LIS HYDRAULIC HAMMER OPERATING- AND MAINTENANCE MANUAL PART 1

OPERATING AND SAFETY INSTRUCTIONS

LINSER INDUSTRIE SERVICE GMBH

Model:	
Serial no:	
Date:	

Attention!
For safe and correct use of the product, please read the safety instructions and operating instructions in this manual.

Foreword

The LIS hydraulic breaker can only be mounted on carrier machines that fulfil the necessary mechanical and hydraulic mounting requirements.
To determine whether the carrier machine is suitable, please note the following points:

- **Weight of the carrier machine:**

The hydraulic breaker may only be mounted on a carrier machine with sufficient load capacity. When using a quick coupling (towing device), the total weight including the quick coupling must be determined.

- **Mounting dimensions:**

A suitable mounting adapter must be used to mount the hammer on the carrier machine. This mounting adapter varies depending on the carrier machine model and must be ordered separately by specifying the following data:

- **Model and year of manufacture of the excavator**

- **Design of the dipper handle:**

The standard mounting adapters from LIS are designed for mounting on most carrier machines. The parts for mounting, such as spacers and bolts, can also be ordered.

- **Hydraulic line:**

Check the nominal bore size of the hammer pipework on the carrier machine. Both the supply and return lines must have a sufficiently large internal diameter. Smaller pipes cause an increase in back pressure and thus lead to overheating of the oil or irregular hammering.

- **Hydraulic pressure:**

The hydraulic pressure and oil flow of the breaker hydraulic lines on the carrier machine must be sufficient for the operation of the breaker. The maximum hydraulic pressure of the carrier machine must be greater than the recommended setting value of the limiting pressure for the hammer. If this is not the case, the impact rate of the hammer will be reduced or the hammer cannot be put into operation at all.

- **Oil production flow:**

The oil flow rate determines the blow rate of the breaker and is therefore the most important factor among the hydraulic parameters for operating the breaker at the desired power. The oil flow rate should therefore be neither too low nor too high. An insufficient oil flow rate results in lower blow rates, while conversely, an oil flow rate that is too high leads to an increase in operating pressure and thus to overheating of the oil. If the pump flow rate exceeds the maximum permissible oil flow rate of the breaker, a flow control valve is required.

- **Oil cooler:**

If the oil temperature is too low or too high, the working performance of the breaker is reduced. The temperature of the hydraulic oil must never exceed the maximum permissible limit of 90 °C, as otherwise damage to the breaker and the carrier machine may occur. If the oil cooler of the carrier machine is too small, either the original cooler must be replaced by a larger cooler or an additional cooler must be fitted.

	**ATTENTION!** Only operate this hammer if you have carefully read and understood the following safety instructions!!! Read this manual before installing, operating or maintaining this device !

- Flying debris from the hammer, hammer bar, rock or other material can cause damage.
- Never operate the hammer when bystanders are in the work area. This can lead to serious or fatal injuries to bystanders.
- On some machines/carriers, the hammer can penetrate the driver's compartment. Ensure that suitable impact protection devices are used when operating the breaker with this type of equipment.
- Only operate the breaker if all safety stickers described in this manual are attached. The stickers must be checked regularly to ensure that all text is legible. If the stickers are illegible, they must be replaced. Replacement stickers are available from Linser Industrie Service GmbH.
- Ear, eye and respiratory protection must be worn at all times when operating the hammer.
- The circuit breaker becomes very hot during operation. Allow the breaker to cool down before touching any parts of the breaker.
- In some cases, the illustrations in this manual may not correspond exactly to your hammer. For example, a bracket may have been removed to make it easier to see the essentials.

Signal words

	**DANGER!** Indicates an imminently hazardous situation which, if not avoided, is likely to result in death or serious injury. This can also be used to indicate areas on the product that could explode if handled carelessly or incorrectly
	**WARNING!** Indicates a potentially hazardous situation or unsafe practice that could result in serious or even fatal injury if not avoided
	**CAUTION!** Indicates a potentially hazardous situation or unsafe practice which, if not avoided, could result in minor or moderate injury.
	**IMPORTANT!** Indicates potential damage that may shorten the service life of the product if not avoided.

The signal words "DANGER", "WARNING", "CAUTION" or "IMPORTANT" are used in conjunction with the above safety warning symbol to indicate the respective hazard level. All four hazard levels are concerned with safety. Therefore, please always observe the safety instructions listed when you see the safety warning symbol, regardless of which signal word is used in conjunction with the symbol

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1. Basic safety instructions

	**WARNING**! The following instructions must always be followed when operating construction machinery.

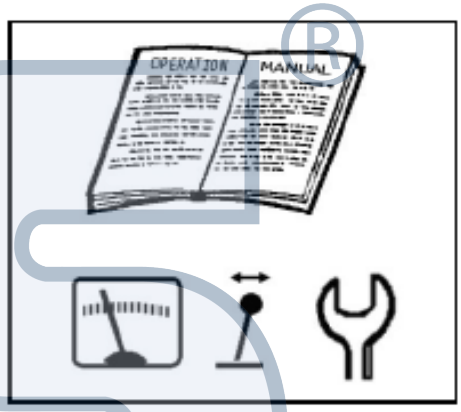
Protect yourself

Operators and maintenance technicians must wear suitable protective equipment as required, including hearing protection, respirator mask, safety helmet, safety shoes, safety glasses, heavy work gloves, etc.

Note:
Loose-fitting clothing or items such as ties, scarves, loose shoe laces, rings, wristwatches or long hair can lead to bodily injury, possibly resulting in death.

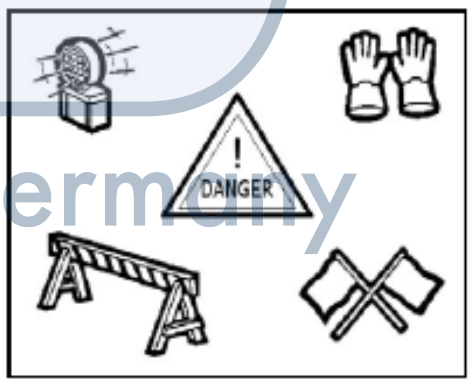
Always use the appropriate tools for inspection and maintenance work. Such work may only be carried out after the appliance has been brought to a standstill and moved to a safe place.

Familiarize yourself with the equipment



Before installing or commissioning the breaker, the operator and maintenance technician must have read and understood the safety instructions, the operating manual and the maintenance instructions.
Only operators who have been trained to operate the carrier machine and the hammer and are appropriately qualified are authorized to operate this equipment.
They must be thoroughly familiar with all aspects of operation and the technical characteristics of the carrier machine and the hammer.

Familiarize yourself with the location



Before using the hammer, check the site for unusual conditions that could pose a hazard. Appropriate warning signs must be put up to ensure safe working conditions. Particular care must be taken when working near electrical cables, gas pipes or underground supply lines.
Please also pay attention to other employees, bystanders and other machines that may be in the vicinity of the place of use. Operation of the breaker must be stopped immediately if people enter the danger zone.

LIS Germany

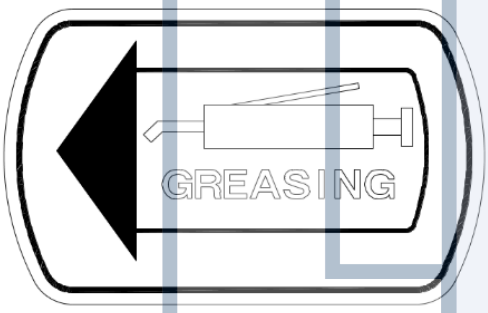
Sticker list & placement on the hammer

Warning sticker (M2023001)

Please attach the supplied safety stickers clearly visible on the hydraulic hammer.

- Use hearing protection
- Wear safety goggles
- Use respiratory protection
- General attention symbol
- Use the manual before use
- CE labelling

Lubrication point



The lubrication point is labelled with this sticker.
Use the recommended grease. Grease must be added at the specified intervals.
EVERY 2 HOURS!!!

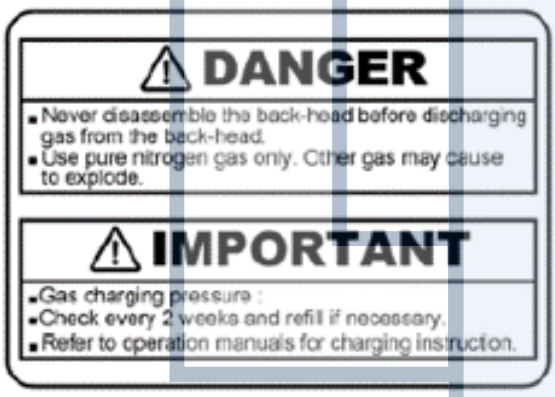
Failure to follow these instructions may result in damage to the chisel and the bushes and may invalidate the warranty.

Nameplate (with CE marking)

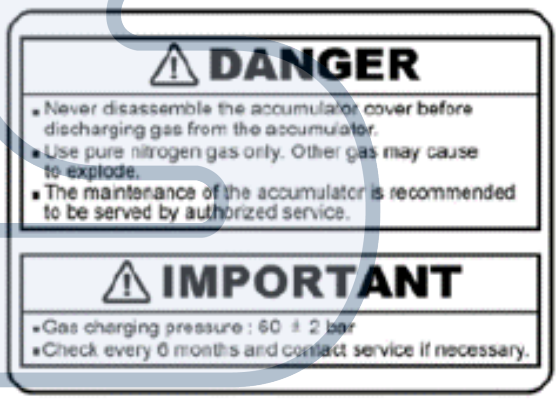
Noise immission with sound power level

General safety
In particular, safety-relevant labelling and signs must be observed, as shown below

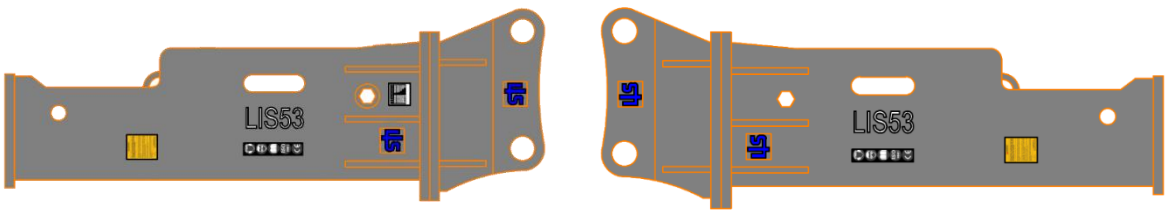
Safety when filling the back of the head with gas



Safety when filling the pressurised storage tank with gas



Placement of the stickers on the hammer



Familiarize yourself with the regulations!

Anyone operating or maintaining such equipment must know and understand the regulations and laws applicable to the use of such equipment. The breaker must be used in accordance with all applicable regulations relating to construction work practices and public safety.
A fire extinguisher and first aid kit must be kept in the driver's cab for emergencies.

Precautions for safe operation

When installing a new hydraulic breaker, a number of checks and scheduled maintenance work must be carried out in advance.

- The hydraulic breaker may only be mounted on a carrier machine with sufficient load-bearing capacity.
- If a quick coupling (towing device) is used, the total weight including the quick coupling must be determined.
- Carrier machines below this weight class do not offer sufficient stability and could topple over when the hydraulic breaker is used, which could result in personal injury or machine damage. With carrier machines above this weight class, there is a risk that the breaker will be subject to excessive mechanical stress.
- It must be ensured that the breaker is compatible with the hydraulic systems of the carrier machine and that its performance characteristics match.
- To protect the operator from injuries caused by flying rocks, the driver's cab must be fitted with a protective screen or a rock guard.

Information on cab protection equipment can be obtained from the manufacturer of the construction machine

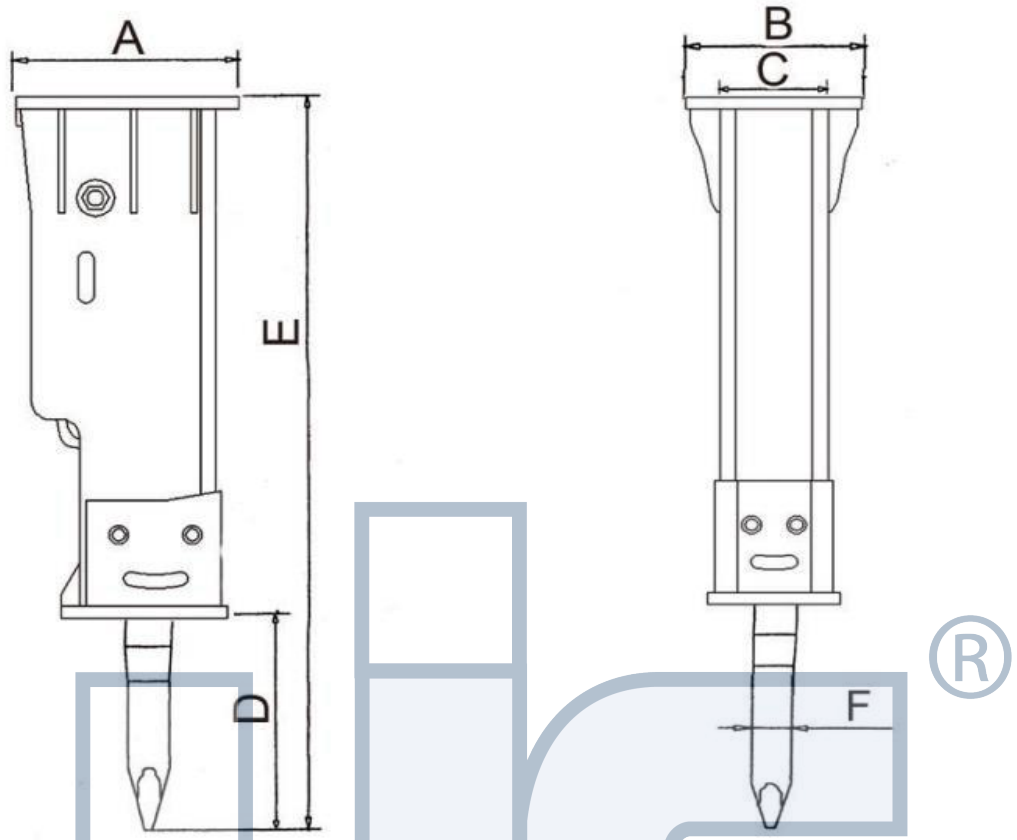
- A second person is required to assemble the hydraulic breaker and must follow the instructions of the driver of the carrier machine. The driver of the carrier machine and the assistant must coordinate clear hand signals with each other in advance.
- To prevent damage to the equipment, the work to be carried out on the carrier machine in accordance with the maintenance schedule must be performed before the breaker is put into operation.
- Check the breaker for wear, loose parts, breakage or cracks. If damage or defects are found, do not operate the hammer

