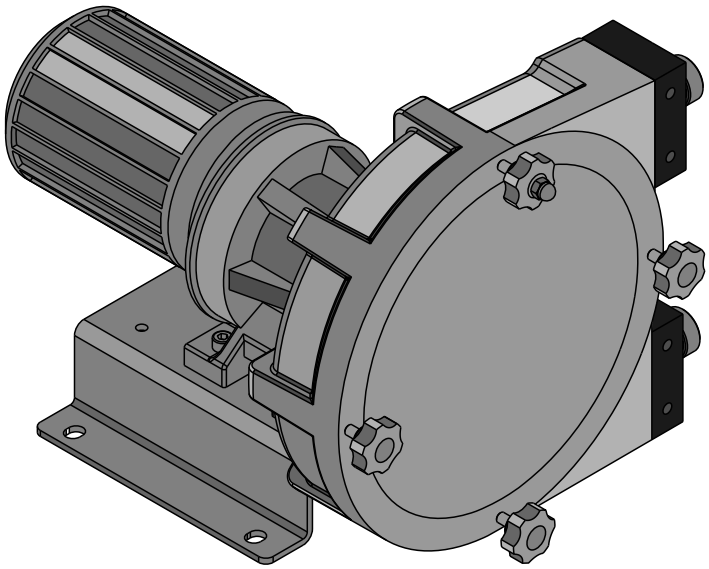
Operating instructions

DULCO®flex DFBa
Peristaltic Pump



Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

ProMinent Dosiertechnik Heidelberg GmbH
Im Schuhmachergewann 5 - 11
69123 Heidelberg Germany
Telephone: +49 6221 842-0
Fax: +49 6221 842-419
email: info@prominent.de
Internet: www.prominent.com

986228, 1, en_GB

Table of contents

1 Introduction

These operating instructions provide information on the technical data and functions of the DULCOMETER® BFDa series peristaltic pump.

1.1 Explanation of the Safety Information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed safety information and are provided as clear step-by-step instructions.

The safety information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Danger!

– Denotes an immediate threatening danger. If this is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger.

Warning!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries. Material damage.

Measure to be taken to avoid this danger.

Caution!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!

Nature and source of the danger

Damage to the product or its surroundings.

Measure to be taken to avoid this danger.

Note!

– Denotes a possibly damaging situation. If this is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information.

Source of the information. Additional measures.

Information!

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

1.2 Users' qualifications

WARNING!

Danger of injury with inadequately qualified personnel!

The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

– All work on the unit should therefore only be conducted by qualified personnel.
– Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Training	Definition
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

1.3 ID Code

Device identification / Identcode

1.3.1 Identcode DULCO®flex DFBa 010

Identcode			
DFBa	DULCO®flex DFBa 010		
		Type	
	010	DFBa 010, 0.024 l/revolution	
			Drive
		000	Pump without drive
			Step-down gears / 3 x 230 / 400 VAC
		A10	0.12 kW, 15 1/min, 21 l/h, 8 bar
		A11	0.12 kW, 20 1/min, 28 l/h, 8 bar
		A12	0.18 kW, 29 1/min, 41 l/h, 8 bar
		A13	0.18 kW, 46 1/min, 66 l/h, 4 bar
		A14	0.25 kW, 57 1/min, 82 l/h, 4 bar
		A15	0.25 kW, 70 1/min, 100 l/h, 2 bar
		A16	0.25 kW, 85 1/min, 122 l/h, 2 bar
			Manual adjustment gears / 3 x 230 / 400 VAC
		A21	0.15 kW, 3-16 1/min, 4-23 l/h, 8 bar
		A22	0.25 kW, 5-29 1/min, 7-41 l/h, 8 bar
		A23	0.25 kW, 10-53 1/min, 14-76 l/h, 4 bar
		A24	0.25 kW, 15-80 1/min, 21-115 l/h, 2 bar

Identcode								
DFBa	DULCO®flex DFBa 010							
			Adjustment gears with integrated frequency converter / 1x 230 VAC					
		A31	0.37 kW, 9-34 1/min, 12-48 l/h, 8 bar					
		A32	0.37 kW, 16-60 1/min, 23-86 l/h, 4 bar					
		A33	0.37 kW, 28-105 1/min, 40-151 l/h, 1 bar					
			Adjustment gears (external frequency converter required) / 3 x 230 / 400 VAC					
		A41	0.18 kW, 0-23 1/min, 0-33 l/h, 8 bar					
		A42	0.18 kW, 0-38 1/min, 0-54 l/h, 8 bar					
		A43	0.25 kW, 0-60 1/min, 0-86 l/h, 4 bar					
		A44	0.25 kW, 0-91 1/min, 0-131 l/h, 1 bar					
				Hose material				
				0	NR			
				B	NBR			
				E	EPDM			
				R	NR-A			
				N	Norprene (max. 2 bar)			
				A	NBR-A			
				H	Hypalon			
					Hydraulic connection			
				A	VA BSP 3/8"			
				B	VA NPT 3/8"			
				C	PP BSP 3/8"			
				D	PVDF BSP 3/8"			
				E	PVDF NPT 3/8"			
				F	PVC NPT 3/8"			
				G	Tri-Clamp, VA, 1/2"			
				H	DIN 11851, VA NW10			
						Base plate		
					0	Base plate, lacquered steel		
					1	Base plate, stainless steel		
					2	Portable unit + lacquered steel base plate		
					3	Portable unit + stainless steel base plate		
							Leakage sensor	
						0	without leakage sensor	
						L	with leakage sensor	
								Rotor
							0	Rotor with 2 rollers

Identcode													
DFBa	DULCO®flex DFBa 010												
									Batch control				
								0	Without batch control				
								C	With batch control				
										Special version			
									0	Standard			
									H	Halar-coated housing			
											Vacuum system		
										0	none		
												Certification	
											01	CE mark	

1.3.2 Identcode DULCO®flex DFBa 013

Identcode			
DFBa	DULCO®flex DFBa 013		
		Type	
	013	DFBa 013, 0.039 l/revolution	
			Drive
		000	Pump without drive
			Step-down gears / 3 x 230 / 400 VAC
		B10	0.12 kW, 15 1/min, 35 l/h, 8 bar
		B11	0.12 kW, 20 1/min, 46 l/h, 8 bar
		B12	0.18 kW, 29 1/min, 67 l/h, 8 bar
		B13	0.18 kW, 46 1/min, 107 l/h, 4 bar
		B14	0.25 kW, 57 1/min, 133 l/h, 4 bar
		B15	0.25 kW, 70 1/min, 163 l/h, 2 bar
		B16	0.25 kW, 85 1/min, 198 l/h, 2 bar
			Manual adjustment gears / 3 x 230 / 400 VAC
		B21	0.15 kW, 3-16 1/min, 7-37 l/h, 8 bar
		B22	0.25 kW, 5-29 1/min, 11-67 l/h, 8 bar
		B23	0.25 kW, 10-53 1/min, 23-124 l/h, 4 bar
		B24	0.25 kW, 15-80 1/min, 35-187 l/h, 2 bar
			Adjustment gears with integrated frequency converter / 1 x 230 VAC
		B31	0.37 kW, 9-34 1/min, 21-79 l/h, 8 bar
		B32	0.37 kW, 16-60 1/min, 37-140 l/h, 4 bar
		B33	0.37 kW, 28-105 1/min, 65-245 l/h, 1 bar

Identcode										
DFBa	DULCO®flex DFBa 013									
			Adjustment gears (external frequency converter required) / 3 x 230 / 400 VAC							
		B41	0.18 kW, 0-23 1/min, 0-53 l/h, 8 bar							
		B42	0.18 kW, 0-38 1/min, 0-88 l/h, 8 bar							
		B43	0.25 kW, 0-60 1/min, 0-140 l/h, 4 bar							
		B44	0.25 kW, 0-91 1/min, 0-212 l/h, 1 bar							
				Hose material						
				0	NR					
				B	NBR					
				E	EPDM					
				R	NR-A					
				N	Norprene (max. 2 bar)					
				A	NBR-A					
				H	Hypalon					
					Hydraulic connection					
					A	VA BSP 3/8"				
					B	VA NPT 3/8"				
					C	PP BSP 3/8"				
					D	PVDF BSP 3/8"				
					E	PVDF NPT 3/8"				
					F	PVC NPT 3/8"				
					G	Tri-Clamp, VA, 1/2"				
					H	DIN 11851, VA NW15				
						Base plate				
						0	Base plate, lacquered steel			
						1	Base plate, stainless steel			
						2	Portable unit + lacquered steel base plate			
						3	Portable unit + stainless steel base plate			
							Leakage sensor			
							0	without leakage sensor		
							L	with leakage sensor		
								Rotor		
								0	Rotor with 2 rollers	
									Batch control	
									0	Without batch control
									C	With batch control
										Special version

Identcode													
DFBa	DULCO®flex DFBa 013												
									0	Standard			
									H	Halar-coated housing			
											Vacuum system		
										0	none		
													Certification
												01	CE mark

1.3.3 Identcode DULCO®flex DFBa 016

Identcode			
DFBa	DULCO®flex DFBa 016		
		Type	
	016	DFBa 016, 0.092 l/revolution	
			Drive
		000	Pump without drive
			Step-down gears / 3 x 230 / 400 VAC
		C10	0.18 kW, 14 1/min, 77 l/h, 8 bar
		C11	0.18 kW, 20 1/min, 110 l/h, 8 bar
		C12	0.25 kW, 32 1/min, 176 l/h, 8 bar
		C13	0.25 kW, 46 1/min, 253 l/h, 4 bar
		C14	0.37 kW, 57 1/min, 314 l/h, 4 bar
		C15	0.37 kW, 70 1/min, 386 l/h, 2 bar
		C16	0.37 kW, 85 1/min, 469 l/h, 2 bar
			Manual adjustment gears / 3 x 230 / 400 VAC
		C21	0.37 kW, 8-50 1/min, 44-276 l/h, 4 bar
		C22	0.37 kW, 10-61 1/min, 55-336 l/h, 2 bar
		C23	0.37 kW, 16-91 1/min, 88-502 l/h, 1 bar
			Adjustment gears with integrated frequency converter / 1 x 230 VAC
		C31	0.37 kW, 9-34 1/min, 49-187 l/h, 8 bar
		C32	0.37 kW, 16-60 1/min, 88-331 l/h, 2 bar
		C33	0.37 kW, 28-105 1/min, 154-579 l/h, 1 bar
			Adjustment gears (external frequency converter required) / 3 x 230 / 400 VAC
		C41	0.25 kW, 0-23 1/min, 0-126 l/h, 8 bar
		C42	0.25 kW, 0-42 1/min, 0-231 l/h, 4 bar
		C43	0.37 kW, 0-60 1/min, 0-331 l/h, 2 bar
		C44	0.37 kW, 0-91 1/min, 0-502 l/h, 1 bar

