KINSHOFER crane and excavator attachments

Operating manual

Hydraulic breaker

KSB

May 2019 [EN]

Subject to changes incurred through continuing product development and improvement.

Editor of the original operating instructions* and
Manufacturer of the attachment:

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*** The Original Operating Instructions, for which the manufacturer accepts responsibility, is the language German. All other languages are a Translation of the Original Operating Instructions.**

Table of Contents

1. Important notes

These instructions apply to the attachment pictured on the title page, which was developed and produced with the utmost dedication. Technical information, mounting and maintenance instructions are provided in this manual.

Service manual and spare parts list
A service manual is available upon request for carrying out repairs on premium line products. A spare parts list can be ordered for all products.

We will be happy to help if you have any questions about the product.
The telephone / fax numbers and the e-mail / Internet addresses are provided at the end of this operating manual.
In order to receive quick and accurate service, state the **serial number** of the attachment.
The serial number is provided on the type plate, on the delivery documents, on the receipt on the conformity declaration and engraved on the attachment.

WARNING
If the delivered attachment is not properly installed, operated and maintained, the attachment and/or carried load could fall down causing serious injuries or damage to property.

Installation, operation and maintenance of the attachment may only be carried out by authorised, trained and experienced personnel.
Before beginning, these personnel must read and understand the following information:

- the operating and safety instructions for the attachment
- the separate**"Safety instructions"** booklet (see **Safety instructions** chapter)
- the instructions for the carrier and other equipment, such as a quick coupler

Failure to observe these instructions may lead to accidents, downtimes, and loss of warranty.

1.1. Safety instructions

These operating instructions are valid only in conjunction with the **„Safety instructions“** booklet, which is delivered with every attachment.
If the booklet is missing, it can be requested free of charge for all EU languages using article number **194079333**.
In the event of discrepancies between these operating instructions and the **„Safety instructions“** booklet, the information in these operating instructions shall have priority.

1.2. Protection measures and safety

WARNING
The installer, operator and maintenance personnel must wear **personal safety equipment** (**PSE**) and comply with the **safety regulations** in force in the country in which the attachment is used.

DANGER
The manufacturer shall assume **no liability** in the event of accidents in which the fitter, operator or maintenance personnel does not wear suitable **personal safety equipment (PSE)**, does not maintain it properly or it is defective.

1.3. Statutory safety and accident prevention

The following regulations apply:

EC **European directives**
EC Directive 2006/42/EC
EC Directive 2003/37/EC

DIN EN ISO **Harmonised standards used:**
DIN EN ISO 4413 Hydraulic fluid power – General rules
DIN EN 474-1 Earth-moving machinery – Safety
DIN EN ISO 12100 Safety of machinery – General design principles
German standards used:
DIN 15428 Lifting equipment – Technical delivery conditions

BGR **Safety and health rules at work – BGR (Germany)**
BGR A1 Basic principle of prevention
BGR 137 Handling of hydraulic liquids
BGR 500 Operation of work equipment

LOCAL **Safety and health regulations for your country**

1.3.1. Safety guidelines for vibrations and noise emissions

EC **European Directive**
Directive 2002/44/EC - Vibration
Directive 2000/14/EC - Noise emission

DIN EN ISO **Harmonised standards used:**
DIN EN ISO 11200 Acoustics - Noise emitted by machinery and equipment
DIN EN ISO 3744 Sound pressure measurement - Noise power and noise energy levels

1.4. Explanation of symbols

Symbol classification

The following classifications are defined according to **ANSI Z535.6-2011** (based on **ISO 3864**) and provide immediate information on the degree of hazard.

NOTICE
In order to avoid personal injury and damage to property, all instructions following these safety signs must be followed.

Safety signs	Description
	Signal word **DANGER** **Extremely dangerous** situation, where failure to observe the safety instruction will lead to **death or serious injury**.
	Signal word **WARNING** **Dangerous** situation, where failure to observe the safety instruction could lead to **death or serious injury**.
	Signal word **CAUTION** **Dangerous** situation, where failure to observe the safety instruction could lead to **minor injuries**.
	Signal word **NOTICE** Indicates **improper handling** which can lead to **damage to property** .
	This symbol indicates a **Notice** of important information.
	This symbol highlights **information** as well as useful **tips** and **recommendations** for efficient and trouble-free operation.

1.5. Notice, danger and warning signs

During the planning and manufacture of this device, great care was taken to ensure that it can be operated safely and efficiently.
Information, danger and **warning signs** required for the use of the device, as well as the legally prescribed signs, are positioned in a clearly visible and safe manner.
If any of the signage is damaged during transport or on site, it must be replaced immediately.

Notice, warning, danger, and prohibited signs		Description
		Observe all information and instructions in the **operating manual**.
		Close off and secure the danger area. Keep a safe distance of **15 m** during operation.
		**Warning: Danger of injury:** Before disconnecting the hydraulic connections, bleed the hydraulic pressure off of the lines.
		WARNING: Danger of injury: Falling material.
		**Warning: Danger to life:** High-voltage lines safety clearance.
		WARNING: Danger of injury: Do not operate/drive on terrain contours, steep gradients, or critical ground conditions - risk of tipping.
		**WARNING: Danger of injury**: Hot surface (danger of burns).
		WARNING: Danger of injury: Close the protective screen/cabin - protection against stone impact.
		**WARNING: Danger to life**: Electrical potential (electric shock).
		Greasing points
		**WARNING: Danger of injury**: DO NOT lubricate or adjust the machine during operation.

1.6. Requisite personnel

Insufficient qualifications

DANGER
Danger in case of insufficiently-qualified individuals!
Inadequately-qualified individuals cannot assess the risks of operating the machine; they place themselves or others in **danger of severe** or **fatal injury**!
- Permit only qualified personnel to perform all tasks.
- Keep all insufficiently-qualified individuals away from the work site.

Personnel qualifications

Various duties described in this operating manual present distinct challenges to associated personnel.
In choosing personnel, always follow applicable age- and job-related regulations!
Consider as personnel only those individuals who can be depended upon to do their work reliably.
Individuals whose reactions are compromised by use of drugs, alcohol, or medications are not authorized.

Instructed persons

Instructed persons are those individuals who have been thoroughly and verifiably instructed in the tasks entrusted to them and the possible dangers involved.

Instruction

Personnel are to be instructed at regular intervals. For improved tracking, create an instruction log containing at least: the following information:
- Date
- Trainee's name
- Type/subject of instruction
- Instructor's name
- Signature fields for the instructor and the trainee

Target groups

These installation instructions are aimed at the following target groups:

- Service personnel of the manufacturer.
- Workshop personnel of a certified partner.

Service personnel Manufacturer

Personnel who carry out the installation and commissioning work.

Certified partner's workshop personnel

Personnel who carry out the installation and commissioning work. They are professionally trained and have successfully completed manufacturer's training.

1.7. Personal safety equipment (PSE)

CAUTION
Personal safety equipment (**PSE**) serves to protect individuals' health and safety in the workplace.
The **potential hazards** covered with the help of the personal safety equipment include:
» **Physical**, **chemical**, **biological** and **electrical** hazards,
» Hazards due to **heat**, **sparks** and **fire**
» As well as hazards due to **fine dust** in the air.

NOTICE
The following **mandatory signs** and **prohibition signs** used in this operating manual and on the machine indicate to the user that these safety measures are required and must be followed at all times during operation:

Symbol	Regulatory sign
	**Protective clothing** Protective clothing consists of a closely-fitting, non-flammable overall having low resistance to tearing, narrow sleeves, and without protruding parts. It serves chiefly to protect against entrapment by moving parts. Also, do not wear rings, chains, or other jewellery.
	**Protective gloves** Wearing protective gloves protects the hands from liquids harmful to the skin, injuries such as abrasions and minor cuts.
	**Safety shoes** Safety shoes protect the feet from crushing, from falling objects, and from slipping on slick surfaces.
	**Protective helmet** A protective helmet shields the head from falling objects, swinging loads, and collisions with fixed objects.
	**Safety glasses** Safety glasses serve to protect eyes from flying objects and splattering liquids.
	**Face protection** The face protection protects the whole face from sparks, flying parts and from splashing oils, chemicals or other liquids.
	**Hearing protection** By wearing hearing protection, such as e.g. capsule hearing protection or earplugs, permanent hearing damage caused by high noise levels (engine or machine noise) can be prevented.
	**Hair nets** For longer, loose hair, make sure that the operator or user wears a hair net. This prevents possible entanglement in moving, tilting or rotating machine parts.
Symbol	**Prohibition sign**
	**Open clothing** Care must be taken that no open, wide or loose clothing is worn, so that it cannot get caught in moving, rotating, tilting or rotating machine parts!

