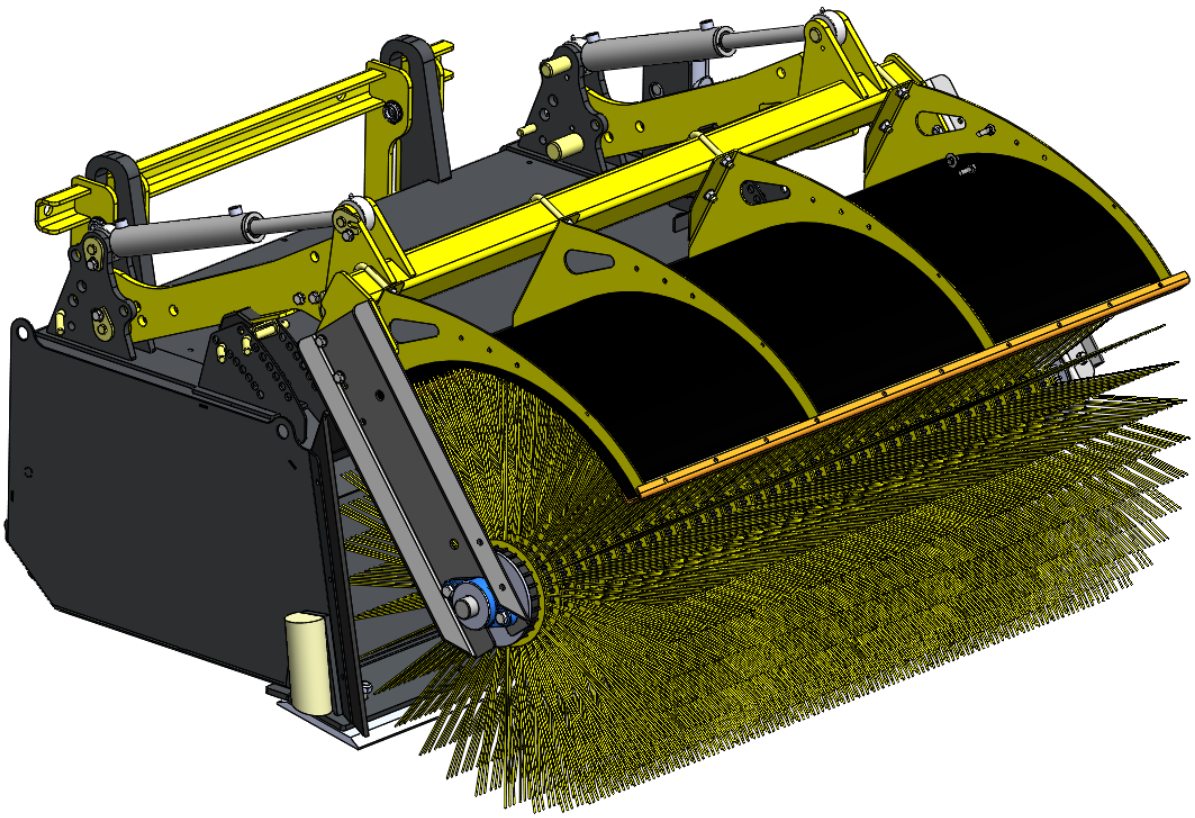
Original

Operating and maintenance manual

Bucket Sweeper (ST-models)



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

General

Congratulations on the purchase of your STARK bucket 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
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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1. DECLARATION OF CONFORMITY

The original manufacturer's EC declaration of conformity:
Generic product name: Bucket sweeper
Models: STARK KAH 1600ST, STARK KAH 1800ST, STARK KAH 2000ST, STARK KAH 2510ST, TOR 1600, TOR 1800, TOR 2200, TOR 2500

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

Bucket sweepers are intended 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 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

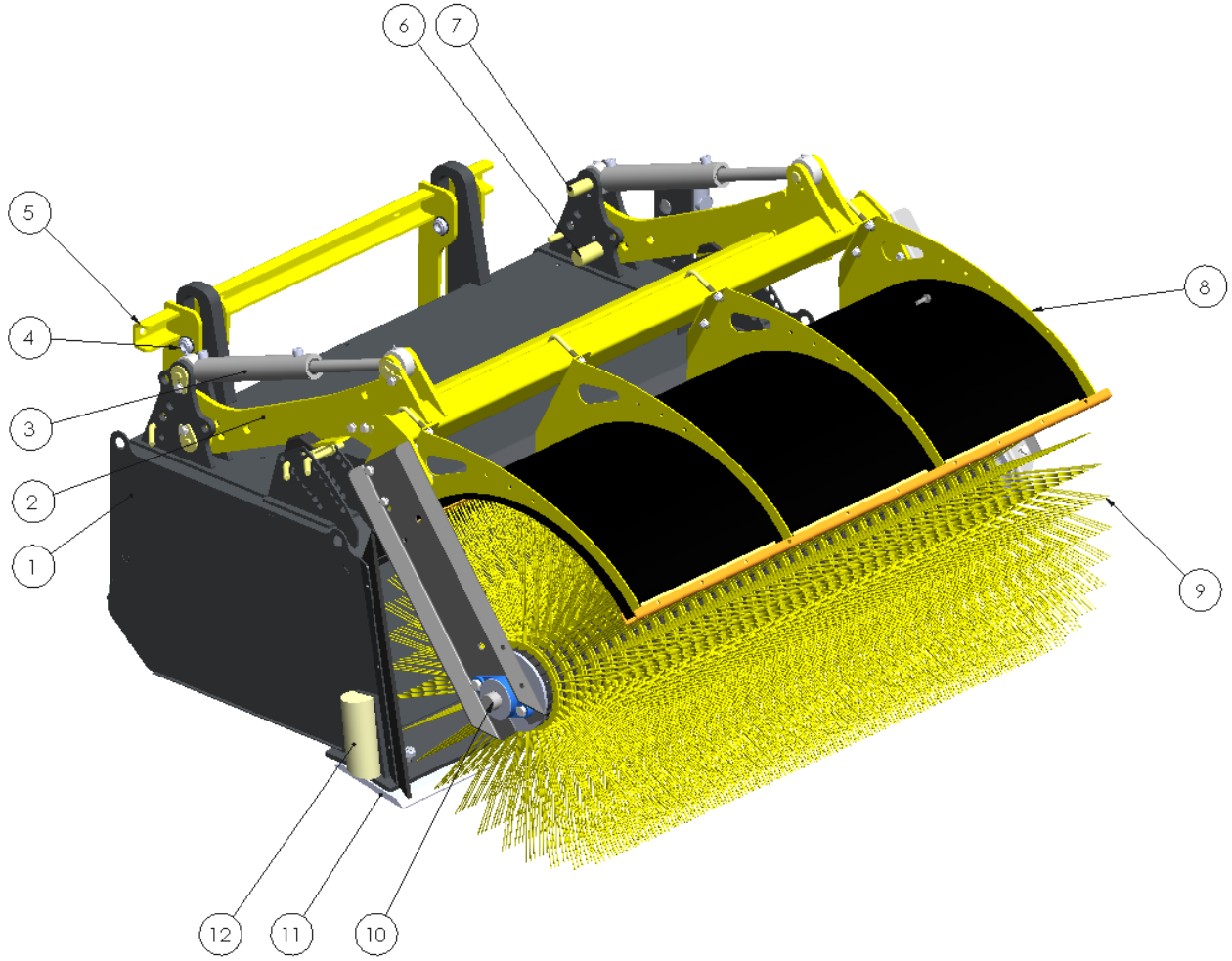
Take down the machine type and the serial number of your bucket sweeper:

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 bucket sweeper 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 bucket 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 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 BUCKET SWEEPER



Picture 1. Main parts of the device

1) Bucket sweeper frame
2) Brush frame arm
3) Brush frame lifting cylinder
4) Floating pin
5) Floating frame
6) Brush frame beam fastening pin
7) Cylinder fastening pin
8) Bolt-on mudguard bracket
9) Brush rings
10) Brush roller
11) Wear blade
12) Edge wear piece

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6. USING THE BUCKET SWEEPER

When attaching the bucket 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 bucket spreader to a new base machine.

6.1. Attaching the bucket sweeper to a base machine

The bucket sweeper is attached to the base machine by bolt-on STARK FIT quick hitcher which in turn are attached to the floating frame. The machine is connected to a hydraulic system. Hydraulic circuit diagrams can be found in a later section in this manual. Ask your retailer for available STARK FIT quick hitches.

