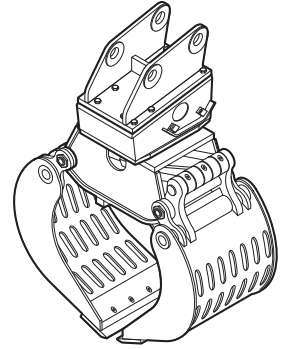


Safety and operating instructions

Multi grapple



Contents

Introduction	7
About these Safety and Operating Instructions	7
Safety instructions	8
Signal words	8
Qualification	9
Intended use	9
Use other than intended	9
Protective equipment	10
Carrier, precautions	10
Transport, precautions	10
Hydraulic installation, precautions	11
Media/consumables, precautions	11
Explosion and fire, precautions	12
Electrical shock, precautions	12
Falling stones, precautions	12
Emissions, precautions	13
Handling machines, precautions	13
Changes to the hydraulic attachment, precautions	13
Environmental pollution, precautions	13
Overview	14
Equipment description	14
Function	14
Name plate	15
Applications	15
Guarantee	15
Removing the packaging	16
Scope of delivery	16
Transport	17
Transport using a crane	17
Transport using a forklift truck	18
Transport using a truck	18
Installation	19
Media/consumables	19
Mineral hydraulic oil	19
Non-mineral hydraulic oil	19
Grease	19
Manufacturing the adapter plate	20
Installing the adapter plate	20
Attaching the hydraulic attachment to the carrier	21
Mechanical mounting aspects	21
Making the hydraulic connections	21
Removing the hydraulic attachment from the carrier	23
Dismantling the hydraulic connections	23
Mechanical disassembly	23
Removing the adapter plate	23
Operation	24
Preparations before starting	24
Switching the multi grapple on and off	25
Functional test	25
Correct operation	26
Demolishing masonry	26
Sorting and loading	26

Continuous water spraying	26
High ambient temperature	27
Low ambient temperature	27
Prohibited operation	27
Suspended load	27
Unsafe base	27
Non-load bearing suspended ceilings	28
Working position	28
Use over the chain	28
Moving the carrier	28
Moving the boom	28
Turning the hydraulic attachment	29
Extending the bucket cylinder	29
Pulling	29
Lifting/Transporting with lifting gear	29
Hammering	30
Moving objects	30
Abrupt movements	30
Cylinder end positions	31
Use under water	31
Maintenance	32
Maintenance schedule	33
Depressurising the hydraulic system	34
Lubrication	34
Lubricating MG 100	34
Lubricating MG 200 - MG 2700	35
Checking the hydraulic attachment and adapter plate for cracks	36
Checking hydraulic attachment for wear	36
Checking hydraulic lines	36
Checking bolted connections	36
Checking the adapter plate bolts for wear	36
Checking and cleaning the hydraulic oil filter of the carrier	36
Checking the hinge pin locking facilities	37
Retightening the screws on the rotation mechanism housing and live ring	37
Bolt connections / Tightening torques MG 100 to MG 1500, MG 5000	38
Bolt connections / Tightening torques MG 1800, MG 2300, MG 2700, MG 3000	40
Troubleshooting	41
The multi grapple does not work	41
The closing power of the multi grapple is insufficient	41
The multi grapple cannot be rotated	41
Operating temperature too high	41
Oil leaks from hydraulic ports	41
Insufficient lubrication	42
Repair	43
Sending in the hydraulic attachment for repairs	43
Storage	44
Multi grapple	44
Grease cartridges	44
Disposal	45
Multi grapple	45
Hydraulic hoses	45
Hydraulic oil	45
Cutter grease and grease cartridges	45
Technical specifications	46

MG 100, MG 200, MG 300, MG 400	46
MG 500, MG 800, MG 1000, MG 1500	47
MG 1800, MG 2300, MG 2700	48
MG 3000, MG 5000	49
EC Declaration of Conformity (EC Directive 2006/42/EC)	50

Introduction

Epiroc is a leading productivity partner for the mining, infrastructure and natural resources industries. With cutting-edge technology, Epiroc develops and produces innovative drill rigs, rock excavation and construction equipment, and provides world-class service and consumables. The company was founded in Stockholm, Sweden, and has passionate people supporting and collaborating with customers in more than 150 countries.

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About these Safety and Operating Instructions



The aim of these Instructions is to familiarise you with the safe and effective operation of the hydraulic attachment. You will also find instructions for regular maintenance activities for the hydraulic attachment in this document.

Please read these Instructions carefully prior to the first attachment and use of the hydraulic attachment.

The different designation of the texts means as follows:

- ▶ Action step in a safety instruction
- ◆ Action step
- 1. Established operation process
- 2. Explanation of the elements of a drawing
- A
- B
- C
- Listing
-
-

Symbols used in illustrations have the following meanings:

-  permitted operation
-  prohibited operation

Safety instructions



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Read these Safety and operating instructions and specifically all safety instructions before using the hydraulic attachment. This will:

- prevent the risk of injuries and fatal accidents for yourself and others,
- protect the hydraulic attachment and other property against material damage,
- protect the environment against environmental damage.

Follow all instructions in these Safety and operating instructions.

Store these Safety and operating instructions in the document compartment of the carrier cab.

Anyone

- transporting,
- installing or removing,
- operating,
- maintaining,
- repairing,
- storing or
- disposing of

the hydraulic attachment must have read and understood these Safety and operating instructions.

These Safety and operating instructions belong to the hydraulic attachment. Keep it for the life of the product. Ensure, if applicable, that any received amendment is incorporated in the instructions. Hand over the Safety and operating instructions if ever you lend, rent out or sell the hydraulic attachment.

All safety regulations listed in this manual comply with the laws and regulations of the European Union. Also observe the additional national/regional regulations.

Hydraulic attachment operation outside the European Union is subject to the laws and regulations valid in the country of use. Please observe any other, more stringent regional regulations and legislation.

Read the carrier manufacturer's Safety and operating Instructions before attaching the hydraulic attachment to the carrier and operating it. Observe all instructions.

Signal words

The signal words Danger, Warning, Caution, and Notice are used as follows in these Safety and operating instructions:

DANGER

indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

The signal word NOTICE is used to address practices related to possible property damage but not related to personal injury.

Qualification

Transporting the hydraulic attachment is only permitted if carried out by people who:

- are authorised to operate a crane or a forklift truck according to the applicable national provisions,
- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood the safety and transport chapter of these Safety and operating instructions.

Installing, maintaining, storing and disposing of the hydraulic attachment are only permitted if carried out by people who:

- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood these Safety and operating instructions.

Operating the hydraulic attachment is only permitted if carried out by qualified carrier drivers. Carrier drivers are qualified if they:

- have been trained to operate a carrier according to the national regulations,
- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood these Safety and operating instructions.

Testing the hydraulic installation is only permitted if carried out by professionals. Professionals are people who are authorised to approve a hydraulic installation for operation according to the national regulations.

Repairing the hydraulic attachment is only permitted if carried out by professionals trained by Construction Tools GmbH. These professionals must have read and understood these Safety and operating instructions. They must follow all safety instructions and guidelines for repair. Otherwise the operational safety of the hydraulic attachment is not guaranteed.

Intended use

Only attach the multi grapple to a hydraulic carrier of a suitable load-bearing capacity. Read the carrier manufacturer's Safety and operating instructions before attaching the multi grapple to the carrier and operating it. Observe all instructions.

Only use the multi grapple for following operations:

- Demolition of timber structures
- Demolition of masonry
- Sorting
- Loading work

Intended use also implies observing all instructions in these Safety and operating instructions.

Use other than intended

Never use the multi grapple:

- to pull/tear at girders, braces and walls.
This damages the multi grapple and adapter plate. The carrier may lose stability.
- to hit or chop
This destroys the multi grapple.
- to push debris aside
This destroys the multi grapple.
- to move the carrier supported by the multi grapple
This damages the multi grapple.
- to lift or transport loads with attachments
This damages the multi grapple.
- under water
This destroys the multi grapple.
- in explosion-hazard environments
Explosions cause serious injury or death.

Protective equipment

Personal protective equipment must comply with the applicable health and safety regulations.

Always wear the following personal protective equipment:

- protective helmet
- safety glasses with side protectors
- protective gloves
- protective shoes
- warning vest

Carrier, precautions

⚠ WARNING Falling carrier

If the load-bearing capacity of the carrier used is insufficient, the carrier will not be stable. It can topple over and cause injuries and damage.

Using a carrier whose load-bearing capacity is too high will greatly burden the hydraulic attachment causing it to wear faster.

- ▶ Only attach the hydraulic attachment to a hydraulic carrier of a suitable load-bearing capacity.
- ▶ The carrier must remain stable at all times.
- ▶ Read the carrier manufacturer's Safety and operating Instructions before attaching the hydraulic attachment to the carrier and operating it. Observe all instructions.

Transport, precautions

⚠ WARNING Risk of death due to suspended loads

When lifting loads these can swing out and fall. This can result in serious injuries or even death.

- ▶ Never stand underneath or in the swinging range of suspended loads.
- ▶ Only move loads under supervision.
- ▶ Only use approved lifting equipment and lifting gear with sufficient load bearing capacity.
- ▶ Do not use worn lifting gear (ropes, belts, chains, shackles etc.).
- ▶ Do not place lifting gear such as ropes and belts on sharp edges or corners, do not knot these or twist them.
- ▶ When leaving the workplace, set down the load.

⚠ WARNING Injury due to swivelling load

When transporting the load by crane it can swivel and cause severe injuries and considerable damage to property.

- ▶ Ensure that no personnel, objects or obstacles are located in the swivel range of the load.

Hydraulic installation, precautions

⚠ **WARNING Hydraulic pressure too high**

If the hydraulic pressure is too high, the parts of the hydraulic attachment will be exposed to excessively high loads. Parts can break loose or burst causing serious injuries.

- ▶ Lay the drain line of the pressure relief valve directly in the tank to ensure the safe functioning of the pressure relief valve!
- ▶ The pressure relief valve must be set at the maximum static pressure.
- ▶ The pressure relief valve setting must be checked to ensure that the maximum static pressure (see chapter *Technical specifications*) of the hydraulic installation is not exceeded at any time. Attach a lead seal to the pressure relief valve.
- ▶ Prior to their first use, the safety facilities on the hydraulic installation must be checked by a professional/authorised monitoring body for their quality (CE mark etc.), suitability and proper functioning.
- ▶ If any significant changes are made to the hydraulic installation, a new acceptance inspection is to be carried out in accordance with the relevant national safety provisions.

⚠ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. Hydraulic lines may spring a leak or burst. Hydraulic oil squirting out can lead to serious injury.

- ▶ When attaching the hydraulic attachment do not lay any hydraulic lines through the carrier's cab.
- ▶ Only use hydraulic lines which comply with the following quality requirements:
 - For the function open and close
Hydraulic hoses with 4 reinforcement steel wires according to DIN EN 856 4SH,
Hydraulic pipes, seamless cold-drawn steel pipes according to DIN EN 10305
 - For the function turn
Hydraulic hoses with 2 steel plaitings according to DIN EN 853 2SN,
Hydraulic pipes, seamless cold-drawn steel pipes according to DIN EN 10305.

Media/consumables, precautions

⚠ **WARNING Hot hydraulic oil under high pressure**

Hydraulic oil will squirt out under high pressure if there is a leakage. The jet of oil might penetrate people's skin and cause permanent damage. Hot hydraulic oil can cause burns.

- ▶ Never use your hands to find leaks.
- ▶ Always keep your face away from a possible leak.
- ▶ If hydraulic oil has penetrated your skin consult a doctor immediately.

⚠ **WARNING Hydraulic oil spills**

Spilt hydraulic oil can make a floor slippery. If people slip they can be injured. Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Make sure not to spill any hydraulic oil.
- ▶ Immediately clean the floor if you have spilt hydraulic oil.
- ▶ Observe all safety and environmental protection provisions when handling hydraulic oil.

⚠ **WARNING Skin infections/diseases due to oil and grease**

Hydraulic oil and grease can cause rashes (or even eczema) if they come into contact with the skin.

- ▶ Avoid all skin contact with hydraulic oil and grease.
- ▶ Use a suitable skin protection product.
- ▶ Always wear safety gloves when working with hydraulic oil or grease.
- ▶ Immediately clean any skin that has been contaminated by oil or grease with water and soap.

Explosion and fire, precautions

⚠ **DANGER Explosion and fire**

Explosions cause serious injury or death. Explosives being cut by the hydraulic attachment may lead to an explosion.

- ▶ Never operate the hydraulic attachment in the direct vicinity of explosives.
- ▶ Make sure that no explosives are hidden in the concrete.
- ▶ Check gas line position plans of the complete construction area.

⚠ **DANGER Explosion and fire**

Operating the hydraulic attachment may create sparks which ignite highly flammable gases. This may lead to fire or an explosion.

- ▶ Never work in an environment with highly flammable substances.
- ▶ Make sure that there are no hidden sources of gas in the work area.
- ▶ Check gas line position plans of the complete construction area.

⚠ **DANGER Explosion and fire**

Dust-rich air can form an explosive atmosphere which may ignite when operating the hydraulic attachment. This may lead to fire or an explosion.

- ▶ Never operate the hydraulic attachment in an explosion-hazard atmosphere.
- ▶ Always provide sufficient ventilation when working in buildings or in a confined area.

Electrical shock, precautions

⚠ **DANGER Electrical shock**

Any contact of the hydraulic attachment with electric circuits or other sources of electricity will lead to an electric shock, resulting in serious injury or death. The hydraulic attachment is not electrically insulated.

- ▶ Never work in the vicinity of electric circuits or other sources of electricity.
- ▶ Make sure that there are no hidden circuits in the work area.
- ▶ Check wiring diagrams.