1.8. Damage to health due to vibrations

WARNING
Vibrations can cause damage to health.
The max. daily stipulated working shall not be exceeded.

EC Directive 2002/44/EC

Exposure limit values and **action levels** for full body vibrations (standardised to a reference time period of 8 hours daily):

1. **Exposure limit value** determined as **1.15 m/s**^{2}
   Or, if desired by a member state:
   Vibration exposure value determined as **21 m/s**$^{1.75}$.

2. **Action value** determined as **0.55 m/s**^{2}
   Or, if desired by a member state:
   Vibration exposure value determined as **9.1 m/s**$^{1.75}$.

Vibrations arising during operation and transferred to the carrier machine and the operator. The intensity of these vibrations varies depending on the material being processed.
The maximum working time for which the operator is permitted to be exposed to these vibrations in any given day, is stipulated in the following table:

Intensity of the vibrations	Max. daily working time [h]
Light	8
Moderate	6
Heavy	4

1.9. Residual risks

The following section identifies residual risks that were ascertained on the basis of a risk assessment.
To reduce the risk of personal injury and property damage and to prevent dangerous situations, this and ensuing sections present specific **safety information** to be taken into account.

DANGER

Suspended loads
Life-threatening danger from suspended loads!
Falling loads can lead to severe injury, including death.
- Never walk beneath suspended loads.
- Move loads only under supervision.
- Ensure that loads are balanced.
- Remove and secure the load before leaving the work site.
  Do not impede the machine in the work area.

NOTICE

Structural modifications
No structural modifications or changes to settings may be made to the attachment or its components!
Unauthorized alterations may lead to the loss of operational reliability, property damage, or may void the warranty.
- Follow directives as they are described in these operating instructions.
  - If you have additional questions, contact the manufacturer.
- Do not weld the attachment until after
  - you have consulted the manufacturer
  - and received welding instructions.
- Do not tamper with safety devices under any circumstances.

WARNING

Incorrect replacement parts
Incorrect replacement parts pose a danger of injury!
Incorrect or faulty replacement parts compromise on-the-job safety and can cause serious injury or lead to malfunctions, damage to the machine, or complete failure.
- Use only approved, original spare parts.
  - Original spare parts can be acquired from distributors or directly from the manufacturer.
  - For questions to the suitability of components, accessories, and replacement parts:
    Contact the on-site operations manager or the manufacturer.

CAUTION

Noise
Hearing loss resulting from noise!
The noise from operating the grab can cause permanent hearing loss.
- Always wear **hearing protection** when at work.
- During operation, see that no one is **within 10 meters** of the machine or the grab.
- Personnel in the **danger zone**: **Cease work immediately!**

NOTICE

Environmental hazards
Incorrect handling or disposal of materials hazardous to the environment can cause significant environmental damage.
- Remove old or excess grease from lubrication points.
- Collect waste oil and grease in suitable containers.
- Observe local regulations for waste disposal.
- Immediately initiate suitable countermeasures if dangerous materials enter the environment, and inform the appropriate local authorities.

WARNING

Hydraulic systems
Life-threatening danger from hydraulic energy!
Hydraulic energy can cause serious injury, including death. Hydraulically-actuated parts can move unexpectedly. Hydraulic fluid under high pressure can escape as a result of damage to individual components.
- Permit only trained personnel to work on hydraulic equipment.
- Before beginning work on hydraulic equipment, turn off the drive motor and secure it against restarting.
- Relieve pressure in all hydraulic conduits and check for absence of pressure.
- Remove all air from newly attached hydraulic components.
- Do not change pressure settings above the specified maximum values.
- Inspect and replace hydraulic hoses according to the maintenance check-list.

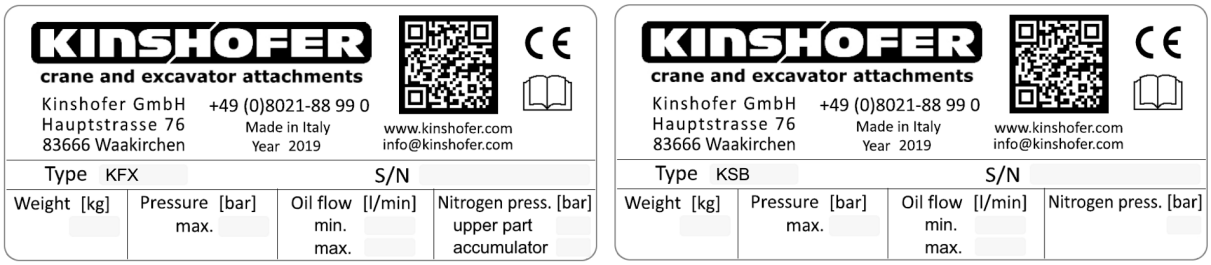
DANGER

Life-threatening danger from high-pressure hydraulic fluid!
- Thin sprays of **high-pressure hydraulic fluid** can **penetrate skin** - immediately call for medical help.
- **Do not use your finger** to search for any leaks.
- **Do not place your face** close to suspected leaks.

1.10. Type plates

NOTICE
The type plate, as shown below or similar, is fastened to the attachment and must be kept clearly legible:

Type plates [KFX / KSB]



1.11. Transport, Unloading and Packaging

The attachment is carefully packed by the manufacturer in order to avoid damage during transportation.

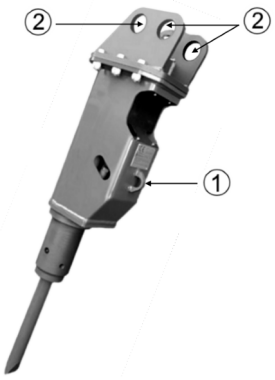
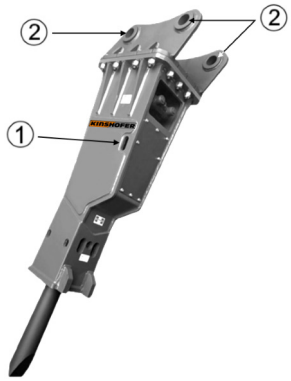
WARNING
Personal injuries and damage to property can be caused by lifted loads falling down.

- Observe the weight information and any symbols which are attached to the transportation packaging.
- Use lifting equipment with sufficient carrying capacity to unload the attachment from the transport vehicle.

1.12. Hydraulic breaker lifting points and storage

The corresponding hooks or rings on the housing (pos. 1) or, alternatively, the holes of the adapter (pos. 2) with the corresponding lifting tools (e.g. Rings, chains, belts, etc.) must be used to transport or move the hydraulic breaker.

NOTICE
To prevent uncontrolled tilting or overload when lifting the attachment (e.g. using hoists, straps, belts, etc.), it must be ensured that the adapter is moved in the middle.

Lifting points - hydraulic breaker		Pos.	Description
 KSB	 KFX	1	Hooks and rings (housing)
		2	Holes (adapter)

Storage
To prevent rusting and other damage, for example to the seals, the breaker must be placed and stored in an upright position.

1.13. Incoming goods inspection

NOTICE
Unpack the delivered goods carefully so that no parts remain in the packaging. Immediately after unpacking, check:

- The attachment as well as any accessory parts delivered with it for transport damage and defects.
- The completeness of the delivery with reference to the delivery note.

Use the original packaging for any return shipping. Dispose of the packaging in accordance with regional regulations.