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

When coupling the bucket 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. Apply parking brake. 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.

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. Check that the brush roll rotates in the direction of the bucket. If not, switch hoses 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 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 BUCKET SPREADER

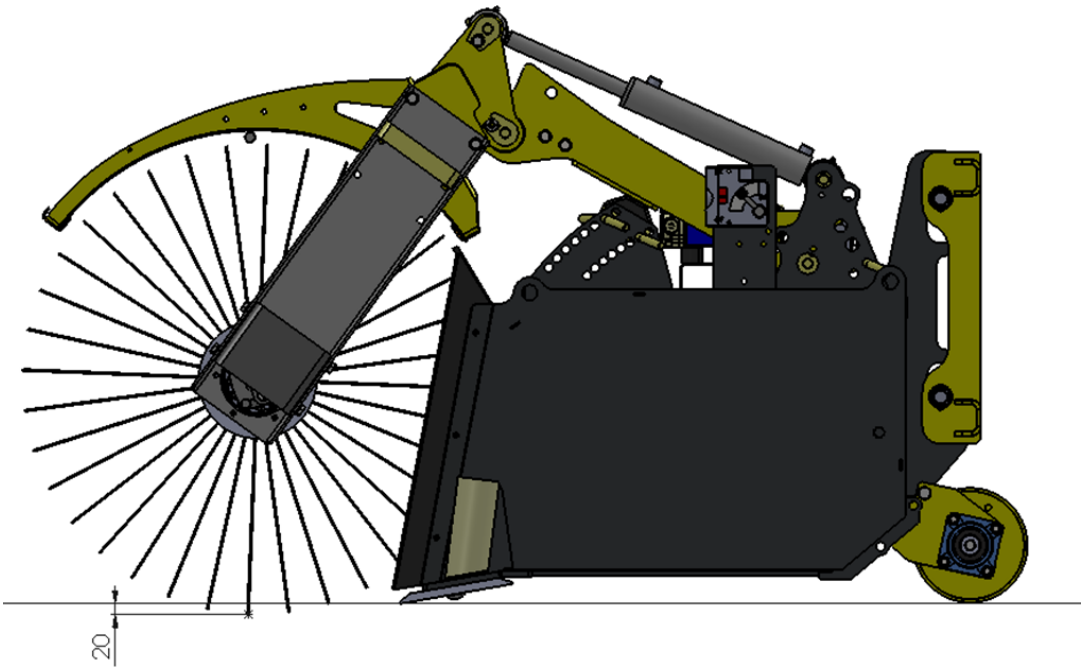
Before using the bucket sweeper, make sure:

- 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 bucket sweeper is connected to the base machine's quick hitching (e.g. front loader). Connect the bucket sweeper to the base machine and make sure the pins are properly locked. Apply the 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 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. Check that the brush roll rotates in the direction of the bucket. If not, switch hoses in the base machine.
6. Make sure that the brush roller's rotation is towards the bucket. If need change the location of the hoses.
7. 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.
8. Adjust the driving speed, motor rotation speed and brush roller rotation speed in accordance to the brushing need. The bush roller rotation speed is adjusted by the flow control valve.
9. Using the control parts, adjust the brush at the appropriate height from the ground. The appropriate height is when brush rings are pressed 20mm to the ground (picture 3).
10. Keep the bucket at the middle position when using Pin Float so that the bucket is on its lip blade and support wheels. This way the bucket will follow bumps and curves of the road. Do not press the bucket with floatation.
11. Stay alert for any abnormal behaviour and oil leaks also during driving.

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Picture 3. Appropriate height of the brush roller

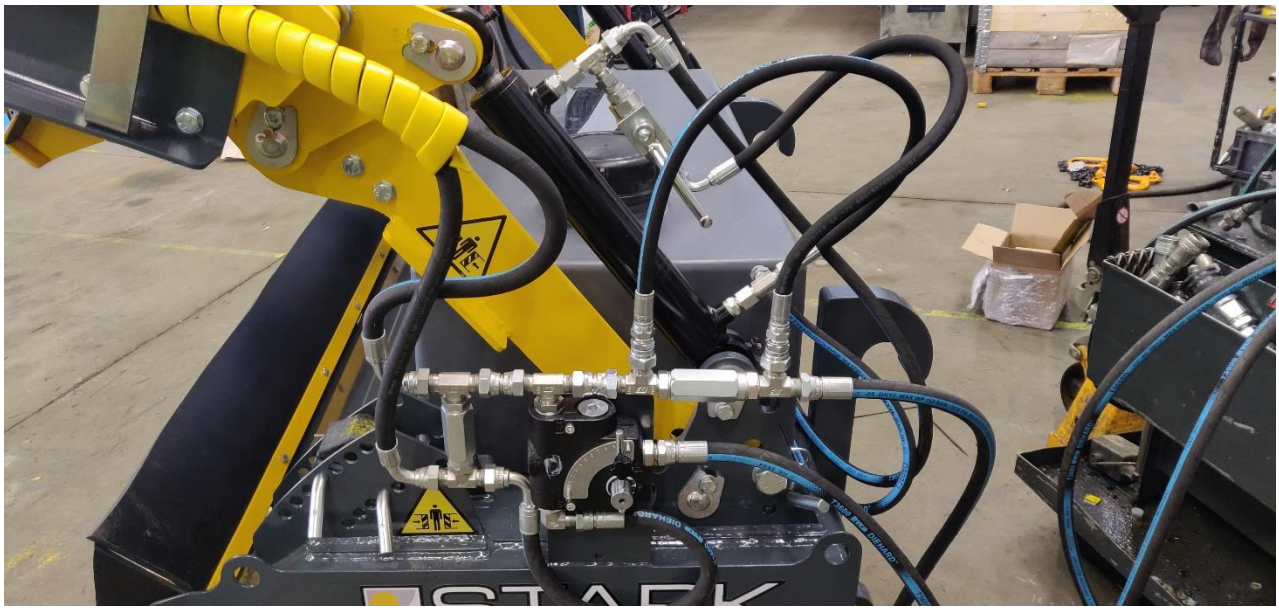
7.2. Adjusting the brush roller height

The height of the brush roller is set by adjusting the height of the rubber-buffed carrier. See below for step-by-step instructions for adjusting the height. (Pictures 4-10)



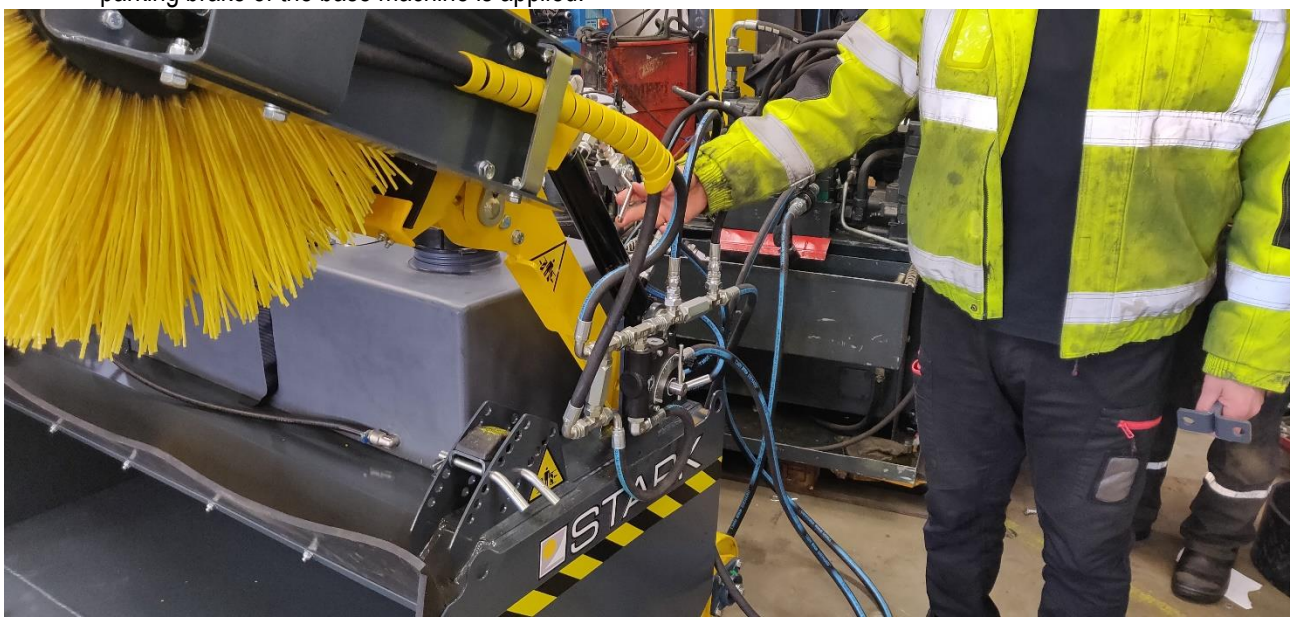
Picture 4. The brush frame beam at the lowest position

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Picture 5. The brush frame arm lifted up

1) Use hydraulics to lift the brush frame arm up, pay attention to the location of the closing valve. Check that the parking brake of the base machine is applied.



