

OPERATION AND MAINTENANCE MANUAL TRAILERS

**TR Safe,
TRM HD, Pro,
TRH**



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Multiva

TRACKING THE FUTURE

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1. FOREWORD

Multiva agricultural machinery is manufactured in Finland. The modern production technology, excellent raw materials, careful production and finishing guarantee a high-class product. Multiva product range includes, amongst others, the following agricultural machinery:

- Trailers
- S-tine harrows
- Disc cultivators
- Cultivators

Thank you for selecting a high-quality Multiva trailer. We hope that the product you selected will meet your requirements and serve you for a long time. **Please read this manual carefully before operating the machine.** The inspection and maintenance measures listed in this manual are crucially important for flawless machine operation and for the validity of the warranty.

All instructions, warnings and prohibitions regarding the use of the machine must always be observed. They have been issued to ensure the safety of the user and durability of the machine.

This operation and maintenance manual covers the following trailer models:
TR Safe, TRM HD and Pro, as well as TRH.

1.1. Purpose of use

Multiva trailer is intended for the transport of all kinds of loose material. All trailer models come with a rectangle-shaped frame that endures torsion and strain. Thanks to durable structural choices and high quality materials, Multiva trailers offer a long-term solution for efficient transport.

TR trailers are intended as grain trailers for the transport of light-weight loose material at farms. TR trailers have a steel body with fixed sides. The bottom edge of the body is beveled, and there are no horizontal welding joints inside, which allow for easy emptying. All TR models come, as standard, with body cover mounting arcs.

TR Safe trailer may also be used for the transport of silage. Thanks to the quick detachment of the silage extension, the trailer can be used for the transport of all light-weight loose material. Excellent emptying properties of the trailer are a particular design focus. The front of the durable steel body is 10 cm narrower than the back, in addition to which the bottom edge of the body is beveled and the inside surfaces are completely smooth. The tailgate has a very large opening, and the inside of the body is free of any bars obstructing unloading.

TRM HD trailers are intended for heavy earthmoving. Their bodies are made entirely of wear-resistant steel which, if compared with older designs, delivers improved shock resistance, structural strength and durability. The bottom edge of the body is beveled and without any horizontal welding joints inside, which allows for easy emptying.

TRM Pro trailer models are intended for demanding professional use and comply with the legislative requirements set for traffic trailers. Traffic trailers have axle suspension as standard, which improves the trailers' road characteristics significantly. TRM 160 Pro trailer's suspension uses a leaf-spring bogie, while the larger traffic trailers use hydraulic suspension.

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TRH is a two or three-axle large trailer with hydraulic suspension. The TRH 18 trailer has two axles, and the TRH 22 and TRH 25 trailers have three axles. At minimum, the rearmost axle is always a steering axle. Thanks to the hydraulic axle suspension, the trailer provides driving comfort even at higher traffic speeds. Axle suspension of the trailer is electronically operable from the tractor's cockpit. The chassis has a tilting body frame which can be equipped with any standard replaceable body. As many different bodies can be equipped on the same frame, the benefit is uninterrupted operation all year round.

Multiva trailers' technical data is available on the manufacturer's website. For information on new products, please contact the manufacturer.

Due to continuous product development, all rights to technical changes are reserved.

1.2. Type plate

The trailer carries a type plate containing the information listed here. Write down the type plate information in the fields provided below. When discussing with a Multiva seller or factory representative, please state the model and serial number of the machine. This will help prevent unnecessary delays and misunderstandings.

Multiva	
Malli / Modell	<input type="text"/>
Paino / Vikt kg	<input type="text"/>
Kantavuus / Bärförmåga tn	<input type="text"/>
Valmistus no / Serie nr	<input type="text"/>
CE	Valmistaja / Tillverkare DOMETAL OY Loimaa, FINLAND

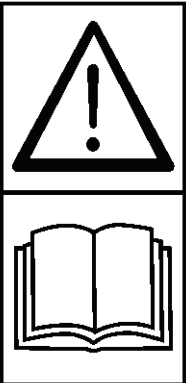
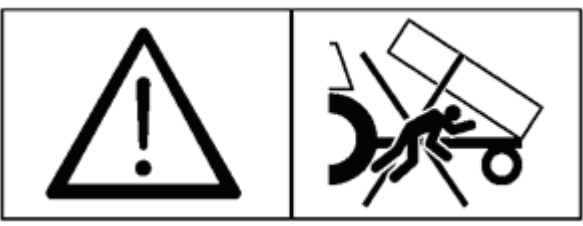
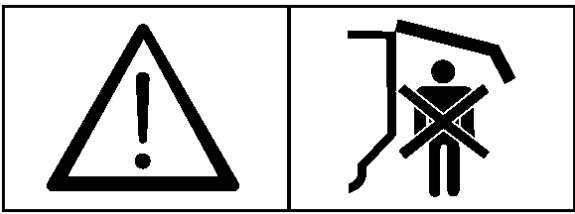
2. SAFETY INSTRUCTIONS

Always observe these safety instructions and distances when using the trailer.

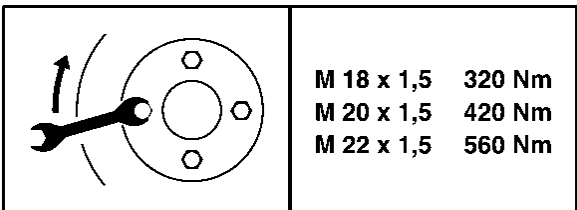
Using the trailer for transport of persons and mounting it while it is moving are strictly prohibited.


2.1. Warning labels

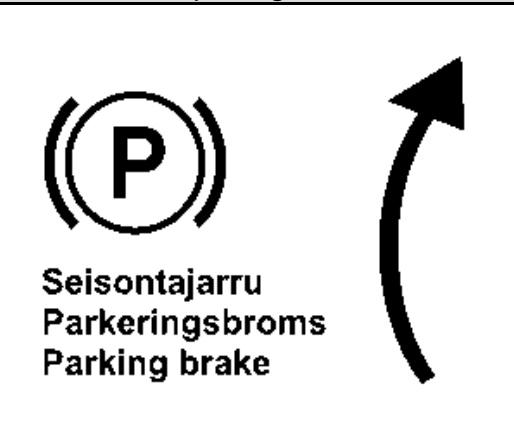
The trailer contains the warning labels listed below. Always observe the safety instructions of these labels. Do not remove the trailer's warning labels.

Warning label on the drawbar	Explanation
	<p>CAREFULLY READ THE OPERATION MANUAL AND THE SAFETY INSTRUCTIONS – ESPECIALLY BEFORE CONNECTING THE MACHINE TO A TRACTOR!</p>
Warning label on the side, at the front of the body	Explanation
	<p>MOUNTING A MOVING TRAILER AND TRANSPORT OF PERSONS ON THE TRAILER ARE PROHIBITED! CRUSHING HAZARD! BODY MUST BE SECURED WITH THE BODY SUPPORT BEFORE WORKING UNDERNEATH!</p>
Warning label on the side, at the rear of the body	Explanation
	<p>It is prohibited to stay near the tailgate when the trailer is connected to a tractor.</p> <p>CRUSHING HAZARD! WHEN THE TRAILER IS CONNECTED TO A TRACTOR, MAINTAIN AT LEAST A 2-METRE SAFETY DISTANCE FROM THE TAILGATE!</p>



Warning label on the side of the body		Explanation
<div></div>		<p>See section <i>9.1 Wheel bolts</i></p> <p>TIGHTNESS OF THE WHEEL BOLTS MUST BE CHECKED AFTER THE FIRST TRANSPORT OF A LOAD!</p>

Warning label on the frame of the trailer		Explanation
		<p>HIGH PRESSURE OIL SPRAY MAY PENETRATE THE SKIN AND CAUSE SERIOUS INJURY!</p>

Warning label on the front of the trailer Pro, trailers with parking brake		Explanation
		<p>Parking brake is activated by turning the lever clock-wise.</p> <p>BEFORE MOVING, THE VALVE MUST BE RETURNED TO ITS ORIGINAL POSITION! BREAK CONNECTOR MUST BE CONNECTED TO THE TRACTOR BEFORE RELEASING THE VALVE FROM THE BREAK POSITION</p>

2.2. Connecting and disconnecting the trailer

The trailer must be attached to the tractor's trailer hitch. The tractor's security instructions must be observed when connecting or disconnecting the trailer. There is a crushing hazard in connecting or disconnecting the trailer. Observe caution when mounting or dismounting the drawbar's support to avoid injury to limbs or fingers. Do not disconnect pressurised hydraulic connectors.