1.14. Service link

- Spare parts
- Technical support
- Returns

Service link *http://www.kinshofer.com/eng/index.php/en/service*

2. Product information

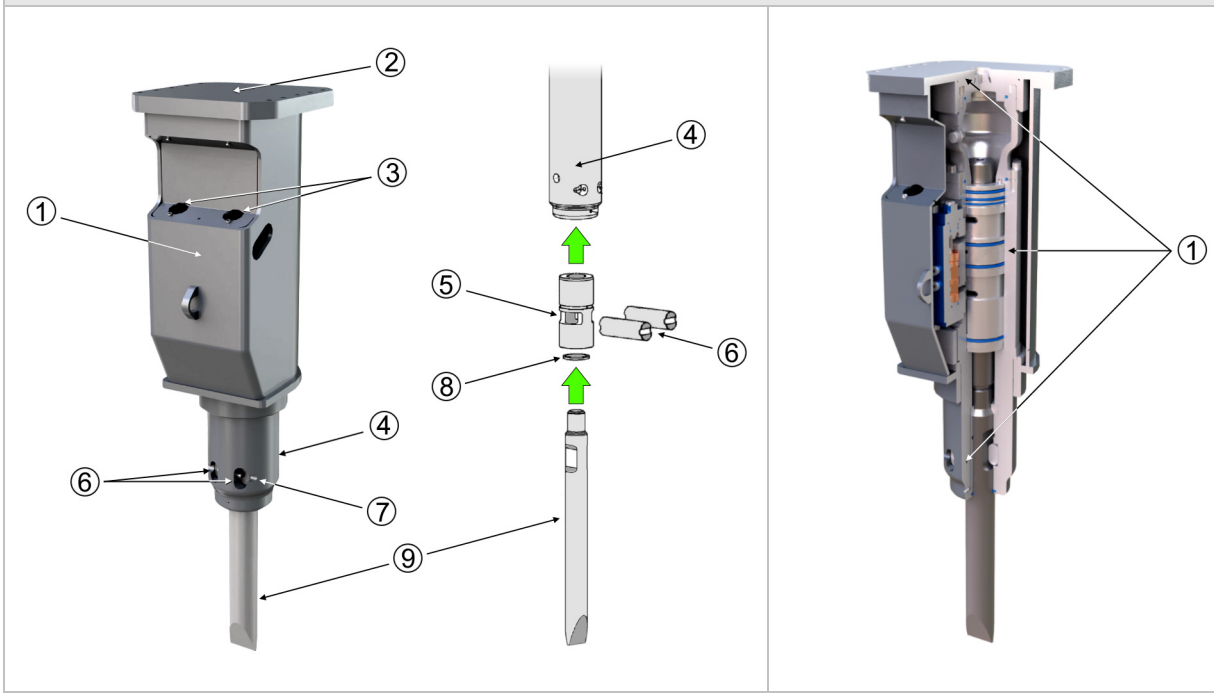
2.1. Product overview

This operating manual applies to the following **hydraulic breaker**:

Type	KSB01	KSB02	KSB03	KSB04	KSB06	KSB08	KSB10	KSB12

The version delivered can be found on the accompanying paperwork (e.g. delivery note).

KSB - hydraulic breaker



Pos.	Description
1	Housing (monoblock design)
2	Flange (adapter plate)
3	Hydraulic connections (IN/OUT)
4	Cylinder housing (tool holder)
5	Bush
6	1 x holding pin (KSB01) 2 x holding pin (KSB02-12)
7	Spring pressure pin
8	Dust seal
9	Tool (chisel)

2.2. Intended use

The **KSB - hydraulic breaker** is designed for use on the excavator with an operating weight of **0.5 – 12 t** and is mounted onto the carrier machine using the quick coupler or direct attachment.
It is operated and controlled via the hydraulic circuit of the carrier machine.

NOTICE
The **operating weights** of the carrier machines and attachments must be adapted to each other (see chapter **Technical data**).

NOTICE
All uses other than those listed in chapter **Intended use** are misuse and can lead to hazardous situations, operational interruptions, and to voiding the warranty.

- The breaker is used to smash different types of materials (e.g. stone, concrete, asphalt, earth, etc.).
- The maximum permissible back pressure is 2.5 MPa (25 bar).
- The breaker works with a system for energy recovery that utilises the inertia of pressurised gas to make high-impact performance and low stress on the excavator arm possible.
- The breaker is also equipped with a system that prevents the effects of blank firing on the structure of the attachment.

2.3. Restrictions

NOTICE
All instructions and safety guidelines of the manufacturer must be observed.
Other regional safety and environmental protection regulations must be observed.

WARNING
All uses other than or in excess of those described in the **Proper intended use chapter** are considered misuse of the attachment and can lead to hazardous situations, operating faults and voiding of the warranty!
The manufacturer shall not accept and liability for resulting personal or property damage!

2.4. Foreseeable misuse

NOTICE
During daily work, it's possible that routines cause **operating errors to occur** or that instructions are ignored. This can be caused by inadequate attention or inadequate knowledge on the part of the operator.

Examples of foreseeable misuse:

- Do not beat or break with the attachment to break up conglomerate rock or other material.
- Do not use the attachment for compacting material.
- For cardanically mounted attachment: Do not use the attachment to pull or push a load by applying lateral pressure.
- Do not operate the attachment in such a manner, in which external forces are caused that exceed the allowable loads and moments of the attachment.

2.5. Safety stickers

NOTICE
All safety stickers must remain legible.

Symbol	Description	Symbol	Description
	**DANGER / WARNING / CAUTION** Before entering a hazardous situation: Pay attention to the risk of injuries, material or property damage. Follow the instructions.		Adhere to the safety clearance: At least 10 m / 30 ft.
	Before carrying out maintenance and repair work: Switch the machine off, read and comprehend the operating instructions and the safety instructions.		Warning of hand injuries: Do not guide the attachment by hand. Keep hands away from moveable / moving parts.
	Read the operating instructions, safety instructions and regional regulations carefully, and ensure you understand them to guarantee safe and proper operation and maintenance.		Warning of suspended load: Do not stand under the suspended load.

3. Technical Information

3.1. Requirements of the carrier machine

NOTICE
To operate the **hydraulic breaker**, the **1 hydraulic circuit** must be available on the carrier machine.

NOTICE
When **assembling** the hydraulic connections, make sure that the return line is always connected **first**.
When **dismantling**, always disconnect it **last**.

Requirements for the carrier machine

In order to operate the attachment correctly, set the values for the **operating pressure** and **oil flow** on the carrier machine.
The setting values are also described on the **type plate**.

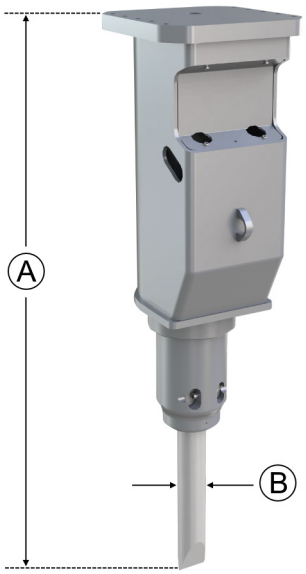
NOTICE
A higher operating pressure on the carrier is not permitted and must be reduced.

3.2. Operating pressure and oil flow

Type	Oil flow	Operating pressure	Back pressure	Hydraulic connection Pressure and tank line
	[l/min]	[MPa/bar]	[MPa/bar]	[inch]
KSB01	13 - 20	10 / 100	2.5 / 25	G1/2"
KSB02	15 - 30	11 / 110		G1/2"
KSB03	18 - 40	11 / 110		G1/2"
KSB04	25 - 55	13 / 130		G3/4"
KSB06	30 - 60	14 / 140		G3/4"
KSB08	50 - 70	16 / 160		G3/4"
KSB10	75 - 90	15 / 150		G3/4"
KSB12	85 - 110	15 / 150		G3/4"

3.3. Dimensions and technical data

KSB - hydraulic breaker



Type	KSB (with tool)	Tool (chisel)	KSB			Carrier machine
	Height A	Diameter B	Weight	Impacts	Impact energy	Operating weight
	[mm]	[mm]	[kg]	[rpm]	[J]	[t]
KSB01	900	40	70	900 - 1100	280	0.5 - 2.5
KSB02	1000	45	100	900 - 1100	400	1.2 - 3.5
KSB03	1100	48	145	900 - 1100	580	1.5 - 4.5
KSB04	1200	55	190	900 - 1100	750	2.5 - 6.5
KSB06	1250	65	250	900 - 1100	950	3.0 - 8.0
KSB08	1550	75	320	800 - 1000	1200	4.5 - 9.0
KSB10	1650	80	430	700 - 900	1700	6.0 - 11.0
KSB12	1700	90	540	600 - 800	2300	8.0 - 12.0

3.4. Noise emissions and sound power levels

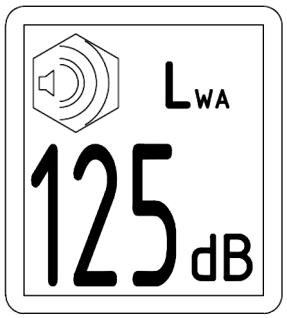
Maximum sound power level
Directive **2000/14/EC** concerning **noise emissions** from devices and machines intended for outdoor use classifies (type 13) hydraulic breakers as working equipment that are subject to the labelling requirement only (and to which the noise emission limits apply).

