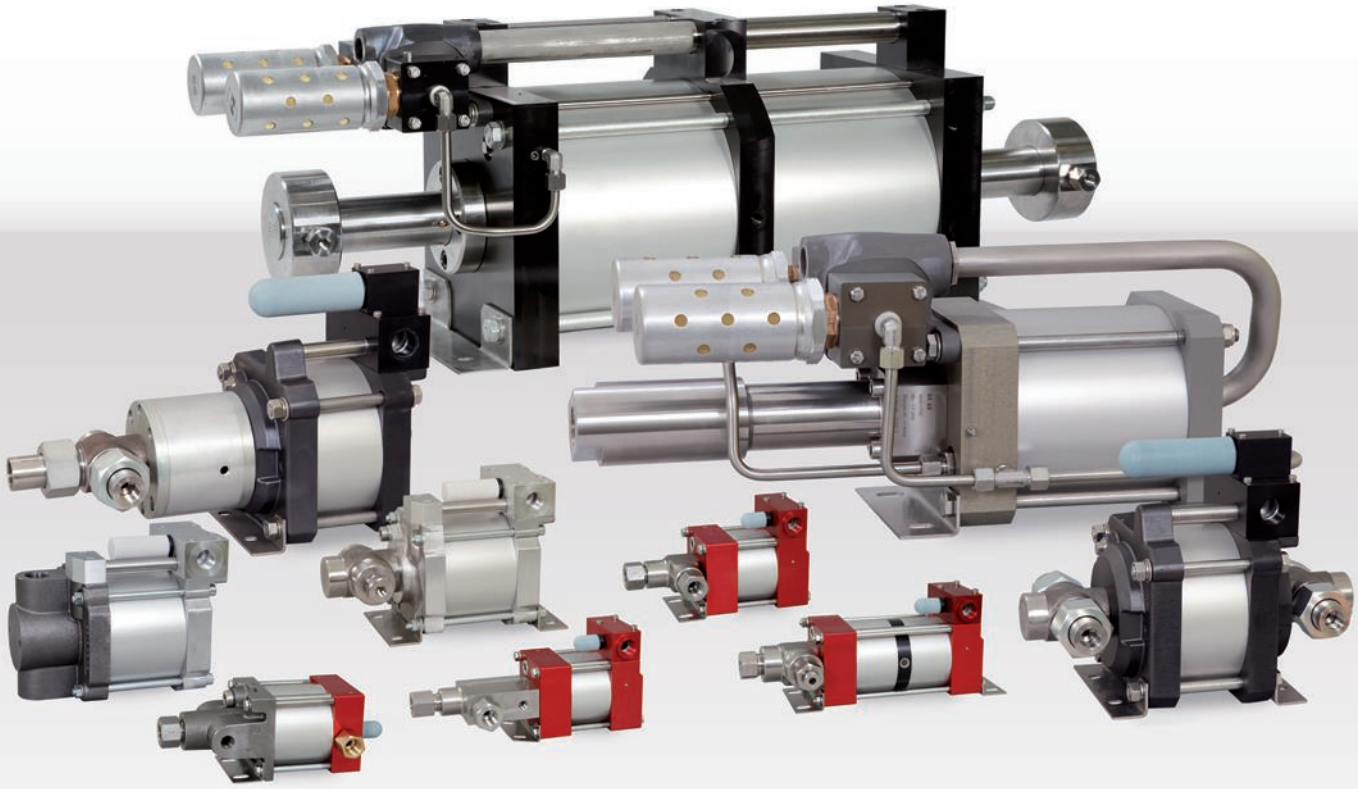
MAXIMATOR®

Maximum Pressure.

Hochdrucktechnik • Prüftechnik • Hydraulik • Pneumatik



» Air-Driven High-Pressure Pumps

Assembly Instructions acc. to Machinery Directive & Operating Instructions acc. to ATEX Directive

Read the instructions before beginning any work!

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Abbreviations and formula symbols used

i	-	transmission ratio
L_{eq}	-	noise emmission
P_B	-	operating pressure
P_L	-	drive pressure

1 General Information

1.1 Information about this instructions

Maximator's high-pressure pumps can be used in a large number of applications. Their purpose is to pump oil, water and other fluids and to generate high pressures. The pumps are driven by compressed air at a range of 1 to 10 bar.

These instructions enable safe and efficient handling of Maximator's compressed air-driven high-pressure pumps. The instructions are part of the high-pressure pump and must be kept in the direct vicinity of the high-pressure pump, accessible to personnel at all times.

Personnel must have carefully read and understood these instructions before commencing work. A basic prerequisite for safe work is compliance with all specified safety information and handling instructions in these operating instructions.

In addition, local occupational safety provisions and general safety regulations apply to the area in which the high-pressure pump is used.

The purpose of illustrations in these instructions is to aid general understanding and they may differ from the actual implementation. Furthermore, technical data and measurement and weight information apply to the day on which these assembly instructions were printed. They may differ in detail from a particular implementation, without fundamentally changing the objective information and thereby losing validity. Differences in textual and pictorial statements depend on equipment and accessories, which means that no claims arising from this can be asserted.

The documents on fitted components contained in the Annex and all other supplied documents apply in addition to these instructions.

The operating instructions for Maximator products are available as a digital download in many languages at

» http://www.maximator.de/Dokumente-Bedienungsanleitungen.

1.2 Explanation of symbols

Safety information

Safety information in these instructions is marked by symbols. The safety information is introduced by signal words that express the extent of the hazard.

WARNING!

This combination of symbol and signal word refers to possible hazardous situations that can lead to minor, slight or serious injuries or even death if they are not avoided.

Note

This combination of symbol and signal word refers to possible hazardous situations that can lead to material and environmental damage if they are not avoided.

Special safety information

The following symbols are used in safety information to draw attention to particular hazards.

WARNING!
This combination of symbol and signal word identifies contents and instructions for intended use in potentially explosive atmospheres.

If a note marked like this is not heeded, there is an increased explosion hazard and serious or even fatal injuries may result.

Safety information in handling instructions

Safety information may relate to particular individual handling instructions. Such safety information is embedded in the handling instructions so that it does not interrupt reading flow when performing the action. The previously mentioned signal words are used.

Example:

1.► Undo screw

2.►  **WARNING!**

Jamming hazard at lid!

Close the lid carefully.

3.► Tighten screw.

Tips and recommendations

This symbol highlights useful tips, recommendations and information for efficient and trouble-free operation.

Other marking

To highlight handling instructions, results, lists, references, and other elements, the following marking is used in these instructions.

Marking	Explanation
1.►	Step-by-step handling instructions
⇨	Results of handling steps
»	References to sections in these instructions ans other applicable documents
•	Lists without defined sequence

1.3 Customer service

Our customer service is available for technical information and repairs :

Address	Maximator GmbH Ullrichstraße 1-2 99734 Nordhausen
Phone: customer service Mon. – Thu.: 7am – 5pm CET Fri.: 7am – 2pm CET	+49 (0) 3631 9533-5444
Customer hotline telephone (charged) Mon. – Thu.: 5pm – 10pm CET Fri.: 2pm – 10pm CET Saturday, Sunday, and holidays: 8am to 8pm CET	+49 (0) 1805 629 462 867
Fax	+49 (0) 3631 9533-5065
E-Mail	service@maximator.de
Internet	www.maximator.de/service

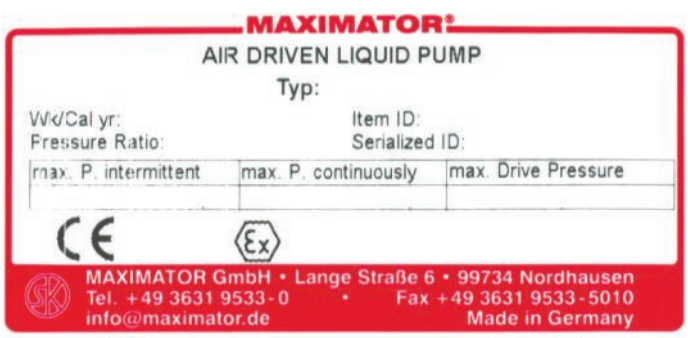
Furthermore, we are always interested in information and application-based experiences, which may be valuable in helping to improve our products.

1.4 Type designation code

The type designation code for the respective high-pressure pump models consists of the designation of the pump type and the variant codes attached to it. In the designation of the pump type, the leading letters refer to the pump series, e.g. M, MO, or G series.

1.5 Nameplate

The nameplate is located in the centre of the high-pressure pump's drive unit and contains the following information:



- Manufacturer
- Type (information from type designati on code)
- Calendar week/year of construction
- Article number
- Transmission ratio
- Serial number
- Maximum intermittent pressure
- Maximum continuous pressure
- Air drive maximum pressure
- ATEX marking

2 Safety

This section provides an overview of all important safety aspects for the protection of personnel as well as safe and trouble-free assembly. Further task-related safety information is contained in the sections for the individual service life phases.

2.1 Intended use

The compressed air-driven high-pressure pumps described in these assembly instructions (see

» chapter 4 "Technical Data") are partly completed machinery and are intended to be incorporated into a system. The high-pressure pumps are used solely for pumping fluids within the meaning of the Machinery Directive. Only pumped fluids approved for the high-pressure pumps (» chapter 2.6 "Pumped fluid compatibility") may be used. The high-pressure pumps are driven, as standard, by means of compressed air or nitrogen at a maximum drive pressure of 10 bar.

If ATEX marking has been affixed to the nameplate and a declaration of conformity has been supplied, the high-pressure pumps may be used in potentially explosive atmospheres.

Intended use also includes compliance with all information contained in these instructions.

Any usage beyond the intended use or any other type of use counts as improper use.

2.2 Warranty and liability

In principle, the "General Terms and Conditions of Sale and Delivery" supplied by the manufacturer of the pumps shall apply. The "General Terms and Conditions of Sale and Delivery" can be viewed on Maximator's website
» http://www.maximator.de.

Any warranty and liability claims are precluded if they are due to one or more of the causes mentioned in these operating instructions and explicitly identified below:

- Improper use of the pumps.
- Improper commissioning, operation or maintenance of the pumps.
- Modifications to the pumps and improper repair work.
- Operating the pumps with defective safety equipment or incorrectly installed safety and protective equipment.
- Failure to comply with the information in these operating instructions in respect of commissioning, operation and maintenance.
- Inadequate monitoring of pump parts that are subject to wear and tear.
- Aging and operational wear of wear parts like seals and guiding elements etc.

2.3 Foreseeable misuse

WARNING!

Improper use hazard!

Improper use of the high-pressure pumps may result in hazardous situations.

- Never use the high-pressure pumps with incompatible pumped fluid (see » chapter 2.6 "Pumped fluid compatibility").
- In the case of special fluids, always contact Maximator!
- Never operate the high-pressure pumps in enclosed vessels.
- Never perform any unauthorized conversions or technical changes to the high-pressure pump
- Never use the high-pressure pumps in any way other than that described in these operating instructions.
- Never exceed the technical limits or pressures stated in these operating instructions.
- Operate the high-pressure pumps only when in perfect technical condition.
- Always observe all information on installation, maintenance and troubleshooting contained in these operating instructions.
- High-pressure pumps cannot be used for
  - creating pharmaceutical products with direct contact
  - creating / machining / processing food

2.4 General hazards

The following section lists residual risks that may emanate from the high-pressure pumps even if they are used as intended.

In order to reduce the risks of injury and damage and to avoid hazardous situations, all safety information listed here and the safety information in further sections of these instructions must be observed.

2.4.1 Pressurized fluid hazards

Escaping fluids

WARNING!

Injury hazard due to escaping fluids!

Fluid may escape from pressure lines, screw connections or pressurized components if the pumps are used incorrectly or if they are damaged. This fluid must not be intercepted or hampered by objects or body parts. The escaping fluid may cause serious injuries.

- Wear personal protective equipment at all times.
- Never grab hold of a pressurized component.

Ensure that defective components to which pressure is applied during operation are immediately replaced by qualified personnel (mechanical or system engineers).

Pressurized components

WARNING!
Injury hazard due to pressurized components!

Fluid, compressed air or gas may escape from pressure lines, screw connections or pressurized components if the pumps are used incorrectly. These fluids may cause uncontrolled movements in the lines, leading to serious injuries.

Defective pressurized components may also cause uncontrolled movements that can lead to severe injuries.

- Before assembling or dismantling hoses, lines, screw connections, always make sure that they are depressurized.
- Wear personal protective equipment at all times.

Ensure that defective components to which pressure is applied during operation are immediately replaced by qualified personnel (mechanical or system engineers).

2.4.2 Low temperature hazards

Cold surfaces

WARNING!
Injury hazard due to cold and icy surfaces!

Components such as exhaust air silencers may ice over due to expanding air or gas. Skin contact with cold surfaces may cause skin irritations. Ice particles may be detached and fly around in an uncontrolled manner.

