

Operating instructions Rerailing Equipment

LUKAS



DUO Traversing System

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(original operating instructions)

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1. Hazard classes

We distinguish between various categories of safety instructions. The table below gives you an overview of the assignment of symbols (pictograms) and key words to the specific hazard and possible consequences.

Pictogram	Damage / injury to	Key word	Definition	Consequences
	human	DANGER!	Immediate danger	Death or major injury
		WARNING!	Potentially dangerous situation	Potential death or major injury
		CAUTION!	Less dangerous situation	Minor or slight injury
	device	CAUTION!	Danger of damage to device / environment	Damage to the equipment, damage to the environment, damage to surrounding materials
	-	NOTE	Advice for application and other important / useful information and advice	No injury / damage to persons / environment / equipment



Wear helmet with face protection



Wear safety gloves



Wear safety shoes



Proper recycling



Observe principles of environmental protection



Read and observe operating instructions

2. Product safety

LUKAS products are developed and manufactured in order to guarantee the best performance and quality when used properly.

Operator safety is the most important aspect of the product design. Moreover, the operating instructions are intended to ensure LUKAS products are used safely.

The generally applicable legal and other binding regulations pertaining to the prevention of accidents and protection of the environment apply and are to be complied with in addition to the operating instructions.

The equipment may only be operated by persons with appropriate training in the safety aspects of such equipment – otherwise, there is a danger of injury occurring.

We would like to point out to all users that they should read the operating instructions carefully before using the equipment and comply with the instructions there without restriction.

We further recommend that a qualified instructor train you in the use of the product.



WARNING / CAUTION!

The operating instructions for the hoses, the accessories and the connected hydraulic equipment must also be observed.


























Even if you have already received instructions on how to use the equipment, you should still read through the following safety instructions once again.



WARNING / CAUTION!

Ensure that the accessories and connected equipment used are suitable for the maximum operating pressure.

	<p>Make sure that limbs or clothing cannot become trapped between the exposed moving parts (e.g. piston plate and jack).</p>	<p>It is prohibited to work under load if this load is lifted exclusively by hydraulic equipment. If this work is absolutely imperative, additional mechanical supports must be used.</p>	
	<p>Wear protective clothing, safety helmet with visor, safety shoes and protective gloves</p>	<p>Inspect the equipment before and after use for visible defects or damage.</p>	
 	<p>The department responsible is to be informed immediately of any changes (including to the operating behaviour). If necessary, the equipment is to be shut down immediately and secured.</p>	<p>Inspect all lines, hoses and screwed connections for leaks and externally visible damage. If necessary, repair immediately. Squirting hydraulic liquids can result in injuries and fires.</p>	
 	<p>In the event of malfunctions, immediately shut down the equipment and secure it. The malfunction is to be repaired immediately.</p>	<p>Do not carry out any changes (additions or conversions) to the equipment without obtaining the prior approval of LUKAS.</p>	

 	<p>Comply with all the instructions regarding safety and danger on the equipment and in the operating instructions.</p>	<p>All the instructions regarding safety and danger on the equipment are to be kept complete and in a legible condition.</p>	 
 	<p>Any method of operation which impairs safety and/or stability of the equipment is prohibited.</p>	<p>Comply with all specified dates or dates specified in the operating instructions pertaining to regular checks / inspections of the equipment.</p>	
 	<p>Safety devices may never be deactivated.</p>	<p>The maximum operating pressure marked on the equipment must not be exceeded.</p>	 
	<p>Before the equipment is switched on / started up, and during its operation, it must be ensured that nobody is endangered by the operation of the equipment.</p>	<p>Only original LUKAS accessories and spare parts may be used for repairs.</p> <p>During all work and transport operations involving the equipment, take care not to trip and become caught in hose loops.</p>	  
 	<p>When working close to live components and cables, suitable measures must be taken to avoid current transfers or high-voltage transfers to the equipment.</p>	<p>The build-up of static charge with the potential consequence of spark formation is to be avoided when handling the equipment.</p>	
	<p>The equipment is filled with hydraulic fluid. These hydraulic fluids can be harmful to your health if swallowed or if their vapours inhaled. Direct contact with the skin is to be avoided for the same reason. Please also note that hydraulic fluids can also have a negative effect on biological systems.</p>	<p>When working with or storing the equipment, ensure that the function and the safety of the equipment are not impaired by the effects of extreme external temperatures and that the equipment is not damaged in any way. Please note that the equipment can also heat up over a long period of use.</p>	
	<p>Ensure adequate lighting when you are working.</p>	<p>Before transporting the equipment, always ensure that the accessories are positioned in such a way that they cannot cause an accident.</p>	
	<p>Always keep these operating instructions within reach where the equipment is used.</p>	<p>Ensure the proper disposal of all removed parts, leftover oil and fluid, and packaging materials.</p>	 

The generally applicable, legal and other binding national and international regulations pertaining to the prevention of accidents and protection of the environment apply and are to be implemented in addition to the operating instructions.

WARNING / DANGER / CAUTION!

The equipment **is to be used exclusively** for the **purpose stated in the operating instructions (see chapter "Proper use")**. Any form of use beyond this is **not considered proper use**. The manufacturer / supplier is not liable for any damages resulting from improper use. The user bears sole responsibility for such use.

Observance of the operating instructions and compliance with the inspection and maintenance conditions are covered by the definition of proper use.



Never work when you are overtired or intoxicated.



3. Proper use

The components of the LUKAS DUO traversing unit are specially designed for rerailing technology. In the event of derailments, the traversing unit is used to raise rail vehicles, move them across the rails, thus allowing the vehicles to be rerailed.

A range of accessories such as base plates, stacking sets, etc. is available for specific applications.

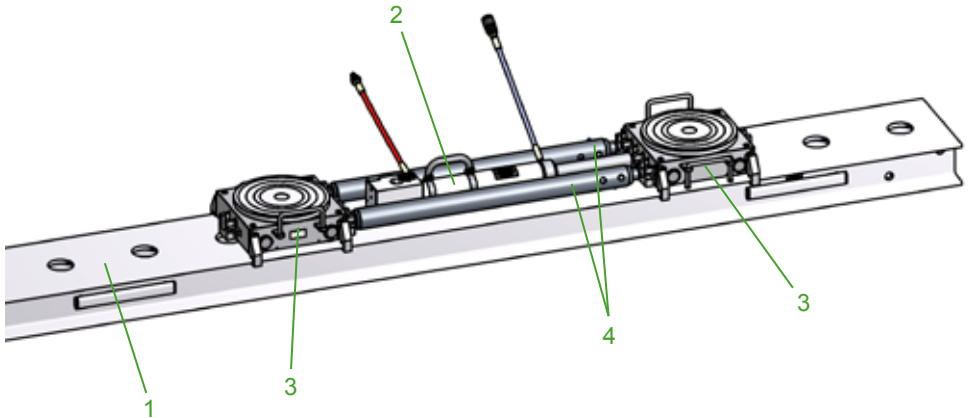


CAUTION!

To minimise the risk to the environment, remedy leaks as soon as possible.

The DUO traversing unit consists of:

- Rerailing bridge (Item 1)
- Traverse jack (Item 2)
- Roller carriage (Item 3)
- Adjustable distance bars (Item 4) [optional]



NOTE:

Suitable lifting gear (e.g. LUKAS HP jack) and accessories are necessary in order to raise rail vehicles and either move them while raised or place them on to the DUO traversing unit.

4. Functions and performance

4.1 Description

4.1.1 Rerailing bridge

The rerailing bridge is placed across the rails and acts as the base and traverse support for the LUKAS roller carriages and the LUKAS traverse jacks.

If one bridge is not long enough, a second bridge can be bolted on by means of connecting elements.

The anchor pin or the integrated anchor jack of the traverse jack can be fixed in the openings at the top of the rerailing bridge. The rerailing bridges are transported by means of the pull-out carrier handles mounted on the sides.

4.1.2 Roller carriages

The LUKAS roller carriages are designed for carrying heavy loads. The special rollers on the underside of the roller carriage make it possible to move the carriage by hand or with the aid of traverse jacks. The roller carriages are specifically designed to match the LUKAS rerailing bridges, thus ensuring optimum traversing of the load.

The upper sliding plate is simply placed on the roller carriage yet it can be rotated and shifted laterally with respect to rolling direction in order to minimise the danger of a jack placed on the plate tilting or the supported load tipping the roller carriage during operation.

4.1.3 Traverse jack

LUKAS traverse jacks are designed for the purpose of traversing the LUKAS roller carriages on the rerailing bridges. The traverse jack is a double-acting hydraulic cylinder. The end of the piston rod is attached to the mounting points provided in the roller carriage. This makes it possible to move the roller carriage in the retract and extend direction of the traverse jack.

