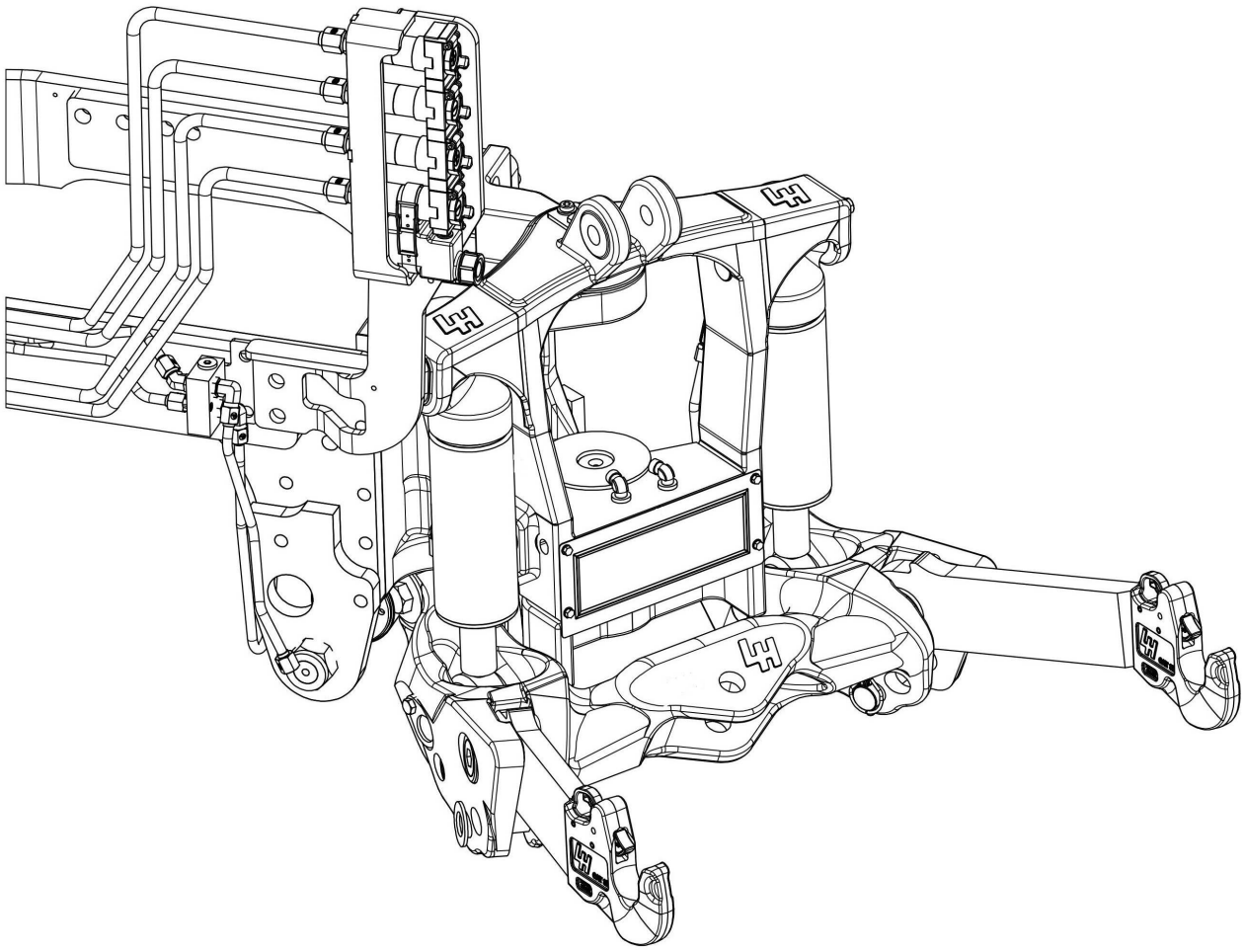
Published 24 August 2011
Spare part no. 05243000

Valtra LHLink

Operating manual



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Contents

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1 INTRODUCTION

Valtra LHLink pivoting front linkage is a versatile device for mounting and operating front-mounted tractor implements. LHLink can be used as a regular front linkage, i.e. you can attach it to a three-point working part, adjust the machine elevation and use power transmission, auxiliary hydraulics and a 12 V connecting plug.

In addition to the features mentioned above, Valtra LHLink front linkage includes an electronically-controlled pivoting feature which enables the linkage and the attached machine to turn in both directions. This allows versatile use of the implement and makes attaching the implement to the front linkage easier and safer.

This manual is an integral part of the front linkage. The linkage manufacturer encourages the sellers of new and second-hand tractors to obtain a written certificate proving that this manual was submitted to the buyer with the trac-

The front linkage is designed to be used only in regular agricultural or property management tasks. Using the linkage for any other purpose will be considered an alteration of the linkage's intended use. Compliance with the operating conditions, maintenance schedule and repair schedule specified by the manufacturer are also an essential part of the linkage's intended use.

The front linkage may only be operated, maintained and repaired by persons familiar with the features and required safety measures of the linkage.

All persons working with the front linkage must follow all safety regulations, all other generally approved occupational or general safety regulations and all road traffic regulations.

Any unauthorised modifications of the front linkage may release the manufacturer from liability following an accident or damage caused by the modified front linkage.

If you have purchased the LHLink front linkage as a retrofit, it may only be installed by an authorised Valtra mechanic.

2 SAFETY INSTRUCTIONS

PLEASE NOTE: Read this manual carefully before operating the linkage. Pay special attention to the following notices.

General warning sign
In this manual, the general warning sign indicates important safety-related information. Please be aware that this symbol is used when there is the risk of an accident Make sure you read the text after the symbol carefully and ensure that all other users of the linkage are aware of the risk.

There is a danger of being squeezed in between the front linkage and the tractor's front wheels. Never stand within the turning range of the front linkage.

Be additionally cautious when working with heavy loads, on an unstable or sloping surface or when taking sharp turns. Risk of the tractor overturning!

Make sure that link arms are in operating position and that the movement range of the front linkage is clear!

The linkage may extend farther than the tractor's sides. This may be dangerous when used in traffic.

When the front linkage is being turned or if the steering system malfunctions, the equipment may be a risk to bystanders. Ensure that there are no bystanders within a dangerous distance of the front linkage.

If you disengage the hydraulic system while using the front linkage, you must reactivate the front linkage after re-engaging the hydraulics.

2.1 General safety instructions

1. **Operation**

   The front loader must be disconnected before using the front linkage.

2. **Operation on a slope**

   Please note that there is a risk that the tractor will overturn when operating on a slope. If the front linkage is turned while the tractor is on a slope, the risk of the tractor overturning is significantly higher. If the slope is steeper than 10 degrees, the manufacturer recommends that the front linkage is only used in its unturned position. Please note that a working part attached to the front linkage will make the machine-linkage assembly less stable. Make sure that all instructions from the tractor manufacturer regarding operation on a slope are followed.

3. **Transferring to a new location**

   When a tractor is driven on a public road, place the front linkage into the centre position and prevent it from turning to reduce the risk to any bystanders.

4. **Moving the tractor during operation**

   Please note that a working part attached to the front linkage may cause an accident. When driving on a public road or public area with the front linkage attached to the tractor, the assembly should be driven slowly by a skilled operator. The front linkage may sometimes turn in the opposite direction to the wheels. This may cause a dangerous situation and could result in the tractor functioning in an unexpected way.

5. **Power transmission**

   Follow all safety instructions from the tractor, working part and power transmission shaft manufacturer. Always use safety equipment complying with the regulations and make sure that all safety equipment is in working order.

6. **Falling**

   The malfunction of a lift cylinder hydraulic hose or a top link mounting may cause the working part to fall. This may result in a dangerous situation. Always lower the working part attached to the front linkage to its lower position before exiting the tractor. The manufacturer recommends only using the original top links.

