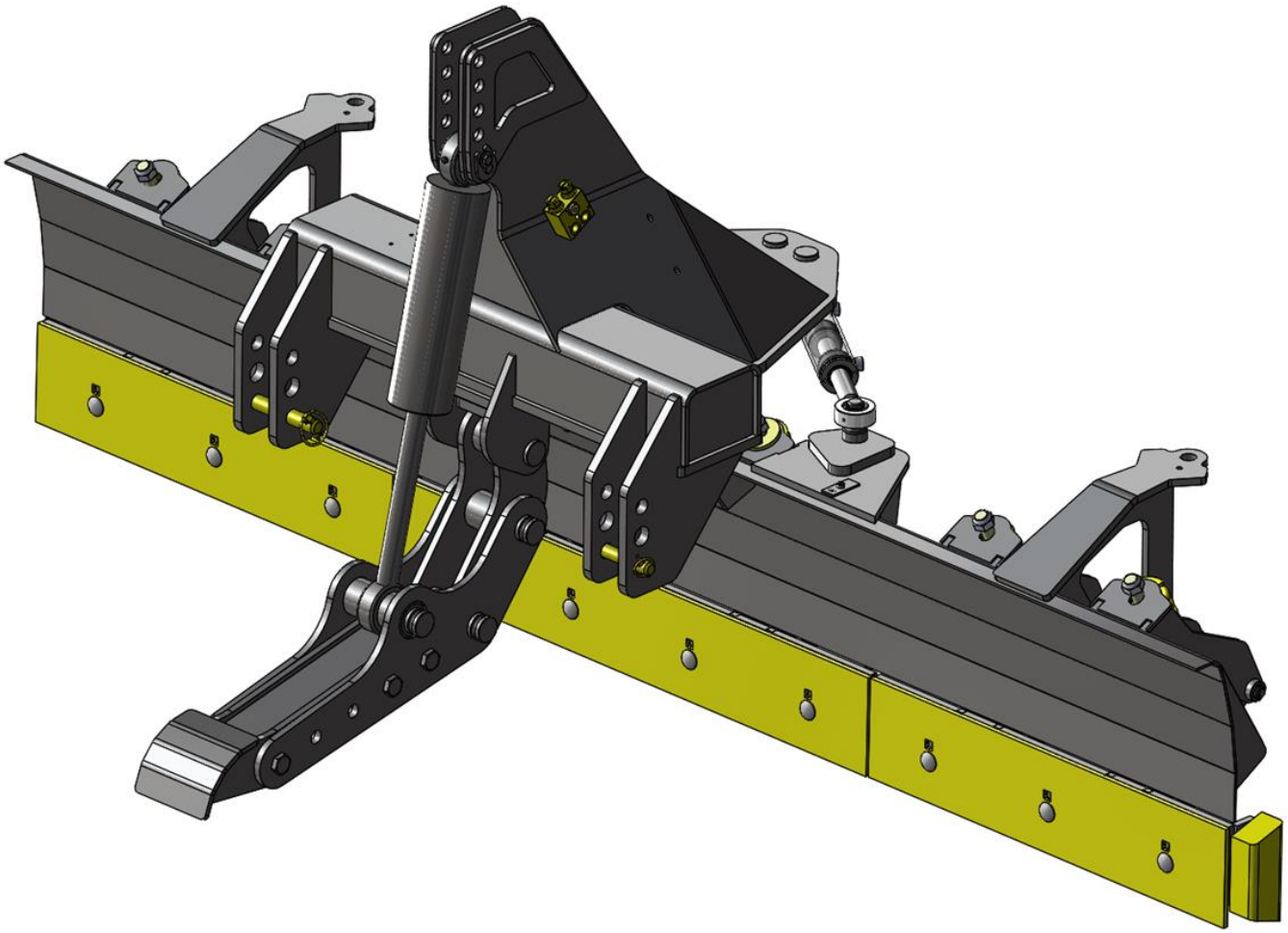
Original

Operating and maintenance manual

Grader blade



Lametal Oy • Kaskenviertäjäntie 2, 73100 LAPINLAHTI, FINLAND
• info@stark.fi • parts@stark.fi • www.stark.fi

General

Congratulations on the purchase of your STARK grader blade!

For us, the long lifecycle and efficiency of your new equipment is a priority. To keep the grader in top working condition, read this manual carefully before using the equipment.
STARK products are engineered and manufactured in Finland, and each of them is equipped according to the needs of the customer.
Never let anyone operate or maintain the device without reading this manual carefully! Always make sure that safety precautions are observed in use and maintenance. Keep this manual for future reference and make sure to hand it over to a new owner.
The cornerstones of the product development of STARK attachments are quality, durability and economy. The products are engineered to be high-performing, safe and durable in professional use. Any feedback on our products is welcome and contributes to the further development of our products. If you have any questions about the use or maintenance of the grader blade, please contact us by e-mail: info@stark.fi
Visit our webpage www.stark.fi for the complete product range, including new products.
The manufacturer reserves the right for structural and technical changes without prior notice. Therefore, some pieces of information given in the manual may have changed after printing this manual.

Read before use



Make sure you know your equipment before you start using it.
Equipment may be operated only by an individual who is thoroughly familiar with its use.
All operators must be properly instructed before use and maintenance of the equipment. Use by individuals with insufficient instructions may pose serious risks to the operators themselves, to the environment and the equipment.

When coupling the attachment to the base machine, make sure:

- that all locking cotters are intact and in order
- there is no pressure in the hydraulic system
- that hydraulic hoses are intact
- there is no skin contact to hydraulic oil when connecting hydraulic hoses
- not to pull by the hydraulic hoses, but only by the hydraulic fitting



During operation, pay attention to:

- safe, appropriate travel speed
- other traffic, people and animals
- danger zones and objects that block your view
- children

NEVER use the machine, if there is someone in the danger zone.
NEVER go under the attachment.

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Table of contents

General 2

Read before use 2

1. DECLARATION OF CONFORMITY 4

2. PURPOSE OF USE 5

3. SAFETY PRECAUTIONS 5

4. IDENTIFICATION INFORMATION AND SPAREPARTS 6

4.1. Identification plate 6
4.2. Maintenance services 6

5. MAIN PARTS OF THE GRADER BLADE 7

6. USING THE BLADE GRADER 8

6.1. Attaching the blade grader to a base machine 8

7. OPERATING THE BLADE GRADER 9

7.1. Operating instructions 9
7.2. Attaching the pressure lever 10
7.3. Adjusting the RELAX -blade system 12
7.4. Adjusting the blades 14
7.5. Adjusting the flat blades 15
7.6. Adjusting the perforated blades 16
7.7. Detaching the grader blade 17
7.8. Transferring the grader blade 17
7.9. Accessories for the grader blade 17

8. MAINTENANCE OF THE GRADER BLADE 18

8.1. General safety precautions for the use and maintenance 18
8.2. Tightening torque 18
8.3. Daily maintenance 18
8.4. Maintenance after first 10 hours of operation 19
8.5. Maintenance after every 50 workhours or weekly 19
8.6. Lubrication points 20

9. HYDRAULICS 22

10. WARRANTY POLICY 25

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1. DECLARATION OF CONFORMITY

The original manufacturer's EC declaration of conformity:
Generic product name: Grader blade
Models: STARK HT 2600 R, HT 3050 R

Manufacturer:
Lametal Ltd
Kaskenviertäjäntie 2 73100 LAPINLAHTI, Finland
tel. +358 17 731 565

Declares that the above-mentioned equipment meet the provisions of Directive 2006/42/EC on machinery and, where applicable, comply with the standards

- SFS-EN ISO 12100-1,
- SFS-EN ISO 12100-2
- SFS-EN 1050

The person authorized to compile technical documentation:



Lassi Mehtonen
Managing director
Kaskenviertäjäntie 2
73100 Lapinlahti, FINLAND

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2. PURPOSE OF USE

Grader blades are intended for grading gravel roads and flat areas and for transferring ice (removal of packed snow).

3. SAFETY PRECAUTIONS

Make sure you know your equipment before you start using it. Equipment may be operated only by an individual who is thoroughly familiar with its use.



Before connecting hydraulics to the base machine, make sure that:

- there is no-one between the attachment and the base machine
- the base machine is turned off and the parking brake is on.

When coupling the attachment to the base machine, make sure that:

- all locking cotters are intact and in order
- hydraulic hoses are intact
- there is no skin contact to hydraulic oil when connecting hydraulic hoses
- you do not to pull by the hydraulic hoses, but only by the hydraulic fitting.

During operation, pay attention to:

- safe, appropriate travel speed
- other traffic, people and animals
- danger zones and objects that block your view
- children
- use of turn signal when driving

NEVER use the machine, if there is someone in the danger zone
NEVER go under the attachment





WARNING! Pressurized hydraulic hoses and components!

During maintenance, the hydraulics of the base machine MUST be turned off. The base machine MUST also be turned off and the parking brake MUST be applied. The equipment must be properly supported, if maintenance can only be performed by going under the equipment. Never go under the equipment if it is not properly supported.
Daily maintenance:

- check general condition of structures, make repairs if needed
- check the hydraulic hoses and fittings, and replace damaged parts

After every 50 hours of operation:

- lubricate points specified in later section of this manual
- check all bolts and nuts for tightness

Check all bolts, nuts and hydraulic fittings for tightness after the **first day** of operation!
If the equipment is not likely to be used for a longer period of time, clean it thoroughly after use and lubricate as instructed.

