

# Installation guide and operating instructions

Emergency brake valve NBV16 effective from X20



**Manufacturer data**

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## **Table of contents**

<b>1</b>	<b>General .....</b>	<b>5</b>
1.1	Information about this installation guide and operating instructions .....	5
1.2	Target readership.....	5
1.3	Storage advice.....	5
1.4	Notes on usage .....	6
1.5	Symbol legend.....	6
1.6	Warnings .....	8
1.7	Other applicable documents .....	9
1.8	Limitation of liability .....	9
1.9	Copyright protection.....	9
1.10	Customer service .....	9
<b>2</b>	<b>Safety.....</b>	<b>10</b>
2.1	General.....	10
2.2	Intended use .....	10
2.3	Foreseeable misuse .....	10
2.4	Basic safety instructions .....	11
2.5	Specific hazards.....	11
2.6	Responsibilities of the operator.....	12
2.7	Qualification of the personnel .....	12
2.8	Personal protective equipment .....	12
2.9	Safety equipment on the vehicle .....	13
2.10	Modifications and manipulations not permitted .....	13
2.11	Replacement parts.....	13
2.12	Consumables and auxiliary materials .....	13
2.13	Accident prevention strategy .....	14
2.14	Environmental protection.....	14
<b>3</b>	<b>Technical data .....</b>	<b>15</b>
3.1	General information .....	15
3.2	System specifications.....	15
3.3	Connections .....	16
3.4	Component drawing .....	17
3.5	Delivery scope.....	17
3.6	Further information .....	17
<b>4</b>	<b>Structure and function .....</b>	<b>18</b>
4.1	Functional description .....	18
4.2	Structure .....	19
4.3	System diagram .....	20
4.3.1	1-line mode*.....	20
4.3.2	2-line mode.....	21
<b>5</b>	<b>Assembly.....</b>	<b>22</b>
5.1	Safety instructions .....	22
5.2	Basic installation instructions .....	23
5.3	Installation of the emergency brake valve .....	26
<b>6</b>	<b>Operation.....</b>	<b>29</b>
6.1	Safety instructions .....	29

## Table of contents

---

6.2	Commissioning.....	29
6.3	Normal operation .....	31
6.3.1	Coupling the trailer.....	31
6.3.2	Park and secure the tractor-trailer.....	33
6.3.3	Uncoupling the trailer .....	33
6.4	Resumption of operation after malfunction.....	34
<b>7</b>	<b>Maintenance and troubleshooting .....</b>	<b>36</b>
7.1	Safety instructions .....	36
7.2	Troubleshooting.....	36
7.3	Maintenance .....	37
7.3.1	Cleaning.....	38
7.3.2	Maintenance.....	38
<b>8</b>	<b>Removal and disposal .....</b>	<b>39</b>
8.1	Safety instructions .....	39
8.2	Disassembly .....	39
8.3	Disposal.....	41
<b>9</b>	<b>Function test checklist .....</b>	<b>42</b>

## General

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### 1 General

#### 1.1 Information about this installation guide and operating instructions

This installation guide and operating instructions, hereinafter referred to as the "instructions", contain important advice on handling the emergency brake valve during installation, setup and operation, maintenance and care, as well as during disassembly and disposal.

The prerequisite for safe, proper and economical work on and with the emergency brake valve is compliance with all safety and procedural instructions provided. This will help you to avoid dangers, reduce repair costs and downtimes and increase the reliability and service life of the emergency brake valve.

The information contained here refers to parts of the supplier documentation relating to the installation host (vehicle). The supplier documents are still valid and are listed in Chapter "1.7 Other applicable documents".



#### NOTE

Read this manual carefully before starting any work!

#### 1.2 Target readership

Target readership groups for this manual are:

- Installation and functional testing personnel prior to handover to the operator
- Operating and maintenance personnel seeking advice about determining conditions that require further actions to ensure safe operation
- Maintenance personnel seeking advice on troubleshooting, maintenance and upkeep in a safe operating condition
- Experts entrusted by the operator to perform inspections and maintenance
- Personnel on the operator side responsible for performing and adhering to the maintenance and inspection intervals specified in these instructions

#### 1.3 Storage advice

These instructions and the other applicable documents are considered part of the product and must be stored in an easily accessible place for all personnel working on the product. Their location must be communicated to the appropriate personnel.

## General

### 1.4 Notes on usage

The pages of the manual are numbered consecutively.

A table of contents is provided after the cover page to facilitate location of the various sections.












If the instructions on a particular topic contain basic or further information elsewhere, the user is informed of this by means of cross-references.

All figures and drawings in this manual are for general illustration purposes in terms of presentation of the material only, rather than necessarily being true to scale. They may differ slightly from the actual design of the emergency brake valve.

### 1.5 Symbol legend

The warnings employed in this manual are accompanied by pictograms to indicate the nature of any potential hazard.

The following pictograms are used:

Symbol	Definition	Symbol	Definition
<b>General symbols</b>			
	General advice and specific handling advice		Important advice for working safely
	Risk of material damage		
<b>Warning symbols</b>			
	General warning symbol		Hazard due to pressurised component
	Risk of environmental damage		
<b>Mandatory signage</b>			
	Read the information in the instructions		Wear eye protection
	Wear protective gloves		Wear protective clothing
	Wear foot protection		

**General**







Symbol	Definition
<b>Special symbols</b>	
	<p>Connection guideline: tractor 1-line braking system*</p> <p>*According to EU 2015/68 Art. 2.2.2.15.3. Permanent single line operation (H1L) is not regulated in Regulation (EU) 2015/68. Please observe national legislation for driving on road in single-line mode</p>
	<p>Connection guideline: tractor 2-line braking system</p>
	<p>Functional note: If the electrical connection and/or the supplementary line SL(ZL) is interrupted, the automatic braking is activated.</p>
<div style="background-color: #ffc107; padding: 10px; border: 1px solid black;"> <p style="text-align: center;"><b>ACHTUNG! CAUTION!</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>Vor jeder Wegfahrt:</b></p> <ol style="list-style-type: none"> <li>1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen</li> <li>2. Bremsprüfung 10 Sekunden durchführen</li> </ol> <p><b>Vor dem Abkuppeln:</b></p> <ol style="list-style-type: none"> <li>1. Mechanische Feststellbremse betätigen</li> <li>2. Druckspeicher entleeren</li> </ol> </div> <div style="width: 45%;"> <p><b>Before each set off:</b></p> <ol style="list-style-type: none"> <li>1. Brake load sensing device (if manually operated) adjust according to load</li> <li>2. Perform brake check for 10 seconds</li> </ol> <p><b>Before uncoupling:</b></p> <ol style="list-style-type: none"> <li>1. Apply mechanical parking brake</li> <li>2. Release accumulator pressure</li> </ol> </div> </div> </div>	<p>Procedural steps:</p> <p><b>NOTICE</b></p> <p>Before driving away:</p> <ol style="list-style-type: none"> <li>1. Always adjust the brake load sensing valve (if manually operated) according to the load</li> <li>2. Always perform a brake test for 10 seconds</li> </ol> <p>Before decoupling:</p> <ol style="list-style-type: none"> <li>1. Operate parking brake</li> <li>2. Depressurise pressure accumulator</li> </ol>

## General

### 1.6 Warnings

The warnings provided in this manual are introduced by keywords that indicate the corresponding level of risk.

The warning symbol also indicates the type of risk. The following warnings are employed in this manual:

	<b>⚠ DANGER</b> <b>Serious injury or death!</b> A warning at this risk level indicates an impending dangerous situation which would result in serious injury or death. ▶ Follow the instructions contained in the warning.
	<b>⚠ WARNING</b> <b>Serious injury!</b> A warning at this risk level indicates a potentially dangerous situation which, if not avoided, could result in death or permanent injury. ▶ Follow the instructions contained in the warning.
	<b>⚠ CAUTION</b> <b>Injury!</b> A warning at this risk level indicates a potentially dangerous situation which, if not avoided, could result in injury. ▶ Follow the instructions contained in the warning.
	<b>NOTICE</b> <b>Material damage!</b> A warning at this risk level indicates a situation which may result in damage to the unit. ▶ Follow the instructions contained in the warning.
	<b>SAFETY INSTRUCTIONS</b> <b>Advice on working safely!</b> This note contains important information and notes for safe working during the subsequent handling steps. ▶ Follow the instructions in this note to avoid accidents and injury.
	<b>NOTE</b> A note indicates additional information that is important for further procedure or which facilitates the described step.



## **General**

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### **1.7 Other applicable documents**

In addition to the advice contained in these instructions, the information below must also be taken into account:

- Signage information on the vehicle/emergency brake valve
  - Separately supplied plans and diagrams individually for the corresponding brake system
  - Operator advice manual
  - Safety data sheets for auxiliary and operating materials
  - Local accident prevention provisions and regional regulations at the installation site
  - Data sheets / Operating Instructions / Documentation of installed components
- ⇒ Observe the notes contained therein – in particular the safety instructions.

### **1.8 Limitation of liability**

All information and notes contained in this manual have been compiled in accordance with the applicable standards and regulations, the technological state of the art and many years of knowledge and experience. The manufacturer assumes no liability for any damage caused by:

- Failure to follow the instructions
- Improper use
- Personnel who are not sufficiently trained
- Unauthorised conversions/technical modifications
- Erroneous installation/connection
- Non-performance of prescribed maintenance work
- Use of non-approved spare parts

The obligations agreed in the delivery contract, the general terms and conditions as well as the delivery conditions of the manufacturer and the legal regulations that were valid at the time of conclusion of the contract shall apply.

We reserve the right to make technical changes within the scope of improving the performance characteristics and further development.

### **1.9 Copyright protection**

This manual is protected by copyright. Its transfer to third parties, its duplication of any kind and in any form – even in extracts – as well as its use and/or the communication of its contents are not permitted without the written consent of the manufacturer. In the event of violations, the user shall be held liable for compensation claims. The manufacturer's right to assert further claims remains reserved.

### **1.10 Customer service**

For technical queries regarding the emergency brake valve, please contact the manufacturer service/customer service (see inside cover page for contact details).

## Safety


## 2 Safety

### 2.1 General

This chapter contains important advice on all safety aspects for the optimum protection of the personnel as well as safe and trouble-free operation.

- In addition to the general safety instructions provided in this chapter, further safety instructions relevant to the corresponding procedural sections are always provided.
- Possible hazards relating to a specific procedural step are described beforehand.

The basis for the safe handling and trouble-free operation of the emergency brake valve is knowledge of these safety and user instructions.

