

Pneumatic double diaphragm pump

PM500

Translation of the original operating manual

CE  II 2 G Ex h IIB T4 Gb X

For professional use.

Always observe the information in this manual, particularly the safety instructions and the warning instructions. Store the manual in a safe place.

Edition: 08/2020

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1 ABOUT THESE INSTRUCTIONS

1.1 PREFACE

The operating manual contains information about safely operating, maintaining, cleaning and repairing the device. The operating manual is part of the device and must be available to the operating and service personnel.






The device may only be operated by trained personnel and in compliance with this operating manual. Operating and service personnel should be instructed according to the safety instructions.

This equipment can be dangerous if it is not operated according to the instructions in this operating manual.

1.2 WARNINGS, NOTICES AND SYMBOLS IN THESE INSTRUCTIONS

Warning instructions in this manual highlight particular dangers to users and to the device and state measures for avoiding the hazard.

These warning instructions fall into the following categories:

	DANGER	Immediate risk of danger. Non-observance will result in death or serious injury.
	WARNING	Potential danger. Non-observance may result in death or serious injury.
	CAUTION	Potentially dangerous situation. Non-observance may result in minor injury.
	NOTICE	Potentially dangerous situation. Non-observance may result in damage to property.
	Info	Provides information about particular characteristics and how to proceed.

Explanation of warning notice:

WARNING

This notice warns you of a danger!

Possible consequences of not observing the warning notice.

- ▶ The measures for preventing the hazard and its consequences.



1.3 GENERAL CHARACTERS AND SYMBOLS

The characters and symbols in this operating manual indicate the following:

- ✓ Requirement that must be fulfilled before an action can be performed.

1. Step 1 of an action to be performed with several action steps.

- ▶ Second level action step

2. Step 2

- ⇒ Intermediate result of an action

- ⇒ Result of a complete action

- ▶ Action to be performed with an action step

1. Numbered list, first level

- Numbered list, second level

- Non-numbered list, first level
- Non-numbered list, second level

[>> 8] = cross-reference on page

◆ = wearing parts

★ = included in service set

● = not part of the standard equipment but available as a special accessory

1.4 LANGUAGES

The operating manual is available in the following languages:

Original operating manual

Language	Order no.
German	2335746

Translation of the original operating manual

Language	Order no.	Language	Order no.
English	2335747	Russian	2359969
French	2335750	Chinese	2344687
Italian	2335748	Dutch	2407828
Portuguese	2404138	Turkish	2412086
Spanish	2335752		

Additional languages upon request or at: www.wagner-group.com

1.5 ABBREVIATIONS

Order no.	Order number
ET	Spare part
K	Marking in the spare parts lists
Pos	Position
Stk	Number of pieces
DH	Double stroke
SSt	Stainless steel
2K	Two components
PTFE	Polytetrafluorethylene
EPDM	Ethylene propylene diene monomer

1.6 TERMINOLOGY FOR THE PURPOSE OF THIS MANUAL

Cleaning

Cleaning	Manual cleaning of devices and device parts with cleaning agent.
Flushing	Internal flushing of paint-wetted parts with flushing agent.
Product pressure generator	Pump or pressure tank.

Personnel qualifications

Trained person	Is instructed in the tasks assigned to him/her, the potential risks associated with improper behavior as well as the necessary protective devices and measures.
Electrically trained person	Is instructed by an electrician about the tasks assigned to him/her, the potential risks associated with improper behavior as well as the necessary protective devices and measures.
Electrician	Can assess the work assigned to him/her and detect possible hazards based on his/her technical training, knowledge and experience in relevant provisions.
Skilled person in accordance with TRBS 1203 (2010/Revision 2012)	A person, who, based on his/her technical training, experience and recent vocational experience, has sufficient technical knowledge in the areas of explosion protection, protection from pressure hazards and electric hazards (if applicable) and is familiar with the relevant and generally accepted rules of technology so that he/she can inspect and assess the status of devices and coating systems based on workplace safety.

2 CORRECT USE

2.1 DEVICE TYPE

Pneumatic double diaphragm pump with order no.:

Metallic versions in aluminum.

Type	Order no.
PM500	U509.A0
PM500	U509.A0A

2.2 TYPE OF USE

The device is suitable for processing liquid products like paints and lacquers:

- Non-ignitable products.
- Products in accordance with their classification in explosion class IIB.

WAGNER explicitly prohibits any other use!

The device may only be operated under the following conditions:

- ▶ Use the device only to work with the materials recommended by WAGNER.
- ▶ Do not deactivate safety fixtures.
- ▶ Use only WAGNER original spare parts and accessories.
- ▶ The operating personnel must be trained on the basis of this operating manual.
- ▶ Follow the instructions in the operating manual.

2.3 FOR USE IN POTENTIALLY EXPLOSIVE AREAS

The device can be employed in explosion hazard zones (Zone 1) (see Chapter Identification [▶▶ 10]).



2.4 PROCESSIBLE WORKING MATERIALS

Fluid materials like paints and lacquers.

Application	PM 500
Water-dilutable products	↗
Solvent-based lacquers and paints	↗
Two-component coating products	↗
Emulsions	↗
UV lacquers	↗
Primers	↗
Epoxy and polyurethane lacquers, phenolic lacquers	↗
Liquid plastics	→
Wax-based underside protection	↗
Shear-sensitive lacquers	↗

Signs and definitions:

- ↗ recommended
- limited suitability
- ↘ not suitable

! NOTICE

Abrasive working materials and pigments!

Greater wear of product-wetted parts.

- ▶ Use the application-oriented model (flow rate/cycle, product, valves, etc.) as indicated in the Chapter Technical Data.
- ▶ Check if the fluids and solvents being used are compatible with the pump construction materials as indicated in the Chapter Materials of Paint-wetted Parts.

Wear caused by abrasive working materials is not covered by the warranty.

Typical applications

Application	PM 500
Furniture industry	↗
Kitchen manufacturers	↗
Joinery	↗
Window factories	→
Steel-processing industry	→
Construction of vehicles	↗
Shipbuilding	↘

Signs and definitions:

- ↗ recommended
- limited suitability
- ↘ not suitable

2.5 MISUSE

Misuse can lead to physical injury and/or property damage! Special attention must be paid that:

- ▶ No dry coating products, e.g., powder are processed.
- ▶ No food, medicine or cosmetics are processed. It is important to note that the device's materials are not food-safe.

3 IDENTIFICATION

3.1 EXPLOSION PROTECTION IDENTIFICATION

Device types: **Metallic versions in aluminum**

Pneumatic double diaphragm pumps with Order no.

PM500	PM500
U509.A0	U509.A0A

As defined in Directive 2014/34/EU (ATEX), the device is suitable for use in potentially explosive areas.

Manufacturer Wagner International AG
9450 Altstätten
Switzerland



II 2 G Ex h IIB T4 Gb X

CE	European Communities
Ex	Symbol for explosion protection
II	Device class II
2	Category 2 (zone 1)
G	Ex-atmosphere gas
Ex	Ignition protection
h	Ignition protection for non-electrical devices
IIB	Explosion group
T4	Maximum surface temperature < 135 °C; 275 °F (with drying protection active)
Gb	Zone 1 high safety level
X	Special notes (see Chapter Identification "X" [►► 10])



3.2 IDENTIFICATION "X"

The maximum surface temperature corresponds to the permissible product temperature. This and the permissible ambient temperature can be found in Chapter Technical data.

Safe Handling of WAGNER Spray Devices

Mechanical sparks can form if the device comes into contact with metal.

In an explosive atmosphere:

- Knocking or pushing metal against metal is to be avoided.
- Do not drop the device.

Maximum surface temperature

The maximum surface temperature of the pump depends on the operating conditions (heated product) and not on the device (frictional heat).

Ignition temperature of the coating product

- Ensure that the ignition temperature of the coating product is above the maximum surface temperature.

Ambient temperature

The permissible ambient temperature range is: 4 °C to 40 °C; 39 °F to 104 °F.

Electrostatic surface spraying

- Do not spray device parts using electrostatic equipment.



Cleaning

If there are deposits on the surfaces, the device may form electrostatic charges. Flames or sparks can form during discharge.

- Remove deposits from the surfaces to maintain conductivity.
- Use only a damp cloth to clean the device.



Air in the pump fluid

Ignitable gas mixtures can form if air enters the pump fluid.

- Prevent the pump from taking in air and running dry.
- If air has been taken in, fix the leak. Then, fill slowly and in a controlled manner until the air has escaped.

Air in the pumped liquid can be caused by damaged diaphragms.

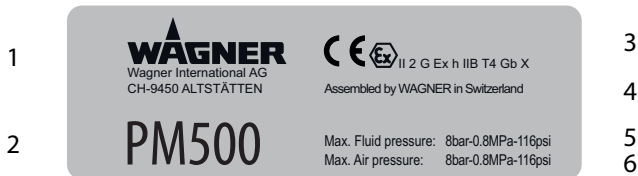
- Avoid operating the pump with damaged diaphragms.
- Periodically check that the pump is working smoothly, paying special attention to the presence of air in the pumped fluid.

Filling and emptying

Ignitable gas mixtures can form in the fluid section or product hoses if the pump must be emptied for maintenance and/or repair purposes.

- Empty and fill the device slowly and in a controlled manner.
- Avoid potentially explosive atmosphere in the surroundings.

3.3 TYPE PLATE



B_07806

Example type plate PM500

1	Manufacturer	4	Indication of origin
2	Device type	5	Max. product pressure
3	CE identification	6	Max. air pressure

4 BASIC SAFETY INSTRUCTIONS

4.1 SAFETY INSTRUCTIONS FOR THE OPERATOR

- ▶ Keep this operating manual at hand near the device at all times.
- ▶ Always follow local regulations concerning occupational safety and accident prevention regulations.



4.1.1 Electrical Devices and Equipment

Danger of electric shock!

Danger to life from electric shock:

- ▶ Prepare device in accordance with the local safety requirements with regard to the operating mode and ambient influences.
- ▶ May only be maintained by skilled electricians or under their supervision. With open housings, the mains voltage poses a danger.
- ▶ Operate device in accordance with the safety regulations and electrotechnical regulations.
- ▶ Do not disconnect any plug connections during operation.
- ▶ Label plug connections with the warning "Do not disconnect when energized".
- ▶ Must be repaired immediately in the event of problems.
- ▶ Decommission if device poses a danger or is damaged.
- ▶ Must be de-energized before work is commenced.
 - ▶ Secure the device against being switched back on without authorization.
 - ▶ Inform personnel about planned work.
 - ▶ Observe electrical safety regulations.
- ▶ Ground all devices to a common grounding point.
- ▶ Only operate the device with a properly installed socket with a protective ground wire connection.
- ▶ Keep liquids away from electrical devices.



4.1.2 A Safe Work Environment

Danger due to dangerous fluids or vapors!

Severe or fatal injuries due to explosion danger or inhalation, swallowing or contact with the skin or eyes.

- ▶ Ensure that the floor in the working area is static dissipative in accordance with EN 61340-4-1 (resistance must not exceed 100 MΩ).
- ▶ Paint mist extraction systems/ventilation systems must be fitted on site according to local regulations.
- ▶ Make sure that the ground connection and potential equalization of all system parts are reliable and continuous and can withstand the expected stress (e.g., mechanical stress, corrosion).
- ▶ Ensure that product hoses/air hoses adapted to the working pressure are used.
- ▶ Ensure that personal protective equipment is available and is used.



- ▶ Ensure that all persons within the working area wear static dissipative shoes. Footwear must comply with EN 20344. The measured insulation resistance must not exceed 100 MΩ.
- ▶ Ensure that during spraying, persons wear static dissipative gloves. The grounding takes place via the spray gun's handle or its trigger.
- ▶ Protective clothing, including gloves, must comply with EN 1149-5. The measured insulation resistance must not exceed 100 MΩ.
- ▶ Ensure that there are no ignition sources such as naked flames, sparks, glowing wires, or hot surfaces in the vicinity. No smoking.
- ▶ Ensure that the pipe joints, hoses, equipment parts and connections are permanently, technically leak-proof:
 - ▶ Periodic preventative maintenance and service (replacing hoses, checking tightness strength of connections, etc.)
 - ▶ Regular monitoring of leaks and defects via visual inspection and odor testing, e.g., daily before commissioning, at the end of work or weekly.
- ▶ Ensure that maintenance and safety checks are performed regularly.
- ▶ In the event of defects, immediately bring the device or system to a stop and arrange to have repairs carried out immediately.

