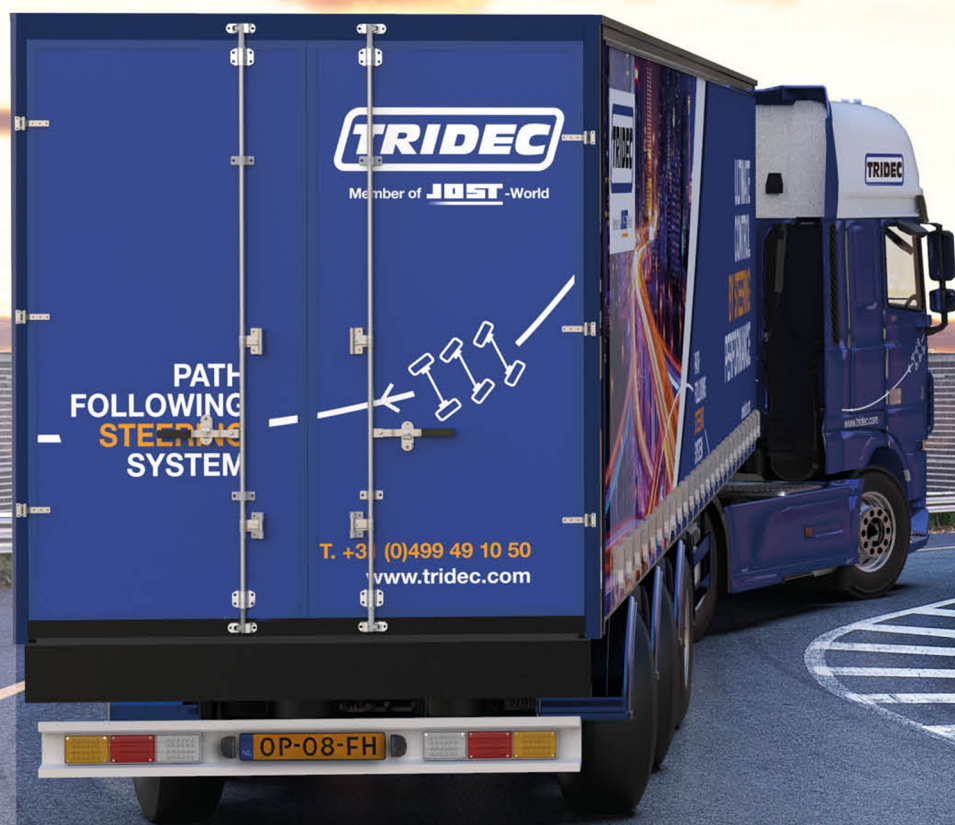


Steering systems and axle suspensions



0800 HF/0900 HF-E

"Compact" control system (MSC)

User manual

Release (07/2019)



EG -DECLARATION OF COMPLIANCE

Directive 2006/42/EG, Annex II-B



Manufacturer: TRIDEC, Transport Industry Development Centre B.V.
Address : Ekkersrijt 6030,
5692 GA Son,
the Netherlands
hereby declares that the product:

Model : 0800 HF/0900 HF-E

Product number : 0800/0900

Commercial name : 0800 HF/0900 HF-E
to which this declaration refers, is in compliance with the provisions
stipulated in the following guideline:

- 70/311/EEG/R79
- 94/20/EEG/R55
- R10

Quality control by:

**SGS-International Certification Services GmbH,
Rödingsmarkt 16,
D-20459 Hamburg
Germany**

Conducted at Son 10/02/2020, the Netherlands

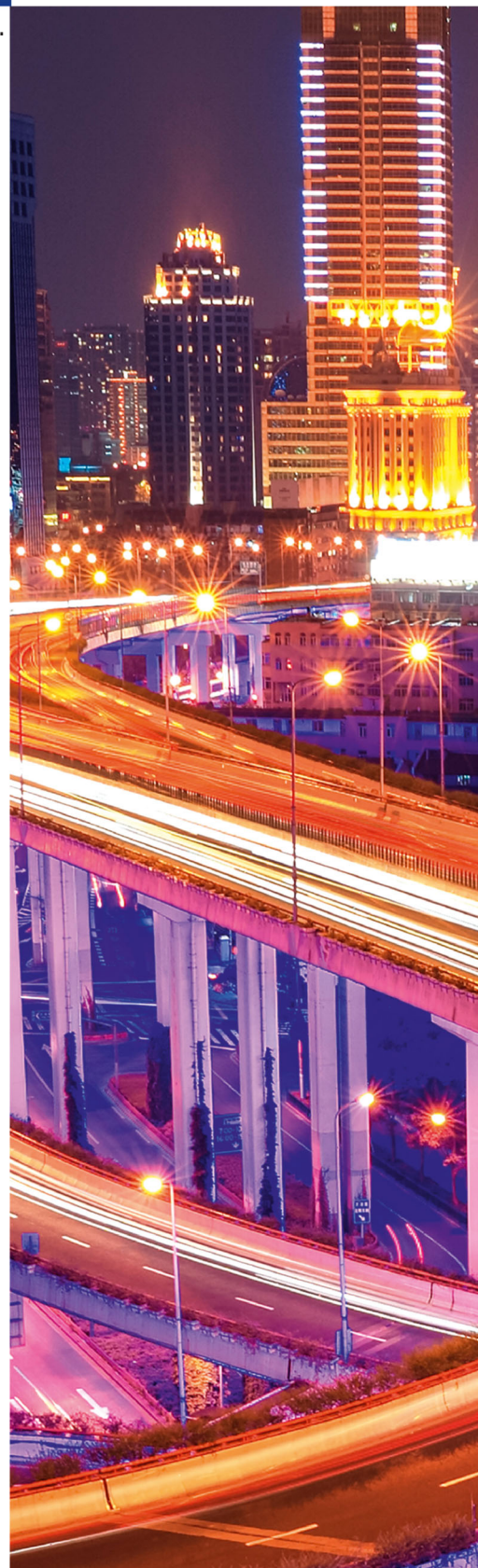
TRIDEC

Frans Lipman

Director



A handwritten signature in blue ink is located to the right of the name "Frans Lipman". The signature is stylized and appears to read "Frans Lipman".





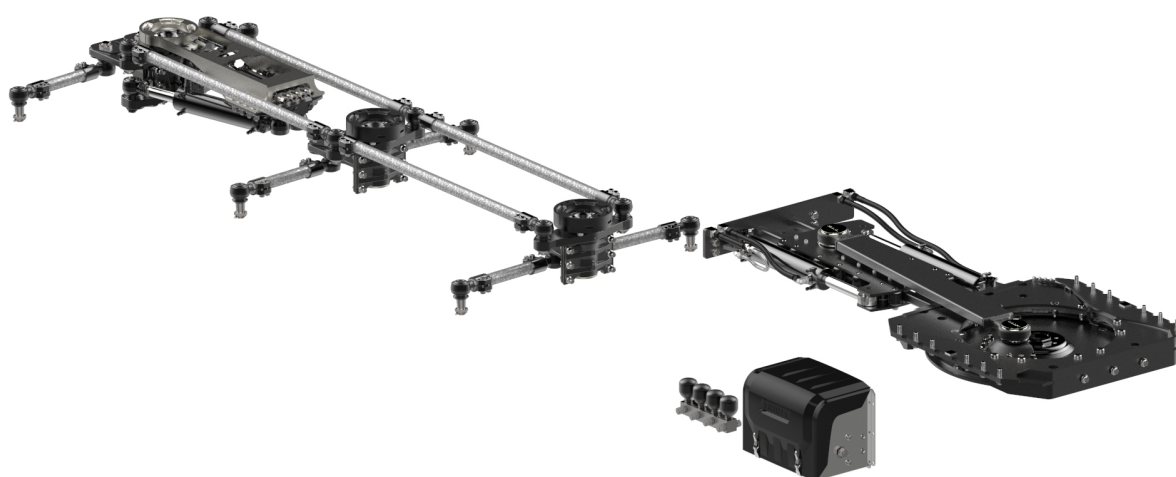
HF with linear attachment



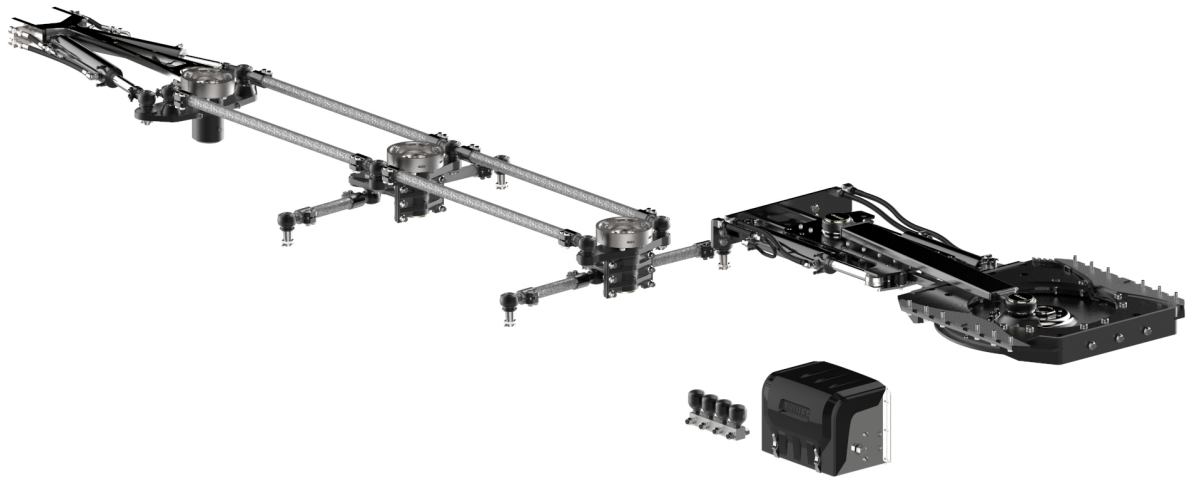
HF-E2 (cp) system with a steering control unit and linear hydraulic attachment



HF-E2 (cp) HD system with steering control unit and linear hydraulic attachment



HF-E2 (lp) system with steering control unit and linear hydraulic attachment




HF-E2 (lp) HD system with steering control unit and linear hydraulic attachment

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Foreword

 This guide is intended for drivers and/or other HF.. steering system users with a "Compact" control system and contains the necessary TRIDEC information regarding the use of the HF.. steering system. This user manual must always be stored in the vehicle.

A separate maintenance, settings and repair manual for service technicians is available on the website: www.tridec.com.

Separate installation instructions for the system are supplied upon delivery of the HF.. steering system.

Effective use:

The HF.. steering system is not designed to be used independently. It has been designed to be mounted as an external steering system to a trailer/semi-trailer. Any modifications whatsoever could compromise the safety of the system. Both the TRIDEC product guarantee and the homologation shall be rendered invalid if these products are modified without written consent from TRIDEC. All guarantee claims against TRIDEC or suppliers of the HF.. steering system shall be declared invalid if the HF.. steering system is not installed according to the instructions supplied by TRIDEC.

Prior to putting the system into service, compliance with the applicable national road traffic regulations must be established for the trailer on which the system is installed. The system may only be used in accordance with the manual for the truck and any other trailer manuals.

The diagrams in this manual are only included as examples and are not intended for any other purposes. Images shown may vary slightly from the system supplied.



All safety information is outlined in chapter 9 (see "Safety & environment" on page 24). Safety risks are depicted using pictograms in all other chapters.

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Date of issue: 10 February 2020 Original version: 1.0

1 Description

The following paragraphs contain information about the components that make up the HF.. steering system and how the system works.

