

EZS 330/350 / XL

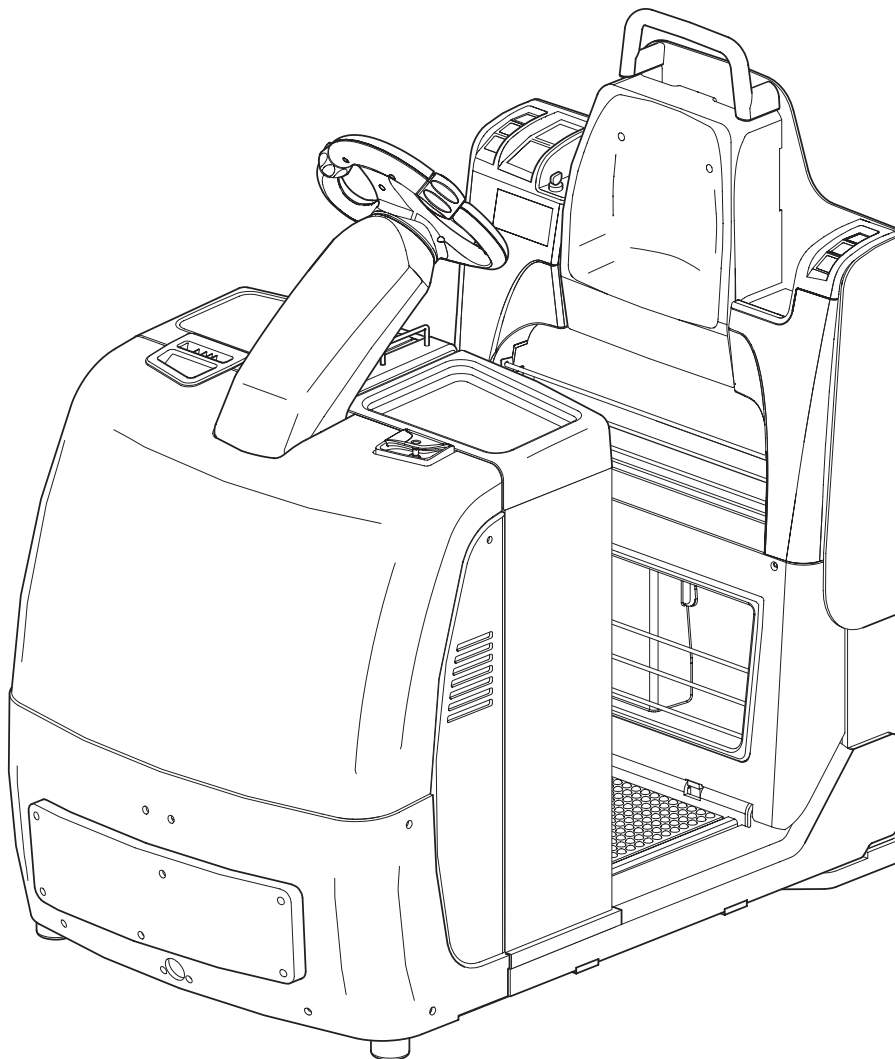
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Operating instructions

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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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Appendix

JH Traction Battery Operating Instructions



These operating instructions apply only to Jungheinrich battery models. If using another brand, refer to the manufacturer's operating instructions.

A Correct use and application



The “Guidelines for the Correct Use and Application of Industrial Trucks” (VDMA) are supplied with the truck. The guidelines form part of these operating instructions and must be observed. National regulations apply in full.

The truck described in the present operating instructions is an industrial truck designed for lifting and transporting loads.

It must be applied, operated and serviced in accordance with the instructions contained in the present manual. Any other type of use is beyond the scope of application and can result in damage to personnel, the truck or property. In particular, avoid overloading the truck with loads that are too heavy. The data plate attached to the truck or the load diagram are binding for the maximum load capacity. The industrial truck must not be used in fire or explosion endangered areas, or areas threatened by corrosion or excessive dust.

Proprietor responsibilities: For the purposes of the present operator manual the “proprietor” is defined as any natural or legal person who either uses the industrial truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting) the proprietor is considered the person who, in accordance with existing contractual agreements between the owner and user of the industrial truck, is charged with operational duties.

The proprietor must ensure that the industrial truck is used only for the purpose it is intended for and that danger to life and limb of the user and third parties are excluded. Furthermore, accident prevention regulations, safety regulations and operating, servicing and repair guidelines must be followed. The proprietor must ensure that all truck users have read and understood this operator manual.



Failure to comply with the operator manual shall invalidate the warranty. The same applies if improper work is carried out on the truck by the customer or third parties without the permission of the manufacturer’s customer service department.

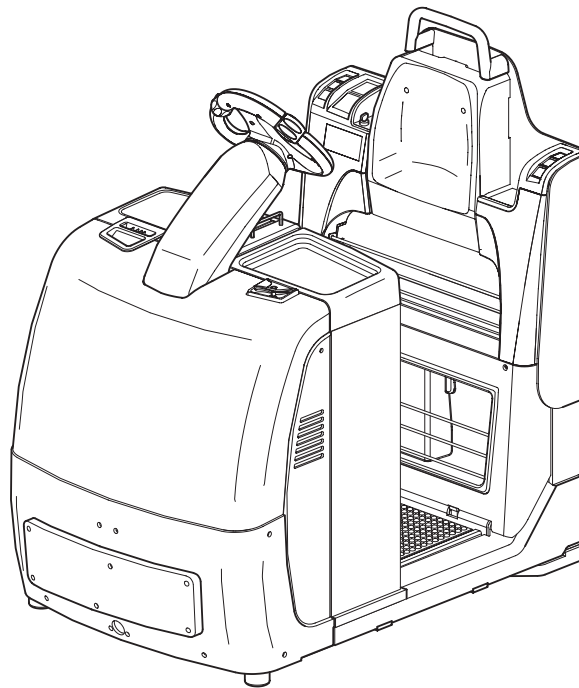
Attaching accessories: The mounting or installation of additional equipment which affects or supplements the performance of the industrial truck requires the written permission of the manufacturer. In some cases, local authority approval shall be required.

Approval of the local authorities however does not constitute the manufacturer’s approval.

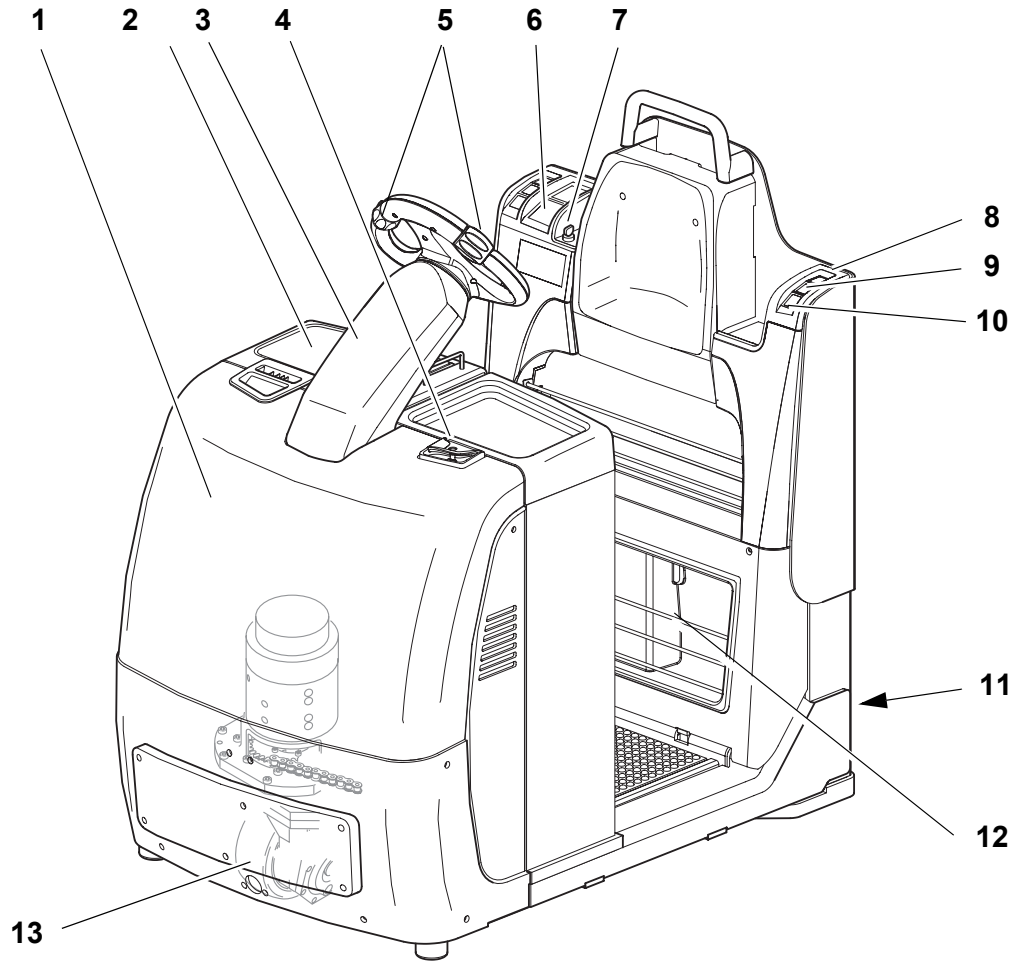
B Truck Description

1 Application

The truck is a three-wheel electric tow truck with a driver's platform, equipped with a Jet Pilot. It is designed for transporting goods on level surfaces in buildings. The tow force is shown on the data plate.



2 Assemblies



Item		Description	Item		Description
1	●	Front panel	8	○	Reverse "pedestrian operation" switch
2	●	Battery panel	9	○	Stop button
3	●	Jet Pilot	10	○	Forward "pedestrian / walk-along operation" button
4	●	Main switch / isolator (emergency disconnect)	11	○	Trailer coupling
5	●	Controller	12	●	Storage compartment
6	○	CANCODE keypad	13	●	Drive wheel
7	●	Key switch		○	Headlight (not shown)
				○	Strobe (not shown)

● = Standard equipment

○ = Optional Equipment

2.1 EN norms

Noise level: 66 dB(A)

in accordance with EN 12053 as harmonized with ISO 4871.

- The noise emission level is calculated in accordance with standard procedures and takes into account the noise level when travelling, lifting and when idle. The noise level is measured at the driver's ear.

Vibration: 0.94 m/s²

in accordance with EN 13059

- The vibration acceleration acting on the body in the operating position is, in accordance with standard procedures, the linearly integrated, weighted acceleration in the vertical direction. It is calculated when travelling over bumps at constant speed.

Electromagnetic Compatibility (

The manufacturer confirms that equipment complies with tolerance levels for electromagnetic emissions and resistance as well as static electricity discharge testing in accordance with EN 12895 including the normative procedures contained therein.

- No changes to electric or electronic components or their arrangement may be made without the written agreement of the manufacturer.

2.2 Conditions of use

Ambient temperature

- during operation -10°C to 40 °C

- Special equipment and authorisation are required if the truck is to be constantly used in conditions of extreme temperature or air humidity fluctuations.

3 Standard Version Specifications



Technical specification details in accordance with VDI 2198. Technical modifications and additions reserved.

3.1 Performance data for standard trucks

	Description	EZS 330	EZS 350	EZS 330 XL	EZS 350 XL	
Q	Tow capacity ¹⁾	3000	5000	3000	5000	kg
F	Rated tow force	600	1000	600	1000	N

3.2 Dimensions

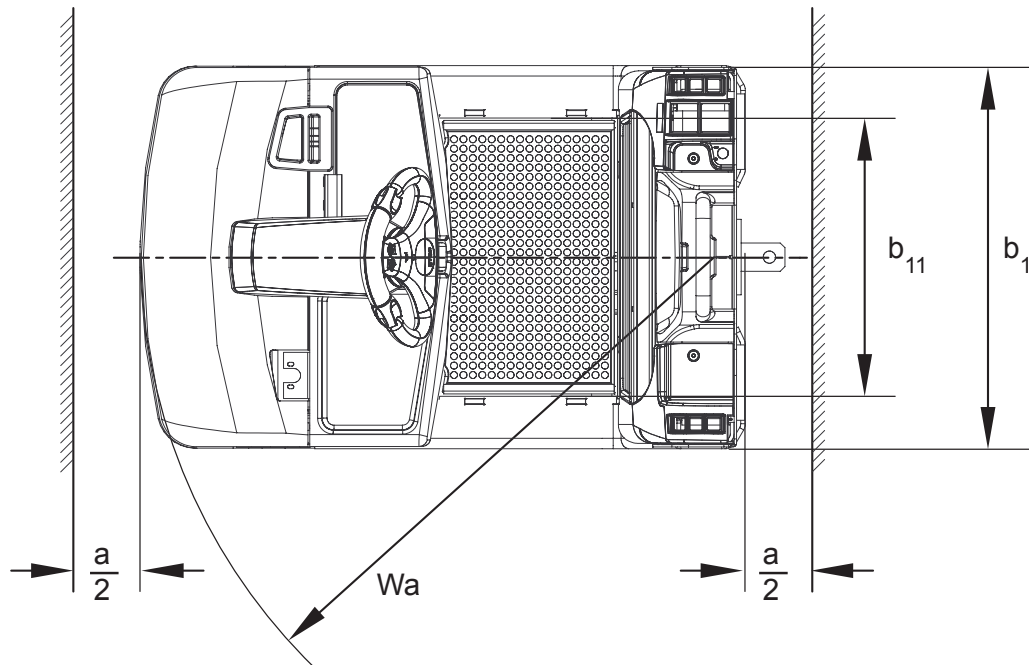
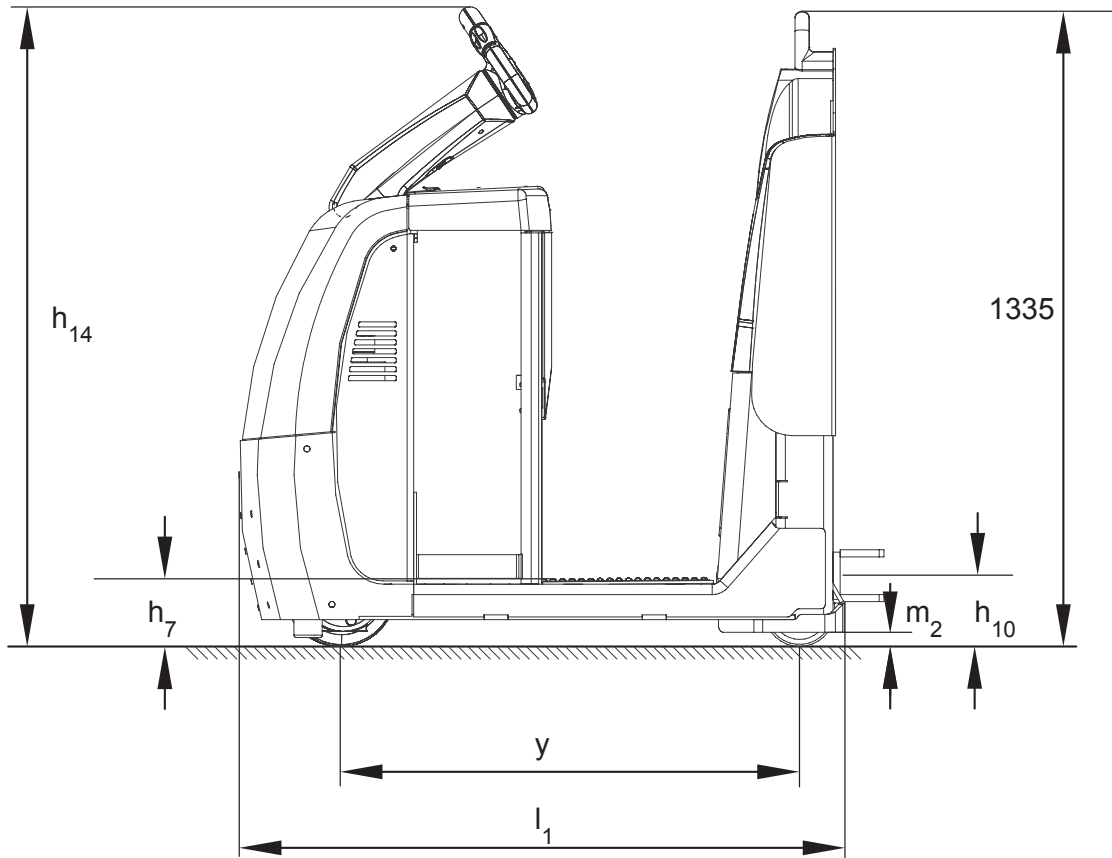
	Description	EZS 330	EZS 350	EZS 330 XL	EZS 350 XL	
	Net weight	1066	1066	1201	1201	kg
	Axle load w.o. load front/rear	514/552	514/552	635/566	635/566	kg
h ₇	Height	132	132	142	142	mm
h ₁₄	Tiller height in travel position ²⁾	1342	1342	1387	1387	mm
h ₁₀	Coupling height	158	158	158	158	mm
l ₁	Overall length ³⁾	1260	1260	1427	1427	mm
b ₁	Overall width	810	810	810	810	mm
b ₁₁	Track width, rear	490	490	490	490	mm
y	Wheel base	920	920	1087	1087	mm
m ₂	Centre wheelbase ground clearance	45	45	45	45	mm
W _a	Turning radius	1160	1160	1320	1320	mm
	Travel speed w / w.o. load	8,5/12,5	5,0/8,0	8,5/12,5	5,0/8,0	km/h
	Tow force without load s ₂ 60 min	600	1000	600	1000	N
	Max. tow force without load s ₂ 5 min	3000	3500	3000	3500	N
	Drive motor, output at s ₂ 60 min	2.5	2.5	2.5	2.5	kW
	Battery voltage, rated capacity k ₅	24/420 (450)	24/420 (450)	24/560 (600)	24/560 (600)	V/Ah
	Battery weight	370	370	370/450	370/450	kg