Picture 6. Shutting valve for the brush frame lifting cylinder

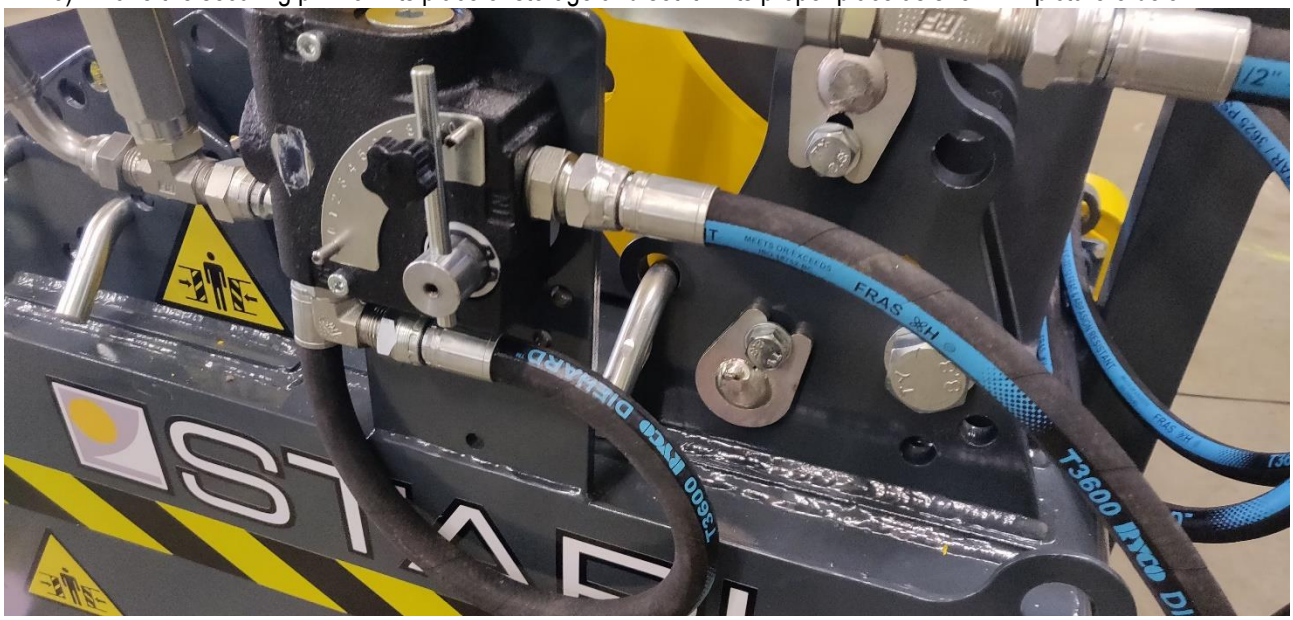
2) Standing on the side of the bucket sweeper, close the lifting cylinder closing valve. Turn off the base machine, and make sure the parking brake is applied.

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Picture 7. Brush frame beam securing pin

3) Take the securing pin from its place of storage and set it in its proper place as shown in picture 8 below.



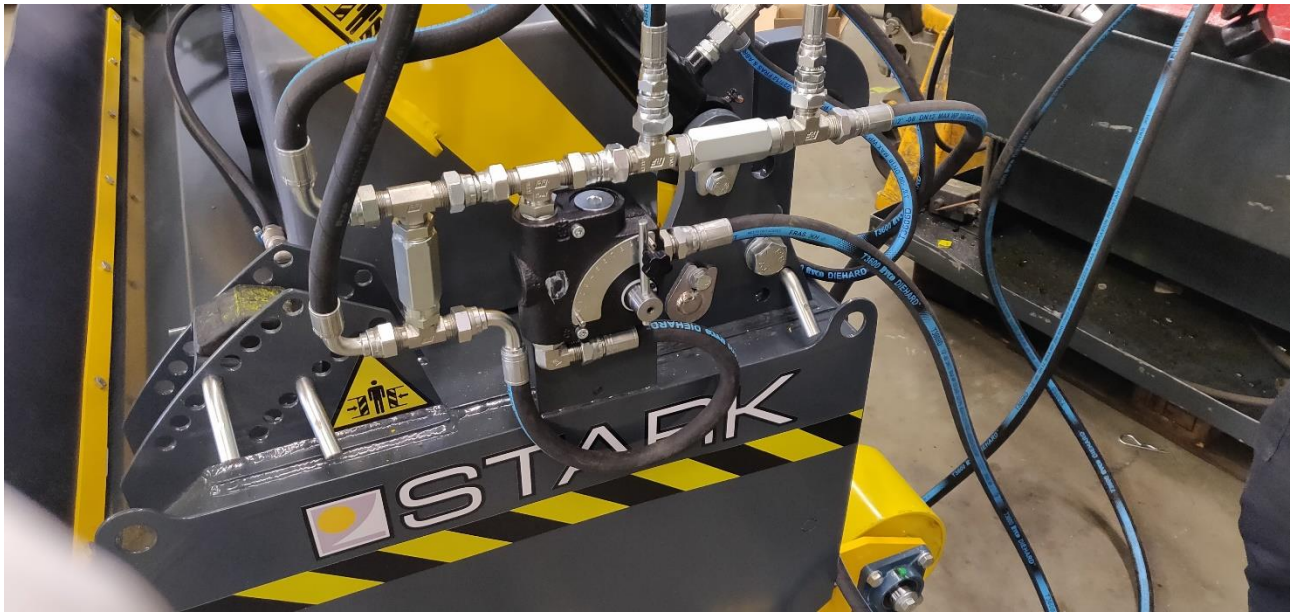
Picture 8. The securing pin in its proper place

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Picture 9. The rubber-buffed carrier for height adjustment

4) Set the height by changing the place of locking pins.



Picture 10. Securing pin in its place of storage

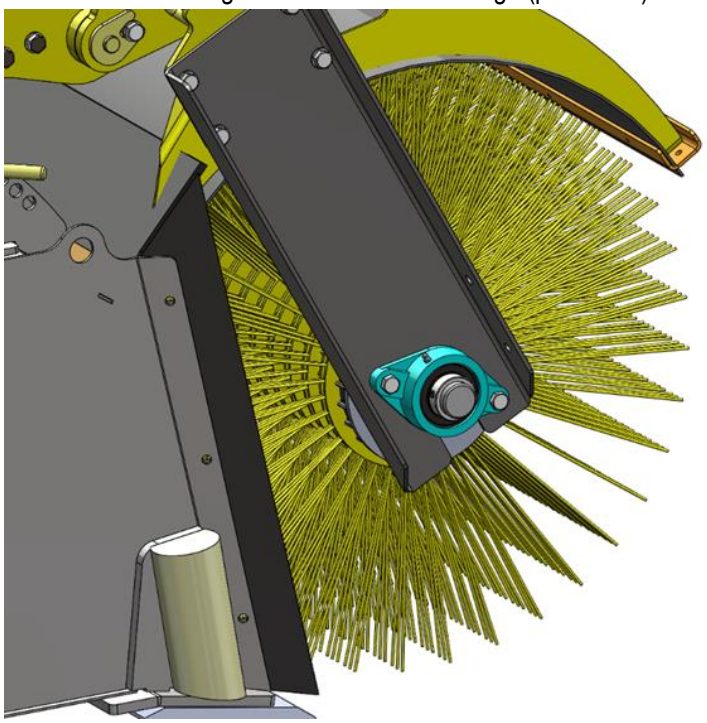
5) Remove the securing pin and put it back to its place of storage as shown in picture 10
6) Switch on the base machine and use hydraulics to lift up the brush frame.
7) Open the cylinder shutting valve. **NOTE**! The brush frame may start going down after opening the valve.

