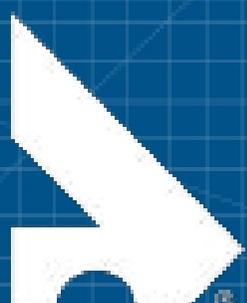


INSTRUCTIONS FOR USE



STAS ®

WE STREAMLINE
YOU WIN

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A INTRODUCTION

1. General

We would like to congratulate you on the purchase of your new STAS nv trailer.

STAS trailers have been built to serve the user for many years. If the trailer is used and maintained in accordance with the legal provisions and professional regulations, we can guarantee you many years of reliable operation.

We recommend you study the instructions and accompanying documentation carefully prior to using the trailer in order to familiarise yourself with all functions of the trailer and to enable you to use it in the best possible manner.

Your trailer has been designed in accordance with current safety standards.

We wish you every enjoyment in the use of your new trailer.

The STAS-team.

An up-to-date list of STAS sales points and recognised service points can be found on our website: www.stas.be or www.alutrailer.com.

2. Safety at work

This manual and accompanying documentation have been drawn up with the following in mind: prevention is better than cure. We would therefore ask you to take note of the following.



You will have been made aware of the main operational and safety instructions for your trailer at the time of delivery. Please apply them correctly.

Please study these instructions and accompanying documentation carefully prior to including the trailer in your trailer fleet.

Please ensure the driver of this trailer is also familiar with these instructions.

3. Notes

Although every care has been taken during the compilation and verification of this manual, it may be possible that, as a result of technical progress, certain components vary slightly from the illustrations in the text. STAS nv reserves the right to apply modifications without prior notice and cannot be held liable for any possible errors.

These instructions apply to trailers with a number of different options. It is possible certain options have not been fitted to your trailer, or are not available for your type of trailer.

This manual should always be kept with the trailer and the operator must be able to refer to it at any time.

This manual was originally published in Dutch and you may have a translated copy of the original. The original Dutch manual is also available on request.



The following information is important and should be taken into account when referring to the manual:

- The “front” is the side of the trailer closest to the tractor.
- The “rear” is the side of the trailer furthest from the tractor.
- In order to determine the left and right hand side, the operator should be looking from the rear to the front of the trailer.



The pictures in this manual are not taken on “UK trailers” (trailers driven on the left) but on “continental trailers” (trailers driven on the right). This implies that certain components will be on the other side of the trailer than shown in the pictures. E.g. position of spare wheel carrier, tool box, control units, ...

B SAFETY REGULATIONS

1. Prevention of accidents and overview of warnings and safety measures

1.1. General

As STAS nv is not aware of the conditions in which the trailer will be used, the company cannot assess the risks caused by external factors. In the interest of his employees and any other third parties which may be involved, the owner of the trailer should arrange for a risk analysis relating to these external risks to be carried out. The owner of the trailer can then use this risk analysis to arrange training for any personnel who may be using the trailer.

It is strongly recommended that operators who are new to the trailer and the moving floor system learn to use it with the trailer in an unloaded condition.

Any possible information regarding regulations relating to unloading yards, safety procedures, etc. required by drivers who are not employed by the company where the unloading is taking place should always be obtained.

Always inform the person in charge of your arrival and your departure and comply with the driving and unloading procedures in the unloading yard and the general instructions on site.

Never reverse your trailer without first ensuring it is safe to do so. Ensure there is no one in the danger zone around the trailer. If there is a signalling person present in the unloading yard, ensure that both parties are familiar with the signals being used. Cease any movement if you can no longer see the signalling person.

2. Personal protective measures

2.1.1 Footwear

When operating the moving floor trailer, protective footwear should be worn at all times. Footwear may include fixed, high fitting shoes with steel toe caps and insulating soles. Slippers, loose fitting shoes, or shoes which could endanger the operator or which do not offer sufficient protection should never be worn.

2.1.2 Clothing

Suitable clothing should ensure the operator is visible whilst carrying out his work and this will contribute to the general safety. Clothing should never be left loose and must always be done up. It should preferably be of an eye-catching colour and be fluorescent which will also offer additional visual safety.

2.1.3 Goggles

During unloading/loading the trailer, load particles may fly around. The operator of the trailer should therefore always wear approved safety goggles, from the moment he leaves the tractor till he returns to his cab.

2.1.4 Gloves

The operator of the trailer should always wear safety gloves in order to avoid injuries caused by sharp or protruding components. Gloves may also offer protection against injuries caused by the nature and characteristics of the load.



This manual contains some pictures on which the operator does not wear safety gloves. These pictures were taken deliberately that way, only for the clearness of the picture itself.

2.1.5 Ear protection

It is recommended that the operator of the trailer wears ear protection whilst operating the moving floor system.

2.1.6 Pictograms

Some of the pictograms listed below can be found on the trailer and/or on the following pages of this user manual. The following is an overview of the warnings and safety measures applicable to your trailer.

	This pictogram appears on the trailer to emphasize the fact that the operator should have studied or referred to the user manual.
	This pictogram appears in various places in this manual and indicates measures which should be observed in order to guarantee safety. This manual should therefore be studied carefully prior to attempting to use the trailer. If particular chapters or paragraphs are unclear, please do not hesitate to contact STAS nv! You should also ensure that everyone who is authorised by you to use the trailer, is familiar with and understands these instructions. The moving floor system is a machine as described in the machinery directive. The trailers are therefore designed to ensure that they comply with the fundamental health and safety requirements as laid down in the 2006/42/EEC machinery directive. The moving floor system may only be used when the trailer is coupled to the tractor.
	This CE marking confirms the conformity with the machinery directive.
	This pictogram indicates areas which could present a hazard for fingers and/or other parts of the body. The hazardous areas themselves are indicated by hatched lines.
	This pictogram indicates areas where fingers and/or other parts of the body are at risk of being cut. The hazardous areas themselves are indicated by hatched lines.
	This pictogram indicates the boundary of an area which is not accessible during normal operation.
	This pictogram indicates the outer most moving part of the trailer and is also used to indicate the hazardous areas where trapping of hands and/or other parts of the body could occur.

	<p>This pictogram indicates the presence of electrical voltage. The trailer receives 24V DC from the towing vehicle.</p> <p>Damaged electrical conductors should be replaced or repaired immediately as they could cause short-circuiting, physical injuries or fire.</p> <p>The components of the electrical system have been carefully balanced. The electrical system for your trailer therefore conforms to the EMC directive.</p>
	<p>This pictogram can be found near electrical connections. It serves to remind the operator that it is not allowed to disconnect the electrical connections by pulling the cable.</p>
	<p>This pictogram can be found near the trailer doors. It serves to remind the operator to ensure there is no one in the immediate vicinity when the doors are opened or closed. In this way, any trapping hazards can be avoided.</p>
	<p>This pictogram indicates that wearing gloves is strongly recommended.</p>
	<p>This pictogram indicates that wearing safety goggles is strongly recommended.</p>
	<p>This pictogram indicates that wearing safety boots is strongly recommended.</p>
	<p>This pictogram indicates that wearing a safety helmet is strongly recommended.</p>
	<p>This pictogram indicates that the person on the catwalk should protect himself by wearing a safety harness.</p>
	<p>This pictogram indicates the danger of falling objects when opening the roof nets or roof sheet.</p>

	<p>This pictogram indicates the date on which the trailer was painted. This date is important as the trailer should not be cleaned with a high-pressure hose until 4 weeks after it was first painted.</p> <p>During cleaning:</p> <p>the maximum water temperature should be no more than 65°C,</p> <p>only neutral cleaning substances should be used.</p>
	<p>This pictogram indicates a slippery surface as a result of spilt oil.</p> <p>The moving floor system, as well as the hydraulically operated top swinging door and the roof net (if fitted to the trailer) are hydraulically operated by means of oil pressure. When coupling or uncoupling these systems, oil may be spilt. Spilt oil should be removed immediately as it is harmful to the environment and can cause a slipping hazard.</p>
	<p>The stability of the trailer, during driving as well as unloading, is determined to a large degree by the way in which the trailer is loaded. Ensure the load is evenly distributed at all times.</p>
	<p>As manufacturers of trailers, we would like to improve lorry safety through optimum distribution of the brake force between the tractor and the trailer.</p> <p>We therefore recommend a BRAKE SYNCHRONISATION is carried out between the first 2000 and 10000 km each time the tractor is changed in order to achieve the best possible brake force distribution and pattern of wear. Please contact the truck manufacturer for a brake synchronisation.</p>

Some pictograms serve as a reminder in order to guarantee the correct use of the trailer. There are pictograms containing information on:

- **tyre pressure,**
- **tightening torques for wheel nuts,**
- **hydraulic system pressure,**
- **trailer loading and unloading instructions,**
- **maximum total weight of tools in tool box,**
- **tightening bolts and nuts and verification of tracking after the first trip of 300 km maximum,**
- **identification of connections.**

C GENERAL DESCRIPTION MOVING FLOOR



Fig a. – Basic version trailer



Fig b. – Eco version trailer

The trailer is available in 2 basic versions, i.e. the Basic version and the Eco version. The main differences between these two options lie in the roof covering and the doors. (see § 6 - Doors and § 7 – Roof covering):

- the Basic version is equipped as standard with a roof sheet (roll over sheet) and barn doors (2-part rear doors),
- the Eco version is equipped as standard with hydraulically operated roof nets and a hydraulic top swinging door.



The various doors (barn doors or hydraulically operated top swinging door) and roof coverings (roll over sheet or roof net) can be combined. However, the terms Basic version or Eco version are not used in that case.

The moving floor trailer can be divided into 2 main parts:

- the trailer, or, in other words, any components which make the vehicle into a trailer (see § 1),
- the moving floor system (see § 2).

1. Trailer

The main components of the trailer are:

- the alloy subframe with a number of crossbars onto which the air suspension, axles, valves,... have been mounted,
- the side walls and front section consisting of alloy plank rails,
- the doors and roof covering,
- the axles with associated braking system,
- the air suspension with air bags,
- the landing legs and wheel accessories,
- the lighting and signalization,
- the reinforced construction at the front for mounting the fifth wheel rubbing plate together with the kingpin, as well as the lead on plate, to the cross members.



The trailer is mounted on 9 ton or 10 ton axles in a low maintenance concept. All axles are fitted with a brake in accordance with the 71/320/EEC and UN/ECE-R13 regulation. The choice of brand for the axles depends on the country or the client. The axles should always be fitted with universal wheel bolts, universal wheel nuts and wheel hub centring.

The air suspension will be of the same manufacture/make as the axles.

2. Moving floor system

The moving floor system offers all advantages of an even loading floor, combined with a multitude of materials which can be automatically unloaded.

The two possible versions with analogue operation are:

- the Keith® Workhorse system,
- the Cargo Floor® system.



The moving floor system may only be used by trained personnel. Improper use can cause serious damage and/or injuries.

2.1. Principle of operation

The principle of operation for the moving floor system is based on the friction between the load and the floor. The floor consists of a number of spaced floor slats. Three double-acting hydraulic cylinders and associated cross members (one for each cylinder) move these floor slats backwards and forwards.

Each cross member is connected to and therefore also responsible for the movement of 1/3 of the total number of floor slats.

The unloading cycle consists of four continuously recurring stages, as illustrated in Fig 2.1.a.

Stage I

Cylinder 1 (and the associated floor slats) moves towards the front of the loading floor. As only 1/3 of the floor is moving, and 2/3 is standing still, the load does not move. This is because the friction of the stationary (larger) floor area is larger than the friction caused by the moving floor slats. At the end of the stroke, the cylinder activates a check valve which ensures the oil flow activates cylinder 2 resulting in the start of stage II.

Stage II

Cylinder 2 (and the associated floor slats) moves towards the front of the loading floor, and the load still does not move. At the end of the stroke, the cylinder activates a second check valve which ensures the oil flow activates cylinder 3 resulting in the start of stage III.

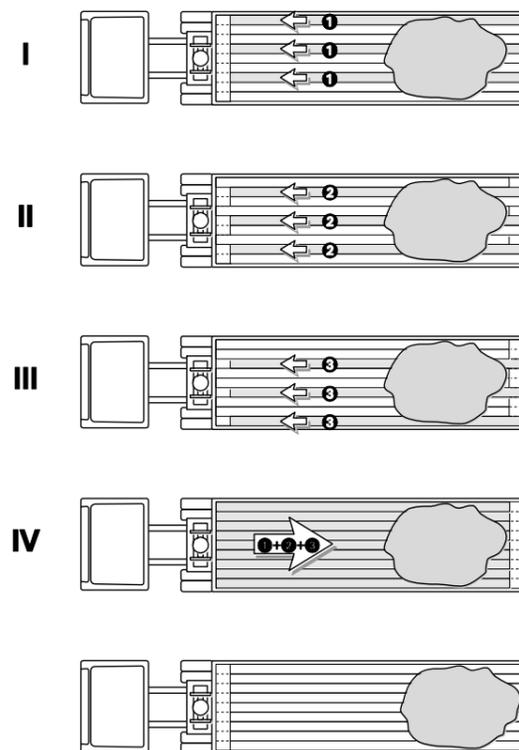


Fig 2.1.a. – Moving floor stages and positions prior to the start of a new cycle

Stage III

Stage III is identical to stages I and II but this time it applies to the remaining floor slats. Cylinder 3 (and associated floor slats) moves towards the front of the loading floor. The load does not move. At the end of the stroke, when all cylinders are positioned next to each other, the cross member connected to the cylinder activates the switching valve. The switching valve switches the pressure to the front end of all cylinders (1, 2 and 3) and stage IV starts.

Stage IV

All cylinders (and all floor slats) move back towards the rear of the loading floor. The floor subsequently moves the load over a distance equal to the stroke of the hydraulic cylinders. At the end of the stroke, the switching valve switches the pressure back to the rear end of all cylinders. The cycle is now complete and stage I follows.

2.2. Speed and maximum load

Loading and unloading times are determined by the speed of the cylinders and their speed is subject to the oil flow to the cylinders.

The maximum load which the system is able to move, is determined by the force exerted by the cylinders onto the floor. This force is subject to the oil pressure.

The hydraulic pump determines both the oil flow and the maximum oil pressure and therefore both the loading and unloading times and the maximum permissible load. In order to protect the system, pressure is limited by a pressure relief valve.



Loading and unloading times may be speeded up by increasing the oil flow. The oil pressure does not affect the loading and unloading times.

System pressure is determined by the load resistance, and not by the position of the pressure relief valve or the pump.

3. Intended use moving floor system

The application area for the moving floor system (standard system) is mainly located in the transport of:

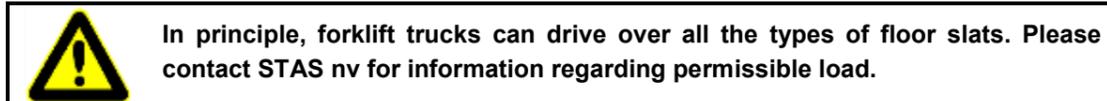
- Potatoes
- Beet and pulp
- Tree bark
- Bulk products
- Pressed bales
- Cereals
- Blocks of wood
- Wood chips
- Domestic waste
- Chicken feed
- Coffee beans
- Coal
- Fertilizer
- Corn
- Milk powder
- Manure
- Old paper
- Pallets
- Rolls of paper
- Potting soil
- Soya
- Straw
- Bales of straw
- Tapioca
- Peat
- Carrots
- Lucerne sawdust
- etc.

There are a number of materials which should not be transported by a moving floor trailer:

- abrasive materials in powder form with low granularity,
- fatty substances without anti-coagulants which may harden during transport.
- materials that suffer from galvanic corrosion due to their chemical compatibility (e.g. between copper and aluminium) in the presence of moisture (condensation, water, ...).

When transporting these product types, there is a risk of the moving floor getting stuck. In this case, the loading floor would need to be fully disassembled and this is not covered by the warranty.

Apart from the standard system, there are also a variety of drive units, floor slats (small, wide, profiled, smooth, various thicknesses, ...) and materials (alloy, steel, composites, plastic, ...). Please contact STAS nv for further information.



4. Trailer identification

4.1. Position of identification plate and trailer identification number

In case of a non-self-supporting construction (see Fig 4.1.a), the trailer identification number (1) can be found on the bottom flange of the chassis bar, along the right hand side (in the driving direction). The identification plate (2) will be attached either along the front right or at the height of the position of the trailer identification number.

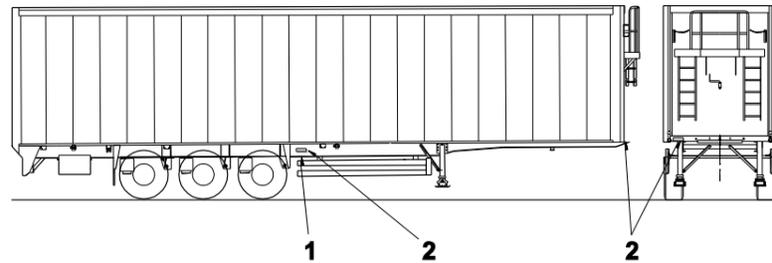


Fig 4.1.a. – Position of identification details on a non-self-supporting construction

In case of a self-supporting construction, the trailer identification number (1) as well as the identification plate (2) can be found on the first cross member along the right hand side (in the driving direction).

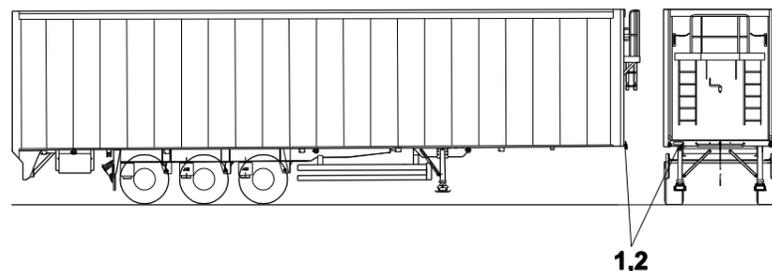


Fig 4.1.b. – Position of identification details on a self-supporting construction

4.2. Identification plate

The identification plate is laid out according to European regulation 76/114/EEC.