- **Guaranteed sound power level - hydraulic breaker:**

  $L_{W.A}$ 125 dB

In compliance with the above mentioned directive, the guaranteed **sound power level L_{WA}** is specified for every hydraulic breaker in a pictogram on the working equipment.
This sticker may not be removed or have its contents changed under any circumstances.
If it is damaged or illegible, it must be replaced.

Guaranteed sound power level L_{WA}



WARNING
Hearing damage resulting from noise!
Operating noise can cause permanent damage to hearing.
- **Hearing protection** must always be worn during the work procedure (see also chapter **Personal Safety Equipment PSE**).

4. Installation and initial operation

4.1. Assembling onto the carrier machine

- Set the attachment device down on a level and firm surface so that it cannot fall over.
- Check that the hydraulic end points (if present) on the carrier support boom are clean.
- Thoroughly remove any dirt.

NOTICE
Breakdowns and oil leaks can be caused by incorrect installation.

NOTICE
Make sure all contact surfaces of the attachment adapter and quick coupler are clean.

NOTICE
Observe the accompanying operating instructions for the quick coupler.

Mechanical attachment

Install the attachment on the carrier machine as per the ordered version:

- By means of an **adapter as a rigid mounting** (integrated on the upper part of the attachment - depending on the excavator type)
- or a **hydraulic quick coupling**.

NOTICE
The **operating weights** of the carrier machines and attachments must be adapted to each other (see chapter **Technical data**).

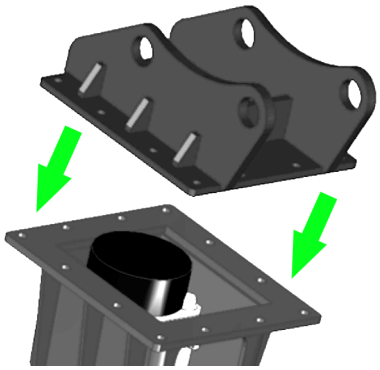
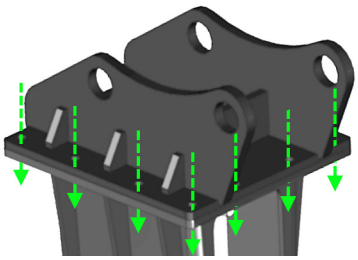
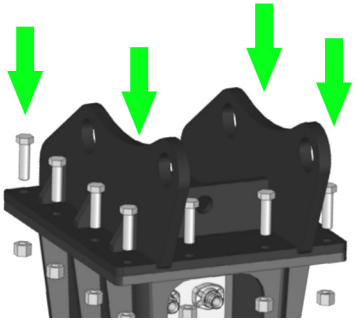
Hydraulic connection

Connect the hydraulic connections of the attachment to the hydraulic terminals on the outrigger of the carrier.

CAUTION
Lay hydraulic lines/hoses such that they will not be chafed or crushed.

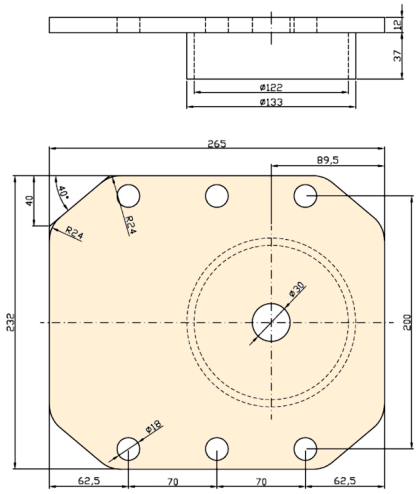
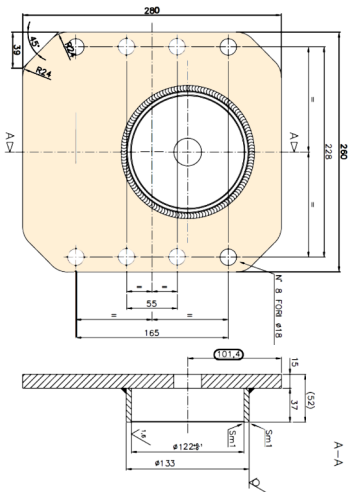
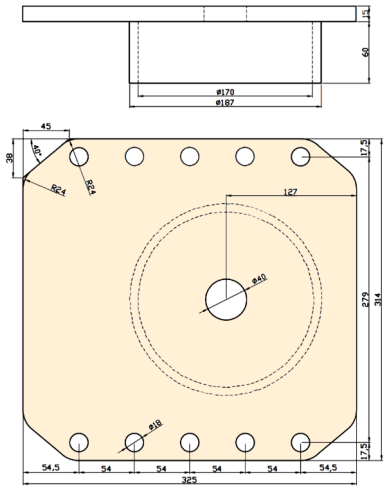
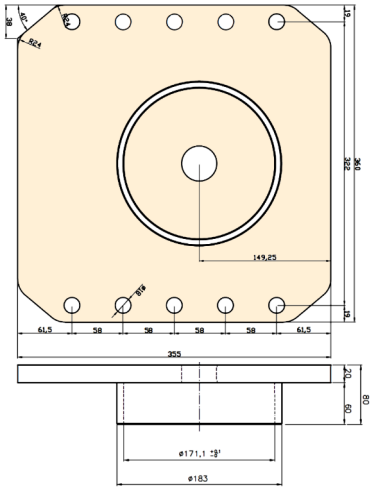
4.2. Assemble the adapter on the hydraulic breaker

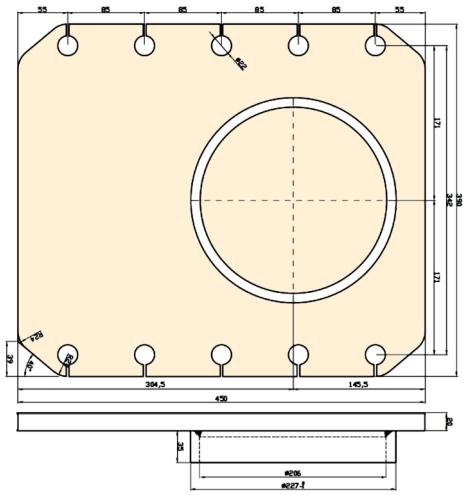
The **hydraulic breaker** of the respective type is supplied with different **hole patterns** to flange-mount an adapter.

Adapter assembly	Description
 Fig. 1	• Carefully place the adapter on the top of the breaker and align the drilled holes (fig. 1 and 2). • Insert the cylinder screws into the drilled holes and secure with washers and nuts (fig. 3) (see chapter **Maintenance - tightening torques**).
 Fig. 2	
 Fig. 3	

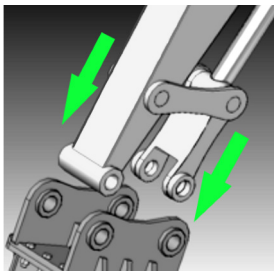
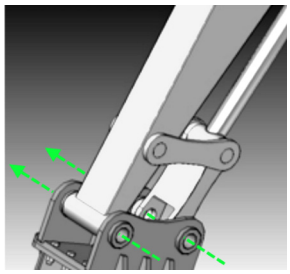
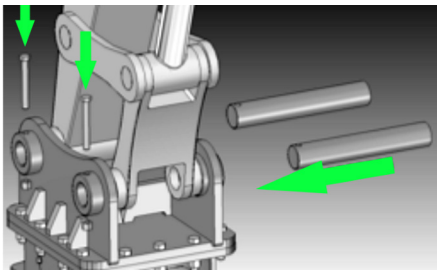
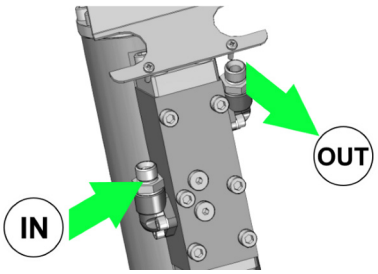
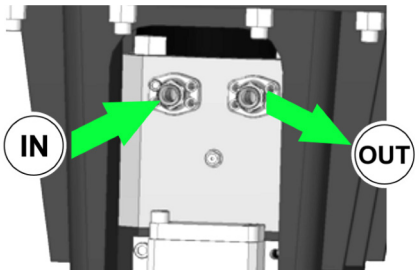
4.2.1. Hole patterns

the **hydraulic breaker** is supplied with the following **hole patterns** to flange-mount an adapter:

