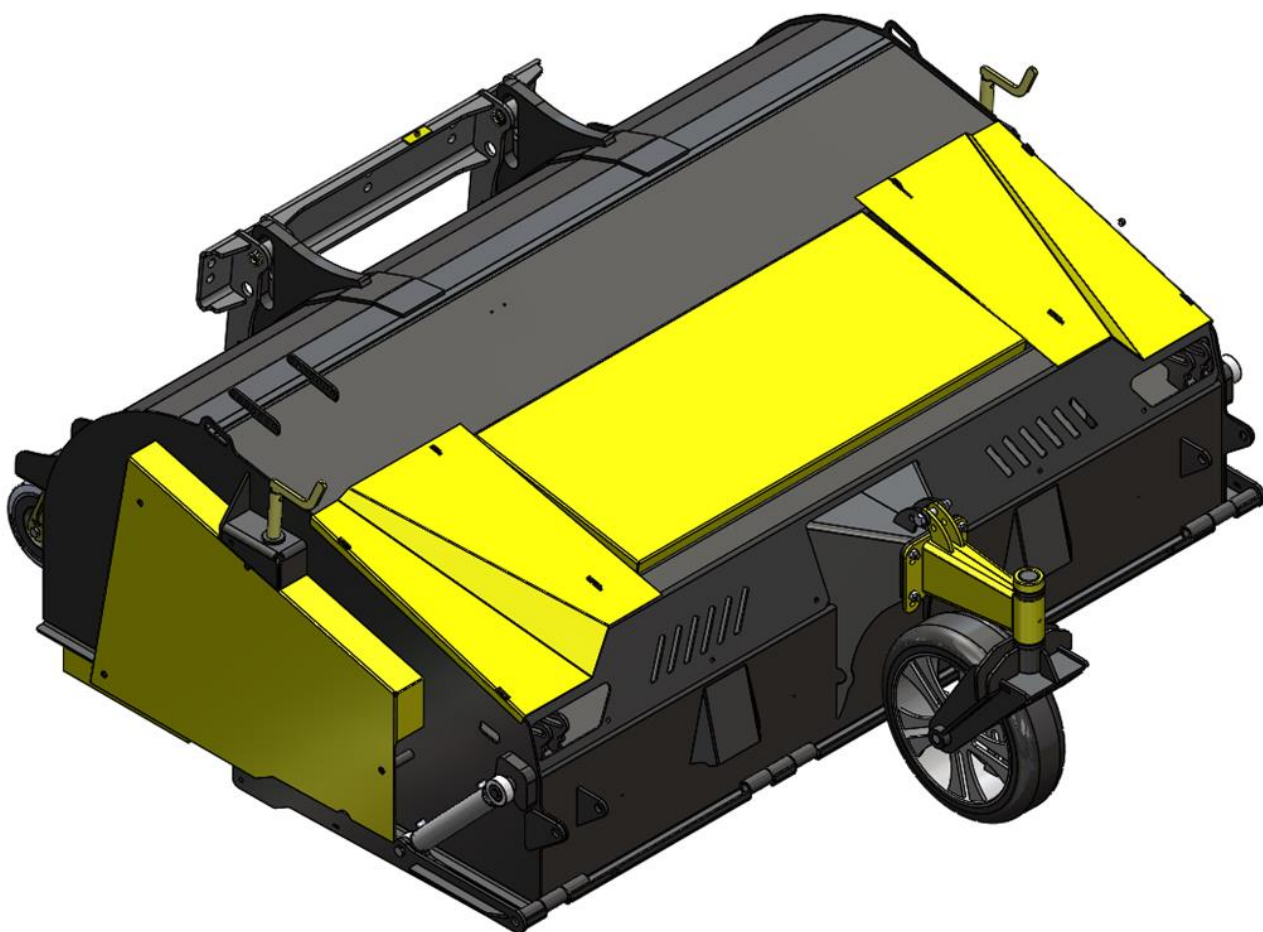




**Original**

# **Operating and maintenance manual**

**Collecting sweeper**



**Lametal Oy** • Kaskenviertäjantie 2, 73100 LAPINLAHTI, FINLAND

• [info@stark.fi](mailto:info@stark.fi) • [parts@stark.fi](mailto:parts@stark.fi) • [www.stark.fi](http://www.stark.fi)

## General

Congratulations on the purchase of your STARK Collecting sweeper!

For us, the long lifecycle and efficiency of your new equipment is a priority. To keep the sweeper 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 bucket sweeper, please contact us by e-mail: [info@stark.fi](mailto:info@stark.fi)

Visit our webpage [www.stark.fi](http://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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# 1. DECLARATION OF CONFORMITY

The original manufacturer's EC declaration of conformity:

Generic product name: Collecting sweeper

Models: KH 1600 T, KH 2000 T, KH 1600 S, KH 2000 S, KH 2500 S

Manufacturer:

Lametal Ltd

Kaskenviertäjäsentie 2 73100 LAPINLAHTI, Finland

tel. +358 17 731 565

Declares that the above-mentioned equipment meets the provisions of Directive 2006/42/EC on machinery and, where applicable, complies 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

Kaskenviertäjäsentie 2

73100 Lapinlahti, FINLAND

## 2. PURPOSE OF USE

Collecting sweepers are used for cleaning streets and yards of different size.

## 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! Rotating rollers!**



**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 section 8.6.
- 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.

## 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 collecting sweeper:

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 collecting sweeper and comply with the warranty policy. To facilitate the supply of spare parts, always inform the manufacturer/dealer of the model and serial number of the collecting sweeper (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 dealer.