N.V. STAS
 FLANDERS FIELDWEG 45
 INDUSTRIEZONE 617
 B-8790 WAREGEM
 Producttype: OPLEGGER ZELFLOSSER

CE

REF. NR. [] 12
 TYPEGOEKEURING [] 7
 TYPE [] 8
 VARIANTIE [] 9a
 VERSIE [] 9b
 BOUWJAAR [] 10
 REMSCHEMA [] 11

TOEGESTANE MAX. MASSA [] kg
 TECHN. TOELAATBARE MASSA [] kg

4a. [] kg 4b. [] kg
 5a.1 [] kg 5a.2 [] kg 5a.3 [] kg 5a.4 [] kg
 5b.1 [] kg 5b.2 [] kg 5b.3 [] kg 5b.4 [] kg
 6a. [] kg 6b. [] kg

5b RT(*) [] KS(*) []
 5b L(*) [] W(*) []
 5b a min(*) [] a max(*) []
 5b b min(*) [] b max(*) []

Fig 4.2.a. – Identification plate

The plate states (see Fig 4.2.a):

- Manufacturer's name (1).
- EEC authorization number (2).
- Trailer identification number (3).
- Legally permissible maximum load of the trailer (4a).
- Technically permissible maximum load of the trailer (4b).
- Legally permissible maximum load for each of the axles (from front to back) (5a).
- Technically permissible maximum load for each of the axles (from front to back) (5b).
- Legally permissible maximum load on the fifth wheel (6a).
- Technically permissible maximum load on the fifth wheel (6b).
- Number national type approval (7).
- Trailer type (8).
- Variant of trailer (9a).
- Version of trailer (9b).
- Year of manufacture (10).
- Brake schedule reference (11).
- Reference number (internal order number)(12)
- Product type (13)
- Swing radius (KS).
- Length (L) of trailer.
- Width (W) of trailer.
- a.min and a.max: the minimum and maximum distance between the front of the towing vehicle and the coupling device.
- b.min and b.max: the minimum and maximum distance between the coupling device and the rear of the trailer.



When determining the mass, an evenly distributed load in the trailer is used as starting point.

4.3. Trailer identification number

The trailer identification number consists of a combination of 17 characters. See § 4.1 for the correct position.

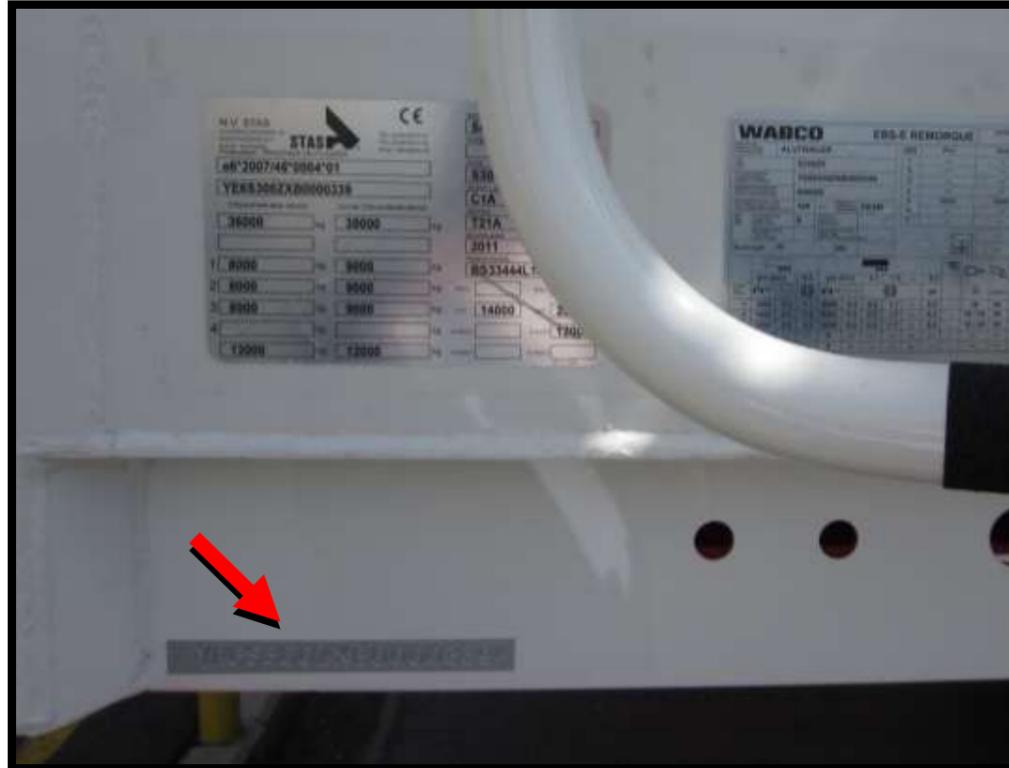


Fig 4.3.a. – Trailer identification number

D SYSTEM DESCRIPTIONS

1. Kingpin, fifth wheel rubbing plate and fifth wheel



Fig 1.a. – Fifth wheel rubbing plate with kingpin

In order to achieve a good and safe driving style for the tractor-trailer combination it is essential to respect the correct coupling height. The guiding value for the coupling height is stated on the sticker which is attached to the trailer.

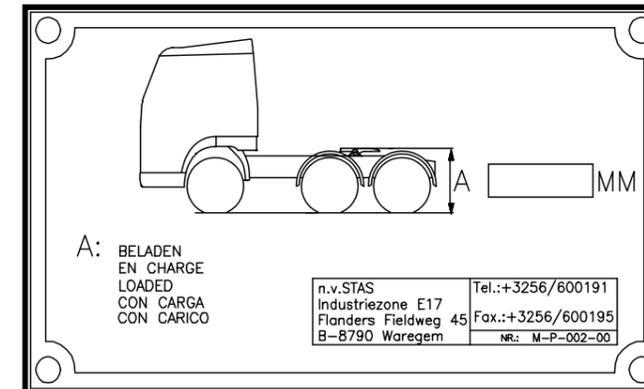


Fig 1.b. – Sticker coupling height for 3 axle tractor

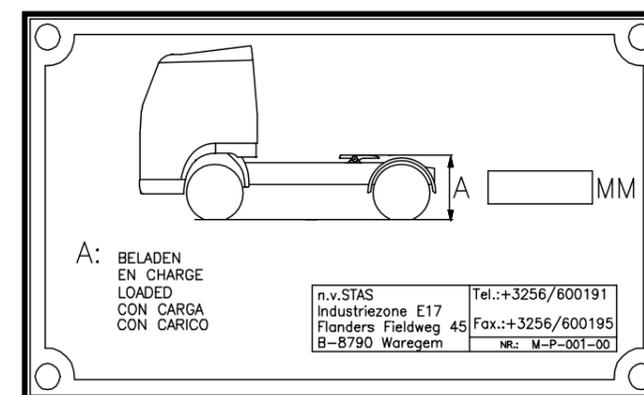


Fig 1.c. – Sticker coupling height for 2 axle tractor



If the coupling height is not respected, STAS nv cannot be held liable for any harmful consequences. Please contact STAS nv for information on setting the coupling height for your tractor-trailer combination, or for further information.

2. Landing legs

2.1. Description

Landing legs serve to support the trailer when it has been uncoupled.

There are two types, i.e. the “steel type” and the “aluminium type”. The “steel type” is fitted with a handle for adjusting the height of the landing leg and is therefore also used for adjusting the correct coupling height for the trailer when coupling the trailer to a tractor.



Fig 2.1.a. – Landing legs -“aluminium type

Both types of landing legs are fitted with a rolling base which is able to absorb limited forward movement (as a result of loss of pressure in the air bags) provided the trailer is parked on a hard surface.



- **Uncoupling and parking the trailer should be done on a solid and flat surface.**
- **Provided the trailer is fitted with a rolling base, it is NOT necessary to bleed the air suspension prior to uncoupling.**



The trailer must be equipped with air suspension in order to be able to use the “aluminium type” landing leg.

2.2. Operation steel type landing leg

2.2.1 Uncoupling the trailer

Proceed as follows:

- Release the handle.



Fig 2.2.1.a. – Storage area for handle “steel type” landing leg

- Pull the handle out completely in order to select high speed.



Fig 2.2.1.b. – Handle “steel type” extended

- Turn the handle clockwise until the landing legs touch the ground.



Fig 2.2.1.c. – Handle “steel type” landing leg

- Select low speed by pushing the handle inwards.
- Rotate the handle until the trailer is fully supported.
- Return the handle to its storage position (in the clip).
- The landing legs are now in the correct position for the trailer to be uncoupled.

2.2.2 Coupling the trailer

Proceed as follows:

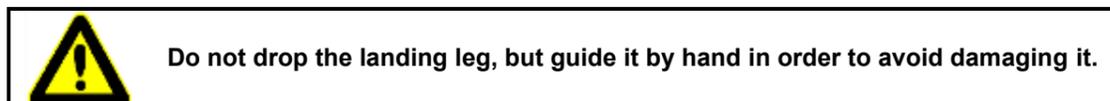
- Release the handle.
- Select low speed by pushing the handle inwards.
- Turn the handle until the position of the fifth wheel rubbing plate is just below the fifth wheel of the tractor.
- The landing legs are now in the correct position for the trailer to be coupled.
- Don't forget to return the landing legs to their highest position once the trailer has been coupled.

2.3. Operation aluminium type landing leg

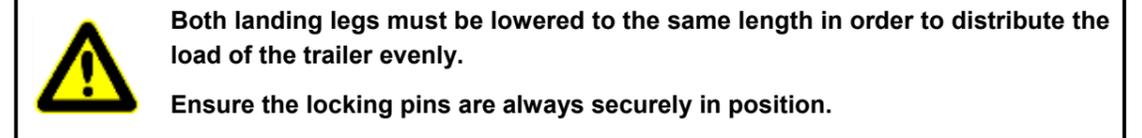
2.3.1 Uncoupling the trailer

Proceed as follows:

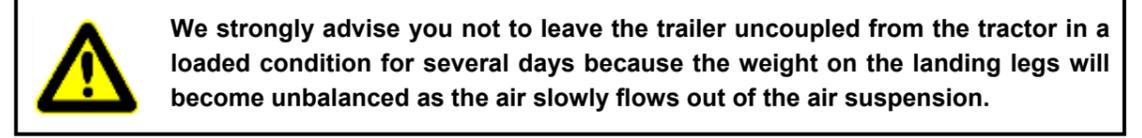
- Ensuring the air suspension of the tractor is in the “driving position”, pull out the locking pin of the landing leg and hold the leg by the lever on the base. Move the first landing leg down until this touches the ground.
- Repeat the above procedure for the other landing leg.



- Secure the locking pins for both landing legs into the lowest possible hole.



- If, after the landing leg has been secured with the locking pin, there is a 1 to 2 cm gap between the base and the ground (depending upon the position of the holes), use the air suspension of the tractor to gently lower the trailer until the landing legs make contact with the ground and are able to take on the load of the trailer.
- The landing legs are now in the correct position for the trailer to be uncoupled.

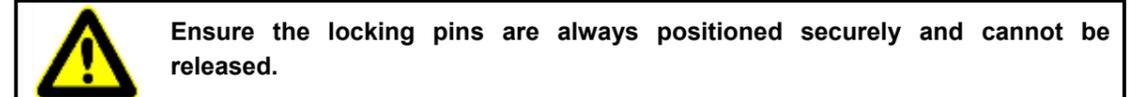


2.3.2 Coupling the trailer

As the height of the “aluminium type” landing legs is not adjustable, adjustment takes place via the air suspension of the tractor.

Once coupling has been carried out, proceed as follows:

- Pull the locking pin out of the first landing leg and position the landing leg as high as possible using the lever on the base of the landing leg.
- Position the locking pin in order to secure the landing leg in the highest position.
- Pull the locking pin out of the other landing leg and position this also as high as possible using the lever on the base of the landing leg and reposition the locking pin.



3. Brakes

3.1. General

Modern tractors and trailers are expected to be safe, efficient, comfortable and environmentally friendly. An important step for complying with these requirements is the introduction of an electronically controlled braking system for trailers or EBS (Electronic Brake System).

EBS allows the continuing best possible synchronisation of the brake forces between the various wheel brakes and between the tractor and its trailer.

The moving floor trailer is equipped as standard with the WABCO Trailer EBS-E system.

The electronically controlled braking system is equipped as standard with a load sensing brake force adjustment and anti-locking system (ABS).

The EBS system:

- complies with the legal requirements,
- conforms with directive 71/320/EC,
- conforms with directive UN/ECE-R13,
- complies with the requirements applicable to trailers suitable for transporting hazardous substances.



Only WABCO recognized maintenance centres have the appropriate software for maintaining the braking system and setting the parameters.



For correct maintenance of the brakes or in case of problems with the brakes:

- consult the Internet site www.wabco-auto.com, then click on : “Find WABCO Service Locations” , choose your country and make a choice between Service Center and/or Service Point and/or Dealer and/of WABCO and press “Start search”. The requested details will be listed.
- contact the STAS nv factories, a recognized representative or dealer appointed by STAS nv or a STAS nv designated service point.

3.2. EBS

3.2.1 System layout

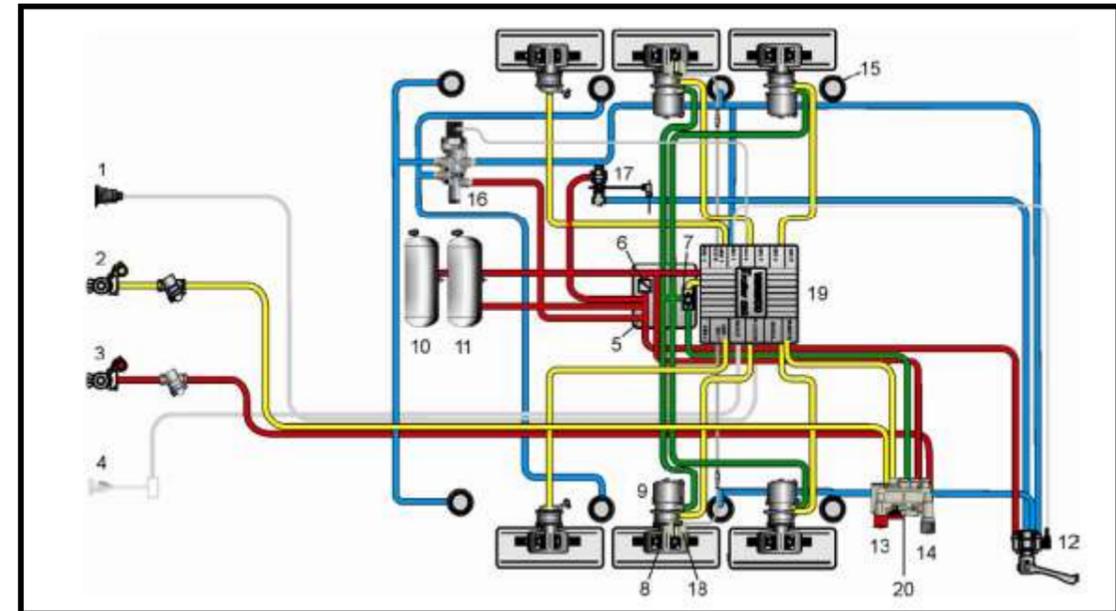


Figure 3.2.1.a. – Example EBS system layout 2S/2M

1. Voltage supply via ISO7638
2. Control line
3. Supply line
4. Stop light supply via ISO1185 (optional)
5. Pneumatic Extension Module (PEM)
6. Charging valve (integrated in the PEM)
7. Overload protection valve (integrated in the PEM)
8. Service brake components of the Tristop® cylinders
9. Tristop® cylinder
10. Reservoirs of the service brake system
11. Reservoir for air suspension
12. Lifting/Lowering valve
13. Red button for actuating the parking brake
14. Black button for releasing the automatic brake
15. Supporting Bellows
16. Lifting axle valve
17. Levelling valve
18. ABS rotational speed sensors
19. Trailer EBS E Modulator
20. Parking release emergency valve (PREV)

Depending upon the number of wheel speed sensors (S) and control loops (M), this configuration is described as 2S/2M or 4S/2M.

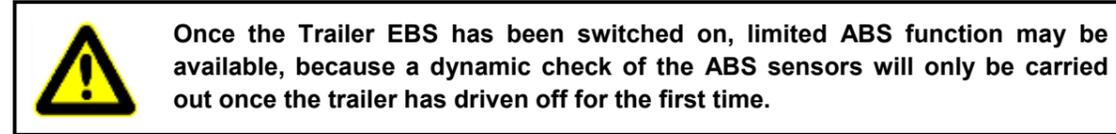
Extension of the 4S/2M configuration with an EBS relay valve for pressure adjustment of the third axle for trailers is described as 4S/3M.

3.2.2 System description

Electro-pneumatic function

The Trailer EBS system is electrically switched on by pin 2 of the socket connection to ISO7638.

If the electrical supply to the ISO7638 plug connection fails, the braking system can be regulated via an optional brake light facility. Immediately after the Trailer EBS has been switched on, a system check is performed. Two seconds after start-up, the magnets in the trailer modulator will be attracted or connected one by one. This procedure can be heard by the magnets clicking. The system is ready for operation within 150 ms of being switched on.



For electro-pneumatic control, the integrated redundancy valve is activated at the start of the braking action, resulting in the pneumatic command pressure being removed and air tank pressure being applied at the front of the inlet valves of the modulators. This will enable the brake cylinder pressure to be regulated up to air tank pressure.

For pressure regulation, the current setting is transmitted to the trailer modulator and is then regulated depending upon the load. In order to adapt the brake forces to the various loads, the bags pressure which is sent to the trailer modulator via a pneumatic pipe, is measured.

The required deceleration is preferably electronically determined via the CAN data bus connection with the towing vehicle. If this connection is not available, then the required value is determined using the integrated pressure sensor in the trailer modulator.

Brake pressure regulation is realised by control circuits with pulse controlled relay valves. For the adjustment of the brake forces to the load on trailers with air suspension, the spring bags pressure is measured by a pressure sensor.

Pneumatic redundancy

In case of faults in the EBS-system resulting in a partial disconnection, the pneumatic command pressure will go to the open inlet valve and the closed outlet valve, so that brake pressure is being controlled purely pneumatically, but without load-sensing control. The ABS control will remain operative for as long as possible. The driver is alerted by a warning light on the dashboard when a fault is detected.

Electric / electronic system layout

During normal use the trailer modulator is electrically supplied by two wires from the ISO7638 which are each fitted with a fuse.

For safety purposes, the electrical supply may be regulated via the brake light in order to maintain some regulatory functions if the electrical supply via ISO7638 should fail.

The data bus connection between the towing vehicle and the trailer modulator is realised via ISO11992. The details are checked and processed by the trailer modulator.

If the trailer has been coupled to a towing vehicle without EBS, a pressure sensor for determining the required brake value is integrated into the trailer modulator. The required value is checked for plausibility.

Pneumatic redundancy is realised by the 3/2 magnet valves integrated in the trailer modulator. At the start of each braking cycle, the trailer modulator energises the magnet valves and removes the redundancy.

Brake pressure of the third axle on a trailer is regulated with an electro-pneumatic EBS relay valve. A brake pressure sensor and a 3/2 magnet valve have been integrated into this valve. The brake pressure sensor is powered by the trailer modulator. The actual value is transmitted as an analogue signal.

In order to protect all active sensors from short-circuiting, they are connected to the trailer modulator.

A pressure sensor for monitoring the supply pressure as well as two pressure sensors for the actual brake pressure have been integrated in the trailer modulator and are powered by the trailer modulator. The actual values are transmitted as analogue signals.

For the determination of the suspension pressure, a pressure sensor has been integrated into the trailer modulator, and a pneumatic pipe is led from the trailer modulator to the bags.

For controlling wear on the brake pads, they have been fitted with indicators for the end value, the signals of which are monitored by the trailer modulator and transmitted to the towing vehicle.