7. **Connections**

   Always clean the quick release hooks and articulated heads before mounting the working part. Check that the coupling hook ends are clean and properly functional. If you fail to do this, the working part may not be properly fixed onto the front linkage. Always be especially careful when mounting the working part. Make sure that the working part cannot unexpectedly move while you are mounting it and make sure that there are no bystanders within the mounting zone. Always ensure that the quick release hooks have been properly locked after mounting.

For instructions on the use of the quick release hooks, please see the tractor manufacturer's manual.

8. **Towing**

   There is a separate towing connector in the front linkage for tractor towing. Make sure that all instructions from the tractor manufacturer regarding towing are followed. For the location of the towing connector, please see Figure 1.

9. **Lifting**

   The front linkage may only be used to lift working machines intended for use with a front linkage.

2.2 Safety signs

Safety signs showing the danger of being trapped have been attached to the front linkage. They show the dangerous operating zone. The safety signs must be kept clean and visible during the entire service life of the machine. If a safety sign drops off or is seriously damaged, obtain a new sign from the front linkage manufacturer or the tractor vendor. For locations of the safety signs, please see Figure 1.

There is a towing connector for towing the tractor on the front linkage. The towing connector may only be used for towing the tractor.

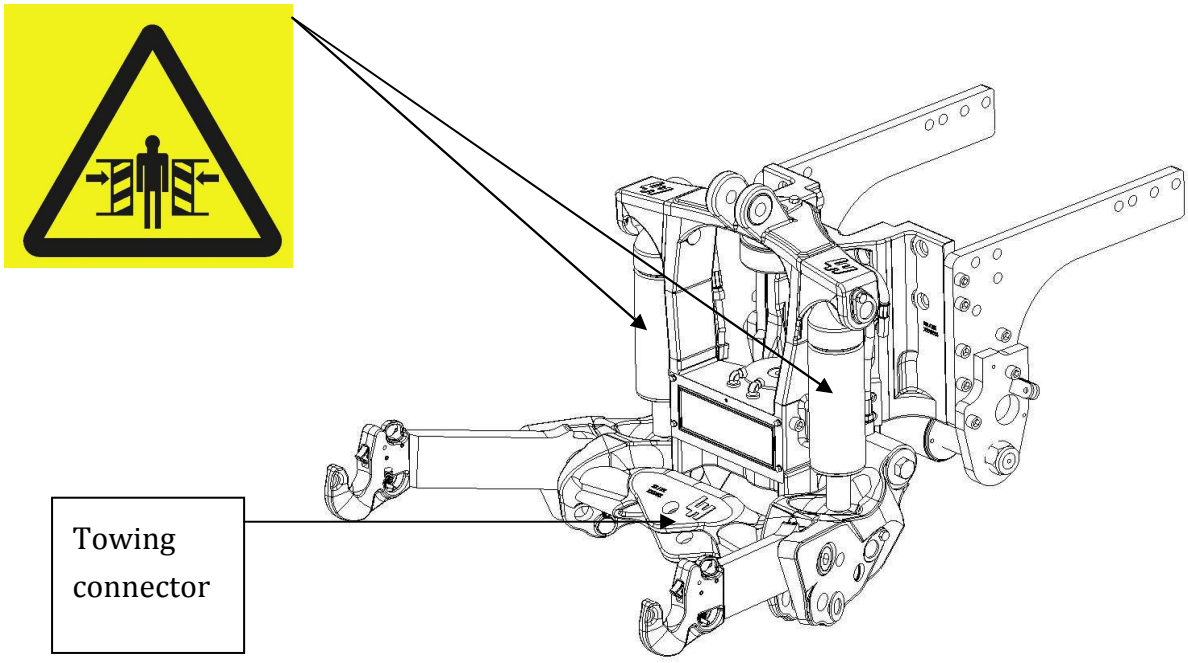
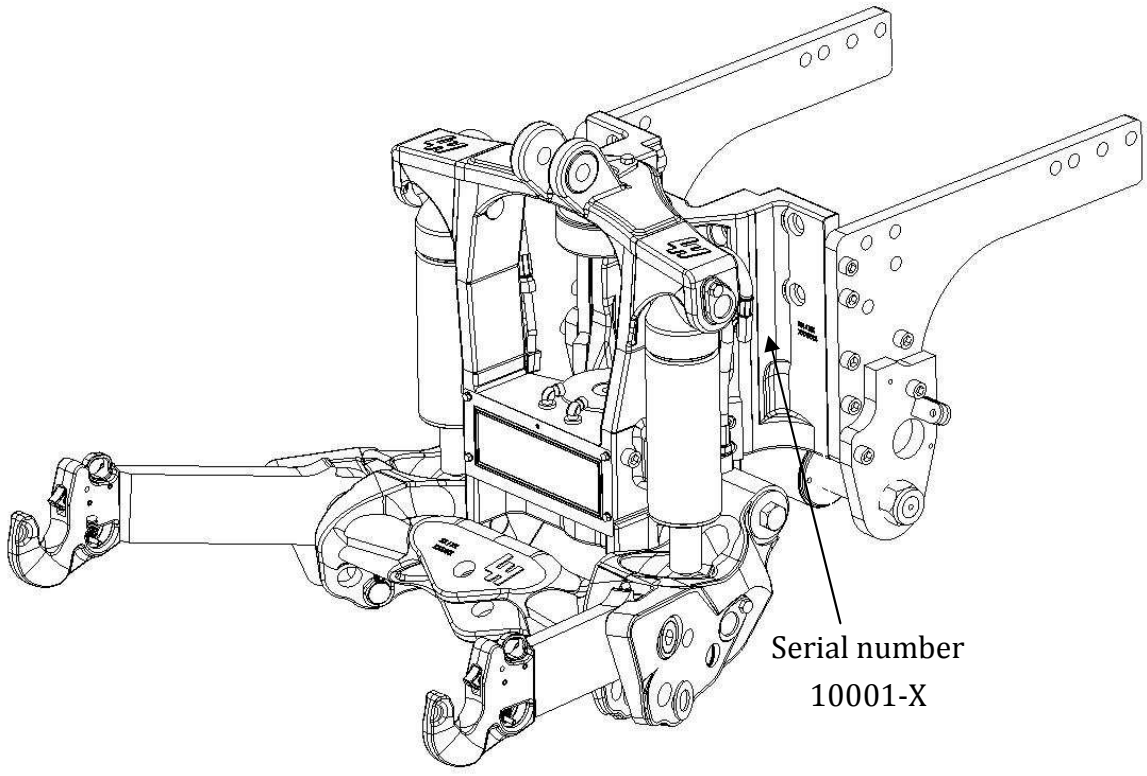