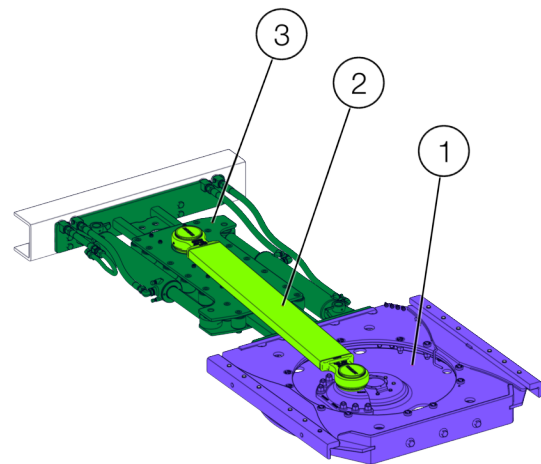
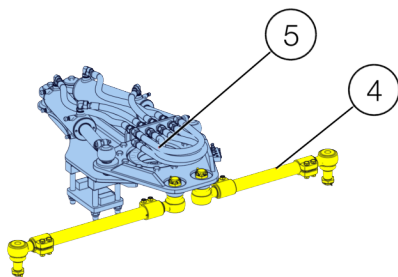
1.1 Product variants

The HF..-series from the TRIDEC product range can be supplied as the following version(s), that is, the:

- HF steering system
- HF-E (cp) steering system
- HF-E (lp) steering system
- HF-E (cp) steering system (HD)
- HF-E (lp) steering system (HD)
- HF-E (ll) steering system

A HF.. steering system consists of:

- one fifth wheel unit
- one attachment
- two or more track rods
- one or more steering knuckles



160033_14

Figure 1-1

Aligned with the chassis width of the semi-trailer, several width variants of the fifth wheel unit (1) can be supplied. The length of the track rods (4) has been aligned to the required track width for the chassis. The fifth wheel unit has a linear/progressive attachment (3) and is fixed to the chassis

by means of brackets. A linear steering system has a different steering behaviour than a progressive steering system. Roughly speaking, the semi-trailer with a progressive steering system steers up to a towing angle (the angle between the tractor unit and semi-trailer) of 35° sharper than a semi-trailer with a linear steering system (see "Danger zones for other road users" on page 25). The angle tightening of the wheels is subject to a maximum. Every steering lever is fixed to the chassis on a welded flange by means of a screwed connection. The steering levers are connected to the steering knuckles through the track rods. Every HF-E steering system has two hydraulic cylinders that are installed on the chassis of the semi-trailer. These are driven by the cylinders on the attachment (3). The steering motion is transferred by means of the steering rods to the steering levers.

The HF-E (cp) steering system has a cross-member on which the cylinders are supported. The HD variant (heavy-duty model) has a heavier member structure. The same applies to the HF-E2 (lp) and HF-E (lp) HD.

The steering of the semi-trailer is realised through a hydraulic circuit. This hydraulic circuit includes a steering control unit and an accumulator. Depending on the application, the HF.. steering system can be supplied with:

- Manual pump
- Compact system
- Tritronic system

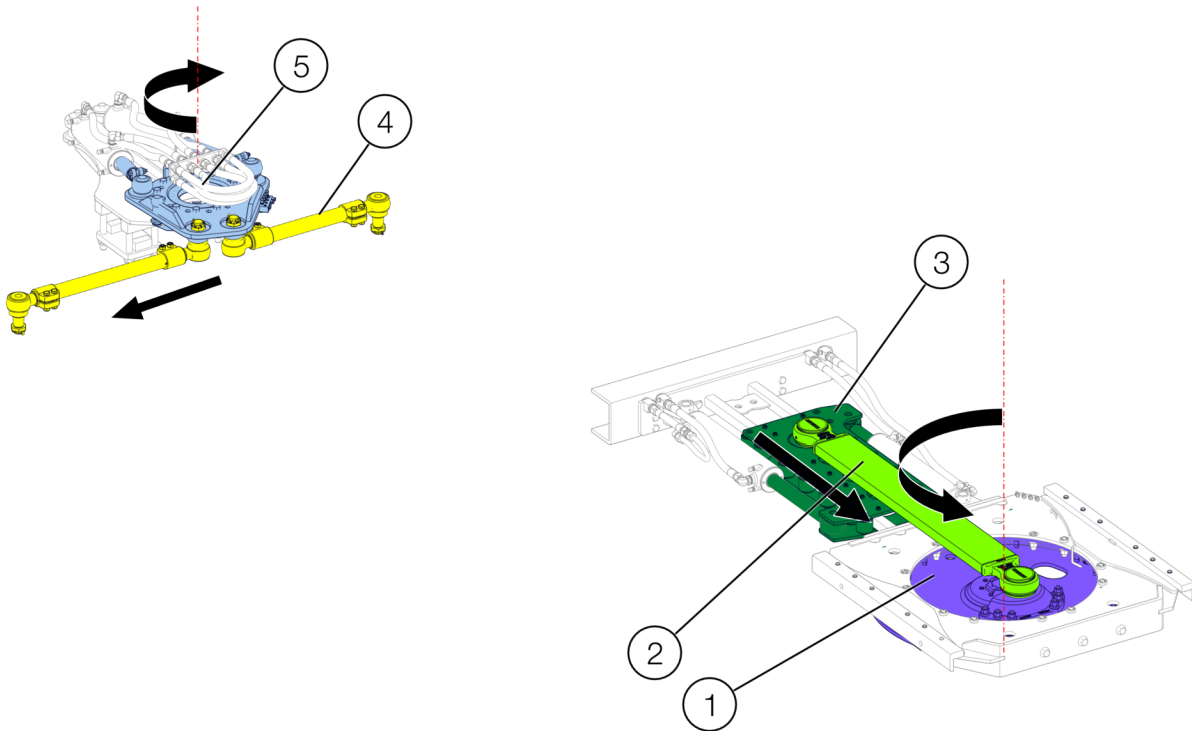
The hydraulic circuit can only be expanded with additional functions in relation to the compact and Tritronic systems. Examples are extra ramps and height adjustment. In relation to the three versions, there is an option to turn the wheels in the straight position in emergency situations by using the manual pump function.

1.2 Operation

Below, the operational principle of the different HF.. systems is described. These steering systems minimise the path followed by tractor unit semi-trailer combinations when taking bends. The stability when driving in a straight line again is realised by giving wheels a caster structurally.

1.2.1 HF.. steering system

A HF.. steering system is used on semi-trailers on which there is no room for a turntable steering. The steering knuckles are connected to a steering rod.



160033_13

Figure 1-2

When the coupled tractor unit takes a bend to the left, steering box section (2) is pulled forwards by slewing ring (1) on the fifth wheel unit. The steering box section is connected on the other side with the structure (3) for the operation of the hydraulic cylinders in the attachment. Both cylinders are driven on the steering knuckle (5) and therefore the installed lever to which the track rods (4) are fixed turns at an angle. The track rods (4) are pulled to the right and steer the wheels (in this example, the wheels are steering to the right).

1.2.2 Hydraulic steering system with manual control

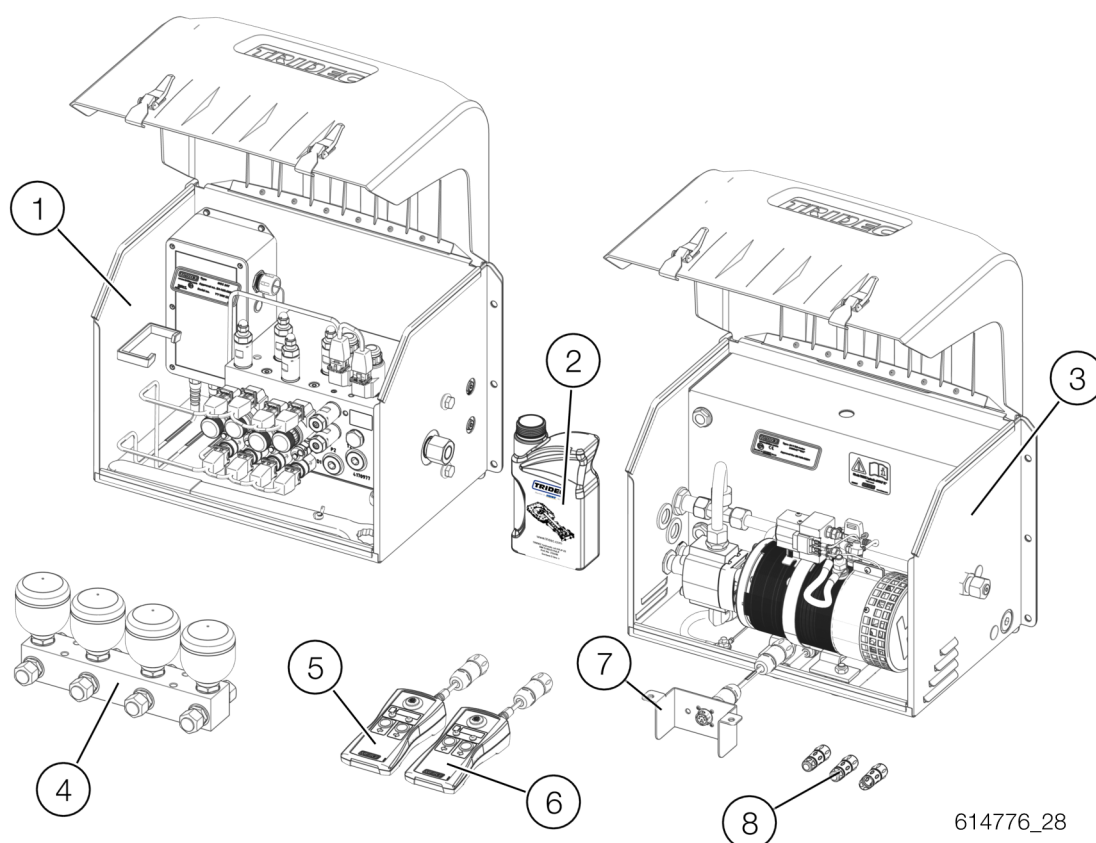
The hydraulic steering systems built by TRIDEC are available:

- with manual pump
- with Compact manual control
- with Tritronic control

A system with Manual Control allows additional steering of the wheels of the trailer/semi-trailer by means of a remote control. The system can be used up to speeds not exceeding 20 km/h.

The 'Compact' manual control system includes the following components:

- one steering control unit
- one power unit
- two remote controls with cable
- two proximity switches
- three connectors
- one support (for remote control in the cab of the tractor unit)
- one accumulator set



614776_28

Figure 1-3

- | | |
|--------------------------|--|
| 1. Steering control unit | 6. Remote control (trailer/semi-trailer) |
| 2. Hydraulic fluid | 7. Support |
| 3. Power unit | 8. Connectors |
| 4. Accumulator | |
| 5. Remote control (cab) | |

When driving around bends, the cylinders on the fifth wheel unit control the cylinders on the trailer/semi-trailer. This causes the wheels of the trailer/semi-trailer to turn corresponding with the programmed steering angles. The steering movement is a result of hydraulic fluid being displaced. As soon as the vehicle combination needs to be manoeuvred, the trailer can be steered separately if required. In such a case, the programmed steering angled will be overruled. This operation can be performed either with the aid of the remote control in the cab or the one on the trailer/semi-trailer. In the latter case, it is better if another person is available to assist. The remote control can be activated by the on/off switch at speeds below 20 km/h. The wheels can then be steered to the left or to the right by pressing the arrow buttons. Before the vehicle combination returns to the road after manual control has been performed, the trailer/semi-trailer must be hydraulically aligned in order for it to be able to follow the tractor unit correctly. This is done by driving straight forward and then using the arrow buttons to steer the trailer/semi-trailer until both LEDs on the remote control light up at the same time.

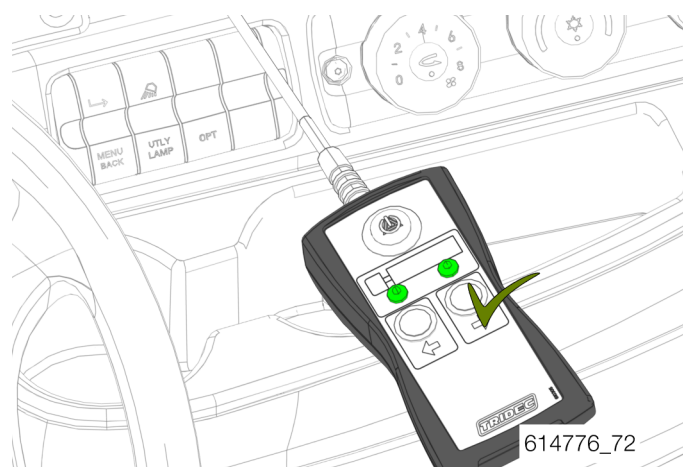


Figure 1-4

The remote control must be switched off as soon as the hydraulic alignment process is complete.



Hydraulic alignment will only be possible if the vehicle combination is mechanically well aligned.

