

# ETM/V 214/216/220

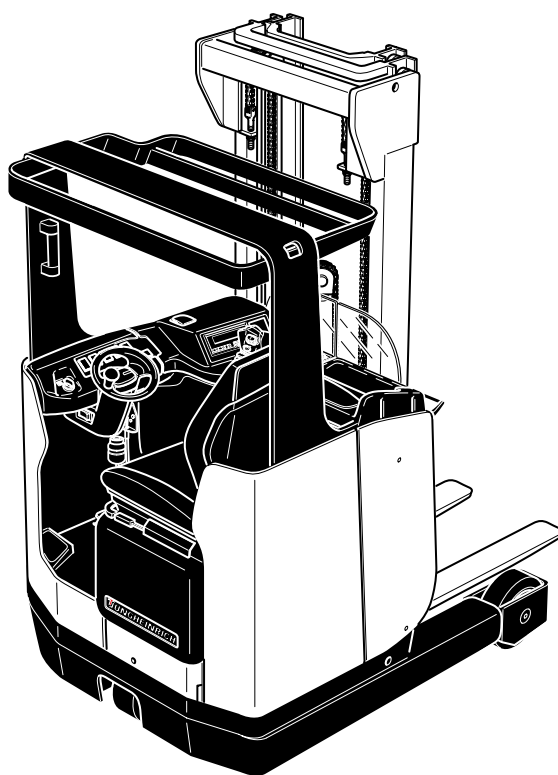
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## Operating instructions



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## **Important notes on transporting and mounting load lifting devices to reach trucks**

### **Transport**

Depending on the overall height of the lifting mast and the local conditions transport can be performed in three different ways

- Standing, with the lifting mast mounted (for trucks with low overall height)
- Standing, with partially mounted lifting mast tilted towards the overhead guard (for trucks with medium overall height). Hydraulic line for the lifting function is interrupted.
- Standing, with the lifting mast dismantled (for trucks with large overall height)

### **Safety Instructions for Assembly and Commissioning**



The assembly of the truck on site, commissioning the truck and instructing the driver must be carried out by personnel trained and authorised by the manufacturer

Connect the hydraulic lines to the basic machine / mast interface and commission the truck only after having installed the mast as per the instructions.



# Foreword

The present ORIGINAL OPERATING INSTRUCTIONS are designed to provide sufficient instruction for the safe operation of the industrial truck. The information is provided clearly and concisely. The chapters are arranged by letter. Each chapter starts with page 1. The page identification consists of a chapter letter and a page number.

For example: Page B 2 is the second page in chapter B.

The operating instructions detail different truck models. When operating and servicing the truck, make sure that the instructions apply to your truck model.

Safety instructions and important explanations are indicated by the following graphics:



Used before safety instructions which must be observed to avoid danger to personnel.



Used before notices which must be observed to avoid material damage.



Used before notices and explanations.



Used to indicate standard equipment.



Used to indicate optional equipment.

Our trucks are subject to ongoing development. Jungheinrich reserves the right to alter the design, equipment and technical features of the truck. No guarantee of particular features of the truck should therefore be inferred from the present operating instructions.

## Copyright

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# A Correct use and application of the truck



The “Guidelines for the Correct Use and Application of Industrial Trucks” (VDMA) are included in the scope of delivery for this truck. The guidelines are part of these operating instructions and must always be heeded. National regulations are fully applicable.

The fork lift truck described in these operating instructions is a truck that is suitable for lifting and transporting loads.

It must be used, operated and maintained according to the information in these operating instructions. Any other uses are outside the design envelope and can lead to injury to persons or damage to equipment and property. Above all, overloading caused by excessively heavy or unbalanced loads must be avoided. The max. admissible load to be picked up is indicated on the identification plate or load diagram label shown on the truck. The fork lift truck must not be operated in spaces subject to fire or explosion hazards, or in spaces where corrosive or very dusty atmospheres prevail.

**Duties of the user:** A “user” within the meaning of these operating instructions is defined as any natural or legal person who either uses the fork lift truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting), the user is considered the person, who, in accordance with existing contractual agreements between the owner and the user of the fork lift truck, is charged with the observance of the operating duties.

The user must ensure that the truck is not abused and only used within its design limits and that all danger to life and limb of the operator, or third parties, is avoided. In addition to this, it must be ensured that the relevant accident prevention regulations and other safety-related provisions, as well as the operating, servicing and maintenance guidelines, are observed. The user must also ensure that all persons operating the truck have read and understood these operating instructions.



If these operating instructions are not observed the warranty becomes void. The same applies if improper works are carried out at the device by the customer and/or third parties without permission of our Customer Service.

**Mounting of attachments:** The mounting or installation of any attachments which will interfere with, or supplement, the functions of the truck is permitted only after written approval by the manufacturer has been obtained. If necessary, the approval of local authorities has to be obtained.

Any approval obtained from local authorities does not, however, make the approval by the manufacturer unnecessary.

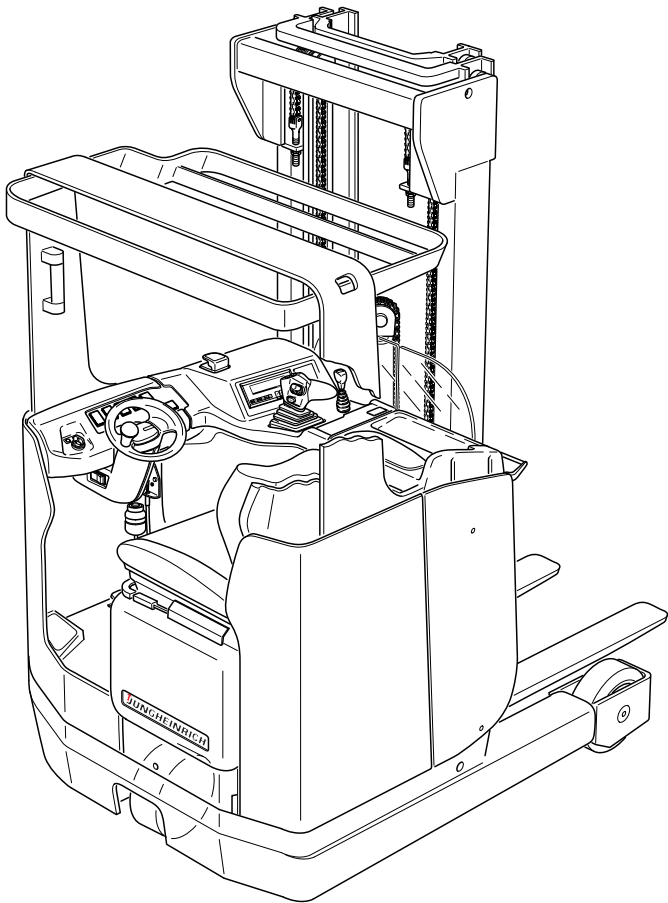


# B Description of the truck

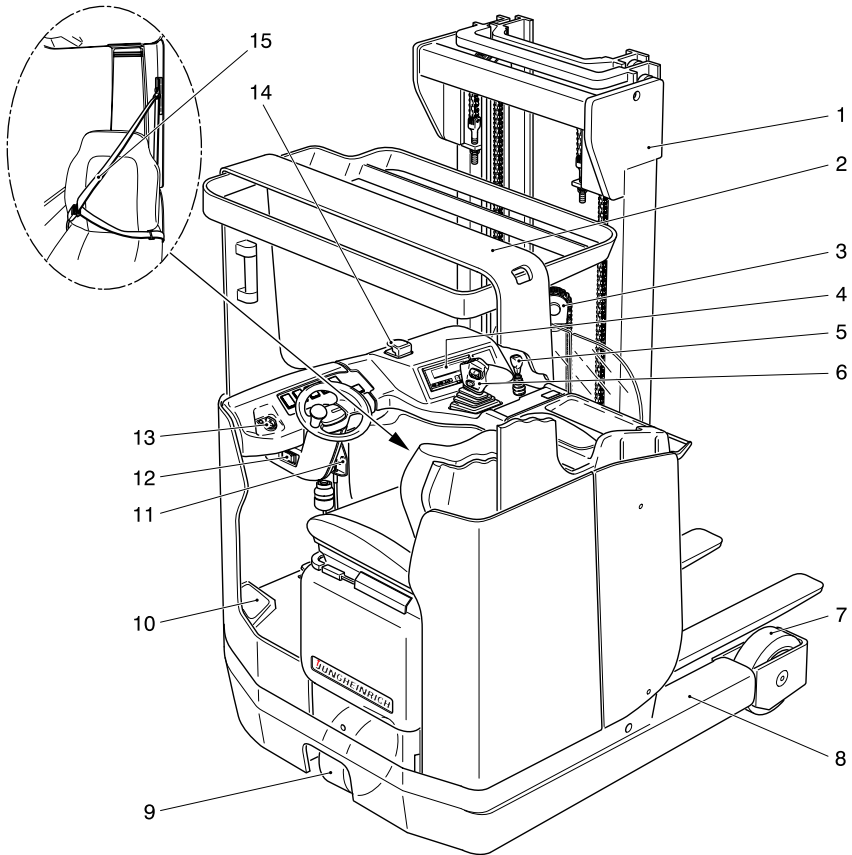
## 1 Application

The ETM/V 214-220 is an electrically driven three-wheel truck incorporating a traversing mast and a lateral seat. It is intended for the lifting and transportation of goods on level ground. It can pick up pallets of open ground support, pallets provided with lateral boards arranged outside or inside the range of the load-bearing wheels, or trolleys. Loads can be stacked in and out and transported across greater distances. Its capacity is shown on the identification label.

Type	Capacity	Load centre distance
ETM/V 214	1400 kg	600 mm
ETM/V 216	1600 kg	600 mm
ETM/V 220	2000 kg	600 mm



## 2 Assembly description and functional description



Item	Designation	Item	Designation
1	● Clear-view lifting mast	9	● Drive wheel
2	● Overhead guard	10	● Foot switch
3	● Free-lift cylinder	11	● Battery trolley unlocking system
4	● Information and service display (LISA)	12	● Parking brake
5	○ Auxiliary hydraulics (ZH2)	13	● Key switch
6	● Multi-pilot stick	14	● Master switch (emergency stop)
7	● Load-bearing wheels	15	○ Safety belt
8	● Wheel arm		
● = Standard equipment		○ = Optional equipment	

## 2.1 Truck

**Safety installations:** The enclosed truck contour featuring rounded edges ensures safe handling of the ETM/V 214-220 truck. The driver is protected by the overhead guard (2). The drive wheel (9) and the load-bearing wheels (7) are enclosed by a sturdy collision guard.

The master switch (14) ensures instant cut-out of all electrical functions in an emergency. Six red LED warning lights in the information and service display (4) indicate the following states:

- Direction of motion Forward(V), „Drive direction“
- Parking brake applied
- Direction of motion Backward (R), „Load direction“
- Lack of brake liquid
- Center position of lateral traversing device (option)
- Battery locking

In case of malfunctions within the hydraulic system, line break safety devices limit the speed at which the load is lowered.

**Indicating instruments:** Information and service display (LISA) (4) with large indications in LCD-technology. Hour meter and battery discharge indicator with lifting movement cut-out function.

**Drive system:** The complete drive unit is screwed into the vehicle chassis. A rigidly mounted 5.4 kW shunt motor, or an optional 6 kW rotary current generator, runs the driving wheel (9) via a front bevel-wheel gear mechanism.

The electronic drive current control system provides variable speed to the drive motor, thus allowing smooth starting without jerks, vigorous accelerating and electronically controlled regenerative braking.

The rate of energy regeneration can be set with the LISA system.

**Brake system:** Two independent brake systems act on the drive wheel. The service brake is designed as a hydraulic drum brake with asbestos-free brake linings and is applied by means of the foot pedal. The parking brake (12) acts mechanically as an electromagnetic brake on the drum brake by pulling a rope.

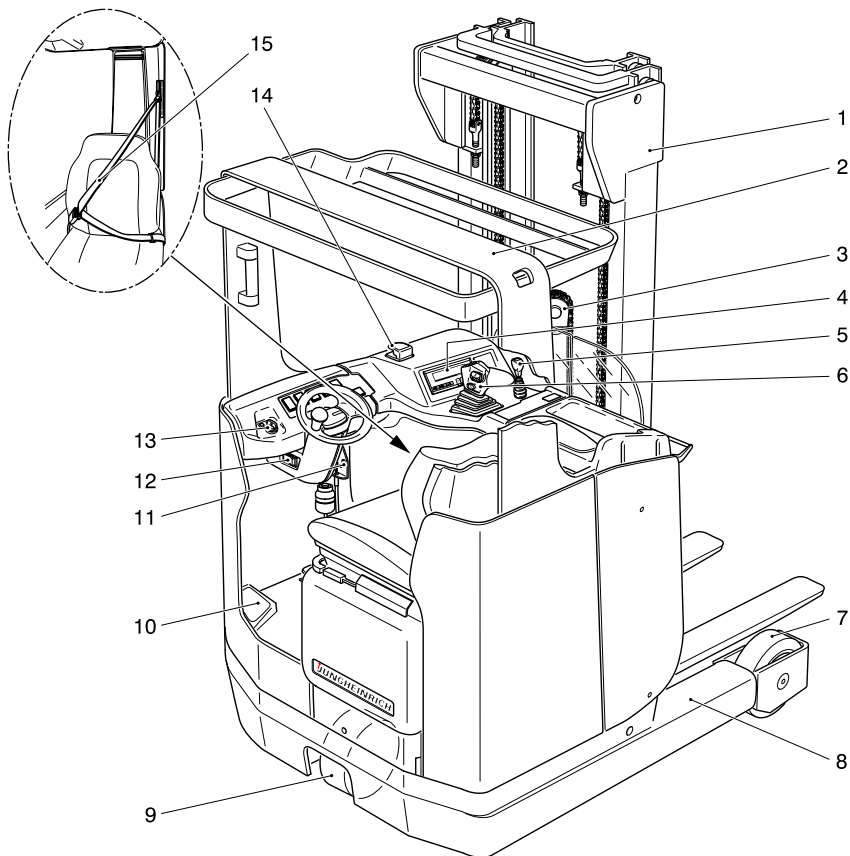
The brake fluid level is monitored by the LISA system. A warning light shows when the parking brake is applied.

Malfunctions in the steering system and in the parking brake system (release of emergency stop) are indicated in the LISA display.

**Steering system:** Chain-operated steering using a steering gear and, as standard, electric steering. The pivoted drive unit can be swivelled by 90° to both sides.

**Driver position:** The driver's place is ergonomically designed and equipped with a large foot space. In order to obtain an ergonomic seating position, the driver can adjust the driver's seat and the steering column horizontally and vertically.

Accelerator and brake pedals are arranged as found in normal vehicles.



Item	Designation	Item	Designation
1	● Clear-view lifting mast	9	● Drive wheel
2	● Overhead guard	10	● Foot switch
3	● Free-lift cylinder	11	● Battery trolley unlocking system
4	● Information and service display (LISA)	12	● Parking brake
5	○ Auxiliary hydraulics (ZH2)	13	● Key switch
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7	● Load-bearing wheels	15	○ Safety belt
8	● Wheel arm		
● = Standard equipment		○ = Optional equipment	

**Operating controls and indicators:** The operating controls and indicators are clearly laid out and arranged at the driver position.

The logically structured multi-pilot stick (6) allows single-handed operation of the drive direction, lifting/ lowering, forward/backward traversing of mast, mast inclination, traversing to the left/right (in lateral traversing operation - auxiliary hydraulics ZH1) and horn functions.

The information and service display (LISA) (4) combines a battery discharge indicator and a working hour meter. The battery discharge indicator is designed as a discharge monitor and will interrupt the lifting function when the battery is depleted to prevent battery exhaustion.

As an option, an auxiliary hydraulic system ZH2 can be operated via the control lever (5).

**Hydraulic system:** Pump unit with a remotely ventilated series-wound motor and a noiseless precision jetting pump integrated in the oil reservoir. The system is controlled via the multi-pilot stick (6) and the optional auxiliary hydraulics (5).

Instead of the multi-pilot, an optional control via individual levers is possible (see chapter E).

**Electric system:** 48 V two-wire system.

As a standard feature, the truck is equipped with an electronic drive and lifting control system. The electronic drive control system variably controls the travelling speed and allows counter-current braking when switching the direction of travel.

The information and service display (LISA) (4) allows a adjustment of the driving and lifting parameters according to the current requirements. Warning indications, operating error indications and service functions are also shown on the LISA.

(For possible drive batteries, see chapter D.)

## 2.2 Load lifting system

**Mast holder:** The mast holder is borne by supporting rollers. The protracting and retracting movements are carried out directly by a simply telescoping traversing cylinder. The guide rails for the mast holder are screwed onto the wheel arms (8).

**Hoist frame:** The trucks are equipped with tiltable, telescoping free-vision hoist frames (1) supported by the mast holder. Adjustable lateral rollers and guide pieces absorb the lateral pressure acting on the fork carrier when transporting unbalanced loads. The mounting of the fork to the fork carrier permits adjustments to be made to the tines. In the case of the double-lift triplex mast (DZ), the initial lifting sequence of the load carriage (free lift), which does not change the total height, is effected by a short free-lift cylinder (3) arranged off-centre. In the case of the telescopic mast (ZT), the free-lift sequence is limited to 80 mm due to the construction of the truck.

**Attachments:** Mechanical and hydraulic attachments are available as optional equipment.



### 3 Technical data - Standard version



Technical data to VDI 2198.

Technical data are subject to alteration and extension in scope.