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4. IDENTIFICATION INFORMATION AND SPAREPARTS

4.1. Identification plate

Identification plate is placed on the side of the equipment. The plate includes contact information, machine type, year of manufacture, serial number and weight. (See an example of an identification plate in picture 1 below).
The first four numbers in the serial number indicate the month and year of manufacture (month first). The remaining five numbers constitute the machine tracking number, which is stored in the manufacturer's database (13971 in the example below).



Picture 1. Identification plate

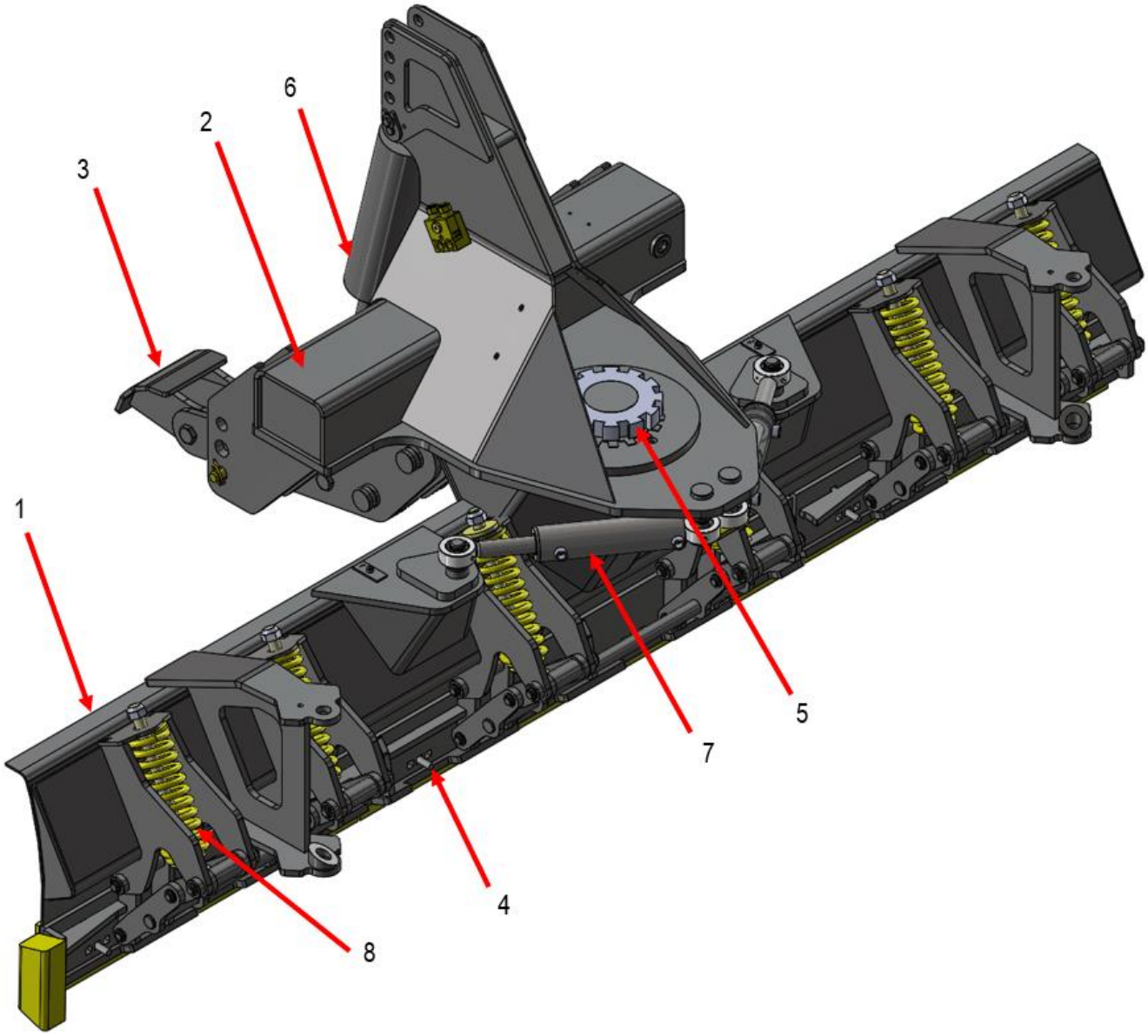
Take down the machine type and the serial number of your grader blade:

Product and model _____Serial number_____

4.2. Maintenance services

When replacing parts, use original, manufacturer spare parts only. By using original spare parts you ensure dependable operation of the grader blade and comply with the warranty policy. To facilitate the supply of spare parts, always inform the manufacturer/retailer of the model and serial number of the grader blade (marked in the identification plate) when you order spare parts.
For more information on maintenance and spare parts, please contact the STARK maintenance and spare part services or your retailer.
Contact information for STARK maintenance services:
tel. +358 (0)17 731 565, e-mail info@stark.fi
tel. +358 (0)44 758 6221, e-mail parts@stark.fi

5. MAIN PARTS OF THE GRADER BLADE



Picture 2. Main parts of the grader blade

1) Main frame of the grader blade
2) Rotating frame
3) Pressure lever
4) Blade frame
5) Bolt of the rotating ring
6) Hydraulic cylinder for the pressing
7) Hydraulic cylinder
8) RELAX -spring

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6. USING THE BLADE GRADER

When attaching the blade grader for the first time, make sure it is compatible with the base machine by following the instructions below. Always check the compatibility when attaching the blade grader to a new base machine.

6.1. Attaching the blade grader to a base machine

The blade grader is attached to the back of the base machine. The machine is connected to a hydraulic system. Hydraulic circuit diagrams can be found in a later section in this manual.

Before using the blade grader, MAKE SURE all locking cotters are secured and intact.

When coupling the blade grader to the base machine, please pay attention to the instructions on the use of the base machine.

1. Make sure that the attachment and the base machine are compatible in terms of mechanical solutions, hydraulics and electricity.

2. Apply parking brake. The blade grader is attached to the coupler on the base machine (e.g. a loader). Attach the bucket sweeper to the base machine, and make sure the locking cotters are secured.

3. Turn off the base machine and make sure the parking brake is applied.

4. Make sure there is no pressure in the base machine hydraulic system. When connecting, always make sure the hydraulic connectors are clean and the hoses are intact.

5. Check carefully the movement paths between the coupling mechanism, the base machine and the attachment for collisions. Check also the space needed for hydraulic hoses and connectors.

6. During first hours of operating the attachment, bolts, nuts and connectors might loosen up. **Retighten them** after the first day of operating the attachment.

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7. OPERATING THE BLADE GRADER

Before using the attachment make sure:

- the bucket spreader is installed correctly
- all locking pins are in place
- hydraulic hoses are connected properly
- hoses are intact
- there are no oil leaks
- all functions are working properly