SAFETY INSTRUCTIONS	
	<p><b>Advice on working safely!</b></p> <p>Non-observance of the warnings and procedural steps provided in this manual can result in considerable dangers.</p> <ul style="list-style-type: none"><li>▶ It is essential to observe the warnings and procedural steps provided!</li><li>▶ Also observe the safety instructions in the "1.7 Other applicable documents"!</li><li>▶ Observe the safety instructions of the installation host (vehicle) and the locally applicable operating regulations.</li></ul>

### 2.2 Intended use

The emergency brake valve is intended for the execution of operating, auxiliary and emergency brake functions (also referred to as automatic brake) on vehicles such as trailers.

The emergency brake valve may only be used in accordance with the technical data and operating conditions defined by the manufacturer, please refer to Chapter "3 Technical data".

### 2.3 Foreseeable misuse

Any use for a purpose other than that specified in Chapter "2.2 Intended use" is considered improper and is therefore not permitted.

For example, improper use is deemed to take place if

- the information in this manual is not observed
- the emergency brake valve is used in an explosive zone
- the limits specified in the technical data are not observed
- the emergency brake valve is operated in a modified or defective condition

## 2.4 Basic safety instructions

The emergency brake valve has been constructed in accordance with the relevant guidelines and the technological state of the art as well as the recognised safety regulations. Nevertheless, the use of the emergency brake valve can be dangerous and lead to damage.

Observe the following safety instructions for safe handling and trouble-free operation of the emergency brake valve:

- Check the emergency brake valve for visible external damage before use. Do not operate a damaged emergency brake valve.
- Only perform cleaning, maintenance and repair work when the emergency brake valve is not in operation and not pressurised (see chapter "2.5 Specific hazards").
- Repairs to the emergency brake valve may only be carried out by authorised specialists. Improper repairs can result in considerable dangers.
- Defective components may only be replaced by original spare parts. Only these parts ensure that the safety requirements are met.
- Observe the specified deadlines for recurring checks/inspections.

## 2.5 Specific hazards

### **Pressurised pipes and assemblies can be dangerous!**

Pressurised pipes and assemblies can lead to injury.

- ▶ Always depressurise pressurised lines and components prior to commencing any work on the hydraulic equipment. Pay attention to pressure accumulators. Empty these completely as well.
- ▶ Wear personal protective equipment during maintenance and repair work on the emergency brake valve.
- ▶ Do not adjust the pressure settings beyond the maximum permissible values.
- ▶ Replace hose lines regularly as preventive maintenance, even if no damage is identified.
- ▶ Ensure that there are no persons in the danger area during commissioning.

### **Contact with hazardous substances can be dangerous!**

All operating and auxiliary materials could contain hazardous substances which may lead to health hazards.


- ▶ Observe the product data sheets for the operating and auxiliary materials being used.
- ▶ Wear the stipulated protective equipment.

## Safety

### 2.6 Responsibilities of the operator

The operator must check the correct condition of the braking system before every use of the vehicle (trailer) on which the emergency brake valve has been installed (please refer to Chapter "6.2 Commissioning").

### 2.7 Qualification of the personnel

	SAFETY INSTRUCTIONS
	<p><b>Inadequate skills can lead to safety risks!</b></p> <p>Improper handling of the emergency brake valve can lead to serious personal injury and material damage.</p> <p>▶ All activities should only be carried out by qualified personnel.</p>

In these instructions, the following qualifications or attributes are defined for the various roles:


#### Vehicle/trailer operators

- are physically and mentally capable of using the braking system in accordance with the instructions in this manual.

#### Technical/service personnel

- are able to install, maintain and repair the braking system as a result of their professional training, knowledge and experience as well as knowledge of the relevant provisions.

### 2.8 Personal protective equipment


	SAFETY INSTRUCTIONS	
	<p><b>Risk of injury due to incorrect or incomplete protective equipment!</b></p> <p>Personal protective equipment must be worn during the work in order to minimise health hazards.</p> <p>▶ Always wear the protective equipment required for the specific type of work.</p> <p>▶ Follow the advice provided in the work area for personal protective equipment.</p> <p>▶ Comply with the safety requirements laid down by the operator.</p> <p>▶ Do not wear rings, chains or other jewellery.</p>	

	Wear protective clothing		Wear foot protection
	Wear protective gloves		Wear eye protection

## Safety


### 2.9 Safety equipment on the vehicle

The emergency brake valve is a vehicle safety device. Protective and/or warning equipment may be located on the vehicle itself or on the coupled tractor.

	<i>NOTE</i>
	For details please refer to the respective vehicle documentation provided by the manufacturer!

### 2.10 Modifications and manipulations not permitted


Alterations or modifications to the emergency brake valve are not permitted.

	<i>NOTE</i>
	In the event of any unauthorised modifications and alterations to the emergency brake valve, all liability and warranties on the part of the manufacturer shall become null and void.

### 2.11 Replacement parts

Erroneous or incorrect spare parts can lead to damage, malfunction or total failure of the emergency brake valve and can also compromise safety.


- Only use original spare parts or spare parts approved by the manufacturer of the emergency brake valve.

	<i>NOTE</i>
	The manufacturer accepts no liability for any damage resulting from the use of spare and wear parts not approved by the manufacturer.

### 2.12 Consumables and auxiliary materials

Non-approved consumables and auxiliary materials can lead to damage, malfunction or total failure of the emergency brake valve and therefore to the vehicle itself, as well as compromising safety.

- Only use consumables and auxiliaries specified and approved by the manufacturer.
- Do not use chemicals that may pose a risk to materials.
- Observe the vehicle documentation of the manufacturer.

	<i>NOTE</i>
	The manufacturer accepts no liability for damage resulting from the use of consumables and auxiliaries not approved by the manufacturer.

## Safety

### 2.13 Accident prevention strategy

Observe the following notes for accident prevention when operating the emergency brake valve:

- Observe and adhere to general and local regulations concerning environmental protection and accident prevention.
- Check the emergency brake valve at least once prior to commissioning for externally visible damage and defects. In the case of damage or defect, stop the vehicle immediately and secure it against further use.
- Repair and/or maintenance work may only be carried out by authorised specialists.
- Prior to commencing any cleaning activity, maintenance or repair work on the emergency brake valve, always depressurise the braking system and secure it against renewed pressurisation. This also depressurises the pressure accumulator.
- Observe the recommended intervals or those specified in the maintenance plan for periodic testing/inspections.
- Only use suitable maintenance tools.
- Subsequent to repair work, reattach all parts properly and check that they are functioning correctly.

### 2.14 Environmental protection

Improper handling of environmentally hazardous substances, especially their incorrect disposal, may cause significant damage to the environment.

- Refer to the safety data sheets of consumable and auxiliary materials for advice on their disposal.

## Technical data

### 3 Technical data

#### 3.1 General information

##### Component identification

Indication	Value	
Type designation	Emergency brake valve NBV16	
Serial number	see markings on component	

##### Metrics

Indication	Value	Unit
Measurements	Refer to the dimension sheet in Chapter "3.4 Component drawing".	
Weight	4.4	kg

##### Environmental conditions

Indication	Value	Unit
Temperature range (operating environment)	-10 to +80	°C
Serial number	see markings on component	

#### 3.2 System specifications

##### General

Indication	Value	Unit
Max. operating pressure	150	bar
Supplementary line pressure range (ZL; see Chapter "3.3 Connections")	0 15 - 35	bar bar
Hydraulic oil in accordance with	DIN 51524	
Filtration	NAS 1638, CLASS 9	

##### Solenoid valve

Indication	Value	Unit
Operating voltage	12 +/- 10%	V <sub>DC</sub>
Max. current consumption	3.5	A
Power	40	W

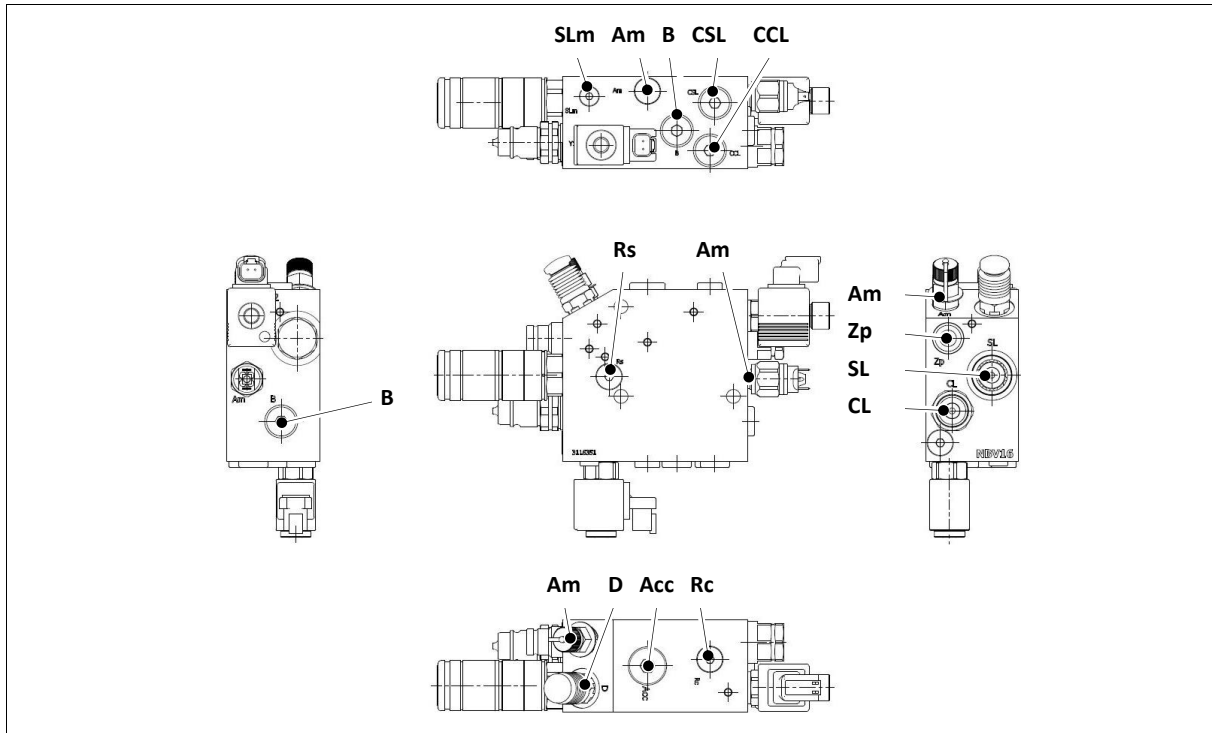
##### Pressure switch

Indication	Value	Unit
Contact type	Opener	
Pressure setting value	55	bar
Current consumption	0.5	A