If any maintenance or repair operations need to be carried out inside bucket sweeper, use extra support to make sure that the brush frame stays up during the operation.

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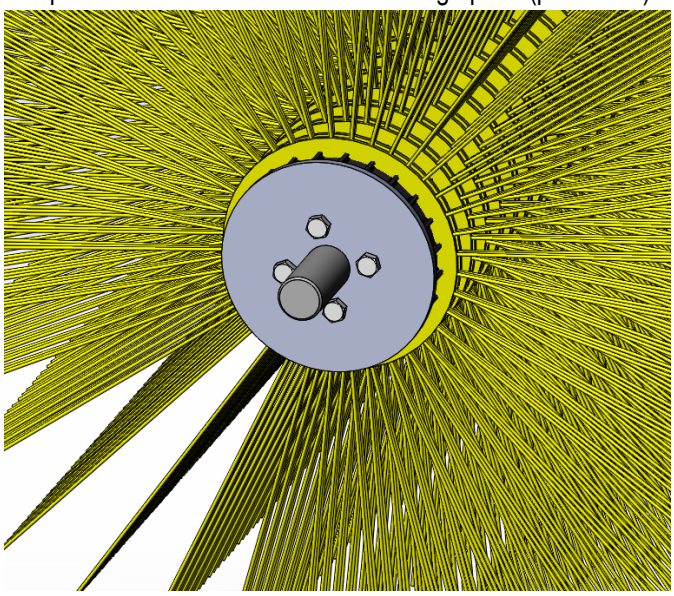
7.3. Changing the brush rings

1. Support the brush roller with two mounting brackets.
2. Detach the bearing and the brush roller flange (picture 11)



Picture 11. Fastening bolts for brush roller bearing

3. Open and remove the brush roller flange plate (picture 12)



Picture 12. Brush roller flange fastening bolts

4. Pull the brush rings out. When moving the mounting brackets, be careful not to put the entire weight of the brush roller on the motor-side.
5. Install new brush rings by working in a reverse order.

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7.4. Transferring the bucket sweeper

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

7.5. Detaching the bucket sweeper from the base machine

1. Lower the bucket sweeper down on an even surface.
2. Turn off the base machine, apply the parking brake and depressurize the system.
3. Detach the hydraulic hoses and protect hose ends with plugs.
4. Unlock the coupling mechanism and detach the device.
5. If the equipment is not likely to be used for a longer period of time, clean it thoroughly after operating and lubricate as instructed. Remove water from containers and hoses. Remove irrigation nozzles and store them inside. If possible, store the whole device indoors.

7.6. Dust control systems

Either a watering system or a dust binding system is available for the bucket sweeper. A low-pressure pump is used for watering and a high-pressure pump for dust binding. The size of the tank is 480 L - CSW 2000 or 600 L CSW 2500. Water reduces sand dusting, improves the cleaning result, lubricates the brushes, and reduces the wear of the brushes. Detergent can be used in water to enhance dust binding. The tanks can be emptied from the tap after use. Empty the water tanks if the irrigation system will not be in use soon.

NOTE!

Use only fresh water in the system!

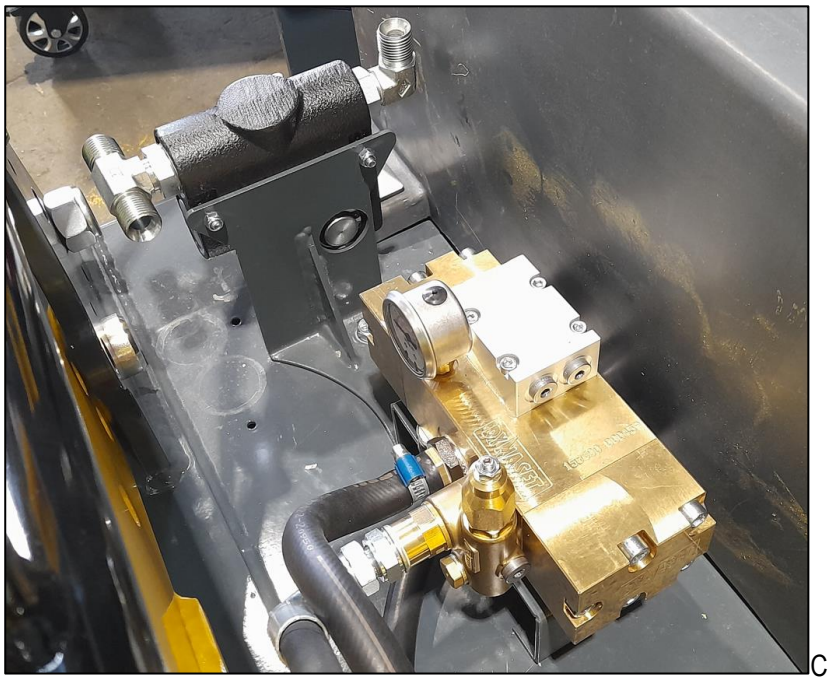
If you store the attachment in freezing temperatures, drive anti-freeze through.

the system by mixing it to the water. Otherwise, the system will get damaged.



7.7. High-Pressure pump

It is possible to add a high-pressure pump to the attachment. Pressure of the pump and the oil flow is adjusted with flow control valve next to the pump. Adjust the pressure of the pump to 60-80 bars.



C

Picture 13. High-pressure pump and flow control valve

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7.8. High-pressure washer

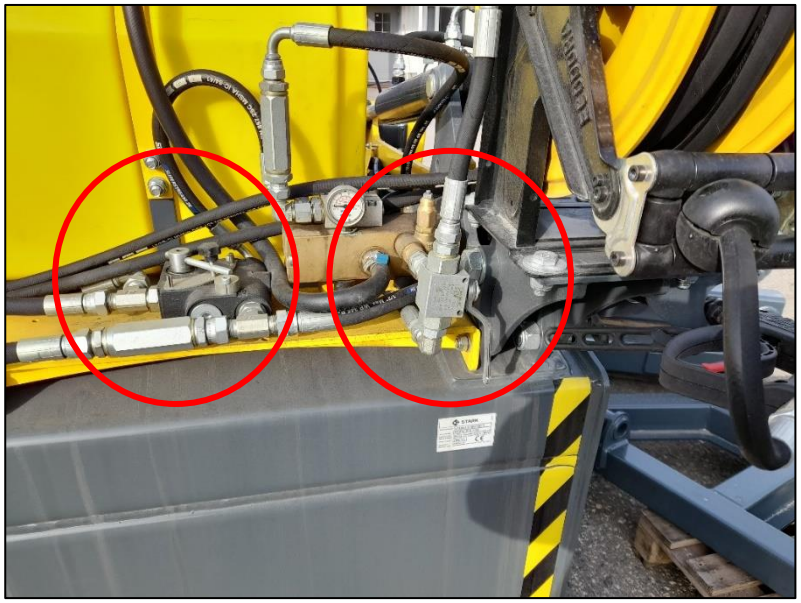
Bucket sweeper is possible to equip with dust binging system and high-pressure washer. When using high-pressure washer, turn the flow of the 3-way tap next to the high-pressure pump to the high-pressure washer. This directs the water from the machines dust binding to the high-pressure washer. If necessary, adjust the water pressure using the pump's flow control valve (picture 13).

Operating the pressure washer:

1. Turn off the base machine.
2. Put on a hand brake.
3. Turn off the hydraulics of the base machine.
4. Turn the main brush flow conrol valve to 0 (Picture 14)
5. Turn the 3-way valve on the pressure washer (picture 15).
6. Turn on the base machine.
7. Turn on the hydraulics of the base machine.
8. Adjust the high-pressure pumps oil flow with the pump's control valve (picture 14). Press the Press the trigger of the pressure washer. At the same time adjust the pressure of the pump. A suitable pressure for the pump is 60-80 bars.