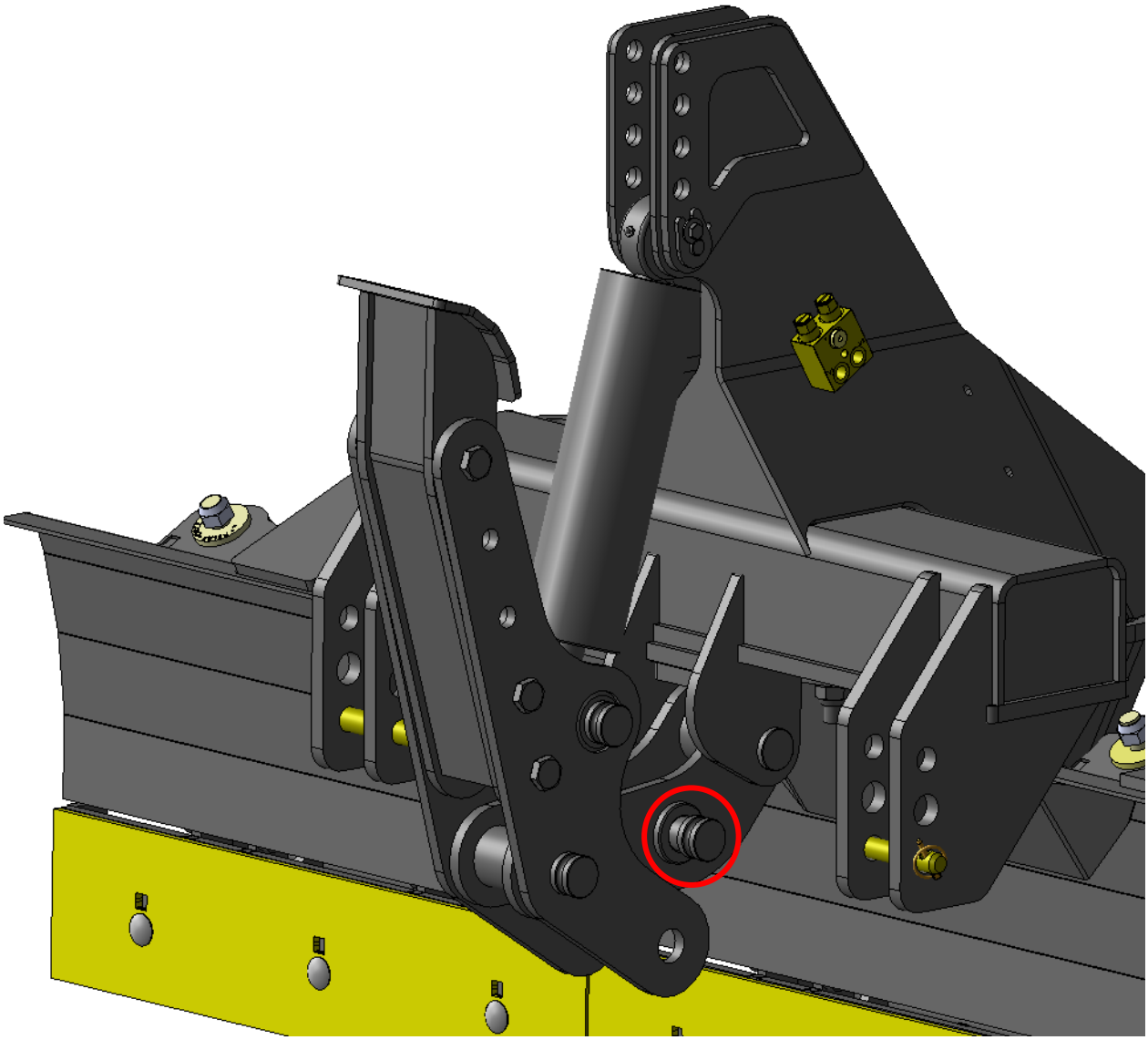
7.1. Operating instructions

1. Check that the attachment and the base machine are compatible in terms of mechanical solutions, hydraulics and electricity.
2. The blade grader is connected to the back of the base machine. Apply the parking brake. Connect the bucket sweeper to the base machine and make sure the pins are properly locked.
3. Turn off the base machine and make sure the parking brake is applied.
4. Make sure there is no pressure in the base machine hydraulic system. When installing, always check that the hydraulic fittings are clean and hoses are intact.
5. Check carefully the movement paths between the attachment mechanism, the base machine and the attachment for collisions. Check also the space needed for hydraulic hoses and fittings.
6. Stay alert for any abnormal behaviour and oil leaks also during driving.

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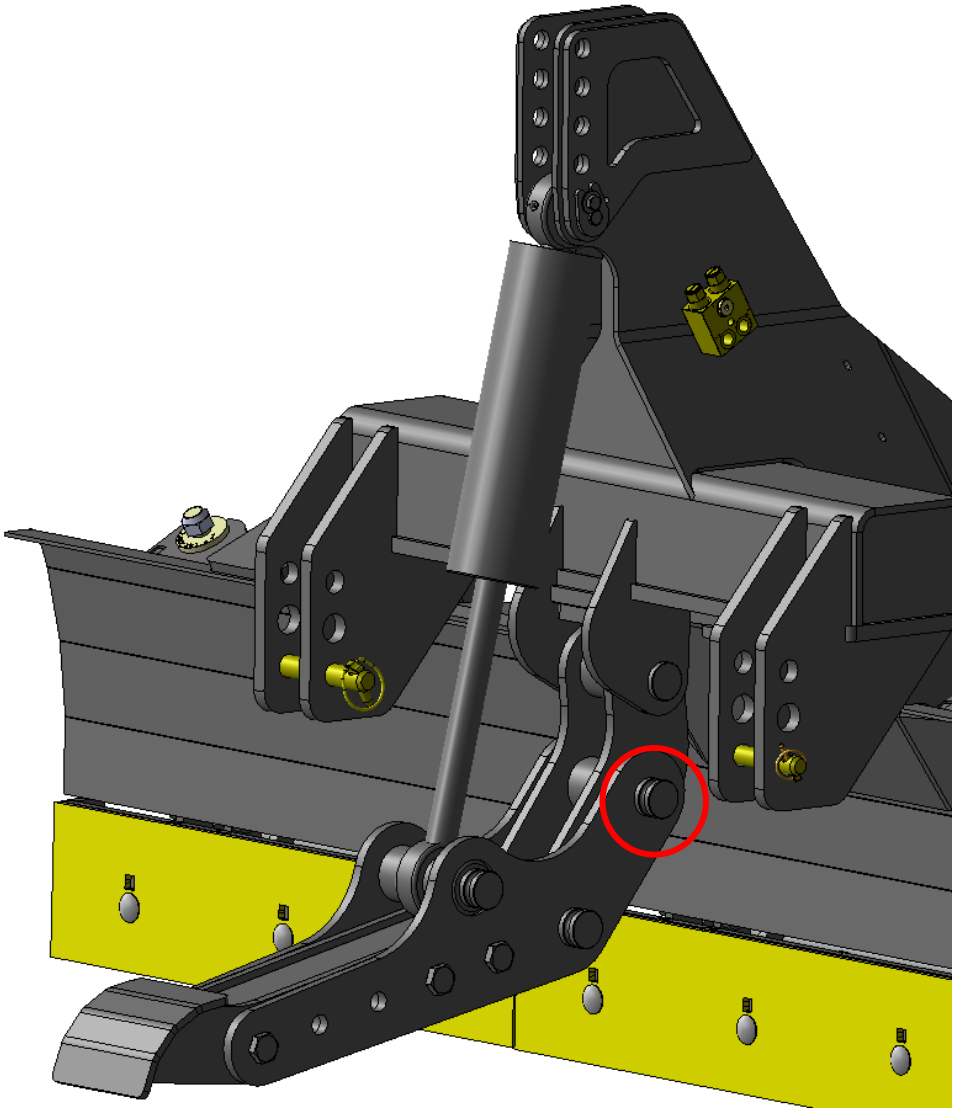
7.2. Attaching the pressure lever

Before operating with the grader blade, lever's hole needs to be attached to the peg (pictures 3 and 4).



Picture 3. Pressure lever in storage postition

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Picture 4. Pressure lever in operating position

Grader blade pressure lever cylinder is equiped with relief valve, which is pre-adjusted to 60bar. **If pressure force is not sufficient, relief valve can be adjusted carefully to achieve more pressure to road. Bear in mind, that more force to the road will also make more lift to the rear end of the tractor. Adjusting relief valve is at customers own risk! Instructions to adjusting relief valve can be found further in user manual.**

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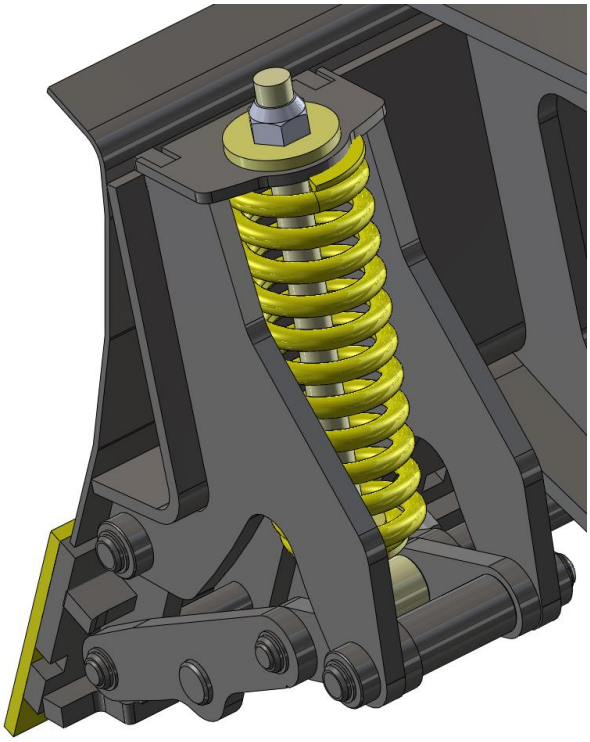
7.3. Adjusting the RELAX -blade system

RELAX -release mechanism keeps the blades locked. The grading result is even and formation of packed snow decreases. When the blade hits an obstacle the release mechanism opens allowing the blade frame to turn backwards and the blade to go over the obstacle. The system protects the driver, the plow and the base machine from damaging.

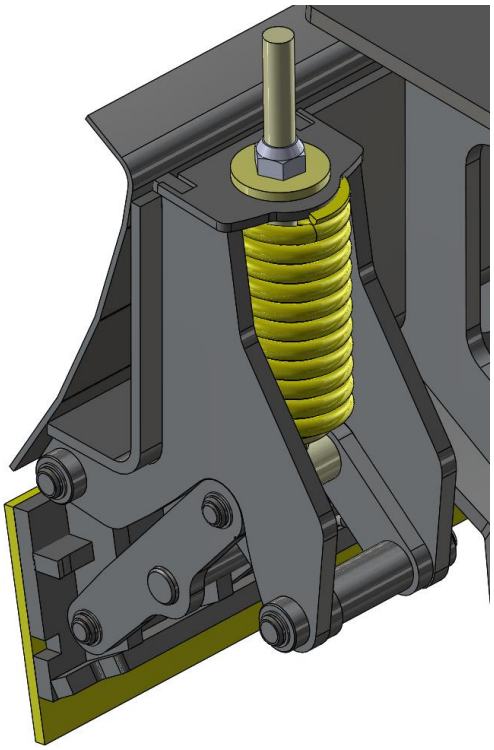
Graders with RELAX -blade system can be pressed down to remove packed snow.

