

Mobile grease spray unit

GROVE®



Gerät Artikel: 04414162

GROVE®

Grease Spray Unit with Air Cap for round or wide spray pattern
Grease Spray Unit with Coupling for Spray Tubes

“Mit Manitowoc wirklich Großes aufbauen”

Mobile grease spray unit



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1 GENERAL

1.1 GENERAL CONDITIONS AND AREAS OF APPLICATION

This machine is a mobile, compressed air-powered high-pressure grease system for **spray lubrication**, in particular:

- rope lubrication on hoist, suspension, and jib ropes of mobile, crawler, and construction cranes,
- spray lubrication of other machine parts where a **grease film** is to be applied by means of a spray jet.

The unit is intended for use in **service operations**:

- Machine/crane secured,
- Cables are stationary or running at a very low, controlled speed,
- the safety instructions of the crane or machine manufacturer must be observed.

The system is **not** intended for continuous production or automatic process lubrication, but as a **service and maintenance device**.

It may only be used by **trained personnel** who are familiar with

- the functioning of grease pumps and compressed air systems,
- the safety requirements of the Machinery Directive 2006/42/EC, and
- the operator's operating regulations

The operator is obliged to ensure that only persons who are capable of operating the machine safely due to their training, instruction, and experience are employed.

1.2 USE OF THE OPERATING AND MAINTENANCE MANUAL

These operating and maintenance instructions are **an integral part of the machine**. They must:

- be made fully available to the operator **before first use**,
- be kept near the machine throughout its entire service life,
- be handed over together with all technical documentation when the machine is transferred, sold, or rented to third parties.

All persons involved in installation, commissioning, operation, cleaning, maintenance, or disassembly must have read and understood these instructions.

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1.3 UNDERLYING LEGISLATION

Depending on the model, the machine is designed to comply with the following European directives.

- **Machinery Directive 2006/42/EC**

Compliance with the applicable directives is confirmed in the **EC Declaration of Conformity** (see Chapter 1.9 and Appendix).

1.4 UNDERLYING STANDARDS

The following standards, among others, have been taken into account or are to be taken into account for design, safety, and documentation (examples, please adapt):

- EN ISO 12100 – Safety of machinery – General principles for design – Risk assessment and risk reduction
- EN 982 / EN ISO 4414 – Safety of fluid power systems and their components – Pneumatics

1.5 SYMBOLS

The following symbols are used in the manual to highlight the most important information and warnings.



PROHIBITION

This symbol indicates prohibited actions that could endanger the safety of the user or damage the machine.

► The corresponding instructions must be strictly followed.



DANGER

This symbol indicates warnings that are important for the physical safety of the user.

► Failure to comply may result in serious injury.



DANGER FROM
ELECTRIC CURRENT

This symbol indicates a potential source of danger due to electric current.

► The relevant electrical regulations must be observed.

IMPORTANT!

This symbol indicates information that is particularly important for the operation, function, or service life of the machine.

► Compliance increases operational safety and reduces malfunctions.

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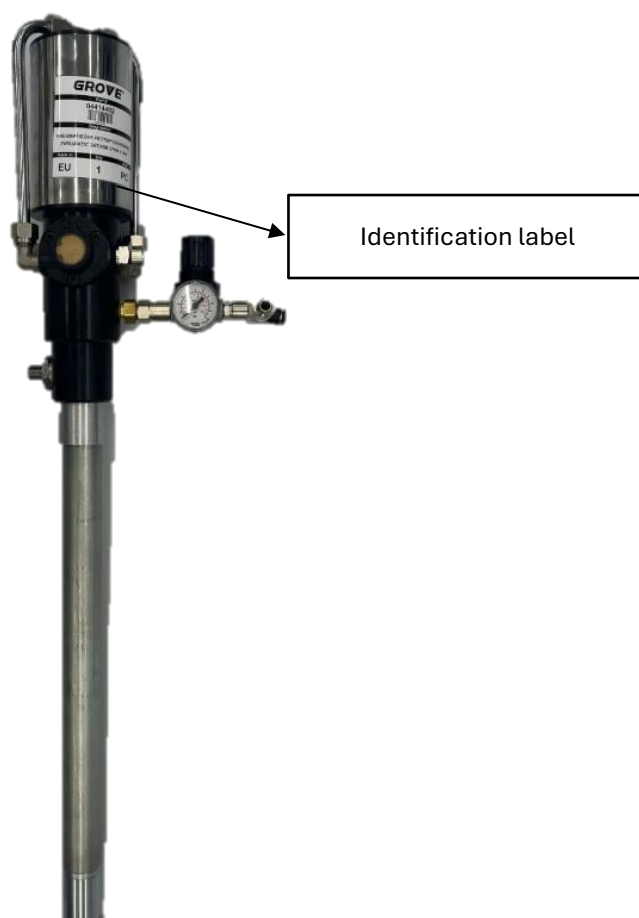


1.6 MANUFACTURER IDENTIFICATION LABEL

A **type plate** is attached to the system (in the case of a combined system, e.g., on the pump trolley or in an easily accessible location). It contains at least the following information:

- Manufacturer's name
- Product name / type
- Item number

This information is essential for queries, spare parts orders, service calls, and for the clear identification of the machine.



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1.7 WARRANTY

The warranty applies exclusively to:

- **intended use** (see section 2.2),
- operation within the operating limits specified in this manual and on the type plate,
- use of **original spare parts** and accessories approved by the manufacturer.

The warranty shall be void in particular in the event of:

- Unauthorized modifications to mechanical, pneumatic, or safety-related components,
- use of non-approved lubricants or media,
- improper repair, maintenance, or bypassing of safety devices,
- failure to observe the safety and operating instructions described in this manual,
- use of the machine in unauthorized environments (e.g., potentially explosive areas without the appropriate approval).

Any further regulations (e.g., warranty period, liability limitations) are set out in the manufacturer's **general terms and conditions**.

1.8 SPARE PARTS ORDERS

Orders for spare parts and accessories must contain the following information:

- Product name and type of machine,
- serial number,
- Year of manufacture,
- Exact description of the required part,
- Item number (if available, e.g., for lances, spray heads, couplings, etc. from Chapter 10 of this manual),
- quantity.

Only **original spare parts** and accessories from the manufacturer guarantee:

- compliance with the safety requirements described in this manual,
- compatibility with existing assemblies,
- maintenance of CE conformity.

If you are unsure, we recommend that you send photos of the required component and the machine's type plate.

Mobile grease spray unit**1.9 DECLARATION OF CONFORMITY****"CE" – DECLARATION OF CONFORMITY**

In accordance with Annex II B of Directive 2006/42/EC,

ERNST HAUSAMMANN & CO AG
Rautistrasse 19 – 8010 Zurich – Switzerland

ARTICLE NUMBERS: SEE CHAPTER 1.6 OF THIS MANUAL

SERIAL NUMBERS: SEE LABEL ON PUMP BODY

The undersigned, **Marko Zilic**,
in his capacity as legal representative of ERNST HAUSAMMANN & CO AG

CONFIRMS

Within the scope of civil and criminal liability, that the product:

MOBILE GREASE SPRAY UNIT ITEM NUMBER: R02.260/S051

is manufactured in accordance with all essential requirements relating to this article
safety; this also includes the following regulations:

- Directive 2006/42/EC (formerly Directive 89/392/EEC) implemented in Italy by
Decree
DPR 459 of 24/07/1996
concerning the safety of machinery

ERNST HAUSAMMANN & CO AG

Legal representative


(MARKO ZILIC)

Date

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2 SAFETY INSTRUCTIONS FOR USERS

2.1 GENERAL SAFETY

The following safety instructions serve to protect people, the machine, and the environment. They must be strictly observed by the operator and all persons working with the machine.

- The machine may only be operated, cleaned, maintained, or repaired by instructed and trained specialist personnel.
- Before initial commissioning, the entire operating and maintenance manual must be read carefully and understood.
- The operator must ensure that all operators:
 - are familiar with the contents of these instructions,
 - are instructed in the dangers of the high-pressure grease system,
 - are familiar with the safety regulations of the company and the crane manufacturer.