1) Level, rolling resistance 200N/t

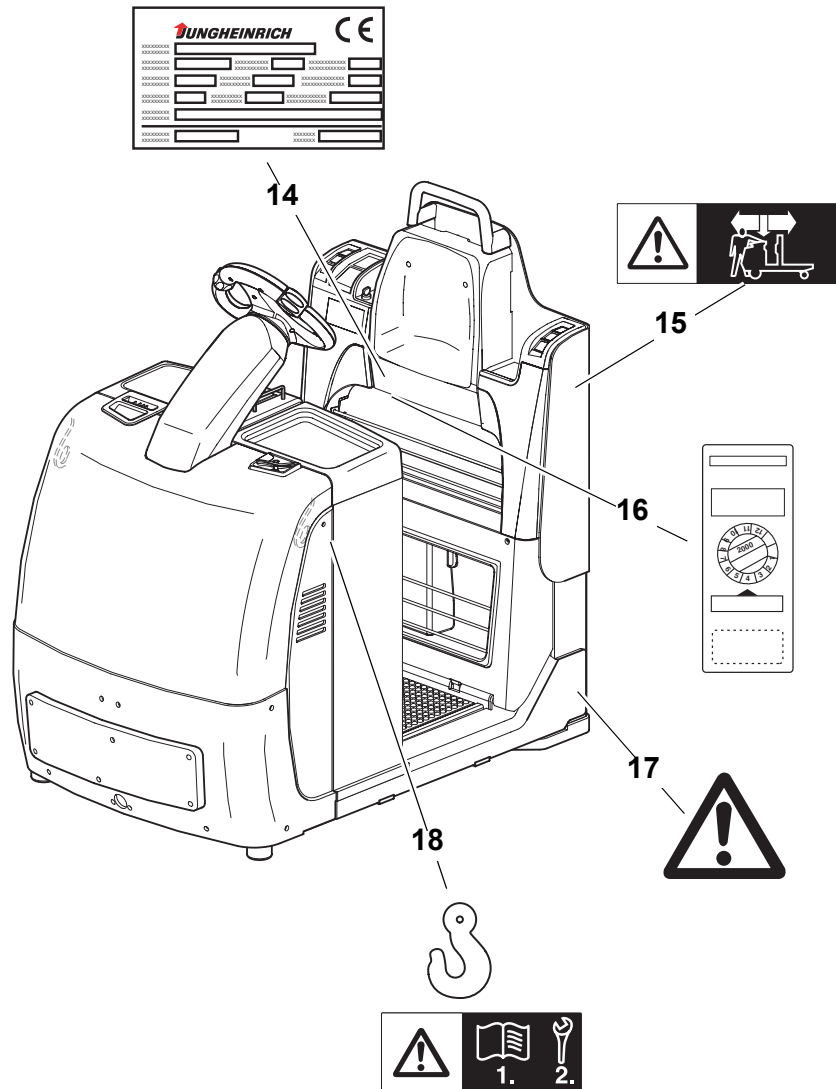
2) JetPilot height

3) Total length excluding coupling, as different coupling versions are available

4) Rated tow force

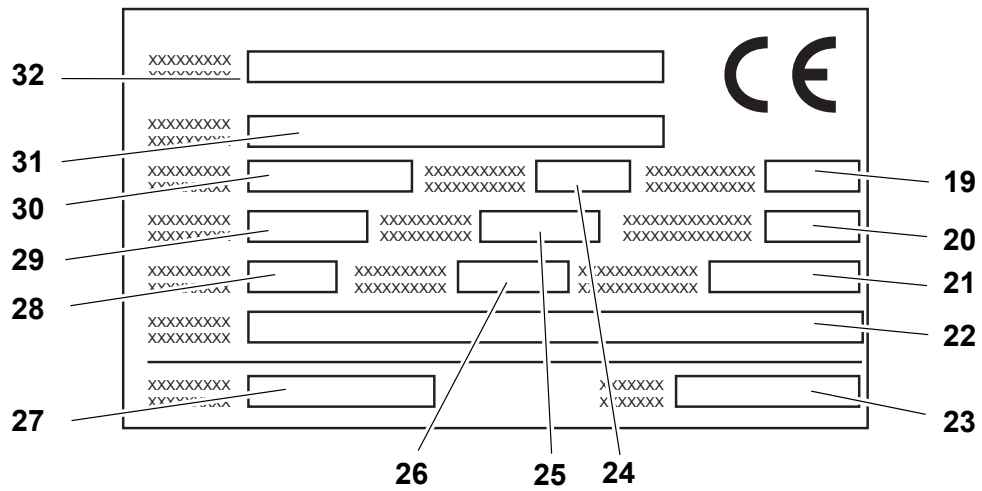


4 Identification points and data plates



Item	Description
14	Truck data plate
15	“Caution, pushbutton operation” warning
16	Accident prevention inspection label (D only)
17	Warning: Risk of trapping when reversing
18	Attachment point of hooks for transportation by crane (inside) “Read operating instructions” warning

4.1 Truck data plate



Item	Description
19	Max. supporting force (kg)
20	Net weight w.o. battery (kg)
21	Min./max. battery weight (kg)
22	Manufacturer
23	Customer no.
24	Year of manufacture
25	Rated tow force 5 min. in N
26	Output (kW)
27	Order no.
28	Battery: Voltage (V)
29	Rated tow force 60 min. in N
30	Serial no.
31	Type
32	Manufacturer's logo



For any queries relating to the truck or spare part orders, please state the truck serial no. (22).

C Transport and Commissioning

1 Lifting by crane



Only use lifting gear with sufficient capacity (for transport weight see truck data plate).

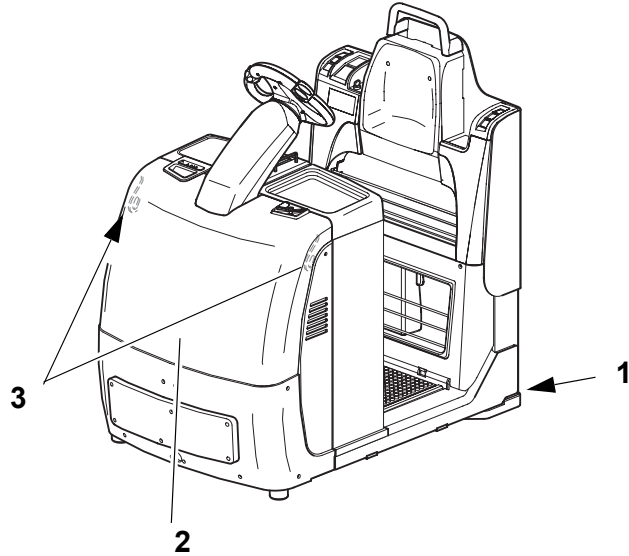


Lifting gear attachment points are provided on the chassis (3) and the back wall (1) in case the truck is to be lifted or transported by crane.

- Park the truck securely (see Chapter E).
- Open the front cover (2) and put it to one side (refer to chapter F).
- Secure the lifting slings to the attachment points (1) and (3).



The lifting gear must be attached to the attachment points in such a manner that it cannot slip under any circumstances and cannot come into contact with any attachments when the truck is lifted.



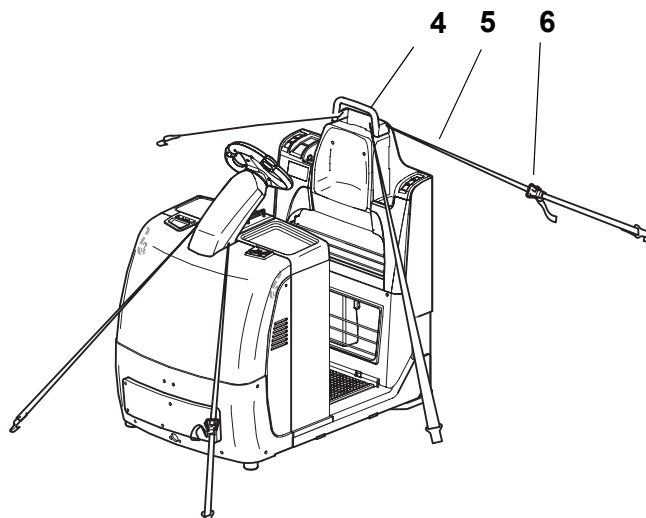
2 Securing the truck during transport

The truck must be securely fastened when transported on a lorry or a trailer. The lorry / trailer must have fastening rings.

To fasten the truck pull the tensioning belt (5) over the truck (4) and attach it to the fastening rings.

Tighten the tensioning belt with the tensioner (6).

Loading must be carried out by specially trained staff in accordance with recommendations contained in Guidelines VDI 2700 and VDI 2703. In each case correct measurements shall be determined and appropriate safety measures adopted.



3 Using the truck for the first time



Only operate the truck with battery current. Rectified AC current will damage the electronic components. Cables connected to the battery (trailing cables) must be less than 6 meters in length.

To prepare the truck after delivery or after transport, proceed as follows:

- Check the truck for completion and satisfactory condition of the equipment.
- Install battery (where required). Do not damage battery cables (see Chapter D).
- Charge the battery (see Chapter D).
- Commission the truck in accordance with instructions (see Chapter E).



When the truck is parked, the running surface of the tyres will flatten. The flattening will disappear after a short period of operation.

4 Operating the truck without its own drive system



This operating mode is not permitted when negotiating inclines and gradients.

If the truck has to be moved after a failure has rendered it immobile, proceed as follows:

- Set the master switch to position “OFF”.
- Set the key switch to position “OFF” (“0”) and remove the key.
- Prevent the truck from rolling away.
- Open battery cover (refer to chapter D).
- Open the front cover (7) and put it to one side (see chapter F).
- Slacken the lock nuts (8) and tighten the screws (9).

The brake is now released and the truck can move.

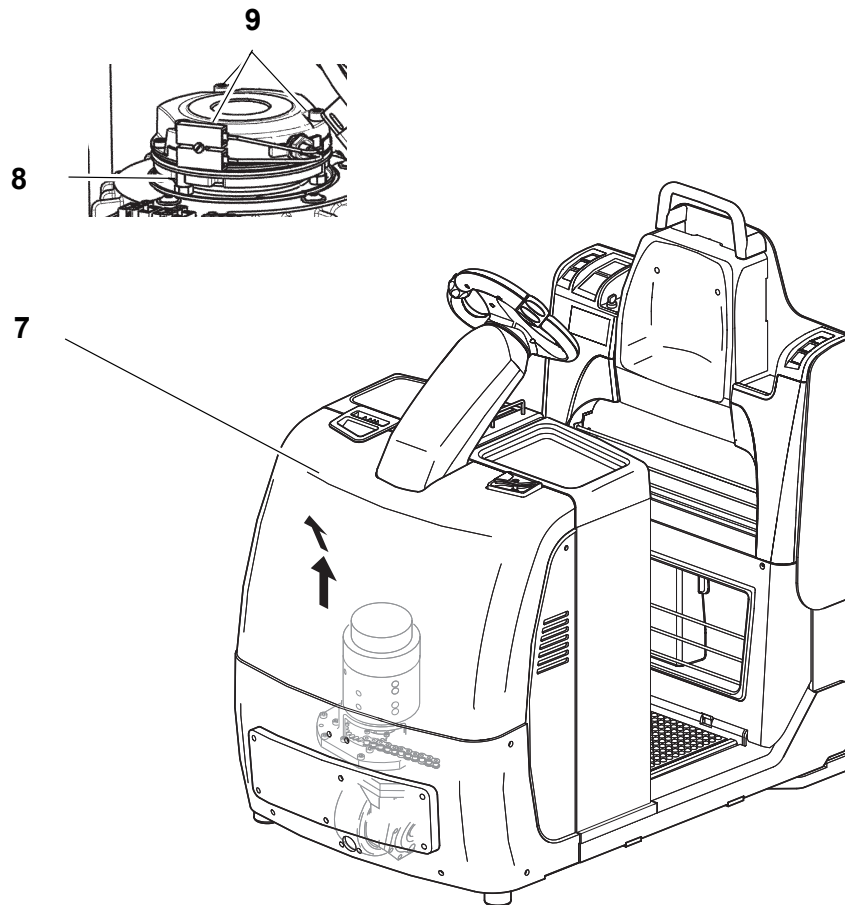


On reaching your destination, ensure that the brake is restored to its initial state. The truck must never be parked with the brakes released.

- Loosen the screws (9) by approx. 5 mm and lock by tightening the lock nuts (8).

The brake is now applied again.

- Refit the front cover (7).



D Battery Maintenance, Charging & Replacement

1 Safety regulations for handling acid batteries

Park the truck securely before carrying out any work on the batteries (see Chapter E).

Maintenance personnel: Batteries may only be charged, serviced or replaced by trained personnel. The present operator manual and the manufacturer's instructions concerning batteries and charging stations must be observed when carrying out the work.

Fire protection: Smoking and naked flames must be avoided when working with batteries. Wherever a truck is parked for charging there shall be no inflammable material or operating fluids capable of creating sparks within 2 metres around the truck. The area must be well ventilated. Fire protection equipment must be provided.

Battery maintenance: The battery cell covers must be kept dry and clean. The terminals and cable shoes must be clean, secure and have a light coating of dielectric grease. Batteries with non insulated terminals must be covered with a non slip insulation mat.

Battery Disposal: Batteries may only be disposed of in accordance with national environmental protection regulations or disposal laws. The manufacturer's disposal instructions must be followed.



Before closing the battery cover make sure that the battery lead cannot be damaged.



Batteries contain an acid solution which is poisonous and corrosive. Therefore, always wear protective clothing and eye protection when carrying out work on batteries. Avoid all contact with battery acid.

Should however clothing, skin or eyes come in contact with acid the affected parts should be rinsed with plenty of clean water - where the skin or eyes are affected call a doctor immediately. Immediately neutralise any spilled battery acid.



Only batteries with a sealed battery container may be used.



The weight and dimensions of the battery have considerable effect on the operational safety of the truck. Battery equipment may only be replaced with the agreement of the manufacturer.

2 Battery types

The truck will be equipped with different battery types, depending on the application. The following table shows which combinations can be included as standard:

LxWxH 798x212x784 mm; 370 kg	
24 V EPzS battery	3 EPzS 420 Ah
24 volt EPzS battery enhanced	3 EPzS 450 Ah
24 volt EPzV battery maintenance free	3 EPzV 360 Ah
24 volt PzW battery wf 200 ¹⁾	3 PzW 420 Ah
LxWxH 798x330x784 mm; 450 kg ²⁾	
24 V EPzS battery	4 EPzS 560 Ah
24 volt EPzS battery enhanced	4 EPzS 620 Ah
24 volt EPzV battery maintenance free	4 EPzV 480 Ah
24 volt PzW battery wf 200 ¹⁾	4 PzW 560 Ah

¹⁾ partially maintenance-free with electrolytic recirculation

²⁾ XL only

The battery weight is indicated on the battery data plate.