#### 3.1 Output data

	Designation	ETM/V 214	ETM/V 216	ETM/V 220	
Q	Capacity (at C = 600 mm)	1400	1600	2000	kg
C	Load centre distance	600	600	600	mm
	Travelling speed with / without load	10,8/11	10,3/10,6	10,1/ 10,6	km/h
	Lifting speed with / without load	0,35/0,55	0,34/0,54	0,28/0,43	m/s (±10%)
	Lowering speed with / without load	0,50/0,50	0,50/0,50	0,50/0,50	m/s (±15%)
	Traversing speed with / without load	0,2	0,2	0,12 d)	m/s
	Climbing ability with / without load	9/13	8/12	7/11	%
	Max. climbing ability (max. 5 min) with / without load	10/15	10/15	10/15	%

d)  $h_3 \geq 6201 - 8000 \text{ mm} = 0,10 \text{ m/s}$

$h_3 \geq 8001 \text{ mm} = 0,08 \text{ m/s}$

#### 3.2 Dimensions

	Designation	ETM/V 214 (ZT/DZ)	ETM/V216 (ZT/DZ)	ETM/V220 <sup>d)</sup> (ZT/DZ)	
s	Height of lowered fork	40	40	50	mm
$h_6$	Height above overhead guard <sup>e)</sup>	2075/2190	2075/2190	2075/2190	mm
$l_1$	Total length <sup>a)</sup>	1957/1985	1957/1985	2034/2060	mm
$l_4$	Traversing distance <sup>b)</sup>	616/594	666/644	690/664	mm
$l_7$	Length across wheel arms	1752	1802	1903	mm
$b_1$	Total width	1120/1238	1120/1238	1126/1244	mm
$b_2$	Total width	1106/1186	1106/1186	1106/1186	mm
$W_a$	Turning radius	1617/1629	1663/1675	1745/1753	mm
Ast	Working aisle width 800 x 1200 pallets, lengthwise <sup>c)</sup>	2617/2639	2617/2639	2669/2695	mm
Ast	Working aisle width 1000 x 1200 pallets, crosswise <sup>c)</sup>	2417/2439	2417/2439	2469/2495	mm
	Dead weight :	Refer to truck identification plate			

a) Length of fork: 800 mm; 560 Ah battery: +90 mm; 700 Ah battery: +162 mm

b) 560 Ah battery: -90 mm; 700 Ah battery: +162 mm

c)  $\pm 5 \text{ mm}$ ; 560 Ah battery: +90 mm; 700 Ah battery: +162 mm

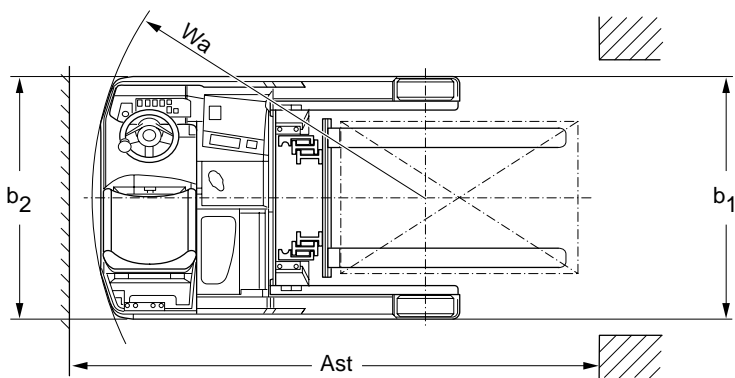
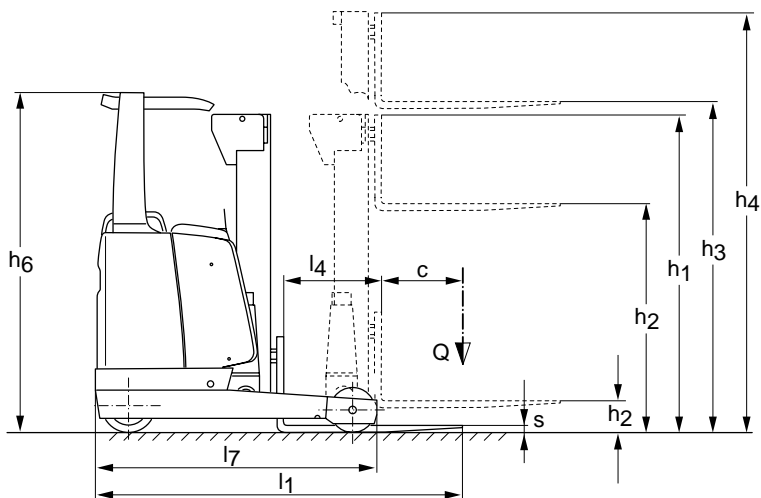
d) 700 Ah battery: a( +162 mm, b) -162 mm, c) +162 mm

e) Overall height  $h_1 \leq 2500$ : 2075 mm

Overall height  $h_1 \geq 2200$ : 2400 mm, 420/560 Ah battery: 2075mm

700 Ah battery: 2190 mm

Overall height  $h_1 > 2400 \text{ mm} = 2190 \text{ mm}$

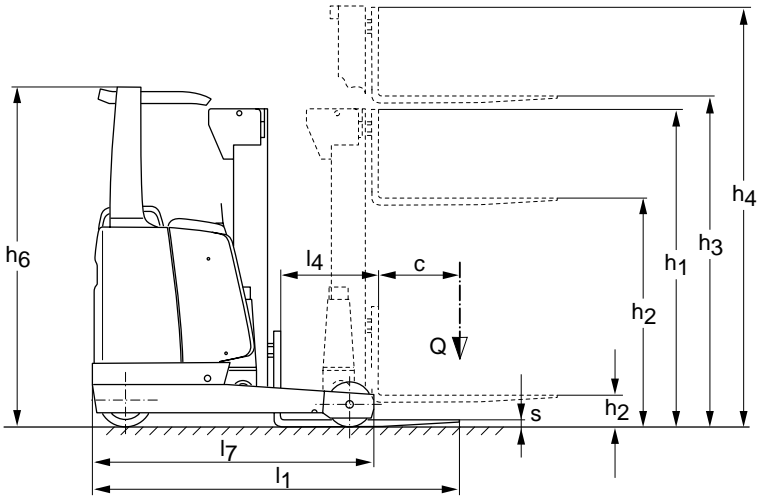


**3.3 Standard hoist frame versions ETM/V 214/216**

	Designation	Telescopic mast (ZT)	Double lift triplex mast (DZ)	Double lift triplex mast (DZ), reinforced	
$h_1$	Total height	1950 - 3100	1950 - 2700	2700 - 3950	mm
$h_2$	Free lift	80	1306 - 2056	2056 - 3306	mm
$h_3$	Lift	2900 - 5200	4250 - 6500	6500 - 10250	mm
$h_4$	Max. height	3544 - 5844	4894 - 7144	7144 - 18094	mm

**3.4 Standard hoist frame versions ETM/V 220**

	Designation	Telescopic mast (ZT)	Double lift triplex mast (DZ)	Double lift triplex mast (DZ) reinforced	
$h_1$	Total height	2050 - 2700	2050 - 3440	2050 - 3440	mm
$h_2$	Free lift	100	1320 - 2710	1320 - 2710	mm
$h_3$	Lift	2900 - 4200	4250 - 8420	4250 - 8420	mm
$h_4$	Max. height	3591 - 4891	4996 - 9166	4996 - 9166	mm



### 3.5 EN standards

#### Continuous sound level:

70 dB(A)  
according to EN 12053 as stipulated in ISO 4871.



The continuous sound level is an average value determined according to the standard's guidelines and takes into consideration the sound level when driving, lifting and in idle mode. The sound level is measured at the driver's ear.

#### Vibration:

0.40 m/s<sup>2</sup>  
according to document N47E of CEN/TC 150/WG8.



The vibration acceleration applied to the operator's body is measured according to the standard's guidelines as a linearly integrated, weighted acceleration in vertical direction. The acceleration is measured when driving across bumps at steady speed.

#### Electromagnetic compatibility (EMC)

The following limit values are observed according to the product standards "Electromagnetic Compatibility of Industrial Trucks (9/95)":

- interference emission (EN 50081-1)
- interference immunity (EN 50082-2)
- electrostatic discharge (EN 61000-4-2).



Electrical or electronic components and their arrangement may only be modified after written approval by the manufacturer has been obtained.

### 3.6 Operation conditions

#### Environmental temperature

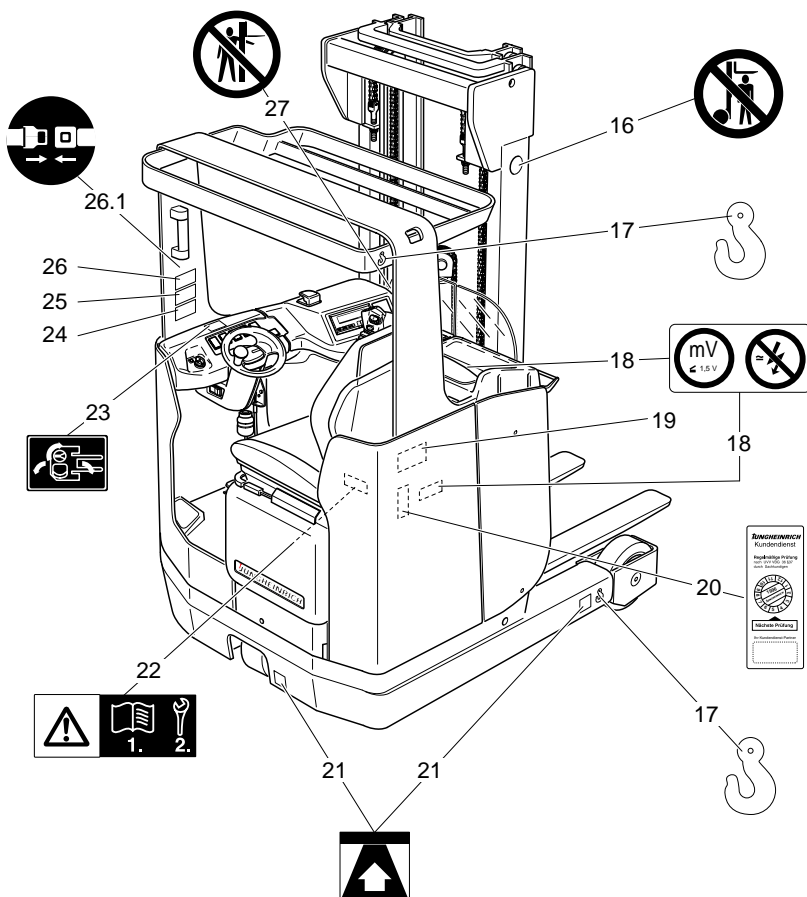
– in operation                      –25°C to 40°C



If the truck is operated continuously below 0°C, it is recommended to fill the hydraulic system with frost resisting oil as approved by the manufacturer.

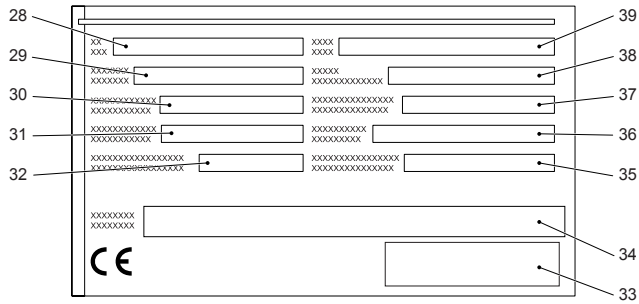
For applications in cold stores resp. in areas with extreme temperature or humidity changes the truck has to be specially equipped and approved.

#### 4 Location of instruction labels and identification plates



Item	Designation
16	Prohibitive sign "Keep away from under the load lifting device"
17	Pick-up points for crane transportation
18	Warning sign "Low voltage electronics"
19	Truck identification plate
20	Plaque confirming accident prevention checks (only D)
21	Pick-up points for lifting jack
22	Attention: Observe the operating instructions
23	Drive direction when locking the steering wheel
24	Load diagram, capacity / lateral traversing device
25	Load diagram, capacity / load centre / fork
26	Load diagram, capacity / load centre / lifting height
26.1	Sign: Put on safety belt
27	Prohibitive sign "Do not reach through the hoist frame"

#### 4.1 Truck identification plate



Item	Designation	Item	Designation
28	Type	34	Manufacturer
29	Serial No.	35	Min./max. battery weight in kg
30	Rated capacity in kg	36	Drive power in kW
31	Battery: Voltage V	37	Load centre distance in mm
32	Empty weight without battery in kg	38	Year of manufacture
33	Manufacturer logo	39	Option

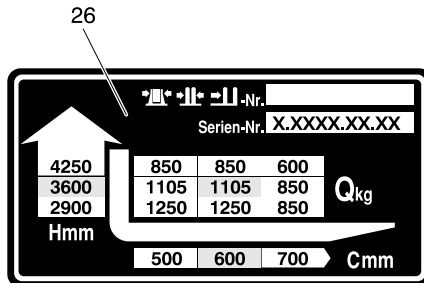


In event of queries relating to the truck or spare part orders, please state the serial no. (29) of the truck.

#### 4.2 Load diagram / capacity / load centre / lifting height

The load diagram (26) shows the capacity of the truck in Q kg with the hoist frame in vertical position. The diagram indicates the maximum capacity at a standard load centre\* C (in mm) and at the desired lifting height H (in mm) in the form of a table.

\*) Apart from the height of the load, the standard load centre also includes the width of the load.

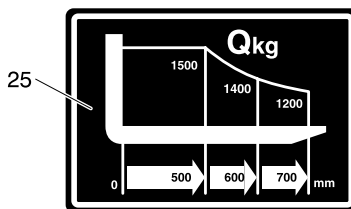


#### Example showing the determination of the max. capacity:

At a load centre C of 600 mm and a max. lifting height H of 3600 mm, the max. capacity Qkg is 1105 kg.

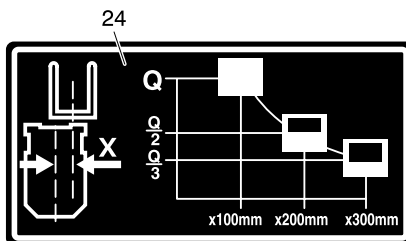
#### 4.3 Load diagram, capacity / load centre / fork

The load diagram (25) shows the capacity  $Q$  of the fork in kg. A diagram shows the max. capacity at different load centres ( $C$  in mm).



#### 4.4 Load diagram, capacity / lateral traversing device

The load diagram (24) shows the reduced capacity  $Q$  in kg with the lateral traversing device extended.



#### 4.5 Pick-up points for lifting jack

For lifting and jacking up the truck.  
(see chapter F)



#### 4.6 Information sign: Observe the operating instructions!

The notes contained in the operating instructions regarding the commissioning (see chapter C) and the mechanical stand-by steering system (see chapter E) must always be observed!

# C Transportation and commissioning

## 1 Loading and unloading of trucks by crane

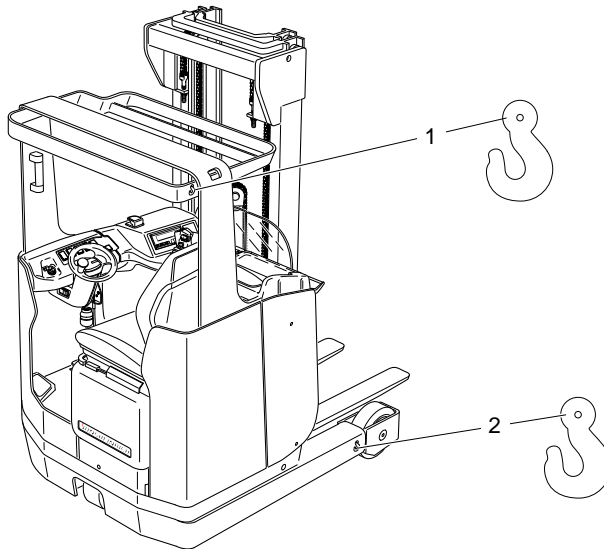


Ensure that the lifting gear is of adequate capacity (Transportation weight = net weight + battery weight; see truck identification plate)

- To load the truck with lifting gear, lay the loop of the rope around the strut of the overhead guard (1). Two lifting points (2) are provided on the wheel arms.
- Park the truck and render it safe (see chapter E).
- Use chocks to prevent the truck from moving!



The lifting gear must be secured to the lifting points in such a way that it does not come into contact with any attachments when the truck is lifted.



### Moving the truck without battery



The transport restraint prevents the parking brake from being applied. In this state, the truck is not braked!

- Press the brake pedal. Use the service brake to prevent the truck from moving!
- Remove the safety chocks.
- Release the service brake.



The truck can now be pulled or pushed.



## 2 Commissioning



The truck must only be operated on battery current. Rectified alternate current will damage the electronics. Cables connected to the battery (towing cable) must be less than 6 meters in length.

To prepare the truck for work following delivery or transportation, the following operations must be performed:

- If necessary, install the battery. Do not damage the battery cable.
- Charge the battery. (see chapter D)
- Remove the transport restraint of the parking brake, if required. (see chapter C)
- Commission the truck as prescribed. (see chapter E)



When supplied without battery, the truck can only be steered using the mechanical spare steering system (see chapter E).

## 3 Parking brake transport restraint



Before commissioning the truck, the transport restraint must be removed. This device is used to lock the magnet actuating the parking brake so that the truck is not braked when no power is available.

The transport restraint is applied if the truck is delivered with an uncharged battery.

The transport restraint consists of a retaining ring (3) attached to a red cable tie which visibly protrudes from the seat hood. The retaining ring is inserted at the tie rod of the magnet. This prevents the magnet from moving.

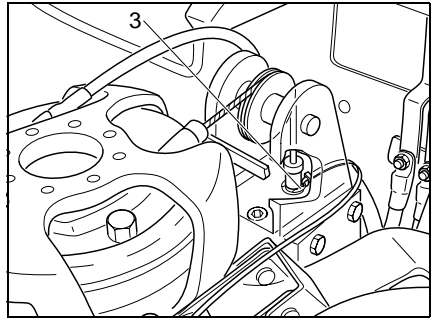
### Removing the transport restraint:

- Connect the charged battery.
- Open the seat hood. (see chapter F)
- Remove the retaining ring (3) with the cable tie from the tie rod.



The second retaining ring inserted at the tie rod must not be removed during commissioning!

- Close and lock the seat hood.
- Switch on the master switch and the key switch.



The truck is now ready for operation.