2.3. Traffic on public roads

The driver must know the operation of the trailer and have the necessary information and capacity to use and transport it appropriately. The driver must be familiar with the operational instructions and follow them. It is prohibited to transport the trailer while ill, over-stressed or under the influence of alcohol. The driver is responsible for possible damages to persons outside the trailer.

When driving on public roads, observe caution and all road traffic regulations, as well as specific regulations concerning slow-moving vehicles. Before starting work with the trailer, its condition must be checked as well as the tightness of the wheel bolts and tyre pressures. Before road transit, check the lights, reflectors and the visibility of the triangular reflector indicating a slow-moving vehicle. Using the trailer for transport of persons is strictly prohibited.

2.4. Parking

It is safe to park the trailer on a solid surface with no more than 8,5 degrees sloping in any direction. The drawbar support of the trailer cannot withstand the weight of a loaded trailer on a soft surface. When parking, secure the wheels with stoppers to ensure immobility.

2.5. Tipping

The trailer must be connected to a tractor when tipping. Observe special care when tipping the trailer. Before tipping, make sure there are no persons inside the safety distance of the tipping point and that the elevated body cannot hit any obstructions such as an electricity line, for instance. Surface under the trailer should be as solid and even as possible. Soft, uneven or sloping surface may cause the trailer to topple over when tipping. The trailer must not be moved when the tipper is raised.

When lowering the body, there is a crushing hazard between the body and the frame. In case of maintenance work between the body and the frame, the body support found on the frame must be used.

2.6. Hydraulic tailgate

When using the hydraulic tailgate, make sure there is free space for using the tailgate and that there are no persons within the 2-metre safety distance. There is a crushing hazard between the tailgate and the body. The tailgate must be supported in case it is used in its open position for mounting the body.

2.7. Extension

Observe caution when connecting the extension to avoid injury to limbs or fingers. Working under the raised extension is prohibited.

2.8. Connecting the TRH body

When connecting a body to the frame, make sure all the locking latches (4) are fully locked. Observe caution when using the body supports to avoid injury to limbs or fingers. Make sure the surface is solid enough before parking the body.

2.9. Hydraulic axle

The trailer must not be used for transport if the axle suspension is at either fully elevated or compressed position, or if the trailer is tilting to one side. In such cases, the suspension is not working and the axle structure may be damaged.

2.10. Friction steered axle

Friction steered axles must always be locked when reversing or on road transit.

2.11. Maintenance

Always stop the trailer and prevent its movement for the duration of maintenance. The maintenance must be performed on an even and stable foundation in order to ensure that the trailer cannot tip over or move. Do not conduct maintenance or other measures when the trailer or one of its components is raised and unsupported. When maintaining the trailer, ensure safe working conditions and sufficient lighting. When lifting the trailer, make sure that the foundation is solid in order to prevent the lifting machine from tipping over. The lifting equipment's capacity must also be sufficient.



3. FIRST USE MEASURES

3.1. Measures before using the trailer

The trailer has been lubricated for the first time at the factory and during testing oil has been pumped into the cylinders. However, it is advisable to familiarise yourself with the lubrication points before initial use. The lubrication points are listed in section 10 MAINTENANCE PROGRAMME, LUBRICATION of this manual.

NOTE! TIGHTNESS OF THE WHEEL BOLTS MUST BE CHECKED AFTER THE FIRST TRANSPORT OF A LOAD!

See section 9.1 Wheel bolts

3.2. Tractor connection

Connect the trailer's drawbar loop on the tractor's hydraulic hitch. Make sure that the tractor's hitch is locked and that it is not rested on the support of the lifting device. Lift the parking support.

The wire for the lights is connected to the tractor's lights outlet. Proper functioning of the lights must be checked when using the trailer. There is extra wire for lights inside the drawbar. The wire can be extended by opening the wire holders and pulling the wire. Adjust the tractor's rear hitch at a height where it cannot touch the drawbar or the hoses when turning.

In case the trailer is equipped with a parking brake, remember to release the brake to transit position.

Hydraulic hoses are colour-coded.

- Connect the tipper's hose (no colour-code) to a single-action hydraulic outlet.
- The brake hose (no colour-code, quick brake coupling) is connected to the brake valve.
- The tailgate hoses are connected to double-action hydraulic outlets.
 - Tailgate closed 1 x blue
 - Tailgate open 2 x blue
- Drawbar suspension 1 x black. or 2 x black in case of double-action
- Bogie stabiliser 1 x red
- Hydraulic suspension control 1 x white
- Steering axle lock 1 x yellow

When you disconnect the trailer from the tractor's hydraulic hitch, always remember to disconnect the hydraulic hoses and the light wire.



3.3. Connecting an electronically operated trailer

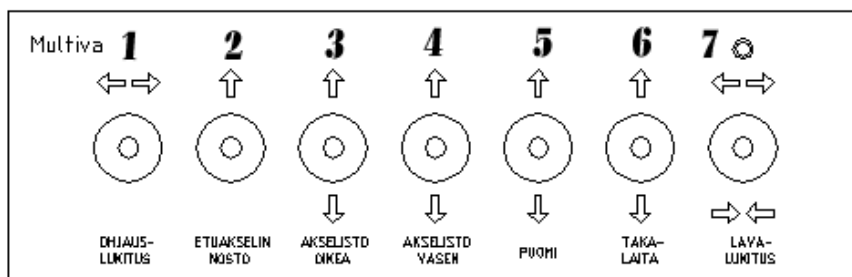
This applies to TRH and other trailers with hydraulic suspension and additional electronic operating systems.

- Connect the tipping cylinder's hose (no colour-code) to a single-action hydraulic outlet.
- Connect the trailer's pressure hose coming from the valve block (1 x yellow) to a single-action hydraulic outlet.
- Connect the valve block's free-flow hose (2 x yellow) to tractor's free-flow outlet.
- If applicable, connect the pressure regulator hose (white) to the control circuit of the tractor's Load Sensing system. This hose is connected only if the tractor has a Load Sensing system. In case you need more information, please contact the tractor manufacturer's representative.
- Connect the hydraulic brake hose to the break valve.
- Wire for the lights is connected to the tractor's lights outlet. Proper functioning of the lights must be checked when using the trailer.

3.3.1. Electronic control

The electronic remote control found in the tractor's cabin is used for the following:

- 1 Steering lock
- 2 Raising of the front axle
- 3 Control of the right-side axle
- 4 Control of the left-side axle
- 5 Hydraulic drawbar suspension
- 6 Hydraulic tailgate
- 7 Locking of the body. To unlock body locking, it is necessary to also press the confirmation button at the same time.