## Technical data

### 3.3 Connections

#### Connection designation



#### Emergency brake valve NBV16 connections

B: Brake connection axle	Am: Measuring connection accumulator / Minimes connection
CL: Control line connection (CL [BL]) to tractor	Am: Measuring connection accumulator
Rc: [only for manufacturer]	D: Pressure discharge valve connection/drain valve
Rs: [only for manufacturer]	SL: Supplementary line connection (SL [ZL]) to tractor
Acc: Accumulator	SLm: Supplementary line measurement connection
CCL: Carry over 2nd trailer (CL [BL])	Zp: Parking station SL (for single-line mode)
Am: Measuring connection accumulator/pressure switch	CSL: Carry over 2nd trailer (SL [ZL])

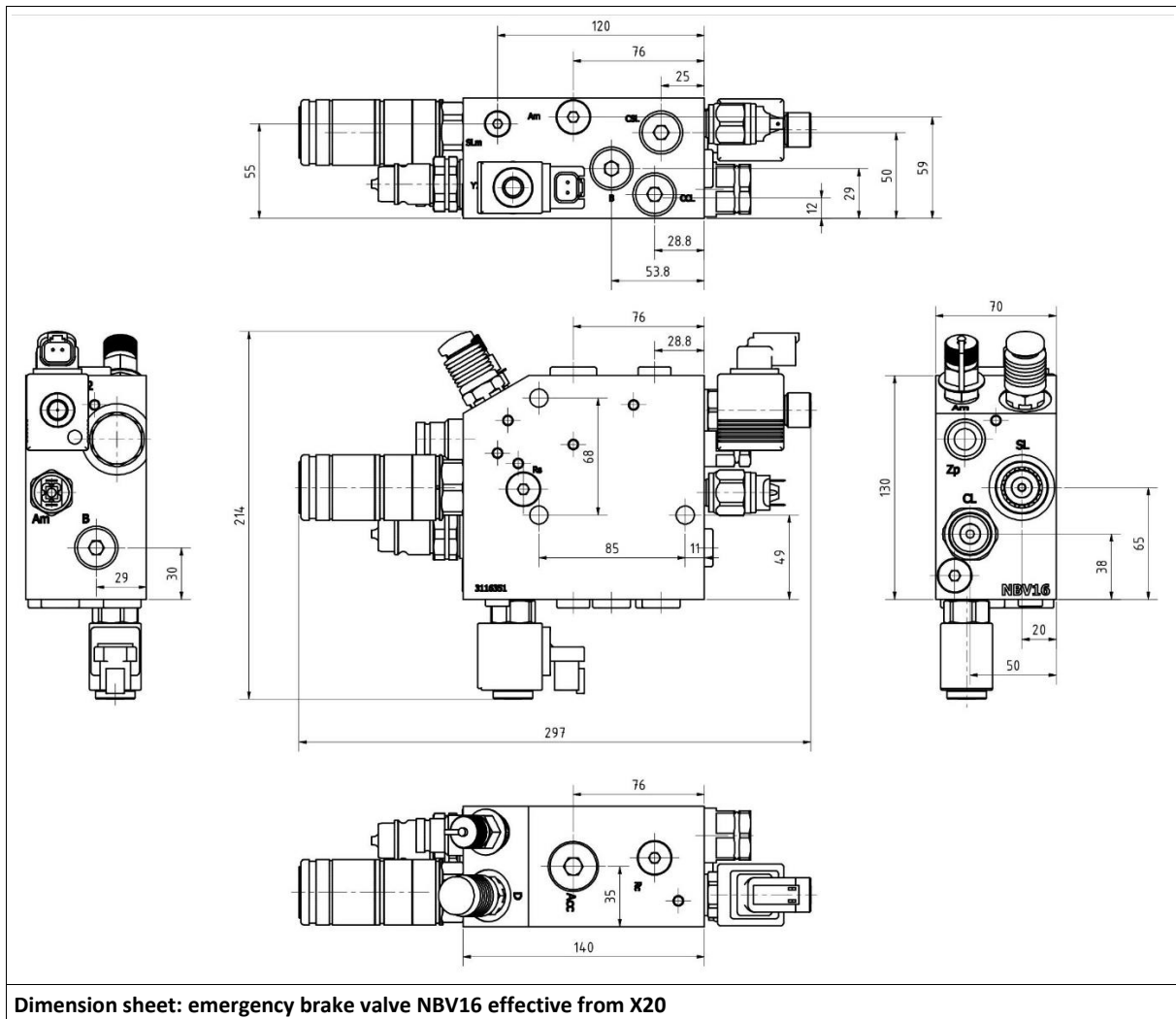
#### Connection sizing

Indication	Value
Brake connection axle (B/BL)	G 3/8"-19
Accumulator (S)	G 1/2"-14
Measuring connection accumulator/pressure switch (SM)	G 1/8"-28
Measurement connection accumulator (SM1)	Minimes M16 x 2
Measurement connection accumulator (SM2)	G 1/8"-28
Supplementary line carry on ZL [SL]	G 3/8"-19
Supplementary line measurement connection (ZLM)	Minimes M16 x 2
Carry over 2nd trailer control line (CCL)	G 3/8"-19
Carry over 2nd trailer supplementary line (CSL)	G 3/8"-19



## Technical data

### 3.4 Component drawing



Dimension sheet: emergency brake valve NBV16 effective from X20

### 3.5 Delivery scope

Please refer to the order and delivery documents regarding the delivery scope.

### 3.6 Further information

Further details on the technical data, emergency brake valve connections and the vehicle itself can be found in the accompanying documentation (please refer to Chapter "1.7 Other applicable documents").

## Structure and function

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### 4 Structure and function

#### 4.1 Functional description

The emergency brake valve NBV16 is designed to equip agricultural and forestry vehicles (trailers). The provisions of EU Regulation 2015/68 are complied with if a hydraulic braking system is fitted on the tractor (with foot pedal activation and 2-line control valve).

The emergency brake valve component is central to the trailer braking system.

The control line, supplementary line and optional load adjustment valve (ALB) are all connected to the emergency brake valve and pressure accumulator. The emergency brake valve works with towing vehicles which are equipped with a 1-line brake connection or with a 2-line brake connection.

The brake pedal on the tractor must be depressed before driving away (after coupling and connecting all lines). This builds up the required operating pressure in the pressure accumulator. During operation, the accumulator is kept at operating pressure each time the brakes are applied. The pressure stored in the accumulator is required to perform the necessary secondary- and automatic braking functions.

The accumulator is monitored by means of a pressure switch. If the pressure in the accumulator is too low, a signal is then sent to the tractor via the standardized connection (ABS in accordance with ISO 7638-2). An error message is then issued to the driver via the tractor display (yellow ABS light).

The electric immobiliser monitors the power supply of the emergency brake valve. If no voltage is applied (e.g. ABS cable not coupled to tractor), then the brakes on the trailer cannot be released and the brake force remains constant.

If the power supply is interrupted during driving then the automatic braking function will trigger immediately. However, the trailer brake is not released after braking until the power supply is restored.

The secondary brake is controlled via the supplementary line from the tractor. To release an existing brake (secondary brake or parking brake), a pressure of 15 – 35 bar must be built up in the supplementary line and the operating voltage must be applied to the electric immobilizer as well as on the electric automatic brake release.

If the pressure in the supplementary line drops below 12 bar, e.g. when the driver applies the handbrake then the braking process is automatically triggered by the pressure in the accumulator.

In the event of a pressure drop in the supplementary line (SL) due to damage or unintentional disconnection, automatic braking takes place automatically by means of the pressure maintained in the accumulator.

## Structure and function

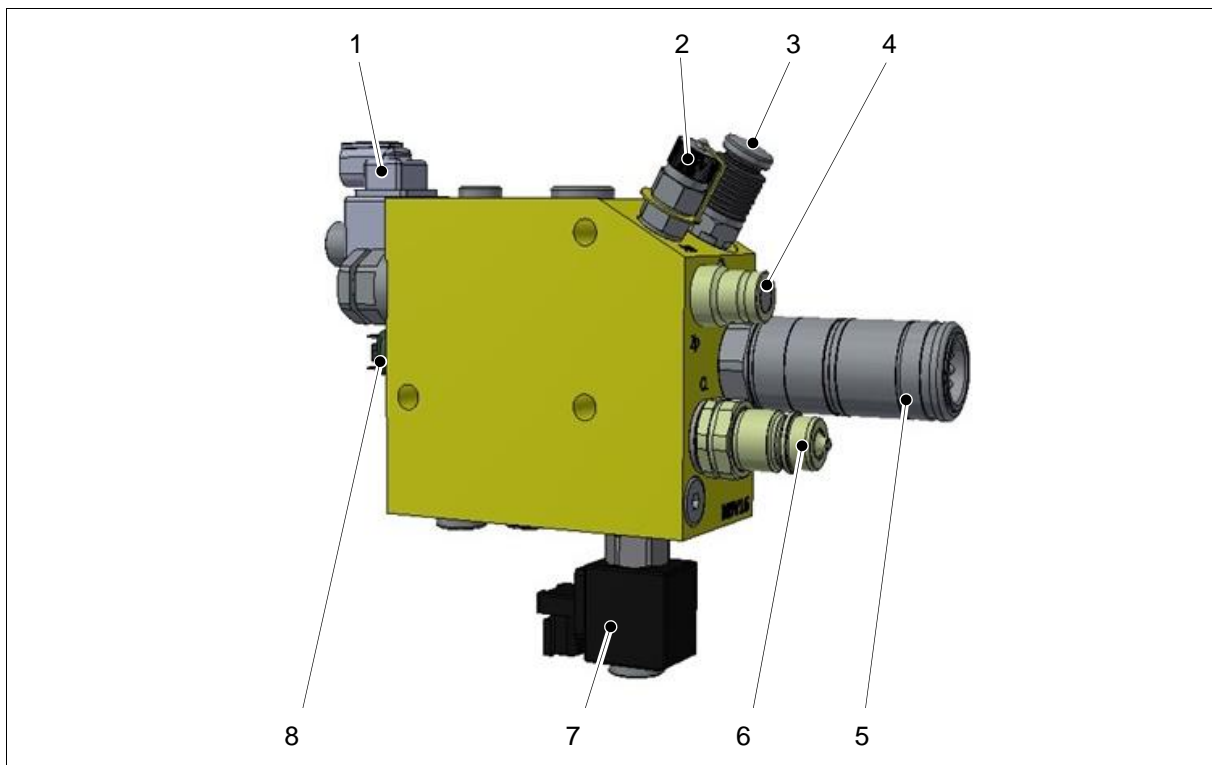
In order to avoid major damage to the hydraulic lines and to avoid the escape of large quantities of hydraulic oil, the couplings are designed as predetermined breaking points with tension limitation. If a coupling connection is released unintentionally by pulling, then the connection can be re-established without tools.

