Original instructions

STILL
ELECTRONIC
DOCUMENTATION
SYSTEM

Counterweight pallet stacker

EXG-10
EXG-12
EXG-16

CE

1217 1218 1219

first in intralogistics

1170 801 15 09 EN - 07/2012

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Introduction

Electric pallet stacker

Electric counterweight pallet stacker types EXG 10, EXG 12 and EXG 16 are designed for stacking.

They can also be used to transport pallets of a maximum weight 1000 kg (EXG 10), 1200 kg (EXG 12) and 1600 kg (EXG 16) inside stores, warehouses and factories.

EXG capacity

EXG 10: maximum of 1000 kg on the fork arms

EXG 12: maximum of 1200 kg on the fork arms

EXG 16: maximum of 1600 kg on the fork arms

Configuration

EXG trucks are configured to pedestrian version as follows:

– **unladen:** 6 km/h in forward travel and 5 km/h in reverse travel

– **laden:** 6 km/h in forward travel and 5 km/h in the direction of the forks

These safe, robust, comfortable and extremely stable trucks offer excellent performance due to their construction which includes:

– a fixed central chassis with the mechanical, electrical and hydraulic units required to operate the truck,

– a fixed fork carriage at the rear of the battery.

Drive system

The drive is provided by a 3 kW asynchronous traction motor.

The drive wheel is driven by a transmission gear with a first stage reduction and a spur and pinion final drive.

The power is supplied by a 3PzS, 4PzS and 5PzS capacity lead-acid battery.

There are several battery types available:

– Vertical access

– Side access

The power supply to the traction motor is controlled by an electronic control module which provides complete control of the speed, acceleration and braking.

Steering

The electric steering offers driving precision and reduced effort during manoeuvres.

Steering is controlled by a tiller designed for pedestrian driving.

The drive unit is mounted on a turntable; steering lock is provided by an electric geared motor which positions the turntable.

The steering motor is controlled by an electronic module that receives information from the tiller and the wheel angle position.

Lifting system

The pallet stackers are fitted with pump unit having a 3 kW motor and a single pump.

Braking

EXG models are fitted with two types of brakes:

– **an electromagnetic safety brake** that also acts as a parking brake.

The parking brake is applied automatically in the following situations:

- tiller released
- truck stationary with drive direction switch in neutral
- power off.

The safety brake is applied automatically in the event of a fault in the traction or steering control systems.

– **an electric counter-current brake** which is applied automatically when the accelerator is released and when the direction of travel is reversed.

Driver's compartment

Pedestrian model:

- the speed is limited to 6 km/h
- the tiller has all the control units and provides the steering for the truck.

All models are also equipped with:

- an emergency off switch on the control board.
- a multifunction display which shows the date, operating hours and battery charge level.

Options

Various options are available on EXG trucks:

- **Cold Store** option
- gradual carriage stop
- digicode
- load backrest
- computer pack
- battery holder.

Your industrial truck

General

The truck described in these operating instructions corresponds to the applicable standards and safety regulations.

If the truck is to be operated on public roads, it must conform to the existing national regulations for the country in which it is being used. The driving permit must be obtained from the appropriate office.

The trucks have been fitted with state-of-the-art technology. All that remains is to handle the truck safely and maintain its functionality.

These operating instructions provide the necessary information to do this. Read and observe the information provided before commissioning the truck. This will prevent accidents and ensure that the warranty remains valid.

EC declaration of conformity

Declaration

STILL GmbH
Berzeliusstrasse 10
22113 Hamburg
GERMANY

We declare that the machine

Industrial truck	**according to these operating instructions**
Model	**according to these operating instructions**

conforms to the latest version of the Machinery Directive 2006/42/EC.

Personnel authorised to compile the technical documents:

See EC compliance declaration

STILL S.A.S.

The manufacturer declares that the truck complies with the requirements of the EC directives valid at the time of marketing. This is confirmed by the EC declaration of conformity and by the EC labelling on the nameplate.

An independent structural change or addition to the truck can compromise safety, thus invalidating the EC declaration of conformity.

The EC declaration of conformity must be carefully stored and made available to the relevant authorities.

Information about documentation

Documentation scope

- Operating instructions document
- Operating instructions for attachment parts (special equipment)
- Spare parts catalogue
- VDMA rules for the proper use of industrial trucks

These operating instructions describe all measures necessary for the safe operation and proper maintenance of the truck in all possible variants at the time of printing. Special designs to meet customer requirements are documented in separate operating instructions. If you have any questions, please contact your service centre.

Enter the production number and the year of manufacture located on the designation plate (see "Marking chapter") in the field provided:

Production no. .....

Year of manufacture

.....

Please quote these numbers for all technical enquiries.

Operating instructions are provided with each truck. These instructions must be stored carefully and must be available to the driver and operator at all times.

If the operating instructions are lost, the operator must immediately request a replacement from the manufacturer.

Personnel responsible for operating and maintaining the equipment must be familiar with these operating instructions.

The operating company (see "Definition of responsible persons" chapter) must ensure that all operators have received, read and understood these instructions.

Thank you for reading and complying with these operating instructions. If you have any questions or suggestions for improvements, or if you have found any faults, please contact your service centre.

Copyright and property rights

Explanation of symbols used

⚠ DANGER

Compulsory procedure that must be followed to avoid life-threatening danger or physical harm.

⚠ WARNING

Compulsory procedure that must followed to avoid injury.

⚠ CAUTION

Compulsory procedure that must be followed to avoid damage to and/or destruction of equipment.

NOTE

For technical requirements that require special attention.

ENVIRONMENT NOTE

To prevent environmental damage.

Explanation of the cross-references

Cross references are used to direct the reader to the appropriate section or chapter.

Examples:

- Cross reference to another section: "Explanation of cross references" chapter
- Cross reference to another chapter: "Definition of responsible persons" chapter

Date of issue and update of this manual

The publication date of these operating instructions is printed on the cover.

STILL makes continuous efforts to develop and improve its industrial trucks. For this reason, the manufacturer reserves the right to make changes and no claim will be accepted concerning the information provided in this instruction manual.

If you require technical assistance with your truck, please contact your nearest STILL service centre.

We hope you enjoy your driving

STILL GmbH

Berzeliusstr. 4

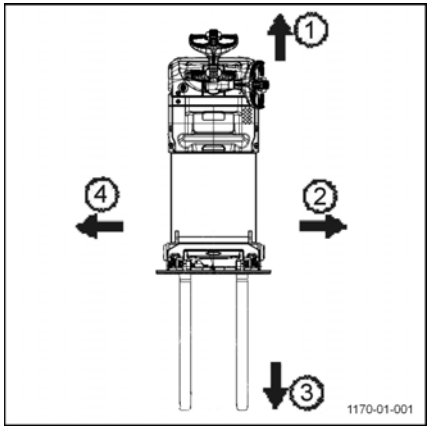
22113 Hamburg

Germany

Definition of directions

Names used in the text: forward travel (1), reverse travel (3), to the right (2) and to the left (4) refer to component installation position with respect to the driver's compartment.

The load is positioned at the back.



Use of the truck

Intended use of the trucks

⚠ CAUTION

This machine was designed for the transport and storage on racks (pallet stackers only) of loads packed on pallets or in industrial containers designed for this purpose.

The dimensions and capacity of the pallet or container must be adapted to the load being transported and must ensure stability.

The table of characteristics and performance attached to this user manual gives you the information you need to check that the equipment is suitable for the work being carried out.

Any specific usage must be authorised by the site manager; an analysis of the potential risks associated with this usage will enable him to put in place any necessary additional safety measures.

Unauthorised use

Any danger caused as a result of unauthorised use becomes the responsibility of the operator or driver and not that of the manufacturer.

Use for purposes other than those described in these operating instructions is prohibited.

Transporting people is prohibited.

The forklift truck should not be used in areas where there is a risk of fire, explosion or corrosion, or in areas that are particularly dusty.

Stacking or unstacking is not permissible on inclined surfaces or ramps.

Place of use

The truck can be used outdoors and in buildings. The truck must not be used outdoors in bad weather. Operation on public roads is permitted only if the special equipment specified in the Road Traffic Licensing Regulations is installed.

The regulations applicable in different countries for driving on public roads must be observed.

The sites on which the truck is used must comply with the applicable regulations (condition of the ground, lighting etc.).

The ground must have sufficient load capacity (concrete, asphalt).

The truck is suitable for indoor and outdoor use (temperatures ranging from -20°C to +40°C).

If your truck is to be used in a refrigerated storage area, it must be configured accordingly; an approval may be necessary for this environment (see chapter entitled "Description").

The operator (see chapter entitled "Definition of responsible persons") must ensure that appropriate fire protection is available in the vicinity of the truck during operation. Depending on the application,additional fire protection must be provided on the industrial truck. If in doubt, please contact the relevant authorities.

Residual risks

Residual dangers, residual risks

Despite all operational precautions and compliance with standards and rules, the possibility of additional risks when using the truck cannot be entirely excluded.

The truck and all its components comply with the regulations relating to current applicable safety rules.

Persons in the vicinity of the truck must be particularly cautious and react immediately in the event of any malfunction, incident, breakdown etc.

⚠ WARNING

Personnel in contact with the truck must be informed of the risks related to using the truck.

These operating instructions draw your attention to the safety rules.

The risks are:

- Escape of consumables due to leaks, ruptured lines and tanks etc.
- Risk of accident when driving over difficult ground such as slopes, soft or irregular surfaces or in poor visibility etc.
- Falling, tripping etc. when moving on the industrial truck, especially in the wet, with leaking consumables or icy surfaces.
- Loss of stability due to the load being unstable or the load slipping etc.
- Risk of fire and explosion due to batteries and electrical voltages.
- Human error - Disregarding safety regulations.

It is important to adjust the speed of the truck depending on the load and ground conditions.

The stability of the truck has been tested to the latest standards. These standards only take account of the static and dynamic tilting forces that can arise during operation that complies with the specifications and operating rules. Risks caused by misuse or incorrect operation that jeopardise the stability cannot be ruled out in extreme situations.

Special risks associated with using the truck and attachments

The manufacturer's approval is required as soon as:

- The truck is used differently from its normal use
- The driver is not sure if he can use the truck correctly and without risk of accident

Overview of hazards and counter-measures

NOTE

This table is intended to help evaluate the hazards in your facility and applies to all drive types. It does not claim to be complete.

NOTE

Observe the national regulations for your country!

Hazard	Measure	Check note √ actioned - not applicable	Notes
Truck equipment does not comply with local regulations	Test	O	If in doubt, consult competent factory inspectorate or employers' liability insurance association
Lack of skills and qualification of driver	Driver training (sit-on and stand-on)	O	BGG 925 VDI 3313 driver permit
Usage by unautho-rised persons	Access with key only for authorised persons	O	
Truck not in a safe condition	Recurrent testing and rectification of defects	O	BetrSichVO (Workplace Safety Ordinance)
Risk of falling when using working platforms	Compliance with national regulations (different national laws)	O	BetrSichVO (Workplace Safety Ordinance) and employer's liability insurance associations
Impaired visibility due to load	Resource planning	O	BetrSichVO (Workplace Safety Ordinance)
Contamination of respiratory air	Assessment of diesel exhaust gases	O	TRGS 554 and BetrSichVO (Workplace Safety Ordinance)
	Assessment of LPG exhaust gases	O	MAK (Maximum Workplace Concentrations) list and BetrSichVO (Workplace Safety Ordinance)

Hazard	Measure	Check note √ actioned - not applicable	Notes
Impermissible usage (improper usage)	Issuing of operating instructions	O	BetrSichVO (Workplace Safety Ordinance) and ArbSchG (Health and Safety at Work Act)
	Written notice of instruction to driver	O	BetrSichVO (Workplace Safety Ordinance) and ArbSchG (Health and Safety at Work Act)
	Observe BetrSichVO (Workplace Safety Ordinance), operating instructions and VDMA (German Engineering Federation) rules	O	
When fuelling			
a) Diesel	Observe BetrSichVO (Workplace Safety Ordinance), operating instructions and VDMA (German Engineering Federation) rules	O	
b) LPG	Observe BGV D34, operating instructions and VDMA rules	O	
When charging the traction battery	Observe BetrSichVO (Workplace Safety Ordinance), operating instructions and VDMA (German Engineering Federation) rules	O	VDE 0510: In particular - Ensure ventilation - Insulation value within permissible range
When using battery chargers	Observe BetrSichVO (Workplace Safety Ordinance), BGR 104 and operating instructions	O	BetrSichVO (Workplace Safety Ordinance) and BGR 104
When parking LPG trucks	Observe BetrSichVO (Workplace Safety Ordinance), BGR 104 and operating instructions	O	BetrSichVO (Workplace Safety Ordinance) and BGR 104

Hazard	Measure	Check note √ actioned - not applicable	Notes
With driverless transport systems			
Roadway quality inadequate	Clean/clear driveways	O	BetrSichVO (Workplace Safety Ordinance)
Load carrier incorrect/slipped	Reattach load to pallet	O	BetrSichVO (Workplace Safety Ordinance)
Drive behaviour unpredictable	Employee training	O	BetrSichVO (Workplace Safety Ordinance)
Driveways blocked	Mark driveways Keep driveways clear	O	BetrSichVO (Workplace Safety Ordinance)
Driveways intersect	Announce right-of-way rule	O	BetrSichVO (Workplace Safety Ordinance)
No person detection during depositing and retrieval	Employee training	O	BetrSichVO (Workplace Safety Ordinance)

Danger to employees

The operating company must identify and evaluate the dangers involved in using the truck. It must also establish which occupational health and safety measures are required to protect employees. Appropriate operating instructions must be drafted and provided for the driver accordingly. A person responsible for health and safety must be appointed.

Construction and equipment of the truck correspond to the Machinery Directive 2006/42/EC and they are therefore identified with the CE symbol. As a result, these factors are not included in the hazard assessment; nor are the attachments, which have their own CE labelling. The operating company must, however, select the type and equipment of the truck so as to comply with the local provisions for deployment.

The results must be published. In the case of truck deployment involving similar hazard situations it is permitted to summarise the results. This overview (see chapter entitled "Overview of hazards and countermeasures") is intended to facilitate compliance with the conditions of these regulations. The overview indicates the main causes of accidents in the event of non-compliance. If other major operational hazards are involved, they must also be taken into consideration.

The working conditions for the trucks are largely similar for many sites. The dangers can therefore be summarised in a single overview. It is recommended that the information provided by the relevant employers' liability insurance association be observed in this respect.

Environmental considerations

Packaging

When the truck is delivered, some parts are packaged to provide better protection during transport. This packaging must be removed completely prior to initial start-up.

ENVIRONMENT NOTE

The packaging material must be disposed of properly after delivery of the truck.

Disposing of components and batteries

The truck is made up of different materials. When components or batteries need to be changed, they must be:

- disposed of,
- processed
- recycled in accordance with the applicable regional and national regulations

NOTE

The documentation provided by the battery manufacturer must be consulted when disposing of batteries.

ENVIRONMENT NOTE

We recommend working with a waste management company when disposing of components and batteries.

2

Safety

Definition of responsible persons

Operating company

The operating company is the natural or legal person or group who operates the truck or on whose authority the truck is used.

The operating company must ensure that the truck is only used for its intended purpose and in compliance with the safety guidelines set out in these operating instructions.

The operating company must ensure that all users read and understand the safety information in these instructions.

The operating company is responsible for the scheduling and correct performance of regular safety checks.

It is recommended that these checks comply with national performance specifications.

Specialist

A specialist is deemed to be:

- A person whose experience and technical training has allowed him to develop relevant knowledge of industrial trucks
- A person who is also familiar with national health and safety regulations and generally recognised technical directives and conventions (standards, VDE regulations, technical regulations of other European Union member states or countries that are signatories to the treaty that established the European Economic Area). This expertise allows him to assess the condition of industrial trucks in terms of health and safety

Drivers

This truck may only be driven by suitable persons who are at least 18 years of age, have been trained in driving, have demonstrated their skills in driving and handling loads, and have been specifically designated to drive the truck. Specific knowledge of the truck is also necessary.

Driver rights,duties and rules of behaviour

The driver must be duly informed of his rights and duties.

The driver must be granted the required rights.

The driver must wear protective equipment (protection suit, safety helmet, industrial goggles and protective gloves) that is appropriate for the conditions, the task and the load to be lifted. The driver must also wear safety footwear to be able to drive and brake in complete safety.

The driver must be familiar with the operating instructions and have access to them at all times.

The driver must:

- Have read and understood the operating instructions
- Have familiarised himself with safe operation of the truck
- Be physically and mentally able to drive the truck safely

⚠ DANGER

The use of drugs, alcohol or medications that affect reactions impair the ability to drive the truck.

Individuals under the influence of the above-mentioned substances are not permitted to perform work of any kind on or with the truck.

Prohibition of use by unauthorised persons

The driver is responsible for the truck during working hours. He must not allow unauthorised persons to operate the truck.

When leaving the truck, the driver must secure it against unauthorised use.

Basic principles for safe operation

Insurance cover on company premises

The company premises are very often restricted public traffic areas.

NOTE

It is advisable to review the operational liability insurance so that insurance covers the truck with respect to third parties in the event of damage caused in restricted public traffic areas.

Modifications and refitting

If your truck is to be used in specific conditions (e.g. refrigerated warehouse or flameproof protection), it must be specially equipped and approved for this purpose, if applicable.

If your truck is used for work that is not specified in the guidelines or in these instructions, and it must be modified or refitted for this purpose, it is important to remember that any structural modification could affect truck handling while driving as well as the stability of the truck, and could lead to accidents. You should therefore contact the manufacturer before carrying out any modification. Permission from the manufacturer is required for any modification that may affect the truck's stability.

Any constructional modification or transformation of your truck is forbidden without prior written permission from the manufacturer. Authorisation from the relevant authority may also be required.

SPECIAL CASE: if the manufacturer of the truck is no longer in business and its activity is unlikely to be taken over by a successor

In this specific case, you may plan a modification or alteration to your truck provided that:

- The modification or alteration is designed, tested and implemented by one or more engineers who are experts in the field of industrial trucks and their safety
- A record is kept of the design, the different tests and the implementation of the modification or alteration
- Appropriate changes are approved and made to the capacity plate, decals, labels and operating instructions
- a permanent and clearly visible label is attached to the truck indicating the nature of the modification or alteration as well as the date of the modification or alteration, and the name and address of the company that carried out the work.

Warning regarding non-original parts

Original parts, attachments and accessories are specially designed for this truck. We draw your attention to the fact that parts, attachment parts and accessories supplied by other companies have not been tested or approved by STILL.

⚠ CAUTION

The installation or use of such products may have a negative impact on the design of the truck and thus impair active or passive driving safety.

We recommend that you obtain approval from the manufacturer and, if applicable, from the relevant regulatory authorities before installing such parts. The manufacturer accepts no liability for any damage caused by the use of non-original parts and non-original accessories.

Damage, faults

Any damage or faults observed on the truck or the accessories must be reported immediately to the responsible personnel. The truck and accessories must never be used before they are correctly reconditioned as they cannot be guaranteed to be safe for operating or driving.

The safety mechanisms and switches must never be removed or disabled. The predefined setpoint values must not be modified.

Work on the electric installation (e.g. connecting a radio, additional lights or other accessories) is permitted only with the approval of the manufacturer.

Medical devices

The operation of medical devices, for example pacemakers or hearing aids, can be impaired. Check with your doctor or manufacturer if the medical devices are sufficiently protected against electromagnetic interference.

Safety tests

Regular safety inspection of the truck

Safety inspection based on time and extraordinary incidents

The operating company (see chapter entitled "Definition of responsible persons") must ensure that the truck is checked by a specialist at least once a year or after noteworthy incidents.

As part of this inspection:

- A full check of the technical condition of the truck in terms of accident safety must be performed
- The truck must be thoroughly checked to detect any damage that may have been caused by improper use
- A test log must be created

The results of the inspection must be retained until a further two inspections have been carried out.

The inspection date is indicated by an adhesive label on the truck.

– Arrange for the service centre to perform periodic safety inspections on the truck.

– Observe the guidelines for tests carried out on the truck in accordance with FEM 4.004.

The operator is responsible for ensuring that any defects are remedied immediately.

– Contact your service centre.

NOTE

Observe the regulations in force in your country.

Safety regulations for handling consumables

Permissible consumables

⚠ WARNING

Consumables can be dangerous.

It is necessary to follow the safety regulations when handling these substances.

Refer to the maintenance data table for the permissible substances necessary for operation.

Oils

⚠ DANGER

Oils are flammable!

- Follow the statutory regulations
- Do not allow oils to come into contact with hot motor parts.
- No smoking, fires or flames!

⚠ DANGER

Oils are toxic!

- Avoid contact and consumption
- In case of inhalation of steam or fumes, breathe fresh air immediately.
- After contact with the eyes, rinse thoroughly with water (for at least 10 minutes) and then consult an eye specialist.
- If swallowed, do not induce vomiting. Seek immediate medical attention.

⚠ WARNING

Prolonged intensive contact with the skin can result in loss of skin oils and cause irritation.

- Avoid contact and consumption.
- Wear protective gloves!
- After any contact, wash the skin with soap and water and then apply a skin care product.
- Immediately change soaked clothing and shoes.

⚠ WARNING

There is a risk of slipping on spilled oil, particularly when combined with water!

- Collect spilled oil immediately using an oil-binding agent and dispose of it in accordance with regulations.

ENVIRONMENT NOTE

Oils are water pollutants!

Always store oil in containers that comply with the applicable regulations.

Avoid spilling oils.

Collect spilt oil immediately using an oil binding agent and dispose of it in accordance with regulations.

Dispose of old oils according to the applicable regulations.

Hydraulic fluid

⚠ WARNING

During operation of the forklift truck, hydraulic fluids are pressurised and are hazardous to your health.

- Do not spill these fluids!
- Follow the statutory regulations
- Do not allow the fluids to come into contact with hot motor parts.
- Do not allow to come into contact with the skin.
- Avoid inhaling the spray
- Penetration of pressurised fluids into the skin is particularly dangerous if these fluids escape at high pressure due to leaks in the hydraulic system. In case of such injury, seek medical advice immediately.
- To avoid injury, use appropriate personal protective equipment (e.g. protective gloves, industrial goggles, skin protection and skin care products).