# D Battery - servicing, recharging, replacement

## 1 Safety regulations governing the handling of lead-acid batteries

The truck must be parked and rendered safe, before any operations on batteries are to be undertaken (see Chapter E).

**Servicing staff:** Recharging, servicing and replacing of batteries must only be performed by qualified personnel. The instructions contained in this operating manual, and the instructions as prepared by the battery supplier and as available at the battery recharging station must be observed, when performing the above operations.

**Fire protection measures:** Smoking and naked flames are not permitted when handling batteries. No inflammable substances or spark-generating materials must be present or stored within a distance of 2 meters of the truck parked for battery recharging. The location must be well ventilated and fire fighting equipment must be kept ready.

**Servicing of batteries:** The battery cell screw caps must be kept dry and clean. Terminals and cable shoes must be clean, lightly greased with pole grease and must be securely tightened.

**Disposal of the battery:** Batteries must only be disposed of as stipulated in the national environmental protection regulations or waste disposal provisions. The manufacturer's specifications for the disposal must be heeded.



Before closing the battery hood, make sure that the battery cable cannot be damaged.



Batteries contain dissolved acid, which is toxic and caustic. For this reason protective clothing and goggles must be worn whenever work is undertaken on batteries. Avoid physical contact with battery acid. If clothing, skin or eyes have accidentally come into contact with battery acid, liberally flush the affected parts with clean water. Consult a doctor, when skin or eyes have come into contact with battery acid. Spilled battery acid must be immediately neutralized.

## 2 Battery type

The batteries are designed in accordance with IEC 254 EN 60254.

The table below shows the capacity of the batteries and also the combinations used as standard equipment:

	capacity	standard	performance-enhanced
48 V - 3PzS - battery	420 Ah	420L	450H
48 V - 4PzS - battery	560 Ah	560L	600H
48 V - 5PzS - battery	700 Ah	700L	750H

The battery weights can be seen on the battery identification plate.

Depending on the type of battery used, it is also possible to use models with enhanced performance or maintenance-free batteries.



When replacing or installing batteries, ensure that the battery is correctly secured in the battery compartment of the truck.



Battery weight and battery dimensions have a considerable effect on the stability of the truck. Battery type changes are therefore permitted only after obtaining approval from the manufacturer.

### 3 Exposing the battery

- Render the truck ready for operation (see chapter E).
- Tilt the multi-pilot stick (1) in direction of arrow (U), drive mast holder to its limit stop position towards the battery and release multi-pilot (1) (mast is in final position).
- Tilt the multi-pilot stick (1) once again in direction of arrow (U) and go on driving mast holder to its limit stop position towards the battery (preparation of battery unlocking).
- Actuate the battery trolley unlocking system (3). The control lamp (4) lights up.
- Tilt the multi-pilot stick (1) in the T direction and push the mast holder with the coupled battery trolley forward until the battery is exposed for servicing.
- Switch off the master switch and the key switch.



Connecting and disconnecting of battery connector and socket is permitted only with the master switch and battery charger switched off.

- Withdraw the battery connector (2) from the socket.
- Remove any insulating matting from the batteries.



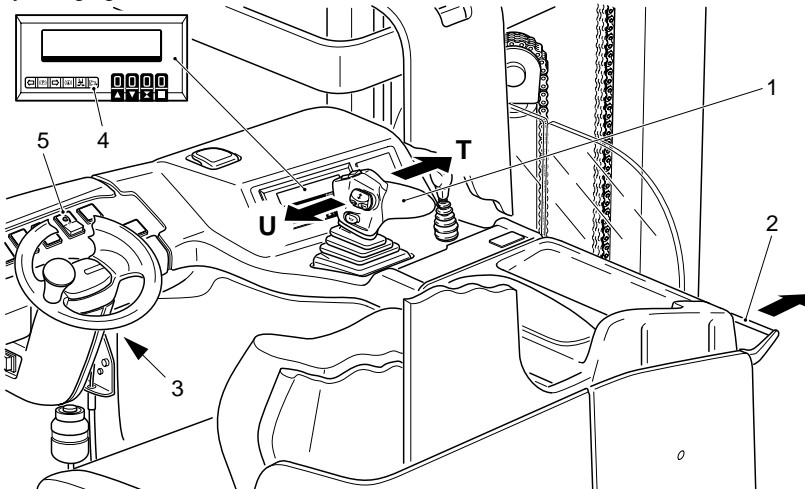
The safety switch of the battery unlocking system interrupts the driving function as long as the battery trolley is unlocked and the control lamp (4) is lit. Before commissioning the truck again, the battery trolley must be returned to the original position to uncouple the battery trolley and the mast holder. The control lamp (4) must have gone out.

#### 3.1 Bypassing the drive current interruption

- Switch on the switch “Cut-back speed” (5).

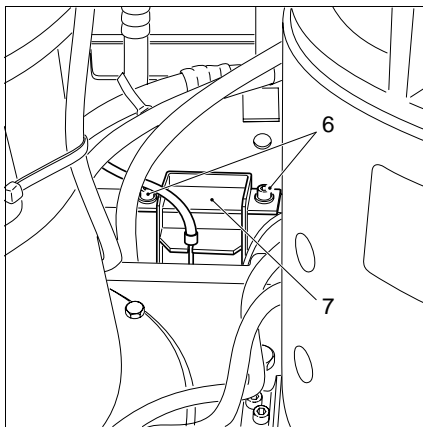



If the battery is protruding, the truck may only be driven at cut-back speed in the battery charging station!




## 3.2 Battery trolley emergency unlocking system

- Render the truck ready for operation (see chapter E).
- Tilt multi-pilot stick (1) in direction of arrow (U), drive mast holder to its limit stop position towards the battery and release multi-pilot (1).
- Tilt multi-pilot stick (1) once again in direction of arrow (U) and go on driving mast holder to its limit stop position towards the battery.
- Switch off the master switch and the key switch.
- Open seat hood (see chapter F)
- Loosen screws (6) of the battery locking system and pull out locking system (7).
- Close seat hood.
- Connect master switch and key switch.
- Tilt the multi-pilot stick (1) in the (T) direction and push the mast holder with the coupled battery trolley forward until the battery is exposed for servicing.
- Control lamp (4) lights up.
- Disconnect main switch and key switch.



 Eliminate the malfunction of the battery unlocking system before mounting the battery locking system.

 The safety switch of the battery unlocking system interrupts the driving function as long as the battery trolley is unlocked and the control lamp (4) is lit. Before commissioning the truck again, the battery trolley must be returned to the original position to uncouple the battery trolley and the mast holder. The control lamp (4) must have gone out.

## 4 Charging the battery

- Expose the battery (see chapter D).



During the recharging operation the tops of the battery cells must be exposed to ensure adequate ventilation. No metal objects must be placed on the battery. Prior to starting the recharging operation, check all cable connections and plugged connections for visible damage.

- Remove any insulating mats from the battery.
- Connect the charging cable of the battery charger to the battery connector (2).
- Recharge the battery observing the instructions provided by the battery supplier and by the battery charger supplier.



All safety instructions as provided by the battery supplier and battery charger supplier must be strictly observed.

## 5 Removing and installing the battery

- Expose the battery  
(see section 3).



Batteries with open poles, or open cell bridges, must be covered with a rubber mat to prevent short-circuiting. When using a crane in battery replacing operations, ensure that the crane is of adequate capacity (see the battery weight indicated on the battery identification plate located at the battery trough). The battery must be lifted vertically to prevent crushing of the battery trough. Lifting hooks must be applied in such a way that, with the lifting gear slack, they will not drop on to the battery cells.

### Removing and installing the battery using lifting gear

- Secure the lifting gear to the battery trough (8).
- Loosen counternut (10) and screw (11) at the red battery lock (9).
- Pull out the red battery lock (9).
- With the lifting gear attached, lift out the battery and move it to one side.

Installation is in the reverse order of operations.

### Removing and installing the battery using a battery trolley



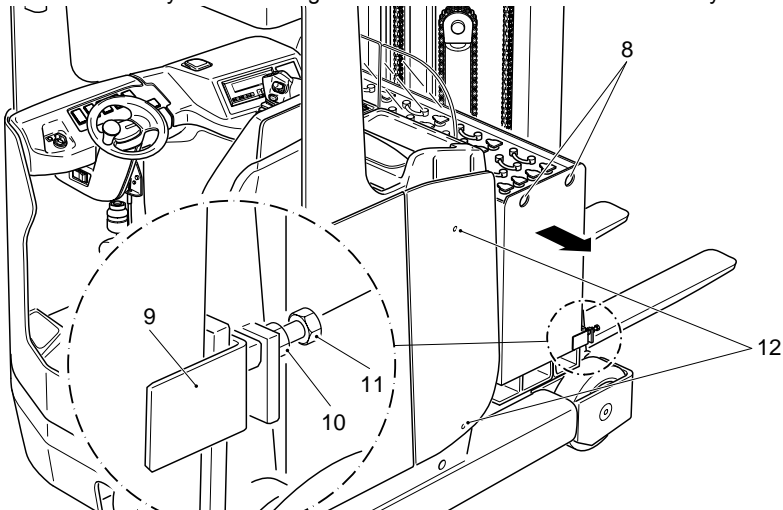
The truck must stand horizontally so that the battery does not automatically roll out when the battery safety device is removed.

- Use the service key to open the side door (12).
- Loosen counternut (10) and screw (11) at the red battery lock (9).
- Pull out the red battery lock (9).
- Pull the battery laterally onto the battery transport trolley.

Installation is in the reverse order of operations.



When replacing batteries, ensure that a battery of the same type is fitted. Upon completion of the battery refitting operations, check all cable connections and plugged connections for any visible damage. Covers and side doors must be safely locked.



## 6 Battery discharge indicator, battery discharge monitor and hour meter

**Battery discharge indicator:** The charging state of the battery (13) is indicated in 10% steps in the LISA display.

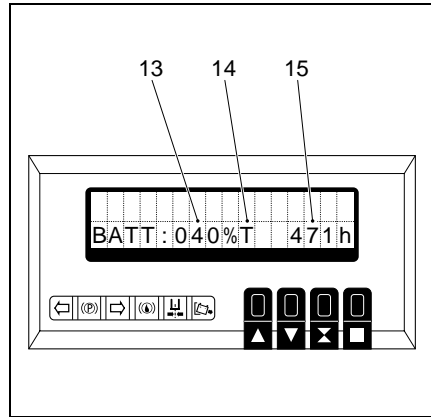


The standard setting of the battery discharge indicator / discharge monitor is made using standard batteries..

When using maintenance-free batteries, the indication has to be adjusted in a way that the symbol (T) (14) comes up behind the percent indication. When this setting is not performed, the battery might suffer damage caused by exhaustive discharge.

Setting of the instrument should be performed by service staff from the manufacturer of the truck.

In case of a rest capacity of the battery of 20% for standard batteries or 40% for maintenance-free batteries, a battery charge is necessary.



**Battery discharge monitor:** In case of undershooting the rest capacity the lifting function is disconnected. LISA indicates a corresponding message.



Lifting will only become possible again, after the battery has been recharged to at least 70 per cent.

**Hour meter:** The service hours (15) are indicated besides the charging state of the battery. The hour meter indicates the overall time of the driving and the lifting movements.



# E Operation

## 1 Safety regulations governing the operation of the truck

**Driving permission:** The truck must only be operated by persons who have been trained in the operation of trucks, who have demonstrated to the user or his representative their capability of moving and handling loads, and who have expressly been charged by the user or his representative with the operation of the truck.

**Rights, duties and conduct of the driver:** The driver must be: informed of his rights and duties; trained in the operation of the fork-lift truck; and familiar with the contents of these operating instructions. All necessary rights must be granted to him. If the fork-lift truck can be used in the pedestrian-controlled mode, the driver must wear safety boots when operating the truck.

**Prohibition of unauthorized use:** The driver is responsible for his truck during working time. He must forbid unauthorized persons to drive or operate the truck. The transport or lifting of persons is forbidden.

**Damage and defects:** Damage or defects noted on the truck or on the attachments must immediately be brought to the notice of the person in charge. Trucks that cannot be safely operated (e.g. due to worn tyres or defective brakes) must not be used until they have been properly repaired.

**Repairs:** Without specific training and express authorization the driver is not allowed to perform any repairs or modifications on the truck. Under no circumstances must the driver change the setting of switches or safety installations, or render them ineffective.

**Danger area:** As danger area is considered the area within which persons are endangered by the travelling or lifting movements of the truck or its load lifting devices (e.g. fork or attachments), or by the loads being transported. This includes also the area within reach of dropping loads or dropping truck attachments.



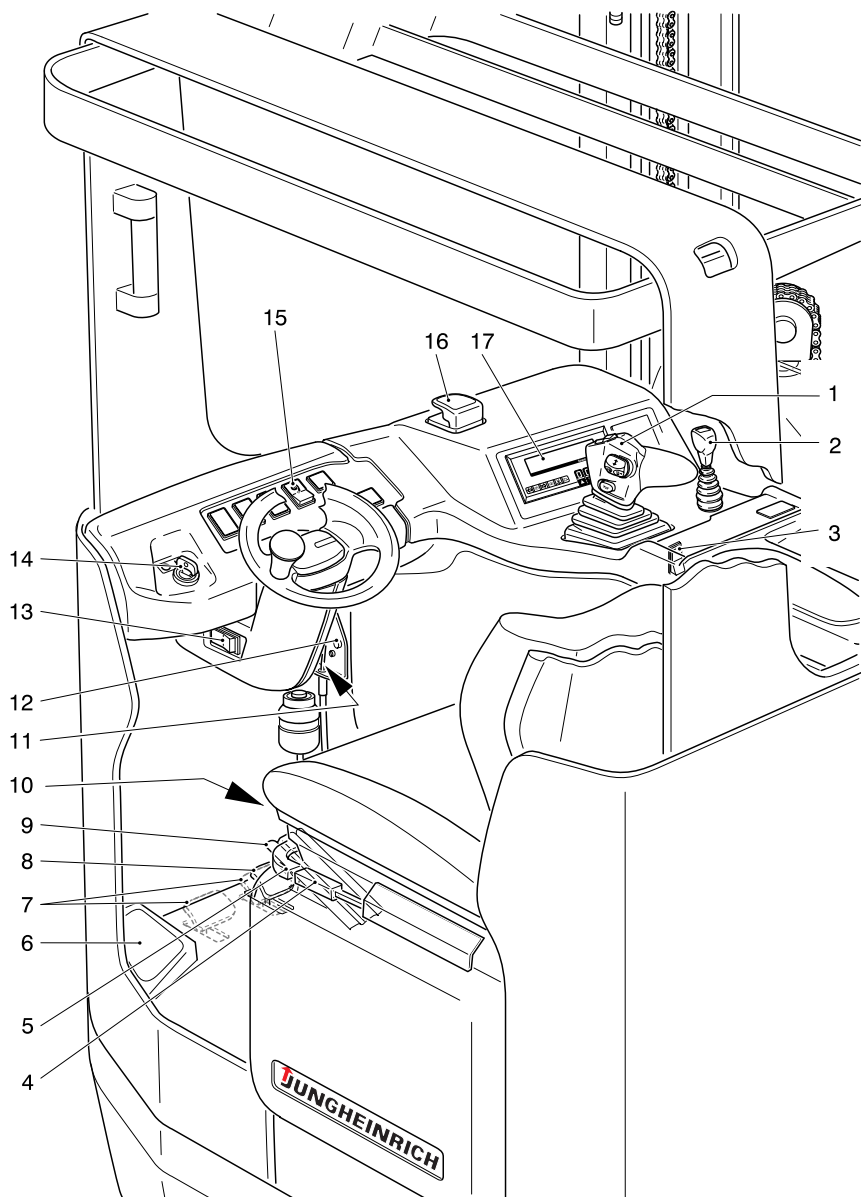
Unauthorized persons must be asked to leave the danger area. The driver must give a warning signal, whenever a situation presenting danger to persons might develop. The truck must immediately be brought to a standstill, if persons, although asked, do not leave the danger area.


**Safety devices and warning labels:** The safety devices, warning labels and warning notes described in the present operating instructions must always be heeded.