Numbering of the functions on the trailer's valve block:	
1A and 1B	body locking
2A and 2B	tailgate
3A and 3B	drawbar suspension
4A and 4B	right-side axle height
5A and 5B	left-side axle height
6	raising of the front axle
7A and 7B	steering lock
8A	free-flow valve



3.3.2. Combining electronic control with tractor's hydraulics

Trailer's hydraulic valves can be adjusted with minor measures to work with different hydraulic systems used on tractors. The valves have quick couplings which allow for changing the functions.

Constant pressure hydraulic system

In case of a constant pressure hydraulic system, hydraulic oil must be able to flow freely even if no valves are in use. Free flow can be achieved by connecting the free-flow valve's quick couplings. This is the method used in most Valtra tractors, for example.



Connecting the free-flow valve's quick couplings

Variable hydraulic system

Free-flow is not needed in a variable hydraulic system, and therefore, the free-flow valve's quick coupling is left disconnected. This is the method used in John Deere tractors, for example.

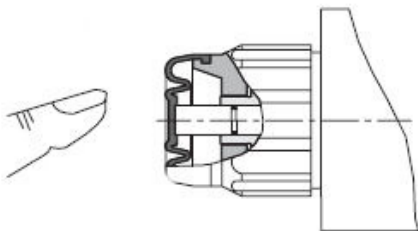
Load Sensing system

The Load Sensing system does not require free-flow either, so the quick coupling is left disconnected. However, the pressure adjustment hose (white colour-coding) must be connected to the tractor's Load Sensing control circuit.

Manual use of valves

Electric valves can be operated manually if necessary. You need to press quite strongly on the centre of the rubber seal. The valve stem's travel is approx. 5 mm. The valves have spring centering allowing the valve to always return to its mid-position, which is the closed position.

When operating valves manually, it is necessary to press two valves. The Free-flow valve, i.e. valve number 8 (at the rear in the valve block) directs tractor oil for use in the trailer's valve block. In addition, it is necessary to press the valve with the desired function.



3.4. Traffic speed

Safe and HD trailers' highest allowed speed is 50 km/h.

The highest allowed speed for trailers with hydraulic axle suspension and Pro trailers is 65 km/h.

TRH trailers' tyre load-carrying capacity may reduce the highest allowed speed.

3.5. Tipping

- make sure the body is not over-loaded
- the load must be spread out evenly on the body
- tip on an even and solid surface
- monitor tyre pressures
- if the load is not flowing, or flows unevenly, stop tipping, lower the body and check for the cause
- under no circumstances should you move the tractor hastily to empty the load
- the trailer must not be moved when the tipper is raised.

Inappropriate use that does not comply with these instructions may cause damage to the tipping cylinder.

Chassis with hydraulic suspension: When tipping a full load, it is recommended that the trailer's axle suspension is set to its lowest position. This causes the trailer's support point to move on the rear axle and allows for stable tipping.

3.6. Loading

When loading the trailer, always make sure that **THE LOAD-CARRYING CAPACITY IS NOT EXCEEDED!** The trailer's load-carrying capacity is marked on the type plate.

NOTE! TRH trailers: it may be prohibited to use the full load-carrying capacity in transport on public roads, because the allowed axle and bogie weights might be exceeded.

3.7. Connecting a body to TRH chassis

The body is connected to the trailer's chassis with the use of the intermediate frame. To connect the body, suspension of the chassis is adjusted to its low position and steering axles are locked. Next, the chassis is moved backwards to the centre of the leg-supported body until the intermediate frame's stopper touches the front end of the body. The chassis is then raised to its high position and the body is locked on the intermediate frame. There are four locking latches in the frame, which are controlled with a double-action cylinder. Each locking point is monitored by a threshold switch. A red warning light will be lit on the control panel and a buzzer will sound if even one of the locking points is open. When connecting a body, always make sure that all the locking latches are fully locked.

It is necessary to adjust the axle suspension in the right position. The hydraulic hoses of the tailgate are connected to the connectors in the rear of the chassis. The hydraulic hoses must be cleaned of any dirt before connecting.

Disconnecting a body is done in reverse order. To release body locking, it is necessary to press the confirmation button on the right side of the control panel together with the rocker switch. The confirmation button prevents accidental release of the body locking.

Do not forget to disconnect the tailgate's hydraulic hoses. **The tailgate's hydraulic circuit has a pilot valve, whereby it is necessary to release pressure from the hoses one by one before connecting or disconnecting.**

The body can be equipped with support legs designed for loaded bodies. They must be removed before road transit because otherwise the maximum allowed trailer width is exceeded. Make sure that if the body is left on leg supports it does not sink in the ground. This is particularly important if there is a heavy load on the body.



4. STANDARD EQUIPMENT

4.1. Hydraulic brakes

The hydraulic hose of the brakes is connected to the tractor's brake valve, so that the trailer's brakes will function automatically when the tractor's brake pedal is pressed. The brake valve must be fully functioning in order to use the trailer's brakes. The brake valve must be able to fully release pressure from the system after braking. Brakes that are not released cause wear and over-heating, which may damage the brake system and wheel hubs.

4.2. Hydraulic tailgate

The hydraulic tailgate functions on double-action mode. In TRM models, the ball valve of the hose allows for locking the tailgate in the lowered position while in transit. In TR models, there is an automatic lock on the low end of the cylinder which opens and locks automatically when opening or closing the tailgate.

4.3. Body cover arcs (TR trailers)

The main purpose of body cover arcs is to facilitate the use of body cover. They are not part of the sides' supporting structure. It is therefore not necessary to have them in place when transporting a load on the trailer.

4.4. Lights

The rear light wire connector is released by turning the connector slightly open and pulling it out. Plastic studs ensure that the connector is always connected appropriately.

5. BODY EQUIPMENT

Depending on the model, some of the following equipment may be standard; some may be available as optional extras.

5.1. TRM side extension

Installation of side extension in parts

Side extensions are installed on top of the standard sides. The front and sides of the extension are locked in place with body-locking latches on the standard body, and the front of the extension is connected with four bolts on the body's left and right sides. Support arcs of the extension are installed next. When using side extensions, the rear support arc must be in place at all times. They are part of the side extension's supporting structure. The rear side extension is raised in place on top of the rear side onto which it is locked with pins. The rear side's reaction beams are installed on the side extension's pin and on the pin in the upper section of the rear side.

Installation of side extension cassette

The side extension cassette can be removed and reinstalled by using a front loader, for example, and by disconnecting or connecting only body locks and knobs from the rear. When lifting, it is necessary to place planks, two-by-four for example, between the body support arcs. The lifting point is the centre of the extension.



5.2. Roll cover

The roll cover is delivered with 150 mm extension parts for standard bodies. The cover support arcs are transferred from the trailer to the extension. By using the crank provided, it is possible to roll in the cover on the side. Spreading the roll cover on the trailer is done by pulling a rope located in the middle of the trailer's right side. After that, the rope must be tied on the body. The hydraulic tailgate and roll cover can be used simultaneously. This is possible because of the flexible joints in the cover's tubes. The roll cover must be either fully spread or rolled in when using the tailgate. In other words, it must be either rolled in and resting on the side support or cover the entire body with all the fastening loops fixed to the body. Otherwise, the cover may be damaged. When rolling in the cover, ensure that the cover rolls in evenly and that both ends are in sync. The cover must be rolled if stored outdoors. Pooling of water on the cover causes a load which may stretch the cover.