2. Specifications and recommended carrier machine weight for the various hammer models

Characteristics	Unit	LIS hydraulic breaker box type					
		LIS40	LIS45	LIS53	LIS68	LIS75A	LIS100A
Excavator Weight	t	0.8-2.5	1.2-3.0	2.5-4.5	4.0-7.0	6.0-9.0	11-16
Adapter		MS01	MS01	MS01/ MS03	MS03	MS08/ CW10	MS10/ CW20
Weight	kg	143	168	218	363	418	886
Length	mm	1122	1240	1325	1587	1887	2316
Width	mm	230	230	237	308	308	376
Operating Flux (min-max)	l/min	15-30	20-40	40-70	40-70	45-85	80-110
Operating Oil pressure	bar	90-120	90-120	90-120	110-140	120-150	150-170
Impact Frequency	BPM	800-1400	700-1200	600-1100	500-900	400-800	350-700
Size of Tube	inch	1/2	1/2	1/2	1/2	1/2	1/2
Chisel diameter	mm	40	45	53	68	75	100
Impact energy	Joule	300	415	625	1005	1170	2500
Part number		LIS-40BT-MS01	LIS-45BT-MS01	LIS-53BT-MS01/ LIS-53BT-MS03	LIS-68BT-MS03	LIS-75A-BT-MS08/ LIS-75A-BT-CW10	LIS-100A-BT-MS10/ LIS-100A-BT-CW20
Part number with neutral top plate WITHOUT adapter		LIS-40BT-WOP	LIS-45BT-WOP	LIS-53BT-WOP	LIS-68BT-WOP	LIS-75BT-WOP	LIS-100-BT-WOP

Characteristics	Unit	LIS hydraulic breaker box type					
		LIS135A	LIS140A	LIS155	LIS165	LIS175	LIS190
Excavator Weight	t	16-21	18-25	28-35	30-45	40-55	50-65
Adapter		MS10/ CW40	MS10/ CW40				
Weight	kg	1488	1805	2379	3130	4479	-
Length	mm	2605	2850	3315	3376	3719	3895
Width	mm	428	488	570	570	570	625
Operating Flux (min-max)	l/min	120-180	120-180	180-240	200-260	210-280	240-300
Operating Oil pressure	bar	160-180	160-180	160-180	160-180	160-180	200-230
Impact Frequency	BPM	350-600	350-500	250-350	200-260	200-350	180-225
Size of Tube	inch	1	1	1 1/4	1 1/4	1 1/4	1 1/2
Chisel diameter	mm	135	140	155	165	175	189
Impact energy	Joule	4500	4900	10250			
Part number		LIS-135A-BT-MS10/ LIS-135A-BT-CW40	LIS-140A-BT-MS10/ LIS-140A-BT-CW40				
Part number with neutral top plate WITHOUT adapter		LIS-135A-BT-WOP	LIS-140A-BT-WOP	LIS-155A-BT/WOP			

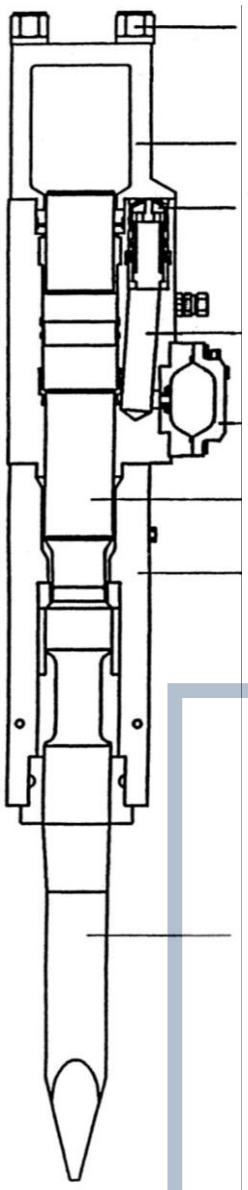
1. Dimensions hydraulic breaker box type



Modell	A	B	C	D	E	F
LIS40BT	340	230	120	262	1222	40
LIS45BT	340	230	120	291	1420	45
LIS53BT	370	237	145	342	1542	53
LIS68BT	440	308	220	376	1609	68
LIS75A-BT	504	308	220	405	1872	75
LIS100A-BT	550	376	280	486	2208	100

Modell	A	B	C	D	E	F
LIS135A-BT	720	488	360	439	2495	135
LIS140A-BT	740	488	360	689	2798	140
LIS155BT	854	570	420	764	3200	155
LIS165BT	854	570	420	754	3313	165
LIS175BT	954	625	475	739	3662	175

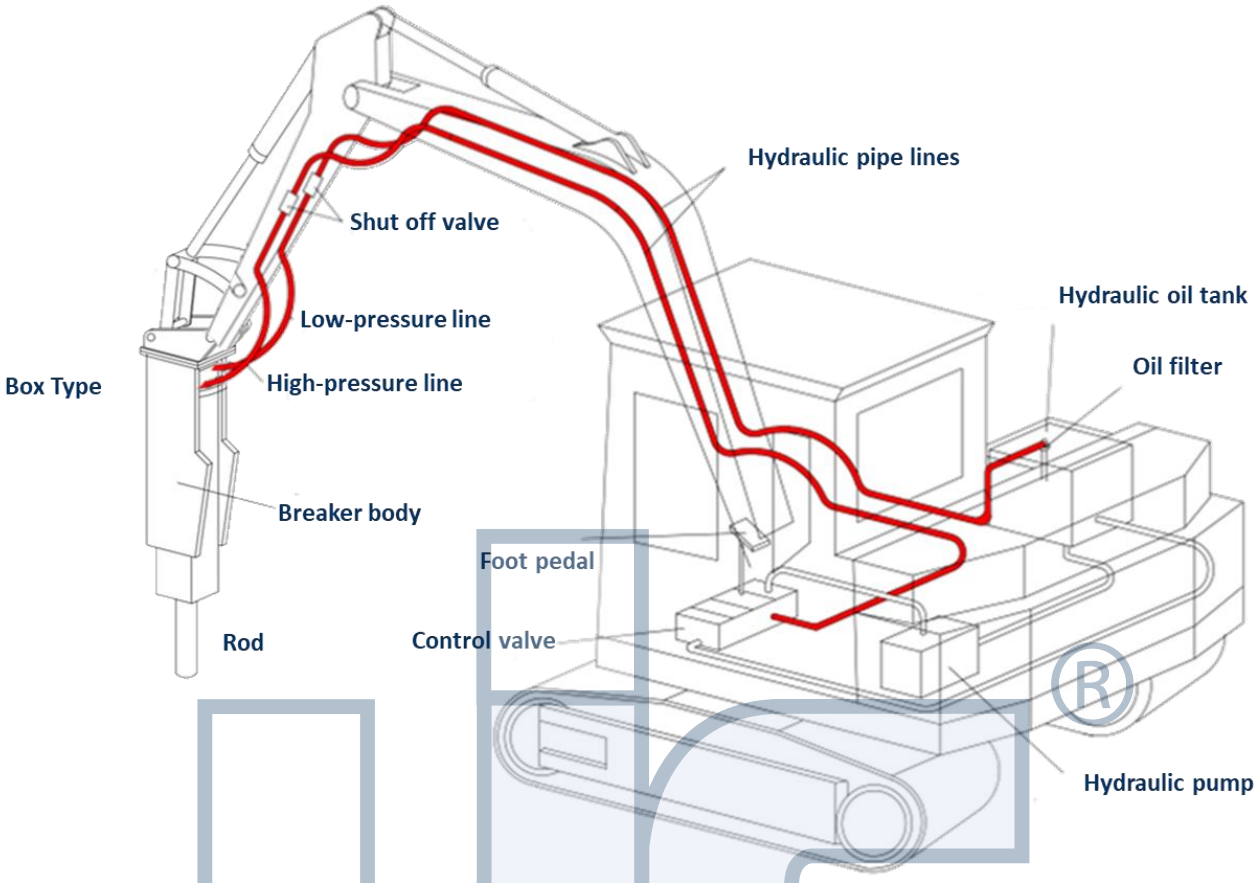
2. Structure



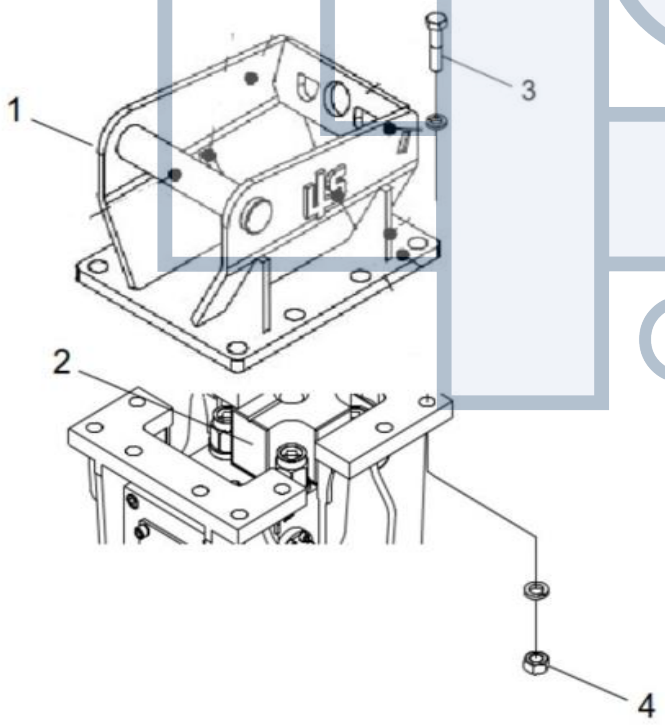
The graphic illustration only shows a general view of the main elements; the details may look different for the various hydraulic breaker models.
The hammer is hydraulically operated equipment and can be used on a carrier machine that fulfils the corresponding hydraulic and mechanical assembly requirements

Throught Bolt Four main screws connect the rear head, the main body and the front head of the hammer
Back head The main task is to store nitrogen
Valve Control of the up and down movement of the piston at certain frequencies.
Control system The heart of the hammer; contains a hydraulic circuit system to control the reciprocating movement of the piston
Piston Conversion of the kinetic energy of the hydraulics into impact energy; the crushing function is performed by punching the piston rod.
Front head The function of the lower head section is to support the main body of the hammer and protect it from damage caused by the recoil force of the hammer
Chisel The chisel itself is specially reinforced to withstand the abrasion caused by direct impact. There are three models to choose from for this part: ▶ pointed type, ▶ flat type and ▶ V-wedge type

3. Preparation for installation and commissioning



1. Assembly and disassembly of the MS01 or MS03 Adapter



(the hydraulic breaker is supplied assembled depending on the version)

1. place the hammer on a firm and level surface so that the maintenance opening of the hammer housing is facing upwards.

2 Fasten the adapter (1) to the hammer housing with two screws. In the case of a silenced hammer, insert the upper damper (2) into the hammer housing before attaching the adapter.

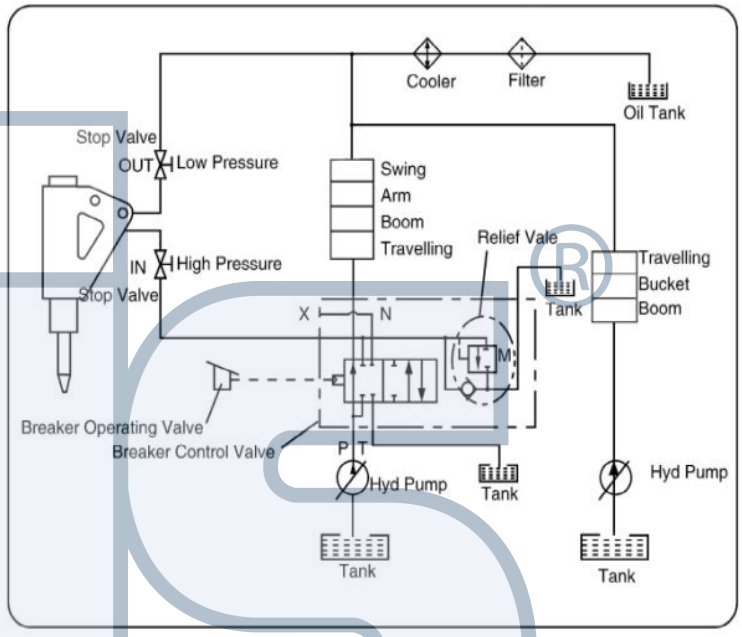
3. then insert all screws (3+4) and tighten to the specified tightening torque.

2. Mounting the hydraulic hammer on the carrier machine

	**DANGER!** When fitting the hammer or removing the bucket, ensure that nobody is in the vicinity of the carrier machine. When moving the carrier machine, do not touch any parts of the carrier machine or the hydraulic breaker. Keep hands away from the boom area and the pin bores. When aligning the pin bores, never insert a finger into the bore; only align the bores by eye and with the aid of a dowel pin. Agree clear hand signals with the assisting employee.

4. Hydraulics

As the LIS breakers are driven by the hydraulics of an excavator, which provides the hydraulic power, our breakers should be installed by a fitter to maximise performance in accordance with the characteristics of the different excavators.



The following points must be carefully observed before installing and commissioning the breaker:

For the installation and operation of the breaker, the basic machine should be equipped with a hydraulic line system for the breaker.

The hydraulic lines vary depending on the model of construction machinery, so a qualified mechanic should connect the hammer lines to the excavator after checking the oil pressure, oil flow rate and pressure drops on the excavator.

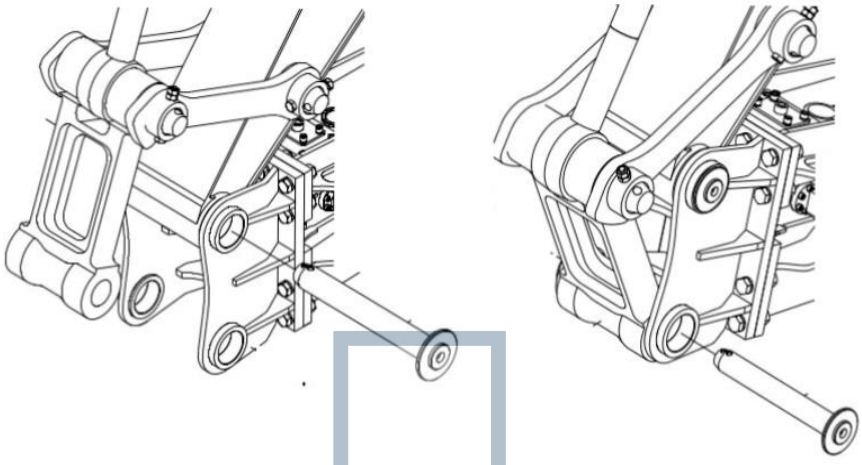
To ensure a long service life of the breaker, you must ensure that you always use original parts for the hydraulic oil lines and accessories that have been supplied or approved by the factory or authorised dealers.