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



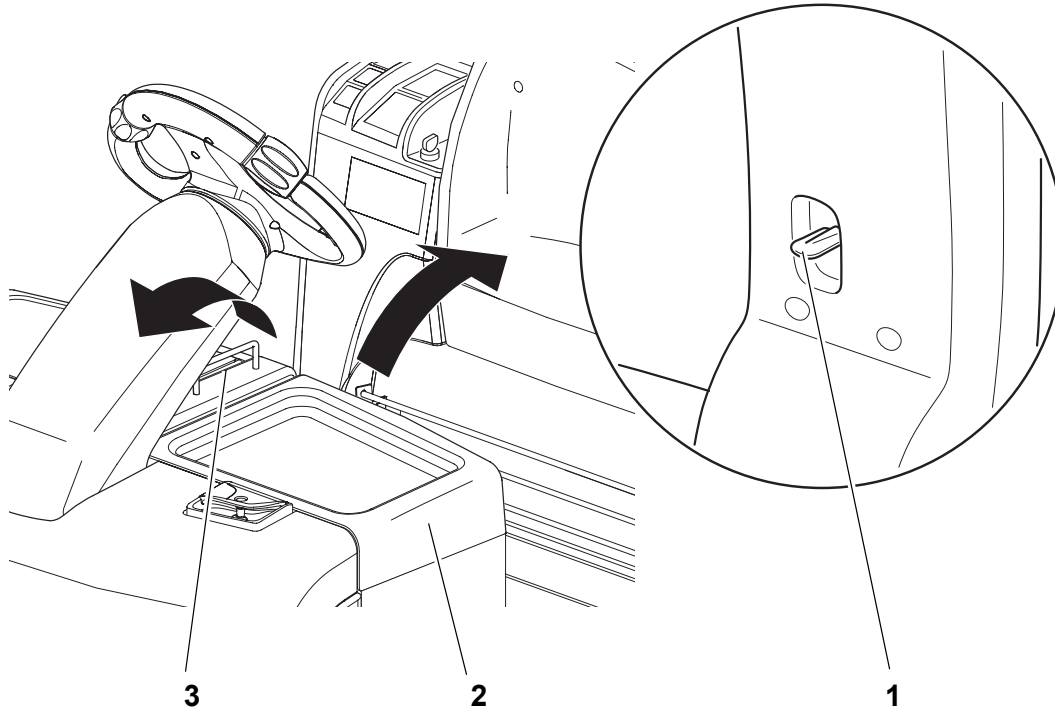
When replacing/installing the battery make sure the battery is securely located in the battery compartment of the truck.

3 Exposing the battery



Park the truck securely (see Chapter E).

- Pull lever (1) upward while at the same time setting the tiller vertical.
- Release the lever (1) again.
- Flip up the battery latch (3) and open the battery cover (2).



All covers and connections must be restored to the normal operating condition before the truck can operate again.

4 Charge the battery



To charge the battery, the truck must be parked in a closed and properly ventilated room.

- Expose the battery (see Section 3).



The battery connector (5) and the charging cable (4) of the battery charging station must only be connected or disconnected with the truck and the battery charger switched off. The main switch (7) must also only be pressed when the truck and the battery charger are switched off.



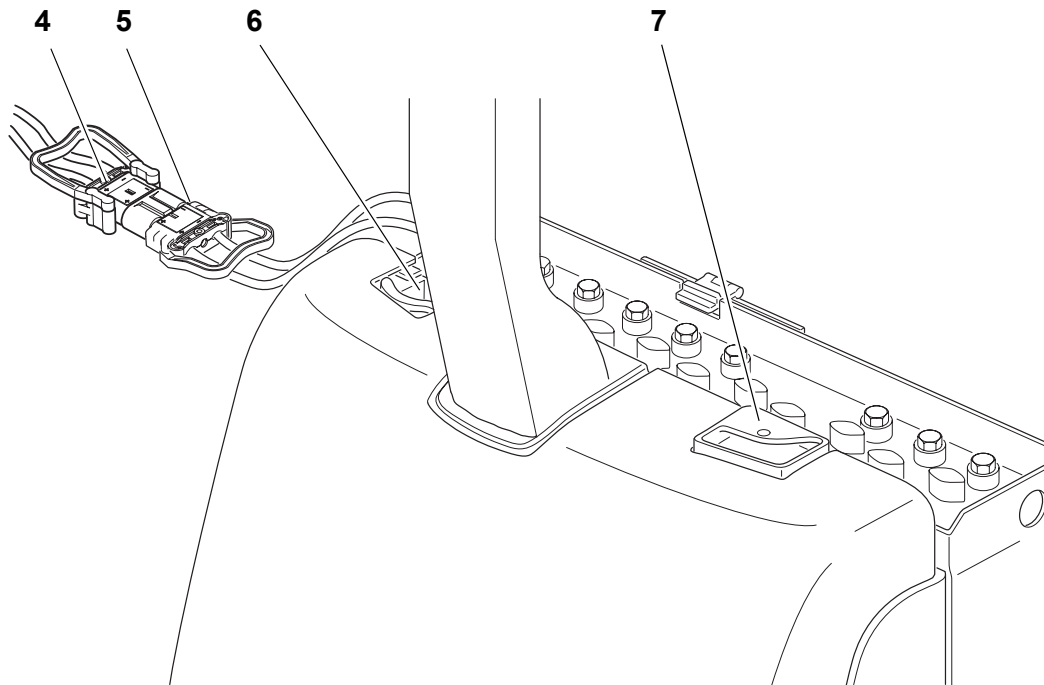
When charging, the tops of the battery cells must be exposed to provide sufficient ventilation. Do not place any metal objects on the battery. Before charging, check all cables and plug connections for visible signs of damage.

All safety instructions given by the battery and battery charger manufacturers must be strictly observed.

- Pull out the battery plug (5) from the bracket (6).
- Remove any insulating mats from the battery.
- Connect the charging cable (4) of the battery charging station to the battery connector (5) and switch on the charger.



Charge the battery in accordance with the battery and charging station manufacturers' instructions.



5 Battery removal and installation



The truck must be parked on level ground. To prevent short circuits, batteries with exposed terminals or connectors must be covered with a rubber mat. Place the battery connector or the battery cable in such a way that they will not get caught on the truck when the battery is withdrawn.



When transporting batteries using a crane, ensure that the crane is of adequate capacity (the battery weight is indicated on the battery data plate on the battery container). The lifting gear must exert a vertical pull so that the battery container is not compressed. Attach the hooks to the attachment points (8) in such a way that the lifting gear, when slack, cannot collapse on the battery cells.

- Expose the battery (see Section 3).
- Pull out the battery plug (10) from the bracket.
- Flip back the battery locking mechanism (9).
- Using crane lifting gear, lift the battery (11) slowly and carefully out of the truck.

The battery can optionally be removed from the side. To do this, pull the battery out at the side onto the battery replacement trolley.



Do not put your fingers between the truck frame and the battery.



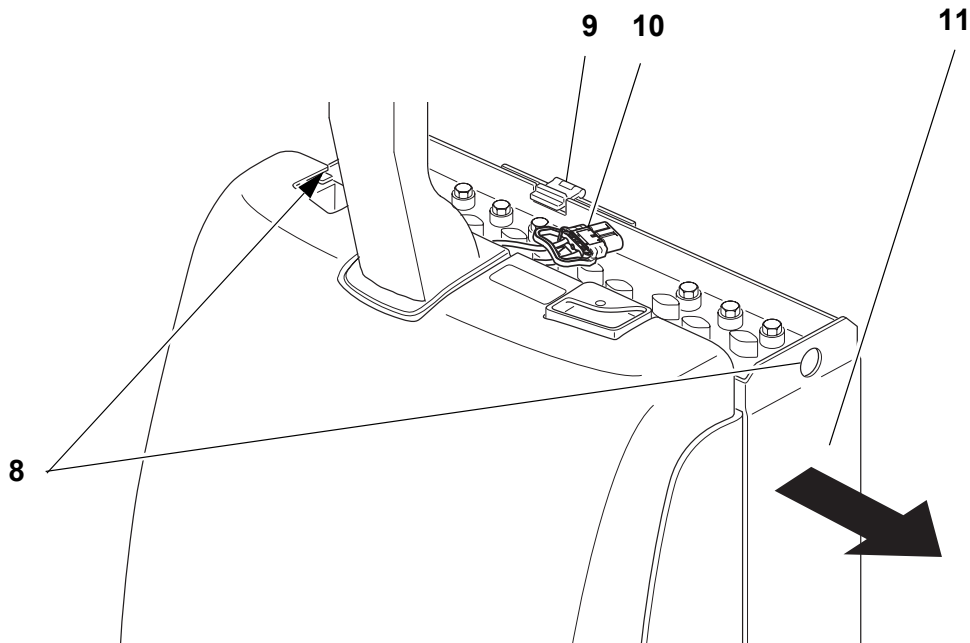
Follow the operating instructions of the battery replacement trolley manufacturer!

Installation is in the reverse order of removal. When reinstalling the battery, note the required installation position and make sure the battery is connected correctly.



After installing the battery check all cables and plug connections for visible signs of damage.

The battery must be securely fixed in the truck to avoid damage arising from accidental movement. After each replacement ensure that the battery is prevented from sliding, by flipping the battery locking mechanism (9) back into the recess. The battery cover must be firmly closed.



E Operation

1 Safety Regulations for the Operation of Forklift Trucks

Driver authorisation The forklift truck may only be used by suitably trained personnel, who have demonstrated to the proprietor or his representative that they can drive and handle loads and have been authorised to operate the truck by the proprietor or his representative.

Driver's rights, obligations and responsibilities: The driver must be informed of his duties and responsibilities and be instructed in the operation of the truck and shall be familiar with the operator manual. The driver shall be afforded all due rights. Safety shoes must be worn for pedestrian operated trucks.

Unauthorised Use of Truck: The driver is responsible for the truck during the time it is in use. The driver must prevent unauthorised persons from driving or operating the truck. Do not carry passengers.

Damage and Faults: The supervisor must be immediately informed of any damage or faults to the forklift truck or attachment. Trucks which are unsafe for operation (e.g. wheel or brake problems) must not be used until they have been rectified.

Repairs: The driver must not carry out any repairs or alterations to the forklift truck without the necessary training and authorisation to do so. The driver must never disable or adjust safety mechanisms or switches.

Hazardous area: A hazardous area is defined as the area in which people are at risk from the truck movement, the load handler (e.g. attachments) or the load itself. This also includes areas which can be reached by falling loads or by the trailer veering.



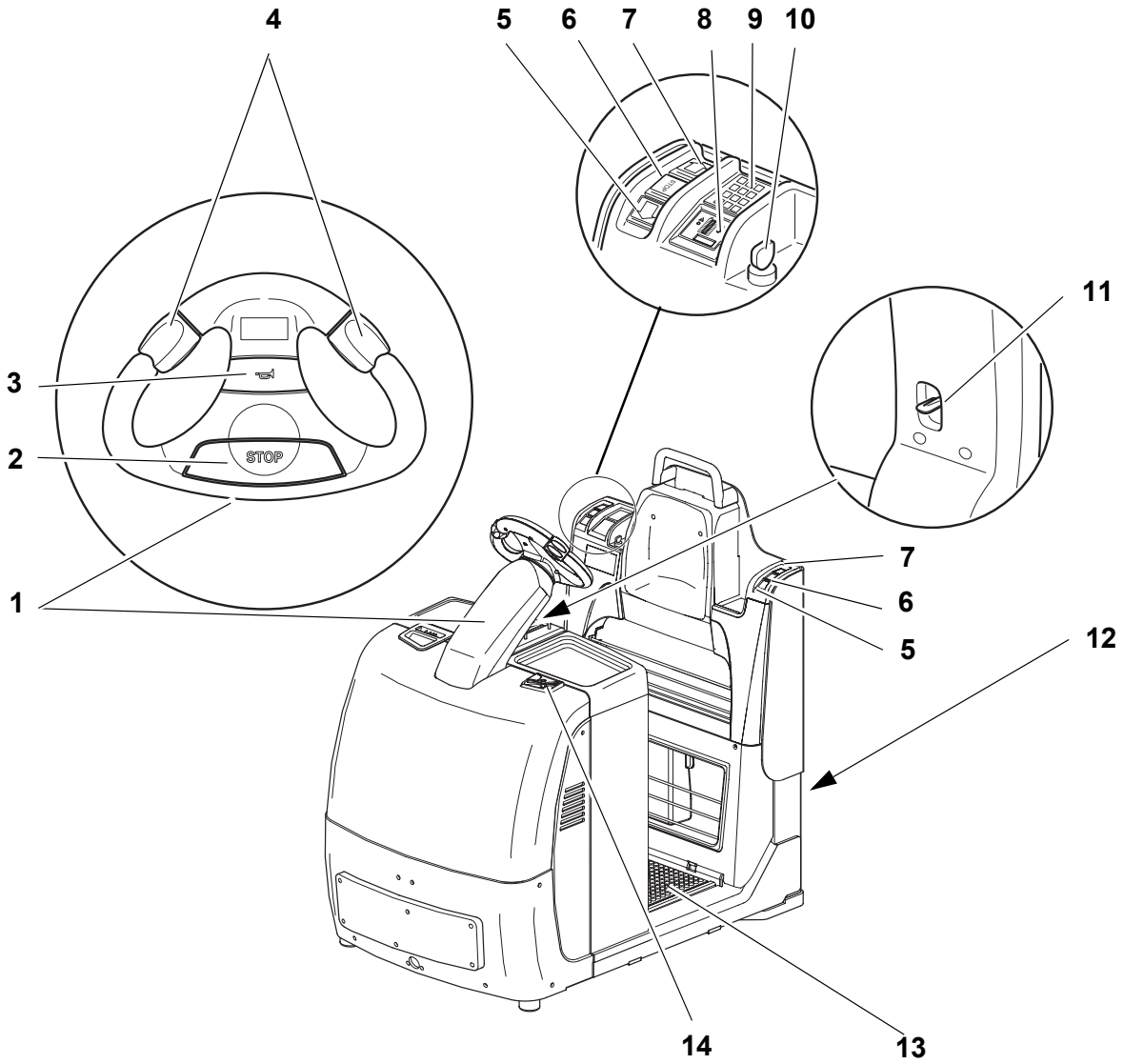
Unauthorised persons must be kept away from the hazardous area. Where there is danger to personnel, a warning must be sounded with sufficient notice. If unauthorised personnel are still within the hazardous area the truck shall be brought to a halt immediately.

Safety Devices and Warning Signs: Safety devices, warning signs and warning instructions shall be strictly observed.

2 Controls and Displays

Item	Control / Display		Function
1	Jet Pilot	●	Steers the truck.
2	Brake button	●	The truck brakes at the maximum possible deceleration rate until it comes to a halt.
3	“Horn” button	●	Triggers a warning signal.
4	Controller	●	Controls the direction of travel as well as the travel speed.
5	Forward “pedestrian / walk-along operation” button	○	Travel starts in pedestrian mode in the forward direction (V) (slow travel).
6	Stop button	○	The electrical functions are cut out and the truck automatically brakes.
7	Reverse “pedestrian operation” button	○	Travel starts in pedestrian mode in the reverse direction (R) (slow travel).
8	Display instrument (CANDIS)	○	Hourmeter. Displays battery capacity. Displays travel parameters and service indicators. Shows the service hours completed by the truck.
9	CANCODE keypad	○	Code settings. Release and select the travel programs. Enter travel parameters.
	Code Lock	○	Replaces the key switch. Switches control voltage on and off. Releases the truck functions.
10	Key switch	●	Switches the truck on and off. Removing the key prevents the truck from being switched on by unauthorised personnel.
11	Tiller adjustment	●	The tiller can be set to the required position.
12	Trailer coupling	○	For towed load
13	Platform	●	– released (without load): Travel inhibited, or truck decelerates. – actuated (with load): Travel released.
14	Main switch / isolator (emergency disconnect)	●	The circuit is interrupted, all electrical functions are cut out and the truck automatically brakes.

● = Standard equipment	○ = Optional Equipment
------------------------	------------------------



3 Starting up the truck



Before the truck can be commissioned or operated, the driver must ensure that there is nobody within the hazardous area.

The electronic traction controller and optionally the steering controller monitor their own operation. In the event of an error, travel and steering are interrupted.



The error that has occurred must be eliminated by the manufacturer's service department.

Checks and operations to be performed before starting daily work

- Inspect the entire truck (especially the wheels) for visible signs of damage.
- Visually inspect the battery attachment and cable connections



When entering the truck, take care not to activate the controller or the “pedestrian” (○) button.