Figure 1. Locations of the safety signs, towing connector

3 TECHNICAL DATA

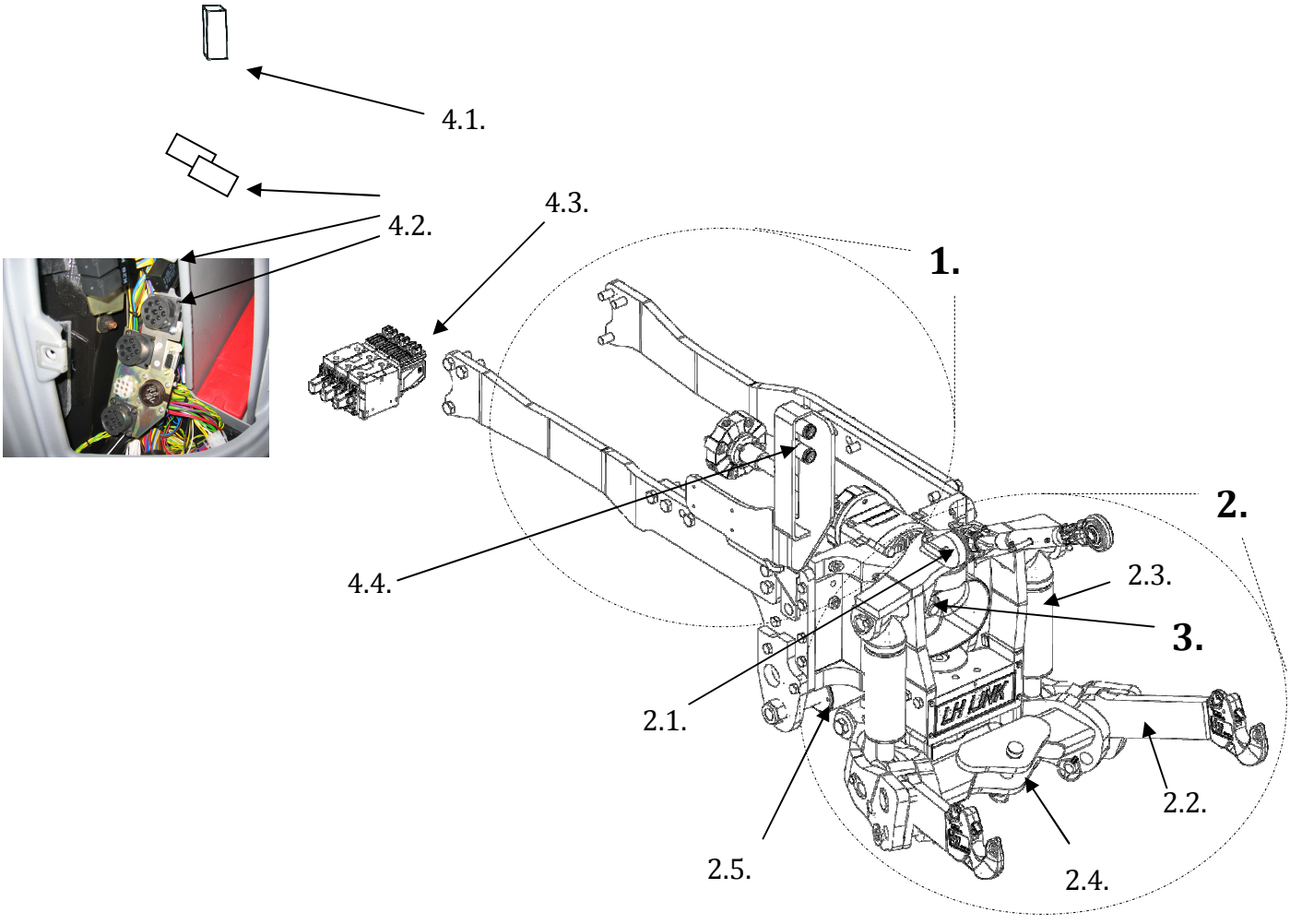
Tractor serial number	
LHLink front linkage serial number	
Width (front linkage straight, transport position)	800 mm
Width (including turning radius, working position)	1583 mm
Weight (standard equipment)	550 kg
Front linkage category	Cat. 2 (870 mm)
Quick release hook category	Cat. 3
Top link category	Cat. 2
Lifting capacity	3500 kg
Lifting range	840 mm
Max turning angle (with limiters)	35° (23°)
Front PTO nominal rotation speed (clockwise in direction oftravel)	1000 rpm
Front PTO shaft profile	1 3/8" (35 mm)
Max oil flow rate	50 l/min
Number of quick couplings for aux. hydraulics (std.equipment)	1–4 pairs
Control system CPU	IOEM



4 INTRODUCTION TO THE FRONT LINKAGE

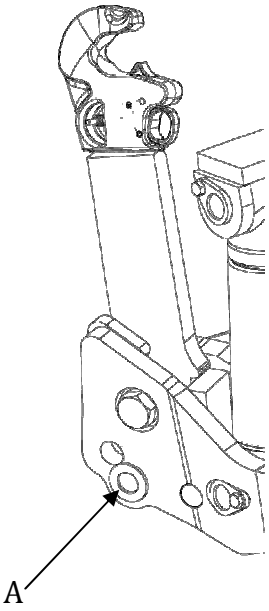
4.1 Components of Valtra LHLink

1. Fixed mounting frame
2. Pivoting linkage
   - 2.1. Top link mounting bracket
   - 2.2. Link arm
   - 2.3. Lifting cylinder
   - 2.4. Drag point clevis
   - 2.5. Turning cylinder
3. Power transmission
4. Control, other components
   - 4.1. Control unit (in tractor cabin)
   - 4.2. CPU, servicing connector and relay (in the cabin inside a housing on the side panel)
   - 4.3. Valve blocks (outside the cabin, at the front right-hand corner of the cabin)
   - 4.4. Quick couplings for auxiliary hydraulics (right side standard, left side available as an accessory)



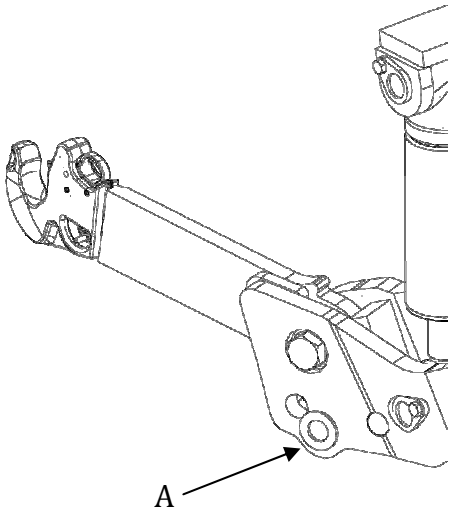
4.2 Operation of front linkage

There are two category-3 quick release hook arms in the Valtra LHLINK front linkage. The hooks can be installed in the transport, working or float position depending on how the front linkage will be used. To change the position:



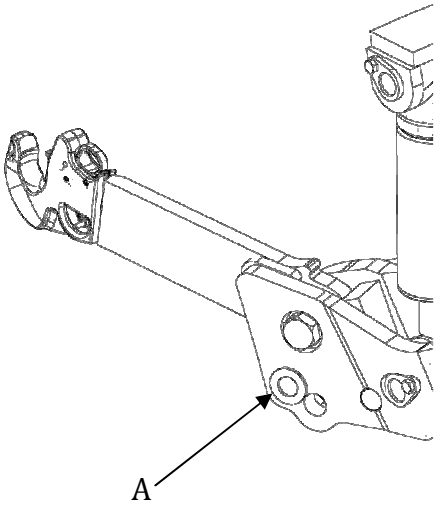
Transport position

1. Loosen bolt A.
2. Turn the arm upwards.
3. Fit bolt A into the lower hole and carefully fix it with a ring pin.



Working position

1. Loosen bolt A.
2. Turn the arm forward.
3. Fit bolt A into the lower hole and carefully fix it with a ring pin.



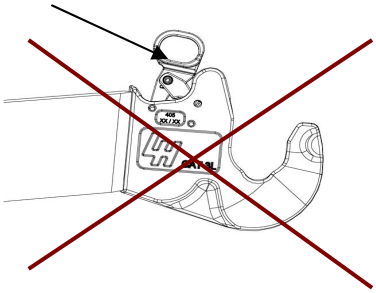
Float position

1. Loosen bolt A.
2. Turn the arm forward.
3. Fit bolt A into the upper hole and carefully fix it with a ring pin.

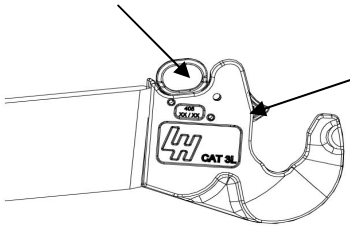
When driving on a public road with no working part attached to the front linkage, the quick release hook arms must be turned to their upper position. When the front loader is in use, the hook arms must be in the transport position.