- Always wear protective work clothing, protective goggles and protective gloves when working near to cold or icy surfaces.

Make sure that all surfaces have warmed to ambient temperature before beginning any work.

2.4.3 General hazards at the workplace

Noise

WARNING!
Injury hazard due to noise!

The noise level occurring in the work area may cause serious hearing damage, depending on the installation type and expanding air.

- Always wear personal protective equipment when working on high-pressure pumps in operation.
- Only remain in the danger zone to the extent necessary.

The noise level depends on the installation situation and can be determined only in the installed state.

Flying ice crystals and accumulations of fluid

WARNING!
Injury hazard due to flying ice crystals and accumulations of fluid!

Ice ejected and tossed around by the expanding air may form on the high-pressure pump's exhaust air silencer during operation. The ejected ice crystals may cause eye injuries and accumulations of fluid on the floor.

- Wear protective goggles at all times during work.
- Immediately use suitable media to absorb accumulations of fluid.
- Wear anti-slip safety footwear at all times.

Attach warning signs and instructions at or near to the area where accumulations of fluid may occur on the floor or ice crystals may fly around.

2.4.4 Explosion hazards

Explosion protection

When working in an explosion zone, adhere to the national or international regulations on behaviour in potentially explosive atmospheres.

2.4.5 Safety at the installation location

The pumps must not be operated in enclosed vessels. The escaping drive air may cause the vessel to burst. Hydraulic screw connections at suction ports and pressure sockets must not be loosened. The screw connections must be tight to prevent leaks and damage. The pump must be installed in a way that keeps the actuators and screw connections freely accessible at all times.

2.5 Fluid and substance hazards

Pumped fluid

WARNING!
Injury hazard due to incorrect handling of pumped fluid!

Incorrect handling of pumped fluid may cause serious poisoning or even fatal injury or illness.

- Always pay attention to the manufacturer's safety data sheet.
- Always ensure sufficient ventilation when working with evaporating fluids.
- Do not smoke inside the danger zone or its immediate vicinity. Avoid all naked flames, fire and sources of ignition.
- Always keep self-contained breathing apparatus ready for emergencies.
- In the event of signs of asphyxiation, immediately provide the affected person with self-contained breathing apparatus, put him or her in the recovery position in the fresh air and keep him or her warm. Initiate first aid measures involving artificial respiration if the person stops breathing. Seek immediate medical assistance.

Leaks

WARNING!

Injury hazard due to unpredictable leaks of the pumped fluid!

If the pumped fluid escapes at unintended places, this may cause serious injuries, illness or even death. Leaks can be caused by wear and tear, aging of seals or untight connections. These include:

- Leaks in the drive unit (escaping drive fluid)
- Leak at suction ports and pressure sockets
- Seal leak on the pump head / high-pressure unit and hence escape of pumped fluid through the exhaust air silencer.

NOTE

The fluid is routed to the ambient air. If necessary, discharge exhaust air safely.

Leak detection holes

Some pump models (e.g. MSF…, GSF…, GX…) have a leak detection hole between pump head / high-pressure unit and drive unit; this leak detection hole prevents the leak from getting into the drive air and hence from entering the environment via the exhaust air silencer.

If a leak exits from the leak detection hole, the high-pressure seal is no longer sealing tightly. Contact Maximator service to have the pump repaired.

Drive fluid

Unless special precautions are taken, the drive fluid will escape from the high-pressure pump in a pulsed manner via the silencer and the relief holes.

WARNING!

Injury hazard due to escaping drive fluid!

If nitrogen is used as the drive fluid, an asphyxiation hazard may arise in the vicinity of the pump; the pump must therefore be installed in a well-ventilated location.

The use of other drive fluid must be clarified with Maximator. Further precautions may need to be taken here.

2.6 Pumped fluid compatibility

Pumped fluid

Maximator high-pressure pumps are suited to being operated with of a wide variety of fluids. In the standard system, the corresponding pumps and seals are configured for hydraulic oils and/or water. Special models that enable the pump to be configured for special fluids are available. The most common seal models are listed in the following table. It generally holds that the operating fluids must not attack the pump materials chemically or physically; if you are unclear about the use of a special fluid, Maximator will be pleased to advise you.

Seal model	Seal material	Note	Pumped fluid temperature
Without designation or "L"	Polyurethane (PU) Nitrile (NBR)	Standard	-20°C … +80°C
VE	Polyethylene (UHMWPE) Fluorocarbon (FKM)	Standard	-20°C … +60°C
VE / NBR	Polyethylene (UHMWPE) Nitrile (NBR)	Special	-20°C … +60°C
VE / EPDM	Polyethylene (UHMWPE) Ethylene propylene (EPDM)	Special	-20°C … +60°C
VE / CRL	Polyethylene (UHMWPE) Chloroprene (CRL)	Special	-20°C … +60°C
VE / FFKM	Polyethylene (UHMWPE) Perfluor (FFKM)	Special	-20°C … +60°C
SF	Filled teflon (PTFE) Fluorocarbon (FKM)	Standard	-20°C … +60°C

WARNING!
Accident hazard due to failure to observe appropriate operating fluid!

A failure to observe the suitability of the operating fluid may result in an increase of seal wear and tear, seal failure and serious accidents.

WARNING!
Accident hazard due to failure to comply with necessary precautions!

In the case of hazardous or environmentally harmful operating fluid, it may be necessary to take special precautions, such as fitting exhaust air or leakage piping. Without these precautions, serious accidents may occur.

2.7 Duties of the Integrator

2.7.1 Safety equipment

Before the high-pressure pump is commissioned, it needs to be installed and integrated into the safety system.

2.7.2 Work and hazard areas

The danger zone is located around the entire high-pressure pump.

2.7.3 Manufacturer

The following section defines a manufacturer as the entity that incorporates the high-pressure pump into complete machinery.

The manufacturer must observe additional duties arising from the incorporation of the high-pressure pump into a plant or a system:

- The manufacturer must ensure that, when incorporating the high-pressure pump into a plant or a system, an overall risk assessment is drawn up and the required hazard removal measures are initiated.
- The manufacturer must ensure that the high-pressure pumps are integrated into the emergency-stop concept of the plant/ system.
- The manufacturer must ensure that all pressure hoses, pressure lines, couplings and screw connections are designed and dimensioned for the pressure ranges of the high-pressure pumps.

2.7.4 Manufacturer's duties

Information that needs to be securely transferred to the operator.

The high-pressure pumps are used in the commercial sphere. The operator of the pumps is therefore subject to the statutory obligations regarding occupational safety.

In addition to the safety information contained in these instructions, the safety, work protection and environmental regulations applicable to the deployment area of the high-pressure pumps must be complied with.

- The following applies, in particular:
- The operator must find out about the applicable occupational safety regulations and additionally determine, in a risk assessment, risks that may arise due to the special working conditions at the location in which the high-pressure pumps are used. It must implement them in the form of instructions for operating the pumps.
- During the entire service life of the high-pressure pumps, the operator must check whether the operating instructions prepared by it comply with the current status of regulations and adapt them if necessary.
- The operator must clearly lay down and define who is responsible for installation, operation, troubleshooting, maintenance and cleaning.
- The operator must ensure that all personnel using the high-pressure pumps have read and understood these instructions. Furthermore, it must train staff, and inform them about hazards, at regular intervals.

- The operator must provide personnel with the necessary protective equipment and give binding instructions on wearing the necessary protective equipment.

The operator is also responsible for ensuring that the high-pressure pumps are always in perfect technical condition. The following therefore applies:

- The operator must ensure that the high-pressure pumps are integrated into the emergency-stop equipment or into the safety chain of the system into which the high-pressure pumps are incorporated.
- The operator must ensure that, when aggressive pumped fluids and/or poisonous fluids are used, pipes are fitted to collect the leaks of aggressive and/or poisonous fluids in corresponding containers, and that aggressive and poisonous fluids are disposed of appropriately.
- The operator must ensure that, in the event of pumping of aggressive, flammable, hazardous or poisonous fluids, appropriate measures are taken to render the pumps safe prior to commencement of any fault removal work.
- The operator must ensure that only suitable pumped fluids (see » chapter 2.6 "Pumped fluid compatibility") are pumped using the high-pressure pump.
- Media compatibility must be checked for this.
- The operator must ensure that the operating media (compressed air and fluids) are pre-installed and stored in the approved manner.
- The operator must ensure that all pressure hoses, pressure lines, couplings and screw connections are designed and dimensioned for the pressure ranges of the high-pressure pumps.
- The operator must ensure that suitable fluid ports exist and that they can be secured by means of a separate shut-off valve.
- The operator must ensure that the ports for the pumped fluids (compressed air and liquids) work correctly.
- The operator must ensure that the high-pressure pumps are always kept and operated in perfect technical condition.
- The operator must ensure that sufficient lighting is always available in the high-pressure pump working area.
- The operator must ensure that all fault removal and repair work is carried out exclusively by personnel trained by Maximator.
- The operator must ensure that all warning, information and safety signs on the high-pressure pumps are kept complete and legible at all times.
- The operator must ensure that the high-pressure pumps are checked in terms of damage and correct condition whenever they are put into service.
- The operator must ensure that, in the event of damage, the device is immediately taken out of service.
- The operator must ensure that the device is kept free of contamination.

Additional operator duties with regard to explosion protection

The operator has additional duties arising from the EC Directive on improving the safety and health protection of workers potentially at risk from explosive atmospheres.

This includes the following organizational measures:

- Marking of explosive areas
- Clear signs in relation to all prohibitions
- Preparation of explosion protection documentation for each zone
- Issuing a prohibition on access by unauthorized persons

2.7.5 Personnel requirements

Qualifications

WARNING!
Injury hazard in the event of inadequate personnel qualifications!

There is a risk of serious injury and considerable damage if unqualified personnel carries out work on high-pressure pumps or remains in the danger zone of the high-pressure pumps.

Only let personnel trained by MAXIMATOR carry out activities.

Keep unqualified personnel away from the danger areas. These instructions specify personnel qualifications for the various areas of activity, as stated below:

Mechanical and system engineers shall be capable of carrying out the work assigned to them on account of their professional training, knowledge and experience as well as knowledge of the relevant regulations. Furthermore, the mechanical and system engineer shall be familiar with the installation, assembly and combination of machinery, able to identify possible hazards independently and know how to avoid them.

Personnel shall consist only of individuals who are expected to perform their work reliably. Individuals whose reactions are affected, e.g. by drugs, alcohol or medication, shall not be permitted to carry out work on the pumps.

Observe the age and job-specific regulations applicable at the installation location when choosing personnel.

2.8 Personal protective equipment

The purpose of personal protective equipment is to protect personnel against safety and health hazards at work.

Personnel must wear personal protective equipment, to which separate reference is made in individual sections of these instructions, during various activities on and with the high-pressure pumps.

Description of personal protective equipment

Protective workwear

Protective workwear is tight-fitting work clothing with low tear strength, tight sleeves and no protruding parts.

Protective goggles

Protective goggles are intended to protect eyes against flying parts and fluid spatter.

Protective gloves

Protective gloves are intended to protect the hands against friction, abrasions, punctures, or more severe injuries as well as against contact with hot or cold surfaces.

Safety footwear

Safety footwear protects the feet against crushing, falling parts, and slipping on slippery sub-surfaces

Hearing protection

Hearing protection is intended to protect against continuous noise that exceeds the permitted noise level and could thereby cause permanent hearing damage.

2.9 Spare parts

WARNING!

Hazard due to the use of incorrect spare parts!

Use of incorrect or faulty spare parts may cause malfunctions. This may cause severe injuries or even death as well as significant material damage.

Use only Maximator original spare parts or spare parts explicitly approved by Maximator.

Contact Maximator in the event of a lack of clarity.

2.10 Environmental protection

NOTE!

Risk to the environment due to incorrect handling of environmentally hazardous substances!

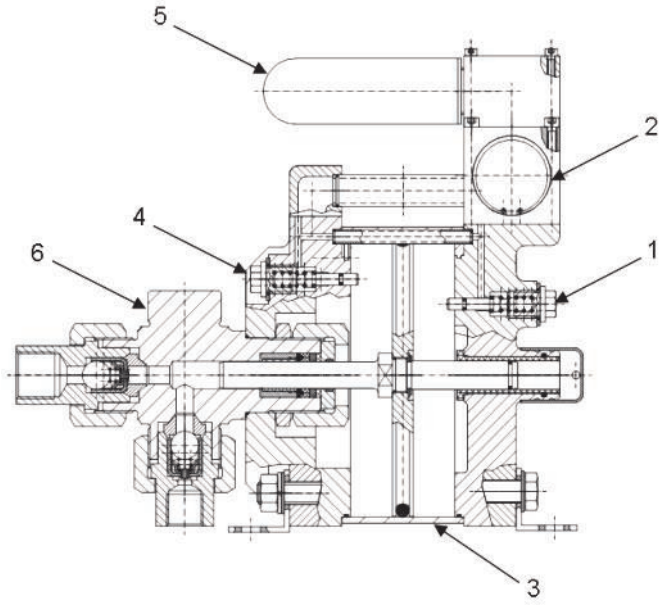
Incorrect handling, especially incorrect disposal, of environmentally hazardous substances may cause significant environmental damage.