ENVIRONMENT NOTE

Hydraulic fluid is a water-polluting substance!

Always store hydraulic fluid in containers complying with the regulations.

Avoid spilling.

Spilt hydraulic fluid should be removed with oil-binding agents at once and disposed of according to the regulations.

Dispose of old hydraulic fluid according to regulations.

Battery acid

⚠ WARNING

Battery acid contains dissolved sulphuric acid. This is toxic.

- Avoid contact and consumption.
- In case of injury, seek medical advice immediately.

⚠ WARNING

Battery acid contains dissolved sulphuric acid. This is corrosive.

- When working with battery acid, always wear protective clothing and eye protection.
- Do not allow any acid to get onto the clothing or skin or into the eyes; if this does happen, rinse immediately with plenty of clean water.
- In case of injury, seek medical advice immediately.
- Immediately rinse away spilt battery acid with plenty of water.
- Follow the statutory regulations

ENVIRONMENT NOTE

– Dispose of used battery acid in line with the applicable regulations.

Disposal of consumables

ENVIRONMENT NOTE

Materials that have to be disposed of following maintenance, repair and cleaning must be systematically collected and disposed of in accordance with regulations. Observe the national regulations for your country. Work may only be carried out in areas designated for this purpose. Take care to minimise, as far as possible, any impact on the environment.

- Any spillage of fluids such as hydraulic oil, brake fluid or gear lubricant oil must be immediately soaked up with an oil-binding agent.
- The regulations for disposal of used oil are applicable.
- Any spillage of battery acid must be neutralised immediately.

Safety devices

Damage, defects and misuse of safety devices

The driver must report any damage or other defects to the truck or attachment immediately to the supervisory personnel.

Trucks and attachments that are not functional or safe may not be used until they have been properly repaired.

Do not remove and do not deactivate the safety systems and shifting devices.

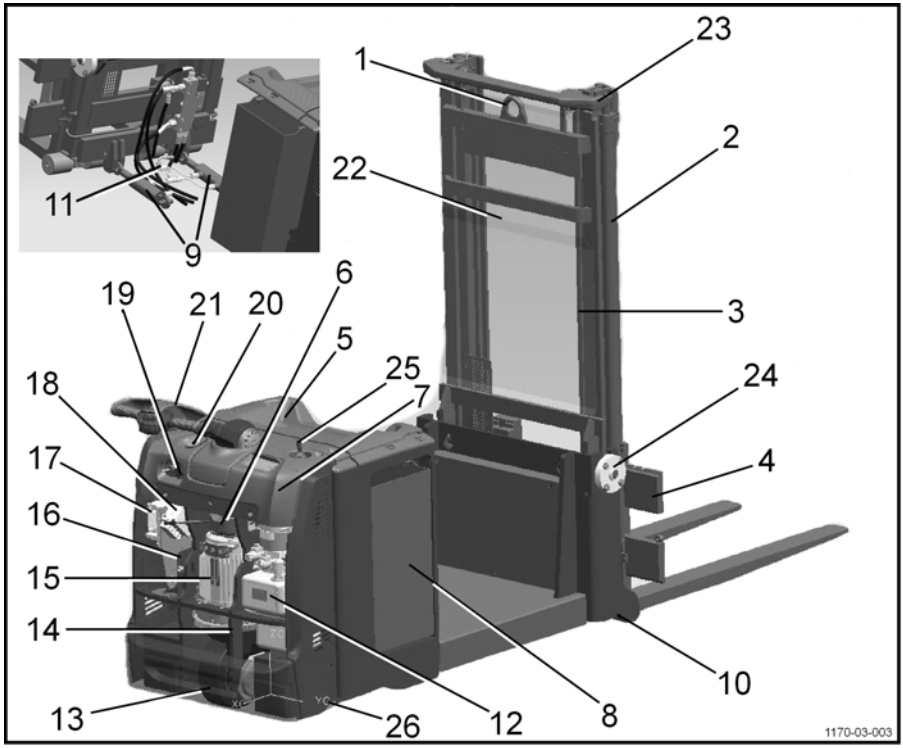
Fixed parts may only be changed with the approval of the manufacturer.

Work on the electrical system (for example, connecting a radio, additional headlights etc.) is only possible with the manufacturer's written approval. All electrical system interventions must be documented.

3

Overviews

Overview

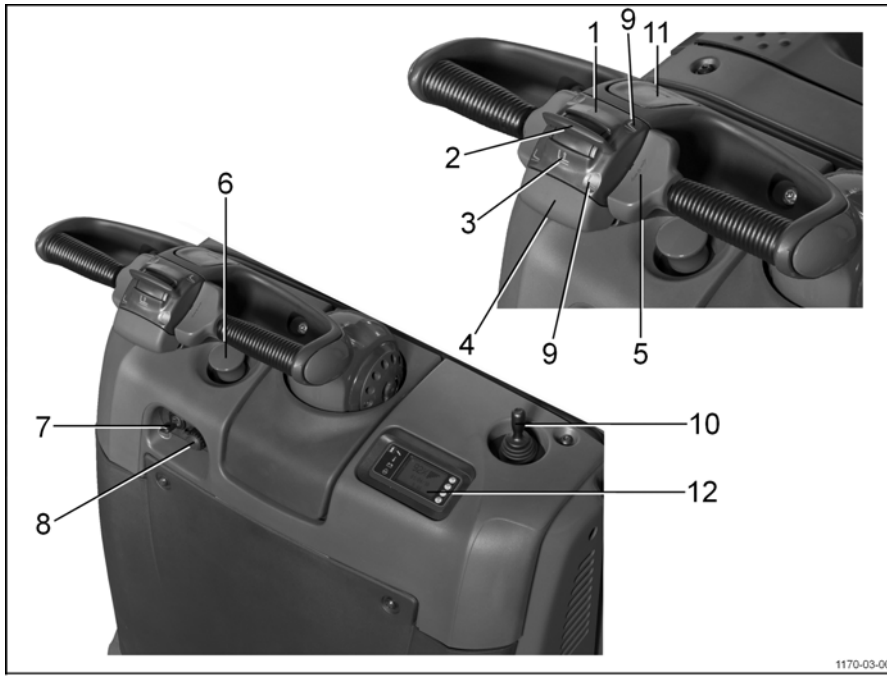


1	Mast slinging point	15	Traction motor
2	Lift cylinder	16	Steering motor
3	Chains	17	Traction and lift controller
4	Fork carriage	18	Steering controller
5	Battery socket	19	Diagnostic connector
6	Electromagnetic brake*	20	Emergency stop button
7	Panel	21	Tiller
8	Battery	22	Mast safety shield
9	Tilt cylinder	23	Fixed or tilting lift mast (depending on truck type)
10	Load wheels		
11	Tilt hydraulics	24	Mast joint
12	Pump unit	25	Mast tilt control
13	Drive wheel	26	Foot protection
14	Transmission gear		

*Hydraulically assisted

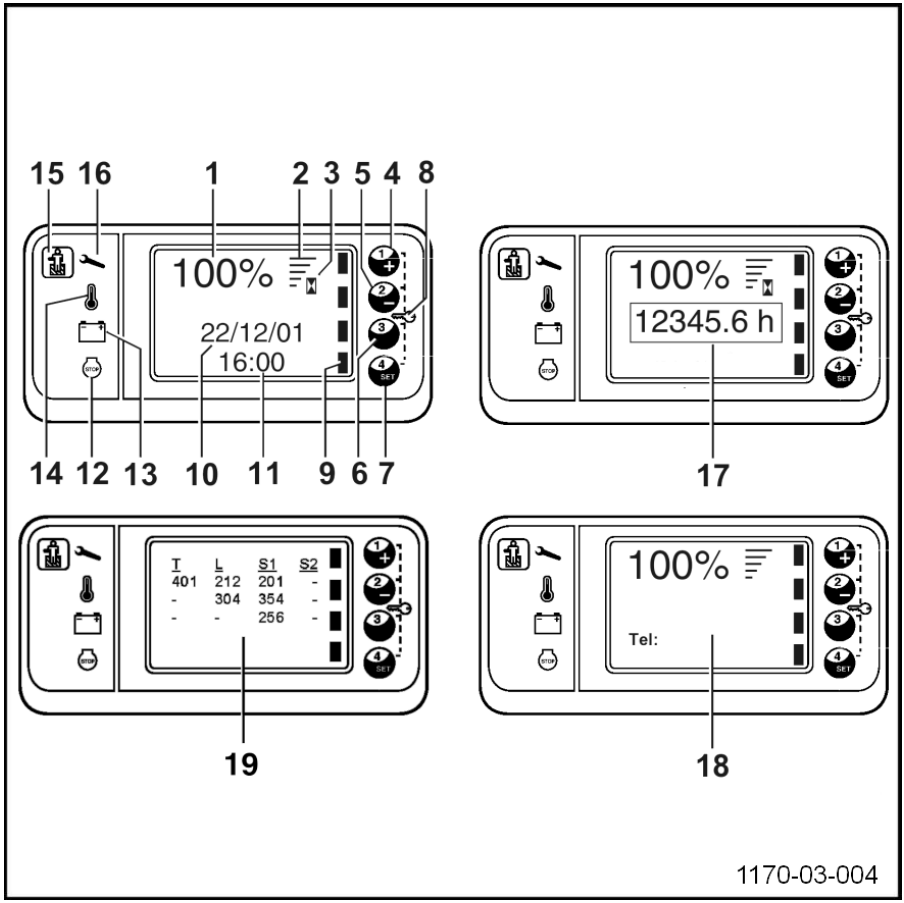
Controls and display

Tiller and dashboard



1	Fork lowering	7	Switch key
2	Fork lifting/lowering proportional control	8	Diagnostic connector
3	Fork lifting	9	Tilt selector
4	Safety reverser	10	Mast tilt
5	Direction reverser/accelerator	11	Horn
6	Emergency stop button	12	Multifunction indicator

Multifunction indicator



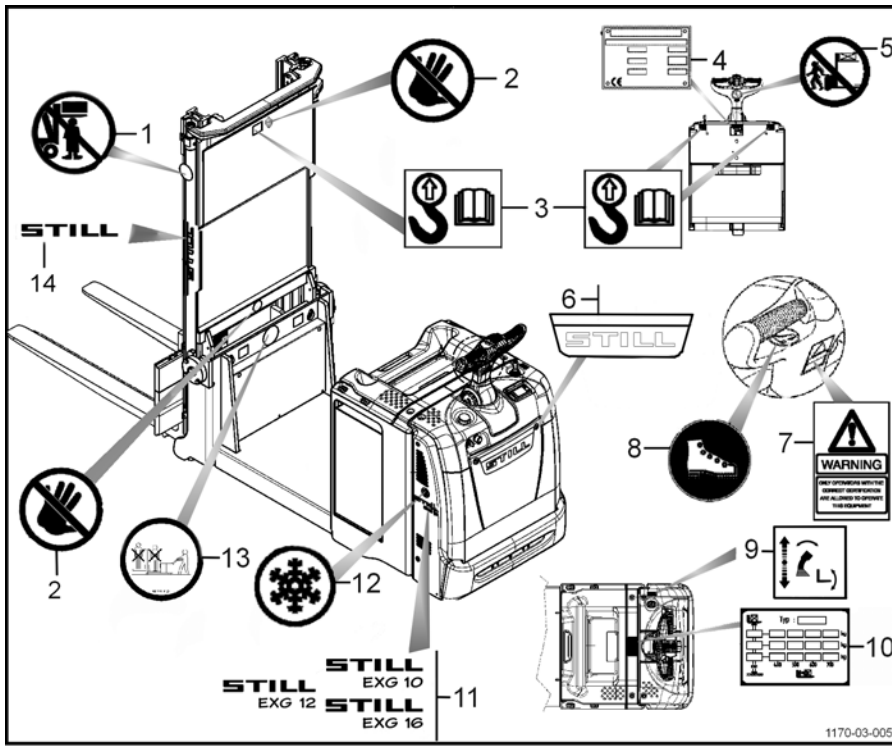
	DESIGNATION	EXPLANATION	COMMENTS / SCREEN MESSAGES
1	Battery charge level as a %	100% = full charge 10% = low charge **1)** 0%= discharged **2)**	**1)** Recharge recommended **2)** Recharge essential
2	Battery charge level represented by 5 bars	100% = full charge 10% = low charge 0%= discharged **1)**	**1)** Battery discharged by 80%. Lifting function deactivated.
3	Hourglass (flashing)	Indicates that hour meter is running	
4	Control button "1"	To display a different screen	Alternative function: setting button

	DESIGNATION	EXPLANATION	COMMENTS / SCREEN MESSAGES
5	Control button "2"	To display the previous screen	Alternative function: setting button
6	Control button "3"	Truck off button	With Digicode option only
7	Control button "4" SET	To access control screens	
8	Digicode keypad	To enter operator's or service engineer's personal ID code	Option preventing use by unauthorised personnel. Default user code: **1-2-3-4** (factory setting)
9	Active button indicator		
10	Date display		See "Setting the date and time"
11	Time display		See "Setting the date and time"
12	"STOP INDICATOR LIGHT" red indicator light	Various faults	**1)** Message: "Motor fault" - Try to restart by resetting ignition key - Alarm still active: Call service engineer **2)** Message: "Brake worn "+ audible alarm - Alarm still active: Call service engineer
13	"BATTERY ALARM" red indicator light	**1)** Flashing: charge < or = 10% **2)** Lit: battery discharged	**1)**->Recharge recom-mended Message: "Low battery charge level" **2)**-> Lifting disabled ->Recharge essential Message: "Battery level=0% Lifting restricted"
14	Temperature alarm indicator light (red)	Lit: control module overheated	-> Truck is stopped Message: "T° fault" In general, wait for the truck to cool down and then restart it.
15	Operator presence indicator (green)	Flashes for 5 seconds after switching on Lights when the operator is on the platform.	Self-test before truck is started.
16	"Maintenance display" red indicator light	**1)** Flashing: service recommended in:... **2)** Lit: service required immediately	**1)** Message: "Next inspection in X days or in Y hours" **2)** Message: "Service inspection required today".

	DESIGNATION	EXPLANATION	COMMENTS / SCREEN MESSAGES
17	Hour meter	Indicates the number of operating hours of the machine	- The meter starts running when the machine is switched on and a control is used. - When the meter is running, the hourglass flashes slowly -The hour meter displays hours and tenths of an hour. - When the power supply is disconnected, the hours are stored in the memory.
18	Information message display		
19	Error code display	Error code beginning with: **T**: Traction module error codes **L**: Lifting module error codes. **S1**: Main steering controller error codes. **S2**: Safety controller error codes.	These codes will help the service department to decide on the appropriate response from the service engineer.

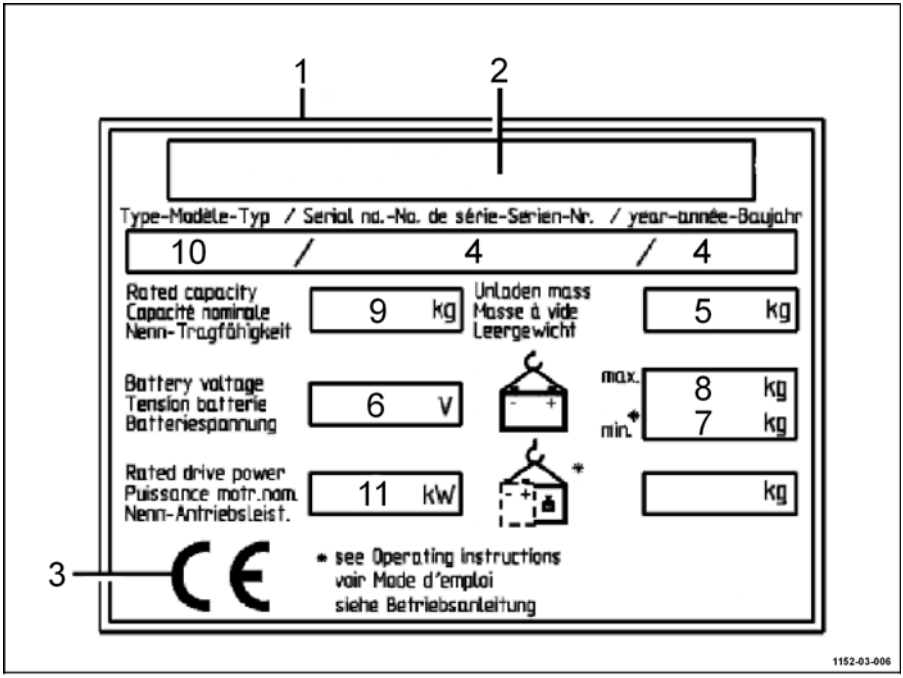
Markings

Marking positions



1	Safety label	8	Label for compulsory foot protection
2	Do not touch warning label	9	Mast tilt label
3	Coupling label	10	Capacity label
4	Identification label (see following page)	11	Truck model label
5	"Do not drive with high load" label	12	Cold store label
6	Company label	13	Passengers not allowed label
7	WARNING label (GB only)	14	Still logo label

Identification label



1	Identification label	6	Battery Voltage
2	Manufacturer	7	Minimum battery weight
3	CE symbol (this symbol means that the machine complies with European regulations for industrial trucks)	8	Maximum battery weight
		9	Nominal capacity of the truck
		10	Model
4	Serial number/year	11	Motor rated power
5	Unladen weight		

4

Use

Intended use of the trucks

⚠ CAUTION

This machine was designed for the transport and storage on racks (pallet stackers only) of loads packed on pallets or in industrial containers designed for this purpose.

The dimensions and capacity of the pallet or container must be adapted to the load being transported and must ensure stability.

The table of characteristics and performance attached to this user manual gives you the information you need to check that the equipment is suitable for the work being carried out.

Any specific usage must be authorised by the site manager; an analysis of the potential risks associated with this usage will enable him to put in place any necessary additional safety measures.

Checks and actions prior to commissioning

List of checks prior to start-up

⚠ WARNING

Damage or other defects on the forklift truck or attachments (special equipment) can result in accidents.

If damage or other defects are noticed on the truck or attachments (special equipment) during the following inspections, do not use the truck until it has been properly repaired. Do not remove or disable the safety systems and switches. Do not change the pre-set values.

⚠ WARNING

Risk of falling!

When working on high-level parts of the truck, do not use truck components for access or to stand on.

– Use suitable access equipment.

Ensure that the truck is in good working condition prior to start-up.

To do this, carry out the following checks:

– Fork arms or other load-carrying equipment should not show any signs of noticeable damage (for example: bending, cracks, significant wear).
– Check that there are no signs of leaking consumables under the truck.
– Do not restrict the field of vision. Ensure the visible area specified by the manufacturer is observed.
– Attachments (special equipment) must be properly secured and function according to their operating instructions.
– Damaged or missing stickers must be replaced in compliance with the marking position table.
– The roller guide rails must be coated in a visible layer of grease.
– The wheels must show no signs of defects or heavy wear. The mounting must be correct.
– Check that there are no foreign objects that could hinder the operation of the wheels and rollers.
– The warning devices (horn etc.) must work.
– The battery cover must be closed.
– Check that the covers are correctly positioned.
– The operator must be qualified to drive the truck. The operator must be able to reach the controls and operate them (especially the anti-crush device). Do not obstruct access to the controls.

Please inform your supervisor if you notice any defects.

Commissioning

Multifunction display settings

Starting the truck using the ignition key (standard version)

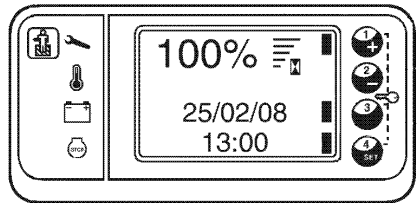
– Plug in the battery connector.

– Pull the emergency stop button.

– Switch on the ignition.

The following display appears:

The truck is ready for operation.

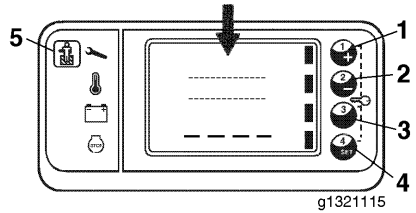


Starting the truck using the digicode

– Plug in the battery connector.

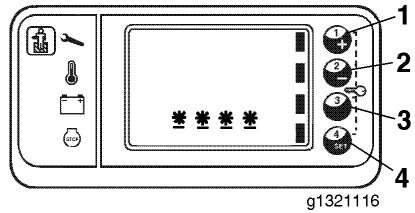
– Pull the emergency stop button.

The screen displays "**Enter PIN Code**" (see arrow).

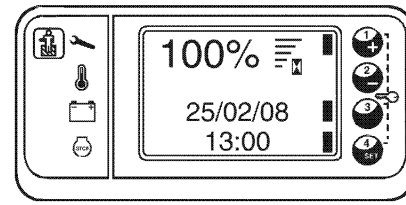


– Enter your personal PIN code using buttons (1) to (4). The figures are represented by stars.

If the code is correct, the welcome screen appears.



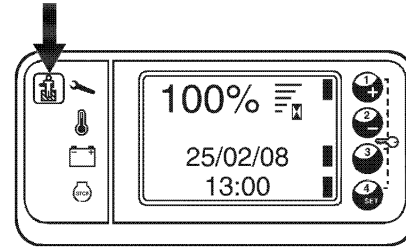
Date, time, battery discharge indicator ▷



g1321170

Driver on the platform ▷

When the driver steps onto the platform, the green "Driver present" indicator light comes on (see arrow) and remains permanently lit. It starts to flash when the operator steps off the platform.



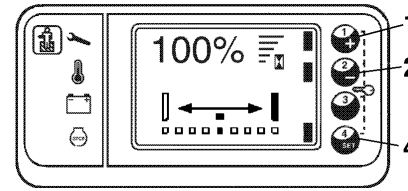
g1321118

NOTE

- *The default PIN code (factory setting) is 1-2-3-4.*
- *If the PIN code is incorrect, repeat the operation.*

Screen contrast

– Press the "**SET**" control button (4) to open the screen for adjusting the **contrast**. ▷



g1321110

– "**+**" button (1): increases the contrast.