	**IMPORTANT!** After fitting the hammer, fully extend and retract the carrier machine cylinder to check that the carrier machine cylinder can move freely and without damage.

1. Setting pressure of the pressure relief valve and the return pressure valve

ONLY IF NO QUICK-CHANGE ADAPTER DEVICE IS USED

During assembly of the hammer, the carrier machine may only be operated from the driver's cab.



1. As instructed by an employee, carefully move the dipper handle into the adapter until the hole in the dipper handle is flush with the holes in the adapter.
2. Insert the dipperstick pin.
3. Attach the stop ring to the dipperstick bolt and secure with a bolt and nuts.
4. Raise the hammer to a suitable height.
5. Extend the bucket cylinder until the hole in the boom is flush with the holes in the adapter.
6. Insert the rod bolt.
7. Attach the stop ring to the bucket pin and secure with a nut and bolt.
8. Check whether mechanical problems, loosening of parts or fitting inaccuracies occur during operation.

Model	Unit	LIS hydraulic breaker box type						
		LIS40	LIS45	LIS53	LIS68	LIS75A	LIS100A	LIS135A
Set pressure oft the overflow valve	cash	110-140	110-140	110-140	150-170	170-190	100-200	190-210
Back pressure	cash	10	10	10	10	10	10	10

Model	Unit	LIS hydraulic breaker box type						
		LIS140A	LIS155	LIS165	LIS175	LIS185	LIS190	LIS195
Set pressure oft the overflow valve	cash	200-210	200-220	220-240	240-260	260-280	240-270	260-280
Back pressure	cash	10	10	10	10	10	10	10

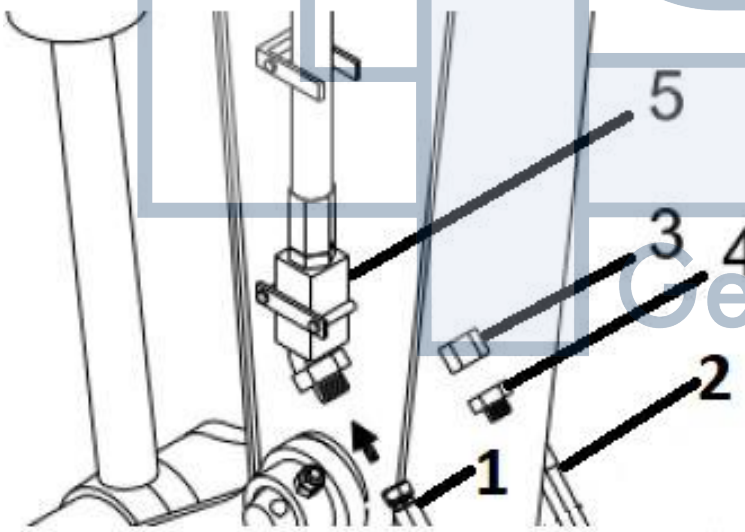
2. Connecting the hydraulic lines of the hammer

Check the following before connecting the hydraulic lines to the carrier machine:

- To protect the breaker from damage, the hydraulic oil of the carrier machine must be kept clean. Check the oil for contamination and change it if necessary or pass the oil through an external filter system and replace the carrier machine oil filter in accordance with the maintenance schedule for the carrier machine.
- When using a newly installed hammer pipe, remove impurities in the hydraulic pipe by bypass flushing (without connecting the hammer).
- Check the pressure setting of the pressure relief valve on the breaker hydraulic line; this setting value for the pressure relief must be 30 ~ 40 bar above the measured max. operating pressure of the hydraulic breaker.
- The sealing surfaces and connection threads of the hoses or fittings must be in perfect condition and must not be contaminated with sand or similar foreign particles.

Once the hydraulic lines for operating the breaker have been prepared accordingly, connect the breaker as follows:

1. If the connecting hoses are not attached to the breaker, remove the cover on the maintenance opening and connect the inlet and outlet hoses (1, 2) labelled "**IN**" and "**OUT**" to the breaker.
2. Ensure that both shut-off valves (5) are closed.
3. Remove the end caps (3) from the shut-off valves (5) and remove the hose plugs (4) from the hoses. Store the caps and plugs safely in the toolbox.
4. Connect the inlet and outlet hoses (1, 2) labelled "**IN** " and "**OUT**" to the shut-off valves on both sides of the carrier machine dipper arm
5. Open the shut-off valves (5)

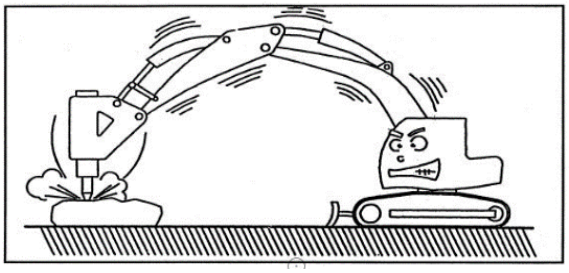


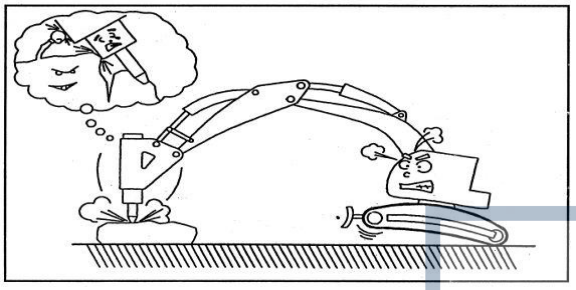
1. high-pressure hose **(inlet)**
2. low pressure hose **(outlet)**
3. end caps
4. hose plug
5. shut-off valves

5. Precautionary measures when operating the hammer

► Correct position of the hammer chisel

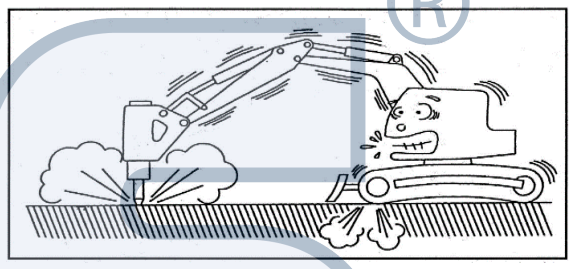
To use the hammer effectively, the chisel must be positioned correctly. If the position is incorrect, the impact energy of the piston is too weak to break the material.
Instead, the impact force of the chisel exerts shocks on the housing, hammer, stick and boom of the excavator, causing damage to these parts.





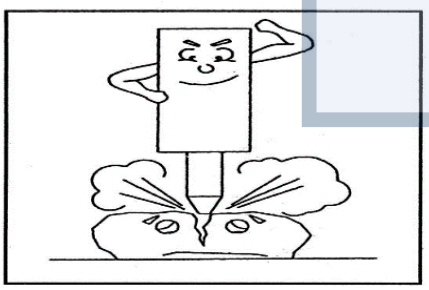
The excavator can suddenly tip forwards if the position in relation to the demolition material (e.g. a rock) is too large as soon as the material breaks through, causing the hammer body or the end of the holder to hit the material violently and cause damage.

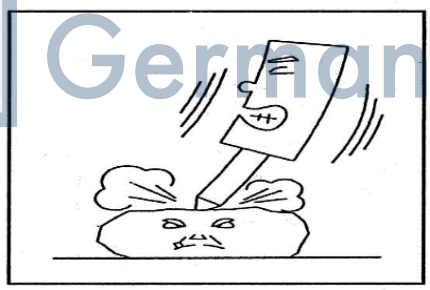
It is not recommended to carry out hammering under the following conditions, as the vibrations during hammering are transferred to the chain of the construction machine.
When hammering, the hammer must always be placed in the correct position.
Special care must be taken to ensure that hammering is not carried out under the wrong conditions.



► Alignment of the chisel

Apply the same direction of boom force in line with the chisel and place the chisel in the rock with the striking surface as vertical as possible. If the striking surface is at an angle, the chisel may slip while striking. This will cause the chisel to seize, break and damage the piston. When breaking, stabilise the chisel first and then select the point of the rock where hammering can be carried out in a stable state.

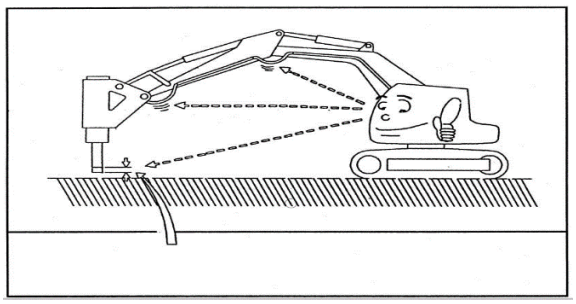




The operator must pay attention to the following points during operation:

- **Stop operation as soon as the hoses vibrate excessively**.

Excessive vibrations in the high- and low-pressure hoses of the breaker require immediate disassembly and repair. Contact your workshop technician to have the problem checked.



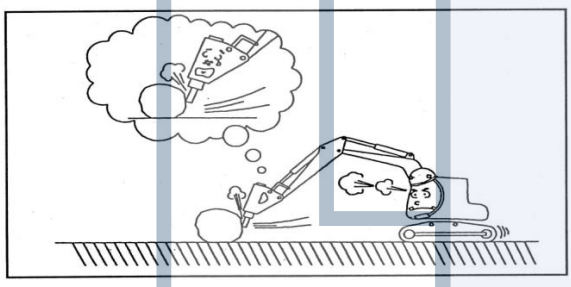
Visual check whether the chisel protrudes when the hammer is lifted

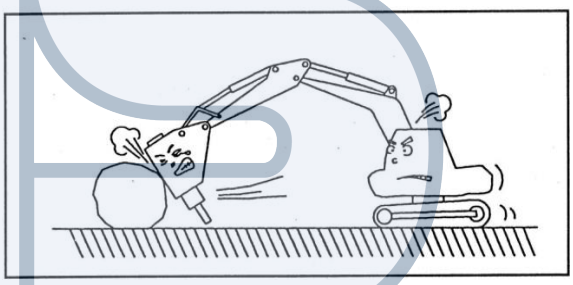
- **Avoid hitting the hammer when hammering.**

As soon as the material is broken, stop hammering. Continuous empty blows on the material not only damage the front head and loosen the screws, but also have a negative effect on the machine. Blank strikes on the material occur if the chisel is not in the correct position on the material or if the chisel is used as a lever. (The impact noise changes when the chisel strikes empty)

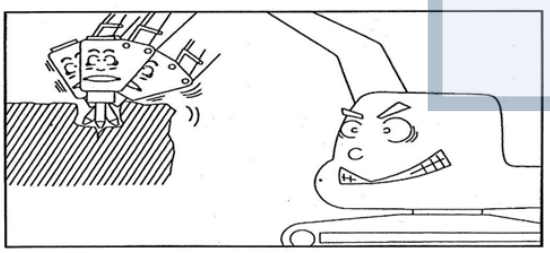
- **Do not move the material with a hammer**

Avoid moving material with the side of the hammer, as this can break the bolts on the hammer and damage the boom and handle of the construction machine.





- **Do not use the chisel as a lever.**



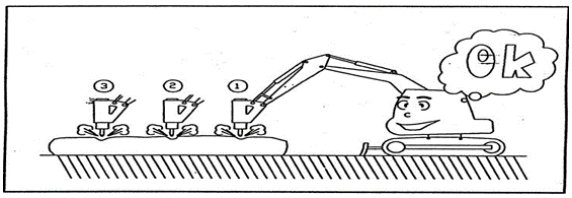
The chisel and the bolts on the hammer could be damaged or even broken by levering.

- **Do not hammer in the same place for longer than 30 seconds**

If the material has not broken after 30 seconds of hammering in the same spot, change the spot to be hammered. Prolonged hammering in the same place leads to overheating and excessive wear of the chisel.

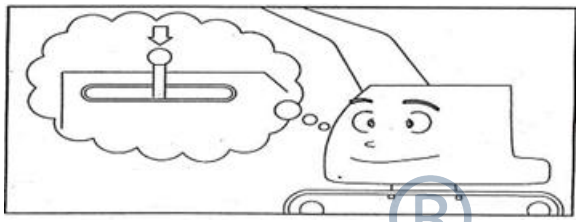
- **Start hammering on an edge**

For hard and large materials, start hammering at an edge. Hard and large materials can be broken relatively easily if the hammer blow is applied to a crack or an edge.



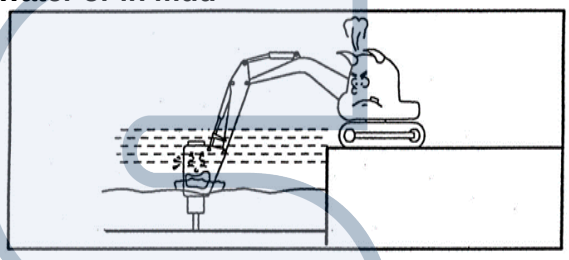
- **Operate the hammer at the correct motor speed**

The hammer breaks the material at the correct motor speed.
Increasing the engine speed beyond the necessary level **does not** increase the impact force, but merely increases the oil temperature to the detriment of the pistons and valves.



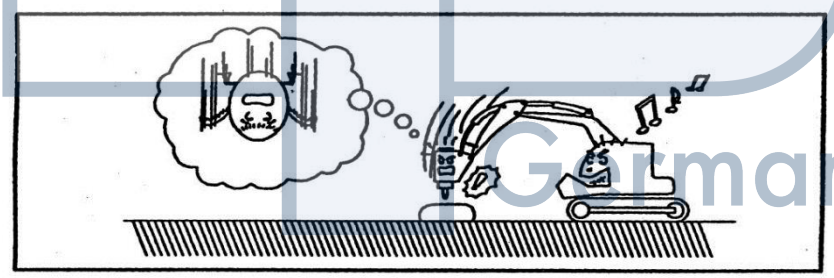
- **Do not operate the hammer under water or in mud**

The hammer must not be used under water. Pistons and similar components can rust and damage the hammer prematurely.



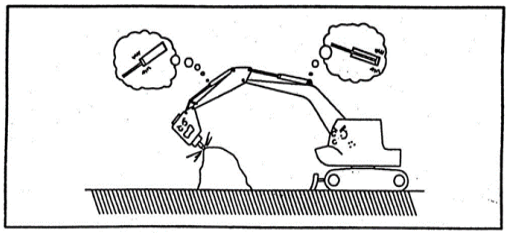
- **Never use as a sledgehammer.**

Dropping the hammer leads to excessive strain on the hammer or the basic machine. Parts of the hammer and the base machine may be damaged.