4.1.3 Personnel Qualifications

Danger due to incorrect use of device!

Risk of death due to untrained personnel.

- ▶ Ensure that the operating personnel has been instructed by the operator in accordance with the operating manual and the operating instructions. The device must only be operated, maintained and repaired by trained personnel. Refer to the operating instructions for information about the required personnel qualifications.

4.2 SAFETY INSTRUCTIONS FOR THE PERSONNEL

- ▶ Always observe the information in this manual, particularly the safety instructions and the warning instructions.
- ▶ Always follow local regulations concerning occupational safety and accident prevention regulations.



Danger due to high-voltage field!

Danger to life from malfunction of active implants.

- ▶ Persons belonging to a risk group according to EMF guideline 2013/35/EU (e.g., carriers of active implants), must not enter the high-voltage area.



4.2.1 Personal Safety Equipment

Danger due to dangerous fluids or vapors!

Serious or fatal injuries due to inhalation, swallowing or contact with the skin or eyes.

- ▶ When preparing or working with lacquer and when cleaning the device, follow the working instructions of the manufacturer of the lacquers, solvents and cleaning agents being used.
- ▶ Implement the prescribed safety measures, in particular the wearing of safety glasses, safety clothing and protective gloves as well as the use of protective hand cream.
- ▶ Use a mask or breathing apparatus if necessary.



- ▶ For sufficient health and environmental safety: Operate the device in a spray booth or on a spraying wall with the ventilation (extraction) switched on.
- ▶ Wear suitable protective clothing when working with hot products.

4.2.2 Safe Handling of WAGNER Spray Devices

Danger due to injection of lacquer or flushing agent into the skin!

The spray jet is under pressure and can cause dangerous injuries.

Avoid injection of lacquer or flushing agents:

- ▶ Never point the spray gun at people.
- ▶ Never reach into the spray jet.
- ▶ Perform the following measures before any work on the device, in the event of work interruptions and malfunctions:
 - ▶ Switch off the energy/compressed air supply
 - ▶ Relieve the pressure from the spray gun and device
 - ▶ Securing the Spray Gun Against Actuation
 - ▶ Disconnect the control unit from the mains
 - ▶ In the event of functional faults, remedy the fault as described in the Troubleshooting chapter
- ▶ If needed, the liquid ejection devices must be checked by experts (e.g., WAGNER service technician) at least every 12 months for their work-safe condition in accordance with DGUV regulation 100-500 Chapter 2.29 and Chapter 2.36.
 - ▶ For shut down devices, the examination can be suspended until the next start-up.



In the event of skin injuries caused by lacquer or flushing agents:

- ▶ Note the lacquer or flushing agent that you have been using.
- ▶ Consult a doctor immediately.

4.2.3 Grounding the Device

Danger due to electrostatic charge!

Risk of injury, explosion hazard and damage to the device.

Friction, flowing liquids and air or electrostatic coating processes create charges. Flames or sparks can form during discharge. Correct grounding of the entire spraying system prevents electrostatic charges.

- ▶ Ensure that all devices and tanks are grounded before each spraying process.
- ▶ Make sure that the ground and potential equalization of all system parts are performed reliably and continuously and can withstand the expected stress (e.g., mechanical stress, corrosion).
- ▶ Ground the work pieces to be coated.
- ▶ Ensure that all persons inside the working area are grounded, e.g., that they are wearing static dissipative shoes.
- ▶ Wear static dissipative gloves when spraying. The grounding takes place via the spray gun's handle or its trigger.



4.2.4 Product Hoses

Danger due to bursting of product hose!

The product hose is under pressure and may cause dangerous injuries.

- ▶ Ensure that the hose material is chemically resistant to the sprayed products and the flushing agents used.
- ▶ Ensure that the product hoses and the fittings are suitable for the pressure generated.
- ▶ Ensure that the following information can be seen on the high-pressure hose:
 - ▶ Manufacturer
 - ▶ permissible operating pressure
 - ▶ Date of manufacture
- ▶ Make sure that the hoses are laid only in suitable places. Hoses should not be laid in the following places under any circumstances:
 - ▶ in high traffic areas
 - ▶ on sharp edges
 - ▶ on moving parts
 - ▶ on hot surfaces
- ▶ Ensure that the hoses are never run over by vehicles (e.g., fork lifts), or that the hoses are never put under pressure from the outside in any other way.
- ▶ Ensure that the hoses are never kinked. Observe maximum bending radii.
- ▶ Ensure that no work is ever performed with a damaged hose.
- ▶ Make sure that the hoses are never used to pull or move the device.
- ▶ The electrical resistance of the product hose, measured at both valves, must be less than 1 MΩ.
- ▶ Suction hoses may not be subjected to pressure.

Several liquids have a high expansion coefficient. In some cases, their volume can rise with consequent damage to pipes, fittings, etc. and cause fluid leakage.

When the pump sucks liquid from a closed tank, ensure that air or a suitable gas can enter the tank. In this way a negative pressure is avoided. The vacuum could implode the tank (squeeze) and can cause it to break. The tank would leak and the liquid would flow out.

The pressure created by the pump can be a multiple of the input air pressure.



4.2.5 Cleaning and Flushing

Danger due to cleaning and flushing!

Explosion hazard and damage to the device.

- ▶ Non-ignitable cleaning agents and flushing agents should preferably be used.
- ▶ When carrying out cleaning work with flammable cleaning agents, make sure that all equipment and resources (e.g., collection tank, funnel, transport cart) are conductive or static dissipative and grounded.
- ▶ Observe the specifications of the lacquer manufacturer.
- ▶ Ensure that the flash point of the cleaning agent is at least 15 K above the ambient temperature or that cleaning is undertaken at a cleaning station with technical ventilation.



- ▶ Never use chloride or halogenated solvents (such as trichloroethane and methylene chloride) with devices containing aluminium or galvanized/zinc-plated parts. They may react chemically thus producing an explosion danger.
- ▶ Take measures for workplace safety.
- ▶ It should be noted that when the device is put into operation or emptied: depending on the coating product used, depending on the rinsing agent (solvent) used, there may briefly be a mixture inside the pipes and equipment which can ignite.
- ▶ Only use electrically conductive tanks for cleaning and flushing agents.
- ▶ The tanks must be grounded.

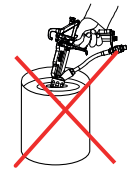
An explosive gas/air mixture forms in closed tanks.

- ▶ Never spray into a closed tank when using solvents for flushing.

External Cleaning

When cleaning the exterior of the device or its parts, also observe the following:

- ▶ Relieve the pressure from the device.
- ▶ De-energize the device electrically.
- ▶ Disconnect the pneumatic supply line.
- ▶ Use only moistened cloths and brushes. Never use abrasive agents or hard objects and never spray cleaning agents with a gun. Cleaning the device must not damage it in any way.
- ▶ Ensure that no electric component is cleaned with or immersed into solvent.



4.2.6 Touching Hot Surfaces

Danger due to hot surfaces because of hot coating products!

Risk of burn injuries

- ▶ Only touch hot surfaces if you are wearing protective gloves.
- ▶ When operating the device with a coating product with a temperature of > 43 °C; 109 °F, apply a warning label to the device that says "Warning - Hot Surface."



Instruction label: Order no. 9998910

Protection label: Order no. 9998911

Info

Order the two labels together.



4.2.7 Maintenance and Repair

Danger due to improper maintenance and repair!

Danger to life and equipment damage.

- ▶ Only a WAGNER service center or a suitably trained person may carry out repairs and replace parts.
- ▶ Repair or replacement of devices or parts of devices are only allowed to be performed outside the hazard area by qualified personnel.
- ▶ Use only WAGNER original spare parts and accessories.
- ▶ Do not change or modify the device; if change is necessary, contact WAGNER.
- ▶ Only repair and replace parts that are listed in the accessories and spare parts chapter and that are assigned to the device.

- ▶ Do not use any defective components.
- ▶ Before all work on the device and in the event of work interruptions:
 - ▶ Relieve the pressure from the spray gun, product hoses and all devices.
 - ▶ Secure the spray gun against actuation.
 - ▶ Switch off the energy and compressed air supply.
 - ▶ Disconnect the control unit from the mains.
- ▶ Observe the operating and service manual for all work.

4.2.8 Protective and Monitoring Equipment

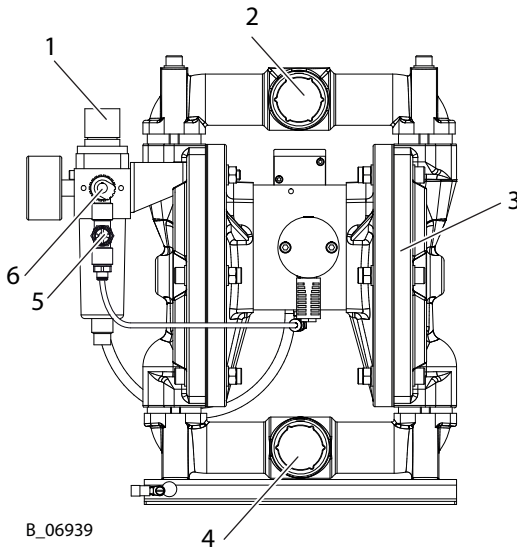
Danger due to removal of protective and monitoring equipment!

Danger to life and equipment damage.

- ▶ Protective and monitoring equipment must not be removed, modified or rendered unusable.
- ▶ Regularly check for perfect functioning.
- ▶ If defects are detected on protective and monitoring equipment, the system must not be operated until these defects are remedied.

5 DESCRIPTION

5.1 COMPONENTS OF PM500



1	Pressure regulator unit	4	Product input
2	Product output	5	Safety valve
3	Pump housing	6	Air input

5.2 MODE OF OPERATION

The double diaphragm pump is driven with compressed air. A pneumatic manifold alternates in supplying two diaphragms with compressed air. Diaphragm motion is created in this manner. The product is thus sucked in and displaced again. A series of four non-return valves prevents the liquid from flowing back, thus producing the suction and delivery phases in each pumping chamber, and generating the pumping effect.

5.3 PROTECTIVE AND MONITORING EQUIPMENT

WARNING

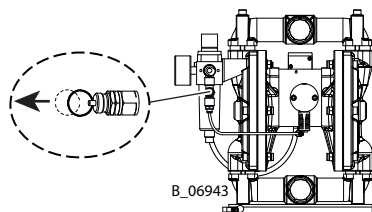
Overpressure!

Danger to life from bursting device components.

- ▶ Never change the safety valve setting.



The air motor is fitted with a safety valve. The safety valve has been set and sealed at the factory. In case of pressures over and above the permissible operating pressure, the valve, which is held with a spring, automatically opens and releases the excess pressure.



5.4 SCOPE OF DELIVERY

Stk	Order no.	Designation
1	--	Diaphragm pump PM 500
The standard equipment includes:		
1	See Chapter EU Declaration of Conformity [▶▶ 56]	Declaration of Conformity
1	2335746	Operating manual, in German
1	See Chapter Languages [▶▶ 6]	Operating manual in the local language

The delivery note shows the exact scope of delivery. Accessories: see Chapter Accessories [▶▶ 51].

5.5 DATA

5.5.1 Materials of Paint-wetted Parts

Type	Order no.	Pump body	Di- aphragm	Diaphragm disc	Valve seat	Valve ball	O-rings
PM 500	U509.A0	Aluminum	PTFE	Stainless steel	Stainless steel	Stainless steel	EPDM
PM 500	U509.A0A	Aluminum, nickel-coated	PTFE	Stainless steel	Stainless steel	Stainless steel	EPDM

Positions of the individual parts: See Chapter Spare Parts [▶▶ 52].

