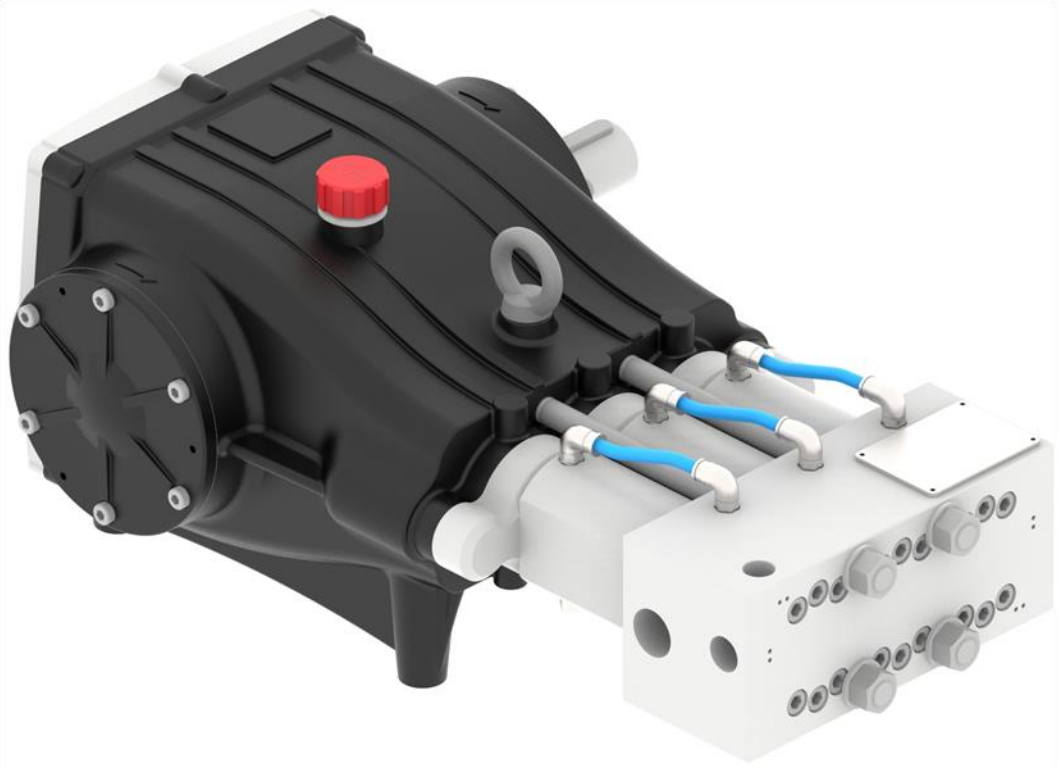
Translation of the original operating instructions

WOMA High-Pressure Plunger Pump 30Y

LEUCO Type GXX1710S



V 1.0 EN

Translation of the Original Operating Instructions
(WOMA High-Pressure Plunger Pump 30Y / LEUCO Type GXX1710S)
WOMA GmbH, Werthauser Straße 77-79, D-47226 Duisburg

Table of contents

1 General

1.1 Information on these operating instructions

These operating instructions have been compiled in accordance with the Directive 2006/42/EC. They are provided so that you can use the complete high-pressure plunger pump 30Y (referred to simply as the “pump” below) safely and efficiently.

These operating instructions are a part of the pump and must be kept in the immediate vicinity of the pump and accessible to operating personnel at all times.

In addition, all the documents listed in the appendix of these operating instructions and the operating instructions from the component manufacturers must be observed!

1.2 Manufacturer

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1.3 Service

Our worldwide service is available to you for all technical information about WOMA products and their applications in systems.

If you encounter difficulties with our products at any time, please contact WOMA service, the responsible representative, or the manufacturing plant, where help is readily available.

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	Quick assistance and correct order processing is only possible if you provide us with the order number and serial number. We recommend that you enter both items of information here: Order no.: …… Serial no.: ……

1.4 Formalities on the operating instructions

Version/Revision: V1.0
Creation date: 11.07.2018

1.5 Representation conventions

1.5.1 Instructions and system reactions

Operating steps to be performed are shown as a numbered list. The order of the steps is to be adhered to.

Example:

1. Operating step 1
2. Operating step 2

1.5.2 Operating steps

Operating steps without a mandatory sequence are shown as a bullet list.

Example:

- Operating step
- Operating step

1.5.3 Enumerations

Enumeration lists are shown as lists with numbered items.

Example:

– Item 1
– Item 2

1.6 Abbreviations and definitions

References to right/centre/left on the pump below are always defined from the front looking at the pump head.

“System” below means the technical equipment in which the pump is integrated and all the necessary technical (safety) equipment, e.g. (safety) valves, piping and the monitoring and control functions.

2 Safety

The pump complies with the Machinery Directory 2006/42/EC and has been designed, manufactured and safety-tested according to the currently valid safety regulations and laws and state-of-the-art technology.

The pump is delivered in a technically flawless condition.

However, there may be hazards at the pump if it:

- is not operated by trained personnel.
- is used improperly or not used for the intended purpose.
- is not in a flawless safety condition.

2.1 Notes on operation

Notices for operating the pump to guarantee the health and safety of operating personnel:

It must be especially ensured that:

- all safety and warning signs are attached to the pump and are legible at all times.
- suitable fire protection is in place at the installation location.
- the pump is checked again for safety following modifications and major repairs.

2.2 Presentation of safety instruction

2.2.1 Warnings

- Protect against possible injury to persons and material damage when observed
- Classify the degree of danger by use of a signal word.
- Indicate the danger of injury to persons by the danger sign.
- Indicate the type and source of the danger.
- Name the risk and the possible consequences.
- Indicate measures for avoiding dangers and prohibit certain modes of behaviour.

⚠ WARNING	**Source of danger** Possible consequences when not observed – Measures / prohibitions

Danger signs

The danger sign warns of personal injury.

Source of danger

The source of the danger states the cause of the danger.

Possible consequences when not observed

Possible consequences when warnings are ignored are, e.g. crushing, burns or other serious injuries.

Measures / prohibitions

All activities that need to be carried out to avoid a danger (e.g. stopping a drive) or that are prohibited to avoid a danger are listed at measures / prohibitions.

List of signal words

Tabelle 1: Signal words

DANGER	This signal word indicates an immediate threat of danger. If this danger is not avoided, this leads to fatal or severe injuries.
WARNING	This signal word indicates a possible danger. If this danger is not avoided, it can lead to fatal or severe injuries.
CAUTION	This signal word indicates a possibly dangerous situation. If this dangerous situation is not avoided, it can lead to minor or moderate injuries.
NOTICE	This signal word indicates actions for prevention of material damage. Observing these instructions prevents damage to, or destruction of, the pump.
	Pointer to useful and important information or advice that contributes to improvement of safety in the handling of the pump.

2.3 Qualification of personnel

Personnel must have the appropriate qualifications in each case for operating, maintaining and repairing the pump.

The area of responsibility, competence and supervision of personnel must be precisely defined by the owner.

Lack of knowledge on the part of the personnel is to be eliminated by training and instruction.

2.3.1 Operating personnel requirements

Operating personnel are persons commissioned by the owner to operate the pump and who have been sufficiently trained in how the pump is operated and functions.

The operating personnel must be familiar with the function and operating principles of the pump, be able to recognise dangers which occur and be able to prevent them by suitable protective measures.

The operating personnel must be in a position to recognise dangers in time and initiate the prescribed defensive action.

The operating personnel must notify the owner immediately of any changes to the pump which impair safety.

2.3.2 Maintenance personnel requirements

Maintenance personnel are persons commissioned by the owner to maintain the pump. Maintenance personnel are untrained but have been instructed in control and monitoring work, e.g. for oil changes, checking screw connections etc.

Maintenance personnel must be familiar with the function and operating principles of the pump, be able to recognise hazards which occur and be able to prevent them by suitable protective measures.

The maintenance personnel must notify the owner immediately of any changes to the pump which impair safety.

2.3.3 Requirements for trained specialists

Trained specialists are persons who have received training from WOMA GmbH to perform inspection, maintenance and service work and who receive the necessary information in the training courses in the form of the service instructions. Trained specialists must be familiar with the function and operating principles of the pump, be able to recognise hazards which occur and be able to prevent them by suitable protective measures.

2.4 Intended use

The pump is intended exclusively to generate high-pressure water.

The pump may only be installed in systems which meet the requirements of the pump in all respects. The pump is designed for a permissible operating pressure of 1,000 bar in continuous operation. The maximum operating pressure of 1,100 bar is permitted for the use of switching valves with high pressure surges.

The pump is designed to operate as a single pump. Any use which may result in pressure surges higher than those produced by the pump alone (e.g. several pumps feeding into a pressure line in a plant) must be agreed with WOMA GmbH.

The pump may only be used with cold water without the addition of any cleaning agent (see Section 3 - Technical data and Appendix 15.1 - Water quality guideline).

No combustible, toxic, corrosive or other hazardous liquids may be used without the express permission of WOMA GmbH.

Use for the intended purpose also includes using original spare parts only.

Any use other than that defined under the “use for the intended purpose” or which extends beyond this use is regarded as “not used for the intended purpose”.

Observe the safety instructions and warnings.

2.5 Foreseeable misuse

- Use of the pump with media other than water, or the addition of unauthorised additives.
- Use of non-original spare and wear parts.
- Non-observance of maintenance intervals.
- Use of the emergency stop switch of the system in which the pump is installed for normal shutdown. The emergency stop switch is only designed to be used to bring the pump/system to a safe condition quickly in the event of a hazard.

NOTICE	Setting up or operating a system incorrectly can lead to premature wear and even to destruction of the pump and other parts of the system, such as valves and fittings.

2.6 Pictograms

Tabelle 2: Pictograms

Pictogram	Description
	Use eye protection
	Use hearing protection
	Use face protection
	Wear protective clothing
	Use hand protection
	General warning sign

2.7 Spare and wear parts

The use of spare and wear parts from third-party manufacturers can pose a risk. Only use original parts or parts approved by WOMA GmbH.

3 Technical data

3.1 Labelling

Tabelle 3: Labelling

Name	Size
Machine name	High-pressure Plunger Pump
Serial number	The serial number is entered on the nameplate.