When attaching a working part, always ensure that the quick release hooks are properly locked before starting work. The quick release hooks will only keep the working part securely in place on the front linkage if properly locked.

Lever up – unlocked



Lever down – locked



Hook locked with a M8x50 screw

5 OPERATING THE FRONT LINKAGE

The lifting and lowering of the front linkage as well as the auxiliary hydraulics is operated with a joystick on the tractor armrest. A control unit inside the tractor cabin controls the automatic turning of the front linkage. The instructions and images below are based on the Valtra Direct/Versu model. For instructions on the HiTech model, please see Chapter 5.10.

5.1 Controls for lifting and lowering

1. Activate the tractor auxiliary hydraulics.
2. Choose the option front valve block by turning the rotating pre-set switch.
3. If you are operating a tractor with a front loader, please select "Front linkage use" instead of "Front loader use" with the side panel switch (not included in the image).
4. Select the desired oil flow rate with the rotating pre-set switch:
   - 10%, 50%, 100% or memory slots M1, M2, M3
   - You can use the memory slots to programme the flow rate, holding time and float position.
5. To control lifting and lowering, use the joystick on the armrest.
   A. Backward – raising the arms
   B. Forward – lowering the arms
   C. Left and right – control of auxiliary hydraulics
      - All the while keeping the lower button on the joystick pressed.

5.2 Turning control (automatic mode)

The turning angle of the LHLink is specified based on the angle of the deflection controller, the turning angle of the front wheels and the position of the turning ratio controller.

You can use the deflection controller to turn the front linkage right and left.

The turning ratio controller governs how much turning the front wheels will affect the turning angle of the linkage.

Operating the turning ratio controller:

- When the controller is in its extreme left position, the front linkage will not turn as the front wheels turn.
- When the controller is in its middle position, the front linkage will turn as much as the front wheels.
- When the controller is in its extreme right position, the front linkage will turn more than the front wheels.

You can limit the maximum turning angle of the front linkage to both directions by using the separate limit switches.

LHLink control panel

Control button and LED
Used to switch front linkage control on/off. The motor must be in operation and the hydraulics must be on to activate the control.

Warning button and LED
Indicates malfunctions by flashing. There are several different flashing series for different

Turning ratio controller
Used to govern how the front linkage will turn when the front wheels are turned.

Left and right limit switch
Used to limit how much the front linkage may turn. The LED on the button will light up when the limit feature is in use. To deactivate the limit, press the button again.
For more information, please see Chapter 5.5.

Deflection controller
Used to control how much the middle point for turning of the front linkage differs from the middle point for turning the front wheels.

The front linkage will be activated when the position of the turning ratio controller, the deflection controller and the front wheels correspond to the actual position of the front linkage to prevent unexpected movements of the front linkage.

5.3 Switching turning control on/off

The turning control of the LHLink is in standby mode when the tractor is switched on and the control panel LEDs have flashed once.

- Turning on (control mode)
  - Press the control button.
  - Activate turning control: the LED will turn on.
- Turning off (standby mode)
  - Press the control button. The LED will turn off.

When the system is in standby mode, the position of the front linkage will be retained and the hydraulic cylinder that turns the front linkage is not controlled.

Turning control cannot be turned on if

- the motor is switched off:
  - the LED will flash twice and and then turn off
- hydraulics are switched off:
  - the LED will flash three times and and then turn off

5.4 Activating

Turning control will be activated when the position determined by the position of the turning ratio controller, the deflection controller and the front wheels corresponds to the turning angle of the front linkage.

Turning control

- Active when the control LED is on
- Inactive when the control LED continuously flashes once per second
  - Activate turning control by turning the tractor steering wheel or the deflection controller until the control LED turns on (stops flashing)
  - Turning control may be activated immediately if the front linkage is in the position corresponding to the control signal

Activate turning control when switching the system from standby mode to the control mode or when removing the turning limit.

You may have to turn both controllers and/or the steering wheel to activate turning control if the front linkage has been turned close to its maximum turning angle. If this is the case, turn the turning ratio controller to its minimum position and turn the deflection controller towards the front linkage's turning angle.

5.5 Limiting the turning range

You can limit the maximum turning angle of the LHLink during operation.

To set left and/or right turning limit:

1. Turn the front linkage to the desired maximum turning angle.
2. Press the limit switch on the desired side.
3. The limit switch light will turn on.

To delete left and/or right turning limit:

1. Press the limit switch: the limit switch LED will turn off.
    - You must activate turning control if the front linkage is turned close to its maximum limit when you delete the limit (see Activating above).

5.6 Malfunctions

The system announces malfunctions with flashing warning LEDs. The LEDs will flash every 10 seconds.

Malfunction LED flashing series:

- Flashes once – deflection controller malfunction
- Flashes twice – turning ratio controller malfunction
- Flashes three times – front linkage turning sensor malfunction
- Flashes four times – control valve malfunction
- Flashes five times – other malfunction

When a malfunction is observed, turning hydraulics control will be deactivated.

Acknowledge the malfunction by pressing the warning button. The device will switch to the activation mode.

If you are unable to eliminate the malfunction, contact an authorised Valtra service point!

If the malfunction is not a control valve or deflection controller malfunction, you will be able to control the front linkage in a manner similar to the joystick feature.

To activate front linkage control in the event of a malfunction:

1. Turn the deflection controller to its middle position to activate the turning feature.
2. Turn the deflection controller right or left to turn the front linkage.

5.7 Calibration and calibration mode

Calibration specifies the operating range of the sensors and controllers.

Calibration is only necessary during factory installation or after servicing the front linkage sensors/controllers.

You do not need to calibrate the system under normal conditions.

If a calibration has not been performed or if the calibrated values are erroneous, the LEDs of all the buttons on the control panel will remain on when the system is switched on. Turning control will operate normally even if the system has not been calibrated. However, the default values specified by the manufacturer will be used as the calibration values. The LHLink must always be calibrated before use!

Verify the following before performing a calibration:

1. The tractor is started.
2. Auxiliary hydraulics are switched on.
3. Turning control is in the standby mode (no LEDs on the control panel are on).

Note the following before performing a calibration:

- You can stop the calibration by pressing the control button. Any calibrations done before you press the control button will remain valid.
- LEDs of an uncalibrated turning control system can be switched off by pressing the control button.
- The order in which the left and right turning direction is calibrated is important because it will specify the operational direction of the sensors and controllers.
- Make sure that you calibrate the extreme positions and middle positions of the sensors and controllers.
- When calibrating the front linkage turning sensor and the front wheel turning angle sensor, you must control the front linkage in a manner similar to the joy-stick control: use the deflection controller to turn the front linkage left and right.
- You can check calibration progress by checking how many times the warning LEDs blink (see To perform calibration below). The warning light will flash every two seconds.
- If necessary, turn the front linkage to a position where the front wheels will not touch the front linkage.

To activate the front linkage turning control feature in calibration mode:

1. Turn the deflection controller to its middle position to activate the turning feature.
2. Turn the deflection controller right or left to turn the front linkage.

To perform calibration:

1. Simultaneously press the left limit switch and the control button.
2. Do not release the buttons until the warning light starts to flash (in about 10 seconds).

- The calibration mode is now active (do not touch the buttons unless you want to calibrate the system).