– "**-**" button (2): reduces the contrast.

NOTE

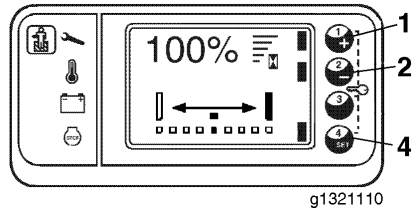
After 5 seconds with no action on the adjustment buttons, the settings are stored and the display automatically returns to the main screen.

Setting the display brightness

– Press the "**SET**" control button (4) twice to open the screen for adjusting the **brightness**.

– "**+**" button (1): increases the brightness.

– "**-**" button (2): reduces the brightness.



g1321110

NOTE

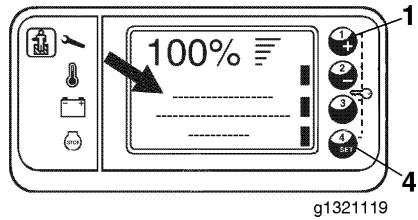
After 5 seconds with no action on the adjustment buttons, the settings are stored and the display automatically returns to the main screen.

Setting the date and time

– Press the button (1)"**+**" twice.

The following display appears (see arrow): "**After Sales Service Address**"

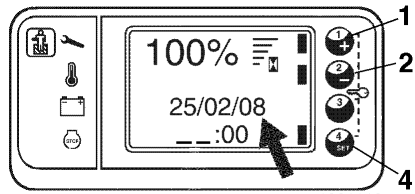
– Press the "**SET**"(4) button (for about 2 seconds) until the date appears and then flashes (see arrow).



g1321119

– Use the "**SET**"(4) button to select the different areas (day/month/year - hour : minute).

– Confirm the flashing values selected using the buttons (1)"**+**" and (2)"**-**" .



g1321112

NOTE

All the settings are saved after 10 seconds if no data is entered and the display automatically returns to the welcome screen.

Settings by the service engineer

When the truck is commissioned, the service engineer sets:

- The language
- The access code for authorised personnel (factory setting: 1-2-3-4)
- The after sales service centre details
- The battery charge indicator display

- The service interval in days or hours
- The service alarm X days or Y hours before the limit (default: 50 hours or 7 days before the limit).

NOTE

The service alarm function can be deactivated.

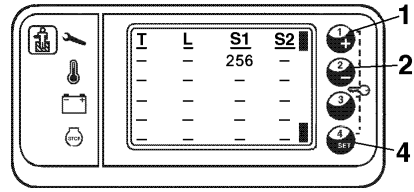
At the end of his service visit, the service engineer:

- Resets the service alarm.
- Reprograms the date and hour meter for the next visit.

Error codes

All the reasons why the truck is running slowly or has stopped are shown on the multifunction indicator, in the form of error codes.

- **T:** traction controller error code.
- **L:** lift controller error code.
- **S1:** steering controller error code.
- **S2:** safety controller error code.



g1321111

NOTE

The appearance of a fault code causes the STOP indicator light to come on.

– Make a note of the breakdown code.

– Press the button (1)"**+**" to display the After Sales Service Centre details.

– Press the "**SET**"(4) button to return to the welcome screen.

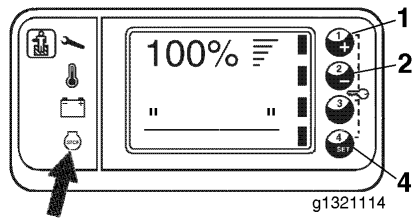
NOTE

Each time the truck is switched on, this screen will appear until the fault is rectified.

Parking brake indicator light

When the parking brake is selected, you will see:

- The red **"STOP"** indicator light (see arrow) come on.
- A warning tone will sound for 5 minutes then you will see the following error message on the display: "Brake worn".



DANGER

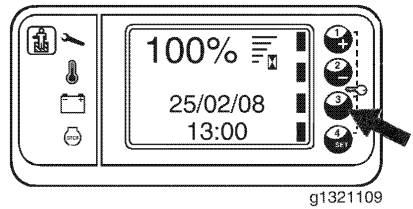
There is a risk of accident or death if the braking system is faulty.

Do not drive the truck if the braking system is faulty. Contact your After Sales Service Centre immediately if you notice a fault or any signs of wear on the truck.

Disconnecting the truck (in digicode mode)

– Go to the main screen.

– Press button "**3**" (see arrow) for 3 seconds.



NOTE

The truck's power supply shuts itself down automatically after 10 minutes if no control is activated. This cut-off time can be adjusted and reprogrammed by the service engineer. To restart the truck, the user must enter his PIN code again.

Changing the PIN code (in digicode mode)

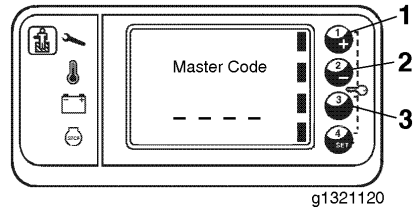
– Start the truck and enter the PIN code.

– Press the button (2) "(-)" until the "**After Sales Service address**" appears on the display.

– Press the button (3) for 3 seconds.

The following message appears on the display:

– Enter the administrator code.
– Enter the new PIN code.
– Confirm by pressing button (1) "(+)".



g1321120

Checking the anti-crush safety device

Anti-crush safety function

The truck moves in reverse when the anti-crush button (2) is pressed.

If the truck is being operated in narrow areas such as a lift, for example, the operator may get stuck against the wall if care is not taken. The operator would be injured by the tiller if this occurred and the truck was not fitted with an anti-crush device.

The truck automatically shifts into reverse when the anti-crush device on the tiller head comes into contact with the driver's body. When the operator moves away from the anti-crush device, the vehicle stops even if forward travel is selected again.

Normal operation may be resumed after releasing the drive direction switches.

Checking the anti-crush safety device

▷

⚠ WARNING

Ensure that the test area is free of people and objects , both in front of and behind the truck.

– Operate the drive direction switch (1) or (3) in forward travel.

The truck moves forward.

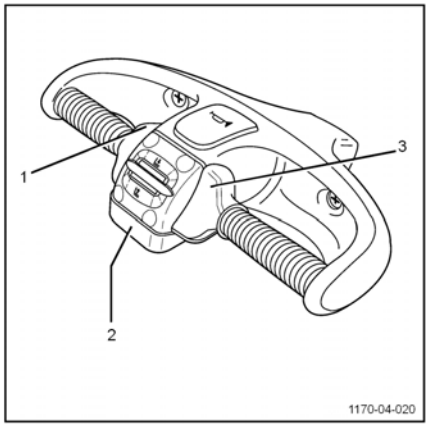
– Activate the anti-crush safety device (2).

⚠ WARNING

The truck stops and shifts into fast reverse.

– Release the anti-crush safety device.

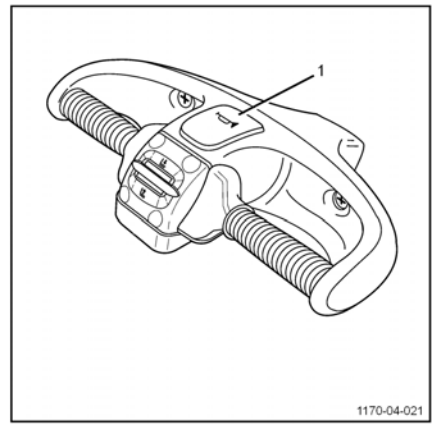
The truck stops.



Checking the horn

– Press the horn button (1) located on the upper part of the tiller

– The horn sounds.



Driving

Driving safety instructions

Behaviour when driving

The operator must obey the same rules within the plant as he would on the road. He must drive at a speed appropriate for the driving conditions. For example, an operator should drive slowly around corners, when entering and passing through narrow passageways, when driving through swing doors, at blind spots, or on uneven surfaces. The operator must always maintain a safe braking distance from vehicles and persons in front of him and must always have the truck under control. He should avoid sudden stops, making fast U-turns, overtaking other vehicles in potentially dangerous areas or areas with poor visibility.

Driving the truck while sitting on top of it is prohibited.

All EXG models are designed to be operated in pedestrian mode. Therefore:

- Never sit on the truck to drive it.
- Do not use the truck as a stepping stool.
- Do not use the truck to carry people.
- Stay in the safety area (working area defined by the manufacturer).

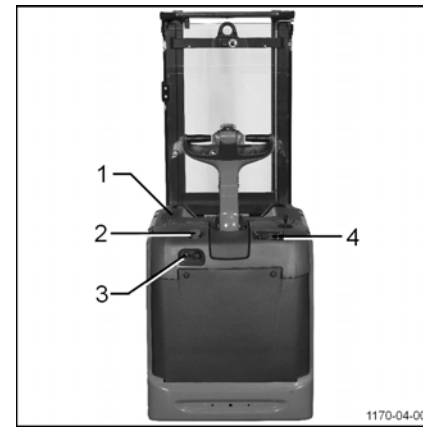
Use of a telephone or radio with the truck is permitted.

However, do not use these devices when driving as they may distract you.

Take a test drive on an open surface.

Driving

Start-up



- Open the battery cover (1).
- Plug in the battery connector.
- Close the battery cover (1).
- Pull the emergency off switch to the raised position (2).
- Turn the switch key (3) to the right or enter the start-up PIN code on the multifunction indicator (4) depending on the version.
- The multifunction indicator (4) starts up.

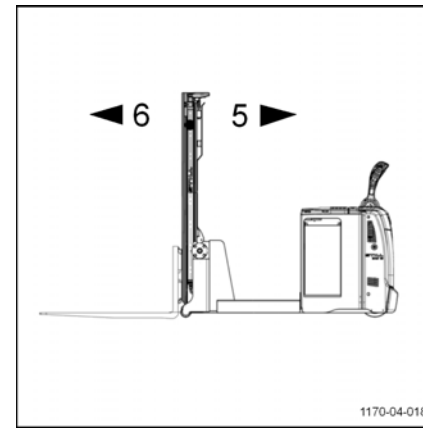
NOTE

Always adjust the truck speed to suit your route, any hazards and the load. Use the pallet stacker on ground that has the correct surface and hardness.

Emergency off switch

- During normal truck operation, the emergency off switch (2) must be pulled out.
- In case of danger, press the switch (2) to break the electrical circuit and apply the electromagnetic brake.

Direction of travel



On a pallet stacker, the conventional controls for the drive direction are:

- Forward travel: (5) - Tiller direction
- Reverse travel: (6) - Fork direction

Forward travel

– Tilt the tiller in the driving area (B)

– Move the drive direction switch forward

– The truck speed depends on the angle of rotation of the drive direction switch.

⚠ WARNING

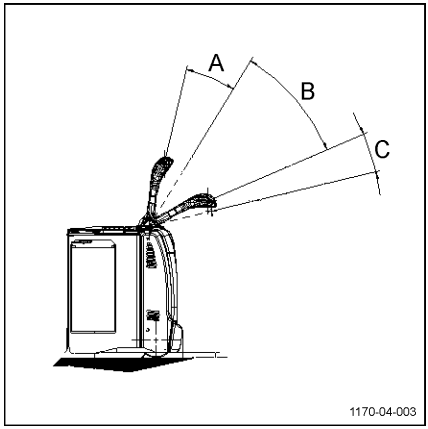
The operator must remain as far as possible from the truck (arms outstretched) in order to avoid injuries to the feet.

Reverse travel

– Tilt the tiller in the driving area (B)

– Gradually and slowly press the drive direction switch backward with your thumb

– The truck speed depends on the angle of rotation of the drive direction switch.



Changing the drive direction

– Release the drive direction switch and activate it in the opposite direction.

The drive direction can be reversed while the truck is in motion.

In this case, the truck is braked electrically until it stops, then it moves off in the opposite direction.

Maximum slowing is controlled by the traction controller.

Steering

The EXG model is fitted with electric steering controlled by a tiller (8).

The electric power steering enables the truck to be manoeuvred gently and precisely with one hand.

⚠ WARNING

Risk of serious injury and/or serious damage to the machine.

Never use a truck with faulty steering.

⚠ WARNING

A safety device stops the truck and applies the brake in the event of a steering fault.

⚠ WARNING

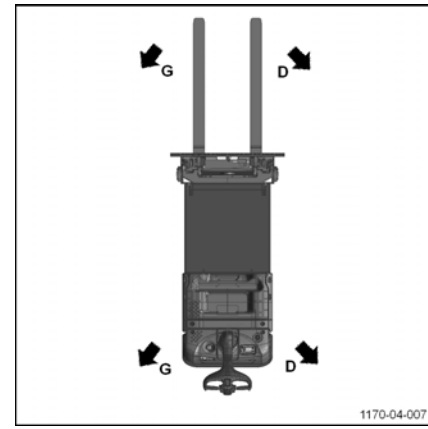
Approaching a tight corner too fast can cause the truck to overturn.

Turning direction in forward travel

- Turn the tiller to the left (L), the truck turns to the left.
- Turn the tiller to the right (R), the truck turns to the right.
- Release the tiller; it should return to the neutral position and the truck should move in a straight line.

Steering angle: 180°

The turning radius (Wa) depends on the length of the fork. (see technical characteristics).



Safety when cornering: speed limitation

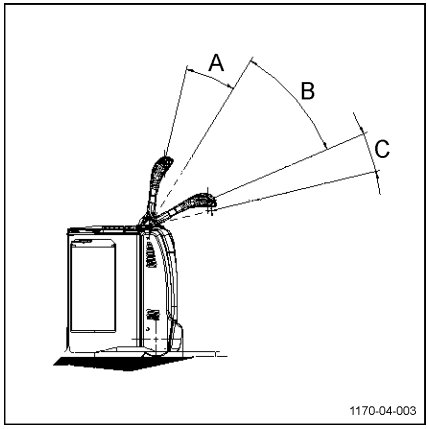
The EXG is fitted with a cornering safety device that automatically reduces the speed when cornering, when a specific drive wheel steering angle is exceeded.

Braking

Safety or parking electromagnetic brake system ▷

The electromagnetic brake is applied automatically:

- If a fault is detected by the traction and/or steering controller.
- When the tiller is in upper braking cut-out position (A) or in lower braking cut-out position (C)
- When the drive direction switch is in the neutral position and the truck is stationary
- When the emergency off switch is pressed.



NOTE

The braking torque is automatically matched to the weight of the load on the forks.

Automatic braking

When the drive direction switch is released, braking is activated automatically. It engages as soon as a certain travel speed is reached.

Braking by changing the drive direction ▷

Braking can be achieved by reversing the direction of travel:

– Move the drive direction switch (9) in the opposite direction until the truck stops.

– Then release the switch.

Lifting

Use of the mast

⚠ WARNING

Only use the lifting device and the accessories for the work for which they are intended. The operator must receive instruction on the operation of the lifting mechanism.

⚠ WARNING

Never put your hands near the lifting mechanism.

⚠ DANGER

The mast protective screen must always be in place, correctly fixed and clean to provide good visibility.

Elevation control

Raising the mast:

- Turn the switch key.
- Pull control flap (1) upwards.

Lowering the mast:

- Push control flap (1) downwards.

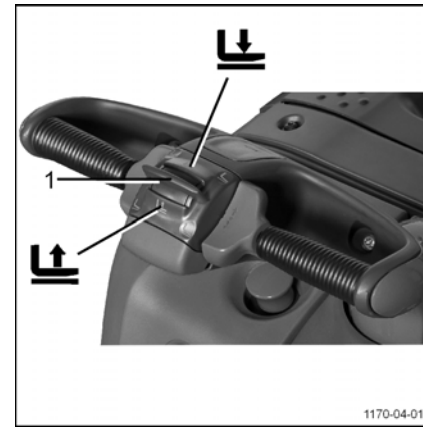
When releasing the control flap (1), the mast stabilises at the required height.

NOTE

The speed of lifting and lowering movements is determined by the degree to which the proportional control (1) is moved. This flap automatically returns to the neutral position when it is released.

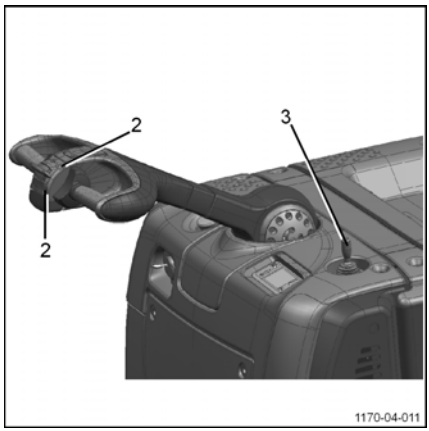
⚠ CAUTION

Always use this control (1) gently without jerking.



Mast tilt control

– Move the tilt selector up or down (2)



– Push or pull the joystick lever (3)

Forward tilt (4) (1° max.)

Backward tilt (5) (6° max.)

– When the lever (3) is released, the mast stabilises at the required tilt.

NOTE

The speed of forward and backward tilt is determined by moving the lever. This lever automatically returns to neutral position when it is released.

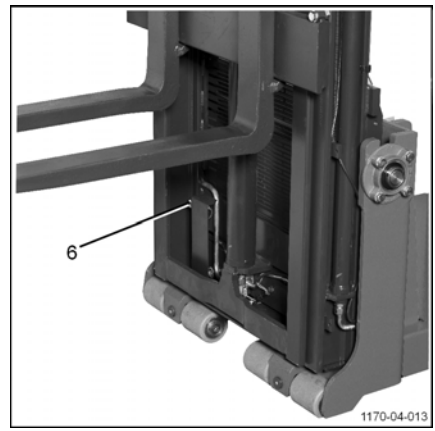
CAUTION

Always move the lever (3) gently and smoothly, especially when the load is raised (risk of truck tipping).

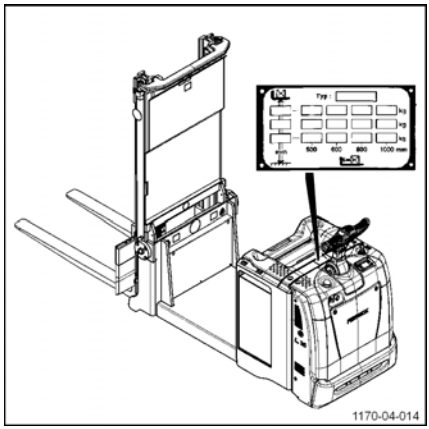
Progressive stopping of the carriage in the lower position

A detector (6) that senses when the position of the forks is 30 cm from the base of the mast triggers automatic slowing of the lowering action.

– Pull the control flap until the carriage is completely lowered. The progressive shutoff device for the carriage avoids the buffer being hit at the end of travel.



Capacity



⚠ CAUTION

Deterioration or destruction of the equipment.

Before picking up a load, make sure that its weight does not exceed the lifting capacity of the machine. Refer to the nominal capacity specified on the truck's capacity rating plate.

The values shown are for compact, homogeneous loads. They must not be exceeded; otherwise the stability of the truck and the resistance of the mast and the chassis are no longer guaranteed.

The distance of the load's centre of gravity from the back of the fork and the lift height determine the maximum lift weight. Check the pallet is in good condition.

Nominal capacity

EXG 10: 1000 kg with 500 mm centre of gravity

EXG12: 1200 kg with 500 mm centre of gravity

EXG12: 1600 kg with 500 mm centre of gravity

⚠ CAUTION

Deterioration or destruction of the equipment

Be careful not to touch adjacent loads or loads positioned at the side or in front of the load being handled.

⚠ CAUTION

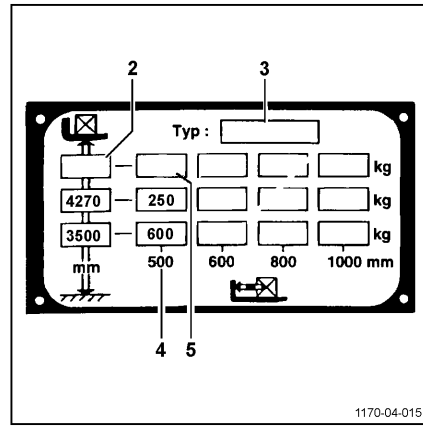
Deterioration or destruction of the equipment

Loads must be arranged so that they are aligned with a narrow space between them to prevent them from catching.

Reading the capacity rating plate

Example of a current label:

- (2) - Maximum lift height
- (3) - Type of lift mast
- (4) - Distance from the back of the fork to the load centre of gravity
- (5) - Maximum capacity on the forks



Adjusting the fork arm span

NOTE

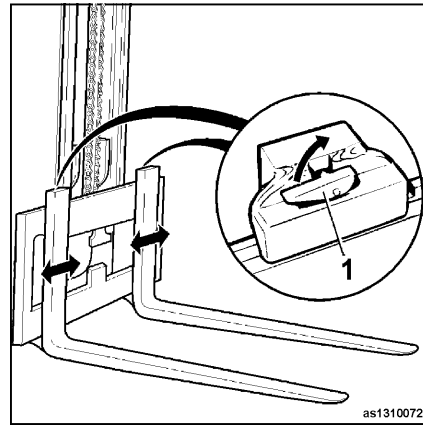
The load centre of gravity must always be at an equal distance from each fork.

– Move the locking lever (1) upwards.

– Set the fork arm span according to the load to be lifted.

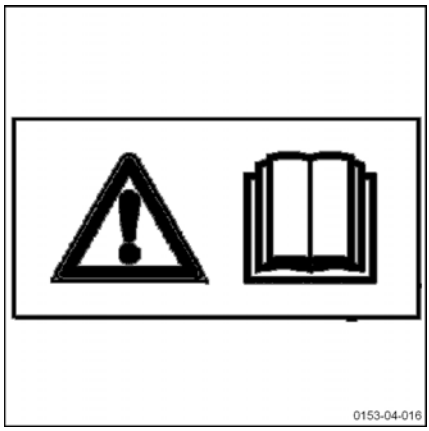
The fork arms must be the same distance from the centre line of the truck.

– Release the opposing lock by one detent on the carriage.