5.5.2 Technical Data

Description	Units	PM500 U509.A0	PM500 U509.A0A
Pump ratio		1:1	
Volume flow per double stroke (DH)	cm ³	500	
	cu inch	30.51	
Maximum operating pressure	MPa	0.8	
	bar	8	
	psi	116	
Maximum speed	DH/min	150	
Maximum flow rate	l/min	75	
	GPM	19.8	
Compressed air quality: free from oil and water	Quality standard 7.5.4 according to ISO 8573.1: 2010		
		7: Particle concentration 5 – 10 mg/m ³ 5: Humidity: pressure dew point: ≤ +7 °C 4: Oil content: ≤ 5 mg/m ³	
Minimum air inlet pressure	MPa	0.2	
	bar	2.0	
	psi	29	
Maximum air inlet pressure	MPa	0.8	
	bar	8	
	psi	116	
Air inlet connection (plug)	BSP(R)	1/4"	

Description	Units	PM500 U509.A0	PM500 U509.A0A
Maximum suction height (1)	m	6.0	
	ft	19.5	
Maximum solid body size	mm	3.5	
	Inches	0.14	
Sound pressure equivalent of 40 cycles/min., supply 6 bar (2)	dB(A)	81	
Liquid connections (inlet & outlet bushing)	BSP(G)	1"	
Weight	kg	13.8	
	lb	30.5	
Maximum product pressure at the pump's inlet	MPa	0.1	
	bar	1	
	psi	14.5	
Product temperature	°C	4 – 90	
	°F	39.2 – 194	
Ambient temperature	°C	4 – 40	
	°F	39.2 – 104	
Allowable inclination for operation	∠°	± 10	

* A-rated emission sound pressure level measured at 1-m distance, LpA1m, according to DIN EN 14462: 2015. Reference measurements have been made by SUVA (Swiss Accident Insurance Institute).

1. Start condition: Empty pump/dry valves
2. LqA (10s)

⚠ WARNING

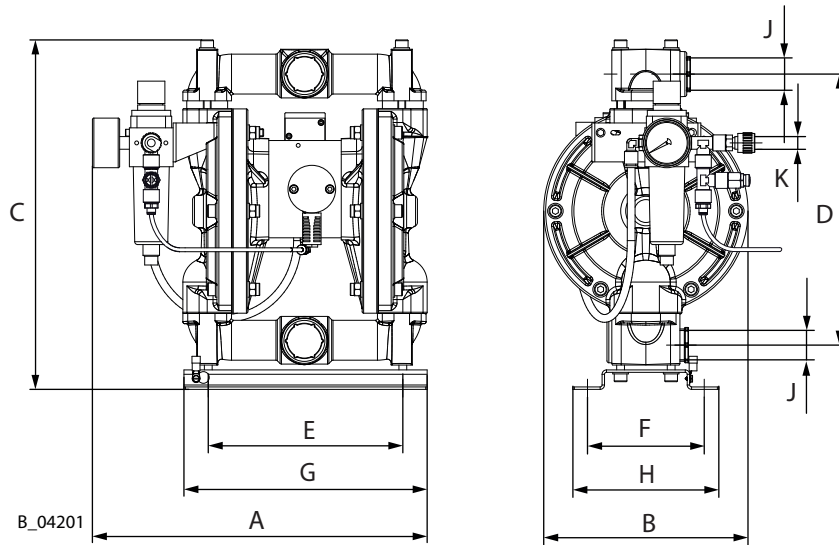
Exhaust air containing oil!

Risk of poisoning if inhaled.

- Provide compressed air free from oil and water.



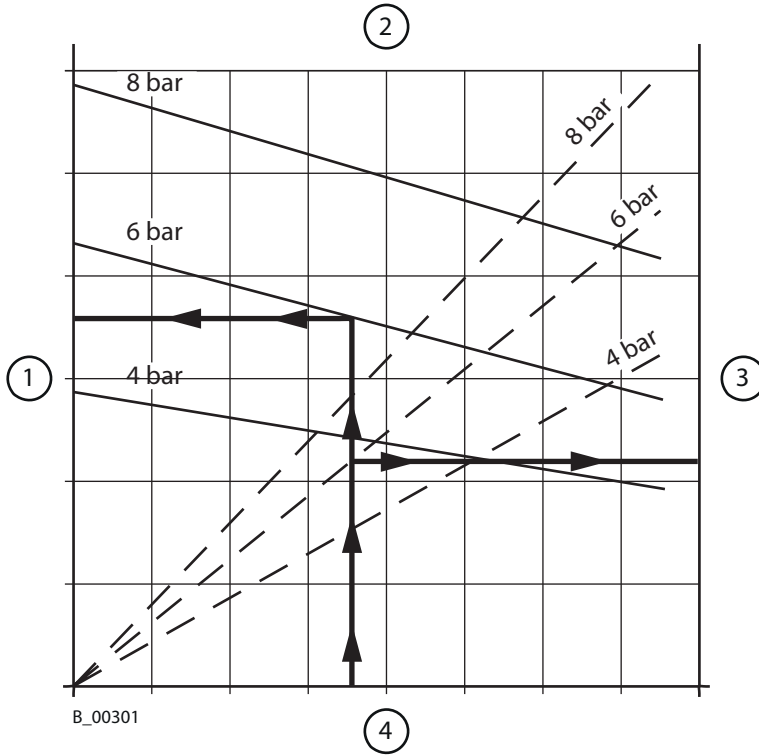
5.5.3 Dimensions and Connections



Pos	mm; inch
A	344; 13.54
B	210; 8.27
C	359; 14.13
D	279; 10.98
E	200; 7.87
F	120; 4.72
G	250; 9.84
H	150; 5.90
J	G1" F
K	G1/4"

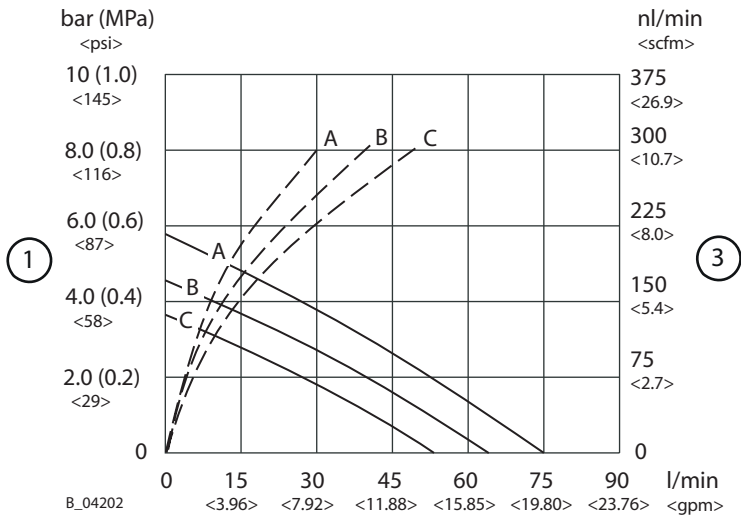
5.5.4 Performance Diagrams

Example



1	Product pressure in bar; (MPa); <psi>	3	Air consumption in nl/min.; <scfm>
2	Stroke frequency in DH/min.	4	Flow rate of water in l/min.; <gpm>

PM500



1	Product pressure in bar; (MPa); <psi>	A	Characteristic curve for air pressure 6 bar; 0.6 MPa; 87 psi
3	Air consumption in nl/min.; <scfm>	B	Characteristic curve for air pressure 5 bar; 0.5 MPa; 73 psi
4	Flow rate of water in l/min.; <gpm>	C	Characteristic curve for air pressure 4 bar; 0.4 MPa; 58 psi

6 ASSEMBLY AND COMMISSIONING

6.1 TRAINING OF ASSEMBLY/COMMISSIONING PERSONNEL

- The assembly and commissioning personnel must have the technical skills to safely commission the device.
- When assembling, commissioning and carrying out all work, read and follow the operating manuals and safety regulations for the additionally required system components.

A skilled person must check to ensure that the device is in a reliable state after it is assembled and commissioned.

6.2 STORAGE CONDITIONS

Until the point of assembly, the device must be stored in a dry location, free from vibrations and with a minimum of dust. The device must be stored in closed rooms.

The air temperature at the storage location must be between -20 °C and +60 °C (-4 °F and +140 °F).

The relative air humidity at the storage location must be between 10 and 95% (without condensation).

6.3 INSTALLATION CONDITIONS

The air temperature at the installation site must be in a range between 0 °C and 40 °C; 32 °F and 104 °F.

The relative air humidity at the installation site must be between 10 and 95% (without condensation).

6.4 TRANSPORTATION

The pump can be moved on a trolley or manually without lifting equipment or a crane.

6.5 ASSEMBLY AND INSTALLATION

WARNING

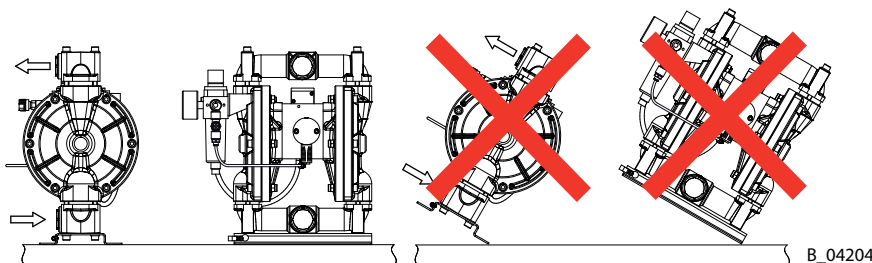
Inclined ground!

Risk of accidents if the device rolls away/falls.

- ▶ Place device on level ground and secure it.



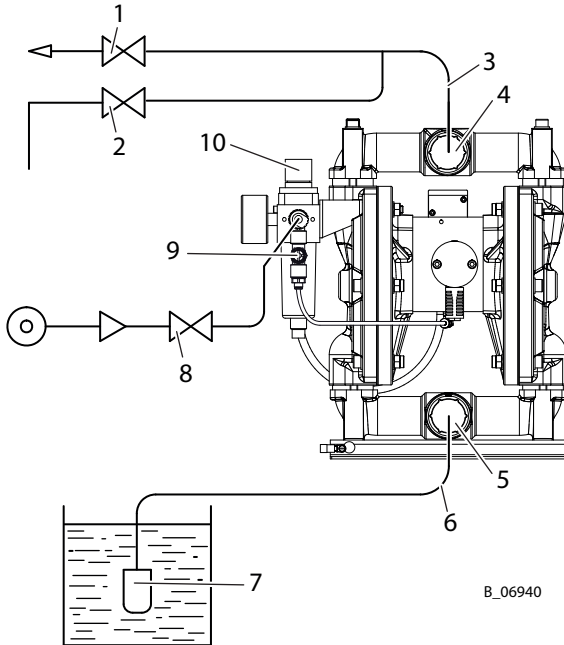
Positioning



B_04204

Info

Ensure that the national explosion prevention rules and regulations are observed when setting up the device.



B_06940

1	Product delivery valve	6	Suction hose
2	Product return valve	7	Air suction filter
3	Product hose	8	Air cut-off valve
4	Delivery manifold	9	Safety valve
5	Suction manifold	10	Air pressure regulator

1. Mount the pump on a frame, trolley or wall mount.
2. Connect the suction system and air supply.
3. Connect the material and air supply in accordance with the superordinate operating manual.

Product connection:

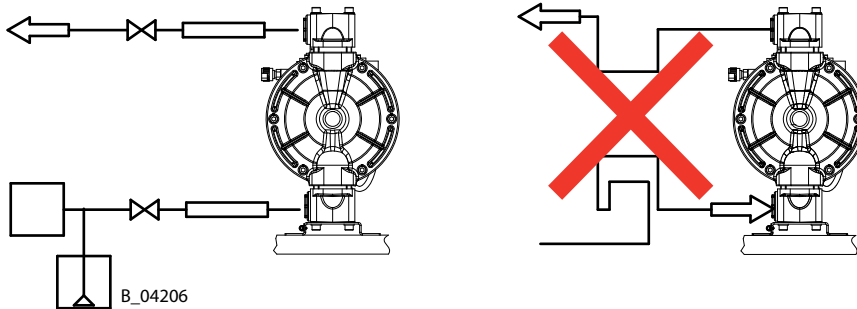
Connect the suction hose (6) to the suction manifold (5). Connect the product hose (3) to the delivery manifold (4). Use flexible hoses to absorb the pump's vibrations. Ensure that the hoses are not mechanically stressing the pump. Never directly connect the pump to rigid pipes.

For pumps installed in areas subject to explosion hazards, all hoses and pipes must be made of conductive material and must be grounded.

Install a suction filter (7) on the suction hose (6). This prevents particles, that are large enough to damage the internal parts of the pump, from entering the pump (see maximum size of solids in Chapter Technical Data [►► 19]).

