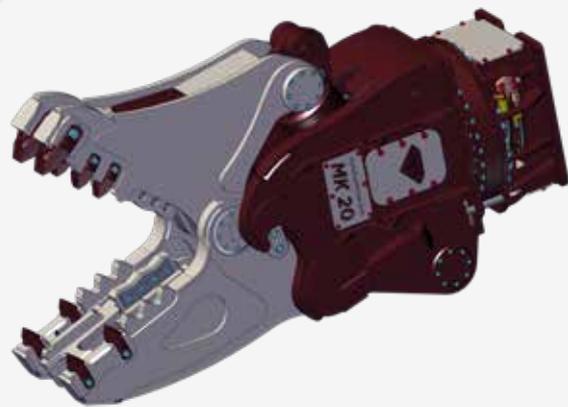
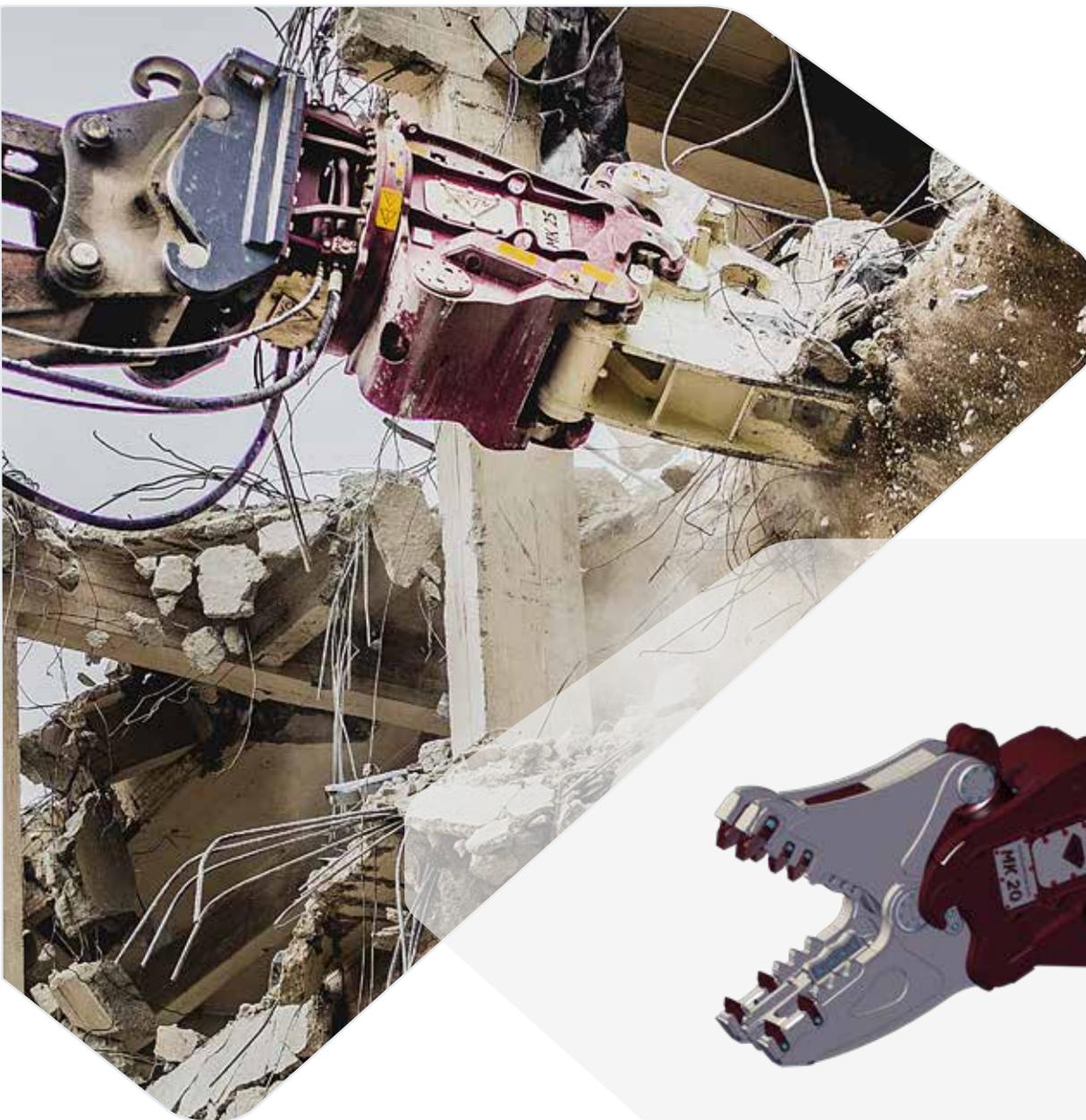




HYDRARAM[®]

DEMOLITION & RECYCLING EQUIPMENT



MULTI-PROCESSOR - MK SERIES

Operation and maintenance manual

Hydraram B.V.

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Certified company





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1. Introduction

1.1. Purpose of the user and maintenance instruction manual

This manual forms an integral part of the attachment and is intended to provide all the information necessary to:

- Inform operators correctly regarding safety issues;
- Handle, pack and unpack the attachment safely;
- Install the attachment safely;
- Ensure users are fully aware of its operating features and limits;
- Ensure the attachment is used correctly and safely;
- Ensure maintenance operations are carried out correctly and safely;
- Dismantle the attachment safely and in accordance with the standards and regulations regarding health and safety in the workplace and environmental protection.

❗ IMPORTANT!

Under current law, the personnel responsible for using and operating this attachment are obliged to read the contents of this document carefully and to ensure the operators and maintenance technicians have read the parts relating to their specific duties. The time spent doing this will ensure correct and safe operation of the attachment.

This document assumes that the applicable laws on safety and occupational hygiene are adhered to where the attachment is to be used. The instructions, drawings and documentation contained in this manual are of a confidential, technical nature and may not be reproduced in whole or in part.

This manual is subject to the following limitations:

- It may never take the place of an adequately experienced user;
- For particularly demanding operations, the manual can only provide a summary of the main steps.

The manual should be regarded as an integral part of the attachment and must be kept for future reference until the attachment is dismantled for disposal. The manual must be stored correctly and kept where it may be readily consulted when using the attachment with the operating machine.

The company Hydraram may not be held liable in the following cases:

- Improper use of the attachment;
- Use contrary to specific national law;
- Incorrect installation (in the case where the attachment was installed by unauthorised personnel);
- Power supply defects;
- Serious failures to perform the required maintenance;
- Unauthorised modifications and operations;
- Use of replacement parts or materials not specific to the model;
- A total or partial failure to follow the instructions provided;
- Use of the attachment with an incompatible machine;
- Exceptional events.

1.2. Safekeeping of the instruction manual

The manual must be stored carefully and kept together with the attachment whenever the latter changes hands throughout its working life. The manual will last longer if it is handled carefully with clean hands and not placed on dirty surfaces.

No parts of the manual should be removed, torn out or modified arbitrarily. This manual should be stored in a cool, dry place near to the attachment it refers to. The manufacturer can supply additional copies of the manual upon request.

1.3. Updating the instruction manual

The manufacturer reserves the right to change the design of, and make improvements to, the attachment without notifying customers and without updating manuals that have already been delivered to the user. Moreover, if the manufacturer makes changes to the attachment already in use at the customer's premises that require changes to one or more chapters of the manual, the manufacturer shall be responsible for sending the manual holder the chapters affected by the change, together with a copy of the new manual revision list.

1.4. Who is this manual intended for?

This manual is intended for: Installation personnel, Operators and Technicians qualified to carry out maintenance on the attachment.

➤ **OPERATOR** refers to the person assigned to operate, adjust, clean and perform regular maintenance on the attachment.

➤ **QUALIFIED PERSONNEL** or **QUALIFIED OPERATOR**, refers to those persons who have attended specialisation and training courses etc. and who have experience in the installation, operation and maintenance, repair or transport of the attachment.

➤ **EXPOSED PERSON** refers to any person located inside an area inside and/or near an operating machine where their presence may be hazardous to their safety, health or well-being.

The attachment is intended for industrial use and, thus, professional and not general use. As a result, it may only be operated by qualified persons and persons who specifically:

- are adults;
- are physically and mentally able to perform work of particular technical difficulty;
- have been adequately instructed in the use and maintenance of the attachment;
- have been judged suitable by the employer to perform the work entrusted to them;
- are capable of understanding and interpreting the manual and the safety instructions;
- are familiar with the emergency procedures and how to implement them;
- are able to operate the specific type of attachment;
- are familiar with the regulations in force;
- have understood the operating procedures defined by the manufacturer of the attachment.

1.5. Glossary and symbols

This section defines the abbreviations used and the meaning of the symbols used to indicate the operator qualification level and the status of the attachment. Their use allows for information regarding the correct and safe use of the attachment to be communicated quickly and clearly.

OPERATOR AREA

The area where the operator must work during normal use of the attachment.

DANGER ZONE

An area inside and/or near the attachment where the presence of an exposed person is a risk to the health of that person.

EXPOSED PERSON

Any person wholly or partially located inside a danger zone.

MAN-OPERATING MACHINE INTERACTION:

Any situation where an operator interacts with the attachment during any of the operational phases at any time during its life cycle.

OPERATOR QUALIFICATION LEVEL

Minimum skill level that the operator must have to perform the operation described.

NUMBER OF OPERATORS

The number of operators required to perform the operation described. This number is derived from a careful analysis by the manufacturer, meaning that the presence of a different number of personnel could prevent the expected result from being achieved or expose the personnel to danger.

STATUS OF THE OPERATING MACHINE

The status of the operating machine includes its operating mode, for example, automatic, jog,

stopped, etc., the condition of the safety devices on the operating machine, such as safety devices enabled, safety devices disabled, emergency stop button pressed, power source insulation type, etc.

RESIDUAL HAZARD

A hazard that it has not been possible to eliminate or reduce sufficiently during the design stage, and against which the existing safety device are not (or are not completely) effective. Information on the presence of such hazards is provided in the manual, as well as instructions and precautions on how to avoid it.

SAFETY COMPONENT

This is a component used to guarantee a given safety function and whose failure or poor operation may have a negative impact on the safety and/or health of exposed persons: its specific function is to guarantee safety and is ancillary to the main function of the machine.

P.P.E.

Acronym for Personal Protective Equipment.

KIT or JAW

Refers to the operating part of the multiprocessor, consisting of two jaws, one of which is operated by a hydraulic cylinder. This part is available in various different versions, which can be interchanged on the same body and are used for different tasks.

⚠ WARNING!

Descriptions preceded by this symbol contain very important information/instructions regarding safety. Failure to observe them may:

- Endanger the well-being of the operators;
- Render the warranty null and void;
- Result in the manufacturer not accepting liability.

❗ IMPORTANT!

This symbol is used to indicate particularly important information regarding the use of the attachment that the operator must make sure to read and understand thoroughly.