Picture 14. Main brush flow control valve



Picture 15. High-pressure pump, it's control valve and 3-way tap

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8. MAINTENANCE OF THE BUCKET SWEEPER

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

8.4. Maintenance after first 10 hours of operation

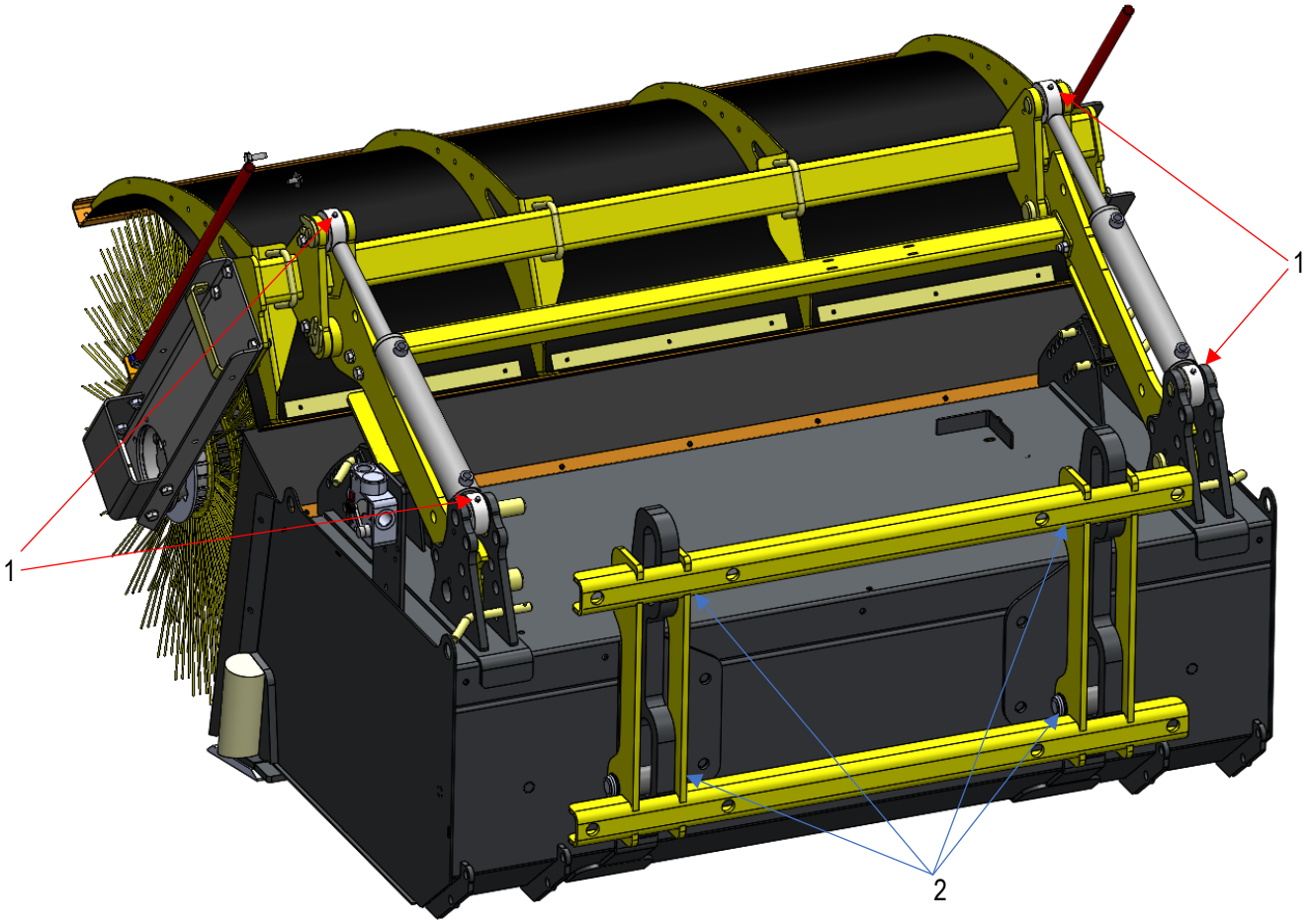
- Lubrication, recommended quality NLGI-2 grade grease or equivalent, shown in the later section
- Check the bolts for the tightness (table 1)

8.5. Maintenance after every 50 workhours or weekly

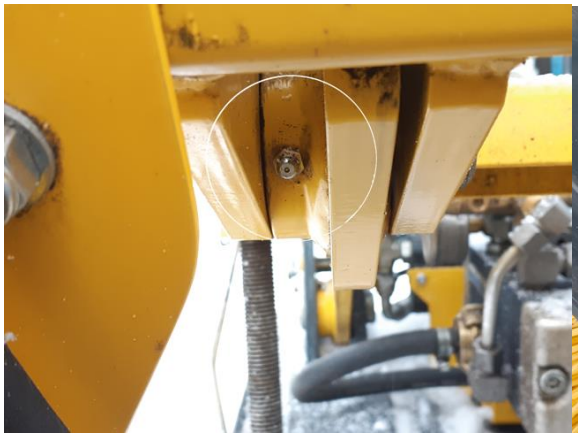
- Lubricate, preferably with a NLGI-2 grease or equivalent (see instructions in later section)
- Check the mechanical condition of the device for bends, distortions or breaches
- Check fastening bolts for tightness (table 1)

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8.6. Lubrication points



Picture 16. Location of grease nipples



Picture 17. Grease nipple for jointed mechanism



Picture 18. Grease nipple for the bearing

1) Grease nipples for the hydraulic cylinders
2) Grease nipples for the floating pins
3) Grease nipple for the bearing
4) Grease nipple for jointed mechanism

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9. HYDRAULICS

The bucket 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.

Max. pressure: 200 bar
Max. oil flow: 100l/min.
Max. return line back pressure 80 bar

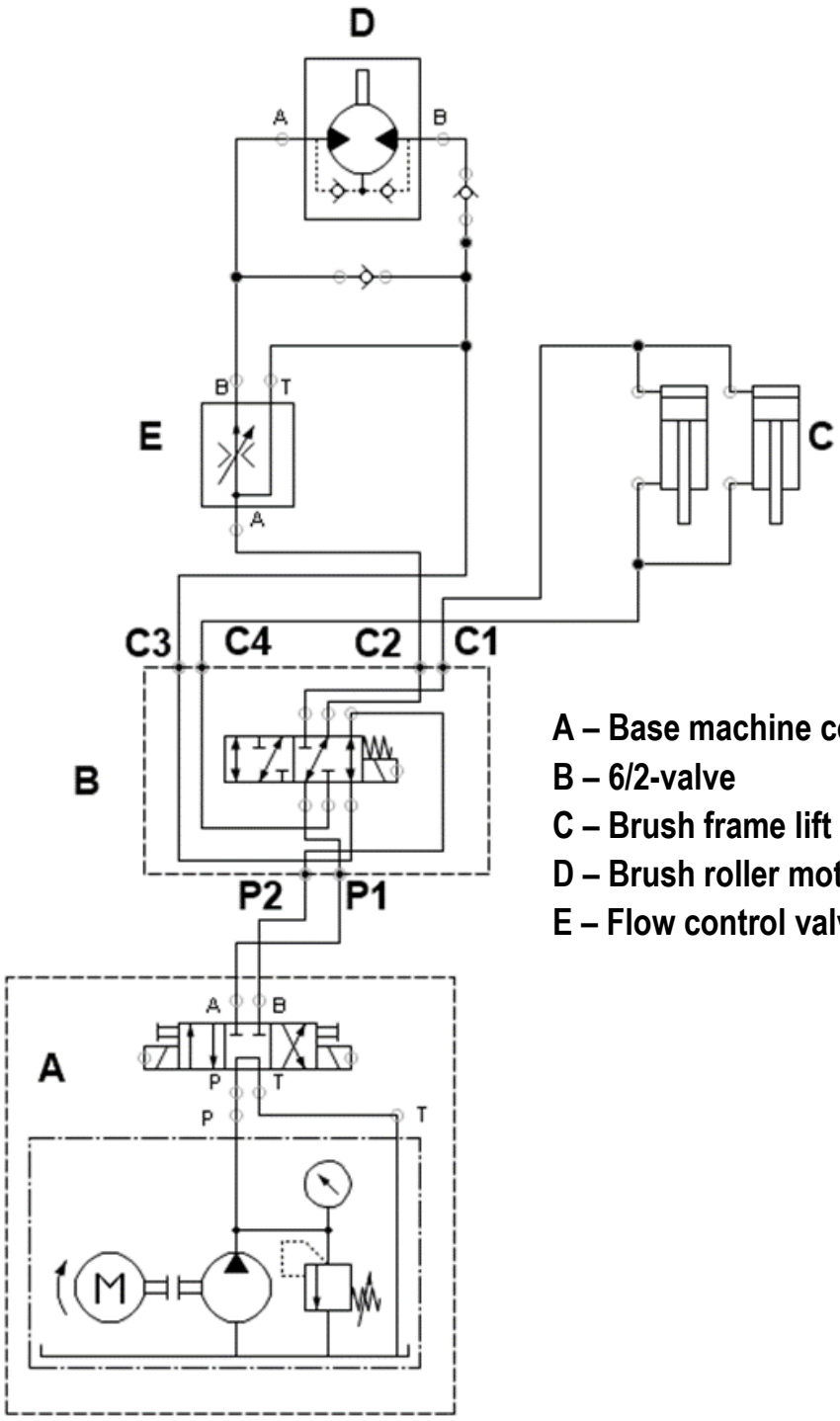
The brush rotation speed is adjusted by the flow control valve. If the base machine has a flow control feature, the control valve in the attachment can be set to position 10.