Identcode										
DFBa	DULCO®flex DFBa 016									
				Hose material						
			0	NR						
			B	NBR						
			E	EPDM						
			R	NR-A						
			N	Norprene (max. 2 bar)						
			A	NBR-A						
			H	Hypalon						
			T	TYGON (max. 2 bar)						
					Hydraulic connection					
				A	VA BSP 3/4"					
				B	VA NPT 3/4"					
				C	PP BSP 3/4"					
				D	PVDF BSP 3/4"					
				E	PVDF NPT 3/4"					
				F	PVC NPT 3/4"					
				G	Tri-Clamp, VA, 1"					
				H	DIN 11851, VA NW 20					
						Base plate				
					0	Base plate, lacquered steel				
					1	Base plate, stainless steel				
					2	Portable unit + lacquered steel base plate				
					3	Portable unit + stainless steel base plate				
							Leakage sensor			
						0	without leakage sensor			
						L	with leakage sensor			
								Rotor		
							0	Rotor with 2 rollers		
									Batch control	
								0	Without batch control	
								C	With batch control	
										Special version
									0	Standard
									H	Halar-coated housing
										Vacuum system
										0 none

Identcode												
DFBa	DULCO®flex DFBa 016											
												Certification
											01	CE mark

1.3.4 Identcode DULCO®flex DFBa 019

Identcode						
DFBa	DULCO®flex DFBa 019					
		Type				
	019	DFBa 019, 0.122 l/revolution				
			Drive			
		000	Pump without drive			
			Step-down gears / 3 x 230 / 400 VAC			
		D10	0.18 kW, 14 1/min, 102 l/h, 2 bar			
		D11	0.18 kW, 20 1/min, 146 l/h, 2 bar			
		D12	0.25 kW, 32 1/min, 234 l/h, 2 bar			
		D13	0.25 kW, 46 1/min, 336 l/h, 2 bar			
		D14	0.37 kW, 57 1/min, 417 l/h, 2 bar			
		D15	0.37 kW, 70 1/min, 512 l/h, 2 bar			
		D16	0.37 kW, 85 1/min, 622 l/h, 2 bar			
			Manual adjustment gears / 3 x 230 / 400 VAC			
		D21	0.37 kW, 8-50 1/min, 58-366 l/h, 2 bar			
		D22	0.37 kW, 10-61 1/min, 73-446 l/h, 2 bar			
		D23	0.37 kW, 16-91 1/min, 117-666 l/h, 2 bar			
			Adjustment gears with integrated frequency converter / 1 x 230 VAC			
		D31	0.37 kW, 9-34 1/min, 65-248 l/h, 8 bar			
		D32	0.37 kW, 16-60 1/min, 117-439 l/h, 2 bar			
		D33	0.37 kW, 28-105 1/min, 204-768 l/h, 1 bar			
			Adjustment gears (external frequency converter required) / 3 x 230 / 400 VAC			
		D41	0.25 kW, 0-23 1/min, 0-168 l/h, 2 bar			
		D42	0.25 kW, 0-42 1/min, 0-307 l/h, 2 bar			
		D43	0.37 kW, 0-60 1/min, 0-439 l/h, 2 bar			
		D44	0.37 kW, 0-91 1/min, 0-666 l/h, 2 bar			
				Hose material		
			0	Norprene (max. 2 bar)		
			T	TYGON (max. 2 bar)		
					Hydraulic connection	

Identcode												
DFBa	DULCO®flex DFBa 019											
				A	VA BSP 1"							
				B	VA NPT 1"							
				C	PP BSP 1"							
				D	PVDF BSP 1"							
				E	PVDF NPT 1"							
				F	PVC NPT 1"							
				G	Tri-Clamp, VA, 1"							
				H	DIN 11851, VA NW 25							
							Base plate					
						0	Base plate, lacquered steel					
						1	Base plate, stainless steel					
						2	Portable unit + lacquered steel base plate					
						3	Portable unit + stainless steel base plate					
								Leakage sensor				
							0	without leakage sensor				
							L	with leakage sensor				
									Rotor			
								0	Rotor with 2 rollers			
										Batch control		
									0	Without batch control		
									C	With batch control		
											Special version	
										0	Standard	
										H	Halar-coated housing	
												Vacuum system
											0	none
												Certification
											01	CE mark

1.3.5 Identcode DULCO®flex DFBa 022

Identcode			
DFBa	DULCO®flex DFBa 022		
		Type	
	022	DFBa 022, 0.248 l/revolution	
			Drive

Identcode					
DFBa	DULCO®flex DFBa 022				
		000	Pump without drive		
			Step-down gears / 3 x 230 / 400 VAC		
		E10	0.25 kW, 17 1/min, 252 l/h, 8 bar		
		E11	0.37 kW, 23 1/min, 342 l/h, 8 bar		
		E12	0.55 kW, 38 1/min, 565 l/h, 4 bar		
		E13	0.55 kW, 45 1/min, 669 l/h, 4 bar		
		E14	0.55 kW, 54 1/min, 803 l/h, 2 bar		
		E15	0.75 kW, 66 1/min, 982 l/h, 2 bar		
			Manual adjustment gears / 3 x 230 / 400 VAC		
		E21	0.37 kW, 3.9-20.4 1/min, 58-303 l/h, 8 bar		
		E22	0.55 kW, 6-32 1/min, 89-476 l/h, 4 bar		
		E23	0.75 kW, 9-48 1/min, 133-714 l/h, 2 bar		
			Adjustment gears with integrated frequency converter / 1 x 230 VAC		
		E31	0.55 kW, 11-40 1/min, 163-595 l/h, 4 bar		
		E32	0.75 kW, 18-63 1/min, 267-937 l/h, 2 bar		
		E33	1.10 kW, 27-92 1/min, 401-1,368 l/h, 1 bar		
			Adjustment gears (external frequency converter required) / 3 x 230 / 400 VAC		
		E41	0.55 kW, 0-29 1/min, 0-431 l/h, 8 bar		
		E42	0.75 kW, 0-38 1/min, 0-565 l/h, 4 bar		
		E43	1.10 kW, 0-54 1/min, 0-803 l/h, 2 bar		
				Hose material	
			0	NR	
			B	NBR	
			E	EPDM	
			R	NR-A	
			N	Norprene (max. 2 bar)	
			A	NBR-A	
			H	Hypalon	
					Hydraulic connection
				A	VA BSP 1"
				B	VA NPT 1"
				C	PP BSP 1"
				D	PVDF BSP 1"
				E	PVDF NPT 1"
				F	PVC NPT 1"
				G	Tri-Clamp, VA, 1"

Identcode																
DFBa	DULCO®flex DFBa 022															
				H	DIN 11851, VA NW 25											
						Base plate										
					0	Base plate, lacquered steel										
					1	Base plate, stainless steel										
					2	Portable unit + lacquered steel base plate										
					3	Portable unit + stainless steel base plate										
							Leakage sensor									
							0	without leakage sensor								
							L	with leakage sensor								
									Rotor							
									0	Rotor with 2 rollers						
											Batch control					
											0	Without batch control				
											C	With batch control				
													Special version			
													0	Standard		
													H	Halar-coated housing		
															Vacuum system	
															0	none
																Certification
															01	CE mark

2 Safety and responsibility

2.1 General safety information

WARNING!

Live parts

Possible consequence: Fatal or very serious injuries

- Measure: The device must be disconnected from the power supply before it is opened
- Isolate damaged, faulty or manipulated devices from the mains in order to de-energise.

WARNING!

Emergency stop switch

Possible consequence: Fatal or very serious injuries

An emergency stop switch is to be connected for the entire plant. This should enable the entire plant to be shut down in the event on an emergency in such a way that the overall plant can be brought into a safe condition.

WARNING!

Unauthorised access

Possible consequence: Fatal or very serious injuries

- Measure: Ensure that there can be no unauthorised access to the unit

WARNING!

Hazardous media / contamination of persons and equipment

Possible consequence: Fatal or very serious injuries. material damage

- Ensure that the pump hoses are resistance against the media being conveyed
- Always observe the the safety data sheets for the media to be conveyed. The system operator must ensure that these safety data sheets are available and that they are kept up-to-date
- The safety data sheets for the media being conveyed are always decisive for initiating counter measures in the event of leakage to the media being conveyed
- Observe the general restrictions in relation to viscosity limits, chemical resistance and density
- Always switch the pump off before exchanging the pump hose

WARNING!

Correct and proper use

Possible consequence: Fatal or very serious injuries

- The unit is not intended to convey or regulate gaseous or solid media
- Do not exceed the rated pressure, speed or temperature for the pump
- The unit may only be used in accordance with the technical data and specifications provided in these operating instructions and in the operating instructions for the individual components
- The system is not designed for use in areas at risk from explosion
- Only switch the pump on if it has been properly fastened to the floor
- Only switch the pump on if it the front cover has been attached.

WARNING!

Operational lifetime of the pump hoses

Possible consequence: Fatal or very serious injuries

The operational lifetime of the pump hoses cannot be precisely specified. For this reason, the possibility of fracture and consequential leakage of liquids must be accounted for. If the hose rupture alarm (optional) is fitted, then the pump can be stopped and / or an electrical valve can be actuated.

In addition, you must avoid particles from untight hoses being introduced into the media being conveyeed. This can be achieved e.g. by means of filtration, a hose rupture alarm or other means suitable for the respective process.

CAUTION!

CIP cleaning

In the event of CIP cleaning, it is necessary to obtain information from the manufacturer about correct installation of the pump (a special installation is required), as well as regarding the compatibility of the cleaning agents with the pump hoses of the pump and the other hydraulic connections.

Cleaning should be undertaken at the recommended maximum temperature.

CAUTION!

Direction of rotation / flow direction

Possible consequence: Material damage right through to destruction of the unit

- The pump's direction of rotation in relation to the desired flow direction must be checked prior to every start.

CAUTION!

Environmental influences

Possible consequence: Material damage right through to destruction of the unit

- The device is not suitable for outdoor operation
- Take suitable measures to protect the device from environmental influences such as:
  - UV rays
  - Moisture
  - Frost, etc.

3 Functional description

Brief functional description

The package contents supplied with the DULCO®flex DFBa is selectable via the identcode.

The DULCO®flex DFBa is a displacement pump. The feed chemical is conveyed by the rotor squeezing the hose in the direction of flow. No valves are needed for this. This ensures gentle handling of the metered media.

The DULCO®flex DFBa has been designed for safe and uncomplicated operation, as well as straightforward maintenance.

The DULCO®flex DFBa can be used for many different media. However, this pump type is often the optimal solution for abrasive, shear-sensitive and viscose media.

Typical areas of use include processes where only a low discharge pressure is required (max. 8 bar).

3.1 Construction

Main modules:

- Drive Unit
- Housing
- Base frame

The pump housing is closed off with a screwed front cover in order to avoid the risk of injury.

The motor serves to drive the rotor. Two rollers at the ends of the rotor serve to press the pump hose against the pump housing.