KSB01 + KSB02	KSB03
	
KSB04 + KSB06	**KSB08**
	

KSB10 + KSB12


4.3. Assembly and dismantling onto the carrier machine

Assembly onto the carrier machine	Description
 Fig. 1	**Assembly** • Carefully move the excavator arm (bucket arm and coupling) towards the mounted adapter of the hydraulic breaker from above (fig. 1). • Insert the bracket of the excavator arm into the adapter until flush (fig. 2). • Guide the connecting pins through the drilled holes. Guide the cylinder screws through the drilled holes of the connecting pins and secure with washers and nuts (fig. 3) (see chapter **Maintenance - tightening torques**). • Connect the hydraulic connections to the hydraulic connections (**IN/OUT**) of the breaker (fig. 4 - KSB/fig. 5 - KFX). • The **hydraulic breaker** (KSB/KFX) is ready for use. **NOTICE** The hydraulic breaker is an extension of the excavator arm; care must be taken to ensure that no collisions occur between the attachment and the carrier machine during operation. • Check the full range of movement carefully for this reason. **Dismantling** Dismantling is carried out in reverse order. **NOTICE** Before disconnecting the hydraulic connections, ensure that the breaker is set down on the ground and the engine is switched off. Next, activate the breaker a few times to bleed off the residual pressure in the hydraulic system.
 Fig. 2	
 Fig. 3	
 Fig. 4 (example: KSB)	
 Fig. 5 (example: KFX)	

4.4. Assembly inspection

The following points must be fulfilled:

- The oil flow of the attachment and the carrier machine are the same.
- The hydraulic hose for the return line is connected to the tank without return pressure.
- The hydraulic hose for the pressure line is connected properly.
- The hydraulic quick couplings are fitted properly.
- The bolted connections are fully tightened.

CAUTION
Improperly connected return lines can lead to major damage and cause accidents.
- Make sure that the return line is properly connected.

NOTICE
Performing commissioning at temperatures below -10°C (14°F) can cause damage to seals and hydraulic components due to increased hydraulic pressure.
- Switch on the hydraulic pump of the carrier machine 5 to 10 minutes before commencing work to allow the hydraulic oil to warm up.

4.5. Functional checks

Carry out a functional check of the attachment after assembly and after all related tasks have been completed.

Procedure

- Check that all mechanical and hydraulic connections are **firmly seated** and **free of leaks**. Tighten with permissible **tightening torque** as necessary (see **Maintenance chapter**).
- Check that all connected lines can move freely.
  In order to avoid wear, the lines must not rub against each other, nor be too short nor too long!
- Ensure that no **hydraulic fluid** escapes from the connections.
- Ensure that **all functions are working correctly**.

4.6. Troubleshooting

Functional fault	Cause	Remedial measures
The breaker does not move.	Tool blocked.	Remove and replace the tool.
	Defect in the rubber hose with quick connector (no oil).	Check the hose; repair/replace the quick connectors.
	Defect on the control valve of the breaker circuit.	Check and set the high-pressure valve of the excavator to 40 bar above the operating pressure of the breaker.
	Insufficient hydraulic oil in the excavator tank.	Refill to the correct oil level.
	Breaker damaged.	Remove the breaker and have the functionality checked by an expert.
Weak impact force.	Insufficient oil flow.	Restore correct oil flow; check operating pressure.
	Oil temperature in the tank is too high.	Check the oil level in the tank and the functionality of the cooling circuit.
	Insufficient oil pressure.	Check and set the high-pressure valve of the excavator to 40 bar above the operating pressure of the breaker.
	Insufficient nitrogen pressure in the upper part.	Refill the nitrogen in the upper part.
Low frequency and high energy per impact.	Tool blocked in the lower area of the upper part.	Attempt to extract the tool and mount it again.
	Breaker partially blocked.	Impact mass or other dynamic element damaged.
Oil loss from the tool.	Cylinder seals worn out.	Remove the breaker and replace all seals.
	Scratches on the piston.	Remove the piston and clean it.
Oil loss from the hydraulic connections.	Connections not tightened.	Tighten the connections to the recommended rotation torque.
	Seals leaking.	Replace the seals.
Oil loss between the upper part and the cylinder.	Seals leaking.	Replace the seals.
Operating temperature too high.	Oil flow greater than expected.	Reduce oil flow to the breaker.
	Increased ambient temperature.	Install additional heat exchangers.
	Insufficient oil in the excavator tank.	Fill to the correct oil level in the excavator tank.
	The high-pressure valve of the excavator not set.	Check and set the high-pressure valve of the excavator to 40 bar above the operating pressure of the breaker.

4.7. Commissioning

WARNING
Assembly, operation, and maintenance of the attachment may only be carried out by **authorised** and **trained** personnel.
These personnel must read and understand the operating manual!

NOTICE
- Bring the carrier into a **secure working position**.
- **No persons are permitted inside the safety zone**.

DANGER
- Before each commissioning check **safety devices**.
- Carry out a **visual and functional inspection** to ensure correct seating after every locking procedure and before starting work.
- Before starting work, perform a complete **movement play** with the attachment.
- **No operating** when **visible defects** of the attachment.

4.8. Operation of the hydraulic breaker

All installation procedures must be completed.

NOTICE
Before commissioning, ensure that the reversing valve is adjusted so that the single-acting hydraulic circuit (hammer line) is activated and the pressure line of the breaker is connected to the hammer line.
If the excavator has no breaker line, a connector must be chosen that fulfils the required technical data.

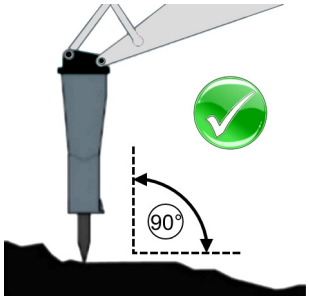
- Most problems and defects that occur during operation are therefore caused when fastening elements become loose or when leaks occur that are not immediately remedied.

- Since mechanical parts and hydraulic connections are broken in during the run-in phase, checks during this phase must be carried out with the utmost care.

- Before removing the cover on the upper part of the breaker, ensure that the pressure has been bled off completely via the nitrogen valve.

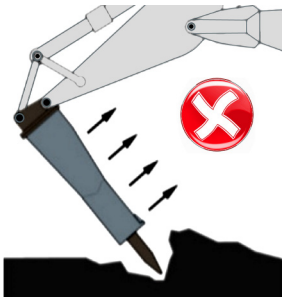
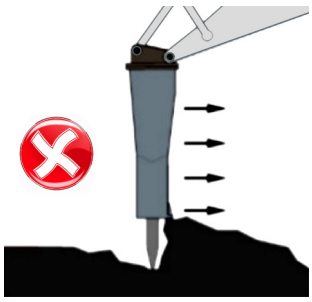
- The breaker and the hydraulic system of the carrier machine can be damaged at a temperature below **-20 °C** and with an oil temperature over **+80 °C**.
  The breaker and the hydraulic system must be warmed up at low temperatures.
  The breaker must not be used at **oil temperatures above +80 °C**, since the oil loses its lubricity, which can damage the seals.

- The breaker can work at any angle as long as the pressure always follows along the tool axis (see the following application examples):

Correct use	Incorrect use
	

NOTICE
If the force of the excavator arm on the breaker is too low or too high, undesired vibrations will occur on the breaker.
To ensure the attachment or the excavator arm do not get damaged, the correct pressure of the excavator must be determined and maintained during use.

- Do not use the hydraulic breaker and the tool as a lever or for demolition!

Incorrect use	Incorrect use
	

- Do not use in a single location for longer than 30 seconds without penetrating the material, since this can lead to overheating and damage to the point!
  In this case, chose another location to the side or look for a weak point in the material like a crack!

- Do not use the tool for lifting loads!

Incorrect use


- Despite the safety system, blank firing must be prevented to reduce damage to the fastening elements, the tool holder, and the tool!

NOTICE
As soon as the material breaks into single parts, the breaker must be switched off immediately!

- The standard breaker is not suitable for underwater work, because water will penetrate the impact chamber of the breaker and cause dangerous shock waves with each impact.
  A conversion set for such work is available upon request.

- Operate the breaker when the excavator is stable on an even and compact surface.

WARNING
In case of contact with high-voltage lines, do NOT leave the cabin of the carrier machine; move the machine until there is no longer contact and a safe distance has been reached.