SYMBOLS RELATING TO OPERATOR QUALIFICATION LEVELS	
	General labourer: an operator with no specific skills who is qualified only to carry out simple tasks as directed by qualified technicians.
	Lifting and handling equipment operators: an operator qualified to use vehicles and equipment for lifting and handling materials and machinery (in strict accordance with the manufacturer's instructions), subject to the legislation in force in the country where the machinery is in use.
	Operator: person able to install and operate the attachment.
	Maintenance mechanic: a qualified technician, who is able to assemble and disassemble the attachment and adjust, service and repair its mechanical parts, as necessary. Typically, such personnel are not qualified to work on live electrical systems.
	Manufacturer's technician: a technician provided by the manufacturer to perform complex operations under unusual or special circumstances or when in agreed with the user. Depending on the situation, such personnel must possess the appropriate skills and qualifications for the work to be carried out.

1.6. Copyright

The copyright of this manual is the property of Hydraram. This manual is intended for use by operating and maintenance personnel. It contains instructions and technical diagrams that may not be copied, in whole or in part, distributed or examined by unauthorised persons for competitive purposes or divulged to any other third party.

2. General information

2.1. Manufacturer's identification data

Hydraram B.V.

Meander 7 9231DB Surhuisterveen - The Netherlands

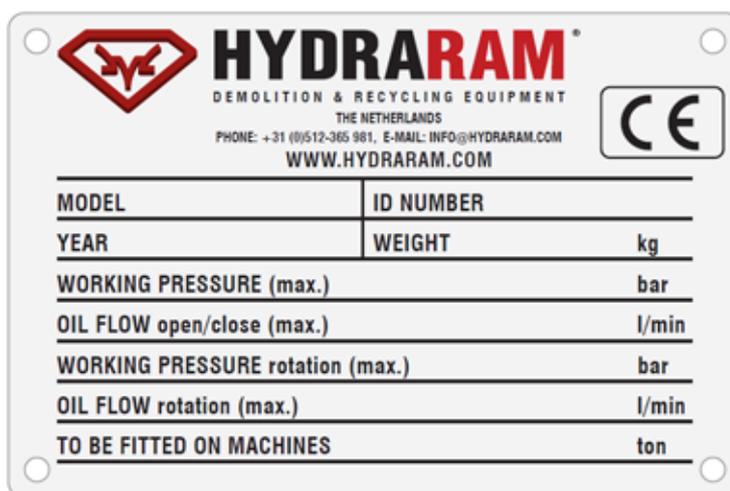
AFTER-SALES SERVICE / SPARE PARTS / CALL CENTRE

Tel: +31 (0)512-365981 - info@hydraram.com

www.hydraram.com

2.2. Attachment identification data and plate

Each attachment is identified by a CE plate indelibly marked with all the relevant machine information. Always provide this information when contacting Hydraram or the customer service centre. The plate is secured to the attachment in a protected position where it is easy to read. This position may vary depending on the model.



2.3. Safety regulations

The attachment has been manufactured in conformity with the safety standards listed below:

- UNI EN ISO 12100:** Machine Safety - Fundamental concepts, general design principles - Risk assessment and reduction.
- UNI EN ISO 13857:** Machine safety - Safety distances to prevent hazard zones from being reached by upper and lower limbs.
- UNI EN 349:** Machine safety - Minimum distances to avoid crushing parts of the human body.
- UNI EN 474-1:** Earthmoving machines - Safety - General requirements.
- UNI EN 474-5:** Earthmoving machines - Safety - Requirements for hydraulic excavators.

The regulations mentioned in this manual may not apply to specific situations that may arise during various work phase

2.4. Set-up procedures to be carried out by customer technician

Except where otherwise stipulated in the contract, the customer shall be responsible for:

- Preparing the working environment/area and operating equipment in conformity with the legally applicable specific safety regulations in the country where the attachment is to be used;
- Checking that the attachment is coupled to the operating machine in compliance with the legally applicable specific safety regulations in the country where the attachment is to be used;
- Providing the hydraulic supply system for the attachment, in conformity with the regulations applicable in the country of use and the instructions in this manual.

⚠ WARNING!

It is the specific responsibility of the customer/user to integrate these instructions into the system/plant user and maintenance manual and to provide any additional information the operator may require.

2.5. General warranty conditions

Hydaram guarantees that all products are free from material or manufacturing defects. Under the terms of this warranty, Hydaram's responsibilities are limited to the repair or replacement with a similar part at the company's plant, on condition that the product is returned within 8 days of the date on which the defect is detected, and provided the defect is correctly identified by photographs or the product is returned with all shipping expenses prepaid.

The company will replace or repair, at its own discretion, any part that, after examination, is determined to demonstrate material or manufacturing defects. In any event, Hydaram's responsibility shall be limited to the original purchase price of the product; any costs incurred in relation to the necessary inspections or report generation are excluded. No repairs will be carried out on site; the warranty applies exclusively when the product is returned to the company.

This warranty replaces any other warranties, expressed or implied, including, but not limited to, guarantees of marketability and suitability, irrespective of purpose; furthermore, under the terms of this warranty Hydaram's obligations and responsibilities shall not include any shipping or other expenses, i.e. installation costs or liability for any direct, indirect or resultant damages or for delays caused by any such defect.

This warranty applies exclusively to new products manufactured by Hydaram. Products manufactured by third parties are covered exclusively by warranties offered to Hydaram by the respective suppliers and will be subjected to any inspections or checks as requested by such parties.

Products manufactured or welded by Hydaram as standard units are guaranteed for twelve (12) months from the delivery date. This guarantee period is completely independent of the effective date the product was put into operation.

If the customer tampers with the product or attempts to disassemble in any other location than the supplier's premises or repair workshop, and/or without notifying the manufacturer in advance, this warranty shall be considered null and void. Hydraulic cylinders or components returned under the guarantee must not be disassembled and must be returned intact to Hydaram. Any welding, modifications or repairs to

the attachment must be authorised in writing in advance by Hydraram; any service operations performed without such authorisation shall result in this warranty being considered null and void. Hydraram may not be held liable for any costs/charges deriving from the customer's failure to meet these warranty conditions.

Hydraram reserves the right to make changes or modifications to the accessories, which, in the company's reasonable opinion, may improve the performance and efficiency of the machine or improve production techniques, at any time. Hydraram is under no obligation to implement such changes or modifications retroactively on any machines that are already in use. Any operations that are expressly forbidden, either verbally or in any written document, or repairs or assembly procedures that are not recommended or authorised by Hydraram shall result in the warranty being considered null and void.

The warranty does not include any parts that are subject to normal wear and tear, or any that are broken or damaged due to improper use of the attachments supplied by Hydraram. In this case, the customer shall arrange for delivery and collection at our factory at their own expense; if the customer requests repairs at their own premises (assuming this is possible), they shall be required to pay for the seller's travel expenses. If, during the warranty period and as a result of customer negligence or any other factor out of the control of Hydraram, the company is unable to intervene promptly in the aftermath of breakdown or fault condition, the customer shall be responsible for any further deterioration or damages resulting from the continued use of the Hydraram products. Any such additional damage is not included in the terms of the warranty.

The company Hydraram may not be held liable for any expenses for repairs performed by, or requested by the customer in workshops other than the authorised structures or in the event where such activities were not authorised in advance. The customer may not claim compensation for any damages deriving from machine downtime during the warranty period.

❗ IMPORTANT!

This warranty is valid only if the product has been entirely paid for in conformity with the required supply conditions and is returned within 2 weeks from the date of purchase. Failure to pay for the products within the agreed terms shall result in the warranty being considered null and void, even if the goods in question are entirely paid for at a later date.

3. Safety

3.1. General precautions

Operator safety is one of the manufacturer's main concerns. When designing and manufacturing a new attachment, we attempt to foresee all possible danger situations and, naturally, to adopt suitable safety measures, paying particular attention to operations that are especially hazardous. The manufacturer may not be held liable for the consequences of any failure to adhere to the safety and accident prevention instructions set out in this manual.

❗ IMPORTANT!

Before using the attachment, operators must read the instructions contained in this manual carefully read and ensure they adhere to the instructions it contains.

The manufacturer has fitted the attachment with all the protection and safety devices considered necessary and, in addition, has provided sufficient information for its safe and correct use. To this end, wherever necessary, each chapter contains the following information regarding every possible man-attachment interaction:

- Minimum operator qualifications required;
- Number of operators necessary;
- Status of the attachment;
- Residual risks;
- Necessary or recommended personal protective equipment;
- Prevention of human errors;
- Prohibitions/obligations regarding reasonably foreseeable incorrect behaviour.

⚠ WARNING!

This information must be adhered to scrupulously.

The user may supplement the manufacturer's information with additional instructions, provided that they do not conflict with that set out in the manual, in order to contribute to the safe use of the attachment. All personnel assigned to work on the attachment must ensure they are wearing appropriate clothing.

- Avoid the use of clothing that could become entangled with parts of the attachment;
- Avoid wearing ties or other loose items of clothing;
- Avoid wearing rings or bracelets that could cause hands to be trapped in the components of the attachment.

Wherever necessary, the manual provides additional recommendations for preventive measures to taken by the user, personal protective equipment, helpful information for avoiding human errors and instructions designed to prevent reasonably foreseeable prohibited behaviours.

It is, however, extremely important to adhere scrupulously to the following instructions:

- It is strictly forbidden to operate the attachment with the fixed protection panels removed;
- It is strictly forbidden to inhibit or bypass the safety devices installed on the attachment;
- Washing must be performed with the hydraulic separation devices disconnected;
- Do not modify any parts of the attachment;
- The manufacturer may not be held responsible for malfunctions caused by failure to respect the above instructions. In the event it is necessary to modify the attachment, we strongly recommend contacting the manufacturer directly.

! IMPORTANT!

The manufacturer may not be held liable for personal injury or damage caused by the attachment in the case of:

- Use of the attachment by inadequately trained personnel;
- Improper use of the attachment;
- Defects in the hydraulic power supply;
- Incorrect installation;
- Lack of the required maintenance;
- Unauthorized service or modifications;
- Use of non-original or unsuitable spare parts;
- Total or partial failure to follow the instructions;
- Use contrary to specific national law;
- Disasters or exceptional events.

Control and checks

Checks must be performed by an expert; they must be visual and functional, with the purpose of guaranteeing the safety of the attachment. They include:

- A check of all the load-bearing structures, which must be free from cracks, breakages, damage, deformation, corrosion, wear or alteration with respect to their original specifications;
- A check of all the mechanical components;
- A check of all the safety devices installed on the attachment;
- A check of all connections with pins and screws;
- A functional check of the attachment;
- A check of the status of the attachment;
- A check to ensure that the hydraulic system is airtight and that it operates correctly.

! WARNING!

If anomalies are found, they must be eliminated before putting the attachment back into operation.

If the person performing the check finds any dangerous cracks or faults, they must notify the manufacturer of the attachment immediately. In the event of a malfunction, stop using the attachment immediately and carry out the appropriate checks and/or repairs.

Make sure that there are no objects between the parts of the attachment. After any maintenance work, check that there are no objects remaining between moving parts.