Falling stones, precautions

⚠ **WARNING Fragments flying around**

Fragments of material which come loose while operating the hydraulic attachment may be flung away and can cause serious injury if people are hit by them. Small objects falling from a great height can also cause serious damage.

During hydraulic attachment operation the danger zone is considerably greater than during the excavation operation due to fragments of stone and pieces of steel flying around, and for this reason the danger zone must, depending on the type of material to be worked on, be enlarged correspondingly, or secured in a suitable manner through corresponding measures.

- ▶ Secure the danger zone.
- ▶ Stop the hydraulic attachment immediately if anyone enters the danger zone.
- ▶ Close the windscreen and the side windows of the driver's cab.

Emissions, precautions

⚠ WARNING Lung disease

Dust may be generated when operating the hydraulic attachment. If dust from rocks or silica dust, produced when operating the hydraulic attachment on rocks, concrete, asphalt or other such materials, is inhaled this may lead to silicosis (dust lungs, a severe lung disease). Silicosis is a chronic disease which may lead cancer and death.

- ▶ Wear a suitable breathing mask.

Handling machines, precautions

⚠ WARNING Narcotics, alcohol and drugs

Narcotics, alcohol and medicinal drugs make their users less alert and affect their ability to concentrate. Negligence and incorrectly assessing a situation can result in serious injury or death.

- ▶ Never work on or with the hydraulic attachment when under the influence of narcotics, alcohol or drugs which affect your alertness.
- ▶ Never allow other people who are under the influence of narcotics, alcohol or drugs which affect their alertness to work on or with the hydraulic attachment.

Changes to the hydraulic attachment, precautions

⚠ WARNING Changes to the hydraulic attachment

Changes to the hydraulic attachment or the adapter plate may lead to serious injury.

- ▶ Never carry out any changes to the hydraulic attachment or the adapter plate.
- ▶ Only use original parts or accessories approved by Epiroc.
- ▶ Modifications that entail new hazards may require a new procedure for assessing conformity.

Environmental pollution, precautions

NOTICE Environmental pollution due to hydraulic oil

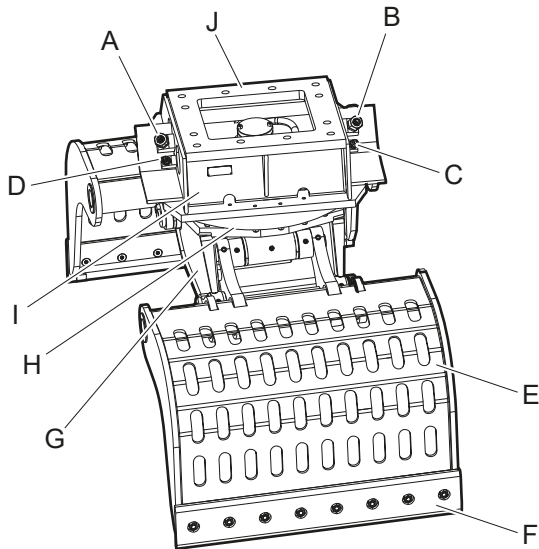
Hydraulic oil is permanently environmentally harmful. Escaped hydraulic oil will lead to groundwater and soil contamination. Organisms may die.

- ▶ Collect any hydraulic oil which escapes to avoid environmental pollution. For minor volumes use an absorbing medium (in case of an emergency use soil). In case of major leakages contain the hydraulic oil. It must not drain off and penetrate the ground or enter the water table or water supplies.
- ▶ Collect contaminated absorbing medium or soil in a watertight box/container and close it tight.
- ▶ Contact an authorized waste management company.
- ▶ Dispose of all contaminated material in accordance with the applicable environmental regulations.

Overview

Equipment description

The illustration gives an overview of the main parts and components of the hydraulic attachment. Actual details may differ.



- A. Port »A« function »Open«
- B. Port »B« function »Close«
- C. Port »C« function »Turn (conterclockwise)«
- D. Port »D« function »Turn (clockwise)«
- E. Grapple leaf
- F. Wear blade
- G. Housing
- H. Live ring
- I. Rotation mechanism housing
- J. Connecting plate for adapter plate

Function

The operation of a multi grapple is described in a simplified version below:

Closing the multi grapple

The carrier driver operates the multi grapple, via a switch on the floor or via a joystick in the carrier, for the function »Close«. Line »B« is connected to the hydraulic cylinder. The hydraulic cylinder extend the piston rod. The grapple leaves grip the material.

Opening the multi grapple

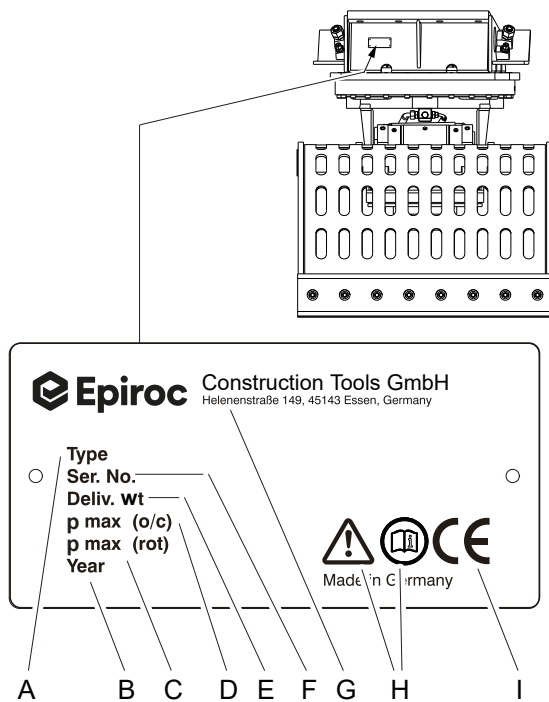
The carrier driver operates the multi grapple, via a switch on the floor or via a joystick in the carrier, for the function »Open«. Oil is fed to the hydraulic cylinder via line »A«. The piston rod retracts. The grapple leaves opens.

Hydraulically turning the multi grapple

The carrier driver activates the carrier function »Turn gripper«. Oil is fed to the hydraulic motor. The hydraulic motor, located in the rotation mechanism housing of the multi grapple, causes the rotation.

To achieve endless turning of the housing, there is a rotary transmission. The oil flows for the functions »Open« and »Close« are transmitted through the rotary transmission.

Name plate



- A. Model
- B. Year of construction of hydraulic attachment
- C. Max. permissible operating pressure »Turn«
- D. Max. permissible operating pressure »Open / Close«
- E. Weight of hydraulic attachment
- F. Serial number
- G. Name and address of manufacturer
- H. The warning symbol and the book symbol indicate that the Safety and Operating Instructions must be read prior to use of the hydraulic tool and in particular the chapter on Safety.
- I. The CE symbol indicates that the hydraulic attachment was produced in conformity with the CE. You can find further information about this in the enclosed EC Declaration of Conformity.

Applications

Field	Type of application
General	sorting
	loading work
Demolition work	masonry
	timber structures

Guarantee

The guarantee or product liability will be invalidated by the following:

- Use other than intended
- Maintenance work not being carried out or being carried out incorrectly
- The use of incorrect consumables
- The use of non-approved parts
- Damage due to wear
- Damage due to improper storage
- Changes not carried out by or in consultation with the manufacturer

Removing the packaging

- ◆ Remove all the packaging material.
- ◆ Dispose of it in accordance with the applicable provisions.
- ◆ Check that the delivery is complete.
- ◆ Check the delivery for visual damage.
- ◆ If any defects are found, consult the Epiroc Customer Center / dealer in your area.

Scope of delivery

The multi grapple is delivered complete with:

- Multi grapple
- Safety and operating instructions
- Spare parts list
- EC Declaration of Conformity

Accessories as ordered:

- Hoses

Special accessories as ordered:

- e.g. adapter plate with Allen screws and pairs of lock washers
- e.g. base plate to construct an adapter plate with Allen screws and pairs of lock washers
- e.g. hydraulic fittings for the carrier

Transport

⚠ **WARNING Fork lift tipping over / hydraulic attachment falling**

The hydraulic attachment is heavy. The fork lift and/or hydraulic attachment tipping over or falling may cause serious injury and material damage.

- ▶ Only transport the hydraulic attachment with lifting equipment with the right load-bearing capacity for the weight of the hydraulic attachment.
- ▶ Make sure that there is nobody near or under the suspended hydraulic attachment.
- ◆ Transport the multi grapple with the grapple leaves open.
There is less oil in the multi grapple if transported with open grapple leaves. In the event of a leak, less oil is lost and the environmental damage is less.
- ◆ Open the multi grapple before transporting it. Proceed as follows to ensure the grapple leaves stay open:
 - ◆ Seal all hose ports and connections on the multi grapple with the enclosed plug fittings and cap nuts if the hydraulic hoses are removed.
 - ◆ If the hydraulic hoses have been attached to the multi grapple, plug the hoses.

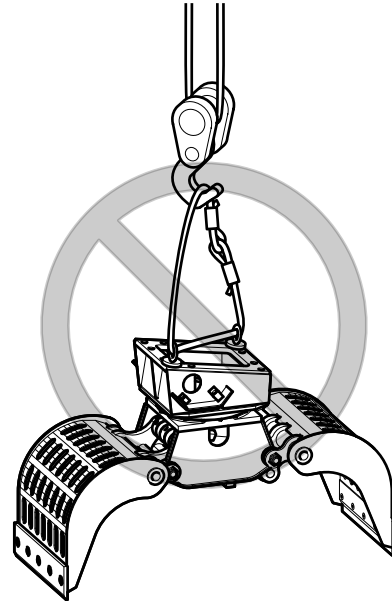
Transport using a crane

You are not allowed to transport the multi grapple with a crane.

⚠ **WARNING Multi grapple falling**

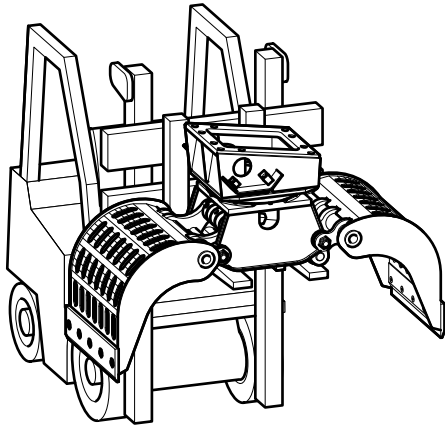
The multi grapple is not designed for crane transport. Lifting equipment can fail and cause the multi grapple to fall.

- ▶ Transport the multi grapple only with a fork lift truck or truck.



Transport using a forklift truck

- ◆ Move the fork of the forklift truck under the housing so that the hydraulic attachment cannot tip over.



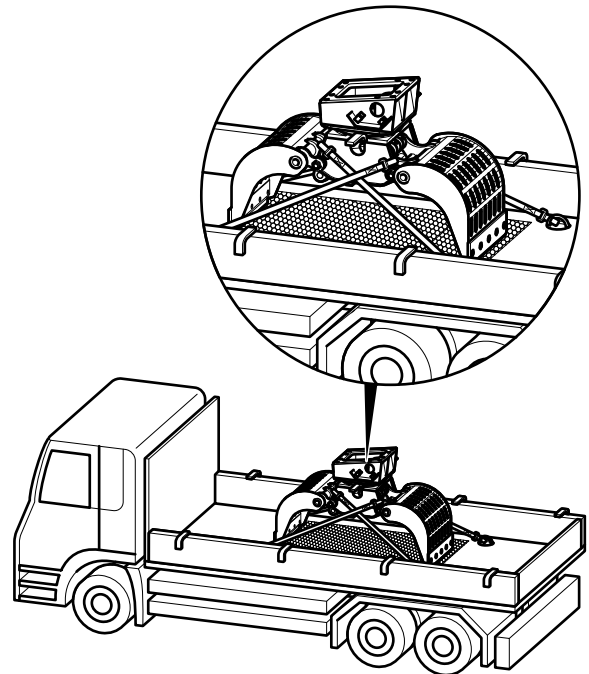
- ◆ Slowly lift the hydraulic attachment.
- ◆ Transport the hydraulic attachment to the location provided for.

Transport using a truck

⚠ WARNING Hydraulic attachment tipping over / slipping

The hydraulic attachment slipping or tipping over and falling from the loading area of a lorry may cause serious injury.

- ▶ Place the hydraulic attachment on an anti-slip mat.
- ▶ Secure the hydraulic attachment to the loading area with ropes or chains.
- ◆ Secure the hydraulic attachment on the loading surface as shown in the following illustration.
- ◆ Observe all the applicable national/regional regulations on securing loads.



Installation

⚠ WARNING Hot hydraulic oil squirting out

The hydraulic system is under high pressure. If hydraulic connections come loose or are disconnected, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Depressurise the hydraulic system before connecting or disconnecting the hydraulic circuits of the hydraulic attachment (see chapter *Depressurising the hydraulic system*).

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

Media/consumables

The following consumables are used when operating the hydraulic attachment:

Mineral hydraulic oil

All hydraulic oil brands prescribed by the carrier manufacturer are also suitable for use when operating the hydraulic attachment.

However, the oil should comply with viscosity class HLP 32 or higher.

In summer and in hot climates, oils of viscosity class HLP 68 or higher should be used.

In all other respects the regulations of the carrier manufacturer are to be taken into consideration.

Optimum viscosity range	= 30 - 60 cSt
Max. start viscosity	= 2000 cSt
Max. oil temperature	= 80 °C

Special conditions apply to using the hydraulic attachment at low temperatures (see chapter *Low ambient temperature*).

- ◆ **Check the oil filter!**
An oil filter must be integrated in the tank line of the hydraulic system. The maximum mesh width allowed for the oil filter is 50 microns; it must have a magnetic separator.