Two versions of the traverse jacks are available. The one version has a fixed pin for locking the traverse jack in the fixing points of the LUKAS rerailing bridge while instead the other version features an integrated single-acting anchor jack that performs the same function as well as lateral guide plates.

The advantage of the version with the anchor jack is that the jack can be hydraulically adjusted without the user having to enter the danger zone. The prerequisite for this function is that the rerailing bridge is aligned approximately horizontal and the load is raised such that there is no danger of the roller carriage rolling away to the side. Nevertheless, it is still essential to firmly secure the load.

The anchor jack is always extended when in no-load position to ensure anchorage in the rerailing bridge is always retained even in the event of pressure loss in the hydraulic system. The anchor jack is retracted when pressure is applied, thus making it possible to shift the traverse jack.

4.1.4 Distance bars

The distance bars are used when a load is raised at two or more points and is then to be shifted in one direction by means of roller carriages. They are always used in pairs to connect the roller carriages. Most distance bars feature a rough adjustment and fine adjustment facility to allow them to be adjusted precisely to the distance between the lifting points. Versions are also available that cannot be adjusted.

The bars are attached to the securing points in the roller carriages.

4.2 Hydraulic supply of jacks

Only LUKAS motor pumps or suitable LUKAS hand pumps may be used to drive the equipment.

If an other-make pump assembly or hand pump is used, it is necessary to make sure that it is designed in accordance with LUKAS specifications otherwise hazardous situations could occur for which LUKAS cannot be held responsible. Particular care must be taken to ensure that the maximum permissible operating pressure of the connected LUKAS devices is not exceeded.



NOTE:

Before you use pumps of a different manufacturer, you must contact LUKAS or an authorised dealer.

The connection between the pump assembly or hand pump and the hydraulic jacks is made by hose lines.

5. Connection of hydraulic devices

5.1 Basic information

Double-acting, hydraulically operated **implements** are fitted with a male quick-disconnect coupling on the pressure supply side (jacks: jack bottom end) and a female quick-disconnect coupling on the return side (jacks: piston rod end); a pair of extension hoses connect them to the control unit.

Single-acting, hydraulically operated **implements** are fitted with a male quick-disconnect coupling on the pressure supply side; an extension hose line connects it to the pump assembly or control unit.

All LUKAS extension hose pairs/lines are colour-coded and equipped with quick-disconnect couplings to minimise the possibility of misconnection.



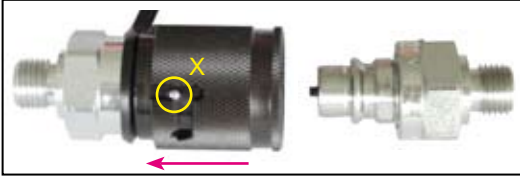
WARNING / DANGER / CAUTION!



Before connecting equipment, make sure that **all the components used** are suitable for the **maximum operating pressure of the pump unit**. In cases of doubt, you **must** consult LUKAS directly!

5.2 Coupling the quick-disconnect couplings

The device connects to the hydraulic pump by means of individually coded quick-connect coupling halves (plug and socket).



Before coupling, remove the dust protection caps, then pull back and hold the locking sleeve of the female coupling (position X). Connect the nipple and female coupling and let go of the locking sleeve. To conclude, turn the locking sleeve into position Y. The connection is now in place and secure. Uncouple in reverse order. Hoses can be connected only when **depressurised**. To protect against dust, the accompanying dust protection caps must be replaced.



CAUTION!

Always connect the return hose first and then the supply hose.



NOTE:

Coupling of the devices is only possible when the hoses are **depressurised**.

To protect against dust, the accompanying dust protection caps must be replaced.



WARNING / DANGER / CAUTION!

Some quick-disconnect couplings have special functions. Therefore it is not permitted to **screw** them **off** the hoses or to **swap** them.



6. Operation

6.1 Setting up the DUO traversing system

6.1.1 General information

The DUO traversing system consists of several individual components. By correspondingly configuring the individual components, several different complete systems can be built up. While not all individual components are required for some of these complete systems, you may need several of the individual components to make up other systems.

In addition to the individual components of the DUO traversing system, you will need suitable hydraulic jacks for lifting the load and at least one suitable hydraulic unit or hand pump to supply the pressure.

6.1.2 Preparing to set up the traversing system



DANGER / CAUTION!

Before the individual components of the DUO traversing system can be set up, the load to be raised must be secured in accordance with applicable guidelines and regulations to prevent it slipping.

Check the individual components for visible damage before setting up the traversing system.

You must pay attention to the following points while setting up the components of the traversing system:

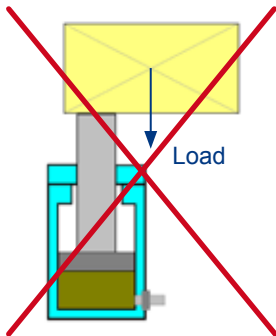
- Make sure that the load is placed centred on to the piston rod or roller carriage plate.



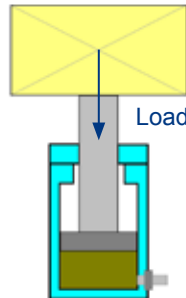
NOTE:

It may be necessary to select a more favourable load application point!

Position the jack/roller carriage under the centre of gravity of the load so that the load cannot tilt during the lifting and traversing operation thus posing a danger to the operating personnel or the equipment itself. The load must always rest centred on the surface of the piston or roller carriage plate. Avoid off-centre loads!

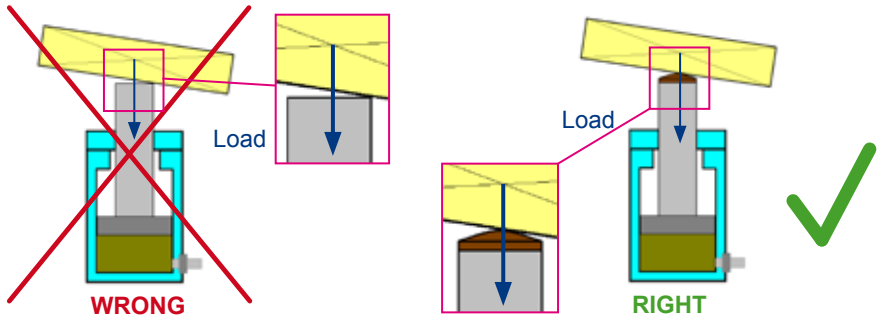


WRONG

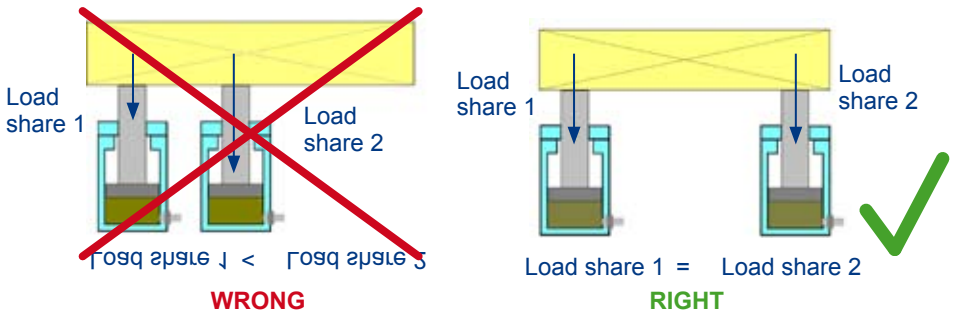


RIGHT

In the majority of cases it is not possible to rest the load over the entire surface of the jack piston. We therefore recommend using suitable piston guard plates otherwise the piston rod or jack may be damaged. A convex piston guard plate evenly distributes the load over the surface of the piston.

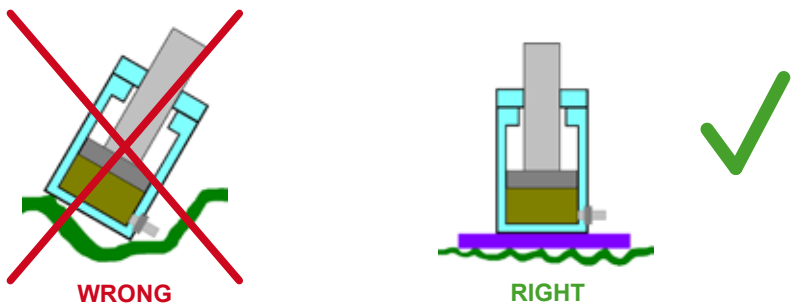


If several jacks/roller carriages are used simultaneously, the load should be distributed as evenly as possible over all jacks/roller carriages.



The following points must be observed while setting up jacks:

- Non-slip, flat ground so that the entire base of the jack rests on the ground. If there is doubt concerning the load bearing capability of the ground, use suitable wooden or metal base supports in order to increase the contact area.



CAUTION!

Hydraulic fluid can leave an oily film on the ground!

