (60 Hz)

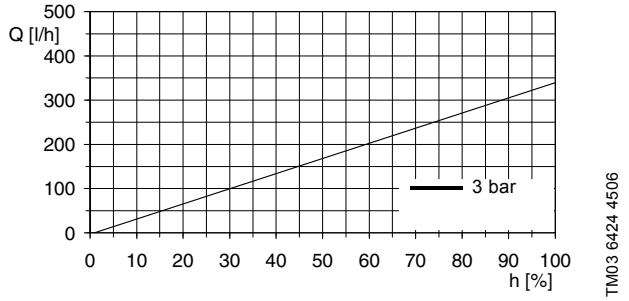

Fig. 66 DMX 321-4 (50 Hz)

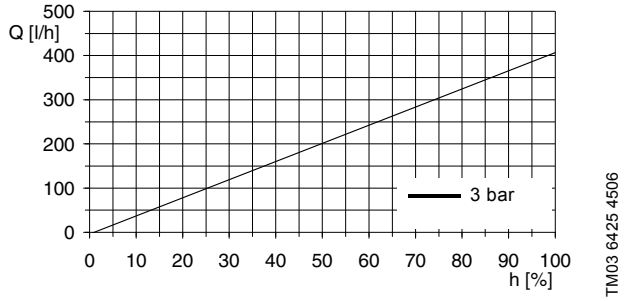

Fig. 67 DMX 321-4 (60 Hz)

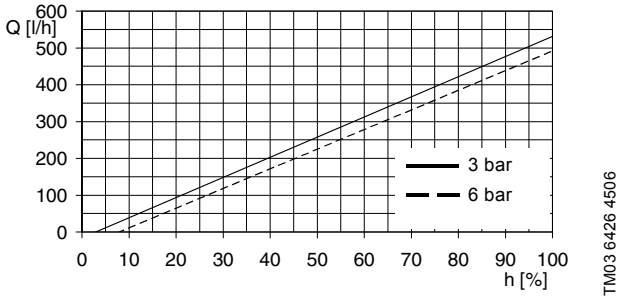

Fig. 68 DMX 460-6 (50 Hz)

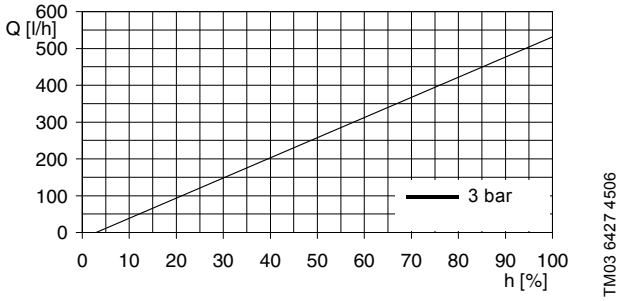

Fig. 69 DMX 460-3.5 (50 Hz)

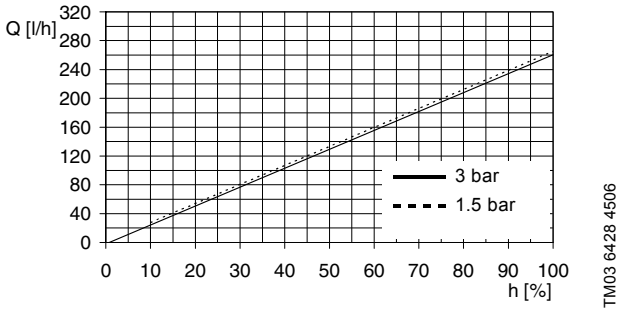

Fig. 70 DMX 249-3 (50 Hz)

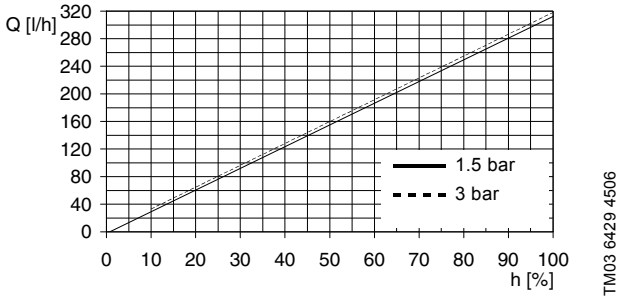

Fig. 71 DMX 249-3 (60 Hz)