Handling loads

Load handling safety rules



⚠ WARNING

It is necessary to closely observe the following instructions before picking up loads. Never touch or stand on moving parts of the truck (e.g. lifting device, pushing devices, work installations or devices for picking up loads).

⚠ WARNING

Take care not to trap hands or feet when operating the truck.

Working with loads

Before picking up a load

Ensure that its weight does not exceed the truck's capacity.

- Refer to the nominal capacity specified on the truck's capacity rating plate.
- You must also make sure that the load is stable, well-balanced and centred between the load arms in order to avoid dropping any part of the load.
- Check that the width of the load is compatible with the width of the load arms.

⚠ CAUTION

Safety footwear must be worn.

Transporting people is strictly prohibited.

⚠ DANGER

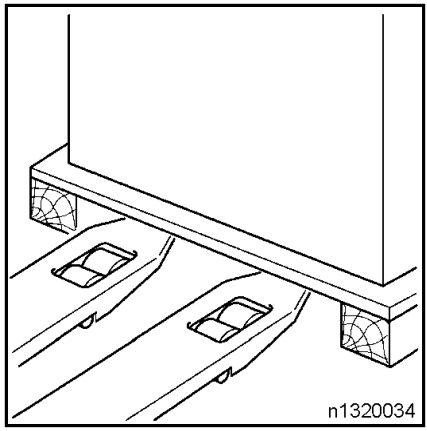
It is essential to slow down when approaching a corner or on wet floors.

⚠ CAUTION

Do not touch nearby loads or loads positioned at the side or in front of the load being handled.

Arrange the loads with a small space between them to prevent them coming into contact with one another.

Picking up a load from the ground

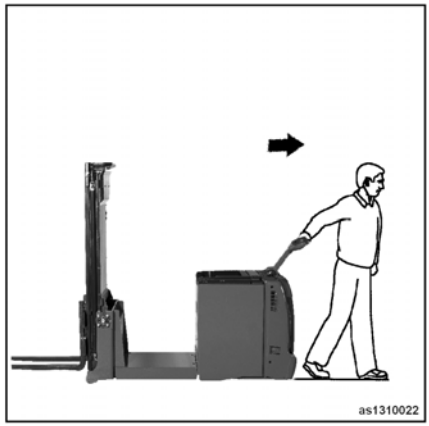


- Approach the load carefully.
- Tilt the mast vertically.
- Lower the fork arms so that they are easily inserted into the pallet.
- Move the forks under the load.
- If the load is shorter than the forks, position it so that the end of the load overhangs the end of the fork arms by several centimetres, to avoid hooking onto the load in front.
- Raise the load a few centimetres from the ground.
- Tilt the mast back as far as it will go.
- Withdraw the load slowly and in a straight line.

⚠ DANGER

Ensure that the pallet is in good condition before commencing any operation.

Transporting a load



- Always drive forwards for optimum visibility and with the mast tilted as far back as possible.
- When carrying a load on a slope, always climb and descend with the load uphill. Never travel across the slope or make a U-turn.
- Reverse gear must only be used for depositing a load. Since visibility in this direction is restricted, you should only travel at very low speed.
- Never drive with an unstable load.
- If visibility is poor, let someone guide you.
- Watch out for low passageways, low doorways, scaffolding, pipes etc.

⚠ CAUTION

Always drive with the mast tilted as far back as possible to ensure optimum distribution of the load over the axles.

The axles will thus have better longitudinal stability and maximum braking capacity.

⚠ CAUTION

The driver must remain as far as possible from the truck (arms outstretched) in order to avoid injuring his/her feet.

Do not travel with a load on the forks in the lower limit stop position or on the load arms. The hydraulic braking assistance no longer corresponds to the weight of the moving unit.

⚠ DANGER

Never drive with the load in the upper position. It is essential to lower the forks before setting off.

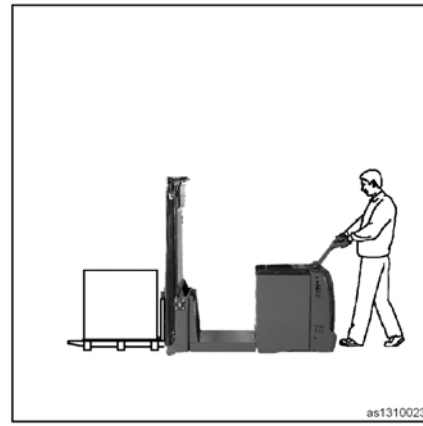
It is essential to slow down when approaching a corner or on wet floors.

⚠ WARNING

Transporting people is strictly prohibited.

Setting a load down on the ground

▷



- Carefully drive the machine to the required location.
- Carefully move the load into the unloading area.
- Lower the load until the fork arms are free.
- Withdraw the machine in a straight line.

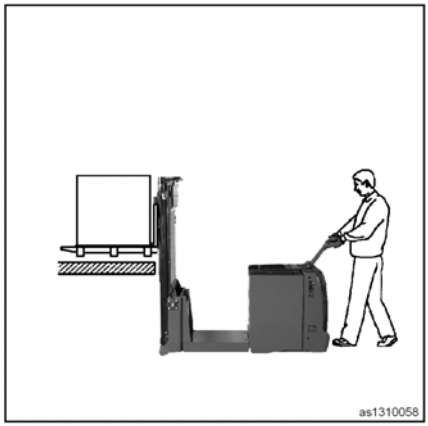
⚠ CAUTION

Be careful not to touch nearby loads or those around the truck.

⚠ DANGER

Personnel must not stand under or near the truck when the load is in the raised position.

Stacking a load



DANGER

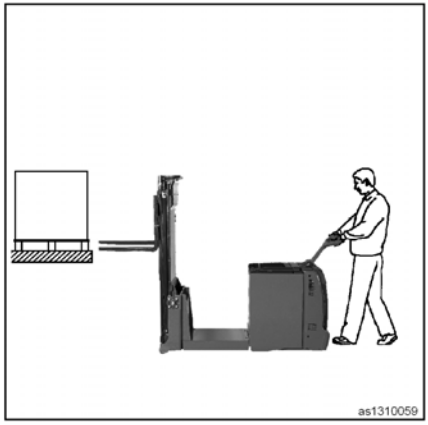
Check that the load does not exceed the maximum capacity of the truck in relation to the lift height.

- Carefully drive the machine to the required location.
- Raise the forks clearly above the level where the load is to be placed.
- Tilt the mast vertically.
- Drive the truck forward into the racking.
- Lower the load until the fork arms are free.
- Withdraw the machine in a straight line.
- Lower the forks again to several centimetres from the ground.

DANGER

Personnel must not stand under or near the truck when the load is in the raised position.

Picking up a load at a height



DANGER

Check that the load does not exceed the maximum capacity of the truck in relation to the lift height.

Check the pallet is in good condition.

- Carefully drive the machine to the required location.
- Tilt the mast vertically.
- Lift the forks to the height of the pallet.
- Move the fork forward carefully under the pallet.
- Lift the forks until the pallet moves away from the racking.
- Tilt the mast as far back as possible.
- Reverse the truck to free the pallet.
- Lower the load to a few centimetres from the ground.

⚠ DANGER

Personnel must not stand under or near the truck when the load is in the raised position.

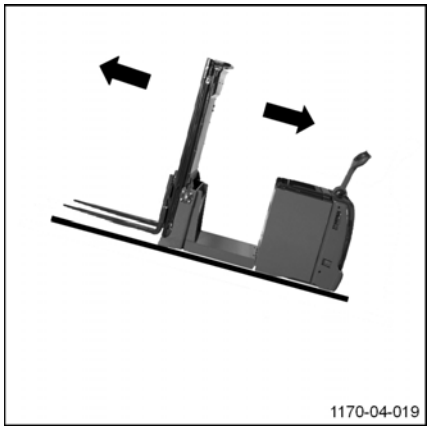
Before leaving the machine

⚠ CAUTION

Always stop the machine on level ground away from traffic routes.

- Lower the fork arms to the bottom position.
- Tilt the mast as far forward as possible.
- Switch off the ignition
- In the case of a prolonged shutdown, press the emergency stop switch and disconnect the battery.

Driving on upward and downward slopes



Slopes should always be approached with the load facing towards the top of the slope. Only slopes marked as clear traffic routes compatible with the truck's technical specifications can be safely used.

⚠ DANGER

The operator must ensure that the ground is clean and has a non-slip surface.

Never travel across slopes or make a U-turn on a slope!

Do not park the truck on a slope.

Reduce speed when going down slopes.

Please observe the maximum gradients defined as suitable for laden and unladen transport.

Transporting the truck in the lift

The truck must only be taken in lifts with an adequate loading capacity that are designed for this purpose, and for which authorisation has been received from the operator. Inside the lift, the truck must be immobilised so that no part is in contact with the wall of the lift cage.

A minimum safety distance of 100 mm from the walls of the lift must always be observed.

Anyone transported with the truck must only enter the lift after the truck has been correctly immobilised and they must exit the lift first.

Driving on loading bridges

Before crossing a loading bridge, the operator must make sure it is properly attached and secured and its load capacity is sufficient. Cross the loading bridge slowly and carefully. The driver must be sure that the vehicle to be entered is secured sufficiently against movement and that it can support the load of the forklift truck.

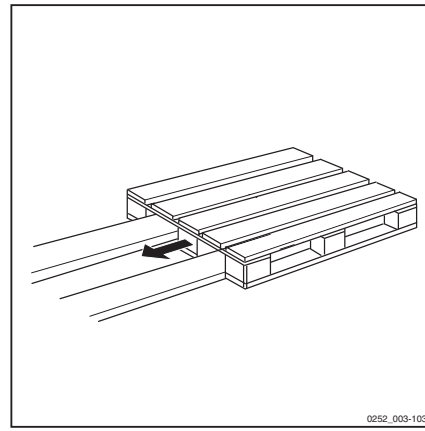
The lorry driver and lift truck operator must coordinate the departure time of the lorry.

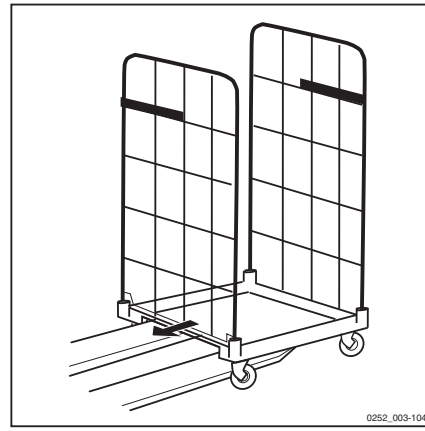
Transporting pallets or other containers ▷

As a general rule loading units must be transported one by one (e.g. pallets). Transporting several loading units at once is only authorised if

- the safetypreconditions are fulfilled.
- by order of the supervisor,

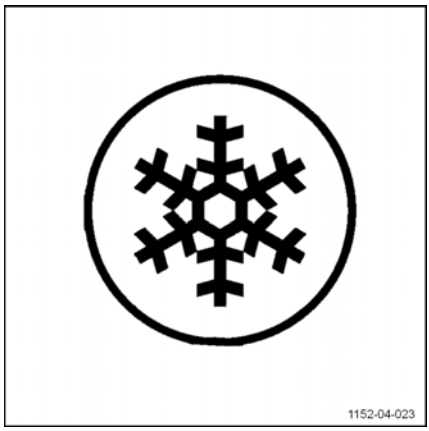
The operator must ensure that the loading unit is properly packed. He must only move loading units that have been carefully prepared and are safe.





Cold store (option)

Cold store usage (optional)



⚠ CAUTION

Standard trucks risk being subject to significant damage if used in extreme conditions.

Only trucks with the Cold Store option may be used inside cold storage. Specific oil designed for cold stores must be used.

These trucks are identified by their Cold Store label.

Area of Use

Trucks with the Cold Store option may be used in two different areas:

- **operating range 1**: the truck can operate at a temperature of -5 °C and, for short periods, at a temperature of -10 °C. It must be parked outside of the cold store.
- **operating range 2 (Entry / Exit applications)**: the truck must be used alternately inside and outside of the cold store. It can withstand temperatures between -30 °C and +45 °C. Specific rules should be followed so as not to damage the truck and to avoid the occurrence of streaming (see the following paragraph). The truck is parked outside of the cold store.

Precautions for Use

The difference in temperature between the cold store and the room temperature zone may result in the formation of condensation water.

This water can freeze when the truck goes back into the cold store and jam the moving parts of the truck.

Streaming occurs if the truck remains outside of the cold store for more than ten minutes. Therefore, it is essential to leave the truck outside of the cold store for 30 minutes so that the condensation disappears.

⚠ DANGER

If the condensation freezes in the cold store, it is prohibited to operate the jammed parts.

This could cause permanent damage to the truck.

Parking

The truck must be parked outside of the cold store.

Parking inside the cold store could cause serious damage to the electrical and mechanical equipment (seals, hoses, rubber and synthetic parts).

⚠ CAUTION

Do not leave discharged or unused batteries in the cold store.

They could be permanently damaged.

Handling the truck in specific situations

Truck towing procedure

It is not possible to tow the truck with no electrical function. The electromagnetic brake remains in the closed position.

It is only permissible to tow the truck with a rigid connection (tow bar) if the truck to be towed can no longer be braked. Check that the towing vehicle is sufficiently powerful to pull and brake the truck being towed.

Moving with no battery

NOTE

In the event of an electrical fault or no battery, it is possible to unlock the brake manually.

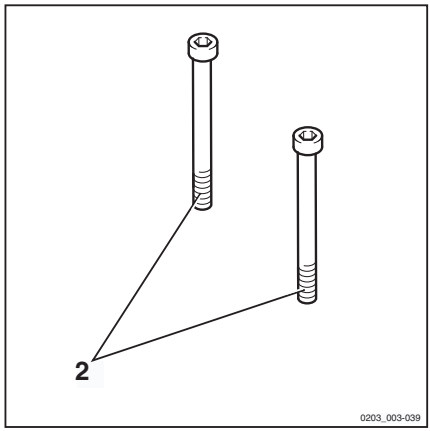
⚠ CAUTION

This procedure must only be carried out by authorised personnel.

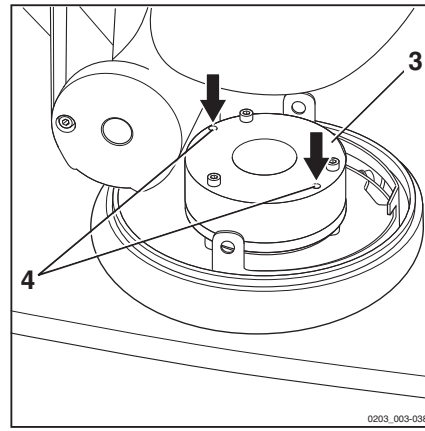
– Unload the fork arms, disconnect the battery.

– Remove the motor cover

– Obtain two screws M5 X 35 (2).



– Screw the screws (2) all the way in the holes (4) in the brake (3). The brake is then deactivated.



⚠ CAUTION

The truck must only be towed at low speeds.

– After towing, chock the truck to prevent it from moving.

– To re-establish brake operation, unscrew and remove the two screws (2).

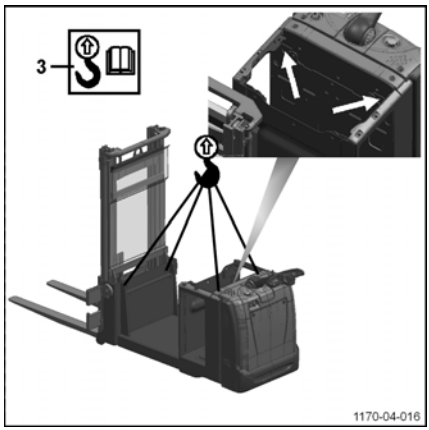
– Refit the covers

⚠ WARNING

It is essential that the covers are correctly refitted before the machine is used.

Slinging, lifting, towing and removal of the mast

Slinging the truck



⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

Only use slings and a hoist of sufficient capacity and protect all parts coming into contact with the lifting device. Attach the lifting device as illustrated. The slinging points are marked by a label (3). Remove the load before slinging the truck.

Weight of machine (with battery): see technical specifications.

⚠ DANGER

Risk to life and/or risk of serious damage to equipment.

Personnel must not stand under or near the truck when it is being lifted.

Do not sling the truck by the mast.

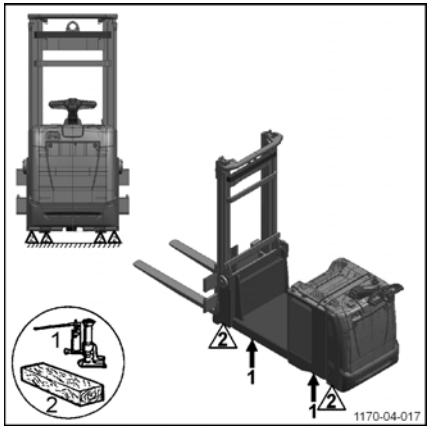
Check that the battery is locked in position.

⚠ CAUTION

Deterioration or destruction of the equipment

Do not sling the truck by the operating device or by the seat.

Lifting the pallet stacker



For some maintenance work it is necessary to lift the pallet stacker.

- Use a jack with adequate lifting capacity.
- To lift the front section of the truck, place the jack under the chassis in the corners (1).
- For safety reasons, chock with pieces of wood (2).
- To service the load wheels, place the jack (1) under the fork arms in the positions indicated (2).

⚠ CAUTION

Deterioration or destruction of the equipment

Do not place the jack or the wedges under the platform of the truck.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

Always immobilise and chock the machine after lifting it.

Towing

⚠ CAUTION

Deterioration or destruction of the equipment

The brake is applied if there is no power supply to the truck from the battery; in this case the machine can only be moved with the front raised and with extreme caution.

⚠ CAUTION

Deterioration or destruction of the equipment.

Do not tow the truck by the control unit.

⚠ CAUTION

Deterioration or destruction of the equipment.

Unload the truck before towing it.

Removing the mast

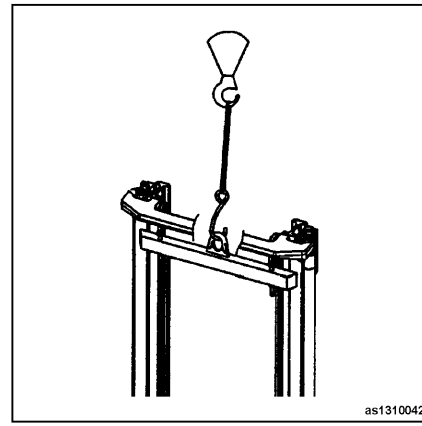
⚠ WARNING

Only use slings and a hoist of sufficient capacity. Protect all parts coming into contact with the lifting device. Attach the lifting device as illustrated.

This work falls exclusively within the competence of network personnel.

Transporting the machine

If the truck has to be transported, please ensure that it is properly chocked and protected against bad weather.



Handling the battery

Battery charging with an external charger

– After use, move the truck to the charging station.
– Stop the truck, lower the forks and switch off the ignition.
– Press the emergency stop switch (1).
– Open the cover on the battery compartment.
– Disconnect the battery connector (refer to chapter 5 on disconnecting and connecting the battery connector).
– Plug the battery connector into the socket on the charging station.
– Now switch the charger on as directed in its specific instructions.
– When charging is complete and the charger has stopped, unplug the charger and reconnect the battery connector to the truck.
– Close the cover on the battery compartment.
– Check the charge status on the truck's multifunction indicator (2) after pulling out the emergency stop switch and switching on. The truck is now ready for use.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

To avoid any sparks, connect the battery connector before switching the battery charger on and disconnect it after switching the charger off.

– Make sure that the charger is compatible with the truck's battery in terms of voltage and charging current (refer to the instructions for the charger).
– Gel electrolyte batteries require a specific setting for the discharge indicator and the charger.

– Ensure correct "+" and "-" polarity when connecting the battery and charger connectors (do not reverse the connectors).
– The connectors are fitted with a locating device to ensure that they are connected the right way round. Regularly check the presence and condition of this device.

Vertical output battery

Removing/replacing the battery

For the maintenance of the batteries, make sure that the capacity of the equipment used (hoist, slings, hooks, trolley, mobile carrier) is sufficient with relation to the battery weight.

When fitting a replacement battery, it must have specifications identical to the original: weight, compartment dimensions, voltage, capacity and connectors. Refer to the plate on the truck for the acceptable minimum and maximum weights.

⚠ CAUTION

The battery is a heavy, fragile component, which must be handled with care. It is recommended to wear gloves.

⚠ CAUTION

When the forks are descending, do not place your feet below the bottom fork plate.

⚠ CAUTION

When handling the locking system and operating the battery, never place your fingers close to moving parts to avoid risk of trapping.

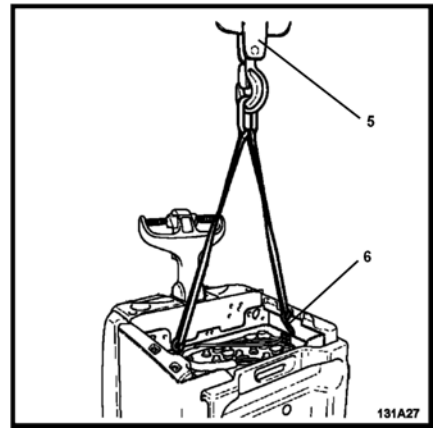
⚠ CAUTION

Before setting off in the truck, make sure the battery is securely locked in place (catch in lowered position)

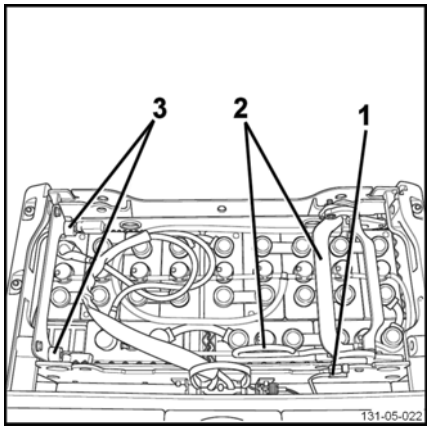
Changing the battery using a hoist

- Lower the fork arms completely.
- Open and pull out the battery box lid.
- Disconnect the battery connector.
- Position the lifting beam (5) above the battery compartment.
- Fix the slinging hooks (6) to the battery box.
- Withdraw the battery.
- Replace the battery by carrying out these operations in reverse order.