- The ground must provide support over the entire area (no grids, rubble, etc.)
- Never place jacks on ductile (non-rigid) base

- To avoid damaging the piston and to ensure safe force application, **never use jacks without a piston guard plate**



CAUTION!

Use an additional non-slip base between the piston guard plate and the load to be lifted as there may also be a greasy film at the contact point on the load!

- Make sure that the load is applied centred on to the piston rod.

6.1.3 Setting up the rerailing bridges

The bridge is placed across the tracks and carefully supported by wooden planks. Please ensure that:

- The rerailing bridge and the supporting wooden planks are placed on firm and stable ground

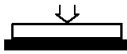
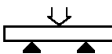
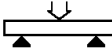
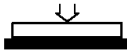
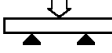
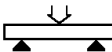
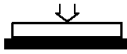
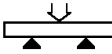
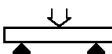


DANGER / CAUTION!

When using wooden supports make sure that undamaged, hardwood is used to rule out the possibility of the base splintering. It is **not** sufficient to additionally strap together other pieces of wood with metal straps!


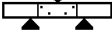


- The maximum load of the bridge is not exceeded:

Bridge height [mm] <i>[in.]</i>	Support width [m] <i>[ft.]</i>	Max. load [kN] <i>[lb]</i>
65 <i>2.56</i>	 0 * <i>0 *</i>	200 <i>44,964</i>
	 0,5 <i>1.64</i>	60 <i>13,489</i>
	 1 <i>3.28</i>	20 <i>4,496</i>
140 <i>5.51</i>	 0 * <i>0 *</i>	700 <i>157,374</i>
	 1 <i>3.28</i>	500 <i>112,410</i>
	 1,43 <i>4.69</i>	400 <i>89,928</i>
184 <i>7.24</i>	 0 * <i>0 *</i>	1200 <i>269,784</i>
	 1 <i>3.28</i>	900 <i>202,338</i>
	 1,43 <i>4.69</i>	650 <i>146,133</i>

* fully supported

- The maximum load of the bridge connecting elements (optional) is not exceeded:

Bridge height	Support width	Max. load
[mm] <i>[in.]</i>	[m] <i>[ft.]</i>	[kN] <i>[lb]</i>
140 <i>5.51</i>	 1 <i>3.28</i>	200 <i>44,964</i>
184 <i>7.24</i>	 1 <i>3.28</i>	300 <i>67,446</i>

- The bridge is horizontally aligned:
The angle of the bridge may not exceed 3°.

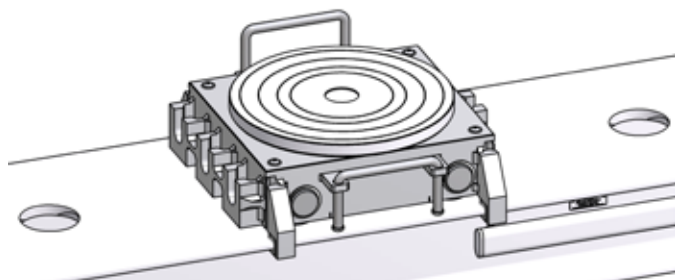
If one bridge is not long enough, a second bridge can be bolted on by means of connecting elements.

For this purpose, the two rerailing bridges are placed end-to-end and bolted together with the aid of flat steel plates, bolts, washers and nuts (as shown in the picture below). Make sure that the upper surfaces of the rerailing bridges are not axially offset otherwise trouble-free traversing may not be guaranteed and/or the individual components may be damaged.



6.1.4 Setting up the roller carriages

The roller carriages are placed on to the rerailing bridges in such a way that the rollers of the roller carriage are able to move along the rerailing bridges. The guides prevent the roller carriage from slipping to the side off the rerailing bridge.



6.1.5 Setting up the hydraulic jacks on the roller carriage

The hydraulic jacks are placed in the centre of the upper support plate on the roller carriage if they are to be moved together with the raised load (see illustration below).

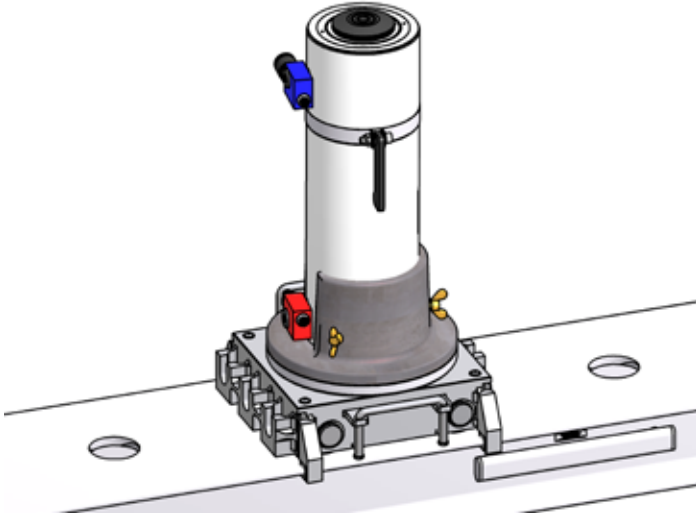


DANGER / CAUTION!

Take care when moving a load raised by a hydraulic jack (mounted on the roller carriage) to ensure that the load cannot tilt while traversing.



It is safer to move loads when it is raised externally by hydraulic jacks, placed on the roller carriage then traversed.



CAUTION!

When setting up the hydraulic jacks, observe all information and instructions in the separate operating instructions for the jacks used!

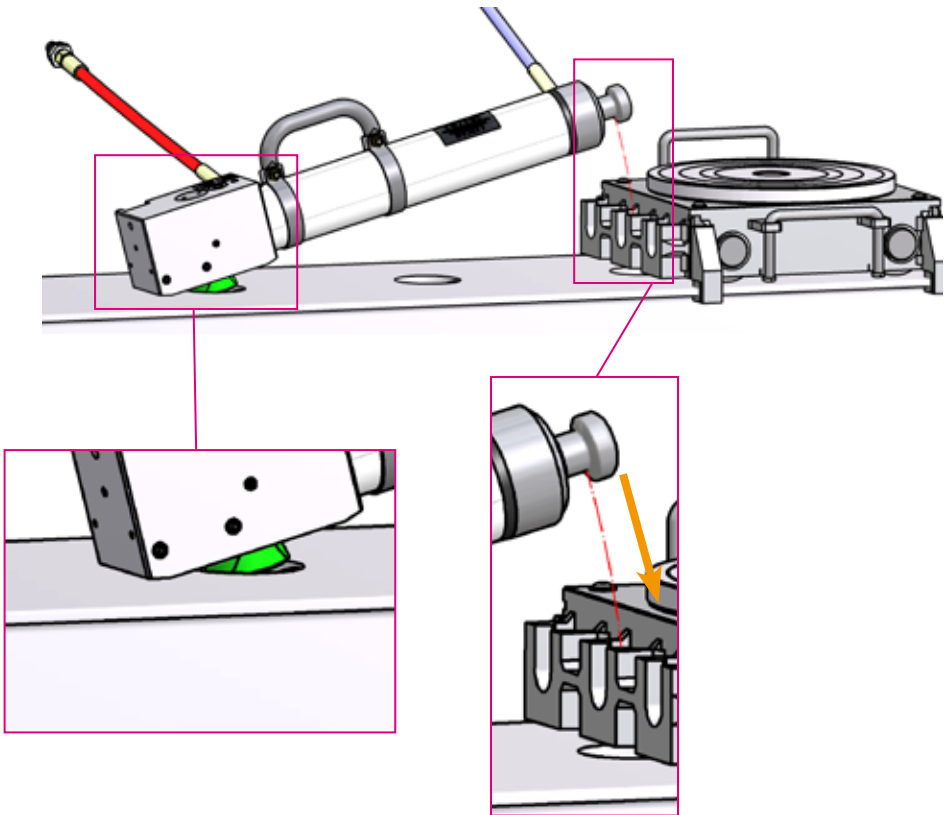


NOTE:

We recommend that you use a base plate from the LUKAS range of accessories when you wish to move a hydraulic jack that is mounted on the roller carriage. The base plates stabilise the jack and counteract the load tipping while traversing.

6.1.6 Setting up the traverse jacks with fixed anchor pin

Fit the traverse jack with the fixed anchor pin in one of the matching mounting points in the rerailing bridge and attach the piston rod head in the centre retainer on the roller carriage (see illustration below). You may have to move the roller carriage a little in order to attach the jack head.