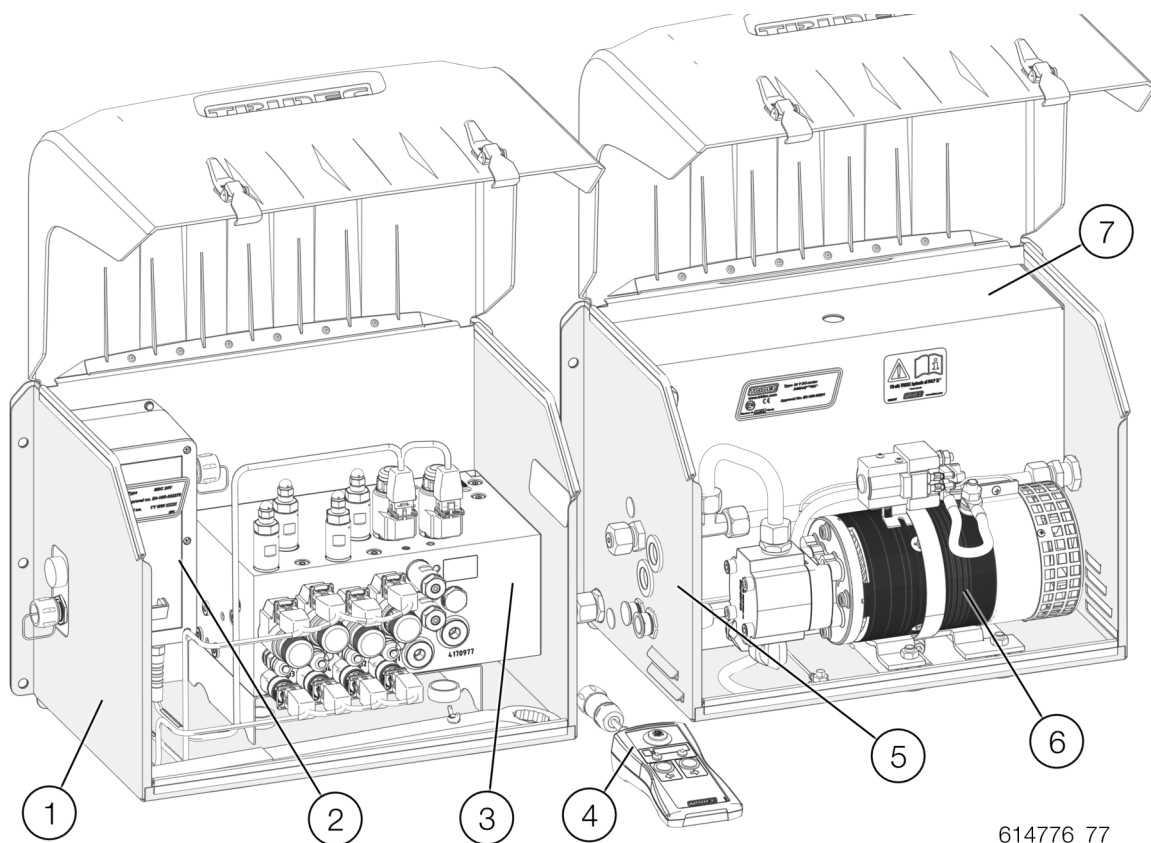
The expansion or contraction of hydraulic fluid due to temperature fluctuations is compensated for by means of accumulators that are fitted to the hydraulic system.

1.2.2.1 Manual control

In order to enable manual control (steering the trailer/semi-trailer independently), the following are used:

- a valve block
- a power unit
- an electronic control unit
- a remote control

Manual Control involves the use of two units; those being a steering control unit (1) and a power unit (6). The valve block (3) and the electronic control unit (2) are located in the steering control unit (1) and the pump and the tank are located in the power unit (5).



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Figure 1-5

- | | |
|----------------------------|-------------------------|
| 1. Steering control unit | 5. Power unit |
| 2. Electronic control unit | 6. Power unit with pump |
| 3. Valve block | 7. Tank |
| 4. Remote control | |

During normal use, the manual control is activated with the aid of one of the remote controls (4). During manual control, one of the steering valves, together with all short-circuit valves, is actuated. The pump (6), which is driven by the electric motor, increases the pressure in one of the two control circuits (Red and blue or green and yellow) which in turn steer the wheels. The movement of the pistons in the cylinders causes the hydraulic fluid to flow from the other circuit through the over-pressure valve (40 bar) back into the tank.

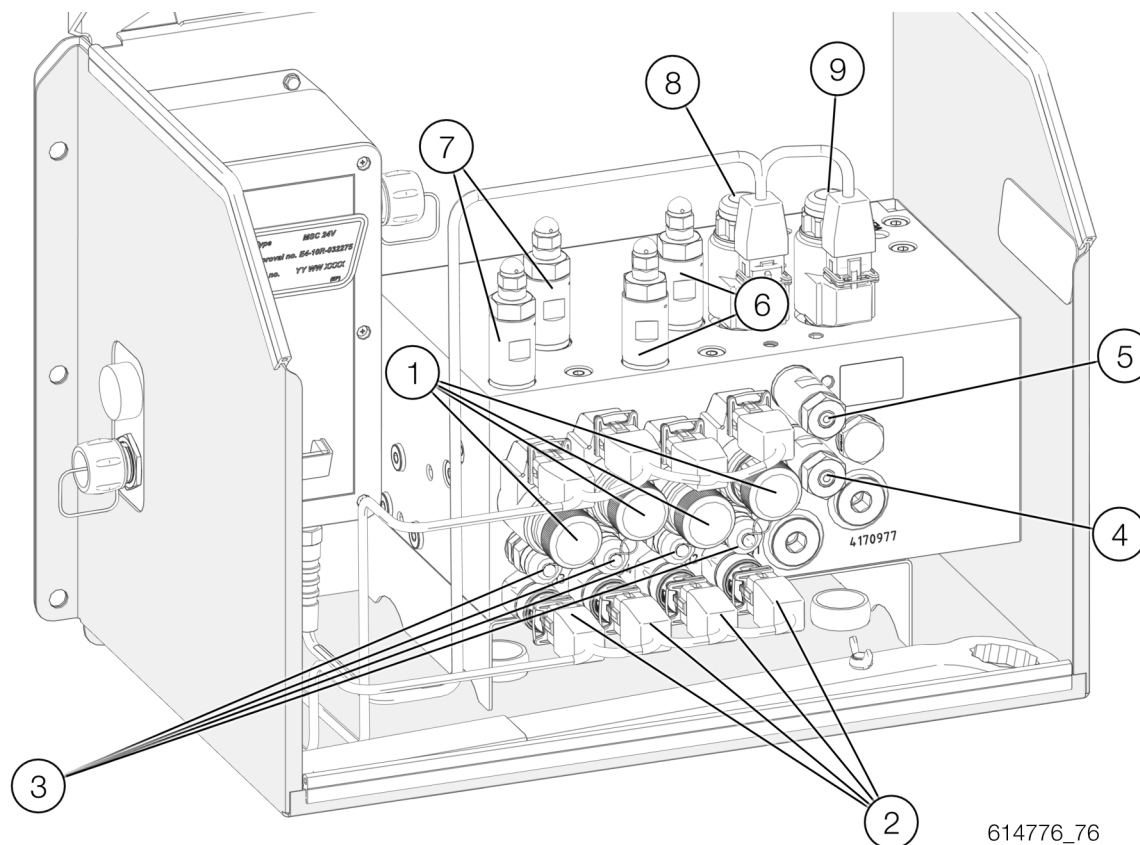


As soon as a steering movement is initiated using one of the remote controls, it will not be possible to use the other remote control for steering.

As soon as the manual control operation is complete, the vehicle combination must be hydraulically aligned (see 'Alignment using the remote control' on page 1).

1.2.2.2 Valves, pressure switches and measurement connections

The hydraulic system is kept at a pressure of 200 bar by means of a pressure relief valve (5). The pressure at the rod and the lower side of the cylinders in a circuit is maintained at 2.25 and 2.75 bar with the aid of overpressure valves (6+7).



614776_76

Figure 1-6

Component	Pressure (bar)
1 Short-circuit valve	
2 Pressure switch	
3 Measurement connection	
4 Overpressure valve	40
5 Overpressure valve	200
6 Overpressure valve (piston rod)	2.25

Component	Pressure (bar)
7 Overpressure valve (piston)	2.75
8 Left steering valve (standard, see 2D CAD drawing)	
9 Right steering valve (standard, see 2D CAD drawing)	

Table-1 Valve block

1 Steering with the remote control

Manual control with a COMPACT system is possible at speeds of up to 20 km/h. There are two ways of controlling the system, those being:

- using the remote control from the cab.
- using the remote control on the trailer/semi-trailer.

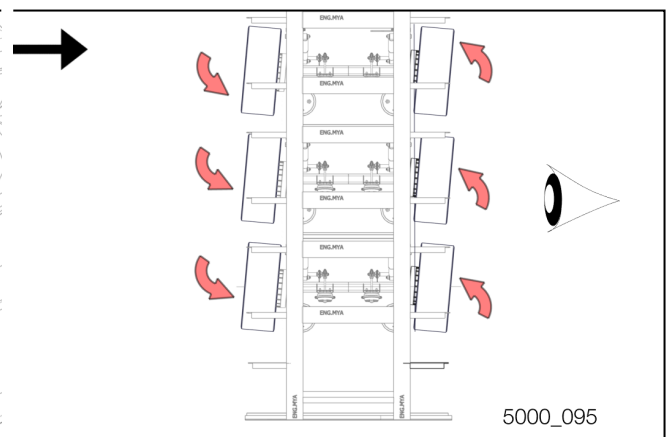
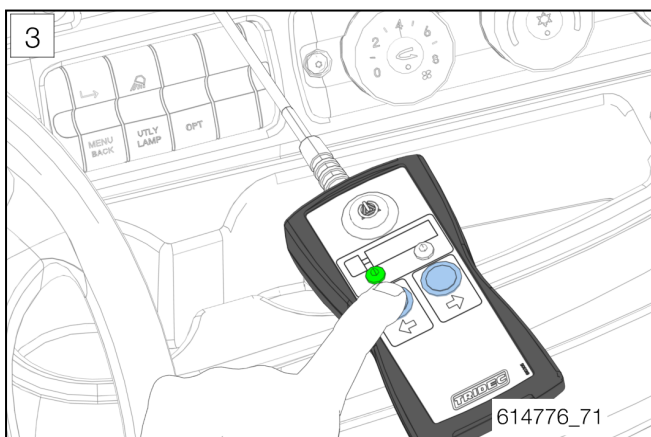
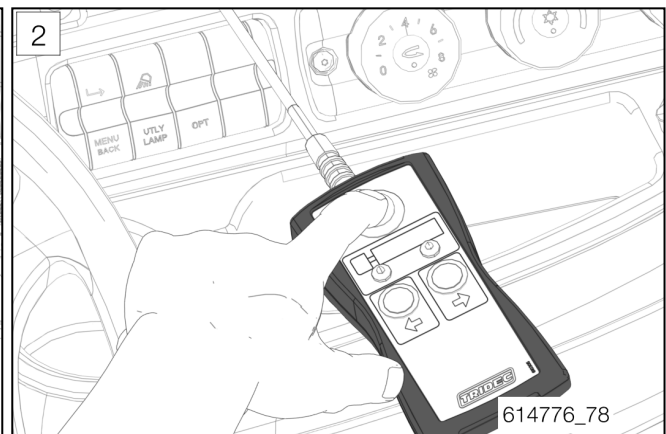
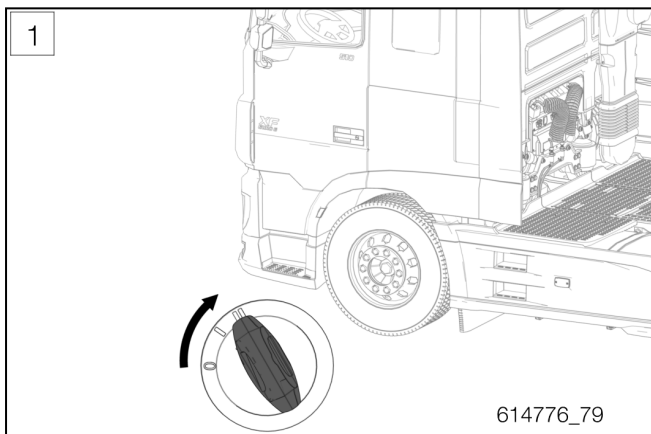
The first option allows the driver to perform operations such as manoeuvring or docking on their own. The second option requires someone else to operate the remote control on the trailer.

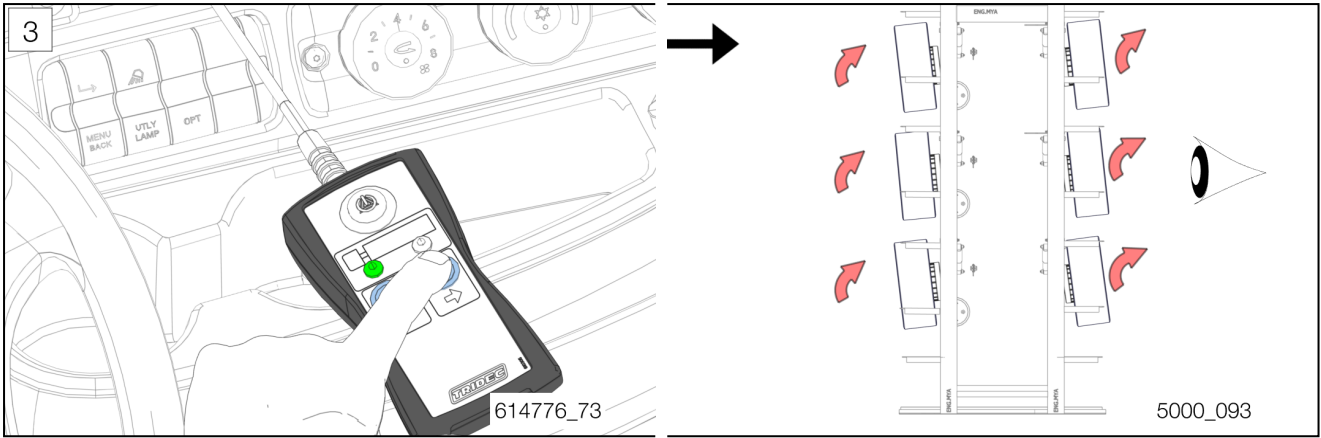


Make sure there are no people or animals in the immediate vicinity of the vehicle combination.