The nameplate (Figure 1) is located on the pump head.

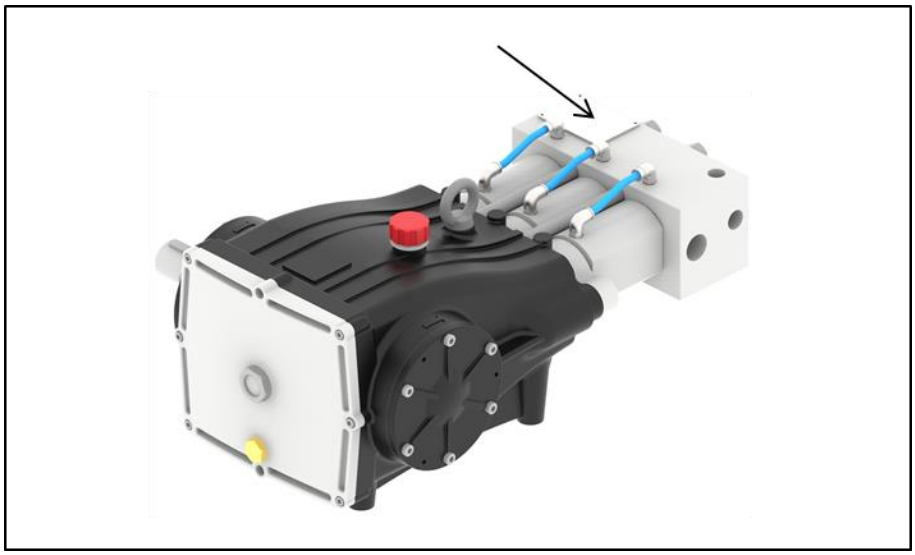


Figure 1: Position of nameplate (for illustration purposes only)

3.2 Conditions of use

Tabelle 4: Conditions of use

Name		Size
Ambient temperature	min.	+5 °C
	max.	+45 °C

3.3 Dimensions

Tabelle 5: Dimensions

Pump	Length x Width x Height
WOMA 30Y LEUCO GXX1710S	627 mm x 422 mm x 262 mm (see also the Dimension sheet in Appendix 15.3)

3.4 Rating

Tabelle 6: Rating

Name	Size
Total power required max.	31 kW (at permissible operating pressure)
Permissible operating pressure under continuous load max.	1,000 bar
Maximum operating pressure for max. 120 switching surges / h	1,100 bar
Flow rate max.	16.7 l/min
Drive speed max. min.	1,000 rpm Depending on the operating parameters, this value can be defined by WOMA GmbH. The speed can be controlled continuously in the range between the operating and pump-dependent maximum and minimum speeds.
Torque (on the drive shaft) max.	291 Nm
Emission sound pressure level according to DIN EN ISO 11203	> 80 dB(A)

3.5 Media

Tabelle 7: Media

Name	Size
Delivery medium inlet pressure min. max. Permissible pressure amplitude(when operating) max.	Relative pressure: 1.0 bar 5.0 bar (higher supply pressure on request) ± 2.0 bar (However, this must not be less than the absolute value of 0.5 bar)
Delivery medium temperature min. max.	 +5 °C +45°C (higher temperatures on request)
Pumping medium supply requirement min.	1.75 times the nominal flow rate of the pump, depending on interchangeable conversion set
Pumping medium quality	See the Water quality guideline in Appendix 15.1

Tabelle 7: Media

Name	Size
Gearbox oil filling quantity approx.	5.5 l
Oil viscosity in acc. with ACEA A3; ACEA B4; ACEA E2; API SL; API CF; API CG-4	15 W - 40
Oil temperature max. Setpoint	80°C 60 - 70°C

	Observe the latest water quality guideline for WOMA high-pressure pumps in the Appendix 15.1.

3.6 Weights

Tabelle 8: Weights

Name	Weight
Total weight approx.	69 kg
Gearbox approx.	34 kg
Interchangeable conversion set approx.	13 kg
Pump head approx.	22 kg

The weights are with oil and without optional accessories.

3.7 Connections

Tabelle 9: Connections

Name	Size
Inlet pressure connection	G1"
Pressure connection	M24x1.5
Pressure gauge / safety valve	G1/2"
Drive shaft	Diameter: 40 mm k6 Key according to DIN 6885 sheet 1 A12 × 8 × 70

4 Functional description

The pump is a horizontal plunger pump with a screw-on pump head. It can be installed in a high-pressure water-jet machine.

The pump is used for example to clean objects with a water tool using cold water and without adding cleaning agent.

The pump is driven directly by a highly elastic coupling via a slip-on or intermediate gear unit or via a balanced joint shaft.

V-belt drives are, in principle, allowed. For the exact design, please contact WOMA GmbH.

	If the max. drive power is transferred with V-belts, the life expectancy of the shaft bearings will be reduced.
	The drive direction of rotation is specified and mandatory for these pumps. If a direction of rotation in the other direction is required, technical modifications must be made in agreement with WOMA GmbH.

4.1 Operating procedure

1. Water is supplied from a break tank to the high-pressure pump via a booster pump or directly via the on-site water supply system (hydrant).
2. A water filter removes undesirable dirt particles that could cause premature wear.
3. The pump converts the rotation of the drive motor into an oscillating movement of the plunger via a crank assembly.
4. Suction and pressure stroke movements of the plungers (pistons) enable the water to reach a higher pressure stage via suction and pressure valves.
5. Depending on the pump type and the plunger diameter, different operating pressures can be set by a pressure control device.
6. The water leaves the pump via a high-pressure hose and is supplied to an application device.
7. Application devices include, for example, spray guns with nozzles, lance pipes, hoses with nozzles etc.

4.2 Components of the pump

The pump consists of three main modules, the gearbox (Figure 2: 1), the interchangeable conversion set (Figure 2: 2) and the pump head (Figure 2: 3):

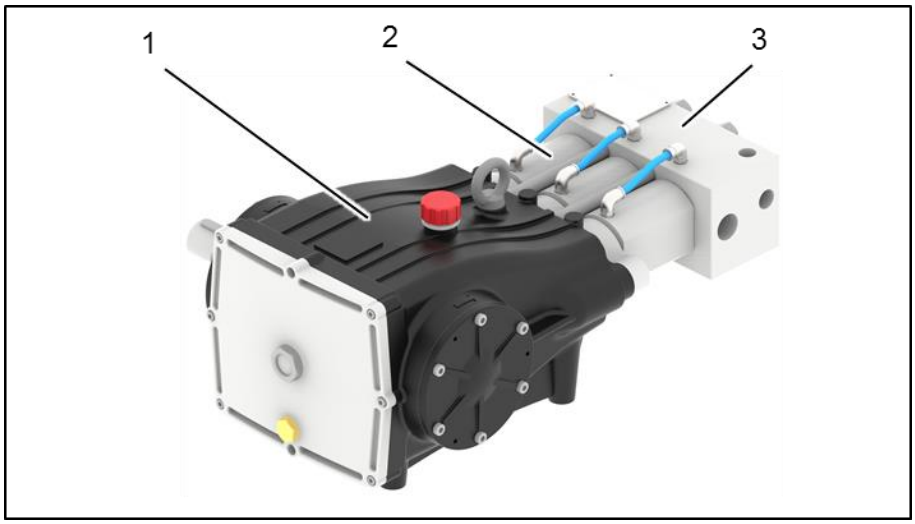


Figure 2: Main modules of the pump

1 Gearbox

2 Interchangeable conversion set

3 Pump head

4.2.1 Gearbox

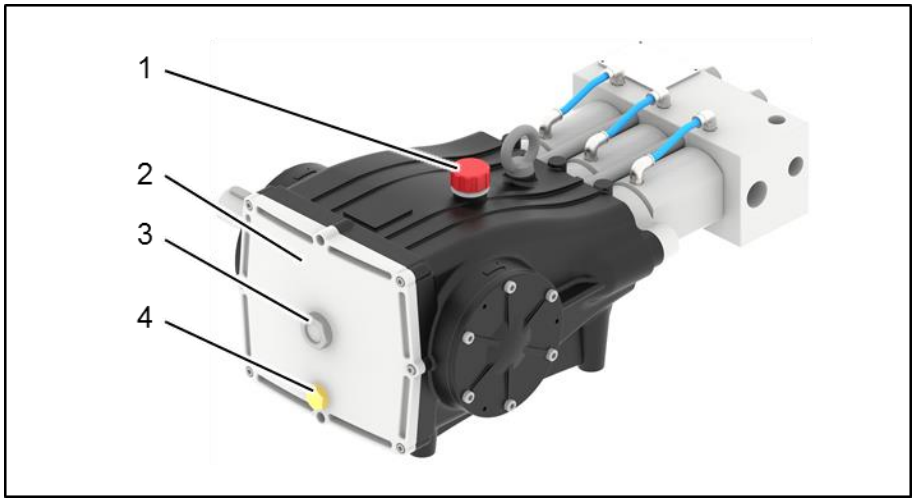


Figure 3: Gearbox

1 Oil filling plug
2 Gearbox cover
3 Oil sight glass
4 Oil drain plug

The gearbox includes a 3-stroke crankshaft.

The connecting rods are driven via the crankshaft pin.

A splash lubrication system ensures an supply oil to the plain bearings, the guide pistons and the connecting rod screws.