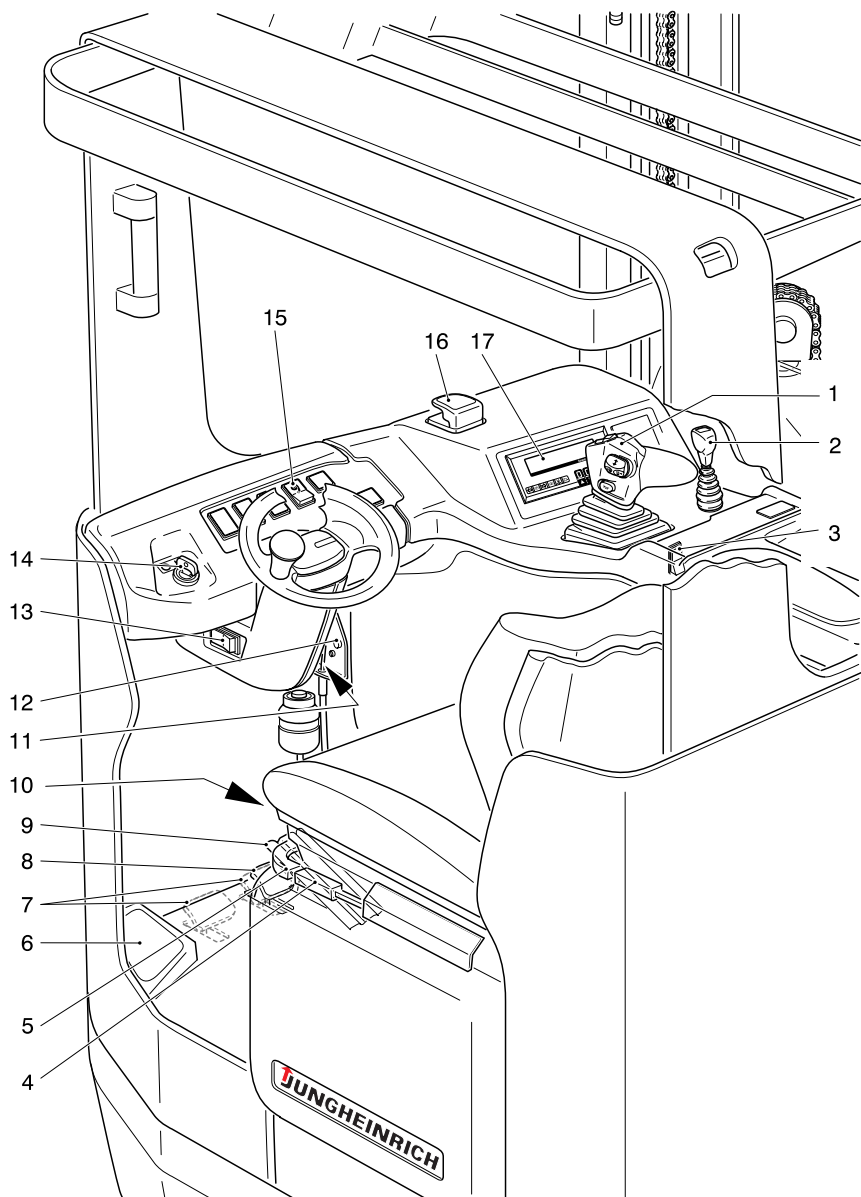


## 2 Description of the operating controls and indicators

Item	Operating control /indicator	Function
1	Multi-pilot stick	● Operates the following functions: Forward / reverse drive direction Lifting / lowering the load lifting device Pushing forward / retracting the mast holder Tilting the hoist frame forward / backward Moving the lateral traversing device to the left / right Horn key
2	Control lever ZH 2	○ Controls the second auxiliary hydraulic system.
3	Switch - emergency steering	● Bypasses the steering control system.
4	Driver seat lock	● Horizontal adjustment of the driver seat.
5	Driver seat weight adjustment	● Setting of driver weight for optimum seat damping.
6	Foot key	● – not pressed: The driving and lifting functions, as well as the auxiliary functions, are locked. The lowering function remains functional. The truck rolls to a stop. – pressed: The driving and lifting functions, as well as the auxiliary functions, are released.
7	Double pedal	○ Regulates driving direction and speed
8	Brake pedal	● Braking of the truck.
9	Accelerator	● Stepless control of the truck travelling speed.
10	Backrest adjustment	● Adjustment of the driver seat backrest.
11	Steering column adjusting mechanism	● The steering column is adjusted to the required distance and locked in that position.
12	Battery trolley unlocking system	● Unlocks the battery trolley.
13	Parking brake	● Prevents the truck from moving when parked.
● = Standard equipment		○ = Optional equipment



Item	Operating control /indicator	Function
14	Key switch with key	<p>● For connection and disconnection of the battery voltage to the truck.</p> <p> Red key (No. 702):  - for the user  Grey key (No. 738):  - for service and workshop</p>
15	Switch - cut-back speed	● Switches cut-back speed on and off.
16	Master switch (emergency stop)	● The circuit is interrupted, all electrical functions are switched off and automatic braking of the truck is triggered.
17	Information and service display (LISA)	● Display of essential driving parameters, lifting parameters, warning signals, operating error indications and service indications
● = Standard equipment                      ○ = Optional equipment		



### 3 Start-up of truck



The driver must make sure that nobody is within the danger area of the truck, before the truck is switched on or operated, or before a load is lifted.

#### Checks and operations to be performed before starting daily work

- Perform a visual check of the entire truck (especially wheels and load lifting equipment) for visible damage.
- Check the load chains for uniform tension.
- Visually check the security of the battery and the cable connections.

#### Adjusting the driver seat



To ensure optimum shock absorption, the driver seat must be adjusted to the weight of the driver.

The driver seat must not be occupied while being adjusted to the driver weight.

Setting the driver weight:

- Pull the lever (5) in the direction indicated by the arrow and release it again.

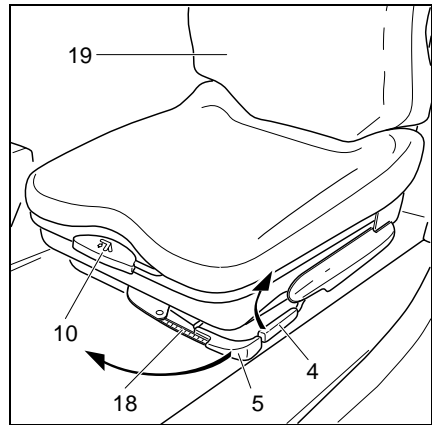


The previously set driver weight is reset to the minimum value. Setting range for the shock absorption: 50 kg to 130 kg.

- Pull the lever (5) again in the direction indicated by the arrow until reaching the appropriate weight mark on the scale (17). Then release the lever again.
- Sit down on the driver seat.



Do not reach between the seat and the chassis wall/overhead guard.



Adjusting the backrest:

- Pull the locking lever (10) upward and adjust the inclination of the backrest (19).
- Release the locking lever again, the backrest is locked in position.

Adjusting the seat position:

- Pull the locking lever (4) of the driver seat locking system outward and move the driver seat forward or backward to a comfortable position.
- Let the locking lever (4) engage again.



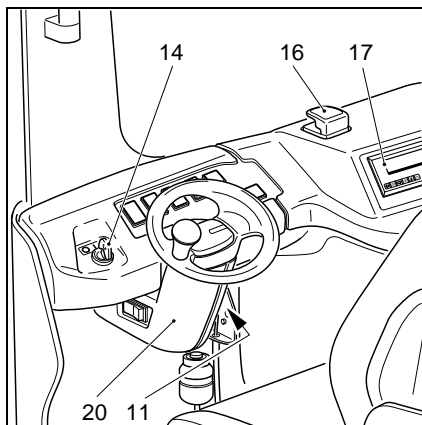
The driver seat locking system must be properly engaged in the set position. The position of the seat must not be changed while driving!



The driver seat adjusting mechanism shown relates to the standard version. For all different designs the adjusting instructions as supplied by the manufacturer apply. When performing the seat adjustments, ensure that all operating controls are within easy reach.

### Adjusting the steering column

- Release the steering column locking mechanism (10) and adjust the inclination and the height of the steering column (19) as required.
- Tighten steering column locking mechanism.



### 3.1 How to use the safety belt ○



Read this section completely before starting up the floor conveyor.

- Fasten the belt before performing any movement of the floor conveyor.
- Adjust the belt height setting (52) according to your size.



The belt protects you against severe injuries.

- If the belt buckle (50) or the belt reel-up device is frozen in, let it thaw and dry.

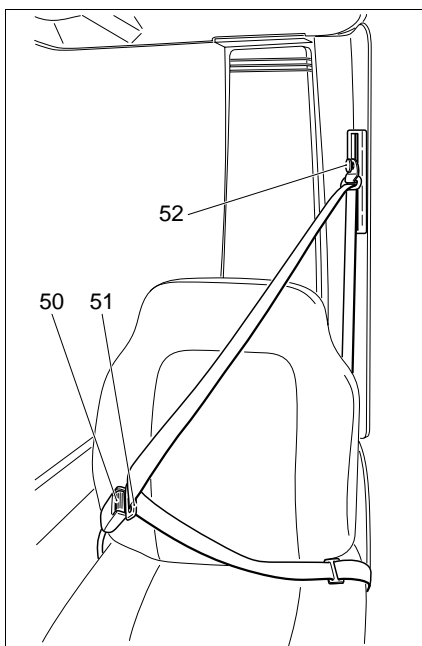


The temperature of the warm air-stream must not exceed +60°C.



Do not modify the safety belt.

- After an accident has occurred, check the safety belt and the seating cover for damages. Exchange them, if required.
- Damaged or not fully functioning safety belts may only be exchanged by contract dealers or branches.
- Only original spare parts may be used for upgrading or repairs.



## ○ Behaviour in unusual situations



Proceed as follows, if there is danger of the floor conveyor tipping over.

– Press the upper part of your body against the the backrest.



– Keep both hands at the steering wheel and use your feet for additional support.



– Bend your body against the falling direction.



## ○ Operating instruction of the safety belt

Before starting up the floor conveyor, pull the belt continuously out of the reel-up device and let it catch in with the belt fitting tight to your body.



The belt must not be twisted when being fastened.

When operating the floor conveyor (e.g. driving, lifting, lowering, etc.) always try to sit with your back having contact with the backrest.

The locking mechanism of the reel-up device permits enough freedom of motion when sitting.



If you are sitting on the front edge of the seat, protection will decrease due to the belt band being too loose.



Use the belt only for protecting one person.

– After using the belt, press the red button and direct the belt locking tongue back to the reel-up device with your hand.



## ○ Behaviour for starting up the floor conveyor on steep slopes

The locking mechanism blocks the belt drawing mechanism if the floor conveyor is parked on a steep slope. The belt can no longer be pulled out of the reel-up device.



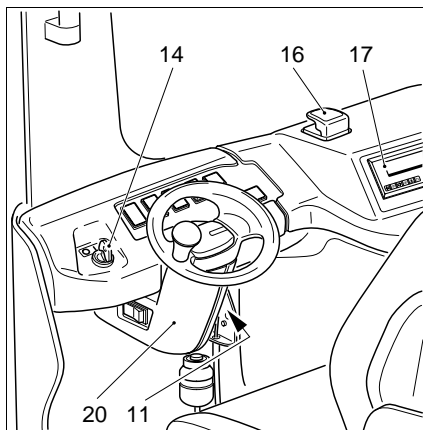
Drive the floor conveyor carefully out of its slope position and fasten the belt.

## Switching on the truck

- Pull up the master switch (16).
- Insert the key in the key switch (14) and turn clockwise against the stop to position "I".
- Check the horn for proper function.

The truck is now ready for operation. The battery discharge monitor shows the current battery capacity.

- Check the brake pedal and the parking brake for correct functioning (see section 4.2).



## 3.2 Emergency stop device



The truck is equipped with an emergency stop device. After connecting the master switch (16) and the key switch (14) an automatic safety inquiry is performed.

### Emergency stop indication

LISA (16) displays an indication after recognizing a trouble in the steering system or in the braking system (see section 5).

### Triggering of an emergency stop

If a malfunction endangering the safety of the operator occurs in the steering system while driving, the truck is automatically braked in a controlled manner until it is at a standstill.

### Resetting an emergency stop

- Switch the master switch and the key switch off and then on again.



If the emergency-stop indication appears on the LISA display even after repeatedly performing the emergency-stop reset, contact the customer service of the manufacturer for further troubleshooting.



If the truck is in a danger zone or between racks after an emergency stop has been triggered, the truck can only be moved and thus recovered by means of the mechanical stand-by steering system! (see section 7)



## 4 Truck operation

### 4.1 Safety regulations applicable when operating the truck

**Driving lanes and work areas:** Only such lanes and routes that are specially allocated for truck traffic must be used. Unauthorized persons must stay away from work areas. Loads must only be stored at places specially provided for this purpose.

**Driving conduct:** The travelling speed must be adapted to the prevailing local conditions. The truck must be driven at slow speed when negotiating bends or narrow passages, when passing through swing doors and at blind spots. The driver must always observe an adequate braking distance between his truck and the vehicle in front and he must be in control of his truck at all times. Sudden stopping (except in emergencies), rapid U-turns and overtaking at dangerous or blind spots is not permitted. It is forbidden to lean out of or reach beyond the working and operating area.

**Visibility:** The driver must look in the direction of travel and must always have a clear view of the route ahead. When loads blocking the view are carried, the ETM/V 214-220 must be driven with the load at the rear. If this is not possible, a second person must walk in front of the truck to give suitable warnings.

**Negotiating slopes and inclines:** Negotiating of slopes and inclines is permitted only, when they are recognized lanes, when they are clean and non-slipping, and when the technical specification of the truck permits safe driving on such slopes or inclines. Loads must always be carried at that end of the truck facing uphill. U-turns, cutting obliquely over slopes or inclines and parking of the truck on slopes or inclines is not permitted. Inclines must only be negotiated at slow speed with the driver ready to brake at any moment.

**Use of lifts and driving on loading platforms:** Lifts and loading platforms must only be used, if they are of adequate load bearing capacity, if suitable for driving on, and if authorized by the user of the truck for truck traffic. The truck driver has to satisfy himself accordingly before driving into lifts or on to loading platforms. The truck must enter lifts with the load in front and must take up a position which does not allow it to come into contact with the walls of the lift shaft. Persons riding in the lift together with the truck must only enter the lift after the truck has come safely to a standstill, and must leave the lift before the truck.

**Nature of the loads carried:** Only loads that have been safely and correctly secured must be carried. Never transport loads stacked higher than the top of the fork carriage, or stacked higher than the guard grille.

## 4.2 Driving, steering, braking

### Emergency cut-out

- Depress the master switch (16).

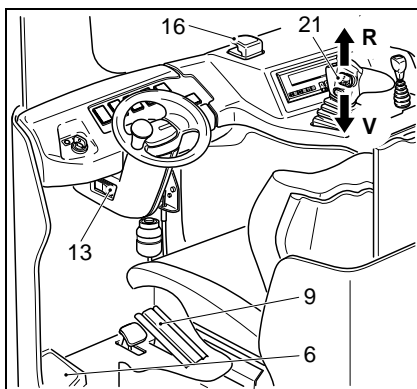
This will switch off all electric functions. Functioning of the switch must not be affected by object placed on it.

### Driving



Do not drive the truck unless the hoods are closed and locked in the stipulated manner.

The main direction of travel is in the direction of the drive (V). Be especially careful when driving in the direction of the load (R).



The truck should only be driven in the direction of the load (R) for positioning purposes and for picking up or depositing loads.

- Render truck ready for operation (see section 3).
  - Release the parking brake (13).
  - Set the travel direction switch (21) to the desired travelling direction (V or R).
  - Press the accelerator pedal (9) and the foot key (6).
- The truck will now move in the selected direction.



The foot key (6) prevents the operator's foot from protruding beyond the truck's contour while driving.

If it is not pressed, all electrical functions except for the steering, the information and service display (LISA), the horn and the battery discharge indicator are deactivated. The truck rolls to a stop.

The lowering function remains functional.



The travelling speed is controlled by means of the accelerator (9).



### Double-pedal version

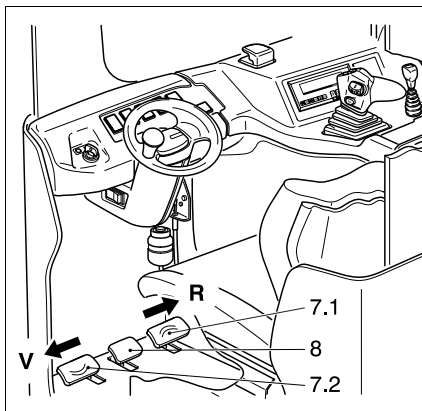
#### Driving

Floor conveyors from the double-pedal series are provided with two pedals which can be used for selecting the driving direction. They can also be used for regulating the driving speed.

Driving pedal 7.1: Driving in fork direction.

Driving pedal 7.2: Driving in actuation direction.

When driving, both feet are to kept on the pedals.



## Steering

Contradirectional steering (standard version)

When travelling forward (travel direction switch (21) set to (V) = drive direction), turning the steering wheel to the left results in a left turn and turning the wheel to the right in a right turn.

The position of the drive wheel is shown on the LISA display.



### Synchronized steering

When travelling forward (travel direction switch (21) set to (V) = drive direction), turning the steering wheel to the left results in a right turn and turning the wheel to the right to a left turn.

The position of the drive wheel is shown on the LISA display.

## Braking



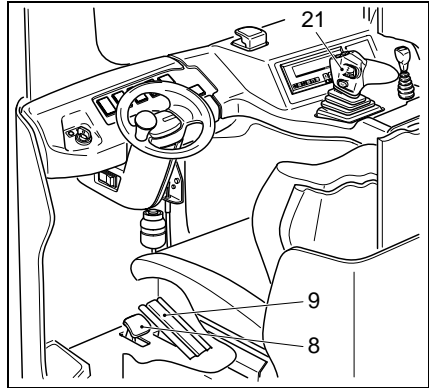
The braking behaviour of the truck strongly depends on the state of the floor. This must be taken into account by the driver for his driving behaviour.

The truck can be braked in three ways:

- by counter-current braking,
- by coasting, or by
- using the service brake.



If the truck is operated by several drivers (for instance in multi-shift operations), the braking and travelling behaviour of the truck must be checked, when the parameters are individually set. Check the truck reactions when taking over the truck.



### Counter-current braking:

- Change over the travelling direction switch (21) during travel to the opposite driving direction. The truck is then braked by the drive current control system until movement in the opposite direction commences.



This mode of braking reduces energy consumption, as it involves energy recovery via the drive current control system.

### Braking by coasting:

- Slowly release the accelerator pedal while driving. The truck is braked by the drive current control according to the position of the accelerator pedal.

### Braking using the service brake:

- Depress the brake pedal (8).



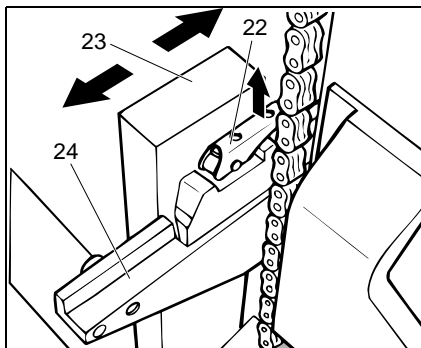
The vehicle is braked by hydraulic drum brakes.

### 4.3 Adjusting the fork tines



To ensure safe picking up of loads, the tines should be apart as far as possible and set centrally to the truck. The load centre must be located centrally between the fork tines.

- Swivel the locking lever (22) upwards.
- Push the fork tines (23) along the fork carrier (24) to the required position.
- Swivel the locking lever downwards and deplace the fork until it engages a groove.



### 4.4 Picking up and setting down loads



Before picking up a load, the driver has to check that the load rests properly on its pallet and that it does not exceed the capacity of his truck.

- Pass the fork tines as far as possible under the load.



#### Lifting



Persons must not be allowed to stand under raised forks.