The brake pressure can be reduced and the pressure accumulator relieved by means of a relief valve (e.g. in the event of a breakdown).

Automatic emergency braking occurs when

- the ABS connector is torn out
- the supplementary line is torn out
- the pressure in the supplementary line drops (e.g. due to drive problems on the tractor/engine off)
- the pressure in the supplementary line is reduced by the tractor's control valve due to emergency and/or control functions (e.g. lack of pressure build-up in the control line BL/CL during braking).

### 4.2 Structure



#### Emergency brake valve NBV16 effective from X20

1	Electric emergency brake release (valve)	5	Coupling supplementary line
2	Minimess connection accumulator	6	Coupling control line
3	Drain valve	7	Electric immobiliser (valve)
4	Parking station supplementary line	8	Pressure switch



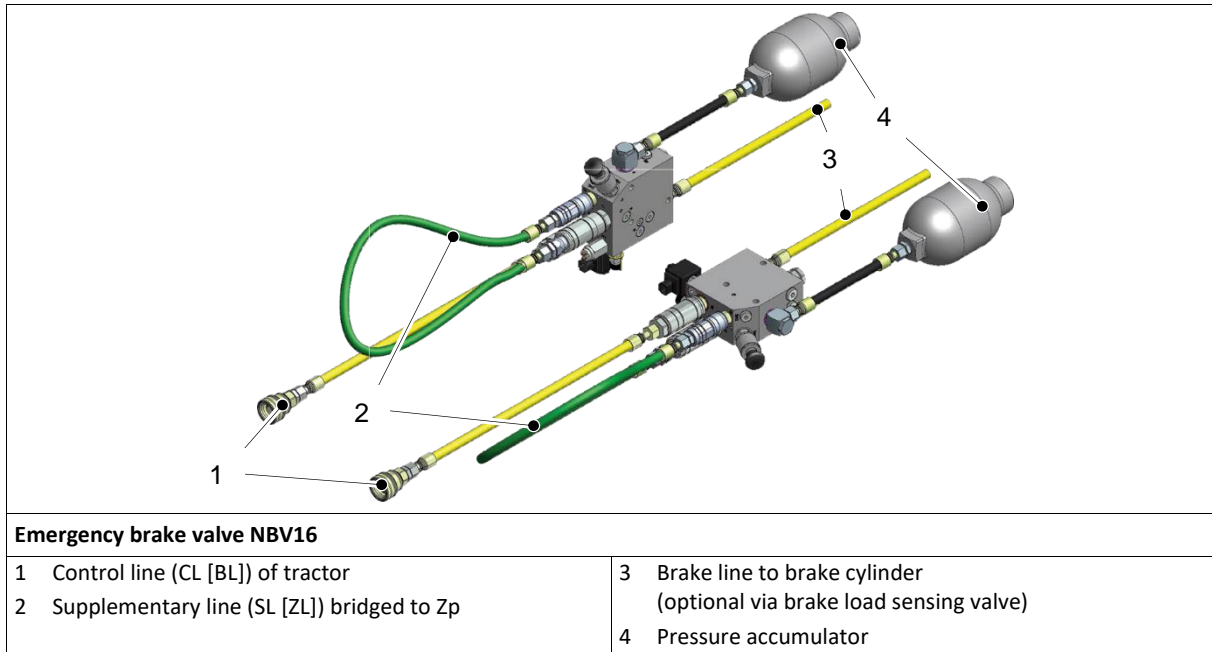
#### NOTE

For details on the emergency brake valve connections, please refer to Chapter "3.3 Connections".


## Structure and function

### 4.3 System diagram

#### 4.3.1 1-line mode\*




To set up the 1-line braking system, a pressure accumulator (4) appropriate for the vehicle (trailer) is connected to connection "Acc" of the emergency brake valve.

	<b>NOTE</b>
	For details on pressure reservoir sizing, please contact Paul Forrer AG.

The connection to the trailer brake cylinders is established via connection "B" of the emergency brake valve. Optionally (depending on the vehicle category), line (3) can be routed via a brake load sensing valve in order to optimize the brake force distribution.

The control line (1) connection from the tractor to the emergency brake valve is established via the "CL: trailer side and CL: on the tractor side".

For operation of the emergency brake valve for a tractor with a 1-line brake connection, the connection "SL[ZL]" must be established via to the connection "Zp". This activates the 1-wire function of the emergency brake valve.

	<b>NOTE</b>
	For details on the emergency brake valve connections, please refer to Chapter "3.3 Connections".

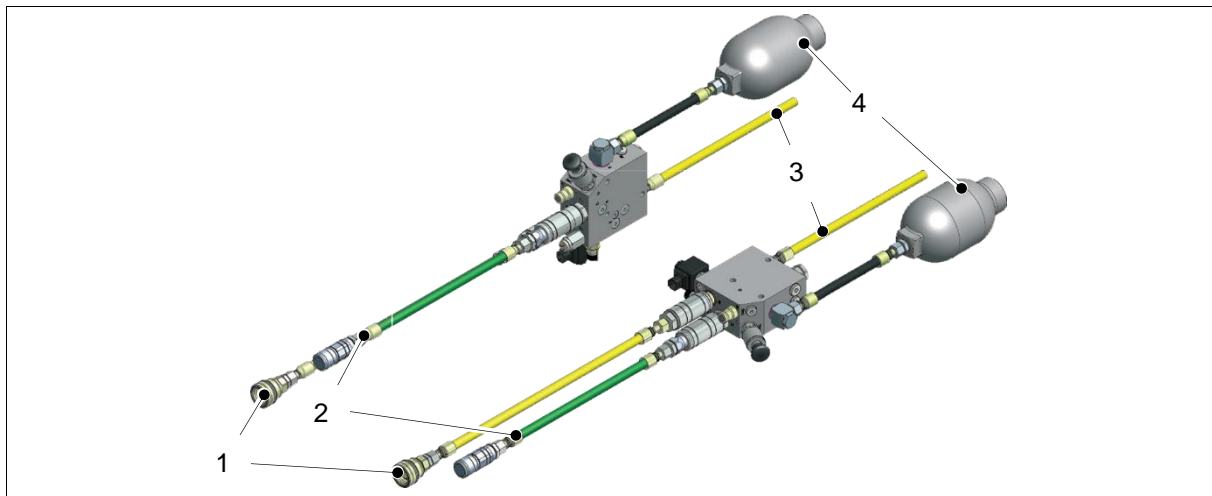
The electrical connection for monitoring and control of the emergency brake valve is established via a pre-assembled cable set. The cable set is equipped with a standardized plug (ABS plug according to ISO-7638-2) for connection to the tractor.

\*According to EU 2015/68 Art. 2.2.2.15.3. Permanent single line operation (H1L) is not regulated in Regulation (EU) 2015/68.

Please observe national legislation for driving on road in single-line mode

## Structure and function

### 4.3.2 2-line mode



#### Emergency brake valve NBV16

- |                                     |  |
|-------------------------------------|--|
| 1 Control line (CL [SL]) of tractor | 3 Brake line to brake cylinder (optional via brake load sensing valve) |
| 2 Supplementary line (SL [ZL])      | 4 Pressure accumulator   |

To set up the 2-line braking system, a pressure accumulator (4) appropriate for the vehicle (trailer) is connected to connection "Acc" of the emergency brake valve.



#### NOTE

For details on pressure reservoir sizing, please contact Paul Forrer AG.

The connection to the trailer brake cylinders is established via connection "B" of the emergency brake valve. Optionally (depending on the vehicle category), line (3) can be routed via a brake load sensing valve in order to optimise the brake force distribution.

The control line (1) connection from the tractor to the emergency brake valve is established via the "CL: trailer side and CL:tractor side".

The connection of the supplementary line (2) from the tractor to the emergency brake valve is established via the connection "SL: trailer side and SL: tractor side".



#### NOTE


For details on the emergency brake valve connections, please refer to Chapter "3.3 Connections".

The electrical connection for monitoring and control of the emergency brake valve is established via a pre-assembled cable set. The cable set is equipped with a standardized plug (ABS plug according to ISO-7638-2) for connection to the tractor.

## Assembly

### 5 Assembly

#### 5.1 Safety instructions

	<b>SAFETY INSTRUCTIONS</b>
	<p><b>Installation work must be performed safely!</b></p> <p>Perform all work in compliance with the safety instructions listed below:</p> <ul style="list-style-type: none"><li>▶ Observe the provisions listed in Chapter "2 Safety" for all work on/with the emergency brake valve.</li><li>▶ Avoid working in a manner that compromises safety. Installation work may only be carried out by trained specialists.</li><li>▶ Always perform this work in accordance with these instructions.</li><li>▶ Observe the relevant national occupational safety regulations as well as local safety regulations.</li><li>▶ Wear the recommended personal protective equipment.</li><li>▶ Secure the vehicle (trailer) against unintentional rolling away (apply the mechanically actuated brake and place chocks underneath).</li></ul>

#### Qualification of the personnel

The emergency brake valve may only be installed by persons who

- are entitled to do so on the basis of their training and qualifications.
- are authorised to do so by the operator of the vehicle.