4.2.2 Interchangeable conversion set

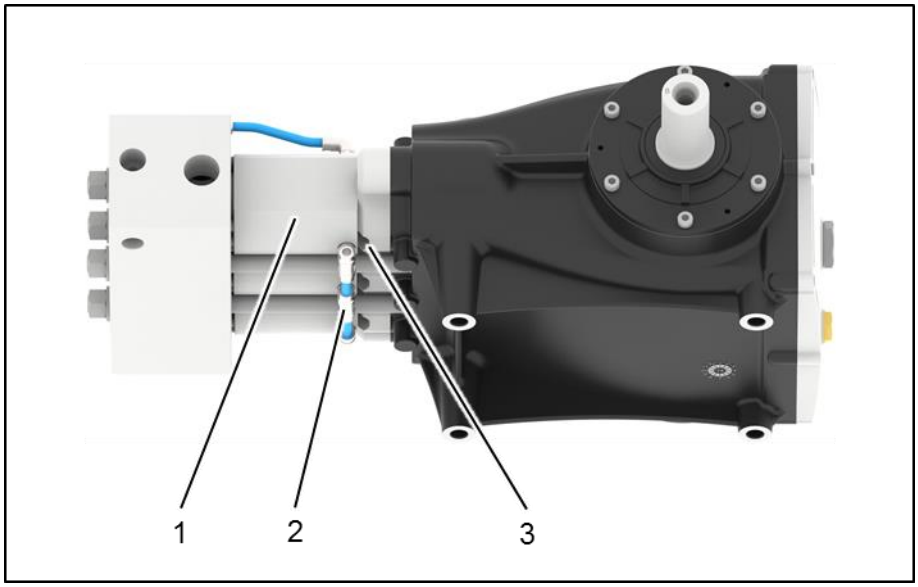


Figure 4: Interchangeable conversion set

1 Cylinder with seal assembly and plunger

2 Sealing water system return

3 Leakage opening check

The interchangeable conversion set consists of the cylinders (Figure 4: 1) with a high-pressure and sealing water seal assembly and the plungers. The plungers are securely connected to the guide pistons by bonded-in union nuts.

The sealing water system is a low-pressure system installed on the cylinder unit for cooling, lubrication and sealing. It is connected directly to the inlet pressure channel of the pump head. As soon as supply pressure is applied in the pump head, water flows around the plunger at low pressure. The sealing water system return (Figure 4: 2) should be routed back into a break tank.

When water escapes from the leakage opening (Figure 4: 3), it is necessary to repair the interchangeable conversion set.

4.2.3 Pump head

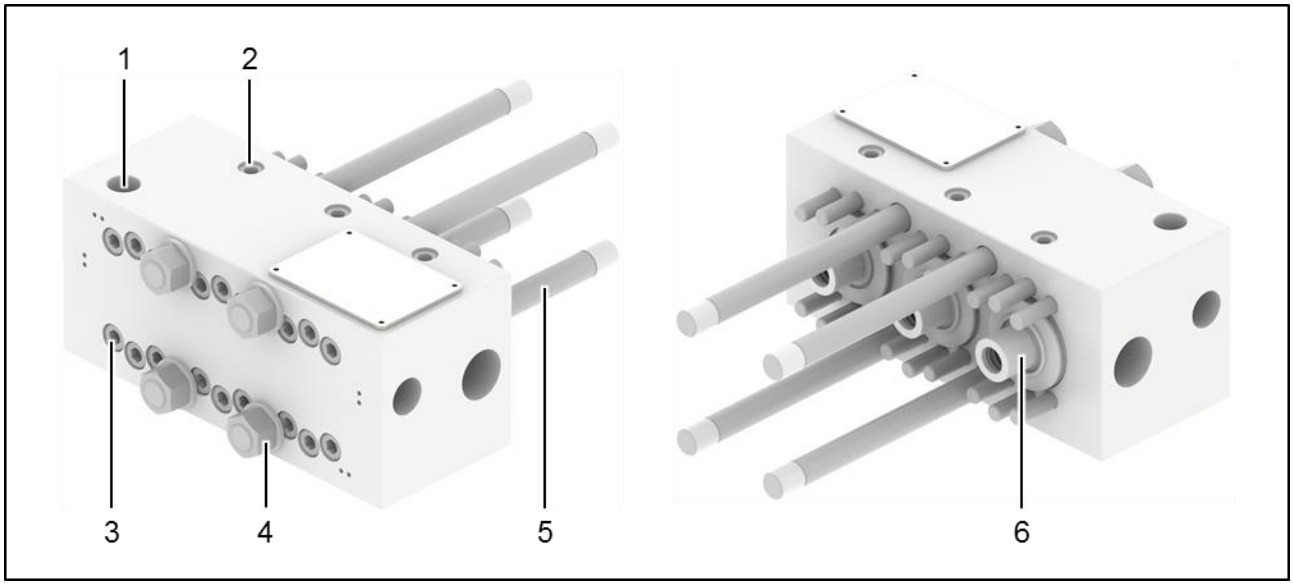


Figure 5: Pump head, front (left), rear (right)

1 High-pressure gauge connection
2 Sealing water connection
3 Fastening screw (interchangeable conversion set on the pump head)
4 Fastening nut (pump head on gearbox)
5 Stud bolt
6 Valve system

The valve system (Figure 5: 6) is installed in the pump head and contains guided suction and pressure valves.

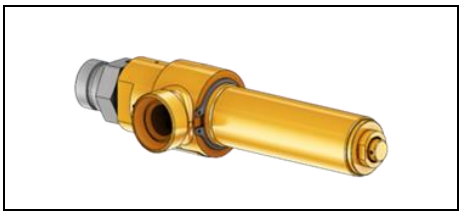
At the high-pressure gauge connection (Figure 5: 1), a pressure gauge is normally installed on which the current high pressure can be read.

At the same time, the sealing water connection (Figure 5: 2) is used for venting the inlet pressure system.

The pump head is connected by stud bolts (Figure 5: 5) and nuts (Figure 5: 4) directly to the gearbox.

4.3 Accessories and options

The following accessories and options can also be purchased and attached to the pump. If not fitted in the factory, please observe the fitting and operating instructions.

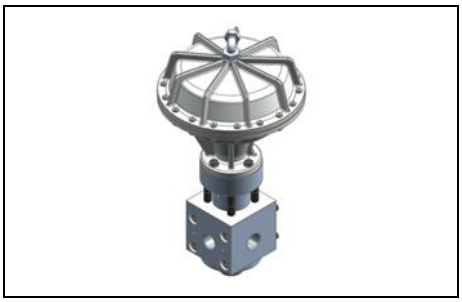


Safety device

The full lift safety valve prevents damage to the system when overpressure occurs by opening completely as soon as a set maximum pressure is exceeded, thereby reducing the pressure.

– 15-60 l/min, operating pressure 750-1,100 bar (9.907-565.0)

Figure 6: Full lift safety valve (similar to the illustration)

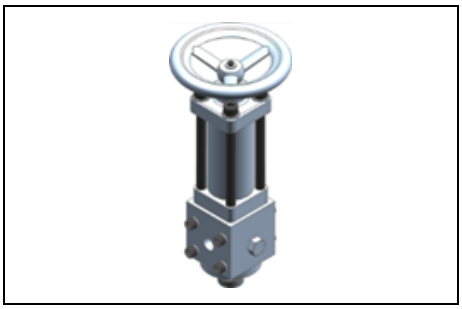


Overflow valve (pneumatic)

A pneumatically operated overflow valve is a regulator that can be used to remotely adjust the pressure to the respective operating conditions and to switch the high pressure on and off. The water pressure can be regulated quickly from the workplace.

– 2/2-way pneumatic, 1500 bar (9.871-149.0)

Figure 7: Overflow valve (for illustration purposes only)



Overflow valve (manual)

A manual overflow valve is a regulator that can be used to easily adjust the pressure to applicable operating conditions and to switch the high pressure on and off manually.

– 2/2-way manual, 1500 bar (9.906-937.0)

Figure 8: Overflow valve (for illustration purposes only)

High pressure monitoring

The pressure gauge is used to monitor the operating pressure directly.

– max. 1,270 bar operating pressure, visual (9.882-792.0)

– sensory monitoring (6.025-114.0)

Figure 9: Pressure gauge for high pressure monitoring

4.4 Connecting lines

Trouble-free function of a high-pressure pump system is primarily dependent on the correct dimensioning and routing of the inlet pressure and pressure lines and their connections.

All lines (hoses and pipes) must be clean on the inside before they are connected and used.

4.4.1 Inlet pressure lines

The inlet pressure lines must be designed so that they cannot draw in air. All detachable connections must be carefully sealed. No leakage may occur due to vibration.

Hose lines must be used to connect the system to the pump to prevent transfer of mechanical oscillations.

Inlet pressure lines must be installed on an upward slope to prevent air pockets. A vent must be installed at the highest point of a line. A vent must be installed approx. every 3m on longer horizontal sections. The minimum dimension for venting is G1/2".

The maximum speed of the conveyed medium must not exceed 1.4 m/s in the inlet pressure and supply lines. Resonance effects in the inlet pressure line of the system can generally be eliminated by extending the inlet pressure line.

In order to keep the resistance to flow in the line as low as possible, avoid elbows and sudden or sharp changes to the cross-section.

Shut-off valves in the inlet pressure or supply feed line must be fully open in operation and must not automatically shut in the event of oscillations or similar influences.

	Shut-off valves must not be used to regulate the upstream pressure.

Booster pumps must be in operation before switching on and off the high-pressure pump. The flow rate that can be achieved according to the pump performance chart must be a minimum of 1.75 times the flow rate of the high-pressure pump.

A cut-off device must be used to monitor whether the inlet pressure supply to the pump is compliant.

The inlet pressure line system must have suitable inlet pressure flow stabilizers or other adequately damping equipment to ensure smooth flow to the suction valves under all operating conditions.

This inlet pressure line from the filter onwards should be of non-corrosive material so that no particles can come free and get into the pump.

It is a good idea to install a break tank to degas the supplied medium and accept the return flow from the overflow/bypass valves.

When medium is returned by overflow valves, make sure that the temperature in the tank does not exceed the permissible values. A certain amount of cool medium may have to be added.

The piping system should be designed with as few connections and bends as possible. Connections must be connected with 45° Y-branch pipes. If the manufacturer has not provided specifications, the bending radius must not be less than 2.5xD.

4.4.2 Pressure lines

All pressure-bearing components, hose connections and pipe connections must be designed as a minimum for the maximum allowable operating pressure.

The hose lines must be laid so that no damage from mechanical influences or vibration occurs.

All pressure lines must withstand mechanical, chemical and thermal loads that occur.

The pump must be decoupled from the pressure line in such a way that pulsation in the pressure channel of the pump head does not exceed ±8% of the operating pressure. The pulsations are mainly dependent on the system set-up and must therefore be checked for the specific application.

4.4.3 Sealing water system return

All pressure-bearing components, hose connections and pipe connections must be designed as a minimum for the maximum allowable operating pressure.