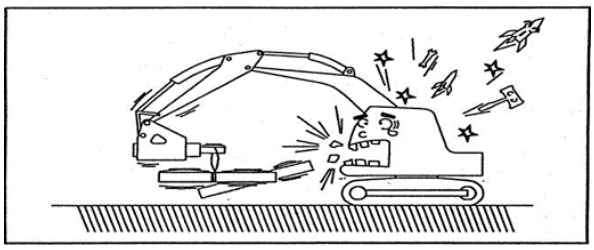


- **Do not hammer when the cylinders are fully retracted or extended.**

Hammering in a state in which the cylinder is fully extended or retracted causes considerable damage to the cylinder and parts of the construction machine.



- **Never use for transport purposes**



The hydraulic breaker is not designed for lifting or transporting loads. Therefore, never use the chisel to lift objects. This is dangerous and can lead to damage to the breaker or chisel.

- **Allow the construction machine to warm up before starting the breaker.**

Especially in winter, the engine of the construction machine should be warmed up to 30° to 40° C for five to ten minutes before starting operation with the hammer.

- **Do not touch the hammer during operation**

Please do not touch the chisel as it can become very hot.

- **You must wear hearing protection, eye protection and respiratory protection when operating the hammer.**

- **Caution with Hammer models with built-in accumulator** (installed from article LIS75A-BT)

Caution, pressurised container! Do not open the accumulator without first reading the operating instructions.

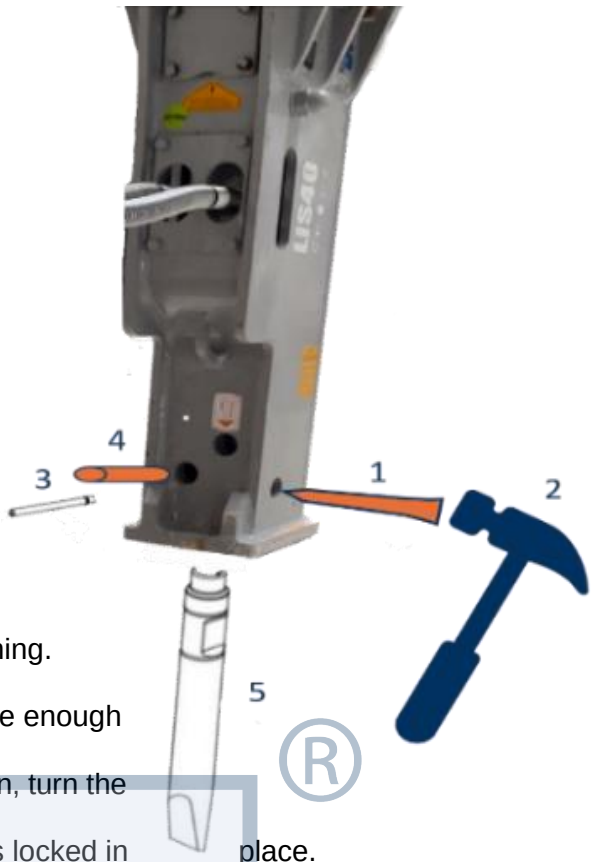
- **Lubrication**

When lubricating the chisel, the hammer must be positioned vertically on the chisel and exert sufficient pressure so that the chisel is pressed into the hammer. This prevents too much grease from entering the impact chamber, which could lead to a loss of power to the hammer due to the damping effect or even stop the operation of the hammer due to a hydraulic lock in the impact chamber. If the breaker is not lubricated regularly, this will limit the service life of the chisel, chisel bushing and front bushing.

- **Always wear eye protection when removing the stop pin.**

The stop pin is removed with a hammer and a punch.

6. Assembly / disassembly of the chisel



The chisel must not be pressurized for removal.
but must be able to move easily in the bucket body.
can be moved.

1. Tools supplied
2. hammer
3. spring cotter pin
4. chisel bolt
5. chisel

1. Assembly:

1. Before inserting the chisel, please check the inner bushes for wear and whether there is any dirt in the bushes.
   openings dirt residues are located
2. Insert the chisel (6) into the bottom of the chisel opening.
3. Turn the chisel (6) into the correct position.
   To do this, the recess on the chisel shaft must provide enough space for the chisel pin to be pushed through.
4. If you cannot see through the opening of the chisel pin, turn the chisel until the view is clear.
5. Push the bolt (4) into the opening so that the chisel is locked in place.
6. Now use the tool supplied (1) to hammer the spring cotter pin (3) back in through the openings on the bottom right and left of the hammer body.
7. Now check whether the chisel can be moved up and down easily.

2. Disassembly:

1. There is a round opening in the lower part of the hammer body on the left and right side.
2. The spring cotter pin (3) is located in the hammer body and can be knocked out through these two openings.
3. To do this, place the supplied tool (1) on one side of the spring cotter pin (3) and hammer through with the hand hammer (2). The split pin (3) should come out of the opening on the other side after a few taps.
4. If the split pin (3) cannot be knocked out, please check that the chisel is unloaded and that the chisel pin is in the correct position.
5. There are further round openings on the front and rear through which the chisel pin can be removed. On the side of the hammer body facing the machine, use the opening next to the opening labelled GREASING
6. Hold the chisel (5) firmly and push the chisel pin (4) out through the opposite opening using the tool supplied (1) and light pressure.

	**WARNING!** The chisel may only be fitted in accordance with the description. Otherwise, the chisel can be pulled out of the hammer by applying force and there is a risk of accidents that could jeopardise safety.

	**WARNING!** The carrier machine must be switched off before inserting or removing the chisel. Always wear safety goggles and gloves when driving in the chisel or chisel bolts, as metal chips or fragments may fly around. Never insert your fingers into the chisel pin holes of the hammer. Do not stand in front of the chisel; there is a risk of possible empty blows caused by the pressure trapped in the hammer. This is associated with the risk of physical injury. The chisels of large hammers are very heavy and difficult to lift manually. Therefore, always use a hoist with a lifting sling to lift the chisel. Make sure that the chisel does not fall down. After operating the hammer, the chisel, especially the tip of the chisel, may be very hot for a while and cause severe burns. Only use original LIS chisels. The use of chisels from other manufacturers can cause malfunctions in the hammer and may invalidate the warranty. To maximise the service life of the chisel, it is important that the chisel is used correctly. The chisel is generally not inserted when the hydraulic breaker is delivered. Before inserting the chisel, bring the hydraulic breaker with the carrier machine into a horizontal position and place it on a suitable support (e.g. square beam).

3. Dismantling the hydraulic breaker from the carrier

Set the hydraulic breaker down on a clean, flat and level surface and apply the parking brake on the carrier machine.

1. Close the shut-off valves completely.
2. Disconnect the hydraulic hoses (I, O) from the shut-off valves.
3. Ensure that no oil is leaking from the hoses and shut-off valves.
4. To prevent contamination, fit end caps to the shut-off valves and insert hose plugs into the hoses.
5. Remove the stop rings from the dipperstick and boom bolts.
6. Lift the lifting arm away from the hydraulic breaker until the hydraulic breaker can be removed or another attachment can be mounted on the carrier machine.
7. If the hammer is not used for a longer period of time, the hammer should be cleaned and the chisel removed from the hammer. Spray the chisel with anti-rust oil.
8. Please vent N2 gas from the rear head before the piston
9. is pressed into the cylinder

4. Inspection after installation

After the hammer has been mounted on the carrier machine and made ready for operation, the assembly must be checked again.

The following points must be checked:

- Oil flow supplied to the hammer - Must be measured at the "IN" inlet line with a flow meter when the hammer is in operation. Alternatively, the oil flow rate can be measured without operating the hammer using a flow meter fitted with a throttle valve, which is set to the operating pressure of the hammer.

- Working pressure of the hammer - Must be measured as close as possible to the inlet opening "IN" of the hammer.

- Note: The oil flow rate and operating pressure must be measured as minimum and maximum values, as these fluctuate slightly when the breaker is in operation.

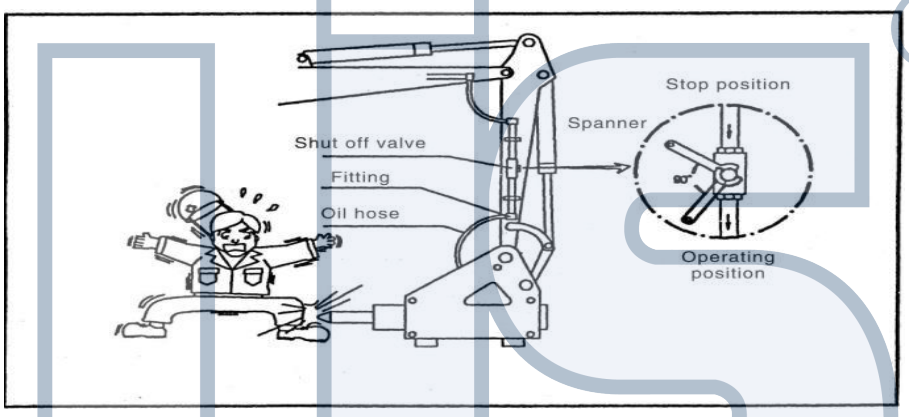
- Limiting pressure of the hammer line - Must be measured with the shut-off valve switched off. This pressure must be set to 30~40 bar above the measured max. operating pressure of the breaker.

- Pre-filling gas pressures in the gas chamber of the rear head and in the pressure accumulator must be measured in the static state, without operation of the hammer, at ambient temperature before operation. Further details on measuring and filling the gas pressures can be found in section "10.".

- The stroke rate: Can be measured if a stroke rate counter is available. It is strongly recommended to measure the number of strokes.

5. Choosing the right chisel

	**ATTENTION!** The chisel can fly out due to the N2 gas pressure, do not stand in front of the chisel.



The right chisel must always be selected in order to achieve optimum work results and ensure the longest possible service life of the chisel.
the longest possible service life of the chisel. The standard chisels recommended for the various tasks are shown below:
There are two main types of breaking with a hydraulic breaker.

- **Penetration breaking (or cutting breaking):**

A conical, pyramid-shaped or wedge-shaped tool forcibly penetrates the material. This method is most effective in soft, layered or plastic materials. The sharper the chisel edge, the better the hammer penetrates the material. When breaking hard material, however, the sharp cutting edges can wear out quickly.

- **Impact crushing:**

Strong mechanical stress waves are transferred into the material and lead to breakage. The best possible energy transfer between the chisel and the material is achieved using a blunt chisel. Impact breaking proves to be more effective for breaking hard, brittle material. In general, small hammers are not suitable for impact breaking.

6. Standard chisel:

Note:

- Chisels are subject to a certain amount of wear during normal operation. (The replacement of these parts due to wear is not covered by the warranty).
- Only original LIS chisels may be used; if chisels from other manufacturers are used, the guarantee may be invalidated.
- Special versions are available on request

Meißeltyp	Anwendung
Pointed chisel (tapered)	Universally applicable; crushing of concrete, rock base and road pavement
Pointed chisel (pyramid-shaped tapered)	Universally applicable; crushing of concrete, rock base and road pavement
Flat chisel - vertical Cut - horizontal Cut	Mining, foundation work, trenching and road construction, demolition work in concrete,completion of embankments.
Blunt chisel	Breaking of oversized boulders, demolition work in concrete
Wide flat chisel (asphalt cutter))	Mining, foundation work, trench excavation, demolition work, completion of embankments, breaking up asphalt pavement.

7. Repair and maintenance

The basic guidelines must be followed when carrying out maintenance work:

- Absolute cleanliness and the utmost care are essential when handling hydraulic components of the breaker. (Dirt is the biggest enemy of hydraulic systems).
- The parts of the hammer must be handled with care and stored using lint-free cloths or cleaning paper specially designed for hydraulic components.
- Only use the specified cleaning fluids to clean hydraulic components. **(Never use water, steam, paint thinner or acidic liquids).**
- Sealing elements such as O-rings, seals and wipers in the hydraulic hammer must be coated with clean hydraulic oil before they are used. It is particularly important that lubricating paste is applied to the sliding areas of the seals in the case of tightly sealing sealing elements.
- Before carrying out maintenance work or repairs on the hydraulic breaker, always allow the gas with which the rear head and the pressure accumulator are filled to escape.
- Only suitable tools may be used for maintenance. There is a risk of personal injury or

damage to the breaker if the wrong tools are used.
- Unauthorised modifications to the hammer can lead to serious malfunctions or impair the durability and performance of the hammer. LIS cannot accept any warranty for such cases.

As the hydraulic breaker is a precision device, the drive cell and main moving parts must not be dismantled under any circumstances. If disassembly is necessary, please contact the responsible dealer. We cannot accept any liability if the customer disassembles the breaker themselves

The following steps must be carried out before carrying out maintenance work:

- To facilitate maintenance and repair, place the hammer in a stable position on a level surface.
- Switch off the carrier machine.
- Close the shut-off valves.
- If necessary, disconnect the hoses and seal them with plugs so that no impurities can enter.

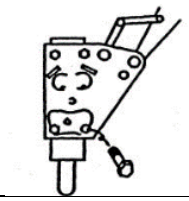
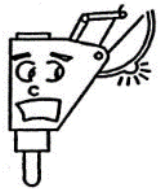
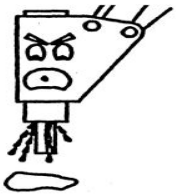
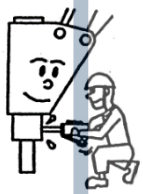
If the hydraulic breaker is used for special purposes,
for example: Tunnelling, tapping, use in iron processing, under water, etc., the maintenance interval is significantly shorter than with conventional use.