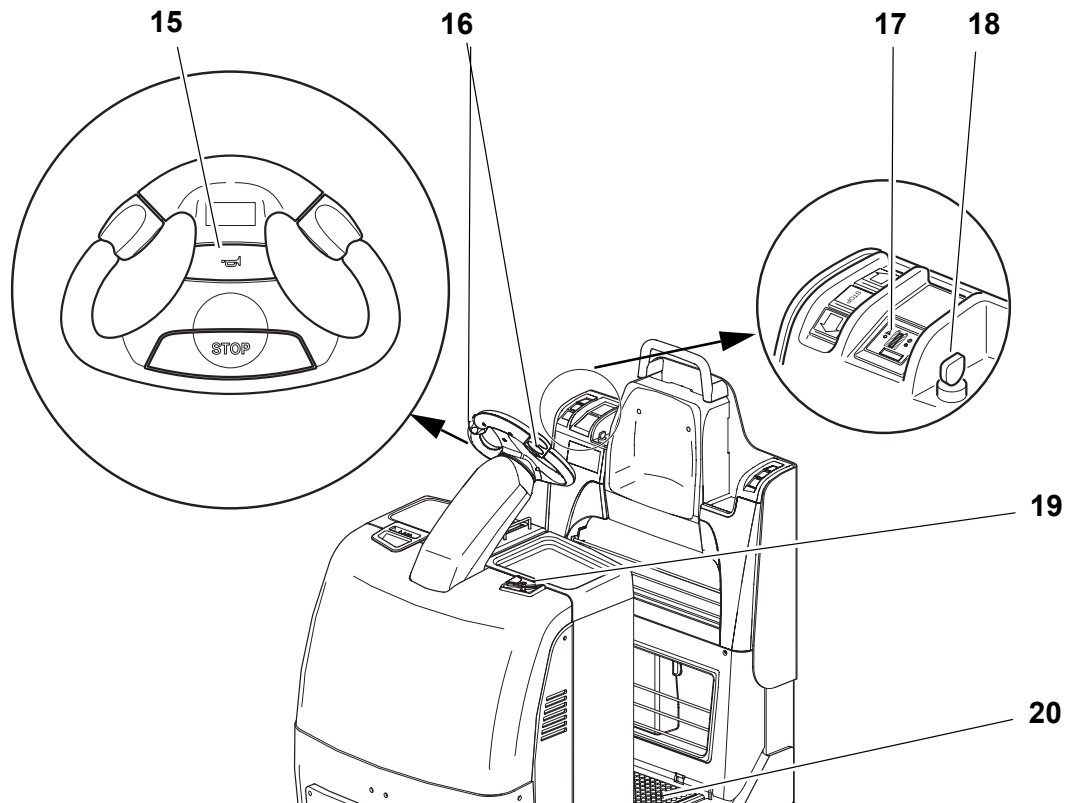
Switching on the truck

- Step onto the operator platform (20).
- After relaxing the tiller adjustment device, set the tiller to the required position and then release the tiller adjustment device.
- Pull out the main switch / isolator (19).
- Insert the key in the key switch (18) and turn it clockwise as far as it will go to the “I” position.
- Test the horn (15).
- Test the controller (16) (see section 4.2).

The truck is now operational.



The display instrument (CANDIS (17/(○))) shows the available battery capacity.



4 Industrial Truck Operation

4.1 Safety regulations for truck operation

Travel routes and work areas: Only use lanes and routes specifically designated for truck traffic. Unauthorised third parties must stay away from work areas. Loads must only be stored in places specially designated for this purpose.

Travel conduct: The driver must adapt the travel speed to local conditions. The truck must be driven at slow speed when negotiating bends or narrow passageways, when passing through swing doors and at blind spots. The driver must always observe an adequate braking distance between the forklift truck and the vehicle in front and must be in control of the truck at all times. Abrupt stopping (except in emergencies), rapid U turns and overtaking at dangerous or blind spots are not permitted. It is forbidden to lean out of or reach beyond the working and operating area.

Travel visibility: The driver must look in the direction of travel and must always have a clear view of the route ahead. The truck must travel with the load at the rear. If this is not possible, e.g. when shunting, the driver must ensure that the shunting area is free. If the driver does not have a clear view, a second person must act as a lookout for the shunting area.

Negotiating slopes and inclines: Negotiating slopes or inclines is only permitted if such roads are clean and have a non-slip surface and providing such journeys are safely undertaken in accordance with the technical specifications for the truck in question. The industrial truck must not be turned, operated at an angle or parked on inclines or slopes. Inclines must only be negotiated at slow speed, with the driver ready to brake at any moment.

Negotiating lifts and docks: Lifts and docks must only be used if they have sufficient capacity, are suitable for driving on and authorised for truck traffic by the owner. The driver must satisfy himself of the above before entering these areas. 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. .

People travelling in the lift with the forklift truck must only enter the lift after the truck has come to a halt and must exit the lift before the truck.

Towing trailers: Do not exceed the maximum trailer load specified for the forklift truck for trailers with or without brakes. The trailer load must be secured in accordance with regulations and must not exceed the dimensions permitted for that roadway. After coupling and before starting the driver shall ensure that the trailer coupling cannot become detached. Forklift trucks pulling a load must be driven such that the trailing vehicle is driven safely and can be stopped under any conditions.

4.2 Travel, Steering, Braking



Be extremely careful when driving and steering, especially when operating outside the geometry of the truck.

The electric steering system is self-monitoring.

The steering controller monitors the fault frequency over a certain period. If the same fault is detected several times during this period, the steering controller reduces the travel speed of the truck to slow travel. If such a fault occurs, the travel speed is not reset to normal travel by switching the truck off and on again. This prevents a fault being cancelled without being rectified.

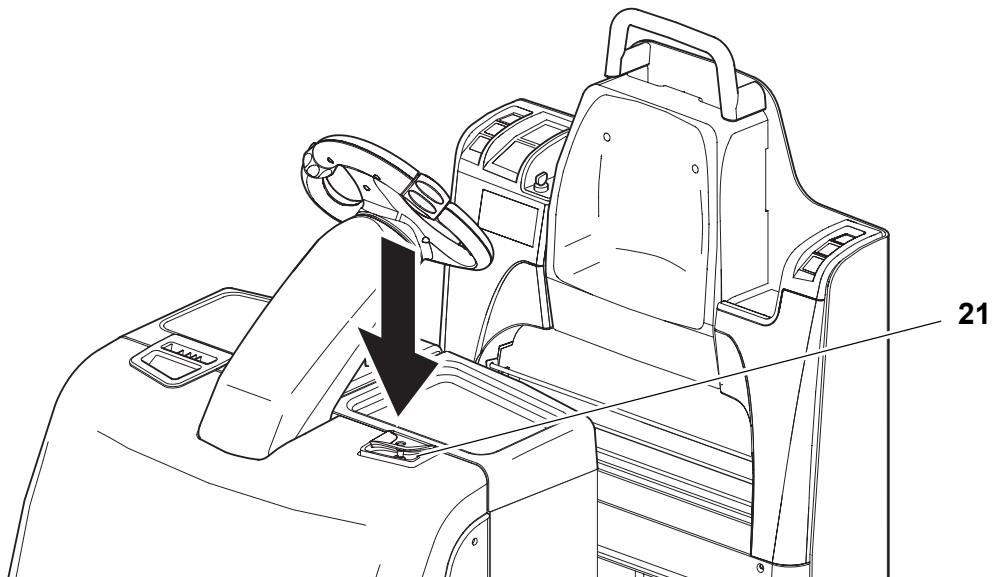


As the steering system is a safety-critical component, the fault must be rectified by the manufacturer's service department.

Emergency Disconnect

- Press the isolator (21) down.

All electrical functions are deactivated.



Travel



Do not drive the truck unless the panels are closed and properly locked.

- Start up the truck (refer to section 3).
- Set the controller (22) to the desired travel direction: forward (V) or reverse (R).



The truck starts to travel in the direction selected.
The travel speed is governed by the controller (22).
For trucks with “pedestrian operation” (○) the truck can be operated at reduced speed without having to stand on the platform.

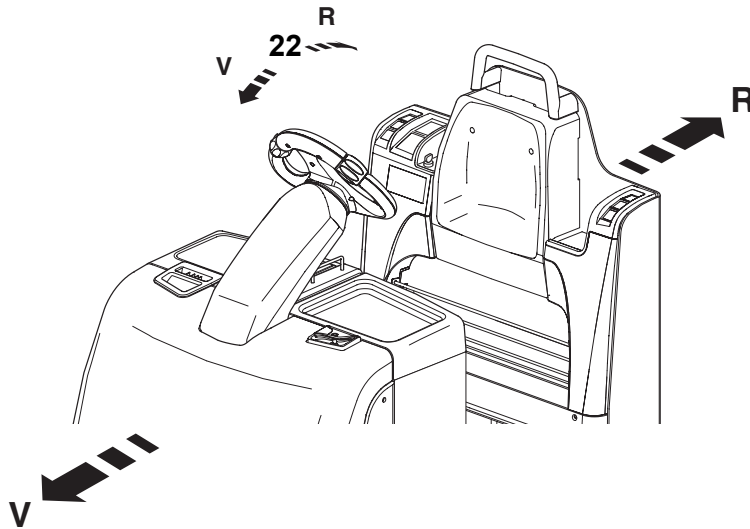
Travelling on inclines

Preventing the truck from rolling back:

With the controller (22) set to neutral, the service brake automatically applies after a short jerk (the controller detects downhill motion on an incline). The service brake is released again via the controller (22) which is also used to select the speed and the travel direction.

Steering

- Turn the steering arm to the left or right.



Brakes



The brake pattern of the truck depends largely on the state of the ground. The driver must take this into account when operating the truck.



The driver must be looking ahead when travelling. If there is no hazard, brake moderately to avoid moving the load and to prevent the trailer from veering out.

The truck can be braked in three different ways:

- using the service brake
- using the generator brake (coasting)
- by plugging (controller)



In emergencies, the truck must only be braked with the service brake.



During normal operation, the generator brake and plugging can be applied. These methods of braking reduce wear and require less energy (energy recovery).

Braking with the service brake:

- Apply the brake button (23).

The truck brakes at the maximum possible deceleration rate until it comes to a halt.



The truck can only start again when the controller has been set to “0”.

Braking via the generator brake (coasting):

- Release the controller (25) - the controller assumes the zero position.

Depending on the setting, the truck is braked by the generator brake, coasting to a stop.



For the standard truck, the rate of deceleration can be adjusted by the manufacturer's service department. For trucks with CANCODE and CANDIS it can be adjusted by entering the appropriate setting.

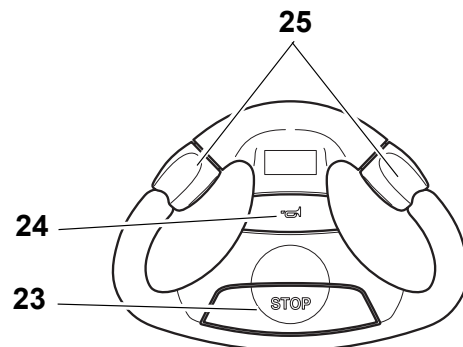
Plugging:

- When travelling, set the controller (25) to the opposite direction.

The truck brakes regeneratively until it starts to move in the opposite direction.



The braking intensity depends on the position of the controller.



4.3 Pedestrian operation (○)

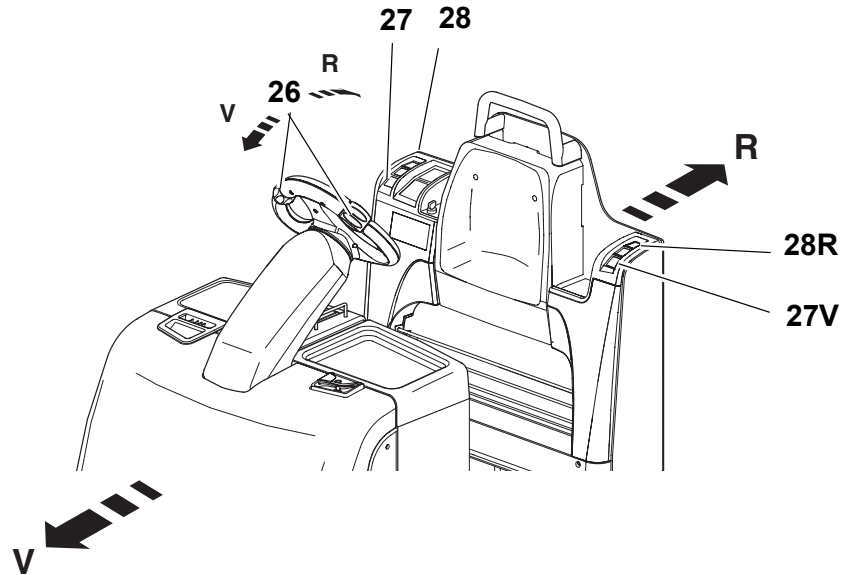


When travelling in pedestrian mode you must make sure – while walking alongside – that the steering system is set to straight ahead travel and that the operator cannot be trapped between the truck and an obstacle.



In pedestrian mode the truck can be operated by the operator from all sides while walking alongside. In this case, the truck travels at a significantly reduced speed.

Pedestrian mode is achieved by pressing the “pedestrian” buttons (27, 28) on the backrest.



Travelling with the “pedestrian” button (○)

– Press the “pedestrian” buttons (27, 28).

The truck travels at a fixed speed of approximately 2km/h (slow travel).

4.4 Coupling Types



When attaching and uncoupling trailers the tow truck and trailer must be on level ground. All controls must be set to neutral. The tow truck and trailer must be secured to prevent any accidental movement.

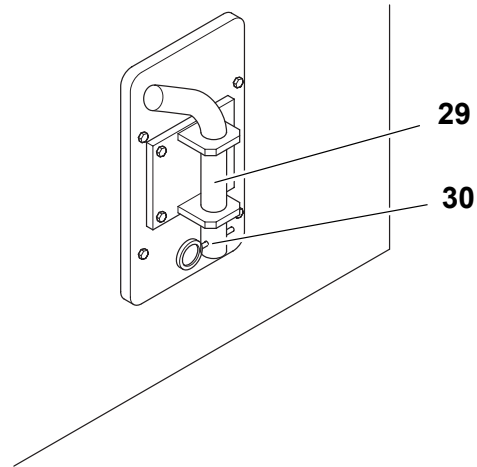


Risk of trapping! When coupling a trailer do not trap your hands between any truck components.

4.4.1 Plug connection (○)

Coupling the trailer

- Pull the bolt (29) up fully out of the trailer coupling.
- Push the tow eye of the trailer into the trailer coupling, from the top push the bolt of the trailer coupling through the holes of the trailer coupling and through the tow eye.
- To lock: push the retaining needle (30; secured by a chain to prevent it from being lost) through the hole at the end of the bolt.



Uncoupling the trailer

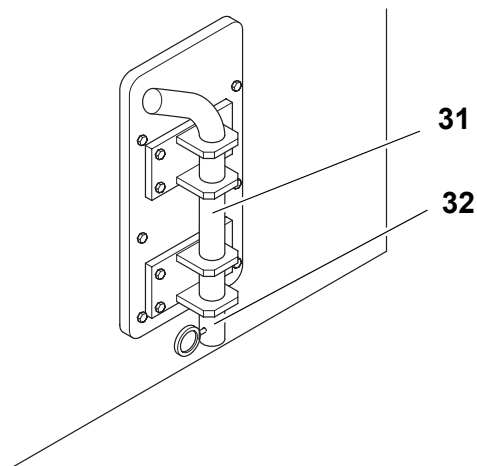
- Make sure that the trailer cannot move accidentally.
- Pull the retaining needle (30) out from the side of the bolt (29). Pull the bolt out of the coupling from the top. Bring the tow eye out from the side of the coupling. Reinsert the bolt into the coupling and secure it.

4.4.2 Double decker plug coupling (○)

Two trailers can be coupled a separate heights.

Coupling the trailer

- Pull the bolt (31) up fully out of the trailer coupling.
- Push the tow eye of the trailer into the trailer coupling, from the top push the bolt of the trailer coupling through the holes of the trailer coupling and through the tow eye.
- To lock: push the retaining needle (32; secured by a chain to prevent it from being lost) through the hole at the end of the bolt.



Uncoupling the trailer

- Make sure that the trailer cannot move accidentally.
- Pull the retaining needle (32) out from the side of the bolt (31). Pull the bolt out of the coupling from the top. Bring the tow eye out from the side of the coupling. Reinsert the bolt into the coupling and secure it.