All hoses, pipes and components connected to the supply line must be designed to operate at the pump's maximum pressure with the pump working at a vigorous rate. All parts connected to the suction manifold must withstand crushing despite the vacuum produced by the pump.

The suction and product hoses and pipes must have a cross-section proportional to the flow rate and the viscosity of the pumped fluid. Avoid long and bent pipes, especially during suctioning.



Compressed air connection:

The compressed air supply must be properly dimensioned.

Connect the pump's compressed air connection to the pressure distribution network.

Establish the connection to the pump fitting. Do not replace the original connection. Use a line with a suitable diameter for the connection. Always use an air cut-off valve and an air processing device (filter/regulator unit). The pressure must not exceed the maximum value indicated on the type plate.

Reversing valve:

The pump's reversing valve does not need any lubrication.

Safety valve:

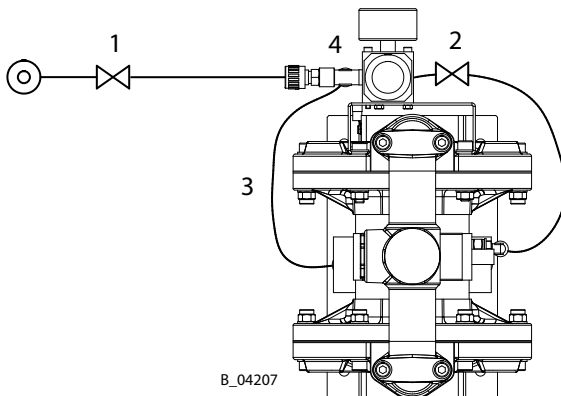
The PM 500 models are equipped with a safety valve that opens when the maximum permissible pressure for the compressed air supply is exceeded.

Non-return valve:

If the pump has been installed on a higher level than the liquid to be pumped, it is recommended that a non-return valve be provided at the lower end of the suction tube.

Installation of the air cut-off valve (1) for the emergency stop:

For the pump, an external air cut-off valve (1) must be installed upstream of the filter pressure regulator (4) for emergency stops.



Installation of an on/off valve (2) for the start/stop operation:

If an on/off valve (2) for the normal start/stop operation is necessary, the on/off valve must be installed downstream of the filter pressure regulator (4) so that the air supply (3) for the pilot valves is not interrupted. The on/off valve can be controlled on-site or remotely.

6.5.1 Ventilation of the Spray Booth

- Operate the device in a spray booth approved for the respective working materials.
– or –
- Operate the device on an appropriate spraying wall with the ventilation (extraction) switched on.
- Observe national and local regulations for the exhaust air speed.

6.5.2 Air Supply Lines

WARNING

Hose connections!

Risk of injury and damage to the device.

- ▶ Do not mix up hose connections of product hose and air hose.
- ▶ Ensure that only dry, clean atomizing air is used in the spray gun! Dirt and moisture in the atomizing air worsens the spraying quality and spray pattern.



6.5.3 Product Supply Lines

DANGER

Bursting hose, bursting threaded joints!

Danger to life from injection of product.

- ▶ Ensure that the hose material is chemically resistant to the sprayed products.
- ▶ Ensure that the spray gun, fittings and product hose between the device and the spray gun are suitable for the pressure generated in the device.
- ▶ Ensure that the following information can be seen on the high-pressure hose:
 - ▶ Manufacturer
 - ▶ Permissible operating pressure
 - ▶ Date of manufacture.



6.6 GROUNDING

WARNING

Discharge of electrostatically charged components in atmospheres containing solvents!

Explosion hazard from electrostatic sparks.

- ▶ Clean the pump only with a damp cloth.



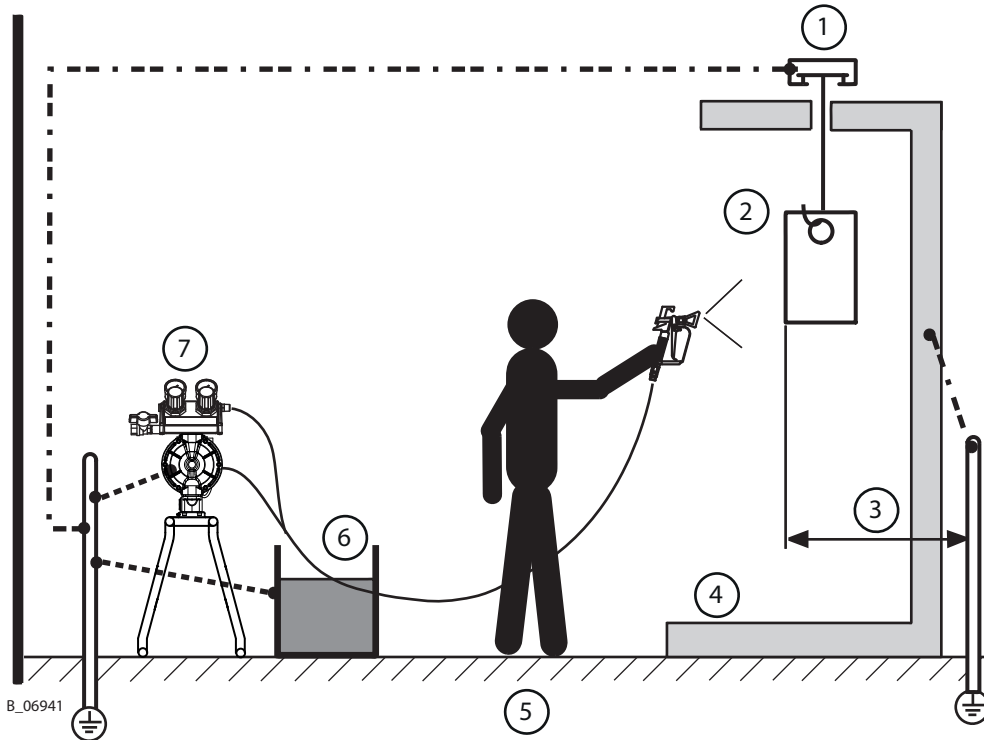
⚠ WARNING

Heavy paint mist if grounding is insufficient!

Risk of poisoning.

Insufficient paint application quality

- ▶ Ground all device components.
- ▶ Ground the work pieces to be coated.

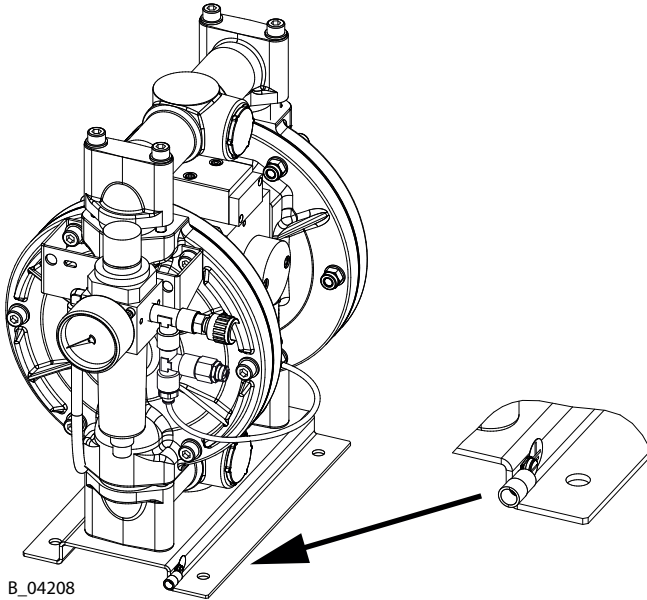


Grounding scheme (example)

Pos	Part / workstation	Cable cross section
1	Conveyor	16 mm ² ; AWG6
2	Work piece	--
3	$R_{\max} < 1 \text{ M}\Omega$	--
4	Spraying stand Alternative: Spray booth	16 mm ² ; AWG6
5	Floor, static dissipative	--
6	Product tank	6 mm ² ; AWG10
7	Pump	4 mm ² ; AWG12

Info

Safe operation of the pump is only guaranteed with a grounding connection. Connect all grounding cables using a short and direct route.



1. Screw on grounding cable with eyelet.
2. Clamp the grounding cable clip to a grounding connection on site.
3. Ground the product tank to an on-site grounding connection.
4. Ground the other parts of the system to an on-site grounding connection.

Ex zone

All devices and equipment must be suitable for use in potentially explosive areas.

- All paints, flushing agents and waste tanks have to be electrically conductive.
- All tanks must be grounded.

6.7 COMMISSIONING

WARNING

Gas mixtures can explode if there is an incompletely filled pump!

Danger to life from flying parts.

- ▶ Ensure that the pump and suction system are always completely filled with flushing agent or working medium.
- ▶ Do not spray the device empty after cleaning.



NOTICE

Impurities in the spraying system

Spray gun blockage, products harden in the spraying system.

- ▶ Flush the spray gun and paint supply with a suitable flushing agent before commissioning.

Emergency stop, see Chapter Emergency Stop [▶▶ 31].

6.7.1 Preparation

Before every commissioning, the following points should be observed as laid down in the operating manual:

1. Secure spray gun with safety lever.
2. Check the permissible pressures.
3. Check all connections for leaks.
4. Check hoses for damage in accordance with chapter Safety Checks and Maintenance Intervals [►► 37].

6.7.2 Fill the Pump with Flushing Agent

The devices are tested during manufacturing with emulsifying oil, pure oil or solvent.

Possible residues must be flushed out of the circuits with a solvent (flushing agent) before commissioning.

- Fill the empty device with flushing agent in accordance with Chapter Filling the Empty Pump [►► 39].

6.7.3 Pressure Tightness Test

WARNING

Overpressure!

Risk of injury from bursting components.

- The operating pressure must not exceed the value shown on the type plate.



1. Gradually increase the pressure in pump with the pressure regulator until maximum pressure is reached. Maintain the pressure for 3 minutes and check all connection points for leaks.
2. Carry out pressure relief in accordance with Chapter Pressure Relief / Work Interruption [►► 32].

6.7.4 Verifying a Safe Operational Condition

A skilled person must check to ensure that the device is in a reliable state after it is assembled and commissioned. This includes:

- Carry out safety checks in accordance with Chapter Safety Checks and Maintenance Intervals [►► 37].



6.7.5 Filling with Working Product

- Proceed in accordance with Chapter Filling the Empty Pump [►► 39].

7 OPERATION

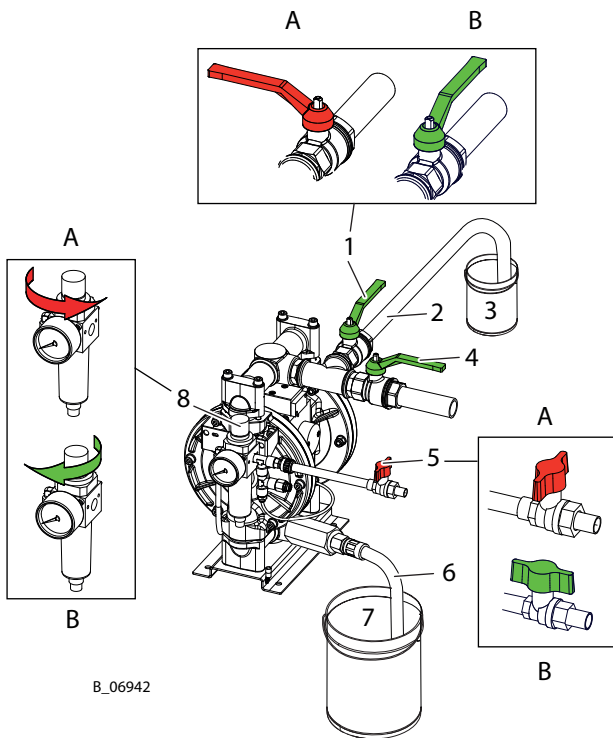
7.1 TRAINING THE OPERATING PERSONNEL

- The operating personnel must be qualified to operate the entire system.
- The operating staff must be familiar with the potential risks associated with improper behavior as well as the necessary protective devices and measures.
- Before work commences, the operating personnel must receive appropriate system training.

7.2 EMERGENCY STOP

In the case of unforeseen occurrences immediately:

1. Immediately close the air cut-off valve.
2. Open the return valve (if installed) and/or the delivery devices (valves or guns).