Procedure:

1. Follow the steps below.





1 Alignment using the remote control

After the TRIDEC system has been fitted, or after manual control has been performed, the trailer/semi-trailer must be hydraulically aligned (straight forward position) so that the trailer/semi-trailer can follow the tractor unit correctly.



Align the trailer/semi-trailer mechanically before performing hydraulic alignment. Use the remote control in the tractor unit.

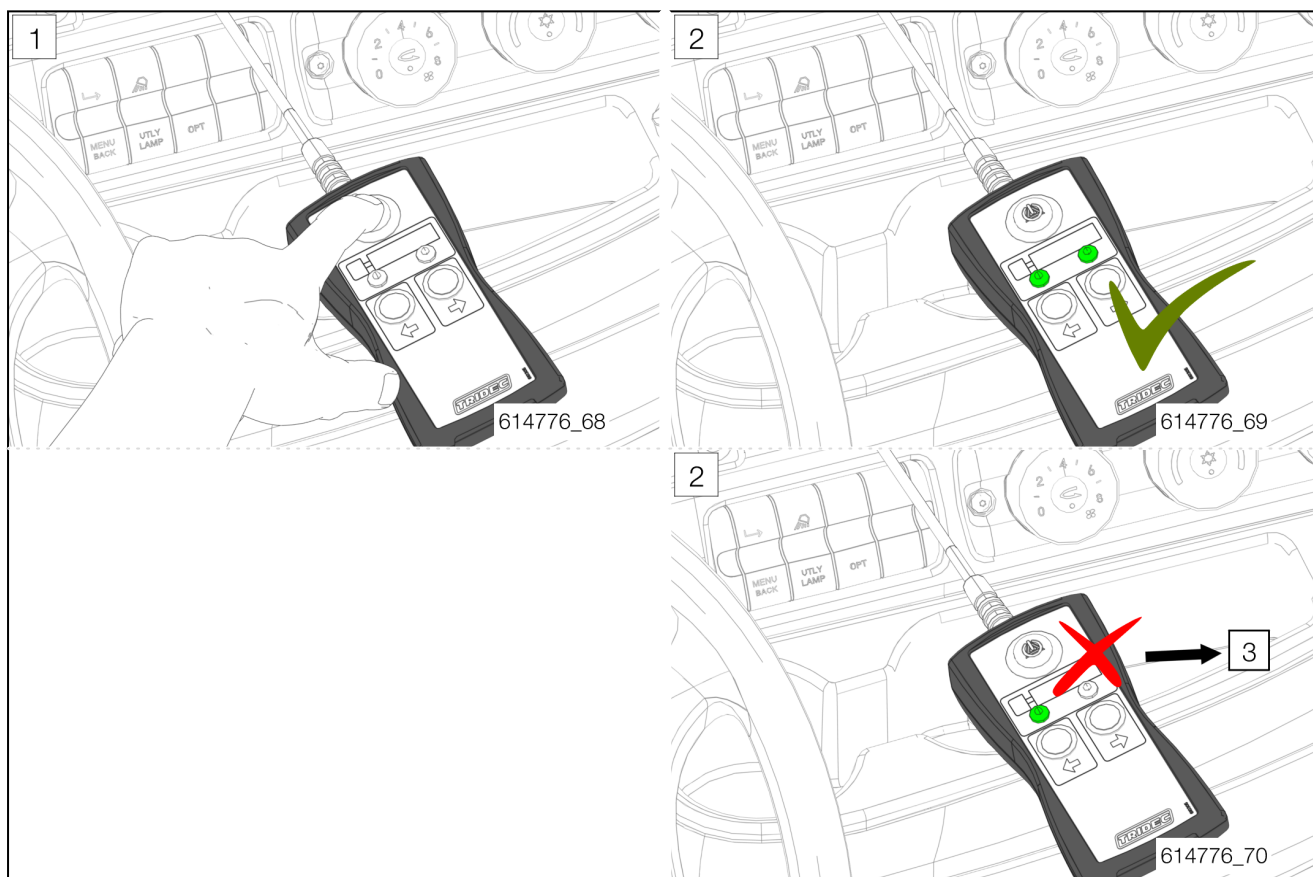


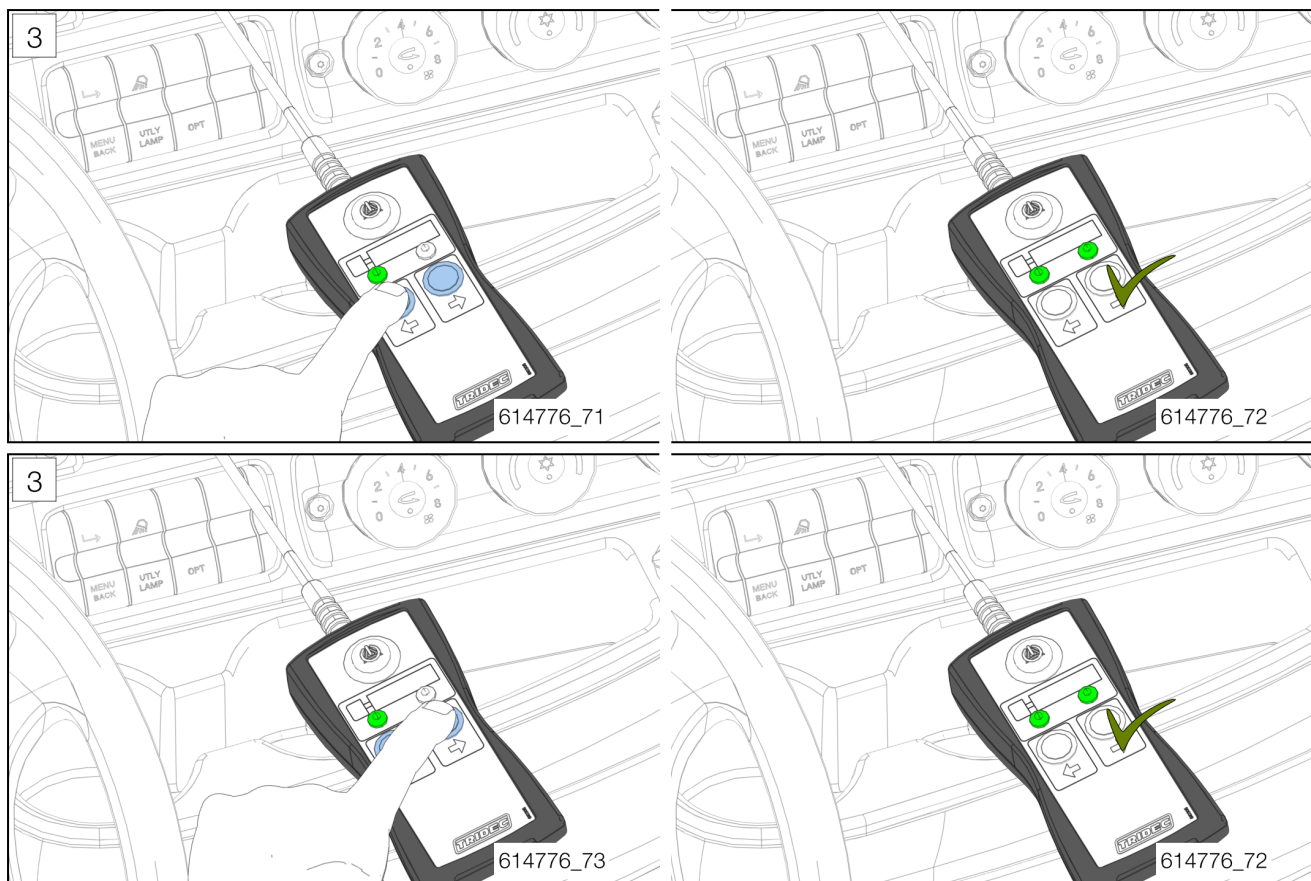
Perform this procedure on a suitable site at a speed below 20 km/h.



Make sure there are no people or animals in the immediate vicinity of the vehicle combination.

Procedure:





If the remote control remains activated above 20 km/h, the LEDs will keep going on and off. This is normal because the course of the vehicle combination is not constant, which means the trailer/semi-trailer does not always follow the tractor unit in a straight line.



Switch off the remote control when it is not in use.

2 Increase hydraulic pressure

If the hydraulic pressure in the steering system is too low, the light on the control unit will come on. In such a case, the steering of the semi-trailer/trailer may become unstable. The pressure in the system needs to be increased.

In case of a "Compact" control system (MSC) control system there are two options;

1. steer while driving at low speed (max 12.5 mph).
2. operating the manual pump (in the case of e.g. a defective unit or an electrical fault).

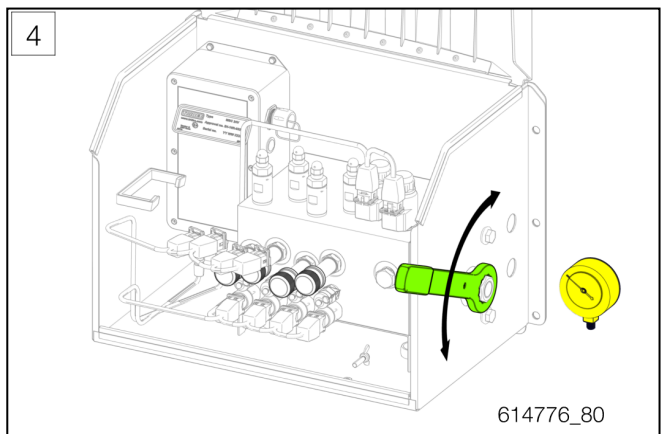
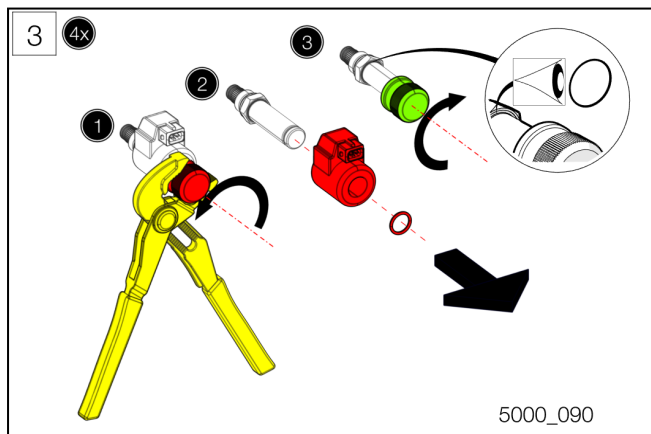
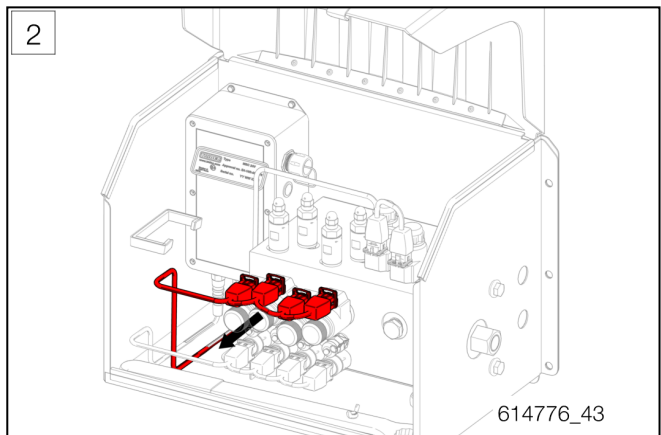
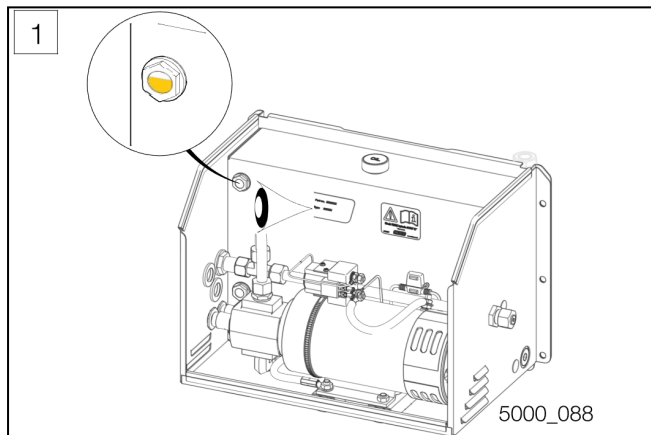


The semi-trailer/trailer must be hitched and connected to the power supply.