It is a good idea to install a break tank to receive the return flow from the sealing water system.

5 Transport and storage

5.1 Safety instructions

⚠ WARNING	**Lifted load** The attachments point is only intended to be used to lift the pump. If this attachment point is used to transport the pump unit (pump with motor), there is a risk that the unit will fall due to overloading. – Use the attachment point on the pump only to transport the pump. – The pump may only be transported by competent personnel.

5.2 Measures before transport

- Disconnect all connection lines.
- Drain the pump (see Section 11.3).
- Assess the load for weight, centre of gravity and possible transport behaviour and use correspondingly suitable slinging and load-bearing means.

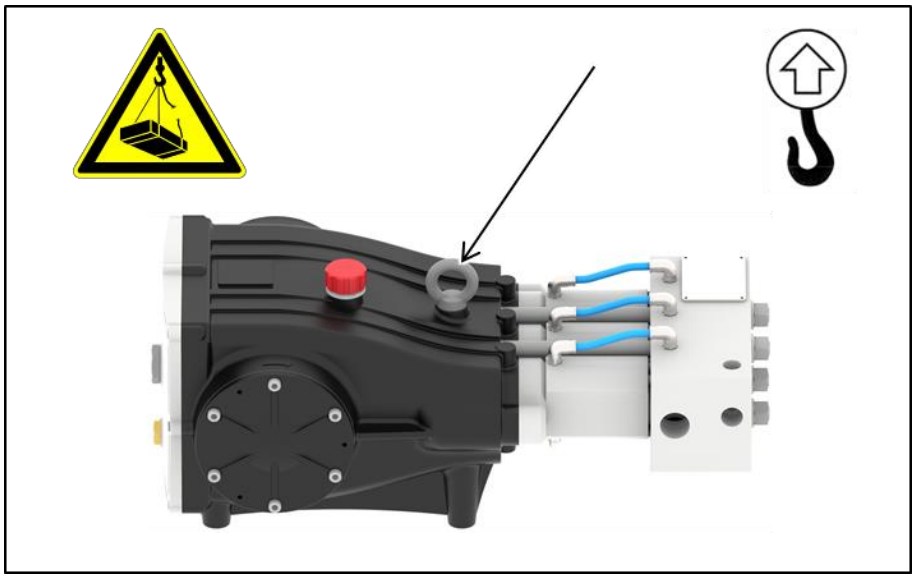


Figure 10: Lifting eye

- Only lift the pump at the lifting point intended for transport (Figure 10).

5.3 Storage

The pump may only be stored under the following conditions:

- All openings must be closed
- Do not store outdoors
- Store in a dry and dust-free location
- Do not expose to aggressive media (e.g. salty air)
- The storage temperature must be between +5°C and +45°C
- Maximum relative air humidity of 60%
- Conserved with a suitable protective agent (see Section 11.3)
- If storage lasts longer than three months, the condition of the machine must be checked and the conservation renewed if necessary.

	The conservation applied in the factory to new, delivered pumps is designed to last for approx. six months.

6 Assembly / Installation

6.1 Safety instructions

⚠ WARNING	**Medium under pressure** When pressure-bearing components fail, there is a danger that the medium under pressure will spray onto people. – Ensure that only components approved for this pressure load are used at all connections.

⚠ WARNING	**Hose lines** If hose lines are inadequately attached, there is a risk of people being struck by them. – Visually inspect the connections before tightening the joints. – Tighten the hose lines in accordance with the manufacturer's information.

Hose lines

- The instructions of the hose manufacturer must be observed.
- The hose gripping device must be securely attached.
- The inlet pressure lines of the pump must be completely leak-tight at the allowed inlet pressure.
- The supply lines must be laid so that they do not pose a tripping hazard.
- The pump must be connected using hoses to avoid transfer of mechanical vibrations.

Pump

- The pump may only be installed by expert, trained personnel.
- The pump may only be installed on a flat surface.
- The pump may only be installed on an incline of max. 5°.

NOTICE	The inclination of the pump must also be no more than 5° in all directions on mobile systems. Exceeding this value can lead to severe pump damage.

- The base frame for the pump to be installed must be stable and torsionally rigid.
- The pump must be carefully aligned to the drive unit.
- The permitted alignment error depends on the specifications of the coupling manufacturer.

- When installing in enclosed spaces (panels, hoods, acoustic enclosures etc.), particular attention must be paid to the maximum permitted ambient and oil temperatures.
- When installing the pump, you must ensure that there is maintenance access space for the following maintenance functions and checks:
  - Oil level check
  - Change of oil
  - Drainage of the pump (if there is a risk of frost)
  - Clear view of the pressure gauge displays
  - Unobstructed view of the earthing point
  - Visual check of the components
  - If applicable, work on motor and coupling
- When installing the pump, make sure that any oil coming from the shaft ends and the guide pistons is collected so that it cannot get into the environment. A suitable system for collecting the oil should be provided, particularly for mobile systems.
- If the pump is to be integrated into a fully automatic system, it should also, for example, be possible to automatically display/evaluate the oil pressure on the control unit.
- Make sure that the seals between components are good. No leakage may occur due to vibration.
- The transfer of vibration is to be avoided by the use of dampers.
- Foundation bolts or other mounting methods must be so designed that undesirable shifts of the equipment are prevented.

6.2 Assembly

DANGER	**Electrostatic charge / current** Risk of electric shock on contact with the housing. – To prevent electrostatic charges building up, a potential equalisation for the relevant equipment is to be provided, if necessary, by use of an earthing cable.

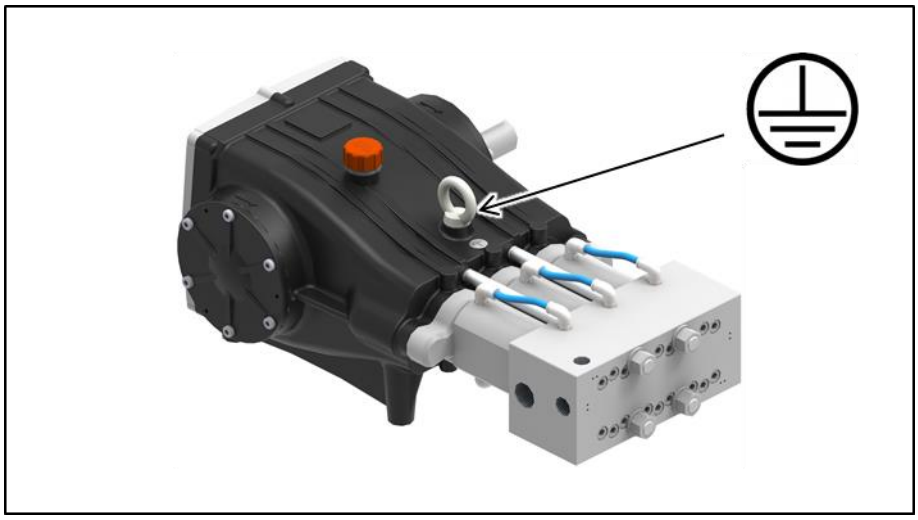


Figure 11: Earthing connection

To install an earthing cable, remove the eyebolt and install the earthing cable with a suitable screw M12.

Instructions for the earthing cable: Make sure that potential equalization is not impaired by linings, coatings or similar on the pump.

6.2.1 Fixing the pump in place

The fixing points (Figure 12) of the pump must prevent movement relative to the system, but should not exert stress on the machine.

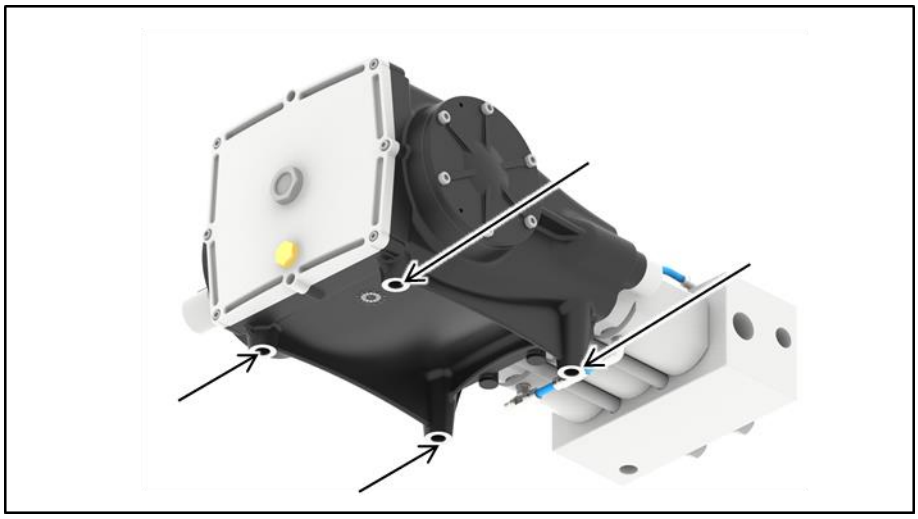


Figure 12: Fixing points

Observe a minimum strength of 8.8. Use screws of a suitable length to secure the pump. A screw-in depth of at least 19 mm and maximum 21 mm must be maintained. For the tightening torque of the recommended M16 bolts, please refer to Tabelle 10: tightening torque.