A	closed	B	open
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7.3 TASKS

Ensure that:

commissioning is carried out in accordance with Chapter Commissioning [►► 29].

1. Carry out a visual inspection: Personal protective equipment, grounding and all devices ready for use.
2. Secure spray gun and insert nozzle into the spray gun.
3. Ensure that the pressure regulator (8) is fully rotated counterclockwise (0 bar pressure). Open the compressed air and product delivery valve (5), then increase the air pressure until the pump starts. Do not let the pump run too quickly while suctioning.

4. To facilitate the pump's suctioning, open the return valve (1 if installed). The return valve (1) is strongly recommended in case of viscous products or long pipes. Close the return valve (1) when the suctioning has finished.
5. The pump supplies the product while the product delivery valve (4) is open. Change the air pressure with the air pressure regulator (8), in order to achieve the desired amount or product pressure.
6. Start work process.

Info

In case air accidentally flows into the pump suction inlet, the air pressure must immediately be reduced to avoid the pump working at an excessive speed.



7.4 PRESSURE RELIEF / WORK INTERRUPTION

The pressure must always be relieved:

- after the spraying tasks are finished,
- before servicing or repairing the system,
- before carrying out cleaning tasks on the system,
- before moving the system to another location,
- before something needs to be checked on the system,
- before the nozzle or the filter is removed from the spray gun.

The components for pressure relief on a CE-compliant spraying system include:

- Outlet equipment (return valve) mounted between pump and spray gun.

Process for relieving pressure

1. Close the spray gun.
2. Close the product delivery valve or any other device installed on the delivery line (such as outlet valves or spray guns).
3. Close the air cut-off valve. Relieve the pressure in the product line, by opening the return valve (if installed) or the dispensing device (valve or spray gun).

Info

Control air pressure is still present.



! NOTICE

Hardened working product in the spraying system when 2K product is processed!

Using 2K materials can destroy the pump and spraying system.

- ▶ Observe the manufacturer's processing rules, particularly in regards to the pot life.
- ▶ Flush thoroughly before the end of the pot life.
- ▶ The pot life is decreased by warmth.

7.5 BASIC FLUSHING

Regular flushing

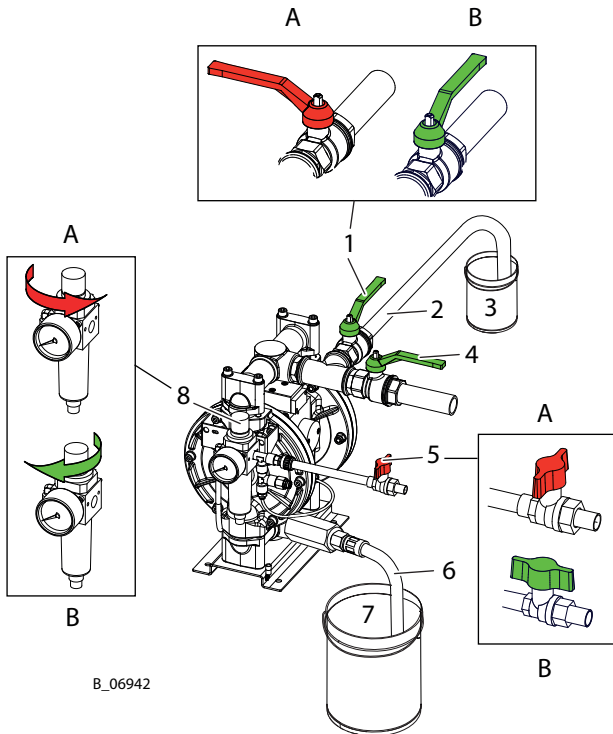
- Regular flushing, cleaning and maintenance ensures the pump's high conveying and suction capacity.
- The cleaning and flushing agents used must be compatible with the working material.

⚠ WARNING

Incompatibility of cleaning/flushing agent and working medium!

Risk of explosion and danger of poisoning by toxic gases.

- Examine the compatibility of the flushing and cleaning agents and working media on the basis of the safety data sheets.



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A	closed	B	open
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Preparation

1. Visual check: personal safety equipment, grounding and all devices ready to use.
2. Place empty, grounded tank (3) under the return tube (2).
3. Place the suction hose (6) in the grounded tank with flushing agent (7).
4. Completely close the pressure regulator (8) (0 MPa; 0 bar; 0 psi).

Flushing via the return valve

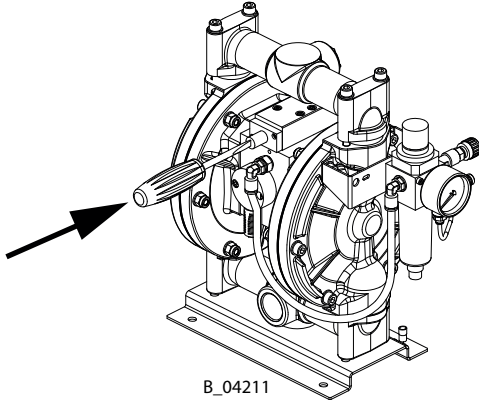
1. Open return valve (1).
2. Slowly open the ball valve (5).
3. Open the air cut-off valve (5) and turn the pressure regulator (8) clockwise until the pump starts.
4. Flush the system until clean flushing agent flows into the tank (3).
5. Close ball valve (5).
6. As soon as there is no pressure remaining in the system, close the return valve (1).

Flushing via the gun

1. Point the spray gun, without nozzle, into the tank (3) and open it.
2. Slowly open the ball valve (5).

3. Flush until clean cleaning agent flows from the spray gun.
4. Close ball valve (5).
5. When there is no pressure remaining in the system, close the spray gun.
6. Secure the spray gun.
7. Dispose of the contents of the tank (3) according to the local regulations.

In case of start-up problems:



1. Rotate the pressure regulator (8) clockwise to a minimum of 2 bar.
 2. Ball valve (5) must be open.
 3. Press the actuation button on one end of the reversing valve until the reversing valve switches over. The air flows out audibly.
 4. Turn the pressure regulator (8) clockwise until the pump starts.
- Do not let the pump run too quickly while suctioning.

7.5.1 Filling with Working Product

After basic flushing, the pump can be filled with working material.

- Proceed according to Chapter Filling the Empty Pump [► 39], but use working product instead of flushing agent.

8 CLEANING AND MAINTENANCE

8.1 CLEANING

8.1.1 Cleaning Personnel

Cleaning work should be undertaken regularly and carefully by qualified and trained personnel. They should be informed of specific hazards during their training.

The following hazards may arise during cleaning work:

- risk to health from inhaling solvent vapors,
- use of unsuitable cleaning tools and aids.

8.1.2 Decommissioning and Cleaning

The device should be cleaned for maintenance purposes, etc. Ensure that no remaining product dries on and sticks to the device.

WARNING

Brittle pressure regulator with filter!

The tank on the pressure regulator with filter becomes brittle through contact with solvents and can burst. Flying parts can cause injury.

- ▶ Do not clean the tank on the pressure regulator with filter using solvent.



1. Interrupt the work sequence in accordance with Chapter Pressure Relief / Work Interruption [▶▶ 32].
2. Carry out basic flushing in accordance with Chapter Basic Flushing [▶▶ 32].
3. Empty system in a controlled manner according to Chapter Emptying Pump [▶▶ 38].
4. Service spray gun in accordance to its operating manual.
5. Clean and check the suction system and the suction filter.
6. Clean the outside of the system.
7. Fully assemble the system.
8. Fill the system with flushing agent in accordance with Chapter Filling the Empty Pump [▶▶ 39].

8.1.3 Long-term Storage

If storing the system for a prolonged period of time, thorough cleaning and corrosion protection are necessary. Replace the water or solvent in the product pump with a suitable preserving oil.

1. Carry out decommissioning and cleaning (steps 1 to 7) in accordance with Chapter Decommissioning and Cleaning [▶▶ 35].
2. Fill the system with preservation agent in accordance with Chapter Filling the Empty Pump [▶▶ 39].
3. Empty the system in a controlled manner in accordance with Chapter Emptying Pump [▶▶ 38] and seal the openings.

8.2 MAINTENANCE

8.2.1 Maintenance Personnel

Maintenance work should be undertaken regularly and carefully by qualified and trained personnel. They should be informed of specific hazards during their training.

The following hazards may arise during maintenance work:

- risk to health from inhaling solvent vapors,
- use of unsuitable tools and aids.

A skilled person must ensure that the device is checked for being in a reliable state after maintenance work is completed.

8.2.2 Maintenance Instructions

DANGER

Incorrect maintenance/repair!

Danger to life and equipment damage.

- ▶ Only a WAGNER service center or a suitably trained person may carry out repairs and replace parts.
- ▶ Use only WAGNER original spare parts and accessories.
- ▶ Only repair and replace parts that are listed in the spare parts chapter and that are assigned to the device.
- ▶ Before all work on the device and in the event of work interruptions:
 - ▶ Relieve the pressure from the spray gun, product hoses and all devices.
 - ▶ Secure the spray gun against actuation.
 - ▶ Switch off the energy and compressed air supply.
 - ▶ Disconnect the control unit from the mains.
- ▶ Observe the operating and service manual for all work.



Prior to maintenance

It should be ensured that the device is in the following state before carrying out any work on it:

- Flush and clean the system according to Chapter Decommissioning and Cleaning [▶▶ 35].
- Relieve the pressure from the pump, product hose and spray gun.
- Secure spray gun with safety lever.
- Interrupt the air supply.
- Depending on the operation, disconnect the product and air-side connection pipes.
- Remove the pump from the base or support it is fastened to.

After maintenance

- Carry out safety checks in accordance with Chapter Safety Checks and Maintenance Intervals [▶▶ 37].
- Put the system into operation and check for leaks as described in Chapter Commissioning [▶▶ 29].
- Have the system checked for safe condition by a skilled person.
- Carry out functional check in accordance with Chapter Function Test after Repair Work [▶▶ 49].

8.2.3 Safety Checks and Maintenance Intervals

Every day

1. Check grounding: see Chapter Grounding [►► 27].
2. Check hoses, tubes and couplings: see Chapter Product Hoses, Pipes and Couplings [►► 37]
3. For each decommissioning, the process according to Chapter Decommissioning and Cleaning [►► 35] must be followed.

Weekly

1. Check system for damage.
2. Check and tighten fastening screws.
3. Check for air and liquid leakages.
4. Check that the safety fixtures function properly (see Chapter Protective and Monitoring Equipment [►► 18]).

Yearly or as required

1. In accordance with DGUV regulation 100-500, Chapters 2.29 and 2.36:
 - Have the liquid ejection devices checked by an expert (e.g. WAGNER service technician) as required, but no later than every 12 months to ensure that they are in safe working order.
 - For shut down devices, the examination can be suspended until the next start-up.

8.2.4 Product Hoses, Pipes and Couplings

The service life of the complete hoses between product pressure generator and application device is reduced due to environmental influences even when handled correctly.

1. Check hoses, pipes, and couplings every day and replace if necessary.
2. Before every commissioning, check all connections for leaks.
3. Additionally, the operator must regularly check the complete hoses for wear and tear as well as for damage at intervals that he/she has set. Records of these checks must be kept.
4. Replace the complete hose if one of the following two periods is exceeded:
 - 6 years from the date of the hose crimping (see fitting embossing).
 - 10 years from the date of the hose imprinting.

Fitting embossing (if present)	Meaning
xxx bar	Pressure
yymm	Crimping date (year/month)
XX	Internal code

Hose imprinting	Meaning
WAGNER	Name / manufacturer
yymm	Date of manufacture (year/month)
xxx bar (xx MPa) e.g. 270 bar (27MPa)	Pressure
XX	Internal code
DNxx (e.g., DN10)	Nominal diameter

8.2.5 Emptying Pump

WARNING

Gas mixtures can explode if there is an incompletely filled pump!

Danger to life from flying parts.