To guarantee maximum safety when transporting the attachment, it is **FORBIDDEN**:

- To tamper with any part of the attachment;
- To leave moving parts unattended;
- To use the attachment when it is not working at 100% efficiency;
- To modify the attachment with respect to its intended use without explicit authorisation from the manufacturer or without assuming full liability as per current legislation;
- To attempt to move the moving parts manually in the absence of power.

3.2. Intended use



The attachment described in this Manual was designed to be mounted and used on earthmoving machines (consult the paragraph 4.3. for the type). The attachment must be used for crushing and demolishing reinforced cement structures and cutting ferrous material with characteristics similar to those described in paragraph 4.3. This attachment is intended exclusively for professional use.

3.3. Unforeseen improper use

It is strictly prohibited for anyone to use the attachment for any purpose other than that expressly permitted and documented. Any improper use of the latter will absolve the manufacturer of all and any damage to property and persons and render any guarantees null and void. The attachment must always be used in the manner and at the times and places required by good practice and in conformity with the applicable legislation, even if there are no laws regulating the sector in the country of use.

Specifically, the attachment must not be used:

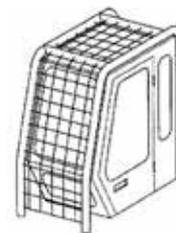
- For any purpose other than those set out in paragraph 3.2, or for any other purpose not mentioned in this manual;
- In an explosive or corrosive atmosphere or where there are high concentrations of dust or oily substances suspended in the air;
- In an atmosphere where there is a risk of fire;
- With its safety devices disabled or not working.
- To lift or transport persons, animals or objects.
- To lift or extract parts stuck in the ground.
- To reach elevated positions by climbing onto the equipment.
- Depending on the structure to be cut, do not start working on the lower tips of the structure when cutting as this could cause the upper part to collapse.
- To strike structures to be demolished.
- As a support point for moving the operating machine.
- To pull, push from the front or the side, strike or impact in any way.

WARNING!

The arm must be moved safely, with slow, accurate movements. Avoid abrupt movements.

3.4. Safety indications relating to use of the attachment

Overhead working may result in falling debris or blocks of material. Make sure that the machine the attachment is installed on has the necessary protections for performing this type of work and that the cab has falling object protective structures (FOPS).



- Before operating the attachment, the operator must read this manual carefully and have thorough knowledge of the operating machine's technical specifications and controls.
- It is recommended that the operator be trained to make best use of the attachment. Unauthorized and/or unqualified personnel may not use the attachment.
- Do not approach to within 20 metres of the range of action of an operating machine when working with an attachment.
- Before starting work with the attachment, warn any persons in its vicinity.
- Wear personal protective equipment whenever the attachment is in use.
- The attachment may only be operated by a qualified operator who has read and understood the contents of this manual.
- Do not allow unauthorized personnel to operate the attachment or perform any type of maintenance on it.
- The operator must quickly release their grip on the attachment in the event of danger.
- Do not use the attachment if it is not working properly.
- The attachment may only be used when it is installed on the operating machine using the upper bracket and the pins provided.
- Make sure that the floor can support the load of the operating machine.
- Make sure in advance that the work area contains no pipes with pressurised gas or fluids that could be damaged during demolition: risk of explosion.
- Ensure the operating machine remains at a distance of at least 10 metres from live, overhead electrical lines.
- To avoid generating and spreading dust while working, it is necessary to dampen the work area with water.
- In the event of a malfunction of the attachment or damage to its components, contact the maintenance manager without attempting to repair it.
- Do not remove the safety devices or protective guards.

3.5. Safety indications relating to maintenance of the attachment

- Maintenance must only be performed by qualified personnel. Unauthorized and/or unqualified personnel may not adjust or repair the attachment.
- Use the most suitable tools for the tasks required.
- All adjustments, maintenance, repair or cleaning must be performed while the operating machine's engine is off, the attachment must be stably supported on the ground and there must be no residual hydraulic pressure. Any residual hydraulic pressure must be released by opening and closing the attachment several times while the engine is off and while depressurising the oil tank. All maintenance operations must be marked on the card in the cabin.
- When cleaning, assembling, disassembling, performing maintenance and transporting, ensure that the attachment is perfectly stable and lock it with the pins provided to prevent it rotating. All moving parts must be secured by external constraints (such as slings or supports).
- All service operations on the rotation slew ring must be performed by a specialized technician equipped with a torque wrench for tightening the screws.

- For the hydraulic connections, only use hydraulic hoses and fittings that conform to the SAEJ517 or DIN20066 standards for the specified pressures. Failure to observe the above could compromise the safety of the attachment.
- Always check the hoses are intact and that they have not been damaged in any way. If necessary, ensure they are replaced immediately. Search for leaks using small pieces of paper or cardboard and never with fingers to avoid injuries to the skin due by high pressure oil.
- The oil can reach very high temperatures. Before performing any service on external surfaces, wait for them to completely cool.
- Never perform hasty or makeshift repairs that could compromise the correct operation of the attachment. If in doubt, always request service by specialized personnel.
- It is forbidden to perform checks and/or replace parts during operation.
- All checks and maintenance that require the removal of the safety protections shall be performed entirely at the user's risk. Therefore, we recommend that such operations be performed exclusively by specialised and authorised technicians.
- In the case of operations or repairs that need to be performed in positions that are not directly accessible from the ground, use ladders or lifting devices that are safe and that conform to national safety regulations.
- In the event of repairs near or below the attachment, make sure that there are no moving parts that can start working and that parts that are unstable by nature are not positioned on or near the attachment; always block them using adequate tools.
- Unless expressly specified by this manual, do not repair or adjust the attachment (or parts of it) during operation, in order to avoid being hooked by moving parts.
- Wear personal protective equipment whenever the attachment is in use, or when working in its vicinity.
- Only use original spare parts to replace worn parts.
- Do not make any adjustments or changes that the manufacturer has not previously agreed to and approved in writing.

⚠ WARNING!

- These safety standards supplement and do not replace current local safety standards.
- Any tampering by the user shall absolve the manufacturer of all and any liability and shall render the user solely responsible to the competent authorities for the prevention of accidents.

❗ IMPORTANT!

Hydraram declines all liability for any accidents, injuries to personnel or damage to property resulting from the failure to adhere to the general safety instructions and the standards set out in this document.

3.6. Operator's position

When the operating machine is working, the operator must pay particular attention to their own position in order to avoid potential hazards to themselves and persons nearby. The area adjacent to the attachment is divided into two areas:

Operator Areas:

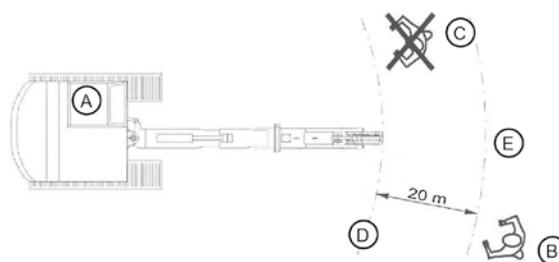
These are the areas in which the operator must work during normal operation of the attachment. The “operator areas” are considered potentially dangerous areas. In these areas, which are indicated on the following diagram, the operator should pay the maximum attention while working to protect the well-being of persons close by;

It is extremely important to follow all the accident prevention rules described up to this point.

Danger Zones:

These are the areas that unauthorised personnel must not approach while the attachment is in use.

- (A) Control area
- (B) Person in safe area
- (C) Person in danger area
- (D) Range of action of the machine
- (E) Safe area limit



3.7. Accident prevention plates and labels

The accident prevention plates attached to the attachment include the main warnings and instructions that should be borne in mind during use.

Symbol	Description	Symbol	Description
	“Read the manual” Read this Use and Maintenance Manual carefully.		“Safety distance” Remain at a safe distance from the range of operation of the operating machine.
	“Burn hazard” Surfaces that can reach high temperatures resulting in burn hazards. Wait for the attachment to cool before carrying out any work on it.		“Danger of ejected material” Remain at a safe distance from the range of operation of the operating machine.
	“Cutting hazard” Do not approach the operating machine during the work cycle. In the event of maintenance, wear personal protective equipment.		“Crushing hazard” Do not approach the operating machine during the work cycle. In the event of maintenance, wear personal protective equipment.

Symbol	Description	Symbol	Description
	“Greasing points” Indicates the points to be lubricated.		“Oil input” Power/rotation oil inlet.
	“Oil return” Power/rotation oil outlet		“Rotation direction” Direction in which the attachment must rotate
	“Drainage” Overflow point for excess oil.		“Lifting points” Use the indicated points when handling and moving the attachment

3.8. Safety pictograms

In the manual various pictogram may be used to indicate warnings regarding DANGER, PROHIBITION and OBLIGATION.

Symbol	Description	Symbol	Description
	Danger of crushing upper limbs		Danger of crushing limbs
	Entanglement hazard		Dragging hazard
	Generic hazard		Removal of safety devices prohibited
	Cleaning, greasing, repairing or adjusting moving parts manually prohibited		

The following pictograms indicate when it is obligatory to wear personal protective equipment (PPE)

Symbol	Description	Symbol	Description
	Protective goggles obligatory		Work clothing obligatory
	Ear defenders obligatory		Protective gloves obligatory
	Safety shoes obligatory		Hard hat obligatory

3.9. Residual risks

A residual risk is a hazard that cannot be completely eliminated through design and protective techniques or a potential hazard that is not obvious.

 **Hazard:** crushing/cutting limbs

Possibility/location of hazard

When assembling disassembling or performing maintenance on the attachment there is a risk of the attachment or part of it falling, or of sudden movement of part of the attachment.

Protections/precautions

Such operations must be carried out carefully by trained personnel. Wear suitable P.P.E.

 **Hazard:** ejected oil

Possibility/location of hazard

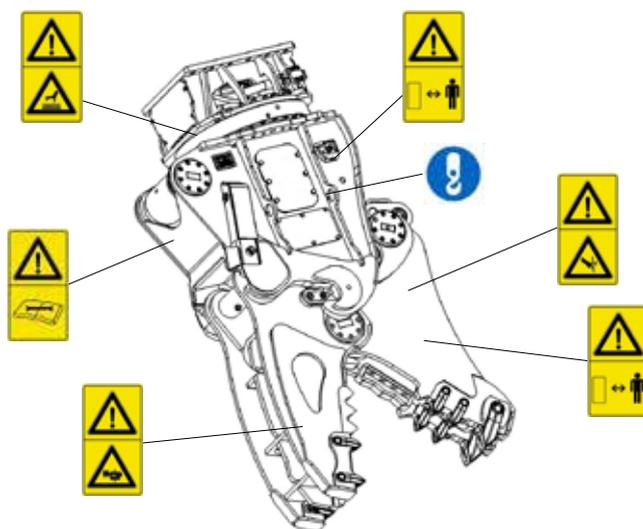
When assembling/disassembling or performing maintenance on the hydraulic components of the attachment there is a risk that oil may be ejected as a result of residual pressure.

Protections/precautions

De-pressurise the circuit fully as shown in this manual. Such operations must be carried out carefully by trained personnel. Wear eye protection.