5.3. TRM hydraulic tailgate lock

TRM trailers can be equipped with a hydraulic tailgate lock which allows for mechanic locking. The lock prevents the tailgate from opening in case pressure in the system is lost. The lock operates automatically when tailgate is used. The locking is spring-loaded. When closing the tailgate, it is necessary to maintain hydraulic pressure for a moment so that oil in the locking cylinder can flow back to the tractor and the locking cylinder can lock itself.



***Hydraulic tailgate lock
In TRM trailers it is in open position***

5.4. Body ladder

The body ladder can be moved easily from the storage place in the front of the body to any other point. The ladder can also be used as an A-frame ladder. The ladder is attached to its own fasteners on the body, whereby it acts as a body ladder. The ladder is locked in storage position when pressed in on its rack.



5.5. Equipment for quick changing of body

The body's tipping joint is connected to the frame with quickly securable pins. The adapter at the top end of the tipper is connected to the body frame with a long fastening pin. An empty body may be left on supporting legs by lifting the drawbar and by lowering the tractor's hitch and hydraulic drawbar; changing of a full body is only possible with hydraulic suspension.



6. FRAME EQUIPMENT

Depending on the model, some of the following equipment may be standard; some may be available as optional extras.

6.1. Drawbar with hydraulic suspension

Suspension of the hydraulically suspended drawbar is produced with a pressure accumulator and two hydraulic cylinders connected in parallel. The accumulator absorbs shocks to the trailer and prevents the swing motion of the trailer and tractor. When the drawbar's hose is connected to the tractor's hydraulic outlet, it is possible to adjust the front height of the trailer after opening the ball valve. Height is adjusted by setting the indicator on the drawbar to the mid-point of the adjustment scale in the front of the frame. Thus, the indicator will be between the two black triangles of the scale. After adjustment, the ball valve of the hose is closed.

Double-action drawbar suspension

Standard in TRH and Pro trailers. Available as an optional extra for Safe and HD models. A second pressure accumulator and hose for the tractor are connected to the cylinders. A load with a high centre of gravity may cause the single-action cylinder bar to come out of the cylinder at the end of tipping. The double-action drawbar suspension prevents the body from tilting and strengthens the functioning of the drawbar.



6.2. Leaf-spring suspended bogie

Uniform axles are supported against the frame with a leaf-spring. The bogie functions similar to trailers with rigid bogies. Thanks to the suspension, driving comfort is improved and transport at high speeds is safer. The leaf-spring suspended bogie always comes equipped with four-wheel brakes.

6.3. Hydraulically suspended axle

Suspension relies on single-action hydraulic cylinders. On both sides of the axle, the hydraulic cylinders are attached side-by-side in their own hydraulic circuit, which allows for cylinder oil flow on one side only. The benefits of hydraulic suspension include even distribution of surface pressure on each tyre, improved driving comfort, possibility of levelling the chassis when tipping on a sloping surface, and adjusting the transport and loading heights.

Piston stroke of the hydraulic cylinders is 200 mm. The correct adjustment is to keep them loaded at mid-point of travel, i.e. when 100 mm of the cylinder rod is out. It is not necessary to adjust the axle suspension during normal transport. When tipping on a sloping or soggy surface, the trailer can be straightened by adjusting the hydraulic cylinder of one side alone. Before driving again, the trailer must be levelled to its original position.



Axle control's three-way valve

(Not TRH)

In the mid-position, the valve is closed. The lever of the valve is turned to the right when adjusting the right side's suspension height and, correspondingly, to the left when adjusting the left side's height.

While in transit, the valve is kept at either mid-position or turned on either side so that it is possible to lower or raise the suspension height and adjust the trailer to a levelled position.



The hose is equipped with a tap so that it is not necessary to keep it connected to the tractor at all times.

6.3.1. Friction steered axle

Friction steering operates on the basis of the wheel hub's connection point being located on the front side of the axle's centreline. Therefore, the steering axle's wheels follow the tractor's line of movement when the lateral force becomes sufficiently strong. When driving straight ahead, the steering axles are stabilised by shock absorbers and a centering slot. **When reversing, the steering axle must always be locked** by using the single-action hydraulic cylinder. Locking of the steering axle is necessary so that the trailer can be steered in the desired direction. When moving forward again, the axle locking should be released. The axle should be kept locked when driving with a transport speed.

In case the axle is not steering despite a released lock:

- make sharp turns on a hard surface while the trailer is loaded. An empty load and a slippery surface fail to create sufficient friction.
- grease the axle kingpins with appropriate vaseline.
- make sure that the axle locking hose is connected to a tractor connector with floating position, i.e. position where pressure can move freely through the valve when the valve is not under control.
- TRH: make sure that the free-flow hose is properly connected.

6.4. Forced steering

Forced steering is available for trailers with hydraulic suspension. Steering uses steering cylinders attached to the tractor, which steer the axles when the tractor turns in relation to the trailer. With this system, it is not necessary to lock the axles when reversing. There is a separate instruction manual on forced steering.

6.5. Ball coupling

This equipment includes a screw-attached rotating towing eye and a ball cup. When changing the coupling, the screws should be tightened to 410 Nm.



6.6. Rear hitch

The rear hitch allows for connecting another trailer or machine behind the trailer. The equipment also includes a tipper connector with change valve, break valve connector and outlet for lights. The change valve is attached under the frame, on the bottom side of the trailer's drawbar. The change valve allows for oil flow to the trailer's rear connector instead of the tipping cylinder. The maximum allowed vertical load of the rear hitch is 1 500 kg (drawbar load) and, horizontally, the maximum is 15 000 kg (towed load).



6.7. Bogie stabilisers

The bogie's stabiliser cylinders move the bogie's point of support from the centre to the rearmost wheels of the bogie, whereby drawbar load is maintained while tipping. In large silage trailers, the bogie's stabiliser cylinders are very useful, especially when towing a trailer with a light-weight tractor. The cylinders are operated through their own single-action hydraulic outlet.



6.8. Tipping limiter

Standard in TRH and Pro trailers. Tipping is limited with a valve, which prevents over-tipping the body. The valve is designed to reduce load on the tipper by stopping oil flow before the tipper reaches its full length. There is a wire attached to the rear of the frame which operates on a reduction valve. The wire has a spring which extends if the tipper reaches its full length. Adjustment is done by turning the fork-attached wire from its front end. By shortening the wire, the valve stops oil flow earlier, i.e. causing a lower maximum height of the tipper.

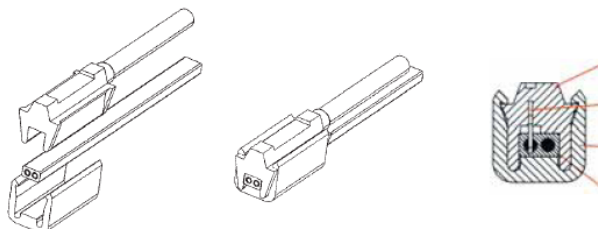
6.9. Pressure control valve for brakes

Installation of this equipment is recommended if the trailers' brakes are excessively effective. The pressure reduction valve is installed between the tractor and the trailer. The valve limits pressure to 110 bar, and a flow control valve is used to adjust the flow in order to attenuate the brakes. The valve hose is connected to the tractor's free-flow outlet.

7. TRAFFIC ACCESSORIES

7.1. Sidelights and front lights

Standard equipment in Pro bodies. There are front corner lamps projecting white light forward and yellow light to the sides. In the middle and rear of the trailer, there also yellow LED lights directed to the side. It is not possible to change a bulb of the LED light; the whole light unit needs to be replaced. Front lights use normal, replaceable light bulbs. The lights are connected to a harness with pressed connectors, so a broken lamp is easily replaced by pressing in a new connector to the harness. Obsolete wire is cut and plugged with a protective cap.