Non-mineral hydraulic oil

NOTICE Mixed hydraulic oil

Never mix mineral and non-mineral hydraulic oils! Even small traces of mineral oil mixed in with non-mineral oil can result in damage to both the hydraulic attachment and the carrier. Non-mineral oil loses its biodegradability.

- ▶ Only use one type of hydraulic oil.

If you are using non-mineral oil it is imperative that the name of the oil in use be indicated when returning the hydraulic attachment for repair.

In order to protect the environment or on technical grounds, hydraulic oils are currently being used which are not classified as HLP mineral oils.

Before using hydraulic oils of this kind it is imperative to ask the carrier manufacturer whether operations with such fluids are possible.

Our hydraulic attachments are basically designed for use with mineral oils. Consult the Epiroc Customer Center / Dealer in your area before using other hydraulic oils approved by the carrier manufacturer. Following initial assembly and after any workshop repairs, our hydraulic attachments are subjected to a test run on a test bed powered by **mineral oil**.

Grease

- ◆ When handling oils and greases observe the safety instructions that apply to these products.

Media /consumables	Part number
Cutter grease	3363 0949 14

Manufacturing the adapter plate

Construction Tools GmbH also supplies base plates to manufacture adapter plates alternatively to the adapter plates supplied.

NOTICE Adapter plate cracking

The adapter plate may crack if it is not designed for the high load.

- ▶ Take not only the weight of the hydraulic attachment but also the crowd force of the carrier, possible vibration etc. into account when dimensioning the adapter plate.
- ▶ Ensure that the design conforms to the state of the art.
- ▶ Have the web plates welded to the adapter plate base plate by a qualified welding specialist.

The base plate is made of the material EN10025-S355 J2G3.

- ◆ Have the web plates designed and manufactured or procure web plates to fit your carrier.
- ◆ Ensure that the web plates are welded to the base plate side marked "TOP".

The adapter plate must not strike in any position during operation of the hydraulic attachment.

Construction Tools GmbH does not design, manufacture or sell web plates for adapter plates.

Installing the adapter plate

NOTICE The adapter plate can come loose

The adapter plate can come loose if the fastening screws are not designed for local high loads.

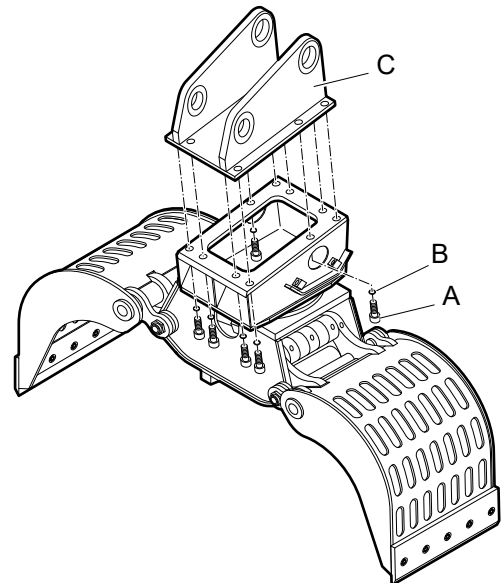
- ▶ Only use the Allen screws of strength category 8.8 and the pairs of lock washers included in the delivery to attach the adapter plate or the base plate.
- ◆ Place the hydraulic attachment within the range of the carrier.
- ◆ Apply anti-seize compound to the Allen screw threads (A) before inserting them.

The contact faces of the screw head and the lock washers (B) must not be lubricated.

⚠ **WARNING Hands and fingers being cut off or hurt**

Bores and surfaces can act like a pair of scissors and cut off or hurt parts of your body.

- ▶ Never use your fingers to check bores or fitting surfaces.
- ◆ Align the adapter plate (C) on the connecting plate of the multi grapple.



- ◆ Fit a pair of lock washers (B) onto every screw.
- ◆ Tighten the Allen screws (A) with an Allen key.
- ◆ Tighten the Allen screws (A) with the required tightening torque.

Type	Key size	Tightening torque
MG 100	14 mm (0.55 in.)	200 Nm (148 ft lbs)
MG 200	14 mm (0.55 in.)	200 Nm (148 ft lbs)
MG 300	14 mm (0.55 in.)	200 Nm (148 ft lbs)
MG 400	14 mm (0.55 in.)	200 Nm (148 ft lbs)
MG 500	14 mm (0.55 in.)	200 Nm (148 ft lbs)
MG 800	17 mm (0.67 in.)	390 Nm (288 ft lbs)
MG 1000	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 1500	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 1800	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 2300	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 2700	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 3000	22 mm (0.87 in.)	1500 Nm (1106 ft lbs)
MG 5000	27 mm (1.06 in.)	2300 Nm (1696 ft lbs)

Attaching the hydraulic attachment to the carrier

Mechanical mounting aspects

You need an assistant to attach the hydraulic attachment to the carrier.

- ◆ Agree on hand signals with your assistant, to enable him to help you place the carrier in the proper position to attach the hydraulic attachment.
- ◆ Lower the stick of the carrier into the holder provided on the adapter plate.

⚠ **WARNING** Injury by impacts

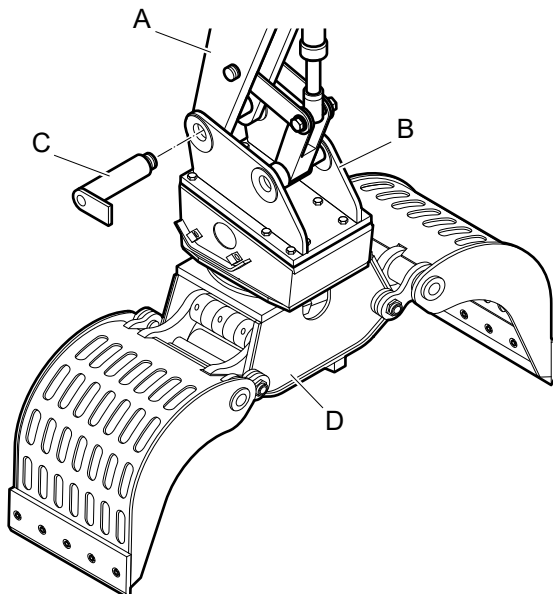
A sudden movement of the carrier may cause your assistant to be hit and injured by the boom or the hydraulic attachment.

- ▶ Only move the boom very slowly and in a controlled manner while an assistant is within the danger zone.
- ▶ Always keep sight of your assistant.

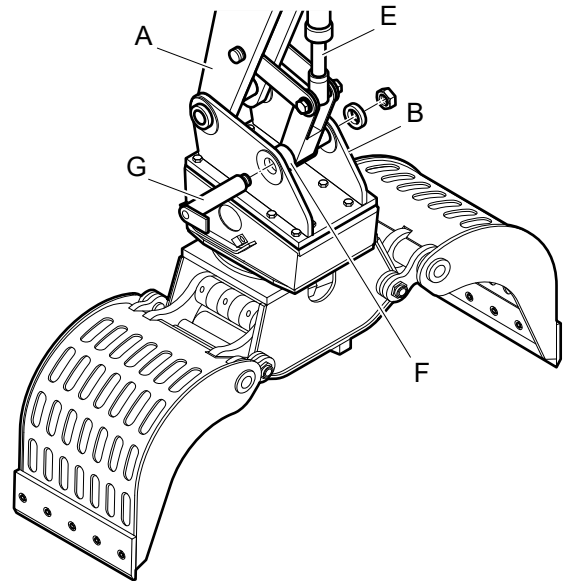
⚠ **WARNING** Hands and fingers being cut off or hurt

Bores and surfaces can act like a pair of scissors and cut off or hurt parts of your body.

- ▶ Never use your fingers to check bores or fitting surfaces.
- ◆ Let your assistant instruct you until the bores in the adapter plate (B) and in the stick (A) are properly aligned.
- ◆ Install the stick bolt (C) and lock it.



- ◆ Lift the hydraulic attachment (D).



- ◆ Extend the bucket cylinder (E) until the bore in the linkage (F) aligns with the bore in the adapter plate (B).
- ◆ Install the linkage bolt (G) and lock it.
- ◆ Carefully move the bucket cylinder (E) to both end positions.

The adapter plate must not be stopped by the mechanical stops in either position. Consult the Epiroc Customer Center / Dealer in your area if the adapter plate is stopped by a mechanical stop.

Making the hydraulic connections

NOTICE Faulty hydraulic installation

The carrier must have a suitable hydraulic installation to operate the hydraulic attachment. Improperly installed lines and incorrect rated sizes may cause the oil to heat up and the hydraulic attachment to be damaged.

- ▶ Only use hydraulic lines of the rated sizes as instructed (see chapter *Technical Specifications*).
- ▶ Check the rated size of the hydraulic lines on existing hydraulic installations! All supply and return lines for the hydraulic oil must have a sufficient inside diameter and wall thickness.
- ▶ Route the hydraulic hoses so that they are torsion-free.
- ◆ Switch off the carrier.
- ◆ Depressurise the hydraulic system according to the manufacturer's safety and operating instructions for the carrier.
- ◆ Close all shut-off valves in the installation at the boom, if no quick couplings are used.

NOTICE Damage to hydraulic parts

Polluted hydraulic lines and connections may enable sand, fragments of material and dirt to penetrate the hydraulic attachment and damage the hydraulic parts.

- ▶ Clean the hydraulic lines and connections prior to connecting the hydraulic lines.
- ◆ Have dirty hydraulic lines rinsed through by a specialist company.
- ◆ Clean dirty hydraulic line connections with a suitable grease-dissolving universal cleaner.
- ◆ Observe the cleaner manufacturer's information on safety and use.

Connecting hydraulic hoses for the functions »Open / Close«

- ◆ Remove the caps/blank flange from port »A« and »B« and keep them in a safe place.
The connection of function »Open« is marked with an »A«, the connection of function »Close« with a »B«.
- ◆ Check that the connections are not damaged.
- ◆ Change any damaged connections.
- ◆ If the two input lines of the boom have the same operating pressure, connect them to port »A« and »B« in a torsion-free manner.
- ◆ If the two input lines of the boom have different operating pressures, connect the hose with the higher operating pressure to port »B« in a torsion-free manner, connect the hose with the lower operating pressure to port »A« in a torsion-free manner.

⚠ WARNING Hydraulic hose flailing about

Pressurised hydraulic hoses will flail about if a bolted connection comes loose or becomes loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Tighten the fastening screws with the correct tightening torque.

Connecting hydraulic hoses for the function »Turn counterclockwise / Turn clockwise«

- ◆ Remove the caps/blank flange from port »C« and »D« and keep them in a safe place.
The connection of function »Turn counterclockwise« is marked with an »C«, the connection of function »Turn clockwise« with a »D«.
- ◆ Check that the connections are not damaged.
- ◆ Replace damaged connections.

- ◆ Fix the hoses to the connection for function »Turn«.
- ◆ Connect both hoses for the function »Turn« to the boom in a torsion-free manner.

⚠ WARNING Hydraulic hose flailing about

Pressurised hydraulic hoses will flail about when bolted connection have come loose or have been loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Tighten the fastening screws with the correct tightening torque.

Removing the hydraulic attachment from the carrier

Dismantling the hydraulic connections

⚠ **WARNING Unexpected movement**

Sudden movements of the carrier may cause serious injury.

- ▶ Secure the carrier such that it cannot move unexpectedly.
- ▶ Observe the carrier manufacturer's instructions.

⚠ **WARNING Hydraulic hose flailing about**

Pressurised hydraulic hoses will flail about when bolted connections have come loose or have been loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Depressurise the hydraulic system before disconnecting a hydraulic hose (see chapter *Depressurising the hydraulic system*).

⚠ **WARNING Hot parts**

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.
- ◆ Close all shut-off valves in the installation at the boom if no quick couplings are used.
- ◆ Disconnect the hose lines to and from the hydraulic attachment at the boom side.
- ◆ Close off all open hose ends.

Mechanical disassembly

- ◆ You need an assistant to remove the hydraulic attachment.
- ◆ Agree on hand signals with your assistant, to enable him to help you move the boom.

⚠ **WARNING Injury by impacts**

A sudden movement of the carrier may cause your assistant to be hit and injured by the boom or the hydraulic attachment.

- ▶ Only move the boom very slowly and in a controlled manner while an assistant is within the danger zone.
- ▶ Always keep sight of your assistant.

⚠ **WARNING Metal chips shooting off**

When hammering out bolts, chips may shoot off and cause serious eye injuries.

- ▶ Wear safety glasses when hammering out the bolts.
- ◆ Remove the bolt locks from the stick and linkage bolts.
- ◆ Drive out the linkage bolt with a steel arbor and a hammer.
- ◆ Switch on the carrier.
- ◆ Retract the bucket cylinder.
- ◆ Drive out the stick bolt with a steel arbor and a hammer.
- ◆ Move the carrier stick out of the adapter plate.

Removing the adapter plate

- ◆ Loosen the fastening screws of the adapter plate.
- ◆ Lift the adapter plate with a suitable lifting equipment and put it down on timber support blocks.
- ◆ Save the fastening screws and the pairs of lock washers for future use.

Operation

⚠ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. If hydraulic connections come loose, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Depressurise the hydraulic system (see chapter *Depressurising the hydraulic system*).
- ▶ Repair any leaks before operating the hydraulic attachment again.

⚠ **WARNING Hot parts**

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

NOTICE Hydraulic oil too hot

The temperature of the hydraulic oil must not exceed 80 °C. Higher temperature will damage the seals of the hydraulic parts.

- ▶ Monitor the oil temperature.
- ▶ Shut off the hydraulic attachment and the carrier if you measure an increased temperature in the tank.
- ▶ Check the hydraulic installation and the pressure relief valve.