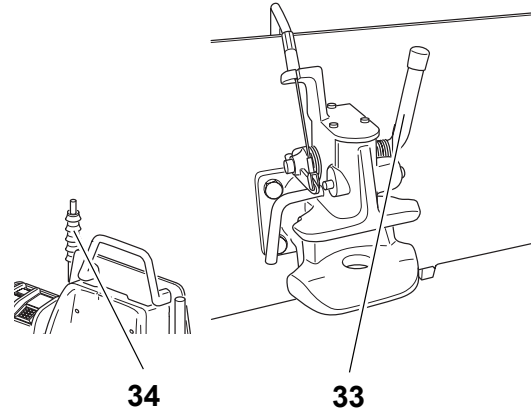
4.4.3 Rockinger coupling with hand lever or Bowden cable (○)

The Rockinger coupling comes either with or without remote locking (Bowden cable).

The Rockinger coupling with remote locking allows trailers to be coupled and uncoupled from the platform via a Bowden cable.

Coupling the trailer

- Push the tow eye of the trailer into the trailer coupling, the bolt of the trailer coupling closes automatically.



Uncoupling the trailer

- Open the tow eye lock by applying the lever (33) or Bowden cable handgrip (34).

4.5 Travelling with trailers



In difficult application conditions (inclines, smooth or slippery travel routes) the tow load must have to be reduced to ensure braking without risk of accidents. The max. permissible load indicated applies only when towing on level surfaces on a good bearing, non-slip surface.

For tow loads in excess of 2000 kg and on inclines, the use of braked trailers is recommended.



Always pull, never push a trailer.



Familiarise yourself with the brake and steering systems of the trailer when you start to travel.



On cornering with long trailers and trailer trains, note how the angle is reduced.

1. Start the truck slowly until the trailer coupling has become taut. Then gradually increase the travel speed.
2. To stop, reduce the speed so that both tow truck and trailer gradually slow down. Brake with care!

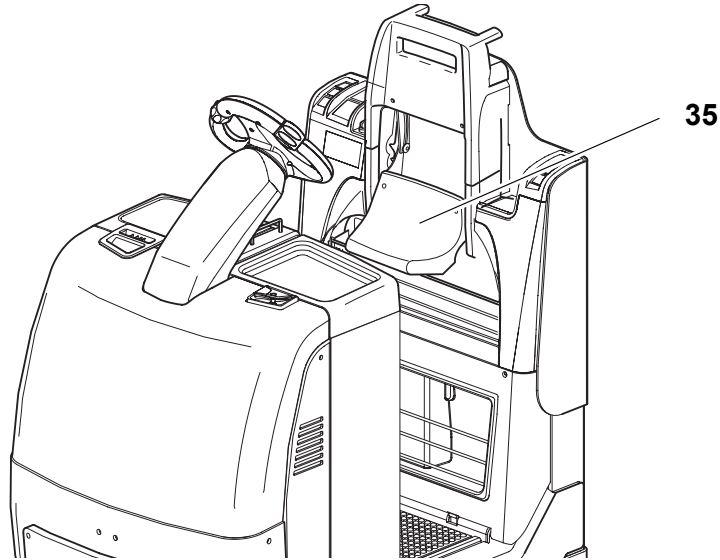


Trailer trains are difficult to shunt. For this reason make sure the angle is correct when cornering.

4.6 Seat ○ (XL only)

The seat (35) is incorporated into the backrest when folded up. When unfolded, the seat allows the operator to take up a comfortable position for driving and operating. The height of the seat is adjustable and can be locked into one of four positions.

- Unfold the seat (35), pull it towards you and push it into the desired height. Lock the seat at the desired height.
- To set a higher position, push the seat up and release it in the desired position.
- To fold it in, push the seat into the highest position and fold it back.



4.7 Parking the truck securely

When you leave the truck it must be securely parked even if you only intend to leave it for a short time.



Do not park the truck on a slope.

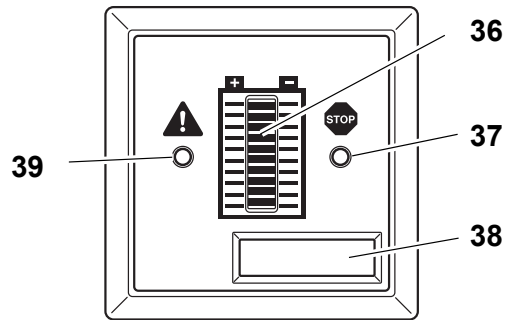
- Set the drive wheel to “Straight ahead”.
- Set the key switch to the “OFF” position (“0”) and remove the key.
- Press the isolator (EMERGENCY DISCONNECT) “Off”.

5 Display instrument (CANDIS) (○)

The instrument indicates:

- Remaining battery charge (LED bars (36)),
- Service hours (LCD display (38)).

It also displays error messages for the electronic components and parameter changes.



Discharge status display

Setting limits for the additional “Warning” (39) and “Stop” (37) displays will depend on the battery type.

Number of bars	Charge status	Wet battery		Maintenance-free battery	
		LED (yellow) Warning	LED (red) Stop	LED (yellow) Warning	LED (red) Stop
10	90.1 - 100%	Off	Off	Off	Off
9	80.1 - 90%	Off	Off	Off	Off
8	70.1 - 80%	Off	Off	Off	Off
7	60.1 - 70%	Off	Off	Off	Off
6	50.1 - 60%	Off	Off	Off	Off
5	40.1 - 50%	Off	Off	On	Off
4	30.1 - 40%	Off	Off	On	On
3	20.1 - 30%	On	Off	On	On
2	10.1 - 20%	On	On	On	On

Avoid falling below the 20% limit for wet batteries or the 40% limit for maintenance-free batteries.

5.1 Operating hours display

Display range between 0.0 and 99,999.0 hours. Travel movements are collated. This is a backlit display.

- For maintenance-free batteries a “T” symbol is shown in the operating hours display (38).

Error messages

The operating hours display is also used for indicating errors. The error is displayed in two parts, starting with a “C” for component and a three-digit component number, followed by an “E” for error with alternating three-digit error number.

If several errors occurs at the same time, they are displayed one after the other. The errors are displayed for as long as they remain (always in combination Cxxx / Exxx). Error messages overwrite the service hour display. Most errors cause the Emergency Stop to be triggered. Errors remain displayed until the control circuit is switched off (Code lock).

- The manufacturer’s service department has detailed component descriptions with error codes.

Display for parameter changes (travel programs)

The LC display (38) is used in conjunction with the operator keyboard (CANCODE (○)) to display the setting parameters. The first three digits of the display show the parameter numbers, the last three digits indicate the parameter value.



Settings of parameter group 0XX (code lock) are not displayed.

5.2 Power up test

On power up the display shows:

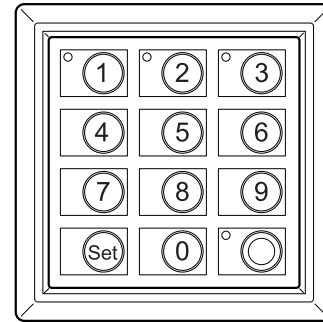
- the software version of the display instrument (briefly),
- the operating hours
- the charge status

6 Keypad (CANCODE) (○)

The keypad consists of 10 digit keys, a Set key and a ○ key.

Activation of the travel programs is indicated through green LEDs on keys 1, 2 and 3.

The ○ key indicates operational status through a red/green LED.



It contains the following functions:

- Code lock function (commissioning the truck).
- Travel program selection.
- Setting the travel and battery parameters, only in conjunction with the display instrument (CANDIS (○)).

The ○ key has top priority and restores the truck from any status to its default status without modifying any settings.

6.1 Code Lock

When the correct code has been entered, the machine is ready for use. You can allocate an individual code to each truck, driver or group of drivers.



When supplied from the factory, the operator code (factory setting 2-5-8-0) is indicated on a removable sticker.



When starting the truck for the first time, change the master and operating codes. (refer to section 6.4)

Starting the truck for the first time


After switching on the isolator and if necessary the key switch, the LED (44) turns red.

When you enter the correct operator code (factory setting 2-5-8-0) the LED (44) turns green.

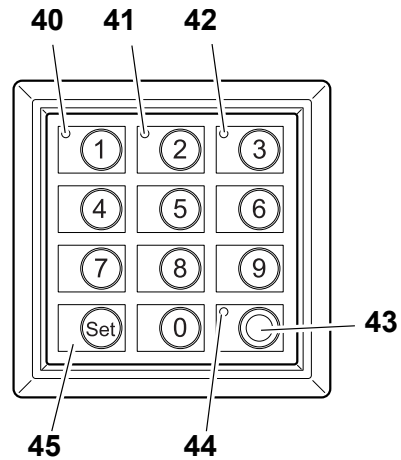
If the wrong code is entered LED (44) flashes red for two seconds. The correct code can then be entered.

- The Set key (45) has no function in operating mode

Power Down

The truck is switched off by pressing the  key (43).

- The truck can switch off automatically after a pre-determined time. To do this the corresponding code lock parameter must be set (see section 6.4).



6.2 Travel programs

Press the digit keys 1, 2, and 3 to select any of three travel programs. The activated programme is indicated by the green LEDs (40), (41), (42) in the corresponding key.

→ The travel programmes differ with respect to travelling speed, acceleration, and deceleration.

Factory settings:

- Program 1: Soft operation
- Program 2: Normal operation
- Program 3: High performance mode (preset on commissioning)

→ The travel programs can be adapted individually to the truck (refer to section 6.4).

6.3 Parameters

In programming mode, the operator keypad enables you to set the code lock functions and adapt travel programs. In addition, the battery parameters can also be set.

→ For trucks without display instrument (CANDIS (○)) only the code lock parameters can be set.

Parameter Groups

The parameter number is composed of three digits. The first digit refers to the parameter group as shown in Table 1. The second and third digits are numbered in sequence from 00 to 99.

No.	Parameter Group
0xx	Code lock settings (codes, travel program authorisation, automatic cutout, etc.)
1xx	Travel program 1 parameters (acceleration, coasting brake, speed, etc.)
2xx	Travel program 2 parameters (acceleration, coasting brake, speed, etc.)
3xx	Travel program 3 parameters (acceleration, coasting brake, speed, etc.)
4xx	Program-independent parameters

6.4 Parameter Settings

To change the truck setting you must enter the master code.



The factory setting for the master code is 7-2-9-5.



When starting the truck for the first time, change the master code (see Section 6.1).



Safety notes for trucks with indicator instrument (CANDIS (○))

- Parameter settings must be made carefully and only by special trained personnel . If in doubt, consult the manufacturer's service department.
- Every setting procedure must be monitored on the LC display of the display instrument (○)). If in doubt, the setting procedure must be cancelled by pressing the ○ key (43)
- Since changing any parameter will affect the truck's travel pattern, you must carry out a test run in a specially designated work area.

To enter the master code:

- Press the ○ key
- Enter master code

	Display instrument (CANDIS)	LED (44) ○ key	LED (40) Key 1	LED (41) Key 2	LED (42) Key 3
Service hours are displayed	2.8.4.0.	Green flashing	Off	Off	Off

Code Lock Parameters

Setting procedure for trucks without display instrument (CANDIS (○)):

- Enter the three digit parameter number and confirm with set key (45).
- Enter the setting according to the parameter list or change and confirm with the Set key (45).



If the entry is incorrect, the LED (44) of the ○ key (43) goes red. If you enter the parameter number again the setting can be entered or changed.

To enter more parameters, repeat the procedure. To complete your entry, press the ○ key (43).

Setting procedure for trucks with and without display instrument (CANDIS (○)):

- Enter the three digit parameter number and confirm with set key (45).
- The display instrument (CANDIS (○)) continues to display the operating hours. If the display changes, cancel the setting procedure with the ○ key (43) and restart from the beginning.
- Enter the setting according to the parameter list or change and confirm with the Set key (45).



If the entry is incorrect, the LED (44) of the ○ key (43) goes red. If you enter the parameter number again the setting can be entered or changed.

To enter more parameters, repeat the procedure. To complete your entry, press the ○ key (43).

The following parameters may be entered.

Code Lock Parameter List

No.	Function	Setting range	Standard setting	Comments Procedure
Code Lock				
000	Change master code The length (4-6 digits) of the master code also pre-determines the length of the operator code (4-6 digits). Provided the operator codes are programmed, only news codes of the same length can be entered. If the code length is to be changed, all operator codes must first be deleted.	0000 - 9999 or 00000 - 99999 or 000000 - 999999	7295	(LED 40 flashes) Enter current code Confirm (Set) (LED 41 flashes) Enter a new code Confirm (Set) (LED 42 flashes) Repeat new code Confirm (Set)
001	Add operator code (max. 600)	0000 - 9999 or 00000 - 99999 or 000000 - 999999	2580	(LED 41 flashes) Enter a code Confirm (Set) (LED 42 flashes) Repeat code entry Confirm (Set)

No.	Function	Setting range	Standard setting	Comments Procedure
Code Lock				
002	Change user code	0000 - 9999 or 00000 - 99999 or 000000 - 999999		(LED 40 flashes) Enter current code Confirm (Set) (LED 41 flashes) Enter a new code Confirm (Set) (LED 42 flashes) Repeat code entry Confirm
003	Delete user code	0000 - 9999 or 00000 - 99999 or 000000 - 999999		(LED 41 flashes) Enter a code Confirm (Set) (LED 42 flashes) Repeat code entry Confirm (Set)
004	Delete code log (Deletes all user codes)	3265		3265 = delete other inputs= do not delete
010	Automatic time cutout	00 - 31	00	00 = No cutout 01 to 30 = Cutout time in minutes 31 = cutout in 10 seconds

LEDs 23-25 are located in key fields 1-3 (see Section 6.2)

No.	Function	Setting range	Standard setting	Comments Procedure
Code Lock				
020	Start travel program	0-3	3	0 – There is no start program 1 – Travel program 1 = Start travel program 2 – Travel program 2 = Start travel program 3 – Travel program 3 = Start travel program
021	Travel program 1*) release	0 or 1	1	0 = Fahrprogram not released 1 = travel program released
022	Travel program 2*) release	0 or 1	1	0 = Travel program not released 1 = travel program released
023	Travel program 3*) release	0 or 1	1	0 = Travel program not released 1 = travel program released
030	Log status display *)			When the parameter number is entered the number of user codes used is shown on the CANDIS displayinstrument.

*) only in conjunction with display instrument (CANDIS (○))

Error messages on keypad

LED (44) flashes red to indicate the following errors:

- New master code is already operator code.
- New operator code is already master code.
- Operator code to be changed does not exist.
- Tried to change the operator code to an existing code.
- Operator code to be deleted does not exist.

Code memory full

6.5 Travel parameters

→ For trucks without a display instrument (CANDIS (○)) the code lock parameters can only be set by the manufacturer's service department.

The following example shows the parameter setting for the acceleration of travel program 1 (parameter 101).

Acceleration example

Enter the three-digit parameter number (101) and confirm with the Set key (45).

	Display instrument (CANDIS)	LED (44) ○ key	LED (40) Key 1	LED (41) Key 2	LED (42) Key 3
current setting is displayed	1.0.1. 6.	Green flashing	Off	Off	Off

– Check the LC display of the display instrument (CANDIS (○)) (parameter number and current parameter value are displayed).

→ If there is no input for approx. 5 seconds, the display switches back to showing the operating hours.

STOP If you require a different parameter number than the one displayed, you must wait until the operating hours are displayed again.

Enter or change the parameter value according to the parameter list.

	Display instrument (CANDIS)	LED (44) ○ key	LED (40) Key 1	LED (41) Key 2	LED (42) Key 3
changed setting is displayed	1.0.1. 8.	Green flashing	Off	Off	Off

Check the LC display of the indicator instrument (CANDIS (○)), (confirm with the Set key (45)).

	Display instrument (CANDIS)		LED (44) ○ key	LED (40) Key 1	LED (41) Key 2	LED (42) Key 3
	Parameter number	Parameter setting				

– The LED (44) of the ○ key (43) switches briefly to steady light and start flashing again after approx. 2 seconds.

→ If the entry is incorrect, the LED (44) of the ○ key (43) goes red. If you enter the parameter number again the setting can be entered or changed.

Repeat the procedure to enter further parameters as soon as the LED (44) of the ○ key (43) flashes. To complete your entry, press the ○ key (43).



Travel is disabled while the parameters are being entered. If the setting is to be checked in programming mode, follow this sequence:

- Select the edited travel program after changing the parameter value, confirm with the Set key (45).
- The truck is now in travel mode and can be checked.
- To continue setting, confirm with the Set key (45) again.