3. Calibrate the turning ratio controller (the warning LEDs will flash once).
    a. Turn the controller to its extreme left position.
    b. Turn the controller to its extreme right position.
    c. Turn the controller to its middle position.
    d. Save the calibrated value by pressing the warning button.
4. Calibrate the deflection controller (the warning LEDs will flash twice).
    a. Turn the controller to its extreme left position.
    b. Turn the controller to its extreme right position.
    c. Turn the controller to its middle position.
    d. Save the calibrated value by pressing the warning button.
5. Calibrate the front linkage turning sensor (the warning LEDs will flash three times).
    a. Turn the front linkage to its extreme left position with the deflection controller.
    b. Turn the front linkage to its extreme right position with the deflection controller.
    c. Turn the front linkage to its middle position with the deflection controller.
    d. Save the calibrated value by pressing the warning button.
6. Calibrate the front wheel turning sensor (the warning LEDs will flash four times).
    a. Use the steering wheel to turn the tractor's front wheels to their extreme left position.
    b. Use the steering wheel to turn the tractor's front wheels to their extreme right position.
    c. Use the steering wheel to turn the tractor's front wheels to their middle position.
    d. Save the calibrated value by pressing the warning button.
7. The calibration is complete.
    a. All the control panel LEDs will switch off.
    b. Use the control button to activate turning control.

If the front linkage turning sensor has been calibrated in the wrong order (the left and right direction have not been calibrated in the right order), the hydraulics will try to control the linkage to the wrong direction, i.e. to the opposite direction to which you want it to go.

5.8 Turning control (manual version)

You can turn the front wheels and the front linkage to opposite directions. This may cause unexpected dangerous situations.

The Valtra LHLink can also be delivered without the automatic turning control feature. In such a case, the front linkage is manually controlled with the joystick in the tractor cabin armrest.

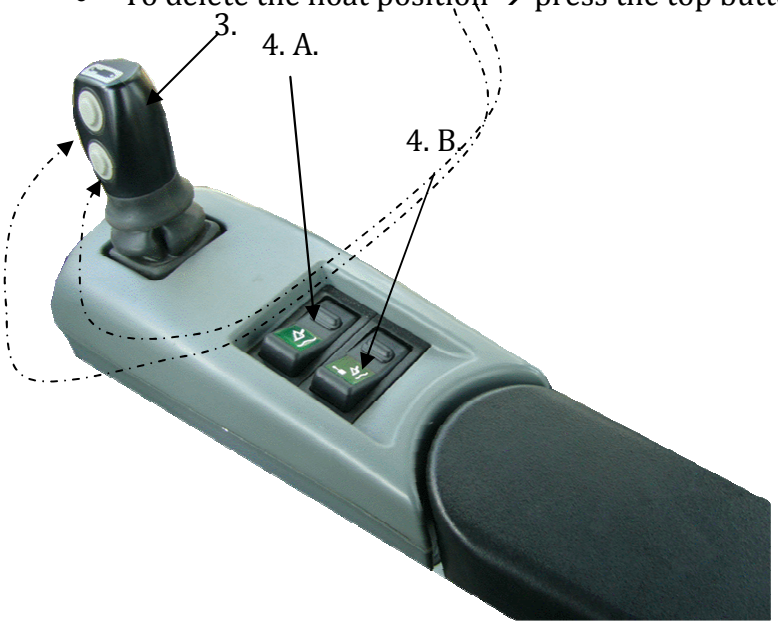
- Joystick
    - Left – front linkage turns left
    - Right – front linkage turns right
    - Backward – raising the arms
    - Forward – lowering the arms
    - Left and right with simultaneously pressing the lower joystick button – second pair of front hydraulics fast couplings

- Third front valve joystick (3F)
    - First pair of front hydraulics fast couplings

5.9 Controls for lifting and lowering (HiTech)

The armrest in Valtra HiTech models is different, and thus the LHLink is controlled in a slightly different manner. However, the turning control feature works as described above in Turning control (manual version). Below are instructions on how to raise and lower the front linkage in HiTech tractors.

1. Use the side panel rocker switch to activate the auxiliary hydraulics.
2. If you are operating a tractor with a front loader, please select "Front linkage use" instead of "Front loader use" with the side panel switch (not included in the image).
3. To control lifting and lowering, use the lever on the armrest.
   - Backward – raising the arms
   - Forward – lowering the arms
   - Left and right – control of auxiliary hydraulics
4. You can select the float position with the armrest switches.
   A. Switch closest to the lever (triple switch)
      - Turn the switch left and move the lever forwards
   B. Switch farthest from the lever (double switch)
      - Turn the switch left
      - Move the lever front/back while pressing the lower button → float position
      - To delete the float position → press the top button on the lever



6 FRONT PTO (ACCESSORY)

Front PTO is available for the LHLink as an accessory. You can use the front PTO in all positions of the front linkage, provided that you are using a wide-angle cardan shaft. The maximum working speed of a LHLink with front PTO is 1000 rpm. The direction of rotation is clockwise in the direction of travel. The shaft diameter is 1 3/8” (35 mm).

To switch on the front PTO, use the rocker switch on the tractor side panel. Before switching on the front PTO, make sure that the tractor is idling and the working part load is as low as possible. Do not increase the rpm until the front PTO has been successfully started. Switch off the front PTO with the rocker switch after use.

Please note: The front PTO includes a safety feature that prevents switching on the front PTO if the tractor is restarted with the rocker switch in the "front PTO on" position. To restart the PTO, switch the PTO switch off first and then on.

Front PTO on/off

Direction of rotation

Front PTO

Always use a 50° wide-angle cardan shaft with the front linkage!

The minimum rpm of the front PTO in working use is 1000. Lower rpm may damage the PTO.

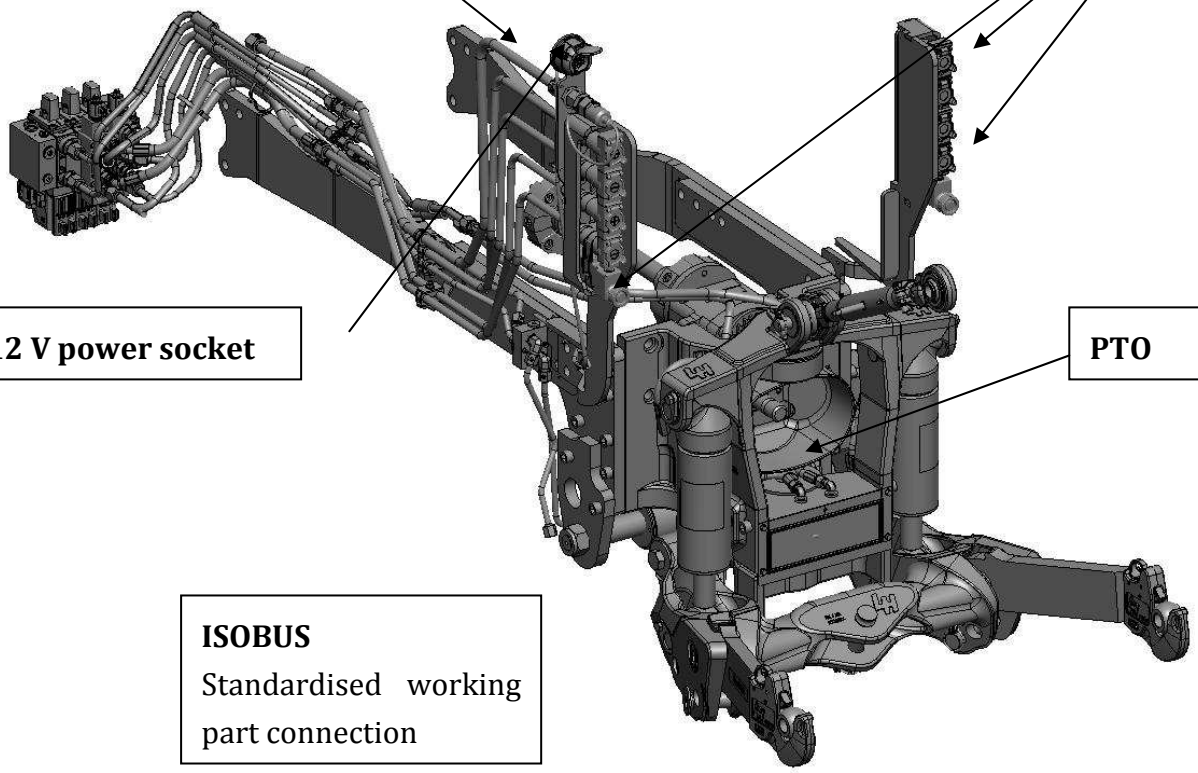
Make sure that the cardan shaft will never touch the hydraulic connectors below it in any working position!