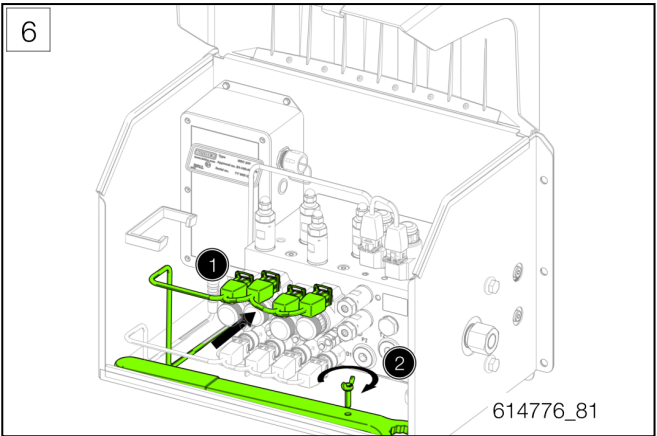
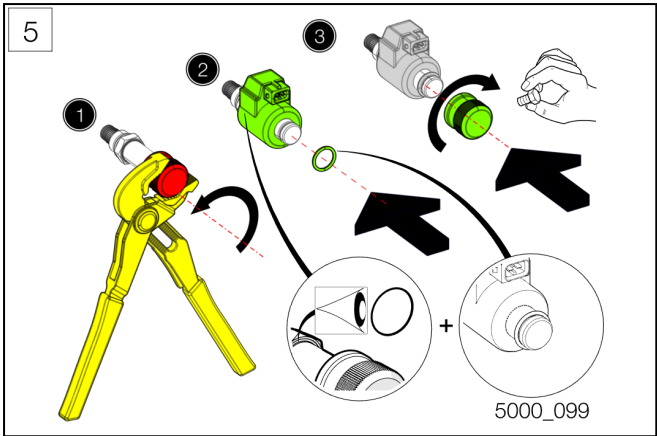


NEVER drive before all parts have been correctly refitted and the wiring has been correctly connected.

1. Follow the steps below.



Pump until the lever can no longer be moved. The system is now at the right pressure.



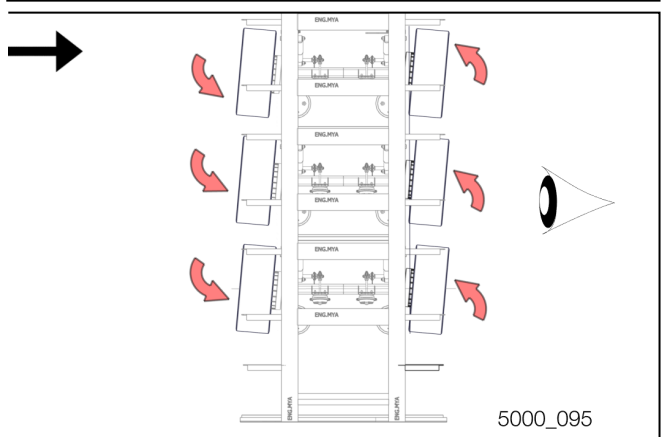
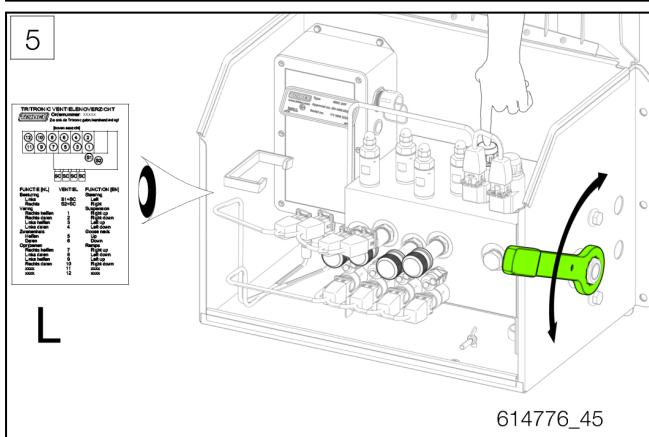
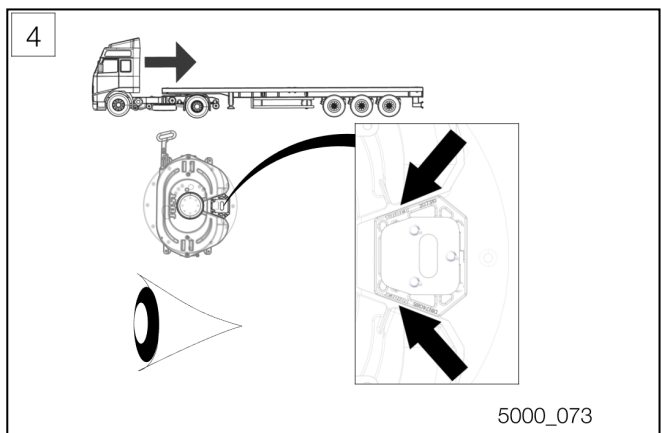
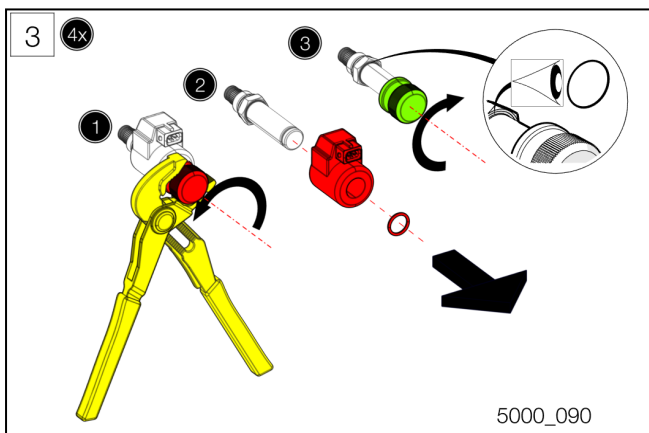
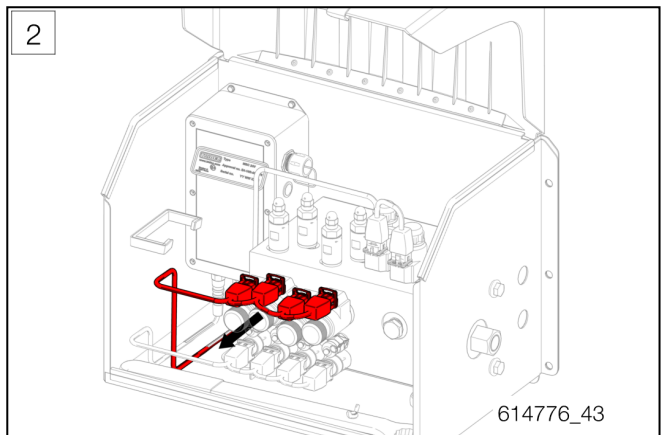
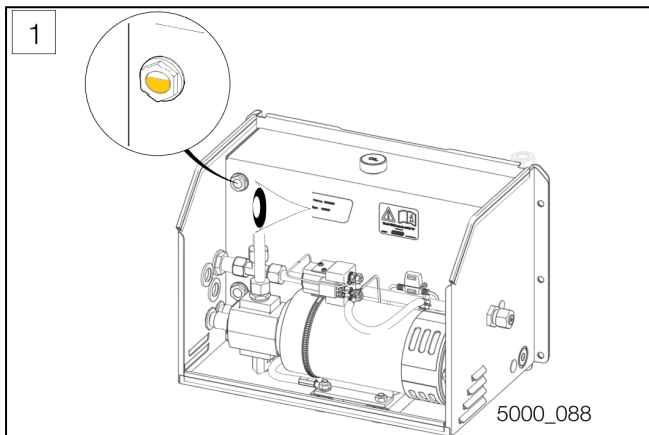
3 Steering without power

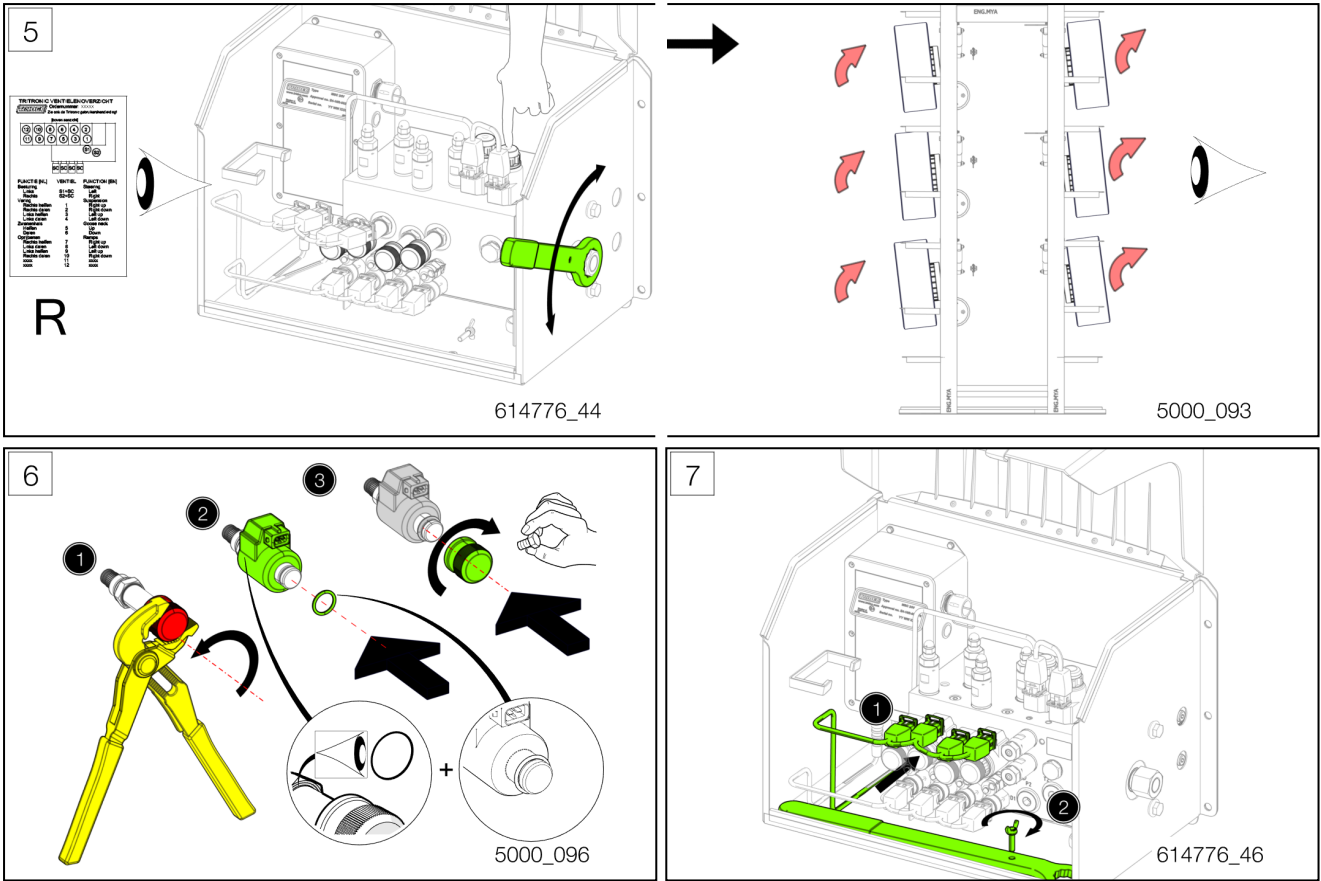
If a semi-trailer/trailer loses power due for example to an electrical fault, the wheels of the semi-trailer/trailer can still be 'steered'.



NEVER drive before all parts have been correctly refitted and the wiring has been correctly connected.

1. Follow the steps below.






4 Putting into service

The following paragraphs contain information regarding putting the HF.. steering system into service.

4.1 Vehicle registration and delivery

 All associated documentation (vehicle registration certificate, CE declaration, user guide, service manual) for the relevant HF.. steering system should be handed to the client upon delivery of a trailer with a HF.. steering system.



The vehicle may not be used until compliance with the applicable national road traffic regulations has been established for the trailer on which the HF.. steering system is installed.



The national road traffic regulations are specific to each country. Contact the national inspection authority in the relevant country for the necessary information.