Two outputs can be used for controlling additional systems on a trailer. The function per output of these systems may be programmed using the Diagnostic Controller or PC-diagnostics.

System faults are recognised by the trailer modulator and stored in accordance with a fixed fault matrix in the diagnostic memory.

The trailer modulator has the following connections:

A. PNEUMATIC CONNECTION:

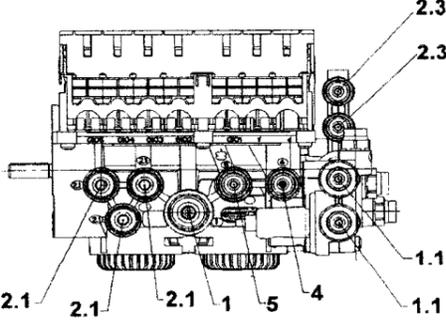
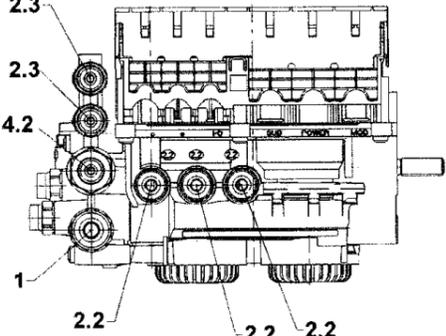
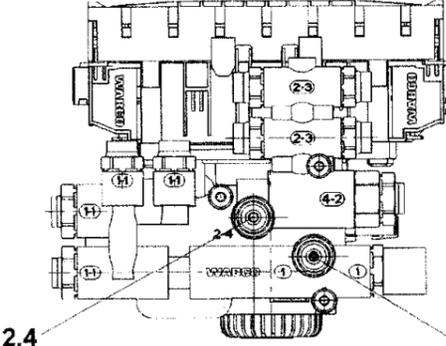
	<ul style="list-style-type: none"> 1. Supply (to the reservoir "Brake") 1.1 Supply "Air Suspension" (to air suspension valve, rotary slide valve, lifting axle valve or ECAS block) 2.1 Braking pressure (to the brake cylinder) 2.3 Tristop® cylinder (to the Tristop® cylinder (12)) 4 Control pressure (to PREV 21) 5 Bellows pressure (to air suspension bellows)
	<ul style="list-style-type: none"> 1 Supply (to the reservoir "Brake") 2.2 Braking pressure (to the brake cylinder) 2.3 Tristop® cylinder (to the Tristop® cylinder (12)) 4.2 Control pressure (to PREV 22)
	<ul style="list-style-type: none"> 1. Supply (o the reservoir "Brake") 2.4 Test connection "Brake"

Figure 3.2.2.a. – Pneumatic connection

B. ELECTRONIC CONNECTION:

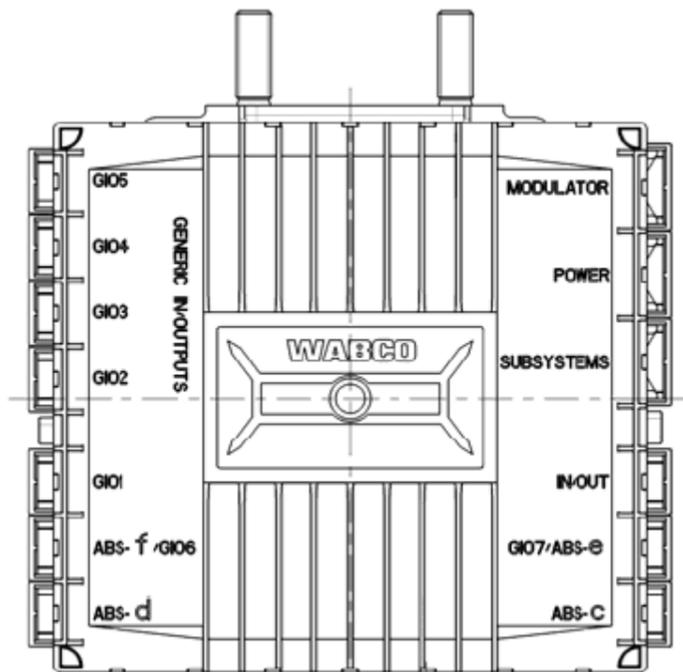


Figure 3.2.2.b. Electronic connection

POWER	Connection ISO 7638 7 pin voltage supply
SUBSYSTEMS	Connection for SmartBoard
MODULATOR	Connection for 3rd modulator (4S/3M or 4S/2M+1M)
IN/OUT	Stop light supply or TCE
ABS – C - D	ABS sensoren main
ABS – E - F	ABS sensoren additional
GIO 1-7	Multifunctional ports IN-OUT

3.2.3 Function of fault lamps

The driver is warned regarding the status of the Trailer EBS by a warning light (yellow) which is connected via ISO7638. A parallel warning signal (red) is transmitted via the ISO11992 trailer connection.

In general the following applies: when the supply pressure in the trailer falls under 4.5 bar, the yellow and red warning lamps illuminate. The warning lights extinguish when the pressure rises above 4.5 bar.

Two different sequences of warning signals can be set.

SEQUENCE 1	
	<p>Example A: once the ignition has been switched on, the warning light illuminates and goes out after 2 seconds, when an actual fault is not detected.</p>
	<p>Example B: once the ignition has been switched on, the warning light does not extinguish when a current fault has been detected.</p>
	<p>Example C: when, after the ignition has been switched on, the system recognises that during the last trip an ABS sensor fault was stored in the diagnostic memory, which is now however registered as "not actual" or when the vehicle has had the ignition switched on for more than half an hour without pressure in the brake pipe, then the warning light will only extinguish when a speed of 7 km/hour is exceeded.</p>
	<p>Example D: if an actual fault is detected once the trip has started, the warning light will illuminate once more and will remain on.</p>

SEQUENCE 2	
	<p>Example E: once the ignition has been switched on, the warning light illuminates and extinguishes after 2 seconds, and goes on and off again after 2 seconds, when an actual fault is not detected and a speed of 7 km/hour has been exceeded.</p>
	<p>Example F (= B): once the ignition has been switched on, the warning light does not extinguish when an actual fault is detected.</p>
	<p>Example G (= C): when the ignition is switched on, and the system recognises that during the last trip an ABS sensor fault was stored in the diagnostic memory, which is now however registered as "not actual", or when the vehicle has had the ignition switched on for more than half an hour without pressure in the brake pipe, than the warning light will extinguish once a speed of 7 km/hour is exceeded.</p>

3.2.4 Function description

Choice of required deceleration and pressure regulation

The "choice of the required deceleration" means: how much braking does the driver require? For a combination with an EBS braked tractor with 7-pin ISO7638 connector the trailer modulator will receive the required deceleration via the CAN-databus connection of the tractor. The determination via the CAN databus always has priority.

If the required value is not available via the databus connection, for example:

- on a combination with a conventionally braked tractor with 5-pin ISO7638,
- when the CAN-databus connection has been interrupted,
- the required value will be determined by measuring the command pressure. This measuring will take place:
 - in the trailer modulator,
 - with an optional external pressure sensor. In the C-version of the EBS, the required value for accidental braking was monitored by a switch integrated into the brake valve of the trailer. This has been replaced by a plausibility control of the sensor value. When a command pressure of 0.3 bar is exceeded, the redundancy valve which is integrated into the trailer modulator, switches to the supply pressure and EBS braking will commence. During braking, the redundancy valve is switched back to the command pressure for a short time and the system checks via the integrated pressure sensors to see whether pneumatic pressure is present. If there is no pneumatic pressure, the EBS braking will be interrupted and the system switches to redundancy braking.

Automatic Load sensing Brake force regulation (ALB)

The Trailer EBS is fitted as standard with load sensing brake force regulation.

The actual axle load is determined by the axle load sensor measuring the spring bags pressure.

In the case of trailers, as is the case for conventional ALB-regulators, the load sensing regulation is static. The controlled brake cylinder pressure (p_{zyl}) as a function of the command pressure (p_m) can be separated into two parts:

- operating the brake (A),
- stability zone (S).

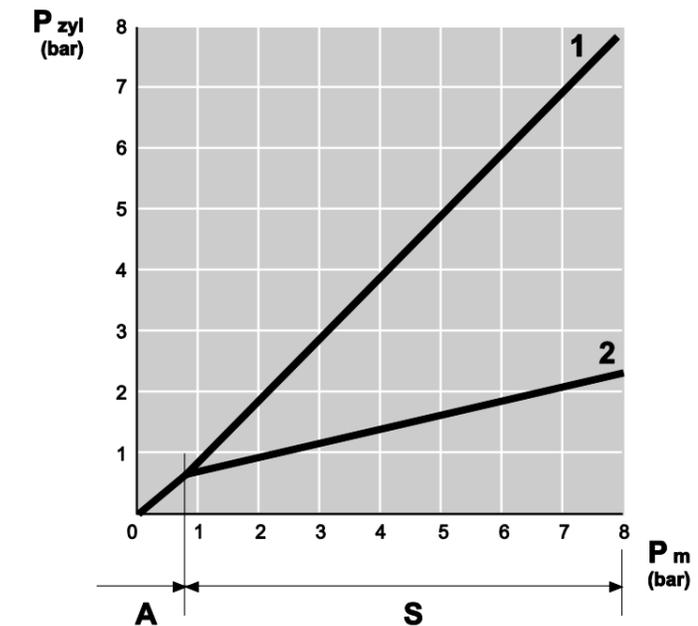


Figure 3.2.4.a. – ALB-function for a trailer (laden = 1, unladen = 2)

In the example, in the picking up area, the brake cylinder pressure rises from 0 to 0.4 bar at a command pressure of $p_m = 0$ to $p_m = 0.7$ bar. At $p_m = 0.7$ bar, the pick-up pressure of the wheel brake has been reached, so that the trailer can start to build up braking force as from this point. The parameters for this point, the responding pressure of the complete trailer brake system, can now be set within the EEC limits.

In laden condition (1) the brake cylinder pressure subsequently follows the straight line which runs through the computed value at $p_m = 6.5$ bar. On an empty trailer (2), the pick-up pressure is also transmitted at $p_m = 0.7$ bar, after that the brake cylinder pressure will be reduced in accordance with the load.

The parameter setting is determined by the WABCO brake calculation program. The parameters are stored in the trailer modulator together with the corresponding brake calculation number.

Pressure regulation

The pressure control circuits convert the pressures determined by the ALB function into brake cylinder pressures. The electronics compare the brake pressures measured at the output of the relay valves integrated into the trailer modulator with the required brake pressures. If there is a deviation, then this will be corrected by energising the aeration or de-aeration magnets.

Anti-locking function (ABS)

The electronics use the signals from the wheel speed sensors to calculate whether one or more wheels are in danger of locking up and decide whether the applied brake pressure should be reduced, maintained or increased.

For a 2S/2M-configuration, one ABS sensor and pressure control circuit of the trailer modulator have been combined into one control channel. Any other wheels on that side of the trailer, if present, will be controlled indirectly. The brake forces are controlled as per the Individual Regulation (IR) principle. Each side of the trailer can apply a different brake pressure dependent upon the conditions of the road surface and braking characteristics.

For a 4S/2M-configuration (optional) two ABS sensors will be connected for each side of the trailer. Again, the brake pressure will be regulated per side. All brake cylinders on one side will have the same pressure. The wheels on one side which are fitted with wheel speed sensors, will be adjusted according to the Modified Side Regulation principle (MSR). The wheel which is most likely to lock up on one side of the trailer determines for that side whether ABS regulation is required. Both modulators are controlled per side independent of one another. The principle of individual regulation is applied where both sides of the trailer are concerned.

A 4S/3M-configuration (optional) is used on trailers with a steering axle. The main axle(s) is individually controlled (IR) as per the 2S/2M-configuration as described previously. However, on the steering axle, two sensors and one EBS relay valve have been installed and this is where the regulation per axle takes place. The wheel, which is in danger of locking up, is used for the ABS regulation of the axle. The ABS regulation occurs as per the Modified Axle Regulation (MAR).

For all above listed configurations, apart from the brake cylinders of ABS sensed wheels, non-sensored wheels of adjacent axles may also be connected to the modulators. However, these indirectly regulated wheels will not pass on any information to the trailer modulator in case of locking urges. The anti-lock brakes on these wheels can therefore not be guaranteed.

Figure 3.2.4.b. shows some examples of sensor locations for the various configurations.

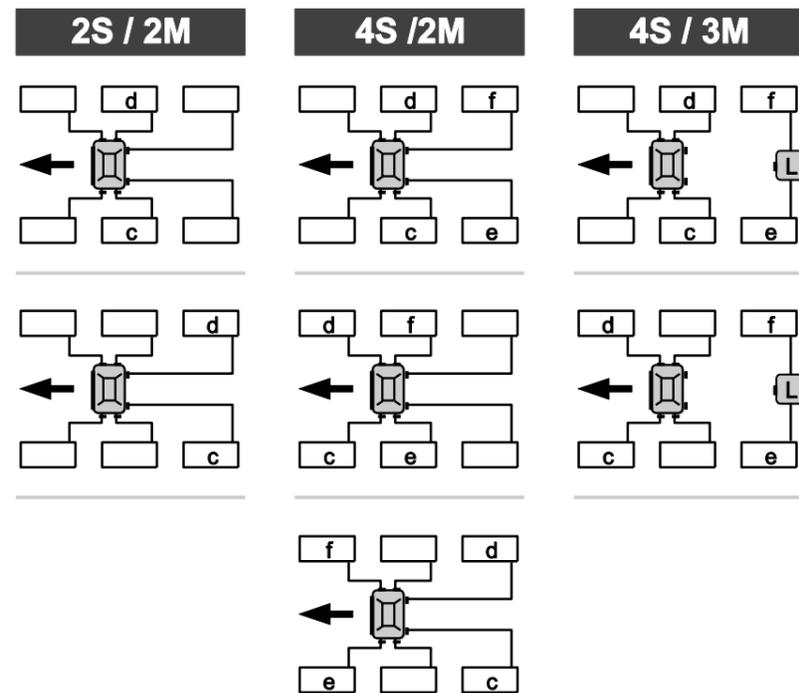


Figure 3.2.4.b. – Placement of the sensors

 **Cadence braking should NEVER be performed as this could have an adverse effect on the braking style of the trailer.**

Roll Stability Support (RSS) (optional)

There are various definitions relating to a vehicle rolling over:

- A vehicle may roll over if the critical lateral acceleration is less than the maximum friction between the tyres and the road.
- The critical lateral acceleration for rolling over is the limit value of the force, which is allowed to affect a vehicle laterally on the driving direction before the vehicle rolls over.
- The maximum friction between the tyres and the road is the limit value of the force, which is allowed to affect a vehicle laterally on the driving direction, before the vehicle slips.
- Trailers often have a relatively high centre of gravity and are therefore extremely likely to roll over when tight bends are being taken at too high speeds. For trailers, the critical lateral acceleration may be lower than that of the tractor. In contrast to the rolling over risk of the tractor, the driver often notices this too late where the trailer is concerned in order to be able to take corrective action (by braking for instance). With the aid of the RSS function, the imminent risk of the trailer rolling over is recognised and corrected by automatic braking. This reduces the risk of rolling over.

The RSS function uses the available details of the Trailer EBS:

- wheel speed,
- information on the load,
- information on the required declaration,
- information from the sensor for lateral acceleration integrated in the EBS modulator.

RSS recognises the risk of rolling over as a result of a strong relief in pressure on the wheels in the inside bend. When the calculated critical lateral acceleration of the trailer is exceeded, a low testing pressure is temporarily applied. Duration and height of the pressure depend upon the current critical lateral acceleration. The risk of rolling over is recognised using the wheel reaction during test braking.

When the risk of rolling over is detected, high pressure braking on the wheels of the trailer in the outside bend will take place in order to prevent rolling over. The brake pressure for the wheels in the inside bend will remain mainly unchanged, depending upon any ABS regulation.

 **When braking in accordance with RSS, the brake lights do not illuminate because the brake light can only be activated by the tractor whereas RSS braking is controlled by the trailer.**

An RSS adjustment starts during a driving situation with partial or no braking. If the driver brakes sufficiently (retardation above the level of the RSS retardation), RSS is not activated. If, during an RSS adjustment of the trailer which has already started, the tractor indicates a pneumatic or electric braking value, then RSS adjustment will be cancelled as soon as the braking value of the tractor is higher than that of the RSS. The braking pressure in the trailer is then adjusted to the requirements of the tractor up to the end of the braking operation.

 **As a result of the RSS control, the physical limits cannot be exceeded. If there is a further increase in lateral forces on the trailer, despite automatic braking and the resulting retardation, and the reduction in lateral acceleration is too slow, the trailer combination may still roll over even if RSS is activated.**

During driving the following are compensated: up to 9% variation in tyre circumference, misalignment of modulator up to 3 degrees on the longitudinal axle of the vehicle plus the offset tolerance of the lateral acceleration sensor. The RSS function may be out of operation or react slowly up to the level of compensation. The warning light may even go out before the RSS is functioning at its best.

When trailers are driving without any pressure in the air bags, it may be that the RSS does not detect any risk of rolling over due to a lack of information on the load.

Once faults are detected, the RSS is permanently switched off and the warning light is activated. In this instance, correct RSS functioning can no longer be guaranteed.

Standstill function

On a stationary trailer (speed < 1.8 km/h) with a command pressure of more than 3.5 bar, the electro-pneumatic brake pressure switches to pneumatic brake pressure after 5 seconds. This function serves to prevent unnecessary use of electricity when the combination is stationary with the handbrake on and the ignition on. This function is deactivated when driving commences.

Emergency brake function

In order to be able to exert maximum brake force at all times, an emergency brake function has been integrated. If the brake pressure value desired by the driver corresponds to more than 90% of the available supply pressure, a so-called emergency stop, the brake cylinder pressures will be increased up to the supply pressure. This function is also operative when a spring bag of the suspension has burst.

Verification of supply pressure

The supply pressure to the trailer is verified by the EBS. If pressure drops below 4.5 bar then the driver is alerted by the red and yellow warning lights. Once the pressure of the air pressure braking system has been corrected and the pressure of the trailer exceeds 4.5 bar, the lights will go out.

If the supply pressure drops below 4.5 bar during driving, this will be stored as a fault.

Kilometre indicator

The Trailer EBS is fitted with an integrated kilometre indicator, which measures the distance covered when the EBS system is functioning. Two separate functions are available:

- The total number of kilometres indicates the total amount of kilometres driven since the system was put into operation. This value is saved on a regular basis and can be read with the aid of the various diagnostics equipment or SmartBoard.
- A tripometer is also available. This can be reset to zero at any time. In this way the number of kilometres between two maintenance inspections can be determined or the number of kilometres driven since a particular time. Diagnostic equipment or SmartBoard is used to read and reset the tripometer.

Special calibration is not required. The calibration factor is calculated using the tyre circumference and the number of teeth in the field system, which are entered during the final inspection of the Trailer EBS.