Preparations before starting

⚠ **WARNING Falling carrier**

A carrier falling or tipping over due to the surface not being level may cause serious injury and material damage.

- ▶ Always observe great care when moving the carrier.
- ▶ Do not use the hydraulic attachment until the carrier is positioned stably.

⚠ **WARNING Fragments flying around**

Fragments of material which come loose while operating the hydraulic attachment may be flung away and can cause serious injury if people are hit by them. Small objects falling from a great height can also cause serious damage.

During hydraulic attachment operation the danger zone is considerably greater than during the excavation operation due to fragments of stone and pieces of steel flying around, and for this reason the danger zone must, depending on the type of material to be worked on, be enlarged correspondingly, or secured in a suitable manner through corresponding measures.

- ▶ Secure the danger zone.
- ▶ Stop the hydraulic attachment immediately if anyone enters the danger zone.
- ▶ Close the windscreen and the side windows of the driver's cab.

- ◆ Before starting the multi grapple, ensure that
 - the multi grapple is complete,
 - the multi grapple and adapter plate do not have any cracks,
 - and none of the hydraulic line connections leak.

The preparations required prior to starting the multi grapple depend on the ambient temperature:

- Ambient temperature below 0 °C (see chapter *Low ambient temperature*).
- Ambient temperature above 30 °C (see chapter *High ambient temperature*).

The oil temperature in the multi grapple must be between 0 °C and +80 °C during operation.

The full capacity of the multi grapple can be achieved when the oil temperature is approx. 60 °C.

- ◆ Make sure that there are no people in the danger zone.
- ◆ Start the carrier as instructed by the carrier manufacturer.

- ◆ Let the carrier warm up until the operating temperature prescribed by the carrier manufacturer has been reached.
- ◆ Put the carrier in its working position.

Switching the multi grapple on and off

After properly attaching the hydraulic attachment to the carrier, the hydraulic attachment can be operated using the carrier's hydraulic system. All functions for normal carrier operation remain unchanged.

The hydraulic attachment is switched on and off using electrical and hydraulic signals. If you have any questions about electric/hydraulic commands, consult the carrier manufacturer and/or the Epiroc Customer Center / Dealer in your area.

- ◆ Switch the hydraulic attachment on and off, as described in the carrier's operating instructions.
- ◆ When leaving the driver's cab, set the safety switch/lever for the electrical/hydraulic attachment installation to the "OFF" position. Carry out the above actions to prevent any unintended start-up of the hydraulic attachment.

Functional test

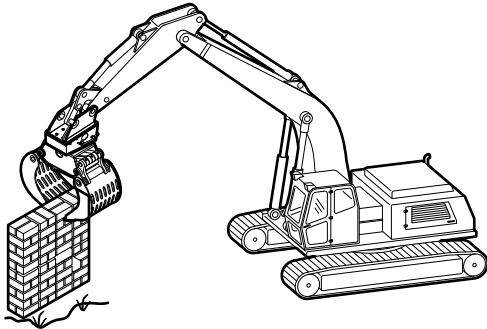
Always carry out a functional test before putting the multi grapple into use. Check that all hydraulic lines and connections are tight and that the multi grapple works without any problem.

- ◆ Prepare the multi grapple so that you can start using it (see chapter *Preparations before to starting*).
- ◆ Lift the multi grapple with the carrier boom function so that it hangs vertically.
- ◆ Close and open the grapple leaves.
- ◆ Turn the multi grapple via the connected carrier function »**Turn gripper**« left and right.
- ◆ Observe the hydraulic lines and whether the multi grapple works properly.
- ◆ Switch the multi grapple off immediately if oil leaks from the hydraulic lines or other malfunctions occur.
- ◆ Depressurise the hydraulic system (see chapter *Depressurising the hydraulic system*).
- ◆ Only take the multi grapple back into operation once all leaks or malfunctions have been remedied.

Correct operation

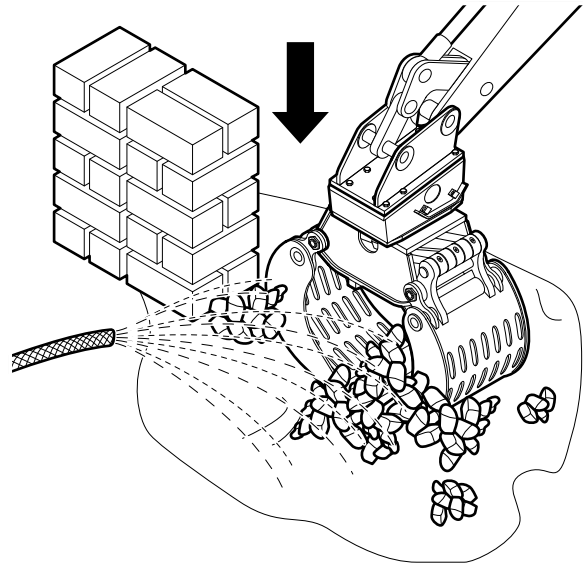
Demolishing masonry

- ◆ Encompass the masonry with the grapple leaves.
- ◆ Break the masonry structure with the grapple leaves.



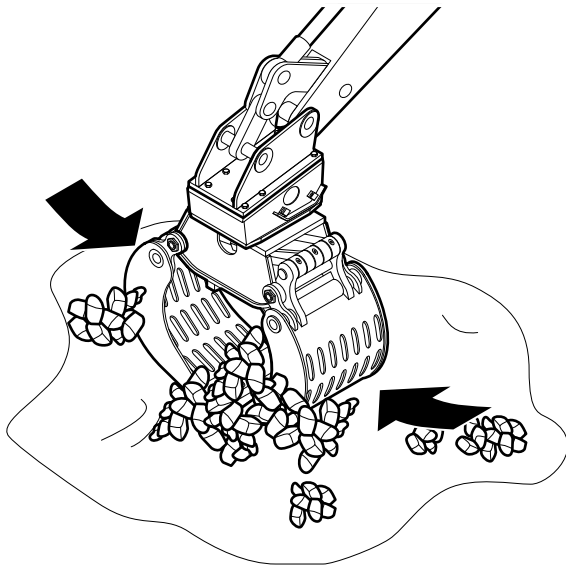
Continuous water spraying

- ◆ Keep the work area moist by continuously spraying water to avoid excessive dust.



Sorting and loading

- ◆ Use the grapple leaves for sorting and loading.



High ambient temperature

- ◆ Only use hydraulic oils of sufficient viscosity.
In summer and in tropical climates, the minimum requirement is a hydraulic oil of type HLP 68.

Low ambient temperature

Ambient temperature below -20 °C:

You must heat up the hydraulic attachment and the carrier when working in ambient temperatures of below -20 °C.

Preferably park the carrier and the hydraulic attachment in a heated, sheltered space while not using it.

NOTICE Hydraulic oil too cold

Operating the hydraulic attachment while hydraulic oil is still cold will damage the seals of the hydraulic parts.

- ▶ Do not operate the hydraulic attachment until the temperature of the hydraulic oil is at least 0 °C.
- ◆ Start the carrier as instructed by the carrier manufacturer.
- ◆ Let the carrier warm up until the operating temperature required by the manufacturer has been reached.
- ◆ Lift the hydraulic attachment using the boom function so that it hangs vertically.
- ◆ Close, open and turn the hydraulic attachment during the carrier warming-up phase.

NOTICE Damage to hydraulic parts

Hot hydraulic oil causes damage to subcooled hydraulic attachments.

- ▶ Do not fill the hydraulic system with hot hydraulic oil.

The temperature of the hydraulic oil of the carrier must be at least 0 °C.

- ◆ Start the hydraulic attachment, once the temperature has reached 0 °C.
- ◆ During operations, leave the carrier engine and pumps running even during breaks.

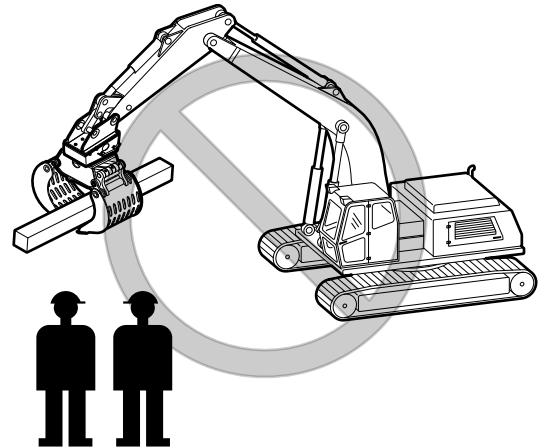
Prohibited operation

Suspended load

▲ **WARNING** Danger of falling parts

Falling parts may cause serious injuries.

- ▶ Never operate the hydraulic attachment over the cab, other people or other machines.

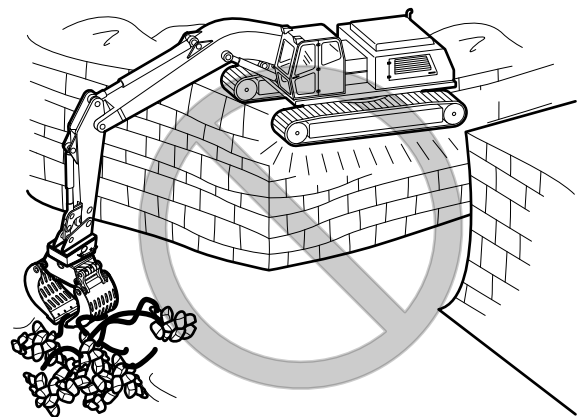


Unsafe base

▲ **WARNING** Danger of tipping

The carrier can topple over and cause injuries and damage.

- ▶ Only work with the hydraulic attachment when the carrier is on a safe base.

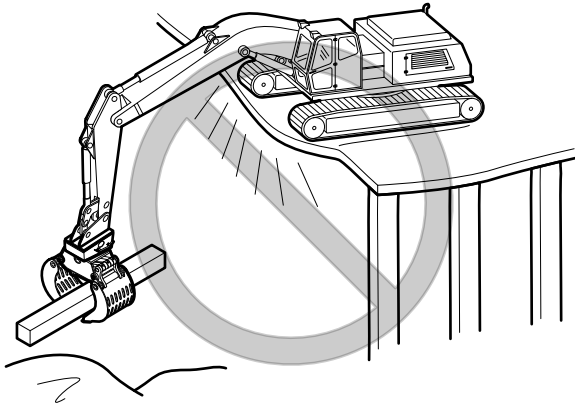


Non-load bearing suspended ceilings

▲ WARNING Danger of collapse

The carrier can collapse and cause injuries and damage.

- ▶ Only work with the hydraulic attachment when the carrier is on a load-bearing suspended ceiling.

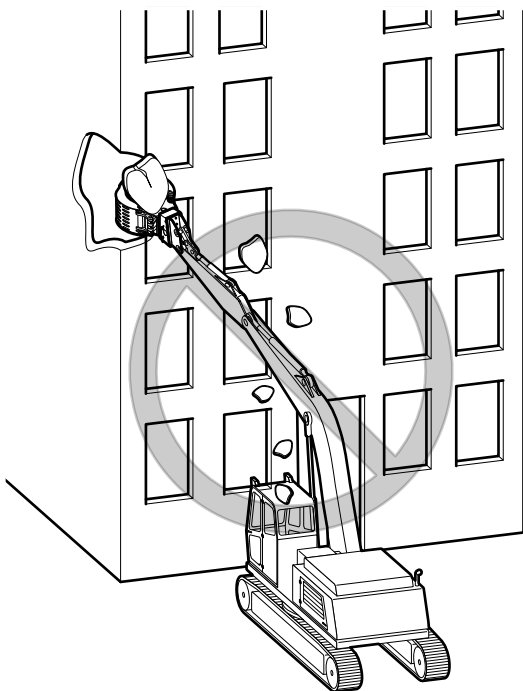


Working position

▲ WARNING Falling debris

Large pieces of debris falling may cause injury and damage.

- ▶ Never start demolishing work from below or the middle.

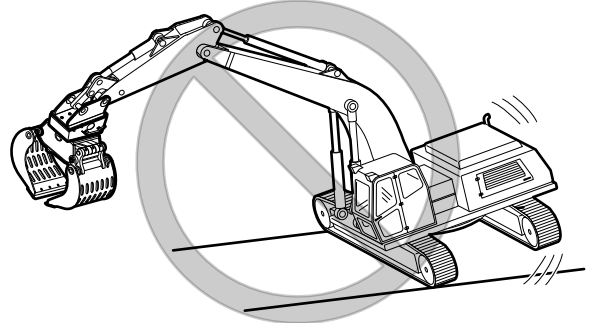


Use over the chain

▲ WARNING Danger of tipping

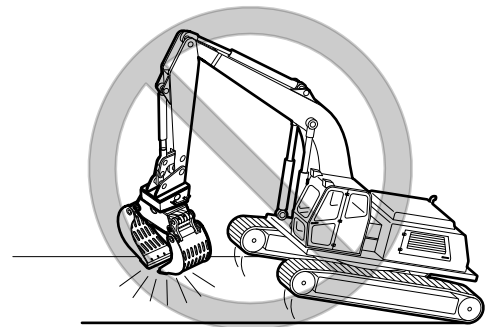
The carrier can topple over and cause injuries and damage.

- ▶ Never work with full delivery sideways in the direction of movement.



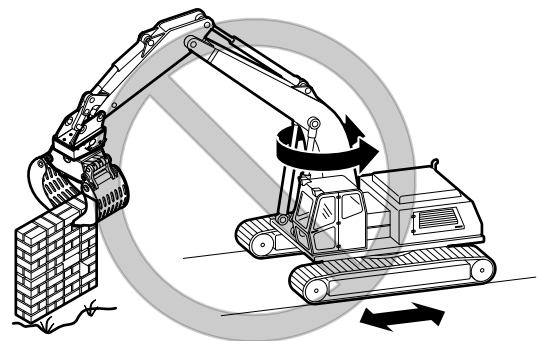
Moving the carrier

- ◆ Never relocate the carrier sideways by placing the hydraulic attachment on the ground to lift the carrier. This would seriously damage the hydraulic attachment.