The rotary movement of the rotors alternately press and relax the rollers in relation to the pump hose. This serves to suck the media in and convey it into the metering line.

3.2 Overview of the Device

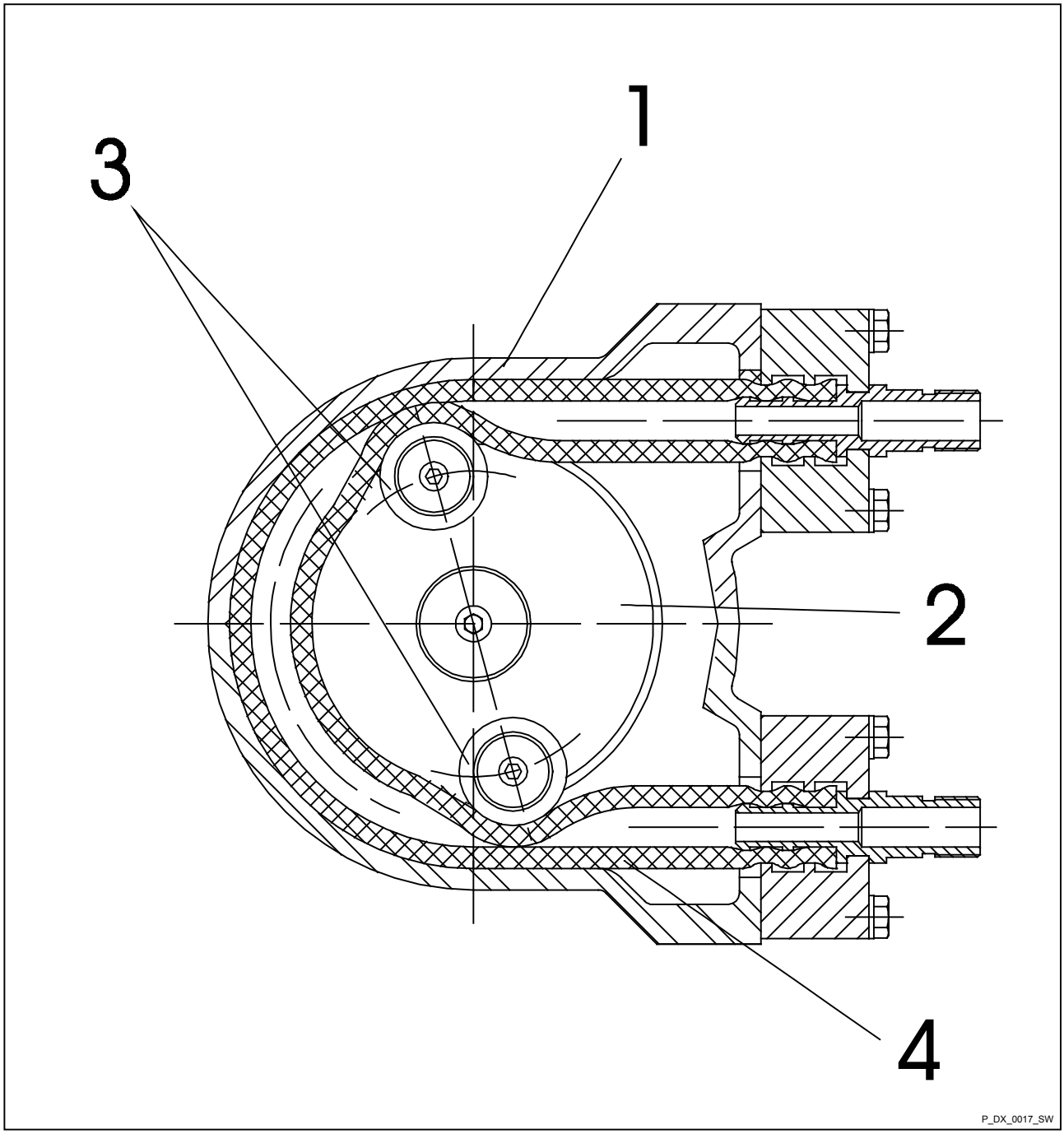


Fig. 1: Diagram of functional principle

1 Housing
2 Rotor
3 Rollers
4 Hose

4 Transport, storage, assembly and Installation

- **User qualification, transport and storage:** instructed persons, see ↳ *Chapter 1.2 “Users' qualifications” on page 5*
- **User qualification, assembly:** trained qualified personnel, see ↳ *Chapter 1.2 “Users' qualifications” on page 5*
- **User qualification, electrical installation:** Qualified electrician, see ↳ *Chapter 1.2 “Users' qualifications” on page 5*

WARNING!
Safety data sheet
Possible consequence: Fatal or very serious injuries

Always observe the corresponding data sheets for the media when carrying out any tasks which involve contact with the media that is to be conveyed.

4.1 Transport

Transport

- The pump is protected by means of cardboard packaging
- The packaging materials can be recycled
- For environmental conditions for storage and transportation see ↳ *Chapter 4.3.1 “Ambient conditions” on page 22*

4.2 Storage

Storage

- The pump hose should be removed from the housing during the duration of storage
- For storage durations longer than 60 days, the coupling surfaces (terminals, reducing adaptors, motors) are to be protected with suitable antioxidant agents
- For environmental conditions for storage and transportation see ↳ *Chapter 4.3.1 “Ambient conditions” on page 22*

4.3 Assembly

CAUTION!
Possible consequence: Slight or minor injuries, material damage.

Carry out the assembly work before the electrical installation is undertaken!

Observe the permissible environmental conditions!

4.3.1 Ambient conditions

NOTICE!

Ambient conditions

Possible consequence: Property damage and increased wear and tear

Assembly is to be carried out in the following order. If the must has to be installed outdoors, then it is to be equipped with protection against sunlight and weather influences.

When positioning the pump, ensure that sufficient room for access is provided for all types of maintenance work.

There are limit values for temperature and pressure, depending on the type of hose selected. These limit values are described in the following section:

Limit values for hose temperature and pressure

Material Hose	min. temp. (°C) Feed chemical	max. temp. (°C) Feed chemical	min. temp. (°C) Environment	max. pressure (bar)
NR	-20	80	-40	8
NBR	-10	80	-40	8
EPDM	-10	80	-40	8
NR-A	-10	80	-40	8
NBR-A	-10	80	-40	8
NORPREN	-40	120	-40	2
TYGON	-10	70	-40	2

Also observe the general safety information, see *Chapter 2.1 “General safety information” on page 16*

4.3.2 Alignment of the suction side

The pump is to be positioned as near as possible to the liquid container, so that the suction side is kept as short and straight as possible.

The suction line must be absolutely airtight and made of a suitable material, so that it is not squeezed together under vacuum.

The diameter must correspond to the rated diameter of the pump hose. A larger diameter is recommended in the event of viscose liquids.

The pump is self-priming and does not require an admission valve. The pump is reversible and the suction connection can therefore comprise of one of two options. Normally the option is selected which is best suited to the physical conditions of the installation.

It is recommended to use a flexible transition between two fixed pipes and the hydraulic connection of the pump, in order to avoid the transmission of vibrations.

4.3.3 Alignment of the discharge side

The discharge line is to be kept as straight and short as possible, in order to avoid performance reduction.

The diameter must correspond to the rated diameter of the pump hose. A larger diameter is recommended in the event of viscose liquids.

It is recommended to use a flexible transition between two fixed pipes and the hydraulic connection of the pump, in order to avoid the transmission of vibrations.

4.3.4 Adjusting the roller pressure

The peristaltic pump is equipped with spacer plates (6), in order to adjust the precise pressure distance to the roller (9) (dependent on speed and operating pressure).