3.10. Placement of accident prevention plates and labels

The position of the accident prevention plates may vary depending on the model of the attachment.



3.11. Lighting

Lighting in the work area must conform to applicable legislation law in the country where the attachment is being used and must provide good visibility at every point, not create dangerous reflections and allow for clear visibility of the controls and the entire work area up to the safety limits required for objects that may be ejected. Since the attachment has no independent lighting, the environment must be provided with general lighting of 250 to 400 lux at every point in the work area.

3.12. Vibration

No dangerous vibrations are generated provided the attachment is used in accordance with the correct operating instructions.

3.13. Noise emissions

The attachment does not generate noise (sound pollution).

4. Description of the attachment

4.1. Description of the attachment

The MK Series Multiprocessor is an attachment that has been designed and constructed by Hydraram. It is a functional and versatile attachment designed to handle a variety of work (demolition, crushing, cutting scrap and metal profiles). The attachment consists of a main body and the jaws. There are 6 types of jaws.

Pulverizer kit: used to reduce cement elements and separate the rebar from the cement.

Shear kit: used on job sites and in industrial demolition depots to cut ferrous materials such as profiles, plates and pipes.

Combi kit: for demolitions of structures made of reinforced cement with a high percentage of ferrous materials.

Universal Kit: for controlled demolition of concrete structures and for the immediate reduction of rod armor during the crushing of the concrete.

Tankshear Kit: indicated in construction sites and in stores for the demolition industry for cutting ferrous materials such as steel and tanks.

Demolition kit: Is designed for primary demolition phases of most precision, as indicated for the demolition of concrete structures and the removal of materials at relevant heights.

Various types of jaws (kits) are available that can be interchanged on the same body. The body is fitted with a slew ring for continuous hydraulic rotation, so as to reduce moving operations as much as possible and provide the highest level of precision.

The closing force is produced by a hydraulic cylinder, which enables the device to demolish even the most resistant materials. The body and various types of kits are made from wear-resistant steel with high elasticity. This ensures excellent anti-abrasion characteristics together with exceptional mechanical strength.

The hinges are made of thermally-treated steel alloy and rotate on hardened, ground bushings with grooves for internal lubrication.

Kits with an interchangeable teeth and blade system ensures they can be replaced quickly and directly on site, thus avoiding having to repair worn parts reducing maintenance costs and limiting machine downtime.

4.2. Permitted environmental conditions

The attachment is suitable for operating in environments that are:

- At altitudes no higher than 3,000m above sea level;
- At temperatures between -20 °C and +50 °C with an average temperature of about 25°C;
- At relative humidity between 30% and 95%.

⚠ WARNING!

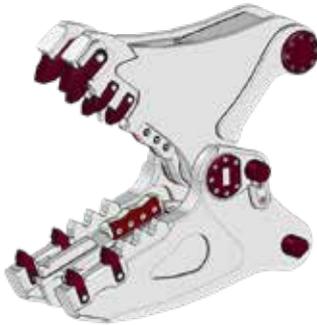
The attachment is **NOT** suitable for use in environments that are:

- Explosive.
- Corrosive.
- Subject to high fire risk.

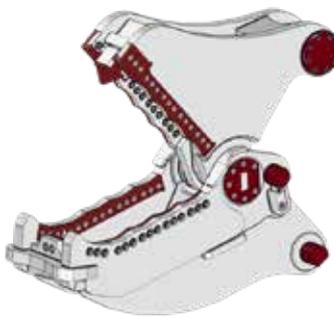
4.3. Attachment technical data



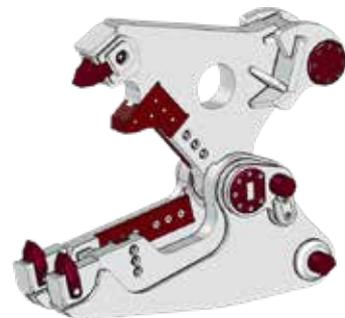
Base body



Pulverizer kit



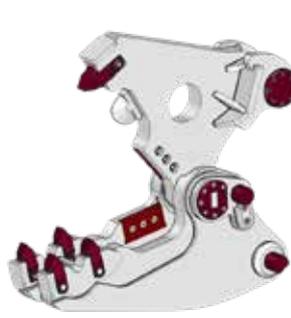
Universal kit



Combi kit



Steel kit



Demolition kit

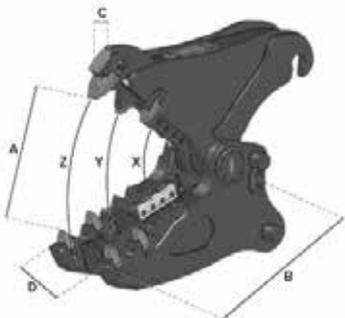
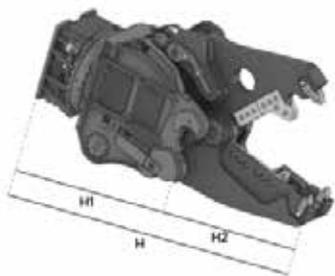


Tankshear kit

		MK-7*	MK-10*	MK-13*	MK-15	MK-20
Excavatorclass:	T.	6 - 14	9 - 18	15 - 25	18 - 25	25 - 35
Base body weight:	Kg.	410	600	795	1180	1465
Workingpressure:	Bar.	280	310	310	310	310
Oilflow:	L/min.	80 - 150	150 - 250	180 - 250	180 - 250	200 - 300
Workingpressure rotation:	Bar	140	140	140	140	140
Oilflow rotation:	L/min.	10	10	10	10	10
Open/close:	Sec.	1.1 / 2.0	1.1 / 2.0	1.5 / 2.1	1.6 / 2.1	2.0 / 2.7
Pulverizer kit						
Weight:	Kg.	250	410	635	680	1035
Jaw opening:	mm.	530	660	720	740	880
Cutter length:	mm.	140	140	180	220	260
Universal kit						
Weight:	Kg.	440	520	610	740	1000
Jaw opening:	mm.	380	420	445	500	635
Cutter length:	mm.	380	440	530	530	660
Combi kit						
Weight:	Kg.	/	450	585	720	1090
Jaw opening:	mm.	/	580	640	740	810
Cutter length:	mm.	/	350	400	420	480
Steel kit						
Weight:	Kg.	210	360	580	630	950
Jaw opening:	mm.	250	340	400	420	480
Cutter length:	mm.	310	370	410	470	510
Demolition kit						
Weight:	Kg.	360	435	575	680	1075
Jaw opening:	mm.	575	605	680	745	870
Cutter length:	mm.	105	150	200	175	240
Tankshear kit						
Weight:	Kg.	/	320	420	560	1000
Jaw opening:	mm.	/	180	240	270	350
Cutter length:	mm.	/	280	405	320	400

*The weights listed above do not include the attachment saddle.

		MK-25	MK-35	MK-50	MK-70
Excavatorclass:	T.	35 - 45	45 - 60	55 - 78	75 - 100
Base body weight:	Kg.	1970	2150	3420	5020
Workingpressure:	Bar.	310	310	340	340
Oilflow:	L/min.	250 - 350	300 - 400	400 - 500	450 - 600
Workingpressure rotation:	Bar	140	140	140	140
Oilflow rotation:	L/min.	10	30	30	30
Open/close:	Sec.	2.6 / 2.7	2.6 / 2.7	3.2 / 3.5	3.0 / 3.7
Pulverizer kit					
Weight:	Kg.	1270	1720	2940	3940
Jaw opening:	mm.	905	970	1100	1300
Cutter length:	mm.	260	260	260	325
Universal kit					
Weight:	Kg.	1300	1590	2650	3390
Jaw opening:	mm.	550	720	900	1020
Cutter length:	mm.	600	750	840	900
Combi kit					
Weight:	Kg.	1305	1780	2900	3890
Jaw opening:	mm.	850	910	990	1160
Cutter length:	mm.	500	500	575	640
Steel kit					
Weight:	Kg.	1240	1425	2290	2850
Jaw opening:	mm.	500	525	575	700
Cutter length:	mm.	565	565	660	755
Demolition kit					
Weight:	Kg.	1235	1700	2750	3120
Jaw opening:	mm.	880	925	1010	1200
Cutter length:	mm.	250	250	290	325
Tankshear kit					
Weight:	Kg.	1400	1750	1900	2360
Jaw opening:	mm.	370	400	400	440
Cutter length:	mm.	430	480	460	530



MULTI PROCESSORS POWERBOOSTER			MK-20P	MK-24P	MK-32P	MK-42P
	Excavator class ¹	T.	18 – 25	25 – 35	35 – 45	45 – 60
	Weight	Kg.	1335	1520	2015	2390
	H1	mm.	1270	1330	1385	-
	Working pressure	Bar.	250	250	250	250
	Oil flow	L/min.	130 – 200	180 – 250	230 – 300	-
	Working pressure rotation	Bar.	140	140	140	140
	Oil flow rotation	L/min.	10	10	10	10
P-JAW			MK-20P	MK-24P	MK-32P	MK-42P
	Weight	Kg.	780	1000	1425	1880
	A	mm.	750	850	905	1030
	B	mm.	720	780	820	935
	C	mm.	300	300	360	395
	D	mm.	465	485	590	630
	Cutter length	mm.	220	260	260	260
	H2	mm.	950	1065	1145	1240
	X	T.	255	260	340	425
	Y	T.	120	155	155	180
	Z	T.	80	105	120	145
	Max. Diameter	mm.	40	45	50	60
C-JAW			MK-20P	MK-24P	MK-32P	MK-42P
	Weight	Kg.	760	1185	1400	1900
	A	mm.	690	815	850	960
	B	mm.	750	800	815	885
	C	mm.	110	130	130	130
	D	mm.	320	350	415	450
	Cutter length	mm.	420	480	500	500
	H2	mm.	1010	1145	1185	1290
	X	T.	480	620	710	955
	Y	T.	130	160	175	240
	Z	T.	80	105	120	155
	Max. Diameter	mm.	45	50	55	75
S-JAW			MK-20P	MK-24P	MK-32P	MK-42P
	Weight	Kg.	650	1020	1310	1605
	A	mm.	410	515	520	550
	B	mm.	485	545	560	630
	C	mm.	100	120	130	130
	D	mm.	330	380	440	440
	Cutter length	mm.	470	510	565	620
	H2	mm.	785	910	965	1055
	X	T.	510	610	815	925
	Y	T.	210	280	325	370
	Z	T.	115	150	165	200
	Max. Diameter	mm.	55	65	70	80
	IPN Max	mm.	240	380	400	450
	HEA Max	mm.	180	240	260	280
D-JAW			MK-20P	MK-24P	MK-32P	MK-42P
	Weight	Kg.	720	1160	1350	1605
	A	mm.	780	940	960	-
	B	mm.	750	800	815	-
	C	mm.	110	130	130	-
	D	mm.	320	350	400	-
	Cutter length	mm.	175	240	250	-
	H2	mm.	1010	1145	1200	-
	X	T.	480	620	410	-
	Y	T.	130	160	165	-
	Z	T.	80	105	120	-
	Max. Diameter	mm.	45	50	55	-

5. Installation

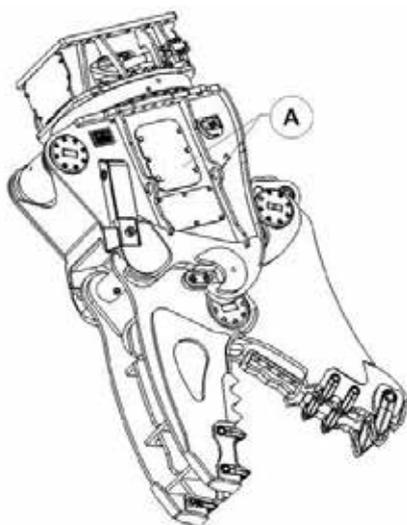
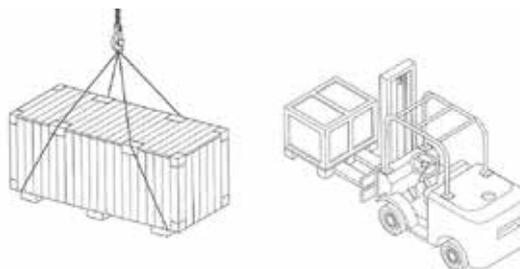
5.1. Moving and handling



The attachment may be shipped on wooden beams or pallets, or in a crate, depending on the destination and the customer's request.