Pull the multi-pilot stick (1) in the (H) direction.

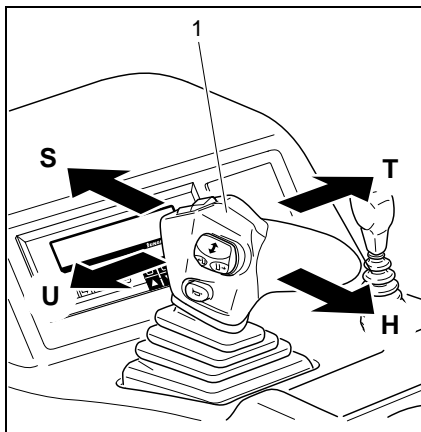


The inclination angle of the multi-pilot stick controls the lifting speed.

- Do not release the multi-pilot stick until the desired lifting height has been reached.



If the fork moves against the end stop (audible noise emitted by the pressure limiting valve), the multi-pilot stick must immediately be returned to its neutral position.



#### Lowering

- Push the multi-pilot stick (1) in the (S) direction.



The inclination angle of the multi-pilot stick controls the lowering speed.



Avoid impacting of the load to prevent damage to the load and to the racking.

#### 4.4.1 Lowering in case of emergency



No personnel must be in the danger area when the emergency lowering device is being used.

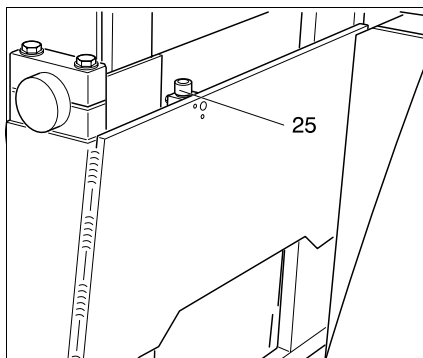
If the hoist frame cannot be lowered due to a malfunction of the lifting control system, the emergency lowering valve (24) on the rear of the mast holder must be actuated.



Do not actuate the emergency lowering valve unless you are standing next to the truck!

Do not reach through the hoist frame to actuate the valve!

- Switch off the master switch and the key switch.
- Pull out the battery plug.
- Press the red valve button down and keep it in this position (if necessary, use a suitable extension).
- Slowly lower the hoist frame and the load lifting device.



The truck must not be used until the malfunction has been eliminated.

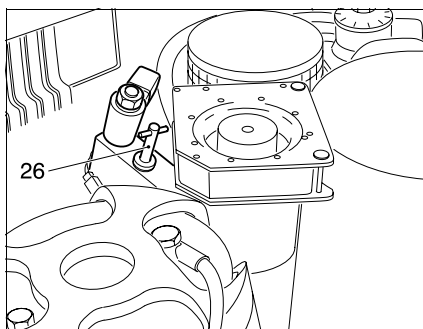
#### 4.4.2 Lowering in case of emergency - Regenerative lowering ○



No personnel must be in the danger area when the emergency lowering device is being used.

If the hoist frame cannot be lowered due to a malfunction of the lifting control system, the emergency lowering valve (25) on the load holding valve block below the driver's seat hood must be actuated.

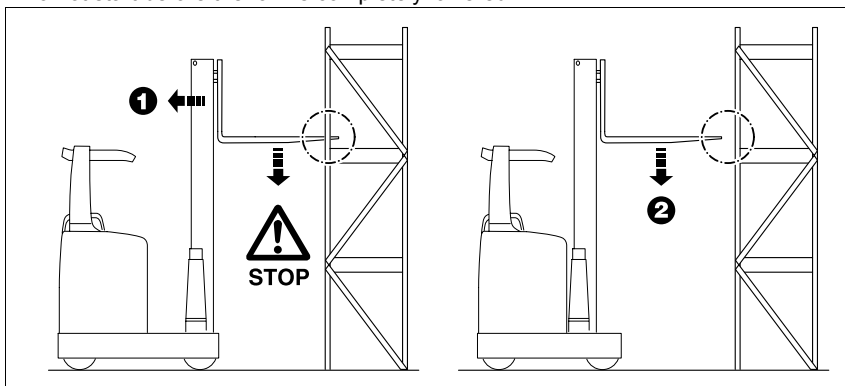
- Switch off the master switch and the key switch.
- Pull out the battery plug.
- Open the seat hood (see chapter F).
- Open the emergency lowering valve and slowly lower the hoist frame and the load lifting device.



The truck must not be used until the malfunction has been eliminated.



The fork must be free before they can be lowered from the rack.  
Do not start before the fork is completely lowered.



### Pushing the mast holder forward



Do not reach between the mast and the battery hood.

- Tilt the multi-pilot stick (1) in the (T) direction to push the mast holder forward and in the (U) direction to retract it.



The inclination angle of the multi-pilot stick controls the traversing speed.



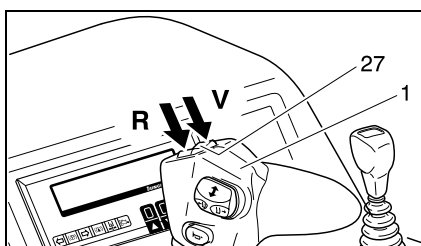
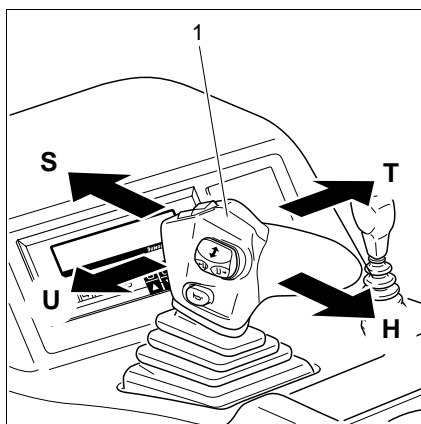
### Dampening of the mast traversing movement

Hydraulic dampening of the mast holder traversing movement is automatically activated when the inner mast is lifted.



### Mast tilting / Forktilting

- Press rocker (V) of the rocker switch (26) to tilt the mast forward.
- Press rocker (R) to tilt the mast backward.



## 4.5 Picking up, lifting and transporting of loads

- Press rocker (V) or (R) on the rocker switch (26) to bring the fork tines into a horizontal position.
- Move the truck up to the load.
- Tilt the multi-pilot stick (1) in the (T) direction to push the mast holder forward.
- Pull the multi-pilot stick (1) in the (H) direction to lift the fork tines to the appropriate height.
- Move the fork tines under the load.
- Pull the multi-pilot stick (1) in the (H) direction to lift the load clear.
- Tilt the multi-pilot stick (1) in the (U) direction to retract the mast holder.




Transport runs with or without load must only be performed with the mast holder retracted, the hoist frame tilted backwards and the load lifting device lowered.

- Press the multi-pilot stick (1) in the (S) dir. to lower the load to the transport position.
- Press rocker (R) on the rocker switch (26) to tilt the load backward.
- Transport the load to the required location.
- Press rocker (V) on the rocker switch (26) to bring the load into a horizontal pos.
- Bring load to the desired height: Pull the multi-pilot stick (1) the (H) direction, if necessary, tilt the multi-pilot stick (1) the (T) direction in order to extraxt the mast holder.
- Press the multi-pilot stick (1) in the (S) direction to set down the load.
- Tilt the multi-pilot stick (1) in the (U) direction to retract the mast holder.

## 4.6 Operating an attachment

### ○ Integrated lateral traversing device

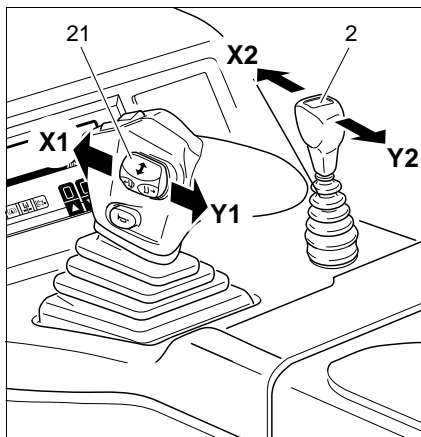
 The directions “to the left” and “to the right” refer to the load lifting device as seen from the operator’s position.

Moving the lateral traversing device to the left:

- Press the switch (21) in the (X1) direction.

Moving the lateral traversing device to the right:

- Press the switch (21) in the (Y1) direction.



Reduced capacity must be taken into account when traversing of load is required (see chapter B).

### ○ Hydraulic attachments

The control lever (2) controlling the functions (X2) and (Y2) is provided for the operation of a hydraulic attachment. (Refer to the operating instructions provided by the manufacturer).



Check the capacity of the respective attachment.

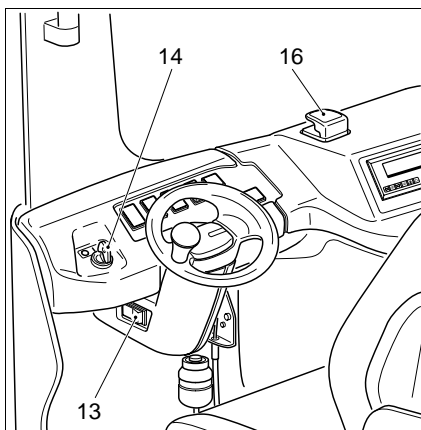
## 4.7 Rendering vehicle safe when parking

When the vehicle is parked and left unattended, it has to be rendered safe, even if it is left unattended for only a short period of time.



Never park the truck on a slope or incline. The load lifting device must always be completely lowered.

- Press the parking brake switch (13).
- Completely lower the load lifting device and move it to a horizontal position.
- Completely retract the mast holder.
- Depress the master switch (16) to the position "OFF".
- Switch the key switch (14) to the position "0" and remove the key from the key switch.





## 5 Information and service display (LISA)

The display (27) of the LCD information and service display (LISA) shows the operation data, the battery charge, the service hours as well as service data and diagnostic data. Below the display there are six LEDs (28) - (33). The keyboard (four keys (34) - (37) serves for the selection, the reading and the modification of vehicle parameters.



The vehicle is delivered with two different keys:

for the user

Key code: 702 (red):

Use of vehicle possible,

LISA only displays current driving data.

for service / workshop

Key code: 738 (grey):

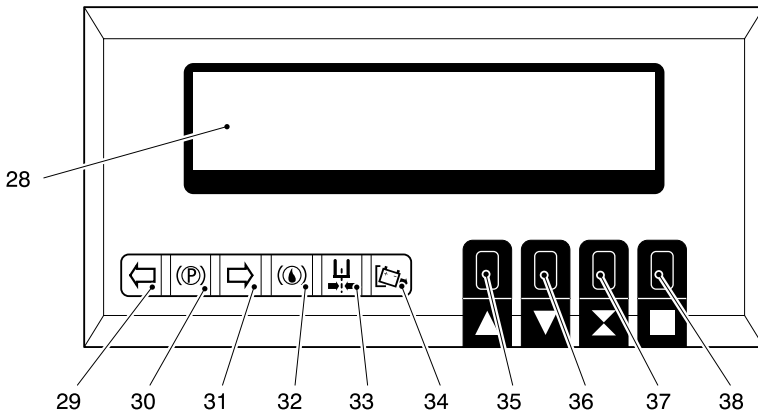
Use of vehicle possible,

LISA allows modifications of vehicle parameters in the user mode

(see section 5.4).









Modifications in the service mode must only be performed by authorized service personnel of the manufacturer!







## 5.1 LED warning lamps

Six red light-emitting diodes indicate the following states:

Item	Function
28	 Direction of motion forward (drive direction) (green LED)
29	 Parking brake applied (red LED)
30	 Direction of motion backward (load direction) (green LED)
31	 Brake liquid level too low (red LED)
32	 Lateral traversing device in center position (green LED)
33	 Battery unlocked (red LED)

## 5.2 Key assignment

Item	Function
34	 Double function - incremental increase of the selected parameter - selection of the individual menu items in ascending order
35	 Double function - incremental decrease of the selected parameter - selection of the individual menu items in descending order
36	 Double function - release of a selection menu from the main menu - acknowledging a query with "NO" -> "X"
37	 Quadruple function - exiting from a selected menu point - storing of modified parameters - acknowledging a query with "YES" -> "■" - Display change between „service hours“ / „time“

### 5.3 Displays

The display shows operating data and fault messages. The user menu permits the setting of the following driving parameters:

Here the time between max. operation of the controller and 100 % control by the electronics is set.

			A	C	C	E	L	E	R	A	T	I	O	N		
																L



			R	E	L	E	A	S	E				B	R	A	K	E	
																	L	



			I	N	V	E	R	S	I	O	N						B	R	A	K	E	
																					L	



			M	A	X	.			S	P	E	E	D				F	O	R	W	.	
																					L	



			C	U	T				B	A	C	K								F	O	R	W	.
																						L		



			M	A	X				R	E	V	E	R	S	.					S	P	E	E	D	
																							L		



			C	U	T				B	A	C	K								R	E	V	E	R	S	.
																							L			



			B	U	Z	Z	E	R				O	N	/	O	F	F							
												O	F	F									L	



									R	E	L	O	A	D										
																						L		



									A	D	J	U	S	T											
																					1	2	:	2	2

When releasing the controller, the drive current control system will start braking the truck. The value is between 0% (rolling to a standstill) and a max. value, which is equal to the minimum value for counter-current braking.

The setting of the counter-current brake affects braking when changing direction. Actual braking when changing direction is also a function of the accelerator position.

Adjustment of maximum speed in drive wheel direction af motion.

Adjustment of maximum speed in drive wheel direction af motion when actuating the slow speed switch.

Adjustment of maximum speed in load part direction af motion.

Adjustment of maximum speed in load part direction af motion when actuating the slow speed switch.

Issues an acoustic alarm in case of operating errors.

Preset values can be called up and adjusted.

Time adjustment.  
Select hour or minute with key (36). Modify adjustment with keys (34) and (35).

## 5.4 Changing truck parameters



Changing of truck parameters will also change the driving behaviour of the truck. This must be taken into account when commissioning the truck!

Parameters may only be changed while the truck is at a standstill and no lifting movements are performed.

- Commission the truck (see chapter E).

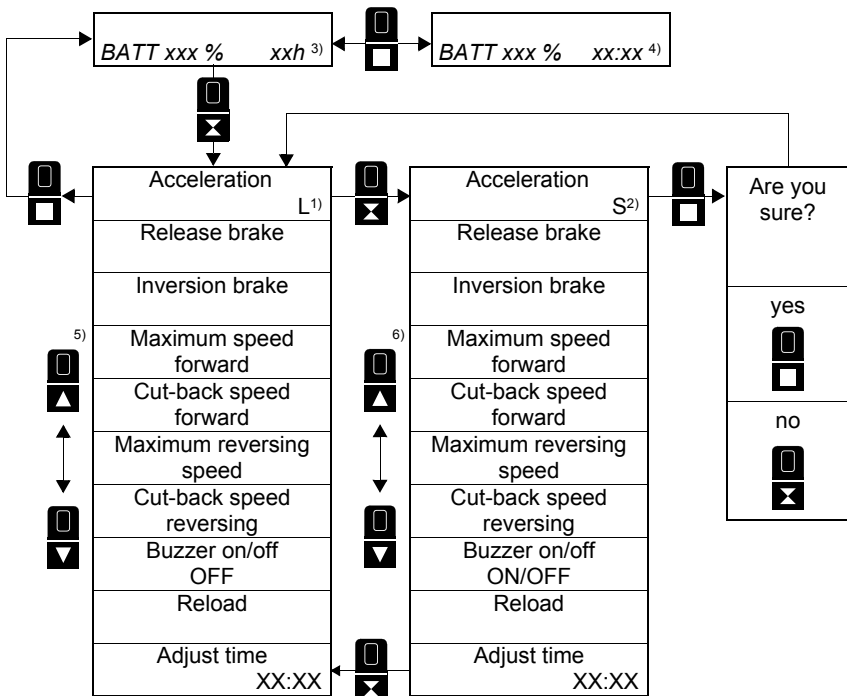
Insert key (738) into key switch and turn to the right until reaching the limit stop.

The display shows the user menu with vehicle name for about three seconds, after that the current steering angle, the battery charge and the service hours are indicated.

- Press the selection menu key (36).

The display shows „acceleration" with the corresponding parameter.

- To view or change the truck parameters, proceed in accordance with the following diagram.
- Moving between the 10 setting parameters is effected by means of the keys (34) and (35).



1) L = Operating parameters are read out (Reading mode)

2) S = The chosen operational parameter can be modified (Writing mode)

3) Service hours display

4) Time display

5) Selection of parameters

6) Changing parameters

## 6 Fault locating operations

This chapter enables the user to locate and to remedy simple faults or the consequences of operating errors. Fault locating operations should be performed in the order as set out in the table below.

Fault	Possible cause	Remedy
Truck does not move	Battery connector not connected	Check the battery connector, or connect, if required
	Master switch depressed	Release the master switch
	Key switch in position "0"	Switch the key switch to position "I"
	Battery charge too low	Check the charge condition of the battery and recharge if required
	Defective fuse	Check fuses
	"Parking brake" switch in braking position	Toggle the switch to "Parking brake released"
	Foot switch not pressed	Press foot switch
	Steering control system detects a malfunction. Emergency stop triggered!	Emergency stop reset: Switch the master switch off/on several times
Load cannot be raised	Truck not operative	Perform all remedial actions indicated under fault "Truck does not move"
	Hydraulic oil level too low	Check the hydraulic oil level
	Battery charge too low, lift cut-out active	Check the charge condition of the battery and recharge if required
	Defective fuse	Check fuses
	Load too high	Comply with maximum load (see nameplate)



If the fault could not be eliminated after performing the "troubleshooting procedures", contact the customer service of the manufacturer since all follow-up troubleshooting can only be performed by specially trained and qualified service staff.

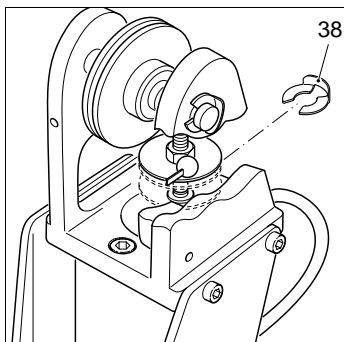
## 7 Mechanical stand-by steering system (emergency steering operation)

If the electrical steering system fails, the mechanical stand-by steering system must be used to recover the truck.