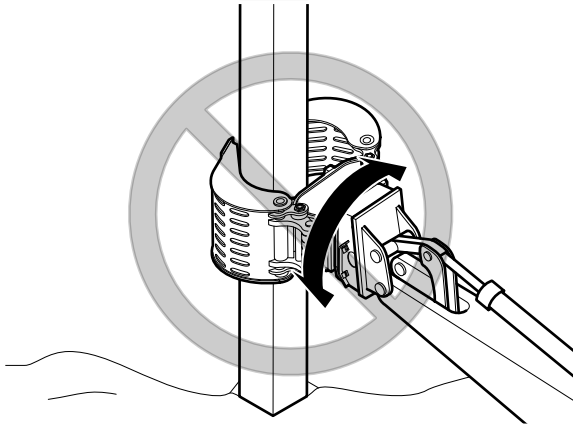
Moving the boom

- ◆ Never move the boom or the carrier while carrying out the gripping action. This would seriously damage the hydraulic attachment.



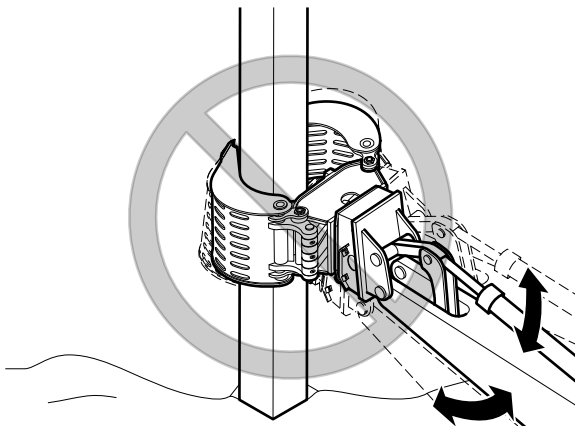
Turning the hydraulic attachment

- ◆ Never turn the hydraulic attachment while carrying out the gripping action. This would seriously damage the hydraulic attachment.



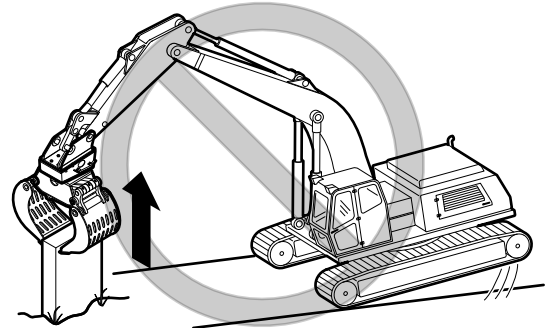
Extending the bucket cylinder

- ◆ Never extend the bucket cylinder while carrying out the gripping action. This bending action would destroy the hydraulic attachment.



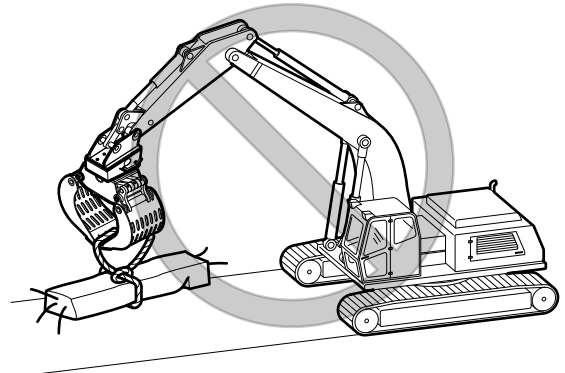
Pulling

- ◆ Never pull at girders, supports or walls with the hydraulic attachment. This would damage the hydraulic attachment and the adapter plate. The carrier may lose stability. It can topple over and cause injuries.



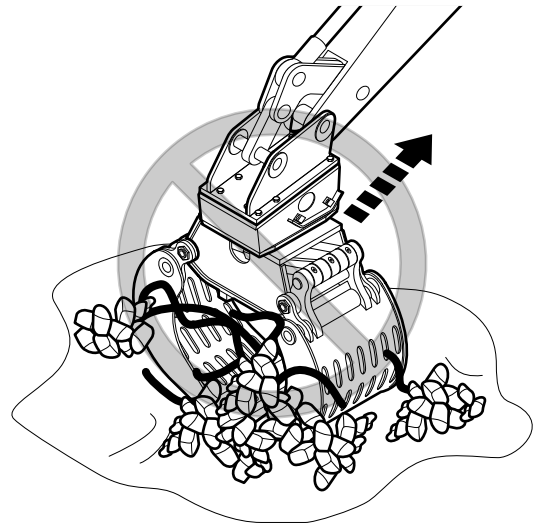
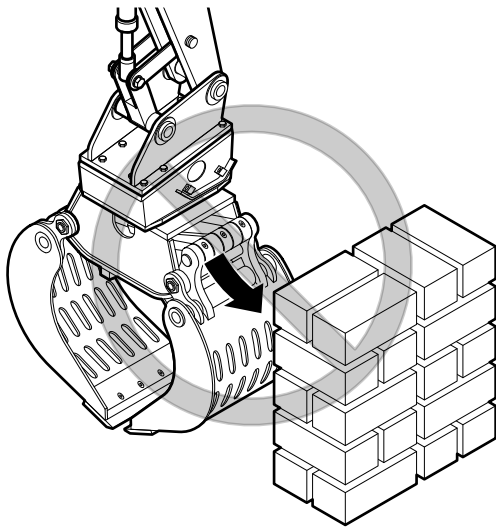
Lifting/Transporting with lifting gear

- ◆ Never use the hydraulic attachment to lift or transport loads with lifting gears (ropes, chains, shackles etc.). The hydraulic attachment was not constructed to lift or transport loads with lifting gears (ropes, chains, shackles etc.). This would damage the hydraulic attachment.



Hammering

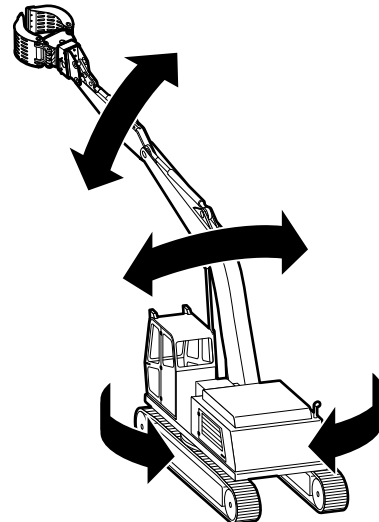
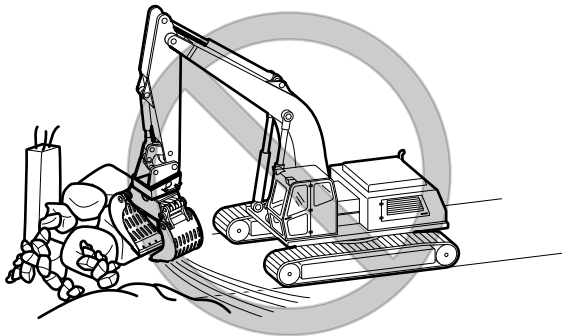
- ◆ Do not use the hydraulic attachment for hammering on the structure to be demolished. This would seriously damage the hydraulic attachment.



- ◆ The boom must be steered securely, slowly and accurately. Never make abrupt movements this would damage the hydraulic attachment.

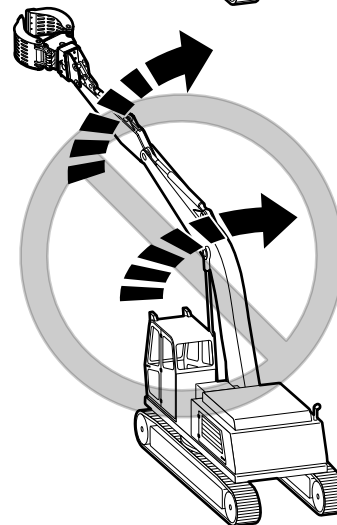
Moving objects

- ◆ Never use the hydraulic attachment to move debris. This would damage the hydraulic attachment.



Abrupt movements

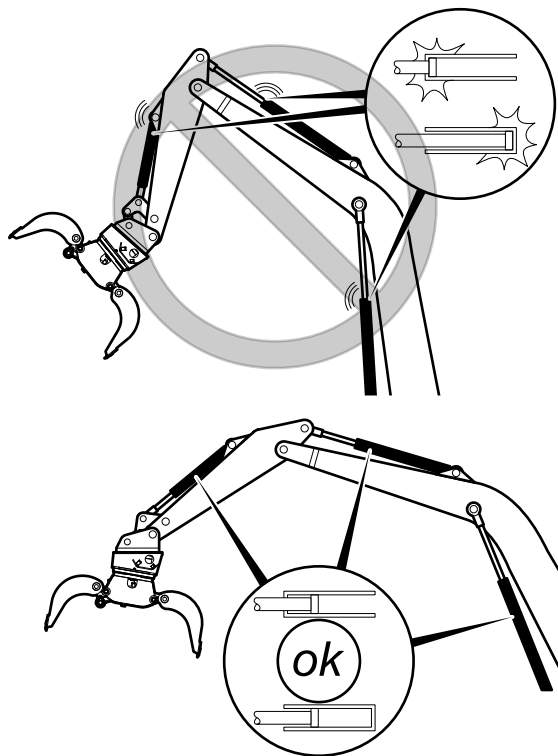
- ◆ Never make abrupt movements to free the hydraulic attachment if it is jammed in the structure to be demolished. This would damage the hydraulic attachment.



Cylinder end positions

- ◆ Reposition the carrier to avoid working with the cylinders at their end positions.

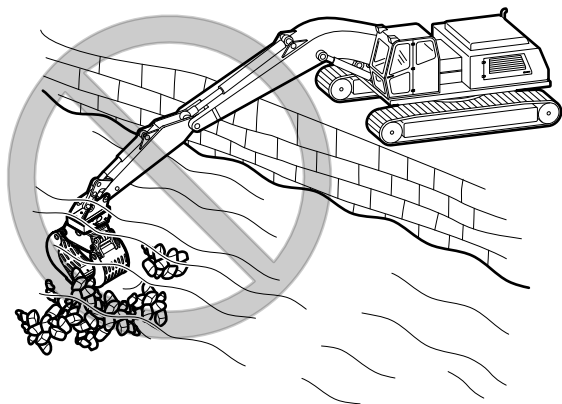
Avoid operating the hydraulic attachment when the carrier stick and bucket cylinder are in one of their end positions. These end positions have damping facilities; the hydraulic cylinder may be damaged by prolonged use while in its end positions.



Use under water

- ◆ Never use the hydraulic attachment under water.

This would seriously damage the hydraulic attachment and may damage the whole hydraulic installation.



Maintenance

The maintenance activities are carried out by the carrier driver.

⚠ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. If hydraulic connections come loose, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Depressurise the hydraulic system (see chapter *Depressurising the hydraulic system*).
- ▶ Repair any leaks before operating the hydraulic attachment again.

⚠ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. Hydraulic oil escaping out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Do not inspect for possible leaks with your fingers or other parts of the body, but use a piece of cardboard instead, holding it up to the suspected leakage site.
- ▶ Examine the cardboard for traces of liquid.
- ▶ Depressurise the hydraulic system (see chapter *Depressurising the hydraulic system*).
- ▶ Repair any leaks before operating the hydraulic attachment again.

⚠ **WARNING Hot parts**

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.

⚠ **WARNING Accidental start**

If the hydraulic attachment is started by accident this may lead to serious injury.

- ▶ Follow the instructions in the Operating Instructions of the carrier to prevent the hydraulic attachment starting by accident.

⚠ **WARNING Unexpected movement**

Sudden movements of the carrier may cause serious injury.

- ▶ Secure the carrier so that it cannot move unexpectedly.
- ▶ Observe the carrier manufacturer's instructions.

⚠ **WARNING Parts of the body or whole bodies may be sheared or crushed**

Grapple leaves may close unexpectedly and shear or crush parts of the body or whole bodies.

- ▶ Ensure that there is nobody between the grapple leaves.

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

Maintenance schedule

prior to shift	<p>Check the multi grapple and adapter plate for cracks.</p> <p>Check hydraulic lines for leaks and damage.</p> <p>Check that the pipe clamps on the carrier are tight.</p> <p>Check wear blades for wear; if necessary turn or replace wear blades.</p> <p>Check the bolted connections at the adapter plate and tighten as required.</p> <p>Check the bolted connections at the hydraulic lines and tighten as required.</p> <p>Check fixing bolts at the wear blades, if necessary tighten or replace.</p> <p>Check the hinge pin locking facilities.</p> <p>Lubricate all lubrication nipples of the multi grapple.</p>
weekly	<p>MG 1800, MG 2300, MG 2700, MG 3000:</p> <p>Retighten the screws on the rotation mechanism housing and live ring.</p>
after the first 50 operating hours	<p>Change hydraulic oil filter cartridge of the carrier.</p>
every 100 operating hours	<p>MG 100 to MG 1500, MG 5000:</p> <p>Retighten the screws on the rotation mechanism housing.</p>
every 500 operating hours	<p>Check oil filter cartridge, replace if necessary.</p>
if necessary	<p>Replace bent and damaged pipes.</p> <p>Replace damaged hoses.</p> <p>Check wear at the adapter plate bolts.</p>

Depressurising the hydraulic system

Even when you have switched off the carrier, a considerable residual pressure can still be present in the hydraulic system.