Subject	Action
Vehicle Registration Certificate	Submit the vehicle registration certificate to the national inspection authority of the country in which the trailer will be registered. The specifications and approval numbers necessary can be found on the vehicle registration certificate.
Warning sticker	Ensure that the warning sticker has been placed in such a way that it is clearly visible to the driver.
CE declaration of compliance	Store the CE declaration with the vehicle documents in accordance with applicable guidelines.
User guide	Provide the client with the HF.. steering system user guide. Instruct the client to keep the user guide with the trailer.
Maintenance and repair manual	Provide the client with the HF.. steering system maintenance and repair manual. This manual contains the necessary information needed for the workshop to maintain the system.

Table-2 Client documents

4.2 Coupling and uncoupling

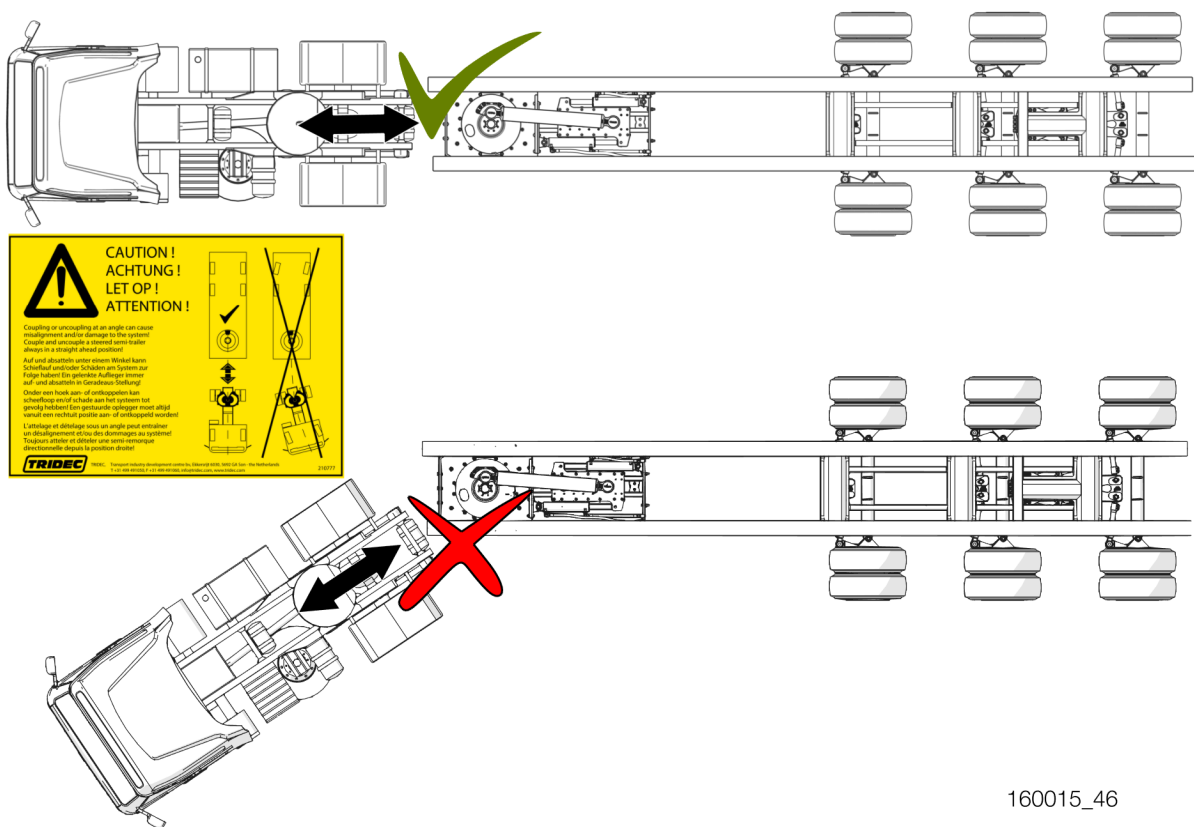


Figure 4-1

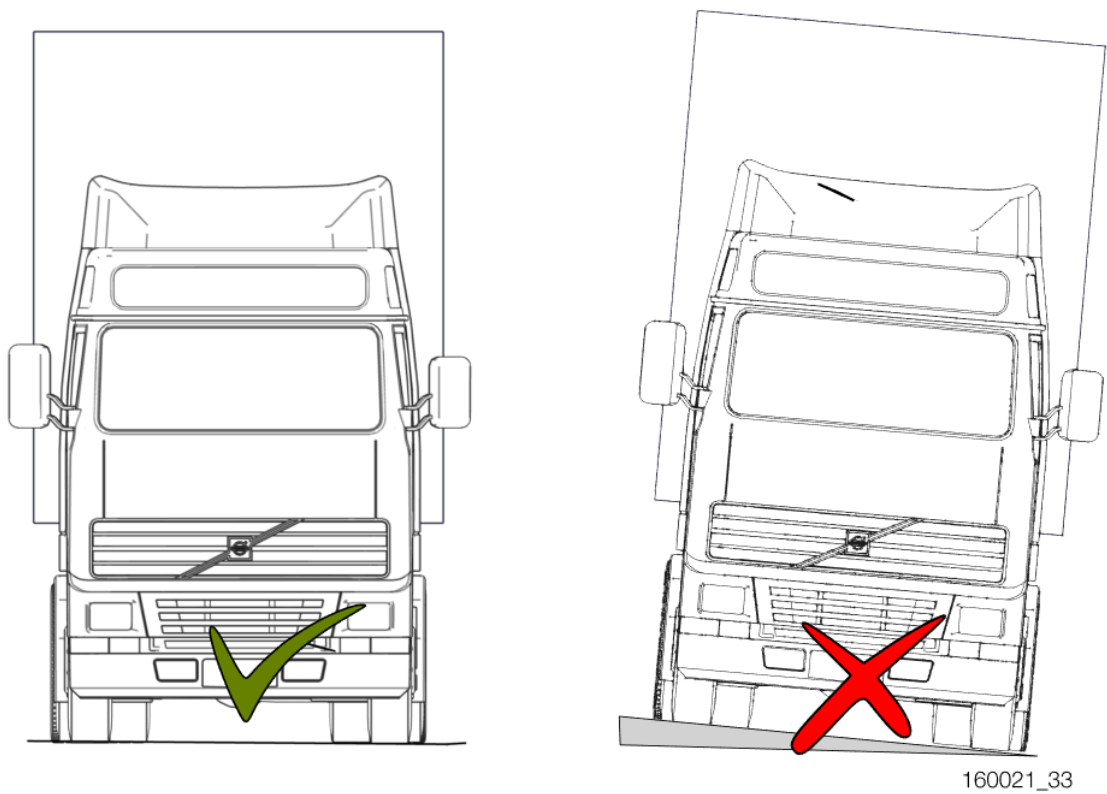


Figure 4-2



Ensure that both the tractor unit and semi-trailer are on the same horizontal surface when coupling and uncoupling.



NEVER park the semi-trailer with steered wheels.



Do not couple or uncouple when there are people or animals in the immediate vicinity of the semi-trailer and tractor unit.

4.3 Use of a steered semi-trailer

The steering behaviour of an unsteered semi-trailer deviates from the steering behaviour of a steered semi-trailer. The centre of rotation (A) of a steered semi-trailer is closer to the tractor unit. This has an impact on the turning radius (C) and the required space on the road. Manoeuvring through narrow streets is simpler with a steered semi-trailer/trailer.

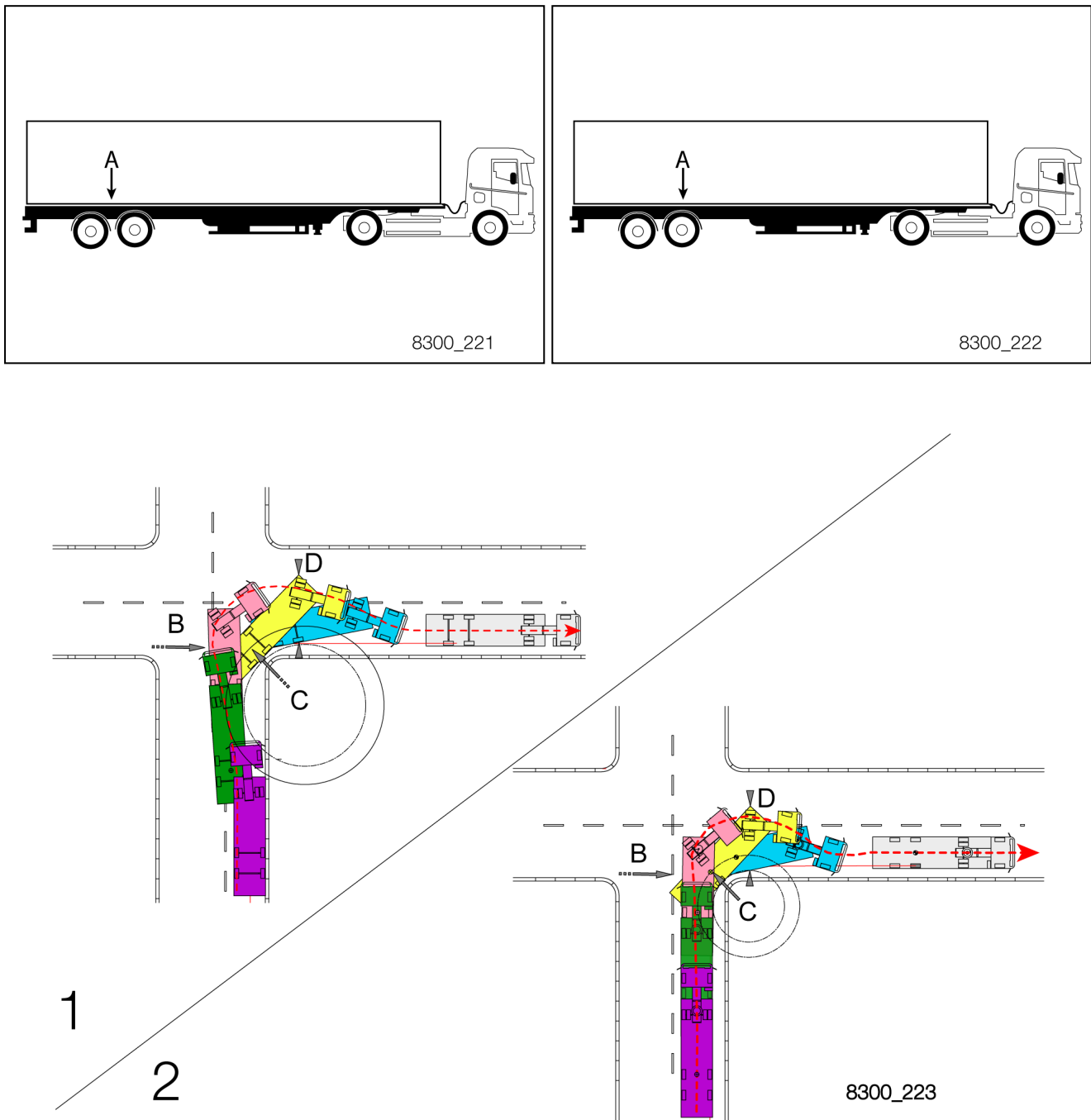


Figure 4-3

- | | |
|--|---|
| 1. Steering behaviour of an unsteered semi-trailer | 3. B = Required space for the semi-trailer swinging out |
| 2. Steering behaviour of a steered semi-trailer | 4. C = Turning radius of a semi-trailer |
| | 5. D = Required space on the carriageway |

The different phases during driving in a bend are shown using colours. The red dotted line shows the described path of the tractor unit and the semi-trailer. The figure (see Figure 4-3) shows that the unsteered semi-trailer has a larger turning radius and therefore needs more space on the carriageway to take a bend.



When taking a bend, the rear side (B) of a steered semi-trailer swings out further than the rear side of an unsteered semi-trailer.




If you do not have any experience with a steered semi-trailer, TRIDEC recommends gaining experience at a site to practice before you go on a public road with your tractor semi-trailer combination.

5 Safety & environment

The following paragraphs contain information regarding safe use of the HF.. steering system. It also describes what should be done when the HF.. steering system reaches the end of its lifespan.

5.1 Safety while operating

 Operating a trailer with a HF.. steering system installed may involve some possible risks. Consult the relevant regulations (for example: road traffic regulations, company procedures, health and safety regulations) which are applicable to the country where the trailer will be used.