7.2. TRM mudguards

The top of the mudguards is welded to the body. The plastic rear arcs can be removed easily if there is a need to reverse against a ground wall.



7.3. Parking brake and emergency brake

The parking brake operates on a pressure accumulator and a valve. No action is needed to recharge the accumulator. It recharges automatically when brakes are used normally. When the manual lever is set to parking brake position, oil flows from the pressure battery to the brakes.

Disconnecting a trailer and leaving it on parking brake:

- Set the manual lever on parking brake position. Once done, disconnect the brake hose from the tractor.



Connecting a trailer to a tractor when parking brake is on:

- Start by connecting the brake hose to the tractor and, once done, set the lever to transit brake position.
- If the lever is set to transit brake position first, the outlet will be pressurised and tractor connection is not possible until that pressure is released.

The emergency brake improves the safety of the vehicle combination. It prevents the trailer from going adrift in case the trailer's connection fails. Emergency brakes are activated when a wire pulls the parking brake's valve into brake position.

The emergency brake wire is connected to the manual lever of the parking brake. Connect the other end of the wire to a robust point in the rear of the tractor. The connection point should withstand at least a 300 kg load.



Connecting the emergency wire

In trailers with pneumatic brakes, the emergency brake uses the system's standard brake valve. No wire is needed. Hose failure activates the brake.

8. PNEUMATIC BRAKES

There are two kinds of pneumatic brakes, which differ in the following ways:

Double-tube brakes

Pneumatic brakes are powered by the tractor's pneumatic system. There are two hoses in a double-tube system. There is always maximum pressure in one of the tube lines, which is used to feed pressure to the accumulator, i.e. feeder line. Pressure from the tractor fills the other tube line upon braking, and is used for operating the trailer's brake valve.

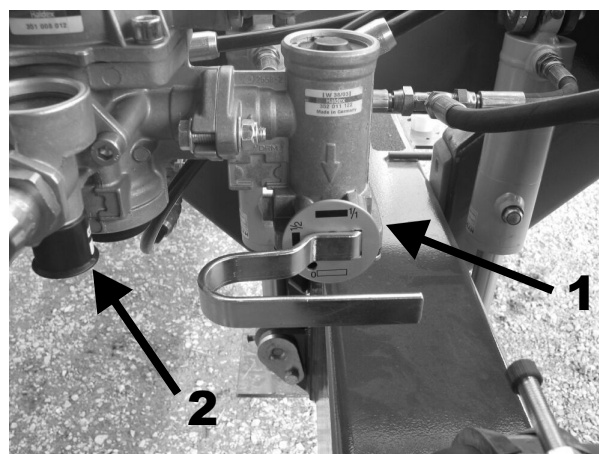
Pneumatic connectors of the brakes must be connected to the brake outlets at the rear of the tractor (2 x gladhand connectors or Duomatic connector). Gladhand connectors are colour-coded to ensure appropriate connection. The control hose is marked with yellow (left) and the feeder hose is marked with red (on the right). The brakes are activated in case of hose failure and when disconnecting the pneumatic hoses from the tractor. In this system, filters are integrated into the connectors.

Single-tube brakes

There is only one gladhand connector in the single-tube brake system (Colour-coded black), which is connected to the tractor's outlet. In this system, there is pressure in the brake hose even when the trailer brakes are not in use. When braking, the pressure in the tube line weakens and the brake valve directs pressure from the accumulator to the brake housing. Weakening pressure or loss of pressure due to connection failure causes the brake valve to activate the brakes. In this system, filters are integrated inside the connector's hand. The maximum allowed speed of a trailer with single-tube brakes is 25 km/h.

Brake force control

Brake efficiency can be adjusted with a specific brake force controller, which allows for setting an appropriate brake force for an empty and a fully loaded trailer. Adjustment of brake force is done by turning the lever (No. 1 in the picture) inside the trailer's frame, on top of the drawbar, to different positions in accordance with the load situation.



Brake force controller (1) and transit valve (2)

Trailer transit without pneumatic brake system

When moving the trailer without availability of pneumatics, the transit valve can be used to release the brakes. Pressing the button 2 in the picture releases the brakes, and pulling it back reactivates the brakes as long as there is pressure in the accumulator.

Parking brake

The parking brake consists of spring brake chambers. The spring brake chambers keep the brakes on even if there is no pressure in the system. In case of pressure loss in the reservoir, the spring brake chambers activate the brakes. If necessary, the spring brake chambers can be deactivated manually. This is done by placing the provided screw bar into the hole at the back of the spring brake chamber until it connects with the cylinder piston. The brake is released by tightening the bolt. The hole in the chambers is covered with a rubber cap.



9. MAINTENANCE PROGRAMME, INSPECTIONS

Inspections are to be carried out on the trailer. Detailed instructions are on the next pages.

Columns:

- 1) After first transport of a load
- 2) every 200 hours
- 3) every 1000 hours, or at least once a year
- 4) every 6 years, or when necessary

	1)	2) 200 h	3) 1000 h	4) 6 yr.
All trailers:				
Wheel bolts	X	X	X	
Tyre pressures	X	X	X	
Hydraulic system	X	X	X	
Bearing clearance of wheel hubs		X	X	
Adjustment of brakes		X	X	
Wear of brake shoes		X	X	
Body pins			X	
Condition of hydraulic hoses			X	
Tightness of all bolts			X	
Depending on installed extras:				
Mud guard mountings			X	
Functioning of the tipper limiter			X	
Condition of drawbar suspension guides			X	
Pressure of accumulators				X
Trailers with leaf-spring bogies:				
Mounting bolts of the bogie	X	X	X	
Mounting bolts of the spring stack	X	X	X	
Mounting bolts of the axles	X	X	X	
Rocker shaft	X	X	X	
Trailers with hydraulically suspended axles:				
Mounting bolts of the axles	X	X	X	
Mounting bolt connecting the spring to the frame	X	X	X	
TRH:				
Mid-frame pins			X	
Pneumatic brakes:				
Empty water from the pressure reservoir every 10 hours	10 h			

9.1. Wheel bolts

Tightness of the wheel bolts must be checked with a torque wrench after the first transport of a load.

6-bolt hubs - M18x1,5	320 Nm
8-bolt hubs - M20x1,5	420 Nm
10-bolt hubs - M22x1,5	560 Nm

It is the responsibility of the machine user to ensure appropriate bolt tightness. The manufacturer is not responsible for damage caused by loose bolts.

9.2. Tyre air pressure

The tyre air pressure must be checked after the first transport of a load.

Tyre pressure guidelines are in the table. Due to different tyre brands, further specifications may be available after printing of this instruction manual. The sticker on the trailer gives the most recent recommended tyre pressures.

6-bolt hubs:	
400/60-15.5"	4,4 bar
480/45-17"	3,0 bar
500/50-17"	3,5 bar
500/50R17"	3,6 bar
8-bolt hubs:	
500/50-17"	3,6 bar
560/45R22.5"	3,2 bar
710/40R22.5"	2,0 bar
10-bolt hubs:	
560/60R22.5"	4,0 bar
650/50R22.5"	3,0 bar
710/40R22.5"	2,6 bar
710/50R26.5"	2,4 bar

9.3. Hydraulic system

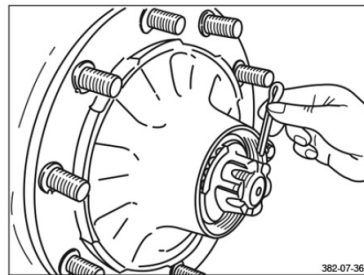
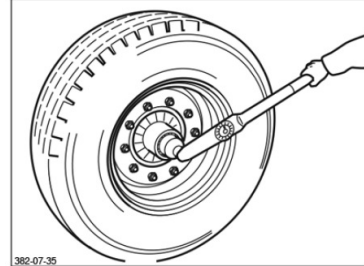
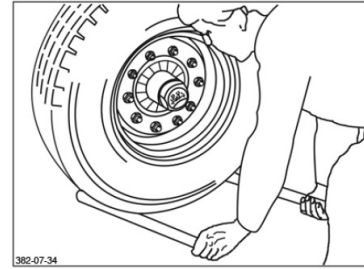
Check the hydraulic systems and tighten the couplings if necessary.