The bucket sweeper is connected to a 2-hose or a 4-hose hydraulic system.

In Combi hydraulics, lowering the brush roller and rotation of the motor is operated on the second flow direction of the hydraulic block, and lifting the brush roller is operated on the reverse flow direction.

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9.1. 2- hose hydraulics

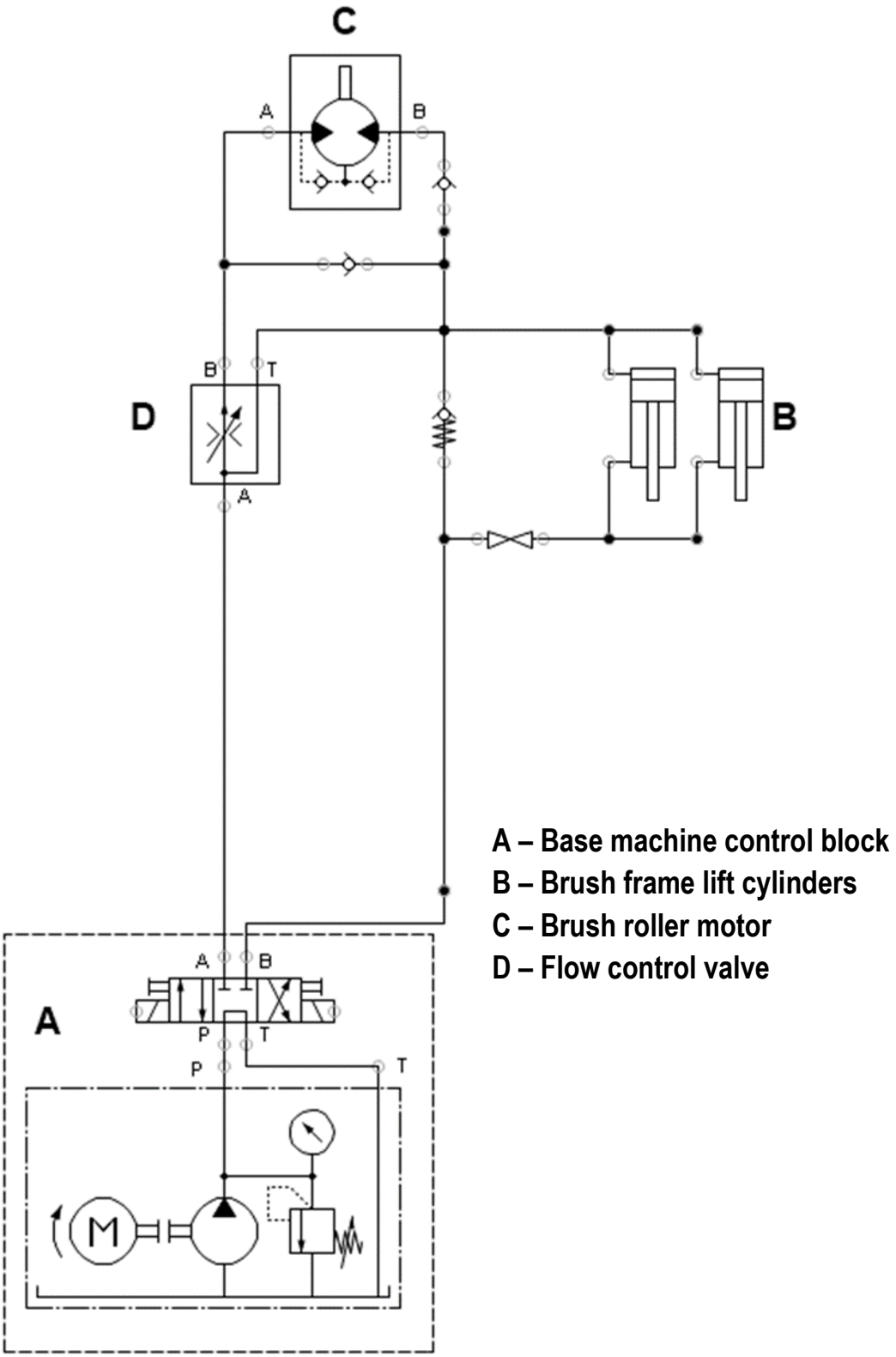


A – Base machine control block
B – 6/2-valve
C – Brush frame lift cylinders
D – Brush roller motor
E – Flow control valve

Figure 1. 2-hose hydraulics

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9.2. Combi hydraulics

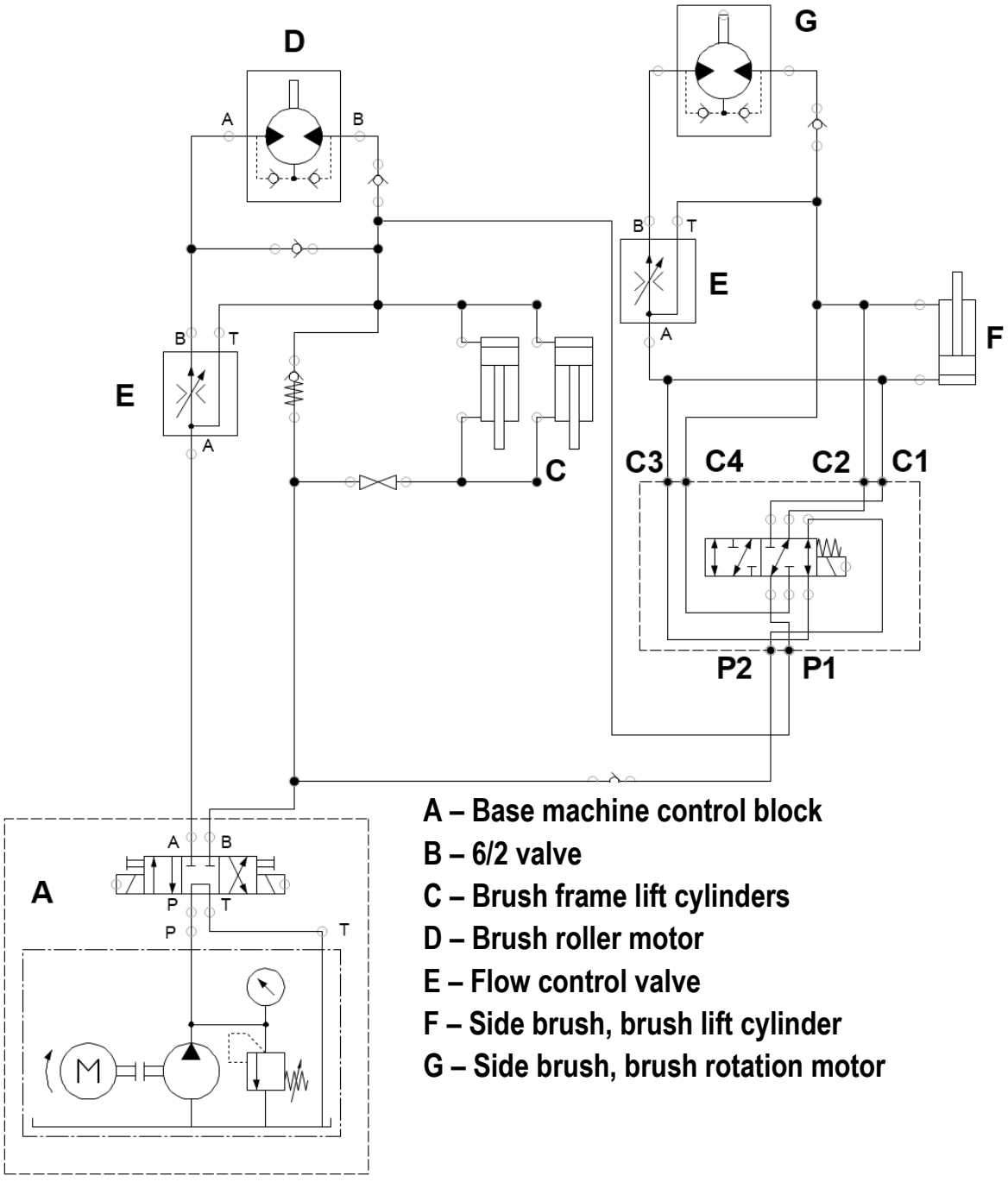


A – Base machine control block
B – Brush frame lift cylinders
C – Brush roller motor
D – Flow control valve