Operation of the RELAX -blade system

1. Blade frame is mechanically locked in position by three joints (picture 5)
2. When the blade hits an obstacle, the increased pressure releases the lock and the blade frame swivels in a quick and wide motion over the obstacle (picture 6)
3. When the obstacle is passed, and pressure returns to normal the spring pushes the blade frame back into the locked position (picture 5)



Picture 5. RELAX -mechanism in normal position

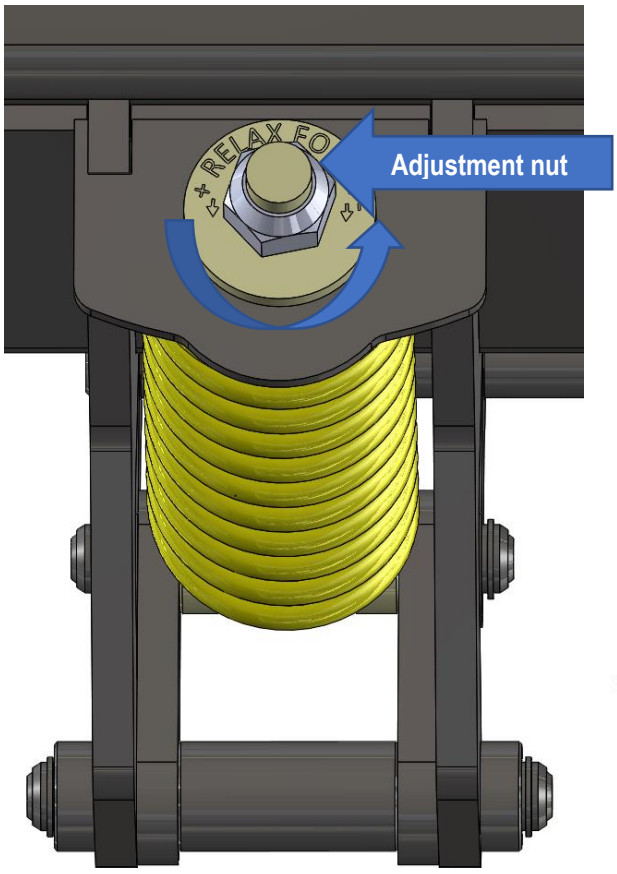


Picture 6. RELAX -mechanism during collision

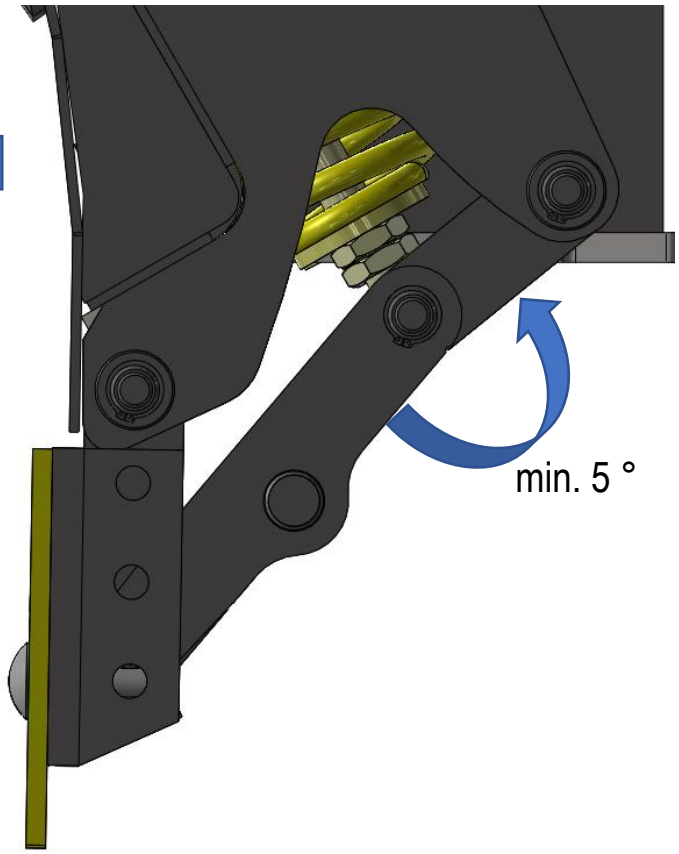
The amount of pressure which releases the lock can be adjusted by changing the angle of the joints (picture 7). Larger the angle, the more easily the lock releases. When the adjustment nut is tightened less pressure is required and when the nut is loosened more pressure is required. The angle between joints should be at least 5° to enable the release mechanism to function as designed (picture 8). Never adjust the angle totally straight!

Rigidity of the spring can be adjusted by the tension nut under the spring (picture 9). Shortest permitted length for the spring is 175 mm when blade is released, then the spring is pre-strained by 25 mm. At the factory the spring is pre strained by 15 mm.

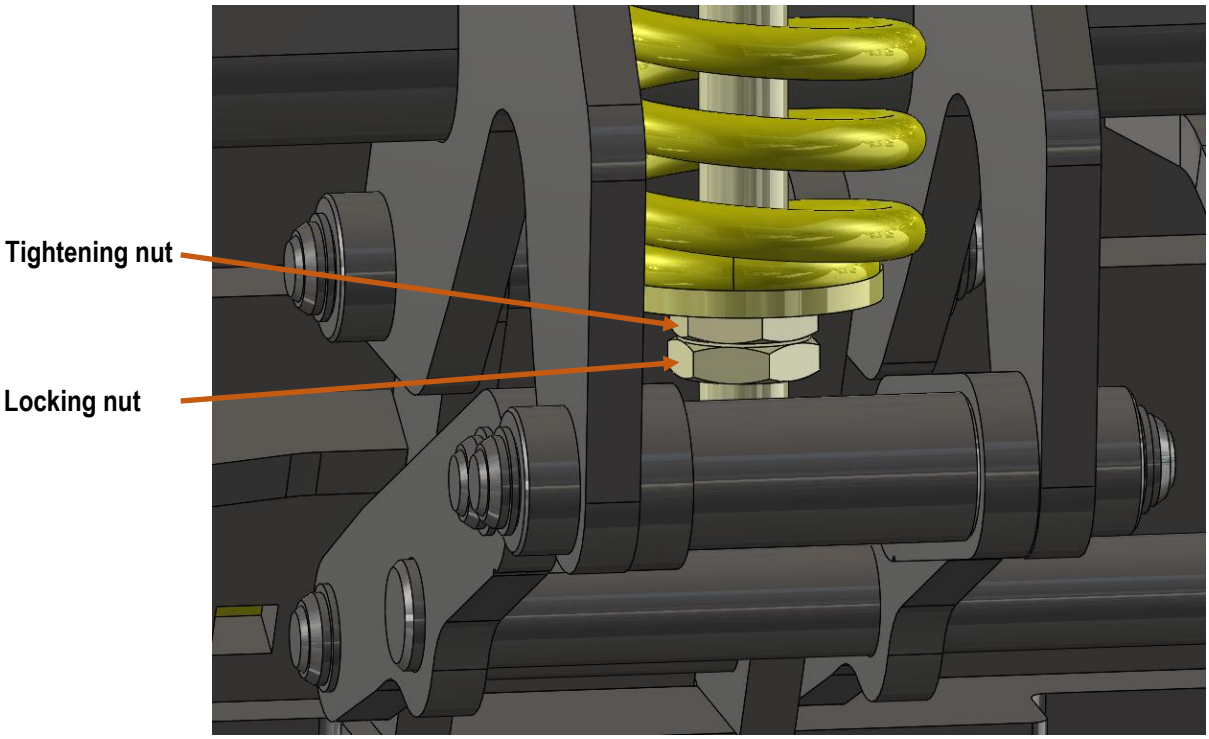
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Picture 7. Adjustment nut of the RELAX -mechanism



Picture 8. Minimum angle between joints must be at least 5°

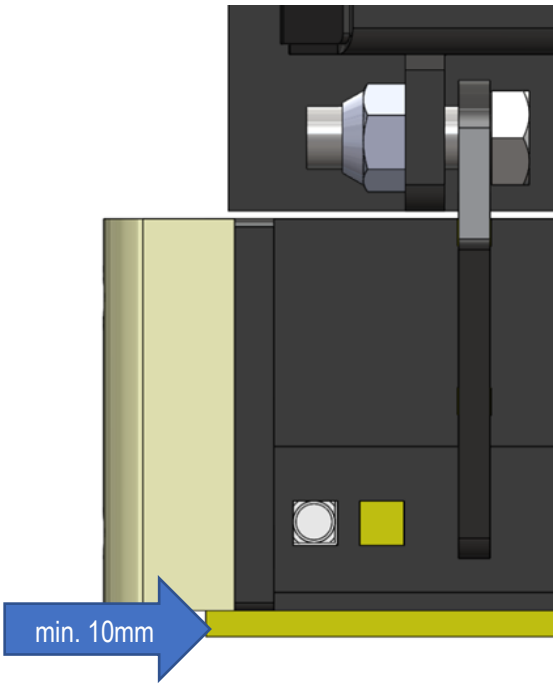


Picture 9. Adjusting the spring

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7.4. Adjusting the blades

Edge of the blade should be 15–45 mm lower than the blade frame. Blades need to be adjusted at the latest when the blade edge is less than 10 mm lower than the blade frame (picture 10). **Do not adjust the blades more than 50 mm lower than the blade frame.**