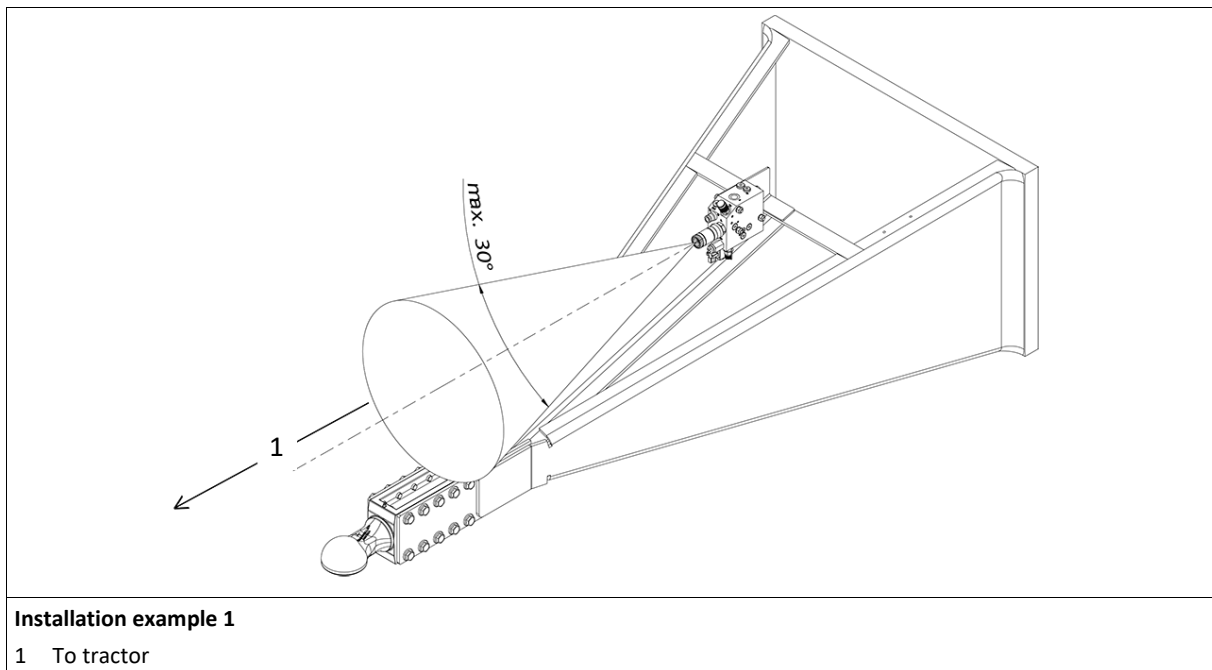
## Assembly

### 5.2 Basic installation instructions

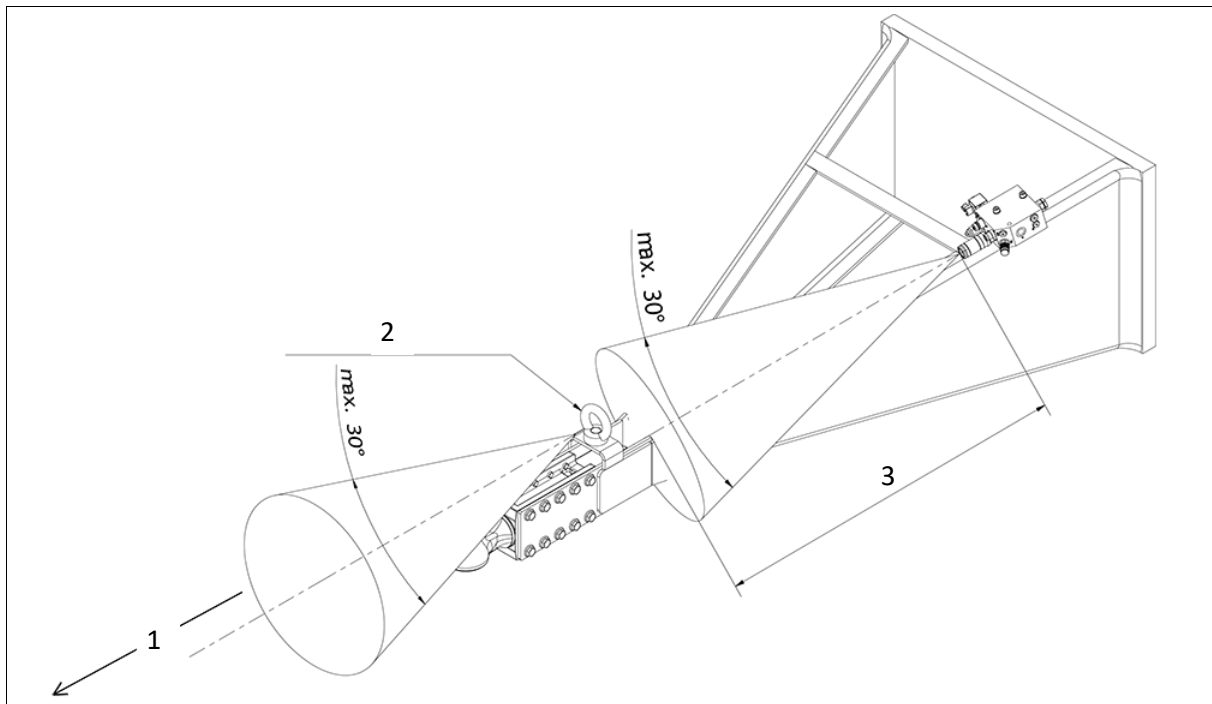
The emergency brake valve must be fitted to the vehicle (trailer) in accordance with the installation specifications listed here.

Essentially the following applies:

- The trailer to which the emergency brake valve is fitted must have a separate, mechanically operated parking brake.
- The emergency brake valve must be fitted as centrally as possible on the drawbar as shown in the following figure.
- The emergency brake valve must be secured in such a way that the tensile forces generated are absorbed by the connected hose lines. This must also be ensured if the couplings work themselves loose due to extreme tensile forces (predetermined breaking point). The emergency brake valve must never be allowed to work itself loose.
- The hose lines from/to the tractor must be free to move and therefore should not be fixed down. It is essential to avoid any tear off angle at the coupling that prevents the coupling from disengaging when tensile forces are too high. If necessary, a redirecting device should be fitted to ensure that only axial traction force can act on the couplings.



## Assembly



### Installation example 2

- 1 To tractor
- 2 Redirecting device for the brake hoses
- 3 > 300 mm to redirecting device

### Installation example 3 (not recommended)

- 1 To the tractor, the CL and SL coupling on the NBV can be mounted decentral from the NBV, an appropriate bracket for the breakaway couplings and the angle of max. 30° must be observed. Disadvantage: The SL line can possibly no longer be coupled to ZP for 1-line operation (hose length).



### NOTICE

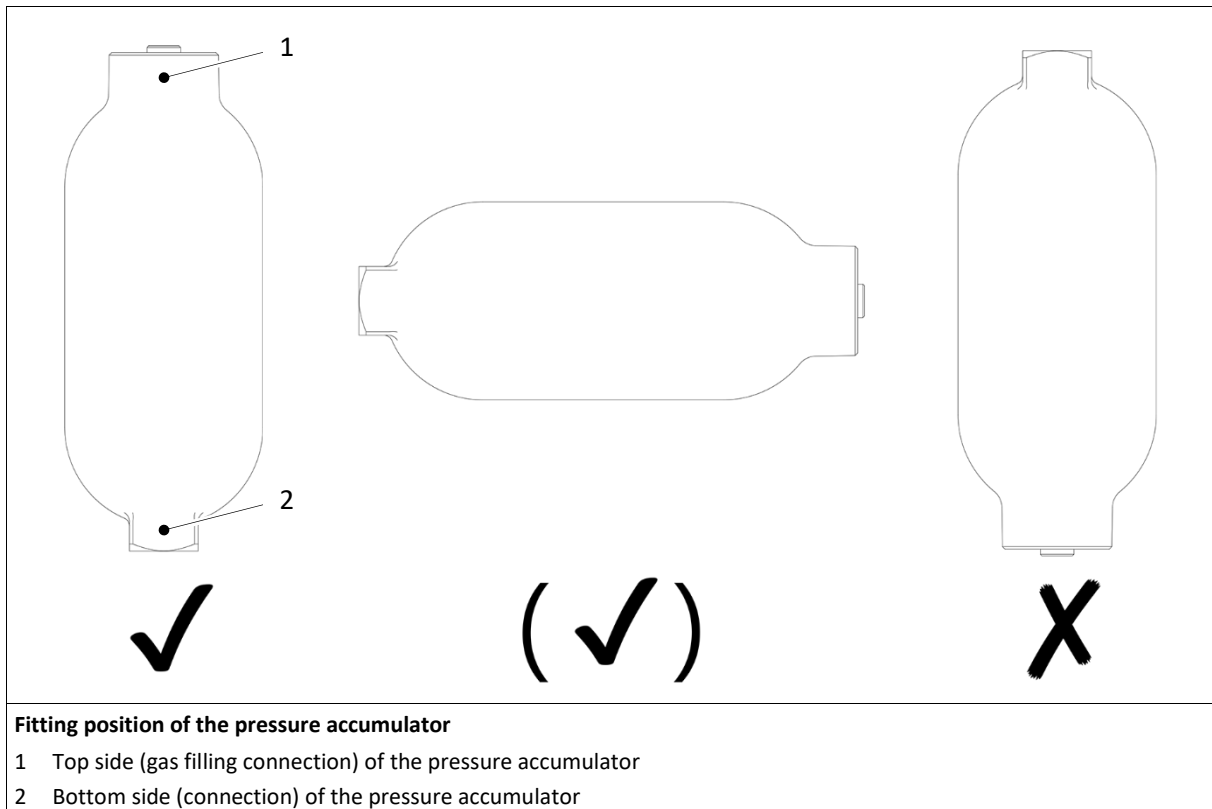
#### Material damage!

If the hose lines to/from the tractor are fixed down in such a way that they are not freely movable, then the couplings cannot release properly in the event of high tensile forces. This may result in shearing of the hose lines and/or further damage.

- ▶ Ensure that the hose lines from the tractor can move freely at all times.
- ▶ Ensure that no tear off angle can occur which would prevent the release of the couplings.



## Assembly





- The emergency brake function can only be triggered by the emergency brake valve if a pressure accumulator appropriate for the trailer is installed, to provide the required brake pressure. Ensure that the recommended installation position of the pressure accumulator is observed and that the accumulator is fitted securely and free of external forces.



### NOTE

For details on pressure reservoir sizing, please contact Paul Forrer AG.  
Refer to manufacturer documentation for information on correct installation of the pressure accumulator.