Before each use, the general condition of the machine must be checked:

- Condition of the pump, high-pressure grease hoses, and compressed air hoses,
- condition of the spray gun, spray head, and lances,
- visible damage (cracks, dents, deformed components),
- Grease leaks or air leaks at screw connections and couplings,
- correct, safe positioning of the pump and container.

**Warning! – High-pressure grease**

The machine operates at high pressures on the grease side. A jet of grease can **penetrate** the **skin** and cause serious injury.

If you suspect this is the case:

- stop work immediately,
- keep the affected person calm,
- **seek medical attention immediately (emergency),**
- inform the doctor which grease was used (safety data sheet).

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**Depressurize!**

Before carrying out any work on the machine (cleaning, maintenance, hose replacement, dismantling of lances or spray heads), the system must be:

- 1) disconnect the system from the compressed air supply and
- 2) completely **depressurized** (see chapter "Commissioning and operation").

The machine must not be operated if:

- safety devices or protective devices have been removed, bypassed, or are defective,
- there is visible damage to pressurized parts,
- it is unclear which media (greases, cleaning agents) are in the system.

2.2 INTENDED USE

The machine is intended exclusively for use with **lubricating greases**, in particular for:

- rope lubrication on hoisting, suspension, and jib ropes of mobile, crawler, and construction cranes,
- spray lubrication of other machine parts to which greases are to be applied in the form of a spray film.

Permissible media:

- **non-flammable lubricating greases**,
- greases within **the viscosity/NLGI range** approved by the pump (e.g., NLGI 0–2),
- greases approved by **the crane or machine manufacturer** for the respective application.

The machine must **not** be used:

- in **potentially explosive atmospheres (ATEX)** unless it has been specifically approved for this purpose,
- with flammable or explosive liquids (e.g., gasoline, solvents),
- with paints, varnishes, adhesives, cleaners, or chemically aggressive media,
- outside the **pressure and temperature ranges** specified in these instructions (see section 3.4),
- for continuous or process lubrication as a permanently installed system.

Any use outside these specifications is considered **improper use**. The operator is solely liable for any damage resulting from this.

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2.3 FORESEEABLE MISUSE

The following misuse, which frequently occurs in practice, is **not permitted** and must be avoided:

- Using the **spray gun or lance as a lever, hammer, or support**,
- Kinking, crushing, running over, or sharply bending grease or air hoses,
- Spraying onto **hot or glowing surfaces** → risk of fire and smoke,
- Spraying in the immediate vicinity of **open flames, sparks, or ignition sources**
- Spraying **during operation at high rope speed** without securing the crane,
- Working on the machine in **inadequate lighting or poor visibility conditions**,
- Removing components (lance, spray head, hoses, fittings) **under pressure**,
- Bypassing, bridging, or deactivating safety devices (e.g., safety air couplings).

The operator must ensure that such misuse is prevented by providing appropriate training, work instructions, and supervision.

2.4 RESIDUAL RISKS

Despite careful design, component selection, and compliance with standards, certain **residual risks** remain with a high-pressure grease system:

- **Leaks:**
 - Grease or air leaks can occur due to wear, aging, or mechanical damage.
 - Consequence: Risk of slipping, contamination, risk of skin contact with the medium.
- **Grease mist/aerosols:**
 - Aerosols can be generated during spraying, especially with high air volume and low grease flow.
 - Consequence: Inhalation of grease mist, irritation of the respiratory tract, contamination of the environment.
- **Tripping hazards caused by hoses:**
 - Hoses laid out in the work area can cause tripping hazards.
 - Consequence: Risk of falling for operating or service personnel.
- **Risk of crushing and entanglement:**
 - There is a risk of crushing and entanglement when working near ropes and moving machine parts.
 - Consequence: Injuries to hands, arms, or body if the machine starts up unintentionally.

These residual risks must be mitigated by:

- consistent use of **personal protective equipment (PPE)**,
- regular **inspection of hoses, couplings, and lances**,
- safe work organization (e.g., hose routing, cordoning off the work area),
- compliance with the safety instructions in this manual

as far as possible.

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2.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The personal protective equipment that the user must wear during **loading, maintenance, and cleaning** are:

Work clothes, work shoes with non-slip soles, and work gloves.



Safety goggles or face shield,



oil-resistant protective gloves



protective work clothing



Safety shoes.

For longer periods of work, in confined spaces, or in the presence of heavy grease mist, additionally:



Respiratory mask in accordance with company guidelines.

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2.6 NOISE AND VIBRATIONS

The pump's air motor and the compressed air outflow generate noise. The noise level depends on:

- the set **air pressure** and delivery rate,
- the operating mode (continuous delivery or intermittent operation),
- ambient conditions (echo, enclosed spaces).

In typical applications, the use of **hearing protection** may be advisable, especially during prolonged use or when working in enclosed spaces with high reverberation.

Vibrations:

- The pump's air motor and the compressed air flow generate noise which, depending on the operating pressure and ambient noise level, may make it advisable to wear hearing protection.
- The hand-held spray gun and the pump generate vibrations, which are usually low.
- During prolonged daily use, it may be advisable to limit **exposure time** and choose ergonomic working positions.

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3 PRODUCT FEATURES

3.1 INTRODUCTION

This chapter describes the design, operating principle, and technical data of the spray system.

The system essentially consists of:

- Mobile compressed air grease pump for barrel containers
- High-pressure grease hose
- Grease spray unit 04414162 with air spray head and interchangeable spray lances.

Detailed knowledge of the product properties is necessary in order to:

- operate the machine as intended,
- avoid hazards caused by exceeding limit values (pressure, temperature),
- select suitable lubricating greases, settings, and working methods,
- carry out maintenance and repair work correctly.

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3.2 PRODUCT DESCRIPTION / SYSTEM STRUCTURE

The mobile spray unit is a **mobile, compressed air-powered high-pressure grease system**. It is typically used in the vicinity of cranes, construction sites, or workshops and can be easily transported from one location to another.

The system is divided into the following assemblies:

1. Compressed air-powered grease pump (barrel pump)

- Piston pump with air motor, designed for pumping lubricating grease from drum containers.
- The pump is mounted on the container and draws in the grease via a suction pipe.
- The compressed air supply (air motor) builds up high grease pressure, which transports the grease through the high-pressure hose to the spray unit.

2. High-pressure grease hose

- Connection between the high-pressure outlet of the pump and the grease spray unit.
- Designed for the maximum working pressure of the pump, with suitable screw connections and seals.
- Hose length selected so that ergonomic work on the rope is possible while the barrel with the pump is at a safe distance.

3. Mobile grease spray unit (basic unit 04414162)

The spray gun consists of:

- Handle with trigger lever (control lever),
- Adjusting screw for the grease quantity,
- Adjusting screw for the air quantity,
- Air connection via safety coupling,
- Air spray head (round/wide jet or coupling air head for lances).

4. Spray lances

- Lengths tailored to different applications (e.g., short lances for easily accessible areas, long lances for hard-to-reach sections).
- Connection via the coupling air head with quick coupling on the spray gun.
- Nozzle geometry designed for an even film of grease on the rope.

5. Compressed air supply

- Connection to an existing compressed air network or a mobile compressor.
- A pressure regulator is pre-installed on the pump.
- The air supply must be designed so that the required volume flows and pressures are available for pump operation and spraying.

The assemblies together form a compact, mobile unit with which the lubricating grease can be applied from the barrel via the spray gun as a spray film on ropes and surfaces.

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3.3 MODE OF OPERATION

The system's mode of operation can be divided into three sub-processes:

1. Grease delivery by the pump

- The air motor of the pump is set in motion by the connected compressed air.
- The pump piston draws grease from the barrel via the suction pipe and pushes it into the high-pressure grease hose with a transmission ratio **of 10:1**.
- The transmission ratio between air pressure and piston area generates a significantly higher pressure on the grease side than the air pressure (high-pressure range).

2. Grease feed to the spray gun

- The grease is fed under high pressure through the high-pressure hose into the spray gun.
- Inside the gun, the amount of grease for the spraying process is adjusted by means of a **grease quantity adjustment screw**.
- This allows the operator to adjust the amount of grease discharged to suit the task at hand (rope diameter, degree of contamination, desired layer thickness).