The kilometre indicator requires an electrical supply. It will therefore only function when the Trailer EBS is electrically connected and is not tamper-proof.

Service signal

This function may be activated using diagnostic equipment. If this function has been activated, a warning light can be set to be activated after a certain number of kilometres, selected with the aid of the diagnostic equipment, have been covered. This warning light will illuminate the first time the ignition is switched on after the selected number of kilometres have been covered and will flash eight times. The flashing will repeat itself every time the ignition is switched on and will help to remind the driver the trailer is due for a service, etc.

The service signal may be reset. After resetting, the set service interval as described, will be re-activated.

This function is not switched on at the time of delivery.

Operation hour counter

The elapsed operation time is stored in the memory and may be read via the diagnostic socket or SmartBoard.

The counter for the operational hours only functions when the Trailer EBS is electrically connected and is therefore not tamper-proof.

ILS (Integrated Load Switch) (optional)

If the trailer is equipped with lift axle(s), these may be automatically controlled, independently from the actual axle load, by the Trailer EBS. To this end, an electrical axle lift valve should be connected to the GIO plugs of the trailer modulator.

The axle load at which the lift axle is lowered is calculated using the pressure present in the air spring bags and using the details of the bags pressure and the axle load in laden and unladen conditions, which have been laid down in the parameters. The value can be included in the parameters as a percentage of the permissible axle load of the trailer.

The trailer speed at which raising the lift axle(s) can be carried out, lies between 0 and 30 km/hour.

Diagnostic equipment is used to set the parameters.

When a fault is detected in the axle load sensor, the lift axle will be lowered at speeds between 5 and 30 km/hour and will not be activated at a speed below 5 km/hour.

Only ABS sensors e and f may be connected to the lift axle. ABS sensors c and d should always be connected to the main axle.



During technical inspection and verification, it should be possible to lower the axle when the trailer is unladen. This may be done by switching off the trailer ignition or through the SmartBoard operation. The axle is then lowered and will remain in this position regardless of the load. The axle will only be raised when the speed of the trailer exceeds 15 km/hour.

Lift axle traction help (optional)

A lift axle traction help may be set up on trailers with a first axle as the lift axle or with the first axle with axle deflation (air suspension dump valve). The value for the axle load for the lift axle traction help should be no more than 30% above the maximum permissible axle load and should be determined by the manufacturer. Once a speed of 30 km/hour has been reached, the axle will come back down or the first axle will be inflated.

The TH version (an axle lift valve) means that the lift axle may be lifted or that the air suspension dump valve can be deflated to help driving off, when the permissible bags pressure set in the parameters is not exceeded after lifting. If the permissible pressure is exceeded during driving off, the lift axle traction help is interrupted and the lift axle will come back down or the air suspension dump valve will be inflated.

Please note : The operation first axle with axle deflation (air suspension dump valve) does not work independently or separately of the lift axle traction help.

The lift axle traction help (or forced lifting) is being activated :

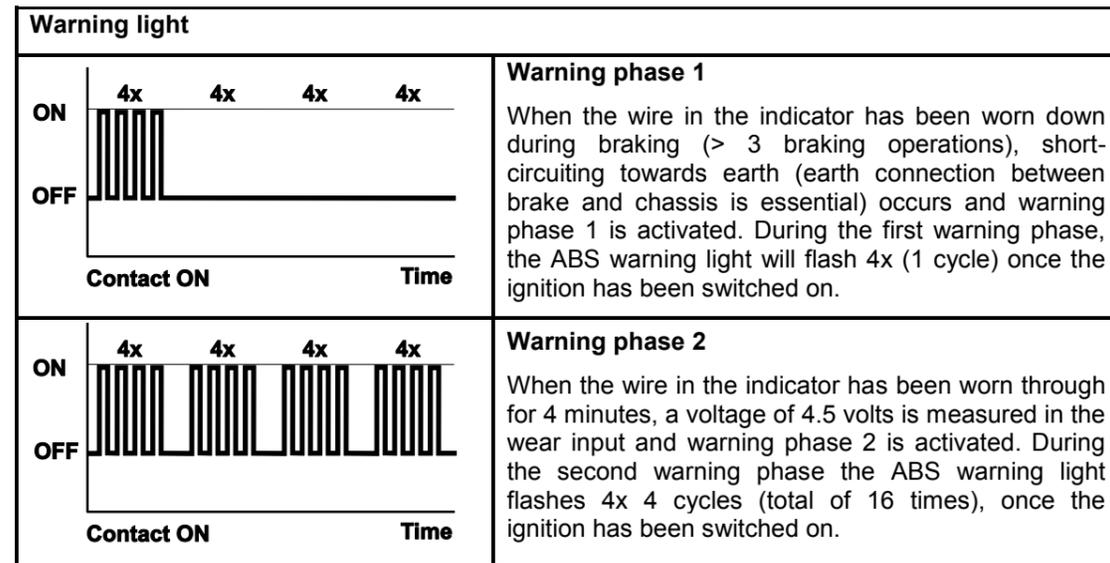
- either through an impulse button connected to the power supply (+24 V) or minus (0 V) and on a GIO of the modulator (with cable) and if the parameters have been set accordingly. The impulse on the button needs to be between 0,1 and 5 seconds.
- or by pushing 3 times the brake pedal if the parameters have been set accordingly on the GIO of the modulator (without cable).
- or through the SmartBoard if the parameters have been set accordingly.

In order to disconnect the lift axle traction help :

- either when the impulse on the button is more than 5 seconds (with cable).
- or by pushing again 3 times the brake pedal (without cable).
- or through the SmartBoard.

Wear indicator (optional)

Up to 6 indicators for monitoring wear on the brake pads can be connected to the electronic system. The wear indicators (a wire integrated into the brake pad) measure the wear on both brake pads. All indicators are connected in series and connected to the wear input in a voltage distributor. The driver is alerted via the ABS warning light, shortly before and when the limit of wear has been reached.



The warning is interrupted when the trailer exceeds a speed of 7 km/hour. In case of system faults, the ABS warning light is permanently activated.

The corresponding information is simultaneously transmitted to the tractor-trailer interface and can be displayed on the display.

The system automatically detects when new wear indicators have been installed after the brake pads have been replaced. All warning lights will be de-activated after approx. 2 minutes (switch on ignition for a minimum of 2 minutes). The warning light will only go out when the ignition is switched on again.

The last five replacements of the brake pads (position of kilometre indicator and operational hours when the second warning phase and replacement of brake pads have taken place) are stored in the ECU and can be read using the PC diagnostics.

3.3. Brake connection

The connecting points on the trailer are located at the front. The command line is colour coded yellow and the supply line is colour coded red.



Figure 3.3.a. – Brake system connection



- When uncoupling the connecting hoses, the brakes are automatically activated.
- Once the air pipes have been disconnected, the connecting points should be protected against contamination by water or dust by placing the lids of the connections over the apertures.
- The parking brake is NOT automatically set once the command and supply air pipes have been disconnected.
- Repairs to the brake system may only be carried out by qualified engineers.
- Any components in the brake system which need replacing, should always be replaced by original components.



Figure 3.3.b. – 7-pin socket (left) and 5-pin socket (right)



Trailers equipped with the EBS-E brake system may only be coupled to tractors with either:

- an ISO7638-1996 electrical connection (7-pin, 24V, CAN-databus),
- an ISO7638-1985 electrical connection (5-pin, 24V, no CAN-databus).

If the ISO7638 cable is not connected, the ABS and additional functions will NOT be operative. In this case, the brake system will operate as a conventional brake system.



3.4. Prevention of premature brake wear

See also “Wear indicator (optional)” on page 45.

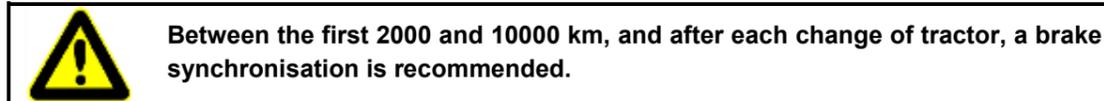
It may be possible that a tractor-trailer combination does not brake properly. Upon further investigation, it is usually found that in case of a trailer with drum brakes, the brake lining has been glazed or burnt and the brake drums have torn. In case of a trailer with disc brakes, it appears the brake pads have completely worn after a limited number of kilometres and the brake discs show deep grooves.

For articulated vehicles, the tractor as well as the trailer are conform to European directives or to the regulations of the United Nations nowadays. In practice however, it appears that on a combination of these two, optimum braking is not performed. Nevertheless, it is most important that each of the vehicles takes on its share of the braking force in a correct manner and under any loading conditions.

A synchronisation of the brake system (see § 3.5) on the tractor and the trailer prevents these problems.



3.5. Brake synchronisation



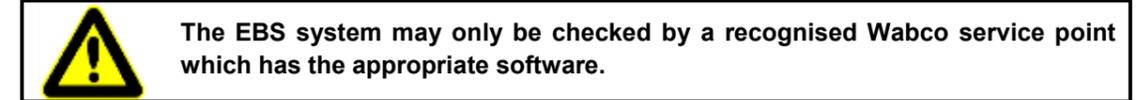
This brake synchronisation, which should be carried out by the tractor manufacturer, is recommended in order to obtain optimum brake force distribution and an optimum wear pattern between the tractor and the trailer.

Damage and wear as a result of poor brake synchronisation will not be accepted under warranty under any circumstances. We therefore recommend a brake synchronisation is performed and the synchronisation report is kept in a safe place. Always ensure that the report clearly states the details of the tractor and the trailer, including the date on which the synchronisation was performed.



3.6. Brake plate

As the braking system is fitted with EBS, the brake plate has been replaced by a sticker. The parameters of the EBS controlled brake system can be found on this sticker.



WABCO		EBS-E REMORQUE		GGVS/ADR TUEH TB 2007 - 019.00 E613R10-1917											
HERSTELLER MANUFACTURER CONSTRUCTEUR	STAS NV		GIO	Pin1	Pin3	Pin4									
TYP TYPE	S339CX		1	---	TH	---									
FAHRZEUG IDENTIFIK. CHASSIS NUMBER NUMERO DE CHASSIS	YE6S339CXAL240047		2	ILS1	---	---									
BREMSBERECHNUNGS-NR. BRAKE CALCULATION NO. CALCUL. DE FREINAGE NO.	48286S		3	LWI	---	---									
POLRADZÄHREZAHL, c-d e-f POLE WHEEL TEETH c-d e-f DENTS COURONNE DENTÉE c-d e-f	90	ABS-System ABS-System Système ABS	4	---	---	---									
RSS Einachsberührung Single Tyre Monie simple	X	Lenkachs Steering axle Essieu avant	5	---	---	---									
Zwillingsberührung Twin Tyre Monie jumelle		Kipplattisches Fahrzeug Critical Trailer Véhicule à centre de gravité élevé	6	---	---	---									
Sous-syst	SB	I/O	7	---	---	---									
ACHSE AXLE ESSEU	pm (bar)	6.5	pm (bar)	0.7	1.9	---	6.5	1.0	Pz						
	TR (daN)														
1	1000	0.2	1.3	9000	5.8	0.5	1.8	---	6.5	1	16	65	76	404	3969
2	1000	0.2	1.3	9000	5.8	0.5	1.8	---	6.5	-	16 / 24	65	76	404	3969
3	1000	0.2	1.3	9000	5.8	0.5	1.8	---	6.5	-	16 / 24	65	76	404	3969
4	0	---	---	0	---	---	---	---	---	---	---	---	---	---	---
5	0	---	---	0	---	---	---	---	---	---	---	---	---	---	---

Figure 3.6.a. – EBS brake system sticker

3.7. Drum brake

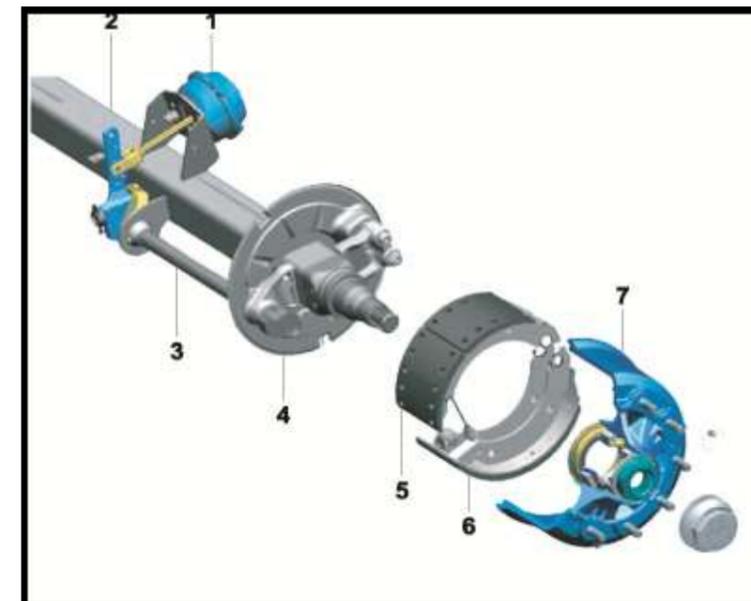


Figure 3.7.a. – Drum brake

The trailer brake operates according to the general drum brake principle. The force of the brake cylinder (1) starts up the brake shaft via brake rods (2,3) in a rotary movement. The cam (4) at the end of the brake shaft spreads the brake pads (5) and in this way pushes them against the inside of the brake drum (7) resulting in an effective braking force.

When the brake pedal is released, the cylinder pressure on the rods is removed and the brake shaft and cam return to their original position. The brake pads are also returned to their original position by return springs (6). The brake force is removed.

3.8. Disc brake

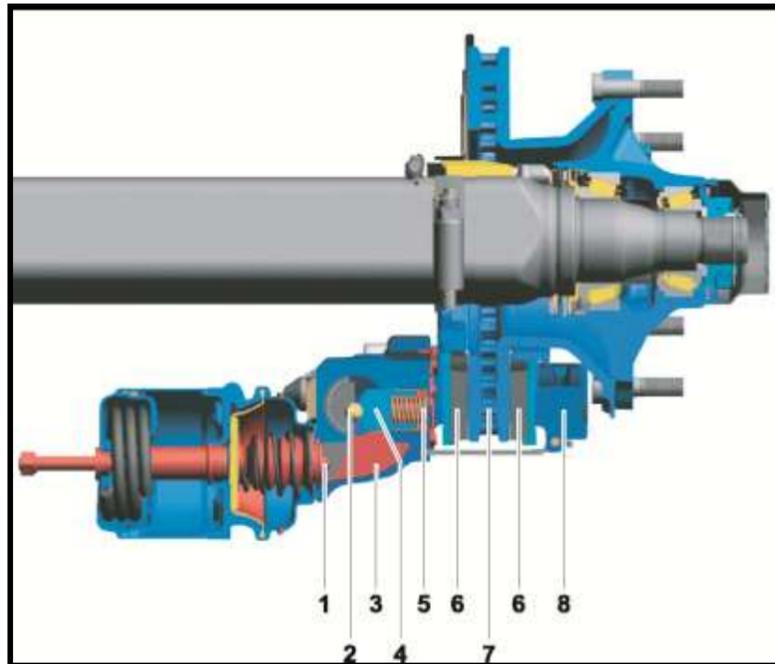


Figure 3.8.a. – Disc brake

When the brake pedal is operated, the connecting rod (1) of the brake cylinder pushes on the lever (2) of the disc brake. The wheel which is eccentrically mounted on bearings (3) transfers the force to the bridge (4). The clamping force impacts upon the inner brake lining via the threaded rod and the piston (5). The brake lining (6) pushes itself off against the brake disc (7). The reactive force which is generated on the brake saddle (8) is transferred to the opposing brake lining resulting in this also being pushed against the brake disc with an equal force and generating an effective braking force.

3.9. Parking brake – spring brake cylinders

The parking brake with spring brake cylinders operates as follows:

- As the pneumatic pressure in the spring brake cylinder disappears, the spring is released and generates a brake force in this way.
- As the pneumatic pressure builds up in the spring brake cylinder, the force of the spring is removed and the brake force is removed.

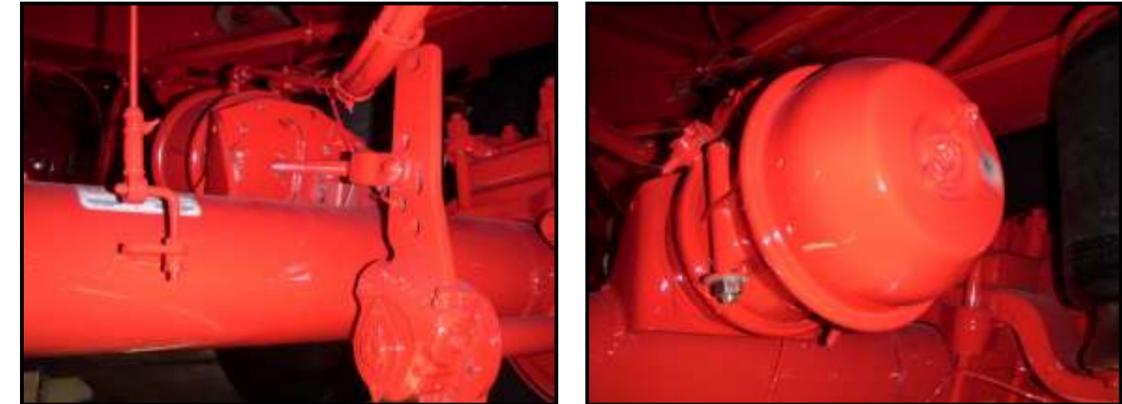


Figure 3.9.a. – Spring brake cylinder

The control unit for the parking brake is located on the side of the trailer, together with the raising and lowering valve and the loading gauge.

The red control button for the spring brake cylinders can be found on the left hand side of the control unit (see Figure 3.9.b.).

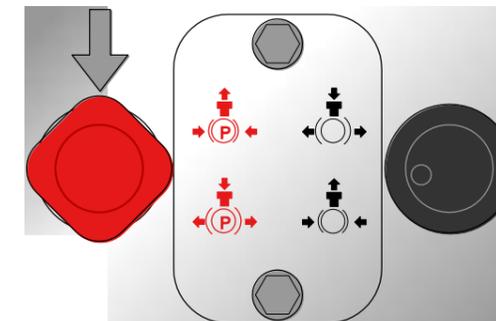


Figure 3.9.b. – Control unit for parking brake with control button

Operation of the parking brake can be summarised as follows:

- Pull out the red button to activate the trailer parking brake.
- Push the red button to switch off the trailer parking brake.



- **Once the parking brake has been switched off, it is NOT possible to drive off immediately. The pressure in the spring brake cylinder needs to rise first before the parking brake is released.**
- **Ensure the parking brake is sufficiently tightened before leaving the trailer unmanned.**
- **It is advisable to place a wheel chock in front of or behind the wheels for additional protection.**
- **Always park the trailer on a horizontal and stable surface, NEVER on an incline.**

3.10. Emergency brake

This function is used when the trailer is not connected to the tractor and it is necessary to move the trailer using a fork lift truck for instance.