7 ACCESSORIES

Currently available optional equipment for the Valtra LHLINK:

Free return
A non-counter pressure hydraulics return line to the tank, ¾”

3 pairs of quick couplings for auxiliary hy-



12 V power socket

PTO

ISOBUS
Standardised working part connection

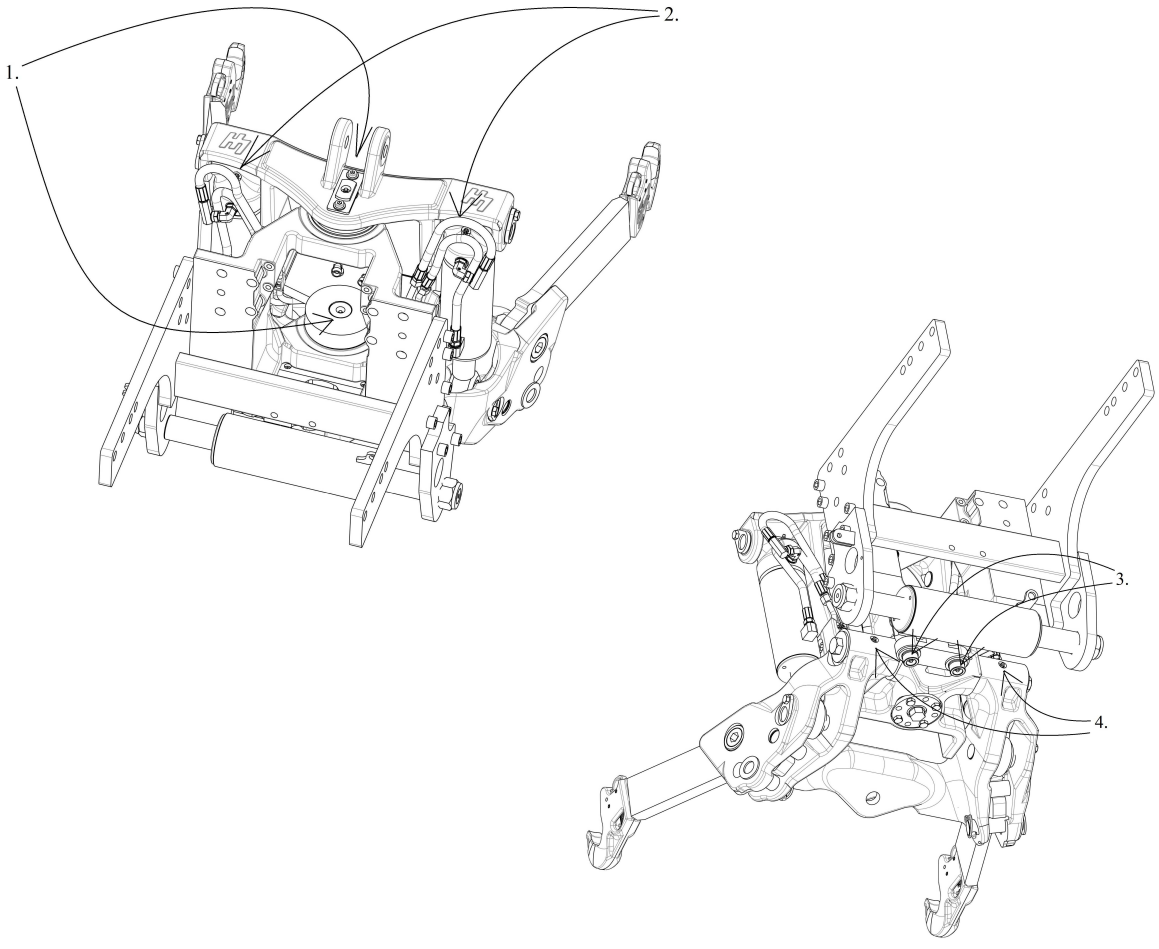
8 SERVICING

8.1 Front linkage

When correctly used, the front linkage does not require much regular maintenance. However, before using the front linkage you should check that the front linkage movement range is free, the locking mechanisms of the quick release hooks are functional, there are no oil leaks etc. A regular maintenance procedure is greasing. It should be performed every 50 operating hours. Greasing points:

1. Bearings between the fixed mounting frame and turning part: 2 grease nipples
2. Top ends of lifting cylinders: 2 grease nipples
3. Turning cylinder levers: 2 grease nipples
4. Torsion bar: 2 grease nipples

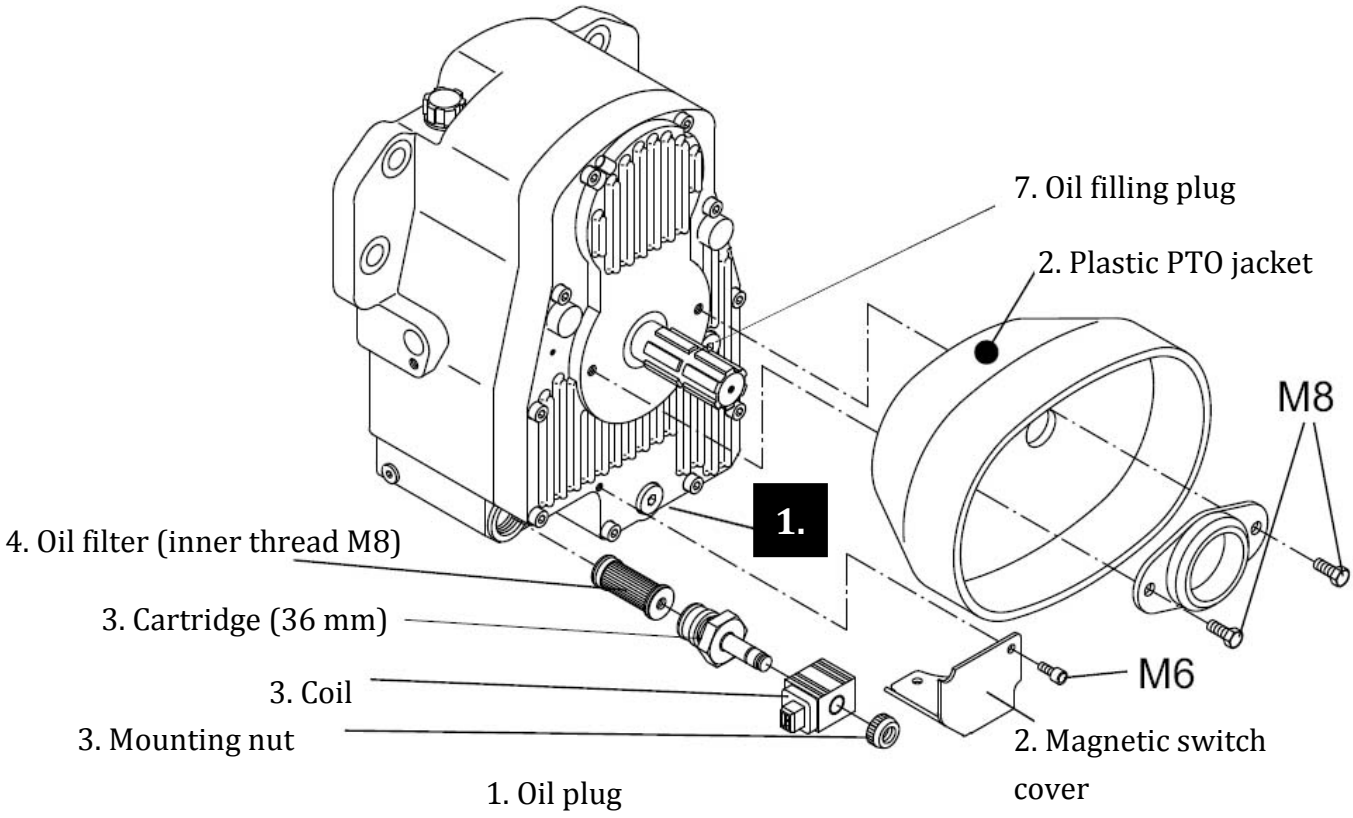
Fixing screws must be tightened every 50 hours: M20 – 385 Nm, M16 – 197 Nm.