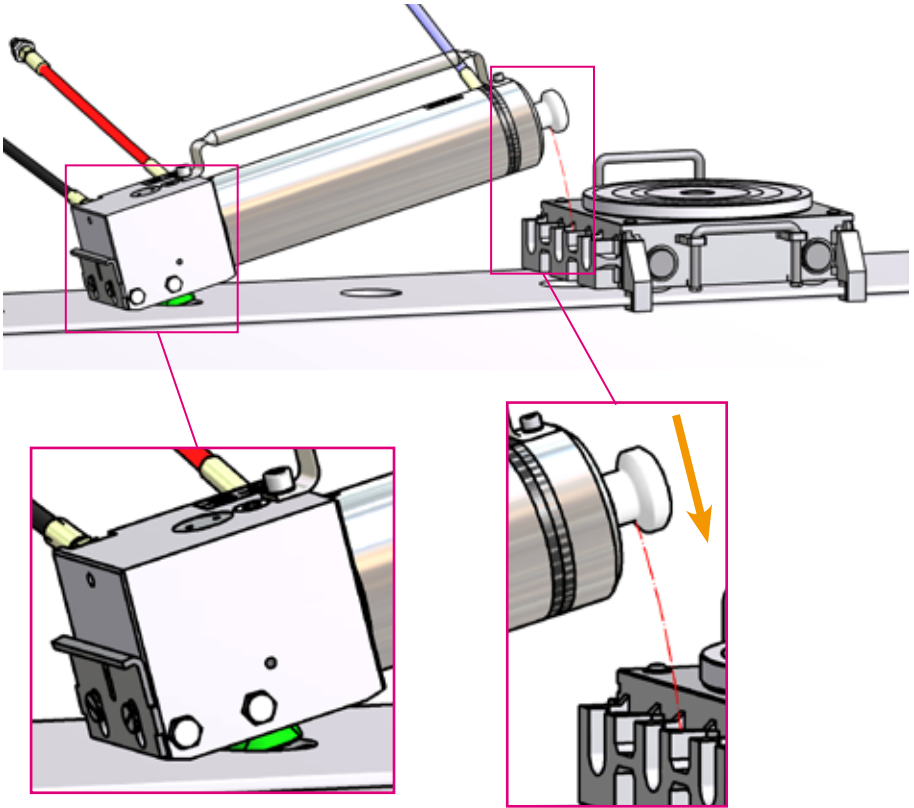
NOTE:

Bear in mind that the traversing range of the jack is limited by the stroke of the piston!

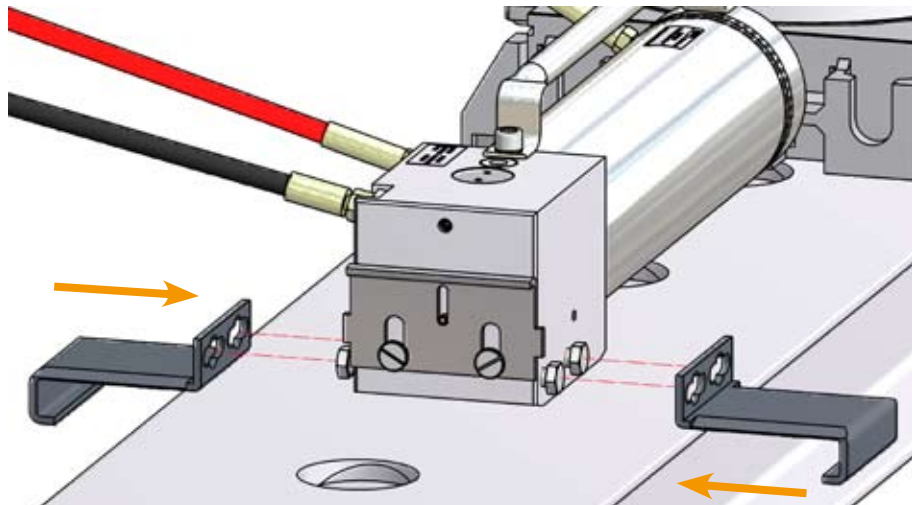
This means that the DUO traversing system must be set up such that the stroke of the jack piston is sufficient for the required traversing range!

6.1.7 Setting up the traverse jack with anchor jack

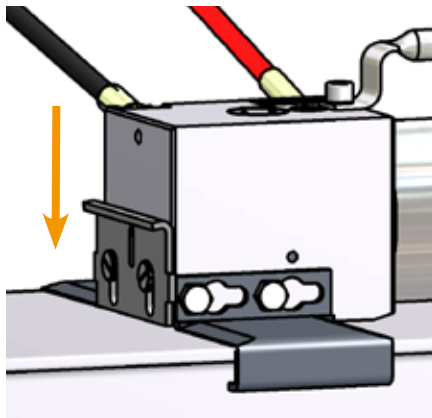
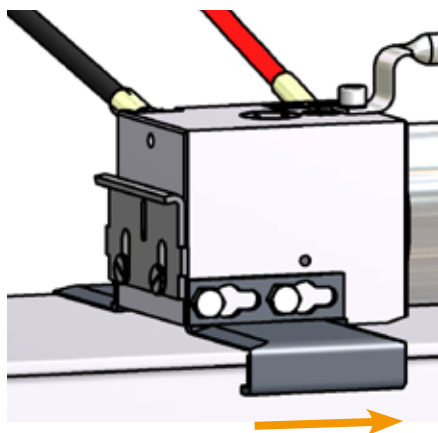
Fit the traverse jack with the head of the anchor plate in one of the matching mounting points in the rerailing bridge. For this purpose you will have to pull the slide plate on the back end of the traverse jack up a little. Then attach the piston head of the traverse jack in the centre retainer on the roller carriage (see illustration below). You may have to move the roller carriage a little in order to attach the jack head.



Now pull up the slide plate as far as it will go and attach the guide plates on the right and left of the traverse jack.



Slide the attached guide plates in the direction of the jack head and push the slide plate down again.
The traverse jack is now secured on the rerailing bridge and cannot shift to the side or lift.



6.1.8 Setting up and adjusting the distance bars

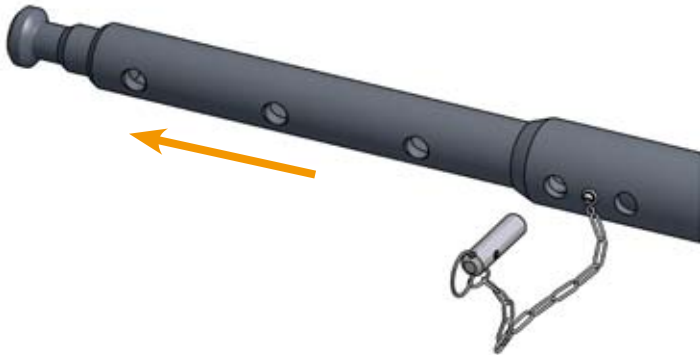
The distance between the load lifting points must be set exactly with the distance bars. For this reason they come with a rough and fine adjustment option.

Rough adjustment of the distance bars:

1. Pull out the lock pin.



2. The coupling bar can now be pulled out to roughly set the distance between the roller carriages. The hole in the coupling bar must be aligned with the corresponding hole in the tube.

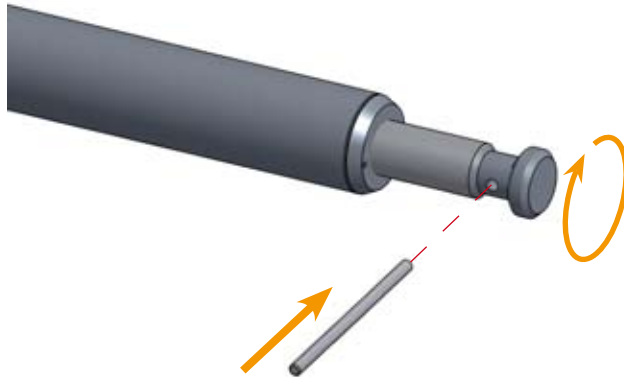


3. Reinsert the lock pin in the corresponding hole in the tube.



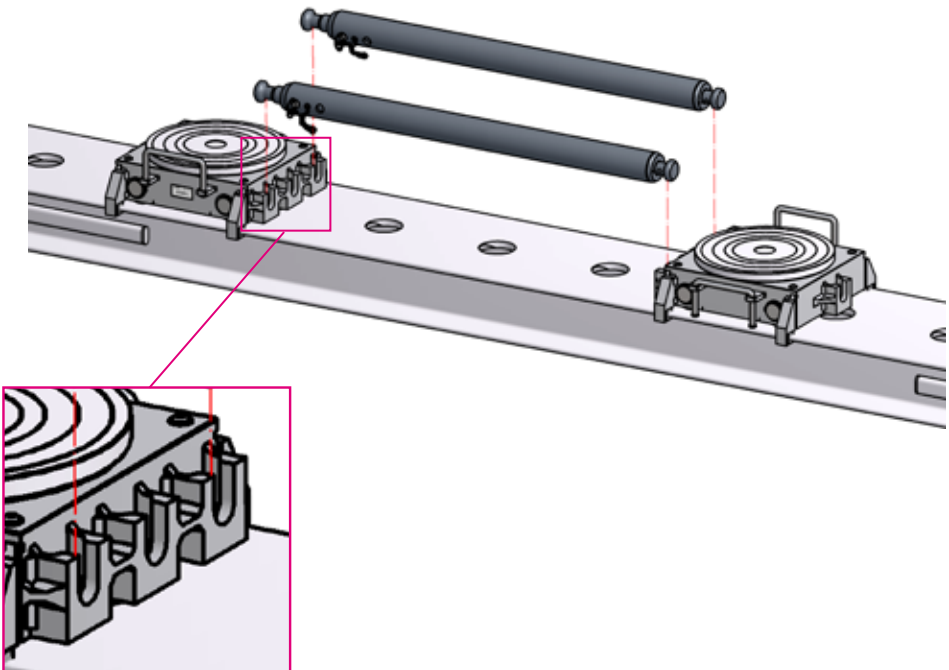
Fine adjustment of the distance bars:

Fine adjustment takes place at the other end of the tube. Insert a metal rod ($\varnothing 8$ mm) or similar tool in the hole in the adjusting pin and unscrew it (turn in anticlockwise direction) until the required size is reached. For the fine adjustment, the adjusting pin can be unscrewed by a maximum of 80 mm.