Tabelle 10: Bolts and tightening torques

Name	Size		
Bolt	M16	M16	M16
Strength class	8.8	10.9	12.9
Tightening torque (Nm)	150	150	150

6.3 Interfaces

The following figure shows the interfaces of the pump:

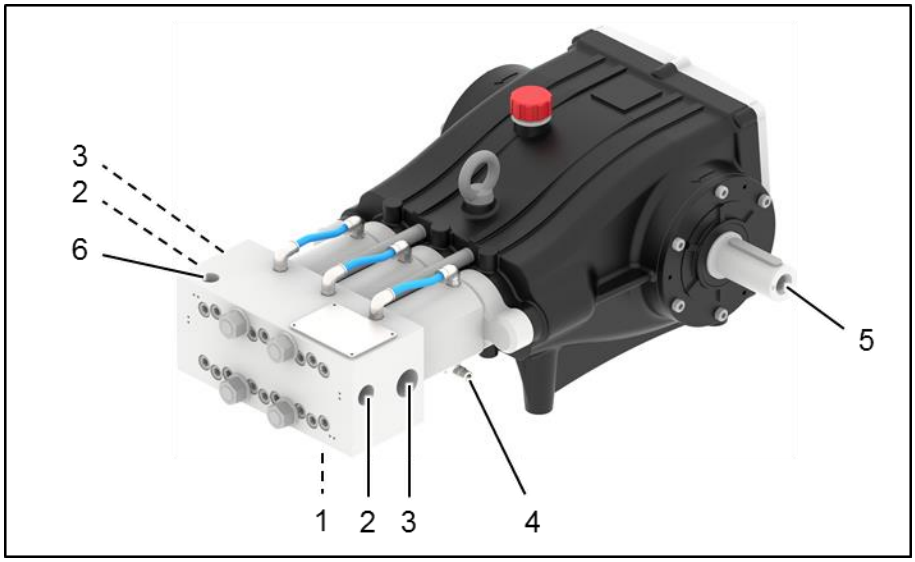


Figure 13: Pump interfaces (for illustration purposes only)

1 High-pressure sensor connection

2 Pressure connection (optionally on right or left), generally valve block/regulator

3 Inlet pressure (optionally on right or left, but also possible on both sides)

4 Sealing water system return

5 Drive shaft (drive side right is standard)

6 High-pressure gauge connection

6.3.1 Mount the valve block/regulator

The valve block/regulator are installed separately.

We recommend installed it as close to the pump head as possible.

For valve block/regulator, see Section 4.3 - Accessories and options

6.3.2 Connecting the connecting lines

	The high-pressure line can only be connected once the flange or regulator has been installed on the high-pressure side (see Section 6.3.1 - Mount the valve block/regulator).

1. Connect the connecting lines as shown in Figure 13. We recommend using hose pipes to avoid transferring vibrations.
2. The inlet pressure line must deliver a minimum pressure (see Tabelle 7: Media). If necessary, install a booster pump. The supplied medium must be filtered, depending on the medium. Contact WOMA GmbH for a quote for suitable booster pumps and filters.
3. We recommended (automatic) ventilation valves for venting the pumped medium. To connect the inlet pressure line, you need a G 1" connection (inlet pressure side, see Figure 13: 3). To connect the high-pressure line, you need a M24x1.5 connection (pressure side, see Figure 13: 2). Hose retainers should also be used.
4. Check all the hose connections of the pump, including the sealing water system.

7 Putting into service

7.1 Safety instructions

⚠ WARNING	**Medium under pressure** When pressure-bearing components fail, there is a danger that the medium under pressure will spray onto people. – Ensure that only components approved for this pressure load are used at all connections. – Never connect the ventilating valves to the pressure side. – The pump may only be put into service by expert, trained personnel. – A safety device must be used to prevent the system exceeding the maximum operating pressure. – The pump must never be switched on without an adequate water supply.

⚠ WARNING	**Noise** Hearing damage can occur depending on the intended purpose and type of drive. – Wear hearing protection.

7.2 Putting into service for the first time

The pump is normally delivered with an oil filling.

In special circumstances (e.g. shipping via air freight), the pump is supplied without an oil filling. The parts inside the pump and the pump head itself are protected against corrosion by a conservation agent. The conservation agent does not need to be washed out before filling with oil.

- Warning signs on the pump must be observed under all circumstances.
- The oil level must be checked before starting the pump for the first time. The oil level should be in the middle of the oil sight glass (Figure 14: 2).

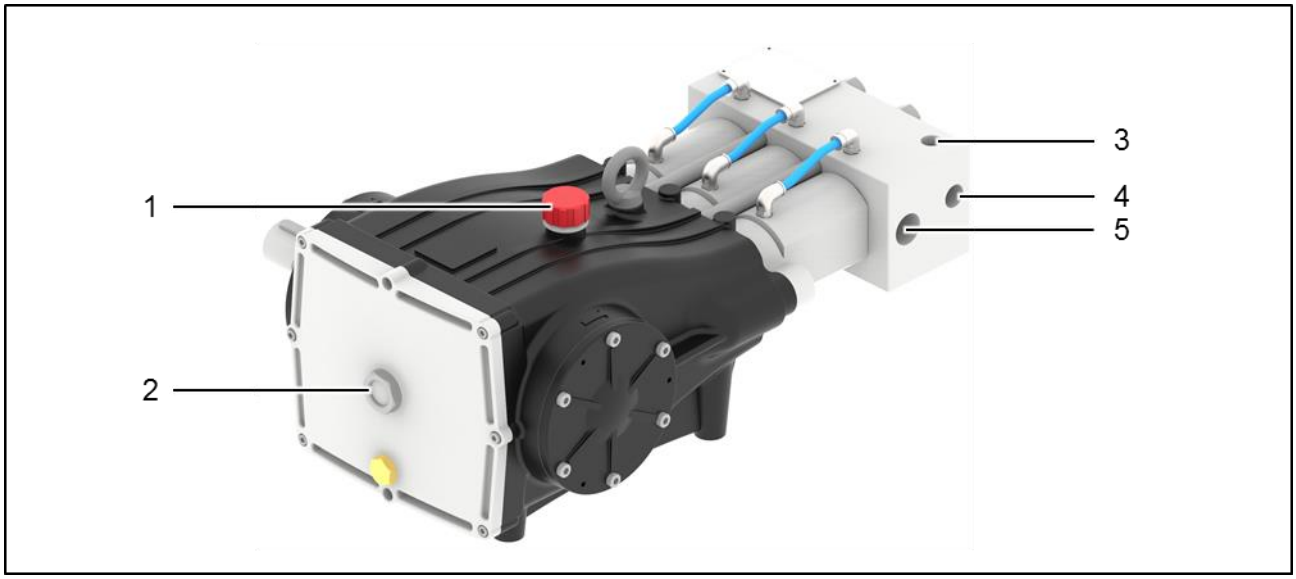


Figure 14: Putting into operation for the first time (for illustration purposes only)

1 Oil filling plug
2 Oil sight glass
3 High-pressure gauge connection
4 High-pressure connection
5 Water inlet connection

The pump is put into operation as follows:

1. Check the oil level at the oil sight glass (Figure 14: 2). The correct fill level is reached when the oil level is in the middle of the oil sight glass.

	The pump must be level when you check the oil sight glass. The oil level should be in the middle of the oil sight glass.

2. If insufficient oil is present, unscrew the oil filling plug (Figure 14: 1).
3. Fill up the specified amount of oil (Tabelle 7: Oil quantities) as per the specification (Tabelle 13: Oils).
4. Screw the oil filling plug back in until tight.
5. Make sure that the inlet pressure line is connected at the water supply connection.
6. Open the shut-off valves (if any) in the inlet pressure line.
7. Fill the break tank (if present).
8. Fill the booster pump (if present) and the filter (if present) with medium and vent them (if applicable, follow the relevant operating instructions).
9. Connect the water tool or other consumer to the high-pressure connection (Figure 14: 4) of the pump with a high-pressure hose.

	You can look through our accessories catalogue for hoses and accessories for the high-pressure pump. You can also find all current offers on the internet at www.woma-group.com

10. Observe the max. allowable operating pressure of all components.
11. Adjust the pressure between 1.0 and 5.0 bar (Figure 15), e.g. with the booster pump (if present).

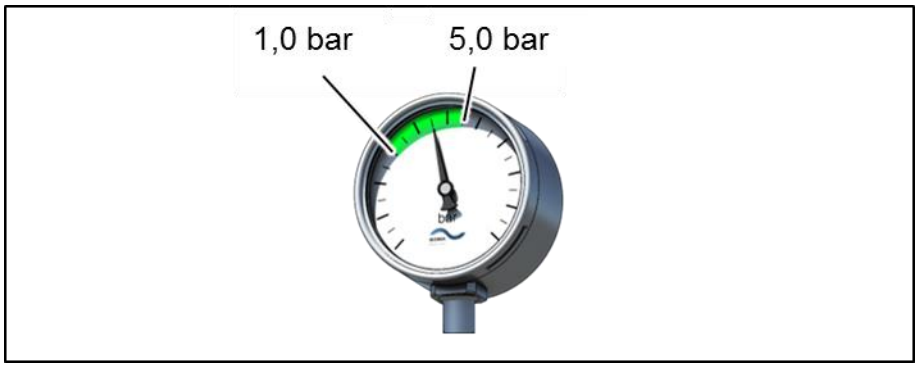


Figure 15: Inlet pressure gauge

12. Check that all lines are free of leaks.
13. The pump is now ready for operation.

NOTICE	When first putting into service and when installing the motor again or its supply lines, check that it is driving in the correct direction of rotation.

8 Operation

8.1 Safety instructions

⚠ WARNING	**Driven components** When drives are in motion, there is a risk of crushing due to moving parts, and there is a risk of being drawn in by rotating parts at the interface to the drive. – Drive movements may only be performed with covers which are bolted down securely.

⚠ WARNING	**Inlet-side connection** There is a risk of being drawn in when the inlet side is open. – The inlet side must be secured so that nothing can be drawn in. This can be achieved e.g. by installed a grid in the reservoir.

⚠ WARNING	**Medium under pressure** If the pump is operated without excess pressure protection, there is a risk of injury from excessive pressure (pump body/head bursts). – The pump may only be operated with adequate protection against excess pressure. – The pump's technical data must be followed when rating the protection against excess pressure.

⚠ WARNING	**High-pressure jet** Depending on the application of the pump, there is a risk that fluid will come out and cause injury to a third party. – The work area must be cordoned off. Entry must be restricted. – The adjacent area must be protected against spray water. – Never direct the water jet at people, animals, machines or electrical components.

⚠ WARNING	**Lack of pressure monitoring** If the pressure is not monitored adequately, hazards can arise from escaping fluid or defective parts. – The pump may only be operated with a pressure monitoring system. – In addition to the current operating pressure, the pressure monitoring system must also display the maximum permitted operating pressure.

⚠ WARNING	**Hot oil** Risk of severe scalding from contact with hot oil. – Do no open the oil drain or the gearbox cover during operation. – The pump must not be operated without gearbox cover.

⚠ CAUTION	**Hot surfaces** Risk of minor burns from contact with the surfaces of the pump. – Do not perform any maintenance work while the unit is in operation. – Do not touch the surface in operation.