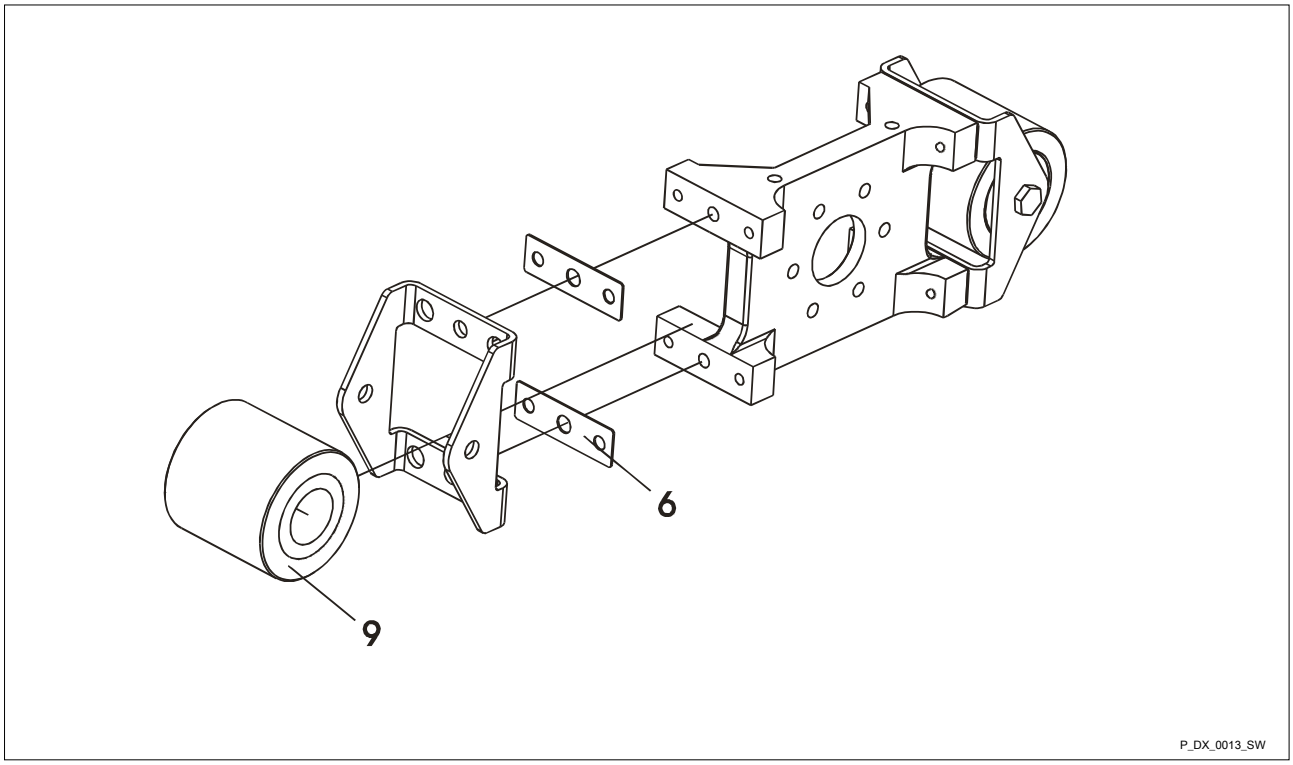


Fig. 2: Space plates / roller

6 Spacer plates
9 Roller

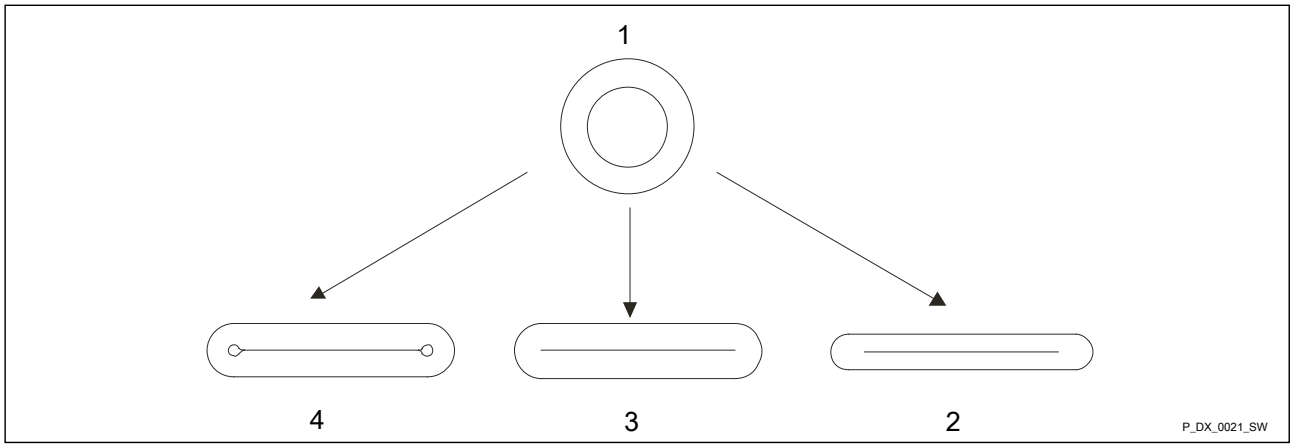


Fig. 3: Squeezing the hose

1 Hose in normal shape
2 Excessive squeezing (increased wear and tear to pump and hose)
3 Perfect squeezing
4 Insufficient squeezing (backflowing media in the cavity will destroy the hose within a short period of time)

The spacer plates are fitted in the factory. You can adapt the number of spacer plates to the actual operating conditions according to the following table.

DFBa 010 / Number of spacer plates of 0.5 mm thickness (except Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	1	1	1	1	1
2,0	1	1	1	1	1
4,0 *	2	1	1	1	1
6,0	2	2	2		
8,0	3	2			
* Supplied state					

DFBa 010 / Number of spacer plates of 0.5 mm thickness (Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	5	5	5	5	5
2,0 *	5	5	5	5	5
* Supplied state					

DFBa 013 / Number of spacer plates of 0.5 mm thickness (except Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	1	1	1	1	1
2,0	1	1	1	1	1
* Supplied state					

1/min	0-19	20-39	40-59	60-79	80-99
bar					
4,0 *	2	1	1	1	1
6,0	2	2	2		
8,0	3	2			
* Supplied state					

DFBa 013 / Number of spacer plates of 0.5 mm thickness (Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	5	5	5	5	5
2,0*	5	5	5	5	5
* Supplied state					

DFBa 016 / Number of spacer plates of 0.5 mm thickness (except Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	1	1	1	1	1
2,0	1	1	1	1	1
4,0 *	2	1	1	1	1
6,0	2	2	2		
8,0	3	3			
* Supplied state					

DFBa 016 / Number of spacer plates of 0.5 mm thickness (Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	9	9	9	9	9
2,0 *	9	9	9	9	9
* Supplied state					

DFBa 019 / Number of spacer plates of 0.5 mm thickness (Norpren and TYGON):

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	5	5	5	5	5
2,0 *	5	5	5	5	5
* Supplied state					

DFBa 022 / Number of spacer plates of 0.5 mm thickness:

1/min	0-19	20-39	40-59	60-79	80-99
bar					
0,5	2	2	1	1	1
2,0	2	2	2	2	2
4,0 *	3	3	2	2	2
6,0	3	3	3		
8,0	4	3			
* Supplied state					

4.3.5 Performance curves

NOTICE!

Maximum pressure under continuous operation

The dotted line indicates the limit for maximum pressure under continuous operation