Connecting two roller carriages:

Two distance bars must always be used to connect two roller carriages. These two distance bars must be set to the same length. They are placed in the retainers in the roller carriages with the coupling bar on the one side and the adjusting pin on the other.





NOTE:

If the traverse jack is to be used between the two roller carriages, the distance bars should be fitted after setting up the traverse jack.

6.1.9 Examples of traversing systems



DANGER / CAUTION!

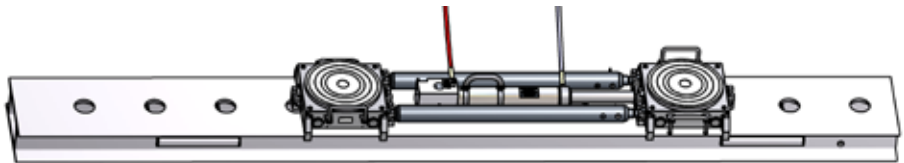
If there are doubts concerning the set-up of your traversing system a correspondingly trained safety technician or LUKAS should be contacted directly before start-up.



NOTE:

There are two methods of setting up the traverse jack in combination with two roller carriages:

1. The traverse jack is set up between the distance bars of the roller carriages.



2. The traverse jack is set up outside the connected roller carriages.



Several examples of setting up traversing systems are illustrated in the following:

1. Traversing system with one roller carriage and separate load lifting system
(recommended method)

Required components:

- Controlled hydraulic supply (e.g. hydraulic unit with control valve)
- Separate load lifting system (e.g. hydraulic jack with accessories)
- Rerailing bridge
- 1 roller carriage
- 1 traverse jack
- Support material (e.g. hardwood blocks)

2. Traversing system with two roller carriages and separate load lifting system
(recommended method)

Required components:

- Controlled hydraulic supply (e.g. hydraulic unit with control valve)
- Separate load lifting system (e.g. hydraulic jack with accessories)
- Rerailing bridge
- 2 roller carriages
- 1 traverse jack
- 2 distance bars
- Support material (e.g. hardwood blocks)



3. Traversing system with one roller carriage and mounted hydraulic jack

Required components:

- Controlled hydraulic supply (e.g. hydraulic unit with control valve)
- Rerailing bridge
- 1 roller carriage
- 1 traverse jack
- 1 hydraulic jack
- Support material (e.g. hardwood blocks)



4. Traversing system with two roller carriages and mounted hydraulic jacks

Required components:

- Controlled hydraulic supply (e.g. hydraulic unit with control valve)
- Rerailing bridge
- 2 roller carriages
- 1 traverse jack
- 2 hydraulic jacks
- Support material (e.g. hardwood blocks)



6.2 Start-up



CAUTION!

During start-up, observe all information and instructions in the separate operating instructions for the other components of your rerailing system.

Preparations before start-up:

Before start-up, all components must be visually inspected for damage and leaks. Damaged components must not be used and must be exchanged.

Hydraulic components must be bled before start-up takes place.

Bleeding the traverse jack:

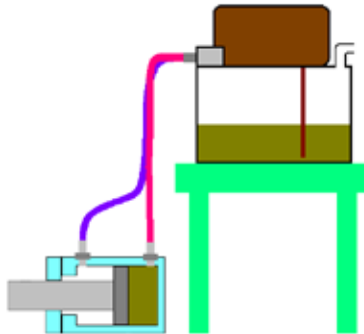
The device must be bled before initial commissioning and after repairs:

- Connect device to hydraulic pump (see Section "Connecting the devices").
- Fully extend and retract the device several times without load.



NOTE:

We recommend that the connected hydraulic supply unit is positioned higher than the jack during the bleeding operation.
The connections of the hydraulic jack should face upwards.



Start-up:



DANGER / CAUTION!

According to instructions, secure the vehicle to be rerailed to prevent it rolling, slipping and tipping!



Set up all the components to be used as described under "Setting up the DUO traversing system". During set-up, observe all applicable standards, directives, laws and regulations. The separate hydraulic supply and the control of the DUO traversing system must be located outside the danger zone!

Now connect up all hydraulic components as described under "Connecting hydraulic devices".



DANGER / CAUTION!

Make sure that nobody is present in the danger zone.

The rerailing system is now ready to use!

6.3 Control of the DUO traverse jack with anchor pin



DANGER / CAUTION!

The vehicle to be rerailed must be secure according to instructions to prevent it rolling, slipping and tipping!



NOTE:

Bear in mind that the traversing range of the jack is limited by the stroke of the piston!

This means that the DUO traversing system must be set up such that the stroke of the jack piston is sufficient for the required traversing range!

6.3.1 Traversing with external load lifting system (recommended method):

Procedure:

1. Set up the rerailing system as described under "Setting up the DUO traversing system" and in the separate operating instructions of the other components used.
2. Raise the vehicle with the separate load lifting system.
3. Place suitable base material (e.g. hardwood blocks or metal plates) on the roller carriages and align such that, after lowering, the vehicle is stable and secure on the roller carriages.



DANGER / CAUTION!

The vehicle to be rerailed must be securely raised such that it cannot slip or tip over before placing the base material and setting up the traversing system.

Always keep an eye on the raised vehicle when placing the base material and setting up the system! If the vehicle begins to move in an uncontrolled manner, leave the danger zone as fast as possible!

You must leave the danger zone after placing the base material and setting up the system!

4. Lower the vehicle on to the roller carriages.
5. Extend the traverse jack with the separate control unit by the distance the vehicle to be rerailed is to be traversed to the rails.



It is strictly prohibited to work under loads that are raised solely by hydraulic means!



6. Move the separate load lifting system such that you can again safely lift the vehicle to be rerailed. The vehicle must still remain secured to prevent it rolling, slipping and tipping!
7. Raise the vehicle to be rerailed and remove the base material from the roller carriages.
8. Retract the traverse jack.

- Lower the vehicle with the separate load lifting system.



NOTE:

If the traversing range does not extend far enough, after shifting the vehicle for the first time (steps 1 to 9) you will have to build up the entire traversing system once again at the new position of the vehicle.
When rebuilding the traversing system make sure that **all** the **prerequisites** defined under "Setting up the DUO traversing system" are met!
You can now repeat the procedure (1 to 9).

- Finally, dismantle the components of the traversing system.

6.3.2 Traversing with hydraulic jack mounted on the roller carriage:

Procedure:

- Set up the rerailing system as described under "Setting up the DUO traversing system" and in the separate operating instructions of the other components used.
- Raise the vehicle with the hydraulic jack(s) such that it (they) cannot tip over or slip off.



DANGER / CAUTION!

The use of stacking sets or similar together with the hydraulic jack mounted on the roller carriage is **strictly prohibited!**



- Extend the traverse jack with the separate control unit by the distance the vehicle to be rerailed is to be traversed to the rails.



NOTE:

Bear in mind that the traversing range of the jack is limited by the stroke of the piston!
This means that the DUO traversing system must be set up such that the stroke of the jack piston is sufficient for the required traversing range!



It is strictly prohibited to work under loads that are raised solely by hydraulic means!

- Lower the vehicle by retracting the hydraulic jack mounted on the roller carriage. The vehicle must still remain secured to prevent it rolling, slipping and tipping!
- Remove the hydraulic jack(s) from the roller carriages.
- Retract the traverse jack.



NOTE:

If the traversing range does not extend far enough, after shifting the vehicle for the first time (steps 1 to 6) you will have to build up the entire traversing system once again at the new position of the vehicle.
When rebuilding the traversing system make sure that **all** the **prerequisites** defined under "Setting up the DUO traversing system" are met!
You can now repeat the procedure (1 to 6).