3. Atomization and application via air spray head and lances

- At the same time, the spray gun is supplied with compressed air via the air connection.
- The air volume is adjusted via an **air volume control screw**.
- The pressurized grease and the compressed air meet in the air spray head. The air atomizes the grease into a spray jet (round jet or wide jet, depending on the head).
- By using lances, the spray jet can be directed close to the rope, even in hard-to-reach places.
- The operator presses the trigger lever on the gun to start and stop the spraying process.

Interaction of settings:

- **Lots of grease / little air** → rather coarse, thick application with higher layer thickness.
- **Less grease / more air** → finer atomization, thinner, more even film.

The optimum setting depends on:

- Wire diameter and geometry,
- Grease type (viscosity, NLGI class),
- Ambient temperature,
- desired layer thickness, and lubrication interval.

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3.4 TECHNICAL DATA

Component	Parameter	Value
Grease pump	Medium	Lubricating grease NLGI 0-2
	Air supply pressure	2-6 bar
	Pressure ratio	10:1
	Max. grease outlet pressure	60 bar
	Ambient temperature	-10 °C to +60 °C
	Compressed-air connection	G ¼"
	Grease connection	G ¼"
Grease spray unit	Air pressure	max. 6 bar
	Medium temperature range	0-60 °C
	Air connection	G ¼"
	Spray head	Round / wide spray air cap or coupling air cap
	Lance connection	G 1/4, size 6 quick coupling
	Material	Body nickel-plated aluminium, nozzle insert stainless steel, seals NBR
Complete system	Max. operating pressure, grease side	Limited by pump type
	Max. operating pressure, air side	6 bar
	Medium	Non-flammable lubricating greases, compatible with materials
	Protection class	Depends on installation, no ATEX approval

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3.5 PROHIBITED AREAS OF APPLICATION

The following applications are **not permitted** and are considered improper use:

- Use in **explosion protection areas (ATEX zones)** without the entire system being certified accordingly.
- Conveying or spraying of:
 - Flammable liquids (e.g., gasoline, diesel, solvents),
 - Paints, varnishes, coating materials,
 - chemicals, cleaners, acids, or alkalis,
 - foodstuffs or food additives.
- Use outside the **pressure and temperature limits** specified in section 3.4.
- Use of the spray gun or lances as **a mechanical tool** (lever, hammer, support).
- Continuous or process lubrication in fully automated systems, unless expressly designed and approved for this purpose.
- Use with media that:
 - attack or decompose the materials used (e.g., aluminum, steel, seals),
 - can cause impermissibly high deposits, coking, or chemical reactions.

The operator is responsible for ensuring that only **approved greases and operating conditions** are used. In case of doubt, consult the manufacturer in advance.

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4 STORAGE, LIFTING, AND TRANSPORT

4.1 INTRODUCTION

This chapter describes the safe procedures for **lifting, transporting, and storing** the rope lubrication unit with compressed air-operated barrel pump and modified grease spray unit.

The aim is to

- **prevent personal injury** (e.g., from tipping, slipping, crushing) and
- **property damage** to the machine, hoses, barrels, and surroundings

The information in this chapter applies to both:

- the **complete system** (pump + drum + hoses + sprayer) as well as
- for **subassemblies** (pump only, sprayer only, drum only).

4.2 GENERAL WARNINGS

**DANGER – Risk of tipping over / crushing**

There is a risk of tipping and crushing when lifting and transporting the barrel, pump, and sprayer. Unapproved means of transport or improper slinging can cause slipping or tipping.

- Lifting and transporting may only be carried out by **trained personnel**.
- **No persons** may remain in the danger zone under suspended loads.
- Move heavy assemblies (barrel with pump) only with suitable **lifting equipment** (lift truck, crane with slings, transport trolley).
- Only transport the machine when **it is depressurized** (disconnect compressed air, vent the system).

IMPORTANT!

Hoses that drag along the floor or become pinched during transport may be damaged. Damaged hoses must be replaced before the machine is put back into operation.

4.3 LIFTING THE MACHINE

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4.3.1 PREPARATION

Before each lifting or transport operation, the following points must be checked:

- The system is **depressurized** (no compressed air connected, grease pressure released via gun).
- Grease leaks have been cleaned up; there are no slippery grease puddles in the work area.
- Hoses are untangled and routed so that they cannot get caught or pinched.
- The barrel and pump are stable and cannot tip over (e.g., correctly secured in a barrel trolley or on a pallet).

4.3.2 MANUAL LIFTING OF INDIVIDUAL COMPONENTS

Some components (e.g., only the spray gun with hose or the pump without barrel) can be moved by hand.

- When lifting by hand, the **relevant occupational safety regulations** (maximum hand load weight, ergonomic lifting from the knees, not from the back) must be observed.
- Always lift the pump by **the pump body** or the designated handles; never pull on the hoses, gun, or air lines.
- Never "pull down" the spray gun by the air hose to grasp it.

4.3.3 LIFTING AND MOVING THE DRUM + PUMP

The filled drum with the pump attached can be very heavy.

- Only move the drum using **suitable aids**, e.g.:
 - Drum transport trolley,
 - Pallet truck/forklift truck (with suitable drum attachment),
 - crane with drum grab or suitable slings (e.g., tension belts around the drum, in accordance with the manufacturer's instructions).
- The pump must be secured in such a way that it cannot **become loose or fall out** when the barrel is tilted or moved.
- When transporting with a pallet truck or forklift:
 - Pick up the drum centrally and secure it against slipping,
 - only travel at a low lifting height,
 - avoid jerky movements.

4.4 STORAGE

4.4.1 STORAGE CONDITIONS

The machine and its components must be stored in such a way that they are protected from damage, corrosion, and contamination:

- **dry, clean, dust-free**, and protected from direct weathering.
- Temperature range during storage:
 - in accordance with the values specified in section 3.4

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- No direct sunlight on hoses and guns for long periods of time (UV exposure can reduce service life).
- Always store drums of grease **upright** and secured against tipping over.

4.4.2 STORAGE OF HOSES AND SPRAY GUN

- Store grease and air hoses **loosely coiled**, do not kink them or hang them under tension.
- Never kink hoses severely or trap them under heavy objects.
- Store spray guns and lances in holders or neatly in a case/on a shelf so that the nozzle tips are protected from impact.
- If available, place protective caps on the spray head and lances to keep dirt and dust away.

4.4.3 LONGER PERIODS OF INACTIVITY

For longer periods of inactivity, we recommend:

1. Depressurize the system and empty the hoses as far as practicable.
2. Clean the spray gun and lances, wipe off any visible grease residue.
3. Store drums in accordance with the manufacturer's instructions/expiration date of the grease.
4. Secure the machine against unintentional use (e.g., close air connections, remove the crane operator's key).

4.5 TRANSPORT

4.5.1 GENERAL TRANSPORT INSTRUCTIONS

The following points must be observed during internal transport (e.g., from the workshop to the crane site) and external transport (e.g., on a truck or trailer):

- **Always** depressurize the machine before transport (no compressed air connected, grease pressure reduced).
- Secure spray guns and lances so that they cannot fall down or hit hard parts.
- Secure hoses (roll them up, fix them in place) so that they do not drag or get caught between moving parts.
- Secure drums against slipping and tipping over (e.g., tension belts, blocking on side walls, special drum holders).

4.5.2 INTERNAL TRANSPORT

- For short distances, it is advisable to use **drum trolleys or rolling boards** on which the drum is secured with a pump.
- Lift hoses or guide them carefully so that other people do not trip over them.
- Drive slowly on uneven ground, avoiding bumps and tilting.

4.5.3 EXTERNAL TRANSPORT (E.G., VEHICLE)

When transporting in vehicles (vans, service vehicles, trucks):

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- Secure the barrel on the vehicle floor or in the cargo area **in a form-fitting and force-fitting manner**.
- Protect the pump against impacts and strong vibrations (e.g., secure it additionally or dismantle it and store it separately).
- Transport spray guns and lances in suitable holders or cases.
- For longer journeys or large temperature differences (summer/winter):
 - Observe the permissible temperature range for the grease (risk of excessive liquefaction or excessive solidification).

4.6 CHECK AFTER TRANSPORT/RELOCATION

After each transport—especially over long distances or on uneven terrain—check the following before commissioning:

- Are all screw connections tight and undamaged?
- Are grease hoses, air hoses, and lances free of kinks, cracks, or visible damage?
- Is the pump still correctly and securely mounted on the drum?
- Are any components bent or loose?