General instructions for operating a trailer with a HF.. steering system:

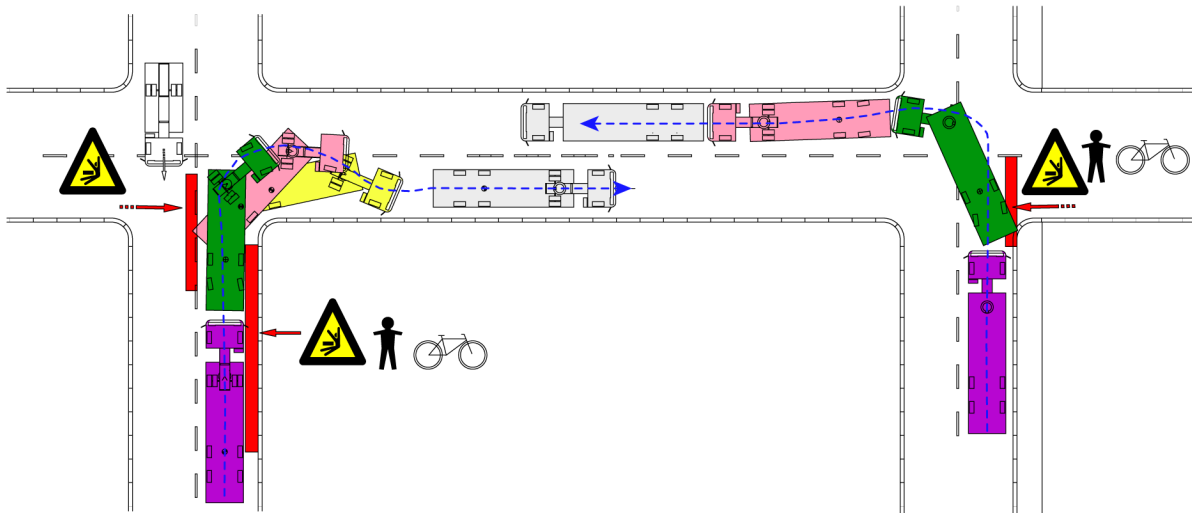
- **NEVER** use or put a trailer with an installed HF.. steering system on public roads until compliance with the national road traffic regulations has been established for the entire trailer.
- Read the user guide **BEFORE** coupling and using a trailer with a HF.. steering system.
- Execute the daily inspection **BEFORE** coupling and using a trailer with a HF.. steering system.
- The truck driver is **ALWAYS** responsible for the use of a trailer.
- **NEVER** drive with a trailer if a signal lamp is lit.
- Only steer the trailer using the HF.. steering system if there are **NO** people in the immediate vicinity of the trailer's moving parts.

The nature of possible dangers and restrictions during use are depicted below in the pictograms.



5.1.1 Danger zones for other road users

When a tractor unit with a semi-trailer takes a bend, more space on the carriageway is used. This means that the other road users such as, for example, oncoming vehicles and cyclists will have less space to manoeuvre. The driver of the tractor unit must be fully aware of this and pay extra attention.



8300_062

Figure 5-1

The red areas (see Figure 5-1) indicate where there is a potential danger for other road users when a tractor unit with a steered semi-trailer takes a bend. The red areas demand extra attention during the manoeuvre.

5.2 Environment



The HF.. steering system must be dismantled and disposed of in accordance with local and national regulations once it has reached the end of its lifespan, regardless of the cause. Contact your local or national public services, waste management authority or the supplier you purchased the product from for more information regarding locations where the materials can be collected for recycling.

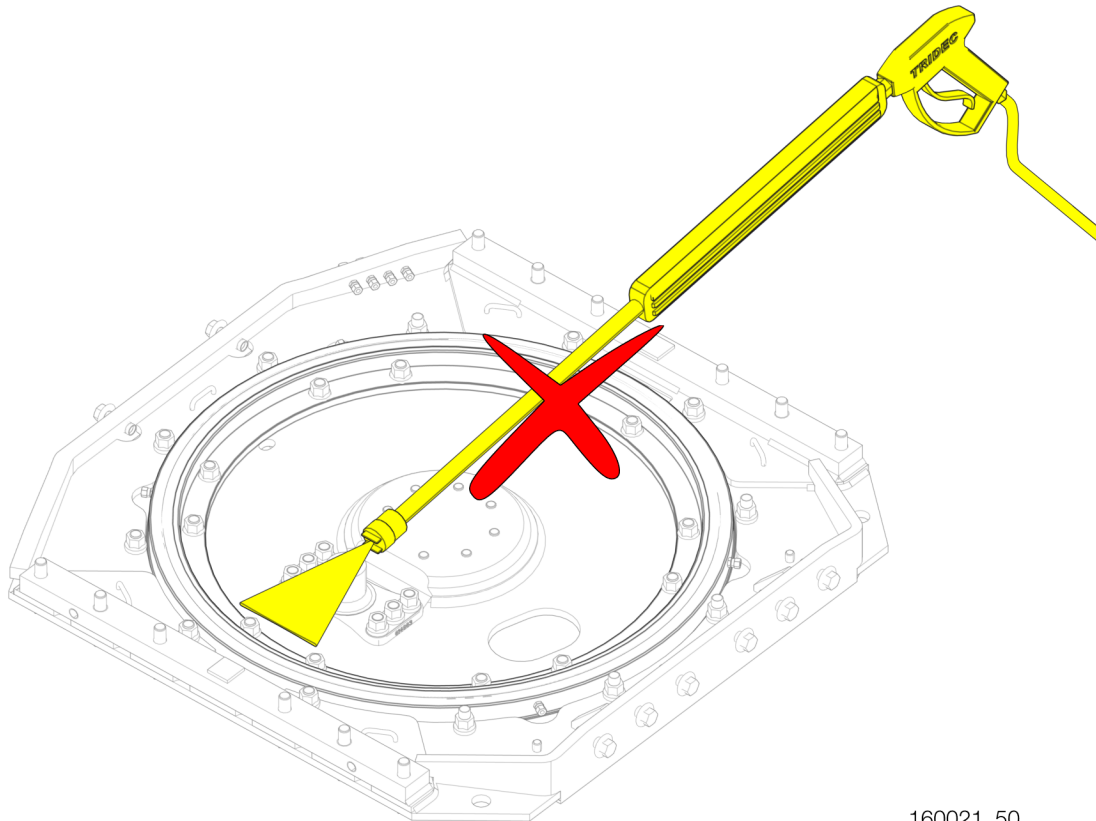
6 General information

The following paragraphs contain information regarding the delivery, storage and guarantee of the HF.. steering system .



Read the following paragraphs when products are delivered!

6.1 Cleaning



160021_50

Figure 6-1

6.2 Pictograms

The following pictograms are used in this user guide:

















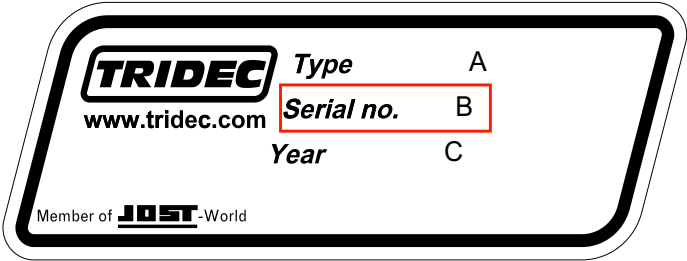
Description	Description	Description
 Important message!	 Tip	 Delivery information.
 Danger of becoming trapped!	 Read this information before you start!	 Information regarding use!
 Provisions set by TRIDEC.	 Recycle	 Alignment tool
 Tyre pressure	 Driving direction	 False
 Important restriction!	 Chance of damage to the system!	 Parts
 Lubricate		

Table-3 Pictograms

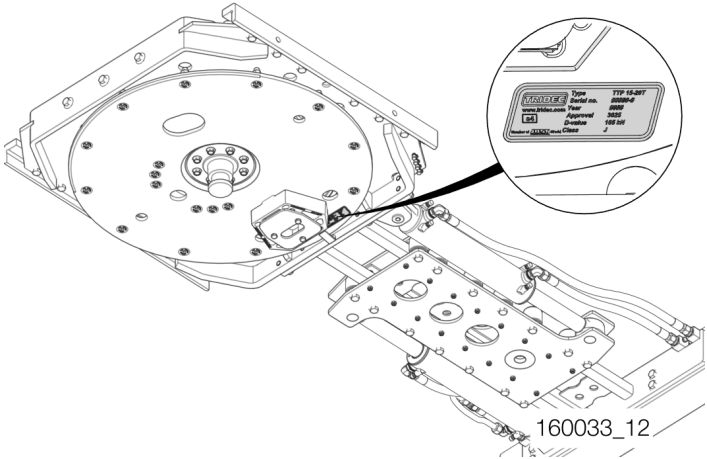
6.3 Type indication

Products manufactured by TRIDEC (see 6.3), are given an identification sticker.



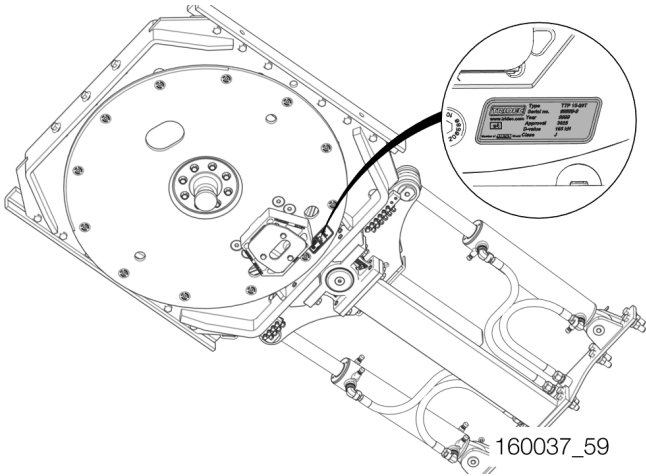
8300_007

Figure 6-2



160033_12

Figure 6-3



160037_59

Figure 6-4

The sticker provides essential information for ordering replacement parts. All product-specific information can be obtained by referencing the serial number on the sticker.

- Type: coding for the product version.
- Serial no.: the order number (required when ordering parts).
- Year: year of construction.



Never remove the sticker affixed by TRIDEC!



The serial number is required for obtaining the correct service information and for ordering parts.

The meaning of the type coding on the sticker is given in the table below (example).

SE 15 10 S TD G	Description
S	Steering system
E or T/D/V	Number of axles under the semi-trailer (E=1, T=2, D=3, V=4 or 5)
15/20 or 26.5	Maximum load (tonnes) on the fifth wheel unit (1 tonne = 1000 kg)
10	Number of steered axles (00=0, 10=1, 20=2, etc.)
S/T	Turntable type S=1200 T=1110
TD	Type of steering system
G/K/T	Type of fifth wheel unit (G= bolt connection K= extra-low version)
XXXXX-X-XXX	Serial number

Table-4 Type indication

7 Maintenance periods


		
Maintenance when commissioning		
Slewing rings	Lubricate the slewing rings	see the service manual

Table-5 Maintenance


		
Maintenance after 10,000 km or after 2 months at most		
Slewing ring	Lubrication	see the service manual
Kingpin	Retighten bolts and nuts	see the service manual

Table-6 Maintenance


		
Maintenance every 25,000 km or every three months. (Under extreme conditions* every 10,000 km or every 1.5 months.)		
Fifth wheel unit	Lubricate at all grease nipples.	

Table-7 Maintenance

*If used in countries where it rains often and a lot and/or where a lot of salt is gritted in the winter on the roads such as in the UK, Ireland, Denmark, Norway, Sweden and Finland.

*If the vehicle is regularly cleaned using chemicals.