When the red air pressure pipe between the tractor and the trailer is uncoupled, the brake system on the trailer will automatically go into the braking position so that, in principle, the trailer cannot be moved. With the aid of the emergency brake, the trailer can still be moved without the tractor.

The control unit for the emergency brake is located on the side of the trailer, together with the raising and lowering valve and the loading gauge.

The black control button for the service brake is located on the right hand side of the control unit (see Figure 3.10.a.).

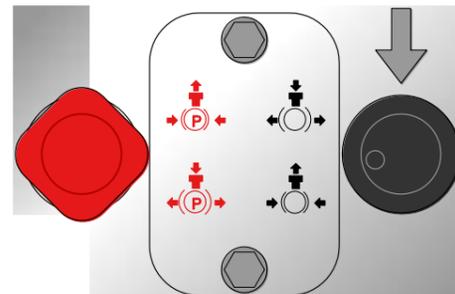


Figure 3.10.a. – Control unit emergency brake with control button

Operation of the emergency brake can be summarised as follows:

- Push the black button to activate the emergency brake in order to move the trailer (using a fork lift truck for instance).
- Pull out the black button to re-activate the service brake for the trailer.

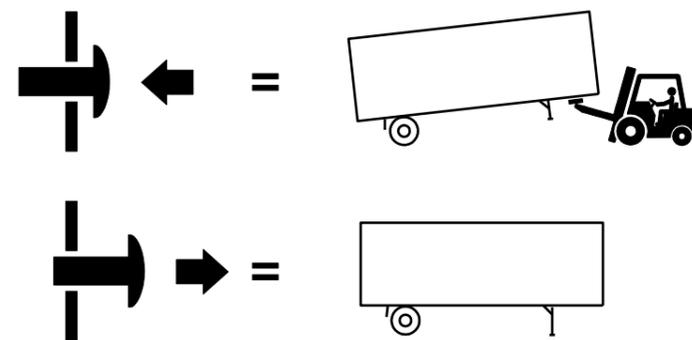


Figure 3.10.b. – Operation of emergency brake

 **Use of the emergency brake requires a pressure of more than 4 bar in the pneumatic circuit.**

4. Air suspension

4.1. General



Figure 4.1.a. – Air suspension

The air suspension of the trailer ensures the chassis of the trailer is spring-mounted with regard to the axles of the trailer and is able to absorb the shocks in this way. The pressure in the spring bags is regulated automatically in such a way that for each load, maximum driving comfort and minor movement of the superstructure is obtained. This also results in good road holding and little tyre wear.

4.2. Raising and lowering valve

The valve for raising and lowering on a trailer with air suspension allows the height of the trailer chassis to be adjusted with a view to loading and/or unloading the trailer.

This valve is used to adjust the difference in height between the axles and the chassis of the trailer.



Figure 4.2.a. – Raising and lowering valve

The raising and lowering valve has 5 positions:

- Position for lowering the chassis to its lowest position (lever clockwise in outer position).
- Position for stopping the lowering movement.
- Driving position.
- Position for stopping the raising movement.
- Position for raising the chassis to its highest position (lever anti-clockwise in outer position).

 **The position of the raising and lowering valve may only be changed to another position from the driving position during loading and unloading.**

4.3. SmartBoard

4.3.1 General

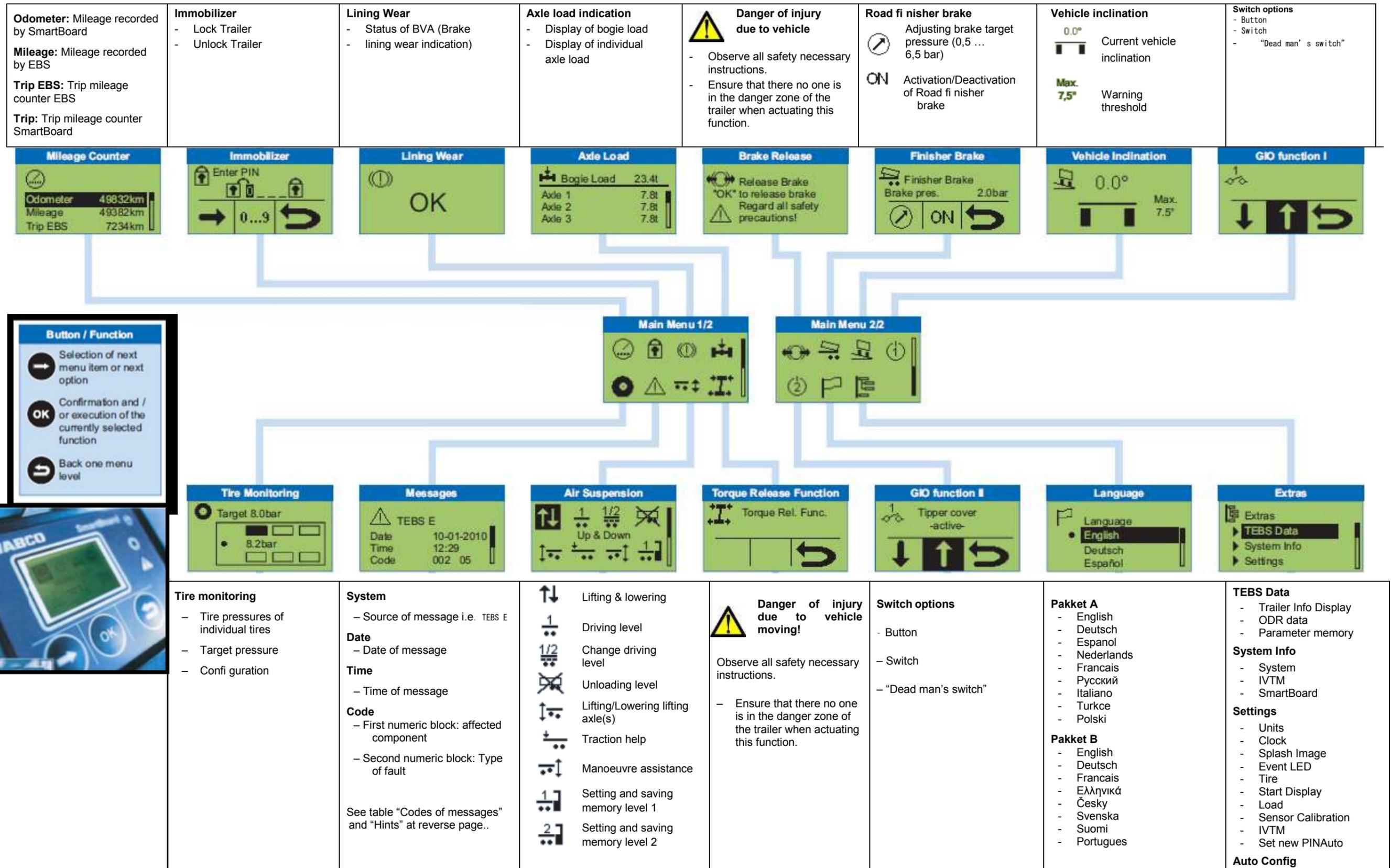


Figure 4.3.1.a. – Button / Function

Certain functions are not standard. Those can be obtained through options.

4.3.2 Electronic kilometre indicator through SmartBoard

The electronic kilometre indicator can be read on the SmartBoard (see Figure 4.3.1.a.).

The electronic kilometre indicator is used to:

- verify in a simple manner how many kilometres the trailer has travelled,
- plan the maintenance of the trailer by the number of kilometres travelled.

Odometer: kilometre recorded by SmartBoard = Total number of kilometres (independent of the power supply)

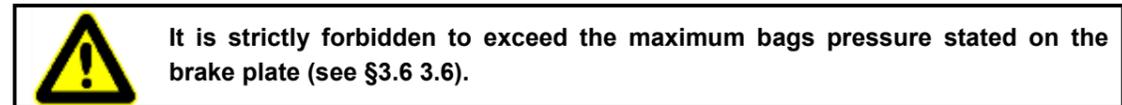
Mileage: number of kilometres recorded by EBS (with power supply)

Trip EBS: trip mileage EBS (with power supply – can be set on 0 (only with PC))

Trip: trip mileage counter SmartBoard (with power supply – can be set on 0 with SmartBoard).

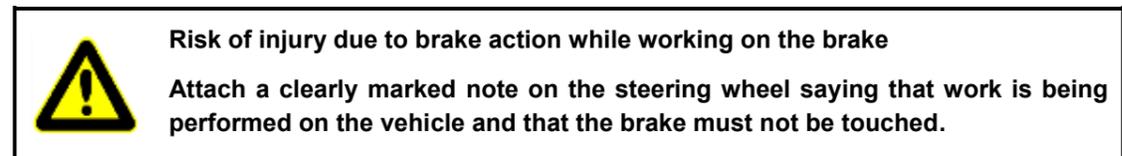
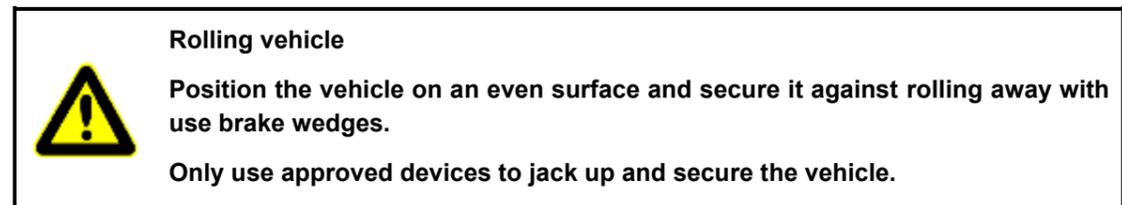
4.4. Load indication through SmartBoard and any possibly calibration

The SmartBoard gives an “indication” of the total axle load or the load on the axles separately (see figure 4.3.1.a.).



Calibration

Pressure sensor calibration



The SmartBoard provides the option to calibrate the pressure sensor to improve the accuracy of the axle load indication of Trailer EBS E.

This will improve the accuracy of the axle load indication. The more accurate the vehicle weight is determined and the pressure sensors are calibrated, the more exact the axle load is displayed. In case of a wrong calibration the axle load indicates wrong values!

The actuation of brake pressures is unaffected by this calibration, these values apply to parameter settings provided by vehicle manufacturer.

Calibration points

The larger the weight difference between individual calibration points, the more exact the axle load indication will be. The calibration point “partially loaded” is an option and not necessarily used.

- Empty
- Partially loaded (optional)
- The vehicle weight in the partially loaded condition should be the midpoint between vehicle weight in empty and fully loaded condition.
- Loaded

Preconditions

- Trailer EBS E1 with software version from TE14013 upwards
- SmartBoard with software from SB010207 upwards



During calibration, the parking brake and service brake must be released.

Calibration on the semi-trailer

Determine the weight of semi-trailer is unladen, partially laden (optional) and laden weight using calibrated weighing device.

Ensure that all axles of the semi-trailer are located on the weighing device.

- Select the menu <extras> <settings> <sensor calibration>.
- For vehicles with raised lifting axle(s) you will be requested to lower them.
- Lower the lifting axle(s) by pressing button <arrow right>.
- The calibration will continue when all lifting axle(s) are lowered.
- Select the menu item <calibrate unladen.> and enter the weight of unladen semi-trailer.
- Button <arrow right>: changes the digit position
- Button <OK>: changing the value
- Button <back>: confirmation of input
- Confirm saving the entered calibration data by pressing the <OK> button.
- A successful calibration is indicated by displayed icon with check.
- Repeat the last two action steps for the partly loaded (optional) and the fully loaded semi-trailer.
- To do this, select the corresponding menu items <calibrate partly laden.> and <calibrate full laden>.

5. Wheel accessories

5.1. Tyres and rims

All wheels and tyres mounted on the trailer are identical. A number of options with regard to make, size, offset and profile of wheel/tyre are available, but these should always comply with the technically permissible axle loads, the load-speed index and the brake schedule.



In the interest of safety it is extremely important to respect the correct tyre pressures.

Driving on tyres with insufficient pressure causes an abnormal rise in temperature which damages components of the tyres. This damage is irreversible and will in due course unavoidably lead to flat tyres. The consequences of insufficient tyre pressures are not always immediately visible and may only become apparent long after the tyre pressures have been corrected.



The valve cap is essential for complete air-tightness and for protection of the inner valve.

Tyre pressures are stated on the sticker located on the side of the trailer at the height of the first axle.

5.2. Spare wheel and spare wheel carrier

The spare wheel is located as standard in the single spare wheel carrier on the passenger side of the vehicle. In order to lift the spare wheel from its carrier, remove the safety bar which retains the spare wheel in position.



Figure 5.2.a. – Single spare wheel carrier

An optional double spare wheel carrier may be fitted.



- The maximum load is 140 kg for a single spare wheel carrier and 250 kg for a double spare wheel carrier.
- The spare wheel should be securely fastened to the spare wheel carrier at all times in order to avoid damaging, coming loose or losing the spare wheel.

5.3. Wheel chock

The use of a wheel chock is strongly recommended when uncoupling the trailer, also when the trailer is being uncoupled on a surface without any apparent slopes.



Do not forget to remove the wheel chock and return it to its holder once the trailer has been coupled.



Figure 5.3.a. – Wheel chock in holder (left) and in position (right)

5.4. Mud guards and mud flaps

There are two types of mud guards which comply with the legal requirements. The first type covers the wheels collectively using part of the chassis and the second type covers the wheels individually.



Figure 5.4.a. – Mud guard types

Both types of mud guard are fitted with mud flaps equipped with spray suppression.



Figure 5.4.b. – Mud flap with spray suppression



The spray suppression on the mud flaps should be cleaned on a regular basis by means of a high pressure cleaner.

6. Doors

6.1. Barn doors



Figure 6.1.a. – Barn doors



Prior to opening the door, ensure:

- the load allows you to do so safely,
- the load cannot suddenly fall out,
- there is no one in the vicinity who could get trapped between the doors and/or side walls,

there is sufficient space to open the doors outwards.

In order to open the doors, proceed as follows:

- Open the door lock (optional). See § 11.3.
- Turn the safety latches of the door handles.
- Rotate both door handles gently upwards and then backwards in such a way till both doors are unlocked.
- Open the door by turning the handles.
- Guide the doors until they have been fully opened and have been positioned against the side wall of the trailer.
- Lock the doors against the side wall of the trailer using the available holders.



Figure 6.1.b. – Door handles (left) and door lock

Reverse the above procedure in order to close the doors.



Once the doors have been closed, please ensure:

- the top and bottom locking cams of the doors are positioned correctly in their holders,
 - the door handles have been secured with the safety latches,
- the holders on the side walls have been pushed back in.

6.2. Hydraulically operated top swinging door



Figure 6.2.a. – Hydraulically operated top swinging door

The control unit for the top swinging door is located at the back of the trailer for safety reasons so that the operator can observe the movement of the door.



Fig 6.2.b. – Control unit top swinging door (right) with reset button and buzzer in storage area (left)

If the trailer has also been fitted with hydraulically operated roof nets, please ensure:

- the roof nets are fully opened or closed prior to operating the top swinging door,
- the correct order of operation is being observed.

The use of the hydraulically operated top swinging door requires sufficient space at the back and at the top of the trailer. Please ensure that this is available. Also ensure that there is no one within a distance of 10 m of the top swinging door. Check this both prior to and during opening or closing the top swinging door.

6.2.1 Opening the hydraulically operated top swinging door

In order to open the top swinging door, proceed as follows:

- Read the safety instructions listed in § 6.2.
- Ensure the trailer is positioned correctly.
- Check whether there is sufficient space behind and above the trailer to open the hydraulically operated top swinging door.



Also ensure there is no one within a distance of 10 m of the top swinging door.

- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and the trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- Push the lever on the distributor on the bulkhead to position “1”.



Fig 6.2.1.a. – Distributor

- Keep the black push button of the control unit pushed in until the top swinging door has fully opened.



When during opening of the top swinging door, the emergency stop on the control unit is activated, this should first be deactivated. Reset button of the top swinging door must now be pressed before the top swinging door may be operated once more. The reset button is located in the storage area of the control unit.

6.2.2 Closing the hydraulically operated top swinging door

In order to close the top swinging door, proceed as follows:

- Read the safety instructions listed in § 6.2.
- Ensure the trailer is positioned correctly.
- Check whether there is sufficient space behind and above the trailer to close the hydraulically operated top swinging door and ensure there are no obstructions which may prevent the door from fully closing.



Also ensure there is no one within a distance of 10 m of the top swinging door.

- Start tractor motor if necessary, switch on the PTO/pump and leave the engine to run at a low rpm.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- Keep the white pushbutton of the control unit pushed in until the top swinging door has fully closed.



The speed at which the door closes is regulated by a sealed throttle valve. It is strictly forbidden to break the seal on this throttle valve.

- Store the control unit in its storage area and close the storage area.
- Pull the lever on the distributor to position "0".



When during closing of the top swinging door, the emergency stop on the control unit is activated, this should first be deactivated. Reset button of the top swinging door must now be pressed before the top swinging door may be operated once more. The reset button is located in the storage area of the control unit.

6.2.3 Top swinging door emergency control unit

If the electric control unit for the top swinging door does not appear to function, the top swinging door may still be opened or closed by using the emergency control on the bulkhead of the trailer. To this end, the small yellow rod C located in the storage area of the control unit for the top swinging door should be used.



Figure 6.2.3.a.– Emergency control C top swinging door and small rod

In order to open or close the top swinging door, proceed as follows:

- Read the safety instructions listed in §6.2.
- Ensure the trailer is positioned correctly.
- Check whether there is sufficient space behind and above the trailer to open or close the hydraulically operated top swinging door.



Also ensure there is no one within a distance of 10 m of the top swinging door.

- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and the trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power. Leave the motor to run at a low rpm when the top swinging door needs to be closed.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- Push the lever on the distributor on the bulkhead to position "1".
- Insert rod C into the appropriate valve C adjacent to the control levers for the roof nets.
- Pull the rod up to open the door, and push it down to close the door.
- Pull the lever on the distributor into position "0".
- Store rod C into the appropriate storage area.



As the operator is not able to carry out a visual check, it is recommended to use the help of a second person during the movement of the door.

6.3. Inspection door



Figure 6.3.a. – Inspection door

The inspection door at the front of the trailer has been installed for:

- checking the top seal of the floor slats,
- checking the inside of the bulkhead,
- checking the moving bulkhead.



The inspection door should not be opened during loading or unloading of the trailer.

When entering the load space via the inspection door, a clear sign **MUST** be placed or hung on the inspection door to indicate it may not be closed.

7. Roof covering

Various versions of roof covering are available:

- roll over sheet (see § 7.2),
- hydraulically operated roof nets (see § 7.3).

7.1. Catwalk with ladders

Most trailers are equipped with a catwalk which can be accessed via the associated ladders. This area serves as a catwalk for the operator, who can use it to:

- open or close the sheet in an efficient and safe way,
- check whether the load is not stacked too high or distributed unevenly after the loading process.