Only when these points have been checked and found to be in order may the system be reconnected to the compressed air supply and put back into operation.

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5 INSTALLATION, CONNECTION, AND COMPRESSED AIR SUPPLY

5.1 INTRODUCTION

This chapter describes the **initial installation** and **connection** of the system, consisting of:

- Mounting the pump on the container (drum),
- Laying the grease and air lines,
- Connecting the grease spray unit,
- Connection to the compressed air supply.

The aim is to ensure a **safe and functional installation** so that:

- all operating limits (pressure, temperature, media) are observed,
- hazards due to incorrect installation are avoided,
- subsequent maintenance and service work can be carried out without any problems.

Installation, conversion, or expansion of the system may only be carried out by **qualified personnel** who are familiar with compressed air and lubrication systems.

5.2 INSTALLATION INSTRUCTIONS

Before starting installation, please note the following points:

- **Check all components**
 - Visually inspect the pump, barrel, hoses, spray gun, and lances for damage (cracks, deformations, leaks).
 - Check that the delivered parts are complete (according to the delivery note/parts list).
- **Select a suitable installation site**
 - Firm, level, and stable surface
 - Sufficient space for operation, maintenance, and hose routing
 - no tripping hazards from hoses or cables in the working area,
 - no immediate proximity to strong heat sources (e.g., radiant heaters, open flames).
- **Safety aspects**
 - The machine may only be installed in a **depressurized state** (no compressed air connected, grease pressure reduced).
 - Wear personal protective equipment (PPE) (protective gloves, safety goggles).
 - The crane must not be moved during installation; all specifications of the crane manufacturer must be observed.
- **Check compressed air supply**
 - Availability of a suitable compressed air source (compressor or compressed air network) with sufficient power and permissible pressure range (typically 2–6 bar, max. 6 bar).
 - The use of a pressure regulator with pressure gauge is mandatory.

5.3 CONNECTION HOSE LINES

The quality and correct installation of the hose lines is crucial for the safety and function of the system.

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5.3.1 GREASE SIDE

- **Only high-pressure hoses approved by the manufacturer** may be used.
- The hoses must be approved for at least the **maximum pump pressure** and comply with the relevant standards.
- Lay the hose lines **without tension**:
 - no sharp edges,
 - no crushing,
 - bending radii at least as large as the minimum bending radius specified in the hose data.
- Tighten screw connections with a suitable tool and the **torque** specified by the manufacturer.
- Hoses must not be used as **a means of traction** (e.g., to pull or lift the pump).
- Protect hoses from contact with hot surfaces, rotating parts, and sharp-edged components.

5.3.2 AIR SIDE

Compressed air hoses must be designed for the **maximum operating pressure** (at least 8 bar) and must comply with the relevant standards (e.g., EN ISO 4414).

Lay hoses so that they:

- not be run over (e.g., by vehicles or cranes),
- are not pinched or kinked,
- do not pose a tripping hazard for personnel.

Air hoses that are attached with a hose nozzle must also be secured with a **hose clamp**.

When using screw connections and plug nipples, only use **approved components** to prevent leaks and uncontrolled loosening.

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5.4 INSTALLATION OF THE SYSTEM

5.4.1 MOUNTING THE PUMP ON THE DRUM

The pump is installed directly on the container (drum) for pumping grease.

We recommend proceeding as follows during installation:

- 1) **Prepare the container**
 - a) Clean the top of the container of dirt and foreign objects.
 - b) Open the container and set the lid aside.
- 2) **Insert the grease sequence plate**
 - a) Insert the grease collection plate into the container.
 - b) **Press** the plate **down firmly** by hand or with a suitable tool to minimize air bubbles under the plate and ensure even grease absorption.
- 3) **Put the lid on**
 - a) Place the lid on the container.
 - b) Tighten the three fastening screws on the side of the red lid by hand.
- 4) **Insert the pump**
 - a) Insert the suction pipe of the pump through the openings in the red lid and in the grease collection plate into the barrel.
 - b) Attach the pump to the screw connection and secure it with the wing screws/clamps provided.
 - c) Check that the pump is **vertical** and cannot twist or come loose.
- 5) **Secure mechanically**
 - a) to prevent slipping.

5.4.2 CONNECTING THE HIGH-PRESSURE GREASE HOSE

- 1) **Connect the hose to the pump**
 - a) Attach the delivery hose to the high-pressure outlet of the pump and screw it tight.
 - b) Ensure that the **screw connection** is **tight and secure**.
- 2) **Connect the hose to the grease spray unit**
 - a) Connect the other end of the hose to the grease inlet of the grease spray unit.
 - b) Ensure that the connection is sealed correctly and tighten the screw connections firmly.
 - c) **Teflon tape or a suitable thread sealant** can be used for threaded connections.
- 3) **Hose routing**
 - a) Lay the hose so that the operator can move **freely and safely** during work.
 - b) Do not put the hoses under tension and do not route them around sharp edges.
 - c) After installation, perform a visual inspection for possible chafing or crushing.

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5.4.3 CHECK AFTER INSTALLATION

After completing the mechanical installation, perform the following checks:

- Check that all screw connections are tight.
- Check that grease and air lines are correctly assigned (no mix-ups of connections).
- Ensure that all protective elements (e.g., protective caps, covers) are reinstalled.
- Check that the container is positioned correctly and cannot tip over or is securely fixed in place.

The system may only be connected to the compressed air supply after these checks have been successfully completed.

5.5 COMPRESSED AIR SUPPLY

A correctly designed and adjusted compressed air supply is a prerequisite for safe and reliable operation of the system.

5.5.1 PUMP

- Connect the compressed air connection of the pump to the **pressure regulator with pressure gauge** to the compressed air source.
- Limit the inlet pressure to the **permissible range for the pump (2–6 bar)**.
 - For the application described here, an **operating pressure of approx. 2 bar** should be used as a guideline; exact values depend on the pump type and grease.
- The compressed air supply (compressor, compressed air network) must comply with the applicable regulations and be equipped with a **pressure relief valve**; the maximum line pressure must **not exceed 6 bar**.

5.5.2 SPRAY GUN / AIR HEAD

- The **safety air coupling supplied** must be used at the air connection of the grease spray unit.
- It must be ensured that:
 - the spray gun, air hose, and connection are adequately **grounded**,
 - a conductive hose with a maximum resistance of $10^6 \Omega$ is used.
- Air pressure for the spray gun:
 - typical working range: **2–6 bar**,
 - maximum permissible: **6 bar**
- Air hoses that are attached with a hose nozzle must also be secured with a **hose clamp** to prevent them from coming loose during pressure surges.

IMPORTANT!

Before disconnecting air or grease lines, always depressurize the system as described in section 6.5.

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6 CONTROL AND FUNCTION

6.1 OPERATING AND DISPLAY ELEMENTS

This chapter describes the most important operating elements on the pump and grease spray unit. A thorough understanding of these elements is essential for the safe and efficient operation of the rope lubrication unit.

6.1.1 ON THE PUMP

Air connection with shut-off valve / pressure regulator

- This is where the pump is connected to the compressed air supply.
- The **shut-off valve** can be used to open and close the air supply to the pump.
- The **pressure regulator** is used to set the inlet pressure (see chapter 3.4).
- The pressure gauge shows the set air pressure.

High-pressure grease outlet

- Connection point where the high-pressure grease hose is connected.
- Depending on the air pressure and the transmission ratio, this is where the **high pressure** is applied to convey the grease to the grease spray unit.
- The connection may only be disconnected or connected when the system is depressurized.

6.1.2 ON THE GREASE SPRAY UNIT

Trigger lever

- Hand lever used by the operator to start and stop the spraying process.
- When the lever is actuated, the grease flow and the air supply to the spray head are released simultaneously.
- When the lever is released, the internal valve closes and the spraying process ends.

Adjusting screw for grease flow rate

- This adjusting screw is used to set the **grease quantity** per unit of time.
- Direction of rotation:
 - **Turn to the left (unscrew)** → grease flow increases.
 - **Turn clockwise (screw in)** → grease flow rate decreases.
- The setting depends on: rope diameter, desired layer thickness, grease viscosity, and ambient temperature.