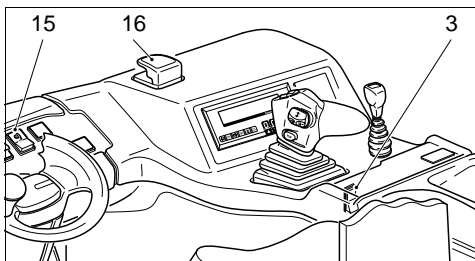
The mechanical steering system may only be used by an expert from the service personnel who is trained in the operation of the system.

- Switch off the master switch and the key switch.
- Secure the truck against moving.
- Open the seat hood.  
(see chapter F).
- Remove the retaining ring (38) inserted on the pull rod below the supporting disk of the potentiometer lever.
- Using a suitable lever (hammer handle), lift the tie rod up to the stop and insert the retaining ring into the lower groove on the pull rod.



This releases the parking brake.

- Then close and lock the seat hood.
- Sit on the driver's seat.
- Swing the armrest upward, unlock the hood lock and open the hood.  
(see chapter F)
- Toggle the switch (3) to the position "Emergency stop operation"



The switch "Emergency stop operation" (3) bypasses the steering control system!

- Switch on the main switch and the key switch. The LISA display shows an info message.



When the truck is steered while standing, the tyre of the drive wheel folds in. This may result in an aligning torque when the crank handle is released.

- Assemble the crank handle (39) according to the tool kit table.
- Through the opening in the bottom plate, plug the crank handle onto the steering drive and turn the drive wheel in the desired steering position.
- Switch on the cut-back speed switch (15). The LISA display shows an indication.
- Remove the safety chocks and carefully drive the truck out of the working area.

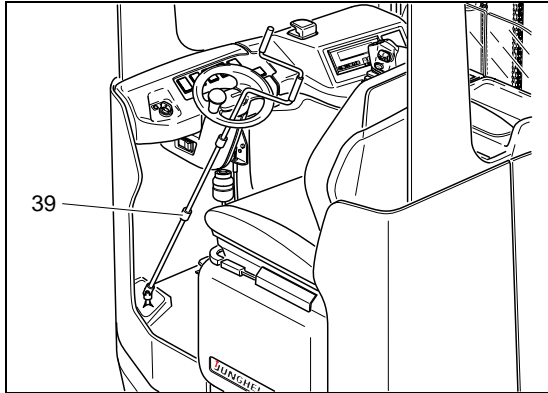


The truck may only be moved at cut-back speed! At the destination, restore the brake system to its operational status! The truck may not be parked with the brake lifted!

- Reinsert the retaining ring (38) into the groove of the pull rod below the supporting disk of the potentiometer lever. This restores the braking state.

### Crank handle tool kit (39)

Item	Qty.	Order No.	Designation
1	1	95 600 210	Socket for wrenches, size 6 mm 1/2 " DIN 3120
2	1	95 608 130	Crank shaft
3	1	95 601 240	Lengthening piece, 1/2 " 125 mm long
4	2	95 608 140	Lengthening piece, 1/2 " 250 mm long
5	1	27 636 010	Cardan joint



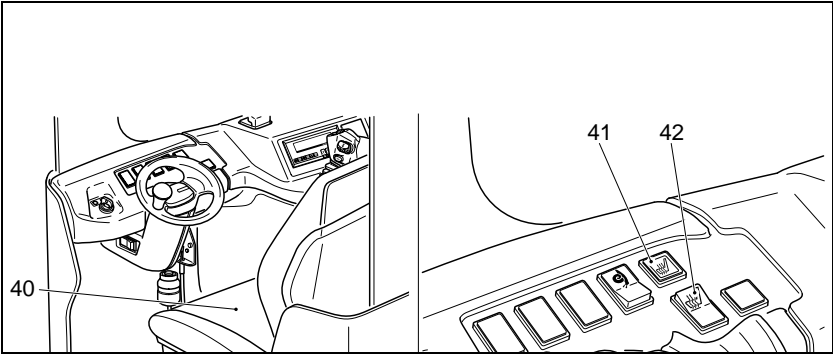
## 8 Auxiliary electrical system

### 8.1 Seat heating



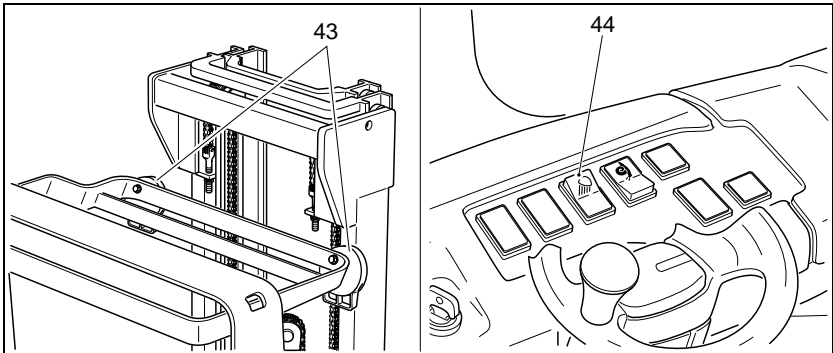
All auxiliary electrical systems are activated regardless of the key switch position. The battery master switch must have been switched on (see section E3, "Switching on the truck").

To prevent discharge of the battery after the truck has been parked, always heed section E, "Rendering vehicle safe when parking".



Item	Designation
40	○ Heatable seat surface (fabric or imitation leather)
41	○ Control lamp - seat heating
42	○ Switch - seat heating ON/OFF

### 8.2 Floodlight



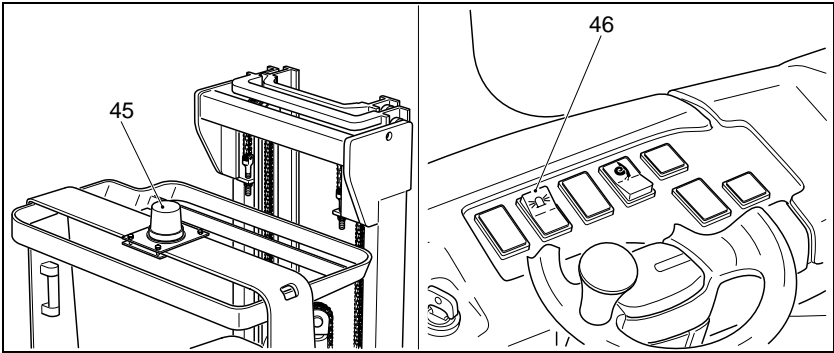
Item	Designation
43	○ Floodlight
44	○ Switch - floodlight ON/OFF



The floodlight is equipped with a joint that can be swivelled in all directions.

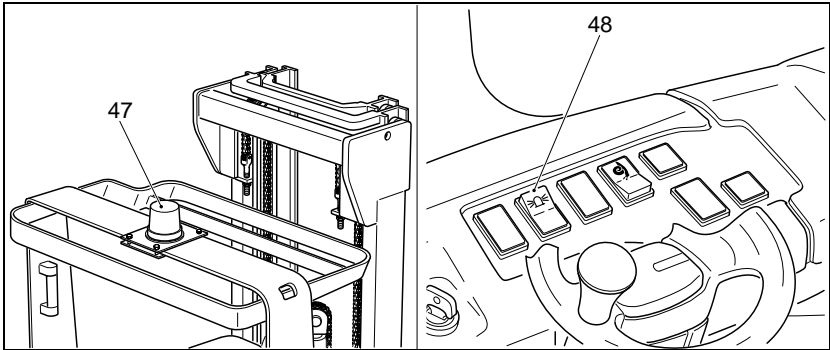


### 8.3 360° warning light



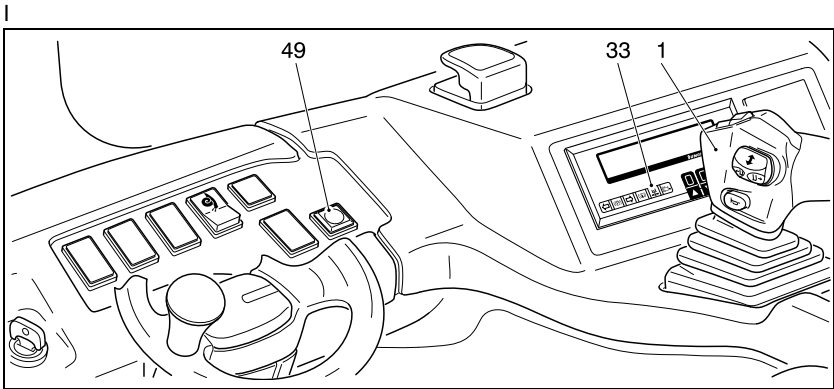
Item	Designation
45	○ 360° warning light
46	○ Switch - 360° warning light ON/OFF

### 8.4 Flash lamp



Item	Designation
47	○ Flash lamp
48	○ Switch - flash lamp ON/OFF

### 8.5 Override button (ESA / Electrical lifting limitation)



Item	Designation
49	○ Override switch
32	○ Control lamp - side shifting device centre position

#### ○ **Override switch ESA**

If the side shifting device is not in the centre position and below the required safety height in front of the wheel arms, retraction of the mast holder is locked by the limit switch - the control lamp (32) is no longer lit.

If the side shifting device is within the wheel arms and below the required safety height, lateral traversing is locked by the limit switch - the control lamp (32) is no longer lit.

Locking of the mast holder retraction movement by the safety switch (ESA) can be overridden by pressing the override button (49) while simultaneously actuating the multi-pilot stick (1).

#### ○ **Control lamp for the side shifting device centre position**

Retraction of the mast holder is released when the green control lamp (32) is lit.

#### ○ **Bridging switch electrical lifting limitation**

In vehicles with „electrical lifting limitation“ the maximum admissible lifting height is limited by limit switches at the load lifting device.

The blocking of the „electrical lifting limitation“ can be bridged by pressing the bridging switch (49) and simultaneous use of the multi-pilot stick (1).

## 9 Single-lever operation ○

### 9.1 Driving, steering, braking ○

#### Emergency cut-out

- Depress the master switch (16).

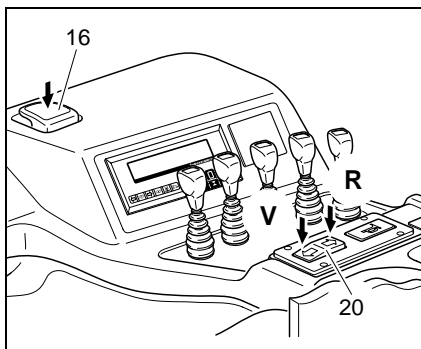
This will switch off all electric functions. Functioning of the switch must not be affected by object placed on it.

#### Driving



Do not drive the truck unless the hoods are closed and locked in the stipulated manner.

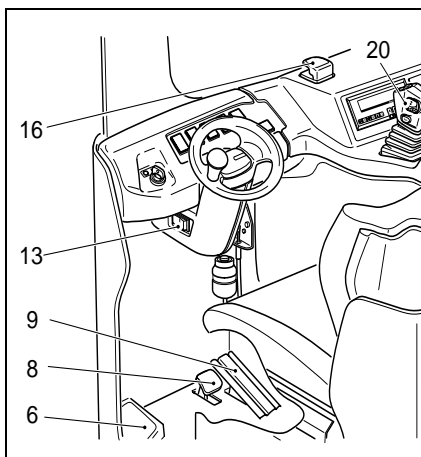
The main direction of travel is in the direction of the drive (V). Be especially careful when driving in the direction of the load (R).



The truck should only be driven in the direction of the load (R) for positioning purposes and for picking up or depositing loads.

- Render truck ready for operation. (see chapter E).
- Release the parking brake (13).
- Set the travel direction switch (20) to the desired travelling direction (V) or (R).
- Press the accelerator pedal (9) and the foot key (6).

The truck will now move in the selected direction.



The foot key (6) prevents the operator's foot from protruding beyond the truck's contour while driving.

If it is not pressed, all electrical functions except for the steering, the information and service display (LISA), the horn and the battery discharge indicator are deactivated. The truck rolls to a stop. The lowering function remains functional.



The travelling speed is controlled by means of the accelerator (9).

## ○ Double-pedal version

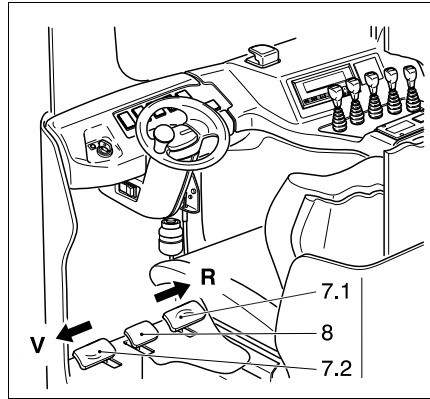
### Driving

Floor conveyors from the double-pedal series are provided with two pedals which can be used for selecting the driving direction. They can also be used for regulating the driving speed.

Driving pedal 7.1: Driving in fork direction.

Driving pedal 7.2: Driving in actuation direction.

When driving, both feet are to be kept on the pedals.



### Steering

#### Contradirectional steering (standard version)

When travelling forward (travel direction switch (21) set to (V) = drive direction), turning the steering wheel to the left results in a left turn and turning the wheel to the right in a right turn.

The position of the drive wheel is shown on the LISA display.

## ○ Synchronized steering

When travelling forward (travel direction switch (21) set to (V) = drive direction), turning the steering wheel to the left results in a right turn and turning the wheel to the right to a left turn.

The position of the drive wheel is shown on the LISA display.

### Braking



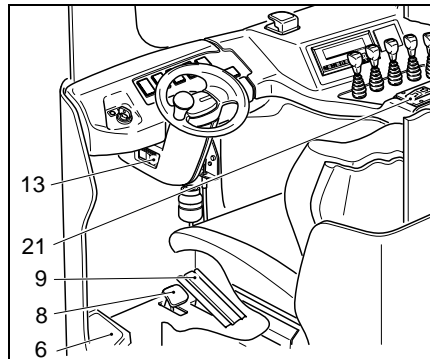
The braking behaviour of the truck strongly depends on the state of the floor. This must be taken into account by the driver for his driving behaviour.

The truck can be braked in three ways:

- by counter-current braking,
- by coasting, or by
- using the service brake.




If the truck is operated by several drivers (for instance in multi-shift operations), the braking and travelling behaviour of the truck must be checked, when the parameters are individually set. Check the truck reactions when taking over the truck.



#### Counter-current braking:

- Change over the travelling direction switch (21) during travel to the opposite driving direction. The truck is then braked by the drive current control system until movement in the opposite direction commences.

-  This mode of braking reduces energy consumption, as it involves energy recovery via the drive current control system.

### **Braking by coasting:**


Slowly release the accelerator pedal while driving. The truck is braked by the drive current control according to the position of the accelerator pedal.

### **Braking using the service brake:**

- Depress the brake pedal (8).

-  The truck is hydraulically braked by drum brakes.


## **9.2 Picking up and setting down loads ○**

-  Before picking up a load, the driver has to check that the load rests properly on its pallet and that it does not exceed the capacity of his truck.


- Pass the fork tines as far as possible under the load.




### **Lifting**

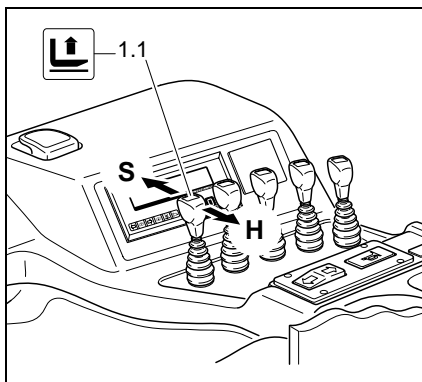
-  Persons must not be allowed to stand under raised forks.

- Pull the control lever (1.1) in the (H) direction.

-  The inclination angle of the multi-pilot stick controls the lifting speed.

- Do not release the control lever until the desired lifting height has been reached.


-  If the fork moves against the end stop (audible noise emitted by the pressure limiting valve), the control lever must immediately be returned to its neutral position.



### **Lowering**

- Push the control lever (1.1) in the (S) direction.

-  The inclination angle of the control lever controls the lowering speed.

-  Avoid impacting of the load to prevent damage to the load and to the racking.

### Pushing the mast holder forward



Do not reach between the mast and the battery hood.

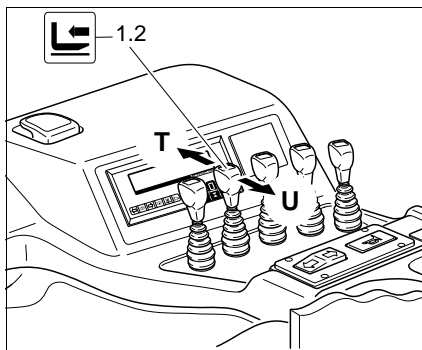
- Tilt the control lever (1.2) in the (T) direction to push the mast holder forward and in the (U) direction to retract it.



The inclination angle of the control lever controls the traversing speed.

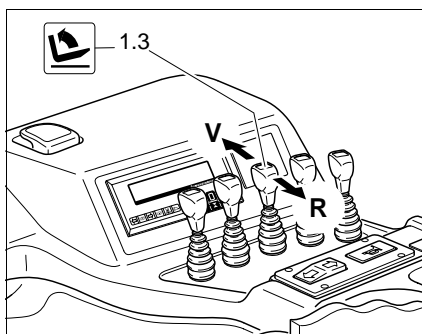


When transporting loads, only drive with the mast holder retracted and the load lifting device lowered.