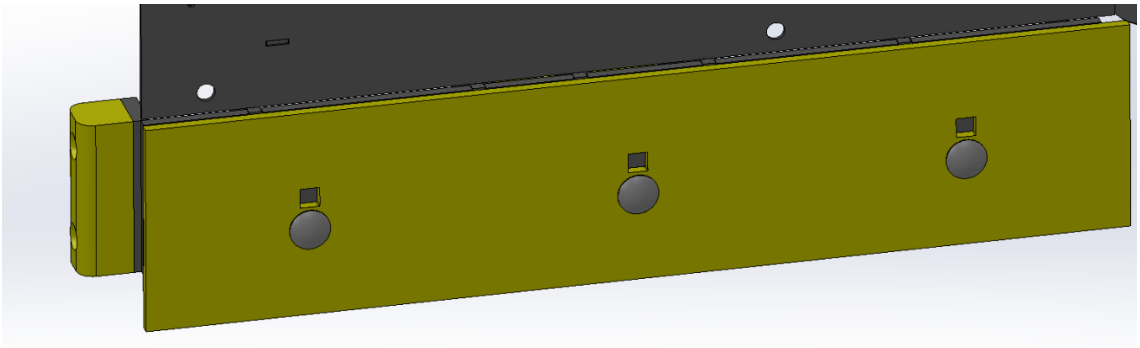


Picture 10. Minimum distance of the blade edge from the blade frame

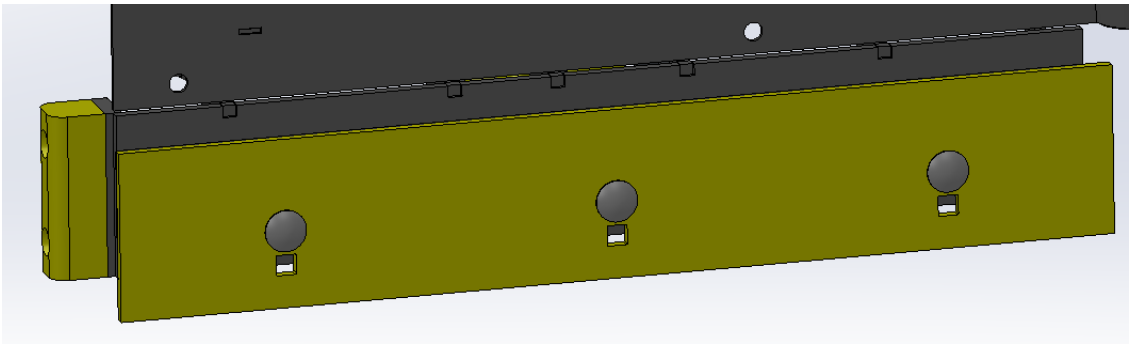
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7.5. Adjusting the flat blades

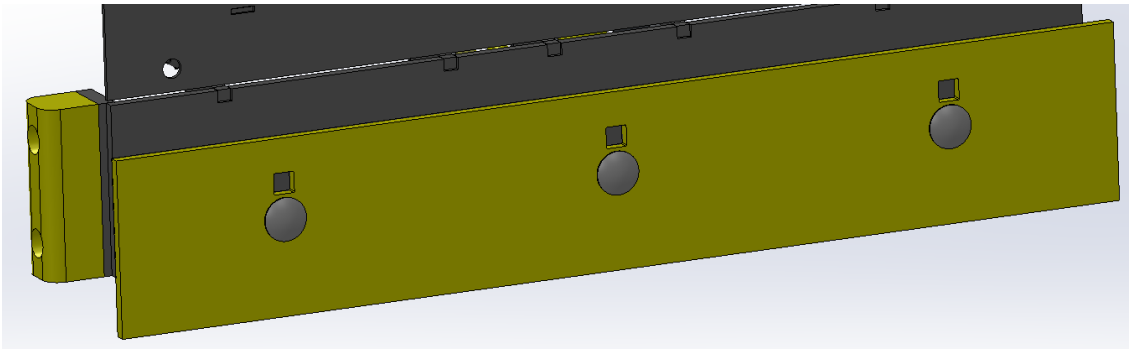
Flat blades can be adjusted three times. Each time there will be about 45 mm wear edge on the blade. First when the blade is new, it is in the position of picture 11. When the blade edge wears out it is lowered and attached from the upper holes of the blade (picture 12). Next time the blade is turned and again attached from the lower holes (picture 13). When the blade edge wears out again it is lowered by attaching it from the upper holes (picture 14). When the blade edge wears out in this position, it needs to be replaced.



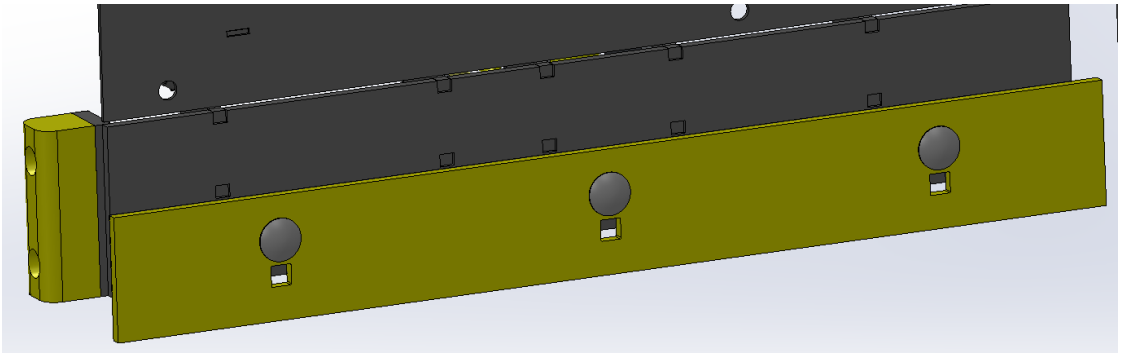
Picture 11. New blade



Picture 12. Lowered blade



Picture 13. Turned blade

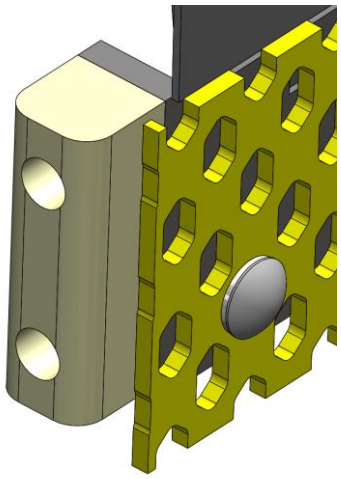


Picture 14. Turned and lowered blade

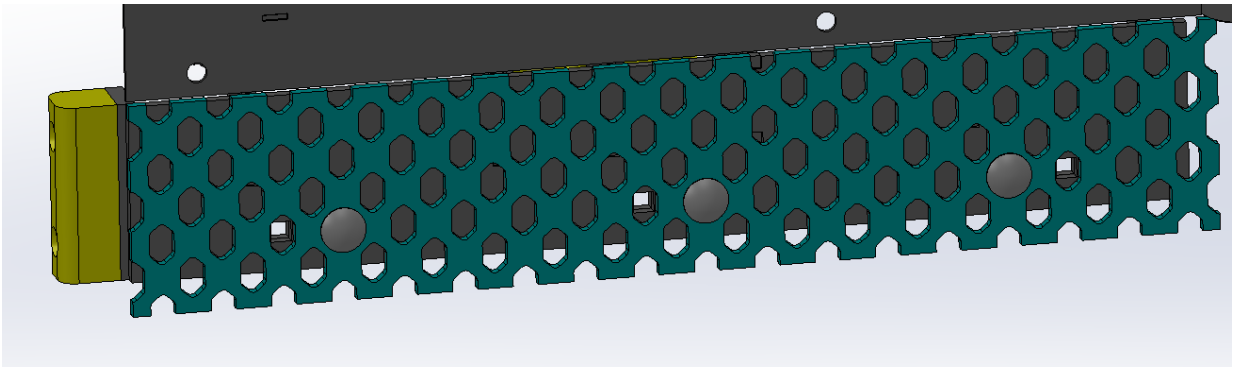
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7.6. Adjusting the perforated blades

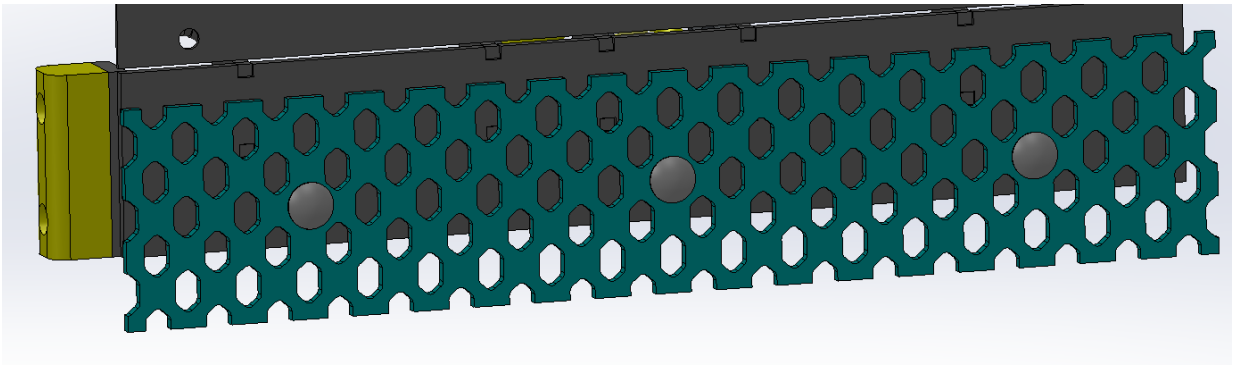
When adjusting perforated blades, the bolts can be removed by holding the bolt head with locking pliers and loosening the locking nut behind the blade. Also, when tightening, the bolt head will need to be held to enable the nut to be tightened. M20 washer is added under the bolt for getting a better grip on it (picture 15).
The bolts are removed, and the blade lowered until a hole on the blade frame can be seen again. The bolts are attached now to the holes next to the ones they were attached to before (picture 16). This enables the blade to be lowered appropriately (picture 17).