Adjusting screw for air volume regulation

- This screw is used to adjust the **air volume** in the spray head.
- The air volume influences:
 - the atomization (fine/coarse spray mist),
 - the width and shape of the spray jet (for round/wide spray heads),
 - the range of the spray jet.
- In general:
 - **More air** → finer atomization, thinner layer, larger spray mist.

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- **Less air** → coarser spray, thicker layer, less mist.

6.2 CONTROL MEASURES BEFORE COMMISSIONING

The following checks must be carried out before starting the rope lubrication unit. These checks are for safety and trouble-free operation.

1) External visual inspection

- Check the pump, hoses, spray gun, and lances for visible damage (cracks, dents, bent parts, exposed wire mesh on hoses).
- Check for grease or air leaks at screw connections and couplings.

1) Checking the container

- Check that the **correct grease** is in the barrel for the application (see Chapter 9 – Properties of lubricating greases).
- Check whether there is still **a sufficient amount of grease in the barrel**. If the level is low, check the fill level and replace the barrel if necessary.

2) Checking the screw connections and connections

- Ensure that all grease screw connections (on the pump, hose, and grease spray unit) are tight and leak-proof.
- Ensure that all air connections (compressor, pressure regulator, air hoses, safety couplings) are correctly connected.

3) Checking the pressure settings

- Check the pressure regulator on the pump to ensure that the air pressure is within the permissible range (see section 3.4; typically approx. 2 bar as the starting value for rope lubrication).
- Check the air regulator on the spray gun to ensure that the air pressure is between 2–6 bar (**max. 6 bar**).

4) Checking the operating environment

- Ropes/parts to be lubricated must be **accessible**.
- The crane/machine must be in **the service position** according to the manufacturer's instructions:
 - secured against unwanted movement,
 - ropes are stationary or moving at a very low, controlled speed.
- The work area must be free of **trip hazards** and well lit.

5) Personal protective equipment (PPE)

- Before starting operation, check that all necessary PPE is being worn:
 - Safety goggles or face shield,
 - Oil-resistant protective gloves,
- Safety shoes,
- Suitable work clothing,
- respiratory protection if necessary (see section 2.5).

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6.3 COMMISSIONING

Commissioning takes place after the control measures from chapter 6.2 have been successfully carried out.

Step 1 – Open the compressed air supply to the pump

- Set the pressure on the pressure regulator to the specified inlet pressure (e.g., 2 bar).
- Slowly open the shut-off valve.
- The pump starts to run and builds up a delivery pressure in the grease hose depending on the air pressure until the system is filled on the pressure side.

Step 2 – Adjust the compressed air adjustment screw on the spray gun

- Slightly open the compressed air adjustment screw on the spray gun.

Step 3 – Venting and initial delivery

- Hold the spray gun in a suitable **collection container** (e.g., metal tray).
- Press the trigger of the spray gun until grease emerges **evenly and without bubbles** from the spray head.
- During this process:
 - listen for unusual noises or heavy leaks,
 - if necessary, stop the pump briefly and repair any leaks.

Step 4 – Basic adjustment of grease and air volume

- First set the grease flow and air volume to a **medium position**.
- Note: Factory setting "grease flow = maximum / air = maximum." For the application, it may be necessary to adjust the grease and air volume to the desired application.

Step 5 – Function test

- Perform a short test spray into the collection container.
- Check whether the spray pattern is even and whether the changes to the grease and air adjustment screws have the desired effect.
- If everything is working correctly, the system is ready for use on the machine / cable.

6.4 OPERATION – ROPE LUBRICATION

This chapter describes the typical sequence of rope lubrication in service operation.

1. Preparation of the crane/machine

- Move the crane into **the service position** according to the manufacturer's instructions.
- Stop the ropes or move them only at a very low, controlled speed.
- Cordon off the danger area and keep unauthorized persons away.

2. Lance selection

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- Select a suitable spray lance depending on the rope diameter, accessibility, and working position (e.g., short lances for easily accessible areas, long lances for high or distant areas).
 - Insert the lance into the coupling air head until it **audibly and visibly clicks into place**.
3. **Adjusting the spray distance and angle**
- Guide the lance at a suitable distance from the rope (typically a few centimeters, depending on the spray pattern).
 - Select the spray angle so that the **entire circumference** of the rope is covered (if necessary, rotate the rope slowly or spray several times from different angles).
4. **Start spraying**
- Press the trigger and start spraying in a controlled manner.
 - Guide the spray jet evenly along the rope.
 - Select the speed of the manual feed so that a **continuous, even film of grease** is created.
5. **Fine adjustment of grease and air quantity**
- If too little grease appears on the rope → **Open** the grease flow adjustment screw a little further (turn to the left).
 - If the rope becomes "dripping wet" or grease drips off → **close** the grease flow adjustment screw slightly (turn to the right).
 - If the spray mist is too fine and heavily atomized → **reduce** the air volume slightly.
 - If the spray appears too coarse and "sticky" → **increase** the air volume slightly.
6. **Working with long lances**
- Long lances increase flow resistance.
 - In this case, it may be advisable **to reduce the air volume initially** and then increase it gradually so that sufficient grease is delivered through the entire length of the lance.
7. **Process section by section**
- Divide the rope into manageable sections (e.g., 1–2 m, depending on the crane type).
 - Work on each section until the desired grease film is achieved.
 - If the rope is moved slowly during lubrication, make sure that all sections are reached evenly.
8. **Checking the lubrication result**
- After spraying, visually inspect the rope:
 - closed grease film,
 - no bare spots,
 - no excessive dripping or dripping.
 - Rework individual areas if necessary.

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6.5 SAFETY MEASURES AFTER OPERATION (PRESSURE RELIEF)

After completing work or during longer breaks, the system must **be depressurized** to enable safe shutdown and subsequent maintenance work.

Step 1 – Close the compressed air supply to the pump

- Close the shut-off valve on the pump's compressed air line.
- Alternatively: Disconnect the compressed air hose from the pump.
- The pump stops and no new pressure is built up.

Step 2 – Release residual pressure on the grease side

- Point the spray gun into a suitable collection container.
- Briefly press the trigger until no more grease comes out and the pressure in the grease hose has been reduced.
- Release the lever.

Step 3 – Vent the compressed air supply to the spray gun

- Activate the safety air coupling on the spray gun.
- For two-stage couplings: first move to the **venting position** until no air noise is audible,
- then disconnect completely.

Step 4 – Checking that there is no pressure

- Check that:
- there is no longer any connection to the compressed air (compressor/power supply disconnected),
- there is no longer any pressure in the grease hose (the spray gun no longer triggers a spray jet when activated).
- Only when the system is completely depressurized may:
- lances, spray heads, or grease and air hoses may be removed,
- cleaning and maintenance work be carried out,
- perform mechanical work on the pump or spray gun.

**Warning!**

Lances, spray heads, hoses, or screw connections must **never** be changed, loosened, or removed **under pressure**. Otherwise, there is a considerable risk of injury from escaping grease or uncontrolled movements of components.

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6.6 WHAT TO DO IN CASE OF MALFUNCTIONS

- If unusual noises, vibrations, severe leaks, or uncontrollable spray patterns occur, the machine must **be shut down immediately** (close the compressed air supply, depressurize the system).
- Only restart the machine after the malfunction has been rectified.
- In the event of safety-related damage (e.g., cracks in the body, damaged hoses), replace components and do not continue to use them.

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7 CARE AND MAINTENANCE

7.1 INTRODUCTION

This chapter describes the most important cleaning and maintenance work that may be carried out by the operator, as well as information on when work must be carried out exclusively by qualified personnel or the manufacturer.

Regular care and maintenance are essential for:

- **trouble-free operation,**
- **high availability** of the system,
- compliance with **safety requirements** in accordance with the Machinery Directive,
- **long service life** of the pump, hoses, spray gun, and lances.

7.2 GENERAL INFORMATION

All maintenance and cleaning work may **only** be carried out **when the system is depressurized** (see Chapter 6.5 "Safety measures after operation").

Before starting maintenance work:

- Disconnect the compressed air supply to the pump and spray gun,
- Completely remove grease by briefly activating the spray gun.
- Secure the machine against unintentional restarting (e.g., labeling, shutting off the air supply).