The following parameters may be entered.

Travel programs

No.	Function	Setting range	Standard setting	Comments
Travel program 1				
100	Acceleration in Pedestrian mode	0 - 9	2	Value of parameter 101 >= Parameter 100
101	Acceleration in Rider mode	0 - 9	2	
102	Coasting brake in rider mode	0 - 9	2	
103	Coasting brake in Pedestrian mode	0 - 9	2	Value of parameter 103 >= Parameter 102
104	Maximum speed in drive direction via controller	0 - 9	8	depending on travel switch
105	Pedestrian speed in drive direction via controller	0 - 9	5	depending on travel switch
106	Pedestrian speed in drive direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)
108	Maximum speed in fork direction via controller	0 - 9	8	depending on travel switch
109	Pedestrian speed in fork direction via controller	0 - 9	5	depending on travel switch
110	Pedestrian speed in fork direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)

No.	Function	Setting range	Standard setting	Comments
Travel program 2				
200	Acceleration in Pedestrian mode	0 - 9	5	Value of parameter 201 >= Parameter 200
201	Acceleration in Rider mode	0 - 9	5	
202	Coasting brake in rider mode	0 - 9	5	
203	Coasting brake in Pedestrian mode	0 - 9	5	Value of parameter 203 >= Parameter 202
204	Maximum speed in drive direction via controller	0 - 9	8	depending on travel switch
205	Pedestrian speed in drive direction via controller	0 - 9	5	depending on travel switch
206	Pedestrian speed in drive direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)
208	Maximum speed in fork direction via controller	0 - 9	8	depending on travel switch
209	Pedestrian speed in fork direction via controller	0 - 9	5	depending on travel switch
210	Pedestrian speed in fork direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)

No.	Function	Setting range	Standard setting	Comments
Travel program 3				
300	Acceleration in Pedestrian mode	0 - 9	7	Value of parameter 301 >= Parameter 300
301	Acceleration in Rider mode	0 - 9	7	
302	Coasting brake in rider mode	0 - 9	7	
303	Coasting brake in Pedestrian mode	0 - 9	7	Value of parameter 303 >= Parameter 302
304	Maximum speed in drive direction via controller	0 - 9	8	depending on travel switch
305	Pedestrian speed in drive direction via controller	0 - 9	5	depending on travel switch
306	Pedestrian speed in drive direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)
308	Maximum speed in fork direction via controller	0 - 9	8	depending on travel switch
309	Pedestrian speed in fork direction via controller	0 - 9	5	depending on travel switch
310	Pedestrian speed in fork direction via pushbutton in backrest	0 - 9	3	not dependant on travel switch (fixed speed)

Program-independent parameters



For trucks without a display instrument (CANDIS (○)) the BATTERY parameters can only be set by the manufacturer's service department.

The parameters are set in the same way as for the travel parameters.

The following parameters may be entered.

No.	Function	Setting range	Standard setting	Comments
Battery parameters				
411	Battery type (normal / high performance / dry)	0 - 2	0	0 = Normal (wet) 1 = enhanced (wet) 2 = Dry (maintenance-free)
412	Discharge monitor function	0 / 1	1	

Setting 0 / 1 is to be interpreted as: 0 = off 1 = on

7 Troubleshooting

This chapter is designed to help the user identify and rectify basic faults or the results of incorrect operation. When locating a fault, proceed in the order shown in the table.

Fault	Possible cause	Action
Truck does not move	<ul style="list-style-type: none">– Battery connector not connected.– Isolator (Emergency Stop) depressed.– Key switch set to "0"– Battery charge too low.– Faulty fuse.	<ul style="list-style-type: none">– Check the battery connector and connect if necessary.– Release isolator– Set the key switch to position "I".– Check the charging condition of the battery and recharge if necessary.– Check fuses F1 and 1F1.



If the fault cannot be rectified after carrying out the remedial procedure, notify the manufacturer's service department, as any further troubleshooting can only be performed by specially trained and qualified service personnel.

F Industrial Truck Maintenance

1 Operational safety and environmental protection

The servicing and inspection duties contained in this chapter must be performed in accordance with the intervals indicated in the maintenance checklists.



Any modification to the forklift truck assemblies, in particular the safety mechanisms, is prohibited. The operational speeds of the truck must not be changed under any circumstances.



Only original spare parts have been certified by our quality assurance department. To ensure safe and reliable operation of the forklift truck, use only the manufacturer's spare parts. Used parts, oils and fuels must be disposed of in accordance with the relevant environmental protection regulations. For oil changes, contact the manufacturer's specialist department.

Upon completion of inspection and servicing, the tasks contained in the "Recommissioning" section must be performed (see chapter F).

2 Maintenance Safety Regulations

Maintenance personnel: Industrial trucks must only be serviced and maintained by the manufacturer's trained personnel. The manufacturer's service department has field technicians specially trained for these tasks. We therefore recommend a maintenance contract with the manufacturer's local service centre.

Lifting and jacking up: When an industrial truck is to be lifted, the lifting gear must only be secured to the points specially provided for this purpose. When jacking up the truck, take appropriate measures to prevent the truck from slipping or tipping over (e.g. wedges, wooden blocks).

Cleaning: Do not use flammable liquids to clean the industrial truck. Prior to cleaning, implement all necessary safety measures to prevent sparking (e.g. through short circuits). For battery-operated trucks, the battery connector must be removed. Only weak suction or compressed air and non-conductive antistatic brushes may be used for cleaning electric or electronic assemblies.



If the truck is to be cleaned with a water jet or a high-pressure cleaner, all electrical and electronic components must be carefully covered beforehand as moisture can cause malfunctions..

Do not clean with pressurised water.

After cleaning the truck, carry out the activities detailed in the "Recommissioning" section.

Electrical System: Only suitably trained personnel may operate on the truck's electrical system. Before working on the electrical system, take all precautionary measures to avoid electric shocks. For battery-operated trucks, also de-energise the truck by removing the battery connector.

Welding: To avoid damaging electric or electronic components, remove these from the truck before performing welding operations.

Settings: When repairing or replacing hydraulic, electric or electronic components or assemblies, always note the truck-specific settings.

Tyres: The quality of tyres affects the stability and performance of the truck. When replacing tyres fitted at the factory, only use the manufacturer's original spare parts. Otherwise the data sheet specifications of the truck cannot be guaranteed. When changing wheels and tyres, ensure that the truck does not slew (e.g. when replacing wheels always left and right simultaneously).

3 Servicing and inspection

Thorough and expert servicing is one of the most important requirements for the safe operation of the industrial truck. Failure to perform regular servicing can lead to truck failure and poses a potential hazard to personnel and equipment.



The service intervals stated are based on single shift operation under normal operating conditions. They must be reduced accordingly if the truck is to be used in conditions of extreme dust, temperature fluctuations or multiple shifts.

The following maintenance checklist states the tasks and intervals after which they should be carried out. Maintenance intervals are defined as:

- W = Every 50 service hours, at least weekly
- A = Every 500 service hours
- B = Every 1000 service hours, or at least annually.
- C = Every 2000 service hours, or at least annually



W service intervals are to be performed by the customer.

During the run-in period – after approx. 100 service hours – the owner must check the wheel nuts/bolts and re-tighten if necessary.

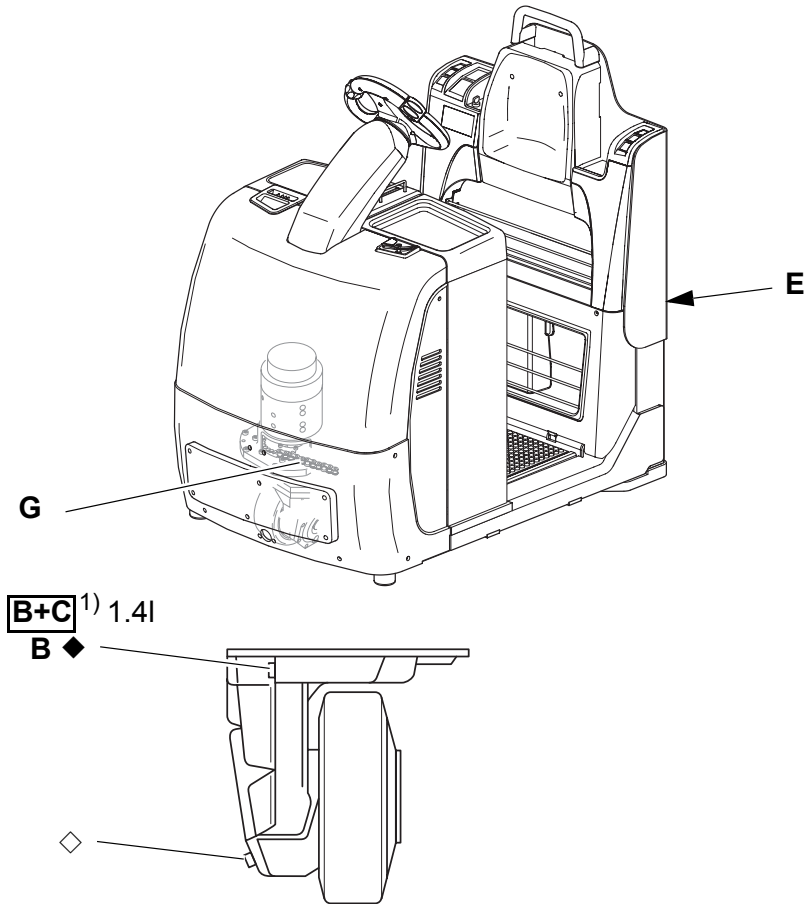
4 Maintenance checklist

			Maintenance intervals				
			Standard = ●	W	A	B	C
			Cold Store = *				
Chassis/ Super- structure:	1.1	Check all load bearing components for damage				●	
	1.2	Check screw connections				●	
	1.3	Test the operator platform and check for damage				●	
Drive unit:	2.1	Check the transmission for noise and leakage				●	
Wheels	3.1	Check wheels for wear and damage	●				
	3.2	Check suspension and attachment		*		●	
Steering	4.1	Check the steering play				●	
	4.2	Check the steering chain and the chain sprocket for wear; adjust and grease		*		●	
	4.3	Check the mechanical parts of the steering column; grease if necessary				●	
Brake system:	5.1	Test operation and settings		*		●	
	5.2	Check the brake lining wear				●	
	5.3	Check the brake linkage; adjust and grease				●	
Electrical system:	7.1	Test operation				●	
	7.2	Check all cables for secure connection and damage				●	
	7.3	Check fuse ratings					●
	7.4	Check switches and trip cams are securely attached and operating correctly				●	
	7.5	Check the warning devices and safety circuits are operating correctly		*		●	
	7.6	Check contactors, replace any worn parts.				●	
Electric motors:	8.2	Check motor is attached securely				●	

Maintenance intervals

			Maintenance intervals				
			Standard = ●	W	A	B	C
			Cold Store = *				
Battery	9.1	Check acid density, acid level and cell voltage			*	●	
	9.2	Check terminals are securely attached, and apply grease			*	●	
	9.3	Clean the battery connections; make sure they are secure			*	●	
	9.4	Check battery cables for damage, replace if necessary.				●	
Lubrication	11.1	Lubricate truck in accordance with Lubrication Schedule.	*			●	
General measurements:	12.1	Check electrical system for frame leakage					●
	12.2	Test travel speed and braking distance					●
	12.4	Test safety devices and cutouts				●	
Demonstration	13.1	Test run with rated load				●	
	13.2	After carrying out maintenance, present the truck to the supervisor.			*	●	

5 Lubrication Schedule



- ▼ Contact surfaces
- ↓ Grease nipple
- ◆ Transmission oil filler neck
- ◇ Transmission oil drain plug
- Cold store application

¹⁾ Compound ratio for cold store usage 1:1

5.1 Consumables

Handling consumption type material: Consumables must always be handled correctly. Follow the manufacturer's instructions.



Improper handling is hazardous to health, life and the environment. Consumables must only be stored in appropriate containers. They may be flammable and must therefore not come into contact with hot components or naked flames.

Only use clean containers when filling up with consumables. Do not mix consumables of different grades. The only exception to this is if mixing is expressly prescribed in the corresponding operating instructions.

Avoid spillage. Spilled liquids must be removed immediately with suitable bonding agents and the bonding agent / consumable mixture must be disposed of in accordance with regulations.

Code	Order no.	Quantity	Description	Used for
B	50 380 904	5,0 l	Fuchs Titan Gear HSY 75W-90	Transmission
C	29 200 810	5.0 l	H-LP 10, DIN 51524	Transmission
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	0.4 l	Chain spray	Chains

Grease guidelines

Code	Saponification	Dew point °C	Worked penetration at 25 °C	NLG1 class	Application temperature °C
E	Lithium	185	265 - 295	2	-35 / +120
F	—	—	310 - 340	1	-52 / +100

6 Maintenance Instructions

6.1 Preparing the truck for maintenance and repairs

All necessary safety measures must be taken to avoid accidents when carrying out maintenance and repairs. The following preparations must be made:

- Park the truck securely (see Chapter E).
- Disconnect the battery so that the truck cannot be started by unauthorised persons (refer to chapter D).



When working on the brake system, prevent the truck from rolling away.

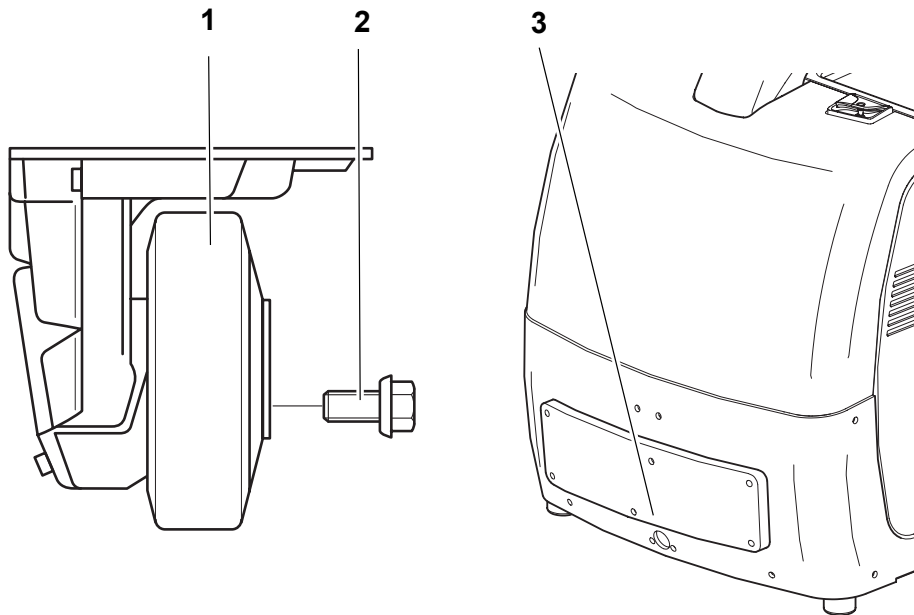
6.2 Tightening the wheel nuts

The wheel nuts on the drive wheel must be retightened in accordance with the maintenance intervals indicated in the maintenance checklist.

- Position the drive wheel (1) at right angles to the longitudinal axis of the truck.
- Pass the socket wrench through the opening (3) in the collision guard and tighten all wheel screws (2) applying a torque of 150 Nm.

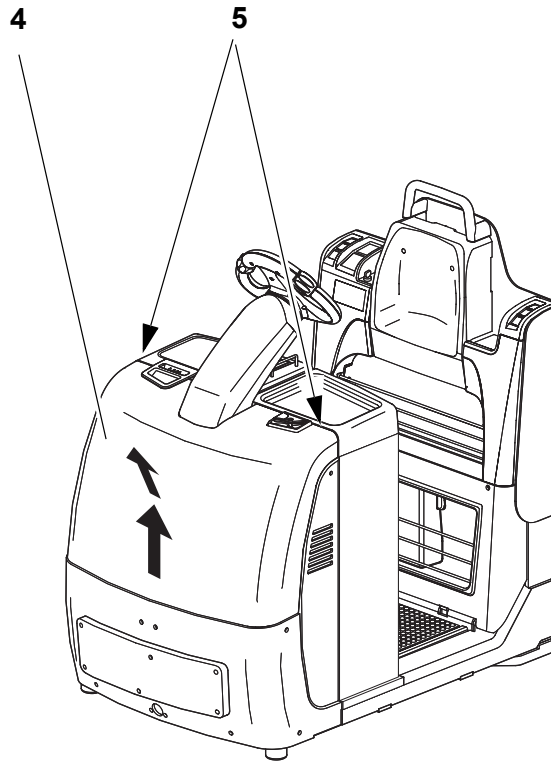


Remove the socket wrench from the opening (3) after the wheel nuts have been tightened.