Contact information for STARK maintenance services:

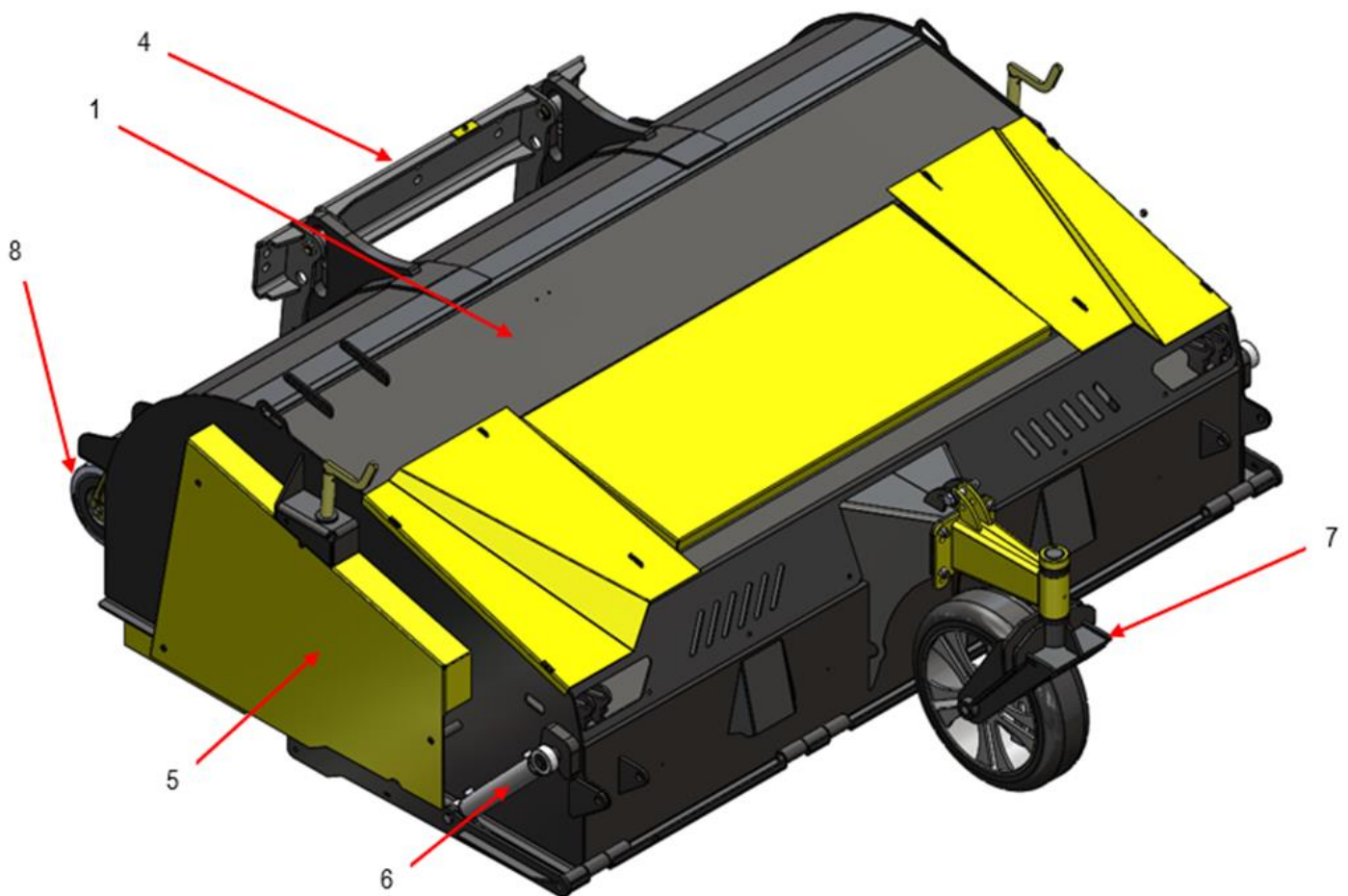
tel. +358 (0)17 731 565, e-mail [info@stark.fi](mailto:info@stark.fi)

tel. +358 (0)44 758 6221, e-mail [parts@stark.fi](mailto:parts@stark.fi)



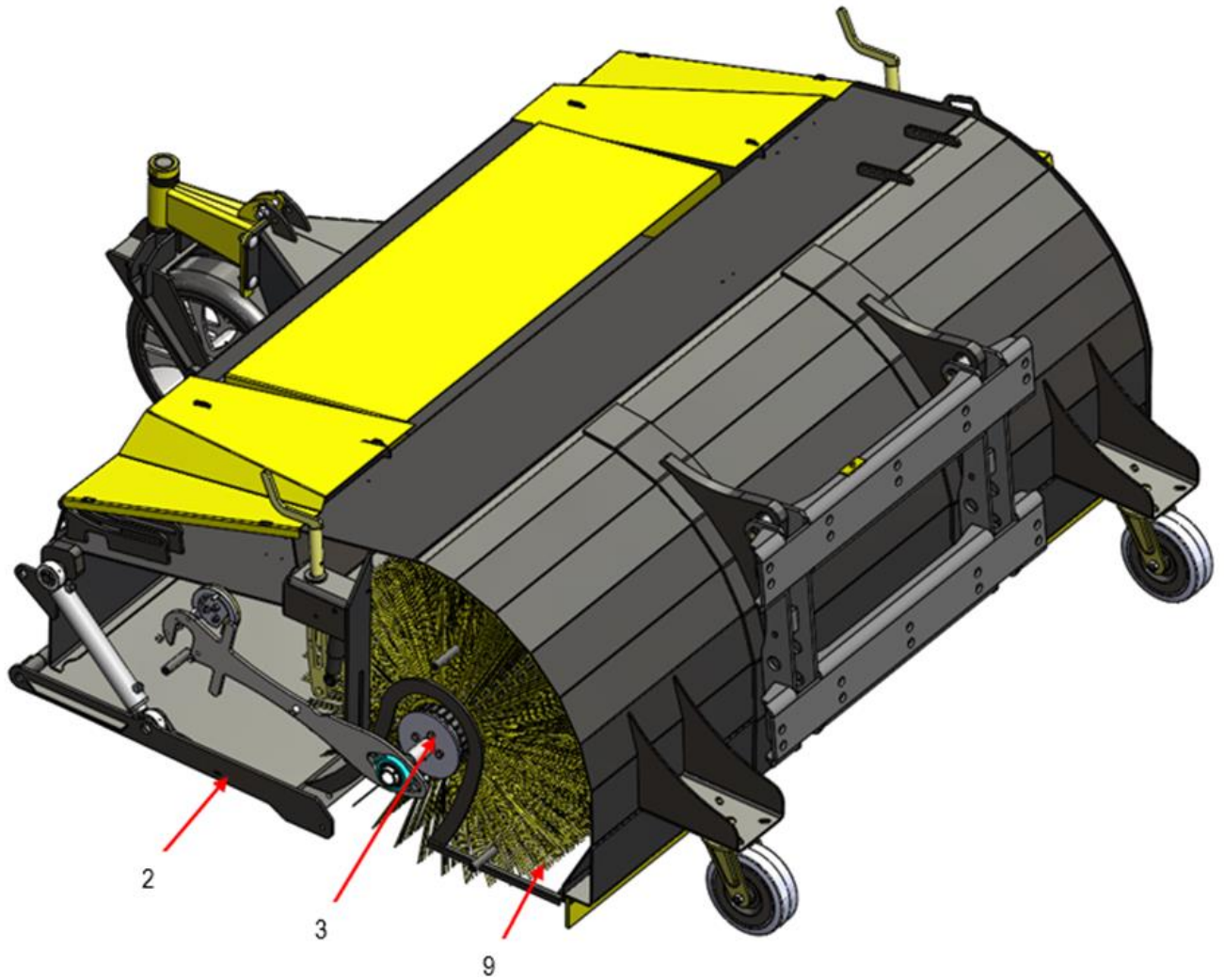
## 5. MAIN PARTS OF THE COLLECTING SWEEPER