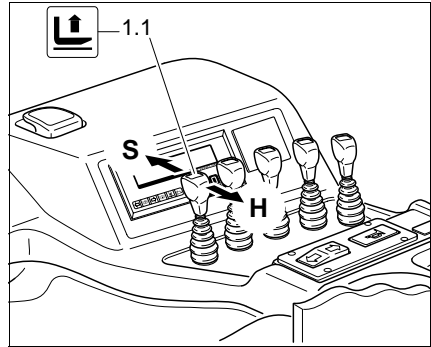
### Mast tilting / Fork lifting

- Press control lever (1.3) in direction (V) to tilt the mast forward.
- Press control lever (1.3) in direction (R) to tilt the mast backward.



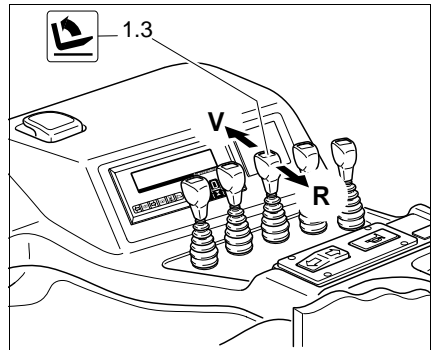
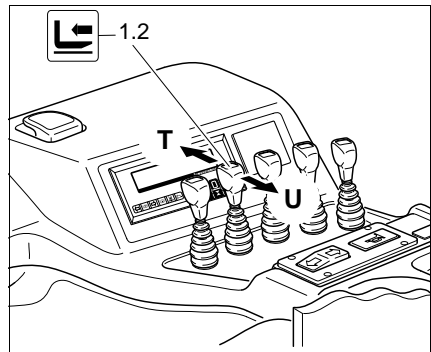
### 9.3 Picking up, lifting and transporting of loads ○

- Press( V ) or ( R ) on the control lever (1.3) to bring the fork tines into a horizontal position.
- Move the truck up to the load.
- Tilt the control lever (1.2) in the (T) direction to push the mast holder forward.
- Pull the control lever (1.1) in the (H) direction to lift the fork tines to the appropriate height.
- Move the fork tines under the load
- Pull the control lever (1.1) in the (H) direction to lift the load clear.
- Tilt the control lever (1.2) in the (U) direction to retract the mast holder..



When transporting loads, only drive with the mast holder retracted, the hoist frame tilted backwards and the load lifting device lowered.

- Press the control lever (1.1) in the (S) dir. to lower the load to the transport position.
- Press (R) on the control lever (1.3) to tilt the load backward.
- Transport the load to the required location.
- Press (V) on the control lever (1.3) to bring the load into a horizontal pos.
- Press the control lever (1.1) in the (H) direction to move the load to the required height. If necessary, press the control lever (1.2) in the (T) direction to push the mast holder forward.
- Press the control lever (1.1) in the (S) direction to set down the load.
- Tilt the control lever (1.2) in the (U) direction to retract the mast holder.



## 9.4 Operating an attachment ○

### ○ Integrated lateral traversing device



The directions “to the left” and “to the right” refer to the load lifting device as seen from the operator’s position.

Moving the lateral traversing device to the left:

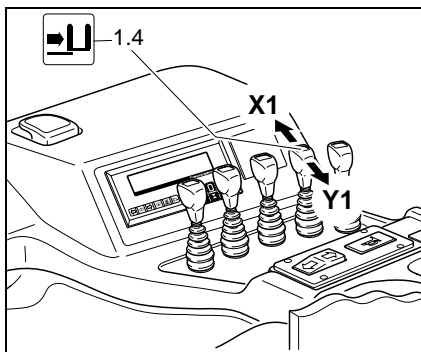
- Press the control lever (1.4) in the (X1) direction.

Moving the lateral traversing device to the right:

- Press the control lever (1.4) in the (Y1) direction.



Reduced capacity must be taken into account when traversing of load is required (see chapter B).

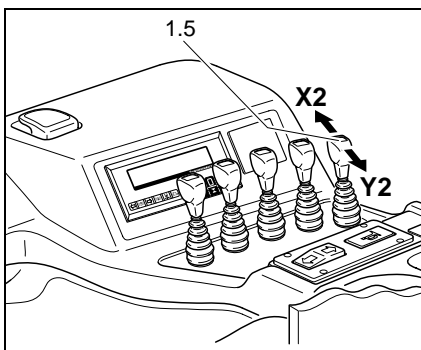


### ○ Hydraulic attachments

The control lever (1.5) controlling the functions (X2) and (Y2) is provided for the operation of a hydraulic attachment. (Refer to the operating instructions provided by the manufacturer).



Check the capacity of the respective attachment.







# F Maintenance of the fork-lift truck

## 1 Operational safety and environmental protection

The checks and servicing operations contained in this chapter must be performed in accordance with the intervals as indicated in the servicing checklists.



Modifications of fork-lift truck assemblies, especially of the safety installations, are not permitted. On no account must the operational speeds of the truck be changed.



Only original spare parts have been certified by our quality assurance service. To ensure safe and reliable operation of the fork-lift truck, only spare parts of the manufacturer must be used. Used parts, oils and fuels must be disposed of in accordance with the applicable environmental protection regulations. For oil changes, the oil service of the manufacturer is available to you.

Upon completion of any checking and servicing activities, the operations contained in the section "Recommissioning" must be performed (see chapter F).

## 2 Safety regulations applicable to truck maintenance

**Servicing and maintenance personnel:** The fork-lift truck must only be serviced and maintained by trained personnel of the manufacturer. The service organization of the manufacturer has external technicians trained especially for these assignments. We thus recommend signing a maintenance contract with the relevant service location of the manufacturer.

**Lifting and jacking up:** When a fork-lift truck is to be lifted, the lifting gear must only be secured to the points specially provided for this purpose. When the truck is to be jacked up, suitable measures must be taken to prevent the truck from slipping or tipping over (use of wedges, wooden blocks). Work underneath the raised load lifting device must only be carried out when the fork is immobilised and supported by a chain of adequate strength.

**Cleaning operations:** No inflammable liquids must be used when cleaning the fork-lift truck. Prior to commencing cleaning operations, all safety measures that are required to prevent sparking (e.g. by short-circuits) have to be taken. For battery-operated fork-lift trucks, the battery plug must be removed. Only weak indraft, weak compressed air and non-conducting, antistatic brushes must be used for the cleaning of electric or electronic assemblies.



If the fork-lift truck is to be cleaned using a water jet or a high-pressure cleaner, all electric and electronic components must be carefully covered beforehand because moisture can lead to incorrect functioning. Cleaning by means of a steam jet is not permitted.

Upon completion of cleaning work, the operations detailed in the section "Recommissioning" must be performed.

**Work on the electric system:** Work on the electric system of the truck must only be performed by personnel specially trained for such operations. Before commencing any work on the electric system, all measures required to prevent electric shocks have to be taken. For battery-operated fork-lift trucks, the truck must also be depowered by removing the battery plug.

**Welding operations:** To prevent any damage to electric or electronic components, these have to be removed from the fork-lift truck before any welding operations are undertaken.

**Settings:** When repairing or replacing hydraulic, electric or electronic components or assemblies, all truck-specific settings have to be retained.

**Tyres:** The quality of the tyres greatly affects the stability and the driving behaviour of the fork-lift truck. Changes must only be made following consultations with the manufacturer. When replacing wheels or tyres, it must be ensured that the fork-lift truck remains level (tyres and wheels must always be replaced in pairs, i.e. left and right together).

**Lift chains:** The lift chains wear rapidly if not lubricated. The intervals in the service checklist apply to normal duty. If requirements are higher (dust, temperature), lubrication is required more often. The specified chain spray must be used as specified. The external application of grease does not provide sufficient lubrication.

**Hydraulic hoses:** The hoses must be renewed every six years. When replacing hydraulic components, also renew the hoses in this hydraulic system.

### 3 Servicing and inspection

Thorough and expert servicing is one of the most important preconditions for safe operation of the fork-lift truck. The neglect of regular servicing intervals can lead to fork-lift truck failure and constitutes a potential hazard to personnel and equipment.

The indicated servicing intervals are based on single-shift operation under normal operating conditions. For applications in dusty environments, or involving large temperature fluctuations or multiple-shift operation, the servicing intervals must be shortened accordingly.

The following servicing checklist indicates the operations to be performed and the respective intervals to be observed. The servicing intervals are defined as follows:

W1 = Every 50 operating hours, but at least once per week  
M3 = Every 500 operating hours, but at least every 3 months  
M6 = Every 1000 operating hours, but at least every 6 months  
M12 = Every 2000 operating hours, but at least every 12 months

In the running-in phase of the truck, the following additional operations have to be carried out:

#### **After the first 100 operating hours:**

- Check the wheel nuts for security and retighten, if required.
- Check the hydraulic connections for leaks and retighten, if required.
- Check steering chain tension, adjust if necessary.

#### **After the first 500 operating hours:**

- Replace the hydraulic oil and the filter cartridge.

#### 4 Maintenance Check - list ETM/V 214-220

			Maintenance intervals				
			standard = ● cold store = *	W 1	M 3	M 6	M 12
<b>Chassis and superstruct.:</b>	1.1	Check all load bearing elements for damage		●			
	1.2	Check all bolted connections		●			
	1.3	Check driver's protective roof and load guard for secure fastening	*	●			
<b>Drive unit:</b>	2.1	Check the transmission for noises and leakage		●			
	2.2	Check whether the drive support plate and screws are fitted tightly		●			
	2.3	Check the transmission oil level		●			
	2.4	Check the mechanical pedal linkage; adjust, if necessary		●			
	2.5	Change the transmission oil			*	●	
<b>Wheels:</b>	3.1	Check for wear and damage		●			
	3.2	Check the wheel bearings and ensure secure fastening of wheels	*	●			
<b>Steering:</b>	4.1	Check the steering chain and chain sprocket for wear, adjust and grease	*	●			
	4.2	Check mechanical parts of the steering head		●			
	4.3	Check the steering for correct function and adjustment		●			
	4.4	Replace and adjust the steering angle potentiometer a)					
	4.5	Check and, if necessary, adjust the steering angle limiter		●			
<b>Brake system:</b>	5.1	Check the brake linings for wear		●			
	5.2	Performance and adjustment check	*	●			
	5.3	Check the brake linkage, adjust and grease, if necessary	*	●			
	5.4	Check the brake lines and connections		●			
	5.5	Change the brake fluid			*	●	
	5.6	Check and, if necessary, adjust the emergency stop device for magnetic lifting		●			
	5.7	Check brake cable of the parking brake and replace it, if necessary		●			
<b>Hydraulic system:</b>	6.1	Performance check	*	●			
	6.2	Check all connections for leakage and damage	*	●			
	6.3	Check hydraulic cylinders for leakage, damage and secure attachment	*	●			
	6.4	Check the oil level	*	●			
	6.5	Replace the hydraulic oil, the filter cartridge and the vent filter			*	●	
	6.6	Check the hose run for correct functioning and damage	*	●			
	6.7	Check the pressure relief valves for correct functioning			*	●	
	6.8	Replace the pressure filter cartridge				●	
	6.9	Check that the hydraulic motor for regenerative lowering is tight and correctly fastened and does not show signs of damage		●			
	6.10	Check the emergency lowering valve for correct functioning			*	●	
	6.11	Remove and rinse the coarse strainer in the control valve		●			

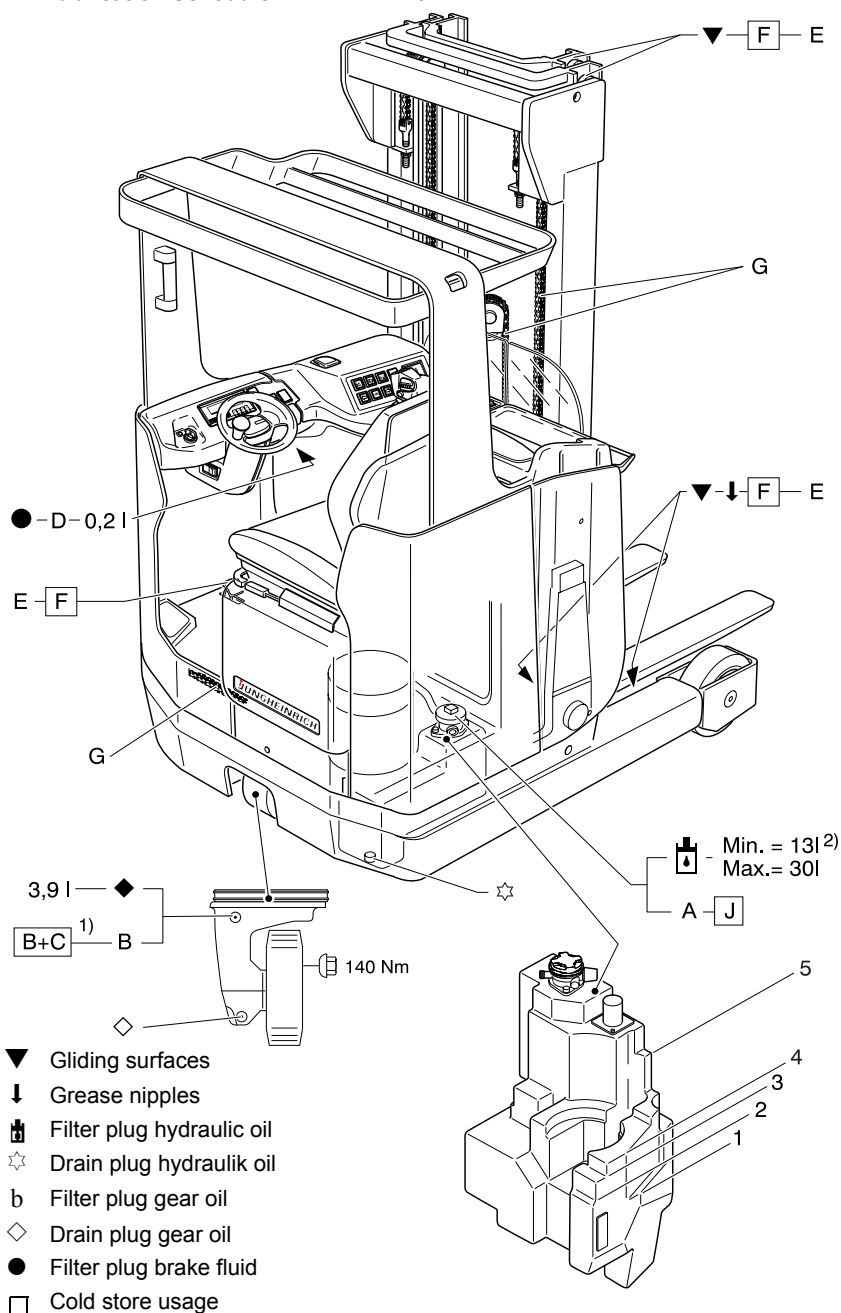
a) As a preventive measure, replace the steering angle potentiometer every 2 years



The maintenance intervals refer to normal service conditions. In case of aggravated conditions, the intervals must be reduced as required.

			Maintenance intervals				
			standard = ● cold store = ✱	W 1	M 3	M 6	M 12
<b>Electrical system:</b>	7.1	Performance check		●			
	7.2	Check all cables for secure connection and damage		●			
	7.3	Check the fuses for correct amperage		●			
	7.4	Check switches and trip cams for secure attachment and correct functioning		●			
	7.5	Check the warning installation for correct functioning	✱	●			
	7.6	Check contactors, replace wearing parts, if necessary		●			
	7.7	Check the electronic boards for tight seat and cleanliness		●			
<b>Electric motors</b>	8.1	Check the carbon brushes for wear g)		●			
	8.2	Check the motor for secure attachment		●			
	8.3	Clean motor housing by means of a vacuum cleaner and check the commutator for wear g)	✱	●			
<b>Battery:</b>	9.1	Check the battery cables for damage, renew, if necessary		●			
	9.2	Check battery trolley locking, performance and adjustment		●			
	9.3	Check acid density, acid level and cell voltage	✱	●			
	9.4	Check the terminals for secure attachment and apply grease	✱	●			
	9.5	Clean battery connections, check for tight seat	✱	●			
<b>Hoist frame:</b>	10.1	Check the mast anchorage		●			
	10.2	Check lifting chains and chain guides for wear, adjust and grease	✱	●			
	10.3	Check support and attachment of tilt cylinder		●			
	10.4	Check the tilt angle of mast					●
	10.5	Perform sight check of rollers, sliding elements, and stops	✱	●			
	10.6	Check hoist frame bearing		●			
	10.7	Check the traversing systems for wear and damage, adjust lateral play, if necessary		●			
	10.8	Check fork tines and fork carrier for wear and damage	✱	●			
<b>Mounted implement:</b>	11.1	Performance check	✱	●			
	11.2	Check the attachment to the vehicle and all load bearing elements	✱	●			
	11.3	Check bearings, guide elements, and stops for wear and damage, grease		●			
<b>General measurements:</b>	12.1	Check the electrical system for a grounding fault					●
	12.2	Check the driving speed and braking distance					●
	12.3	Check the lifting and lowering speed					●
	12.4	Check safety and shutdown devices		●			
<b>Lubrication:</b>	13.1	Grease the vehicle in accordance with the lubrication schedule	✱	●			
<b>Demonstration:</b>	14.1	Perform a trial run under nominal load		●			
	14.2	Upon completion of servicing operations, demonstrate the vehicle to the person responsible	✱	●			

## 5 Lubrication Schedule ETMV 214-220



1) Compound cold store 1:1

2) Filling amount see  
"Checking the hydraulics oil level"

## 5.1 Fuels, coolants and lubricants

**Handling consumption type material:** Consumption type material must always be handled properly. Manufacturer's instructions to be observed.



Improper handling is injurious to health, life, and environment. Consumption type materials must be stored in adequate containers. They might be inflammable and, therefore, must not come into contact with hot components or open fire.

When filling in consumption type materials use clean containers only. It is prohibited to mix consumption type materials of different grades or qualities resp., except if mixing is expressly prescribed in these operating instructions.

Avoid spilling. Spilt liquid must be removed immediately using a suitable binding agent, and the mixture of consumption type material and binding agent is to be disposed of according to the regulations.