A residual pressure can still be present in the hydraulic attachment even after you have disconnected the quick-release couplings or closed the shut-off valves.

The hydraulic attachment can only be depressurized using the hydraulic system of the carrier, by allowing hydraulic oil to drain to the tank via the return connection.

Depending on the type of hydraulic attachment, the internal leaks, the oil temperature, the type of hydraulic oil and the design of the hydraulic installation of the carrier, the time required to relieve the pressure can vary.

Observe the following steps in order to depressurise the hydraulic attachment:

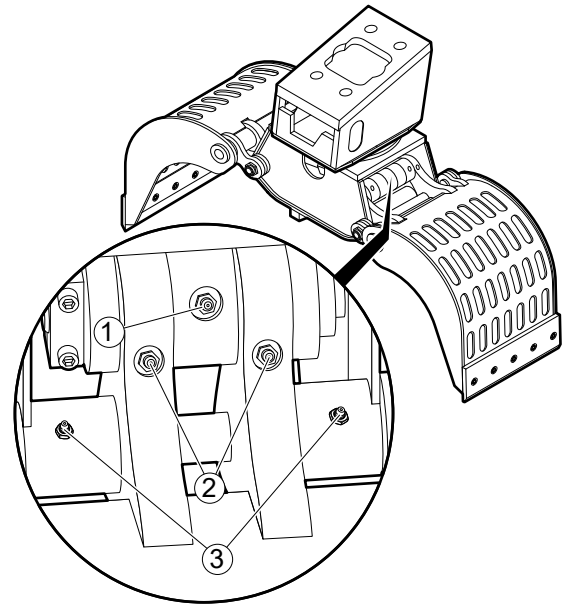
1. Ensure that the hydraulic oil in the hydraulic attachment and in the carrier has a temperature of at least 0 °C. If necessary, pre-heat it to at least 0 °C.
2. The hydraulic attachment must be connected to the hydraulic system of the carrier device, i.e. the hydraulic hoses must be connected up and the respective shut-off valves in the supply pipe and in the connection to the tank must be opened.
3. Open the grapple leaves completely.
4. Place the hydraulic attachment on the ground.
5. Depressurise the hydraulic system according to the manufacturer's safety and operating instructions for the carrier.
6. You must wait at least another 60 minutes until the pressure has been relieved through leakages.
7. When you have made sure that no more pressure is present in the hydraulic system, you must disconnect the hydraulic connection to the carrier. Close the shut-off valves or disconnect the quick-release couplings, so that no hydraulic oil can flow back from the carrier.

Lubrication

Lubrication interval: prior to every shift.

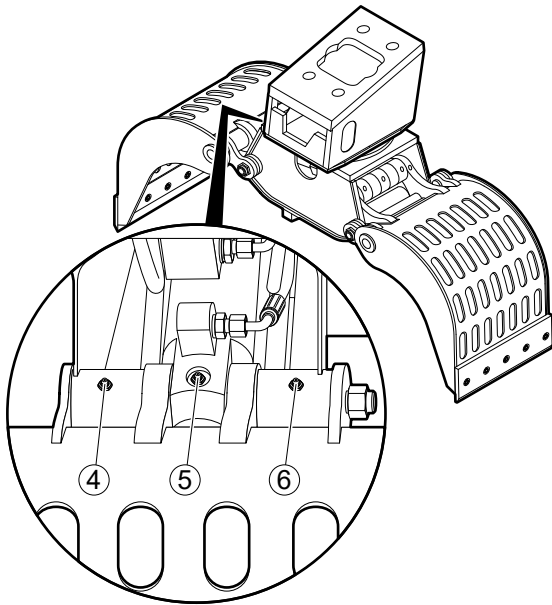
- ◆ Place the multi grapple on the ground.
- ◆ Secure the carrier so that it cannot move unexpectedly.
- ◆ Only use cutter grease for lubrication.
- ◆ Place the grease gun on all lubrication nipples.

Lubricating MG 100

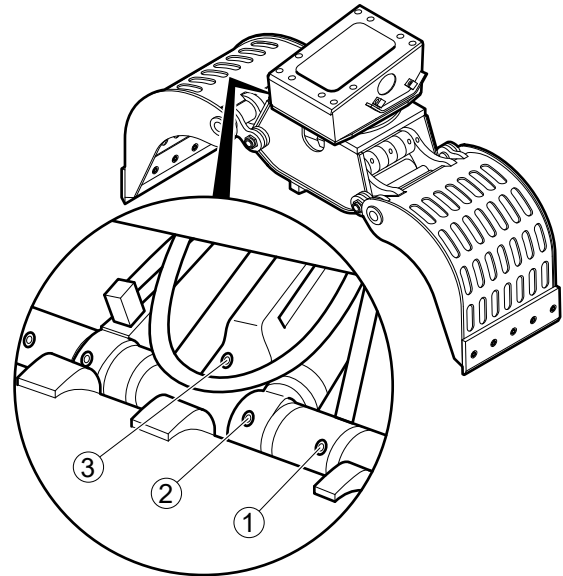


Lubrication point 1	once every 8 hours
Lubrication point 2	once every 8 hours
Lubrication point 3	once every 8 hours

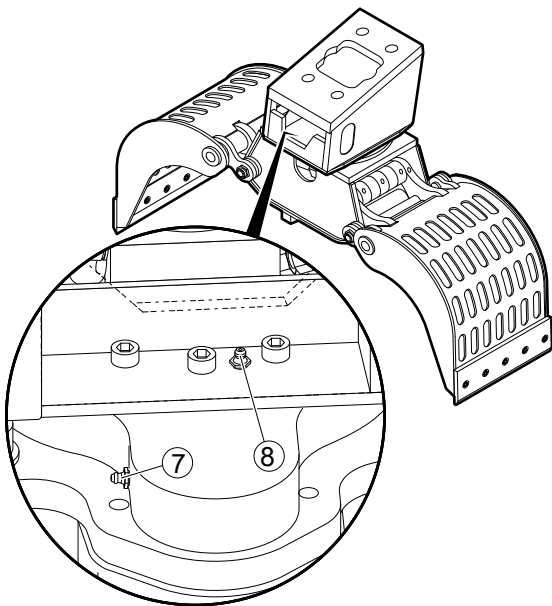
Lubricating MG 200 - MG 2700



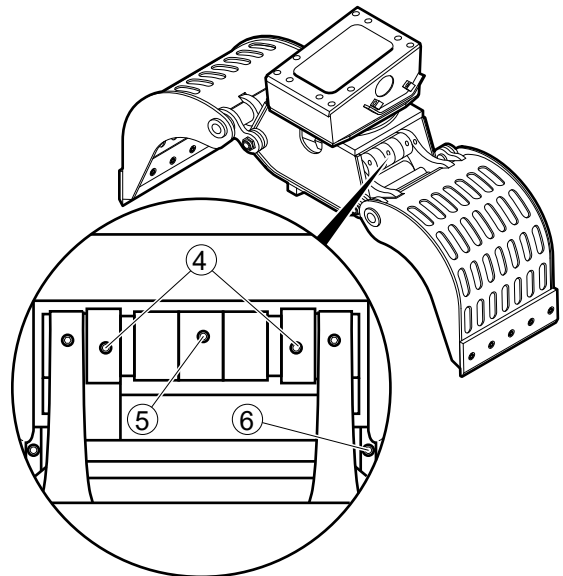
Lubrication point 4	once every 8 hours
Lubrication point 5	once every 8 hours
Lubrication point 6	once every 8 hours



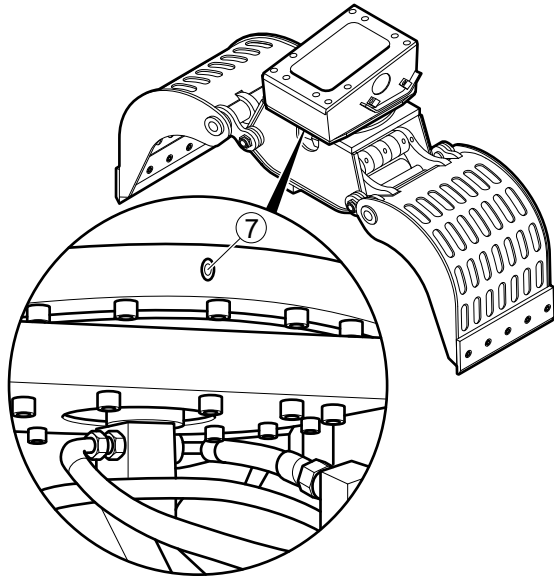
Lubrication point 1	once every 8 hours
Lubrication point 2	once every 8 hours
Lubrication point 3	1 stroke from the manual grease gun once every 8 hours



Lubrication point 7	once every 8 hours
Lubrication point 8	once every 8 hours



Lubrication point 4	once every 8 hours
Lubrication point 5	once every 8 hours
Lubrication point 6	once every 8 hours



Lubrication point 7

once every 8 hours

Checking the hydraulic attachment and adapter plate for cracks

- ◆ Secure the carrier so that it cannot move unexpectedly.
- ◆ Check all the hydraulic attachment and adapter plate load-bearing parts and welds for cracks prior to every shift.
- ◆ Ensure repair or refinishing in good time to prevent greater damage.

Checking hydraulic attachment for wear

- ◆ Secure the carrier so that it cannot move unexpectedly.

⚠ **WARNING** Parts of the body or the whole body may be sheared or crushed

The grapple leaves may close unexpectedly and shear or crush parts of the body or the whole body.

- ▶ Ensure that there is nobody between the grapple leaves.
- ◆ Secure the carrier so that it cannot move unexpectedly.
- ◆ Prior to starting work, check the multi grapple and the wear blades for wear.
- ◆ Turn or replace the wear blades in good time to prevent greater damage.

Checking hydraulic lines

- ◆ Secure the carrier such that it cannot move unexpectedly.
- ◆ Perform a visual inspection of all lines (pipes and hoses) from the pump to the hydraulic attachment and back to the tank, before starting work.
- ◆ Tighten loose bolted connections and hose clamps to the torque required (see Chapter *Bolted connections / tightening torques*).
- ◆ Replace damaged pipes and/or hoses.

Checking bolted connections

- ◆ Secure the carrier such that it cannot move unexpectedly.
- ◆ Check all bolted connections regularly for tight fit (see Chapter *Bolted connections / Tightening torques*).
- ◆ Tighten loose bolted connections and hose clamps to the torque required (see Chapter *Bolted connections / Tightening torques*).

Checking the adapter plate bolts for wear

- ◆ Carry out this visual check whenever the hydraulic attachment has been removed from the carrier.
- ◆ Check the adapter plate bolts for excessive wear such as cracks, pitting or severe erosion.
- ◆ Rework or replace worn bolts.

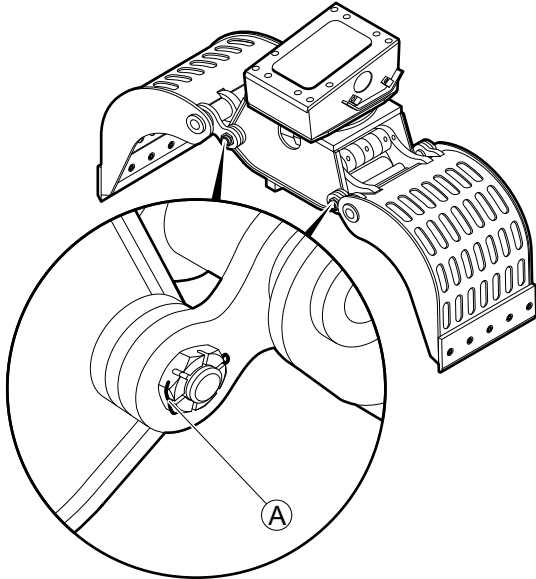
Checking and cleaning the hydraulic oil filter of the carrier

An oil filter must be integrated in the return circuit of the hydraulic system. The maximum mesh width allowed for the oil filter is 50 microns; it must have a magnetic separator.

- ◆ Secure the carrier such that it cannot move unexpectedly.
- ◆ Change the oil filter cartridge after the first 50 operating hours.
- ◆ Check the oil filter **every** 500 operating hours and replace if it is necessary.

Checking the hinge pin locking facilities

- ◆ Check the hinge pin locking facilities (A) once a day.



- ◆ Replace damaged castle nuts and splint pins.

Retightening the screws on the rotation mechanism housing and live ring

MG 100 to MG 1500 and MG 5000:

- ◆ Retightening the screws on the rotation mechanism housing and live ring every 100 operating hours. Tightening torques (see chapter *Bolt connections/Tightening torques*)

MG 1800, MG 2300, MG 2700 and MG 3000:

- ◆ Weekly check for axial or radial clearance in the live ring.
- ◆ Unscrew and remove the screws from the rotating mechanism housing.
- ◆ Remove the upper part from the multi grapple.
- ◆ Check all live ring screws to see if they are stretched or loosened.
- ◆ Replace stretched screws and retighten all screws on the live ring with the required tightening torque.
- ◆ Tightening torques (see chapter *Bolt connections/Tightening torques*)
- ◆ Check the condition of the live ring and replace it if defective.
- ◆ Fit the upper part on the multi grapple.
- ◆ Fix the screws of the rotating mechanism housing and tighten with the required tightening torque.
- ◆ Tightening torques (see chapter *Bolt connections/Tightening torques*)

Bolt connections / Tightening torques MG 100 to MG 1500, MG 5000

The bolt connections of the multi grapple are subjected to very high loads.

- ◆ Tighten any loose connections without exceeding the recommended tightening torques.