Maintenance after 100,000 km or after 12 months at most

Slewing ring	Measure the axial/radial clearance.	see the service manual
Steering wedge	Free movement and wear	see the service manual
Kingpin	Wear	see the service manual
Ring plate	Deformations	see the service manual

Table-8 Maintenance

7.1 Daily maintenance

The HF.. steering system is basically maintenance free. TRIDEC, however, recommends that the visual checks below be performed before any use;






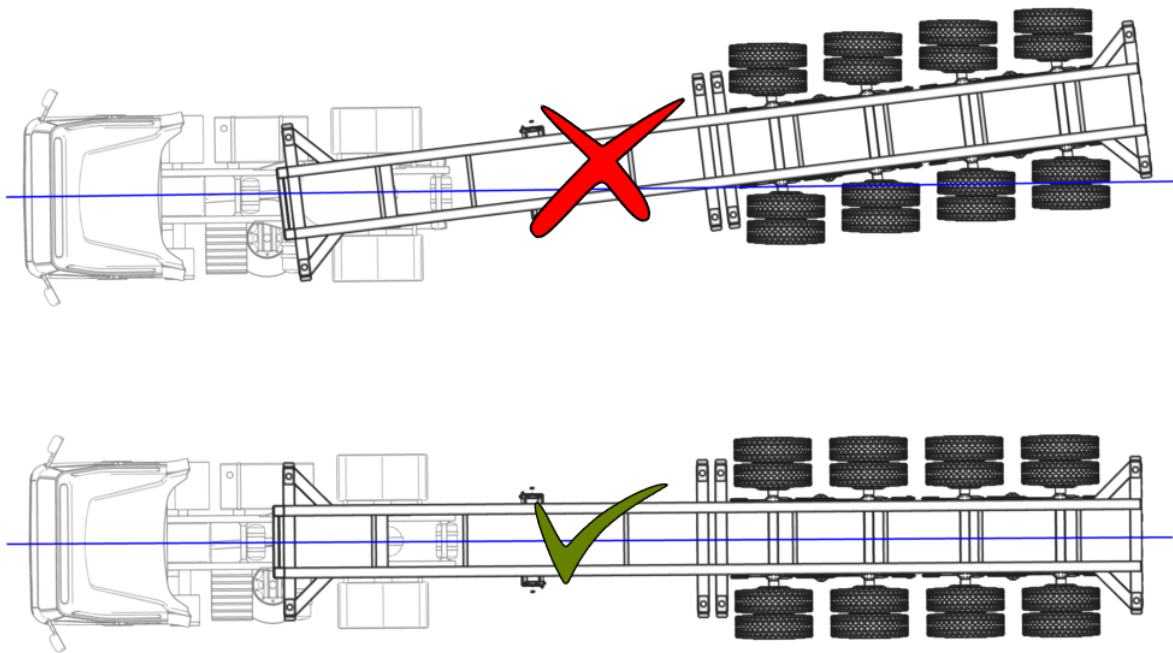
	Check	Action
	 Check for missing or loose bolts and nuts.	Tighten loose bolts or nuts using the correct tightening moment. If required, install new bolts and/or nuts.
	Check the semi-trailer for damage that may have an impact on the driving behaviour.	Contact the service workshop if there is damage.
	 Check that the semi-trailer/trailer follows the tractor unit in a straight line (see Figure 7-1).	Check for damage to the steering system and align the semi-trailer.

Table-9 Maintenance



160021_46

Figure 7-1

7.1.1 Lubricant

Lubricate a HF.. steering system using a lubricant that meets the NLGI class 2 specification. If a central lubrication system has been connected, a grease type may be used that meets the NLGI class 0 or NLGI class 2 specification. Verify this using the manual of the central lubrication system.



Only use lubricants that are prescribed by TRIDEC in a HF.. steering system. Other lubricants are **NOT** permitted.

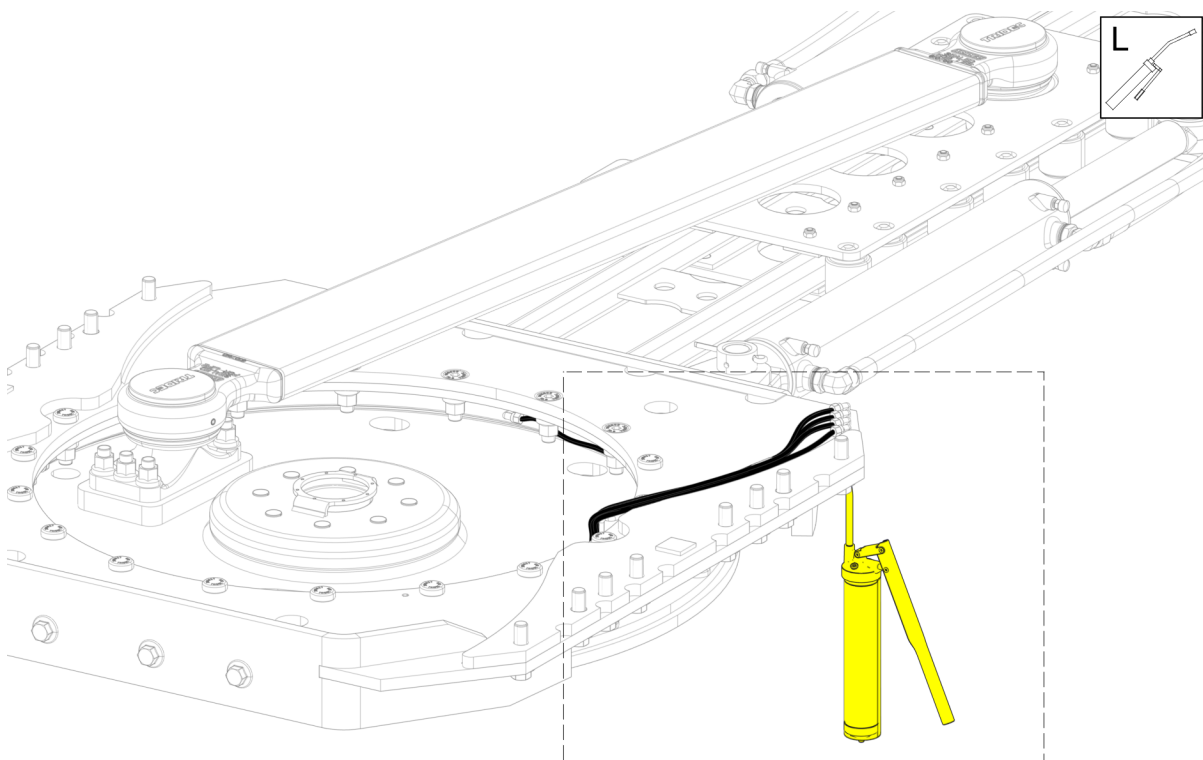


Caution! Replace lubricants of a HF.. steering system within the maintenance period set by TRIDEC.

Procedure

1. Uncouple the semi-trailer and lift the wheels of the steered axle(s) so that they no longer are in contact with the ground.
2. Turn the ring plate from left to right when lubricating the slewing ring to distribute the grease uniformly over the slewing ring.
3. Remove the surplus grease that comes out from under the seal of the slewing ring.

Lubrication points



600949_01

Figure 7-2

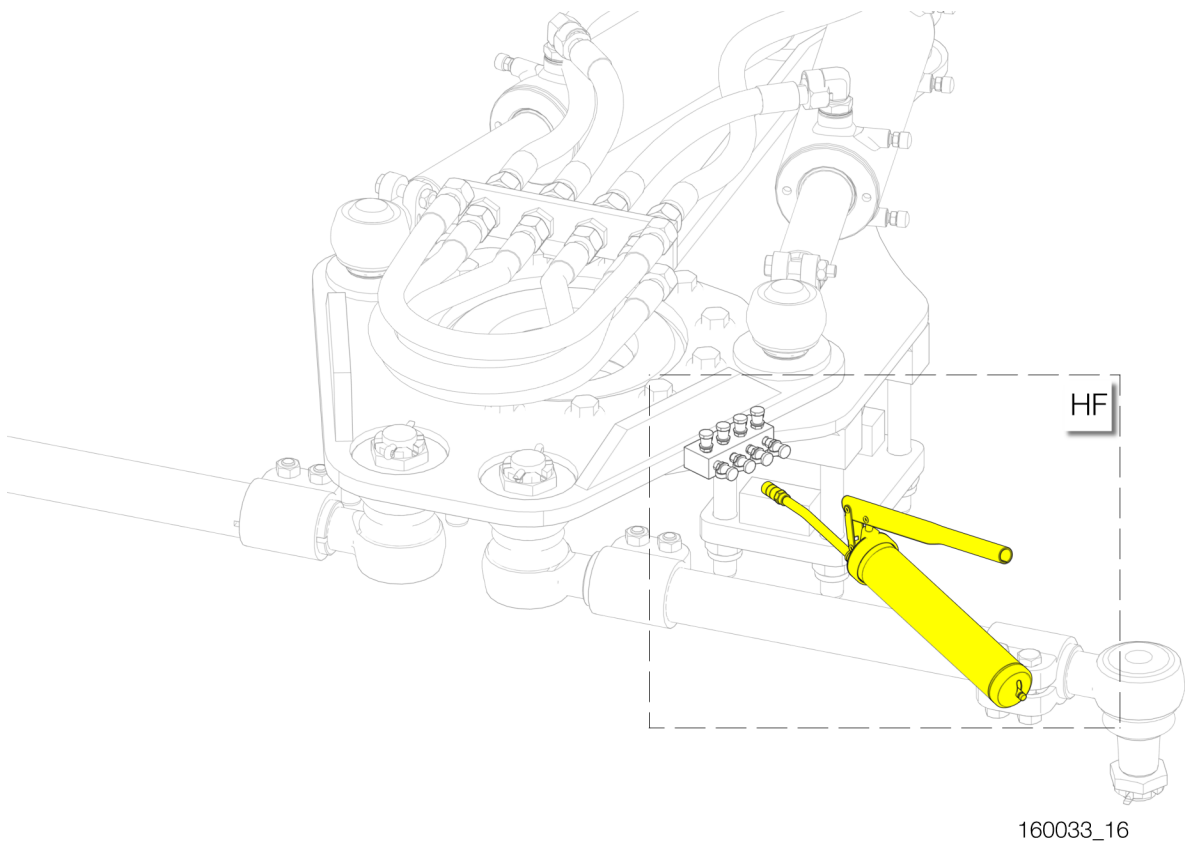


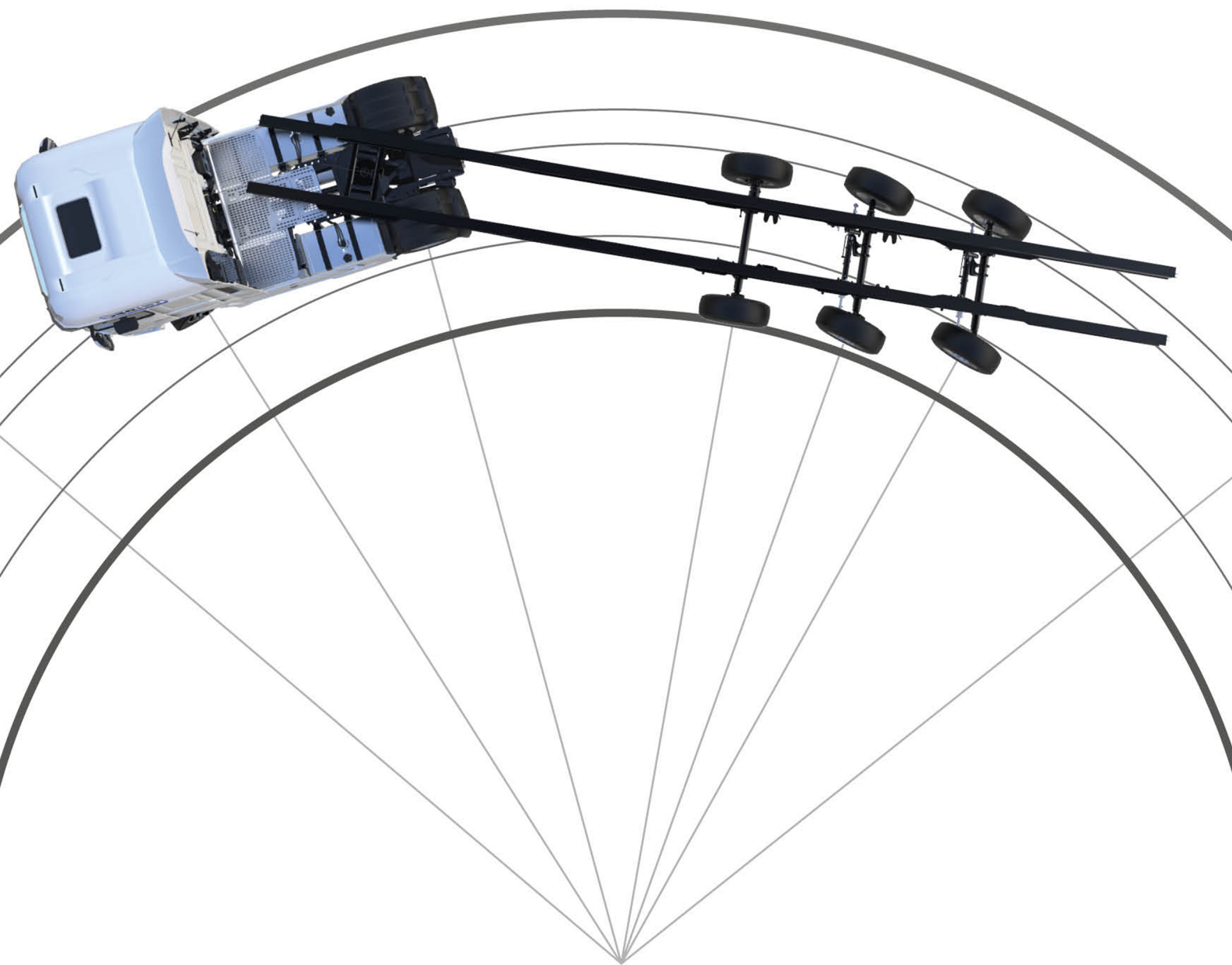
Figure 7-3

Notes

Notes

[Notes](#)

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