Figure 2. Combi hydraulics

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9.3. Combi hydraulics with side brush



A – Base machine control block
B – 6/2 valve
C – Brush frame lift cylinders
D – Brush roller motor
E – Flow control valve
F – Side brush, brush lift cylinder
G – Side brush, brush rotation motor

Figure 3. Combi hydraulics with side brush

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9.4. Combi hydraulics with side brush and high-pressure washer

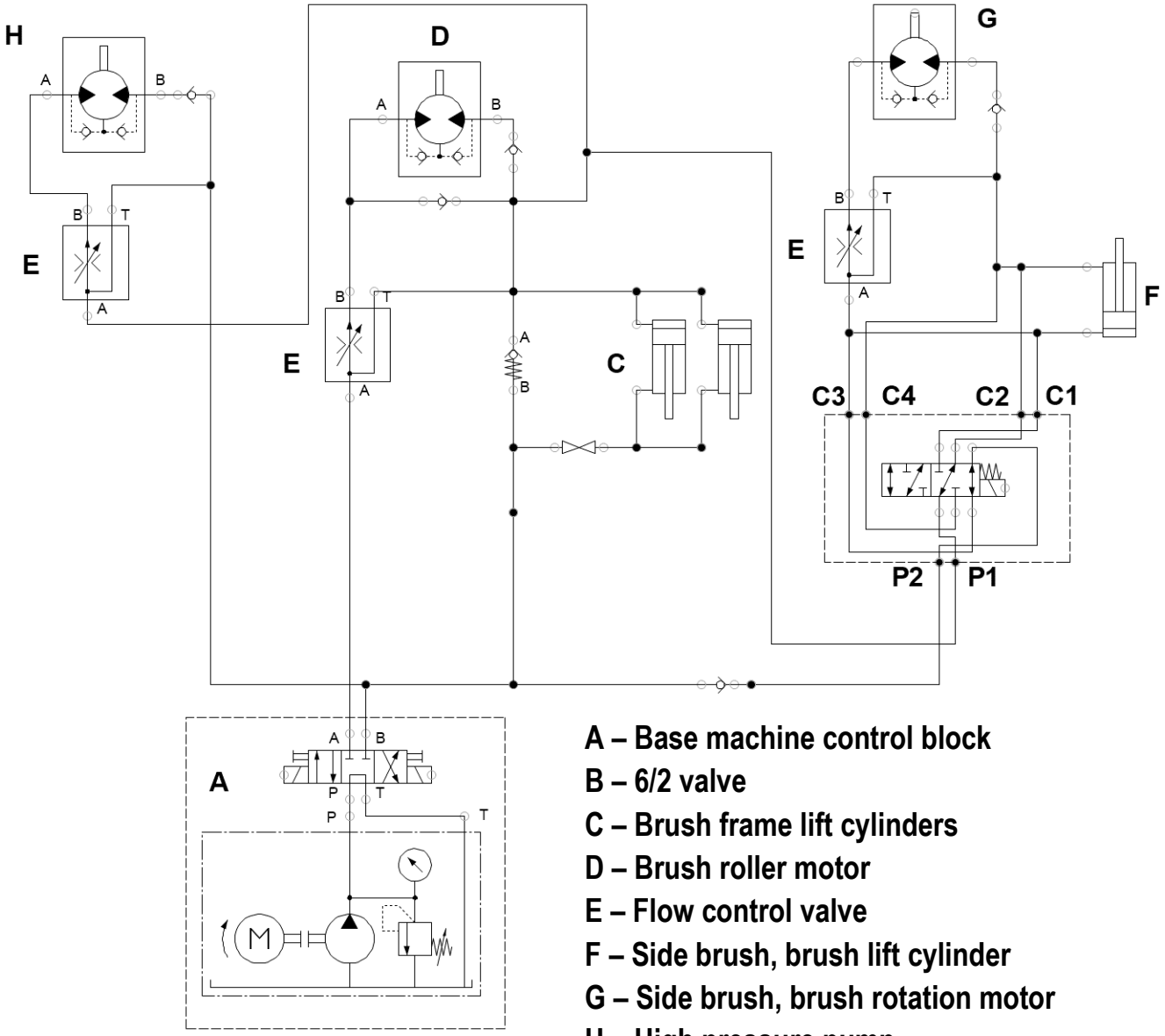
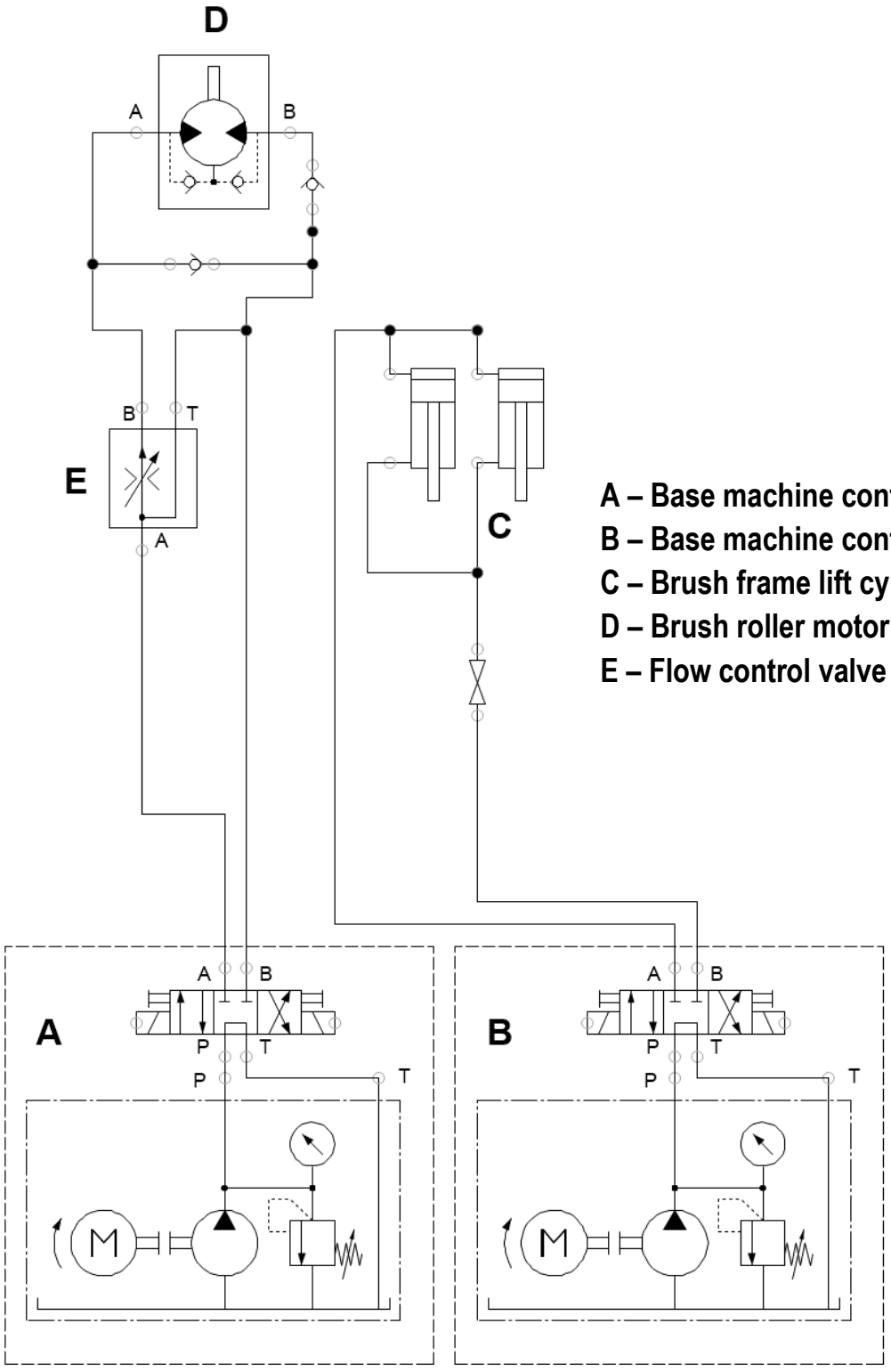