			MG 100	MG 200	MG 300
Connection point	Pos.	Interval	Tightening torques		
Adapter plate*	A	daily	200 Nm (148 ft lbs)	200 Nm (148 ft lbs)	200 Nm (148 ft lbs)
Rotation mechanism housing	B	every 100 operating hours	70 Nm (52 ft lbs)	130 Nm (96 ft lbs)	130 Nm (96 ft lbs)
Live ring	C	every 100 operating hours	40 Nm (30 ft lbs)	110 Nm (81 ft lbs)	110 Nm (81 ft lbs)
Wear blade	D	if necessary	-	-	300 Nm (221 ft lbs)

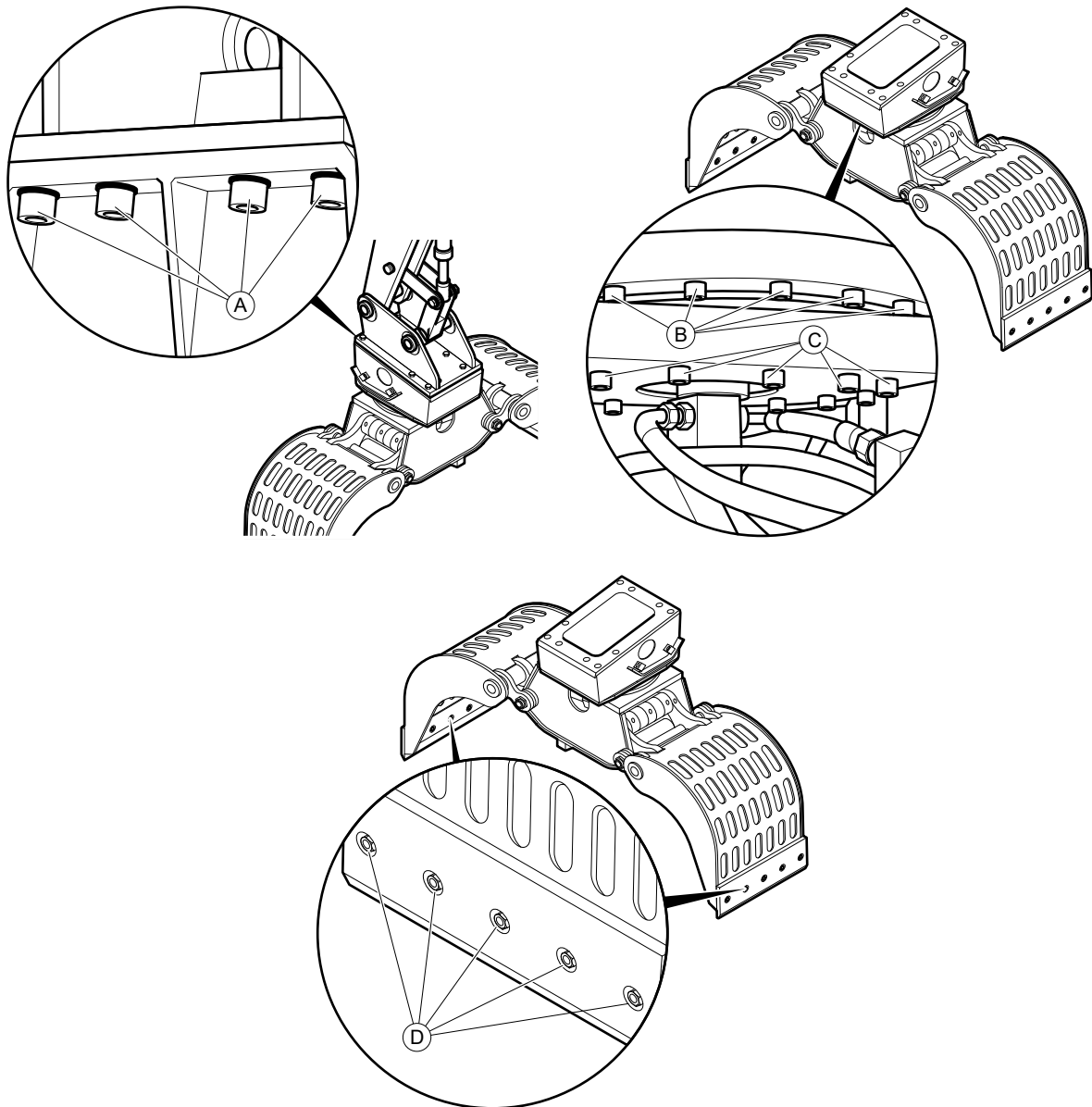
* Apply anti-seize compound to the Allen screw threads before inserting them. The contact faces of the screw head and the lock washers must not be lubricated.

			MG 400	MG 500	MG 800
Connection point	Pos.	Interval	Tightening torques		
Adapter plate*	A	daily	200 Nm (148 ft lbs)	200 Nm (148 ft lbs)	390 Nm (288 ft lbs)
Rotation mechanism housing	B	every 100 operating hours	130 Nm (96 ft lbs)	130 Nm (96 ft lbs)	130 Nm (96 ft lbs)
Live ring	C	every 100 operating hours	110 Nm (81 ft lbs)	110 Nm (81 ft lbs)	130 Nm (96 ft lbs)
Wear blade	D	if necessary	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)	550 Nm (406 ft lbs)

* Apply anti-seize compound to the Allen screw threads before inserting them. The contact faces of the screw head and the lock washers must not be lubricated.

			MG 1000	MG 1500	MG 5000
Connection point	Pos.	Interval	Tightening torques		
Adapter plate*	A	daily	1500 Nm (1106 ft lbs)	1500 Nm (1106 ft lbs)	2300 Nm (1696 ft lbs)
Rotation mechanism housing	B	every 100 operating hours	130 Nm (96 ft lbs)	200 Nm (148 ft lbs)	300 Nm (221 ft lbs)
Live ring	C	every 100 operating hours	130 Nm (96 ft lbs)	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)
Wear blade	D	if necessary	550 Nm (406 ft lbs)	550 Nm (406 ft lbs)	1350 Nm (996 ft lbs)

* Apply anti-seize compound to the Allen screw threads before inserting them. The contact faces of the screw head and the lock washers must not be lubricated.



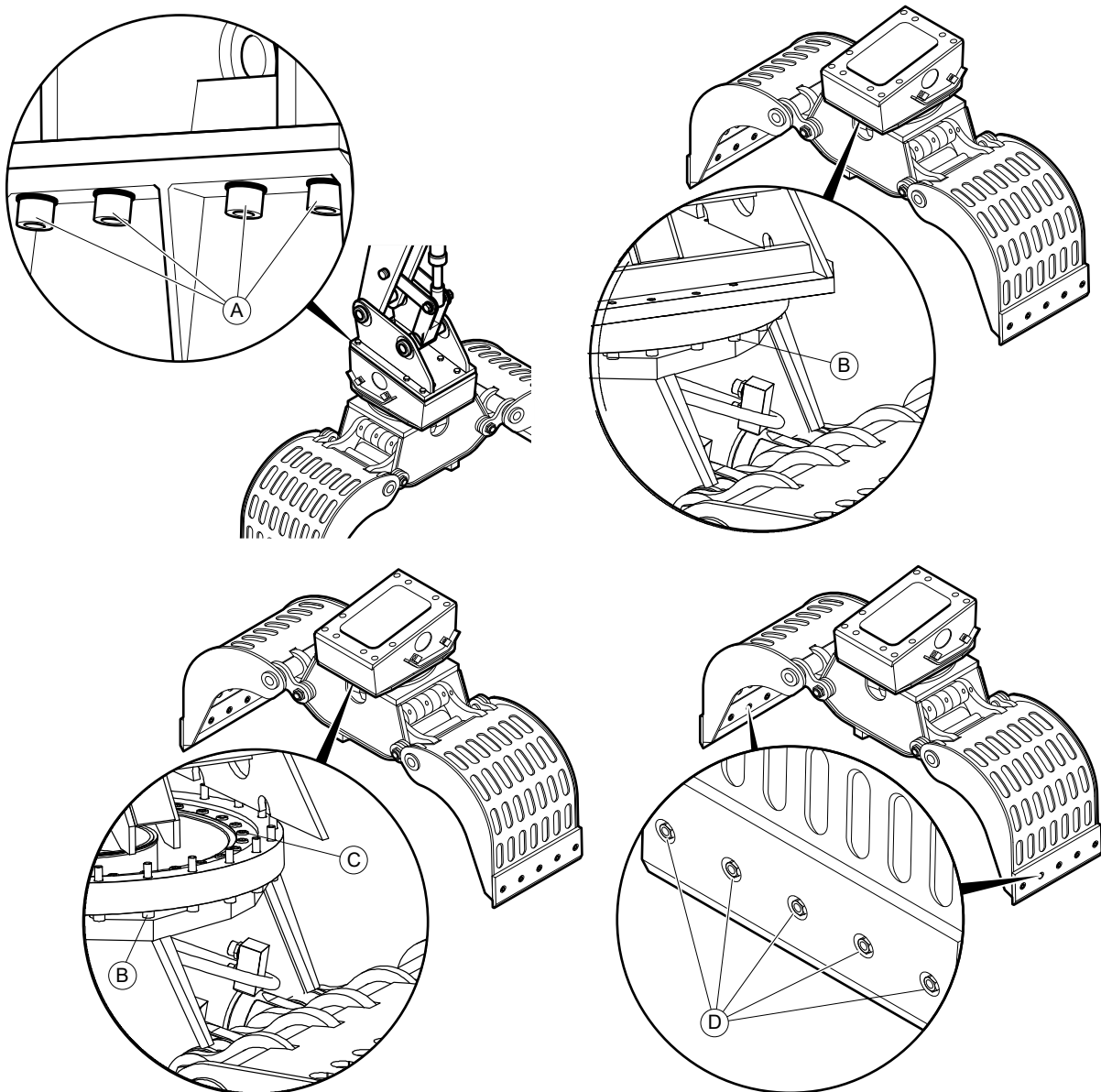
Bolt connections / Tightening torques MG 1800, MG 2300, MG 2700, MG 3000

The bolt connections of the multi grapple are subjected to very high loads.

◆ Tighten any loose connections without exceeding the recommended tightening torques.

			MG 1800	MG 2300	MG 2700	MG 3000
Connection point	Pos.	Interval	Tightening torques			
Adapter plate*	A	daily	1500 Nm (1106 ft lbs)	1500 Nm (1106 ft lbs)	1500 Nm (1106 ft lbs)	1500 Nm (1106 ft lbs)
Rotation mechanism housing	B	weekly	200 Nm (148 ft lbs)	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)
Live ring	C	weekly	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)	300 Nm (221 ft lbs)
Wear blade	D	if necessary	550 Nm (406 ft lbs)	550 Nm (406 ft lbs)	1350 Nm (996 ft lbs)	1350 Nm (996 ft lbs)

* Apply anti-seize compound to the Allen screw threads before inserting them. The contact faces of the screw head and the lock washers must not be lubricated.



Troubleshooting

The multi grapple does not work

Cause	Remedy	By
Check valve in line Opening or Closing closed	Open the check valve	Carrier driver
Defective couplings blocking lines Opening / Closing	Replace defective coupling parts	Workshop
Electrical equipment in the system defective	Check the electrical equipment and repair as necessary	Workshop
Rocker switch defective	Check the rocker switch and replace as necessary	Workshop
Magnet on switch-on valve damaged	Replace the magnet	Workshop

The closing power of the multi grapple is insufficient

Cause	Remedy	By
Opening and Closing lines have been mixed up	Properly connect the Opening and Closing lines. Only in case of different pressure settings of the Opening and Closing lines, i.e. existing system is also suitable for multi grapple operation.	Carrier driver
Operating pressure too low	Correct the operating pressure	Workshop / Epiroc Customer Center / Dealer in your area

The multi grapple cannot be rotated

Cause	Remedy	By
Rotation motor / gear unit / rotary transmission defective	Check rotation motor / gear unit / rotary transmission and replace defective parts	Epiroc Customer Center / Dealer in your area

Operating temperature too high

Cause	Remedy	By
Oil level in tank too low	Check oil level and top up oil	Carrier driver or workshop
Carrier pump delivery too high; a constant volume of oil is squirted out of the pressure relief valve	Check and correct motor speed of carrier Drive the pump	Epiroc Customer Center / Dealer in your area
Pressure relief valve defective or valve with poor characteristics	Fit new type-tested pressure relief cartridges or a more precise pressure-limiting valve	Workshop or Epiroc Customer Center / Dealer in your area

Oil leaks from hydraulic ports

Cause	Remedy	By
Cap nuts are loose	Check and tighten cap nuts (see chapter <i>Bolt connections/ Tightening torques</i>)	Carrier driver

Insufficient lubrication

Cause	Remedy	By
Intervals between lubrication too long	Check lubrication and lubricate (see chapter <i>Lubrication</i>)	Carrier driver

Repair

⚠ WARNING Hydraulic system under high pressure

Carrying out repairs on the pressurised hydraulic attachment may lead to serious injury. Connections may come loose unexpectedly, parts may move suddenly and hydraulic oil may squirt out.

- ▶ Depressurise the hydraulic system before carrying out repairs to the hydraulic attachment or the carrier (see chapter *Depressurising the hydraulic system*).
- ◆ For technical support contact the Epiroc Customer Center / Dealer in your area.

Sending in the hydraulic attachment for repairs

NOTICE Mixed hydraulic oil

Never mix mineral and non-mineral hydraulic oils! Even small traces of mineral oil mixed in with non-mineral oil can result in damage to both the hydraulic attachment and the carrier. Non-mineral oil loses its biodegradability.

- ▶ Only use one type of hydraulic oil.
- ◆ Always specify which hydraulic oil has been used when sending in the hydraulic attachment to have it repaired.

Storage

Multi grapple

⚠ WARNING Falling multi grapple

The multi grapple is heavy. If it topples over where it is stored, it may cause injury.

- ▶ Store the multi grapple on squared timbers or a pallet on a horizontal base.