1. Inspection interval:	Inspection points
Points that must be checked at all times during operation!	Temperature of the hydraulic oil (below 80°C) Falling or damage to components Oil leakage at the hammer and hose/pipe Occasionally a small amount of oil flows along the rod. (This has no influence on the performance, use and operation of the hammer). Irregularity in the performance or operation of the hammer Exceptional changes to the cables
After one hour of operation:	Top up with grease (every hour) Check wear of the inner bushing, outer bushing & chisel Check hydraulic oil for contamination and filling, top up or replace if necessary Limit Min. viscosity 20~40Cst
Every 8 hours or daily:	Ensure that the chisel is sufficiently lubricated with grease. Lubricate more frequently if necessary. Remove the chisel and locking pin and check that they are in perfect condition.
Every 50 hours or weekly (main inspection)	Check gas pressure in the back of the head, top up gas if necessary Check the chisel, front bushing, chisel bushing, chisel stripper and lower piston section for wear. Check hydraulic hoses, replace if necessary. Check through bolts, replace and/or retighten if necessary.
Regular inspection: Every month or after 200 operating hours	Working pressure Setting pressure of the overflow valve of the hydraulic pressure line Filter change
After 3 months or after 500-1000 operating hours	Replace oil seal Check all seals, also replace the accumulator diaphragm if necessary Check piston for deformation Check the condition of the hammer and the holder
For long-term storage of more than one month	The chisel must be removed. The gas must be completely released from the back of the head. The impact piston must be placed at the upper end of the stroke. The lower end of the piston, the chisel and the bushes must be adequately protected with grease or anti-corrosion fluid. All hydraulic connections must be sealed with clean plugs, to avoid oil leaks or to prevent dirt from getting into the hammer. The hammer must be stored vertically. The hammer must be stored in a dry place.

For other maintenance questions regarding the excavator, please contact the manufacturer of the machine.

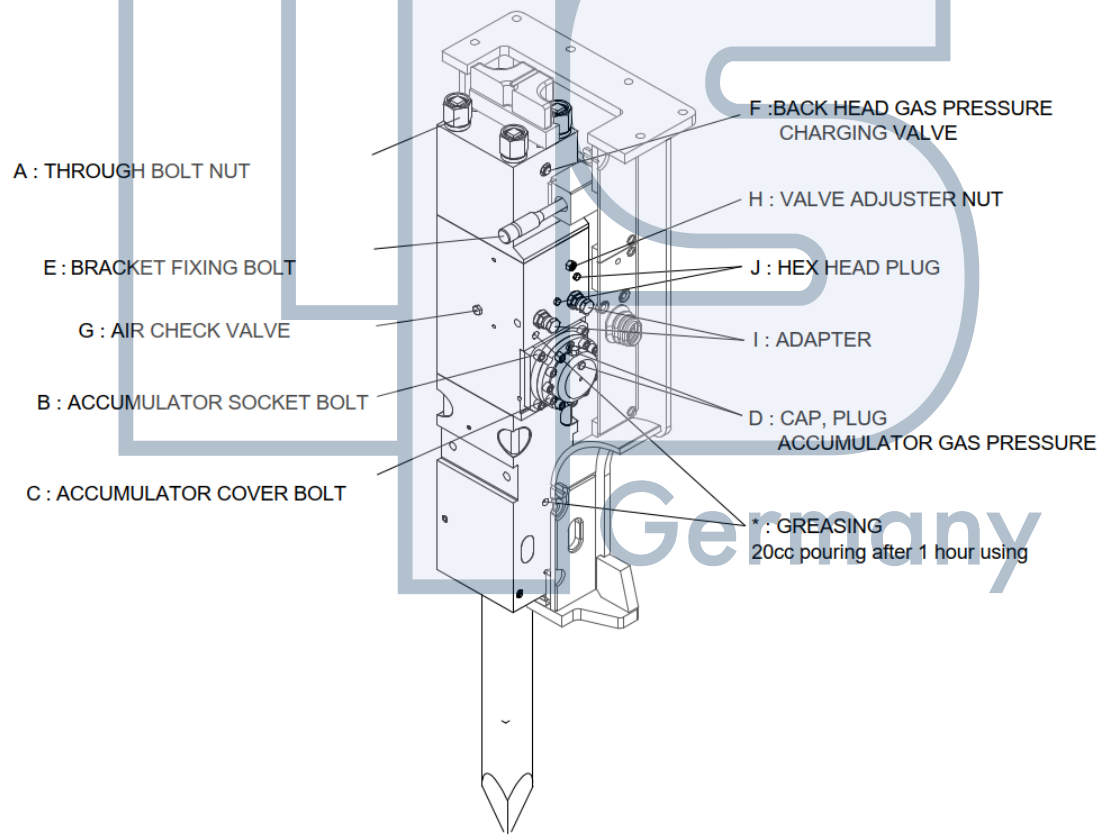
2. Daily check

Before you start working, please check all the important points

	Check that all nuts and bolts are present and tight
	Check the hoses for damage and that the hose connections have not come loose
	Check the hammer for unusual oil leaks
	Check that the chisel shows no unusual wear
	Before each operation and two to three hours after each continuous operation, check the grease level and top up if necessary.
	Check the level of the hydraulic oil and that the oil is not contaminated
	Check whether rubber plugs, bolts or other parts are still present

3. Tightening torque & gas pressure

MODE / ITEM	Position	Einheit	LIS40 LIS45	LIS53		LIS68	LIS75	LIS75	LIS85	LIS100		LIS135	LIS140		LIS155 LIS165	LIS175	LIS190
DURCHGANG SCHRAUBENMUTTER	A	kg-m	25~30	25~30		38~42	60~70	60~70	96 ~105	140 ~150		270 ~280	290 ~300		440 ~450	470 ~480	470 ~480
AKKUMULATOR SCHRAUBEN	B	kg-m	–	–		–	–		–	–		–	60~65		65~70	65~70	90~95
AKKUMULATOR DECKELSCHRAUEBN	C	kg-m	–	–		–	–		–	–		–	45		35	35	65
KAPPE	D	kg-m	–	–		–	15		–	–		–	15		15	15	15
RAHMEN-SCHRAUBE	E	kg-m	60	80		100	100	100	145	145		250	250		350	350	350
Hinterkopf Gasbefüllungsventil	F	kg/㎠ (psi)	16,5 (235)	16,5 (235)		16,5 (235)	16,5 (235)	16,5 (235)	16,5 (235)	16,5 (235)		16,5 (235)	16,5 (235)		16,5 (235)	16,5 (235)	16,5 (235)
Akkumulator Gasdruck	D	kg/㎠(psi)	–	–		–	–	10 (142)	–	–		–	55 (782)		55 (782)	55 (782)	55 (782)
Druckventil	G	kg-m	16~18	16~18		16~18	16~18	16~18	16~18	16~18		16~18	16~18		16~18	16~18	16~18
Ventileinstellungsmutter	H	kg-m	–	–		–	–	25~30	–	–		30~35	30~35		50~55	50~55	60~65
Adapter	I	kg-m	16~18	16~18		16~18	16~18	16~18	24~26	24~26		32~35	32~35		35~40	35~40	35~40
Befüllungsventil	F	kg-m	35~40	35~40		35~40	35~40	35~40	35~40	35~40		35~40	35~40		35~40	35~40	35~40
Hex-Kopfstecker	J	kg-m	–	–		–	–	–	–	–		3~4	3~4		3~4	3~4	3~4
Schmierung nach jeder Arbeitsstunde	*	cm^3	7	7		10	10	10	10	15		20	20		25	25	25



8. Wear limit of cutting tool, wear bushes and cutting tool bolts

Even with normal and proper operation of the hammer, wear will occur on the chisel and the chisel wear parts, e.g:

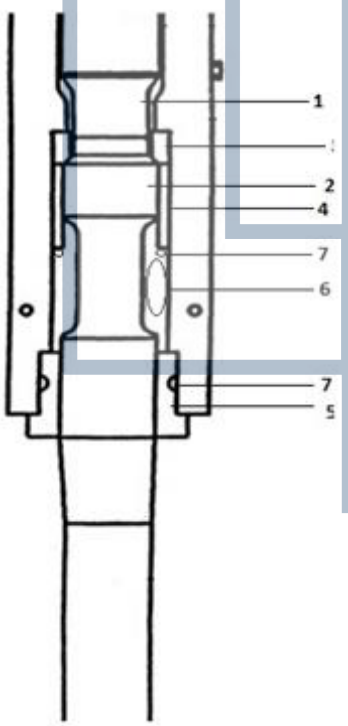
- Wear bushing, chisel bushing, front bushing
- Pressure ring
- Chisel bolts, stop bolts and sleeves
- Scraper and scraper holder

Such wear on cutting tools and the cutting tool wear parts is due to:

- Wear due to sliding of metal on metal
- Wear of the contact point due to micro-welding effect
- Abrasive wear due to particles
- Buckling or peeling of surfaces due to extremely high contact pressure
- Faster wear due to frictional heat

The chisel, chisel bushing and front bushing must be checked for wear every 60 operating hours of the hydraulic breaker or weekly. If the wear exceeds the permissible wear limits, the relevant parts must be replaced. If these parts continue to be used even though they have reached their wear limit, serious damage may occur to the piston and chisel. In particular, if the hydraulic breaker has too much play between the chisel and the two wear bushes, the chisel can bend and break as a result of incorrect blows. The replacement of parts due to wear is not covered by the warranty.

1. Chisels and wear parts in the front head:



Shown is a general angled sectional view of the front head.

1. piston
2. chisel
3. thrust ring
4. chisel bushing
5. front bushing
6. chisel pin
7. stop pin

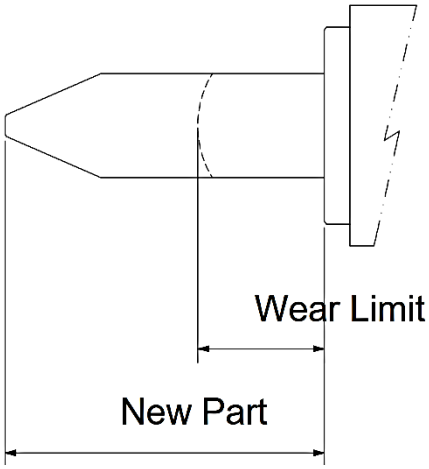
LIS Germany

2. Chisel:

The initial dimension of the chisel is specified in the following table. Replace the chisel when the limit value is reached.

Unit: mm

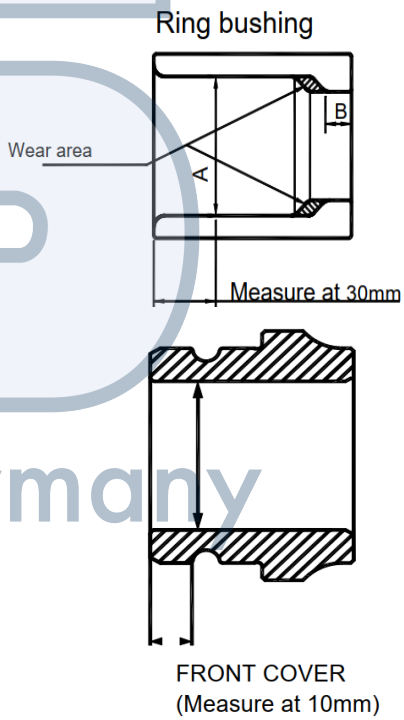
Model	New Chisel long	New Chisel short	Wear Limit
LIS40	297	247	200
LIS45	326	276	200
LIS53	330	280	200
LIS68	425	325	250
LIS75A	507	507	250
LIS100A	561	461	250
LIS135A	701	601	350
LIS140A	762	662	400
LIS155	913	813	500
LIS165	952	852	500
LIS175	918	818	550
LIS190	871	776	550



3. Ring bushing

Unit: mm

Model	New part	Limit values	New part ring bushing	Wear Limit
LIS40	40	42	8,75	7,00
LIS45	45	47	12,25	8,00
LIS53	53	55	8,50	6,00
LIS68	68	71	10,50	7,50
LIS75A	75	79	15,00	12,00
LIS100A	100	105	17,00	14,00
LIS135A	135	140	32,50	29,50
LIS140A	140	146	40,00	37,00
LIS155	155	161	46,00	43,00
LIS165	165	171	41,00	38,00
LIS175	175	181	53,50	50,50
LIS185	185	181	45,00	42,00
LIS190	190	196	31,50	28,50
LIS195	195	201	45,00	42,00



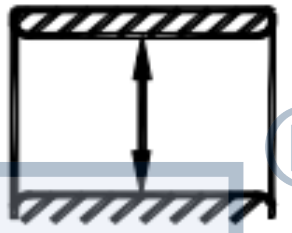
4. Chisel bushing and front bushing

The inside diameters of the chisel bushing and the front bushing are the same for new parts. The initial diameter of the chisel bushing and the front bushing is specified in the following table. Replace both bushes if the limit value is exceeded.
For hammer models that are not equipped with a chisel bushing, only the front head needs to be checked. When replacing the chisel bushing and the front bushing, make sure that the bushings and the bore on the front head are completely clean. Coat the fitting surfaces with grease.

Dimensional limits for cutting tool, cutting tool bush and front bush

Unit: mm

Model	Inside diameter new part	Internal diameter limit values
LIS 40	40	42
LIS 45	45	47
LIS 53	53	55
LIS 68	68	71
LIS 75A	75	79
LIS100A	100	105
LIS135A	130	140
LIS140A	140	146
LIS 155	155	161
LIS 165	165	171
LIS 175	175	181
LIS 185	185	191
LIS 190	190	196
LIS 195	195	201



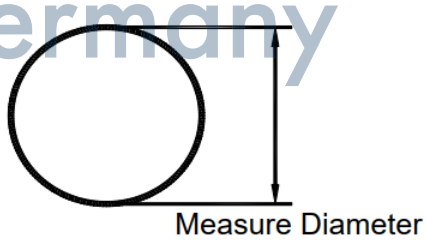
Thrust Bush
(Measure at center)

5. Front head bolt Chisel bolt

Unit: mm

Model	New part	Limit value
LIS100A	26	24
LIS135A	30	24
LIS140A	26	28
LIS155	26	24
LIS165	26	24
LIS175	36	34
LIS185	36	34
LIS190	36	34
LIS195	36	34

Front head pin



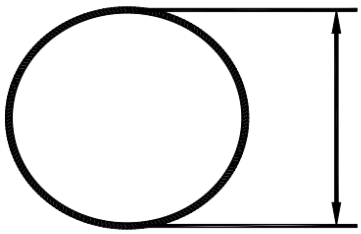
Measure Diameter

6. Stop bolt

Unit : mm

Model	New part	Limit value
LIS40	13	11
LIS45	13	11
LIS53	13	11
LIS68	16	14
LIS75A	16	14
LIS100A	17,5	15,5
LIS135A	17,5	15,5
LIS140A	20	18
LIS155	17, 5	15,5
LIS165	17,5	15,5
LIS175	18	16
LIS185	26	24
LIS190	26	24
LIS195	26	24

Stop pin



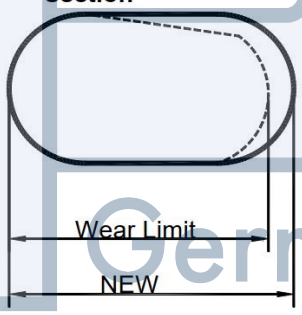
Measure diameter

7. Chisel bolt

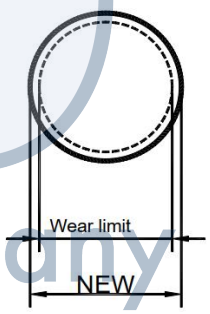
Unit : mm

Model	New part	Limit value
LIS40	28	26
LIS45	28	26
LIS53	32	30
LIS68	38	36
LIS75A	42	40
LIS100A	60	57
LIS135A	82	79
LIS140A	88.5	85.5
LIS155	96	93
LIS165	96	93
LIS175	99	95
LIS180	121	118
LIS190	110	107
LIS195	121	118

Chisel pin with elongated cross section



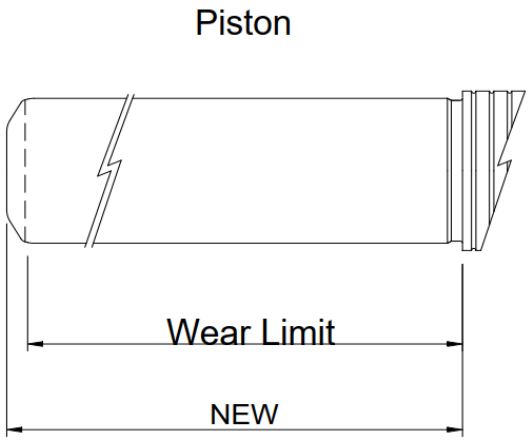
Chisel pin with round cross-section



8. Piston

Unit : mm

Model	New (long type)	New (short type)	Limit value
LIS40	297	247	200
LIS45	326	276	200
LIS53	330	280	200
LIS68	425	325	250
LIS75A	507	407	250
LIS100A	561	461	250
LIS135A	701	601	350
LIS140A	762	662	400
LIS155	913	813	500
LIS165	952	852	500
LIS175	918	818	550
LIS190	918	818	550
LIS195	871	776	550



9. N2 Gas - Nitrogen

DANGER!