### 5.3 Installation of the emergency brake valve

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Serious injury!</b> Unintentional rolling away of the vehicle (trailer) is highly dangerous and can lead to serious injury.</p> <ul style="list-style-type: none"><li>▶ Secure the trailer against unintentional rolling away. Always apply the mechanical parking brake and place suitable chocks under the wheels.</li></ul>
	<p style="text-align: center;"><b>NOTICE</b></p> <p><b>Material damage!</b> Contamination of the components being fitted may lead to damage. This can lead to malfunctions and even complete failure of the emergency brake valve.</p> <ul style="list-style-type: none"><li>▶ All components that are installed on the vehicle (trailer) must remain in their original packaging until they are fitted.</li><li>▶ They should be clean and in good condition.</li></ul>

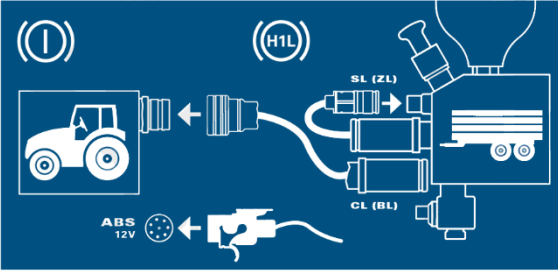
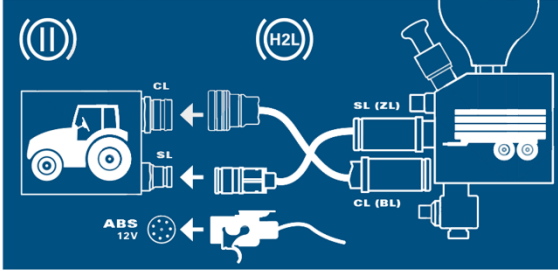
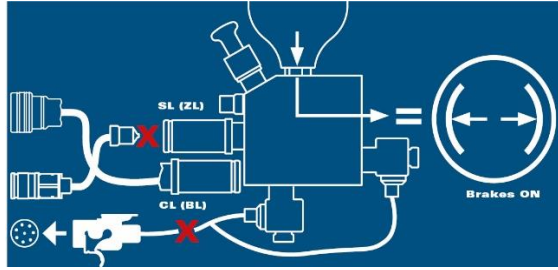
Perform the following installation steps:

- ➡ Position the vehicle (trailer) securely against unintentional rolling away. Apply the mechanical parking brake and place suitable chocks under the wheels.
- ➡ Attach the emergency brake valve to the drawbar (see Fig. "Installation example" in Chapter "5.2 Basic installation instructions").


Assembly

	<b>NOTICE</b>
<p><b>Material damage!</b></p> <p>An incorrectly installed emergency brake valve may work itself loose. This can lead to malfunctions and even complete failure of the emergency brake valve.</p> <ul style="list-style-type: none"> <li>▶ Ensure that the emergency brake valve is properly fitted.</li> <li>▶ Establish the screw connection and secure with appropriate elements (e.g. spring washer, locking varnish, etc.) so that all occurring forces are absorbed and the screw connections cannot work loose.</li> </ul>	

- Install the pressure accumulator in accordance with the specifications (please refer to Chapter "5.2 Basic installation instructions").
- Clean all hoses and pipelines by suitable means (e.g. compressed air, pipe cleaning projectiles, etc.) prior to installation.
- Establish all connections, piping and hoses according to the hydraulic plan/diagram (please refer to Chapter "1.7 Other applicable documents").
- Fill the vehicle (trailer) braking system with hydraulic oil in accordance with the specifications (please refer to Chapter "3 Technical data").
  - In doing so, vent the emergency brake valve via connections B and SL or SLm.
  - Bleed the entire brake system of the trailer.
- Attach signage in a clearly visible position near the emergency brake valve as shown in the following figure.

	
<b>Fitting guideline: tractor 1-line braking system</b>	<b>Fitting guideline: tractor 2-line braking system</b>
	
<b>Functional note: automatic braking</b>	

## Assembly


 <p><b>ACHTUNG!</b> <b>CAUTION!</b></p> <p><b>Vor jeder Wegfahrt:</b></p> <ol style="list-style-type: none"><li>1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen</li><li>2. Bremsprüfung 10 Sekunden durchführen</li></ol> <p><b>Vor dem Abkuppeln:</b></p> <ol style="list-style-type: none"><li>1. Mechanische Feststellbremse betätigen</li><li>2. Druckspeicher entleeren</li></ol> <p><b>Before each set off:</b></p> <ol style="list-style-type: none"><li>1. Brake load sensing device (if manually operated) adjust according to load</li><li>2. Perform brake check for 10 seconds</li></ol> <p><b>Before uncoupling:</b></p> <ol style="list-style-type: none"><li>1. Apply mechanical parking brake</li><li>2. Release accumulator pressure</li></ol>	<p><b>NOTICE</b></p> <p>Before driving away:</p> <ol style="list-style-type: none"><li>1. Always adjust the brake load sensing valve (if manually operated) according to the load</li><li>2. Always perform a brake test for 10 seconds</li></ol> <p>Before decoupling:</p> <ol style="list-style-type: none"><li>1. Operate parking brake</li><li>2. Depressurise pressure accumulator</li></ol>
<p><b>Procedural steps:</b> Before driving away / prior to coupling</p>	

- ➡ Test according to checklist (see Chapter "9 Function test checklist").
- ➡ Check the entire brake system for leaks.

## Operation

## 6 Operation

### 6.1 Safety instructions

	<b>SAFETY INSTRUCTIONS</b>
<p><b>Improper operation can be dangerous!</b></p> <p>Incorrect operation is dangerous for various reasons.</p> <p>The procedural steps described in this chapter relate to the vehicle/trailer setup.</p> <ul style="list-style-type: none"> <li>▶ The personnel involved must have an appropriate driving licence.</li> <li>▶ The personnel involved must have been instructed in the general handling of commercial vehicles.</li> </ul>	

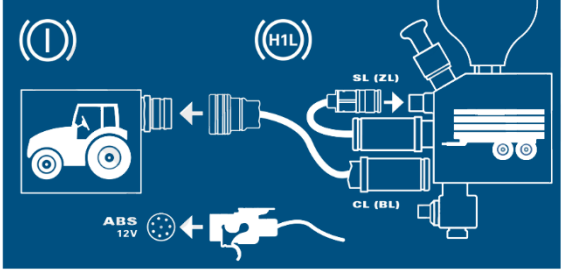
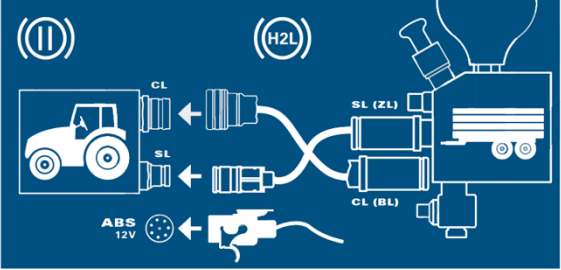
### 6.2 Commissioning

Requirements:

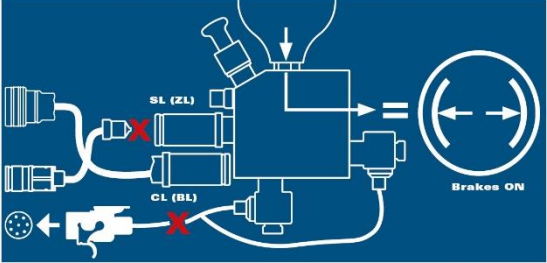
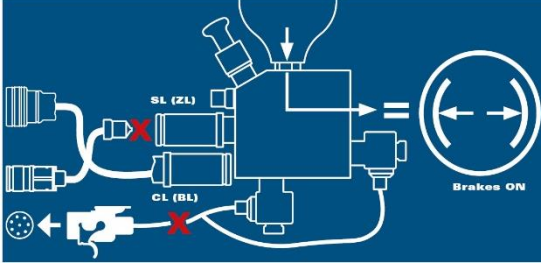
- The emergency brake valve is correctly fitted (please refer to Chapter "5 Assembly").
- A function test (see Chapter "9 Function test checklist") has been carried out and no errors were found.

Perform the following steps for commissioning:


- Couple the trailer to the tractor and secure it against unintentional rolling away (apply the parking brake of both the tractor and the trailer, place chocks underneath, etc.).
- Clean plug connections before coupling.
- Connect the tractor to the trailer both hydraulically and electrically.

For tractor with 1-line braking system:	For tractor with 2-line braking system:
	
<ul style="list-style-type: none"> <li>➤ Connect control line "CL (BL)" and ABS plug connection to the corresponding connections on the tractor.</li> <li>➤ Bridge connection "SL (ZL)" to connection "Zp".</li> </ul>	<ul style="list-style-type: none"> <li>➤ Connect control line "CL (BL)", supplementary line "SL (ZL)" and ABS plug connection to the corresponding connections on the tractor.</li> </ul>

Operation

For tractor with 1-line braking system:	For tractor with 2-line braking system:
	
<p>☞ If the electrical connection is interrupted, the automatic brake is activated.</p>	<p>☞ If the electrical connection and/or the supplementary line "SL (ZL)" is interrupted, the automatic brake is activated.</p>

- ☞ Switch on the tractor ignition.  
Tractor ABS indicator light illuminates.
- ☞ Start the tractor.
- ☞ Apply the service brake of the tractor until the ABS indicator light of the tractor extinguishes and then go on applying for another 10s.

<p><b>ACHTUNG!</b> <b>CAUTION!</b></p>  <table border="0" style="width: 100%; font-size: small;"> <tr> <td style="vertical-align: top;"> <p><b>Vor jeder Wegfahrt:</b></p> <ol style="list-style-type: none"> <li>1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen</li> <li>2. Bremsprüfung 10 Sekunden durchführen</li> </ol> <p><b>Vor dem Abkuppeln:</b></p> <ol style="list-style-type: none"> <li>1. Mechanische Feststellbremse betätigen</li> <li>2. Druckspeicher entleeren</li> </ol> </td> <td style="vertical-align: top;"> <p><b>Before each set off:</b></p> <ol style="list-style-type: none"> <li>1. Brake load sensing device (if manually operated) adjust according to load</li> <li>2. Perform brake check for 10 seconds</li> </ol> <p><b>Before uncoupling:</b></p> <ol style="list-style-type: none"> <li>1. Apply mechanical parking brake</li> <li>2. Release accumulator pressure</li> </ol> </td> </tr> </table>	<p><b>Vor jeder Wegfahrt:</b></p> <ol style="list-style-type: none"> <li>1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen</li> <li>2. Bremsprüfung 10 Sekunden durchführen</li> </ol> <p><b>Vor dem Abkuppeln:</b></p> <ol style="list-style-type: none"> <li>1. Mechanische Feststellbremse betätigen</li> <li>2. Druckspeicher entleeren</li> </ol>	<p><b>Before each set off:</b></p> <ol style="list-style-type: none"> <li>1. Brake load sensing device (if manually operated) adjust according to load</li> <li>2. Perform brake check for 10 seconds</li> </ol> <p><b>Before uncoupling:</b></p> <ol style="list-style-type: none"> <li>1. Apply mechanical parking brake</li> <li>2. Release accumulator pressure</li> </ol>	<p><b>NOTICE</b></p> <p>Before driving away:</p> <ol style="list-style-type: none"> <li>3. Always adjust the brake load sensing valve (if manually operated) according to the load</li> <li>4. Always perform a brake test for 10 seconds</li> </ol> <p>Before decoupling:</p> <ol style="list-style-type: none"> <li>1. Operate parking brake</li> <li>2. Depressurise pressure accumulator</li> </ol>
<p><b>Vor jeder Wegfahrt:</b></p> <ol style="list-style-type: none"> <li>1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen</li> <li>2. Bremsprüfung 10 Sekunden durchführen</li> </ol> <p><b>Vor dem Abkuppeln:</b></p> <ol style="list-style-type: none"> <li>1. Mechanische Feststellbremse betätigen</li> <li>2. Druckspeicher entleeren</li> </ol>	<p><b>Before each set off:</b></p> <ol style="list-style-type: none"> <li>1. Brake load sensing device (if manually operated) adjust according to load</li> <li>2. Perform brake check for 10 seconds</li> </ol> <p><b>Before uncoupling:</b></p> <ol style="list-style-type: none"> <li>1. Apply mechanical parking brake</li> <li>2. Release accumulator pressure</li> </ol>		
<p><b>Procedural steps:</b> Before driving away / prior to coupling</p>			