- 1) Frame of the collecting sweeper
- 2) Bottom plate
- 3) Broom roller
- 4) Floating beam
- 5) Protective case
- 6) Hydraulic cylinder
- 7) Front support wheel
- 8) Back support wheel
- 9) Brush lamellas



Picture 2. Main parts of the sweeper





Picture 3. Main parts of the sweeper

## 6. ATTACHING THE COLLECTING SWEEPER

When attaching the collecting sweeper 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 collecting sweeper to a new base machine.

### 6.1. Attaching the collecting sweeper to a base machine

The collecting sweeper is attached to the base machine by bolt-on STARK FIT quick hitches which in turn are attached to the floating frame. The machine is connected to a 2- or 4-hose hydraulic system (hydraulic circuit diagrams are shown in section 9 in this manual). Ask your dealer for available STARK FIT quick hitches.

**Before using the collecting sweeper, MAKE SURE** all locking cotters are secured and intact.

When coupling the collecting sweeper 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. The bucket sweeper 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. Apply parking brake.
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. Test the base machine and the loader by doing all movements to the end in order to make sure that the sweeper won't collide with the base machine. Check also the space needed for hydraulic hoses and connectors. Check that the brush roll rotates in the direction of the sweeper. If not, switch hose locations in the base machine.
6. The rotating speed of the brush roller can be adjusted by the flow control valve. Usually, appropriate speed is set by using positions 2-10. If the base machine has a flow control feature, turn the flow control valve to position 10.
7. During the first hours of operating the attachment, bolts, nuts and connectors might loosen up. **Retighten them** after the first day of operating the attachment.

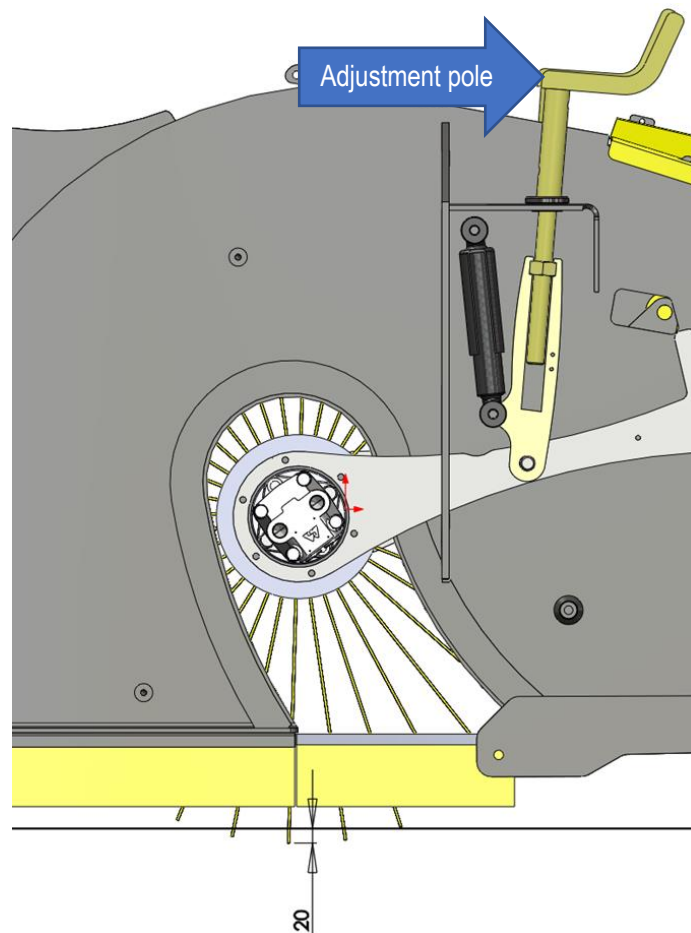
## 7. OPERATING THE COLLECTING SWEEPER

Before using the collecting sweeper, make sure:

- the sweeper is installed correctly
- all locking pins are in place
- hydraulic hoses are installed correctly
- hoses are intact
- there are no oil leaks
- all functions are working properly
- that you have learnt to operate the collecting sweeper in a closed area before actually starting to use it

### 7.1. Operating manual

1. Make sure that the attachment and the base machine are compatible in terms of mechanical solutions, hydraulics and electricity.
2. The collecting sweeper is attached to the coupler on the base machine (e.g. a loader). Attach the sweeper to the base machine, and make sure the locking cotters and pins 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.. Make sure that the hydraulic hoses and connectors have enough space.
6. Check that the brush roll rotates in the direction of the case and the side brushes (if used) rotate towards the device. If not, switch hose locations in the base machine.
7. Broom roller's rotational speed can be adjusted by a flow control valve. Usually, appropriate speed is set by using positions 2-10. If the base machine has a flow control feature, turn the flow control valve to position 10.
8. Adjust driving speed, engine's revolution speed and rotational speed of the broom roller to fit your working area.
9. Use the adjustment pole to set the brush at the appropriate height from the ground . In the appropriate height, the brush rings are pressed approx. 20mm against the ground.
10. When possible keep the floatation in the centre so that the sweeper rests on its support wheels, following slantings and other shapes on the road more closely. Do not lift or press the sweeper against the ground with a lifting device.
11. Stay alert for any unusual behavior and oil leaks also during driving.