There is a risk of explosion if other gases are used. Only pure nitrogen with a purity of 99.8 % may be used.

The breaker is a nitrogen-supported hydraulic breaker. The gas with which the rear head is filled ensures high impact power, while the gas with which the pressure accumulator is filled reduces pressure fluctuations in the hammer. With this type of hydraulic breaker, the operating performance of the breaker depends on the gas pressure. The filling pressures in these gas chambers are therefore an important factor for the hammer and must always remain within the specified limits.

Please note the **conversion table for** filling
This section describes how the rear head and the pressure accumulator of the hammer are filled with gas and how the gas pressure is controlled here. Pure nitrogen with a purity of 99.8% must always be used; other gases, e.g. air or oxygen, are not permitted. Gas filling sets must be available at all times so that the following checks and maintenance work can be carried out.

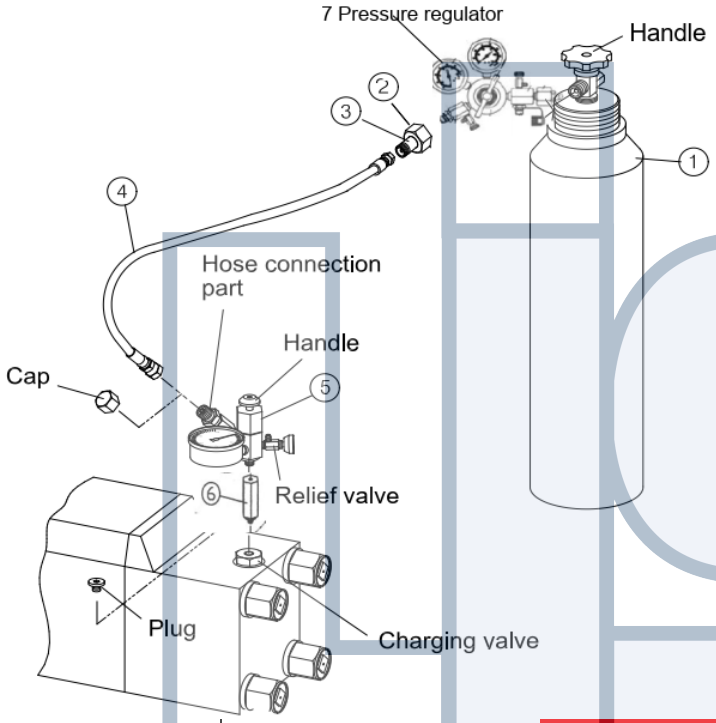
1. Gas pressure in the back of the head

If the impact power of the hydraulic breaker begins to decrease, the gas pressure in the backhead must be checked. The gas in the backhead only needs to be topped up when the gas pressure has fallen below the specified value.

In general, the gas pressure in the rear head should be checked at least every **50 operating hours** or **weekly**. If necessary, top up the gas.

NOTE!

To check the gas pressure or to top up the gas, always lay the hydraulic breaker flat without exerting any pressure on the chisel.



1) N2 gas cylinder (not included in the scope of delivery)
2) Adapter nut (C91121)
3) Adapter coupling (C91122)
4) Synflex hose (2651001)
5) 3-way valve / pressure gauge (C91142)
6) Extension adapter for box type (F01137)
7) Pressure reducer (not included in the scope of delivery)

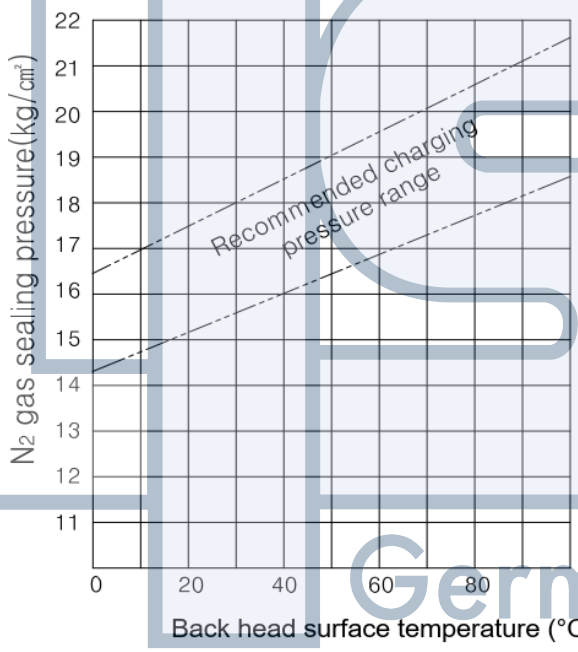
CAUTION!

The gas pressure changes depending on the condition of the piston rod. Lay the hammer flat and allow the piston to fully extend to fill the hammer. Keep away from the chisel while filling the hammer with gas. The chisel can be hit by the piston and suddenly pushed out when the through bolts are replaced or the housing of the hammer is dismantled. Release the N2 gas before starting work. Take particular care when handling and storing the N2 gas cylinder as it is a highly pressurised container. Only use nitrogen gas. **Gas pressure at the back of the head 16 bar at a surface temperature at the back of the head of 20°C** See "CONVERSION TABLE FOR N2 GAS PRESSURE AT THE BACK OF THE HEAD".

2. Check the gas pressure at the back of the head

1. Unscrew the cover plate on the hydraulic breaker and remove the plug from the filler valve.
2. Make sure that the cap and the outlet valve of the 3-way valve (5) are closed.
3. Place the 3-way valve (5) on the extension adapter (6) and both on the filler valve of the rear head.
4. At this point, the handle (knob) of the 3-way valve must be upright to prevent the gas from escaping.
5. Now press the handle (button) into the filler valve so that the gas pressure in the back of the head is displayed on the pressure gauge.
6. For the correct gas pressure, refer to the **conversion table for filling at the** back **of the head**
7. If there is too much gas in the back so that the specified pressure is exceeded, open the outlet valve slightly to reduce the gas pressure. However, if the gas pressure is too low, top it up again as described on the next page.
8. Once the specified pressure has been reached, close the outlet valve and release the handle (knob)
9. Now open the outlet valve completely, remove the 3-way valve from the back of the head and replace the plug on the filler valve. At this point, make absolutely sure that no impurities get into the valve.

3. Conversion table for filling nitrogen gas pressure at the back of the head



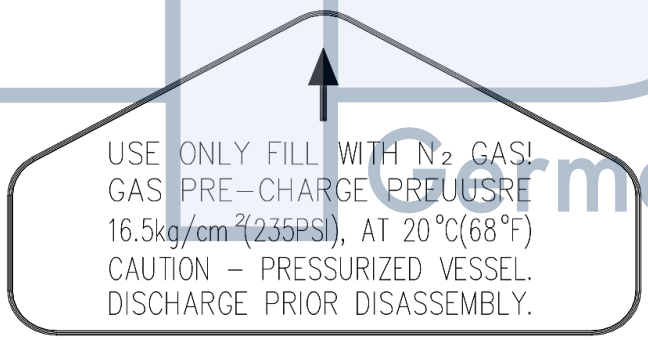
(Depends on the temperature of Back Head surface)

Back Head Surface Temperature (℃ / ℉)	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104
Back Head Gas Pressure (kg/㎠ / psi)	15.5 / 220	16 / 228	16.5 / 235	17 / 242	17.5 / 249

4. Filling the back of the head with N2 gas

1. Unscrew the cover plate on the hydraulic breaker and remove the plug from the filler valve.
2. Screw the adapter (3) and the adapter nut (2) together and connect the filling hose (4) to the adapter (3+2)
3. Connect the pressure reducer (7) to the N2 gas cylinder (1).
4. Connect the filling hose (4) to the pressure reducer (7).
5. Please refer to the **conversion table for the filling at the** back **of the head**
6. Set the desired pressure plus 10% on the pressure reducer.
7. Remove the cap from the 3-way valve
8. Place the extension adapter (6) on the filler valve of the back of the head.
9. Close the outlet valve on the 3-way valve.
10. Then connect the filling hose (4) to the 3-way valve (5).
11. Now close the pressure relief valve of the 3-way valve (5) completely and open the valve of the pressure reducer (7) anti-clockwise to fill the gas.
12. When the gas pressure has reached the specified pressure at the pressure reducer, close the N2 gas cylinder (1) by turning the handle clockwise.
13. Leave the handle of the 3-way valve up. The pressure generated will cause it to return to its position automatically
14. To release the N2 gas from the filling hose (4) and the 3-way valve, open the outlet valve on the 3-way valve.
15. Remove the filling hose (4) from the pressure reducer (7) and the 3-way valve (5), screw the cap back onto the 3-way valve and close the outlet valve.
16. Now press the handle (button) of the 3-way valve downwards and the gas pressure inside the rear head is displayed on the pressure gauge of the 3-way valve.
17. If the pressure is too high, release a small amount of gas from the back of the head by repeatedly opening and closing the outlet valve.
18. When the desired pressure is reached, close the outlet valve and release the handle (knob).
19. Now open the outlet valve completely, remove the 3-way valve from the back of the head and replace the plug on the filler valve. At this point, make absolutely sure that no impurities get into the valve.

The rear head is located on the rear head valve, labelled with this sticker.

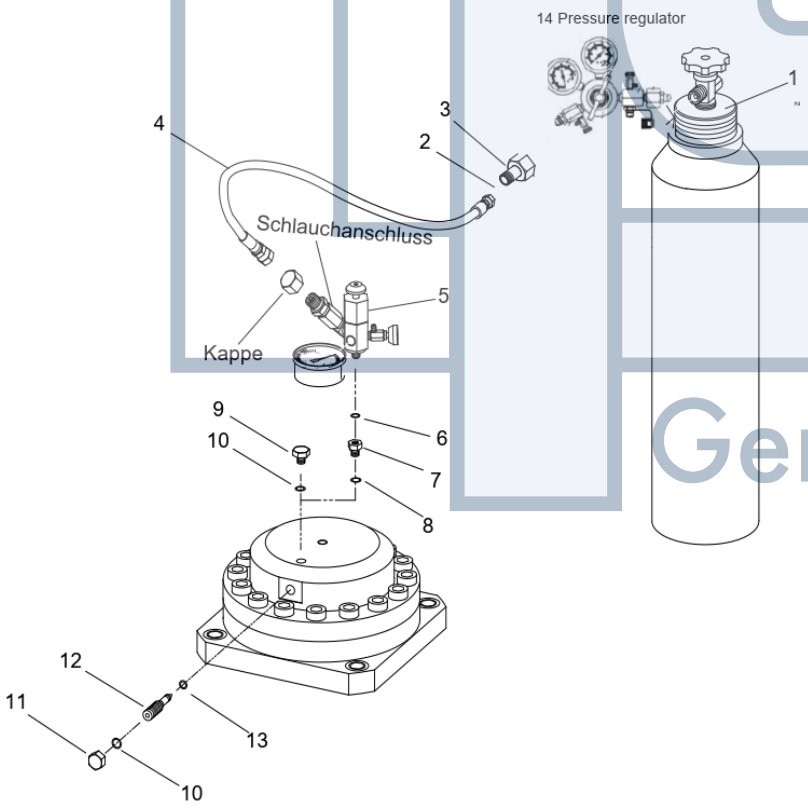


5. Gas pressure in the accumulator

	**CAUTION!** Take particular care when handling and storing the N2 gas cylinder as it is highly pressurised. Only use nitrogen gas. When dismantling the accumulator, the N2 gas must be drained before starting work. Do not touch the surface of the memory when working. Be sure to use that 3-way valve for filling the N2 gas, if you fill directly from the cylinder, the diaphragm may break off. If you only fill the N2 gas into the accumulator, make sure that the accumulator and the lid are fully tightened. Standard accumulator gas pressure 55kg/cm² (783 psi) at a temperature of 20°C on the accumulator surface

6. Checking the gas pressure in the accumulator

1. Make sure that the cap and the valve of the 3-way valve (5) are firmly tightened.
2. Remove the cap (11) from the accumulator and fully tighten the filling valve (12). 3) Check that the O-rings (6) + (8) are attached to the bushing (7). Remove the plug (9)
3. and screw on the socket.
4. Attach the socket (7) to the 3-way valve (5).
5. Loosen the filling valve (12) step by step. The boost pressure is displayed on the pressure gauge.
6. Close the valve clockwise when the gas pressure is normal.
7. If the gas pressure is higher, repeat the loosening and tightening of the pressure relief valve of the 3-way valve, the pressure is gradually reduced.
8. Loosen the pressure relief valve of the 3-way valve to release the N2 gas in the 3-way valve (5).
9. Remove the 3-way valve (5) and tighten the plug (9) and the cap (11).