Follow the manufacturer's instructions on handling environmentally hazardous substances and their disposal.

If environmentally hazardous substances accidentally enter the environment, take appropriate measures immediately. If in doubt, inform the responsible local authorities about the damage and ask about suitable measures that can be taken.

3 Design and Function

3.1 Overview



1 Pilot valve 1

2 Spool valve (4/2 directional control valve)

3 Air cylinder

4 Pilot valve 2

5 Exhaust air silencer

6 Pump head with inlet and pressure valve

Fig. Maximator G100L high-pressure pump

3.2 Brief description

Maximator compressed air-driven high-pressure pumps work on the principle of a pressure intensifier. They are used to pump fluids and are operated with a drive pressure of max. 10 bar of compressed air.

Large surfaces are charged with a low pressure (air piston) and generate high pressure (high-pressure piston) over the small surfaces. The transmission ratio is based on the piston area of the large air piston in relation to that of the smaller high-pressure piston.

Continuous pumping is achieved by means of a final position-controlled oscillation of the high-pressure piston. The maximum pressure achievable depends on the drive pressure and the corresponding pump type.

The pump automatically stops when the final pressure is reached and no longer consumes any air. Only a drop in pressure on the hydraulic side or an increase in drive pressure results in the pump restarting.

With many pumps, it is possible to construct variants with two high-pressure units as double-acting implementations. In the case of this variant, the pumped volume increases and the pulsation is reduced. There are also pumps with several drive units. The transmission ratio increases correspondingly here, which means that a higher operating pressure can be achieved with less drive pressure.

3.3 Assembly description

Pilot valve

The purpose of the pilot valves is to enable the air piston to switch the stop positions over. The pilot valves are actuated in the stop positions by the air piston and transfer air impulses to the spool valve. This enables the pilot valves to ventilate and vent the actuator chamber of the spool valve. This moves the spool valve from one stop position to the other.

Spool valve

The spool valve is used to apply compressed air alternately to the top and bottom of the air piston. The spool valve is controlled by means of the pilot valves and ensures that the drive air reaches the opposite side of the air piston.

Drive unit

The drive unit is used to take up the drive air (compressed air) and actuate the pump's high-pressure unit via a piston rod, thereby pumping the fluid in question.

Pump head with inlet and outlet valve

The pump head locks the stroke chamber and separates it spatially from the ambient pressure. The pump head contains the inlet and outlet valves. The fluid to be pumped enters and exits the high-pressure pump's stroke chamber through these inlet and outlet valves.

High-pressure unit

The pump's high-pressure unit is used to pump the respective fluid. The high-pressure unit consists of the pressure cylinder, pump head with inlet and outlet valves and the high-pressure piston with seal and guide elements.

Exhaust air silencer

The exhaust air silencer serves to reduce noise when expanding drive air is discharged from the high-pressure pump. On completion of its task, the drive air exits the pump via the exhaust air silencer. The exhaust air silencer may be made of plastic or aluminium, depending on the pump model.

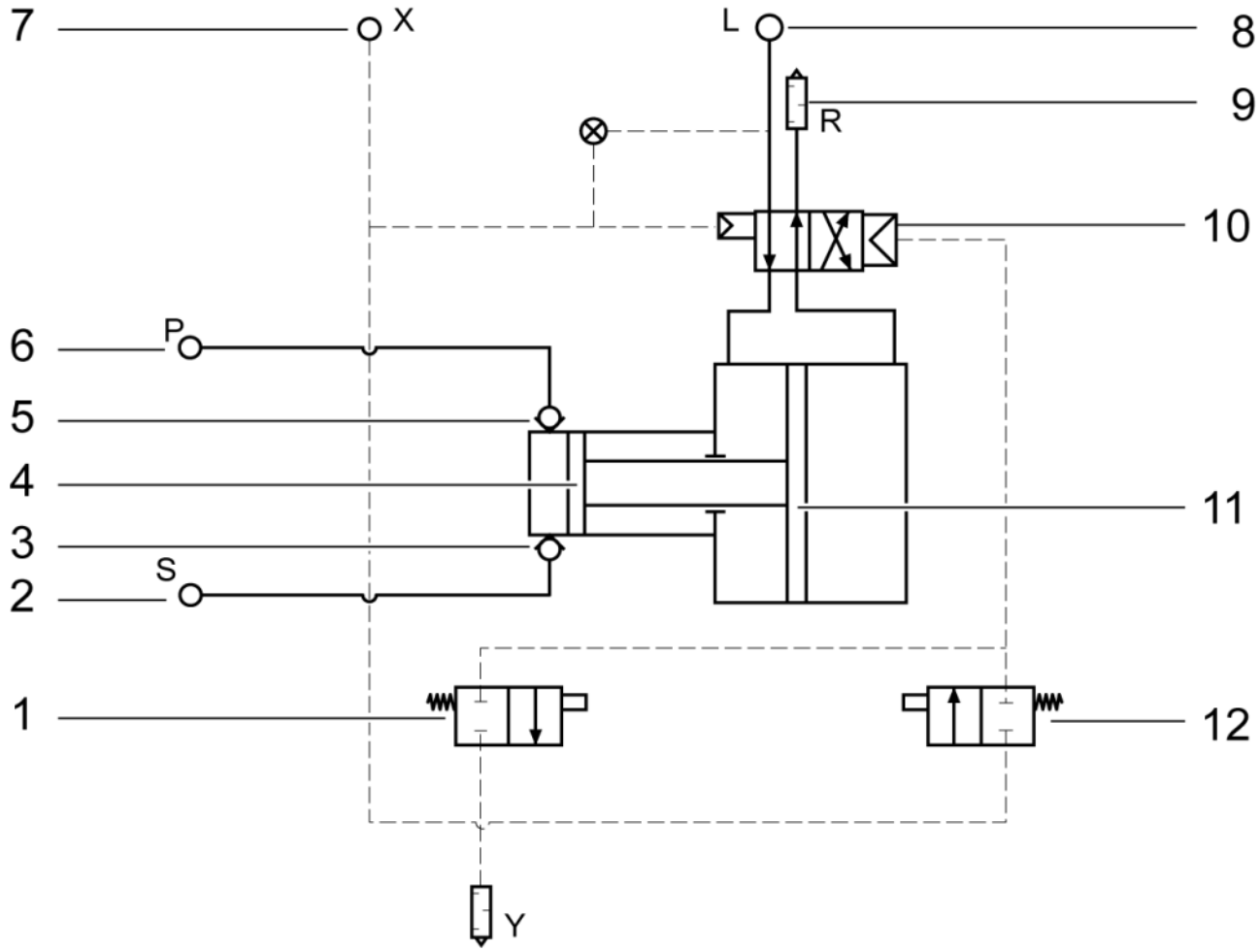
3.4 How the high-pressure pumps work

Explanation of how the pump works

The drive air flows from the air port (8) through the spool valve (10) to the bottom of the air piston (11). The air piston moves to the right in the drive unit, thereby causing the pump to perform a suction stroke. The intake valve (3) opens. The high-pressure piston (4) sucks the fluid through the suction port (2) to the pump's HP unit. In the upper stop position, the air piston (11) actuates the pilot valve (12). The control air passes from the port (7) to the spool valve (10) and pushes it into the other switching position.

The chamber under the air piston (11) is now connected to the silencer (9) via the spool valve (9); the drive air is vented via port R. The drive air simultaneously accesses the top of the air piston (11). The air piston moves to the left in the drive unit, with a pressure stroke being performed. The inlet valve (3) closes. The pressure valve (5) is opened and the high-pressure piston (4) pushes the pumped fluid out from the pressure outlet (6).

During the pressure stroke, both pilot valves (1) and (12) are closed. The spool valve (10) is held in its front position by the trapped pressure on the large spool valve side. When the air piston (11) reaches the bottom stop position, it actuates the pilot valve (1). The large spool valve area is vented via the port (Y). The spool valve (10) is pushed into the start position by the drive air. A new suction stroke begins.



1	Pilot valve bottom cap	5	Outlet valve	9	Drive air outlet
2	Suction port	6	Pressure outlet	10	Spool valve
3	Inlet valve	7	Control air inlet	11	Air piston
4	High-pressure piston	8	Air port	12	Pilot valve upper cap

Fig. High-pressure pump connection diagram

3.5 Ports

The high-pressure pumps are supplied without any pipelines or screw connections. The information about port values must be observed for all interface connections (» chapter 6.4.1 "Port sizes"). A drawing for all ports that need to be fitted is always enclosed with the high-pressure pump.

The high-pressure pumps have the following interfaces:

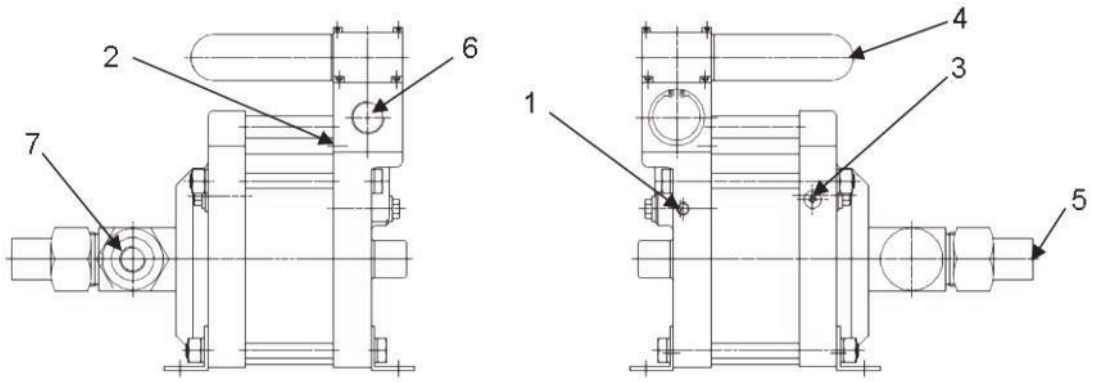


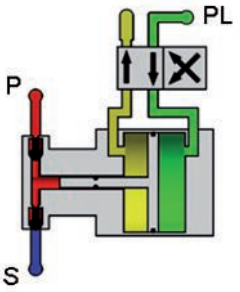
Fig. High-pressure pump ports

Item no.	Designation	Function
1	Pilot port "X"*	Port for direct pilot valve (filtered and uncontrolled) control air ≥ drive air (max. 10 bar)
2	Spool valve "Y" ventilator port	Ventilation and bleeding of the spool valve (pulse-shaped air escape)
3	Pilot valve exhaust air port	Bleeding of the pilot valve. This port can be used as a port for a stroke counter. The air exits in a pulsed manner here. The port must not be completely sealed.
4	Exhaust air silencer port	Output of expanding drive air
5	Inlet "S"	Suction pipe port
6	Compressed air port "PL"	Input of compressed drive air (max. 10 bar)
7	Outlet "P"	Pressure line port

* The port for direct pilot valve air is not available with all pump models.

3.6 Models

Maximator high-pressure pumps of various sizes can be assigned to the following models. » Chapter 4 "Technical Data" contains the models that are currently available.

<table>
<tr>
<td>Single-acting
 
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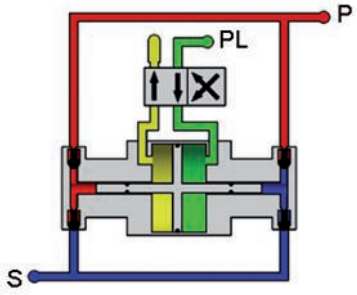
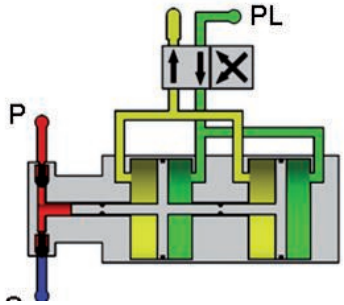
<td>Double-acting
 
</td>
</tr>
<tr>
<td>Single-acting with two air pistons
 
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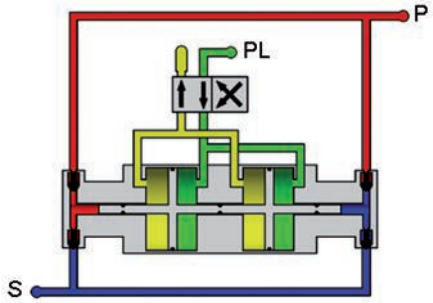
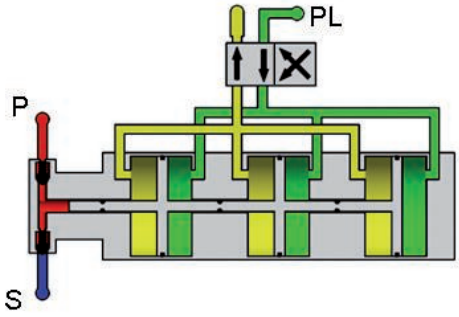
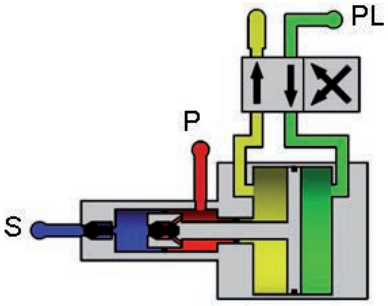
 
</td>
</tr>
<tr>
<td>Single-acting with three air pistons
 
</td>
<td>Double-acting with one high-pressure piston
 
</td>
</tr>
</table>

Key:

	PL = air drive		P = operating pressure
	S = suction port		= exhaust air

3.7 Delivery

Scope of delivery:

Designation	Quantity
High-pressure pump	1
Assembly instructions and operating instructions for high-pressure pumps	1
Set of drawings (sectional drawing, parts list, port drawing)	1
Declaration of incorporation in accordance with the Machinery Directive	1
Declaration of conformity in accordance with ATEX 2014/34/EU	1

3.8 Accessories

With regard to the installation of the high-pressure pump, we also stock an extensive range of valves, fittings and pipes as well as other components.