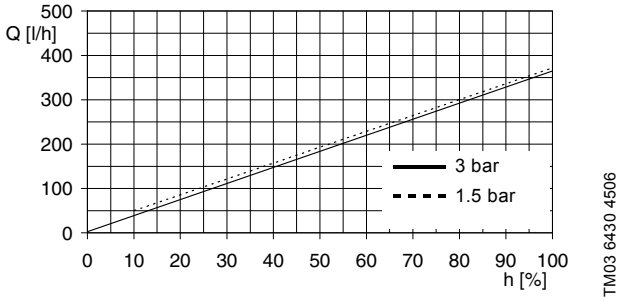

Fig. 72 DMX 315-3 (50 Hz)

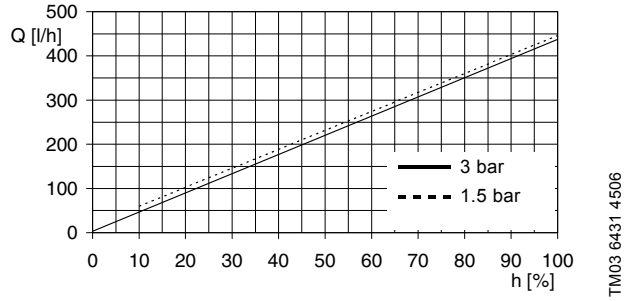

Fig. 73 DMX 315-3 (60 Hz)

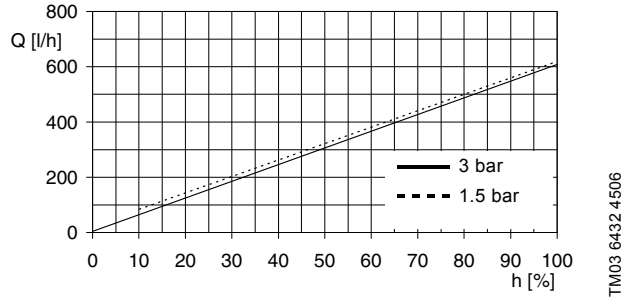

Fig. 74 DMX 525-3 (50 Hz)

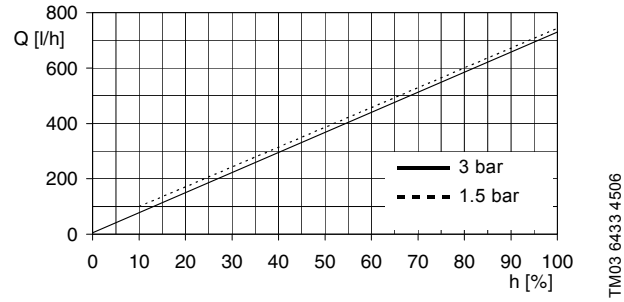

Fig. 75 DMX 525-3 (60 Hz)

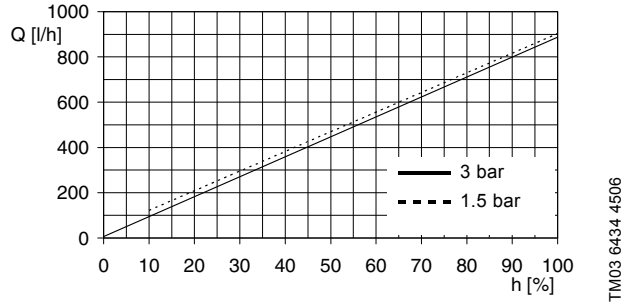

Fig. 76 DMX 765-3 (50 Hz)

14. 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.

Subject to alterations.

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.

GrA3476

Please give a short description of the fault:

_____ Date and signature

_____ Company stamp

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