Lifting the attachment in its packaging using cables and a gantry crane or a forklift truck.

The attachment unloading, lifting and handling operations must be carried out by personnel qualified to operate lifting equipment. Before starting operations, identify all the areas that will be affected by the attachment moving and handling operations, including loading it on the transport vehicle and installing it on the machine, and note any hazardous points.



A= Lifting points of the attachment

- It is forbidden to climb on the attachment or loiter and/or pass underneath it during movement or handling.
- Unauthorized persons are forbidden to enter the movement and handling area.
- All operators must keep at a safe distance to avoid being hit if the attachment or one of its parts should fall.
- The equipment and vehicles used to lift and transport the attachment must have sufficient load bearing capacity.
- When using lifting cables, check that they are certified and are labelled with manufacturer's information and load bearing capacity. Check for damage, broken wires and signs of wear.
- Hook the cables to the eyelets indicated by stickers.

The same precautions must be taken if using chains. When using a gantry or mobile crane for lifting, ensure that they have sufficient span and load bearing capacity. Perform the set-up by moving the lifting vehicle for short distances until the condition of optimum stability is reached. Slowly lift and handle with the maximum care to avoid oscillations.

⚠ WARNING!

The manufacturer may not be held liable for personal injuries or damage to property in the event that lifting systems other than those described are used.

❗ IMPORTANT

When the attachment arrives, the user must check it for any damage (breakage or significant dents) that may have occurred during shipping or unloading. If damage has occurred, immediately make it known to the transporter and add the words **“ACCEPTED WITH RESERVATIONS”** to the delivery document. In the presence of damage, submit a written claim to the transporter within 8 days of receiving the attachment. If significant transport damage is noted at the time of delivery and/or any parts are found to be missing notify the Manufacturer immediately. It is also necessary to check the received material against the detailed list on the transport document.

5.2. Storage

If the attachment is to be stored before use, the following precautions must be taken:

- Store the attachment in a protected place;
- Lubricate all parts of the attachment;
- Protect the attachment from shocks and stress;
- Protect the attachment from humidity and large temperature variations;
- Keep the attachment away from corrosive substances.

5.3. Coupling check

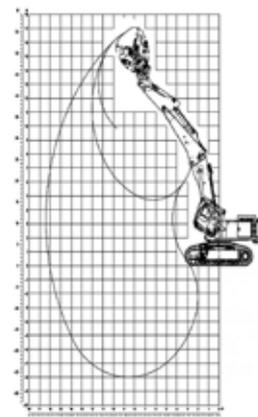
Assembly preparations

Before installing the attachment, it is necessary to prepare a manoeuvring area that is adequate for the dimensions of the attachment and the lifting equipment to be used. Before mounting the attachment on the operating machine, check that the latter is stable, i.e., that the lifting capacity (LC) of the machine is sufficient to meet the essential safety requirements to avoid tipping it over.

To do this, you must:

- Check the minimum 360° lifting capacity value (LCmin) indicated in the specifications of the operating machine;
- Check the Mass M of the attachment, as indicated on the identification plate.

Ensure that: $M \times K \leq LC_{min}$ where K is a correction factor that takes into account the bounce of the attachment beyond the bucket hinge point: in the case of crushers and pulverisers $K=1.2$. If this condition is not met, the attachment **MAY NOT** be mounted onto the machine.



⚠ WARNING!

This condition only ensures the stability of the operating machine when working on flat, horizontal and unyielding ground.

5.4. Mounting the attachment

Mounting begins with the attachment supported stably on the ground with the operating machine's engine stopped and parking brakes engaged. If the attachment is supplied without the operating machine fitting, it is the customer/operator's responsibility to provide for the application of a suitable connection fitting corresponding to the characteristics of the operating machine.

Then, proceed as follows:

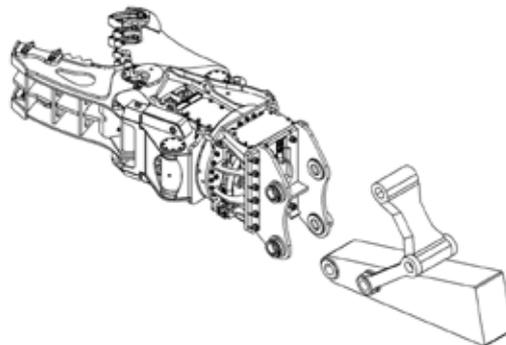
- Rotate the fitting of the attachment vertically.
- Clean the inside surfaces of the fitting with a cloth.
- Carefully clean the pins and bushings of the fitting of the attachment to remove any dirt.

! IMPORTANT

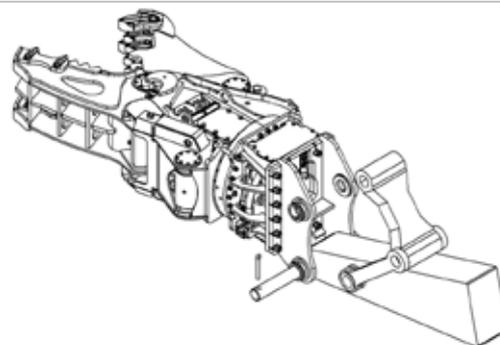
In all mounting operations, never force the pins but check their good alignment.

MOUNTING THE ATTACHMENT ON THE OPERATING MACHINE

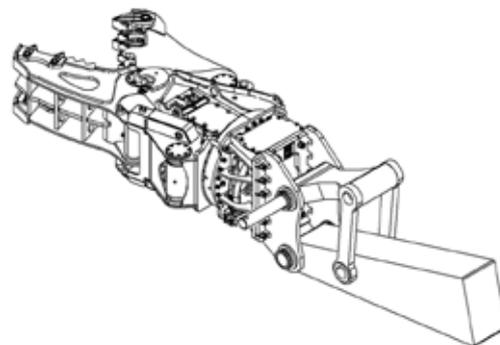
1. Bring the operating machine close, inserting the arm into the adapter plate.



2. Insert the first pin, checking its alignment and securing it in position with its own safety system (screws, cotter pins, etc.)



3. Move the arm so that the upper hole on the saddle is aligned with the hole on the arm piston rod and insert the second pin, securing it in position with an appropriate safety system.



5.5. Use on construction cranes

The range of possible applications for the MK Series hydraulic demolition attachments includes installation on construction cranes. Below is a list of operating systems, rules and requirements that must be respected when using the attachment in this way.

- The first rule to follow when the attachment is installed is to check that the load bearing capacity of the construction crane is at least 2.4 times the operating weight of the attachment. This safety coefficient is double that which applies when mounting it on a hydraulic excavator.
- A external hydraulic control unit (See hydraulic connections) is necessary when using the attachment with a construction crane.
- The attachment must be used exclusively for demolition and not for transporting or moving objects.
- The demolition attachment and the construction crane must be used separately. The operator must use the two machines at different times.
- The attachment can work either vertically or horizontally depending on the type of structure to be demolished, so long as it is always attached to the couplings provided.
- Check the stability of the couplings and cables that support the attachment before every work cycle.

5.6. Hydraulic connections



The hydraulic system is connected by connecting the hydraulic fittings on the attachment to the corresponding fittings on the operating machine.

This is done for both the attachment hydraulic rotation fittings (if present), and those used for opening and closing the attachment. Connect the flexible hoses between the operating machine and the attachment (in accordance with the standard SAE J517 or DIN 20066 standards) and tighten the screws or fittings.



❗ IMPORTANT!

The presence of dirt (sand, gravel or dust) on the fittings could damage the attachment hydraulic system.

The ROTATION system must be connected to a delivery and corresponding return line, in addition to a drain outlet when required.

The OPENING/CLOSING system must to be connected to a delivery and corresponding return line. Ensure the two hydraulic systems are kept separate.

To ensure the attachment works correctly, the hydraulic system filters on the operating machine must undergo regular maintenance. Contamination must not exceed level 11 on the NAS scale.

TECHNICAL CONNECTION SPECIFICATIONS

Hydraulic connections				
Attachment		A	B	Operating machine
Leistung				
Rotation				
Dränage				

									
A	B	B optional	A	B	B optional	A	B	B optional	MK SERIES
1/2" Gas	1/2" Gas	S 16 (24x1.5)	1/4" Gas	1/4" Gas	L 10 (16x1.5)	/	/	/	MK-7
3/4" Gas	3/4" Gas	S 25 (36x2)	3/8" Gas	3/8" Gas	S 16 (24x1.5)	/	/	/	MK-10 MK-13
1" SAE 6000	1" Gas	S 30 (42x2)	3/8" Gas	3/8" Gas	S 16 (24x1.5)	/	/	/	MK-15 MK-20 MK-25 MK-35
1" 1/4 SAE 6000	1" 1/4 SAE 6000	1" 1/4 Gas	1/2" Gas	1/2" Gas	S 16 (24x1.5)	1/4" Gas	1/4" Gas	L 12 (18x1.5)	MK-50
1" 1/2 SAE 6000	1" 1/2 SAE 6000	1" 1/2 Gas	1/2" Gas	1/2" Gas	S 16 (24x1.5)	1/4" Gas	1/4" Gas	L 10 (16x1.5)	MK-70

The operating machine output pressure and flow rate must always conform to the requirements of the attachment in use (see 4.3. Technical Specifications). If this is not possible, the system must be equipped with reduction valves (contact the manufacturer of the operating machine or a specialized workshop). Do not use the attachment without check that the pressure and oil flow of the operating machine are those required.

Before using the attachment start the operating machine and pressurise the hydraulic system slowly to as to avoid any backlash, until it reaches the maximum operating pressure, which should conform to the specifications shown on the identification plate of the attachment. While the engine is running at idling speed, open the attachment 1/4 of the way, and then close it again, open it half way, and then close it again, open it 3/4 of the way, and then close it again, and then finally, open it fully and close it again. Open and close the attachment 5 or 6 times, checking that there are no leaks along the hydraulic circuits.