Personal protective equipment (PPE) must also be worn during maintenance:

- protective gloves,
- safety goggles or face shield,
- suitable work clothing.

When handling lubricating greases, the **safety data sheets** for the respective greases (manufacturer's instructions) must also be observed. These contain information on skin and eye contact, inhalation of aerosols, and disposal.

Only **original spare parts and components approved by the manufacturer** may be used.

The use of non-approved parts may:

- compromise safety,
- interfere with the function of the machine,
- lead to loss of warranty and CE conformity.

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7.3 CLEANING

7.3.1 EXTERNAL CLEANING

The pump, hoses, spray gun, and lances must be cleaned externally on a regular basis in order to:

- remove grease deposits and dirt,
- detect leaks at an early stage,
- ensure safe working conditions (no risk of slipping).

Recommended procedure:

1. Depressurize the system completely.
2. Wipe surfaces with cloths; use a mild cleaning agent if necessary.
3. Do not allow water or cleaning agent to enter the air connections or spray head.
4. After cleaning, ensure that all parts are dry before restarting the machine.

7.3.2 CLEANING THE SPRAY GUN AND SPRAY LANCES

Spray lances and spray heads should be cleaned regularly to ensure an **even spray pattern**.

Procedure:

- 1) Depressurize the system.
- 2) Detach the lance from the quick coupling.
- 3) Remove grease residues from the outer surface of the lance and especially from the nozzle outlet with a cloth.
- 4) Do not use hard or sharp tools (e.g., screwdrivers, wire brushes) to clean the nozzles in order to avoid damaging the nozzle geometry.
- 5) If heavily soiled, the lance can be soaked in a suitable cleaning agent (compatible with grease and materials) and then dried.

The spray head itself must **not** be **placed in solvents** or completely immersed. Cleaning should only be carried out from the outside with a cloth and, if necessary, a small amount of cleaner.

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7.4 STANDARD MAINTENANCE

A **regular maintenance schedule** is recommended to ensure reliable operation. The following table is a suggestion and can be adapted to the conditions of use (frequency of use, environment). **Before each use / daily:**

7.4.1 MAINTENANCE SCHEDULE (OVERVIEW)

Before each use / daily:

- Visual inspection of the system for obvious damage:
 - Cracks, deformations, severe corrosion,
 - grease or air leaks at screw connections and couplings,
 - Damaged or kinked hoses.
- Check the hoses for safe routing (no tripping hazards, no kinks).
- Check the grease level in the container; replace the container if necessary.
- Function test of the spray gun in the collection container (short test spray).

Weekly:

- Check the screw connections on the pump, hoses, and spray gun for tightness; tighten loose connections.
- Function test of the adjusting screws for grease and air volume regulation (smooth operation, no jamming).
- Clean the spray lance and spray head (see 7.3.2).
- Visually inspect the air hoses (no blistering, no constrictions).

Monthly:

- Detailed inspection of high-pressure grease hoses:
 - external damage,
 - exposed wire mesh,
 - Unusual stiffening or swelling.
→ Hoses with abnormalities must **be replaced immediately**.
- Visually inspect the pump for grease or air leaks in the area of the air motor and seals.

Annually (more often if used intensively):

- **Disassemble, clean, and inspect** the pump according to the pump maintenance instructions:
 - Pistons and seals,
 - check valves,
 - suction pipe, and grease follower plate.
- Replace wear parts (seals, valves) according to the manufacturer's specifications.
- Inspect the inside of the spray gun for wear on the needle, seals, and seating surfaces; use replacement parts if necessary.

Work on the internal components of the pump and spray gun should only be carried out by **qualified service personnel** or directly by the manufacturer/authorized service centers.

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7.6 LEAK TEST

Regular leak tests increase operational safety and help to detect small leaks at an early stage.

Recommended procedure:

1. Prepare the system for operation (connect compressed air, but do not spray yet).
2. Run the pump briefly until a stable grease pressure has built up in the system.
3. Check all screw connections and hose connections for **visible grease leaks**.
4. Particularly critical areas:
 - Pump/grease hose connection,
 - Grease hose/spray unit connection,
 - Screw connections on the spray head.

When searching for leaks, do **not** direct **an open jet of grease** onto the skin or towards people. Never "feel" for leaks with your hands, only perform a visual inspection (using a cloth if necessary).

If a leak occurs:

- Immediately depressurize the system,
- replace the seal or hose,
- Perform another check after the repair.

7.7 REPLACEMENT OF HOSES AND SEALS

Hoses

- High-pressure grease hoses and air hoses are subject to natural wear and tear.
- At the latest when the first signs of:
 - cracks,
 - blistering,
 - damage to the outer shell,
 - significantly increased stiffness, or
 - exposed reinforcement meshthe hoses must be replaced.
- Replacement may only be carried out when **the system is depressurized**.
- New hoses must:
 - be approved for the pressure range in question,
 - have the connections and lengths specified by the manufacturer,
 - be professionally installed and screwed in place with the correct torque.

Seals

- Seals in the pump and spray gun can wear out, harden, or be damaged by incorrect media over time.

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- Symptoms of defective seals:
 - Grease leakage at normally sealed points,
 - Decreased delivery rate despite correct air supply,
 - uneven pump operation.
- Seals on the pump and spray gun should always be replaced by **qualified personnel** or an authorized workshop, as special tools and knowledge are often required.

7.8 EXTRAORDINARY MAINTENANCE/REPAIRS

The following work is considered extraordinary maintenance and should not be carried out by normal operating personnel, but only by **qualified service technicians**:

- Disassembly of the pump's air motor,
- Extensive repairs to pump pistons, check valves, and internal mechanics
- Complete disassembly of the sprayer (spray head, valve unit, needle, seating surfaces),
- Modifications to the compressed air installation (fixed lines, additional valves, safety devices),
- all work that could constitute a **change to the original safety concept** (e.g., removal of safety couplings, modification of regulators).

In the event of serious malfunctions or recurring problems, the manufacturer or an authorized service center should be contacted.

Incorrect repairs carried out by the user can lead to dangerous situations (e.g., hose rupture, unintentional grease ejection, pressure build-up in an impermissible location).

7.9 MAINTENANCE DOCUMENTATION

It is recommended that all maintenance work carried out be documented:

- Date of maintenance
- Type of work performed (e.g., hose replacement, seal replacement, filter replacement),
- spare parts used,
- Name of the employee performing the work,
- special observations (e.g., abnormalities, recommended follow-up checks).

Complete maintenance documentation:

- supports **traceability**,
- facilitates **fault diagnosis** in the event of malfunctions,
- serves as proof of proper maintenance in accordance with operator obligations.

8 POSSIBLE PROBLEMS AND THEIR SOLUTIONS

8.1 INTRODUCTION

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Despite proper design and regular maintenance, malfunctions may occur in the system that:

- the pump's delivery rate,
- the spray pattern of the grease spray unit, or
- the general function of the system

This chapter describes typical malfunctions, their possible causes, and suggestions for rectification. The measures listed **do not** replace the safety-related information in chapters 2, 6, and 7.

8.2 GENERAL TROUBLESHOOTING INFORMATION

Before attempting to troubleshoot any malfunction, depressurize the system **as far as possible**.

- Shut off the compressed air supply to the pump.
- Remove grease from the spray gun (spray into a collection container until no more grease comes out).
- Vent and disconnect the compressed air supply to the spray gun.

When working on parts that carry grease (hoses, screw connections, spray head, pump), **PPE** must be worn:

- protective gloves,
- safety goggles,
- suitable work clothing.

Never "feel" for a **high-pressure leak** with your hands (risk of injection)! Only check for leaks visually (using a white cloth or cardboard strip if necessary).

Modifications to safety-related components (safety couplings, pressure regulators, valves, safety valves) may only be carried out by **qualified personnel**.

If a malfunction cannot be rectified using the measures described in this chapter or **occurs repeatedly**, contact the manufacturer or an authorized service center.