1) N2 gas cylinder (2900003)
2) Adapter (coupling) (C91122)
3) Cap nut (C91121)
4) Synflex hose (2651001)
5) 3-way valve (C01244)
6) O-ring (2850010)
7) O-ring hex bushing (U81414)
8) O-ring (2850014)
9) Plug (U81276)
10) O-ring (2850014)
11) O-ring plug (U81275)
12) Filling valve (U81266)
13) O-ring (2850003)

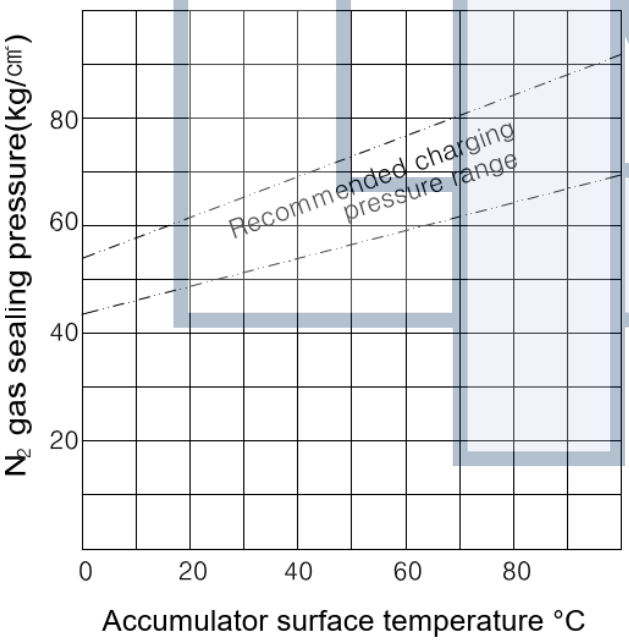
7. Filling the accumulator with N2 gas

1. Connect the filling hose (4) to the pressure reducer (7),
2. after you have screwed the hose adapter (3) onto the connection, screwed the nut (2) onto the bottle and connected it to the pressure reducer.
3. Connect the 3-way valve (5) to the filling hose (4) after you have unscrewed the cap of the 3-way valve.
4. Remove the cap (11) from the accumulator and fully tighten the filling valve (12).
5. Check that the O-rings (6) + (8) are fitted to the bushing (7). Remove the plug (9) and screws.
6. Loosen the storage charging valve (12) after checking that the socket (7) in the 3-way valve is connected.
7. Slowly turn the knob of the pressure reducer anti-clockwise.
8. Fill the gas into the accumulator according to the conversion table for charging the N2 gas pressure.
9. Turn the knob on the N2 gas cylinder clockwise to close the gas.
10. Close the storage tank charging valve (12).
11. Loosen the pressure relief valve of the 3-way valve to release the N2 gas remaining in the filling hose.

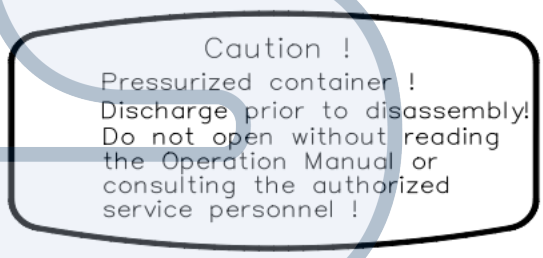
8. Conversion table for filling nitrogen gas pressure in the accumulator

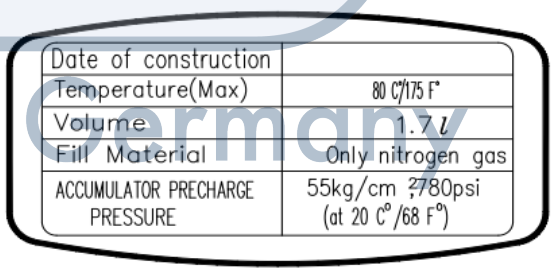
Accumulator Surface Temperature (℃ / ℉)	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104
Accumulator Gas Pressure (kg/㎠ / psi)	51 / 730	53 / 755	55 / 780	57 / 815	59 / 830

Conversion table for filling
N_2-Gas pressure at the accumulator



The accumulator stickers (A) and (B) are located on the accumulator body





9. Troubleshooting

Error	Possible causes	Remedy
The hammer cannot be set in motion	Pressure and return lines swapped	Connect hammer hoses correctly
	Shut-off valve in pressure and/or return lines closed	Open shut-off valves
	Gas pressure in rear head too high	Check the gas pressure in the rear head and set to the correct value
	Hydraulic oil level in the tank too low	Check hydraulic oil level and top up tank
	Pressure relief valve opens if the pressure is too low	Reset the limiting pressure
	Defect in valve and piston	Contact the responsible dealer.
	Leak between pressure and return side in the hydraulic circuit of the excavator	Check installation, pump and other hydraulic elements
	Operating pressure too low	Check the engine speed of the carrier machine and/or operating pressure
Stroke rate of the hydraulic hammer too low	Insufficient hydraulic oil supply from the carrier machine Flow resistance at the oil filter or oil cooler too high	Contact the responsible dealer. Check, clean or replace the oil filter/cooler
	Hydraulic oil overheated	Check and replace filter, radiator
	Gas pressure in rear head too low	Check gas pressure in rear head and top up gas
	Chisel to piston not arranged correctly	Press the chisel down with the carrier machine.
	Inner diameter of the return line too small	Increase the inside diameter of the return pipe
	Return pressure too high	Check and reduce return pressure
	Pressure relief valve opens if the pressure is too low	Reset the limiting pressure
	Hydraulic oil level in the tank too low	Check hydraulic oil level and top up tank
	Poor pump performance	Consult an authorised service technician
	Diaphragm in accumulator defective Pressure adjustment valve screwed in too far	Replace diaphragm Readjust pressure adjustment valve
	Insufficient supply quantity of the hydraulic system	Check pump data with measuring device and compare with original data
Uneven number of strokes	Gas pressure of the pressurised storage tank too low	Check and top up nitrogen gas
	Defect in hammer valve or faulty distributor function	Contact the responsible LIS dealer

Error	Possible causes	Remedy
Oil leaks between rear head and cylinder	Seal defective	Check and replace seals
Oil leaks at the accumulator	O-ring and/or support ring defective	Check and replace the O-ring and support ring
Oil leaks at the chisel	Cylinder seals defective	Dismantle hydraulic breaker and replace seals
Hydraulic oil temperature too high	Hydraulic oil level in the tank too low	Fill hydraulic oil tank
	Delivery rate of the carrier pump too high	Correct the speed of the carrier machine motor Reset the pump.
	High outside temperature and no radiator installed.	Install oil cooler
	Pressure relief valve defective	Install new pressure relief valve
Gas leaks at the rear head	Loose through bolts	Tighten through bolts
	Defect in the gas valve of the rear head	Replacing the gas valve of the rear head
	Defective O-ring on the rear head	Replace O-ring
	Defective cylinder liner seals	Check and replace piston bush seals

10. Hydraulic oil and grease

The choice of hydraulic oil determines the performance of the hydraulic breaker.

(1) For use in special regions with a harsh climate (extremely cold or hot weather)
(2) If the recommended hydraulic oil brands are not available
(3) If the hydraulic oil supplied for the basic machine does not match the recommended one.

1. Hydraulic oil and grease recommended for LIS hydraulic breaker

Manufacturer	Hydraulic oils			Fat (MOS2)
	Summer	Winter	All seasons	
	ISO VG 46	ISO VG 32	ISO VG 46	NLGI No2
Mobil	Mobil DTE 25	Mobil DTE 24	Mobil DTE 15M	Mobil Grease Special
	Mobil SHC 525 *			Mobilith SHC 220 *
	Mobil Eal Syndraulic 46 **			
LG-Caltex	Randohd 46	Rando HD 32	New Rando HDCZ	Molytex EP2
Interlube	-	-	-	InterLube LISHC400
Mato	-	-	-	Multi Basic EP-2M 3100018
BP	Energol HP46	Energol HP32	Energol HP46	-
Shell	Tellus 46	Tellus 32	Tellus T 46	Retinax HDX-2
S-Oil	-	-	Azolla ZS 46	-

*** Synthetic lubricant** **** Environmentally friendly synthetic lubricant**

	**CAUTION!** Hydraulic oil temperature and viscosity Operate the hydraulic breaker at an oil temperature of 20 °C to 80 °C. Operation at higher temperatures can damage the internal components, resulting in reduced performance.

2. Oil contamination and oil change

Contaminated oil leads to malfunctions of the breaker and the base machine and causes damage to parts.

Pay particular attention to oil contamination.

Contaminated oil should be changed immediately.
When changing the oil, clean the oil tank, cylinder and lines thoroughly.
When cleaning or replacing the oil filter, also check whether the oil is contaminated.

- Replacing the filter: after the first 50 hours and every 100 hours thereafter
- Replacing the hydraulic oil: every 500 hours

	**IMPORTANT!** If the hammer is not lubricated with sufficient grease, the friction on the hammer chisel will generate a lot of heat. The heat can lead to premature wear and cracks in the chisel and chisel holder. Always observe the applicable safety regulations when handling oil and grease!

3. Lubricate chisel

Lubricate regularly and check the grease
For continuous use, lubricate the chisel with sufficient grease **every two hours**.
Fill the grease through the grease nipple provided between the chisel and the chisel bush.

Every 2 hours

- 6 ~ 12 grease bursts for LIS40 - LIS68,
- 12 ~ 25 grease bursts with LIS75 - LIS195

with a large grease gun

The lubrication interval and grease quantity must be adapted to the respective hammer model and the operating conditions!

4. Use with high ambient temperature:

If the breaker is used in high ambient temperatures, i.e. in summer or in tropical climates with temperatures above 30 °C, the temperature of the hydraulic oil must be monitored to ensure that it does not exceed the specified temperature limit. If the oil temperature exceeds the maximum permissible operating temperature value, hydraulic oil with a suitable viscosity must be used.
In this case, hydraulic oil of a high viscosity class should be used. If the oil temperature is still too high despite using an oil with a high viscosity, an additional hydraulic cooler must be fitted.

5. Use with low ambient temperature:

At temperatures below 0 °C, the carrier machine must warm up before use in accordance with the procedure described by the carrier machine manufacturer. Before starting up the hydraulic breaker, ensure that the hydraulic oil of the carrier machine is at least 0 °C.
Note:
The hydraulic breaker and carrier machine cannot operate at full power until the oil has reached a temperature of **at least 60 °C.**

6. Disruptions that can occur:

The temperature of the hydraulic oil must never exceed the maximum permissible oil temperature. If higher temperatures are measured in the tank, the hydraulic system and/or the pressure relief valve must be checked. The following are some faults that can be attributed to incorrect oil viscosity or incorrect oil temperature:

Oil that is too thick (i.e. oil temperature too low) can cause the following:
- Slow or irregular beats
- Starting difficulties
- Damage to hammer parts due to cavitation
- Low impact power

Oil that is too thin (i.e. oil temperature too high) can cause the following:
- Restricted oil supply from the carrier pump
- Low impact rate; low crushing capacity
- Insufficient lubrication; faster wear of the hammer parts
- Damage to the sealing elements

	**IMPORTANT!** If the hammer is used without preheated oil: the sealing elements of the hammer may break. The diaphragm in the accumulator may rupture.

	**IMPORTANT!** If hot hydraulic oil is supplied to an extremely cold breaker, this leads to internal mechanical stresses in the breaker, which ultimately cause the breaker to fail.

7. Hydraulic oil filter

Contaminated hydraulic oil can cause damage not only to the breaker, but also to the hydraulic components of the carrier machine.
Contaminated hydraulic oil can cause the following:

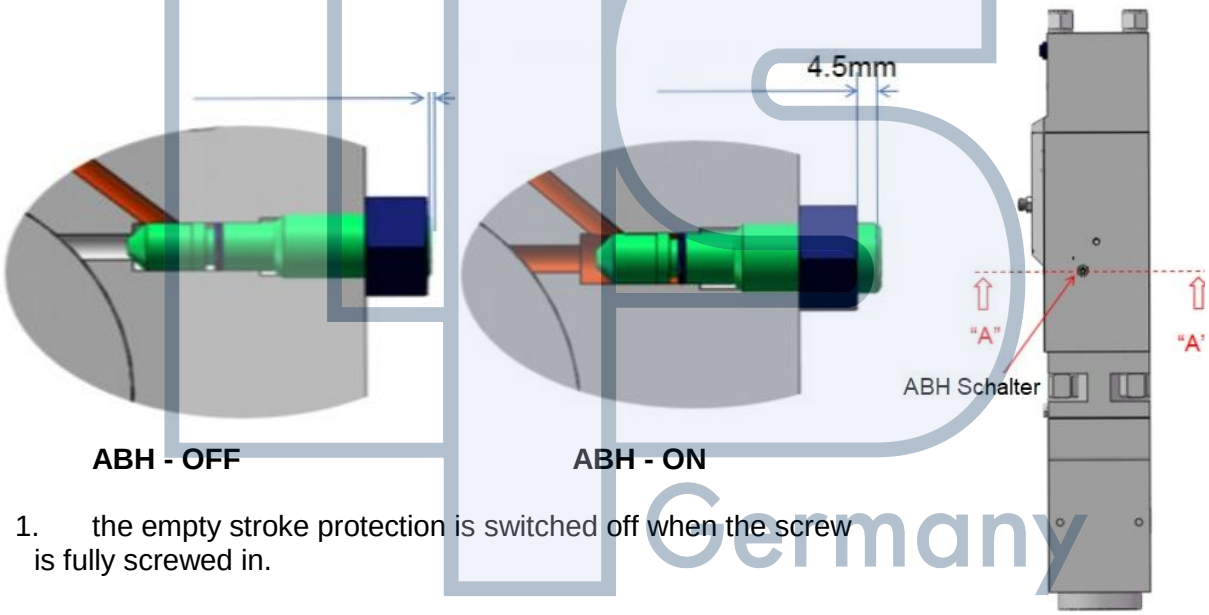
- Faster parts wear
- Clamping or seizing of moving parts
- Scoring on sliding surfaces of moving parts
- Oil leaks and impairment of the hammer's performance Reduction in oil quality
- Air bubbles and water in the hydraulic oil can cause cavitation faults.

Check the oil filter in the return line of the machine; this filter must not be coarser than **50 micrometres** and a **magnetic separator** must be integrated.
We recommend changing the hydraulic oil and oil filter in accordance with the construction machinery manufacturer's instructions!

11. ABH - Empty stroke system

The ABH switch is located on the side of the hammer. It is recommended to switch on the idle protection even during normal hammer operation. If the empty stroke protection system (AHB) is switched on, it prevents blows when the hammer is idling.