Picture 15. M20 washer is added under the bolt



Picture 16. The first position of perforated blade



Picture 17. Perforated blade after it has been lowered

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7.7. Detaching the grader blade

- Lower the grader to an even ground.
- Turn off the base machine, put on the parking brake and release pressure from the system.
- Take off the hydraulic hoses and protect the couplings with plugs.
- Open the mechanical locking and loosen the plow.
- If the plow is left unused for a long period of time, clean and lubricate it properly before storage.

7.8. Transferring the grader blade

Lift the grader blade high enough and reduce speed if needed, especially on bumpy, uneven roads. The grader blade or the base machine can be damaged due to excessive speed.

7.9. Accessories for the grader blade

Following accessories are available for the grader blade:

- Mechanical support wheels
- Hydraulic support wheels
- Control unit
- Flat-, perforated- and pin blade set

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8. MAINTENANCE OF THE GRADER BLADE

8.1. General safety precautions for the use and maintenance

- Comply with existing laws and regulations and the instructions given in this manual.
- Never go under an unsecured device.
- Always apply the parking brake of the base machine before performing any actions on the device.
- Only use tools that are in proper working order.
- Be careful with the pressurized hydraulic hoses and components.
- Make sure there is no pressure in the hydraulic system. Take into account the pressure accumulator.
- Make sure hydraulic fluids or greases do not leak to the ground.
- Use all necessary personal protectors.

8.2. Tightening torque

	Nm (strength 8.8)
M4	3,3
M5	6,5
M6	11,3
M8	27,3
M10	54
M12	93
M14	148
M16	230
M18	329
M20	464
M22	634
M24	798
M27	1176
M30	1597
M33	2161
M36	2778
M39	3597

Table 1. Tightening torque

8.3. Daily maintenance

In order to prevent further damages, it is important to inspect the device visually for possible defects. Inspect at least the following on a daily basis:

- hydraulic hoses and components for possible leaks
- general mechanical functioning

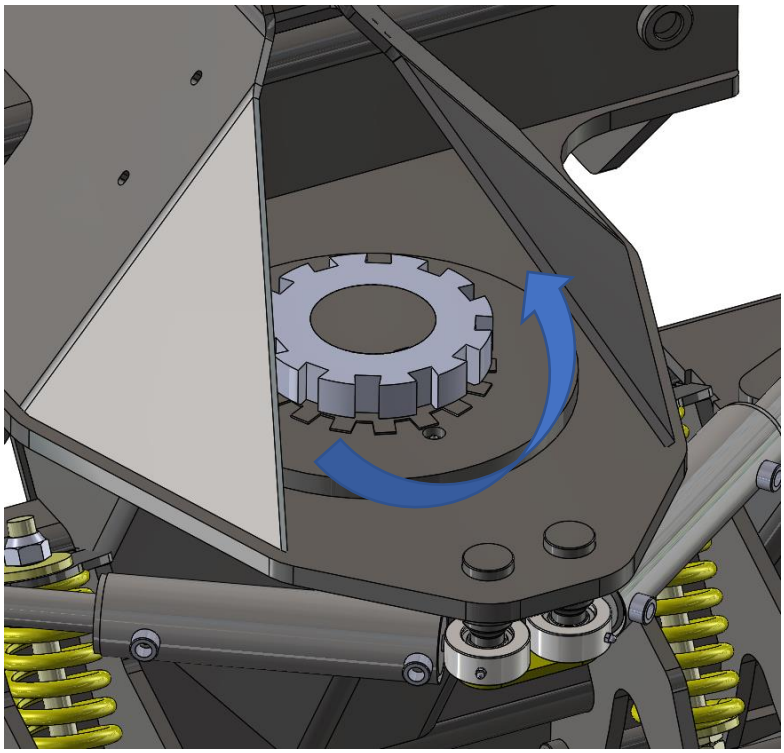
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8.4. Maintenance after first 10 hours of operation

- Lubrication, recommended quality NLGI-2 grade grease or equivalent, shown in the later section
- Check the bolts for the tightness (table 1).
- Check the bolt of the rotating ring for tightness (picture 18)

8.5. Maintenance after every 50 workhours or weekly

- Lubricate, preferably with a NLGI-2 grease or equivalent (see instructions in later section)
- Check the mechanical condition of the device for bends, distortions or breaches
- Check fastening bolts for tightness (table 1).
- Check the bolt of the rotating ring for tightness (picture 18).

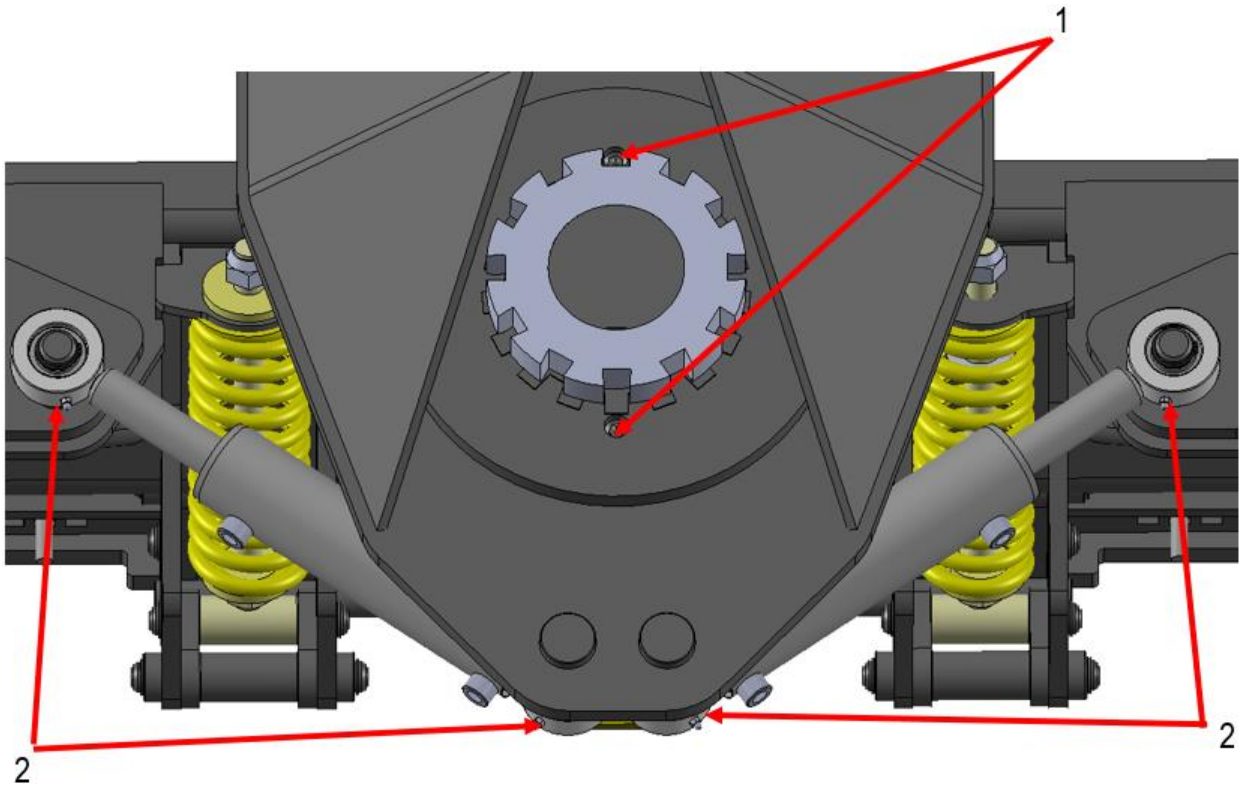


Picture 18. Check the rotating ring for tightness

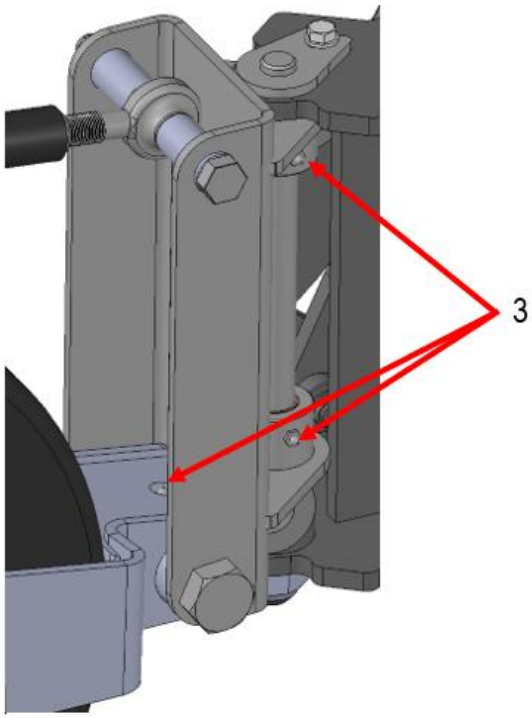
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8.6. Lubrication points