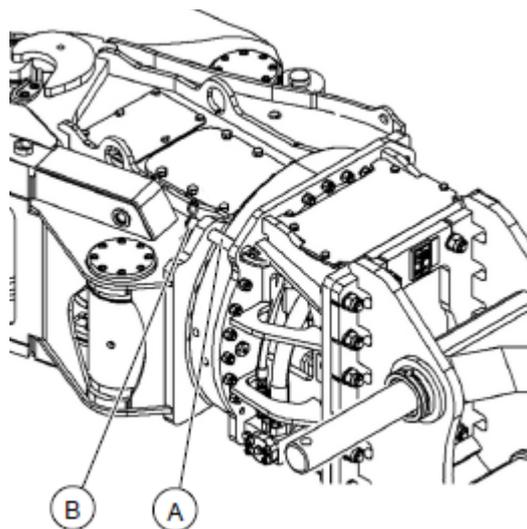
❗ IMPORTANT!

Before using the attachment for cutting operations, move it to an open space with no obstacles or persons within the range of action of the operating machine and perform a series of unladen manoeuvres to familiarize yourself with its workings. At this point, the attachment is ready for work.

5.7. Stopping and disassembly

Upon completing work and before lowering the attachment to the ground, proceed as follows:

- Using the ROTATION control on the operating machine, rotate the attachment so as to be able to insert the stopping pin (A) in the holes on the body and the adapter plate.
- Insert the respective cotter pin (B).
- Activate the operating machine's OPEN/CLOSE control to return the entire rod of the attachment inside the cylinder.
- Place the attachment on two wooden supports on the ground, orienting it horizontally.
- Switch off the machine engine.
- Release the hydraulic pressure by operating the OPEN/CLOSE controls on the attachment several times while the engine is switched off and while depressurising the oil tank.
- Make sure that there is no residual pressure in the hydraulic system.
- Loosen the screws or fittings on the hoses and insert the safety plugs.



⚠ WARNING!

- Check that the rotation locking pin has been inserted correctly to avoid unexpected movements of the attachment during transport.
- When disconnecting the hoses, take care to collect the oil in suitable containers. Do not spill oil on the ground.

- Remove the safety system from the pins (screws, cotter pins, etc.) and slide them out.
- Switch the operating machine on and move the arm so as to extract it from the fitting on the attachment, making sure that there are no personnel in the immediate vicinity of the work area.
- This completes the switch off and disassembly procedures.
- Place the attachment in a dry, protected place.

6. Using the attachment

6.1. Putting into operation

Carry out the following checks each time before using the attachment:

- Check all the safety systems;
- Check safety panels and signage.

Operators must carry out a series of checks and controls designed to prevent errors or accidents during use each time before using the attachment:



- Check that the attachment has not been damaged during assembly;
- Carefully check the integrity of the hydraulic hoses, valves and various components;
- Check that all moving and rotating parts move freely;
- Check that the hydraulic couplings are tight to prevent dangerous leaks.

⚠ WARNING!

Carefully perform a visual inspection of the whole attachment and make sure that there are no objects or persons obstructing its normal operation and/or that no objects have inadvertently been left on top of it.

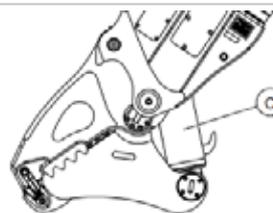
6.2. Kit replacement

⚠ WARNING!

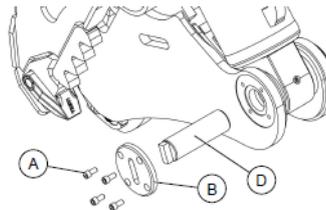
Kit replacement operations must be performed using appropriate lifting means and maintaining a safe distance when moving the attachment. Wear appropriate PPE.

6.2.1. Kit removal for models with mechanical coupling

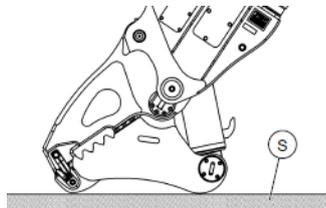
1. Fully extend cylinder (C) so that the kit is fully closed.



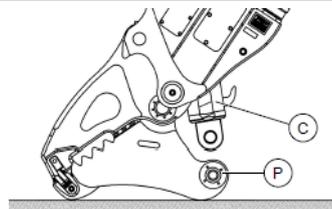
2. Loosen the screws (A).
3. Remove the flange (B).
4. Extract the pin (D).



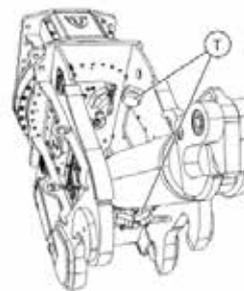
5. To facilitate easy removal, place the kit onto a compact surface (S) as shown in the diagram.



6. Push the cylinder closing control (C) so it goes in just enough to release the moveable jaw (P); the cylinder remains free to swing.



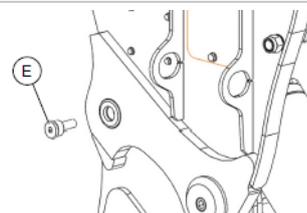
7. The chassis is fitted with buffers (T) to absorb any minor impact of the cylinder. Forceful impacts could seriously damage the cylinder.



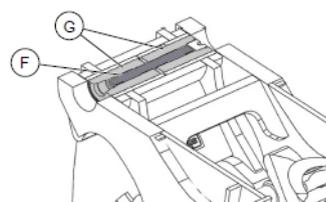
ⓘ IMPORTANT!

In the following operations, we advise against making sudden manoeuvres with the machine which would cause the cylinder to swing excessively.

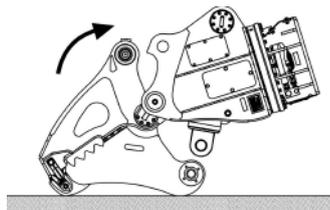
8. Remove plug (E) from the back pin or remove the pin lock depending on the model.



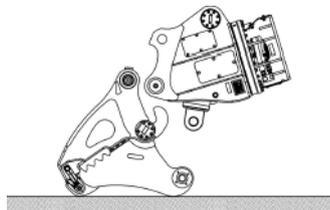
9. Rotate the screw (F) to retract the pins (G) inside the kit or slide out the pin depending on the model.



10. At this point use the operating machine movements to release the kit from the rear coupling as shown in the diagram, and then from the retaining hooks.



11. This completes the uncoupling procedure.

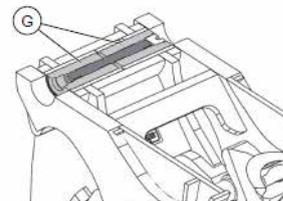


6.2.2. Coupling procedure

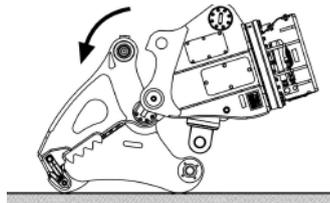
1. To facilitate the coupling procedure, place the kit on a compact surface (S) as shown in the diagram.



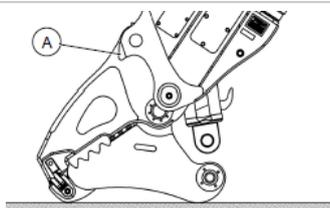
2. Ensure the coupling pins (G) are retracted as shown in the diagram.



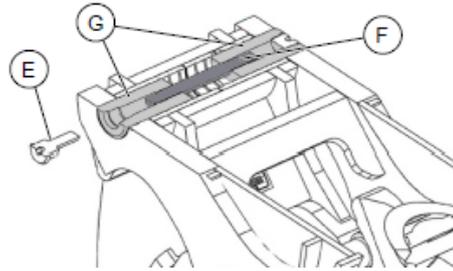
3. Attach the coupling hooks to the kit using the operating machine controls as shown in the diagram.



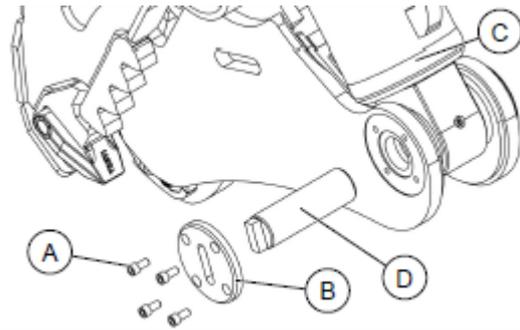
4. Use the operating machine controls to rotate the frame until it comes into contact with the kit buffers (A), as shown in the diagram.



5. Turn screw (F) until pins (G) in the kit protrude fully into the hole on the frame. On models with a fixed pin, insert the pin directly.
6. Screw plug (E) onto the pin. On models with a fixed pin, assemble the respective pin lock provided.



7. Use the attachment hydraulic system to extend cylinder (C) until its coupling point is aligned with the hole in the kit, as shown in the diagram.
8. If the cylinder coupling point is not aligned correctly with the hole in the kit, use suitable tools to correct the alignment manually.
9. Insert pin (D) and its flange (B), securing it using the screws (A).



6.3. Operating cycle

- Move the operating machine to the work site.
- Ensure no personnel are present within the working range of the operating machine or in danger areas.
- Move the attachment, with its jaw open, towards the material to be demolished or cut, check that the material is well positioned in the attachment (if necessary move the excavator arm or rotate it to optimise its grip) and close the jaw to execute the operation.
- During the operation, make sure that the force is sufficient. If not, release the material by opening the jaw and close again, if necessary, on a different area of the material to be demolished.
- Once the crushing operation has been completed, move the operating machine away from the work site, making sure that there are no unstable parts or pieces in positions that are potentially dangerous for the operators assigned to clear away and/or load the material.

6.4. Stopping the attachment

To stop attachment, simply leave the hydraulic distributor controls on the operating machine in the idle position. Under normal conditions, if the controls are not operated, the attachment will remain stationary.

6.5. Temporary decommissioning

When the attachment is not used for prolonged periods, disconnect its hydraulic system.

6.6. Waste disposal

The user is responsible for the correct disposal of the waste produced by the attachment in conformity with the laws in force in the country of use. Lubricants and replaced parts must be disposed of in conformity with the laws in force in the country where the attachment is used.

6.7. Dismantling

When dismantling the attachment, the plastic parts must be separated and sent to the appropriate collection centre, in conformity with the applicable legislation. As for the metal elements of the attachment, it is sufficient to separate the steel pieces from those made of other metals or alloys, so they can be correctly sent for recycling by fusion.

7. Maintenance

7.1. De-energising the attachment



Before performing any type of maintenance and/or repairs, the attachment must be disconnected from the hydraulic power supply. The residual hydraulic pressure must be released by operating the OPEN/CLOSE controls on the attachment several times while the engine is off and while depressurising the oil tank. All maintenance operations must be marked on the card in the cabin.