6.3 Remove the front panel

- Open battery cover (refer to chapter D).
- Remove the hex socket screws (5) located under the battery cover using the hex socket wrench (6).
- Lift up the front panel (4) and put it to one side.



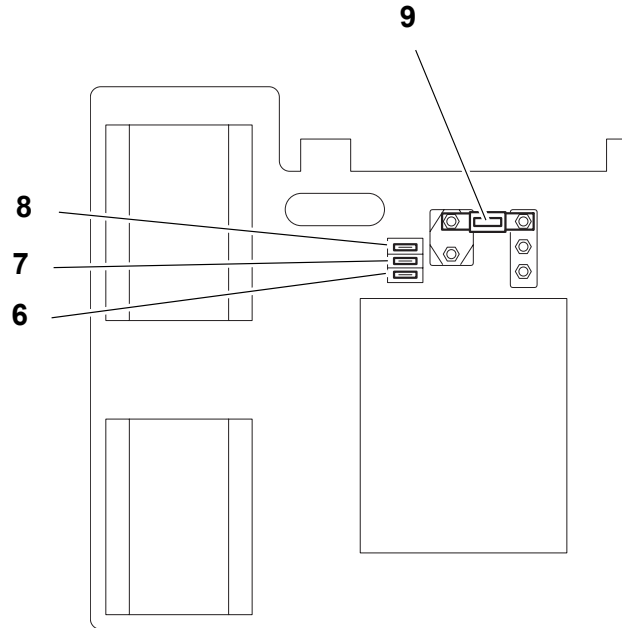
Installation is the reverse order.



Do not drive the truck unless the panels are closed and properly locked.

6.4 Checking electrical fuses

- Prepare the truck for maintenance and repairs (see Chapter 6.1).
- Remove the front panel (see Section 6.3).
- Referring to the table, check all fuses for correct rating and damage; replace fuses where required.



Item	Description	To protect:	Rating
6	6F1	Battery discharge indicator / battery hourmeter	2 A
7	F1	Overall control circuit fuse	10 A
8	3F6	Steer motor / steering	30 A
9	1F1	Drive motor	300 A

- Reinstall the front panel (see section 6.3).

6.5 Recommissioning

The truck may only be restored to service after cleaning or repair work, once the following operations have been performed.

- Test horn.
- Test main switch operation.
- Test brakes.
- Lubricate the truck in accordance with the lubrication schedule.

7 Decommissioning the industrial truck

If the industrial truck is to be decommissioned for more than two months, e.g. for operational reasons, it must be parked in a frost-free and dry location and all necessary measures must be taken before, during and after decommissioning as described.



On decommissioning the truck must be jacked up so that all the wheels are clear of the ground. This is the only way of ensuring that the wheels and wheel bearings are not damaged.

If the truck is to be out of service for more than 6 months, further measures must be taken in consultation with the manufacturer's service department.

7.1 Prior to decommissioning:

- Thoroughly clean the truck.
- Check the brakes.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck in accordance with the lubrication schedule (see Chapter F).
- Charge the battery (see Chapter D).
- Disconnect the battery, clean it and grease the terminals.



In addition, follow the battery manufacturer's instructions.

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

7.2 During decommissioning:

Every 2 months:

- Charge the battery (see Chapter D).



Battery powered trucks:

The battery must be charged at regular intervals to avoid depletion of the battery through self-discharge. The sulfatisation would destroy the battery.

7.3 Returning the truck to operation after decommissioning

- Thoroughly clean the truck.
- Lubricate the truck in accordance with the lubrication schedule (see Chapter F).
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery (see Chapter D).
- Check transmission oil for condensed water and replace if necessary.
- Start up the truck (see Chapter E).



Battery powered trucks:

If there are switching problems in the electrical system, apply contact spray to the exposed contacts and remove any oxide layers on the contacts of the operating controls by applying them repeatedly.



Perform several brake tests immediately after re-commissioning the truck.

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

The truck must be inspected at least annually or after any unusual event by a qualified inspector. The inspector shall assess the condition of the truck from purely a safety viewpoint, without regard to operational or economic circumstances. The inspector shall be sufficiently instructed and experienced to be able to assess the condition of the truck and the effectiveness of the safety mechanisms based on the technical regulations and principles governing the inspection of forklift trucks.

A thorough test of the truck must be undertaken with regard to its technical condition from a safety aspect. The truck must also be examined for damage caused by possible improper use. A test report shall be provided. The test results must be kept for at least the next 2 inspections.

The owner is responsible for ensuring that faults are immediately rectified.



The manufacturer has a safety department with trained personnel to carry out inspections. A test plate is attached to the truck as proof that it has passed the safety inspection. This plate indicates the due date for the next inspection.

9 Final de-commissioning, disposal



Final, correct de-commissioning or disposal of the truck must be performed in accordance with the regulations of the country of use. In particular, regulations governing the disposal of batteries, fuels and electronic and electrical systems must be observed..

Instructions for use

Jungheinrich traction battery

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1 Jungheinrich traction battery

with positive tubular plates type EPzS and EPzB

Rating Data

1. Nominal capacity C5:	See type plate
2. Nominal voltage:	2,0 V x No of cells
3. Discharge current::	C5/5h
4. Nominal S.G. of electrolyte*	
Type EPzS:	1,29 kg/l
Type EPzB:	1,29 kg/l
5. Rated temperature:	30° C
6. Nominal electrolyte level:	up to electrolyte level mark „max.“

* Will be reached within the first 10 cycles.



- Pay attention to the operation instruction and fix them close to the battery!
- Work on batteries to be carried out by skilled personnel only!



- Use protective glasses and clothes when working on batteries!
- Pay attention to the accident prevention rules as well as DIN EN 50272-3, DIN 50110-1!



- No smoking!
- Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode!



- Acid splashes in the eyes or on the skin must be washed with water. In case of accident consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.



- Risk of explosion and fire, avoid short circuits!



- Electrolyte is highly corrosive!



- Batteries and cells are heavy!
- Ensure secure installation! Use only suitable handling equipment e.g. lifting gear in accordance with VDI 3616.



- Dangerous electrical voltage!
- Caution! Metal parts of the battery are always live. Do not place tools or other metal objects on the battery!

Ignoring the operation instructions, repair with non-original parts or using additives for the electrolyte will render the warranty void.

For batteries in classes Ex I and Ex II the instructions for maintaining the appropriate protection class during operation must be complied with (see relevant certificate).

1. Commissioning filled and charged batteries. For commissioning of unfilled batteries see separate instructions!

The battery should be inspected to ensure it is in perfect physical condition.

The charger cables must be connected to ensure a good contact, taking care that the polarity is correct. Otherwise battery, vehicle or charger could be damaged.

The specified torque loading for the polscrews of the charger cables and connectors are:

	steel
M 10	23 \pm 1 Nm

The level of the electrolyte must be checked. If it is below the antisurge baffle or the top of the separator it must first be topped up to this height with purified water.

The battery is then charged as in item 2.2.

The electrolyte should be topped up to the specified level with purified water.

2. Operation

DIN EN 50272-3 «Traction batteries for industrial trucks» is the standard which applies to the operation traction batteries in industrial trucks.

2.1 Discharging

Be sure that all breather holes are not sealed or covered.

Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition.

To achieve the optimum life for the battery, operating discharges of more than 80% of the rated capacity should be avoided (deep discharge).

This corresponds to an electrolyte specific gravity of 1.13 kg/l at the end of the discharge. Discharged batteries must be recharged immediately and must not be left discharged. This also applies to partially discharged batteries.

2.2 Charging

Only direct current must be used for charging. All charging procedures in accordance with DIN 41773 and DIN 41774 are permitted. Only connect the battery assigned to a charger, suitable for the size of battery, in order to avoid overloading of the electric cables and contacts, unacceptable gassing and the escape of electrolyte from the cells.

In the gassing stage the current limits given in DIN EN 50272-3 must not be exceeded. If the charger was not purchased together with the battery it is best to have its suitability checked by the manufacturers service department. When charging, proper provision must be made for venting of the charging gases.

Battery container lids and the covers of battery compartments must be opened or removed. The vent plugs should stay on the cells and remain closed.

With the charger switched off connect up the battery, ensuring that the polarity is correct. (positive to positive, negative to negative). Now switch on the charger. When charging the temperature of the electrolyte rises by about 10°C, so charging should only begin if the electrolyte temperature is below 45°C. The electrolyte temperature of batteries should be at least +10°C before charging otherwise a full charge will not be achieved.

A charge is finished when the specific gravity of the electrolyte and the battery voltage have remained constant for two hours. Special instructions for the operation of batteries in hazardous areas. This concerns batteries which are used in accordance with EN 50014, DIN VDE 0170/0171 Ex (in areas with a firedamp hazard) or Ex II (in potentially explosive areas). During charging and subsequent gassing the container lids must be removed or opened so that the explosive mixture of gases loses its flammability due to adequate ventilation. The containers for batteries with plate protection packs must not be closed until at least half an hour after charging has past.

2.3 Equalising charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity. They are necessary after deep discharges, repeated incomplete recharges and charges to an IU characteristic curve. Equalising charges are carried out following normal charging. The charging current must not exceed 5 A/100 Ah of rated capacity (end of charge - see point 2.2).

Watch the temperature!

2.4 Temperature

An electrolyte temperature of 30°C is specified as the rated temperature. Higher temperatures shorten the life of the battery, lower temperatures reduce the capacity available. 55°C is the upper temperature limit and is not acceptable as an operating temperature.

2.5 Electrolyte

The rated specific gravity (S. G.) of the electrolyte is related to a temperature of 30°C and the nominal electrolyte level in the cell in fully charged condition. Higher temperatures reduce the specified gravity of the electrolyte, lower temperatures increase it. The temperature correction factor is -0.0007 kg/l per °C, e.g. an electrolyte specific gravity of 1.28 kg/l at 45°C corresponds to an S.G. of 1.29 kg/l at 30°C.

The electrolyte must conform to the purity regulations in DIN 43530 part 2.

3. Maintenance

3.1 Daily

Charge the battery after every discharge. Towards the end of charge the electrolyte level should be checked and if necessary topped up to the specified level with purified water. The electrolyte level must not fall below the anti-surge baffle or the top of the separator or the electrolyte „min“ level mark.

3.2 Weekly

Visual inspection after recharging for signs of dirt and mechanical damage. If the battery is charged regularly with a IU characteristic curve an equalising charge must be carried out (see point 2.3).

3.3 Monthly

At the end of the charge the voltages of all cells or bloc batteries should be measured with the charger switched on, and recorded. After charging has ended the specific gravity and the temperature of the electrolyte in all cells should be measured and recorded.

If significant changes from earlier measurements or differences between the cells or bloc batteries are found further testing and maintenance by the service department should be requested.

3.4 Annually

In accordance with DIN VDE 0117 at least once per year, the insulation resistance of the truck and the battery must be checked by an electrical specialist.

The tests on the insulation resistance of the battery must be conducted in accordance with DIN EN 60254-1.

The insulation resistance of the battery thus determined must not be below a value of 50 Ω per Volt of nominal voltage, in compliance with DIN EN 50272-3.

For batteries up to 20 V nominal voltage the minimum value is 1000 Ω .

4. Care of the battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI code of practice «The Cleaning of Vehicle Traction batteries».

Any liquid in the battery tray must be extracted and disposed of in the prescribed manner. Damage to the insulation of the tray should be repaired after cleaning, to ensure that the insulation value complies DIN EN 50272-3 and to prevent tray corrosion. If it is necessary to remove cells it is best to call in our service department for this.

5. Storage

If batteries are taken out of service for a lengthy period they should be stored in the fully charged condition in a dry, frost-free room. To ensure the battery is always ready for use a choice of charging methods can be made:

1. a monthly equalising charge as in point 2.3
2. float charging at a charging voltage of $2.23 \text{ V} \times$ the number of cells. The storage time should be taken into account when considering the life of the battery.

6. Malfunctions

If malfunctions are found on the battery or the charger our service department should be called in without delay. The measurements taken in point 3.3 will facilitate fault finding and their elimination.

A service contract with us will make it easier to detect and correct faults in good time.



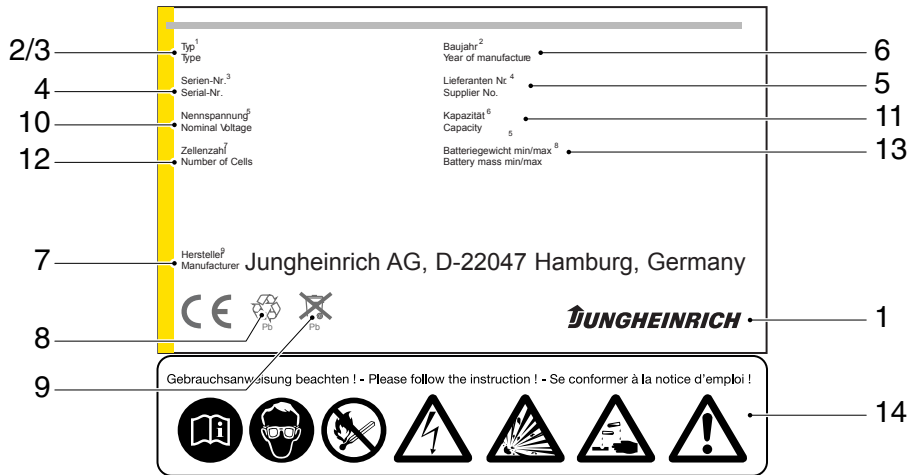
Back to the manufacturer!

Batteries with this sign must be recycled.

Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

We reserve the right make technical modification.

7. Type plate, Jungheinrich traction battery



Item	Designation	Item	Designation
1	Logo	8	Recycling symbol
2	Battery designation	9	Dustbin/material
3	Battery type	10	Nominal battery voltage
4	Battery number	11	Nominal battery capacity
5	Battery tray number	12	Number of battery cells
6	Delivery date	13	Battery weight
7	Battery manufacturer's logo	14	Safety instructions and warnings

* CE mark is only for batteries with a nominal voltage greater than 75 volt.

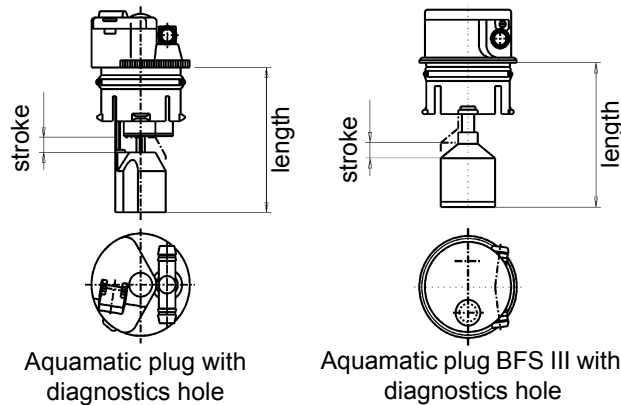
Aquamatic/BFS III water refilling system for Jungheinrich traction battery with EPzS and EPzB cells with tubular positive plates

Aquamatic plug arrangement for the Operating Instructions

Cell series*		Aquamatic plug type (length)	
EPzS	EPzB	Frötek (yellow)	BFS (black)
2/120 – 10/ 600	2/ 42 – 12/ 252	50,5 mm	51,0 mm
2/160 – 10/ 800	2/ 64 – 12/ 384	50,5 mm	51,0 mm
–	2/ 84 – 12/ 504	50,5 mm	51,0 mm
–	2/110 – 12/ 660	50,5 mm	51,0 mm
–	2/130 – 12/ 780	50,5 mm	51,0 mm
–	2/150 – 12/ 900	50,5 mm	51,0 mm
–	2/172 – 12/1032	50,5 mm	51,0 mm
–	2/200 – 12/1200	56,0 mm	56,0 mm
–	2/216 – 12/1296	56,0 mm	56,0 mm
2/180 – 10/900	–	61,0 mm	61,0 mm
2/210 – 10/1050	–	61,0 mm	61,0 mm
2/230 – 10/1150	–	61,0 mm	61,0 mm
2/250 – 10/1250	–	61,0 mm	61,0 mm
2/280 – 10/1400	–	72,0 mm	66,0 mm
2/310 – 10/1550	–	72,0 mm	66,0 mm

* The cell series comprise cells with two to ten (twelve) positive plates, e.g. column EPzS. 2/120 - 10/600.