Picture 4. Optimal height of the broom roller from the ground

## 7.2. Adjusting the height of the broom roller

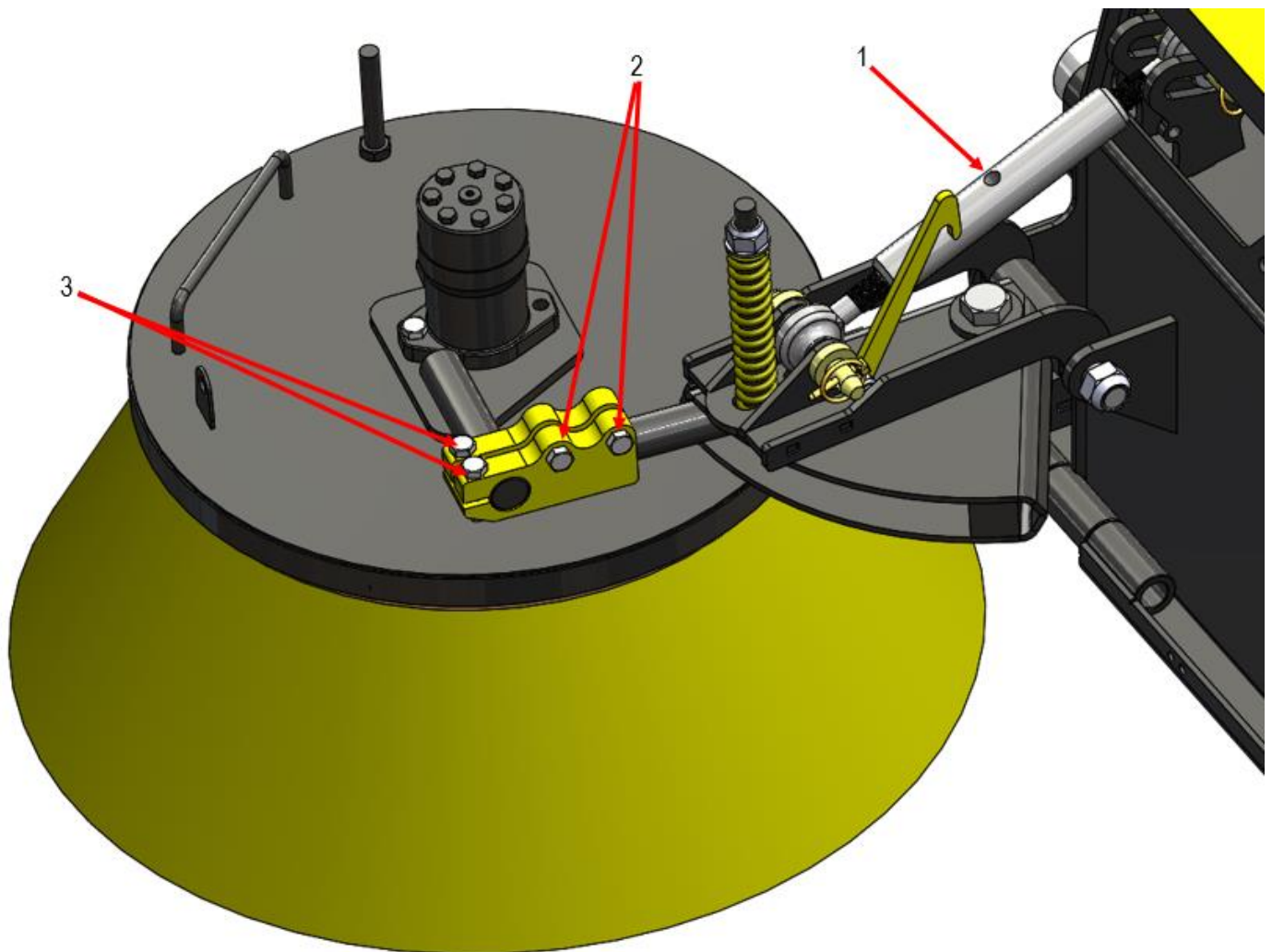
The broom roller height is set by adjustment poles located at both ends of the sweeper (picture 4). When you adjust the height, do it on both sides in equal measure. Otherwise the broom roller will be tilted, and the brush rings will wear unevenly. In the optimal height, the brush rings are pressed approx. 20mm against the ground.

### 7.3. Adjusting the side brushes

Side brushes are available as an accessory for both sides of the collecting sweeper. For the best possible operating efficiency, adjust the side brush so that it will tilt to the front and to the outer side. (Picture 5)

#### Adjusting the side brush:

1. Adjusting the height and wear of the side brush: rotate the push arm
2. Tilting the brush to the side: Loosen the bolts, tilt the brush to the desired position, tighten the bolts
3. Tilting the brush to the front / back: Loosen the bolts, tilt the brush to the desired position, tighten the bolts