7. Finally, dismantle the components of the traversing system.

6.4 Control of the DUO traverse jack with anchor jack



DANGER / CAUTION!

The vehicle to be rerailed must be secure according to instructions to prevent it rolling, slipping and tipping!



6.4.1 Traversing with external load lifting system (recommended method):

Procedure:

1. Set up the rerailing system as described under "Setting up the DUO traversing system" and in the separate operating instructions of the other components used.
2. Raise the vehicle with the separate load lifting system.
3. Place suitable base material (e.g. hardwood blocks or metal plates) on the roller carriages and align such that, after lowering, the vehicle is stable and secure on the roller carriages.



DANGER / CAUTION!

The vehicle to be rerailed must be securely raised such that it cannot slip or tip over before placing the base material and setting up the traversing system.



Always keep an eye on the raised vehicle when placing the base material and setting up the system! If the vehicle begins to move in an uncontrolled manner, leave the danger zone as fast as possible!

You must leave the danger zone after placing the base material and setting up the system!

4. Lower the vehicle on to the roller carriages.
5. Extend the traverse jack with the separate control unit by the distance the vehicle to be rerailed is to be traversed to the rails.
6. Secure the load to prevent it slipping to the side.
7. If the traversing range does not extend far enough, now retract the anchor jack with the aid of the separate control unit. (If the traversing range does extend far enough, continue with Point 11)
8. Completely retract the traverse jack.
9. Shut down the anchor jack. The jack will consequently extend automatically.
10. Extend the traverse jack again. Due to friction, the roller carriages normally do not move until the extended anchor jack engages in one of the retainer holes in the rerailing bridge. Nevertheless if necessary, still secure the roller carriage to prevent it rolling away!

Once the anchor jack has engaged, the roller carriages move in the traversing direction of the traverse jack.

- Points 9 and 10 can be repeated as often as necessary.



NOTE:

The traversing range is only limited by the length of the rerailing bridge.



DANGER / CAUTION!

When shifting several times make sure that the roller carriages are not pushed from the rerailing bridge!



- Move the separate load lifting system such that you can again safely lift the vehicle to be rerailed. The vehicle must still remain secured to prevent it rolling, slipping and tipping!
- Raise the vehicle to be rerailed and remove the base material from the roller carriages.
- Lower the vehicle on to the rails with the separate load lifting system.
- Return the traverse jack to its basic setting.
- Finally, dismantle the components of the traversing system.

6.4.2 Traversing with hydraulic jack mounted on the roller carriage:

Procedure:

- Set up the rerailing system as described under "Setting up the DUO traversing system" and in the separate operating instructions of the other components used.
- Raise the vehicle with the hydraulic jack(s) such that it (they) cannot tip over or slip off.



DANGER / CAUTION!

The use of stacking sets or similar together with the hydraulic jack mounted on the roller carriage is **strictly prohibited!**



- Extend the traverse jack with the separate control unit by the distance the vehicle to be rerailed is to be traversed to the rails.
- If the traversing range does not extend far enough, now retract the anchor jack with the aid of the separate control unit. (If the traversing range does extend far enough, continue with Point 11)
- Completely retract the traverse jack.
- Shut down the anchor jack. The jack will consequently extend automatically.
- Extend the traverse jack again. The roller carriages do not move until the extended anchor jack engages in one of the retainer holes in the rerailing bridge. Once the anchor jack has engaged, the roller carriages move in the traversing direction of the traverse jack.
- Points 6 and 7 can be repeated as often as necessary.



NOTE:

The traversing range is only limited by the length of the rerailing bridge.



DANGER / CAUTION!

When shifting several times make sure that the roller carriages are not pushed from the rerailing bridge!

9. Lower the vehicle on to the rails by retracting the hydraulic jack mounted on the roller carriage. The vehicle must still remain secured to prevent it rolling, slipping and tipping!
10. Remove the hydraulic jack(s) from the roller carriages.
11. Retract the traverse jack.
12. Finally, dismantle the components of the traversing system.

7. Dismantling the equipment / deactivation following operation



WARNING / DANGER / CAUTION!

Before the rerailing equipment concerned is removed, make sure that the load is in a stable, immovable condition.

7.1 Hydraulic jack

After completing the work, the hydraulic jacks and traverse jacks are to be retracted such that they protrude only by a few mm*). This relieves the load in the entire system both hydraulically and mechanically.



NOTE:

Due to fluctuations in ambient temperature, slight movements can occur when storing hydraulic jacks and traverse jacks. This effect is caused by the different expansion rates of the hydraulic fluid trapped on the piston and rod side.

*) 1 mm = 0.04 inch

7.2 Hoses

The hose lines are uncoupled as described under "Connecting the devices". Ensure that you replace the dust protection caps onto the mono-coupling halves.

7.3 Other components of the traversing system

The components are dismantled in the reverse order they were built up.

7.4 Hydraulic supply, control and separate load listing systems

When work is completed, the hydraulic supply, control and the required load lifting systems have to be shut down. Please refer to the separate operating instructions for these components!

8. Maintenance and service

A visual inspection must be carried out after each use and at least once a year regardless of use. In addition, a function test must be carried out every 3 years, or whenever there is any doubt as to the safety or reliability of the equipment (observe all applicable national and international rules and regulations relating to the maintenance intervals of the hydraulic devices).



CAUTION!

Clean off any dirt before checking the equipment.



WARNING / DANGER / CAUTION!

In order to carry out maintenance and repair work, tools appropriate for the job and personal protection equipment obligatory



Checks to be performed:

Visual inspection

- Jack and piston rod not damaged or deformed
- Jack accessories complete and not damaged
- Rerailing bridge not damaged or deformed
- Distance bars not damaged or deformed
- Roller carriage not damaged or deformed
- General tightness (no leaks)
- Handles present and secure
- All screw connections tightened
- Type plate, warning labels and other markings present and legible
- Couplings operate smoothly
- Dust protection caps fitted
- All accessories undamaged

Function test

- Fully extend and retract piston
- Smooth extension and retraction of jacks under pressure
- Roller carriage moves smoothly without load
- Fully extend and retract distance bars
- No unusual noises

9. Repairs

9.1 General

Servicing may only be carried out by the manufacturer or personnel trained by the manufacturer and by authorised LUKAS dealers.

Only LUKAS spare parts may be used to replace all components (see spare parts list) since special tools, assembly instructions, safety aspects, inspections might have to be complied with (see also chapter "Maintenance and service").

During all installation work, pay particular attention to the cleanliness of all components as contaminants could cause damage to the equipment.



WARNING / DANGER / CAUTION!

Protective clothing must be worn when repairs are being carried out, since parts of the units can also be pressurised in an idle state.

**NOTE:**

Before you use couplings from a different company, you must contact LUKAS or an authorised dealer.

**CAUTION!**

Since LUKAS rerailing devices are designed for top performance, only those components in the spare parts lists of the relevant unit may be replaced.

Further components in the devices may only be replaced if:

- You have participated in appropriate LUKAS service training,
- You have the explicit permission of the LUKAS customer service (on request, check for granting permission. Check is necessary in each individual case!)

9.2 Preventative service

9.2.1 Care information

The exterior of the equipment is to be cleaned from time to time in order to protect it from external corrosion. Oil is to be applied to the metallic surfaces.

9.2.2 Stress test

If there is any doubt regarding the safety or reliability of the equipment, a function and load test must also be performed.

9.2.3 Changing the hydraulic fluid in the traverse and anchor jack

- After approx. 200 deployments, but after three years at the latest, replace the hydraulic fluid

**CAUTION!**

During a hydraulic fluid replacement, always use a suitable receptacle to collect escaping fluid and dispose of the collected fluid correctly.

**CAUTION!**

All of the hydraulic fluid in the system must be replaced if conditions of use (ambient temperatures) vary considerably. When selecting the appropriate hydraulic fluid, please observe the "Recommended hydraulic fluids" chapter.

Procedure:

1. Completely retract jack.
2. Unscrew hoses at the jack.
3. Drain off hydraulic fluid.
4. Flush.
5. Reconnect hoses correctly.
6. Connect pump with fresh hydraulic fluid and extend and retract the jack several times.
7. Bleed jack as described under "Start-up".
8. Disconnect pump.

9.3 Repairs

9.3.1 Replacing couplings

The couplings must be replaced in the event of:

- external damage
- the locking device not working
- hydraulic fluid continually leaking in a coupled/uncoupled state.



WARNING / DANGER / CAUTION!



Never repair couplings: they are to be replaced by original LUKAS parts.

During installation, tighten the coupling to a torque of $M_A = 40 \text{ Nm}$.