Furthermore, it is possible to purchase hydraulic units that are ready for connection. You can obtain an overview of Maximator's product range on Maximator's website » http://www.maximator.de.

The following accessories are available for the high-pressure pumps.

Air control unit

Using the Maximator air control unit makes it easy to operate the high-pressure pump. The air control unit consists of a pressure filter, water separator, shut-off valve, pressure governor, pressure gauge and, where applicable, a safety valve.

Seal kits

The individual seal sets of the high-pressure pump components are available from Maximator as complete seal kits. These seal kits are required whenever faults are remedied. See also sectional drawings and parts lists of the high-pressure pump.

4 Technical Data

4.1 Operating conditions

Ambient conditions

Specification	Value	Unit
Temperature range	-20 … + 60*	°C

* Temperature range taking compressed air quality into account.

Operating fluid

Specification	Value	Unit
Operating temperature, min.*	0	°C
Operating temperature, max.*	60 **	°C
Particle size, max.	30	µm

* Maximator will be pleased to advise you if your operating temperatures differ
** Temperatures up to 80°C are permitted intermittently

Pneumatic (air quality in accordance with ISO 8573-1)

Specification	Value	Unit
Oil-free compressed air	*possible	
Max. compressed air cleanliness factor of oil (class 4)	5	mg/m³
Max. number of particles in the case of 0.1 – 0.5 µm size (class 3)	not specified	pc
Max. number of particles in the case of 0.5 – 1.0 µm size (class 3)	90.000	pc
Max. number of particles in the case of 1.0 – 5.0 µm size (class 3)	1.000	pc
Max. solids, particle concentration (class 6)	5	mg/m³
Max. pressure dew-point in the event of humidity (class 4)	+3	°C

To avoid damage to seals and their counter surface, a filter with a fineness of max. 10µm must be installed.

Oil in the oiler must comply with DIN 51524 – ISO VG 32.

* Maximator pumps do not generally require a compressed air oiler, as they are treated with special grease during assembly. After an oiler has been used for the first time, however, the drive fluid always needs to be oiled, as the oil washes out the special grease.

Drive pressure

The high-pressure pumps can be operated with the drive pressures contained in the table opposite.

Min. P_L	1 bar
Max. P_L	10 bar

Noise emission

Example: G-model high-pressure pump on tank at 10 bar drive pressure.

Specification	Value	Unit
Noise emission (L_{eq})	79	dB(A)

L_{eq} = equivalent continuous sound level (averaged over 30 seconds)

The noise emission measurement was performed at a height of 1.5 metres and at a distance of 1 metre from the test stand. The detected noise emission was measured without counter-pressure at full load operation and may vary considerably, depending on model range, use and installation situation.

4.2 Performance values and weights

Annex I "Performance Values and Weights" contains a list of the performance values and weights of all pump types. The list involves approximate specifications, which may vary slightly.

For more detailed information about the respective pump, including characteristic curve and port drawing, please consult the respective data sheet on Maximator's website » http://www.maximator.de.

4.3 Calculating the operating pressure

Before the high-pressure pump is commissioned, the operating pressure needs to be calculated. The pump's theoretically achievable static end pressure is calculated using the following formula:

$$P_B = P_L * i$$

P_B = operating pressure
P_L = drive pressure
i = transmission ratio

For the transmission ratio "i" that applies to the corresponding pump type, see » Annex I

"Performance Values and Weights" or the pump's nameplate

The actually achievable end pressure depends on other influencing factors (friction, type of fluid, spring return, etc.) and may perhaps be smaller.

4.4 Suction height

All Maximator high-pressure pumps are self-suctioning. To ensure correct suction behaviour, it is important to select cross-sections of the connecting pipes that fit the ports used.

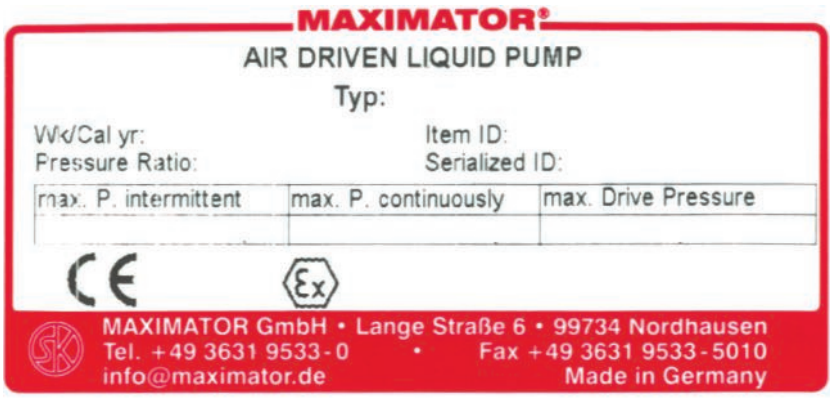
Primary pressure in the suction pipe does not cause any problems. Higher suction heights can be achieved. Smaller suction pipe cross-sections are possible.

Annex I "Performance Values and Weights" contains a list of achievable suction heights for all pump types.

4.5 Explosion protection

Ex marking

The Ex marking is located on the nameplate of the high-pressure pump's drive unit.



Marking	Designation	Meaning
CE Ex	CE mark, Ex mark	Conformity marking in accordance with Annex III of Directive 2004/42/EC and Article 16(4) of Directive 2014/34/EU.
II	Equipment group	The pump may be used in potentially explosive atmospheres, except in mining.
2D/2G	Equipment category	In the case of equipment categories 2G/2D, a potentially explosive atmosphere involving gases (G) and dust (D) may occasionally occur. The equipment guarantees a high level of safety and can be used in zone 1 and zone 2 / 21 and 22.
IIB	Explosion group	For use with substances from group IIB, e.g. propane
IIC	Explosion group	For use for substances from group IIC, e.g. hydrogen
c	Ignition protection type	Constructional safety for non-electrical equipment intended for use in potentially explosive atmospheres according to DIN EN 13463-5.
TX	Additional marking	The temperature depends on the operating parameters.

4.5.1 Operating instructions in accordance with the Explosion Protection Directive

The operating instructions for Group II Category 2G/2D Explosion Group IIB and IIC are listed below. The respective nameplate shows the group to which your Maximator high-pressure pump can be assigned.

4.5.2 Operating instructions in accordance with the Explosion Protection Directive (IIB)

If the pumps bear an Ex mark and are supplied with a declaration of conformity in compliance with 2014/34/EU, they can be used in potentially explosive atmospheres. They correspond to Group II Category 2G/2D Explosion Group IIB constructional safety.

A prerequisite for safe operation is that the pump should be correctly connected to the earth potential.

The pump temperature is roughly the same as the fluid temperature.

If the pump runs dry, there is a temperature increase in relation to the ambient temperature. Annex IIII "Temperature Increase" lists the temperature increases identified for the individual model ranges. Extended dry running of the HP seal must be avoided.

Equipment must not be cleaned or maintained in the presence of a potentially explosive atmosphere. Take care, when cleaning, to ensure that the plastic surfaces and electrically non-conductive surfaces do not build up an electrostatic charge (use a moist cotton cloth).

No ignitable mixtures may be used as drive gas.

The assembly instructions pursuant to the Machinery Directive (2006/42/EC) are an integral part of these operating instructions.

4.5.3 Operating instructions in accordance with the Explosion Protection Directive (IIC)

If the pumps bear an Ex mark and are supplied with a declaration of conformity in compliance with 2014/34/EU, they can be used in potentially explosive atmospheres. They correspond to Group II Category 2G/2D Explosion Group IIC constructional safety.

A prerequisite for safe operation is that the pump should be correctly connected to the earth potential.

The pump temperature is roughly the same as the fluid temperature.

If the pump runs dry, there is a temperature increase in relation to the ambient temperature. Annex IIII "Temperature Increase" lists the temperature increases identified for the individual model ranges. Extended dry running of the HP seal must be avoided.

Equipment must not be cleaned or maintained in the presence of a potentially explosive atmosphere. Take care, when cleaning, to ensure that the plastic surfaces and electrically non-conductive surfaces do not build up an electrostatic charge (use a moist cotton cloth).

No ignitable mixtures may be used as drive gas.

The assembly instructions pursuant to the Machinery Directive (2006/42/EC) are an integral part of these operating instructions.

5 Transportation, Packaging and Storage

5.1 Transportation safety information

Incorrect transportation

Material damage due to incorrect transportation!

Incorrect transportation may cause significant damage.

- Proceed with caution when unloading transport items on delivery and in the case of transportation within the company and pay attention to the symbols and information on the packaging.
- Do not remove any packaging until shortly before assembly.

5.2 Packaging

The individual packages have been packed in accordance with the expected transportation conditions. Only environmentally friendly materials have been used for the packaging.

The packaging is intended to protect the individual components against transportation damage, corrosion and other damage until they are assembled. Therefore, do not destroy the packaging and do not remove it until shortly before assembly.

Dispose of packaging material in accordance with the currently applicable statutory provisions and local regulations.

5.3 Storage

Store packages under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free environment.
- Do not expose to aggressive fluids.
- Protect against sunlight.
- Avoid mechanical shocks.
- Storage temperature: -20 to 60°C
- Relative air humidity: max. 60%
- If the equipment is stored longer than 3 months, inspect the general condition of all parts and the packaging on a regular basis. Repair the parts, where necessary

The packages may contain storage information that goes beyond the requirements stated here. This information must be complied with accordingly.

6 Installation and Commissioning

6.1 Installation and commissioning safety information

Incorrect installation and commissioning

WARNING!
Injury hazard due to incorrect installation and commissioning!

Incorrect installation or commissioning may cause serious injuries and considerable damage.

- Ensure that all installation work is carried out and completed in accordance with the specifications and information contained in these instructions.

Explosion protection

WARNING!
Explosion hazard during assembly!

Carry out assembly work only when no potentially explosive atmosphere is present.

Appropriate measures must be taken to ensure static discharge capability at all times. Failure to observe these instructions will result in loss of explosion protection.

Safety when pressurizing potentially explosive substances Avoidance of potentially explosive atmospheres in rooms and in the open air

The following conditions will prevent the formation of an explosive atmosphere in areas of systems at risk:

- Systems must be set up in well-ventilated areas (if possible, outdoors).
- Systems must be and remain airtight.
- Blow-out circuits of safety valves, leakage pipes etc. must be routed to the open air.

Establish pipe connections to systems such that they ensure durable tightness of the connection.

6.2 Installation prerequisites

Install the high-pressure pump in a way that meets the following conditions:

- The assembly location must be level. Flatness less than 1 mm.
- The high-pressure pump must have a safe and fixed stand or seat.
- The high-pressure pump must not be exposed to any oscillations or vibrations.
- The high-pressure pump must be easily accessible on all sides.
- The high-pressure pump must be installed such that it is not exposed to any external sources of heat.
- We recommend that the high-pressure pump be assembled in a dust-free environment.

6.3 Assembling the high-pressure pump

With regard to assembly, make sure you observe the safety information from » chapter 2 "Safety".

The high-pressure pump must be fixed to the designated mounting holes using at least 4.6 grade screws or bolts. The appropriate screw or bolt size must be determined from the set of drawings supplied.

The preferred installation position is vertical. Where possible, the pumps must be assembled such that leak detection holes do not point upwards.