These are cells with the positive plate 60Ah. The type designation of a cell is e.g. 2 EPzS 120.



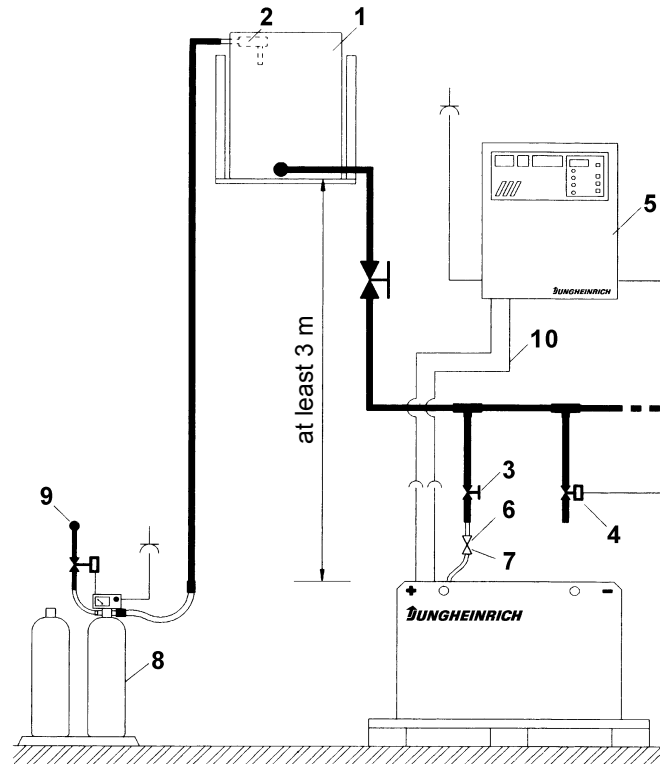
Non-adherence to the operating instructions, repairs carried out with non-original spare parts, unauthorised interference, and the use of additives for the electrolytes (alleged improvement agents) will invalidate any claim for warranty.

When using batteries which comply with Ex I and Ex II , it is important to follow the instructions on maintaining the respective protection class during operation (see associated certification).

Diagrammatic view

Equipment for the water refilling system

1. Water tank
2. Level switch
3. Discharge point with ball valve
4. Discharge point with solenoid valve
5. Charger
6. Sealing coupler
7. Closing nipple
8. Ion exchange cartridge with conductance meter and solenoid valve
9. Connection for untreated water
10. Charging lead



1. Design

The Aquamatic/BFS battery water refilling systems are used for automatically adjusting the nominal electrolyte level. Venting holes are provided for letting off the gases which arise during charging. In addition to the optical level indicator, the plug systems also have a diagnostics hole for measuring the temperature and the electrolyte density. All battery cells of the design series EPzS; EPzB can be equipped with the Aquamatic/BFS filling systems. The water can be refilled by means of a central sealing coupler through the hose connections in the individual Aquamatic/BFS plugs.

2. Application

The Aquamatic/BFS battery water refilling system is used in traction batteries for forklift trucks. The water refilling system is provided with a central water connection for the water supply. Soft PVC hose is used for this connection and for the hose connections for the individual plugs. The hose ends are put onto the hose connection sleeves located on the T or < pieces.

3. Function

The quantity of water required in the refilling process is controlled by the valve located in the plug in combination with the float and the float rods. In the Aquamatic System the existing water pressure at the valve turns off the water supply and ensures that the valve closes securely. When the maximum filling level is reached in the BFS system, the float and the float rods through a lever system close the valve with five times the buoyant force and consequently interrupt the water supply reliably.

4. Filling (manual/automatic)

The batteries should be filled with battery water as soon as possible before the battery charging comes to an end; this ensures that the refilled water quantity is mixed with the electrolyte. In normal operation it is usually sufficient to fill once a week.

5. Connection pressure

The water refilling unit is to be operated in such a way that the water pressure in the water pipe is between 0.3 bars and 1.8 bars. The Aquamatic System has an operating pressure range of between 0.2 bars and 0.6 bars. The BFS system has an operating pressure range of 0.3 bars to 1.8 bars. Deviations from the pressure ranges impair the system's functional reliability. This wide pressure range permits three types of filling.

5.1 Falling water

The height of the tank is chosen to suit whichever water refilling system is used. For the Aquamatic System the installation height is 2 m to 6 m and for the BFS system the installation height is 3 m to 18 m over the battery surface.

5.2 Pressurised water

The pressure-reducing valve in the Aquamatic System is set from 0.2 bars to 0.6 bars and from 0.3 bars to 1.8 bars in the BFS system.

5.3 Water Refill Trolley (serviceMobil)

The submergible pump located in the ServiceMobil's tank generates the necessary filling pressure. No difference in height is permitted between the standing level of the ServiceMobil and the standing level of the battery.

6. Filling duration

The length of time needed to fill the batteries depends on the conditions under which the battery is used, the ambient temperatures and the type of filling and/or the filling pressure. The filling time is approx. 0.5 to 4 minutes. Where filling is manual, the water feed pipe must be separated from the battery after filling.

7. Water quality

Only refilling water which conforms in quality to DIN 43530 part 4 may be used to fill the batteries. The refilling unit (tank, pipelines, valves etc.) may not contain any kind of dirt which could impair the functional reliability of the Aquamatic/BFS plug. For safety reasons it is recommendable to insert a filter element (optional) with a max. passage opening of 100 to 300 µm into the battery's main supply pipe.

8. Battery hose connections

Hose connections for the individual plugs are laid along the existing electric circuit. No changes may be made.

9. Operating temperature

The temperature limit for battery operation is set at 55° C. Exceeding this temperature damages the batteries. The battery filling systems may be operated within a temperature range of > 0° C to a maximum of 55° C.

CAUTION:

Batteries with automatic water refilling systems may only be operated in rooms with temperatures > 0° C (as there is otherwise a danger that the systems may freeze).

9.1 Diagnostics hole

To be able to measure the acid density and temperature easily, the water refilling systems must have a diagnostics hole with a 6.5 mm-diameter (Aquamatic plugs) or a 7.5 mm-diameter (BFS plugs).

9.2 Float

Different floats are used depending on the cell design and type.

9.3 Cleaning

The plug systems may only be cleaned with water. No parts of the plugs may come in contact with soap or fabrics which contain solvents.

10. Accessories

10.1 Flow indicator

To monitor the filling process, a flow indicator can be inserted into the water feed pipe on the battery side. During the filling process, the paddlewheel is turned by the flowing water. When the filling process ends, the wheel stops and this indicates the end of the filling process. (ident no.: 50219542).

10.2 Plug lifter

Only the appertaining special-purpose tool may be used to disassemble the plug systems (plug lifter). The greatest of care must be employed when prising out the plug to prevent any damage to the plug systems.

10.2.1 Clamping ring tool

The clamping ring tool is used to push on a clamping ring to increase the contact pressure of the hose connection on the plugs' hose couplings and to loosen it again.

10.3 Filter element

For safety reasons a filter element (ident no.: 50307282) can be fitted into the battery's main supply pipe for supplying battery water. This filter element has a maximum passage cross-section of 100 to 300 µm and is designed as a bag filter.

10.4 Sealing coupler

The water is supplied to the water refilling systems (Aquamatic/BFS) through a central supply pipe. This is connected to the water supply system at the battery charging station by means of a sealing coupler system. On the battery side a closing nipple (ident no.: 50219538) is mounted and the customer must place a sealing coupler construction on the water supply side (obtainable under ident. no.: 50219537).

11. Functional data

PS - self-sealing pressure: Aquamatic > 1.2 bars

BFS system none

D - rate of flow in the opened valve when the pressure is 0.1 bars: 350 ml/min

D1 - maximum permissible leakage rate in the closed valve when the pressure is at 0.1 bars: 2 ml/min

T - permissible temperature range: 0° C to a maximum of 65° C

Pa - operating pressure range: 0.2 to 0.6 bars in the Aquamatic system and operating pressure range: 0.3 to 1.8 bars in the BFS system.

2 Jungheinrich traction batterie

Maintenance free Jungheinrich traction batterie with positive tubular plates type EPzV and EPzV-BS

Rating Data

1. Nominal capacity C5:	See type plate
2. Nominal voltage:	2,0 Volt x No of cells
3. Discharge current:	C5/5h
4. Rated temperature:	30° C

EPzV batteries are valve-regulated batteries with an immobilised electrolyte and where a water refilling isn't permitted during the whole battery life. Instead of a vent plug there are valves used, who will be destroyed when they are opened.

When operating valve-regulated lead-acid batteries the same safety requirements as for vented cells apply to protect against hazards from electric current, from explosion of electrolytic gas and in case of the cell container is damaged, from the corrosive electrolyte.



- Pay attention to the operation instruction and fix them close to the battery!
- Work on batteries to be carried out by skilled personnel only!



- Use protective glasses and clothes when working on batteries!
- Pay attention to the accident prevention rules as well as DIN EN 50272, DIN 50110-1!



- No smoking!
- Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode!



- Acid splashes in the eyes or on the skin must be washed with water. In case of accident consult a doctor immediately!
- Clothing contaminated by acid should be washed in water.



- Risk of explosion and fire, avoid short circuits!



- Electrolyte is highly corrosive!
- In the normal operation of this batteries a contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (gelled sulphuric acid) is corrosive like the liquid electrolyte.



- Batteries and cells are heavy!
- Ensure secure installation! Use only suitable handling equipment e.g. lifting gear in accordance with VDI 3616.



- Dangerous electrical voltage!
- Caution! Metal parts of the battery are always live. Do not place tools or other metal objects on the battery!

Ignoring the operation instructions, repair with non-original parts and non authorised interventions will render the warranty void.

For batteries in classes ⓔI and ⓔII the instructions for maintaining the appropriate protection class during operation must be complied with (see relevant certificate).

1. Commissioning

The battery should be inspected to ensure it is in perfect physical condition.

The battery end cables must have a good contact to terminals, check that the polarity is correct.

Otherwise battery, vehicle or charger could be destroyed.

The battery has to be charged according to item 2.2

The specified torque loading for the pole screws of the end cables and connectors are:

	steel
M 10	23 ± 1 Nm

2. Operation

DIN EN 50272-3 «Traction batteries for industrial trucks» is the standard which applies to the operation traction batteries in industrial trucks.

2.1 Discharging

Ventilation openings must not be sealed or covered.

Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition.

To achieve the optimum life for the battery, operating discharges of more than 60% of the rated capacity should be avoided (deep discharge).

They reduce the battery life considerable. To measure the state of discharge use only the battery manufacturer recommended discharge indicators.

Discharged batteries must be recharged immediately and must not be left discharged.

This also applies to partially discharged batteries.

2.2 Charging

Only direct current must be used for charging. Charging procedures according to DIN 41773 and DIN 41774 must only be applied in the manufacturer approved modifications. Therefore only battery manufacturer approved chargers must be used. Only connect the battery assigned to a charger, suitable for the size of battery, in order to avoid overloading of the electric cables and contacts and unacceptable gassing of the cells. EPzV batteries have a low gas emission.

When charging, proper provision must be made for venting of the charging gases. Battery container lids and the covers of battery compartments must be opened or removed.

With the charger switched off connect up the battery, ensuring that the polarity is correct (positive to positive, negative to negative). Now switch on the charger. When charging the temperature of the battery rises by about 15° C, so charging should only begin if the battery temperature is below 35° C. The battery temperature should be at least +15°C before charging otherwise a full charge will not be achieved. Are the temperatures a longer time higher than +40° C or lower than +15° C, so the chargers need a temperatures regulated voltage.

The correction factor is, in accordance with DIN EN 50272-1, -0,005 V/c and Kelvin.

Special instructions for the operation of batteries in hazardous areas.

This concerns batteries which are used in accordance with EN 50 014, DIN VDE 0170 / 0171 Ex I (in areas with a firedamp hazard) or Ex II (in potentially explosive areas). The attention pictograms has to be respected.

2.3 Equalising charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity. Equalising charges are carried out following normal charging.

They are necessary after deep discharges and repeated incomplete recharges. For the equalising charges has to be used only the battery manufacturer prescribed chargers.

Watch the temperature!

2.4 Temperature

A battery temperature of 30°C is specified as the rated temperature. Higher temperatures shorten the life of the battery, lower temperatures reduce the available capacity. 45° C is the upper temperature limit and is not acceptable as an operating temperature.

2.5 Electrolyte

The electrolyte is immobilised in a gel. The density of the electrolyte can not be measured.

3. Maintenance

Don't refill water!

3.1 Daily

Charge the battery immediately after every discharge.

3.2 Weekly

Visual inspection after recharging for signs of dirt and mechanical damage.

3.3 Quarterly

After the end of the charge and a rest time of 5 h following should be measured and recorded:

- the voltages of the battery
- the voltages of every cells

If significant changes from earlier measurements or differences between the cells or bloc batteries are found, further testing and maintenance by the service department should be requested.

3.4 Annually

In accordance with DIN VDE 0117 at least once per year, the insulation resistance of the truck and the battery must be checked by an electrical specialist.

The tests on the insulation resistance of the battery must be conducted in accordance with DIN 43539-1.

The insulation resistance of the battery thus determined must not be below a value of 50 Ω per Volt of nominal voltage, in compliance with DIN EN 50272-3.

For batteries up to 20 V nominal voltage the minimum value is 1000 Ω .

4. Care of the battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI code of practice «The Cleaning of Vehicle Traction batteries».

Any liquid in the battery tray must be extracted and disposed of in the prescribed manner.

Damage to the insulation of the tray should be repaired after cleaning, to ensure that the insulation value complies with DIN EN 50272-3 and to prevent tray corrosion. If it is necessary to remove cells it is best to call our service department for this.

5. Storage

If batteries are taken out of service for a lengthy period they should be stored in the fully charged condition in a dry, frost-free room.

To ensure the battery is always ready for use a choice of charging methods can be made:

1. a quarterly full charging like charge as in point 2.2. If any consumer is connected with, e.g. measure or controlling systems, it can be, that this charging is necessary every 14 days.

2. float charging at a charging voltage of 2.25 V x the number of cells.

The storage time should be taken into account when considering the life of the battery.

6. Malfunctions

If malfunctions are found on the battery or the charger our service department should be called without delay. The measurements taken in point 3.3 will facilitate fault finding and their elimination.

A service contract with us will make it easier to detect and correct faults in good time.



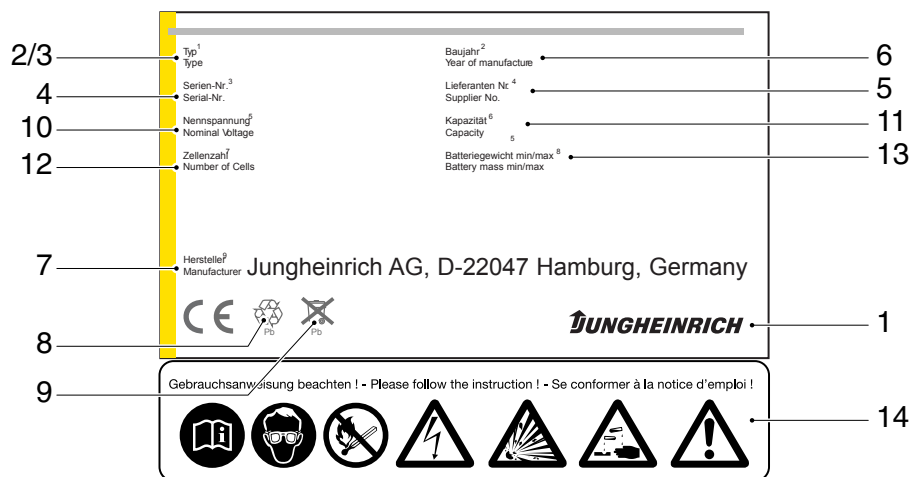
Back to the manufacturer!

Batteries with this sign must be recycled.

Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

We reserve the right make technical modification.

7. Type plate, Jungheinrich traction battery



Item	Designation	Item	Designation
1	Logo	8	Recycling symbol
2	Battery designation	9	Dustbin/material
3	Battery type	10	Nominal battery voltage
4	Battery number	11	Nominal battery capacity
5	Battery tray number	12	Number of battery cells
6	Delivery date	13	Battery weight
7	Battery manufacturer's logo	14	Safety instructions and warnings

* CE mark is only for batteries with a nominal voltage greater than 75 volt.