- The pump must never be switched on without an adequate water supply.
- If the pump is used without a sound-absorbing enclosure, the regulations of Member States relating to the noise emissions into the environment by outdoor equipment (Directive 2000/14/EC) must be complied with.
- The media required for the high-pressure pump and the drive motor, such as electrical power, fuel, cooling water and process water, must be available at all times and in adequate quantities.
- Ratings for pressure/supply rate/drive speed/drive output which are higher than those specified in the corresponding rating list may not be installed. If cleaning agents are used, they may only be added after the pressure has been increased.

8.2 Operational requirements

Shut-off valves in the inlet and supply lines must be fully open during operation and must not automatically close in the event of oscillations or similar influences.

Shut-off valves must not be used to regulate the upstream pressure.

Booster pumps must be in operation before switching on and off the high-pressure pump.

The nominal inlet pressure of the medium must lie between 1.0 and 5.0 bar relative pressure (overpressure) at all times during operation.

As the pump is a plunger-type pump, there is always pulsation of the inlet pressure. The inlet pressure system must be designed with pulsation dampers or similar so that the inlet pressure does not exceed a maximum resulting amplitude of +2.0 bar. Care is to be taken that the relative value does not fall below 0.5 bar at any time.

It is a good idea to install a break tank to degas the supplied pumping medium and to accept the return flow from the overflow valves. The break tank must ensure that the medium is degassed under all operating conditions.

When medium is returned to the break tank by overflow valves, make sure that the temperature of the incoming medium does not exceed the permissible values. If necessary, a certain amount of cool medium must be added.

For coarse contamination, it is necessary to install a filter upstream in the supply line, see Section 15.1 - and Section Water quality guideline - .

Before starting the pump, the oil level must be visible at the centre of the oil sight glass (Figure 14: 2).

8.3 Starting operation

For a cold start, the machine must first be run empty for approx. 3 minutes before switching to high-pressure operation to ensure that all bearings are adequately supplied with oil.

After starting the machine, check the operating pressure.

8.3.1 Checking the operating pressure

The operating pressure is measured at the pump head (Figure 14: 3) with a high-pressure gauge (Figure 9). For the permissible operating pressure, see Tabelle 6: Operating pressure.

- The required operating pressure can be set at the overflow valves, by changing the flow rate or by selecting the appropriate nozzle on the water tool.
- The required operating pressure can be adjusted continuously up to the max. permissible value manually or pneumatically via an overflow valve (see Section 4.3 - Accessories and options).
- The drive speed can be used to change the flow rate. However, a minimum speed must be maintained, depending on the application. Please contact WOMA GmbH for a calculation of the minimum speed for a specific set-up.

The operating pressure should be monitored electronically.

9 Help in case of malfunctions

9.1 Contact in case of malfunctions

WOMA GmbH
Werthauser Straße 77-79
47226 Duisburg
Germany

Tel.: + 49 2065-304-222
Fax: + 49 2065-304-200
E-mail: service@woma.kaercher.com

www.woma-group.com

9.2 Malfunction table

	If the fault cannot be rectified with the help of the malfunction table, get in touch with the service personnel at WOMA GmbH (see Section 1.3 - Service).

You will find assistance with rectifying malfunctions in the table below. Unless otherwise noted, qualified personnel are responsible for rectifying the fault. Qualified personnel are operating, maintenance and trained specialists (see Section 2.3 - Qualification of personnel).

Tabelle 11: Malfunction table

Malfunction	Cause	Fault correction	Responsible
High-pressure pump does not reach the required operating pressure	High-pressure hose leaky	Check and replace if necessary	Qualified personnel
	Water tool defective	Inspect and replace, replace nozzles	Qualified personnel
	Water volume is too low	Clean water filter	Qualified personnel
	Water inlet pressure is not adequate	Check booster pump and lines	Qualified personnel
	Safety device defective or leaking	Check or replace	Qualified personnel
	Inlet pressure system is drawing air	Re-seal the lines	Trained specialists
	Regulator rod and / or regulator seat on the pressure regulator has been eroded by water	Replace regulator rod and regulator seat	Trained specialists
	Valve plates and valve seats in the pump head are worn	Remove and replace valve plates and valves seats	Trained specialists
	Packing set in the interchangeable conversion set is worn	Remove and replace packing set	Trained specialists

Tabelle 11: Malfunction table

Malfunction	Cause	Fault correction	Responsible
High-pressure pump Abnormal running noises	Air in the inlet pressure line system	Vent and/or re-seal inlet pressure line	Qualified personnel
	Valves in the pump head are defective	Remove and replace the valves	Trained specialists
	Vibrations/pulsations in the inlet pressure or high-pressure line system	Check damping equipment is working effectively, check valves for leaks/wear	Trained specialists
	Gearbox worn or damaged	Have the gearbox inspected	WOMA Service
Interchangeable conversion set is leaking	Packing set is worn	Replacing packing set	Trained specialists
	Low-pressure seal is leaking	Replace low-pressure seal	Trained specialists
	Scoring or damage on plunger	Replace plunger	Trained specialists
	Cylinder faulty	Replace cylinder	Trained specialists

10 Service and maintenance

To ensure a long service life and fault-free functioning of the pump, regular care is required in addition to correct operation.

The pump must be inspected regularly and faults rectified in good time to prevent consequential damage.

- Maintenance work may only to be carried out by qualified and instructed personnel.
- Work must only ever be carried out when machines are at a standstill and secured against being switched on again. The procedure described in the operating instructions for shutting down machines must be adhered to under all circumstances (Section 11 - Decommissioning).
- Interference with the running pump is prohibited.
- Care is to be taken to ensure that fellow employees working nearby are not put at risk.

10.1 Safety instructions

⚠ WARNING	**Pressure-bearing components** When pressure-bearing components are opened, there is a danger that the medium under pressure will hit people or that the bolts are ejected. – Perform maintenance work only when the pump is shut down and depressurised. – Make sure that inadvertent starting of the motor/drive unit is not possible.

⚠ WARNING	**Hot oil** Risk of severe scalding from contact with hot oil. – Allow the oil to cool until lukewarm before changing oil. – Only change oil when the machine is at a standstill. – For maintenance work involving oil, you must wear safety goggles and oil-resistant protective gloves.

⚠ CAUTION	**Hot surfaces** Risk of minor burns from contact with the surfaces of the pump. – Let the pump components cool down before maintenance. – Wear suitable protective gloves. – Do not perform any maintenance work while the unit is in operation. – Do not touch the surface in operation.

10.2 Care and cleaning

⚠ CAUTION	**Chips** Risk of being cut by chip fragments left in the pump. – Wear suitable protective gloves.

- The pump must be cleaned, if needed.
- Do not use aggressive cleaning agents.
- Use lint-free cleaning cloths.
- Before cleaning the pump, all openings into which cleaning agent must not penetrate for safety or functional reasons must be covered.
- The cleaning agent safety data sheets must be observed.

10.3 Maintenance schedule

The following activities must be carried out by the owner at the relevant time intervals (h = operating hours).

“Check” always means that, in the case of negative findings, the checked parts also need to be replaced. The respective spare parts needed are included in the corresponding wear part packages.

Components that are not replaced must be checked every time that the machine is maintained from the date of the first check.

Daily or every 10 h	Check	Clean	Replace
Oil filling: Check, top up if necessary (see Section 10.4.1)	●		
Check pump externally for leaks in the oil and water systems	●		
Information signs: present and legible (replace if necessary)	●	●	

Weekly or every 50 h	Check	Clean	Replace
Gearbox and water part: check for abnormal noises	●		
Pump: clean according to level of soiling		●	

After 50 h for the first time/always 50 h after repair and at every maintenance interval (see Section 10.4.2)	Check	Clean	Replace
Cylinder fixing and pump head mounting on the gearbox: Check the tightening torque and inspect for signs of corrosion	●		
Pump mounting on the foundation: check	●		
Check all connections to valves and connection points	●		

For the first time after 50 h	Check	Clean	Replace
Oil filling: Drain and replace the first fill of oil (see Section 10.4.1)			●

The following activities must be performed at the specified time intervals and only by trained specialists. At WOMA, trained specialists get the information they need from training sessions as servicing instructions.

NOTICE	Maintenance by trained specialists is a precondition for permanently safe and reliable operation of the pump.

NOTICE	The maintenance intervals specified represent the expected operating life if our set-up and water guidelines are followed and the pump is commissioned and maintained professionally. These values may differ up or down if operating conditions are better or worse.

Every 12 months or every 1,000 h (whichever occurs first) Maintenance interval A	Check	Clean	Replace
Change of oil			●
Oil (6.288-050.0) [1 litres]			

Additionally every 12 months or every 2,000 h (whichever occurs first) Maintenance interval B	Check	Clean	Replace
Interchangeable conversion set: Check wearing parts (plunger, pressure fittings ...)	●		
Interchangeable conversion set: Change the maintenance package (seals, guide ring and valve springs)			●
Interchangeable conversion set, maintenance package (9.919-918.0) - wear package (9.919-924.0)			
Pump head: Check wearing parts (valves, guide sleeves)	●		
Pump head: Replace the maintenance package (seals, valve springs ...)			●
Pump head 30Y maintenance package (9.919-919.0) - wear package (9.919-921.0)			
Clean gearbox and check for leaks	●	●	
GE 30 seal, guide pistons wear package (9.918-701.0) GE 30 seal, gearbox and bearing cover wear package (9.918-843.0)			

Additionally every 24 months or every 4,000 h (whichever occurs first) Maintenance interval C	Check	Clean	Replace
Interchangeable conversion set: Check wearing parts (cylinders)	●		
Interchangeable conversion set wear package (9.919-925.0)			
Pump head: Change the maintenance package (screws)			●
Pump head 30Y maintenance package (9.919-920.0)			

10.4 Description of the regular maintenance work

The following sections describe the checking and maintenance work that is required and may be carried out by untrained, but instructed, personnel.