Lifting points

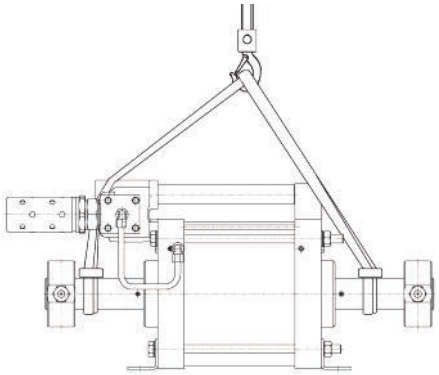


Fig. Lifting points for GPD model range

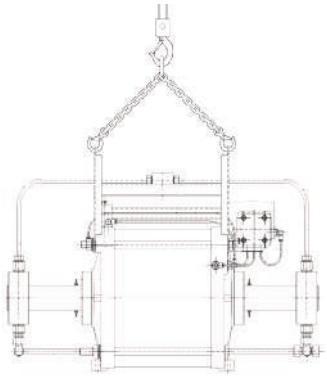


Fig. Lifting points for DPD model

As shown in the graphics, pumps for models GPD, GPD-2 and DPD can be attached using two belt straps or double-strand chains.

6.4 Mounting connection lines

The high-pressure pump is supplied without any screw connections or pipelines. Observe the specifications in » chapter 6.4.1 "Port sizes" and supplied port drawing.

Unpredictable movements

WARNING!

Injury hazard due to unpredictable movements of compressed air lines!

Lines in the internal compressed air network can move unpredictably in the event of a load change (hose rupture) and thereby cause injuries.

- Depressurize the connecting line before commencing any assembly work.
- All piping must be safely anchored to the floor or walls.
- All piping must be laid so as to avoid any trip hazard.
- Wear personal protective equipment at all times.

Using incorrect connecting lines

WARNING!
Risk of material damage due to the use of incorrect connecting lines!

Use of incorrectly dimensioned piping or screw connections can lead to malfunctions and material damage to the high-pressure pump.

- The piping and lines must be adjusted to the high-pressure pump's maximum outlet pressure (see » chapter 4.3 "Calculating the operating pressure")
- The respective screw connections must be fitted professionally.

The cross-section of the high-pressure pipes and lines must not be smaller than the cross-section of the ports.

A prerequisite for correct installation is the existence of a professionally planned, installed and maintained compressed air network and a shut-off valve additionally installed at the compressed air network inlet.

6.4.1 Port sizes

Port dimensions, mechanical

» Annex II "Port Dimensions" lists the standard ports for all pump types.

For more detailed information about the respective pump, including characteristic curve and port drawing, please consult the respective data sheet on Maximator's website » http://www.maximator.de.

The pipe cross-sections must not be smaller than in the corresponding port. Pipe cross-sections that are too small may result in pump problems and malfunctions.

Other ports

The inlet and outlet as well as drive air ports listed in » chapter 6.4.1 "Port Sizes" are standard ports. In addition to G threads, NPT threads and Maximator high-pressure ports are available. The pressure ranges applicable to the respective ports are contained in the following table:

Port designation	Pressure range
G (BSP) or NPT	0 - 1050 bar
Maximator high-pressure port - medium pressure - M	0 - 1550 bar
Maximator high-pressure port - high pressure - H	0 - 4500 bar
Maximator high-pressure port - ultra high pressure - U	0 - 7000 bar

For further information about the Maximator high-pressure ports, please see the chapter "Technical Information" in the » Maximator Valves, Fittings and Tubing Catalogue.

6.4.2 Connecting the drive air

Depending on the model, the drive air port on the high-pressure pump either needs to be fitted to the air drive port (PL) of the spool valve housing or to the compressed air control unit (accessories), if available. Regarding the use of drive air lines, hose connections or screw connections, observe the information contained in » chapter 6.4.1 "Port sizes" and the port drawing supplied.

The following section describes how to fit the drive air.

WARNING!
Injury hazard due to pressurized components!

1.► Unscrew the sealing plug on the drive air connection (PL) of the spool valve housing or on the compressed air control unit.

2.► Suitably connect the air control unit's controlled compressed air outlet to the drive air connection (PL) of the spool valve housing. *

3.► Suitably connect the drive air to the drive air connection (PL) of the spool valve housing or to the compressed air control unit, if available, using a hose or pipe.

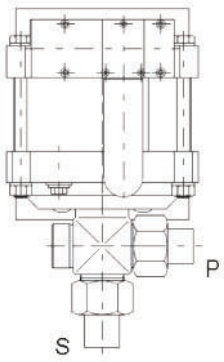
* If an air control unit exists (air control unit available as an option).

6.4.3 Control air

In the case of pumps with a port for control air (direct pilot valve air) - the port is marked by "X" -, the control air must be connected before the pressure governor (or at the pressure governor's uncontrolled outlet). This enables the pump to work better even at low drive pressures. If the control air is not connected, the pump does not work. The same requirements on compressed air quality apply to the control air as to the drive air (see » chapter 4.1 "Operating conditions").

In a number of pump models, the control air port is available as standard (see » chapter 6.4.1 "Port sizes". With other models, this port is available as a special option.

6.4.4 Connecting the suction pipe and the pressure pipe



1.► Remove sealing plug from the inlet and outlet ports (S and P).

2.► Piping for inlet and outlet lines in accordance with the port drawing.

6.5 Fitting the exhaust air silencer

The following section describes how to fit the exhaust air silencer.

The exhaust air silencer may be made of plastic or aluminium, depending on high-pressure pump model. The exhaust air silencer is always fitted in the same way.

Personnel:	Mechanical and system
Protective equipment:	Personal protective equipment

1.► Keep the exhaust air silencer ready.

2.► Unscrew the sealing plug from the exhaust air port.

3.► Place the exhaust air silencer on the exhaust air port and hand-tighten it.

6.6 Commissioning

The following section describes how to commission the high-pressure pump.

Personnel:	Mechanical and system engineers
Protective equipment	Protective workwear
	Protective goggles
	Safety footwear
Special tools:	Leak detector spray

1.► Check all ports to make sure that they have been installed correctly

2.► Check all piping for mechanical damage.

3.► Open intake port on the suction line, where necessary.

4.► Controller button on air control unit is set to closed (0 bar). *

5.► Open the compressed air line of the compressed air network to the high-pressure pump.

6.► Pull controller button of the compressed air control unit upwards.*

⇨ The controller button audibly clicks out of the lock.

7.► Set the drive pressure you require on the controller button.*

⇨ The pump will automatically start pumping.

All Maximator high-pressure pumps are self-suctioning. For further information, see » chapter 4.4 "Suction height"

8.► **WARNING!**
Injury hazard due to escaping fluids!

Carry out leak test on all ports.

* If an air control unit exists (air control unit available as an option).

In order to keep the load on the pump components low during commissioning, we recommend that the drive air pressure be increased slowly.

This keeps the pump's stroke frequency low. Otherwise, operating phases with very high clock frequencies may occur during the suction process until the suction line and the pump are vented and during the startup phase until the desired operating pressure has been reached.

It is, for example, possible to use the optionally available air control unit to control the drive air pressure.

7. Operation

7.1 Operation safety information

Noise

WARNING!
Injury hazard due to noise!

The noise level occurring in the work area can cause major hearing damage, depending on the installation type and expanding air.

- Always wear personal protective equipment when working on high-pressure pumps in operation.
- Only remain in the danger zone to the extent necessary.

The noise level depends on the installation situation and can be determined only in the installed state.

Flying ice crystals and accumulations of fluid

WARNING!
Injury hazard due to flying ice crystals and accumulations of fluid!

Ice ejected and tossed around by the expanding air may form on the high-pressure pump's exhaust air silencer during operation. The ejected ice crystals may cause eye injuries and accumulations of fluid on the floor.

- Wear protective goggles at all times during work.
- Immediately use suitable media to absorb accumulations of fluid.
- Wear anti-slip safety footwear at all times.

Attach warning signs and instructions at or near to the area where accumulations of fluid may occur on the floor or ice crystals may fly around.

Dry run

WARNING!
The high-pressure pump heats up if it runs dry!

Lubrication of the HP piston by the pumped fluid is essential for the high-pressure pump to operate safely. Without such lubrication, the high-pressure pump heats up as indicated in » chapter 4.5 "Explosion protection".

NOTE!
Components become damaged if they run dry!

Lubrication of the HP piston by the pumped fluid is essential for the high-pressure pump to operate smoothly. Without lubrication, pump parts become damaged. The correct commissioning procedure is described in » chapter 6.6 "Commissioning".

Incorrect operation

WARNING!
Injury hazard due to incorrect operation!

Incorrect operation may cause serious injuries and significant material damage.

- Observe all specifications and information in accordance with these instructions.

7.2 Cleaning

Personel: To be defined by the system engineer

Pressurized components

WARNING!
Injury hazard due to pressurized components!

Before commencing any cleaning work, shut down and depressurize the pump

Operating fluids

WARNING!
Injury hazard due to operating fluid residues

If the pump is operated by means of hazardous or environmentally harmful fluids, fluid residues may be present in the direct vicinity of the pump. Relevant precautions (PPE, collecting vessel, etc.) must then be taken when cleaning.

Explosion protection

WARNING!
Explosion hazard during cleaning

Perform cleaning only when no potentially explosive atmosphere is present.

Appropriate measures must be taken to ensure static discharge capability at all times. Take care, when cleaning, to ensure that the plastic surfaces and electrically non-conductive surfaces do not build up an electrostatic charge (use a moist cotton cloth).

Failure to observe these instructions will result in loss of explosion protection.

7.3 Inspection and maintenance intervals

Personnel: To be defined by the system engineer

Maximator recommends the following inspection and maintenance intervals.

Maintenance interval	Maintenance	
Before and after every use	1.►	Check system to ensure that it is functioning safely.
	2.►	Dehumidify the air system.
	3.►	Check ports for leaks.
	4.►	Check screw connections and piping for damage. Inspect and
Every 3-6 months	1.►	lubricate spool valve, pilot valve or o-rings in the drive unit. Replace if necessary.*
	2.►	Check high-pressure pump for leaks.
	3.►	Check and, if necessary, tighten bolts, check valves and screw connections.
Every 6 months	1.►	Replace air filters.
Every 12 months	1.►	Carry out pressure test on the high-pressure pump piping.
	2.►	Inspect and, if necessary, replace check valves.
	3.►	Clean the high-pressure pump.
As required or following wear and tear	1.►	Replace all seal and guide elements.

* Maximator special grease (3620.2725) is contained in some seal sets or available separately.

7.4 Fault analysis

7.4.1 Pressure system

Possible fault	Cause of fault	Fault removal
Pump fails to work at low air pressure.	Friction of o-rings on spool valve is too high.	• Lubricate • Replace o-rings on the spool valve.
	O-rings swell due to use of wrong oil or lubricant.	• Change o-rings. • Use acid-free and silicon-free lubricants.
Pump operates only at high air pressure.	Air escapes through pistonguide in top cap.	• Replace o-rings on piston rod.
	Air escapes through filter disc in bottom cap.	• Replace O-Rings on air piston
Pump does not operate or operates only slowly.	Direct pilot valve air not connected if control air port "X" available	• Connect control air
	Direct pilot valve air not sufficiently pressurized.	• Control air pressure must be at least the same as the drive pressure.
	Silencer or spool valve iced up.	• Use water separator to dewater compressed air.
	Formation of residue in the silencer.	• Clean the silencer. Replace, where applicable.
Pump does not operate. Air escapes through the silencer.	O-rings on the spool valve defective.	• Change and grease o-rings.
	O-ring on air piston defective or worn out.	• Change and grease o-ring.
Pump does not operate. Air escapes through piston guide in top cap	Pilot valve hangs.	• Check pilot valve. • Change pilot valve and seal, where applicable.
Pump does not operate. Air escapes through small hole on spool valve housing.	Spool valve hangs.	• Clean spool valve and sleeve. • Check and, if necessary, replace o-rings and sleeve. • Lubricate.

Possible fault	Cause of fault	Fault removal
Pump does not operate. Air escapes through small hole in bottom cap.	Pilot valve in top or bottom flap hangs.	• Clean and grease pilot valve. • Check for wear and tear and replace, if required.
Pump operates with high frequency and short strokes.	Pilot valve in top or bottom flap defective.	• Clean, grease and, if required, replace pilot valve.
	O-ring on high-pressure piston in top cap defective.	• Replace and grease o-ring.

7.4.2 Hydraulic system

Possible fault	Cause of fault	Fault removal
Pump operates without conveying or operates irregularly. It does not achieve the calculated final pressure.	Air in the hydraulic system	• Vent hydraulic system. • Check suction pipes and screw connections for leaks. • Check seal between air and hydraulic system.
	Suction pipe too long.	• Shorten suction pipe
	Suction cross-section too small.	• Extend suction cross-section, as the suction flow will otherwise stall.
	Failure of the check valves.	• Check, clean and, if necessary, replace check valves.
	Suction filter contaminated.	• Clean suction filter.
	Worn packing ring or HP seal.	• Replace seal sets.
Fluid escapes through the exhaust.	Worn packing ring or HP seal.	• Replace seal sets. • In the event of increased wear
Fluid escapes through filter disc in the lower cap.	Worn packing ring or HP seal.	• Replace seal sets.