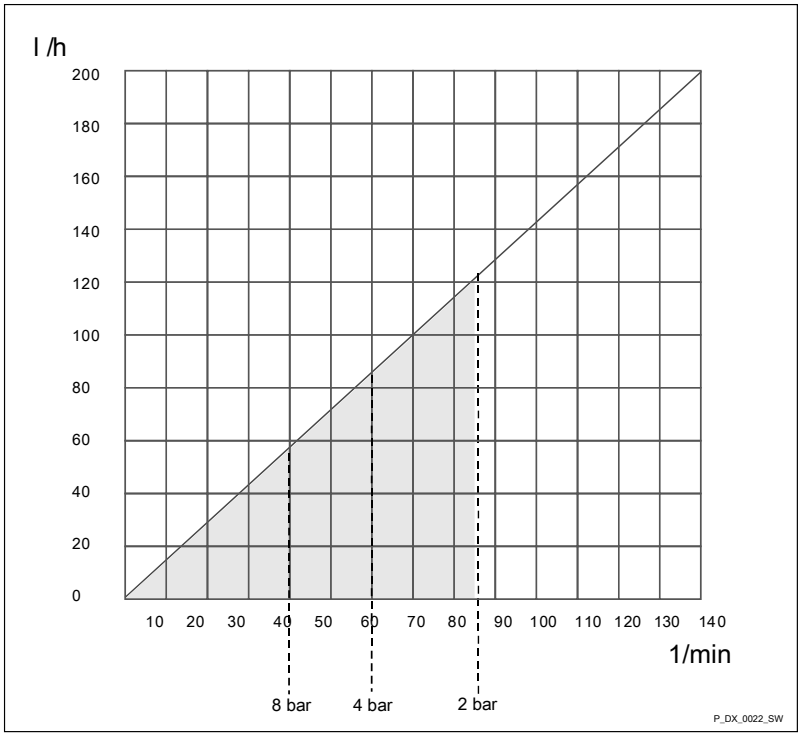


Fig. 4: DFBa 10

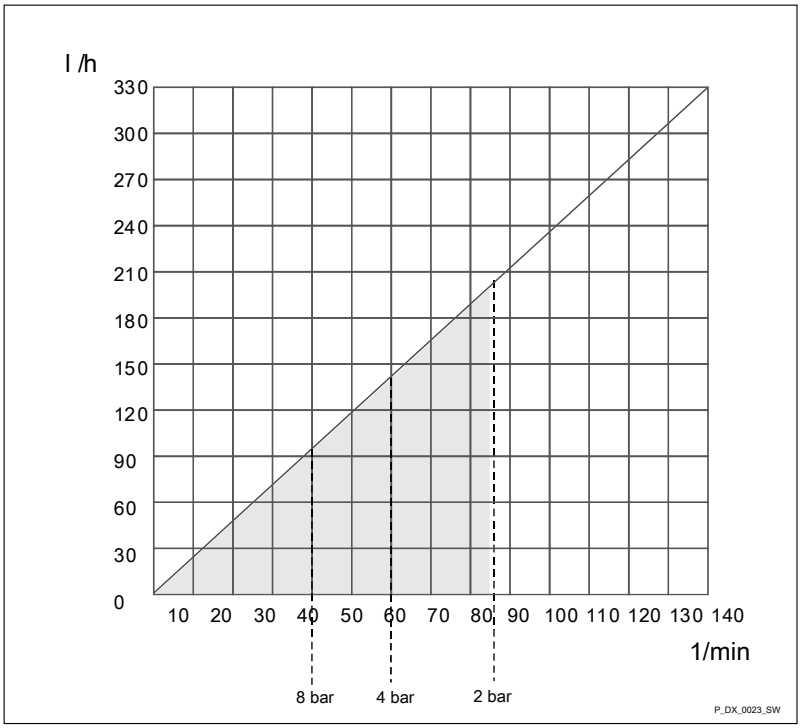


Fig. 5: DFBa 013

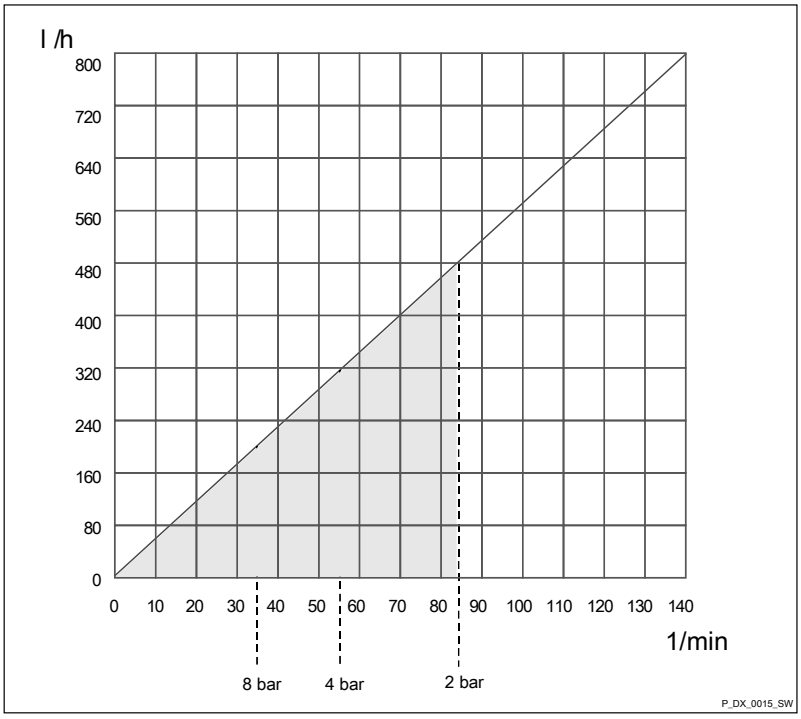


Fig. 6: DFBa 016

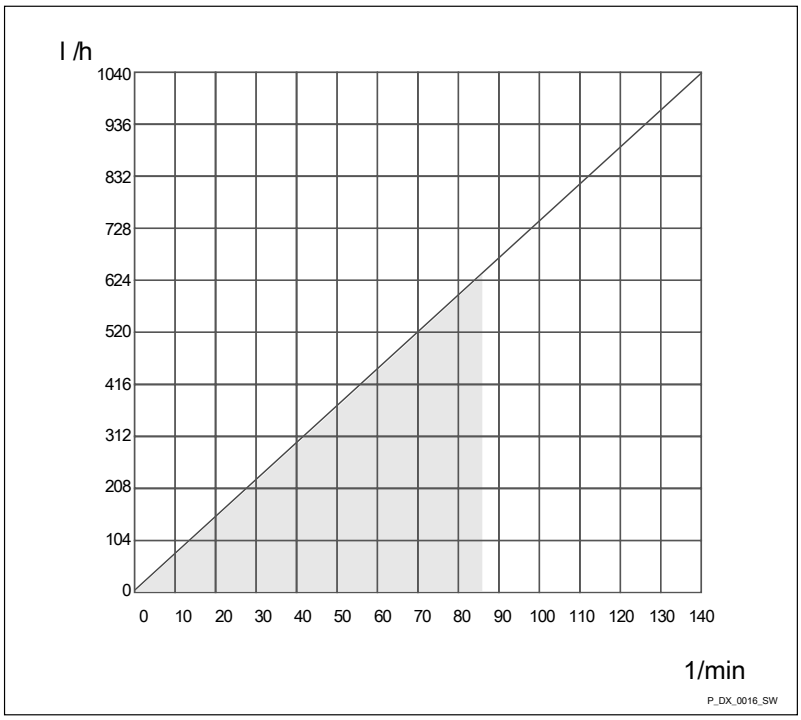


Fig. 7: DFBa 019

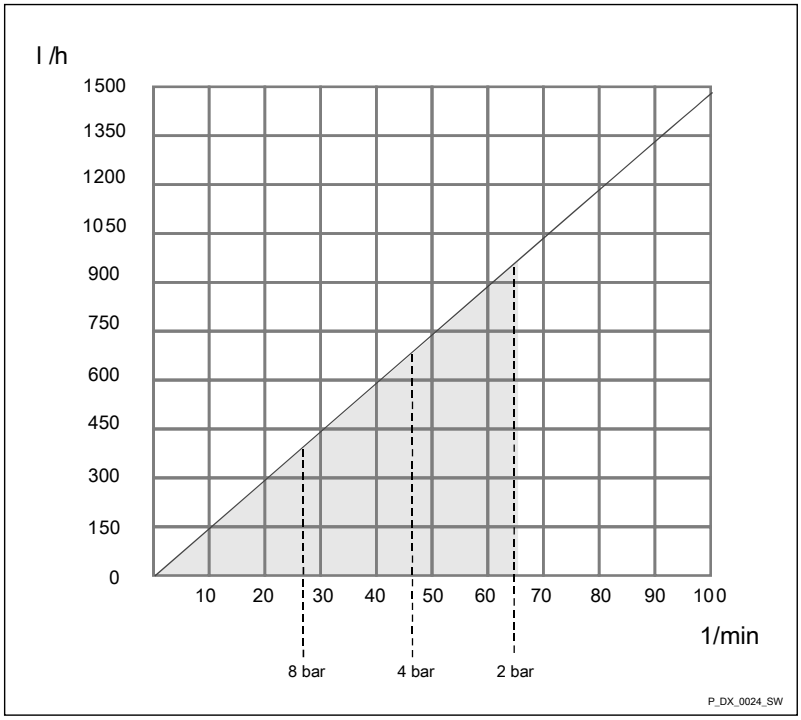


Fig. 8: DFBa 022

5 Commissioning

- **User qualification, commissioning:** trained user, see *Chapter 1.2 “Users' qualifications” on page 5*

5.1 Testing prior to commissioning the pump

The following tests are to be carried out:

- Ensure that the pump has not been damaged during transportation or storage. Immediately report any damage to the supplier
- Check that the mains voltage is suitable for the motor
- Ensure that the hose is suitable for the fluid to be conveyed and that it is not damaged
- Make sure that the temperature of the liquid does not exceed the recommended temperature range
- Only switch the pump on if it the front cover has been properly attached
- Check that the rollers are correctly fitted and fastened
- Check that the hose and rollers are sufficiently lubricated
- Check that the thermal overload protection (not included in the delivery scope) corresponds to the value specified on the motor type plate
- Check whether the direction of rotation is correctly adjusted
- Check that the optional electrical components are connected and are working properly
- Install a manometer in the pressure line if the back-pressure value is unknown
- Check the operating instructions in order to ensure that the flow values, pressures and power consumption of the motor do not exceed the rated values
- Install a pressure relief valve in the pressure line in order to protect the pump in the event that a valve is unintentionally closed off or the line is blocked in another way.

6 Operating the DFBa

- **User qualification, operation:** instructed persons, see
  ↳ *Chapter 1.2 “Users' qualifications” on page 5*

The peristaltic pump is to be fully integrated into the customer's designated plant and is then controlled by this plant. It is not possible to operate the pump directly.

7 Maintenance, repair, malfunctions, disposal and spare parts

- **User qualification, maintenance and disposal:** instructed persons, see *Chapter 1.2 "Users' qualifications" on page 5*
- **User qualification, repair and malfunctions:** trained user, see *Chapter 1.2 "Users' qualifications" on page 5*

7.1 Maintenance

CAUTION!
Disconnect the pump from the mains
Possible consequence: Personal injury

You may only carry out work on the pump after it has previously been switched off and disconnected from the mains.

Lubrication

- Check that the rollers and the hose are sufficiently lubricated
  - Check every 200 operating hours
- Check whether the oil level is correct for the step-down gears
  - Exchange the oil at regular intervals in accordance with the step-down gear maintenance manual.

7.2 Exchanging the pump hoses

Exchanging the pump hoses - dismantling

1. Close off all valves, in order to prevent leakage of the feed chemical
2. Dismantle the pump hoses from both discharge and suction sides
3. Remove the front cover
4. Remove a roller incl. the spacer plate (the roller that is not touching the pump hose)
5. Turn the rotor with the help of the motor so that the remaining roller is not pressing against the pump hose
6. Remove the pressure flange from the pump housing
7. Remove the pump hose to be exchanged
8. Dismantle the hydraulic connections from both pump hose ends

Exchanging the pump hoses - installation

1. Clean the interior surfaces of the pump housing
2. Lubricate the internal surfaces of the pump housing at the contact surfaces to the pump hose
3. Check the rollers. Ensure that the roller surfaces are not damaged
4. Attach the hydraulic connections at both hose ends with the help of the pressure flange
5. Lay the pump hose into the pump housing
6. Lubricate the pump hose and the rollers
7. Fasten the pressure flange to the pump casing

8. Turn the rotor with the help of the motor so that the remaining roller presses against the pump hose
9. Re-attach the second roller with spacer plates back onto the rotor
10. Attach the front cover to the pump housing
11. Mount the pump hoses from both discharge and suction sides
12. Open all of the valves

7.3 Troubleshooting

Problem	Possible cause	Solution
Increased pump temperature	Pump hose has no lubricant	Lubricate pump hose
	Increased product temperature	Reduce product temperature
	Insufficient or poor suction conditions	Check suction line for blockages
	Pump speed too high	Reduce pump speed
Reduced flow or pressure	Valves on discharge and or suction side completely or partially closed	Open valves
	Pump hose insufficiently compressed	Check roller fastening
	Pump hose rupture (the product leaks out into the housing)	Exchange pump hose
	Partial blockage of the suction line	Clean pipe
	Insufficient product quantity in storage container	Fill storage container or exchange pump
	Insufficient diameter on the suction side	Increase the diameter on the suctions side, as far as possible
	Suction line too long	Shorten the suction line, as far as possible
	High viscosity of medium	Reduce viscosity, as far as possible
	Air introduction in the suction connections	Check connections and accessories for air tightness
Vibrations on pumps and pipelines	The pipes are not correctly fastened	Fasten pipes correctly (e.g. wall brackets)
	Pump speed too high	Reduce pump speed
	Insufficient nominal width of the pipes	Increase nominal width
	Pump base plate loose	Fasten base plate
	Pulsation dampers insufficient or missing	Install pulsation dampers on suction and / or discharge side.
Short operational lifetime of the hoses	Chemical exposure	Check the compatibility of the hose with the liquid being conveyed, the cleaning fluid and the lubricant

Problem	Possible cause	Solution
	High pump speed	Reduce pump speed
	High conveying temperature	Reduce product temperature
	High operating pressure	Reduce operating pressure
	Pump cavitations	Check the suction conditions
Pump hose pulled into the pump housing	High inlet pressure (> 3 bar)	Reduce inlet pressure
	Pump hose filled with deposits	Clean or replace the pump hose
	Holder (pressure flange) insufficiently tightened	Re-tighten holder (pressure flange)
The pump does not start up	Insufficient motor performance	Check motor and replace if necessary
	Insufficient output from frequency converter	The frequency converter must match the motor
		Check voltage. Start occurs at minimum 10 Hz
	Blockage in the pump	Check if the suction or discharge side is blocked. Rectify blockage

7.4 Disposal of Used Parts

WARNING!

Danger due to feed chemicals

Possible consequence: Fatal or serious injuries

In the event that damage to the pump hose causes the pump to be contaminated with feed chemicals, then it is to be decontaminated with suitable agents (refer to the feed chemical safety data sheets).

NOTICE!

If no Declaration of Decontamination is affixed to the delivery, acceptance of the devices will be refused.

(also available as download from: www.prominent.com)

A signed "Declaration of Decontamination" is required by law and in order to protect our staff, before you order can be processed.

Please ensure that this is attached to the outside of the package. Otherwise we are unable to accept your delivery.

NOTICE!

Regulations governing disposal of used parts

– Note the current national regulations and legal standards which apply in your country

The pump hose is to be removed and disposed of on-site before sending the pump to ProMinent Dosiertechnik GmbH, Heidelberg / Germany.

ProMinent Dosiertechnik, Heidelberg/Germany is prepared to take back clean used parts.