8.2 Front PTO oil change

Maintenance of the front PTO includes oil changes and replacing the oil filter. The first oil change should take place after 50 hours of use. After this, the oil should be changed every 500 hours. The front PTO requires 1.8 litres of oil. The recommended oil type is a universal tractor oil, 10 W 30. Servicing:

1. Open the oil plug at the bottom part of the front PTO and drain out the used oil.
2. Remove the plastic PTO jacket and cover of the magnetic switch.
3. Detach the magnetic switch components.
4. Replace the oil filter (remove it with an M8 screw).
5. Lubricate the magnetic switch components and replace them in reverse order.
6. Replace the plastic PTO jacket, the magnetic switch cover and the oil plug.
7. Open the oil filling plug and fill the gearbox with fresh oil.
8. Make sure that there is 1.8 litres of oil in the PTO and/or the oil level is up to the bottom edge of the oil filling plug's threaded port after an oil change.
9. Replace the oil filling plug.
10. Properly dispose of the waste oil.

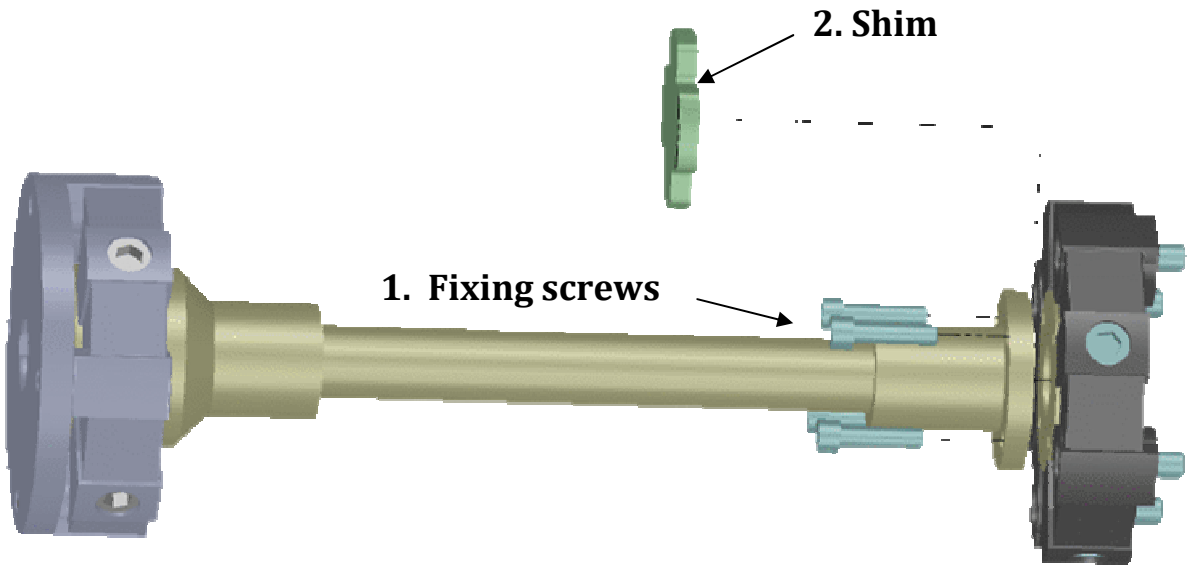


8.3 Disassembling front PTO intermediate shaft when replacing tractor V-belt

The tractor's V-belt cannot be replaced without partially disassembling the front PTO shaft. To disassemble the shaft:

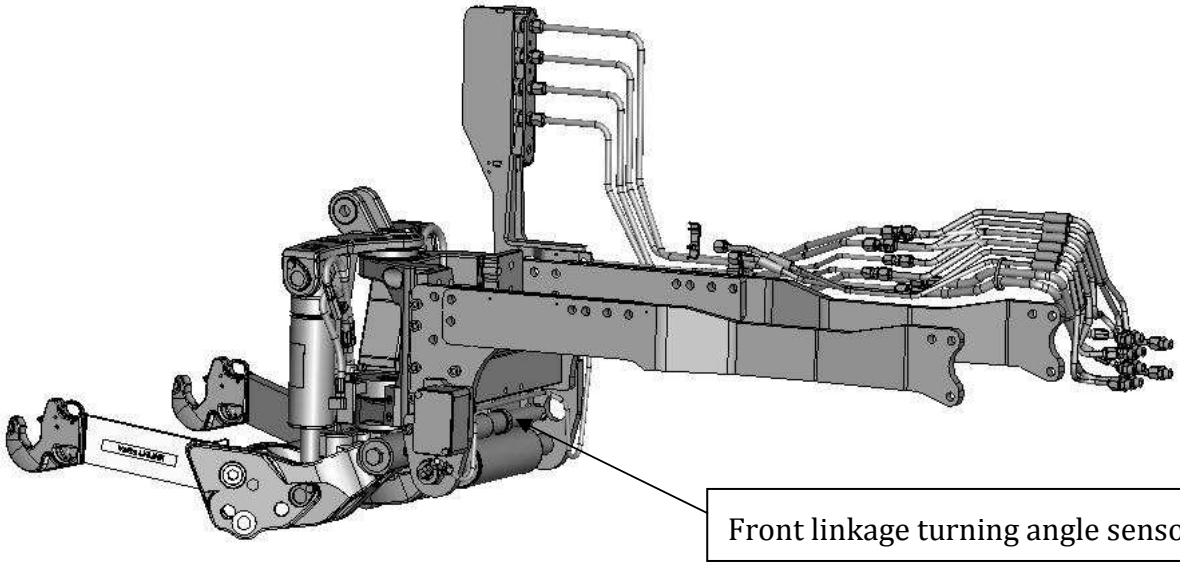
1. Open the fixing screws (4 pcs).
2. Remove the shim in between the shaft and the silent block from the above.