1. Setting for LIS75-LIS100

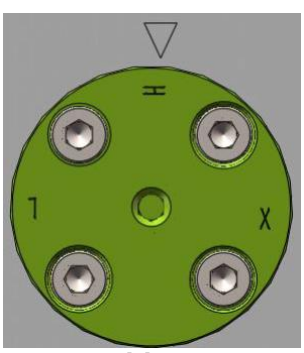


ABH - OFF **ABH - ON**

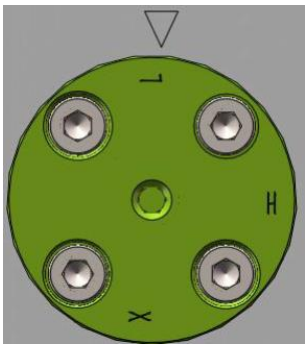
1. the empty stroke protection is switched off when the screw is fully screwed in.

2. the anti-condensation device is switched on when the bolt protrudes approx. 3 threads beyond the nut, about 4.5 mm.

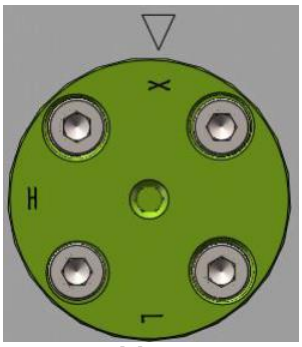
2. ABH setting for LIS135A-140A



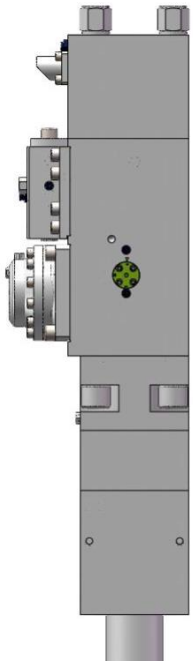
H-position



L-position



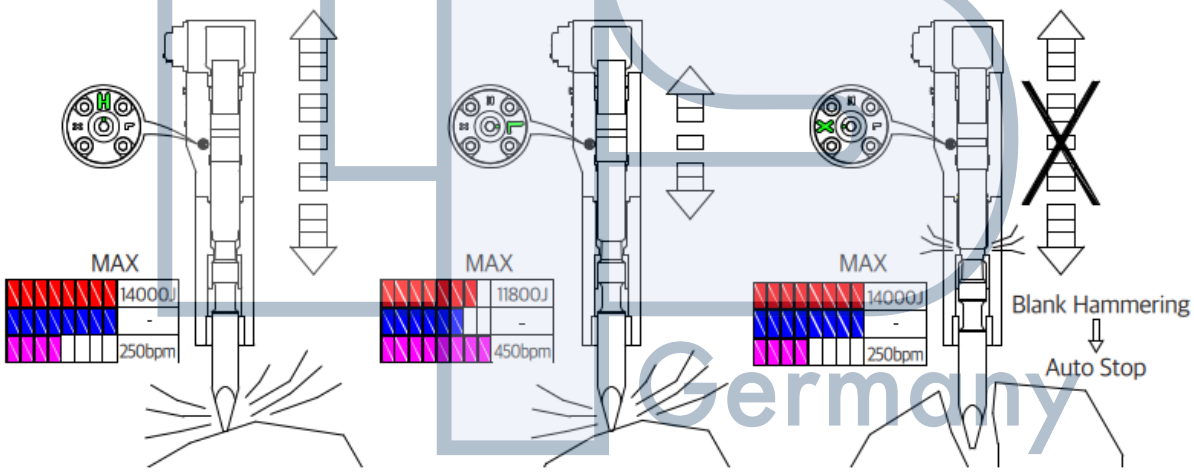
X-position



1. If the ABH switch is in the H position, this means that the hammer is in "Long stroke and high impact force" mode and the ABH (empty stroke protection) is switched off.

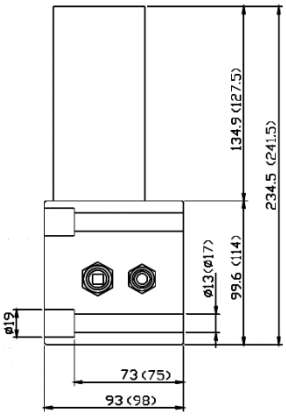
2. If the ABH switch is in the L position, this means that the hammer is in "short stroke and normal impact force" mode and the ABH (empty stroke protection) is switched off.

3. If the ABH switch is in the X position, this means that the hammer is in "Long stroke and extra impact power" mode and the ABH (empty stroke protection) is switched on.



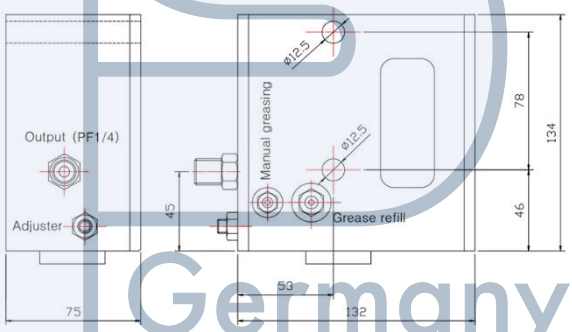
12. Automatic lubrication pump

1. LISC5+AUTOLUBE



Dimension:	140mm x 93mm x 234.5mm
Weight:	3.6 kg
Outlet pressure:	120 bar
Connection:	PF ¼
Dispensing quantity:	0.2 ~ 1.0 cc/min
6.0~	42.0 cc/hour
Temperature range:	-10°C ~ 60°C
Cartridge:	LISHC400 (Interlube)
Dimension:	Ø 62mm X 180 mm
Weight:	400g
Lubricant:	Interlube

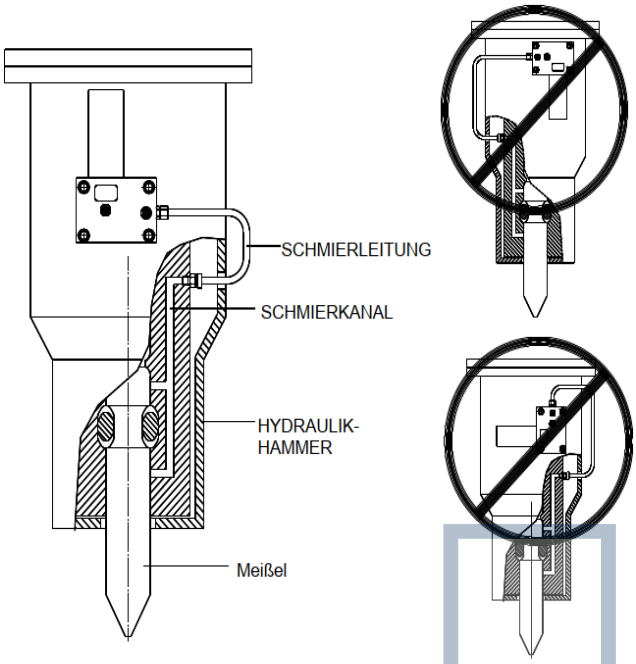
2. S1-250AUTOLUBE



Dimension: 120mm x 75mm x 134mm

Weight:	3.1 kg
Outlet pressure:	80 bar
Connection:	PF ¼
Dispensing quantity:	0.1~ 0.7 cc/min
Temperature range:	-20°C ~ 60°C
Cartridge:	LISHC400 (Interlube)
Dimension:	Ø 62mm X 180 mm
Weight:	400g
Lubricant:	Interlube

3. Installing the lubrication pump



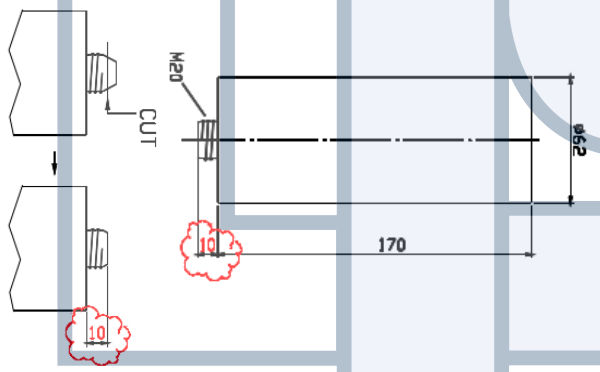
1. The lubrication pump must be installed parallel to the chisel of the hammer.

2. The pump body must be screwed firmly onto the hammer. The screws must be tightened to a torque of 200 Nm and no washers must be used. If the screw torque is too low or too high, this can cause serious damage or malfunctions.

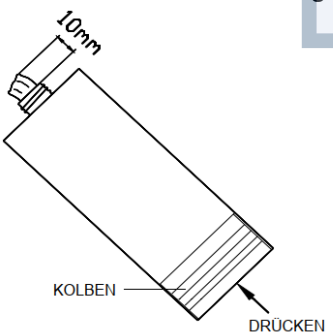
3. The grease cartridge may only be tightened hand-tight. If the cartridge is overtightened, the screw on the grease cartridge may break off.

4. Fitting the grease cartridge

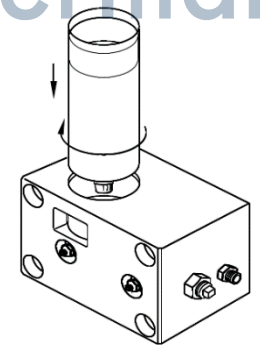
1. Cut the cartridge at the tip of the thread and make sure that the thread is no longer and no shorter than 10 mm.



2. Press the piston of the cartridge grease comes out

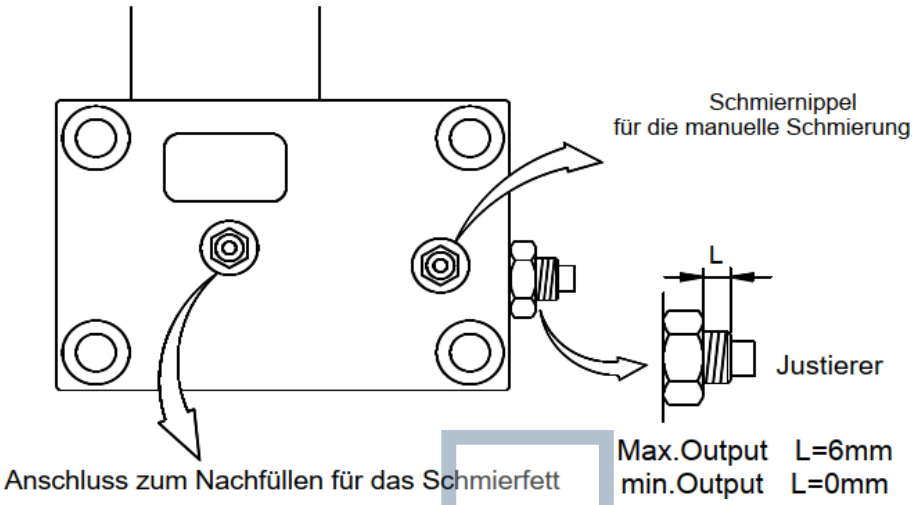


3. insert the cartridge until some 10mm of and tighten it hand-tight



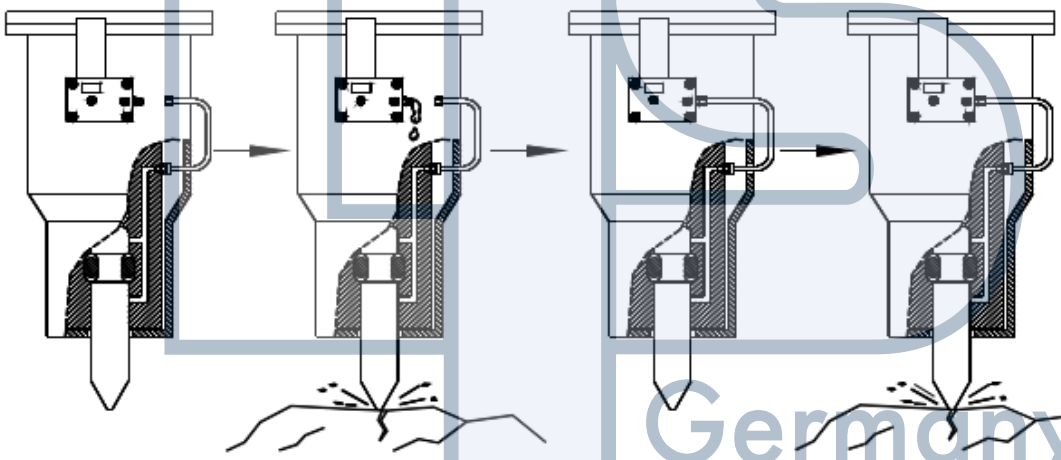
5. Manual lubrication

Running time of a LISHC400 (Interlube) cartridge: 10 ~ 25 Ton2-4 days

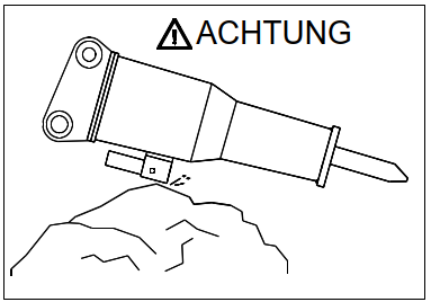


	**IMPORTANT!** If the hammer has not been used for more than 2 months, please add sufficient grease via the grease nipple before use.

6. Checking the pump before operation



1. Run the hammer without connecting the hose
2. Check that the grease flows for 3 minutes
3. Connect the hose



	**IMPORTANT!** Make sure that the pump is not damaged!

13. Declaration of conformity

Declaration of conformity

in accordance with the EC Machinery Directive (2006/42/EC, Annex II 1.A)

-Original-

The manufacturer,

Linser Industrie Service GmbH
Camp-Spich-Straße 70
53842 Troisdorf
Germany

declares under sole responsibility that the products,

- LIS Hydraulic hammer LIS40-BT-XXXX
- LIS Hydraulic hammer LIS45-BT-XXXX
- LIS Hydraulic hammer LIS53-BT-XXXX
- LIS Hydraulic hammer LIS68-BT-XXXX
- LIS Hydraulic hammer LIS75A-BT-XXXX
- LIS Hydraulic hammer LIS100A-BT-XXXX
- LIS Hydraulic hammer LIS135A-BT-XXXX
- LIS Hydraulic hammer LIS140A-BT-XXXX

Comply with all relevant provisions of the

- Directive 2006/42/EC – machinery directive

Applied conformity assessment procedure

Internal production control according to Annex VIII
Risk assessment according to EN ISO 12100:10
Quality management system ISO 9001

- Directive 2000/14/EC of the European Parliament and of the council

Applied conformity assessment procedure
Internal production control according to Annex V
Guaranteed sound power level: 122dB (Lwa)

The technical manager of the company Linser Industrie Service GmbH is authorized to hand over and store the relevant technical documentation upon request.

Troisdorf 01/08/2024 Niclas Nieth B.Sc., Technical manager