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8.3 TYPICAL MALFUNCTIONS IN THE AREA OF GREASE DELIVERY (PUMP)

8.3.1 OVERVIEW TABLE – GREASE DELIVERY

Malfunction / Symptom	Possible cause	Remedy
Pump does not start	No compressed air / air valve closed	Check air supply, open shut-off valve
	Air pressure too low	Increase air pressure at the regulator (within permissible values)
	Air filter / maintenance unit clogged	Check, clean, or replace filter
	Air motor blocked or defective	Switch off the system, contact qualified personnel / manufacturer
Pump is running but not delivering grease	Grease barrel empty or fill level very low	Change container, check fill level
	Air in suction pipe/system not vented	Vent the system until grease is pumped without bubbles
	Suction pipe clogged (e.g., contaminants in the grease)	Remove suction pipe, clean, install filter if necessary
	Grease follow-up plate not sitting correctly on grease surface	Replace the follow-up plate and avoid air bubbles
Pump delivers irregularly (pulsing, interruptions)	Air in the system / incomplete venting	Vent the system again
	Grease properties unsuitable (too viscous in cold conditions)	Use suitable grease or adjust temperature
	Wear on pump seals / check valves	Check seals / valves, replace if necessary (qualified personnel)
Unusually loud pump / strong vibrations	Air pressure too high	Reduce air pressure (according to specifications)
	Mechanical defect (bearing damage, piston damage)	Take pump out of service immediately, call specialist service

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Malfunction / Symptom	Possible cause	Remedy
Grease escaping from pump housing or suction pipe	Seal defective or worn	Replace seal (repair kit, qualified personnel)
	Crack or damage to the housing/suction pipe	Replace affected parts, do not continue to operate the pump

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8.4 TYPICAL PROBLEMS WITH SPRAY PATTERNS/SPRAY GUNS

8.4.1 OVERVIEW TABLE – SPRAY GUN AND SPRAY PATTERN

Malfunction / Symptom	Possible cause	Remedy
No grease comes out of the spray head	Grease pressure too low / pump not delivering	See section 8.3 (Checking grease delivery)
	Grease quantity control completely closed	Gradually open the grease flow adjustment screw
	Spray head or lance completely clogged	Depressurize the system, clean the spray head/lance
Only air, hardly any grease (spray mist very thin)	Grease quantity control closed too far	Open the grease flow adjustment screw further
	Air volume too high	Reduce the air flow slightly
Spray pattern uneven (streaks, "holes" in the spray pattern)	Nozzle/lance partially dirty	Clean nozzle/lance, do not use hard tools
	Grease contains solid particles/contaminants	Check grease quality, change container if necessary
	Air pressure fluctuates	Check air supply (compressor / regulator)
Too much grease applied (heavy dripping, "dripping" rope)	Grease quantity control too wide open	Close the grease flow adjustment screw slightly
	Air volume too low	Slightly increase air volume (finer atomization)
Too little grease application	Grease quantity control too far closed	Increase grease quantity
	Pump does not deliver sufficiently	See section 8.3
Spray mist too strong/too fine	Air pressure or air volume too high	Reduce air pressure / air volume regulation

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Malfunction / Symptom	Possible cause	Remedy
	Spray distance to the rope too great	Reduce spray distance
Spray jet "spits" (uneven discharge)	Air bubbles in the grease (not completely vented)	Vent the system again
	Nozzle partially clogged	Clean nozzle
Spray gun drips after releasing the lever	Valve seat dirty or worn	Depressurize the system, clean the gun / check the valve
	Seals in valve worn	Replace seals (qualified personnel)

Mobile grease spray unit



8.5 TYPICAL FAULTS IN THE COMPRESSED AIR SUPPLY SYSTEM

8.5.1 OVERVIEW TABLE – COMPRESSED AIR

Malfunction / symptom	Possible cause	Remedy
Pump and spray gun do not respond	No compressed air supply (compressor off, valve closed)	Switch on compressor, open valves
Air pressure too low (pump slow/no atomization)	Incorrect setting on the pressure regulator	Increase pressure on regulator (within permissible values)
	Pipe losses too high (hoses too small, long distances)	Use larger hose cross-sections / shorter distances
	Filter/maintenance unit dirty	Clean the filter or replace the filter insert
Pressure surges or severe pressure fluctuations	Compressor overloaded / insufficient power	Use a suitable compressor
	Defective or unsuitable pressure regulator	Check regulator, replace if necessary
Unusually high air consumption	Air leak in hoses or connections	Check system for leaks, repair leaks
	Defective seal in pump or spray gun	Check/replace seal
Water in the compressed air (condensate visible)	No condensate separator or defective condensate separator	Retrofit or repair maintenance unit
	Condensate is not drained regularly	Introduce drainage intervals, remove condensate

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8.6 RECURRING FAULTS AND REFERRAL TO SPECIALIST SERVICE

If, despite following the measures listed in the tables, a malfunction:

- cannot be **rectified** or
- **recur** after a short time,

the following steps are recommended:

1. Shut down the system and secure it against unintentional start-up.
2. Note the following information:
 - Description of the fault (symptoms, since when, frequency),
 - operating conditions (type of grease, temperature, air pressure, gun settings),
 - any abnormalities observed (noises, leaks, vibrations).
3. Read the serial number and type of the pump and spray unit from the type plate.
4. Contact the manufacturer or an authorized service center and provide the information you have collected.

Work that cannot be carried out by the operator and requires **specialist service**:

- Disassembly of the air motor and pump mechanism,
- Internal replacement of valves and seals in the pump,
- Comprehensive repairs to the spray gun (valve seat, needle, nozzle carrier),
- Modifications to the compressed air installation (fixed piping, additional safety valves, electrical/pneumatic controls).

8.7 SAFETY INSTRUCTIONS AFTER TROUBLESHOOTING

After each repair or troubleshooting, the following points must be observed:

- Keep the system depressurized until all work has been completed.
- Reassemble all open connections (grease and air side) correctly and with the correct torque.
- Visually inspect all affected areas for leaks and correct fit.
- Perform **a test run** of the system under controlled conditions (e.g., spraying into a collection container).
- Only when proper functioning has been confirmed may the system be returned to regular operation (rope lubrication on the crane).

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9 PROPERTIES OF LUBRICATING GREASES

9.1 GENERAL

The performance and reliability of the system depend to a large extent on the **lubricating greases used**. Incorrect or unsuitable greases lead to:

- insufficient lubrication of the ropes,
- increased wear and corrosion,
- clogging of lines, spray lances, and spray heads,
- excessive spray mist or droplet formation,
- increased stress and malfunctions on the pump.

This chapter describes the basic properties that lubricating greases must fulfill for use in this system, as well as information on selection, storage, and disposal.

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9.2 REQUIREMENTS FOR LUBRICATING GREASES FOR THIS SYSTEM

Only **non-flammable lubricating greases** that meet the following requirements may be used to operate the rope lubrication unit:

- are approved for the corresponding **rope lubrication on cranes** (observe manufacturer approvals),
- can be used in **the specified viscosity and temperature range** of the pump and spray gun,
- are compatible with the materials used in the system (steel, aluminum, stainless steel, NBR seals, hoses).

The following are not permitted:

- Greases with highly abrasive solid particles (metal particles, coarse solid lubricants),
- Greases with components that attack seals, hoses, or metals (e.g., unsuitable additives, solvent components),
- Greases with a pronounced tendency to resinify or coke at the temperatures expected in the system.

9.3 NLGI CLASS AND VISCOSITY

Lubricating greases are classified according to **NLGI classes** (e.g., NLGI 0, 1, 2). This classification describes the **consistency** of the grease, or, to put it simply, "how soft or hard" the grease is.

- **NLGI 0–1:** relatively soft, good pumpability even at lower temperatures.
- **NLGI 2:** medium consistency, widely used standard grease in crane and machine construction.

Greases in the **NLGI 0–2** range are generally suitable for this system (see pump and grease approvals):

- Greases that are **too soft** (below NLGI 0) can flow too freely at higher temperatures and drip more.
- Greases that are **too hard** (above NLGI 2) can be difficult to pump at low temperatures and can cause delivery problems in pumps and spray lances.

In addition to the NLGI class, the **base oil viscosity** is also relevant:

- Higher base oil viscosity → better lubricating film under high loads, but poorer pumpability in cold conditions.
- Lower viscosity → better pumpability in cold conditions, but possibly a thinner lubricating film.

The exact permissible viscosity can be found in the **data sheets for the pump and the grease**.