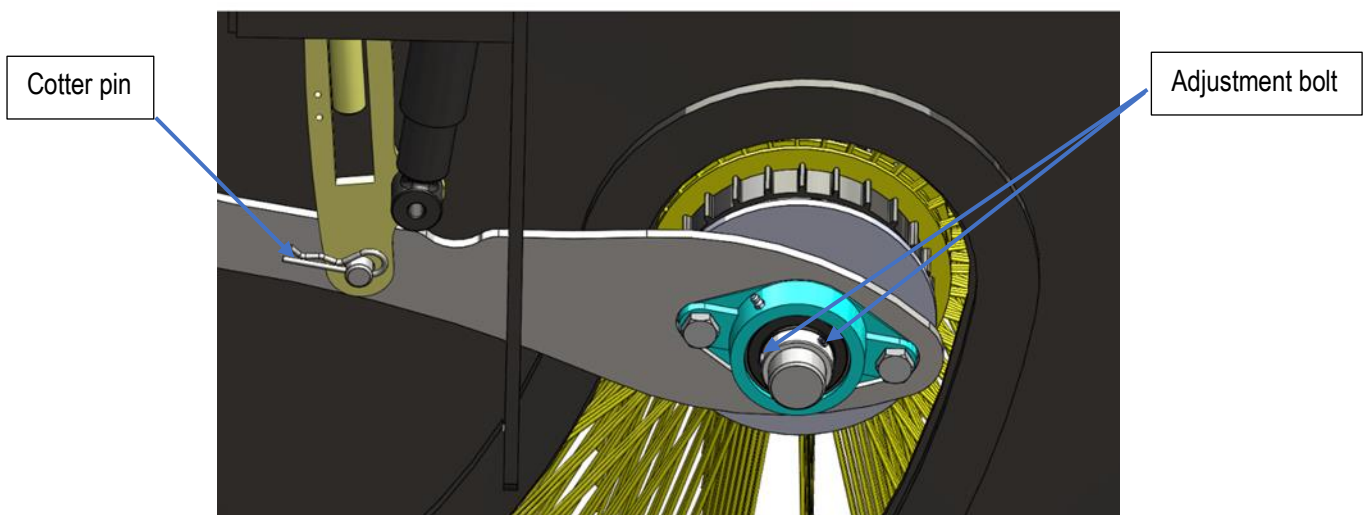
Picture 5. Adjusting the sidebrush



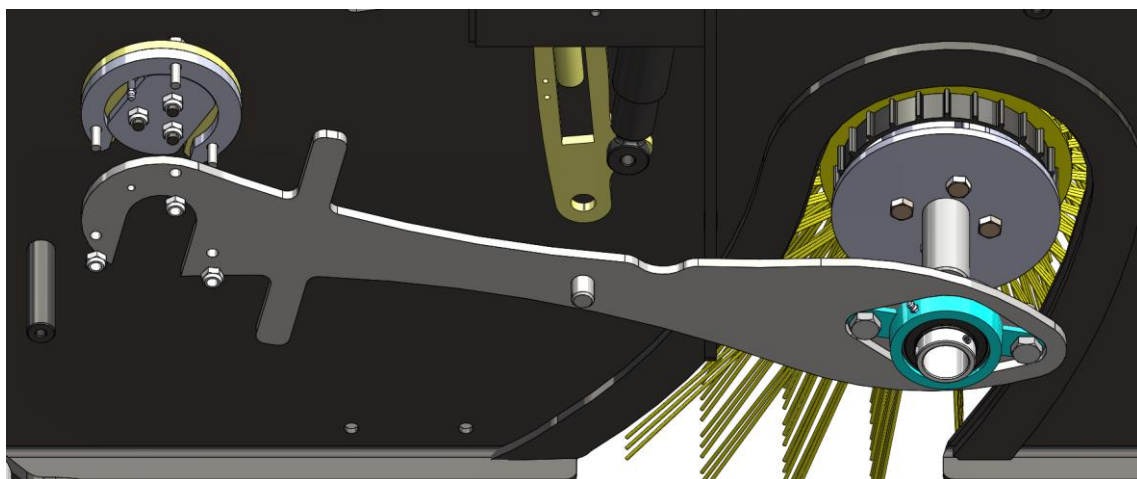
## 7.4. Replacing the brush rings

Clean the device inside the casing carefully..

- 1) Open protective cases from both sides.
- 2) Detach the hydraulic hoses located inside the protective case (mark the hoses to make it easier to reattach them). Protect the exposed hydraulic connectors with plugs.
- 3) Loosen the adjustment bolts in the bearing unit. Detach the cotter pin from the bottom of the adjustment pole and remove the adjustment pole. The bearing unit does not need to be removed from the support plate. (Picture 6)
- 4) Support the left side of the broom roller before detaching the right side. Detach the three M12 bolts from the bearing unit's support plate and remove the lift arm. (Picture 7)
- 5) Remove M8 bolts from the engine's support plate on the right side (picture 8). After this the broom roller is detached from the frame.
- 6) Remove the brush rings. Pay attention to the order in which they were installed, since every other ring needs to be turned 180 degrees.
- 7) The first six brush rings, located next to the engine case, cannot be turned, so the six brush rings near the engine are all installed without turning them.
- 8) When brush rings are changed, reassemble the roller broom in reverse order. Remember to keep the hydraulic connectors clean. In order to prevent jamming, it is advised to add e.g. copper paste between the bearing and the roller axle.