- ☞ Remove wheel chocks if necessary.
- ☞ Release trailer parking brake.
- ☞ Release tractor parking brake.
- ☞ Start slowly and effect test braking.
- ↔ The tractor-trailer is ready to be driven.

## Operation

### 6.3 Normal operation

#### 6.3.1 Coupling the trailer


Perform the following steps for coupling:

- ➔ Couple the trailer to the tractor and secure it against unintentional rolling away (apply the parking brake of both the tractor and the trailer, place chocks underneath, etc.).
- ➔ Clean plug connections before coupling.
- ➔ Connect the tractor to the trailer both hydraulically and electrically.

For tractor with 1-line braking system:	For tractor with 2-line braking system:
<ul style="list-style-type: none"> <li>➔ Connect control line "CL (BL)" and ABS plug connection to the corresponding connections on the tractor.</li> <li>➔ Bridge connection "SL (ZL)" to connection "Zp".</li> </ul>	<ul style="list-style-type: none"> <li>➔ Connect control line "CL (BL)", supplementary line "SL (ZL)" and ABS plug connection to the corresponding connections on the tractor.</li> </ul>
For tractor with 1-line braking system:	For tractor with 2-line braking system:
<ul style="list-style-type: none"> <li>➔ If the electrical connection is interrupted, the automatic brake is activated.</li> </ul>	<ul style="list-style-type: none"> <li>➔ If the electrical connection and/or the supplementary line "SL (ZL)" is interrupted, the automatic brake is activated.</li> </ul>

- ➔ Switch on the tractor ignition.  
Tractor ABS indicator light illuminates.
- ➔ Start the tractor.
- ➔ Apply the service brake of the tractor until the ABS indicator light of the tractor extinguishes and then go on applying for another 10s.

## Operation

 <p><b>ACHTUNG!</b> <b>CAUTION!</b></p> <p><b>Vor jeder Wegfahrt:</b> 1. Bremskraftregler (wenn manuell betätigt) gemäss Beladung einstellen 2. Bremsprüfung 10 Sekunden durchführen</p> <p><b>Vor dem Abkuppeln:</b> 1. Mechanische Feststellbremse betätigen 2. Druckspeicher entleeren</p> <p><b>Before each set off:</b> 1. Brake load sensing device (if manually operated) adjust according to load 2. Perform brake check for 10 seconds</p> <p><b>Before uncoupling:</b> 1. Apply mechanical parking brake 2. Release accumulator pressure</p>	<p><b>NOTICE</b></p> <p>Before driving away:</p> <ol style="list-style-type: none"><li>1. Always adjust the brake load sensing valve (if manually operated) according to the load</li><li>2. Always perform a brake test for 10 seconds</li></ol> <p>Before decoupling:</p> <ol style="list-style-type: none"><li>3. Operate parking brake</li><li>4. Depressurise pressure accumulator</li></ol>
<p><b>Procedural steps:</b> <b>Before driving away / prior to coupling</b></p>	


- ➞ Remove wheel chocks if necessary.
- ➞ Release trailer parking brake.
- ➞ Release tractor parking brake.
- ➞ Start slowly and effect test braking.
- ↔ The tractor-trailer is ready to be driven.



## Operation

### 6.3.2 Park and secure the tractor-trailer

To park and secure the tractor-trailer:

	<b>NOTE</b>
	Check beforehand (by pressing the test switch in the tractor) whether the parking brake of the tractor alone is able to hold the entire tractor-trailer on an incline. Refer to the manufacturer documentation for information on the tractor.

- Release the tractor's parking brake.
- Activate the mechanical parking brake of the trailer.
- If necessary, place chocks under the wheels.
- Switch off the tractor ignition.
- ↩ The tractor-trailer is now parked and secured against unintentional rolling away.


### 6.3.3 Uncoupling the trailer

To uncouple the trailer:

- Apply the tractor's parking brake.
- Activate the mechanical parking brake of the trailer.
- Secure the trailer by placing chocks under the wheels.
- Depressurise/zero the pressure from the accumulator via the drain valve on the emergency brake valve.
- Uncouple all connections (control line "CL (BL)", supplementary line "SL (ZL)" and ABS plug connection) from the corresponding connections on the tractor.
- Hose lines and electrical connection lines must be stored clean, dry and protected from the weather.
- Uncouple the trailer from the tractor.
- ↩ The trailer is now separated from the tractor and secured against unintentional rolling away.  
The tractor is ready to be driven.

## Operation

### 6.4 Resumption of operation after malfunction

	<b>⚠ WARNING</b>
	<p><b>Serious injury!</b> Unintentional rolling away of the vehicle (trailer) is highly dangerous and can lead to serious injury.</p> <ul style="list-style-type: none"><li>▶ Secure the trailer against unintentional rolling away. Always apply the mechanical parking brake and place suitable chocks under the wheels.</li></ul>


#### Releasing an emergency brake after the lines have sheared:

- The lines have been torn out of the coupling (at the predetermined breaking point) of the emergency brake valve due to the excessive tensile load.
- The automatic brake has activated

To release the brake:

- Secure the tractor-trailer against unintentional rolling away (apply parking brake, place chocks underneath, etc.).
- Insert the lines back into the couplings on the emergency brake valve.
- Start the tractor and apply the service brake.
- ↔ The CL-coupling is now unlocked and the hose connection is ready for operation again.
- Check ABS plug connection for correct fit. Reconnect as necessary.
- Perform commissioning steps (see Chapter 6.2 Commissioning).
- ↔ The tractor-trailer is ready to be driven.

#### Emergency braking release without tractor

	<b>⚠ WARNING</b>
	<p><b>Serious injury!</b> Perform all work in compliance with the safety instructions listed below:</p> <ul style="list-style-type: none"><li>▶ Observe the provisions listed in Chapter "2 Safety" for all work on/with the emergency brake valve.</li><li>▶ Avoid working in a manner that compromises safety. Troubleshooting and maintenance may only be performed by trained specialists.</li><li>▶ Always perform this work in accordance with these instructions.</li><li>▶ Observe the relevant national occupational safety regulations as well as local safety regulations.</li><li>▶ Wear the recommended personal protective equipment.</li><li>▶ Secure the vehicle (trailer) against unintentional rolling away (apply the mechanically actuated brake and place chocks underneath).</li></ul>

## Operation

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The following accessories are required to release an emergency brake without a tractor:


- Collecting container for hydraulic oil (filling volume approximately 5 l)
- Suitable hose line with minimess connection M16x2.

To release the brake:

- ➡ Secure the trailer against unintentional rolling away (apply parking brake, place chocks underneath, etc.).
  - ➡ Guide the free hose end of the Minimess hose line into the collection container, screw the Minimess hose line onto the Minimess connection for the storage tank (see chapter "4.2 Structure") until the oil flows out.
- ↩ The brake system will depressurise and the brake is released.

## 7 Maintenance and troubleshooting

### 7.1 Safety instructions


	<b>SAFETY INSTRUCTIONS</b>
	<p><b>Troubleshooting and maintenance work should be performed safely!</b></p> <p>Perform all work in compliance with the safety instructions listed below:</p> <ul style="list-style-type: none"><li>▶ Observe the provisions listed in Chapter "2 Safety" for all work on/with the emergency brake valve.</li><li>▶ Avoid working in a manner that compromises safety. Troubleshooting and maintenance may only be performed by trained specialists.</li><li>▶ Always perform this work in accordance with these instructions.</li><li>▶ Observe the relevant national occupational safety regulations as well as local safety regulations.</li><li>▶ Wear the recommended personal protective equipment.</li><li>▶ Secure the vehicle (trailer) against unintentional rolling away (apply the mechanically actuated brake and place chocks underneath).</li></ul>

#### Qualification of the personnel

Maintenance and troubleshooting of the emergency brake valve may only be carried out by persons who



- are entitled to do so on the basis of their training and qualifications.
- are authorised to do so by the operator of the vehicle.

### 7.2 Troubleshooting

	<b>⚠ WARNING</b>
	<p><b>Serious injury!</b></p> <p>Unintentional rolling away of the vehicle (trailer) is highly dangerous and can lead to serious injury.</p> <ul style="list-style-type: none"><li>▶ Secure the trailer against unintentional rolling away. Always apply the mechanical parking brake and place suitable chocks under the wheels.</li></ul>

If a fault occurs in the brake system of the vehicle (trailer) then perform the appropriate test according to the checklist (see Chapter "9 Function test checklist"), in order to establish the cause of the fault.

## 7.3 Maintenance

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Serious injury!</b> Unintentional rolling away of the vehicle (trailer) is highly dangerous and can lead to serious injury.</p> <ul style="list-style-type: none"><li>▶ Secure the trailer against unintentional rolling away. Always apply the mechanical parking brake and place suitable chocks under the wheels.</li></ul>
	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>Serious injury!</b> When working on pressurised components, there are various dangers which can lead to serious injury.</p> <ul style="list-style-type: none"><li>▶ Completely depressurise the system before performing any work on the emergency brake valve or braking system.</li></ul>

The brake system must be depressurised before maintenance work is performed.