If the trailer is equipped with hydraulically operated roof nets, the catwalk will also be used to check and repair the roof motors and roof nets.



Figure 7.1.a. – Catwalk

The catwalk contains a fixing point for a safety harness. This harness prevents the operator from falling off the catwalk. However, it is not supplied with the trailer.



- **Prior to accessing the ladder to the catwalk, ensure the ladder treads as well as your shoes are free from mud or other substances which could cause you to slip.**
- **Always use both hands when climbing up or down the ladders. Use 3 supporting points at all times (2 feet and 1 hand or 1 foot and 2 hands).**
- **Always use a safety harness which has been attached to the fixing point on the catwalk.**
- **Access to the catwalk should not be used for watching the loading or unloading process.**

7.2. Roof sheet

The roof sheet provides a perfect seal of the trailer and is attached to:

- the front of the trailer by means of a continuous rubber band and tensioning straps,
- the left hand side of the trailer (right hand side for “UK trailers”) by means of tensioning straps or slats,
- the right hand side of the trailer (left hand side for “UK trailers”) by means of a permanent attachment.

The roof sheet is fitted with a roll up slat into which a rolling handle can be fitted. This rolling handle is either attached to the catwalk support or it can be found inside the roll up slat where it will be fastened by a rubber band. The rolling handle enables the operator to roll the roof sheet up or down.



Figure 7.2.a. – Rolling handle attachment

Prior to rolling up the roof sheet, the fasteners on the front and left (right for “UK trailers”) will have to be loosened. Roller stops should also be fitted to prevent the roof sheet from rolling off the trailer.



Figure 7.2.b. – Straight (left) and buckled (right) roller stops



For safety reasons it is important to check whether the roller stops have been correctly fitted prior to rolling up the roof sheet.

Buckled roller stops should only be used on private sites.

If you are driving on a public road with an open roof sheet, it should be properly attached to the trailer. Please bear in mind that a rolled up roof sheet considerably increases the total height of the trailer.

7.3. Hydraulically operated roof nets

Roof nets are nets which are attached to fixed frames which may be hydraulically opened. Roof nets always consists of a section which opens to the left and a section which opens to the right.



Figure 7.3.a. – Opened left hand section of roof net

The control unit for the hydraulic roof nets is located on the bulkhead of the trailer, in particular valves A (black) and B (blue).



Figure 7.3.b. – Control unit roof nets



When opening the roof nets, it is possible for objects which may be present on the roof nets, to fall down. If possible, remove these objects prior to opening the roof nets. If it is not possible to remove them, ensure there is no one in the vicinity when opening the roof nets.

If your trailer is also equipped with a hydraulic top swinging door, it is essential to observe the correct order of operation in order to avoid damaging the system.



The hydraulically operated top swinging door should always be fully closed prior to opening or closing the hydraulically operated roof nets.

7.3.1 Opening the hydraulically operated roof nets



When opening the roof nets, the left hand roof net (B) should always be opened first, and after that the right hand roof net (A).

Attention: the left and right hand side of the trailer are determined by looking at the trailer from the rear to the front.

In order to open the roof nets, proceed as follows:

- Ensure the trailer is positioned correctly.
- Check whether there is enough space above and to the sides of the trailer for opening the roof nets.
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and the trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.

- Push the lever on the distributor to position “1”.
- Pull lever B on the control unit to open the left hand roof net. Keep pulling until the roof net has fully opened.
- Pull lever A on the control unit to open the right hand roof net. Keep pulling until the roof net has fully opened.
- Pull the lever on the distributor to position “0”.

7.3.2 Closing the hydraulically operated roof nets



When closing the roof nets, the right hand roof net (A) should always be closed first, and after that the left hand roof net (B).

Attention: the left and right hand side of the trailer are determined by looking at the trailer from the rear to the front.

In order to close the roof nets, proceed as follows:

- Ensure the trailer is positioned correctly.
- Check whether there is enough space above and to the sides of the trailer for closing the roof nets.
- If required, start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- Push the lever on the distributor to position “1”.
- Push lever A on the control unit to close the right hand roof net. Keep pushing until the roof net has fully closed.
- Push lever B on the control unit to close the left hand roof net. Keep pushing until the roof net has fully closed.
- Pull the lever on the distributor to position “0”.

8. Moving floor system accessories

8.1. Moving bulkhead with floor sheet

In order to avoid part of the load being left on the loading floor during unloading, the system is equipped with a moving bulkhead with floor sheet. As a result of the friction generated during unloading with the moving floor system, the floor sheet and moving bulkhead will move towards the back of the trailer and drive the complete load along.

The moving bulkhead is supplied as standard on the Basic version of the trailer and is optional on the Eco version.



Figure 8.1.a. – Moving bulkhead with floor sheet

Depending on the version of trailer, the moving bulkhead with floor sheet can be accessed via the barn doors or the hydraulically operated top swinging door. If the moving bulkhead with floor sheet is not used, then:

- the floor sheet is hung against the moving bulkhead,
- the moving bulkhead is secured with rubber bands.



Figure 8.1.b. – Floor sheet detail (left) and fastening of moving bulkhead (right)

In order to use the moving bulkhead with floor sheet correctly, proceed as follows:

- Detach the rubber bands which keep the moving bulkhead in position.
- Detach the floor sheet from the moving bulkhead and spread it out over the loading floor as far as possible.
- Ensure the track rails for the moving bulkhead on both sides of the trailer are not obstructed along the full length of the trailer.
- Check whether the left and right hand end stops of the moving bulkhead are fitted in the track rails.
- Once the trailer has been loaded, check whether sufficient material has been poured onto the floor sheet. This to ensure that the floor sheet is pressed sufficiently against the loading floor and to ensure that the load does not end up underneath the floor sheet or behind the moving bulkhead.

At the end of the unloading procedure, the floor sheet will be hanging out the trailer. If the trailer is fitted with a hydraulically operated top swinging door, ensure that this door cannot be operated when the floor sheet is being re-laid in the trailer or when the operator is in the load space. This to prevent the risk of trapping. To this end, the storage area for the control unit for the top swinging door should be locked prior to entering the area concerned.




- After unloading, the moving bulkhead with floor sheet should be pushed back against the front of the trailer and be fastened correctly.

8.2. Detachable funnel

The detachable funnel may be used to unload cereals into a unloading well. The funnel is stored underneath the trailer and behind the side guard.



Figure 8.2.a. – Funnel behind side guard

In order to install the funnel, proceed as follows:

- Remove the locking pin and fixing rod on both sides of the side guard and raise the side guard.

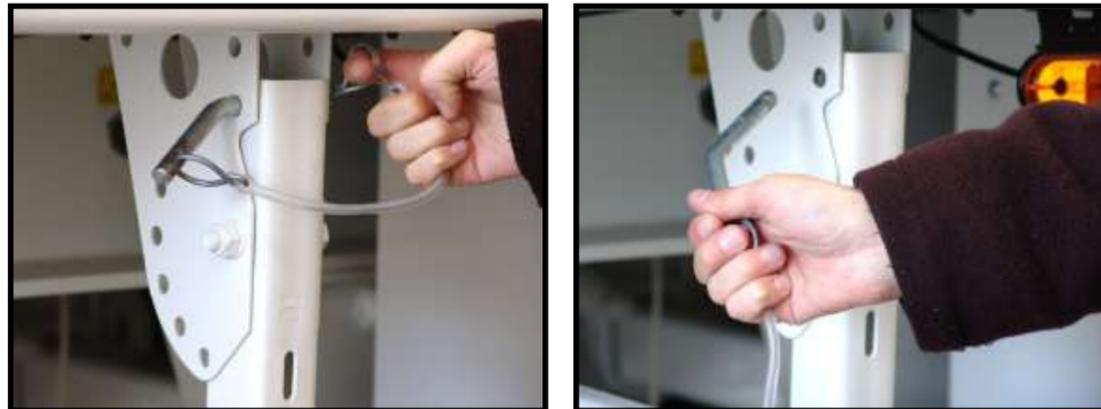


Figure 8.2.b. – Locking pin (left) and fixing rod (right)

- Replace the fixing rods and locking pins to ensure the side guard stays up.



Figure 8.2.c. – Raised side guard



- Pull the locking pin out of the funnel and slide the funnel out of its storage position.



Figure 8.2.d. – Locking pin (left) and sliding of funnel (right)

- Detach the support bar from the funnel and turn this at a right angle to the funnel.
- Now hang the funnel at the rear of the trailer whilst positioning the support bar against the trailer bumper.



Figure 8.2.e. – Funnel support bar (left) and support bar position (right)



Figure 8.2.f. – Funnel in position



Ensure the funnel is hung correctly and that the positioning bar is in the correct position. This mainly to avoid the funnel becoming detached during unloading resulting in some of the load being lost, or damage or personal injuries being caused.

9. Lighting and signalisation

The equipment consists of:

- front position lights with built-in reflectors,
- registration plate light,
- side-marker lights with built-in reflectors,
- end outline marker lights,
- reflectors at the rear of the trailer,
- rear lights consisting of various compartments in which rear light, brake light, reflector, direction indicator, fog light and reversing light have been installed.

The electrical supply is 24V in accordance with the 76/756/EEC regulations.

The connections are:

- ISO 12098 – 15 pin
- ISO 1185 “N” – 7 pin
- ISO 3731 “S” – 7 pin



Faulty lights should be replaced immediately in order to prevent further damage, to maintain the trailer in accordance with the regulations and to avoid any accidents.

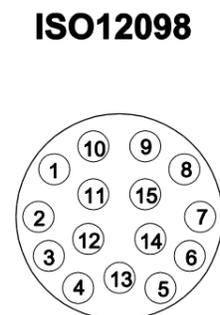
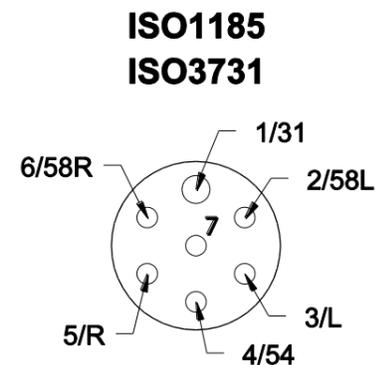


Figure 9.a. – Lighting connections

ISO1185	
1/31	Mass
2/58L	Position light left
3/L	Direction indicator left
4/54	Brake light
5/R	Direction indicator right
6/58R	Position light right
7/54G	Free
ISO3731	
1/31	Mass
2/58L	Free
3/L	Reversing light
4/54	Free
5/R	Free
6/58R	Free
7	Fog light

ISO12098	
1	Direction indicator left
2	Direction indicator right
3	Fog light
4	Mass
5	Position light left
6	Position light right
7	Brake light
8	Reversing light
9	Free
10	Free
11	Free
12	Free
13	Mass for data line
14	Data line
15	Data line

A detailed overview can be found in the service book.

10. Various accessories

10.1. Tool box

The tool box is located at the side of the trailer and is used to stock:

- various types of tools,
- fire extinguisher,
- wheel wrench
- ...



Figure 10.1.a. – Tool box



The total content of the tool box should weigh no more than 25 kg.
Always ensure the tool box is locked in order to prevent theft or accidental opening of the tool box (e.g. during driving).

10.2. Retractable ladder for accessing load space

A retractable ladder which provides the operator with access to the load space is located at the rear of the trailer. This ladder is secured by means of a locking pin.



Figure 10.2.a. – Ladder for access to the load space



When the ladder is being used, ensure it is fully retracted.

The ladder should not be used as a support for moving heavy loads into or out of the load space.

During unloading, the ladder should be fully pushed in so as not to obstruct the unloading process and to avoid damaging the ladder.

Do not use the ladder during the load procedure. Access to the loading space during the loading can cause serious injuries or even death.

10.3. Side guards

The side guards serve to protect other road users on both sides from the open space underneath the trailer for safety reasons.

On the left hand side (right for "UK trailers"), the guard, once raised, provides access to the optional funnel. On the right hand side (left for "UK trailers"), the side guard is used as a support for attaching a ladder.



Figure 10.3.a. – Left hand side guard (right for "UK trailer")



Figure 10.3.b. – Right hand side guard (left for "UK trailer")

In order to raise the side guard, proceed as follows:

- Remove the locking pin and fixing rod on both sides of the side guard and raise the side guard.



Figure 10.3.c. – Locking pin (left) and positioning pin (right)

- Replace the fixing rods and locking pins so that the side guard remains in the raised position.



Figure 10.3.d. – Raised side guard

In order to close the collapsible side guard, follow the above procedure in reverse order.



The side guard should always be secured down when the trailer is being driven.

Ensure the side guard is correctly secured in position if you need to go underneath it.

10.4. Ladder

The ladder is located on the right hand side of the trailer (left for “UK trailer”) against the side guard. In order to remove and replace the ladder it is not necessary to raise and secure the side guard. It is sufficient to move the hinges which keep the ladder in its position.



Figure 10.4.a. – Ladder



In order to prevent theft it is strongly recommended to use a lock to secure the ladder.

10.5. Alloy rims

Your trailer may optionally be fitted with alloy rims. The following procedure should be followed for cleaning the rims:

- Clean the rim with water. In order to remove dirt and grease deposits, a high pressure cleaner may be used.
- Check whether the rim has cooled down.
- Spray Alclean onto the rim and leave the product to work for 10 to 15 minutes. The alloy will become shiny white.
- Thoroughly rinse the rim and the wheel with water.
- Repeat the above steps for stubborn deposits.
- Apply a small amount of Alpolish onto the rim.
- Spread the paste evenly over the surface. Concentrate on one small area at a time to prevent the polish from drying out.
- Rub the polish over the surface using Alfinish until the paste has disappeared off the surface.
- See also www.alcoawheels.com .

10.6. Rear light protection

Manipulating the load during loading and unloading could cause damage to the rear lights. In order to prevent this, the rear lights are protected from the load by a collapsible protective plate.



Fig 11.2.a. – Rear light protection up (left) and down (right)

 Remember that when the protection is down it completely covers the rear lights. It is therefore important to ensure that the protection is raised up prior to departure.

10.7. Additional rear door lock

The trailer doors may be fitted with an additional pneumatically operated door lock. The control unit for the door lock is located on the left hand side of the trailer (right for “UK trailers”), next to the control unit for the floor system. The control lever is used to open and close the door lock.

- Turn the control lever for the pneumatic door lock downwards in order to open it.



Fig 10.6.a. – “Opening” of door lock (left) and opened door lock (right)

- Turn the control lever for the pneumatic door lock upwards in order to close it.



Fig 10.6.b. – “Closing” of door lock (left) and closed door lock (right)

E SPECIFIC PROCEDURES

1. Trailer coupling and uncoupling

1.1. Coupling

1.1.1 Preliminary inspections

Prior to coupling the trailer to the tractor, it is extremely important the following checks are carried out:

- the fifth wheel rubbing plate and mounting must be in perfect condition (no tears, deformation or dents),
- the kingpin and kingpin mounting must be in perfect condition,
- a layer of grease must be present on the fifth wheel rubbing plate, the pin and the fifth wheel and these various components should be greased sufficiently,
- there should be no foreign objects (imbedded in the layer of grease) which could obstruct the correct coupling of the tractor and the trailer.

1.1.2 Procedure

To couple the trailer, proceed as follows:

- Apply trailer parking brake (see 3.9).
- Check whether the locking of the fifth wheel is open.
- Check whether the rear of the fifth wheel is pointing downwards.
- Check the coupling height (see § 1) and use the landing legs to adjust (see § 2). If the coupling height is correct, the fifth wheel will lift the trailer during the coupling procedure.
- Ensure the tractor and trailer are correctly aligned before coupling the trailer.
- Slowly reverse the tractor until it locks into a coupled position.
- Check whether the tractor-trailer combination has been coupled correctly by attempting to drive forward slowly whilst the parking brake of the trailer is still on.
- Visually check a correct coupling has been made and that the locking pin of the fifth wheel is in the correct position.
- Connect the electrical lines and the brake lines whilst respecting the colour coding.



- **Once the electrical connections have been made, a visual check of all functions must always be carried out.**
- **Check to ensure all rear floodlights, which could bother traffic coming from behind, are switched off.**
- **If there is any visible corrosion or other fault (e.g. cables without insulation), these must be rectified immediately in order to avoid short-circuiting.**
- **Damage to plugs, electrical cabinet,... should be rectified as soon as possible.**
- **For safety reasons it is not recommended to drive with coupled hydraulic connections. It is better to connect the hydraulic hose to a dummy coupling on the tractor.**

- Raise the landing legs to their highest position. On the steel landing legs, fasten the lever in the safety hook and for the aluminium landing legs, position the locking pins (see § 2).
- Release trailer parking brake (see 3.9).
- Test the ABS system. A warning light on the dashboard of the tractor provides information on the ABS system of the trailer to the operator. If the ABS system is functioning correctly, the ABS light will light up when the ignition is switched on and will go out at a speed of 7 km/hour or after 2 seconds.



Exceptions which do not represent a fault in the ABS system:

- **Warning light flashes 4 times once ignition has been switched on: this indicates worn brake pads on the trailer.**
 - **Warning light flashes 8 times once ignition has been switched on: the trailer is due for service.**
- The tractor-trailer combination is ready for use.

1.2. Uncoupling

To uncouple the trailer, proceed as follows:

- Apply trailer parking brake (see § 3.9).
- Lower the landing legs until they can take over the weight which is resting on the tractor. The air suspension of the tractor is used to adjust the aluminium landing legs. See § 2.
- Disconnect the electrical connections and brake lines.



- **Ensure dust, dirt or water cannot get into the couplings and/or air lines. To this end, the covers for the couplings should be placed over the apertures.**
 - **Close the covers of the electrical connection box securely and store the cables or secure them in a safe place.**
 - **Always pull the plugs, and never the cables.**
- Open the fifth wheel coupling.
 - Carefully drive the tractor away from underneath the trailer.

2. Trailer loading and unloading

2.1. Safety instructions



- **Access to the trailer is forbidden when the tractor is able to supply power to the moving floor system.**
- **Ensure that no one is able to activate the moving floor system or the hydraulic rear door when work is being carried out in the trailer.**
- **It is recommended a second person supervises whilst work is being carried out in the trailer.**
- **Check there is no one left in the trailer before activating the moving floor system or before closing the trailer door. Driving whilst persons are present in the trailer is forbidden.**



- Open the doors before starting the system.
- During the full duration of the loading and unloading process, ensure no one is present in the area where the load may end up.
- Ensure there is always some one near the emergency stop during loading or unloading.
- During driving and when the system is not in use, the pump should be switched off at all times.



Ensure there is no one underneath the system when the pump is switched on. A warning sticker is located on the side guard of the trailer at the height of moving components of the moving floor system.

2.2. Loading the trailer

2.2.1 General information



The stability of the trailer, during driving as well as unloading, is determined to a large extent by the way in which the trailer is loaded. It is therefore important to ensure the load is evenly spread at all times.

The lateral connections between the side walls contribute to the stability and sturdiness of the trailer. Ensure that these are always attached during transport.

During loading as well as unloading, the trailer must be coupled to the tractor.