9.4. Bearing clearance of wheel hubs

The bearing clearance of wheel hubs must be checked every 200 hours. If hub bearings are found to be loose, they must be tightened.

The wheels must be lifted for check-up. To ensure there is no looseness, a rod is inserted between the wheel and the chassis, and by moving it, it is possible to check for any looseness of the wheel bearings.

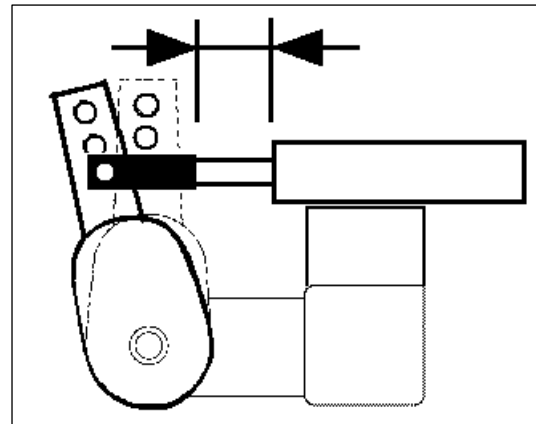
When tightening a bearing, lift the wheel up and open the hub cap. Remove the locking pin of the axle castle nut, and tighten the nut until you feel slight resistance in the bearing. Then open the nut until the locking pin fits into the next slot where the bearing is spinning freely. If the nut is already aligned with the hole, open the nut until the next slot (but do not open the nut more than 30 degrees). Lock the pin in place. The hub cap's rims must be cleaned of grease to ensure tight attachment when pressed in. Fill a third of the cup's volume with lubrication grease and reinstall the cap.



9.5. Adjustment of brakes

The brake adjustment must be checked every 200 hours. If the travel of brake cylinder exceeds 60 mm, the brakes must be adjusted. The brakes must be released before adjustment.

The adjustment screw on the brake lever is turned so that the cylinder travel is between 40-50 mm. Clockwise turning shortens the travel. After adjustment, ensure the brake does not stay on after braking.



9.6. Wear of brake shoes

Check the wear of brake shoes, and replace them if the remaining contact surface is below 1,5 mm in thickness.

9.7. Body pins

The upper and lower end attachment pins of the tipper must be checked, and if there is any wear, the pins must be replaced.

The locking and condition of the body's tipping joint pins must be checked and replaced if necessary.

9.8. Condition of hydraulic hoses

Visually inspect the hoses for cuts, wear and malformations. When checking the hoses, take special care to ensure that any possible oil spray discharging from the hoses does not come into contact with your skin. Pressurised oil spray may penetrate clothes and skin.

9.9. Mudguard mountings

Check the mountings and ensure tightness of the bolts.

9.10. Functioning of the tipper limiter

It is necessary to check the tipper functioning so that the tipper cylinder cannot fully extend without the valve cutting oil flow approx. 50 mm before maximum extension. The limiter is adjusted by turning the attachment fork on the wire.

9.11. Condition of drawbar suspension guides

In case the lateral guide is worn to 7 mm in thickness, or there is over 3 mm in clearance, the guides must be replaced.

9.12. Pressure accumulators

Over time, the pressure accumulators will lose pressure. The right pressure must be ensured from the manufacturer before starting any operation. Repairs of pressure accumulators should be left to authorised repair shops.

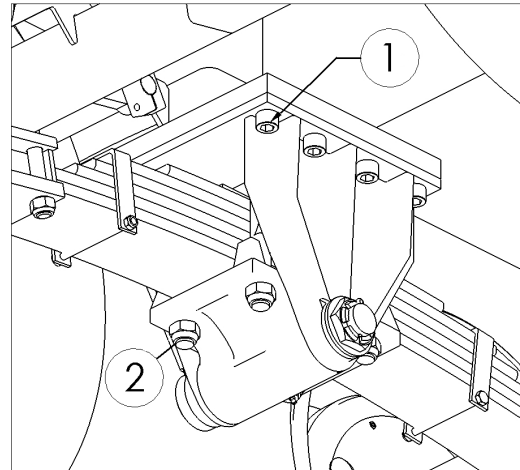
9.13. Spring-leaf bogies

- **Frame attachment of bogies**

Tightness must be ensured with a torque wrench, point 1 in the picture, 16 pcs. The tightening torque is 400 Nm.

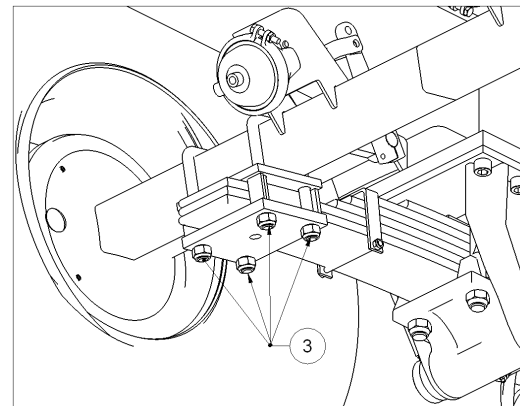
- **Mounting bolts of the spring stack**

Tightness must be ensured with a torque wrench, point 2 in the picture, 8 pcs. The tightening torque is 450 Nm.



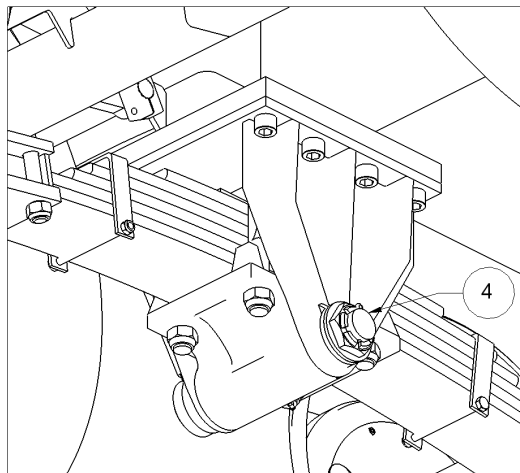
- **Mounting bolts of the axles**

Tightness of the U-bolts must be ensured with a torque wrench, point 3 in the picture, 16 pcs. The tightening torque of the bolts is 400 Nm.



- **Rocker shaft**

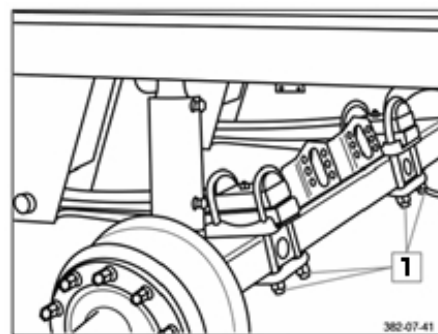
Inspect the tightness of the rocker shaft mounting bolts. The bolts are locked with pins, point 4 in the picture, 2 pcs. The tightening torque is 300 Nm. The rocker shaft must also be greased after the first transport of a load.