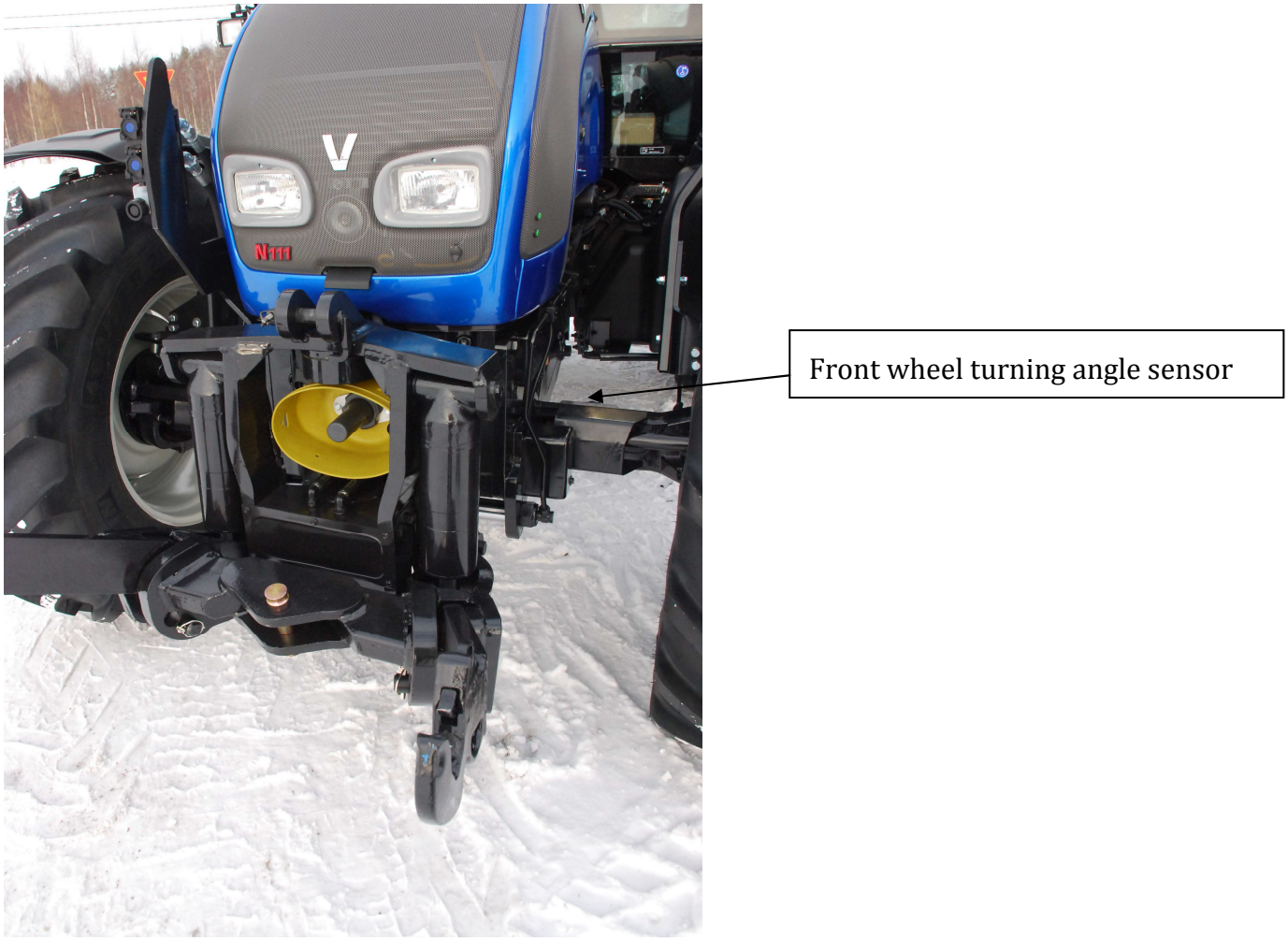
3. When reassembling the shaft, loosely screw on the two lowest fixing screws.
4. Next, put the shim in place by dropping it from the above and then tighten all the four screws.
    - Lock the screws in place with Loctite 2701 or similar.



8.4 Locations of front linkage sensors

The turning automatics of the LHLink includes two sensors: the front wheel turning angle sensor (a standard accessory in the tractor) and the front linkage turning angle sensor. The front wheel sensor is on the king pin of the left front wheel and the front linkage turning angle sensor is above the turning cylinder.





9 SPECIAL CASES

9.1 Front linkage with front loader

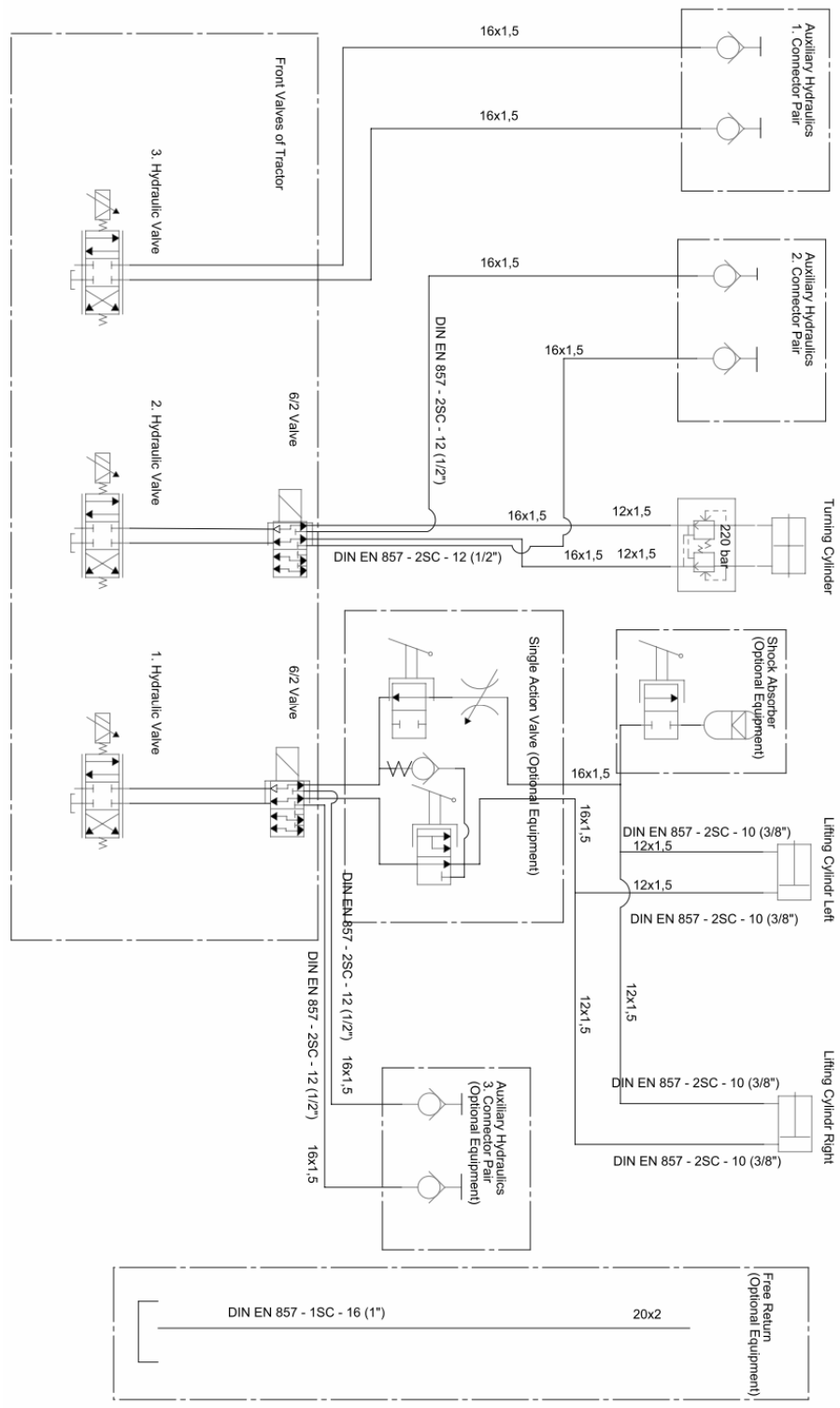
Valtra LHLINK can also be used in tractors equipped with a front loader. In this case, the tractor must be equipped with a front valve block with 6/2 selector valve that can be used to switch between front loader operation and front linkage operation. Simultaneously using the front loader and front linkage is not possible. When a front loader is used in combination with a turning front linkage (manual version), only one pair of auxiliary hydraulics quick couplings may be used in the front block.

When the front loader is in use, the front linkage must be in its top position and the arms must be in the transport position.

When the front linkage is in use, the front loader must be disengaged from the tractor.

10 APPENDICES

10.1 Hydraulic diagram, mechanical version, without loader



10.2 Hydraulic diagram, turning automatics