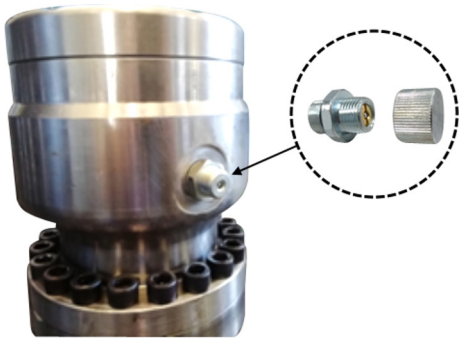
4.8.1. Gas support - nitrogen N_2

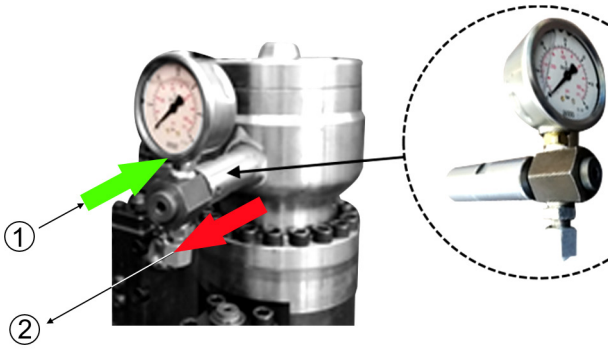
The **KSB hydraulic breaker** is equipped with a **gas support system**.
It consists of a pressure chamber filled with **nitrogen (N_2)** that is located on the upper part of the breaker.

If a **decline in performance** of the breaker is noticed, the **nitrogen pressure in the upper part** of the breaker must be checked and refilled (see table - **Nitrogen pressure guide values**):

Type		KSB01	KSB02	KSB03	KSB04	KSB06	KSB08	KSB10	KSB12
Nitrogen pressure N_2-pressure	**[MPa/bar]**	1.5 / 15	2.0 / 20	2.5 / 25	2.0 / 20	2.5 / 25	2.5 / 25	2.0 / 20	2.5 / 25

The following procedure is recommended to **check the nitrogen pressure** and **fill with nitrogen**:

Nitrogen	Description
 Fig. 1	**Check the nitrogen pressure** • Unscrew the protection cap of the filling valve (fig. 1). • Screw the manometer onto the filling valve (fig. 2). • Push the moveable sleeve with the needle of the manometer into the valve until the manometer displays pressure. • Compare the nitrogen pressure (MPa/bar) shown in the manometer with the prescribed values of the respective breaker type specified (see the following table **N_2-pressure**). • **After measuring**: Pull the moveable sleeve with needle out of the valve.

Nitrogen	Description
 Fig. 2	**Refill the nitrogen** **NOTICE** Nitrogen with a purity grade of **≥ 99.8%** must be used. • Connect the pressure reducer to the nitrogen bottle. • Connect the filling hose between the pressure reducer and the free connector on the manometer of the breaker. • Now push the moveable sleeve with the needle of the manometer into the valve again until the manometer displays pressure. • Slowly open the regulator on the pressure reducer and introduce nitrogen until the correct operating pressure. • Allow for a few minutes rest after filling. • **After a few minutes**: Pull the moveable sleeve with needle of the manometer out of the valve. Close the regulator of the nitrogen bottle again. • Unscrew the filling hose and screw the end cap onto the filling valve.

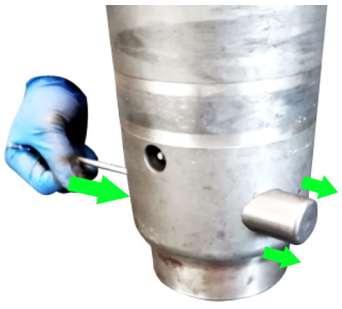
4.8.2. Tool change

The tool is fastened and secured using a holding pin in the bushing of the breaker.
The **KSB01** type is equipped with 1 holding pin, the **KSB02-12** types are equipped with 2 holding pins.

Replacing the tool To replace the tool, the spring pressure pin is pushed in using an interior hexagonal wrench until the holding pin can be removed from the hole (fig. 1).

Procedure **KSB1** with 1 holding pin:

- The spring pressure pin must be held down (fig. 2) so that the holding pin can be removed from the opposite site of the hole (fig. 3) using an extractor.
- The tool sits freely in the cylinder housing and can be removed.

Tool change		
 Fig. 1	 Fig. 2	 Fig. 3

Procedure **KSB2-12** with 2 holding pins:

- Completely knock out the blocking/locking pin with the extractor and breaker.
- The holding pins are free and can be removed from the holes on the opposite side.
- The tool sits freely in the cylinder housing and can be removed.

- Before assembling a new tool, the clamping bush and the holding pins must be cleaned and lubricated with molybdenum disulphide.
- Insert the tool into the cylinder housing and complete assembly in reverse order.

NOTICE
Ensure that the spring pressure pin is completely extended and locked in position.

DANGER
Replacing the tool or removing the lock (holding pin, blocking/locking pin, spring pressure pin) with the machine running can cause damage to the attachment and severe injuries.

DANGER
Before the breaker is started, the protective screen or the splinter protection of the driver cabin must be closed so that the driver is protected from potential stone impact during operation!
Ensure that there are no persons within the safety distance of 20 m!

NOTICE
Ensure that the tool has made contact with the material, and exert pressure on the breaker using the excavator arm before starting the breaker.
The front part of the excavator can be lifted a few centimetres to increase the pressure on the tool.

4.8.3. Setting the stroke rate

There are no configuration options for the **stroke rate** of the **KSB breaker**.
A small but useful setting is possible for work using the control system of the excavator (see chapter **Operating pressure and oil flow**) that adjusts the oil amount of the breaker line.

5. Shut down

Procedure

1. Set the attachment down on a **horizontal** and **stable surface** before dismantling from the carrier.
2. **Switch off** the carrier's **drive**.
3. **Switch on the ignition**.
4. Actuate all hydraulic valves in the control circuits for the attachment until all of the pressure in the attachment or in the hydraulic lines has been dissipated - then check the system that it is **free of pressure**.
5. Secure the attachment or the carrier machine to prevent **erroneous** or **unauthorised** starting up.
6. **Disconnect** the mechanical and hydraulic **connections** to the carrier.

NOTICE
Observe further requirements for shutting down as described in the **shutting down chapter** as well as on the **safety instructions** sheet.

WARNING
Health risks and **environmental contamination** through **escaping oil**.
Hydraulic oil may escape from the lines on the attachment and the carrier machine during dismantling:

- Position a **suitable collecting tray** under the hydraulic connections to collect the oil.

5.1. Dismantling

Procedure

1. **Switch off** all **supply media**, if available, (e.g. hydraulic and electrical).
2. **Disconnect** the mechanical and hydraulic **connections** to the carrier.
3. Next, **close the hydraulic connections**.

WARNING
Health risk and **environmental pollution** due to **escaping oil**.
Hydraulic oil may escape from the lines on the attachment and the carrier machine during dismantling:

- Position a suitable **collecting tray** under the hydraulic connections to catch the oil.

6. Cleaning and care

- The cleaning of the **attachments** should be carried out on a suitable surface with an **oil separator**.
- Adjust the cleaning intervals to the operating conditions, at least **once weekly** (see chapter **Maintenance and service**)!

Notice
Paint damage, damage to seals and bearings, oil leaks and other damage are possible if cleaning is not carried out properly.

1. The attachment can be cleaned with the help of compressed air:
   - If the attachment is dry.
   - max. **1 MPa** (10 bar) air pressure.
   - min. **400 mm** nozzle distance.

2. The attachment can be cleaned with the help of a high pressure cleaner:
   - max. **80 °C** water temperature.
   - max. **7 MPa** (70 bar) water pressure.
   - min. **400 mm** nozzle distance.
   - Never clean seals and seal gaps directly with a pressure washer.
   - The paint requires **two weeks**, to harden completely after commissioning or after being repainted. Do not use a pressure washer during this period.

Lubrication and Functional checks

Every time after cleaning, the attachment must be lubricated and a functional check carried out, see chapter **Technical data / Overview greasing point** and chapter **Assembly and commissioning / Functional checks**.

7. Maintenance and service

WARNING
Switch off the carrier, depressurise and secure to prevent reactivation.

7.1. Maintenance

Checks and maintenance must be carried out in accordance with the maintenance check list in order to guarantee the safety, functional capability and long service life of the product.

- Maintenance work must be carried out by specially trained personnel.
- Pay attention to cleanliness when carrying out maintenance work.
- Before opening the hydraulic connections, these should be cleaned along with the immediate environment in order to prevent dirt getting in to the hydraulic system.
- Clean the greasing points before lubricating.

NOTICE
Use under intensified working conditions
All information relates to an 8 hour working day.