When handling the locking system and operating the battery, never place your fingers close to moving parts to avoid risk of trapping.



Side access battery; selection of battery compartment opening side



Depending on the installation, you can choose the side from which the battery is removed.

To switch the battery removal direction:

– Turn around the stop with its rubber buffers (3).

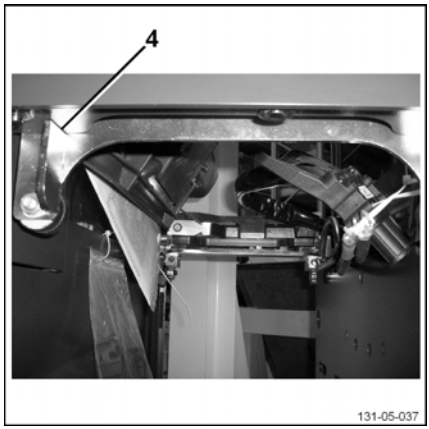
– Turn around the locking system (2).

– Turn around the battery locking safety sensor (1).

Once the stop and its rubber buffers have been turned around, carry out the following 2 adjustments:

- 1) Battery stop adjustment
- 2) Buffer adjustment

1) Battery stop adjustment



– When fitting the buffer support stop, ensure that it is correctly positioned against its 2 brackets without any play (4).

2) Buffer adjustment

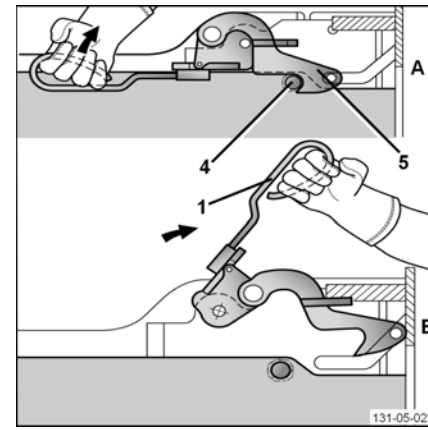
– Once the buffer support stop is locked in place, ensure that the buffers (3) are adjusted to the correct height (they are adjustable in order to ensure proper contact with the battery tabs).

NOTE: The buffers must not catch the battery case when it is being handled.

Side access battery; unlocking/locking the battery

A) Battery locked

The handle is in the horizontal position and the battery tabs (4) are held by the hooks (5).



B) Unlocking the battery

– Open the battery cover.

– Raise the handle (1) vertically until it reaches the stop to unlock the battery.

DANGER

Do not use the truck when the battery is unlocked.

CAUTION

Once the battery is unlocked, it can be moved.

NOTE

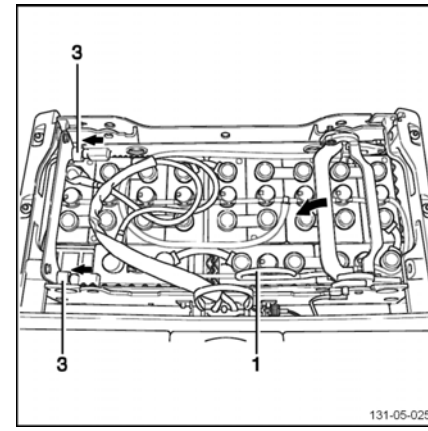
Only locking the battery correctly prevents it from being accidentally dislodged from its compartment.

C) Locking the battery

Once the battery is against the buffers (3) :

– Lock the battery by lowering the handle (1) towards the battery cells until it reaches the stop.

– Close the battery cover.



CAUTION

When operating the lock and installing the battery, keep your fingers away from moving parts to avoid any risk of them being trapped.

We recommend the use of gloves.

Putting Out of Commission and Storage

Parking the truck.

⚠ WARNING

Do not park the truck on a slope, or if this is absolutely necessary, make sure it is safely secured using chocks.

Never leave the truck with the load in the raised position.

Parking the truck.

– Lower the fork arms.

– Remove the ignition key or press the digicode # key for 2 seconds.

– Press the emergency off switch.

Restarting work

– Pull the emergency off switch.

– Put the key back in the ignition or enter the 5-digit code on the digicode (default code: 00000).

Long-term truck storage

The following work must be carried out on the truck to prevent corrosion if it needs to be stored for a long period of time. If the truck is to be stored for more than two months, it must be positioned in a clean and dry area. The area must be well-ventilated with no risk of freezing.

Work prior to storage

– Clean the truck thoroughly.

– Check the hydraulic oil level and refill if necessary.

– Coat any unpainted metal parts with a thin layer of oil or grease.

– Grease all hinges and joints.

– Check battery condition and electrolyte density. Maintain the battery in accordance with the manufacturer's requirements. (Follow the instructions).

– Spray contacts with an aerosol product designed for contacts.

– Raise and chock the truck so that the wheels do not touch the ground, in order to prevent irreversible deformation of the tyres.

– Cover the truck with a cotton cover to protect it from dust.

⚠ CAUTION

We recommend that you do not use a plastic sheet as this encourages condensation to form.

Consult the service department for further measures to take if the truck must be stored for a longer period of time.

Recommissioning after storage

If the truck has been stored for more than six months, it must be checked carefully before being recommissioned. This check is similar to the workplace accident prevention inspection. It is therefore necessary to check all points and systems that are important for truck safety.

Carry out the following operations:

– Clean the truck thoroughly.

– Grease all hinges and joints.

– Check the condition and density of electrolyte, and, if necessary, recharge the battery.

– Check that there are no traces of condensation water in the hydraulic oil. Drain if necessary.

– Carry out the same maintenance work as for the first time it was commissioned.

– Commission the truck.

– In particular, check the following during start-up:

- traction, control and steering
- brakes (service brake and parking brake)
- lifting device

5

Maintenance

General maintenance information

General

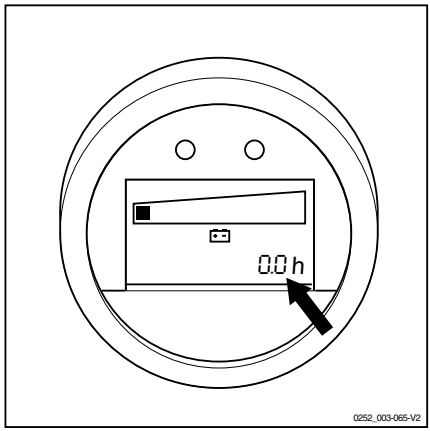
The following instructions contain all the information needed for truck maintenance. It is necessary to carry out the various maintenance operations according to the maintenance plan. The truck will then be ready for service, will continue to be reliable and the warranty can be applied.

Service plan

Maintenance work must be carried out according to the hour meter. Please consult the truck's maintenance plan.

The service plan is followed by advice to facilitate work.

Maintenance intervals must be reduced if the truck is used under harsh conditions (extreme heat or extreme cold, large quantities of dust).



Grade and quantity of lubricants and other consumables

Only lubricants and other consumables specified in these operating instructions are authorised for use during maintenance work.

Lubricants and other consumables required for truck maintenance are listed in the maintenance specifications table.

Never mix different qualities of grease or oil. If it is absolutely necessary to change brands, make sure to flush thoroughly beforehand.

Before changing any filters or working on the hydraulic system, thoroughly clean the surface and the areas around the part.

All containers used to pour oil must be clean.

Servicing and maintenance personnel training and qualification

Truck maintenance can only be carried out by qualified and authorised personnel.

The annual inspection for prevention of accidents at work must be carried out by a person qualified to do so. The person carrying out this inspection must provide their expertise and opinion without being influenced by economic factors or company internal issues. Safety is the only critical deciding factor.

The person responsible for carrying out the inspection must have sufficient knowledge and experience to be able to assess the condition of the truck and the efficiency of the protective installations in accordance with the technical regulations and principles established for checking industrial trucks.

Battery maintenance staff

Batteries must be recharged, maintained and changed:

- by specially trained staff
- by following the manufacturer's instructions of the battery, the charger and the truck.

It is essential to follow the battery maintenance instructions and the battery charger operating instructions.

Maintenance operations that do not require special training

Simple maintenance operations such as checking the hydraulic fluid level or checking the battery electrolyte level can be carried out by persons with no special training.

In this case, it is not necessary to have a qualification such as that required for maintenance of batteries and chargers.

Refer to the Maintenance section of this manual for further information.

1000 hour service plan

At operating hours										Carried out	
1000		3000		5000		7000		9000		✓	✖
Depending upon use, environmental conditions and driving style, the following procedures must be carried out at the intervals shown above.											
Before performing the procedures											
Clean the truck if necessary											
Consult the error codes using the diagnostic software											
Reset the service interval using the diagnostic software											
Traction motor											
Clean the cooling fins											
Transmission											
Check the transmission gear oil level											
Steering/Wheels/Braking											
Check the condition and tightening of wheels											
Clean and lubricate the turntable											
Adjust the electromagnetic brake air gap											
Check the brake circuit for leaks											
Check the wear on the tyre tread of the wheels											
Check the tightness of nuts											
Clean and lubricate the steering motor pinions											
Lubricate load wheel axles											
Lubricate the mast tilt bearing											
Electrical equipment											
Clean and blow out the electrical panel											
Check the tightness of the line switch power terminals											
Clean and blow out the controller power terminals											
Cleaning and blowing out the controller fans											
Checking and torque tightening the connection cables and connectors											
Check the battery electrolyte level and top up the density											
Checking the battery connectors and cables											

At operating hours										Carried out	
1000		3000		5000		7000		9000		✓	✖
Check the adjustment of the rubber stops on the battery locking system											
Check the operation of the battery charger											
Hydraulic circuits											
Check the oil level in the lift and tilt circuit											
Check the lift and tilt circuit for leaks											
Change the pressure filter											
Blow-clean and check the pump motor brushes											
Mast / chains											
Checking the condition of the mast and the chain mountings											
Adjust the length of the mast chains											
Clean and lubricate the chains											
Lubricate the mast											
Check the condition and mountings of the mast protectors											
Final checks											
Make a visual inspection of the condition of and wear on the side sliding shoes											
Make a visual inspection of the general condition of the chassis and the forks											
Resetting the maintenance intervals to zero on the multifunction display											
Test driving the truck											

2000 hour service plan

At operating hours										Carried out	
2000		4000		6000		8000		10000		✓	✖
Depending upon use, environmental conditions and driving style, the following procedures must be carried out at the intervals shown above.											
Before performing the procedures											
Clean the truck if necessary											
Consult the error codes using the diagnostic software											
Reset the service interval using the diagnostic software											
Traction motor											
Cleaning the cooling fins											
Transmission											
Drain the transmission gear											
Steering/Wheels/Braking											
Check the wear on the tyre tread of the wheels											
Check the tightness of nuts											
Adjust the electromagnetic brake air gap											
Check the brake circuit for leaks											
Clean and lubricate the steering motor pinions											
Lubricate load wheel axles											
Lubricate mast tilt bearings											
Electrical equipment											
Clean and blow out the electrical panel											
Check the tightness of the line switch power terminals											
Clean and blow out the controller power terminals											
Cleaning and blowing out the controller fan											
Checking and torque tightening the connection cables and connectors											
Check the battery electrolyte level and top up the density											
Checking the battery connectors and cables											
Check the adjustment of the rubber stops on the battery locking system											
Check the operation of the battery charger											

At operating hours										Carried out	
2000		4000		6000		8000		10000		✓	✖
Hydraulic circuits											
Check the oil level in the lift and tilt circuit											
Check the lift and tilt circuit for leaks											
Change the pressure filter											
Draining the main lift circuit											
Replace the breather plug											
Blow-clean and check the pump motor brushes											
Final checks											
Make a visual inspection of the condition of and wear on the side sliding shoes											
Make a visual inspection of the general condition of the chassis and the forks											
Resetting the maintenance intervals to zero on the multifunction display											
Test driving the truck											

Technical data for inspection and maintenance

Assembly	Consumables/lubricants	Capacities/Setting values
Main hydraulic system	Maximum hydraulic oil	9.5 l
	Filter insert	Efficiency: 20µm
	EXG 10 maximum pressure	196 bar
	EXG 12 maximum pressure	196 bar
	EXG 16 maximum pressure	196 bar
	EXG 10 / EXG 12 / EXG 16 tilt pressure	160 bar
Transmission gear	Transmission gear oil	1.5 l
Drive wheel	Wheel nuts	Tightening torque: 140 Nm
Load wheels	Mounting screws	Tightening torque: 50Nm
Traction and pump motor	Fuses	Power 250 A, Quantity: 1
Steering motor	Fuses	Power 80 A, Quantity: 1
Control cable harness	Fuses	Control 7.5 A, Quantity: 1
Cold store control cable harness	Fuses	Control 10 A, quantity: 1
Steering motor		0.18 kW
Battery	Distilled water	As required
Joints	lithium-soap grease	As required

Recommended lubricants

Hydraulic oil

Recommended hydraulic oil for use in **severe conditions of temperature and load**:

Hydraulic oil **ISO VG 46 H-L or H-LP** according to DIN 51524, PART 2 - HLP

Cold store hydraulic oil

Recommended hydraulic oil for use **in cold stores**:

Hydraulic oil **HLP2 to 68** Renolin HLR 520

NOTE

If in doubt, ask your local truck dealer for advice. You should also consult your local dealer if a representative of an oil company offers you an oil product which is not specified in these operating instructions. Only the oils listed above are approved by the manufacturer. Using oil mixtures or hydraulic fluids that are not recommended can cause damage that may be expensive to rectify.

Transmission gear oil

Extreme pressure oil for mechanical transmission, **SAE 80W90,** compliant with specifications API GL5 and MIL.L21DSC

Aerosol can for chains

Manufacturer's reference no.: 7326300602.
For cold stores: 7326300615.

Grease for pinion gear and steering ring

Aerosol can silicone grease (600 ml) Reference no.: FM 8 107 219.

CAUTION

Deterioration or destruction of the equipment.
Follow the maintenance and safety instructions.

Multi-purpose lubricating grease

Lithium soap grease, extreme pressure with anti-wear additive **KPF2K - 30, KPF 2K - 20, KPF 2N - 30** complying with the standard, DIN 51825.

ENVIRONMENT NOTE

Pending disposal in accordance with environmental regulations, used oil must be stored safely, out of the reach of children. Never dispose of used oil in drains or allow it to penetrate soil.

Maintenance safety instructions

Servicing and maintenance measures

To avoid accidents during servicing and maintenance operations, take all necessary safety measures, such as, for example:

ensuring that there is no risk of the truck moving or starting up unexpectedly (remove the battery connector).

Working on the electrical equipment

Operations on the truck's electrical system must only be carried out when there is no voltage supply. Operating checks, testing and adjustment of parts supplied with voltage must only be carried out by qualified personnel who have received detailed instructions and have been authorised to perform this work. They must take the required precautionary measures. Rings, metal bracelets etc. must be removed before carrying out any operations on electrical components.

To avoid damaging electrical equipment including electrical components, such as the traction controller, these must be removed from the truck before carrying out any electric welding operations.

Operations on the electrical system are permitted only with the consent of the manufacturer.

Safety devices

Refit and check all safety devices for proper operation after maintenance and servicing.

Preparation for maintenance

Access to the technical compartment

⚠ CAUTION

Deterioration or destruction of the equipment

Before commencing work on the truck

- Stop the truck (key or indicator)
- Press the emergency off switch.
- Disconnect the battery connector.

⚠ WARNING

Risk of serious injury (burns) and/or damage to equipment.

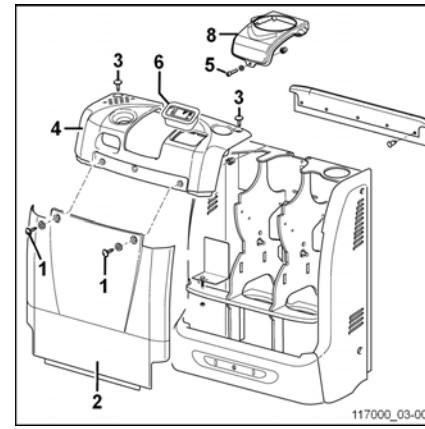
The brake, motor, cables and other electrical components may be very hot.

Opening the engine cover

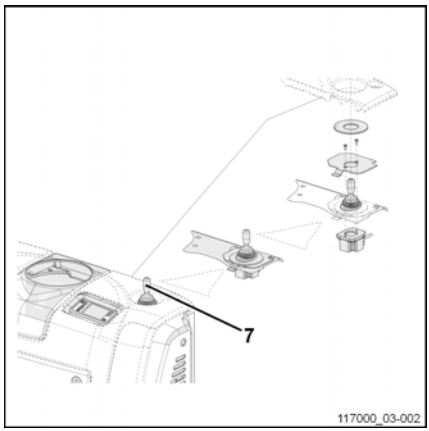
- Unscrew the 2 screws (1) which hold the cover in place.
- Pull the cover (2) backwards.
- Lift off the cover (2) and place it on the ground.
- To close it, place the tab (3) inside the chassis.
- Tighten the 2 cover (2) screws (1).

Removal of the dashboard

- Remove the front hood (2)
- Unscrew the 2 screws (3) which hold the dashboard in place (4).
- Unscrew the tiller cover nut (5)
- Disconnect the 6X2 supply from the multi-function indicator (6)



– Disconnect the 2X5 supply from the joystick (7) ▷
– Remove the dashboard
– The flexibility of the dashboard (4) makes it easy to remove from the chassis.



Remove the tiller housing

– Remove the front hood (2)
– Remove the dashboard (4)
– Unscrew the 2 screws fixing the housing (8)to the chassis.
– The tiller housing (8) is freed
– Remove the tiller to free the housing completely.

Types of lifting masts

Working on the lift mast

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

When working on the front of the truck with the mast or fork carriage raised, fit a safety device to prevent the mast from being lowered accidentally.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

After all work is completed, re-secure and clean the mast protective screens if necessary.

Standard lifting mast

OPERATION

When lifting the inner strut, the return pulley of the chain is also raised in such a way that the fork carriage is lifted at a ratio of 2:1.

Safety device for the standard lift mast

⚠ WARNING

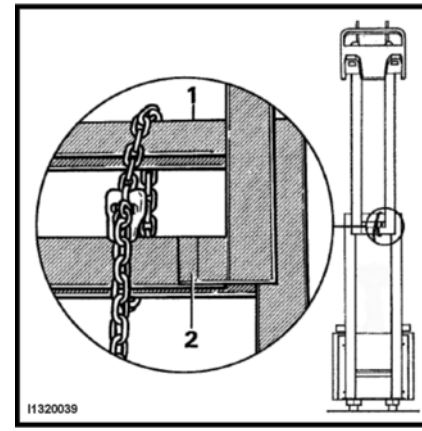
Risk of serious injury and/or serious damage to equipment.

Choose a chain whose strength is far greater than the weight of the mast.

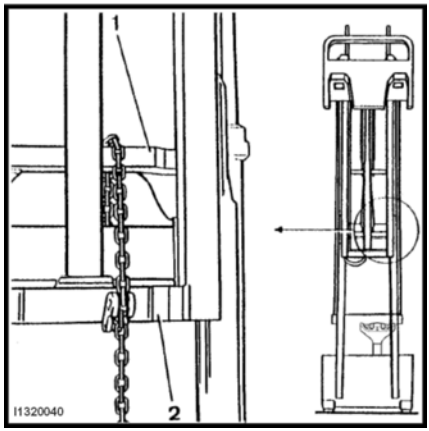
– Raise the mast.

– Connect the chain after passing it over the fixed strut (2) and beneath the cross member of the inner strut (1).

– Lower the inner strut until the safety chain is under tension.



Dual lifting mast



NOTE

The advantage of this mast is that it can be used in areas with low ceilings such as cellars, lorries, boat hulls etc., allowing maximum use of its free lifting ability.

OPERATION

The fork carriage is raised until free lifting through the return pulley of the centre cylinder chain. It moves at twice the speed of the cylinder. Then the inner strut is lifted by the two side cylinders and brings the fork carriage with it. The centre cylinder is mounted on the inner mobile strut.

Safety device for the Duplex lift mast

WARNING

Risk of serious injury and/or serious damage to equipment.

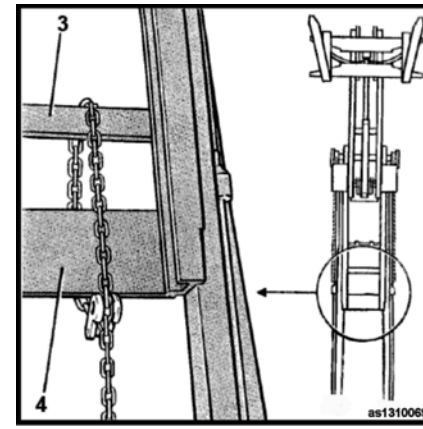
Choose a chain whose strength is far greater than the weight of the mast.

- Lift the mast.
- Connect the chain after passing it over the cross member of the fixed strut (1) and the cross member of the inner strut (2).
- Lower the inner strut until the safety chain is under tension.
- Lower the fork carrying carriage to the bottom of its travel.

Triple lifting mast

OPERATION

The fork carriage is raised until free lifting through the return pulley of the centre cylinder chain. Then the two outer cylinders raise the intermediate mast. Due to the chain return, the inner mast is raised at the same time. The centre cylinder is located in the inner mobile mast.



Safety device for the Triplex lift mast

⚠ DANGER

Danger of death and/or risk of serious damage to equipment.

Select a chain whose lifting strength is suitable for each type of mast. Observe the maximum recommended elevations.

- Raise the mast.
- Connect the chain after passing it over the cross member of the outer mast (4) and under the cross member of the centre mast (3).
- Lower the mast until the safety chain is under tension.
- Lower the fork carrying carriage to the bottom of its travel.