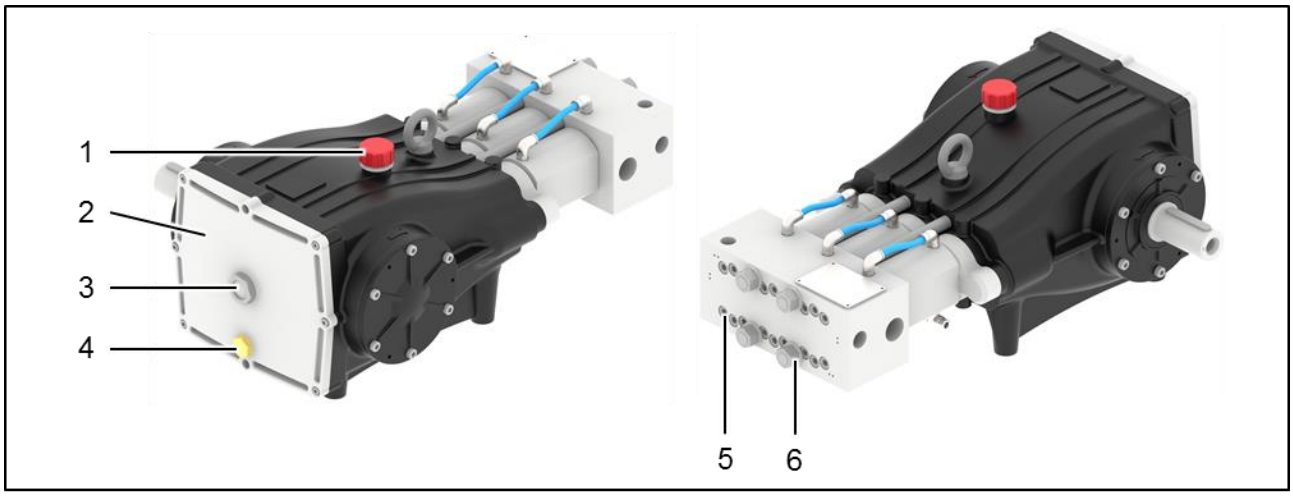


Figure 16: Components to be checked

1 Oil filling plug	4 Drain plug
2 Gearbox cover	5 Fastening screw (interchangeable conversion set on the pump head)
3 Oil sight glass	6 Fastening nut (pump head on the gearbox)

10.4.1 Change oil

For the first oil change, we recommend removing the gear cover and cleaning out any deposits from the oil sump before filling with fresh oil.

	The oil should be changed when the pump is lukewarm.

1. Place an adequately-sized oil collecting pan to collect the old oil under the drain plug (Figure 16: 4).
2. Open the drain plug (Figure 16: 4).
3. Unscrew the oil filling plug (Figure 16: 1).
4. Let the oil flow till no more comes out.
5. Clean any metal residues from the drain plug.
6. Open the gearbox cover if the oil contains a lot of metal residue (Figure 16: 2) and check the inside of the gearbox for possible damage.
   WOMA Service will be happy to help you assess the gearbox.
7. Screw the drain plug (Figure 16: 4) back into the housing.

8. Check the drained off oil for any water content (white-coloured emulsion).
9. If emulsion can be verified in the oil, have the non-rotating seals of the pistons renewed. Inspect the plunger seals (Figure 4: 3) for leaks.
10. Fit the gearbox cover (Figure 16: 2 tightly back on to the housing if it has been opened.
11. Fill up the specified amount of oil (Tabelle 7: Oil quantities) as per the specification (Tabelle 13: Oils) at the oil filling plug (Figure 16: 1).
12. Check the oil level at the oil sight glass (Figure 16: 3).

	The oil level should be in the middle of the oil sight glass.

13. Screw the oil filling plug (Figure 16: 1) back in.

10.4.2 Check fixings/screwed connections

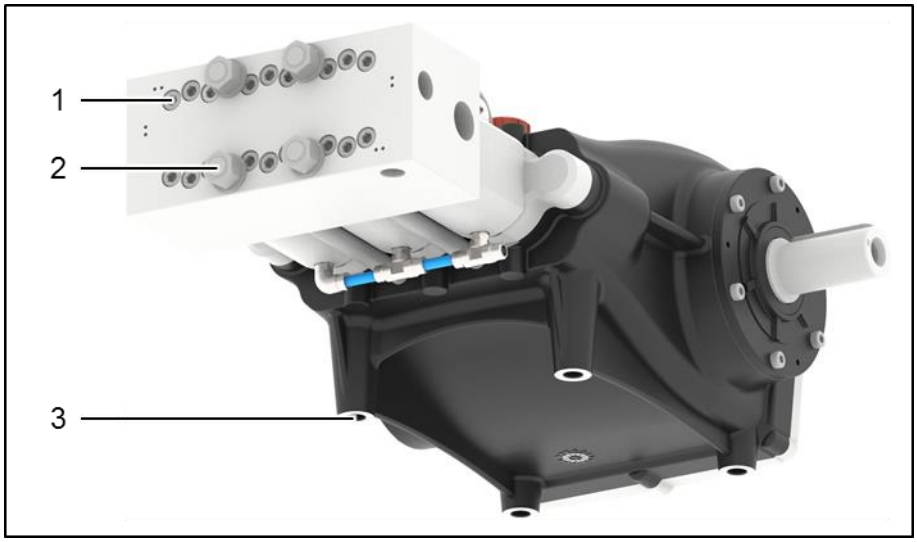


Figure 17: Components to be checked

Tabelle 12: Tightening sequence and test torque

	Cylinder fixing	Pump head fixing	Pump fixing
Position in Figure 17	1	2	3
Bolt / nut	Bolts M10	Nuts M16	Bolts M16
Quantity	18	4	4
Tightening sequence	Figure 18 Number 1 – 18	Figure 18 Number 19 – 22	-
Test torque (Nm)	40	35	150

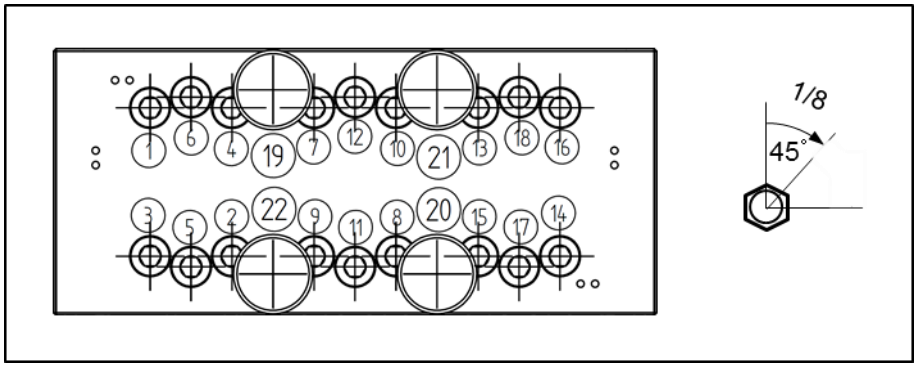


Figure 18: Tightening sequence for screw connections

NOTICE	If the test is negative, the cylinder fixing and pump head mounting screw connections must be replaced as a precaution.

Checking the cylinder fixing
(Figure 17: 1)

1. Check the bolts for corrosion.
2. Use an adequately sized torque wrench for checking. The applicable torque is shown in Tabelle 12: Tightening sequence and test torque.
3. Check all the cylinder fixings with maximum 1/8 turns one by one in alternating order as indicated in Figure 18: Tightening sequence for screw connections.

Checking the pump head mounting on the gearbox
(Figure 17: 2)

1. Inspect the nuts and stud bolts for corrosion.
2. Use an adequately sized torque wrench for checking. The applicable torque is shown in Tabelle 12: Tightening sequence and test torque.
3. Check all the pump head mounting points with maximum 1/8 turns one by one in alternating order as indicated in Figure 18: Tightening sequence for screw connections.

Checking the pump mounting on the foundations
(Figure 17: 3)

1. Check the bolts for corrosion.
2. Check the fixing bolts with an adequately sized tool. The applicable torque is shown in Tabelle 12: Tightening sequence and test torque. The fixing bolts of the pump must prevent movement relative to the overall machine; may not however stress the machine.

11 Decommissioning

11.1 Safety instructions

⚠ CAUTION	**Oil** Risk of irritation to skin and eyes due to contact with oil. – Wear protective goggles and oil-proof gloves when carrying out maintenance work involving oil.

11.2 Performing decommissioning

Apart from the following steps, other system-specific steps may be necessary. These are to be found in the operating instructions of the machine manufacturer.

Under the current rules and regulations, the following procedure is recommended for decommissioning:

1. Switch off the high pressure.
2. Turn off the motor.
3. Once the pump is at a standstill, switch off the inlet pressure.
4. Close the shut-off valve in the inlet pressure line.
5. Relieve pressure in the high-pressure line.

11.3 Antifreeze/conservation

For temporary decommissioning or if there is a risk of frost, the pump must first be drained. If the pump is to be shut down for a longer period, measures must be taken so that it can be started again without problems. The durability of the conservation agent must be taken into account in this case.

ℹ	The WOMA conservation oil (5 l container, material number 9.901-464.0) provides protection for up to 6 months.
ℹ	If there is a risk of frost, we recommend using an antifreeze agent on glycol base with anti-corrosion additives.
ℹ	The period of decommissioning for which conservation is necessary depends on the ambient conditions and the quality of the medium. In general, i.e. if water quality meets the specifications, conservation must be used for a planned downtime of more than 3 weeks.