Maintenance intervals should be cut in half or performed every day with:

- Construction site operation where there are extreme levels of dirt.
- Increased operating times, e.g. multi-shift operation.
- Significant external influences.
- Frequent underwater use.

Replace hydraulic hoses every 2 years under these conditions.
Property damage, including destruction of the attachment can occur under these conditions if the attachment is not properly maintained!

NOTICE
In the event of damage, the attachment must not continue to be used!

WARNING

Danger of injury and crushing with:
- Maintenance work
- Repair work
- Cleaning work

In order to avoid health risks:
- Wear eye protection
- Wear hand protection
- Wear hearing protection

7.1.1. Maintenance check list

Maintenance intervals	✓
After 1 operating hour	
Check bolted connections and retighten if necessary [2]	
Check pinned joints and safety parts, tighten or replace if necessary.	
Daily	
Lubricate the grease nipple [1.3]	
Check hydraulic connections for leaks and tighten if necessary.	
Check for cracks, wear, corrosion and functional safety	
Every 50 operating hours	
Check bolted connections and retighten if necessary [2]	
Check pinned joints and safety parts, tighten or replace if necessary.	
Annually	
Carry out checks in accordance with the country-specific health and safety directives. Enter data as verification of the safety checks carried out in the **Verification of checks chapter**.	
Seal replacement	
Crack checking by means of die penetration process per EN 571 and EN ISO 3452	
Oil change in the vibration unit	
Every 2 years	
Replace hydraulic hoses under intensified working requirements, see also warning in **maintenance chapter**	
Every 6 years	
Replace hydraulic hoses, couplers and screwed connections	
Commissioning after being shut down for extended periods (1 month or more)	
Lubricate the grease nipple [1.3]	
Check bolted connections and retighten if necessary [2]	
Check pinned joints and safety parts, tighten or replace if necessary.	
Check hydraulic connections for leaks and tighten if necessary.	
Check for cracks, wear, corrosion and functional safety.	
Seal replacement	

See operating instructions in chapter:
[1] Overview of greasing points
[2] Check screw fittings / tightening torques
[3] Oil and grease

Location, Date	Stamp with signature

7.1.2. Daily maintenance

1. Check the attachment for deformation, cracks, and wear.
2. Check all hydraulic connections and hydraulic lines for leaks and externally visible damage.
3. If necessary, replace all damaged parts to assure operational safety.
4. Apply grease to the grease nipple with a grease gun (see chapter on **overview of greasing points**) until grease starts to emerge from between the bearings.
   Use grease with properties as described in the chapter **oil and grease**.
5. Check bolted connections and tighten if necessary.

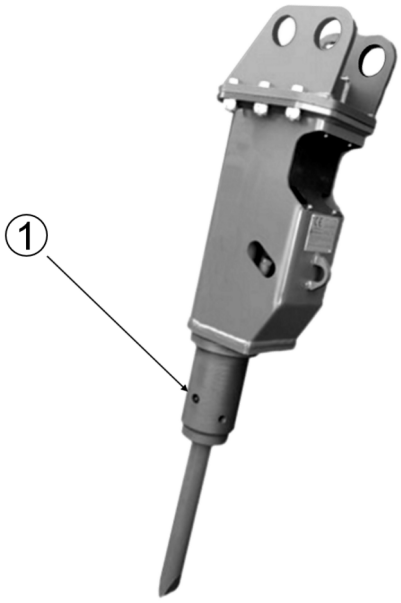
7.1.3. Wear inspection

NOTICE
Both the **bushes for the tool guide** on the hydraulic breaker and the **tool** (chisel) must be checked regularly for wear and tear.
The **degree of wear** of the different types is listed in the following:

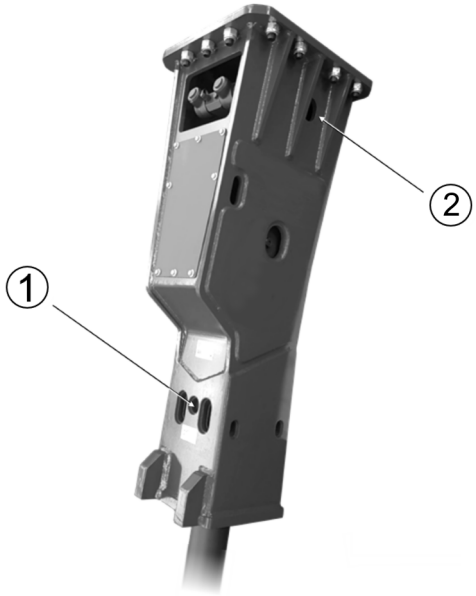
Type	Starting diameter		Max. wear	
	Bush	Tool	Bush	Tool
	[mm]	[mm]	[mm]	[mm]
KSB01	40.5	39.7	1.0	2.0
KSB02	45.2	44.7	1.0	2.0
KSB03	48.3	47.8	1.0	2.0
KSB04	57.2	56.6	1.0	2.0
KSB06	65.1	64.5	2.0	2.5
KSB08	75.5	74.9	2.0	2.5
KSB10	80.8	79.8	2.0	2.5
KSB12	90.8	89.8	2.0	2.5

7.1.4. Greasing points

Greasing points - hydraulic breaker



KSB



KFX

Pos.	Description
1	Grease nipple (tool holder)
2	Grease nipple for the optional lubrication system (Beka-Lube)

7.1.5. Check after 50 operating hours

Inspection After each initial attachment or re-attachment, e.g. after repairs, after **1 operating hour,** and then **every 50 operating hours,** all fastening screws, nuts, and hydraulic connections must be checked for stability.

Tighten If screwed connections are loose, tighten according to the tightening torques as specified.

Cylinder and hexagon head cap screws/nuts [Friction coefficient 0.125]							
Quality class		8.8	10.9	12.9	8.8	10.9	12.9
Thread [metric]	SW [mm]	Tightening torques [Nm]			Tightening torques [ft-lbs]		
M5	8	5.8	8.1	9.7	4.3	6	7.2
M6	10	10	14	17	7.5	10.5	12.5
M8	13	24	34	40	20	25	30
M10	17	48	67	81	35	50	60
M12	19	83	117	140	60	85	105
M14	22	132	185	220	95	135	160
M16	24	200	285	340	150	210	250
M18	27	275	390	470	205	290	345
M20	30	390	550	660	290	405	485
M22	34	530	745	890	390	550	656
M24	36	675	950	1140	500	700	840
M27	41	995	1400		734	1032	
M30	46	1350	1900		995	1400	
M33	50	1830	2580		1350	1903	
M36	55	2360	3310		1740	2440	
M39	60	3050	4290		2250	3164	
M42	65		4500			3320	
M48			6500			4795	

Locking screws/nuts [Friction coefficient 0.125]							
Type		Tensilock screws/nuts				Ribbed screws/nuts	
Quality class		Class 80		Class 100		Class 100	
Carrier material		Steel	Cast iron	Steel	Cast iron	Steel	Cast iron
Thread [metric]	SW [mm]	Tightening torques [Nm/ft-lbs]					
M6	10	16 / 11.8	13 / 9.6	21 / 15.5	16 / 11.8	19 / 14	16 / 11.8
M8	13	34 / 25.1	28 / 20.7	44 / 32.5	36 / 26.6	42 / 31	35 / 25.8
M10	17	58 / 42.8	49 / 36.1	75 / 55.3	64 / 47.2	85 / 62.7	75 / 55.3
M12	19	97 / 71.5	83 / 61.2	120 / 88.5	105 / 77.4	130 / 95.9	115 / 84.8
M14	22	155 / 114.3	130 / 95.9	185 / 136.4	170 / 125.4	230 / 169.6	200 / 147.5
M16	24	215 / 158.6	195 / 143.8	280 / 206.5	260 / 191.8	330 / 243.4	300 / 221.3

7.1.6. Internal threads of hydraulic fittings

Tightening torques: BSP / metric thread					
Series	AD pipe	Screw thread			
		BSP	MA [Nm]	ISO thread [metric]	MA [Nm]
L	6	G1/8 A	25	M10 x 1.0	25
	8	G¼ A	50	M12 x 1.5	30
	10	G¼ A	50	M14 x 1.5	50
	12	G3/8 A	80	M16 x 1.5	80
	15	G½ A	160	M18 x 1.5	90
	18	G½ A	105	M22 x 1.5	160
	22	G¾ A	220	M26 x 1.5	285
	28	G1 A	370	M33 x 2.0	425
	35	G1¼ A	600	M42 x 2.0	600
	42	G1½ A	800	M48 x 2.0	800
S	6	G¼ A	60	M12 x 1.5	35
	8	G¼ A	60	M14 x 1.5	60
	10	G3/8 A	110	M16 x 1.5	95
	12	G3/8 A	110	M18 x 1.5	120
	14	G½ A	170	M20 x 1.5	170
	16	G½ A	140	M22 x 1.5	190
	20	G¾ A	320	M27 x 2.0	320
	25	G1 A	380	M33 x 2.0	500
	30	G1¼ A	600	M42 x 2.0	600
	38	G1½ A	800	M48 x 2.0	800

7.1.7. Annual maintenance

Inspection according to regional regulations

Carry out an **expert inspection** for cracks, wear, corrosion and functional safety according to the country-specific health and safety directives.
In Germany the test must be carried out per regulation **BGR 500, chapter 2.8, section 3.15.2**.