9.14. Hydraulically suspended axle

- **Mounting bolts of the axles**

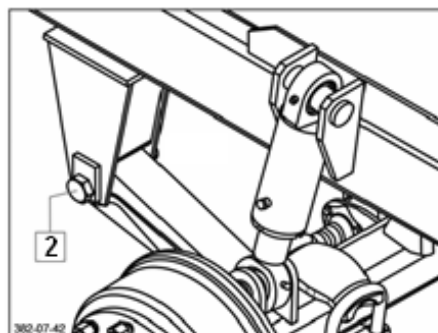
Tightness of the U-bolts must be ensured with a torque wrench, point 1 in the picture, 4 pcs. per axle. The tightening torque is 650 Nm.



- **Mounting bolt connecting the spring to the frame**

The spring mounting bolt must be tightened to have no clearance, point 2 in the picture, 2 pcs. per axle.

To ensure bolt tightness appropriately, unscrew the nut a little, and tighten the connection between the frame bracket and spring so that there is no clearance.

**9.15. TRH mid-frame pins**

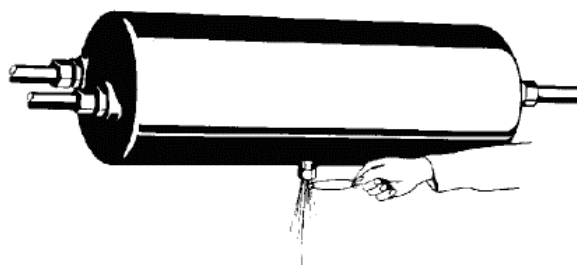
The upper and lower end attachment pins of the tipper must be checked, and if there is any wear, the pins must be replaced.

The locking and condition of the body's tipping joint pins must be checked and replaced if necessary.

9.16. Emptying water from the pressure reservoir

Applicable to trailers with pneumatic brakes only.

Accumulated water in the pressure reservoir must be emptied by turning the valve stem to the side until only dry air comes out of the valve.



10. MAINTENANCE PROGRAMME, LUBRICATION

All lubrication points must be greased again after using a pressure washer for washing. For lubrication, use general grease which contains lithium soap and EP additives.

For the lubrication of slide bearing bogie bearings, it is recommended to use so-called pin grease (stable and adhesive greases). However, using such grease on wheel hubs may damage bearings.

50 hour maintenance - lubricate also grease nipples that require lubrication every 10 hours. 200 hour maintenance - lubricate also grease nipples that require lubrication every 10 and 50 hours. 1000 hour maintenance - lubricate all grease nipples.

Clean the grease nipples before lubrication. Apply a few presses of lubricant in the grease nipples. Any overflow should be wiped off.

Detailed instructions are on the next pages.

Columns:

- 1) every 10 hours or daily
- 2) every 50 hours
- 3) every 200 hours
- 4) every 1000 hours or at least once a year

	1) 10 h	2) 50 h	3) 200 h	4) 1000 h
All trailers:				
Towing eye	X	X	X	X
Tipping joints		X	X	X
Tailgate cylinders			X	X
Cylinder spherical bearings			X	X
Change of wheel hub lubrication grease				X
Depending on installed extras:				
Bogie bearings		X	X	X
Spring-leaf bogie's rocker shafts		X	X	X
Suspended drawbar			X	X
Hydraulically suspended axles			X	X
Steering axles' pivot bolts		X		
Steering axles' locking cylinder			X	
Cleaning the filters of pneumatic brakes			X	
Changing the cartridge of the pressure filter - TRH				X



10.1. Tow eye

The tow eye is lubricated from the hole at the bottom side of the drawbar tube. The loop is greased slightly on the inside and bottom.

10.2. Tipping joints

Pins join the back end of the body and chassis, 2 pcs.

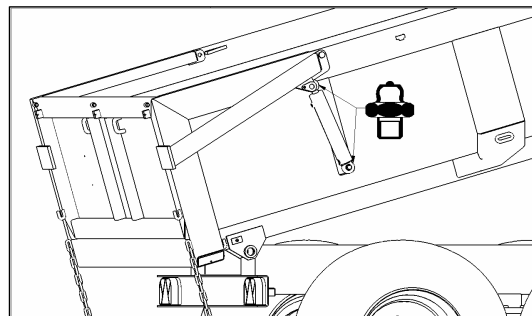
Lubricant is pressed into the grease nipples until clean lubricant overflows.

10.3. Tailgate cylinders

4 pieces. TR lock parts, 2 pcs.

Apply a few presses of lubricant in the cylinder joint socket.

TR lock parts; lubricant is pressed into the grease nipples until clean lubricant overflows.



10.4. Cylinder spherical bearings

All cylinder bearings are lubricated slightly.

10.5. Change of wheel hub lubrication grease

Lift the trailer on supports and remove wheels.

Remove the wheel hub together with the brake drum, clean all parts and inspect them. All worn parts must be replaced with new ones.

Clean the inside and outside of the wheel hub. Remove the old grease in its entirety. Clean the bearings and liners carefully from the old grease with diesel oil.

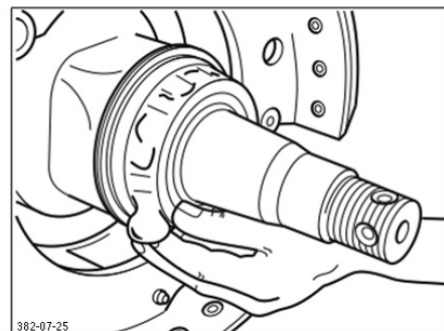
Fill the gap between the bearings and 1/3 of the cup with fresh grease, and lubricate the bearings slightly.

Then remount the hubs and adjust the bearing clearance.

When greasing wheel hubs, use lithium-based petroleum jelly with a drop point of at least 190 °C – for example, BPW Eco-Li 91- lubricating grease. Using the wrong kind of lubricant may damage the hub.

Check wear of brake shoes.

Check the tightness of tyre bolts after next transport.

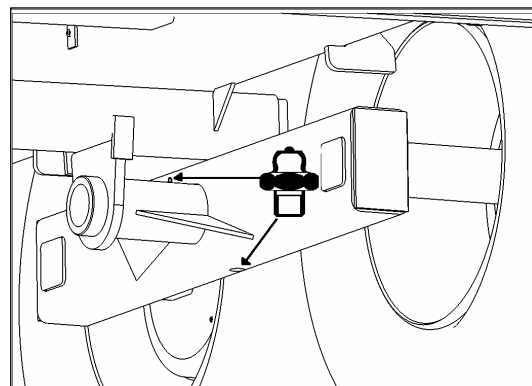


10.6. Bogie bearings

4 pcs. Before greasing, the rear end of the trailer must be lifted so that the bogies are not under the load of the trailer and grease can penetrate the whole width of the bearing. Rocking the bogie while applying grease helps in spreading it.

Continue greasing until clean grease overflows from the ends of the sockets.

In trailers with leaf-spring bogies, rocker shafts are greased.