1) Grease nipples of the rotational ring
2) Grease nipples of the hydraulic cylinder
3) Grease nipples of the support wheels
4) Grease nipples of the pressure lever's grease nipples

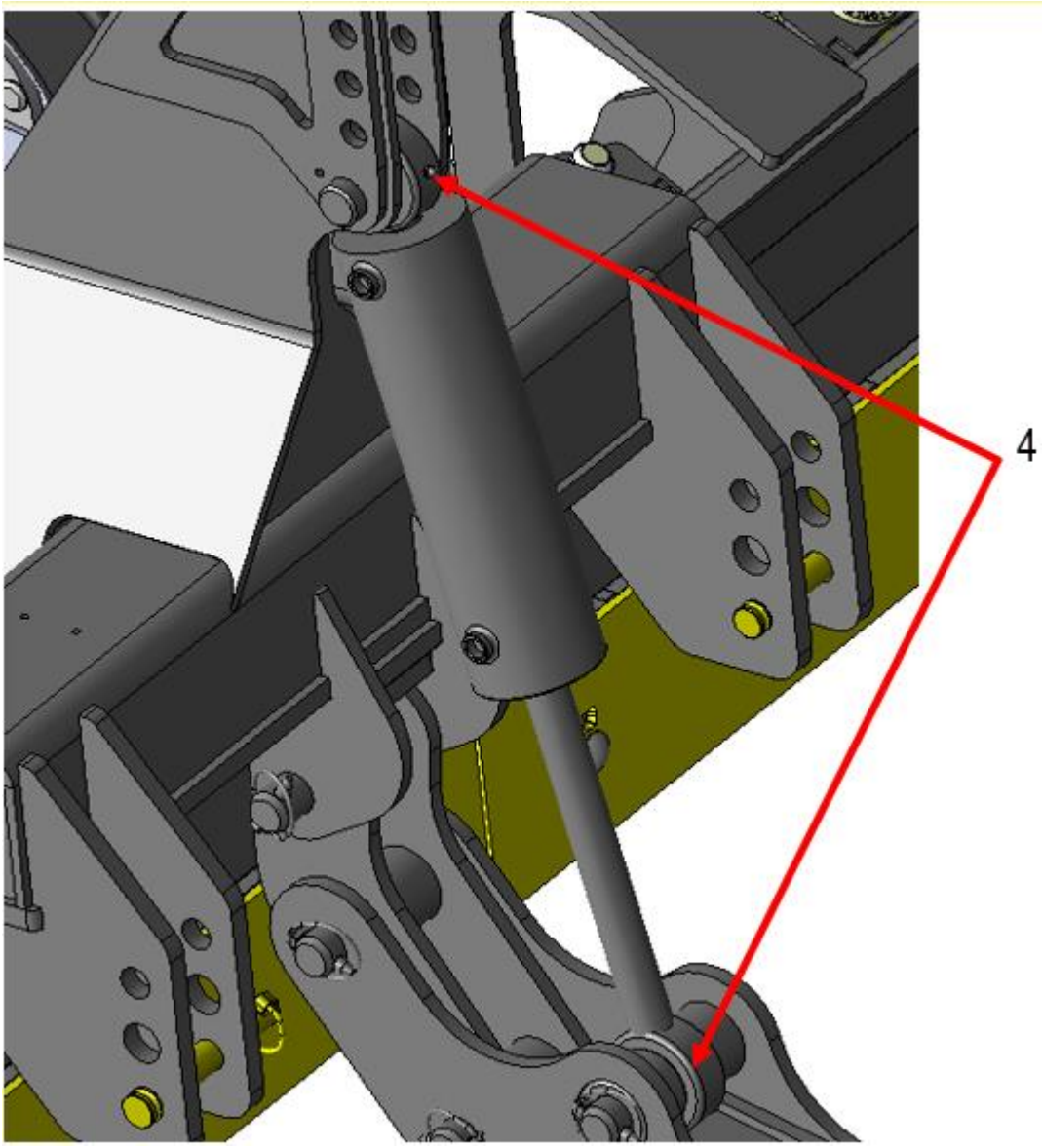


Picture 19. Lubrication points



Picture 20. Lubrication points

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Picture 21. Lubrication points

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9. HYDRAULICS

The grader blade can be connected to a 5-hose hydraulic system (chart 1), in which it is possible to switch the tank line (T) to a pressure accumulator (A), which makes it a 4-hose hydraulic system. Alternatively, the device can be connected to a 9-hose hydraulic system (chart 2). The device is equipped with a complex closed hydraulic system, which has been tested and adjusted by the manufacturer. Any repairs to the system are to be performed by replacing one component at a time by a professional in hydraulics. Any alterations or modifications to the hydraulic system are on the sole responsibility of the client.

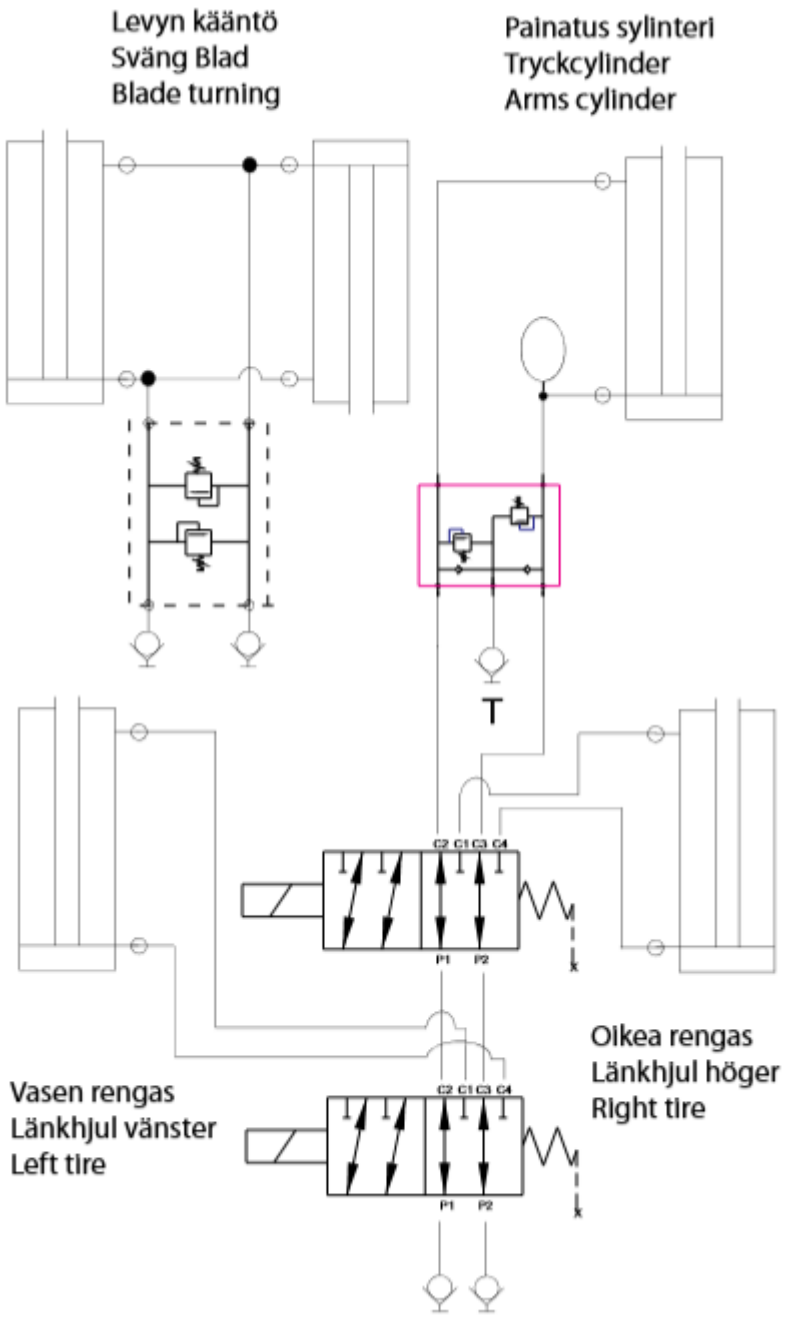


Chart 1. 5-hose hydraulic system (chart 1), in which it is possible to switch the tank line (T) to a pressure accumulator (A)