7.1.8. Commissioning after being shut down for 1 month or more

Carry out all maintenance work according to the **maintenance check list**.
If the attachment has been exposed to environmental influences and temperature fluctuations (e.g. storage outdoors), then exchange the seals.

7.1.9. Replace the hydraulic components every 6 years

Irrespective of the operating times, every **6 years** it is necessary to replace hydraulic hoses, hydraulic quick couplings and screwed connections on the attachment.

7.2. Repair and welding work

NOTICE
Loss of all warranty and liability claims through unauthorised modifications to the attachment. Possible damage to property and loss of functional safety.

- No structural modifications or changes to settings may be undertaken on the attachment or on components.
- Welding work only after consultation with the manufacturer and compliance with the:
  - Welding instructions.
  - Specification of the filler material

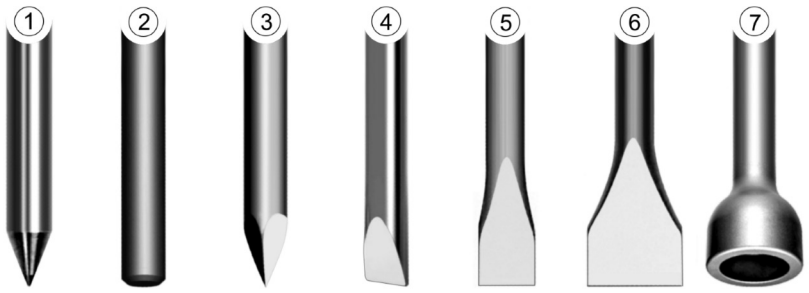
NOTICE
Loss of guarantee claims due to use of non-original parts. Possible loss of operating and functional safety.

- For repair work and replacement of wearing part only **original spare parts** from the manufacturer may be used in order to guarantee functionality and safety.

Exceptions include standardised parts such as screws and hydraulic fittings.

7.3. Accessories, spare parts and wearing parts

Tools



Pos.		Description
1	**Moil point (conical)**	» concrete » medium-hard and solid rock
2	**Blunt tool**	» reinforced concrete » very hard rock
3	**Pyramid tool (pyramidal)**	» reinforced concrete » very hard rock
4	**Chisel tool**	» medium-hard and layered rock
5	**Wood cutter tool**	» cuts all types of wood
6	**Asphalt drive**	» breaks up asphalt
7	**Pile drive**	» placing wooden and concrete posts

7.4. Oil and grease

Hydraulic fluid

The attachment may be operated with industry-standard mineral oils according to the information in the operating instructions for the carrier.

NOTICE
Because of the functional test completed by the manufacturer, residual material of the following **hydraulic oil** may still be present in the attachment:

HLP46 according to DIN 51524 Part 2 / ISO VG 46

In order to be able to use the attachment on ecologically sensitive terrain or in protected areas, the manufacturer authorises operation with the following quickly biologically degradeable **hydraulic oil**:

HEES according to ISO 15380 or OECD 301 B

NOTICE
Possible damage due to using non-homogeneous hydraulic oil.

- Do not mix hydraulic oils of differing standards under any circumstances.
- In case of doubt regarding the specification or mixture, replace the hydraulic oil completely.
- The proportion of foreign oil must not exceed **2%**.
- Hydraulic oils should be analysed every **500 operating hours** to avoid a premature oil change.

Observe the information in the operating instructions for the carrier.

Breaker grease

Mineral oil basic special paste (e.g.: Lorax-M/Anderol, Meisselpaste/Fuchs Lubritech) for lubrication of inserted tools and bushes of hydraulic breakers.

The breaker paste may be used up to max. 1,100 °C.

7.5. Disposal

Oil and grease

Observe country-specific and regional disposal directives.

Attachment

After proper shut down and removal of hydraulic oil and grease residues, the attachment can be disassembled and the materials recycled.

8. Claims, warranty and liability

8.1. Complaint

In the event of a complaint, contact the contractual partner or manufacturer. After agreement with the manufacturer, return damaged parts in their original packaging.
Enclose a completed **returns form** with the return.
Include the serial number of the attachment (see chapter **1**).
For transport damage: Provide the name of the transport company, delivery date and delivery time, name of the driver and registration number of the transport vehicle. Include the delivery papers with the return.

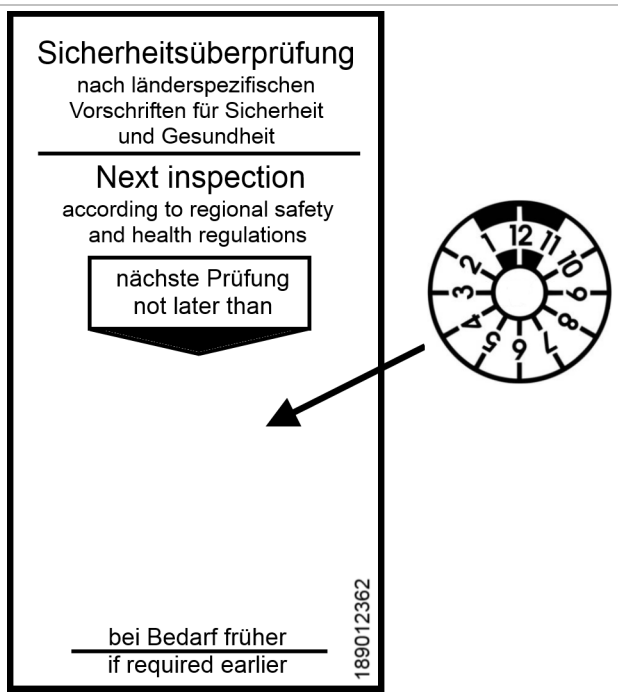
8.2. Warranty and liability

General terms and conditions of service

Services and deliveries are provided exclusively according to the **general terms and conditions of service** of the manufacturer.
Agreements deviating from these terms must be agreed to in writing and confirmed by the manufacturer.
Guarantee and liability claims for personal and property damage are excluded if the limitations in the general terms of service are not observed.

9. Certificate of Inspection

Cranes and excavators must be inspected according to regional regulations. This is the responsibility of the operator.
If an inspection sticker is on the attachment at delivery, the manufacturer recommends replacing the round sticker after each inspection for the next due date.
Stickers can be obtained from the manufacturer.



Verification of SAFETY CHECKS having been carried out:
Type:
Serial number:

Year	Date	Qualified expert	Company

10. EC Declaration of conformity

We hereby declare that the attachment

Type:		CE
Serial number:		
Date:		

as delivered, complies with the health and safety requirements of the EC machinery directive 2006/42/EC of 17/05/2006 of the Council of the European Community.

The attachment for cranes or excavators is suitable, among other things, for lifting, transporting, digging or breakdown of various materials or exchanging equipment on construction sites and other industrial areas.

Applied harmonised standards:	
DIN EN ISO 12100	Safety of machinery
DIN EN 474-1	Earth-moving machines - safety
DIN EN 1501-5	Waste collection vehicles
DIN EN 13155	Loose lifting attachments
DIN EN ISO 4413	Fluid technology - General rules and safety requirements on hydraulic systems and their components
Applied German standards and technical specifications:	
DIN 15428	Attachments - Technical delivery conditions
BGR 500	Operation of work equipment
Country-specific health and safety directives	
Party responsible for documentation:	Head of technical documentation, **Kinshofer GmbH**

Kinshofer is certified in accordance with ISO 9001 by DVS Zert e.V., Düsseldorf, Germany

Kinshofer GmbH
Hauptstraße 76
DE-83666 Waakirchen

(T. Friedrich, managing director)

11. Locations

... up front, everywhere

KINSHOFER
crane and excavator attachments

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