7.5 Repair

Maximator devices should be sent to your local Maximator representative for repairs. All information regarding this is available on the Maximator website
» http://www.maximator.de/Inhouse+Reparaturen.

WARNING!
Injury hazard due to incorrect handling of pumped fluid!

If the Maximator high-pressure pump has come into contact with dangerous or environmentally hazardous pumped fluid, make sure that all measures are taken to render the pump safe before repairing it. The safety data sheet of the pumped fluid and a clearance certificate must be enclosed.

8 Dismantling and Disposal

Personel:	Mechanical and system engineers
Protective equipment:	Personal protective equipment

Safety information

At the end of the high-pressure pump's service life, it must be dismantled and disposed of in an environmentally friendly manner.

Explosion protection

WARNING!
Explosion protection during dismantling!

Introducing sources of ignition such as sparks, naked flames, and hot surfaces can lead to explosions in the explosion zone.

- Obtain written approval for work before beginning the dismantling operation.
- If aggressive, flammable, hazardous or poisonous fluids are being pumped, take care to ensure, prior to dismantling, that it is safe to handle the pump.
- Dismantle only when no potentially explosive atmosphere is present.
- Use only tools that have been approved for use in explosion protection.

Failure to observe these instructions will result in loss of explosion protection.

Dismantling and Disposal

Incorrect dismantling

WARNING!
Injury hazard due to incorrect dismantling!

Residual risks such as sharp components, tips and corners on or in the high-pressure pump or on the required tools may cause injuries.

- Ensure that there is sufficient space before starting work.
- Shut off all operating fluid to the high-pressure pump.
- Make sure that the workplace is clean and tidy. Components and tools lying loosely on top of another or lying about are hazard sources.

Consult the manufacturer in the event of any uncertainty.

Dismantling

1.► Shut down and de-pressurize the pump

2.► 

WARNING!
Injury hazard due to incorrect handling of pumped fluid!

If aggressive, flammable, hazardous or poisonous fluids are being pumped, appropriate measures must be taken to render the pumps safe prior to commencement of the dismantling operation.
Observe the safety data sheet of the pumped fluid.

3.► Undo fastening screws.

4.► Clean assemblies and components professionally.

5.► Dismantle assemblies and components in accordance with applicable occupational safety and environmental protection regulations.

Disposal

If no return or disposal agreement has been entered into, dispose of the disassembled components in accordance with the locally applicable regulations or recycle them in an appropriate manner.

Annex I: Performance Values and Weights

Model	Type	Trans-mission ratio *	Stroke volume ** cm³	Operating pressure	Weight **** kg	Suction height m
Single-acting MO pumps with one air drive piston	MO4	1:4	30,5	40	2,5	2
	MO8	1:9	14,7	90	2,5	2
	MO12	1:14	9,4	140	2,5	2
	MO22	1:29	4,6	290	3,0	1
	MO37	1:47	2,8	470	3,0	1
	MO72	1:88	1,5	880	3,0	1
	MO111	1:133	1,0	1000	3,0	0,5
	MO189	1:225	0,6	1000	3,0	0,5
Double-acting MO-D pumps with one air drive piston	MO22D	1:28	9,2	280	4,5	1
	MO37D	1:46	5,6	460	4,5	1
	MO72D	1:86	3,0	860	4,5	1
	MO111D	1:130	2,0	1000	4,5	0,5
	MO189D	1:220	1,2	1000	4,5	0,5
Single-acting S pumps with one air drive piston	S15	1:17	28,3	170	9,1	2
	S25	1:25	19,6	250	9,1	2
	S35	1:39	12,6	390	9,1	2
	S60	1:61	8,0	610	9,1	1
	S100	1:108	4,5	1000	9,1	1
	S150	1:156	3,1	1000	9,1	1
Double-acting S-D pumps with one air drive piston	S15D	1:16	56,6	160	14,5	2
	S25D	1:24	39,2	240	14,5	2
	S35D	1:38	25,2	380	14,5	2
	S60D	1:60	16,0	600	14,5	1
	S100D	1:107	9,0	1000	14,5	1
	S150D	1:155	6,2	1000	14,5	1
Single-acting M pumps with one air drive piston	M4	1:4	30,5	40	3,0	2
	M8	1:9	14,7	90	3,0	2
	M12	1:14	9,4	140	3,0	2
	M22	1:28	4,6	280	2,8	1
	M37	1:46	2,8	460	2,8	1
	M72	1:86	1,5	860	2,8	1
	M111	1:130	1,0	1300	2,8	0,5
	M189	1:220	0,6	2200	2,8	0,5

Performance Values and Weights

Model	Type	Trans-mission ratio *	Stroke volume ** cm³	Operating pressure	Weight **** kg	Suction height m
Double-acting M-D pumps with one air drive piston	M4D	1:3	61	30	4,7	2
	M8D	1:8	29,4	80	3,7	2
	M12D	1:13	18,3	130	3,7	2
	M22D	1:28	9,2	280	3,7	1
	M37D	1:46	5,6	460	3,7	1
	M72D	1:86	3,0	860	3,7	1
	M111D	1:130	2,0	1300	3,7	0,5
	M189D	1:220	1,2	2200	3,7	0,5
Single-acting M-2 pumps with two air drive pistons	M111-2	1:261	1,0	2500	3,9	0,5
	M189-2	1:440	0,6	4000	3,9	0,5
Single-acting M-3 pumps with three air drive pistons	M111-3	1:391	1,0	2500	4,6	0,5
	M189-3	1:660	0,6	4000	4,6	0,5
Single-acting S-SS pumps with one air drive piston and stainless steel components in contact with fluid	S40-SS	1:39	12,0	390	7,0	1
	S80-SS	1:80	6,0	800	7,0	1
	S160-SS	1:160	3,0	1630	7,0	0,5
	S200-SS	1:200	2,4	1930	7,0	0,5
	S250-SS	1:244	2,0	2400	7,0	0,5
	S350-SS	1:370	0,08	3700	7,0	0,5
Single-acting G pumps with one air drive piston	G10	1:11	90	110	16,0	2
	G15	1:16	62,0	160	16,0	2
	G25	1:28	35,3	280	14,5	2
	G35	1:40	24,5	400	14,5	2
	G60	1:63	15,4	630	13,5	1
	G100	1:113	8,8	1050	13,5	1
	G150	1:151	6,6	1450	13,5	1
	G250	1:265	3,8	2650	13,5	0,5
	G300	1:314	3,2	3140	13,5	0,5
	G400	1:398	2,5	3980	13,5	0,5
	G500S	1:519	1,9	4500	13,5	0,5

Performance Values and Weights

Model	Type	Transmission ratio *	Stroke volume ** cm^3	Operating pressure	Weight **** kg	Suction height m
Double-acting G-D pumps with one air drive piston	G10D	1:10	180,0	100	22,0	2
	G15D	1:15	124,0	150	22,0	2
	G25D	1:27	70,6	270	19,0	2
	G35D	1:40	49,0	400	19,0	2
	G60DS	1:63	31,4	630	17,0	1
	G100DS	1:113	17,6	1050	17,0	1
	G150DS	1:151	7,6	1450	17,0	1
	G250DS	1:265	7,5	2650	19,0	0,5
	G300DS	1:314	6,4	3140	19,0	0,5
	G400DS	1:398	5	4000	19,0	0,5
	G500DS	1:519	3,8	4500	19,0	0,5
Single-acting G-2 pumps with two air drive pistons	G10-2	1:22	90,0	220	20,5	2
	G15-2	1:32	62,0	330	20,5	2
	G25-2	1:56	35,3	560	19,0	2
	G35-2	1:80	24,5	800	19,0	2
	G60-2	1:126	15,4	1260	18,0	1
	G100-2	1:226	8,8	2100	18,0	1
	G150-2	1:300	6,6	2900	18,0	1
	G250-2	1:530	3,8	4500	22,0	0,5
	G300-2	1:628	3,2	4500	22,0	0,5
	G400-2	1:796	2,5	5500	22,0	0,5
	G500-2	1:1038	1,4	7000	22,0	0,5
Single-acting MSF pumps with one air drive piston, intermediate chamber and leak detection hole	MSF4	1:4	30,5	40	6,7	2
	MSF8	1:9	14,7	90	6,7	2
	MSF12	1:14	9,4	140	6,7	2
	MSF22	1:28	4,6	280	3,5	1
	MSF37	1:46	2,8	460	3,5	1
	MSF72	1:86	1,5	860	3,5	1
	MSF111	1:130	1,0	1000	3,5	0,5

Performance Values and Weights

Model	Type	Trans-mission ratio *	Stroke volume ** cm³	Operating pressure	Weight **** kg	Suction height m
Single-acting GSF with one air drive piston, intermediate chamber and leak detection hole	GSF10	1:11	90,0	110	20,0	2
	GSF15	1:16	62,0	160	20,0	2
	GSF25	1:28	35,3	280	19,0	2
	GSF35	1:40	24,5	400	19,0	2
	GSF60	1:63	15,7	630	18,0	1
	GSF100	1:113	8,8	1050	18,0	1
	GSF150	1:151	6,6	1450	18,0	1
Double-acting GPD with one air drive piston	GPD30	1:30	508	300	58,0	2
	GPD60	1:60	257	600	58,0	2
	GPD120	1:129	121	1200	58,0	2
	GPD180	1:192	69	1920	58,0	1
	GPD260	1:277	48	2770	58,0	0,5
Double-acting GPD-2 pumps with two air drive pistons	GPD30-2	1:60	508	600	78,0	2
	GPD60-2	1:120	257	1200	78,0	2
	GPD120-2	1:258	121	2580	78,0	2
	GPD180-2	1:384	69	3000	78,0	1
	GPD260-2	1:554	48	3000	78,0	0,5
Double-acting GX pumps with one high-pressure piston	GX35	1:36	110	360	24,0	2
	GX60	1:66	65	600	24,0	2
	GX100	1:117	36	1000	24,0	2
	GX170	1:177	36	1000	30,0	2
Double-acting DPD pumps with one air drive piston	DPD200	1:268	72	2100	54,0	0,5

* Computed transmission ratio

** Computed stroke volume

*** Maximum permitted static operating pressure; the pressure may differ, depending on the selected model (pay attention to the nameplate)

**** Weight of the basic model, approx. value.

Annex II: Port Dimension

Model	Type	S	P	PL	X
Single-acting MO pumps with one air drive piston	MO4	G3/8	G1/2	G3/8	-*
	MO8	G3/8	G1/2	G3/8	-*
	MO12	G3/8	G1/2	G3/8	-*
	MO22	G3/8	G1/4	G3/8	-*
	MO37	G3/8	G1/4	G3/8	-*
	MO72	G3/8	G1/4	G3/8	-*
	MO111	G3/8	G1/4	G3/8	-*
	MO189	G3/8	G1/4	G3/8	-*
Double-acting MO-D pumps with one air drive piston	MO22D	G3/8	G1/4	G3/8	-*
	MO37D	G3/8	G1/4	G3/8	-*
	MO72D	G3/8	G1/4	G3/8	-*
	MO111D	G3/8	G1/4	G3/8	-*
	MO189D	G3/8	G1/4	G3/8	-*
Single-acting S pumps with one air drive piston	S15	G3/4	G3/4	G1/2	-*
	S25	G3/4	G3/4	G1/2	-*
	S35	G3/4	G3/4	G1/2	-*
	S60	G1/2	G3/8	G1/2	-*
	S100	G1/2	G3/8	G1/2	-*
	S150	G1/2	G3/8	G1/2	-*
Double-acting S-D pumps with one air drive piston	S15D	G3/4	G3/4	G1/2	G1/8
	S25D	G3/4	G3/4	G1/2	G1/8
	S35D	G3/4	G3/4	G1/2	G1/8
	S60D	G1/2	G3/8	G1/2	G1/8
	S100D	G1/2	G3/8	G1/2	G1/8
	S150D	G1/2	G3/8	G1/2	G1/8
Single-acting M pumps with one air drive piston	M4	G1	G1/2	G3/8	-*
	M8	G3/4	G1/2	G3/8	-*
	M12	G3/4	G1/2	G3/8	-*
	M22	G3/8	G3/8	G3/8	-*
	M37	G3/8	G3/8	G3/8	-*
	M72	G3/8	G3/8	G3/8	-*
	M111	G3/8	G3/8	G3/8	-*
	M189	G3/8	G3/8	G3/8	-*
Double-acting MD pumps with one air drive piston	M4D	G1	G1/2	G3/8	-*
	M8D	G3/4	G1/2	G3/8	-*