### Depressurisation via "CL" connection (please refer to Chapter "4.2 Structure")

To depressurise:

- A tractor must be connected.

or

- The hydraulic oil connecting containers (filling volume approximately 5 l) provided and the connection line fed into the container.
- ➡ Insert the "CL" connecting line into the collecting container.

To depressurise the brake system:

- ➡ Actuate the discharge valve.
- ↩ The braking system will depressurise.

## Depressurisation via emergency minimess connection accumulator (please refer to Chapter "4.2 Structure")

The following accessories are required for depressurisation:

- Collecting container for hydraulic oil (filling volume approximately 5 l)
- Suitable hose line with minimess connection M16x2.

To depressurise the brake system:

- Secure the trailer against unintentional rolling away (apply parking brake, place chocks underneath, etc.).
- Guide the free hose end of the Minimess hose line into the collection container, screw the Minimess hose line onto the Minimess connection for the storage tank (see chapter "4.2 Structure") until the oil flows out.
- ↩ The braking system will depressurise.

### 7.3.1 Cleaning

Clean any contamination from the emergency brake valve at regular intervals.

When doing so:

- Always remove any coarse contamination with a suitable brush.
- In case of heavy soiling, rinse the component with a soft water jet.

### 7.3.2 Maintenance

The emergency brake valve is low-maintenance.

- In order to maintain the condition of the emergency brake valve, perform a functional test at regular intervals (e.g. during legal acceptance and regular technical approval of the vehicle) and at least once per year (see Chapter "9 Function test checklist").
- Check, service and maintain the other components of the braking system in accordance with the statutory requirements, standards and directives.


For example:

- Check the pressure accumulators in accordance with the latest version of the "Pressure Equipment Directive" as amended.
- Replace the hose assemblies regularly in accordance with the manufacturer's instructions, and at least every 6 years.
- Replace the hydraulic oil regularly, and at least once a year, in accordance with the manufacturer's instructions.

## Removal and disposal

### 8 Removal and disposal

#### 8.1 Safety instructions


	<b>SAFETY INSTRUCTIONS</b>
	<p><b>Removal and disposal work should be performed safely!</b></p> <p>Perform all work in compliance with the safety instructions listed below:</p> <ul style="list-style-type: none"> <li>▶ Observe the provisions listed in Chapter "2 Safety" for all work on/with the emergency brake valve.</li> <li>▶ Avoid working in a manner that compromises safety. Removal and disposal work may only be carried out by trained specialists.</li> <li>▶ Always perform this work in accordance with these instructions.</li> <li>▶ Observe the relevant national occupational safety regulations as well as local safety regulations.</li> <li>▶ Wear the recommended personal protective equipment.</li> <li>▶ Secure the vehicle (trailer) against unintentional rolling away (apply the mechanically actuated brake and place chocks underneath).</li> </ul>


#### Qualification of the personnel

Removal and disposal of the emergency brake valve may only be carried out by persons who

- are entitled to do so on the basis of their training and qualifications.
- are authorized to do so by the operator of the vehicle.

#### 8.2 Disassembly

	<b>⚠ WARNING</b>
	<p><b>Serious injury!</b></p> <p>Unintentional rolling away of the vehicle (trailer) is highly dangerous and can lead to serious injury.</p> <ul style="list-style-type: none"> <li>▶ Secure the trailer against unintentional rolling away. Always apply the mechanical parking brake and place suitable chocks under the wheels.</li> </ul>

	<b>⚠ WARNING</b>
	<p><b>Serious injury!</b></p> <p>When working on pressurised components, there are various dangers which can lead to serious injury.</p> <ul style="list-style-type: none"> <li>▶ Completely depressurise the system before performing any work on the emergency brake valve or braking system.</li> </ul>

## Removal and disposal

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The braking system must be depressurised before disassembly work is performed.

### Depressurisation via "CL" connection (please refer to Chapter "4.2 Structure")

To depressurise:

- A tractor must be connected.

or

- The hydraulic oil collecting containers (filling volume approximately 5 l) provided and the connection line fed into the container.
- ➡ Insert the "CL" connecting line into the collecting container.

To depressurise the brake system:

- ➡ Actuate the discharge valve.
- ↔ The braking system will depressurise.

### Depressurisation via minimess connection accumulator (please refer to Chapter "4.2 Structure")

The following accessories are required for depressurisation:

- Collecting container for hydraulic oil (filling volume approximately 5 l)
- Suitable hose line with minimess connection M16x2.

To depressurise the brake system:

- ➡ Secure the trailer against unintentional rolling away (apply parking brake, place chocks underneath, etc.).
- ➡ Guide the free hose end of the Minimess hose line into the collection container, screw the Minimess hose line onto the Minimess connection for the storage tank (see chapter "4.2 Structure") until the oil flows out.
- ↔ The braking system will depressurise.


### Disassembly

- ➡ Finally, remove the emergency braking system from the trailer using suitable tools/aids.



## Removal and disposal

### 8.3 Disposal

	<i>NOTE</i>
	<p><b>Environmental damage due to improper disposal!</b></p> <p>Improper disposal can cause considerable damage to the environment.</p> <ul style="list-style-type: none"><li>▶ If hazardous substances enter the environment, appropriate action should be taken to limit the damage. In case of any doubt, the local authority where the damage occurred should be informed.</li><li>▶ Observe product data sheets for consumable and auxiliary materials.</li><li>▶ Always comply with local environmental legislation.</li></ul>

Subsequent to removal, perform the following steps for correct disposal:

- Sort metals and plastics for recycling or scrapping.
- Waste electrical and electronic components should only be disposed of by approved specialist companies.
- Dispose of hazardous waste materials such as lubricants and batteries in accordance with statutory regulations.
- Dispose of residual materials as general waste.

## Function test checklist

### 9 Function test checklist

Work step	Result	Test result		Checked by:
		OK	Not OK	
Couple trailer to tractor with 2-line braking system and secure trailer against unintentional rolling away (place chocks underneath, etc.).	-			
Connect control line "CL (BL)", supplementary line "SL (ZL)" and ABS plug connection to the corresponding connections on the tractor	-			
Fit the pressure gauge on to the following emergency brake valve connections: <ul style="list-style-type: none"> <li>• Am (reservoir pressure "Acc")</li> <li>• SLm (Pressure in supplementary line "SL (ZL)")</li> <li>• B (Brake pressure at the outlet of the emergency brake valve)</li> </ul>	-			
Switch on the tractor ignition	<ul style="list-style-type: none"> <li>• Tractor ABS indicator light illuminates.</li> </ul>			
Start the tractor	-			
Release the tractor parking brake	<ul style="list-style-type: none"> <li>• The pressure in the supplementary line must be 15 – 35 bar.</li> <li>• Display on pressure gauge connection "SLm"</li> </ul>			
Operate the tractor service brake until approximately 90 bar is reached at Am.	<ul style="list-style-type: none"> <li>• The pressure accumulator is filled/charged.</li> <li>• Display on pressure gauge connection "Am"</li> <li>• Tractor ABS indicator light extinguishes</li> <li>• The trailer brake cylinders should extend</li> </ul>			
Operate the tractor service brake until approximately 115 bar is reached at Am.	-			
Release service brake	<ul style="list-style-type: none"> <li>• Pressure in the pressure accumulator should only drop slowly</li> <li>• <b>Requirement:</b> the pressure must not drop by more than 30 bar over a test period of 60 s.</li> <li>• Display on pressure gauge connection "Sm"</li> </ul>			

## Function test checklist

Work step	Result	Test result		Checked by:
		OK	Not OK	
Activate the parking brake on the tractor	<ul style="list-style-type: none"> <li>The trailer brake cylinders shall extend</li> <li>Pressure at connection "B" = pressure at connection "Am"</li> </ul>			
Release the tractor parking brake	<ul style="list-style-type: none"> <li>Pressure at connection "B" 0-2 bar</li> <li>Brake cylinders retract</li> </ul>			
Disconnect the ABS plug connection to the tractor	<ul style="list-style-type: none"> <li>Brake cylinders extend with residual pressure from accumulator</li> </ul>			
Operate the service brake of the tractor until 115 bar is reached at B and release the service brake again.	<ul style="list-style-type: none"> <li>The brake pressure of 115 bar remains constant</li> <li>Display on pressure gauge connection "B"</li> <li>The trailer brake cylinders should extend</li> </ul>			
Connecting the ABS plug connection to the tractor	<ul style="list-style-type: none"> <li>Brake pressure drops</li> <li>Display on pressure gauge connection "B" 0-2bar</li> <li>The trailer brake cylinders should retract</li> </ul>			
Pull out the hose line of the supplementary line "SL (ZL)" from the emergency brake valve.	<ul style="list-style-type: none"> <li>Pressure at connection "B" = pressure at connection "Am"</li> <li>The trailer brake cylinders should extend</li> </ul>			
Activate the parking brake on the tractor and connect the supplementary hose line "SL (ZL)" to the emergency brake valve.	-			
Release the tractor parking brake	<ul style="list-style-type: none"> <li>Pressure at connection "B" 0-2 bar</li> </ul>			
Pull out the ABS plug on the tractor.	<ul style="list-style-type: none"> <li>The trailer brake cylinders should extend</li> <li>Pressure at connection "B" = pressure at connection "Am"</li> </ul>			
Plug in the ABS connector on the tractor.	<ul style="list-style-type: none"> <li>Pressure at connection "B" 0-2 bar</li> </ul>			
Operate the service brake of the tractor until 115 bar is reached at BL and release the service brake again.	<ul style="list-style-type: none"> <li>Pressure at connection "B" again 0-2 bar</li> </ul>			
Slowly empty the accumulator via the drain valve until the ABS lamp illuminates (target: 55–60 bar), then activate, release and reactivate the parking brake on the towing vehicle.	<ul style="list-style-type: none"> <li>The trailer brake cylinders should extend</li> <li>Pressure at connection "B" &gt; 45 bar</li> </ul>			

**Function test checklist**

Work step	Result	Test result		Checked by:
		OK	Not OK	
Release the tractor's parking brake, actuate the service brake for 10 s. Switch off tractor ignition	<ul style="list-style-type: none"> <li>• The trailer brake cylinders should extend</li> <li>• Pressure at connection "B" = pressure at connection "Am"</li> </ul>			
Depressurise/zero the pressure from the accumulator via the drain valve on the emergency brake valve.	<ul style="list-style-type: none"> <li>• Pressure at connection "B" 0 bar</li> <li>• Pressure at connection "Am" 0 bar</li> </ul>			
Set the brake adjuster and the optional brake load sensing valve "ALB" in accordance with the manufacturer's instructions.	-			