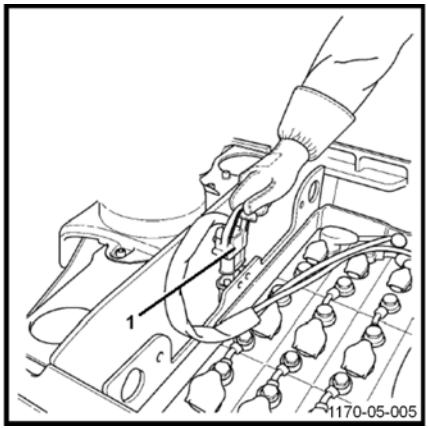
Cleaning

Cleaning the truck

Cleaning instructions

– Always park the truck following the instructions provided.

– Disconnect the battery connector (1).



Washing the outside of the truck

Disconnect the battery before cleaning the truck. Use a steam jet cleaner or products with a strong degreasing effect with extreme care because they dilute the grease inside the sealed-for-life bearings. These bearings cannot be greased by hand and may be permanently damaged by these cleaning methods.

⚠ WARNING

Do not use flammable liquid to wash the truck. The safety regulations mentioned above must be followed to prevent sparks which could cause a short circuit (remove the battery connector). All components that are sensitive to moisture (particularly electrical components) must be protected if the truck is to be cleaned. Follow the manufacturer's instructions when using the cleaning product.

– Clean the truck with a cleaning product mixed with water. Use a sponge and cloths.

– Specifically clean the oil filler holes and their surrounding area and also the lubricating nipples.

– Lubricate the required locations (hinges and seals).

Cleaning the electrical system

⚠ WARNING

Do not expose electric motors or any other electrical equipment, brakes and bearings to a direct jet.

NOTE

Only use dry cleaning products. Do not remove the cowlings and other covers.

– Clean the electrical parts with a non-metal brush and dry with lightly compressed air.

After washing

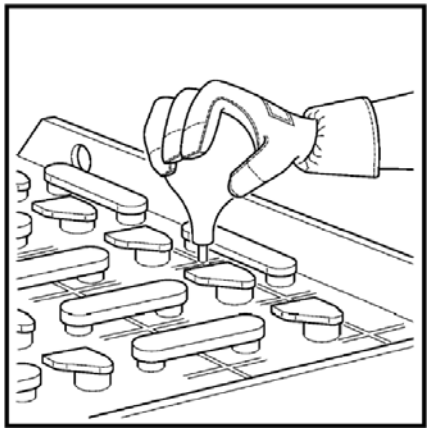
– Carefully dry the truck (with compressed air, for example).

– Start the truck, in accordance with the instructions.

If there are still traces of moisture in the motor despite the precautions taken, dry it using compressed air (clean and dry), otherwise there is a risk of short-circuit. ONLY then may the truck be switched back on and returned to service while preventing any corrosion.

Maintenance as required

Cleaning the battery and its compartment ▷



⚠ WARNING

This delicate operation must be carried out wearing acid-resistant gloves and clothing and protective glasses. Follow the safety precautions described in previous chapters.

ENVIRONMENT NOTE

Do not pour acid-bearing wash water down the drain. For more information, see the battery instructions.

Battery in open case

- Check if there are traces of sulphate in the case and the chassis.
- If there is only minimal sulphate build-up, just wipe the top of the cells with a damp cloth.
- If sulphate build-up is heavy, you will need to take out the battery, jet wash it and clean the frame.

Battery in sealed compartment

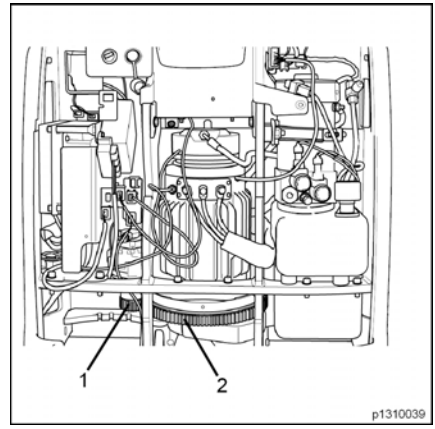
- Check that there is no electrolyte in the bottom of the compartment by connecting the rubber suction bulb supplied with the battery to the plastic plunger tube.
- Pump out any electrolyte that has spilled between cells.
- Clean the upper surface of the cells with a damp cloth.

⚠ CAUTION

In case of heavy sulphate build-up or excessive electrolyte spillage, call our service engineers as soon as possible.

Transmission

Steering: checking the geared motor pinion / turntable



- Remove the front hood.
- Check that the steering geared motor pinion (1) and the turntable (2) are free from dirt.
- Clean with solvent if necessary, then dry with compressed air.
- Lubricate the pinion gear and the turntable with silicone spray (see recommended lubricants).

NOTE

There is a risk of dust clogging if non-recommended products are used.

⚠ CAUTION

Deterioration or destruction of the equipment

Always disconnect the battery connector when carrying out maintenance on the pinion gear and the turntable. The wearing of gloves is recommended.

Checking the battery charging status ▷

⚠ DANGER

The battery must be charged and serviced in accordance with the instructions provided with the battery and the battery charger (if an external battery charger is used).

⚠ WARNING

The battery contains sulphuric acid, which is a hazardous product. Wear gloves and goggles when working on the battery. In case of contact with eyes or skin, rinse immediately with clean water, then seek medical advice if necessary. Charging the battery releases hydrogen, which can create an explosive mixture. Do not create sparks, do not smoke and keep naked flames away from a battery which is being charged or has recently been charged. To prevent the accumulation of hydrogen, keep the battery cover open during charging. Charge the battery in a well-ventilated room. Do not place metal objects on the battery: there is a risk of creating a short-circuit.

- Before using the truck, check to ensure that the battery is correctly charged.
- Plug in the battery connector.
- Pull the emergency off switch upwards (if necessary).
- Depending on the model selected, turn the switch key (1) or enter the PIN code on the electronic key.
- Check the battery charge on the indicator (2) (refer to chapter 3 on the multifunction indicator).

Opening the battery cover

– Stop the truck and lower the forks.
– Turn off the ignition and remove the key.
– Press the emergency off switch.
– Lift the cover (4) in the direction of the forks until it reaches its upper stop (X).

To close, return the cover to the(4)horizontal position using its handle.

⚠ CAUTION

The cover is rather heavy and must be handled with care. The wearing of gloves is recommended.

⚠ CAUTION

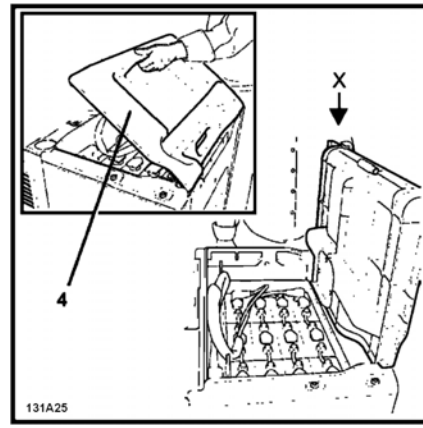
Keep fingers away from moving parts to avoid any risk of them being trapped.

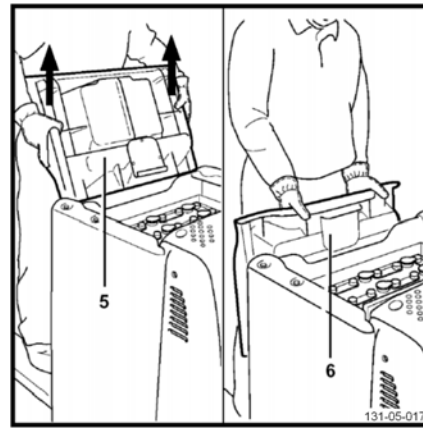
NOTE

It is possible to remove the cover (5) after opening it fully. Release it vertically for easy access to the battery components.

NOTE

A hook (6) makes it possible to hang the cover on the edge of the battery compartment.

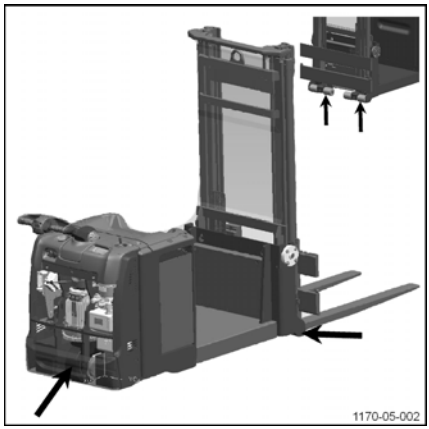




Maintenance every 1000 hours

Checking the condition and tightness of wheels

Condition of wheels



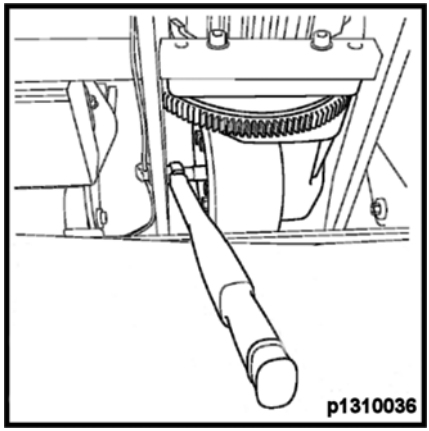
- Raise the truck so that the wheels are off the ground and carefully support the machine on suitable blocks.
- Check that the wheels rotate freely and remove all the coiled wires that may obstruct them.
- Check the extent of tread wear.
- Replace wheels that are worn or damaged.
- Carry out this operation at the front, then the rear.

⚠ CAUTION

Deterioration or destruction of the equipment

It is essential to remove any wire that may have wound round the wheel hubs and bearings.

Wheel tightness



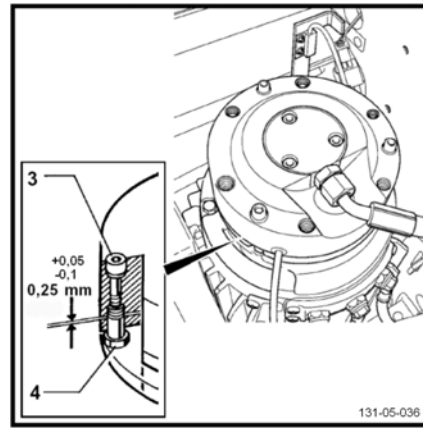
- Raise the truck so that the wheels are off the ground and carefully support the machine on suitable blocks.
- Remove the front hood.
- Check the tightness of the nuts on the drive wheel, torque setting: 140 Nm.
- Check the tightness of the mounting screws on the load wheels, torque setting: 50 Nm.
- Check the tightness of the stabiliser wheel axle, torque setting: 15 Nm.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

It is recommended that gloves are worn when replacing the drive wheel.

Adjusting the brake air gap



IMPORTANT

The mechanical braking torque is factory set.

NOTE

This brake system is boosted by the pressure in the lifting circuit.

- Check the brake in the engaged position, in other words with the power off and with no load on the forks.
- Check the air gap on the brake using a set of shims. The original air gap is 0.25 with a tolerance ranging from – 0.1 to 0.05 mm. The maximum air gap after partial disc wear is 0.5 mm. Beyond this, there is a risk of the brake not releasing fully and a risk of overheating.
- If the air gap is close to the limit value of 0.5 mm, it must be adjusted.

To do this, it is necessary to:

- Tilt the tiller support backwards.
- Loosen the three mounting screws (3).
- Adjust the three banjo bolts (4) to set the air gap to its original value of 0.25 mm.
- Retighten the three mounting screws (3).
- Check the air gap at three points at 120° intervals.
- Make sure that the air gap is equal right around the brake.
- Return the tiller support to its original position.
- Switch on the ignition and check that the brake releases completely.

NOTE

Use an offset open-ended spanner to adjust the banjo bolt (4) at the bottom near the chassis.

We recommend that this work is carried out by our service engineers.

Battery maintenance

The operations described below relate to lead batteries with liquid electrolyte. For batteries with gel electrolyte, which are said to be "maintenance-free", please refer to the manufacturer's instructions.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment.

Avoid contact with the acid. Do not create a short-circuit. Refer to the recommendations in the daily checks section. The electrolyte contains sulphuric acid, which is a hazardous product. Wear gloves and goggles when working on the battery. In case of contact with eyes or skin, rinse immediately with clean water, then seek medical advice if necessary. Charging the battery releases hydrogen, which can create an explosive mixture. Do not create sparks, do not smoke and keep naked flames away from a battery which is being charged or has recently been charged. To prevent the accumulation of hydrogen, keep the battery cover open during charging. Charge the battery in a well-ventilated room. Do not place metal objects on the battery as there is a risk of creating a short-circuit.

Electrical equipment, testing electrolyte level and topping up with water

This check and any topping up required should be carried out every week, after charging an open lead battery only.

- Switch off the ignition, open the bonnet, unplug the battery connector.
- Check the level, which should be up to the base of the plug, slightly above the splash guard.
- Add distilled water to top up cells with a low water level.
- Then refit the plugs.

⚠ CAUTION

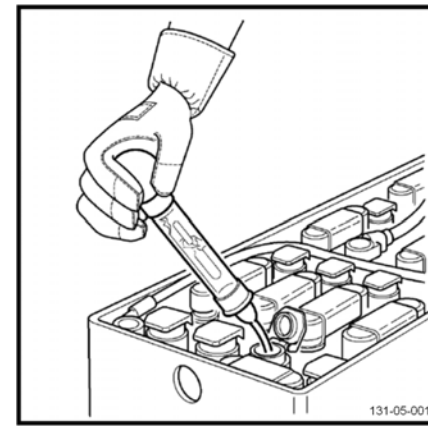
Deterioration or destruction of the equipment

Only top up with distilled water. Never top up before charging (risk of overflow). Do not overfill the cells.

NOTE

For more information, see the instructions provided with the battery.

Electrical equipment: checking the electrolyte density



Measuring the density gives an accurate indication of the charging status of each cell in an open lead battery only. This measurement can be taken before or after charging:

- Minimum density of an 80% discharged battery: 1.14
- High density, battery 100% charged: 1.29 to 1.32 (depending on manufacturer).

We recommend that you measure this every 1 to 2 weeks.

– Note the values in your battery log book.

– Lift the cap cover of each element as shown above.

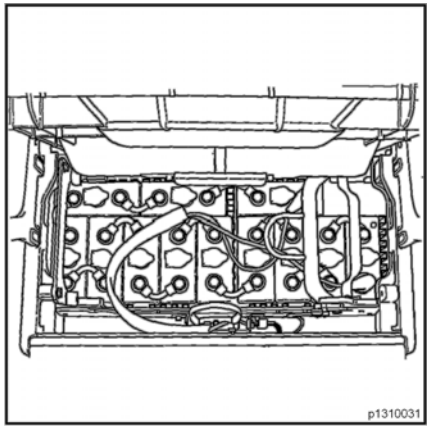
– Carefully measure the density of each element with the acidometer.

– Replace the caps after taking the measurement.

NOTE

If the density in the cells differs or it is very low in certain cells, contact our service engineers. Allowing the battery charge to fall below the threshold of 1.14 is very detrimental to the battery operating life.

Electrical equipment, checking condition of battery cables, terminals and connectors ▷



- Check that the cable insulation is undamaged and that there are no signs of overheating at the connections.
- Check that the + and - output terminals are not sulphated (presence of white salt).
- Check the condition of the power connector contacts and the presence of the keying pin.

⚠ CAUTION

Deterioration or destruction of the equipment

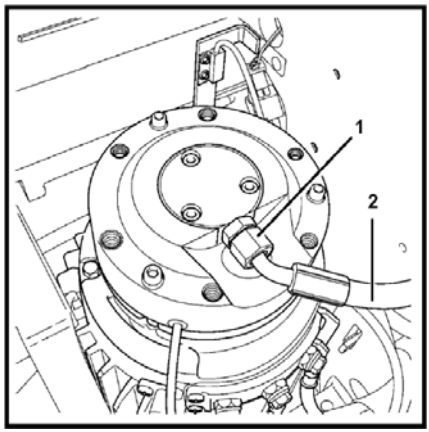
Always replace any damaged battery connector or there is a risk that electronic components may be damaged. Always use male and female battery connectors of the same brand.

⚠ CAUTION

Deterioration or destruction of the equipment

The points mentioned above can cause serious incidents. Request assistance from our service engineers as quickly as possible.

Electromagnetic brake, checking the brake assistance circuit for leaks ▷

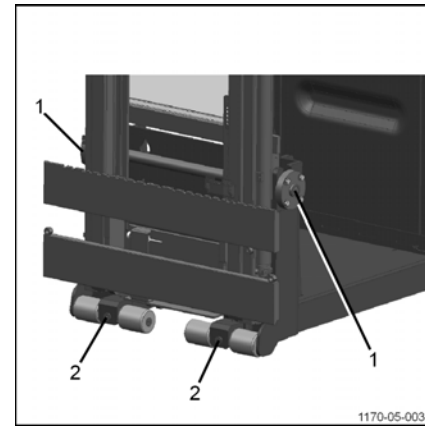


- Inspect the brake assistance hydraulic circuit: hose and connections.
- If necessary, tighten the unions (1) of the hose (2):
  - tightening torque: 40 Nm
  - on the pump unit: 35 Nm.
- Wipe away any traces of oil before they reach the brake disc pads.

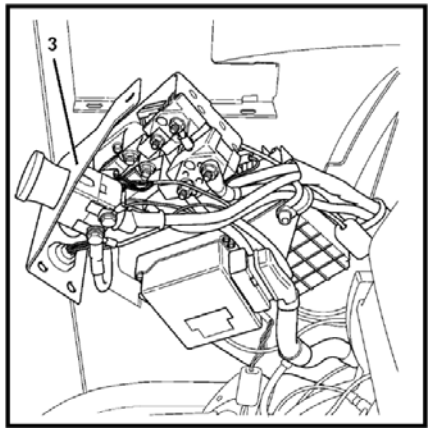
In the event of leakage, stop the truck and contact the service engineer.

Lubricating the load wheel axles and mast tilt bearings ▷

- Lubricate the 2 grease nipples on the load wheel axles (1)
- Lubricate the 2 grease nipples on the mast tilt bearing (2)



Cleaning the electrical plate and checking the connections



- Disconnect the battery connector.
- Remove the front cover and the dashboard.
- Tilt the electrical plate (3) back.
- Clean the electric panel using compressed air.
- Check that the connector pins of the cables are properly fitted.
- If necessary, tighten the power terminals on the motors and switches.

IMPORTANT

When repositioning the electrical plate, push the cables well back to avoid trapping them.

NOTE

Protect the electrical plate from moisture. All adjustments and repairs must be carried out by our service engineers.

We recommend that you entrust this operation to our network.

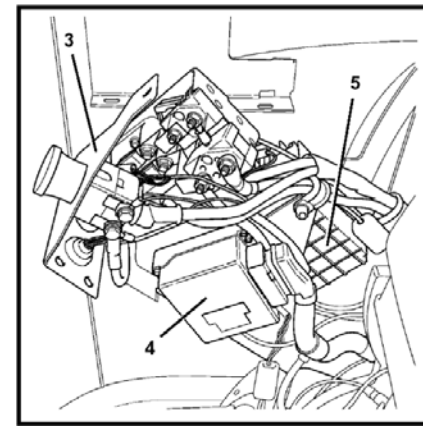
Electrical equipment, checking the control modules and their connections

To avoid a possible cut-out after several rotations of the electrical plate (3), check the tightness of the power terminals on the traction controller (5) and the steering regulator (4):

- Tightening torque for cables at the traction controller terminals: 9 Nm.
- Tightening torque for cables at the steering regulator terminals: 5 Nm.
- Tightening torque for cables at the switch terminals: 9 Nm.

⚠ CAUTION

Always disconnect the battery connector before working on an electrical component.



Electrical equipment, testing and cleaning the fan

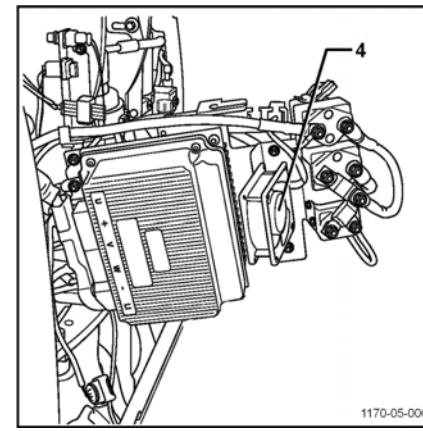
– Disconnect the battery connector.

– Remove all material clogging the grilles beneath the truck.

– Using a compressed air gun and a short brush, remove the dust from the fan blades (4).

– Reconnect the battery.

– The fan should rotate when the circuit is switched on.



Cleaning the cooling fins

- Unplug the battery connector.
- Open the technical compartment cover.
- Blow the motor (1) with compressed air.
- Check for signs of overheating at the power supply cable connections.
- Check that the connections are tight.

Specific mast maintenance

Checking the condition of mast mounting and its chains

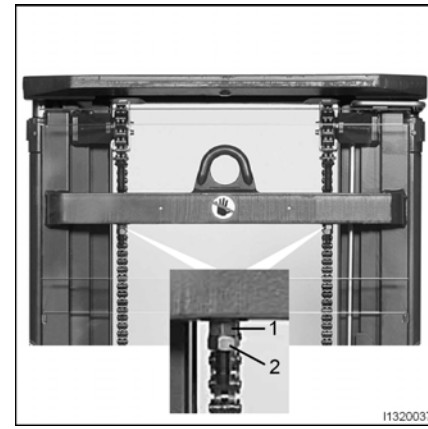
- Thoroughly clean the mast guide rails and the chains.
- Inspect surfaces for wear and check rotation of rollers.
- Inspect the chains for wear, especially around the return pulleys.
- Check the chain fixings and anchorings.
- Replace any worn chains, or any chain that is stretched by 3 %.
- Inspect the fixing elements between the mast and the chassis.
- Inspect the fixing collars of the mast cylinders.

Adjusting the length of the mast chains

NOTE

Depending on the use of the truck, the chains are liable to stretch and as a result they have to be adjusted regularly.

- Lower the mast completely.
- Undo the lock nut (2).
- Place the chains under slight tension by tightening the nut (1).
- Retighten the lock nut (2).



CAUTION

Deterioration or destruction of the equipment.