7.2. General information

This attachment is subject to three levels of maintenance:

- Regular
- Scheduled
- Extraordinary

These include operations such as lubrication, cleaning, adjustment, replacement, inspection, tightening, etc. When performing maintenance and/or repairs, it is best to follow these **recommendations**:

- Before beginning work, display a, "ATTACHMENT IN MAINTENANCE" sign in a position where it can be clearly seen;
- Do not use solvents or inflammable materials;
- Take care not to spill lubricants;
- When accessing parts of the attachment, use appropriate tools for the operations to be performed;
- Do not climb on the components of the attachment because they were not designed to carry the weight of people;
- Once the work is complete, replace and secure all the safety panels that were removed and/or opened correctly;
- Carefully clean individual components with an appropriate degreaser and without using compressed air (as this just moves dirt around);
- Determine maintenance intervals based on the specific requirements in relation to the production cycle of the attachment;
- Every day, before using the attachment, the operator should visually inspect the general state of its components and request maintenance if they notice any strange noises or fault conditions;
- Check that the mechanical parts are always well lubricated (only those components that need lubrication).

⚠ WARNING!

The manufacturer may not be held liable for the consequences of any failure to observe the recommendations listed above, or if the attachment is used in any way that differs from that stated in these instructions.

7.3. Regular maintenance



Regular maintenance must be carried out by a mechanic and includes inspections and checks intended to monitor the state of the attachment. The machine must be isolated for maintenance.

Daily Maintenance

1. Visual inspection of the structure of the attachment to find any faults (specifically the saddle connections between the attachment and the operating machine).
2. Check the play between the pins and bushings of the adapter plate.
3. Check that there are no cracks in the welds
4. Visual check of the cylinder and valves, and that the fittings are tight and hydraulic tubes are undamaged.
5. Check for the metal identification plate with the declaration of conformity of the attachment and its main technical specifications.
6. Check that the hazard warning labels on the attachment are present and in good condition. Replace any that are missing or difficult to read.

⚠ WARNING!

Failure to observe these requirements will release the manufacturer from any liability under the guarantee.

7.4. Scheduled maintenance



Scheduled maintenance must be carried out by a mechanic and includes inspections, checks and maintenance to ensure the attachment continues to function efficiently.

⚠ WARNING!

Wear P.P.E. whenever carrying out scheduled maintenance.



Scheduled maintenance table

The machine must be isolated for maintenance.

Interval	Operation
Every 8 hours	Lubricate the hinges and the slew ring and replace any damaged greasers.
Every 8 hours	Check that the screws of the connection saddle are not loose or damaged.

Interval	Operation
Every 8 hours	Check that the screws of the slew ring are not loose or damaged.
Every 8 hours	Check that the screws holding the interchangeable teeth and knives are not loosened or damaged.
Every 40 hours	Check the play between the pins and bushings of the saddle connection (if the play is greater than 0.6 mm, replace the bushings or pin).
Every 40 hours	Use a feeler gauge to check the play between the cutting blades, which must be between 0.2 and 1.2 mm. If the play exceeds this limit, see chapter 7.5.2.
Every 40 hours	Lubricate the pinion and the teeth of the slew ring.
Every 6 months	Check the integrity of the gaskets of the slew ring.
Every 12 months	Check the cylinder oil leakage internally and externally.

7.5. Extraordinary Maintenance



Extraordinary maintenance must be carried out by a mechanic and includes maintenance, repairs and the replacement of components to ensure the attachment runs correctly.

⚠ WARNING!

Wear P.P.E. whenever carrying out extraordinary maintenance.



Extraordinary maintenance table

The machine must be isolated for maintenance.

Interval	Operation
When necessary	Rotation of the cutting blades (in event of worn profile).
	Replace worn cutting blades.
	Replace the interchangeable teeth when excessively worn or broken.

Interval	Operation
When necessary	Adjusting blades (in event of excessive play).
	Replacing worn blades.
	Rotating the blades (in event of worn profile).
	Restoring the anti-wear material.

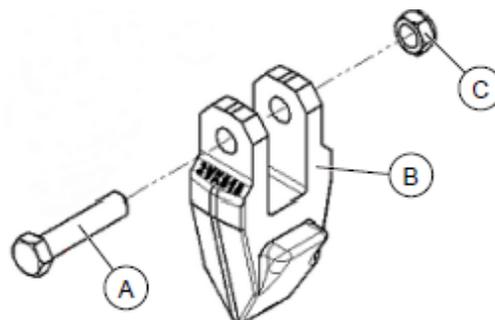
7.5.1. Checking and replacing the interchangeable teeth

This chapter applies to kits that feature interchangeable teeth.

The use of bolted interchangeable teeth for the attachment is dictated by the need to replace the bits that are inevitably worn during demolition directly on site, thus avoiding having to send the worn bits to the workshop.

If the screws and bolts are loosened or damaged, tighten them with a wrench or replace them completely.

1. Remove the screws (A) and respective bolts (C) from the teeth (B) mounted on the claws of the attachment.
2. Remove the worn teeth from their seat.
3. Insert new interchangeable teeth and tighten using new screws.



ⓘ IMPORTANT!

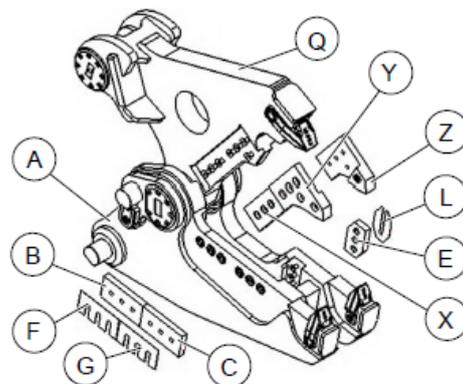
If the interchangeable teeth are replaced when they begin to show visible wear, the performance of the attachment during demolition will be improved.

The attachment was designed to reduce extraordinary maintenance to a minimum and it is up to the operator to determine its state and suitability for use. We recommend stopping the attachment and performing maintenance whenever its performance is not optimal; this will ensure that maximum efficiency is always achieved.

7.5.2. Adjusting and replacing the blades

The chapters that follow describe the operations to be performed on the attachment when it is necessary to adjust or replace components subject to wear (due to normal use when cutting materials).
Components subject to adjustment and/or wear:

- (A) Female jaw
- (B) Primary lower blade
- (C) Secondary lower blade
- (E) Guide blade
- (F) Primary shim
- (G) Secondary shim
- (L) Guide shim
- (Q) Male jaw
- (X) Secondary upper blade
- (Y) Primary upper blade
- (Z) Tip blade

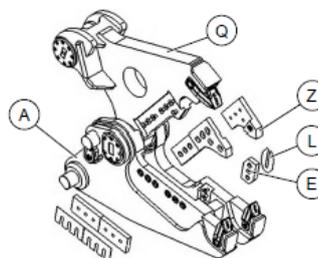


⚠ WARNING!

When adjusting the blades, it is necessary to move the jaw. Ensure no personnel is in the danger area or in areas where the operator cannot see them.

Guide blade

The front blade (E) is located on the front of the female jaw (A) and is used to guide the male jaw (Q) when cutting the material.



Adjustment procedure:

- Partially close the jaw of the attachment so that the tip blade (Z) on the male jaw (Q) meets the guide blade (E).
- Slowly move the male jaw (Q) and check the play between the tip blade (Z) and the guide blade (E) in several positions. Make sure that it never exceeds 0.4 mm (it is initially adjusted to 0.15 mm).
- If the play exceeds this limit, insert shims (L) behind the guide blade.
- If the play remains excessive despite the use of all the shims, it is possible to rotate the guide blade (E).

ⓘ IMPORTANT!

Turning the blades of the attachment increases the quality of the cut and extends the life of the blades.

Replacement procedure:

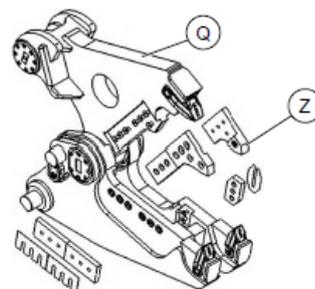
- If the play remains excessive, even when all the shims provided (L) have been used, and after having rotated it, the guide blade (E) must be replaced.
- Remove the worn guide blade and all the shims by loosening the screws.
- Install the new blade guide, without inserting the shims.
- Repeat the adjustment between the guide blade (E) and the tip blade (Z).
- If, after replacing the guide blade (E), the play is still excessive, even when all the shims provided have been used, the tip blade (Z) must be replaced.

! IMPORTANT!

Excessive play between the cutting blades leads to material becoming jammed and, as a result, a considerable reduction of perforating efficiency. The jammed material can create hazardous situations.

Tip blade

The tip blade (Z) is located on the front of the male jaw (Q) and is used to penetrate the material so as to start the cut.



Adjustment:

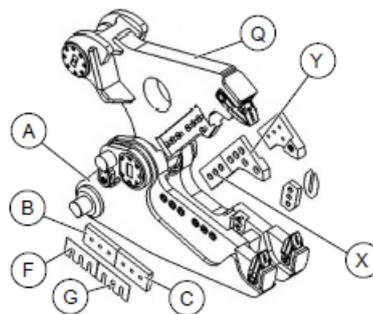
There are no adjustments on this component.

Replacement:

- To replace the tip blade (Z) loosen the locking screws.
- Remove the worn blade and install the new tip blade. After replacement, adjust to restore the tolerances with respect to the guide blade.

Primary and Secondary Blades

The primary and secondary blades (B, C, X and Y) are both located on the front part of the female jaw (A) and the male jaw (Q) and perform the main cutting function.



Adjustment procedure:

- Slowly move the male jaw (Q) and check the play between the blades on the female jaw (B and C) and the blades on the male jaw (X and Y). Make sure that it never exceeds 0.4 mm (it is initially adjusted to 0.1 mm).
- Loosen the locking bolts on the blades (B and C) located on the female jaw (without removing them), insert one or more adjustment shim and then retighten the bolts.
- If the play remains excessive, despite using all the shims provided (F and G), the blades on both the female jaw and male jaw can be rotated.
- If the blades are very worn, they must be replaced.

Replacement procedure:

- If the play remains excessive, despite using all the shims provided (F and G) and after having rotated them, it is necessary to replace the blades (B, C, X and Y).
- Remove the worn guide blade and all the shims by loosening the locking screws.
- Install the new blade and repeat the adjustment of the play between the blades (B, C, X and Y).

7.5.3. Lubrication

The attachment must be lubricated at all the greasing points indicated stickers on the respective plate.



Lubrication intervals must be determined based on operating conditions. The attachment must be re-lubricated before or after prolonged periods of inactivity. This is especially true for the winter break. Take care that no detergent penetrates the ball roller system or damages the gaskets.

❗ IMPORTANT!

- More frequent lubrication is recommended in regions with a tropical climate and in places that are damp, dusty, impregnated with impurities and subject to sudden changes in temperature.
- Following use under water, disassemble the hinges and carefully clean the pins and bushings to eliminate any trace of oxidation before lubricating again.