7.5 Spare parts

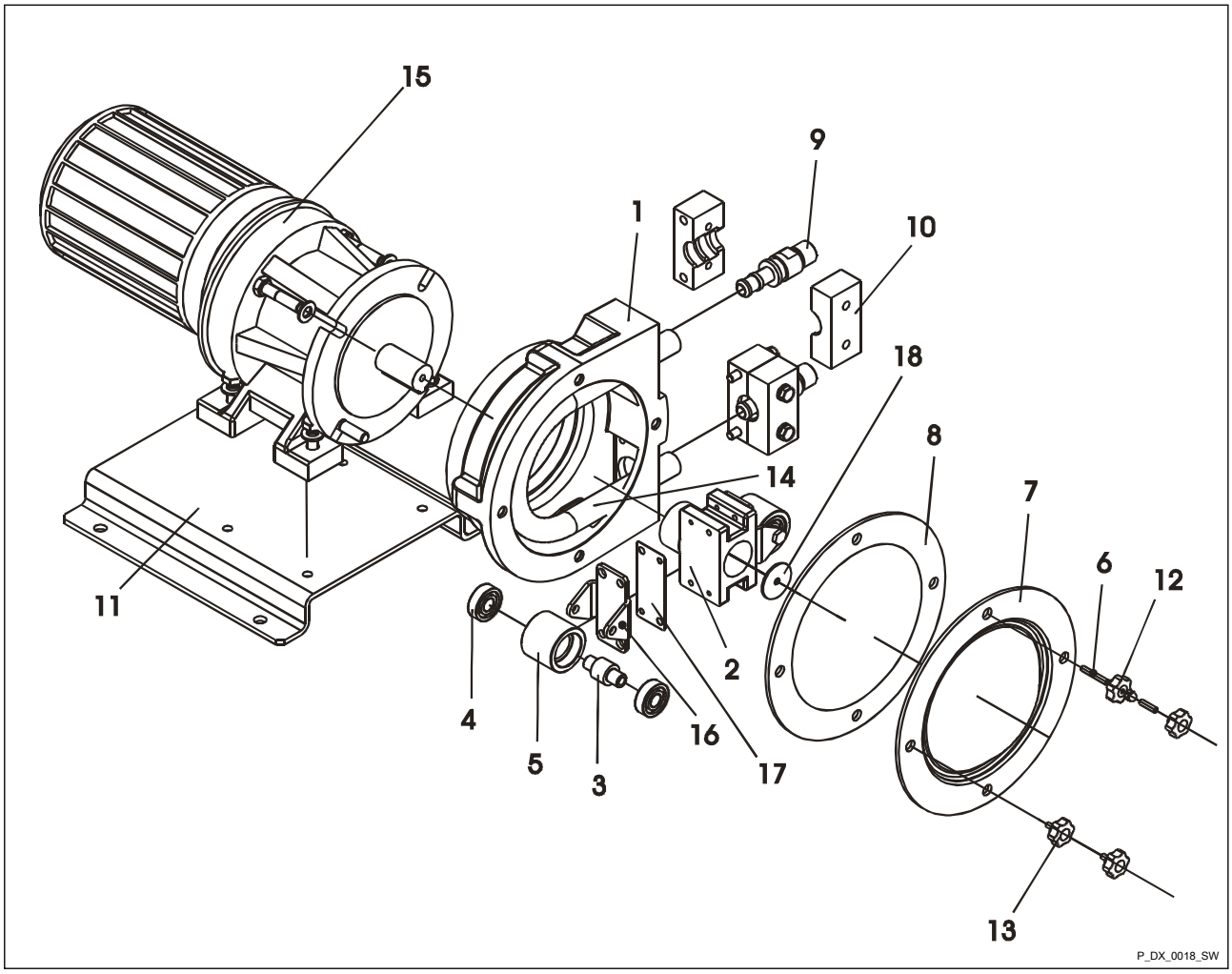


Fig. 9: Spare parts exploded view DFBa 010/013

DFBa 010 refer to Fig. 9				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
1	Pump housing	1	102.02.01	
2	Rotor (2 rollers)	1	102.02.03	
3	Rotor shaft	2	102.01.04	
4	Roller ball bearings	4	102.01.02	
5	Roller ⌀35	2	102.01.09	
6	Long bolts	1	102.00.07	
	Short bolts	3	102.00.14	
7	Front cover	1	102.00.08	
8	Seal front cover	1	102.00.05	
9	Connection VA-BSP	2	102.00.10	
	Connection PP-BSP	2	102.00.15	
	Connection PVDF-BSP	2	102.00.16	
	Connection VA-NPT	2	102.00.17	

DFBa 010
refer to Fig. 9

Pos.	Description	Quantity	Reference	Part number
	Connection PP-NPT	2	102.00.18	
	Connection PVDF-NPT	2	102.00.19	
	Connection DIN	2	102.00.20	
	Connection SMS	2	102.00.21	
	Connection TRI-CLAMP	2	102.00.22	
10	Pressure flange, standard	2	102.00.11	
	Pressure flange, thermoplastic hose	2	102.00.23	
11	Base plate	1	102.00.12	
	Base plate, stainless steel	1	102.00.24	
12	Nut	1	102.00.25	
13	Box nut	3	102.00.26	
14	Pump hose NR	1		1037150
	Pump hose NBR	1		1037151
	Pump hose EPDM	1		1037152
	Pump hose NR-A	1		1037153
	Pump hose NBR-A	1		1037154
	Pump hose NORPRENE	1		1037155
	Pump hose HYPAGLON	1		1037156
15	Drive	1		
16	Roller holder	2	102.01.06	
17	Spacer plate		102.01.07	
18	Rotor washer	1	102.01.10	

DFBa 013
refer to Fig. 9

Pos.	Description	Quantity	Reference	Part number
1	Pump housing	1	102.01.01	
2	Rotor (2 rollers)	1	102.01.03	
3	Rotor shaft	2	102.01.04	
4	Roller ball bearings	4	102.01.02	
5	Roller ⌀35	2	102.01.09	
6	Long bolts	1	102.00.07	
	Short bolts	3	102.00.14	
7	Front cover	1	102.01.08	
8	Seal front cover	1	102.01.05	

DFBa 013 refer to Fig. 9				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
9	Connection VA-BSP	2	103.00.10	
	Connection PP-BSP	2	103.00.15	
	Connection PVDF-BSP	2	103.00.16	
	Connection VA-NPT	2	103.00.17	
	Connection PP-NPT	2	103.00.18	
	Connection PVDF-NPT	2	103.00.19	
	Connection DIN	2	103.00.20	
	Connection SMS	2	103.00.21	
	Connection TRI-CLAMP 3/4"	2	103.00.22	
10	Pressure flange, standard	2	103.00.11	
	Pressure flange, thermoplastic hose	2	102.00.11	
11	Base plate	1	102.00.12	
	Base plate, stainless steel	1	102.00.24	
12	Nut	1	102.00.25	
13	Box nut	3	102.00.26	
14	Pump hose NR	1		1037157
	Pump hose NBR	1		1037158
	Pump hose EPDM	1		1037159
	Pump hose NR-A	1		1037160
	Pump hose NBR-A	1		1037161
	Pump hose NORPRENE	1		1037162
	Pump hose HYPALON	1		1037163
15	Drive	1		
16	Roller holder	2	102.01.06	
17	Spacer plate		102.01.07	
18	Rotor washer	1	102.01.10	

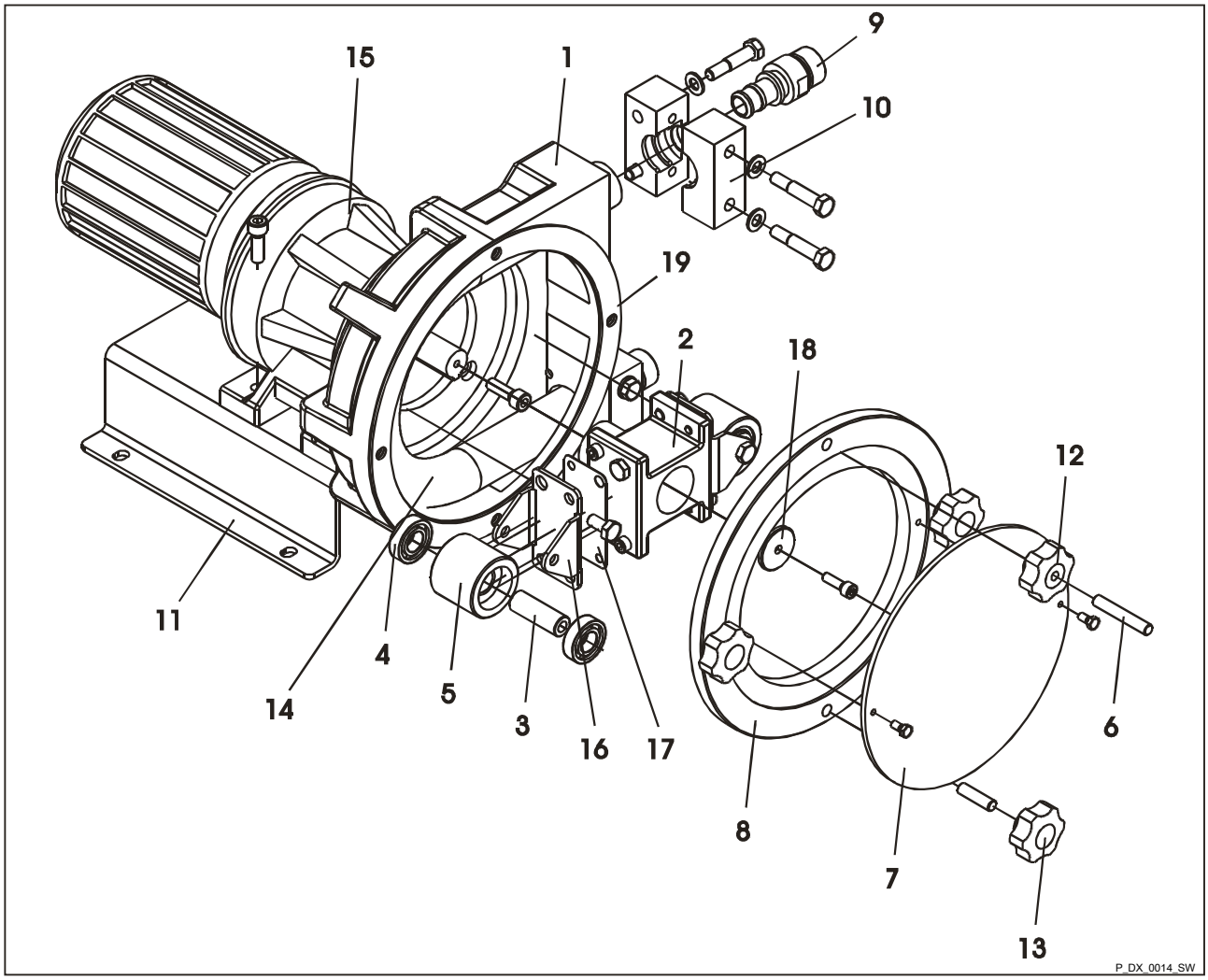


Fig. 10: Spare parts exploded view DFBa 016/019

DFBa 16 refer to Fig. 10				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
1	Pump housing	1	101.02.01	
2	Rotor	1	101.02.03	
3	Rotor shaft	2	101.01.04	
4	Roller ball bearings	4	101.01.36	
5	Roller ⌀45	2	105.01.07	
6	Long bolts	1	102.00.07	
	Short bolts	3	102.00.14	
7	Front cover	1	101.00.12	
8	Seal front cover	1	101.00.11	
9	Connection VA-BSP	2	101.00.13	
	Connection PP-BSP	2	101.00.14	
	Connection PVDF-BSP	2	101.00.15	

DFBa 16 refer to Fig. 10				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
	Connection VA-NPT	2	101.00.16	
	Connection PP-NPT	2	101.00.17	
	Connection PVDF-NPT	2	101.00.18	
	Connection DIN	2	101.00.19	
	Connection SMS	2	101.00.20	
	Connection TRI-CLAMP	2	101.00.21	
10	Pressure flange, standard	2	101.00.22	
	Pressure flange, thermoplastic hose	2	101.00.23	
11	Base plate	1	101.00.24	
	Base plate, stainless steel	1	101.00.25	
12	Nut	1	102.00.25	
13	Box nut	3	102.00.26	
14	Pump hose NR	1		1037164
	Pump hose NBR	1		1037165
	Pump hose EPDM	1		1037166
	Pump hose NR-A	1		1037167
	Pump hose NBR-A	1		1037168
	Pump hose NORPREN	1		1037169
	Pump hose TYGON	1		1037170
	Pump hose HYPAGLON	1		1037171
15	Drive	1		
16	Roller holder	2	101.02.34	
17	Spacer plate		101.02.35	
18	Rotor washer	1	101.02.13	
19	Cover seal	1	101.02.40	