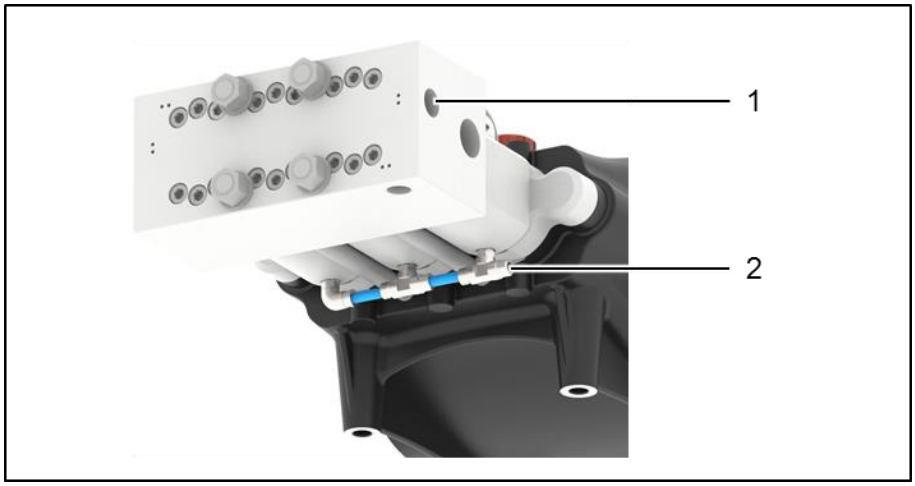


Figure 19: Drain the pump

1 Drain plug on inlet pressure block

2 Sealing water outlet

1. Suck in the antifreeze/preservative agent with the last working cycles of the pump. Also feed it into the sealing water system if you use an external sealing water supply.
2. Switch off the pump.
3. Seal the inlet pressure high-pressure line of the pump to be protected/conserved and depressurise the lines.
4. Place an adequately-sized container ready to collect the remaining antifreeze/conservation agent.
5. To drain the inlet pressure block, remove the drain plug (Figure 19: 1).
6. Release the overflow valve (see Section 4.3 - Accessories and options).
7. Detach all return lines from (of the overflow valve, sealing water system (Figure 19: 2) and let the pipes / hoses run empty.
8. Screw the drain plug (Figure 19: 1) back onto the inlet pressure block.
9. Drain the oil - preferably while the pump is still lukewarm (see Section 10.4.1 - Change oil).

⚠ CAUTION	**Falling objects** Risk of crushing or pinching from objects falling off the pump. – Two screws of the gearbox cover must be replaced with grub screws before loosening the last screw.

10. Remove the gearbox cover (Figure 3: 2) from the gearbox.
11. Spray all sides of the gearbox housing with conservation oil.
12. Close the gearbox housing with the gearbox cover.
13. Fit all return lines (of the overflow valve, sealing water system (Figure 19: 2)) back at the appropriate points.

12 Disassembly

12.1 Safety instructions

⚠ CAUTION	**Oil** Risk of irritation to skin and eyes due to contact with oil. – Wear protective goggles and oil-proof gloves when carrying out maintenance work involving oil.

12.2 Preparation for dismantling

Before beginning the dismantling, all components to be slackened off must be secured against falling, toppling or shifting.

- Only those persons authorised to perform the dismantling may be present in the working zone.
- Make sure that all systems are depressurised.
- Have the tools for dismantling ready.
- Select and have ready suitable load suspension equipment, attachments, ropes and chains.
- Make sure that all operating and auxiliary liquids have been drained.

12.3 Perform dismantling

There may be some remaining operating and auxiliary fluids in various parts. You should therefore have a suitably sized container ready to collect fluid before loosening components, lines etc. Operating and auxiliary fluid that escapes must be collected and disposed of properly.

13 Disposal

The following points are to be noted when disposing of the pump, as well as of operating and auxiliary materials:

- Observe national regulations for the site.
- Observe company-specific regulations.
- Dispose of operating and auxiliary materials in compliance with the applicable safety data sheets in each case.

14 Lists

14.1 List of figures

14.2 List of tables

15 Appendix

15.1 Water quality guideline

Filtration – standard	≤ 10 µm
Total water hardness	3 - 15°H
CaO	30 - 150 mg/l
$CaCO_3$	54 - 268 mg/l
Calcium hardness	0.89 - 2.14 mmol/l
pH value	6.5 - 9.5
Degree of alkalinity (pH 8.2)	0 - 0.25 mmol/l
Proportion of all dissolved substances	10 - 75 mg/l
Electrical conductivity	100 - 450 µS/cm
Chlorides (e.g. NaCl)	< 100 mg/l
Iron (Fe)	< 0.2 mg/l
Fluoride (F)	< 1.5 mg/l
Free chlorine (Cl)	< 1 mg/l
Copper (Cu)	< 2 mg/l
Manganese (Mn)	< 0.05 mg/l
Phosphate (H_3PO_4)	< 50 mg/l
Silicates (Si_xO_y)	< 10 mg/l
Sulphate (SO_4)	< 100 mg/l

15.2 Consumables

Tabelle 13: Consumables

Assembly greases and pastes			
Area of application	**Designation**	**Container**	**Material no.**
Screws and nipple threads	Thread assembly paste	500 g	9.892-362.0
Fit joints and similar	Anti-seize assembly paste	450 g	9.892-352.0
O-rings	Silicone grease	100 g	9.890-524.0
Oils			
Area of application	**Recommended oils**	**Container**	**Material no.**
Oil viscosity in acc. with ACEA A3; ACEA B4; ACEA E2; API SL; API CF; API CG-4	15 W – 40	1.0 l	6.288-050.0
Preservation and antifreeze agents			
Area of application	**Designation**	**Container**	**Material no.**
Standstill for an extended period	Conservation oil	5.0 l	9.901-464.0
Downtime with risk of frost	Antifreeze	200 l	9.890-458.0

15.3 Dimension sheet

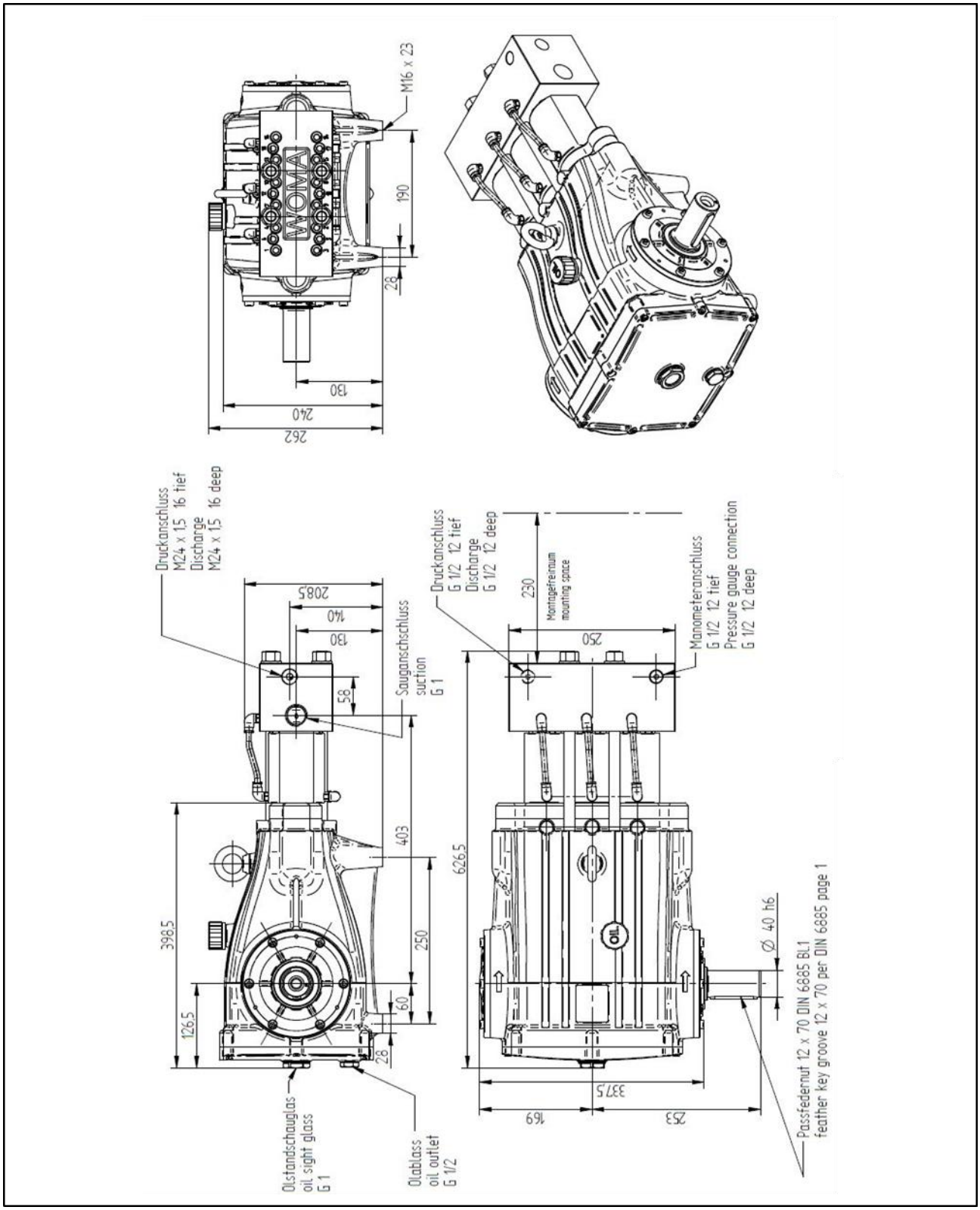


Figure 20: Dimension sheet

15.4 Translation of EC Declaration of Conformity

CE	**Translation of the original EC Declaration of Conformity for a Machine** in accordance with the Directive 2006/42/EC, Appendix II, 1A	WOMA Kärcher Group

We hereby declare, as

WOMA GmbH
Werthauser Strasse 77-79
47226 Duisburg
Germany

that the machine

Trade designation:	**High-pressure plunger pump**
Model:	**30Y**
Type:	**Plunger pump**
Function:	**The high-pressure pump serves, in combination with a drive unit and a water tool/end user, for the generation of water at high-pressure.**

in the version ready for operation, complies with all applicable requirements of the Machinery Directive 2006/42/EU.

Applied harmonized standards:

EN ISO 12100:2010	Safety of Machines - General Structural Principles - Risk Assessment and Risk Reduction
EN 809:1998+A1:2009/AC:2010	Pumps and Pump Assemblies for Fluids - General Safety Requirements

Manufacturer and Entity Responsible for the Preparation of the Technical Documents:
Woma GmbH, Werthauser Strasse 77-79, 47226 Duisburg, Germany

Signatory to the Declaration:

Germany, 47226 Duisburg, dated 11.07.2018

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(pp Dr.-Ing. Uwe Kaiser, Technical Division Manager)

i. A. Simon Andrzejewski
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(on behalf of WOMA GmbH Simon Andrzejewski, Documentation)