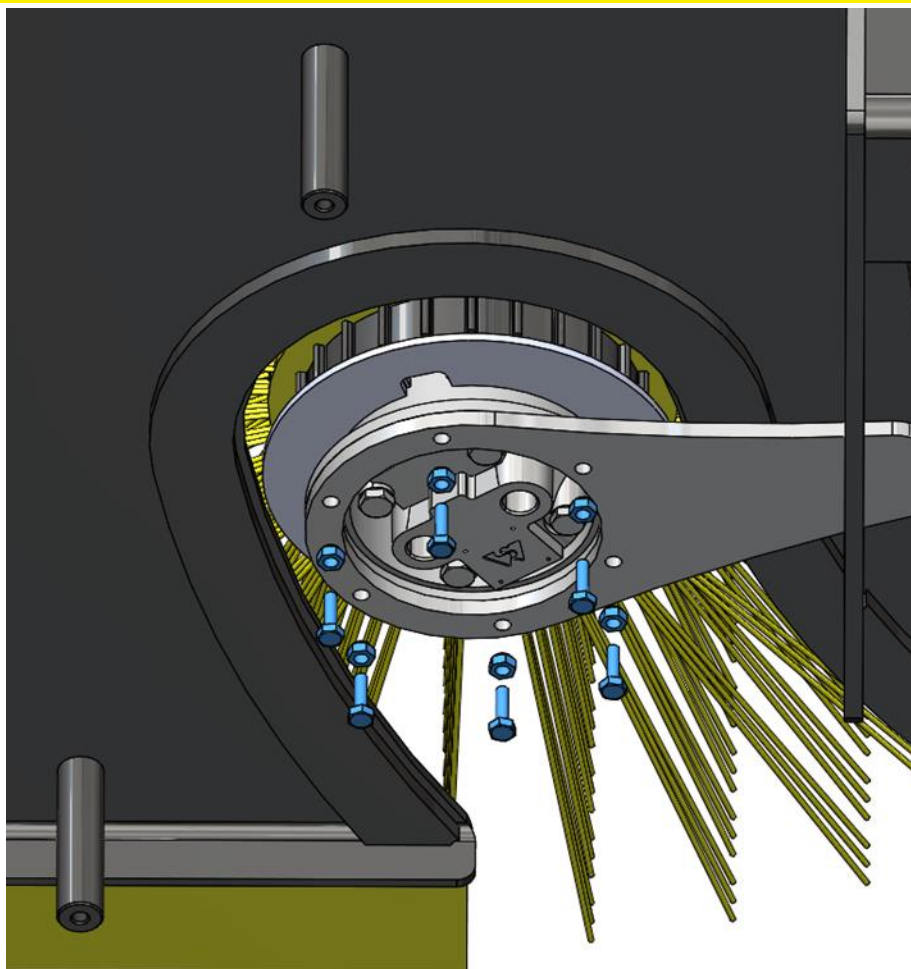


Picture 6. Bearing unit and cotter pin



Picture 7. Detaching the bearing unit's support plate

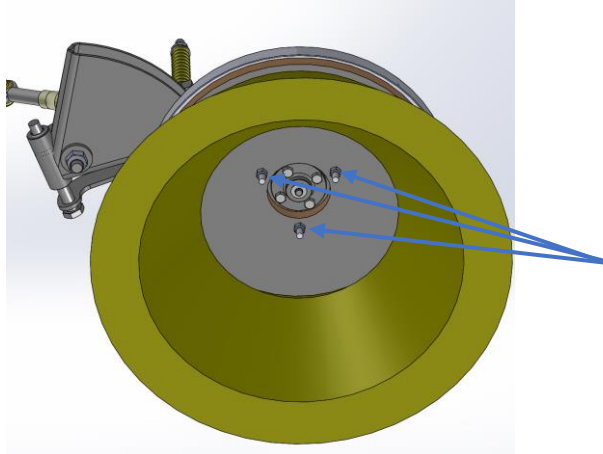




Picture 8. Bolts of the engine's support plate

### 7.5. Replacing the side brushes

Remove the nuts at the bottom of the side brush (picture 9) and detach the brush. Attach a new brush.



Picture 9. Nuts of the side brush

### 7.6. Transferring the collecting sweeper

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

### 7.7. Detaching the collecting sweeper

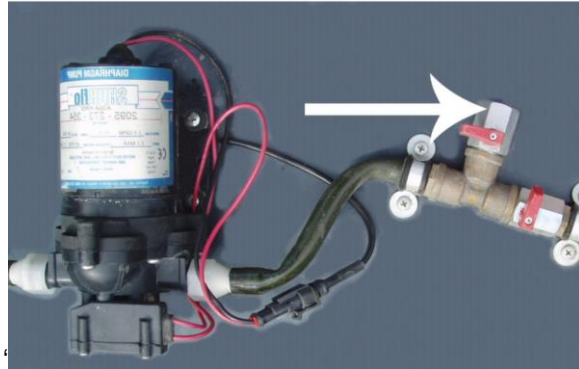
1. Lower the collecting sweeper to an even ground. Lift the broom roller so that the brush rings are not pressed against the ground.
2. Turn off the base machine, put on the parking brake and release pressure from the system.
3. Detach the hydraulic hoses and protect the couplings with plugs.
4. Open the mechanical lock and detach the sweeper.
5. If the sweeper is not used for a long period of time, it needs to be cleaned and lubricated properly before storage. Make sure there is no water in the container or hoses. Store the equipment indoors, if possible.

## 7.8. Irrigation system

Collecting sweeper can be upgraded with an irrigation system. The container size in the irrigation system can be either 155 l or 255 l. The irrigation system suppresses dusting, improves the cleaning result, greases the brushes and reduces wearing. To improve dust suppression, detergent can be added to water. After operating, the containers can be emptied by turning the tap next to the pump (picture 10).

Empty the water containers if the irrigation system is not likely to be used in the near future.

**Only fresh water can be used in the irrigation system! Using salt water is strictly prohibited!**



Picture 10. Water pump and tap

## 7.9. Accessories for the collecting sweeper

- Wired controller + wires 12/24 V
- Right side brush, different versions for S- and T-models (includes a flow control valve)
- Left side brush, different versions for S- and T-models (includes a flow control valve)
- Hydraulic lift for the side brush

### Dust binding

- Low-pressure irrigation system 155L - 255L, 12V – 24V
- High-pressure irrigation system
- Side brush irrigation system
- Side brush high-pressure pipeline
- Extra nozzle for the high-pressure pipeline

## **8. MAINTENANCE OF THE COLLECTING SWEEPER**

### **8.1. General safety precautions for the use and maintenance**

- Comply with the 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, including 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 daily:

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

### **8.4. Maintenance after first 10 hours of operation**

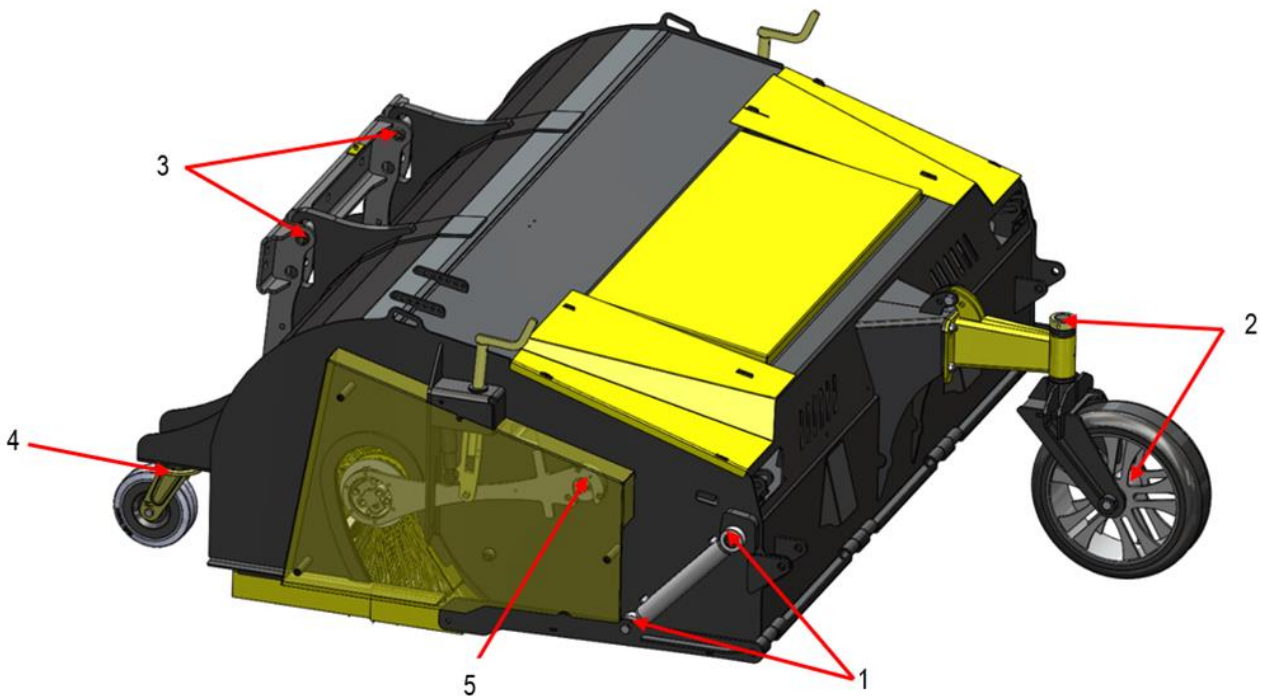
- Lubrication, recommended quality NLGI-2 grade grease or equivalent, as instructed in section 8.6
- Check the bolts for the tightness (table 1)