Code	Order-no.	Supply Qty	Designation	Used for:
A	29 200 670	5,0 l	H-LP 46, DIN 51524	Hydraulic system
B	29 200 680	5,0 l	CLP 100, DIN 51517	Transmission
C	29 200 810	5,0 l	H-LP 10, DIN 51524	Transmission, hydraulic system
D	29 200 150	1,0 l	Brake fluid	Brake system
E	29 201 430	1,0 kg	Grease, DIN 51825	Lubrication
F	29 200 100	1,0 kg	Grease, TTF52	Lubrication
G	29 201 280	0,51 kg	Chain spray	Chains
J	29 202 020	5,0 l	Aero Shell Fluid 4	Hydraulic system

### Grease data

Code	Saponification	Dropp. point °C	Worked penetr. at 25 °C	NLG1 class	Service temperat. °C
E	Lithium	185	265-295	2	-35/+120
F	--	--	310-340	1	-52/+100



## 5.2 Reservoir filling level ETM/V 214/216

Marking	Litre	Lifting heights ( $h_3$ ) in mm	
		ZT	DZ
5	ca. 30	-	<10250
4	ca. 25	-	< 8720
3	ca. 23	< 4400	< 7100
2	ca. 20	< 3800	< 5600
1	ca. 16	-	-

## 5.3 Reservoir filling level ETM/V 220

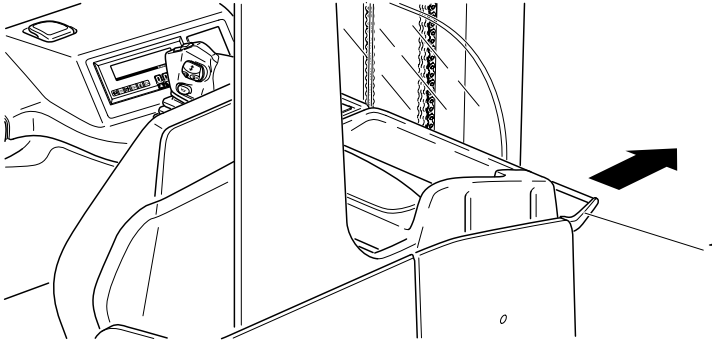
Marking	Litre	Lifting heights ( $h_3$ ) in mm	
		ZT	DZ
upper level	ca. 32	-	< 11510
5	ca. 30	-	< 10220
4	ca. 25	-	< 7400
3	ca. 23	-	< 6200
2	ca. 20	< 4200	< 4700
1	ca. 16	-	-

## 6 Instructions for the servicing operations

### 6.1 Preparing the truck for the performance of servicing and maintenance operations

All required safety measures must be taken to prevent any accidents in the course of the servicing and maintenance operations. The following preparatory operations must be performed:

- Park and secure the truck (see chapter E).
- Disconnect the battery plug (1) to prevent accidental starting of the truck.



When work has to be performed under the raised fork or under the jacked up truck, suitable measures must be taken to prevent any dropping, tilting or slipping of the fork or truck. When lifting the truck, the instructions contained in chapter "Transportation and commissioning" have to be observed.

When performing work on the parking brake, the truck must be secured against moving.

### 6.2 Safety belt maintenance ○

It is recommended that the driver checks daily condition and function of the safety belt daily before starting up the floor conveyor. Only regular checks ensure that a fault or defective is detected in time.

- Pull out the belt completely and check the fibres for wear and tear.
- Check the function of the belt buckle and control whether the belt is perfectly winding up in the reel-up device.

#### Checking the blocking mechanism:

- Park the floor conveyor in horizontal position.
- Pull out the belt jerkily.



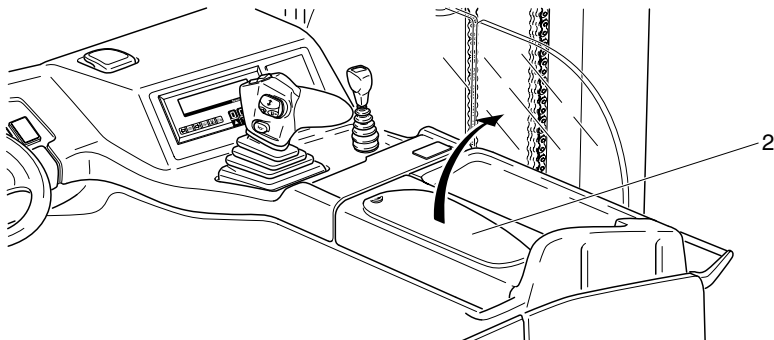
The mechanism must block the pull-out movement.




Do not operate the floor conveyor with a defective safety belt - have it exchanged immediately!

### 6.3 Opening the arm rest

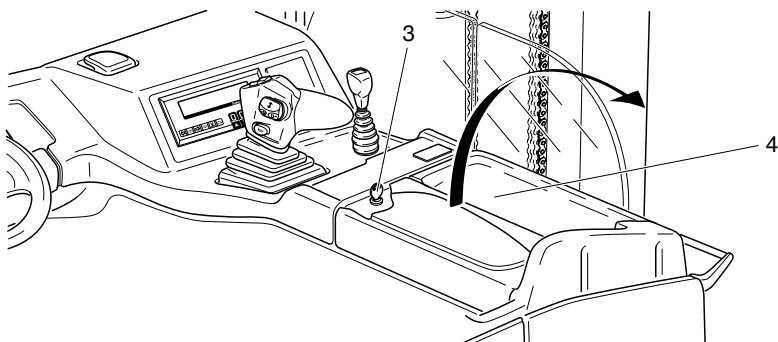
- Swing the arm rest (2) upward.




 The square spanner and the hood lock are accessible.

### 6.4 Opening the hood (Direct current motor)

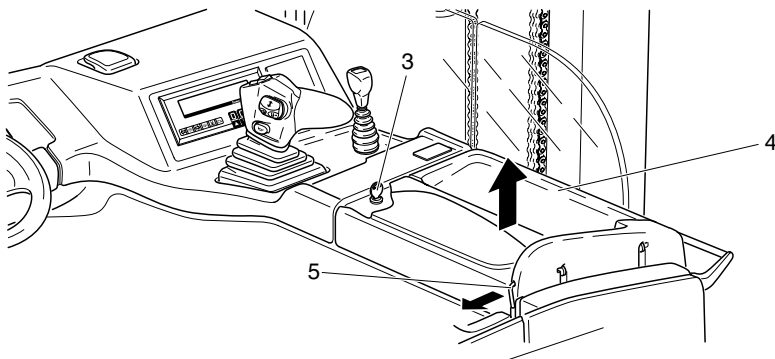
- Unlock the hood (4) using the service key (3).
- Swing the hood upward.



 The drive current control system and the truck fuses are readily accessible for servicing purposes.

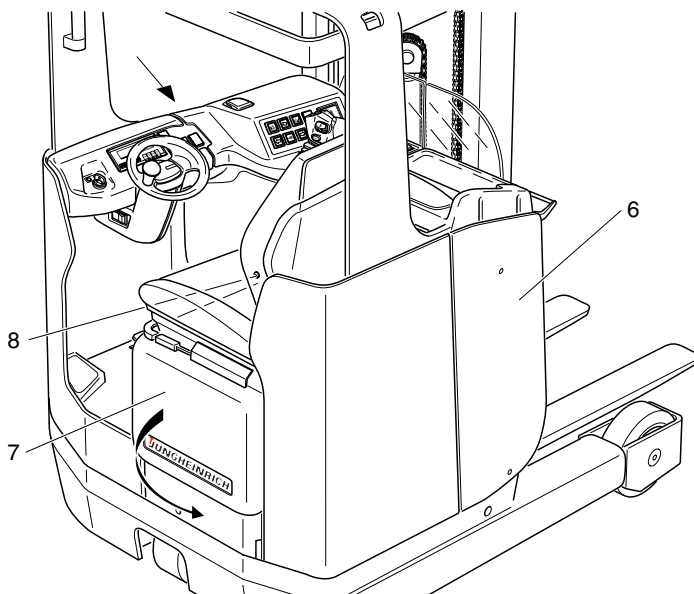
## 6.5 Opening the hood (Three-phase current) ○

- Open the seating cover
- Pull out pin 5.
- Remove cover and control cover.



## 6.6 Opening the battery doors and the seat hood

- Unlock the battery door (5) using the service key and remove it.



- Unlock the seat hood (7) using the service key and screw out the securing screw (8).
- Swing the seat hood sideways in the direction of the arrow.



The drive unit and the hydraulic unit are accessible for servicing purposes.

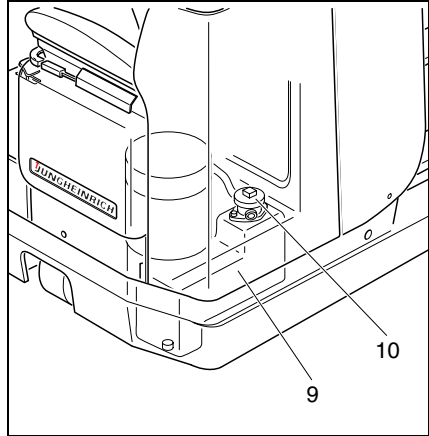
## 6.7 Checking the hydraulic oil level

- Prepare the truck for servicing and maintenance.  
(see sections 6.1 and 6.4 - "Opening the seat hood").
- Check the hydraulic oil level in the hydraulic reservoir (9).



The oil level must be checked at the hydraulic reservoir with the load lifting device completely lowered.

- If necessary, top up through the filler neck (10) using oil of the correct specification.  
(For the hydraulic oil specification, see section 5.1).
- Lock the seat hood again and screw in the securing screw.



## 6.8 Pressure filter for regenerative lowering

- Park the truck and render it safe  
(see chapter E, section 4.7)
- Move the mast holder up to the front stop position.
- Completely lower the load lifting device.
- Switch the master switch and the key switch to "Off".

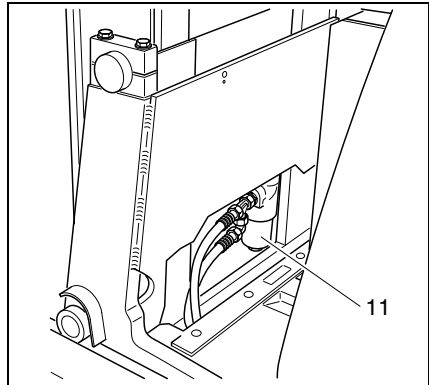


Make sure that the battery plug is disconnected before starting work between the mast holder in the front stop position and the battery!

- Pull out the battery plug.
- Replace the pressure filter cartridge (8.1).

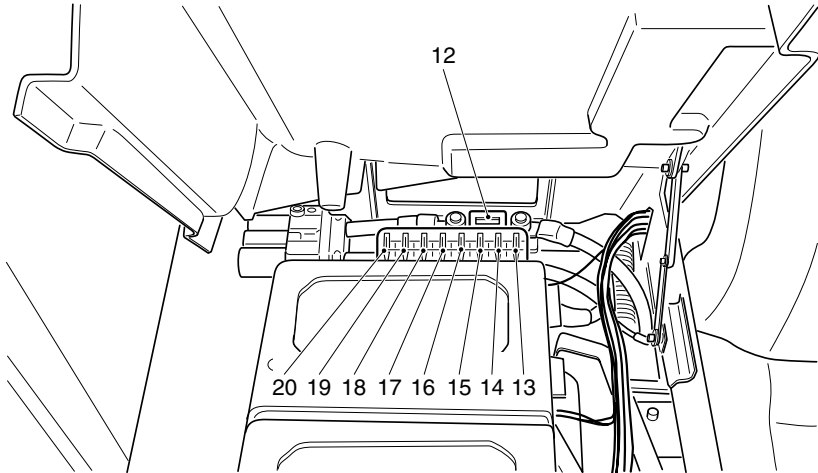


After the pressure filter cartridge has been replaced, the hydraulic system must be deaerated!



## 6.9 Checking the electric fuses (Direct current motor)

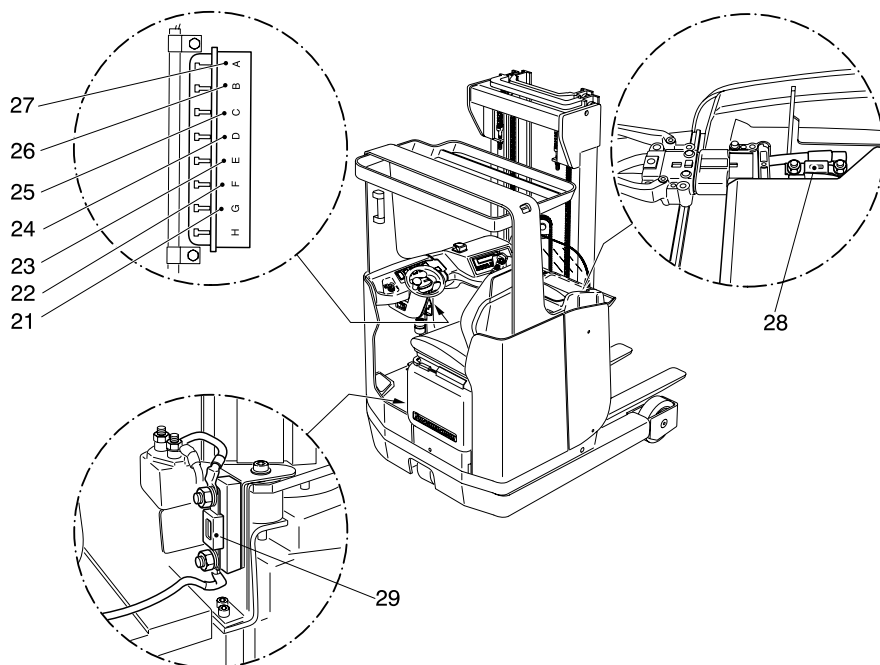
- Prepare the truck for servicing and maintenance (see sections 6.2 and 6.3).
- Check all fuses for correct value according to table, replace if necessary. .



Item	Designation		Value / type
12	F8	Main fuse	355 A
13	1F10	Fuse, field "Driving"	30 A
14	3F6	Fuse, steering motor	30 A
15	3F9	Control fuse, steering electronics	3 A
16	9F4	Fuse, options	10 A
17	4F10	Fuse, fan	10 A
18	1F9	Control fuse, driving / lifting electronics	3 A
19	1F8	Control fuse, interface	3 A
20	F1	Overall control system fuse	30 A

## 6.10 Checking the electric fuses (Three-phase current) ○

- Prepare the truck for servicing and maintenance (see sections 6.2 and 6.3).
- Check all fuses for correct value according to table, replace if necessary.



Item	Designation		Value / type
21	3F6	Steering engine fuse	30 A
22	3F9	Steering electronics control fuse	3 A
23	9F4	Options fuse	10 A
24	4F10	Ventilator fuse	10 A
25	1F9	Driving/lifting control fuse	3 A
26	1F8	Interface control fuse	3 A
27	F1	Total control fuse	30 A
28	F8	Main fuse	355 A
29	2F1	Pump engine fuse (only for utility sinks)	100 A

## 6.11 Recommissioning the truck

Recommissioning of the truck following the performance of cleaning or maintenance work is permitted only, after the following operations have been performed:

- Check the horn for proper functioning
- Check the master switch for correct function.
- Check the brake for correct function.

## 7 Decommissioning the truck

If the truck is to be decommissioned for more than two months, it must be parked in a frost-free and dry location and all measures to be taken before, during and following decommissioning must be performed as detailed below.



During decommissioning the truck must be jacked up ensuring that the wheels are clear of the ground. Only this measure will ensure that wheels and wheel bearings do not suffer damage.

If the fork-lift truck is to be decommissioned for more than 6 months, additional measures must be discussed with the Service Department of the manufacturer.

### 7.1 Operations to be performed prior to decommissioning

- Thoroughly clean the truck.
- Check the brakes for correct function.
- Check the hydraulic oil level and top up, if required (see chapter F).
- Apply a thin film of oil or grease to all parts not protected by a paint coating.
- Grease the truck as detailed in the lubrication chart (see chapter F).
- Recharge the battery (see chapter D).
- Disconnect and clean the battery. Apply pole grease to the battery poles.



In addition to this, all instructions as given by the battery supplier have to be observed.

- Spray all exposed electrical contacts with a suitable contact spray.

### 7.2 Measures to be taken during decommissioning

#### Every 2 months:

- Recharge the battery (see chapter D).



Regular recharging of the battery is very important, as otherwise, caused by self-discharging, excessive depletion of the battery would occur, which, owing to sulfatization, will result in the destruction of the battery.



### 7.3 Recommissioning the truck

- Thoroughly clean the truck.
- Lubricate the truck according to the lubrication chart (refer to chapter F).
- Clean the battery. Grease the pole screws using pole grease and reconnect the battery.
- Recharge the battery (refer to chapter D).
- Check if the gear oil contains condensed water and change, if required.
- Check if the hydraulic oil contains condensed water and change, if required.
- Start up the truck (refer to chapter E).



If switching troubles are experienced in the electric system, spray the exposed contacts with contact spray and remove a possible oxide layer on the contacts of the operating controls by repeated operation.



Perform several brake tests immediately after recommissioning the truck.

## 8 Safety checks to be performed at regular intervals and following any untoward incidents (Ⓢ): Accident prevention check according to BGV D27)

At least once yearly, or after any untoward incident, the truck has to be checked by a qualified inspector. The inspector must assess the condition of the truck from a stand-point purely concerned with safety aspects, uninfluenced by any company or economic circumstances. The inspector must be adequately informed and experienced to be able to assess the condition of the truck and the effectiveness of the safety installations based on the technical rules and principles governing the inspection of trucks.

The inspection must comprise a comprehensive check of the technical condition of the truck with regard to accident prevention aspects. Apart from this, the truck must be thoroughly inspected for damage possibly caused by incorrect use of the truck. The inspection results must be recorded in an inspection report which has to be kept available for a period spanning at least the next two inspection intervals.

The user has to ensure that all defects are eliminated without delay.



The manufacturer has set up a special safety service with specially qualified staff. As visual proof that the fork-lift truck has passed the safety inspection, a plaque is affixed to it. This plaque indicates in which month of which year the next test will be due.