Procedure:

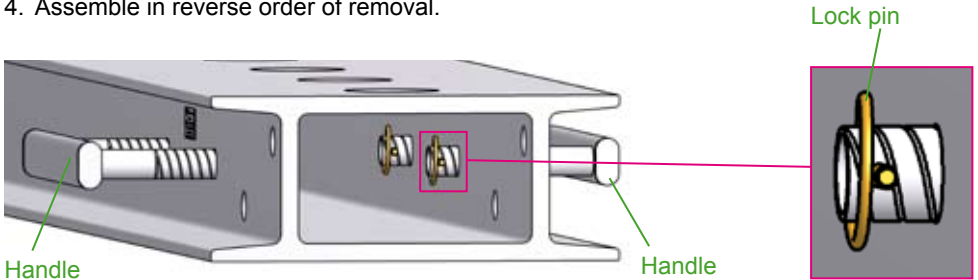
1. Remove the coupling.
2. Fit the new coupling and screw it in with a torque of $M_A = 40 \text{ Nm}$.

9.3.2 Replacing handles on the rerailing bridge

All damaged or broken handles must be replaced.

Procedure:

1. Pull out the damaged handle almost to the end stop.
2. Release the lock pins by pulling back the metal rings and pulling out the pins.
3. You can now pull the handle out of the rerailing bridge and replace it.
4. Assemble in reverse order of removal.

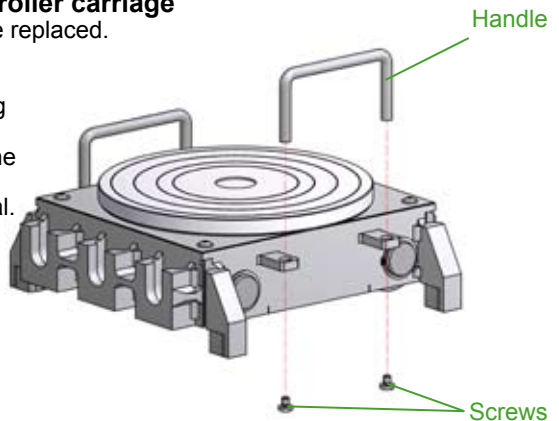


9.3.3 Replacing handles on the roller carriage

All damaged or broken handles must be replaced.

Procedure:

1. Undo and remove the screws holding the handle.
2. You can now pull the handle out of the roller carriage and replace it.
3. Assemble in reverse order of removal.

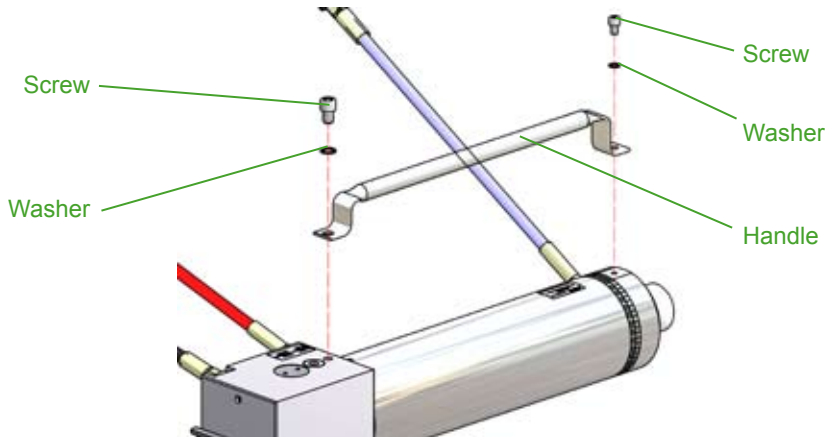


9.3.4 Replacing handle on the traverse jack

All damaged or broken handles must be replaced.

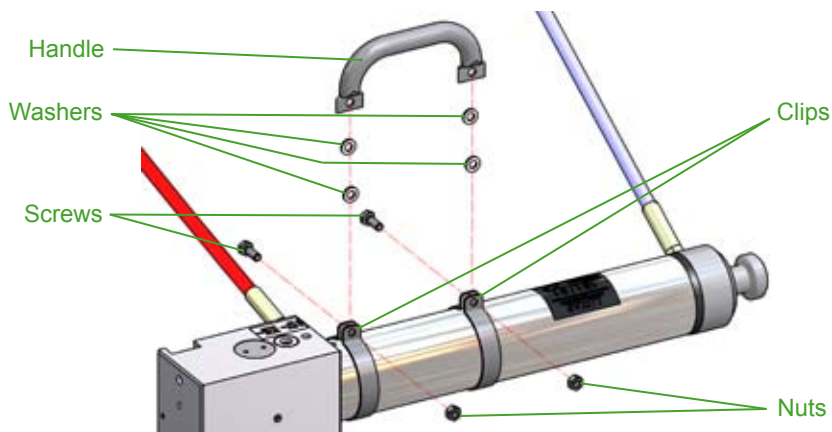
Procedure for handles mounted directly on the traverse jack:

1. Undo and remove the screws holding the handle together with the washers.
2. You can now detach the handle and replace it.
3. Assemble in reverse order of removal.



Procedure for handles secured with clips:

1. Undo and remove the screws and nuts.
2. You can now remove the handle and washers from the traverse jack and replace it. If the clips are damaged, remove them by pulling them in the direction of the jack head. Be careful not to damage the hose lines.
3. Assemble in reverse order of removal.

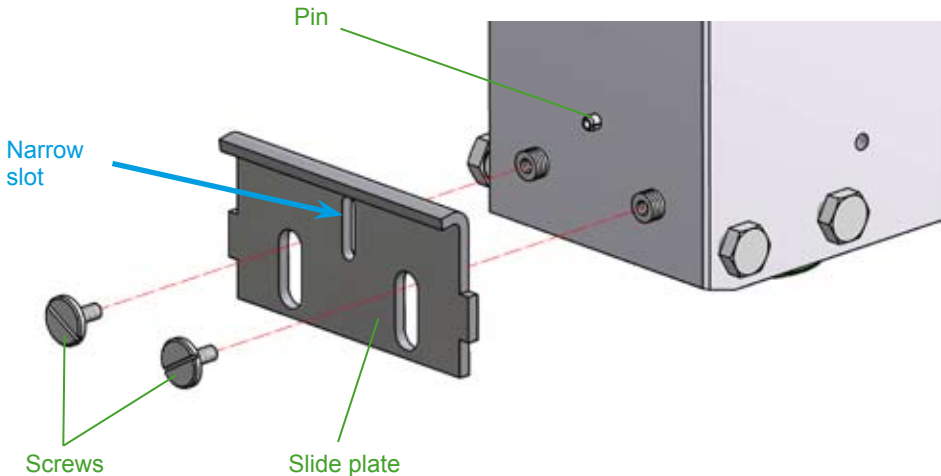


9.3.5 Replacing sliding plate on the traverse jack with anchor jack

The sliding plate must be replaced if it is damaged, bent or broken.

Procedure:

1. Undo and remove the screws on the anchor jack.
2. You can now detach the slide plate and replace it.
3. Assemble in reverse order of removal. Make sure that the pin fitted in the anchor jack can move in the narrow slot in the slide plate.



9.3.6 Replacing hoses on the traverse jack

All damaged or leaking hoses must be replaced.

Procedure:

1. Unscrew and remove the defective hoses from the jack together with the seals.



NOTE:

If only the hoses are defective and not the couplings, you should first unscrew the couplings before removing the hoses. After replacing the hose lines, the couplings are reconnected to the new hoses (see "Replacing couplings").

2. Place the seals on the hose connections on the jack and screw on the new hoses. (Tighten to a torque of $M_A = 35 \text{ Nm}$)

9.3.7 Labels

All damaged and/or illegible labels (safety signs, type plate, etc.) must be renewed.

Procedure:

1. Remove damaged and/or illegible labels.
2. Clean the surfaces using acetone or industrial alcohol.
3. Attach new labels.

Make sure that the labels are attached in the right position. If you are no longer sure about this, contact your authorised LUKAS dealer or LUKAS directly.