The following procedure applies to storage:

- ◆ Open the grapple leaves.
There is less oil in the multi grapple if the grapple leaves are open. In the event of a leak, less oil is lost and the environmental damage is less.
- ◆ Remove the multi grapple from the carrier (see chapter *Removing the hydraulic attachment from the carrier*).
- ◆ Store the multi grapple in a dry, well-ventilated room.
- ◆ If storage is only possible outdoors, then the multi grapple is to be protected from the weather with plastic film or tarpaulins.

Grease cartridges

⚠ WARNING Fire and harmful vapors

Cutter grease can burn and cause serious fire. Harmful vapors are generated when cutter grease is burnt.

- ▶ Never store grease cartridges near fire-propagating or self-igniting substances.
- ▶ Do not expose the grease cartridges to direct sunlight.
- ◆ Store the grease cartridges in a cool, properly ventilated room.

Disposal

NOTICE Environmental damage due to consumables

Hydraulic oil and cutter grease are environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any such consumables which may escape.
- ▶ Dispose of them in accordance with the applicable environmental regulations.

Multi grapple

- ◆ Remove the multi grapple from the carrier (see chapter *Removing the hydraulic attachment from the carrier*).
- ◆ Remove the adapter plate (see chapter *Removing the adapter plate*).
- ◆ Remove the hydraulic hoses from the multi grapple.
- ◆ Dispose of the multi grapple in accordance with all applicable regulations or consult an authorised and specialised recycling company.

Hydraulic hoses

- ◆ Drain the hydraulic oil from the hydraulic hoses and collect it.
- ◆ Dispose of the hydraulic hoses in accordance with the applicable regulations to avoid environmental hazards.

Hydraulic oil

- ◆ Collect any hydraulic oil that escapes.
- ◆ Dispose of it in accordance with the applicable environmental regulations.

Cutter grease and grease cartridges

- ◆ Dispose of cutter grease and not completely emptied grease cartridges in accordance with the applicable regulations.
- ◆ Completely emptied grease cartridges can be recycled.

Technical specifications

MG 100, MG 200, MG 300, MG 400

Type	MG 100	MG 200	MG 300	MG 400
Carrier weight class	0.7 – 1.2 t	1.2 – 3.0 t	2 – 5 t	4 – 8 t
	1543 - 2646 lbs	2646 - 6614 lbs	4409 - 11023 lbs	8818 - 17637 lbs
Service weight ¹	90 kg	175 kg	290 kg	450 kg
	198 lbs	386 lbs	639 lbs	992 lbs
Dimensions				
Jaw opening / max.	600 mm	750 mm	1100 mm	1400 mm
	23.62 in.	29.53 in.	43.31 in.	55.12 in.
Leaf width	300 mm	450 mm	500 mm	600 mm
	11.81 in.	17.72 in.	19.69 in.	23.62 in.
Height	600 mm	650 mm	750 mm	850 mm
	24.41 in.	25.59 in.	29.53 in.	33.47 in.
Max. closing force	0.6 t 1323 lbs	1.5 t 3307 lbs	2.0 t 4409 lbs	2.3 t 5071 lbs
Capacity(SAE)	30 l 7.9 gal	70 l 18.5 gal	100 l 26.4 gal	150 l 39.6 gal
Operating pressure				
Open / Close	300 bar 4350 psi	300 bar 4350 psi	300 bar 4350 psi	300 bar 4350 psi
Turn	150 - 170 bar 2175 - 2465 psi	150 - 170 bar 2175 - 2465 psi	150 - 170 bar 2175 - 2465 psi	150 - 170 bar 2175 - 2465 psi
Oil flow				
Open / Close	15 l/min 4.0 gal/min	25 l/min 6.6 gal/min	35 l/min 9.2 gal/min	40 l/min 10.6 gal/min
Turn	3 - 5 l/min 0.8 - 1.3 gal/min	5 - 10 l/min 1.3 - 2.6 gal/min	5 - 10 l/min 1.3 - 2.6 gal/min	10 - 15 l/min 2.6 - 4.0 gal/min
Hydraulic connections ²				
Open / Close	M 16 x 1.5	M 20 x 1.5	M 20 x 1.5	M 20 x 1.5
Turn	M 16 x 1.5	M 16 x 1.5	M 16 x 1.5	M 16 x 1.5
Hose lines (inside diameter)				
Open / Close	8 mm 0.32 in.	8 mm 0.32 in.	8 mm 0.32 in.	8 mm 0.32 in.
Turn	8 mm 0.32 in.	8 mm 0.32 in.	8 mm 0.32 in.	8 mm 0.32 in.
Pipework (diameter and wall thickness)				
Open / Close	10 x 1.5 mm 0.39 x 0.06 in.	12 x 1.5 mm 0.47 x 0.06 in.	12 x 1.5 mm 0.47 x 0.06 in.	12 x 1.5 mm 0.47 x 0.06 in.
Turn	10 x 1.5 mm 0.39 x 0.06 in.	10 x 1.5 mm 0.39 x 0.06 in.	10 x 1.5 mm 0.39 x 0.06 in.	10 x 1.5 mm 0.39 x 0.06 in.

¹ Multi grapple including adapter plate of medium size
Please note that the working weight can be considerably higher, depending on the adapter plate.

² Sealing cone with 24°

MG 500, MG 800, MG 1000, MG 1500

Type	MG 500	MG 800	MG 1000	MG 1500
Carrier weight class	5 – 9 t	10 – 16 t	12 – 20 t	16 – 24 t
	11023 - 19841 lbs	22046 - 35274 lbs	26455 - 44092 lbs	35274 - 52910 lbs
Service weight ¹	460 kg	825 kg	1150 kg	1700 kg
	1014 lbs	1819 lbs	2535 lbs	3748 lbs
Dimensions				
Jaw opening / max.	1500 mm	1800 mm	1950 mm	2100 mm
	59.06 in.	70.87 in.	76.77 in.	82.68 in.
Leaf width	700 mm	800 mm	800 mm	1000 mm
	27.56 in.	31.50 in.	31.50 in.	39.37 in.
Height	900 mm	1150 mm	1300 mm	1500 mm
	35.44 in.	45.28 in.	51.18 in.	59.06 in.
Max. closing force	2.4 t 5291 lbs	3.8 t 8377 lbs	4.6 t 10141 lbs	6.8 t 14991 lbs
Capacity(SAE)	200 l 52.8 gal	400 l 105.7 gal	500 l 132.1 gal	700 l 184.9 gal
Operating pressure				
Open / Close	300 bar	350 bar	350 bar	350 bar
	4350 psi	5075 psi	5075 psi	5075 psi
Turn	150 - 170 bar	190 - 210 bar	190 - 210 bar	190 - 210 bar
	2176 - 2466 psi	2756 - 3046 psi	2756 - 3046 psi	2756 - 3046 psi
Oil flow				
Open / Close	35 - 50 l/min	70 - 100 l/min	85 -120 l/min	120 - 170 l/min
	9.2 - 13.2 gal/min	18.5 - 26.4 gal/min	22.5 - 31.7 gal/min	31.7 - 44.9 gal/min
Turn	10 - 15 l/min	20 - 25 l/min	20 - 25 l/min	20 - 25 l/min
	2.6 - 4.0 gal/min	5.3 - 6.6 gal/min	5.3 - 6.6 gal/min	5.3 - 6.6 gal/min
Hydraulic connections ²				
Open / Close	M 20 x 1.5	M 36 x 2	M 36 x 2	M 36 x 2
	M 16 x 1.5	M 20 x 1.5	M 20 x 1.5	M 20 x 1.5
Hose lines (inside diameter)				
Open / Close	8 mm	20 mm	20 mm	20 mm
	0.32 in.	0.79 in.	0.79 in.	0.79 in.
Turn	8 mm	8 mm	8 mm	8 mm
	0.32 in.	0.32 in.	0.32 in.	0.32 in.
Pipework (diameter and wall thickness)				
Open / Close	12 x 1.5 mm	25 x 4 mm	25 x 4 mm	25 x 4 mm
	0.47 x 0.06 in.	0.98 x 0.16 in.	0.98 x 0.16 in.	0.98 x 0.16 in.
Turn	12 x 1.5 mm	12 x 1.5 mm	12 x 1.5 mm	12 x 1.5 mm
	0.47 x 0.06 in.	0.47 x 0.06 in.	0.47 x 0.06 in.	0.47 x 0.06 in.

¹ Multi grapple including adapter plate of medium size

Please note that the working weight can be considerably higher, depending on the adapter plate.

² Sealing cone with 24°

MG 1800, MG 2300, MG 2700

Type	MG 1800	MG 2300	MG 2700
Carrier weight class	20 – 28 t 44092 - 61729 lbs	25 – 38 t 55115 - 83775 lbs	28 – 45 t 61729 - 99208 lbs
Service weight ¹	1800 kg 3968 lbs	2280 kg 5026 lbs	2750 kg 6063 lbs
Dimensions			
Jaw opening / max.	2100 mm 82.68 in.	2250 mm 88.58 in.	2230 mm 87.80 in.
Leaf width	1200 mm 47.24 in.	1200 mm 47.24 in.	1200 mm 47.24 in.
Height	1500 mm 59.06 in.	1650 mm 64.96 in.	1700 mm 66.93 in.
Max. closing force	6.8 t 14991 lbs	8.0 t 17637 lbs	9.0 t 19841 lbs
Capacity(SAE)	850 l 226.6 gal	900 l 237.8 gal	1000 l 264.2 gal
Operating pressure			
Open / Close	350 bar 5075 psi	350 bar 5075 psi	350 bar 5075 psi
Turn	190 - 210 bar 2756 - 3046 psi	190 - 210 bar 2756 - 3046 psi	190 - 210 bar 2756 - 3046 psi
Oil flow			
Open / Close	150 - 170 l/min 39.6 - 44.9 gal/min	160 - 180 l/min 42.3 - 47.6 gal/min	180 - 200 l/min 47.6 - 52.8 gal/min
Turn	30 - 35 l/min 7.9 - 9.3 gal/min	30 - 35 l/min 7.9 - 9.3 gal/min	30 - 35 l/min 7.9 - 9.3 gal/min
Hydraulic connections ²			
Open / Close	M 36 x 2	M 42 x 2	M 42 x 2
Turn	M 20 x 1.5	M 20 x 1.5	M 20 x 1.5
Hose lines (inside diameter)			
Open / Close	20 mm 0.79 in.	25 mm 0.98 in.	25 mm 0.98 in.
Turn	8 mm 0.32 in.	8 mm 0.32 in.	8 mm 0.32 in.
Pipework (diameter and wall thickness)			
Open / Close	25 x 4 mm 0.98 x 0.16 in.	30 x 5 mm 1.18 x 0.20 in.	30 x 5 mm 1.18 x 0.20 in.
Turn	12 x 1.5 mm 0.47 x 0.06 in.	12 x 1.5 mm 0.47 x 0.06 in.	12 x 1.5 mm 0.47 x 0.06 in.

¹ Multi grapple including adapter plate of medium size
Please note that the working weight can be considerably higher, depending on the adapter plate.

² Sealing cone with 24°

MG 3000, MG 5000

Type	MG 3000	MG 5000
Carrier weight class	35 – 50 t 77162 - 110231 lbs	45 – 100 t 99208 - 220462 lbs
Service weight ¹	3250 kg 7165 lbs	5300 kg 11685 lbs
Dimensions		
Jaw opening / max.	2460 mm 96.85 in.	3000 mm 118.11 in.
Leaf width	1500 mm 59.06 in.	1500 mm 59.06 in.
Height	1800 mm 70.87 in.	2000 mm 78.74 in.
Max. closing force	9.0 t 19841 lbs	13.0 t 28660 lbs
Capacity(SAE)	1300 l 343.4 gal	1600 l 422.7 gal
Operating pressure		
Open / Close	350 bar 5075 psi	350 bar 5075 psi
Turn	190 - 210 bar 2756 - 3046 psi	190 - 210 bar 2756 - 3046 psi
Oil flow		
Open / Close	180 - 200 l/min 47.6 - 52.8 gal/min	280 - 300 l/min 74.0 - 79.3 gal/min
Turn	30 - 35 l/min 7.9 - 9.3 gal/min	50 - 60 l/min 13.2 - 15.9 gal/min
Hydraulic connections ²		
Open / Close	M 42 x 2	SAE 1" 6000 psi
Turn	M 20 x 1.5	M 26 x 1.5
Hose lines (inside diameter)		
Open / Close	25 mm 0.98 in.	25 mm 0.98 in.
Turn	8 mm 0.32 in.	16 mm 0.63 in.
Pipework (diameter and wall thickness)		
Open / Close	30 x 5 mm 1.18 x 0.20 in.	30 x 5 mm 1.18 x 0.20 in.
Turn	12 x 1.5 mm 0.47 x 0.06 in.	18 x 2 mm 0.71 x 0.08 in.

¹ Multi grapple including adapter plate of medium size
Please note that the working weight can be considerably higher, depending on the adapter plate.

² Sealing cone with 24°

EC Declaration of Conformity (EC Directive 2006/42/EC)

We, Construction Tools GmbH, hereby declare that the machines listed below conform to the provisions of EC Directive 2006/42/EC (Machinery Directive), and the harmonised standards mentioned below.

Multi grapple	Part number
MG 100	3363 1036 50
MG 200	3363 1036 51
MG 300	3363 1036 52
MG 400	3363 1036 53
MG 500	3363 0982 20
MG 800	3363 0982 21
MG 1000	3363 0982 22
MG 1500	3363 0982 23
MG 1800	3363 0982 24
MG 2300	3363 1124 62
MG 2700	3363 0982 25
MG 3000	3363 1167 56
MG 5000	3363 1036 55

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