Always ensure the load is evenly spread.

For loading pallets or other non-bulk material (e.g. paper rolls), the moving floor system is used. A section of the load or one or two pallets are placed at the rear end of the floor using a fork lift truck. The system then transports the load into the trailer.

When the trailer is being used for transporting pallets, the pallets should be clean underneath (no nails, ...). Disposable pallets must be avoided (bottom planks are too flimsy or load is poorly distributed when the pallets are heavily loaded). For poor quality pallets, a plank of 27 to 30 mm thickness and a length of approx. 2 metres should be applied underneath the pallets, at each end, at a right angle to the slats of the loading floor.

2.2.2 Loading bulk goods



The moving floor system does not need to be used for loading the trailer with bulk goods. This can be done using conventional bulk loading techniques. This means that:

- the roof nets or roof sheet are opened,
- the doors remain closed,
- the load is loaded into the trailer body from above,
- the moving floor system is not used.



The lateral connections of the side walls should always be fastened when loading bulk material.

The positions of the lateral connections are indicated by arrows. This in order to avoid damaging them when loading bulk goods.

2.2.3 Loading by using the Keith® Workhorse system in the standard version



The control unit for the moving floor system is fitted with a stop which allows the system to be switched off immediately. Once the stop has been deactivated, operation may be continued immediately.

To load the trailer using the moving floor system, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- For trailers with **hydraulically operated top swinging doors**, open the top swinging door (see § 6.2.1) and lastly pull the lever on the distributor on the bulkhead to position “2”.
- Position part of the load or one or two pallets using a fork lift truck at the rear end of the plank flooring.
- Remove the control unit for the moving floor system from its storage area.



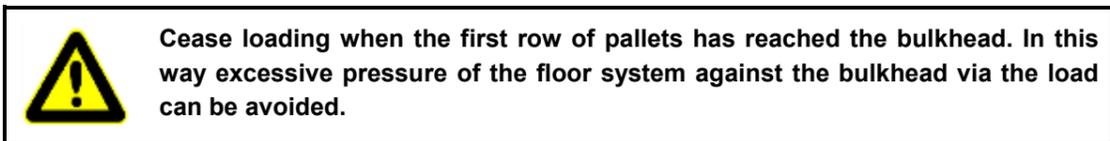
Figure 2.2.3.a. – Control unit storage area

- Push the black switch on the control unit. The switch should be held in this position manually.



Figure 2.2.3.b. – Control unit moving floor system

- The floor will start up.
- Once the load in the trailer has reached the required position, release the black control button.
- Load the remainder of the trailer as described above.



- When the full load has been loaded, store the control unit for the moving floor system in its storage area.

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with an hydraulic top swinging door:

- If there is not enough space to close the door (e.g. loading quay), first switch off the PTO/pump, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position “1”.
- Close the top swinging door (see § 6.2.2).
- Once the top swinging door has been closed, ensure the distributor on the bulkhead is in the “0” position.
- Switch off the PTO/pump.
- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.2.4 Loading by using the Keith® Workhorse system in the alternative version (without electrical operation)



The alternative version of the Keith® Workhorse system does not have a control unit. The system works completely hydraulic (no electrical parts).

It is recommended for a second person to assist the operator of the moving floor system during loading (at the back of the trailer).

Pushing the emergency lever stops the loading process (emergency stop function).

To load the trailer using the moving floor system in its alternative version, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Check whether the mechanical emergency stop lever (red lever) is locked. When in locked position the mechanical emergency stop lever prevents the “uncontrolled” start of the moving floor system.



Figure 2.2.4.a. – Mechanical emergency lever in locked position

- Start the tractor's motor, switch on the PTO/pump and increase the power.
- Turn on the tractor's lights to send electrical power to the trailer.
- For trailers with **hydraulically operated top swinging doors**, open the top swinging door (see § 6.2.1) and lastly pull the lever on the distributor on the bulkhead to position “2”.
- Put the selection bar in load position (pulled out position)



Figure 2.2.4.b. – Selection bar for loading and unloading in loading position

- Position part of the load or one or two pallets using a fork lift truck at the rear end of the plank flooring.
- Unlock the mechanical emergency stop lever. Pull out the lever. The floor now starts to move.



Figure 2.2.4.c. – Unlocked and pulled out mechanical emergency stop lever

- Once the load in the trailer has reached the required position, completely push in the mechanical emergency stop lever. This will make the floor stop moving.
- Load the remainder of the trailer as described above.



Cease loading when the first row of pallets has reached the bulkhead. In this way excessive pressure of the floor system against the bulkhead via the load can be avoided.

- When the full load has been loaded, completely push in the mechanical emergency lever and lock it (see Figure 2.2.4.c).

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with an hydraulic top swinging door:

- If there is not enough space to close the door (e.g. loading quay), first switch off the PTO/pump, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position “1”.
- Close the top swinging door (see § 6.2.2).
- Once the top swinging door has been closed, ensure the distributor on the bulkhead is in the “0” position.
- Switch off the PTO/pump.
- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.2.5 Loading by using the Cargo Floor® system



The control unit for the moving floor system is fitted with a stop which allows the system to be switched off immediately. Once the stop has been deactivated, operation may be continued immediately.

To load the trailer using the moving floor system, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- For trailers with **hydraulically operated top swinging doors**, open the top swinging door (see § 6.2.1) and lastly pull the lever on the distributor on the bulkhead to position “2”.
- Position part of the load or one or two pallets using a fork lift truck at the rear end of the plank flooring.
- Remove the control unit for the moving floor system from its storage area.

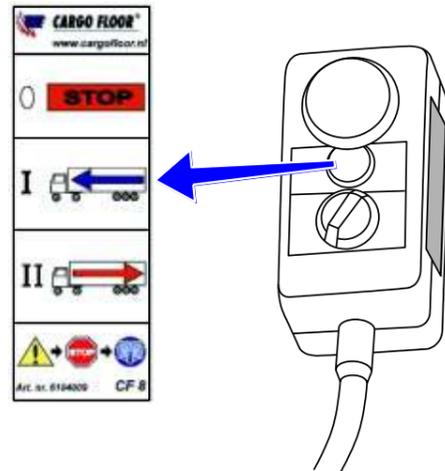


Figure 2.2.5.a. – CF8 control unit

- Push the middle switch (I) on the CF8 control unit. The switch should be held in this position manually.
- The floor will start up.
- Once the load in the trailer has reached the required position, release switch I.
- Load the remainder of the trailer as described above.



Cease loading when the first row of pallets has reached the bulkhead. In this way excessive pressure of the floor system against the bulkhead via the load can be avoided.

- When the full load has been loaded, store the control unit for the moving floor system in its storage area.

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with hydraulic top swinging door:

- If there is not enough space to close the door (e.g. loading quay), first switch off the PTO/pump, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position “1”.
- Close the top swinging door (see § 6.2.2).
- Once the top swinging door has been closed, ensure the distributor on the bulkhead is in the “0” position.
- Switch off the PTO/pump.

- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.3. Unloading the trailer

2.3.1 General



In order to prevent damage to the roof sheet or roof nets it is recommended, if not compulsory, to always open these when unloading the trailer.

In some cases (left hand photo) opening is recommended, in other cases (right hand photo) it is compulsory.







In this case the unloading cycle should be stopped, the PTO/pump be switched off, the trailer be slowly moved, the PTO/pump switched back on, the power increased and the unloading cycle restarted.

2.3.2 Unloading by using the Keith® Workhorse system in the standard version



The control unit for the moving floor system is fitted with a stop which allows the system to be switched off immediately. Once the stop has been deactivated, operation may be continued immediately.

To unload the trailer using the moving floor system, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- For trailers with **hydraulic roof nets** and **hydraulically operated top swinging doors**, the roof nets should be opened first (see § 7.3) and then the top swinging door (see § 6.2.1). Lastly pull the lever on the distributor on the bulkhead to position “2”.
- Push the white switch on the control unit. The switch will automatically remain in this position.



Figure 2.3.2.a. – Control unit moving floor system

- The floor will start up.
- Press the red button to stop the unloading process.

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with hydraulic top swinging doors and roof nets:

- If there is not enough space to close the door (e.g. loading quay), first switch off the PTO/pump, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position “1”.
- Close the top swinging door (see § 6.2.2).
- Close the roof nets (see § 7.3).
- Once the top swinging door and the roof nets have been closed, ensure the distributor on the bulkhead is in the “0” position.
- Switch off the PTO/pump.
- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.3.3 Unloading by using the Keith® Workhorse system in the alternative version (without electrical operation)



The alternative version of the Keith® Workhorse system does not have a control unit. The system works completely hydraulic (no electrical parts).

It is recommended for a second person to assist the operator of the moving floor system during unloading (at the back of the trailer).

Pushing the emergency lever stops the unloading process (emergency stop function).

To unload the trailer using the moving floor system in its alternative version, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Check whether the mechanical emergency stop lever (red lever) is locked. When in locked position the mechanical emergency stop lever prevents the “uncontrolled” start of the moving floor system.



Fig 2.3.3.a. – Mechanical emergency lever in locked position

- Start the tractor's motor, switch on the PTO/pump and increase the power.
- Turn on the tractor's lights to send electrical power to the trailer.
- For trailers with **hydraulic roof nets** and **hydraulic operated top swinging doors**, first open the roof nets (see § 7.3), then open the swinging door (see § 6.2.1) and lastly pull the lever on the distributor on the bulkhead to position "2".
- Put the selection bar in unload position (pushed in position).



Figure 2.3.3.b. – Selection bar for loading and unloading in unloading position

- Unlock the mechanical emergency stop lever. Pull out the lever. The floor now starts to move.



Figure 2.3.3.c. – Unlocked and pulled out mechanical emergency stop lever

- If the unloading needs to be paused or stopped, completely push in the mechanical emergency stop lever. This will make the floor stop moving.
- When the load has been fully unloaded, lock the emergency stop lever as shown on Figure 2.3.3.c.

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with an hydraulic top swinging door and roof nets:

- If there is not enough space to close the door (e.g. loading quay), first switch off the PTO/pump, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position "1".
- Close the top swinging door (see § 6.2.2).
- Close the roof nets (see § 7.3).
- Once the top swinging door and roof nets have been closed, ensure the distributor on the bulkhead is in the "0" position.
- Switch off the PTO/pump.
- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.3.4 Unloading by using the Cargo Floor® system

The Cargo Floor® system is fitted with a remote control which is connected to the trailer via a 10 metre long cable.



The control unit for the moving floor system is fitted with a stop which allows the system to be switched off immediately. Once the stop has been deactivated, operation may be continued immediately.

To unload the trailer using the moving floor system, proceed as follows:

- Ensure the trailer is positioned correctly.
- On a trailer with **barn doors**, open these doors and fasten them using the safety devices (see § 6.1).
- Check whether the hydraulic couplings of the tractor and trailer are clean.
- Connect the hydraulic couplings between the tractor and trailer in the correct manner.
- Start the tractor motor, switch on the PTO/pump and increase the power.
- Switch on the tractor lights in order to supply electrical power to the trailer.
- For trailers with **hydraulic roof nets** and **hydraulically operated top swinging doors**, open the roof nets first (see § 7.3) and then the top swinging door (see § 6.2.1). Lastly pull the lever on the distributor on the bulkhead into position "2".
- Turn the bottom switch (II) clockwise. The switch will automatically remain in this position.

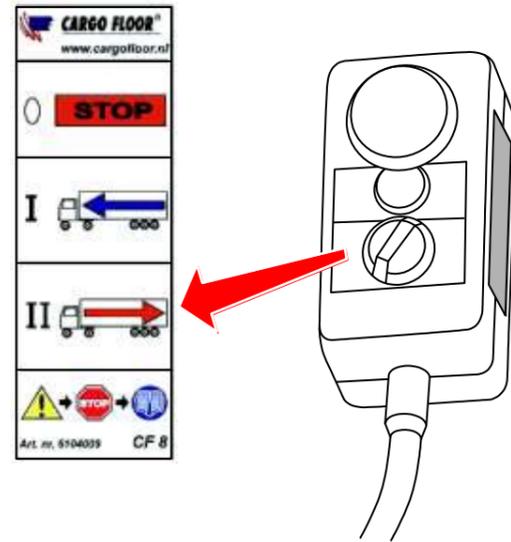


Figure 2.3.4.a. – Control unit moving floor system

- The floor will start up.
- Deactivate the bottom turning knob to stop the unloading process.

For trailers with barn doors:

- Switch off the PTO/pump.
- Switch off the tractor lights.
- Drive a few metres forward if necessary so that the doors may be closed.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.
- Close the trailer doors (see § 6.1).

For trailers with hydraulic top swinging doors and roof nets:

- If there is not enough space to close the door (e.g. loading quay), switch off the PTO/pump first, drive a few metres forward so that the door may be closed, switch the PTO/pump on again and increase the power.
- Push the lever on the distributor on the bulkhead to position “1”.
- Close the top swinging door (see § 6.2.2).
- Close the roof nets (see § 7.3).
- Once the top swinging door and the roof nets have been closed, ensure the distributor on the bulkhead is in the “0” position.
- Switch off the PTO/pump.
- Switch off the tractor lights.
- Disconnect the hydraulic couplings between the tractor and trailer. Store the hoses in a safe place and ensure they are secured.

2.4. Emergency control unit

2.4.1 General

In case of electrical faults, the floor system can still be hydraulically operated by hand. Please refer to the manual for the moving floor system under the paragraph on “emergency provision” or “emergency operation”.

2.4.2 Secondary operation for Cargo Floor®

For operating the moving floor system, a fixed switch has also been installed in the storage area for the control unit.

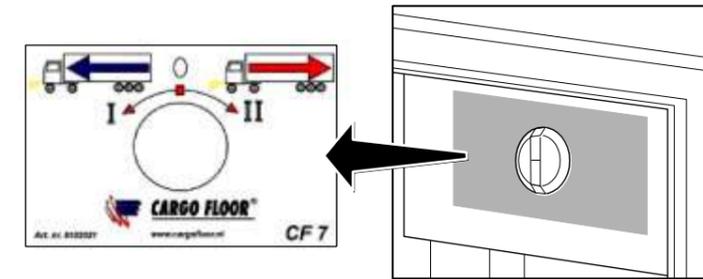


Figure 2.4.2.a. – Fixed switch for operating moving floor system

This switch has 3 positions:

- I = “load”: the switch must be kept in this position manually to allow the system to load. If the switch is released, it returns to the “0” position.
- 0 = “stop”: the switch automatically returns to this position when the turning knob is released. In this position the moving floor system is inactive.
- II = “unload”: the switch must be kept in this position manually to allow the system to unload. If the switch is released, it returns to the “0” position.

F PREVENTIVE MAINTENANCE

Preventive maintenance on the trailer may be divided into the following sections:

- Mechanical maintenance on the trailer (see § 1).
- Maintenance on the bodywork of the trailer (see § 2).
- Maintenance on the moving floor system (see § 3).

1. Mechanical maintenance

1.1. Visual inspection

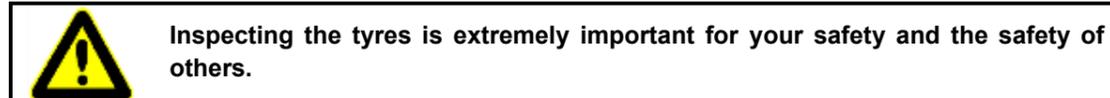
A general visual inspection of the trailer should be carried out at regular intervals and any damaged or faulty components must be replaced or repaired immediately.

1.2. Tyres

Visually check the tyre pressures before each trip. Tyre pressures should be measured weekly and adjusted if required. The table below shows the recommended tyre pressure and rims for the most common tyre sizes. If the trailer is fitted with a different tyre size, the correct tyre pressure may be obtained from the manufacturer.

Tyre size	Rim width (advice)	Recommended tyre pressure (bar)
425/55 R19.5	13.00 x 19.5	9
445/45 R19.5	14.00 x 19.5	9
445/65 R19.5	14.00 x 19.5	8.5
11 x 22.5	7.50 x 22.5	8
12 x 22.5	8.25 x 22.5	8.5
13 x 22.5	9.00 x 22.5	8.5
365/80 R20	10.00 x 20	9
385/65 R22.5	11.75 x 22.5	9
425/65 R22.5	13.00 x 22.5	8.5
445/65 R22.5	14.00 x 22.5	9

Check whether the tyres of the trailer still contain the regulation grooves on a regular basis. Replace the tyres in time.



1.3. Tightening torques for bolts

All bolts and nuts should be inspected on a monthly basis. Particular attention should be paid to the bolts and nuts in the floor system, the fifth wheel rubbing plate and the axle attachment to the chassis.

The following table indicates the tightening torques for normal construction bolts according to class 8.8 and class 10.9 (as per DIN ISO 898 – Part 1).

Size	Tightening torque (Nm)		Size	Tightening torque (Nm)	
	Class 8.8	Class 10.9		Class 8.8	Class 10.9
M5	5.5	8.1	M20	425	610
M6	9.6	14	M20x1.5	475	680
M8	23	34	M22	580	820
M8x1	25	37	M22x1.5	630	900
M10	46	67	M24	730	1050
M10x1.25	49	71	M24x2	800	1150
M12	79	115	M27	1100	1550
M12x1.25	83	120	M27x2	1150	1650
M14	125	185	M30	1400	2000
M14x1.5	135	200	M30x2	1500	2150
M16	195	295	M36	2450	3500
M16x1.5	210	310	M36x2	2650	3780
M18	300	430	M42	3930	5600
M18x1.5	340	485	M42x2	4280	6050

The tightening torques listed are applicable up to M16x1.5 for bolts with galvanized surfaces and a surface roughness of $\mu=0,125$. On larger diameters, the surface roughness is $\mu=0,140$.

The previously stated tightening torques do NOT apply:



- to wheel nuts,
- when lubricants such as MOS2 are used.

Please also refer to the additional documentation supplied with the trailer for tightening torques relating to the floor system, axles, brakes and suspension.

2. Maintenance schedule trailer bodywork

Properly maintained bodywork will prolong the life of the trailer. The trailer should be washed using an appropriate detergent (car shampoo) and sufficient water.



- In order to avoid problems with the paint, it is advisable not to clean the trailer for the first 4 weeks using a high pressure cleaner and/or detergent. Refer to the sticker on the trailer.
- In order to avoid paint damage, the affixed advertisements and stickers should not be removed.

Instructions for cleaning with high pressure cleaners:

- Use cold water for the first 3 months, with a low dosage of neutral detergent if necessary. Working pressure 40-60 bar.
- After 3 months, warm water may be used with a dosage of light alkaline cleaning material. Temperature 40-60°C. Working pressure 60-100 bar.
- Spraying distance 30 cm minimum.
- Do not keep the jet pipe still but move it continuously at an angle of approx. 45° over the lacker.



Use of a higher temperature or pressure, a smaller spraying distance and (or) aggressive chemicals, cause loss of adhesive strength and gloss of the paint system.

3. Maintenance schedule moving floor system



The great force and pressure of the system can cause serious injuries. During maintenance or repair the pump must be switched off at all times.