## 8.5. Maintenance at 50-working hour intervals or on a weekly basis

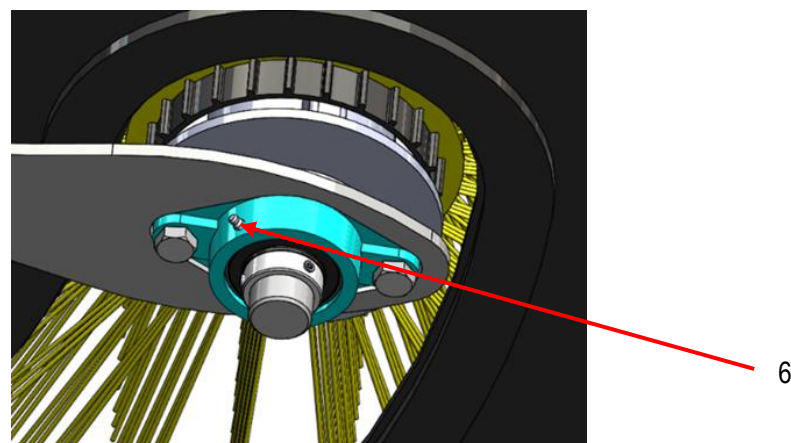
- Lubricate, preferably with a NLGI-2 grease or equivalent, as instructed in section 8.6
- Check the mechanical condition of the device for bends, distortions or breaches
- Check fastening bolts for tightness (table 1)

## 8.6. Lubrication points

- 1) Grease nipples of the hydraulic cylinder (Both sides of the sweeper)
- 2) Grease nipples of the front support wheel
- 3) Grease nipples of the floatation beam
- 4) Grease nipples of the back-support wheel
- 5) Grease nipples of the engine's support plate (Both sides of the sweeper)
- 6) Grease nipples of the bearing unit



Picture 11. Lubrication points



Picture 12. Grease nipples of the bearing unit

## 9. HYDRAULICS

The collecting sweeper can be connected to a 2-hose or a 4-hose hydraulic system. 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.

The collecting sweeper is attached to the base machine with 2 or 4 hoses. In a 2-hose system (figures 1 and 2), the flow control valve is used to choose whether to rotate the brushes or open/close the bottom plate. In a 4-hose system (figures 3 and 4), both actions can be controlled by the base machine's hydraulics and a separate valve is not needed.

The brush rotation speed is adjusted by the flow control valve. If the base machine has a flow control feature, the control valve in the attachment can be set to position 10.