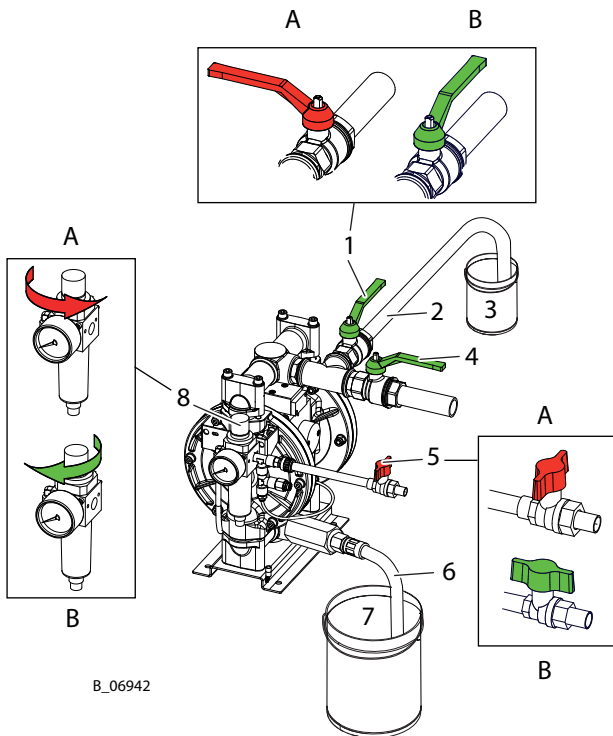
Ignition of potentially explosive surrounding atmosphere.

- ▶ Empty and fill the device slowly and in a controlled manner.
- ▶ Avoid potentially explosive atmosphere in the surroundings.



Info

If the pumping product becomes heated, switch off all heaters and let the product cool off.



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A	closed	B	open
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1. Visual check: personal safety equipment, grounding and all devices ready to use.
2. Place an empty, grounded collection tank (3) under the return tube (2).
3. Place the suction hose (6) in an empty, grounded tank (7).
4. Close pressure regulator (8) (0 MPa; 0 bar; 0 psi).

Emptying via return line

1. Open return valve (1).
2. Slowly open the ball valve (5).
3. Slowly dial up the air pressure at the pressure regulator (8) until the pump operates smoothly (approx. 0.15 MPa; 1.5 bar; 21.75 psi).

4. Be ready for the switch from working product to air.
5. As soon as working product is no longer flowing from the return tube (2), close the ball valve (5).
6. Close return valve (1).

Emptying up to the gun

1. Point the spray gun, without nozzle, into the tank (3) and open it.
2. Slowly open the ball valve (5). Be ready for the switch from working product to air.
3. As soon as no more working product is flowing, close the ball valve (5).
4. Close and secure the spray gun.
5. Carry out pressure relief in accordance with Chapter Pressure Relief / Work Interruption [►► 32].
6. Dispose of the contents of the tank (3) according to the local regulations.

8.2.6 Filling the Empty Pump

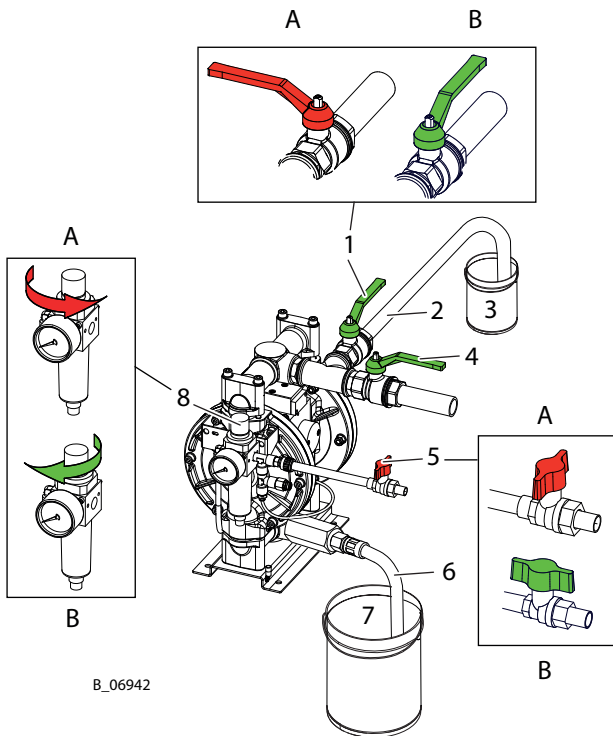
WARNING

Gas mixtures can explode if there is an incompletely filled pump!

Danger to life from flying parts.

Ignition of potentially explosive surrounding atmosphere.

- Empty and fill the device slowly and in a controlled manner.
- Avoid potentially explosive atmosphere in the surroundings.

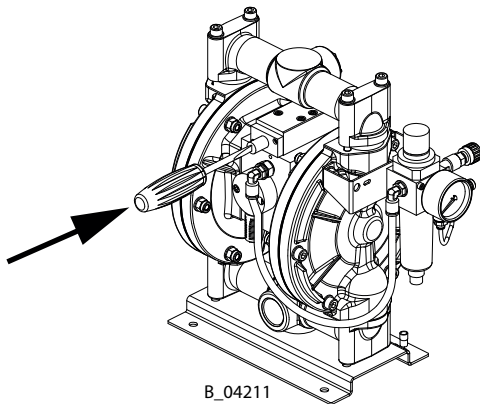


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A	closed	B	open
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1. Carry out a visual inspection: Personal protective equipment, grounding and all devices ready for use.
2. Place an empty, grounded collection tank (3) under the return tube (2).
3. Place the suction hose (6) in a grounded tank with working product (7).
4. Fully close the pressure regulator (8) (0 MPa; 0 bar; 0 psi)
5. Open return valve (1).
6. Slowly open the ball valve (5).
7. Open the air cut-off valve (5) and turn the pressure regulator (8) clockwise until the pump starts. Be ready to switch from air to working product and prevent back spray.
8. Close ball valve (5) as soon as pure working material starts coming from the return tube (2).
9. Close return valve (1).
10. Point the spray gun, without nozzle, into the tank (3) and open it.
11. Slowly open the ball valve (5).
Be prepared for the switch from air to working material and avoid backspray.
12. As soon as pure working product without air bubbles is flowing, close the ball valve (8).
13. Close and secure the spray gun.
14. Carry out pressure relief in accordance with Chapter Pressure Relief / Work Interruption [►► 32].
15. Dispose of the contents of the tank (3) according to the local regulations.

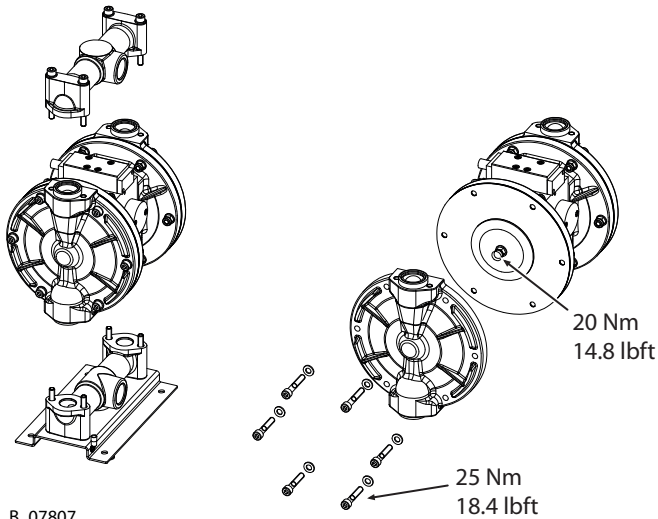
If the pump doesn't start up, carry out the following steps:



1. Turn the pressure regulator (8) clockwise to a minimum of 2 bar.
2. Ball valve (5) must be open.
3. Press the actuation button on one end of the reversing valve until the reversing valve switches over. The air flows out audibly.
4. Turn the pressure regulator (8) clockwise until the pump starts.
5. Do not let the pump run too quickly while suctioning.

8.3 REPLACING THE DIAPHRAGM (PREVENTIVE MAINTENANCE)

Mark the coupled parts (diaphragm covers, manifold, covers) with a felt-tip pen so as to make subsequent reassembly easier.



B_07807

Info

When executing the following operations it is imperative to avoid any rotation of the shaft in the motor block!



Disassembly

1. Remove the suction and delivery manifolds.
2. Unscrew the mounting screws from only one of the diaphragm covers.
3. Unscrew the central nut and remove the first diaphragm. The diaphragm is composed of two layers: the product side and the air side.

Assembly

1. Clean the parts and replace the first diaphragm and the shaft's O-rings.
2. Fit the central nut by applying the torque specified in the figure.
3. Remount the diaphragm cover.
4. Repeat steps 2) to 3) of the dismantling process and 1) and 2) of the assembly process for the opposite side of the pump.
5. Remount the suction and delivery manifolds. Apply the right torques according to the directions in Chapter Spare Parts [►► 52].

8.4 CLEANING/REPLACEMENT OF THE SUCTION AND DELIVERY NON-RETURN VALVES

1. Remove the suction and delivery manifold.
2. Remove the seals, seats and balls from the diaphragm covers and the manifold's housings.
3. Check the condition of wear of the ball guide/stops inside the diaphragm cover and manifold. Replace if worn.
4. Remove all dirt particles as well as hardened product residues. Check the balls and seats for excessive wear. Clean or replace the components.
5. Clean the contact surfaces of the manifolds and the diaphragm cover and mount the components. Apply the correct torque, in accordance with Chapter Spare Parts [►► 52].

It is recommended that the static seals be replaced when reassembling.

8.5 REPLACEMENT OF THE REVERSING VALVE

1. Unscrew the reversing valve.
2. Install the new reversing valve.

During the performance of the operations described above, check the positioning of the valve's seals and cover including the seal.

9 TROUBLESHOOTING AND RECTIFICATION

Problem	Cause	Remedy
The device does not work.	The air motor does not work or stops.	Turn the pressure regulator knob clockwise to a minimum of 2 bar. Press the actuation button on one end of the reversing valve until the reversing valve switches over. The air flows out audibly.
	No pressure indication (pressure regulator defective)	Disconnect compressed air supply briefly or repair or replace the pressure regulator.
	The delivery line is clogged.	Check the delivery line.
	Insufficient compressed air supply.	Check the compressed air supply.
	The filter in the delivery line is clogged (if installed).	Clean or replace the filter.
The device is operating (i.e. the pump is moving) but no liquid is being pumped.	The suction filter is clogged (if installed).	Carefully clean the filter.
	No fluid is available at the pump's inlet.	Check the fluid level in the tank or container.
	The suction tube is clogged or leaking (is possibly sucking air in from the atmosphere).	Check the suction tube. Replace it if necessary.
The product flow is suspended.	The suction tube is partially clogged.	Check the suction tube. Replace it if necessary.
	Cavitation (air bubbles in the liquid)	Check the suction in the tank. Exclude air suction due to high viscosity.
	The non-return valve doesn't completely close.	Check for impurities on the valve seats. Replace the non-return valves if necessary.
The pump supply decreases while working.	Partial clogging of the delivery line.	Check the delivery line.
	Deviations of the product characteristics (like viscosity).	Check the product characteristics.
	Ice formation inside the air outlet pipes.	Check the compressed air quality. Install a condensation separator in the air line. Install an air dryer if necessary. If necessary, install an oiler and fill it with special de-icing fluid.
The product delivery valve is closed, nevertheless the pump continues to run even if the air cut-off valve is closed.	The product delivery valve or the delivery manifold leaks.	Check the product delivery valve and the seals of the delivery manifold.
	Dirty or worn-out non-return valves in the delivery and suction manifold.	Clean the non-return valves and replace them if they are worn.

If none of the causes of malfunction mentioned are present, the defect can be remedied by a WAGNER service center.

10 REPAIRS

10.1 REPAIR PERSONNEL

Repair work should be undertaken carefully by qualified and trained personnel. They should be informed of specific hazards during their training.

The following hazards may arise during repair work:

- risk to health from inhaling solvent vapors,
- use of unsuitable tools and aids.

A skilled person must check to ensure that the device is in a reliable state after it is repaired. A function test should be performed.

10.2 REPAIR NOTES

DANGER

Incorrect maintenance/repair!

Danger to life and equipment damage.

- ▶ Only a WAGNER service center or a suitably trained person may carry out repairs and replace parts.
- ▶ Use only WAGNER original spare parts and accessories.
- ▶ Only repair and replace parts that are listed in the spare parts chapter and that are assigned to the device.
- ▶ Before all work on the device and in the event of work interruptions:
 - ▶ Relieve the pressure from the spray gun, product hoses and all devices.
 - ▶ Secure the spray gun against actuation.
 - ▶ Switch off the energy and compressed air supply.
 - ▶ Disconnect the control unit from the mains.
- ▶ Observe the operating and service manual for all work.