DFBa 019 refer to Fig. 10				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
1	Pump housing	1	101.02.01	
2	Rotor	1	101.02.03	
3	Rotor shaft	2	101.01.04	
4	Roller ball bearings	4	101.01.36	
5	Roller D45	2	105.01.07	
6	Long bolts	1	102.00.07	

DFBa 019 refer to Fig. 10				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
	Short bolts	3	102.00.14	
7	Front cover	1	101.00.12	
8	Seal front cover	1	101.00.11	
9	Connection VA-BSP	2	105.00.13	
	Connection PP-BSP	2	105.00.14	
	Connection PVDF-BSP	2	105.00.15	
	Connection VA-NPT	2	105.00.16	
	Connection PP-NPT	2	105.00.17	
	Connection PVDF-NPT	2	105.00.18	
	Connection DIN	2	105.00.19	
	Connection SMS	2	105.00.20	
	Connection TRI-CLAMP	2	105.00.21	
10	Pressure flange, standard	2	101.00.22	
11	Base plate	1	101.00.24	
	Base plate, stainless steel	1	101.00.25	
12	Nut	1	102.00.25	
13	Box nut	3	102.00.26	
14	Pump hose TYGON	1		1037172
	Pump hose NORPREN	1		1037173
15	Drive	1		
16	Roller holder	2	101.02.34	
17	Spacer plate		101.02.35	
18	Rotor washer	1	101.02.13	
19	Cover seal	1	101.02.40	

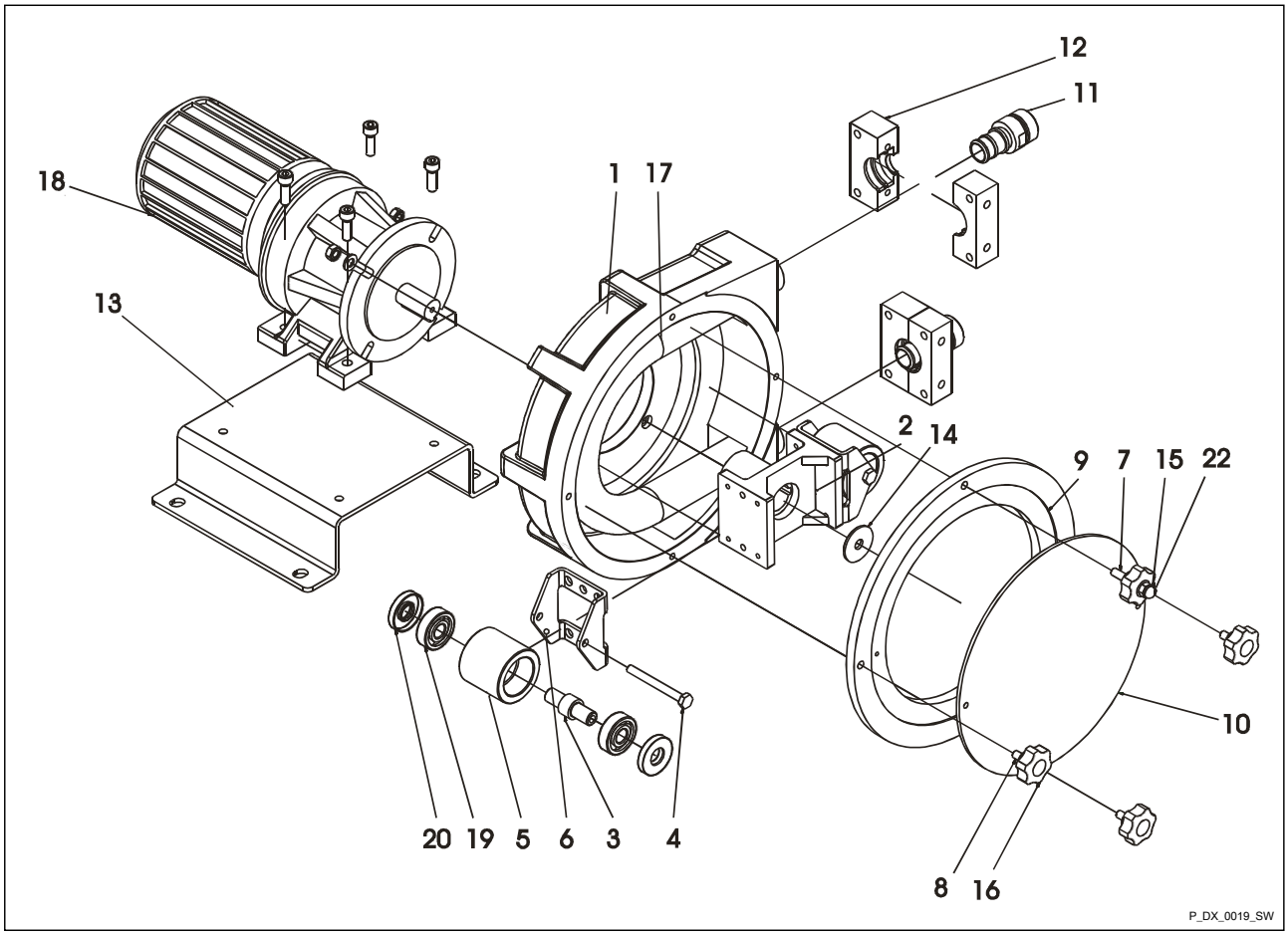


Fig. 11: Spare parts exploded view DFBa 22

DFBa 022 refer to Fig. 11				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
1	Pump housing	1	113.00.01	
2	Rotor	1	113.00.02	
3	Rotor shaft	2	113.00.03	
4	Screw rotor shaft	2	113.00.04	
5	Roller standard	2	113.00.05	
	Roller for thermoplastic hose	2	113.00.06	
6	Take-up roller	2	113.00.07	
7	Long bolts	1	102.00.07	
8	Short bolts	3	102.00.14	
9	Seal front cover	1	113.00.08	
10	Front cover	1	113.00.09	
11	Connection VA-BSP	2	113.00.10	
	Connection PP-BSP	2	113.00.11	
	Connection PVDF-BSP	2	113.00.12	

DFBa 022 refer to Fig. 11				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
	Connection VA-NPT	2	113.00.13	
	Connection PP-NPT	2	113.00.14	
	Connection PVDF-NPT	2	113.00.15	
	Connection DIN	2	113.00.16	
	Connection SMS	2	113.00.17	
	Connection TRI-CLAMP	2	113.00.18	
12	Pressure flange, standard	2	113.00.19	
	Pressure flange, thermoplastic hose	2	113.00.20	
13	Base plate	1	113.00.21	
	Base plate, stainless steel	1	113.00.22	
14	Rotor washer	1	113.00.23	
15	Nut	1	102.00.25	
16	Box nut	3	102.00.26	
17	Pump hose NR	1		1037175
	Pump hose NBR	1		1037176
	Pump hose EPDM	1		1037178
	Pump hose NR-A	1		1037179
	Pump hose NBR-A	1		1037180
	Pump hose NORPREN	1		1037181
	Pump hose HYPALON	1		1037182
18	Drive	1		
19	Roller bearing	4	113.00.31	
20	Seal roller bearing	4	113.00.32	

Lubricant				
Pos.	**Description**	**Quantity**	**Reference**	**Part number**
1	0.5 kg silicone grease for DULCO®flex DFBa	1		1037255
2	1.0 kg silicone grease for DULCO®flex DFBa	1		1037256

8 Technical data DFBa

Type DFBa	Feed rate in l/U	P max. in bar	Flow rate at max. pressure in l/h	Rollers/ shoes	Hose interior ⌀ in mm	Solids max. ⌀ in mm	Weight without drive in kg	Connector DN
010	0,024	8	56	Rollers	10	2,5	6	3/8"
013	0,039	8	92	Rollers	13	3,3	6	3/8"
016	0,092	8	200	Rollers	16	4,0	13	3/4"
019	0,12	2	600	Rollers	19	4,8	13	1"
022	0,24	8	375	Rollers	22	5,5	22	1"

8.1 Dimensions DFBa 010 / 013

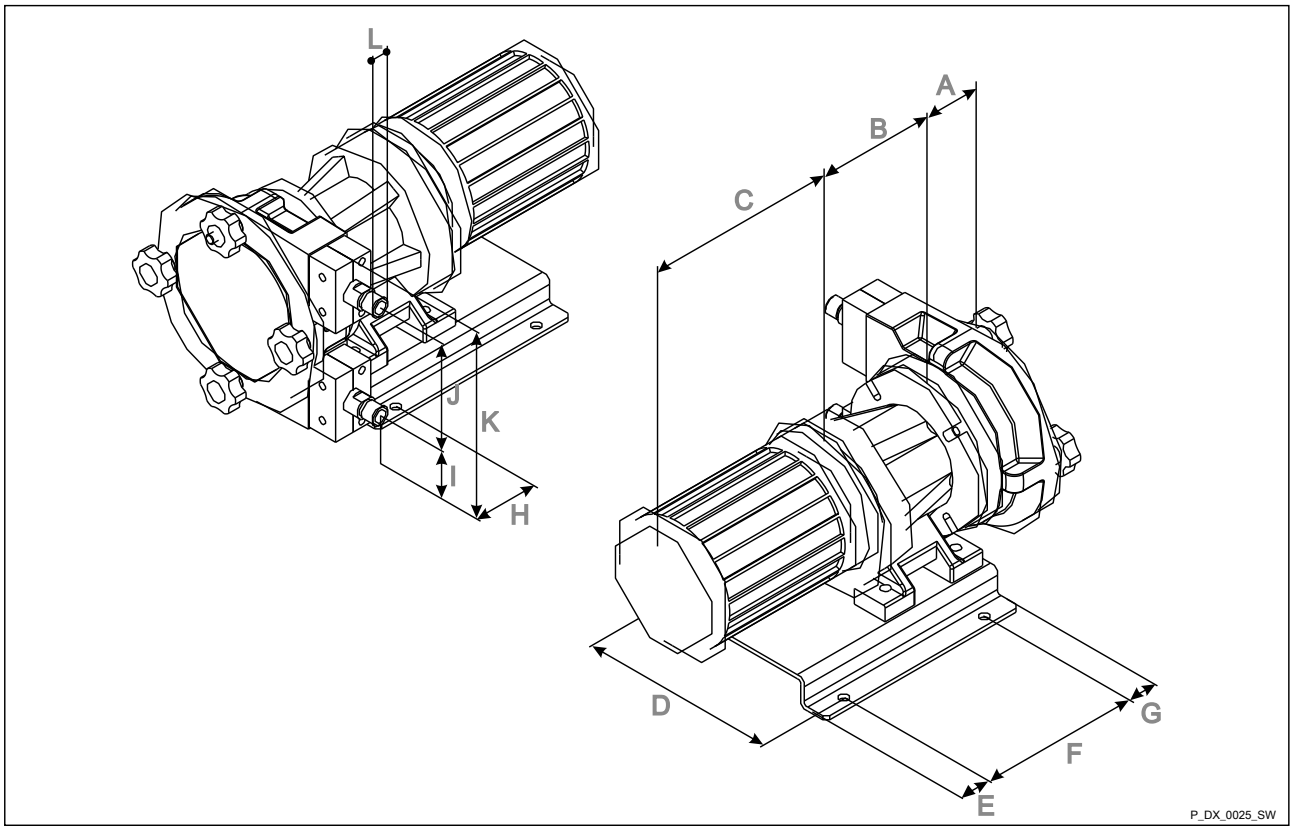


Fig. 12: Dimensions DFBa 010 / 013

A 70 mm
B *
C *
D 190 mm
E 30 mm
F 160 mm
G 30 mm
H 61 mm
I 60 mm
J 115 mm
K 210 mm
L 3/8" BSP
* Dependent on selected drive