M1 = Engine of the main brush

M2 and M3 = Engines of the front brushes

P = Pressure hose

T = Tank hose

### 9.1. 2-hose hydraulics

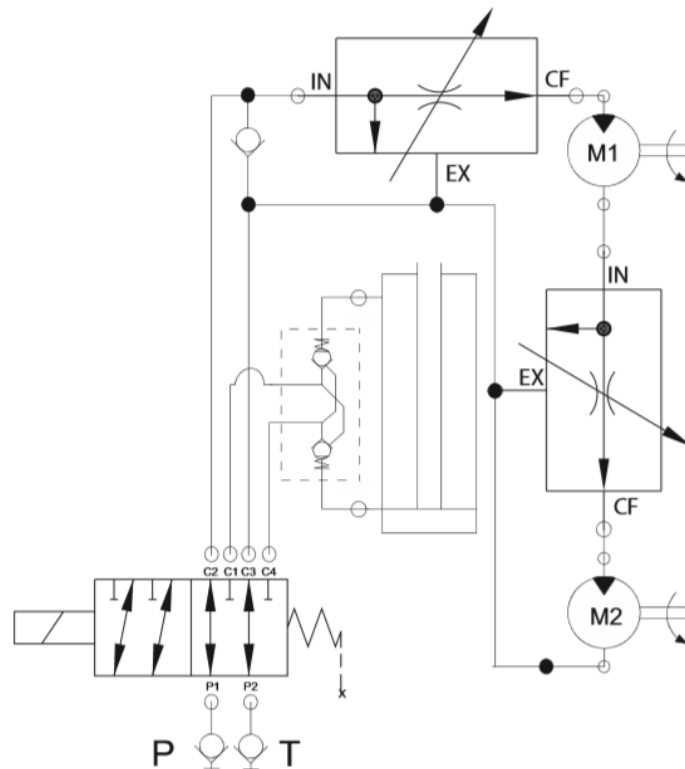


Figure 1. 2-hose hydraulics with one side brush



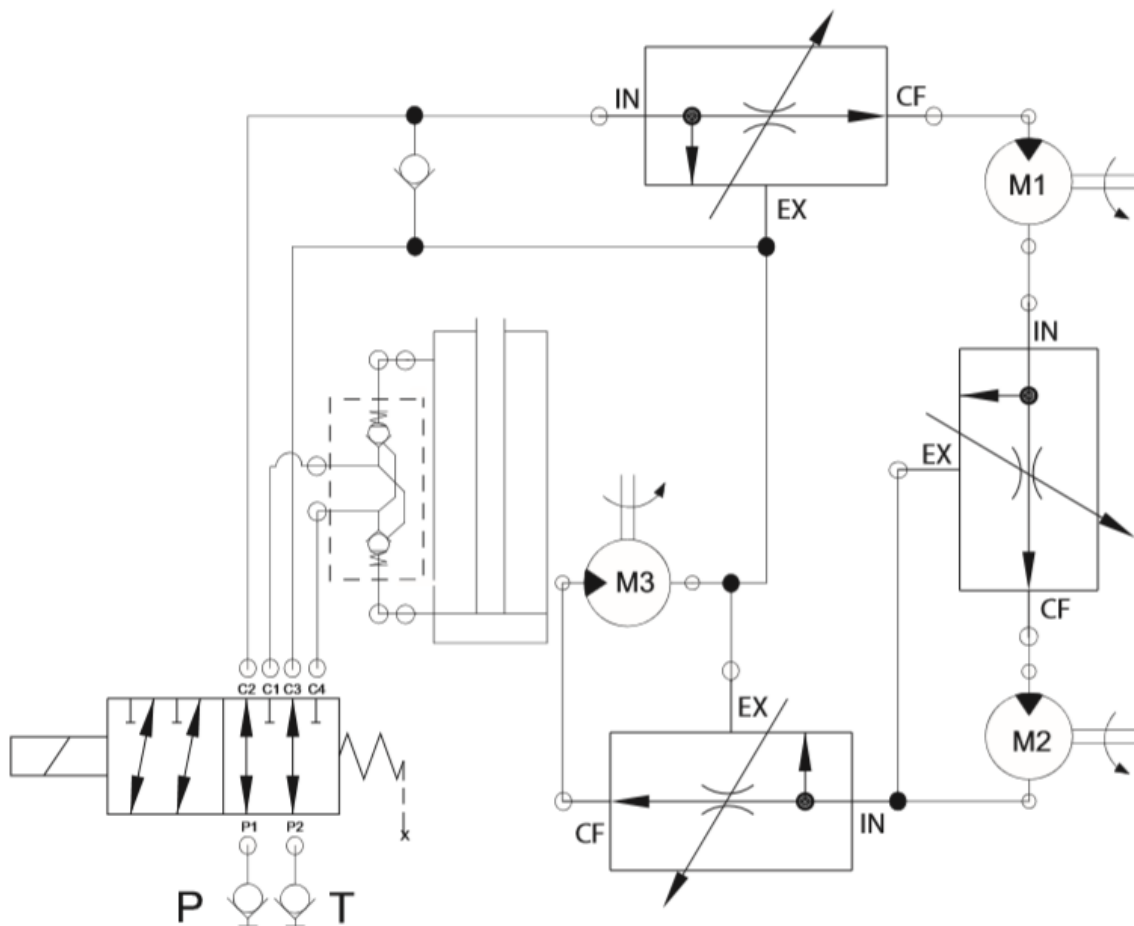


Figure 2. 2-hose hydraulics with two side brushes

**9.2. 4-hose hydraulics**

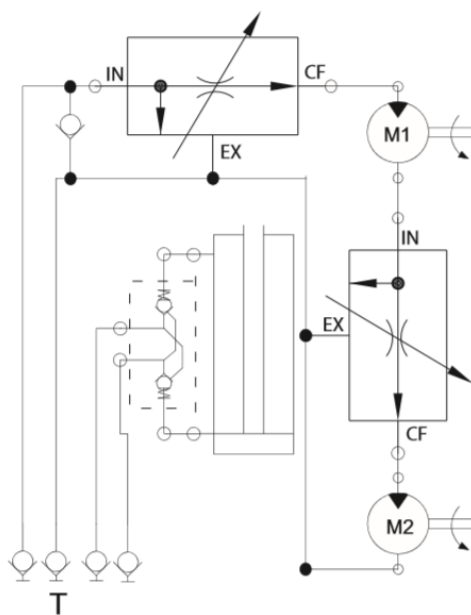


Figure 3. 4-hose hydraulics with one side brush

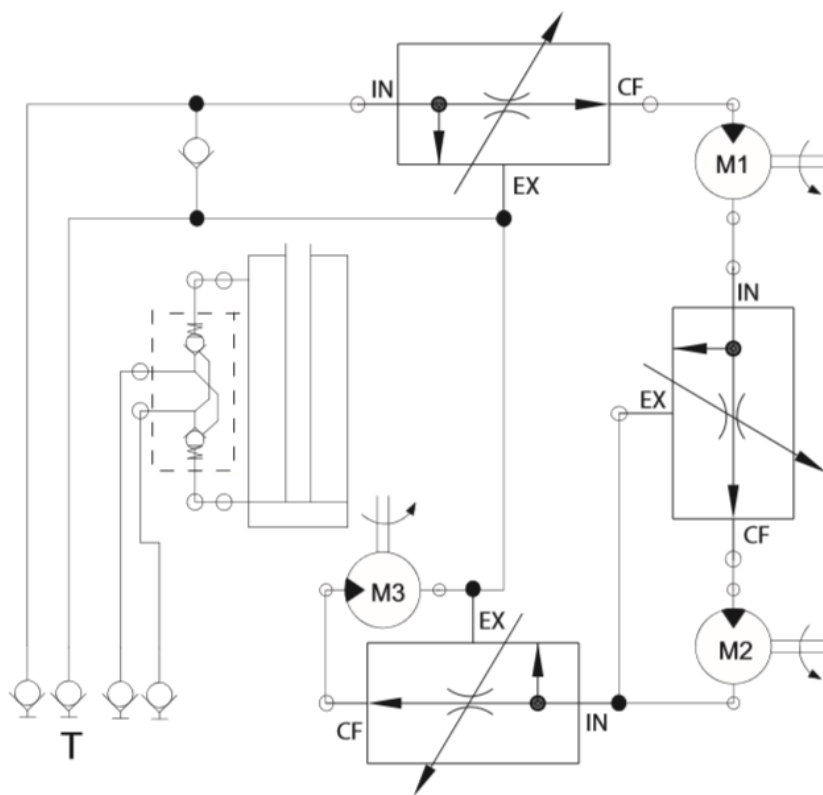


Figure 4. 4-hose hydraulics with two side brushes

## 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 dealer 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 dealer 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 dealer must be filled in according to the instructions and submitted for processor. The warranty claim procedure is carried out either in Finnish or English.