9.4 TEMPERATURE BEHAVIOR

The temperature behavior of a grease is crucial for:

- **pumpability** (start-up and delivery behavior of the pump),
- **adhesion** to the rope,

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- **aging** (oxidation, hardening), and
- the **separation behavior** of oil and thickener.

Please note the following for this system:

- The system is designed for a specific **ambient temperature range** (see section 3.4, typically e.g. -10 °C to $+60\text{ °C}$).
- At low temperatures, **viscosity increases** → grease becomes more viscous, the pump has to work harder, and the delivery rate decreases.
- At high temperatures, **viscosity decreases**, greases can become thinner and flow or drip more easily.

The greases used must:

- be suitable for **the intended operating temperature range** of the crane or application,
- have sufficient **cold flow** properties,
- not run out of the rope excessively at higher temperatures (e.g., during summer operation).

In extreme temperature conditions (e.g., very cold regions), specially approved rope lubricants may need to be used.

9.5 MATERIAL COMPATIBILITY

The lubricating greases must be **compatible** with the materials used in the system, in particular:

- Metals: steel, stainless steel, aluminum, brass
- Seals: NBR (nitrile rubber) or comparable elastomers
- Hoses: oil- and grease-resistant rubber compounds, polyurethane, or comparable materials

Greases that are not suitable are those that:

- contain solvents,
- contain highly corrosive or aggressive additives,
- are known to be **incompatible** with NBR or aluminum.

For new or unknown lubricating greases, the following should be checked:

- check the **safety data sheet (SDS)** and the **technical data sheet** provided by the grease manufacturer,
- in case of doubt, obtain **approval from the system manufacturer** or the responsible technical department.

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9.6 NOTES ON SELECTING LUBRICATING GREASES FOR ROPE LUBRICATION

Greases are generally required for rope lubrication on cranes that:

- can withstand high **surface pressures** at the strand contact points,
- offer good **corrosion protection** (e.g., against moisture, sea air, precipitation),
- exhibit sufficient **adhesion** to the rope (even under changing loads, vibration, and weather conditions),
- are compatible with any old grease already present on the rope or can be combined with suitable cleaning/replacement strategies.

Typical requirements:

- NLGI class (e.g., 1 or 2) in accordance with the crane manufacturer's approval,
- high level of **additives** for wear protection and corrosion protection,
- good **adhesion** to steel ropes to minimize slinging.

Recommendations:

- Only use greases that have been **expressly approved by the crane manufacturer** or that have comparable properties and have been approved.
- When switching to a different grease system (e.g., different manufacturer, different thickener type), it may be necessary to remove old grease as far as possible to avoid **incompatibilities** (e.g., hardening or separation).

9.7 HANDLING, STORAGE, AND SHELF LIFE OF LUBRICATING GREASES**Handling:**

- Always wear protective gloves when handling greases.
- Avoid skin contact if possible; if contact occurs, wash skin with soap and water.
- Inhalation of aerosols (spray mist) should be minimized; use suitable respiratory protection if ventilation is inadequate.

Storage:

- Store drums and containers with grease **upright** and tightly closed.
- Protect from weather, direct sunlight, and extreme temperature fluctuations.
- Store in a cool, dry place within the temperature range specified by the grease manufacturer.
- Avoid contamination of the container opening (only open the lid in a clean environment).

Shelf life:

- Lubricating greases are subject to **aging** (oxidation, change in consistency).
- Observe the **best-before date** specified by the manufacturer.
- Check older greases regularly (smell, discoloration, oil separation).
- If noticeable changes occur, do not use the grease and dispose of it properly.

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9.8 ENVIRONMENTAL AND DISPOSAL INFORMATION

Lubricating greases are **environmentally relevant substances** and must not be:

- be disposed of in the ground,
- surface water, or
- the sewage system.

Disposal instructions:

- Grease residues, contaminated cloths, and cleaning agents must be disposed of as special or hazardous waste in accordance with **local legal regulations**.
- Barrels with residual quantities must be returned to the supplier's **certified disposal company** or return system.
- Uncontrolled discharge of grease into the environment is strictly prohibited.

It is recommended that

- Keep the **safety data sheets (SDS)** applicable to the grease used available at the place of use.
- to instruct operating and maintenance personnel accordingly with regard to environmental protection and disposal.

10 ACCESSORIES

10.1 ACCESSORIES FOR THE GREASE SPRAY SYSTEM

- **Lance set 04414163** with four stainless steel lances 170–1000 mm
- Replacement coupling air head 04412195
- Replacement round/wide jet air head 04412196

10.2 ACCESSORIES FOR THE PUMP

- Dust cover with pump attachment
- Grease follow-up plate for various container sizes
- Transport trolley for drums

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11 STORAGE, DISMANTLING, AND RECYCLING

11.1 STORAGE DURING PROLONGED SHUTDOWN

If the rope lubrication unit is not used for a longer period of time (e.g., seasonal shutdown, longer construction site break), the following measures are recommended:

1. Depressurize the system

- Close the compressed air supply to the pump and spray gun.
- Release grease pressure via the spray gun (spray briefly into a collection container).
- Vent the air lines and disconnect them if necessary.

2. Cleaning

- Clean the outer surfaces of the pump, hoses, spray gun, and lances.
- Remove grease residue from nozzles and spray head.
- Clean grease residue from the work area (to avoid slipping).

3. Protection from environmental influences

- Store the system in a dry, clean, and frost-free room.
- Store drums upright, tightly closed and secured against tipping over.
- Store hoses loosely coiled and fitted with protective caps on the spray head side.

4. Protection against unauthorized use

- Mark or cover compressed air connections.
- If necessary, use mechanical locks (e.g., lock shut-off valve, mark area).

11.2 DISMANTLING THE SYSTEM

If the system is to be completely dismantled, e.g., for maintenance in the workshop or at the end of its service life, the following steps must be observed:

1. Complete pressure relief

- Disconnect the compressed air supply and completely remove all grease (see section 6.5).
- Ensure that there is no residual pressure in the grease or air lines.

2. Disconnecting the media connections

- Disconnect the air hoses via the safety couplings.
- Loosen the high-pressure grease hoses at the screw connections.
- Drain residual grease into a suitable collection tray.

3. Disassembly of pump and barrel

- Remove the pump from the drum (carefully pull out the suction pipe).
- Remove grease residue from the barrel as far as possible.

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- Check whether there are any residual amounts of grease in the barrel (dispose of appropriately).

4. Disassembly of spray gun and lances

- Remove the lances and store them separately.
- Clean the spray gun, spray head, and couplings and prepare them for storage or disposal.

Safety aspect:

Only carry out dismantling work with suitable PPE.

Leaking grease can cause slippery surfaces – keep the work area clean.

11.3 RECYCLING/DISPOSAL OF THE SYSTEM

At the end of the machine's service life, the components must be disposed of **properly**. **National laws and regulations** as well as **internal company environmental guidelines** must be observed.

11.3.1 LUBRICATING GREASES AND GREASY RESIDUES

- Lubricating greases and grease-contaminated materials (cloths, filters, disposable hoses) are generally considered **hazardous waste**.
- They must be collected in suitable, sealed containers and handed over to an **authorized waste disposal company**.
- Under no circumstances may lubricating greases:
 - be disposed of in the ground,
 - surface water, or
 - the sewage system.

11.3.2 Metallic components

- Pumps, spray guns, lances, metal parts of hoses, and barrel screw connections are mainly made of metals (steel, aluminum, brass, etc.).
- After removing grease residues, these parts can be recycled as **scrap metal**.
- Metal components must be collected separately from other waste.

11.3.3 Non-metallic components

- Hoses, seals, plastic parts, handles, etc. are made of various plastics and elastomers.
- Depending on the type of material and degree of contamination, these parts can be:
 - thermally recycled or
 - disposed of as residual waste, provided this is legally permissible.

It is advisable to coordinate disposal with a **certified waste disposal company** in order to achieve the best possible recycling rate.

11.4 RESPONSIBILITY OF THE OPERATOR

The operator is responsible for ensuring that:

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- all work related to the storage, dismantling, and disposal of the system is carried out safely and in compliance with the law,
- operating and maintenance personnel are instructed in **environmental and disposal requirements**,
- relevant documents (safety data sheets, disposal certificates) are kept.