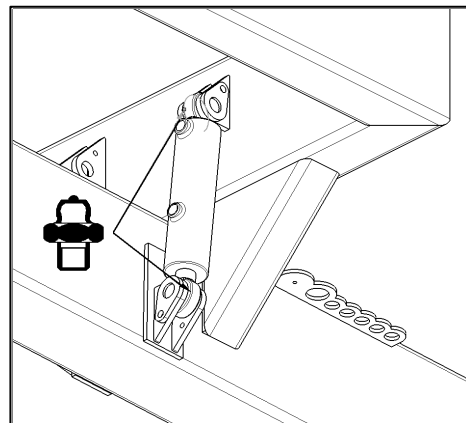
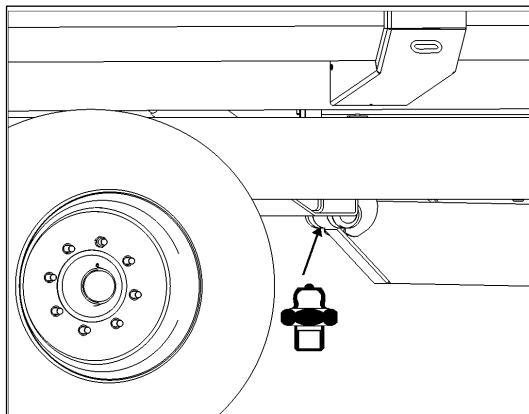


10.7. Suspended drawbar

- Drawbar socket

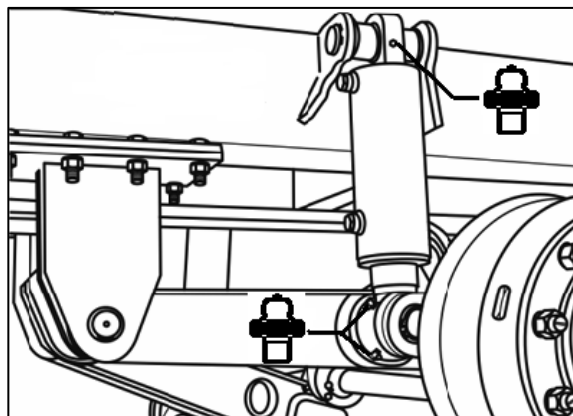
Lubricant is pressed into the grease nipples until clean lubricant overflows.

- Drawbar cylinder's joint sockets



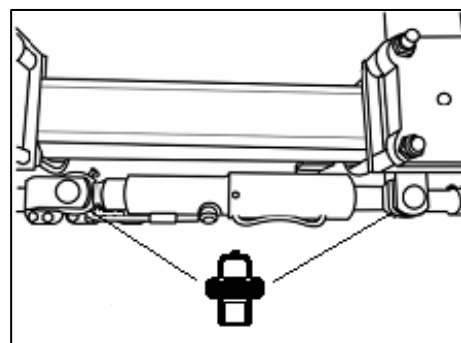
10.8. Hydraulically suspended axles

- Apply a few presses of lubricant in the suspension cylinder's spherical bearings. Check the condition of the bearings, and replace them if necessary.

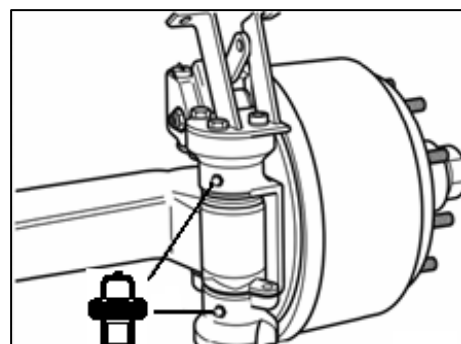


- Grease nipples on the steering swivel of the steering axle, 4 pcs.

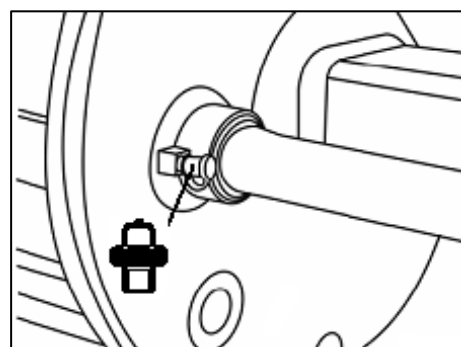
NOTE! Do not use high viscosity pin grease on the steering swivel. Use of such grease may jam the steering swivel and stop the friction steering from working.



- Steering axle's locking cylinder joint sockets, 2 pcs.



- Brake camshaft bushings on the brake plate.



10.9. Cleaning the filters of pneumatic brakes

The cleaning of pneumatic brakes' filters should be performed every 200 hours.

The filters are integrated into the connectors. Remove the filter cartridge, wash it with detergent, and dry it with pressurised air.

10.10. TRH pressure filter cartridge replacement

The pressure filter of a trailer equipped with electric hydraulic valves should be replaced every 1000 hours, or when the flow indicator on the side of the filter is fully red. The filter is inside the trailer's frame, on the left side. Unscrew the filter cup, and replace the filter cartridge. Check and replace if necessary the O-ring between the cup and the filter body.

10.11. Maintenance, general information

It is recommended to keep the trailer clean so as to ensure durability of the paint coating. If the paint coating is damaged, the spot concerned should be painted or protected by other means against corrosion.

In matters concerning spare parts and supplies, contact the trailer's retailer.

11. STORAGE

For long-term storage, clean the trailer carefully and lubricate it. It is recommended to store the trailer indoors. **NOTE!** Tyres and hydraulic hoses may be damaged under long-term storage outdoors.

Hydraulic cylinders must be positioned in such a way that as little as possible of the chromed piston rod is visible.

Tyre pressures should be checked and adjusted if necessary before storage. After storage, tyres should be driven back into shape at a modest speed.

The piston rod parts that remain visible must be protected with petroleum jelly or thick oil.

12. WARRANTY

Multiva agricultural machines come with a one-year warranty.

Warranty policy:

1. The manufacturer shall replace, free-of-charge, any parts that become unusable due to defective workmanship or defective raw materials within the warranty period. However, any parts subject to wear are not covered by the warranty.
2. Damage caused by misuse, inadequate service, changes unauthorised by the manufacturer, traffic accidents and other reasons beyond feasible inspection are excluded from the coverage under this warranty.
3. Damage caused by powering the machine with a clearly over-sized tractor is also excluded.
4. If a failure is repaired by a third party, the manufacturer will only compensate the costs for the repairs if this procedure has been agreed upon in advance with a representative of the manufacturer.
5. The manufacturer is not liable for loss of income due to downtime caused by damage or for any other indirect losses caused by damaged machinery.

13. EC DECLARATION OF CONFORMITY

**Dometal Oy
Kotimäentie 1
32210 Loimaa
Suomi Finland**

hereby states that the machine in question

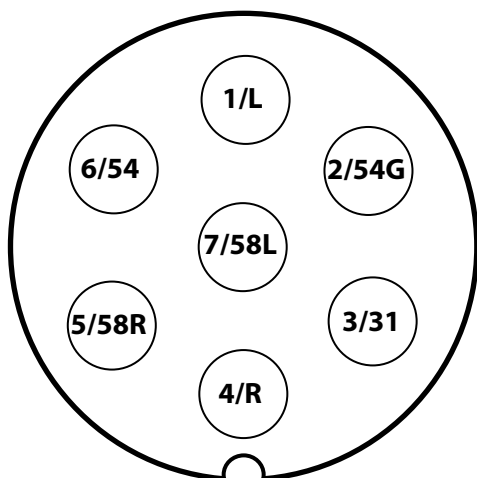
Multiva -trailer

meets the requirements of Machinery Directive 98/37EU. The following standards were applied in the design of the machine:

SFS-EN 292-1:1992 + revision 1995
SFS-EN 292-2+A1:1995

Furthermore, the following standards were applied in the design of the machine:

SFS-EN 1853:1999
SFS-EN 982:1996

Connection socket according to SFS 2473

1/L	Left turn signal	yellow
2/54G	Free	-
3/31	Ground	white
4/R	Right turn signal	green
5/58R	Right rear light+reg. plate light	brown
6/54	Brake light	red
7/58L	Left rear light	black