Port Dimensions

Model	Type	S	P	PL	X
Double-acting M-D pumps with one air drive piston	M12D	G3/4	G1/2	G3/8	-*
	M22D	G3/8	G3/8	G3/8	-*
	M37D	G3/8	G3/8	G3/8	-*
	M72D	G3/8	G3/8	G3/8	-*
	M111D	G3/8	G3/8	G3/8	-*
	M189D	G3/8	G3/8	G3/8	-*
Single-acting M-2 pumps with two air drive pistons	M111-2	G1/4	4H	G3/8	-*
	M189-2	G1/4	4H	G3/8	-*
Single-acting M-3 pumps with three air drive pistons	M111-3	G1/4	4H	G3/8	-*
	M189-3	G1/4	4H	G3/8	-*
Single-acting S-SS pumps with one air drive piston and stainless steel components in contact with fluid	S40-SS	G3/8	G3/8	G1/2	-*
	S80-SS	G3/8	G3/8	G1/2	-*
	S160-SS	G1/4	4H	G1/2	-*
	S200-SS	G1/4	4H	G1/2	-*
	S250-SS	G1/4	4H	G1/2	-*
	S350-SS	G1/4	4H	G1/2	-*
Single-acting G pumps with one air drive piston	G10	G1	G3/4	G3/4	G1/8
	G15	G1	G3/4	G3/4	G1/8
	G25	G3/4	G3/4	G3/4	G1/8
	G35	G3/4	G3/4	G3/4	G1/8
	G60	G3/4	G1/2	G3/4	G1/8
	G100	G3/4	G1/2	G3/4	G1/8
	G150	G3/4	G1/2	G3/4	G1/8
	G250	G1/2	4H	G3/4	G1/8
	G300	G1/2	4H	G3/4	G1/8
	G400	G1/2	4H	G3/4	G1/8
	G500S	G1/4	4H	G3/4	G1/8
Double-acting G pumps with one air drive piston	G10D	G1	G3/4	G3/4	G1/8
	G15D	G1	G3/4	G3/4	G1/8
	G25D	G3/4	G3/4	G3/4	G1/8
	G35D	G3/4	G3/4	G3/4	G1/8
	G60DS	G3/4	G1/2	G3/4	G1/8
	G100DS	G3/4	G1/2	G3/4	G1/8
	G150DS	G3/4	G1/2	G3/4	G1/8
	G250DS	G1/2	4H	G3/4	G1/8
	G300DS	G1/2	4H	G3/4	G1/8
	G400DS	G1/2	4H	G3/4	G1/8
	G500DS	G1/4	4H	G3/4	G1/8
Single-acting G-2 pumps with two air drive pistons	G10-2	G1	G3/4	G3/4	G1/8
	G15-2	G1	G3/4	G3/4	G1/8

Port Dimensions

Model	Type	S	P	PL	X
Single-acting G-2 pumps with two air drive pistons	G25-2	G3/4	G3/4	G3/4	G1/8
	G35-2	G3/4	G3/4	G3/4	G1/8
	G60-2	G3/4	G1/2 !	G3/4	G1/8
	G100-2	G1/2	4H	G3/4	G1/8
	G150-2	G1/2	4H	G3/4	G1/8
	G250-2	G1/4	4H	G3/4	G1/8
	G300-2	G1/4	4H	G3/4	G1/8
	G400-2	G1/4	4H !	G3/4	G1/8
	G500-2	G1/4	5U	G3/4	G1/8
Single-acting MSF pumps with one air drive piston, intermediate chamber and leak detection hole	MSF4	G1	G1/2	G3/8	-*
	MSF8	G3/4	G1/2	G3/8	-*
	MSF12	G3/4	G1/2	G3/8	-*
	MSF22	G3/8	G3/8	G3/8	-*
	MSF37	G3/8	G3/8	G3/8	-*
	MSF72	G3/8	G3/8	G3/8	-*
	MSF111	G3/8	G3/8	G3/8	-*
Single-acting MSF pumps with one air drive piston, intermediate chamber and leak detection hole	GSF10	G1	G3/4	G3/4	G1/8
	GSF15	G1	G3/4	G3/4	G1/8
	GSF25	G3/4	G3/4	G3/4	G1/8
	GSF35	G3/4	G3/4	G3/4	G1/8
	GSF60	G3/4	G1/2	G3/4	G1/8
	GSF100	G3/4	G1/2	G3/4	G1/8
	GSF150	G3/4	G1/2 !	G3/4	G1/8
Double-acting GPD pumps with one air drive piston	GPD30	G3/4	G3/4	G3/4	-*
	GPD60	G3/4	G3/4	G3/4	-*
	GPD120	G3/4	9M	G3/4	-*
	GPD180	G1/4	6H	G3/4	-*
	GPD260	G1/4	6H	G3/4	-*
Double-acting GPD-2 pumps with two air drive pistons	GPD30-2	G3/4	G3/4	G3/4	-*
	GPD60-2	G3/4	G3/4 !	G3/4	-*
	GPD120-2	G3/4	9M !	G3/4	-*
	GPD180-2	G1/4	6H	G3/4	-*
	GPD260-2	G1/4	6H	G3/4	-*
Double-acting GX pumps with one high -pressure piston	GX35	1NPT	3/8NPT	G3/4	-*
	GX60	1NPT	3/8NPT	G3/4	-*
	GX100	1NPT	3/8NPT	G3/4	-*
	GX170	1NPT	3/8NPT	G3/4	-*
Double-acting DPD pumps with one air drive piston	DPD200	G1/2	6H	G3/4	-*

* Pilot port "X" available as a special option.

! High-pressure pumps with outlet threads of type G or NPT are permitted only up to a maximum of 1050 bar. For higher operating pressures, the pumps must be equipped with high-pressure ports appropriate to the desired pressure range (see » chapter 6.4.1 "Port sizes")

Annex III: Dry Run

WARNING!
The high-pressure pump heats up if it runs dry!

Lubrication of the HP piston by the pumped fluid is essential for the high-pressure pump to operate safely. Without such lubrication, the following increases in temperature on external pump components have been detected in relation to the ambient temperature.

Model	Temperature increase K
Single-acting MO pumps with one air drive piston	8
Double-acting MO-D pumps with one air drive piston	8
Single-acting S pumps with one air drive piston	5
Double-acting S-D pumps with one air drive piston	5
Single-acting M pumps with one air drive piston	8
Double-acting M-D pumps with one air drive piston	8
Single-acting M-2 pumps with two air drive pistons	8
Single-acting M-3 pumps with three air drive pistons	8
Single-acting M-ECO pumps with one air drive piston and spring return	180
Single-acting S-SS pumps with one air drive piston and stainless steel components in contact with fluid	23
Single-acting G pumps with one air drive piston	23
Double-acting M-D pumps with one air drive piston	23
Single-acting G pumps with two air drive pistons	23
Single-acting MSF pumps with one air drive piston, intermediate chamber and leak detection hole	180
Single-acting GSF pumps with one air drive piston, intermediate chamber and leak detection hole	180
Double-acting GPD pumps with one air drive piston	40
Double-acting GPD-2 pumps with two air drive pistons	40
Double-acting GX pumps with one high-pressure piston	120

* G-, G-D-, and G-2 Pumps with distance piece (e.g. G250-2) must be classified like a GSF-Pump.

Annex IV: Declaration of Incorporation

Einbauerklärung nach 2006/42/EG, Anhang II, Nr.1 B
Inhalt gemäß 2006/42/EG, Anhang II, Nr.1 B.
Anschrift Hersteller: MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Deutschland
Der Dokumentationsbeauftragte ist bevollmächtigt, die speziellen technischen Unterlagen nach Anhang VII B zusammenzustellen: dokumentationsbeauftragter@maximator.de / Tel.: 03631-9533-5109
Die Bauart von Druckluftbetriebenen Hydraulikpumpen der Baureihe:

MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-,
G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-, DPD...-Pumpen

ist eine unvollständige Maschine nach Artikel 2g und ausschließlich zum Einbau in oder zum Zusammenbau mit einer anderen Maschine oder Ausrüstung vorgesehen.
Grundlegende Sicherheits- und Gesundheitsschutzanforderung gemäß Anhang I dieser Richtlinie kommen zur Anwendung und wurden eingehalten :
Auflistung siehe separate Anlage
Die speziellen technischen Unterlagen gemäß Anhang VII B wurden erstellt und sie werden der zuständigen nationalen Behörde auf Verlangen in elektronischer Form übermittelt.
Diese unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Maschinenrichtlinie entspricht.

Declaration of Incorporation acc. to 2006/42/EC, Annex II, Nr.1 B
Contents acc. to 2006/42/EC, Annex II, Nr.1 B.
Name and address of manufacturer: MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Germany
The documentation officer is authorised to compile the relevant technical documentation as set forth in Annex VII B:
dokumentationsbeauftragter@maximator.de / Tel.: +49(0)3631-9533-5109
The model of air driven liquid pumps type:

MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-,
G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-, DPD...-pumps

is a partly completed machinery as defined in Article 2g and exclusively envisaged for installation into or assembly with other machinery or equipment.
Essential health and safety requirements (EHSR) acc. to Annex I to this directive have been applied and complied with:
See separate Appendix
The relevant technical documentation according to Annex VII B was compiled and will be forwarded to the competent national authority in electronic format upon request.
The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive on Machinery.

Déclaration d'incorporation de quasi-machines conformément à la Directive 2006/42/CE, Annexe II, Nr.1 B
Contenu conforme à la Directive 2006/42/CE, Annexe II, Nr.1 B.
Adresse du fabricant : MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Allemagne
La personne en charge de la documentation a procuration pour établir la documentation technique spéciale conformément à l'Annexe VII B : dokumentationsbeauftragter@maximator.de / Tél. : 03631-9533-5109
Le modèle de pompes hydropneumatiques type:

MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-,
G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-, DPD...-pompes

est une quasi-machine conformément à l'Article 2g et elle est destinée uniquement à être intégrée ou dans une autre machine ou un autre équipement ou à réaliser avec ceux-ci un ensemble cohérent.
Les exigences essentielles de santé et de sécurité conformément à l'Annexe I de la Directive ont été appliquées et respectées :
Voir la liste en Annexe
La documentation technique spéciale conformément à l'Annexe VII B a été établie et sera transmise sous forme électronique, sur réquisition, aux services nationaux compétents.
Cette quasi-machine ne pourra être mise en service qu'après avoir constaté que la machine dans laquelle la quasi-machine est intégrée, satisfait aux prescriptions de la Directive sur les machines.

Nordhausen, den 20.04.2016 (Nordhausen, 20.04.2016) [Nordhausen, le 20.04.2016]

i.V.
.....
Steffen Roloff (Technischer Leiter) (Technical Director) [Directeur technique]

Declaration of Incorporation

Appendix to Declaration of Incorporation according to 2006/42/EC Annex II, No.1 B
Description of essential health and safety requirements as defined in 2006/42/EC, Annex I, which were applied and complied with:

No.	Essential requirements	Applicable	Complied
1.1.1.	Definitions	Yes	Yes
1.1.2.	Principles of safety integration	Yes	Yes
1.1.3.	Materials and products	Yes	Yes
1.1.4.	Lighting	No	
1.1.5.	Design of machinery to facilitate its handling	Yes	Yes
1.1.6.	Ergonomics	No	
1.1.7.	Operating positions	No	
1.1.8.	Seating	No	
1.2.	Control systems		
1.2.1.	Safety and reliability of control systems	Yes	No
1.2.2.	Control devices	No	
1.2.3.	Starting	Yes	No
1.2.4.	Stopping	Yes	No
1.2.4.1	Normal stop	Yes	No
1.2.4.2	Operational stop	No	
1.2.4.3	Emergency stop	Yes	No
1.2.4.4	Assembly of machinery	No	
1.2.5.	Selection of control or operating modes	No	
1.2.6.	Failure of the power supply	Yes	No
1.3.	Protection against mechanical hazards		
1.3.1.	Risk of loss of stability	Yes	No
1.3.2.	Risk of break-up during operation	Yes	Yes
1.3.3.	Risk due to falling or ejected objects	Yes	Yes
1.3.4.	Risks due to surface, edges or angles	Yes	Yes
1.3.5.	Risks related to combined machinery	No	
1.3.6.	Risks related to variations in operating conditions	No	
1.3.7.	Risks related to moving parts	Yes	Yes
1.3.8.	Choice of protection against risks arising from moving parts	No	
1.3.8.1	Moving transmission parts	No	
1.3.8.2	Moving parts involved in the process	No	
1.3.9.	Risks of uncontrolled movements	No	
1.4.	Required characteristics of guards and protective devices		
1.4.1.	General requirements	No	
1.4.2.	Special requirements for guards	No	
1.4.2.1	Fixed guards	No	
1.4.2.2	Interlocking movable guards	No	
1.4.2.3	Adjustable guards restricting acces	No	
1.4.3.	Special requirements for protective devices	No	
1.5.	Risks due to other hazards		
1.5.1.	Electricity supply	No	
1.5.2.	Static electricity	Yes	Yes
1.5.3.	Energy supply other than electricity	Yes	No
1.5.4.	Errors of fitting	Yes	Yes
1.5.5.	Extreme temperatures	No	
1.5.6.	Fire	Yes	Yes
1.5.7.	Explosion	Not applicable or certified separately	