10. Troubleshooting

Problem	Check	Cause	Solution
Jack piston moves slowly or erratically during operation	Hose lines connected correctly?	Air in hydraulic system	Bleed pump system
	Pump assembly running?		
Device does not build up specified force.	Hydraulic fluid level in supply pump?	Insufficient hydraulic fluid in pump	Top up hydraulic fluid and bleed
	Check operating pressure of hydraulic assembly	Insufficient supply pressure	If possible, increase the max. operating pressure at the hydraulic unit to the max. operating pressure of the cylinder or use a different hydraulic unit with sufficient max. operating pressure.
	Check device	Device defective	Shut down device and repair (have repaired)
hose assembly cannot be coupled		Pressurised	Switch the pump to depressurised circulation
		Coupling defective	Coupling needs to be replaced immediately
Hydraulic fluid leaking from hoses or connections	Hose lines defective?	Leak, possible damage	Replace hoses
Damage to surface of hydraulic hose lines		Mechanical damage or contact with aggressive media	Replace hoses
Hydraulic fluid leaking from piston rod		Piston rod seal defective	Have problem rectified by authorised dealer, personnel trained by LUKAS or LUKAS directly
		Piston damaged	
Leak from couplings	Coupling damaged?	Coupling defective	Coupling needs to be replaced immediately

If it is not possible to rectify the malfunctions, inform an authorised LUKAS dealer or the LUKAS Customer Service department immediately.
The address for the LUKAS Customer Service department is:

LUKAS Hydraulik GmbH

Weinstraße 39, D-91058 Erlangen
Postfach 2560, D-91013 Erlangen

Tel.: (+49) 09131 / 698 - 348
Fax.: (+49) 09131 / 698 - 353

11. Technical data

As all the values are subject to tolerances, there can be minor differences between the data of your devices and the data in the following tables!

11.1 Traverse jack

Device type		TC170/90-350
Article number		84072/0564
Dimensions (W x H)	[mm] <i>[in.]</i>	363 x 186 <i>14.29 x 7.32</i>
Length (retracted)	[mm] <i>[in.]</i>	668 <i>26.30</i>
Length (extended)	[mm] <i>[in.]</i>	989 <i>38.94</i>
Max. stroke	[mm] <i>[in.]</i>	321 <i>12.64</i>
Pressure	[kN] <i>[lbf.]</i>	176 <i>39,568</i>
Tractive force	[kN] <i>[lbf.]</i>	92 <i>20,683</i>
Weight including hydraulic fluid fill	[kg] <i>[lb]</i>	22,5 <i>49.6</i>
Max. operating pressure	[MPa] * <i>[psi]</i>	53 <i>7,687</i>
Operating fluid quantity	[l]** <i>[gal.-US]</i>	0.509 <i>0.134</i>
Special feature	Anchor jack	

* 1 MPa = 10 bar

** The amount of hydraulic fluid in the hydraulic assembly necessary to operate the device (differential quantity: piston/rod side)

Device type		TC330/200-350	TC170/90-350 SBB
Article number		84072/0569	84072/0584
Dimensions (W x H)	[mm] <i>[in.]</i>	370 x 213 <i>14.57 x 8.39</i>	90 x 176 <i>3.54 x 6.93</i>
Length (retracted)	[mm] <i>[in.]</i>	685 <i>26.97</i>	653 <i>25.71</i>
Length (extended)	[mm] <i>[in.]</i>	1007 <i>39.65</i>	974 <i>38.35</i>
Max. stroke	[mm] <i>[in.]</i>	322 <i>12.68</i>	321 <i>12.64</i>
Pressure	[kN] <i>[lbf.]</i>	337 <i>75,764</i>	176 <i>39,568</i>
Tractive force	[kN] <i>[lbf.]</i>	207 <i>46,538</i>	92 <i>20,683</i>
Weight including hydraulic fluid fill	[kg] <i>[lb]</i>	43 <i>94.8</i>	20 <i>44.1</i>
Max. operating pressure	[MPa] * <i>[psi]</i>	53 <i>7,687</i>	
Operating fluid quantity	[l]** <i>[gal.-US]</i>	0,793 <i>0.209</i>	0.509 <i>0.134</i>
Special feature		Anchor jack	No anchor jack

* 1 MPa = 10 bar

** The amount of hydraulic fluid in the hydraulic assembly necessary to operate the device (differential quantity: piston/rod side)

11.2 Roller carriages

Device type		RC-700/350	RC-1000/350
Article number		840720640	840721631
Dimensions (L x W x H)	[mm] [in.]	390 x 380 x 130 <i>15.35 x 14.96 x 5.12</i>	360 x 380 x 140 <i>14.17 x 14.96 x 5.51</i>
Max. width of rerailing bridge	[mm] [in.]	350 <i>13.78</i>	350 <i>13.78</i>
Max. permissible load	[kN] [lbf.]	750 <i>168,615</i>	1000 <i>224,820</i>
Mass	[kg] [lb]	41,6 <i>91.7</i>	63 <i>138.9</i>

11.3 Rerailing bridges

Device type		1.1 m / 65 mm	2.2 m / 65 mm	3.3 m / 65 mm
Article number		840726340	840725760	840725040
Dimensions (L x W x H)	[mm] [in.]	1100 x 350 x 65 <i>43.31 x 13.78 x 2.56</i>	2200 x 350 x 65 <i>86.61 x 13.78 x 2.56</i>	3300 x 350 x 65 <i>129.92 x 13.78 x 2.56</i>
Mass	[kg] [lb]	20 <i>44.1</i>	39 <i>86.0</i>	59 <i>130.1</i>

Device type		1.1 m / 140 mm	2.2 m / 140 mm
Article number		840726350	840725750
Dimensions (L x W x H)	[mm] [in.]	1100 x 350 x 140 <i>43.31 x 13.78 x 5.51</i>	2200 x 350 x 140 <i>86.61 x 13.78 x 5.51</i>
Mass	[kg] [lb]	40 <i>88.2</i>	81,5 <i>179.7</i>

Device type		3.3 m / 140 mm	4.4 m / 140 mm
Article number		840725050	840726550
Dimensions (L x W x H)	[mm] [in.]	3300 x 350 x 140 <i>129.92 x 13.78 x 5.51</i>	4400 x 350 x 140 <i>173.23 x 13.78 x 55.1</i>
Mass	[kg] [lb]	120,5 <i>265.7</i>	163 <i>359.3</i>

Device type		1.1 m / 184 mm	2.2 m / 184 mm
Article number		840726381	840726382
Dimensions (L x W x H)	[mm] [in.]	1100 x 350 x 184 <i>43.31 x 13.78 x 7.24</i>	2200 x 350 x 184 <i>86.61 x 13.78 x 7.24</i>
Mass	[kg] [lb]	70 <i>154.3</i>	140 <i>308.6</i>

Device type		3.3 m / 184 mm	4.4 m / 184 mm
Article number		840726383	840726384
Dimensions (L x W x H)	[mm] [in.]	3300 x 350 x 184 <i>129.92 x 13.78 x 7.24</i>	4400 x 350 x 184 <i>17.32 x 13.78 x 7.24</i>
Mass	[kg] [lb]	210 <i>463.0</i>	280 <i>617.3</i>

11.4 Distance bars

Device type		1830/1030	2800/1500	1094	1695	2384
Article number		840720580	840720582	840720591	840720592	840720593
Length (retracted)	[mm] [in.]	1030 <i>40.55</i>	1500 <i>59.06</i>	1094 <i>43.07</i>	1695 <i>66.73</i>	2384 <i>93.86</i>
Length (extended)	[mm] [in.]	1830 <i>72.05</i>	2800 <i>110.24</i>	- -	- -	- -
Dimensions (diameter)	[mm] [in.]	50 <i>1.97</i>	50 <i>1.97</i>	65 <i>2.56</i>	65 <i>2.56</i>	65 <i>2.56</i>
Mass	[kg] [lb]	40 <i>88.2</i>	65 <i>143.3</i>	25,4 <i>56.0</i>	37,4 <i>82.4</i>	51,2 <i>112.9</i>

11.5 Recommended hydraulic fluids

Mineral oil DIN ISO 6743-4 for LUKAS hydraulic equipment and others

	Oil temperature range	Oil code	Viscosity rating	Remarks
A	-24 +30°C	HL 5	VG 5	
B	-18 +50°C	HM 10	VG 10	
C	-8 +75°C	HM 22	VG 22	
D	+5 +80°C	HM 32	VG 32	
E	-8 +70°C	HF-E15	VG 15	Bio-oil

	Oil temperature range	Oil code	Viscosity rating	Remarks
A	<i>-11.2 +86°F</i>	HL 5	VG 5	
B	<i>-0.4 +122°F</i>	HM 10	VG 10	
C	<i>+17.6 +167°F</i>	HM 22	VG 22	
D	<i>+41.0 +176°F</i>	HM 32	VG 32	
E	<i>+17.6 +158°F</i>	HF-E15	VG 15	Bio-oil

recommended viscosity range: 10...200 mm²/s (*10...200 cSt.*)

Supplied with HM 22 DIN ISO 6743-4.

11.6 Operating and storage temperature ranges

Operating temperature	[°C]	-20 ... +55
Ambient temperature (device in operation)	[°C]	-25 ... +45
Storage temperature (device not in operation)	[°C]	-30 ... +60

Operating temperature	<i>[°F]</i>	<i>-4 ... +131</i>
Ambient temperature (device in operation)	<i>[°F]</i>	<i>-13 ... +113</i>
Storage temperature (device not in operation)	<i>[°F]</i>	<i>-22 ... +140</i>

12. Notes



Please dispose all packaging materials and dismantled parts properly.

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