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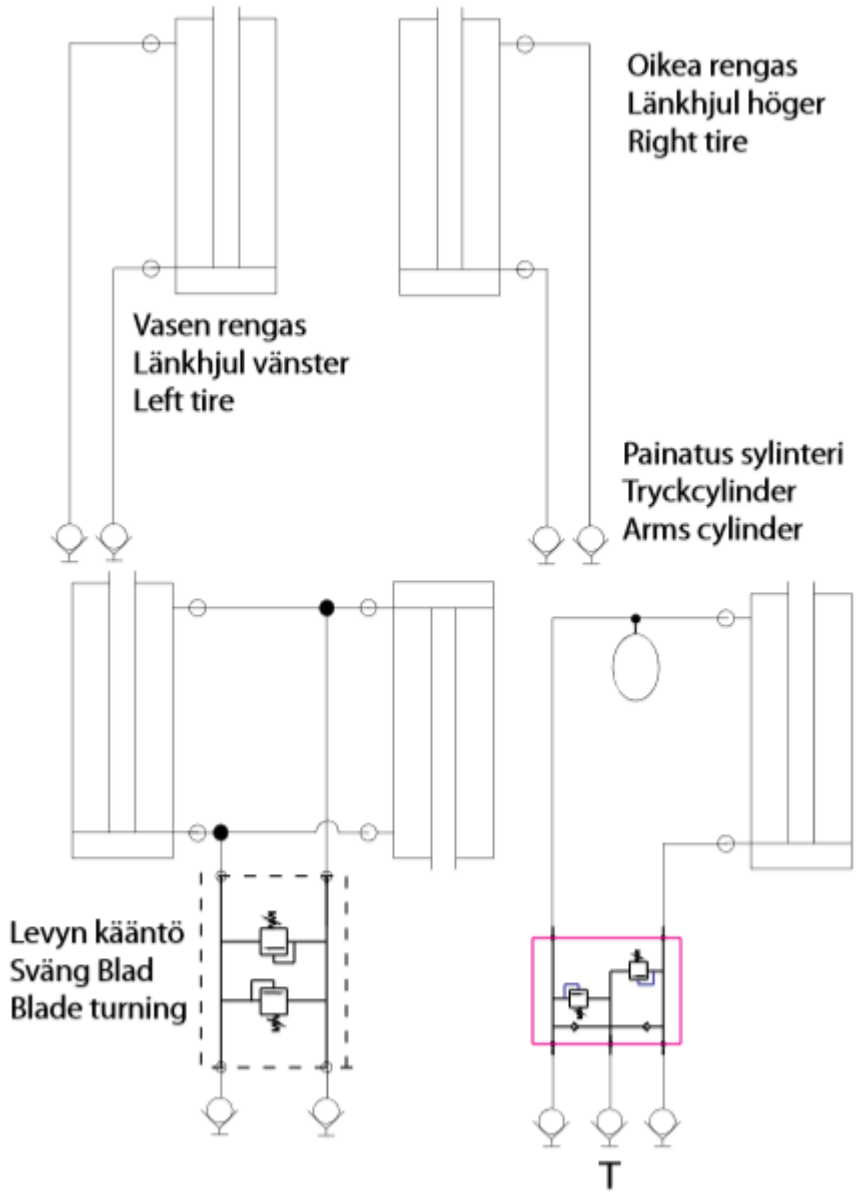


Chart 2. 9-hose hydraulic system

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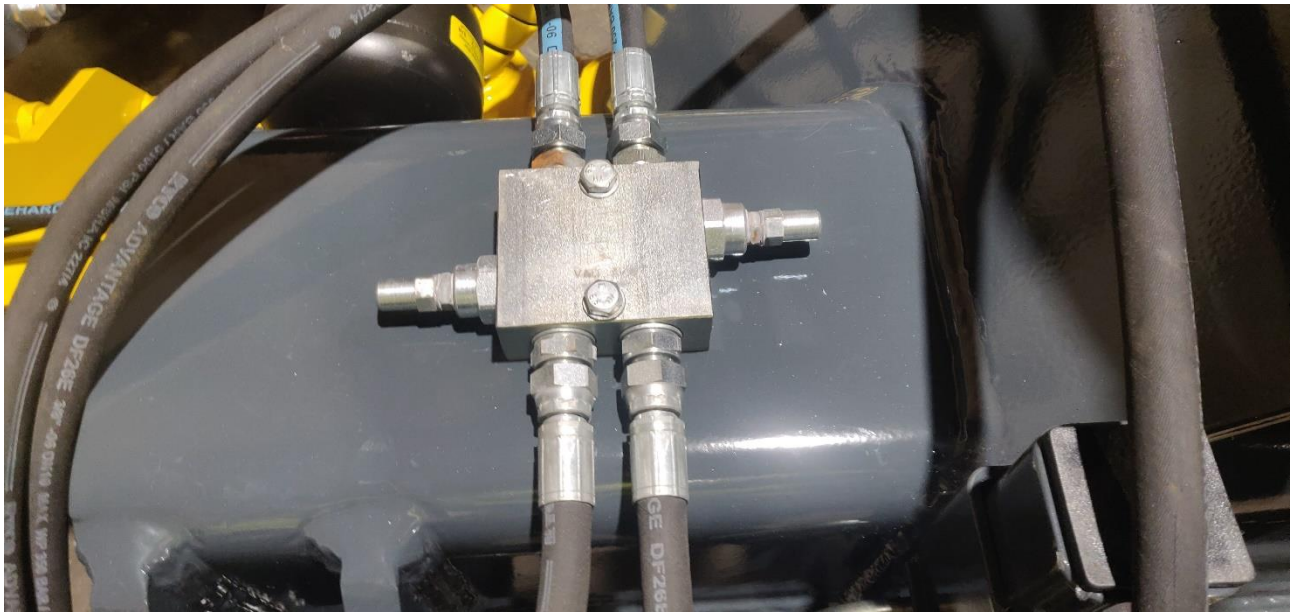
9.1. Relief valve

⚠	Relief valve is a safety device, which is pre-set at the factory. Changes to setting at customer's own risk!

Pressure lever relief valve adjustment is done with flat headed screwdriver. Factory setting 60bar. Turn cylinder relief valve setting is done by removing cover caps, opening locking nut with 13mm spanner, and adjusting the with 5mm hex key. Factory setting150bar. NOTE! Adjust only little, with ¼ round at a time and test function. (pictures 22 and 23).



Picture 22. Pressure lever relief valve.



Picture 23. Turn cylinder relief valve.

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10. WARRANTY POLICY

1. **Warranty coverage**
   Lametal Oy, the manufacturer of STARK attachments, offers new devices a guarantee which covers material and manufacturing defects in accordance with the terms in this warranty policy. Limitations to the warranty are specified in point 7.
2. **Warranty starting date**
   The warranty starts on the agreed date of product delivery to the client, or on the date of approved instalment or on the date the equipment has been taken into operation. The equipment is taken into operation when it has been delivered to the client in accordance with the agreement and the client has acknowledged receipt of the equipment. The client is to check the equipment before use as instructed in this manual and to notify the manufacturer or the reseller of the equipment of any defects or flaws that are noticed during initial inspection. This notification is to be done in writing within eight (8) days after delivery. Hidden defects and defects that are otherwise difficult to detect must be reported immediately after detecting them, within one (1) year after receipt of the equipment at the latest.
3. **Warranty period**
   STARK warranty covers a period of one (1) year. If need be, the client and the manufacturer make separate agreements on warranty concerning repairs and spare parts used in repairs.
4. **Repairs during the warranty period**
   Repairs during the warranty period are carried out free of charge within the normal working hours by the manufacturer repair and maintenance services or by a repair service provider accredited by the manufacturer. If repairs are carried out by a repair service provider which has not been accredited by the manufacturer, the manufacturer does not compensate for costs that are not covered by the warranty, such as travel and waiting hours, daily allowances, travel expenses or costs arising from detaching and reinstalling the equipment. The manufacturer does not compensate for indirect costs caused by repairs during the warranty period, such as lost working hours. Original parts replaced during the warranty period shall remain with the manufacturer. The client must keep the damaged parts for six (6) months unless otherwise agreed, and have them delivered to the manufacturer without delay upon request.
5. **Conditions for repair under warranty**
   Manufacturer's instructions for operation, instalment and maintenance have been followed.
   The equipment was damaged when operated in conditions for which it has been engineered.
   In maintenance and repairs, only original, manufacturer parts have been used.
   The form for the notification of defects provided by the manufacturer or the retailer has been filled in according to the instructions and submitted for processing.
6. **Warranty after repair**
   Warranty holds until the end of the original warranty period. Repair under warranty does not prolong the warranty period.
7. **Limitation to the warranty**
   The warranty does not cover:
   - consequential expenses resulting from the damaged equipment
   - indirect costs, such as loss of working hours
   - damages caused to a third party
   - equipment or components that have been modified or repaired by the client themselves
   - damages caused by normal wear and tear, inappropriate maintenance operations, neglect, accident, connecting error, equipment overloading, user's inexperience or use of other than original parts

   The warranty offered by the manufacturer does not exceed the purchase price of the equipment.
8. **Warranty claim procedure**
   For a warranty claim to be processed, the form for the notification of defects provided by the manufacturer or the retailer must be filled in according to the instructions and submitted for processor. The warranty claim procedure is carried out either in Finnish or English.

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