Declaration of Incorporation

No.	Essential requirements	Applicable	Complied
1.5.8.	Noise	Yes	No
1.5.9.	Vibrations	No	
1.5.10.	Radiation	No	
1.5.11.	External radiation	Yes	Yes
1.5.12.	Laser radiation	No	
1.5.13.	Emissions of hazardous materials and substances	Yes	No
1.5.14.	Risk of being trapped in a machine	No	
1.5.15.	Risk of slipping, tripping or falling	Yes	No
1.5.16.	Lightning	No	
1.6.	Maintenance		
1.6.1.	Machinery maintenance	Yes	No
1.6.2.	Access to operating positions and servicing points	No	
1.6.3.	Isolation of energy sources	Yes	No
1.6.4.	Operator intervention	Yes	Yes
1.6.5.	Cleaning of internal parts	No	
1.7.	Information		
1.7.1.	Information and warnings on the machinery	No	
1.7.1.1	Information and information devices	No	
1.7.1.2	Warning devices	No	
1.7.2.	Warning of residual risks	No	
1.7.3.	Marking of machinery	Yes	Yes
1.7.4.	Instructions	No	
1.7.4.1	General principles for the drafting of instructions	No	
1.7.4.2	Contents of the instructions	No	
1.7.4.3	Sales literature	No	
2.	Supplementary essential health and safety requirements for certain categories of machinery	No	
2.1.	Foodstuffs machinery and machinery for cosmetics or pharmaceutical products	No	
2.2	Portable hand-held and/or hand-guided machinery	No	
2.2.1.	General		
2.2.2.	Portable fixing and other impact machinery	No	
2.3.	Machinery for working wood and material with similar physical characteristics	No	
3.	Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery	No	
4.	Supplementary essential health and safety requirements to offset hazards due to lifting operations	No	
5.	Supplementary essential health and safety requirements for underground work	No	
6.	Supplementary essential health and safety requirements for machinery presenting particular hazards due to the lifting of person	No	

Annex V: EC Declaration of Conformity

EU-Konformitätserklärung
Im Sinne der EU-Richtlinie Explosionsschutz 2014/34/EU.
Anschrift Hersteller: MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Deutschland
Hiermit erklären wir, dass die Bauart von druckluftbetriebenen Hydraulikpumpen der Baureihe:
MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-, G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-Pumpen
in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:
EU-Richtlinie Explosionsschutz 2014/34/EU
Angewendete harmonisierte Normen und technische Spezifikationen:
DIN EN 1127-1
DIN EN 13463-1
DIN EN 13463-5
Notifizierte Stelle: **0102 PTB - Braunschweig, (Bundesallee 100, 38116 Braunschweig)**
Eingeschaltet zur Aufbewahrung der Unterlagen nach 2014/34/EU
Weitere einschlägige Bestimmungen: EG Maschinenrichtlinie (2006/42/EG) (Unvollständige Maschine)

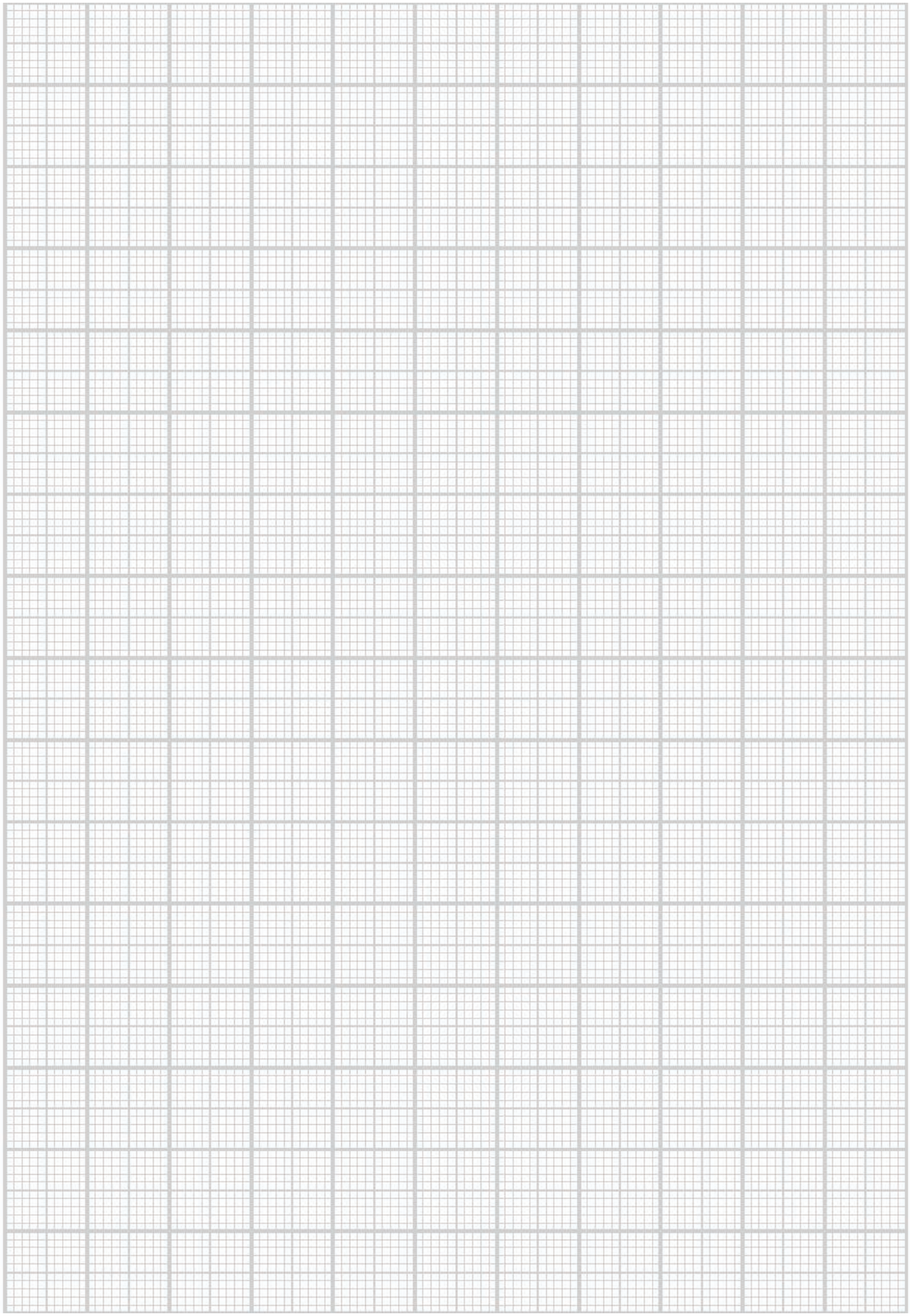
EU Declaration of Conformity
As defined by the regulations of the EU Explosion Protection Directive 2014/34/EU
Name and address of manufacturer: MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Germany
Herewith, we declare that the model of air driven liquid pumps type:
MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-, G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-Pumps
as supplied are in conformity with the following relevant regulations:
EC Explosion Protection Directive 2014/34/EU
Harmonised standards and technical specifications applied:
DIN EN 1127-1
DIN EN 13463-1
DIN EN 13463-5
Notified bodies: **0102 PTB - Braunschweig (Bundesallee 100, 38116 Braunschweig)**
Involved for preserving the documents in compliance with 2014/34/EU
Further likewise applicable directives: Machinery directive (2006/42/EC) (partly completed machinery)

Déclaration de conformité UE
Au sens de la directive UE atmosphères explosives 2014/34/UE
Adresse du fabricant : MAXIMATOR GmbH
Lange Straße 6
99734 Nordhausen / Allemagne
Nous certifions que le modèle de pompes hydropneumatiques type:
MO...-, MO...D-, S...-, S...D-, M...-, M...D-, M...-2-, M...-3-, S...-SS-, G...-, G...D-, G...-2-, MSF...-, GSF...-, GPD...-, GPD...-2, GX...-pompes
est conforme, à sa livraison, aux spécifications applicables suivantes:
Directive CE atmosphères explosives 2014/34/UE
Normes harmonisées appliquées et prescriptions techniques:
DIN EN 1127-1
DIN EN 13463-1
DIN EN 13463-5
Services notifiés: **0102 PTB - Braunschweig (Bundesallee 100, 38116 Braunschweig)**
Chargé de conserver les dossiers conformément à 2014/34/UE
D'autres directives également applicables: Directive machines (2006/42/CE) (quasi-machine)

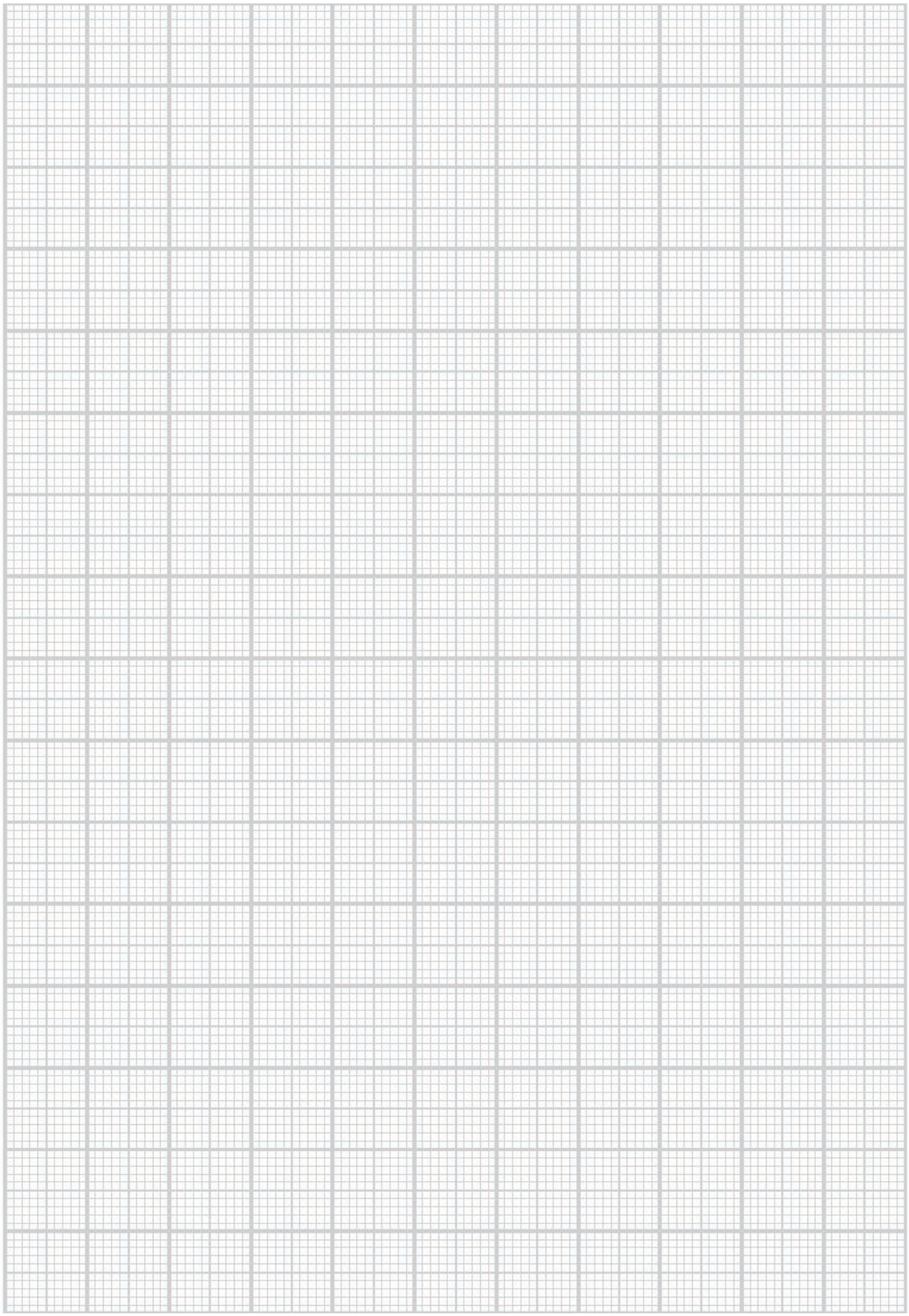
Nordhausen, den 08.09.2016 (Nordhausen, 08.09.2016) [Nordhausen, le 08.09.2016]

ppa.
Steffen Roloff (Divisionsleitung Components) (Division Manager Components) [Chef de division Components]

Notes



Notes



At your side, everywhere:

With our international partner companies, experienced specialists in high pressure technology are always available to assist you.

We have compiled detailed information about our international partners for you on our website at www.maximator.de/vertrieb+weltweit.

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