In order to guarantee a high degree of reliability and a long life of your moving floor system, you should perform the following procedures.

- Check the quality of the oil (every 6 months).
- Replace the filter element (yearly).
- Change the hydraulic oil (every 2 years or more frequently if required).
- Check the quantity of oil in the tank. A minimum of 150 litres of oil should be present in the tank in order to eliminate heat development.



Proper hydraulic oil as per ISO VG 32 should be used at all times when replenishing or changing the oil.

General inspections for moving floor systems are:

- Check whether the screws/bolts are secure. Tighten or replace if necessary.
- Check the coupling screws and couplings for all hydraulic components.
- Remove any residue (condensation, dirt,...) from the bottom of the oil tank. This can be done by removing the tank cover.
- Check the filter elements and replace if necessary (at least yearly). The inspection can be carried out by removing the filter cover of the return and pressure filter.
- Check whether the switching valve has been adjusted correctly and that connection is taking place as per the regulations.
- Regularly clean the floor parts with a steam cleaner.
- Check the seal between the two fixed floor slats and the moving slats. If there is any clearance between these slats, the fixed profiles will have to be adjusted to ensure an optimum seal and to avoid any leakage via the side walls.
- Check the connection between the aluminium floor slats and the moving floor system. If there is any clearance, tighten the screws or replace them.



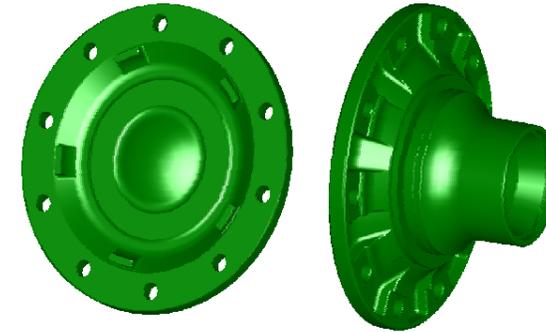
The above checks are essential in order to avoid premature wear.

4. Wheels

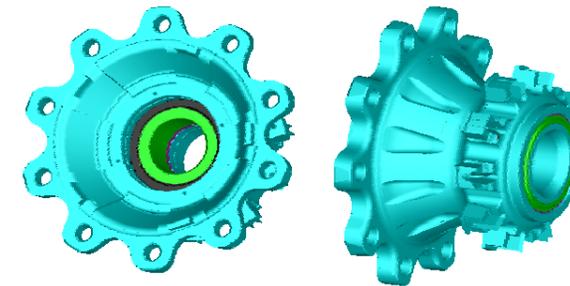
The members of EUWA (Association of European wheel manufacturers) would like to inform you about a potential technical issue regarding steel and aluminum wheels for commercial vehicles.

In the European commercial vehicle market a trend to more and more weight optimized hub designs can be noticed. The weight optimisation is often created by using a "star shape" for the outline of the hub.

The definition of the truck wheel attachments, i.e. in the ISO 4107 or DIN 74361-3 are only defining the diameter of the wheel support (outer diameter of the hub), but it is not clearly defined if the outline of the hub must be circular. The definition of other shapes is not explicitly prohibited.



Example of round hub with continuous diameter



Example of star shaped hub

In order to maximize safety, EUWA strictly recommends for the vehicles equipped with non-circular hubs in the field, that the wheels used on such hubs have to be checked towards cracks on the inner and outer attachment face each 50.000 km. In case of crack detection the wheels have to be replaced immediately! Also in such cases the hubs should be checked with regard to wear out and cracks and if necessary the hubs should be replaced.

G TROUBLESHOOTING MOVING FLOOR SYSTEM

1. Most common problem causes

Prior to starting a thorough fault investigation (see § 2 and § 3) it is advisable to first run through the most common causes which are listed below:

- Are the emergency stops pulled out?
- Is the oil reservoir full?
- Does the pump reach the required oil volume at 210 bar?
- Has the system been connected in the correct manner?
- Is the pressure relief valve set to 210 bar?
- Is the PTO system switched on?
- Have the quick-couplings been fully and correctly connected?
- Is the on/off valve switched on?
- Is there sufficient voltage for electrical operation?
- Are the tractor lights switched on?

2. Keith® Workhorse System



- Cylinder 1 is the cylinder on the driver's side on trailers which are driven on the right (continental trailers).
- Cylinder 1 is the cylinder on the passenger's side on trailers which are driven on the left (UK trailers).

PROBLEM	
Cause	Solution
Problem: System does not respond	
Quick-couplings wrongly connected or ports opened incorrectly	Check the quick-couplings and the ports
Problem: Cycle starts, then floor stops	
All cylinders move towards the rear, then the system stops	
Switching valve is not functioning correctly	Check the setting
Insufficient pressure	Check the pressure and the position of the pressure relief valve
Cylinder 1 moves towards the front, cylinder 2 moves towards the front, cylinder 3 moves towards the front, then the system stops	
Switching valve is not functioning correctly	Check the setting
Floor runs fine empty or with a light load, but not with a heavy load	
Insufficient pressure	Check the pressure and the position of the pressure relief valve
Switching valve is not functioning correctly	Check the setting
Cycle does not run correctly during unloading	
Cylinders 1 and 2 move towards the front together	
The check valve at the front end of cylinder 1 is not functioning correctly	Repair the check valve
Cylinders 2 and 3 move towards the front together	
The check valve at the front end of cylinder 2 is not functioning correctly	Repair the check valve
All cylinders move towards the front together	
The loading/unloading valve is not functioning correctly	Repair the loading/unloading valve
The check valves at the front ends of cylinders 1 and 2 are not functioning correctly	Repair the check valves
Cycle does not run correctly during loading	
Cylinders 3 and 2 move towards the rear together	
The check valve at the rear end of cylinder 3 is not functioning correctly	Repair the check valve
Cylinders 2 and 1 move towards the rear together	
The check valve on the rear end of cylinder 2 is not functioning correctly	Repair the check valve
All cylinders move towards the rear together	
The loading/unloading valve is not functioning correctly	Repair the loading/unloading valve
The check valves on the front ends of cylinders 2 and 3 are not functioning correctly	Repair the check valves



If the above points (see §1 1 and § 2) do not provide a solution, please contact the supplier of the trailer.

3. Cargo Floor® system

- Check whether the quick-couplings have been connected correctly and whether the ports have been opened correctly.
- Ensure the switch is in the “loading“ or “unloading” position and not in the “Stop” position.
- Check whether the LED indicators in the plug covers in the system illuminate when the system is switched on:
 - Unloading: Switch position II, LED red should illuminate.
 - Loading: Switch position I, LED red + LED yellow should both illuminate.
- If the LED indicators are illuminated, remove the plug covers from the coil and clean the plug bases and check whether the function is now operative.
- If the LED indicators are not illuminated, you should first check the fuse in the tractor and in the cabled remote control, and then the voltage in the plug cover if necessary. If there is still no voltage, this could indicate a broken cable, oxidation or the system being incorrectly connected.
- Check whether all solenoids are functioning correctly.
- Check the setting on the switching valve.
- Check the oil level in the reservoir.
- Check the system for oil leaks.



If the above points (see § 1 and § 3) do not offer a solution, please contact the supplier of the trailer.

3.1. Via Interface and PC with voltage supply ISO7638

By using the Interface and a PC with correct software, the user can call for the system information and read and update the memory diagnoses.

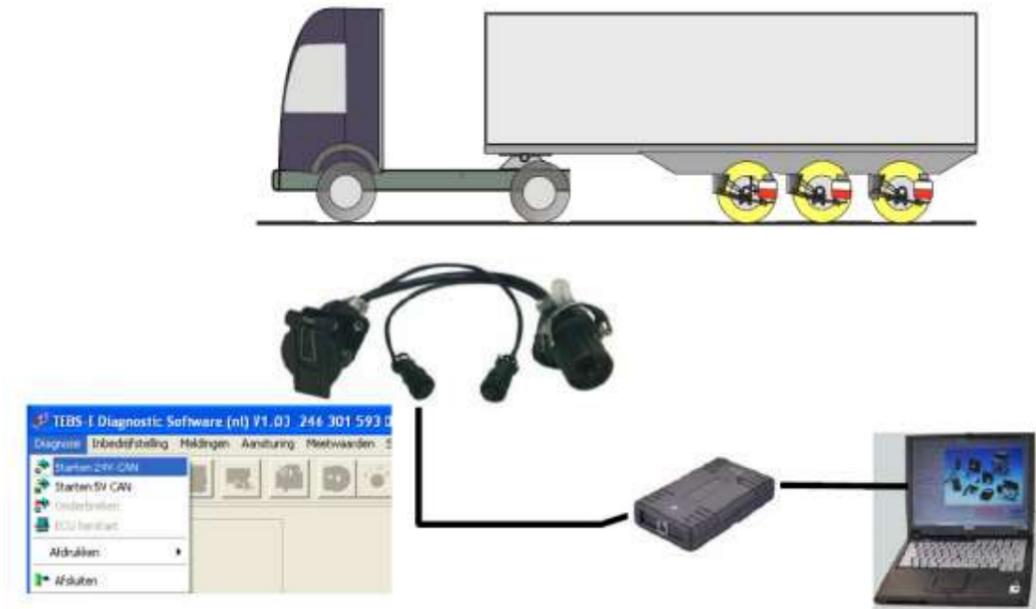


Figure 3.1. – Via Interface and PC with voltage supply ISO7638

H TECHNICAL SPECIFICATIONS

1. Trailer - mechanical

1.1. Kingpin and fifth wheel rubbing plate

On a steel fifth wheel rubbing plate, a GF662/102/601 type kingpin is used.

The kingpin can be disassembled from underneath its socket by unscrewing the eight M14x1.5 bolts. These bolts should be tightened to a torque of 180 Nm.

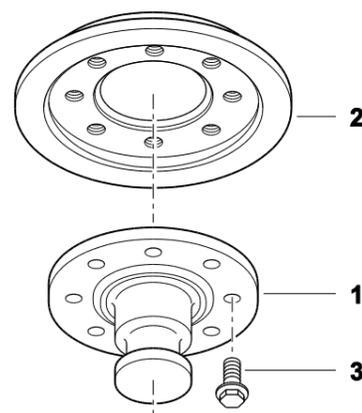


Fig 1.1.a. – Kingpin (1), socket (2) and securing bolt (3)

On an aluminium fifth wheel rubbing plate, a JOST KZ1312 type kingpin is used. This kingpin is screwed onto the aluminium fifth wheel rubbing plate with eight M14 or M14x1.5 bolts to a torque of 130 Nm.

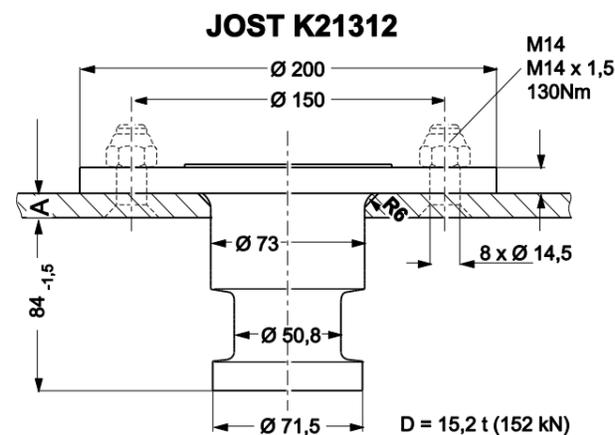


Fig 1.1.b. – Kingpin on aluminium fifth wheel rubbing plate



All kingpins used comply with the EC Directive 94/20 of 30 May 1994. It is advisable to check the securing and wear of the kingpin on a weekly basis.

Directives relating to the assessment of worn and/or deformed 2" trailer couplings					
			Minimum pin diameter in mm	Original pin diameter in mm	
WEAR	I	Pin surface worn locally and evenly showing negligible grooves	Reference surface height 4 mm max	d1 = 70 d2 = 49	d1 = 73 ± 0.1 d2 = 50.8 ± 0.1
	II	Pin surface worn locally and showing several scores and/or holes		d1 = 71 d2 = 49.5	d1 = 73 ± 0.1 d2 = 50.8 ± 0.1

Fig 1.1.c. – Measurement of wear on kingpin

1.2. Aluminium landing legs

The maximum side load for this type of landing leg is 10,700 kg.

1.3. Steel landing legs

Lifting capacity	24 ton
Static loading capacity	50 ton
	36 ton for landing legs fitted with wheels
Force to be applied to handle for a load of 16 ton	210 N

2. Moving floor system

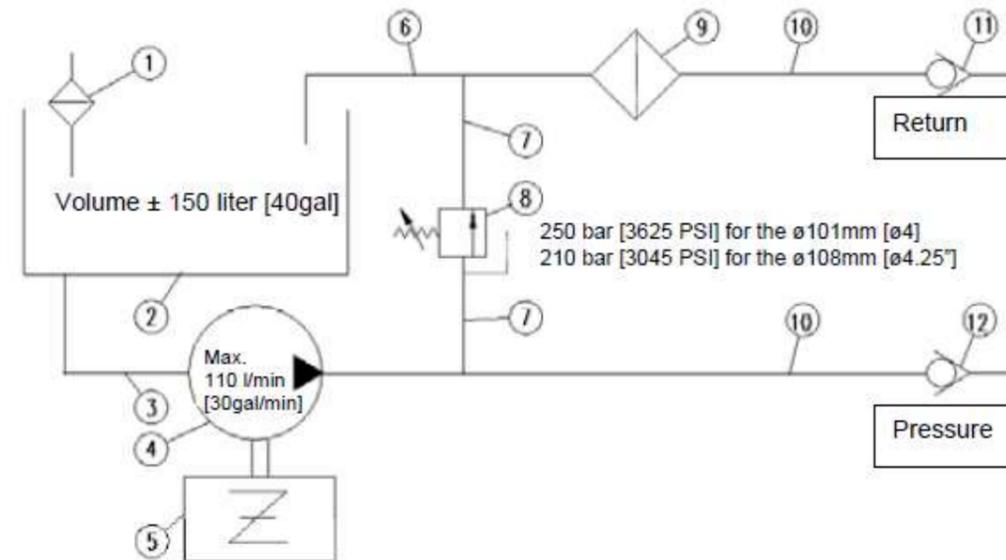
2.1. Keith® Workhorse System

2.1.1 General

		KFD 400	KFD 425
Cylinders	Quantity		3
	Standard diameter.	Ø 4 = 101 mm	Ø 4,25 = 108 mm
	Stroke	200 mm	200 mm
System weight	477 kg		
System speed		2,8 Meter/Minute	2,5 Meter/Minute
Load capacity		27 Ton (at a pressure between 150 and 250 bar)	27 Ton (at a pressure between 120 and 210 bar)
Pump	Oil pressure	Ø 4,25 = 250 bar	Ø 4,25 = Max. 210 bar
	Oil flow	110 l/min	110 l/min

2.1.2 Hydraulic system specifications

Hydraulic diagram:



1	Bleeding	7	Outlet pipe min 3/4"
2	Reservoir	8	Pressure relief valve max 210 bar
3	Suction pipe min. 2"	9	Return filter
4	Pump	10	Return/pressure line 1"
5	PTO	11	Quick-coupling (M)
6	Filter return pipe min 1 1/4"	12	Quick-coupling (V)

Fig 2.1.2.a. – Hydraulic diagram

The hydraulic system complies with the following requirements – characteristics:

Pump/PTO	The amount of oil (oil flow) pumped into the system determines the loading and unloading times; the oil pressure determines the total weight which can be handled
	The moving floor system is designed for a maximum oil flow of 110 litres/min
	Compare motor performances to ensure the motor is capable of driving the pump.
	Check the rpm of the motor does not drop considerably during loading.
	Compare the maximum permissible load of the PTO with that of the pump.
Hydraulic oil	High quality, suitable for a pressure of 210 bar. ISO viscosity is 46 (32 during cold conditions).
	Extremely cold conditions will require the use of hydraulic liquids used in the aviation industry.

Hydraulic reservoir	The volume of oil in the reservoir is equal to or bigger than the oil flow per minute. The reservoir should be 80-90% full.
	The suction and return pipes have been installed such to prevent cavitation. The filler cap is fitted with a breather plug.
Pressure relief valve	The pressure relief valve is set to 210 bar.
	Correct adjustment of the pressure relief valve is extremely important: <ul style="list-style-type: none"> • If set too low, the system may not load or unload. • If set too high, the system may be damaged.
Hydraulic oil filter	Filtration grade is 10 µm.
	In extremely cold circumstances, it is best to use 25 µm.
	Flow volume of the filter should be at least equal to the maximum oil flow which may occur in the system (110 litres/min).
Hydraulic pipes	All hydraulic pipes are suitable for a pressure of 300 bar minimum.
	Dimensions: <ul style="list-style-type: none"> • Suction pipe: minimum diameter 2", maximum length 1.5 metres without constrictions. • Pressure pipe: this is the pipe from the tractor to the trailer; diameter is 3/4". • Return pipe: the diameter of the pipe from the trailer to the filter is 1"; the diameter of the pipe from the filter to the reservoir is 1 1/4" minimum.
Quick-couplings	On the tractor: <ul style="list-style-type: none"> • Male on the return pipe (to the reservoir) • Female on the pressure pipe (from the pump)
	On the trailer: <ul style="list-style-type: none"> • Female on the return pipe (from "TANK" filter block) • Male on pressure pipe (to "PUMP" filter block)

2.2. Cargo Floor® system

2.2.1 General

Cylinders	Quantity	3
	Standard diameter.	100/45 mm
	Stroke	200 mm
Max. operating pressure	225 bar	
Pump	Oil pressure	Max. 250 bar
	Oil flow	Max. 110 l/min

2.2.2 Specifications

Operating valves	24V DC control
	The moving floor system is designed for a maximum oil flow of 110 litres/min
	Compare motor performances to ensure the motor is capable of driving the pump.
	Check the rpm of the motor does not drop considerably during loading.
	Compare the maximum permissible load of the PTO with that of the pump.
Hydraulic oil	High quality, ISO VG 32, such as Shell Tellus T32, BP HL2-32 or ESSO Unavis 32 or equivalent.
	Synthetic ester based biodegradable hydraulic oil (HEES) or vegetable based oil (HETG).
Pressure relief valve	The pressure relief valve is set to 225 bar.
	Correct adjustment of the pressure relief valve is extremely important:
	If set too low, the system may not load or unload. If set too high, the system may be damaged.
Hydraulic oil filter	Filtration grade is 20 µm.
	Flow volume of the filter should be at least equal to the maximum oil flow which may occur in the system (110 litres/min).
Hydraulic pipes	Dimensions:
	Pressure pipe: this is the pipe from the tractor to the trailer; outside diameter is 20mm, wall thickness 2.5 mm, inside diameter 15 mm. Return pipe: the diameter of the pipe from the trailer to the filter; outside diameter is 25 mm, wall thickness 2.0 mm, inside diameter 21 mm.



VERSION 3.1 - 09/2012