Before Repair Work

It should be ensured that the device is in the following state before carrying out any work on it:

1. Flush and clean the system according to Chapter Decommissioning and Cleaning [▶▶ 35].
2. Interrupt the air supply.
3. Depending on the operation, disconnect the product and air-side connection pipes.
4. Remove the pump from the base or support it is fastened to.

After Repair Work

1. Carry out safety checks in accordance with Chapter Safety Checks and Maintenance Intervals [▶▶ 37].
2. Put the system into operation in accordance with Chapter Commissioning [▶▶ 29] and check for leaks in accordance with Chapter Function Test after Repair Work [▶▶ 49].
3. Have the system checked for safe condition by a skilled person.
4. Carry out functional check in accordance with Chapter Function Test after Repair Work [▶▶ 49].

10.3 TOOLS

The following tools are required for assembling and disassembling the device (if possible, always bring entire tool sets with you):

- Torque wrench set
- Allen wrench set

10.4 CLEANING THE PARTS AFTER DISASSEMBLY

WARNING

Incompatibility of cleaning agent and working medium!

Risk of explosion and danger of poisoning by toxic gases.

- Examine the compatibility of the cleaning agents and working media on the basis of the safety data sheets.



Please note:

1. Thoroughly clean all reusable parts with a suitable cleaning agent.
2. All dismantled parts have to be clean and dry after cleaning. Care should be taken that these parts remain free of solvents, grease or sweat from the hands (salt water). Perform cleaning and mounting tasks wearing gloves.

10.5 ASSEMBLY OF THE DEVICE

In Chapter Spare Parts [►► 52] the order numbers for device spare parts can be found, as well as for wearing parts such as seals.

1. Defective parts, O-rings and seal sets must always be replaced.
2. Use greases and glues in accordance with Chapter Spare Parts [►► 52].
3. Observe torque specifications in Chapter Spare Parts [►► 52].

Assembly Aids

Order no.	Quantity	Designation
9992590	1 pc \triangleq 50 ml	Loctite® 222
9992831	1 pc \triangleq 50 ml	Loctite® 542
Z125.00	1 pc \triangleq 1 kg	Grease

Brand notice

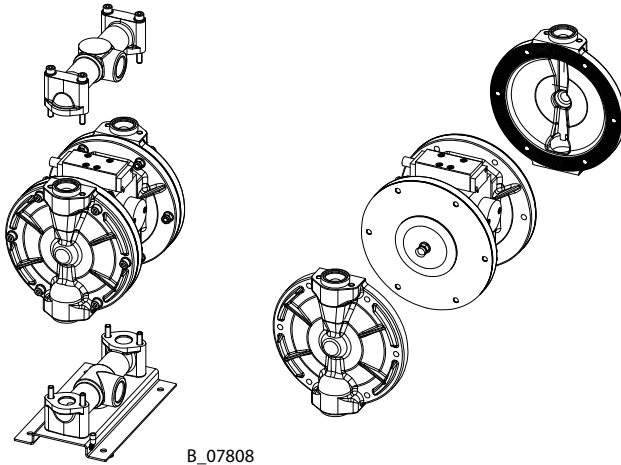
The brands specified in this document are property of the respective owners. Loctite, for example, is a registered brand of Henkel.

10.6 REPLACING THE DIAPHRAGM (DUE TO BREAKAGE)

If the diaphragms are replaced as a result of breakage, all the internal parts of the motor must be cleaned and the condition of the seals and reversing valve, which may have been damaged by contact with the pump fluid, must be checked.

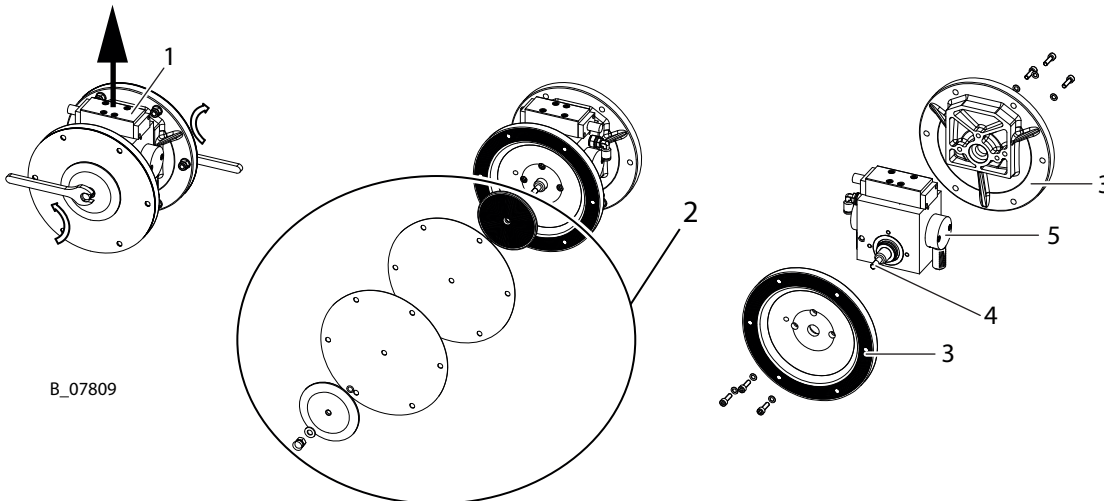
Mark the coupled parts (diaphragm covers, manifold, covers) with a felt-tip pen so as to make subsequent reassembly easier.

1. Remove the suction and delivery manifolds.
2. Unscrew the fastening screws from the two diaphragm covers and remove the diaphragm covers.



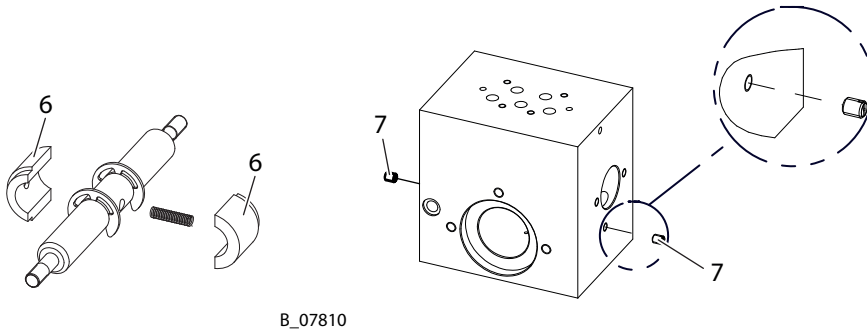
B_07808

3. Remove the reversing valve (1).
4. With the help of two wrenches located opposite each other (or hexagonal socket spanner and bench vice), loosen one of the central nuts and remove the first diaphragm (2). The diaphragm is composed of two layers: the product side and the air side.



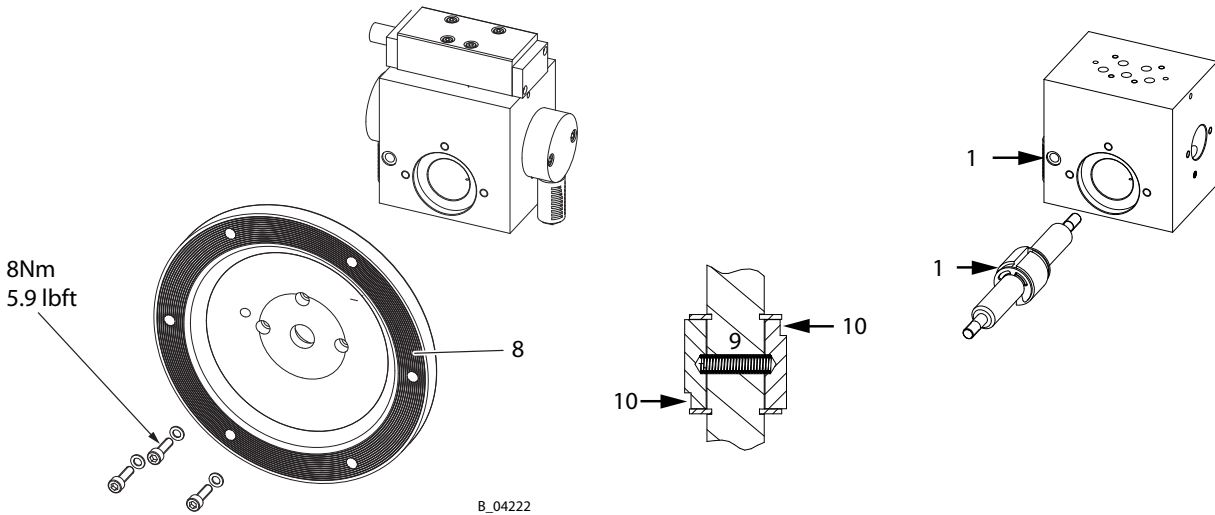
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5. Clamp the end of the shaft released from the diaphragm in a bench vice (with soft jaws to avoid damaging it). Remove the central nut from the opposite end of the shaft. Remove the second diaphragm.
6. Remove the inner diaphragm cover (3).
7. Remove the shaft (4) from the motor block.
8. Dismantle the fast discharge valves (5), then remove their seals.
9. Clean all parts and check their condition. Replace defective parts.
10. Check the internal cylindrical area of the motor. It must be clean and smooth (without any scratches).
11. Check the sliding shoes (6; two halves) for wear and replace if necessary.



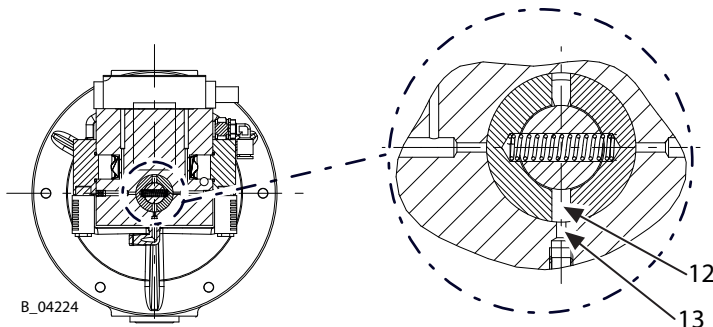
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12. Check the two vent screws (7) on the motor block. Their passages must not be clogged.
13. In the following assembly instructions, apply the right torques, greases and glues according to Chapter Spare Parts [►► 52]!
14. Mount one internal diaphragm cover (8) on the motor block, with the corresponding seals and shaft guide bushing.



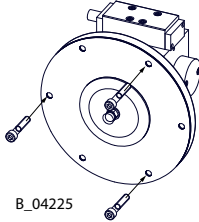
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15. Insert the spring (9) in the cross hole of the shaft, and grease it at the ends.
16. Put the two halves of the sliding shoe on the shaft, make sure to keep the steps (10) opposite each other.
17. Insert the shaft with the sliding shoe into the motor block, making sure that the steps (10) are each aligned in the direction of the drillings (11) in the block (according to the figure, analog to the backside).
18. Turn the shaft so that the gap (12) between the two halves of the sliding block is aligned with the drilled air connection hole (13).
Note: The gap (12) must be vertical when the pump is in the operating position.



B_04224


19. Hold the end of the shaft (without inner diaphragm cover) in a bench vice (with soft jaws to avoid damage).
20. Mount first diaphragm with the corresponding seals and O-rings on the opposite side of the shaft.
21. Align the holes of the diaphragm with the holes of the inner diaphragm cover. Insert three of the six fastening screws to prevent any rotation. Screw on the central nut of the diaphragm.



22. Remove the motor block from the bench vice. Mount the second inner diaphragm cover.
23. Mount the second diaphragm along with the relevant seals and O-rings. Align the holes of the diaphragm with the holes of the inner diaphragm cover and insert three screws as for the opposite side. Screw on the central diaphragm nut.
24. Mount the first outer diaphragm cover by removing the three screws, then fit all six screws together.
Mount the second outer diaphragm cover in the same fashion.
25. Before assembling the fast discharge valves, check the condition of the seals and replace them if necessary. Check the installation position of the seals. Replacement of the air mufflers is recommended.
26. Check if the reversing valve is contaminated by pumped fluid and replace if needed.
Mount the reversing valve.
27. Suction and delivery manifolds: Check and insert the non-return valves and their appertaining seals. Mount the suction and delivery manifolds. Apply the right torques according to the directions in Chapter PM500 Spare Parts [► 53].