Figure 4. Combi hydraulics with side brush and high-pressure washer

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9.5. 4-hose hydraulics



A – Base machine control block
B – Base machine control block 2
C – Brush frame lift cylinders
D – Brush roller motor
E – Flow control valve

Figure 5. 4-hose hydraulics

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9.6. 4-hose hydraulics with side brush

A – Base machine contol block
B – Base machine contol block 2
C – Brush frame lift cylinders
D – Brush roller motor
E – Flow control valve
G – Side brush, brush lift cylinder
H – Side brush, brush rotation motor

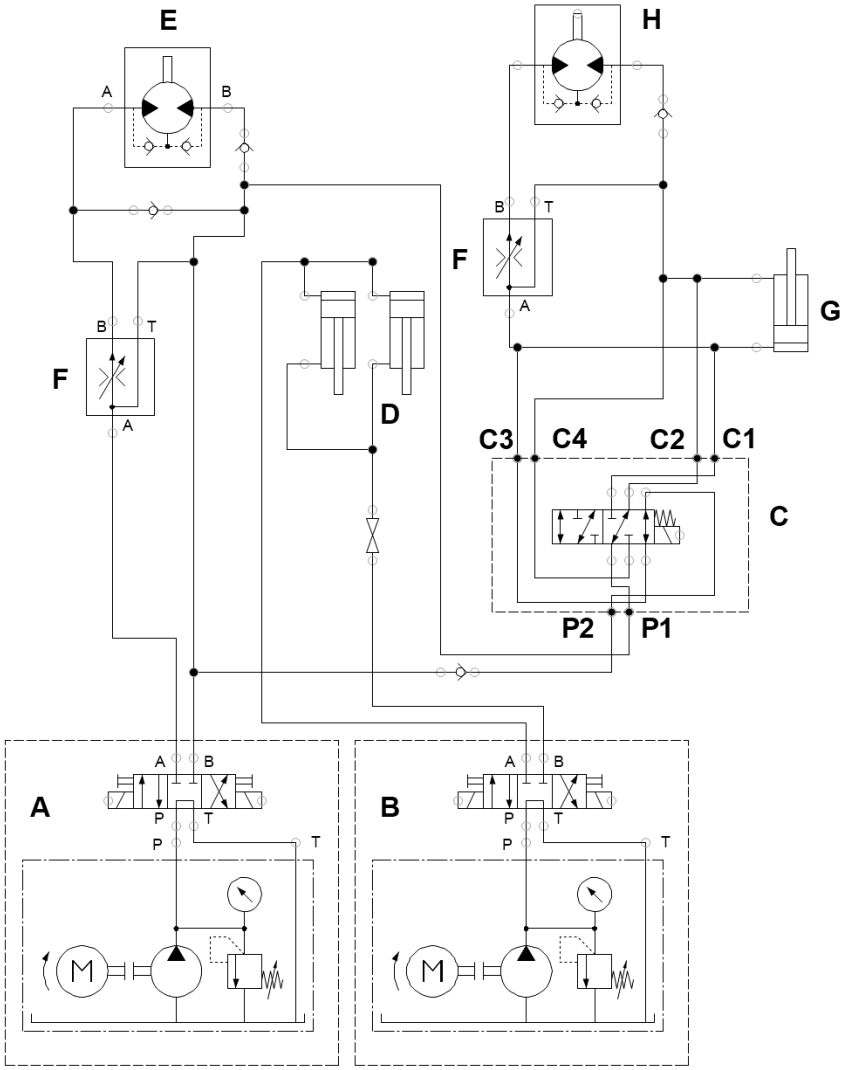
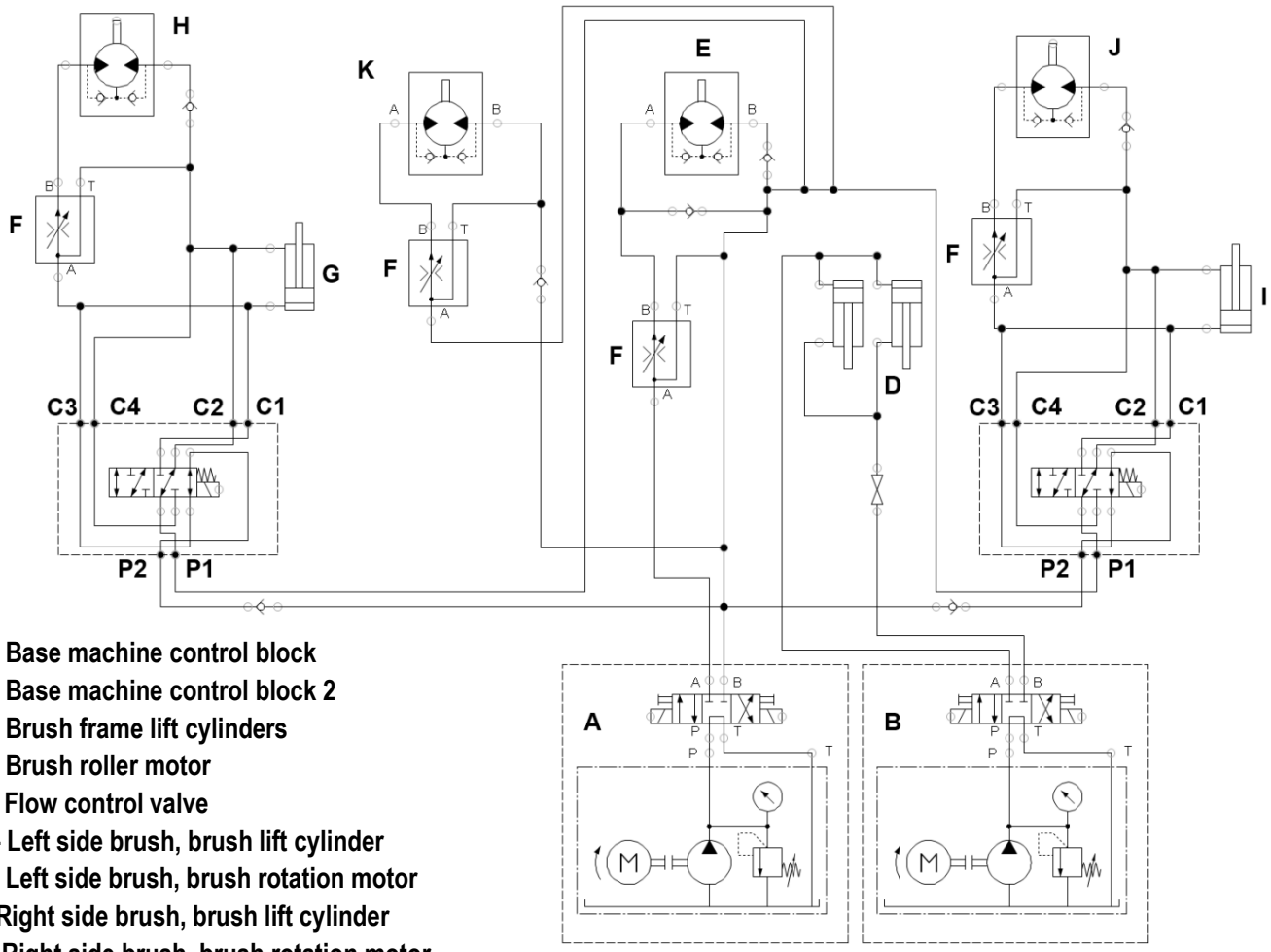


Figure 6. 4-hose hydraulics with side brush

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9.7. 4-hose hydraulics with two side brushes and high-pressure washer



A – Base machine control block
B – Base machine control block 2
C – Brush frame lift cylinders
D – Brush roller motor
E – Flow control valve
G – Left side brush, brush lift cylinder
H – Left side brush, brush rotation motor
I – Right side brush, brush lift cylinder
J – Right side brush, brush rotation motor
K – High pressure pump

Figure 7. 4-hose hydraulics with two side brushes

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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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