After this adjustment, check that the lift carriage does not reach the mechanical stop at the top of the mast. If this is the case, slacken or change the chains. We advise you to entrust this operation to a specialist within our network.

Cleaning and lubricating the chains

NOTE

If the lifting chain is too dirty, clean it.

- Place a recipient underneath the elevator.

– Clean using a paraffin-based product (petroleum, fuel oil etc.). Observe the manufacturer's safety instructions.
– If using a steam jet cleaner, do not use additives.
– Immediately dry the chain and its joints with compressed air. Move the chain frequently during this operation.
– Lubricate the chain immediately using a special aerosol chain lubricant.

⚠ CAUTION

Deterioration or destruction of the equipment.

Chains are safety components. Use of cold cleaning agents, chemical products, acid or chlorinated products could destroy the chains.

NOTE

Use of high pressure liquid cleaning devices is not advisable.

⚠ DANGER

Danger of death and/or risk of serious damage to equipment.

On trucks fitted with macrolon mast protection, clean the translucent screen thoroughly after lubrication operations.

Lubricating the mast

– Coat the guidance surfaces, the return pulleys and chains with a special aerosol chain lubricant.

NOTE

For equipment that is used in the food industry, use a dry lubricant instead of an aerosol.

Checking the condition and mountings of the mast protectors ▷

It is important to inspect the condition of the mast protection screens and to check that the mountings are tightened.

⚠ WARNING

Risk of serious injury and/or serious damage to equipment

Keep hands away from moving parts and assemblies without first lowering the equipment to the ground and disconnecting the battery.

Hydraulic systems

Checking the oil level

To check the hydraulic oil level:

– Lower the load arms completely.

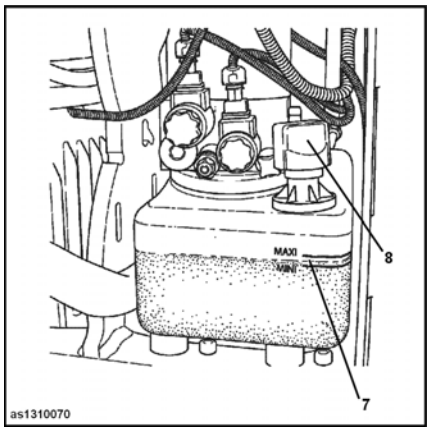
– Pull the emergency off switch.

– Remove the front hood.

– The oil level (7) must be between the min. and max. on the tank for the truck functions to operate correctly.

– Top up if necessary after unscrewing the plug (8).

– Refit and tighten the plug afterwards.



⚠ CAUTION

Deterioration or destruction of the equipment

Only use hydraulic oil that complies with the specifications (see recommended lubricants).

Checking the system for leaks

– Inspect the hydraulic system:

- Pipes
- Hoses and connections between the pump unit and the cylinders

– Tighten the connections if necessary.

– Check that the hoses are attached correctly and show no signs of friction wear.

If you find a leak, please contact our service engineers.

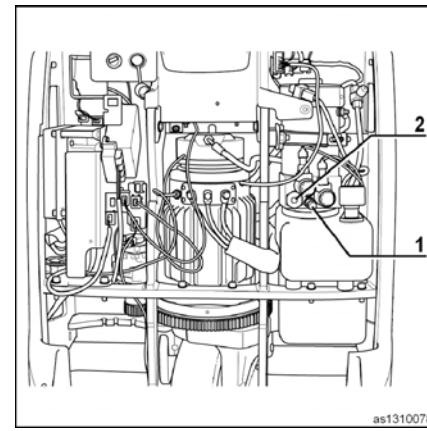
Cleaning the breather plug on the hydraulic tank

– Lower the lifting mechanism.

– Unscrew the plug.

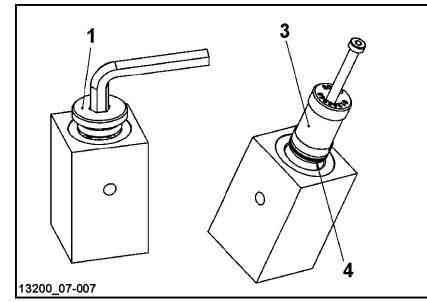
– Clean the strainer in the breather plug with compressed air.

Changing the hydraulic pressure filter "1" ▷



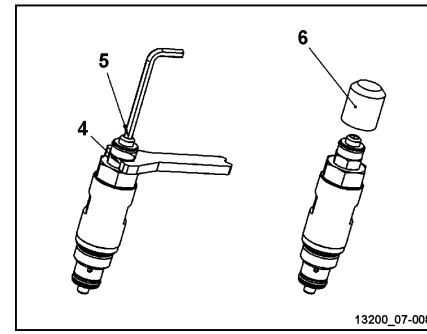
1 Hydraulic filter 20µm
2 Main pressure cut-off

– Unscrew the plug (1). ▷
– Insert an M6 type screw in the filter (3).
– Carefully remove the filter (3).
– Lubricate the O-ring (4) before changing the filter element.
– Carefully fit the new filter and O-ring (see illustration).
– Tighten the plug (1) to a torque of 70 Nm.



Adjusting the main pressure cut-off "2" ▷

– Remove the safety plug (6).
– Unscrew the locknut (4).
– Adjust the pressure of the pressure cut-off using an Allen key (5).
• To increase the pressure cut-off setting, turn the key (5) clockwise.
• To lower the pressure cut-off setting, turn the key (5) anti-clockwise.
– When the pressure cut-off setting is adjusted, lock the setting by tightening the locknut (4).



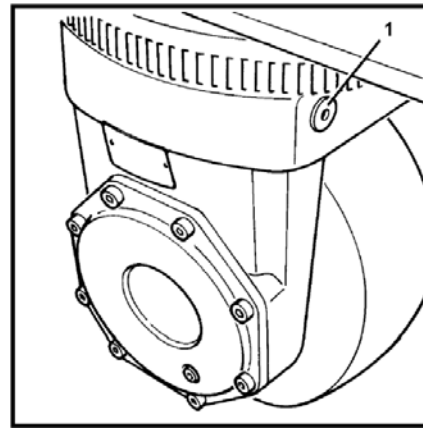
Maintenance every 1000 hours

NOTE

This operation must only be carried out by a person authorised by our network.

Transmission

Checking the transmission gear oil level ▷

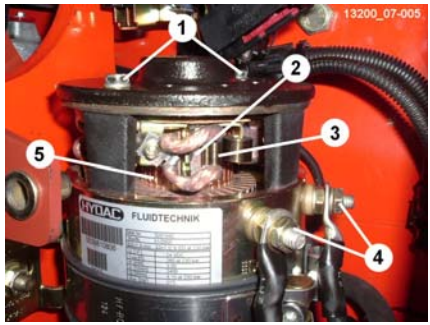


– Remove the front hood.
– Turn the wheel to access the level plug (1).
– Unscrew the plug (1); the oil should just touch the bottom of the bore.
– Top up if necessary.
– Tighten the plug.
– Check for signs of leakage around the seals and wheel shaft.

Maintenance every 2000 hours

Hydraulic systems

Replacing the pump motor brushes



– Lower the lifting mechanism.
– Disconnect the battery connector.
– Disconnect the 2 motor power supply cables (4).
– Note the positions of the motor power supply terminals (4) in relation to the pump unit.
– Unscrew the 2 tension rods (1).
– Remove the brush inspection collar.
– Rotate the motor to access the desired brush (2).
– Lift the brush pressure springs (3).
– Remove the brushes (2) from their guide.
– Change the brushes.

NOTE

Do not fit new brushes to a worn commutator (5).

Draining the oil from the circuit

– Lower the forks to the ground to eliminate pressure in the hydraulic system.
– Switch off the ignition and unplug the battery connector.
– Use the vacuum drainage kit.
– Remove the breather and insert the discharge hose into the filling opening down to the bottom of the tank.
– Drain off the oil.

NOTE

Dismantling the pump unit is not recommended.

Filling up

– Fill up the tank through the filling opening.
– Change the breather filter.
– Tighten the plug.
– Operate the lifting mechanism several times and bleed the circuit using the screws provided on the lift cylinders.

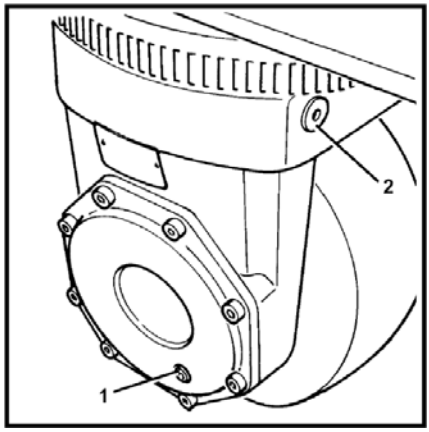
⚠ CAUTION

Deterioration or destruction of the equipment

Only use hydraulic oil that complies with the specifications (see lubrication table).

Transmission

Draining the transmission gear



NOTE

Before doing this, run the transmission gear to warm the oil.

- Remove the front hood.
- Raise the truck.
- Turn the wheel to provide access to the drain and level plugs (1)(2).
- Place a container under the transmission gear.
- Unscrew the level plug (2).
- Unscrew the magnetic drain plug (1).
- Drain the transmission gear oil.
- Clean and screw the magnetic drain plug back in, after fitting a new gasket.

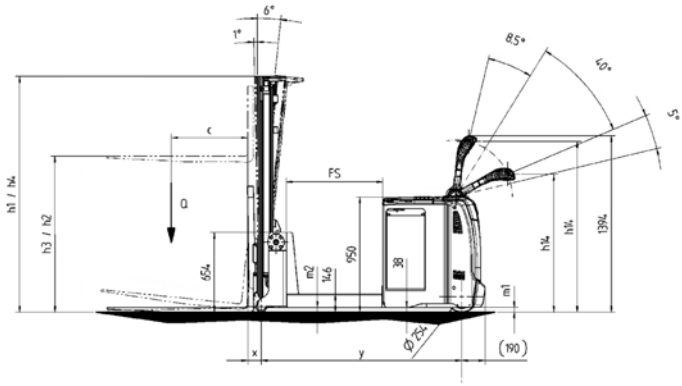
FILLING

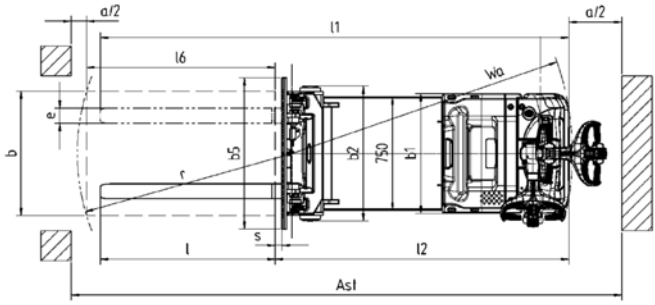
- Fill the reducer through the top opening (2) up to the lower edge of this opening.
- Screw the level plug (2) back in.

6

Technical data

Technical Data Sheet EXG 10-12-16





DESCRIPTION					
1.1	Manufacturer		STILL		
1.2	Model type		EXG16	EXG12	EXG10
1.3	Drive type: battery, diesel, petrol, LPG, mains power		Battery		
1.4	Driving: manual, pedestrian, standing, seated, order picking		Pedestrian		
1.5	Rated capacity	Q (kg)	1600	1200	1000
1.6	Centre of gravity	c(mm)	500	500	500
1.8	Distance from the centre of the wheel to the front face of the forks	x (mm)	105	100	100
1.9	Wheelbase	y (mm)	1635	1270	1270

WHEELS			EXG16	EXG12	EXG10
3.1	Tyres: polyurethane, rubber		Polyurethane for slippery floors		
3.2	Front wheel (drive wheel) dimensions	mm	∅ 254 x 102		
3.3	Front / rear wheel dimensions (load side)	mm	4 ∅ 85 x 105		
3.5	Number of front / rear or drive side / load side wheels		1 x /4		
3.7	Rear track width, load side	mm	483		

DIMENSIONS			EXG16	EXG12	EXG10
4.1	Mast / fork tilt, front / rear	a/b (°)	1/6		
4.9	Height of tiller in driving position, min/max.	h14(mm)	1103/1287		
4.15	Height of forks when lowered	h13 (mm)	46	41	41
4.19	Total length	l1 (mm)	2920	2550	2550
4.20	Length to front of forks	l2 (mm)	1920	1550	1550
4.21	Total width	b1/b2 (mm)	790/890		
4.22	Fork arm dimensions	s/e/l (mm)	45/100/1000	40/80/1000	40/80/1000
4.24	Largeur du tablier porte fourches	b3(mm)	minimum 800		
4.25	Ecartement des bras de fourches, min/max	b5 (mm)	225/753	205/733	205/733
4.31	Ground clearance, mast	m1 (mm)	40		
4.32	Ground clearance, centre of truck	m2 (mm)	40		

4.33	Aisle width with a 1000 x 1200 pallet crosswise	Ast (mm)	See calculation formulas		
4.34	Aisle width with an 800 x 1200 pallet lengthwise	Ast (mm)	See calculation formulas		
4.35	Turning radius	Wa (mm)	1845	1480	1480

PERFORMANCE DATA			EXG16	EXG12	EXG10
5.1	Travel speed (with/without load)	km/h	6 forward / 5 reverse		
5.2	Vitesse de levée, avec/sans charge	m/s	0,11 / 0,23		
5.3	Vitesse de descente, avec/sans charge	m/s	0,29 / 0,39		
5.10	Service brake		Electromagnetic		

DRIVE			EXG16	EXG12	EXG10
6.1	Traction motor, 60 minutes	kW	3		
6.2	Lift motor, 15 %	kW	3		
6.3	Type de batterie selon la norme DIN 43 531/35/36 A, B, no		4/5 PzS SV — 4 PzS SL	3/4 PzS SV — SL	3/4 PzS SV — SL
6.4	Voltage et capacité (5h) de la batterie	V/Ah	24 / —		
6.5	Poids de la batterie (+/- 5%)	kg	Voir Norme DIN / Type batterie / Capacité		

MISCELLANEOUS			EXG16	EXG12	EXG10
8.1	Speed control		LAC		
8.4	Noise level at operator's ear	dB(A)	<70		

Loads per axle

	3 Pzs (VA)	3 Pzs B (SA)	4 Pzs (VA)	4 Pzs B (SA)	5 Pzs (VA)	Units	
EXG16 (mast 2844D) with tilt	Non-standard		2020	2085	2230	kg	Weight in running order
			1310	1295	1360	kg	Drive axle load, unladen
			710	790	870	kg	Load-bearing axle load, unladen
			730	710	780	kg	Drive axle load, laden
			2890	2975	3050	kg	Load-bearing axle load, laden
			738	788	663	mm	Free Space FS (load chassis)
			100 X 45 / 1000	100 X 45 / 1000	100 X 45 / 1000		Forks
EXG 12 (mast 2924D) with tilt	Non-standard	1885	2060	1985	Non standard	kg	Weight in running order
		1100	1180	1145		kg	Drive axle load, unladen
		785	880	840		kg	Load-bearing axle load, unladen
		550	620	590		kg	Drive axle load, laden
		2535	2640	2595		kg	Load-bearing axle load, laden
		523	373	423		mm	Free Space FS (load chassis)
		80 X 40 / 1000	80 X 40 / 1000	80 X 40 / 1000			Forks
EXG 10 (mast 2424D) with tilt	1930	1861	2035	1958	Non standard	kg	Weight in running order
	1125	1099	1180	1144		kg	Drive axle load, unladen
	805	762	855	814		kg	Load-bearing axle load, unladen
	660	635	715	680		kg	Drive axle load, laden
	2270	2226	2320	2278		kg	Load-bearing axle load, laden
	423	523	373	423		mm	Free Space FS (load chassis)
	80 X 40 / 1000	80 X 40 / 1000	80 X 40 / 1000	80 X 40 / 1000			Forks

VA: Vertical Access

Loads per axle

SA: Side Access

Note: Apron ISO 2B width: 800 mm.

Mast table

EXG10	Mast type	1924S	2424S	2924S	3324S	3824S	1924D	2424D	2924D	3324D	3824D	3516T
h3	Lift (mm)	1924	2424	2924	3324	3824	1924	2424	2924	3324	3824	3516
h3 + h13	Lift + fork height (mm)	1965	2465	2965	3365	3865	1965	2465	2965	3365	3865	3557
h1	Mast height HT re-tracted (mm)	1515	1765	2015	2215	2465	1440	1690	1940	2140	2390	1690
h4	Mast HT height ex-tended (mm)	2485	2985	3485	3885	4385	2485	2985	3485	3885	4385	4077
h2	Free lift (mm)	150	150	150	150	150	879	1129	1379	1579	1829	1129

EXG12	Mast type	1924S	2424S	2924S	3324S	3824S	4224S
h3	Lift (mm)	1924	2424	2924	3324	3824	4224
h3 + h13	Lift + fork height (mm)	1965	2465	2965	3365	3865	4265
h1	Mast height HT retracted (mm)	1515	1765	2015	2215	2465	2665
h4	Mast HT height extended (mm)	2485	2985	3485	3885	4385	4785
h2	Free lift (mm)	150	150	150	150	150	150

EXG12	Mast type	1924D	2424D	2924D	3324D	3824D	4224D	3516T	4266T
h3	Lift (mm)	1924	2424	2924	3324	3824	4224	3516	4266
h3 + h13	Lift + fork height (mm)	1965	2465	2965	3365	3865	4265	3557	4307
h1	Mast height HT retracted (mm)	1440	1690	1940	2140	2390	2590	1690	1940

h4	Mast HT height extended (mm)	2485	2985	3485	3885	4385	4785	4077	4827
h2	Free lift (mm)	879	1129	1379	1579	1829	2029	1129	1379

EXG16	Mast type	1844S	2344S	2844S	3244S	3744S	4144S
h3	Lift (mm)	1844	2344	2844	3244	3744	4144
h3 + h13	Lift + fork height (mm)	1890	2390	2890	3290	3790	4190
h1	Mast height HT retracted (mm)	1515	1765	2015	2215	2465	2665
h4	Mast HT height extended (mm)	2405	2905	3405	3805	4305	4705
h2	Free lift (mm)	150	150	150	150	150	150

EXG16	Mast type	1844D	2344D	2844D	3244D	3744D	4144D	3516T	4266T
h3	Lift (mm)	1844	2344	2844	3244	3744	4144	3516	4266
h3 + h13	Lift + fork height (mm)	1890	2390	2890	3290	3790	4190	3562	4312
h1	Mast height HT retracted (mm)	1440	1690	1940	2140	2390	2590	1690	1940
h4	Mast HT height extended (mm)	2405	2905	3405	3805	4305	4705	4077	4827
h2	Free lift (mm)	879	1129	1379	1579	1829	2029	1129	1379

NUMBERS AND SYMBOLS

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

V

W

STILL GmbH
Berzeliusstrasse 10
D-22113 Hamburg

Ident no. 1170 801 15 09 EN

Original instructions

STILL
ELECTRONIC
DOCUMENTATION
SYSTEM

Counterweight pallet stacker

EXG-10
EXG-12
EXG-16

CE

1217 1218 1219

first in intralogistics

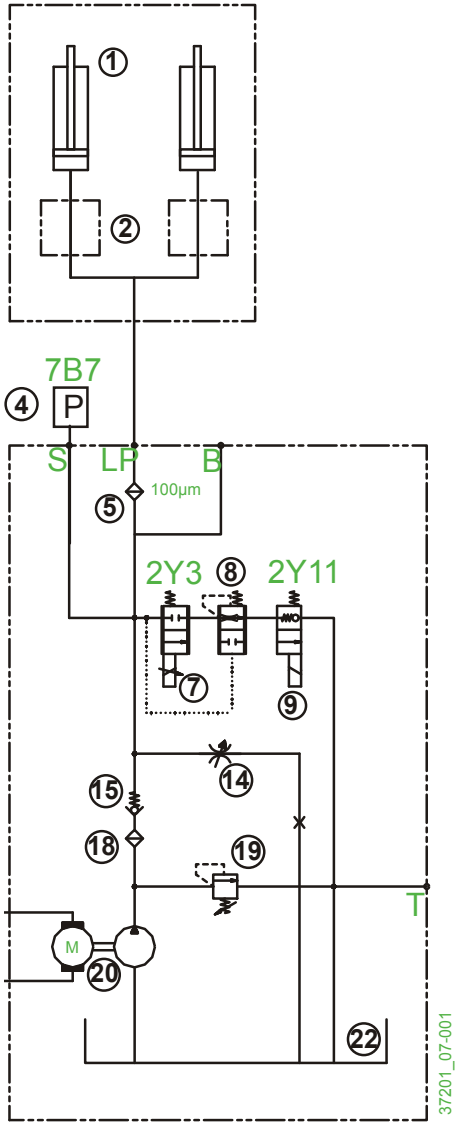
1170 801 15 09 EN - 07/2012

Annex

Diagrams

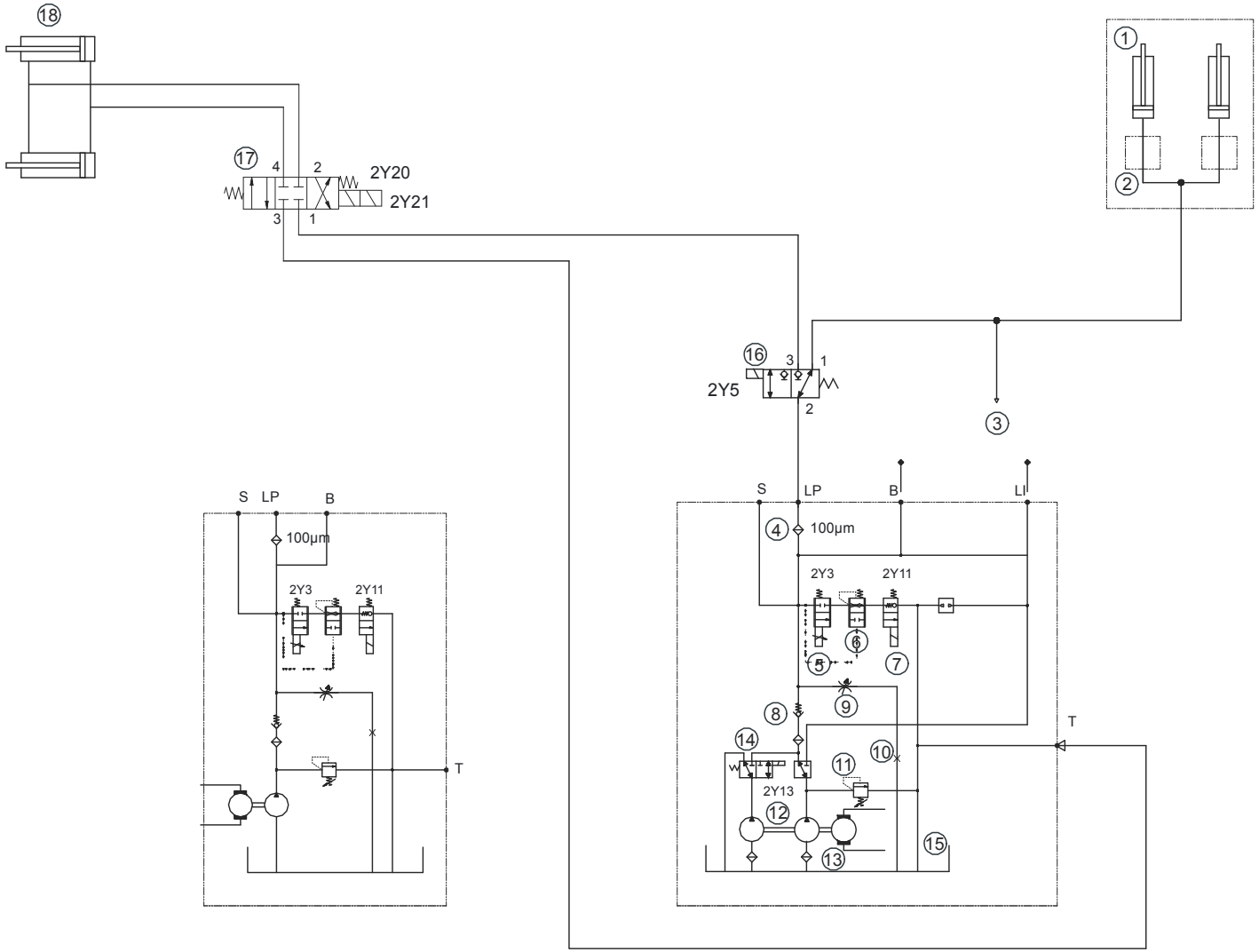
Hydraulic installation

Proportional control / Without Initial Lift



1	High lift cylinders
2	Cylinder safety valves
4	Pressure sensor 7B7
5	Strainer 100 µm
7	Proportional lowering solenoid valve 2Y3
8	Pressure balance* linked to the proportional solenoid valve
9	Load retainer solenoid valve 2Y11
14	Safety valve with diaphragm Ø=1.2 mm
15	Non-return valve
18	Filter cartridge 20 µm
19	Main pressure relief valve set at 240 bar
20	Pump
22	Hydraulic tank