11 FUNCTION TEST AFTER REPAIR WORK

After all repairs, the device must be checked for safe condition before recommissioning. The necessary scope of inspection and testing depends on the repair carried out and must be documented by the repair personnel.

Activity	Aid tools
1. EX-relevant tests	
<ul style="list-style-type: none"> ▶ Check the ground connection between the corresponding ground connection of the pump and the frame/trolley, and between the individual parts of the frame/trolley: $<100 \text{ k}\Omega$ <p>These tests are -relevant!</p>	Ohmmeter
2. Leaktightness check	
<ol style="list-style-type: none"> 1. Connect the pump to the air supply (6 bar). 2. To perform a tightness check on the device, the product pressure with the flushing agent is slowly increased in increments until the maximum pressure indicated on the type plate is reached. 3. Close pump outlet. 4. Allow to stand in this position for 0.5-1 minute and listen for audible blowing off. 5. When the air supply is turned off, a drop in pressure must be watched for. 	Air motor: Test medium: Compressed air Leak spray Fluid section: Test medium: Suitable flushing agent
3. General checks	
<ol style="list-style-type: none"> 1. Check the tightening torques of various screws; see Chapter Spare Parts [►► 52]. 2. Check all fittings. 3. Empty device (Chapter Emptying Pump [►► 38]) and relieve pressure (Chapter Pressure Relief / Work Interruption [►► 32]). 4. Check the functionality of the frame or transport trolley. Check whether the pump is mounted horizontally on the frame. 	Torque wrench Visual check

12 DISPOSAL

12.1 DEVICE

When the devices must be scrapped, please differentiate the disposal of the waste materials.

The following materials have been used:

- Stainless steel
- Aluminum
- Elastomers
- Plastics

12.2 CONSUMABLE PRODUCTS

Consumable products (lacquers, adhesives, flushing and cleaning agents) must be disposed of in accordance with all applicable legal requirements.

13 ACCESSORIES

No standardized accessories available for the PM500.

14 SPARE PARTS

14.1 HOW CAN SPARE PARTS BE ORDERED?

Always supply the following information to ensure delivery of the right spare part:

Order number, designation and quantity

The quantity need not be the same as the number given in the "Stk" column in the lists. This number merely indicates how many of the respective parts are used in each component.

The following information is also required to ensure smooth processing of your order:

- billing address
- delivery address
- name of the person to be contacted in the event of any queries
- type of delivery (normal mail, express delivery, air freight, courier etc.)

Identification in spare parts lists

Explanation of column „K“ (marking) in the following spare parts lists:

♦ Wearing parts. Wearing parts are not included in the warranty.

* = included in service set

● not part of the standard equipment but available as a special accessory

Explanation of order no. column:

-- Item not available as spare part.

/ Position does not exist.

14.2 NOTES ON USING SPARE PARTS

DANGER

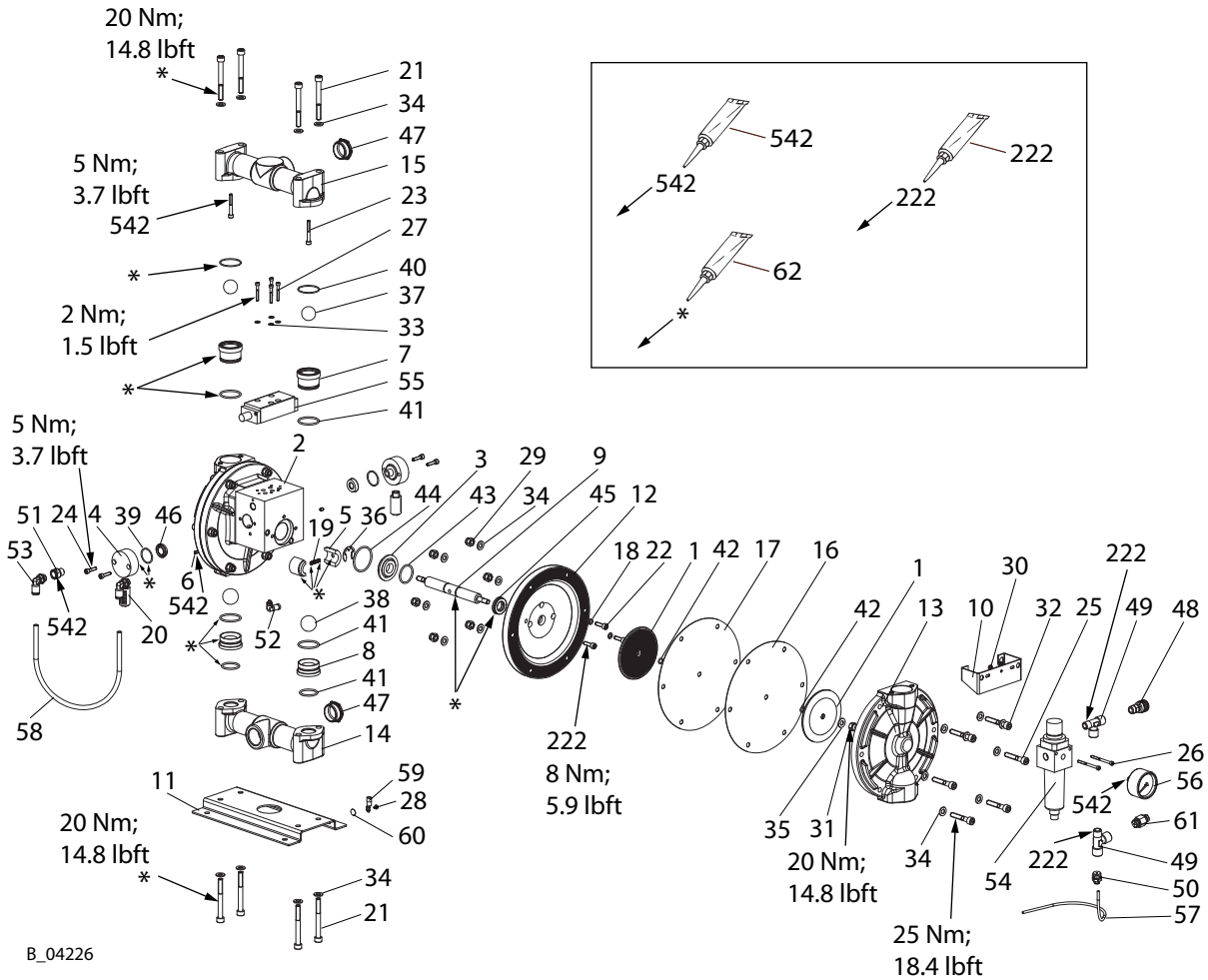
Incorrect maintenance/repair!

Danger to life and equipment damage.

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- ▶ Only repair and replace parts that are listed in the spare parts chapter and that are assigned to the device.
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 - ▶ Relieve the pressure from the spray gun, product hoses and all devices.
 - ▶ Secure the spray gun against actuation.
 - ▶ Switch off the energy and compressed air supply.
 - ▶ Disconnect the control unit from the mains.
- ▶ Observe the operating and service manual for all work.



14.3 PM500 SPARE PARTS



B_04226

Pos	K	Stk	Order no.	Order no.	Designation
		1	U509.A0	U509.A0A	DDP PM500 lacquer
1		4	A327.22		Diaphragm disc
2		1	A328.01		Motor block
3		2	A330.04		Piston bushing
4		2	A331.01		Discharger flange
5		1	A337.08		Sliding shoe block (set)
6		2	A414.04		Bleed screw
7		2	A673.03		Delivery valve seat
8	◆	2	A674.03		Valve seat
9		1	D410.12		Motor piston
10		1	E309.62		Frame, 1/4 FR
11		1	E315.62		Frame, Pump PM 500/S
12		2	F109.01		Inner Cover
13		2	F144.21	F144.01	Outer Cover
14		1	F145.21	F145.01	Suction manifold
15		1	F146.21	F146.01	Delivery manifold

Pos	K	Stk	Order no.	Order no.	Designation
16	◆	2	G702.05		PM 500 PTFE Diaphragm, white
17	◆ *	2	G705.06		PM 500 Diaphragm Motor, black
18	◆ *	6	G709.07		Seal, screw M.
19		1	H209.03		Spring
20	◆	2	H505.07		Silencer
21		8	9900324		Hexagon socket head cap screw, M8 x 75
22		6	9900312		Hexagon socket head cap screw, M6x20
23		2	K118.03		Screw, M5x40
24		4	9900358		Hexagon socket head cap screw, M5x20
25		10	9900355		Hexagon socket head cap screw, M8x45
26		2	9906026		Hexagon socket head cap screw, M4x50
27		4	9900386		Hexagon socket head cap screw
28		1	K199.62		Round tapping screw, 3.5x6.5
29		12	9910208		Self-locking hexagon nut, M8
30		2	9910108		Nut, M4
31		2	K319.03		Cap nut, M8, stainless steel
32		2	9900317		Hexagon socket head cap screw, M8 x 50
33		4	9920104		Washer, A4.3
34		34	9920102		Washer, A8.4
35		2	9925045		Washer, A8.4
36		2	K606.02		Lock washer for waves
37	◆	2	K804.03		Ball, 1"
38	◆	2	K814.03		Ball, 1 1/8"
39	◆ *	2	L126.06		O-ring
40	◆ *	2	L151.06		O-ring
41	◆ *	6	L107.06		O-ring
42	◆ *	6	L123.06		O-ring
43	◆ *	2	L116.06		O-ring
44	◆ *	2	L127.06		O-ring
45	◆ *	2	L408.06		Seal, DI.18
46	◆ *	2	L415.06		Outlet seal
47		2	M033.07		Cover, 1" M
48		1	M209.04		Fitting with adjusting collar 1/4"
49		2	9985694		Fitting T FFM 1/4"
50		1	M225.04		Quick fitting D M 1/4"x4
51		1	M239.00		Fitting D MF 1/4"
52		1	M303.00		Quick Fitting L M5X4

Pos	K		Stk	Order no.	Order no.	Designation
53			2	9998253		Plug-in fitting, rotating
54			1	P124.00M		Filter, regulator CZ 1/4"
55	♦		1	P498.00		Reversing valve, P/1 SP/NUM
56			1	9998677		Pressure gauge, 0-10 bar, RF40 (d40)
57			1	S424.07		Hose control, MT.0,330
58			1	S426.07		Hose, MT.0,400
59			1	Y622.00A		Cable lug
60			1	9950372		Adhesive label (grounding)
61			1	368288		Safety valve, 8.4 bar
62			1	Z125.00		Grease
222			1	9992590		Loctite® 222
542			1	9992831		Loctite® 542
				T933.00		Service set

♦ = wearing parts

★ = Included in service set

15 DECLARATION OF CONFORMITY

15.1 EU DECLARATION OF CONFORMITY

We hereby declare that the supplied version of diaphragm pumps and spray packs:

Type
PM500

complies with the following guidelines:

2006/42/EC	2014/34/EU (ATEX Directive)
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Applied standards, in particular:

EN ISO 12100:2010	EN 14462:2015
EN 809: 1998+A1:2009+AC:2010	EN 12621:2006+A1:2010
EN ISO 4413:2010	EN 1127-1:2019
EN ISO 4414:2010	EN ISO 80079-36:2016
EN ISO 13732-1:2008	EN ISO 80079-37:2016

Applied national technical standards and specifications, in particular:

DGUV regulation 100-500, Chapter 2.29 and Chapter 2.36	TRGS 727
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Identification:



EU Declaration of Conformity

The EU Declaration of Conformity is enclosed with this product. If needed, further copies can be ordered through your WAGNER dealer by specifying the product name and serial number.

Order number: 2335753



Order number 2335747
Edition 08/2020

Germany

J. Wagner GmbH
Otto-Lilienthal-Strasse 18
Postfach 1120
D-88677 Markdorf
Telephone: +49 (0)7544 5050
Fax: +49 (0)7544 505200
E-mail: ts-liquid@wagner-group.com

Switzerland

Wagner International AG
Industriestrasse 22
CH-9450 Altstätten
Telephone: +41 (0)71 757 2211
Fax: +41 (0)71 757 2222

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More contact addresses on the internet at:
www.wagner-group.com

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