8.2 Dimensions DFBa 016 / 019

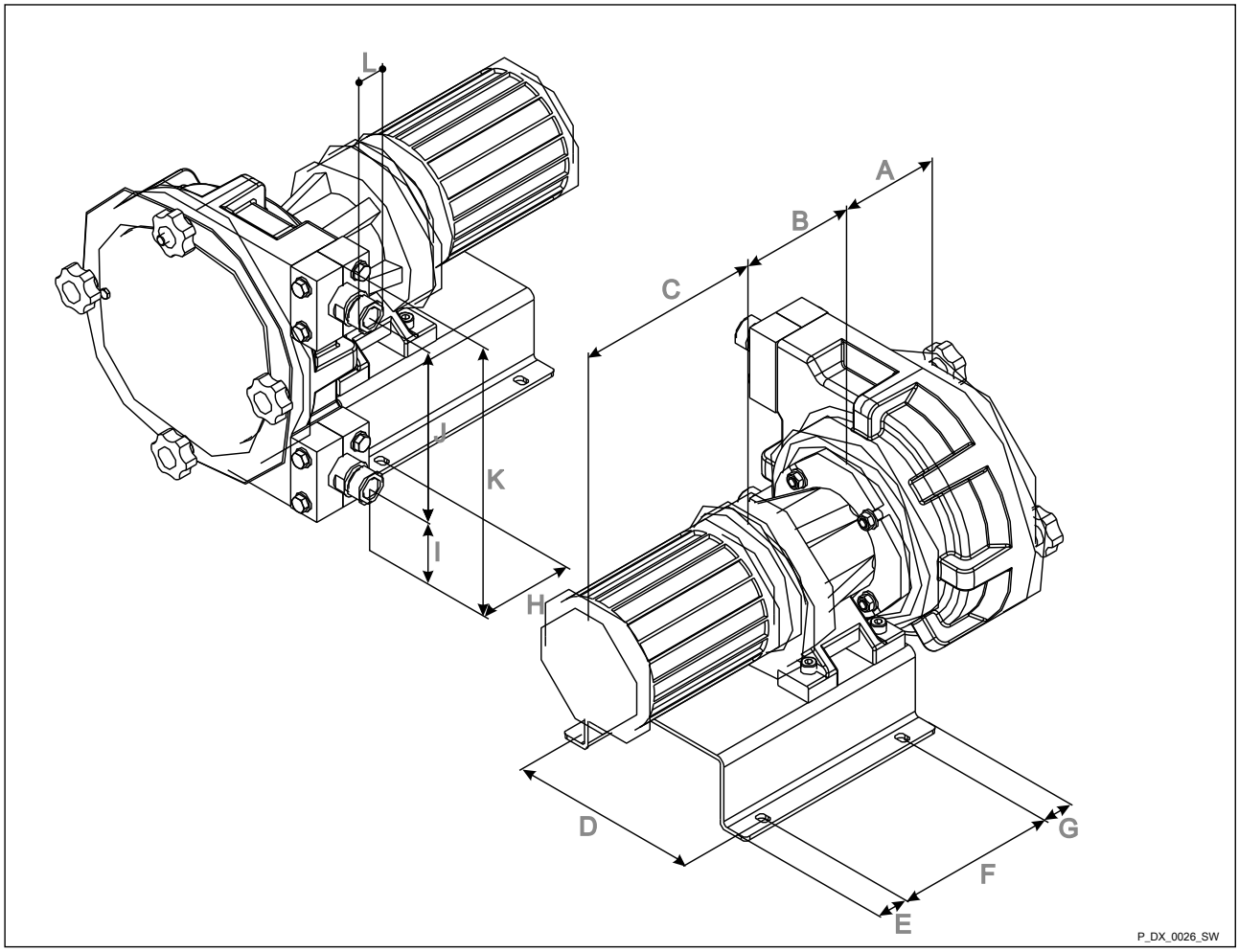


Fig. 13: Dimensions DFBa 016 / 019

A	119 mm
B	*
C	*
D	190 mm
E	30 mm
F	160 mm
G	30 mm
H	75 mm
I	60 mm
J	170 mm
K	265 mm
L	3/4" BSP
*	Dependent on selected drive

8.3 Dimensions DFBa 022

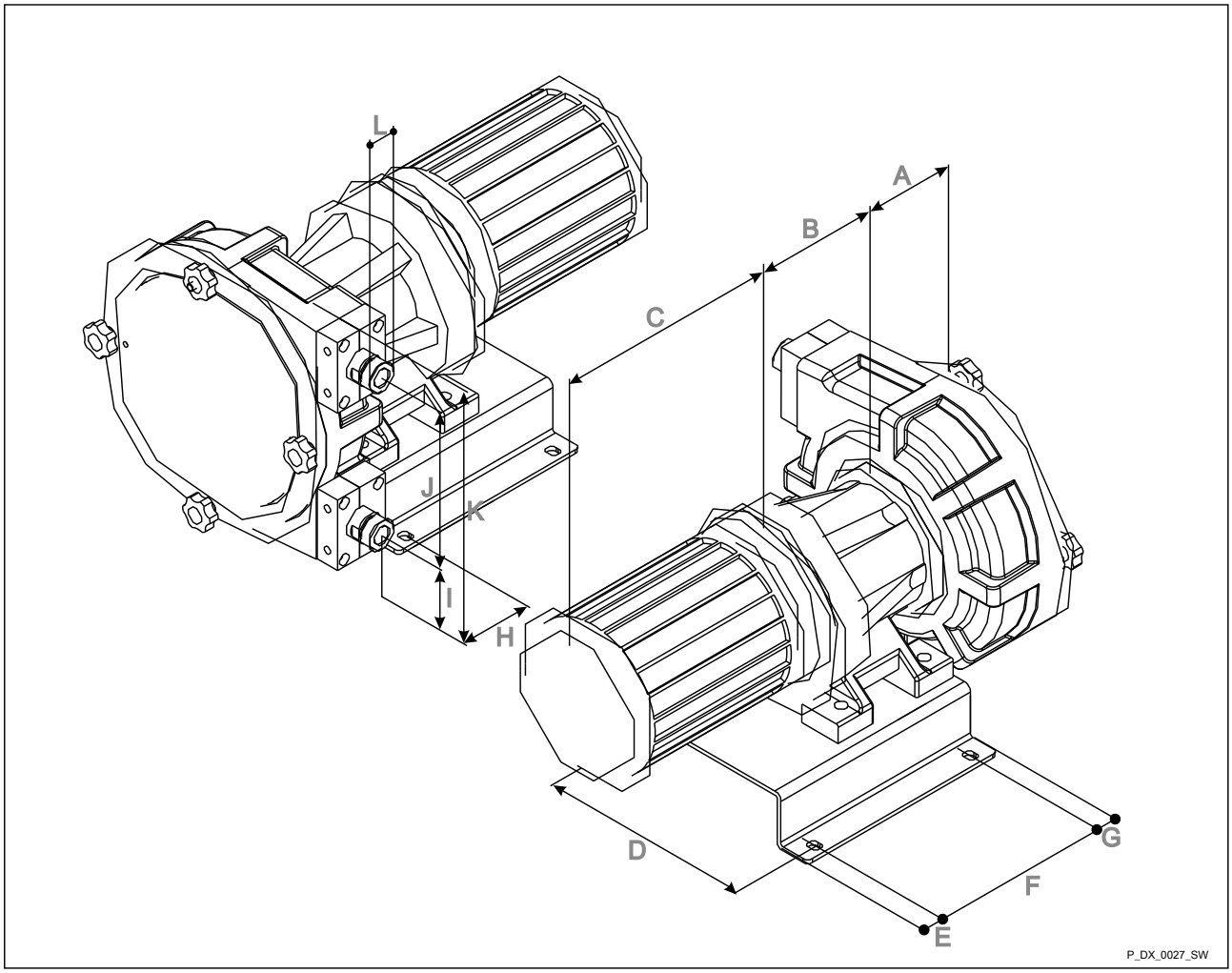


Fig. 14: Dimensions DFBa 022

A	110 mm
B	*
C	*
D	245 mm
E	25 mm
F	175 mm
G	25 mm
H	95 mm
I	85 mm
J	210 mm
K	355 mm
L	1" BSP
*	Dependent on selected drive

9 DFBa technical appendices

9.1 Declaration of Conformity

- Original -

EC Declaration of Conformity

We hereby declare,

ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5 - 11
DE - 69123 Heidelberg

that the following designated product complies with the pertinent fundamental safety and health requirements of the EC Directive in terms of its design and construction and in terms of the version marketed by us.
This declaration loses its validity in the event of a modification to the product not agreed with us.

Description of the product:	***Peristaltic pump DULCOflex***
Product type:	***DFAa..., DFBa..., DFCa..., DFDa...***
Serial no.:	***refer to nameplate on the device***
Pertinent EC Directives:	***EC Machinery Directive (2006/42/EC)*** ***EC EMC Directive (2004/108/EC)*** ***The protection targets laid out in the low-voltage regulations 2006/95/EG have, as shown in appendix I, Nr. 1.5.1 of the machine regulations 2006/42/EG been adhered to***
Applied harmonised standards in particular:	***EN ISO 12100-1, EN ISO 12100-2, EN 809, EN 60204-1, EN 60034-1, EN 60034-5, EN 60034-7, EN 61000-6-1, EN 61000-6-2***
Technical manuals were prepared by authorized documentation personnel:	***Norbert Berger*** ***Im Schuhmachergewann 5-11*** ***DE-69123 Heidelberg***
Date / Manufacturer - Signature :	*16.03.2010*
Details of the signatory:	*Joachim Schall, Head of Research and Development*

Fig. 15: EC Declaration of Conformity

10 Index