Hydraulic diagram (with mast tilt)



1170-07-001

1	High lift cylinders	6	Pressure balance linked to the proportional solenoid valve	10	Diaphragm Ø=1.2 mm linked to the safety valve (9)	14	Filter cartridge 20 µm
2	Cylinder safety valves	7	Load retainer solenoid valve 2Y11	11	Main pressure cut-off	15	Filler plug fitted with a breather filter
3	Brake assistance	8	Non-return valve	12	Pump	16	Needle solenoid valve 2Y5
4	Strainer 100 µm	9	Safety valve	13	Hydraulic tank	17	Mast tilt solenoid valve 2Y20-2Y21
5	Proportional lowering solenoid valve 2Y3					18	Tilt cylinder

Electrical installation

Circuit diagram parts list

POWER :

1A1: Traction and lifting control module

3A1: Steering control module

1F1: 250 A traction/lift fuse

3F1: 80 A steering fuse

G1: Battery

1K2: Traction contactor

3K1: Steering contactor

1M1: Traction motor

3M1: Steering motor

2M1: Pump unit motor

X1: Battery socket

CONTROLS :

A1: Control interface (travel, lift, horn)

1A1 Traction and lift controller (LAC) :

- :1 - Status of LES safety relay
- :2 - Traction Lift contactor 1K2
- :3 - Proportional solenoid valve 2Y3
- :4 - Switching solenoid valve 2Y5
- :5 - Additional function 1
- :6 - Additional function 3
- :7 - Tiller foot
- :8 - Operator presence
- :9 - Channel A speed sensor
- :10 - Channel B speed sensor
- :11 - Emergency stop button control
- :12 - Battery locking detection
- :14 - Tiller anti-crush safety device in OFF position
- :14 - Tiller anti-crush safety device in ON position
- :16 - Initial lift top cut-out
- :18 - Initial Lift in lower position
- :19 - Setting 1, main lift control
- :20 - Setting 2, main lift control
- :21 - CAN high (lifting)
- :22 - Power supply to potentiometers 1B1 and 2B4
- :23 - LAC power supply
- :24 - Power supply, brake Y1, solenoid valves, 1K2
- :25 - Mast tilt solenoid valve 2Y21
- :26 - Load retainer solenoid valve 2Y11
- :27 - Booster solenoid valve 2Y13
- :28 - Additional function 2
- :29 - Traction speed restriction No. 1
- :30 - Operator seat presence
- :31 - Platform position
- :32 - Forks at 0.3 m off ground
- :33 - Forks at 0.3 m off ground
- :34 - Battery level
- :35 - LES status
- :36 - Initial Lift control
- :37 - Accelerator potentiometer setting
- :38 - Accelerator switches
- :39 - Top fork limit stop
- :41 - Forks at 1.5 m off ground
- :43 - CAN high (traction)
- :44 - CAN low (traction)
- :45 - CAN low (lifting)
- :46 - Power supply to speed sensor 1B2
- :47 - Fan 9M1 control
- :48 - LAC controller power supply
- :49 - Brake Y1
- :50 - Mast tilt solenoid valve 2Y20
- :52 - Creep speed 2, direction opposite to that of fork
- :53 - Guard rail position
- :56 - Tiller anti-crush safety device
- :57 - Traction speed restriction No. 2
- :59 - Initial Lift lowering control
- :60 - Traction motor temperature gauge
- :61 - Wheel position setting
- :62 - Full lift authorisation
- :64 - Inclinometer
- :68 - Power supply to potentiometers 1B1 and 2B4
- :69 - Power supply to speed sensor 1B2

3A1 Steering controller (LES) :

- :1 - Control card supply
- :2 - Supply to setting potentiometer 3B2
- :3 - Setting track 1, potentiometer 3B2
- :4 - Setting track 2, potentiometer 3B2
- :5 - Channel A speed sensor
- :6 - CAN 2 high (steering)
- :7 - CAN 2 low (steering)
- :8 - Traction authorisation
- :9 - 3K1 contactor drive
- :10 - 3K1 contactor supply
- :11 - Control card supply
- :12 - Supply to wheel position potentiometer 3B3
- :13 - Setting track 1, potentiometer 3B3
- :14 - Channel B speed sensor
- :16 - CAN 1 high (steering)
- :17 - Wheel position setting
- :18 - Supply to internal safety relay A
- :19 - Supply to internal safety relay B
- :20 - Supply to setting potentiometer 3B2
- :21 - Supply to setting potentiometer 3B3
- :22 - Setting track 1, potentiometer 3B3
- :24 - Motor 3M1 brush wear
- :27 - CAN 1 low (steering)
- :29 - Status of LES safety relay

7A5 Braking module (LORD)

1B1 Accelerator potentiometer

1B2 Traction motor speed sensor

1B6 Traction motor temperature sensor

2B1 Fork height sensor, 0.3 m from the ground

2B5 Joystick potentiometer

2B6 Fork height sensor, 1.5 m from the ground

3B2 Steering potentiometer (setting)

3B3 Steering potentiometer (wheel position)

7B7 Pressure sensor

1F3 7.5 A control circuit fuse

4H1 Horn

K5 Electronic key relay

1K2 Traction contactor

3K1 Steering contactor

9M1 Electrical panel fan

6P4 Multifunction display

R1, R2 Additional solenoid valve resistor

R1CF Cold store tiller resistor

S1 Switch key

1S3 Rear safety contact (belly switch) on tiller

1S4 Tiller foot contact

1S4A Tiller foot contact

1S19 Battery lock contact

1S21 Forward travel butterfly valve

1S22 Reverse travel butterfly valve

2S6 Tilt validation contact

2S7 Tilt validation contact

4S1 Horn

7S5 Control circuit opening contact (mechanically controlled by 7S1)

X2 Battery lock connector

X5 Connector for electronic key relay

X13 Braking module connector (LORD)

1X1 Traction/lifting controller connector (LAC)

1X2 Speed sensor connector

1X3 Plate/control unit interface connector (A1)

1X5 Control module connector

1X6 Additional solenoid valve option connector

1X9 Driver presence connector

1X11 Fork height connector 1.5 m (mast)

1X20 Platform position connector

1X25 Traction motor temperature connector

1X28 Fork height connector 1.5 m (mast)

2X2 Fork height connector 0.3 m (mast)

2X5 Full Lift connector (tiller)

2X9 1.5 m guardrail / relay supply connector

2X23 Load retaining solenoid valve connector

2X24 Proportional solenoid valve connector

2X26 Booster solenoid valve connector

2X61 Lift connector

3X1 Electric steering connector

3X3 Wheel position potentiometer connector

6X2 Multifunction indicator connector

6X7 Diagnostic socket connector

7X6 Electromagnetic brake connector (Y1)

7X7 Pressure cut-off connector

7X9 Control circuit opening connector

9X3 Cold store connector

9X6 Additional technical compartment hydraulic connector

9X7 Mast / chassis link connector

9X11 Fan connector

Y1 Electromagnetic brake

2Y3 Proportional solenoid valve

2Y5 Switching solenoid valve

2Y11 Load retaining solenoid valve

2Y13 Booster solenoid valve

2Y20 Mast tilt solenoid valve

2Y21 Mast tilt solenoid valve

2Y22 Additional function 2 solenoid valve

2Y23 Additional function 2 solenoid valve

2Y24 Additional function 3 solenoid valve

2Y25 Additional function 3 solenoid valve

Z1 Interference suppression circuit

Z2 Interference suppression diode

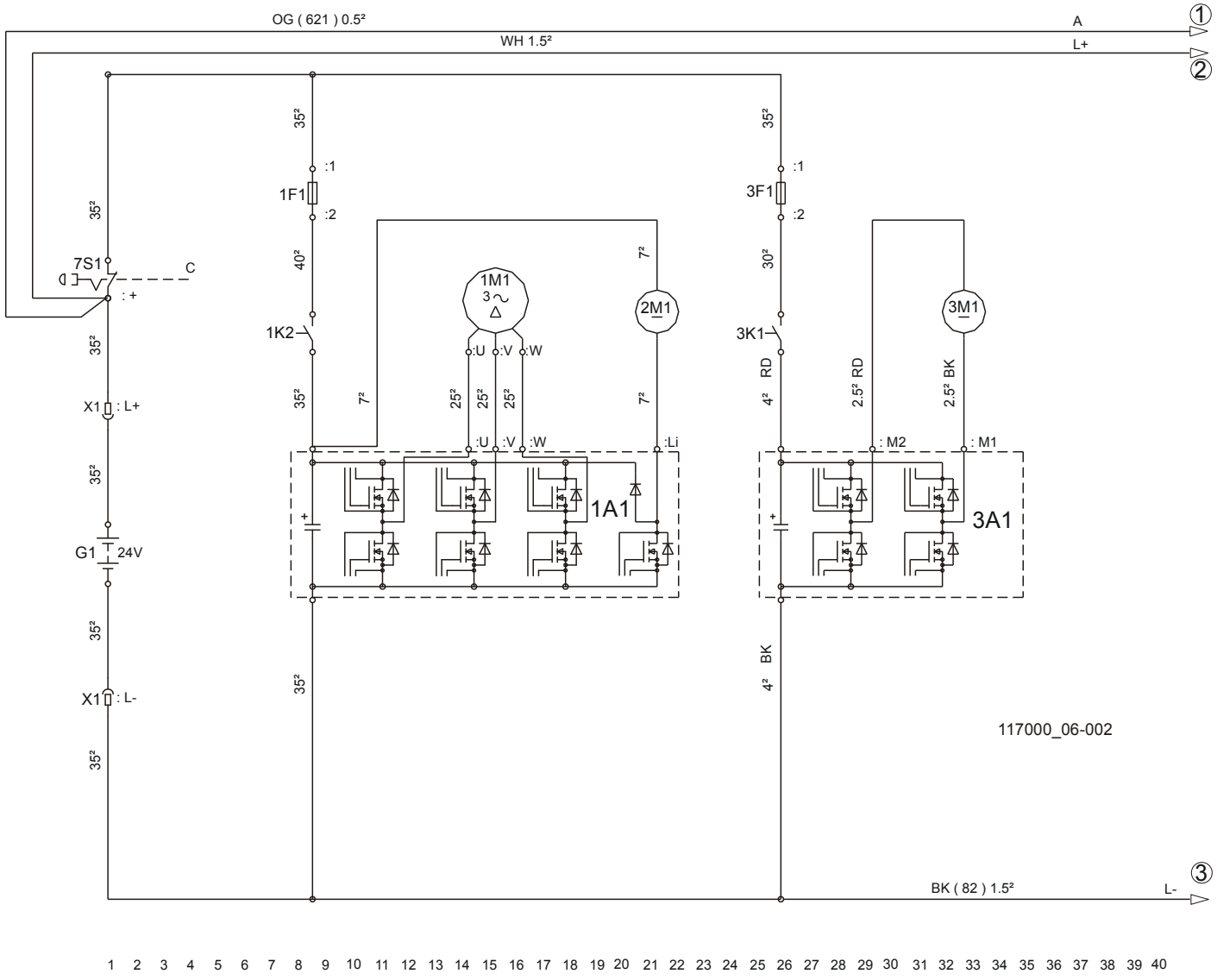
7Z1 Brake interference suppression

7Z2 Contactor interference suppression

Legend: electric wire codes

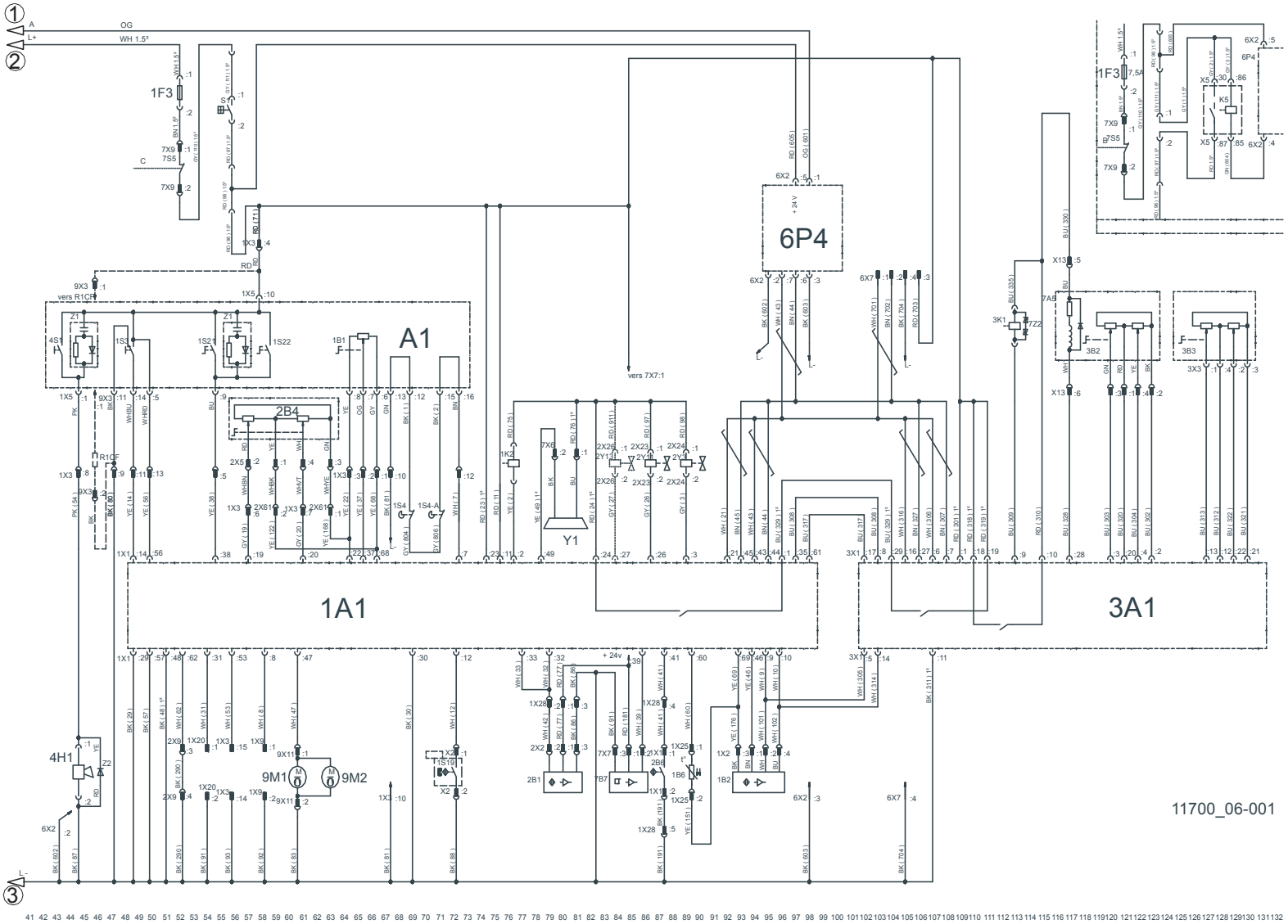
Code	Colour	Code	Colour
BK	Black	GN	Green
WH	White	VT	Violet
BU	Blue	RD	Red
OG	Orange	YE	Yellow
BN	Brown	GY	Grey

Power EXG10, EXG12, EXG16

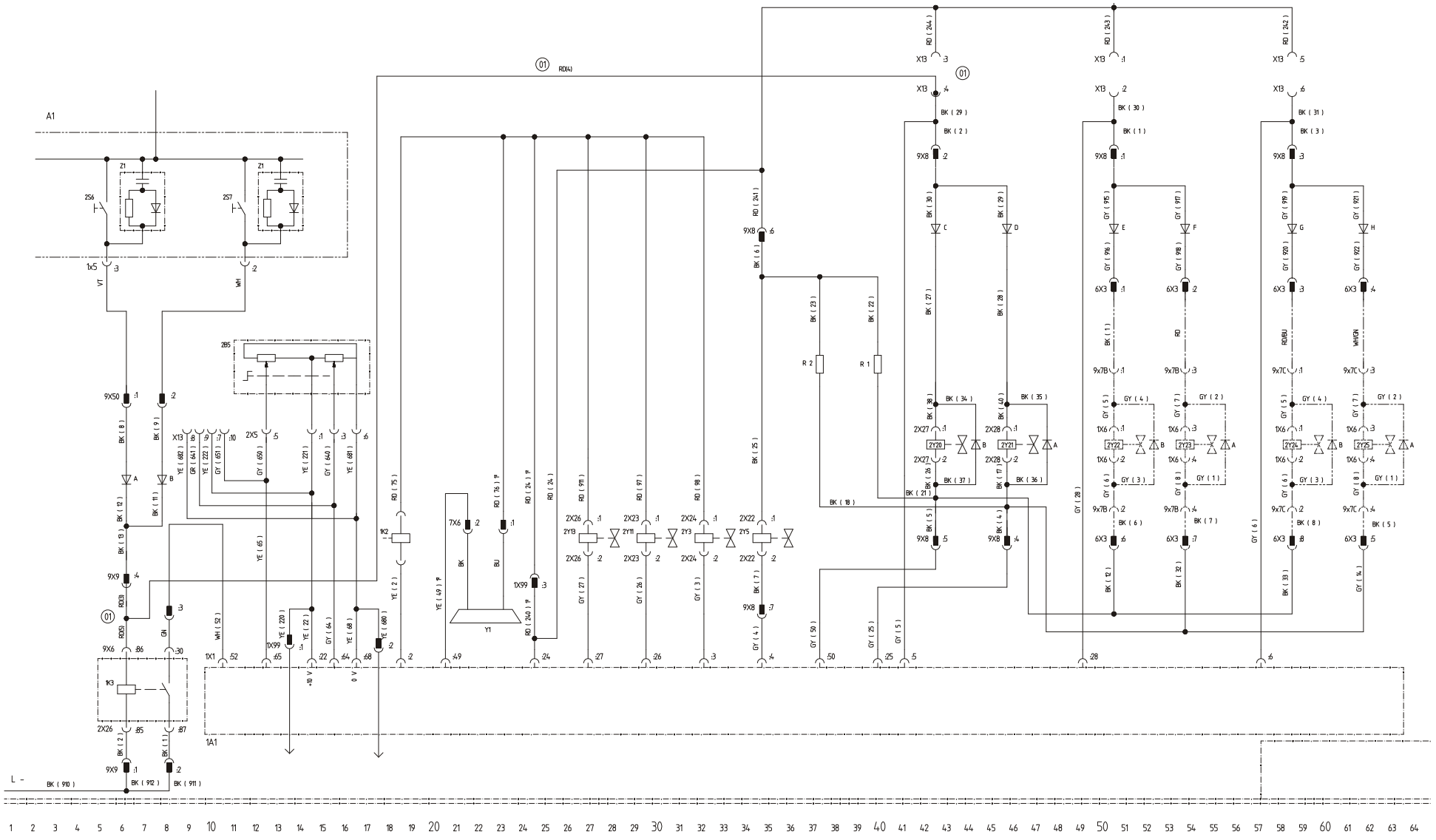


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Controls EXG10, EXG12, EXG16



Mast tilt option EXG10, EXG12, EXG16



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