SLEW RING LUBRICATION

Once the attachment is mounted on the operating machine, lubricate the rolling system and the teeth using the lubricator and the lubricators on either side. For this operation and all subsequent lubrication, only use lubricants that are acid-free, contain resins,

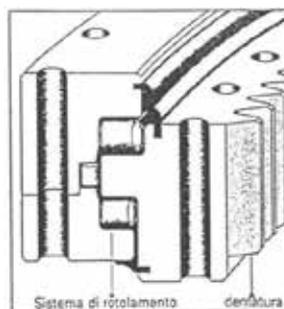
are not hygroscopic, resist aging and with a

temperature range suitable for the use of the bearing as in the table in chapter 7.5.4. The purpose

of the complete greasing is to reduce friction, create a seal and protect against corrosion. We recommend

that you grease in a way that allows grease to come out of the crevices of the bearing or seal gaskets.

There are synthetic spacers between the revolving bodies in the rolling tracks: the use of aggressive products changes the properties of the grease, corrodes the rolling tracks and damages the spacers.



7.5.4. Table of lubricants

We have checked the compatibility of the greases shown in the table with the materials used for spacers and gaskets and consider them suitable for use in the bearings. For this reason, if the user wishes to use lubricants differing from those shown here they must obtain confirmation from the supplier or maker that the selected lubricant is suitable for use and that its specifications are at least equivalent to those of the products listed in the table. Use at low temperatures requires special lubricants.

The maintenance personnel are responsible for determining the quantity of lubricant required through scheduled checks of the condition of the lubricant.

● = Greases for use with ball rolling system/hinges

▲ = Greases for use with teeth

Brand	Type	Name	Ambient temperature
BP	●	Energrease LS-EP2	from -20° to +120°C
	▲	Energrease LC 2	from -25° to +160°C
CASTROL	●	Spheerol EPL 2	from -30° to +130°C
	▲	Castrol LZV-EP	from -30° to +130°C
ELF	●	EPEXA 2	from -30° to +130°C
	▲	CARDREXA GR 1-AL	from -30° to +130°C
ESSO	●	BEACON EP2	from -30° to +130°C
	▲	Esso Multi-Purpose Grease (Moly)	from -30° to +130°C
IP	●	Athesia EP 2	from -25° to + 100°C
	▲	Viscum Fluids	from -10° to +150°C
MOBIL	●	Mobilux EP 2	from -30° to +130°C
	▲	Mobiltac 81	from -30° to +130°C
KLUBER	●	CENTOPLEX 2 EP	from -30° to +130°C
	▲	GRAFLOSCON C-SG 0 ultra	from -30° to +130°C
SHELL	●	Shell Alvania EP (LF) 2	from -30° to +130°C
	▲	Shell Malleus GL 95	from -30° to +130°C

7.5.5. Tightening the screws

Tightening must be performed exclusively by specialised technicians using a torque wrench and applying the torque values indicated in the table Tightening Torques and Stresses. The screws may only be re-tightened once, after which they must be replaced.

The table below applies to nuts and triangular-profile screws with large pitch metric threads as a function of their UNI strength class.

Tightening Torques and Stresses										
UNI 3740			6S		8.8-(8G)		10.9-(10K)		12.9-(12K)	
Nominal Diameter	Large pitch	Resistant section	Tightening torque	Tightening stress on the screw	Tightening torque	Tightening stress on the screw	Tightening torque	Tightening stress on the screw	Tightening torque	Tightening stress on the screw
d	r	s	(M)	(R)	(M)	(R)	(M)	(R)	(M)	(R)
mm	mm	mm ²	Nm	KN	Nm	KN	Nm	KN	Nm	KN
M5	0.8	12.03	5.10	5.3	5.98	6.3	8.50	8.8	10.20	10.6
M6	1	17.3	8.73	7.5	10.3	8.8	14.7	12.4	17.6	14.9
M8	1.25	31.9	21.58	13.7	25.5	16.2	35.30	22.8	42	27.4
M10	1.5	50.9	42.2	21.8	50	25.8	70.6	36.3	85.5	43.60
M12	1.75	74.3	73.6	31.8	87.3	37.7	122.6	52.9	147	63.6
M14	2	102	116.7	43.7	138.3	51.7	194.2	72.7	235.5	87.3
M16	2	141	178.5	60	210.9	71.20	299.2	100	358	120
M18	2.5	171	245	73	289.4	86.5	412	121.6	490.5	146.1
M20	2.5	220	348.5	93.9	412	111.3	578.8	156.5	696.5	187.8
M22	2.5	276	471	117.3	559.2	139.3	784.8	195.7	942	234.5
M24	3	317	598.5	135.4	711.2	160.4	1000.5	225.6	1197	271
M27	3	419	888	178.1	1049.7	210.9	1481	296.3	1776	356
M30	3.5	509	1206.5	215.8	1422.4	256	2011	360	2403	432.6
M33	3.5	636	1628.5	269.8	1932.6	319.8	2717	449.3	3267	539.6

7.5.6. Anti-wear material

Periodically, check the state of deterioration of the claws on the attachment and replace the anti-wear material when necessary. The material must be applied in accordance with the instructions below.

WARNING!

- Before replacing the material, carefully remove any paint residues to avoid releasing toxic vapours. Also, remove any deposits of cement, concrete and accumulated crushing waste on the part to be filled.
- Before adding welded material, make sure there is no oil or inflammable liquids near the working area.

To add the wear repair material, connect the ground pole of the welding machine to the part to be welded, as close as possible to the welding area. The ground pole must be connected so that the current does not pass through the hinges or the hydraulic cylinder. If the attachment is mounted on the operating machine during welding, follow the instructions in the manual supplied with the latter to avoid damaging its battery or electronics.

- After carefully cleaning the area where material is to be added and the surrounding area, pre-heat to 150 °C to 200 °C, checking the temperature frequently. Exceeding these temperatures can alter the mechanical properties of the material.
- Do not deposit more than two overlapping layers on attachment jaws or on the part to be filled. If the part in question is significantly worn, insert shaped and bevelled material to restore the part to its original dimensions. Then, proceed with welding the piece and filling it.
- Grind the ends of the fill material beads.
- Allow the part to cool slowly in the absence of air drafts.
- Follow the technical application standards recommended by the manufacturer of the repair wire.

To add material use 57 HRC (600 Brinell) repair wire, Ø 1.2 mm K 300.

The recommended wires are:

UTP: A67S Ø 1.2 mm

FORTARGEN: A7111 MIG Ø 1.2 mm



DANGER!

Before replacing material, it is necessary to switch off the operating machine and wear suitable PPE (gloves, goggles, safety shoes and suitable clothing).

7.6. Diagnostics and troubleshooting

General requirements

In the event of an attachment malfunction, request a specialised technician to carry out a troubleshooting investigation on it or call the manufacturer's technical support service.

Problem	Possible cause	Possible solution
Crushing power below expectations	The operating machine is not dispensing adequate pressure to the attachment's hydraulic circuit.	→ Check the pressures on the operating machine.
	The speed/booster valve is not calibrated correctly.	→ Calibrate the speed/booster valve.
	The speed/booster valve's gasket seals are damaged.	→ Replace the gasket seals of the speed/booster valve.
	The attachment's cylinder gasket seals are damaged.	→ Replace the gasket seals of the cylinders.
	The attachment rotating joint seals are damaged.	→ Replace the gasket seals of the rotating joint.
Difficulty demolishing and/or cutting	The dimensions or resistance of the material are greater than the attachment demolition capacity.	→ See chapter 4.3. Technical Data.
	The cutting blades or teeth are too worn.	→ See chapter 7.5. Extraordinary maintenance.
	The blades are not correctly adjusted or are too worn.	→ See chapter 7.5. Extraordinary maintenance.
The jaws close by themselves	Oil leaking from the operating machine distributor.	→ Contact technical assistance for the operating machine.
	Oil leaking on the speed/booster valve.	→ Replace the hydraulic cartridges or the entire speed/booster valve.
	Oil leaking from the cylinder.	→ Replace the gasket seals on the cylinder.
	Oil leaking from the rotating joint.	→ Replace the gasket seals on the rotating joint.

Problem	Possible cause	Possible solution
The jaw is blocked	There is material between the cutting blades that prevents them from opening.	→ Remove the material stuck between the blades with a blowtorch, and then restore the adjustments.
The attachment doesn't rotate	Operating machine pressure not correctly calibrated.	→ Adjust the pressure of the operating machine.
	Rotation motor damaged.	→ Replace the motor.
	Motor valve damaged.	→ Replace the motor valve.
	Flow regulator valve closed.	→ Open the flow regulator valve.
The attachment rotates slowly or too fast	Incorrect oil flow from the operating machine.	→ Adjust the flow of oil from the operating machine.
	Flow regulator valve incorrectly calibrated.	→ Correctly calibrate the flow regulator valve.
Oil leaks	Gasket seals damaged.	→ Replace the gasket seals.
	Hydraulic tubing loose.	→ Tighten the fittings of the hydraulic tubing.
Difficulty coupling kit to frame	The kit is not positioned correctly.	→ Position the kit correctly. See chapter 6.
	Material present on coupling surfaces.	→ Clean the coupling surface.
	Cylinder wedge not fully retracted (on version with hydraulic attachment).	→ Open the diverter and use the cylinder opening control to return the wedge to its housing. See chapter 6.
	The pin activation screw does not turn (on version with manual coupling).	→ Loosen the screws.
Difficulty coupling the cylinder to the kit	The movable part of the cylinder (barrel) is not correctly aligned.	→ Manually rotate the barrel until it is correctly aligned.
	Attachment position not correct.	→ See the chapter 6.

Problem	Possible cause	Possible solution
Difficulty closing the hook of the cylinder on a model with hydraulic quick coupling	Hole of the conical pin not aligned.	→ Make sure that the surfaces of the hexagonal bushing are parallel to the surface of the hook.
	There is material on the coupling surfaces.	→ Clean the coupling surfaces.

Contact the manufacturer in the case of any defects or malfunctions affecting the attachment that are not described in this manual.

8. Spare parts

8.1. Assistance

For any information relating to the use, maintenance and installation of the attachment, Hydraram is always at the customer's service. The customer should submit questions in as clear a manner as possible, referring to this manual and the instructions provided.

8.2. Spare parts

Contact the manufacturer to request any replacement parts.

⚠ WARNING!

Always use original replacement parts. We strongly advise against the use of non-original parts and, in the event non-original spare parts are used Hydraram may not be held responsible for the consequences of resulting breakages, malfunctions, injuries to personnel or damage to property. In addition, in such cases, the guarantee will be rendered null and void (if still valid).

In order to interact more effectively with our technicians when ordering replacement parts, please follow this procedure:

- Call the spare parts service of Hydraram and describe the type of fault experienced.
- Quote the attachment serial number indicated on the identification plate.
- Describe the part that is not working (with the help of photographs if necessary);
- Indicate the shipping method. If this field is not filled out, Hydraram while taking every care to provide the requested service, may not be held liable for any delivery delays caused by force majeure. The recipient is always liable for shipping expenses.



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