

EJC 110/112

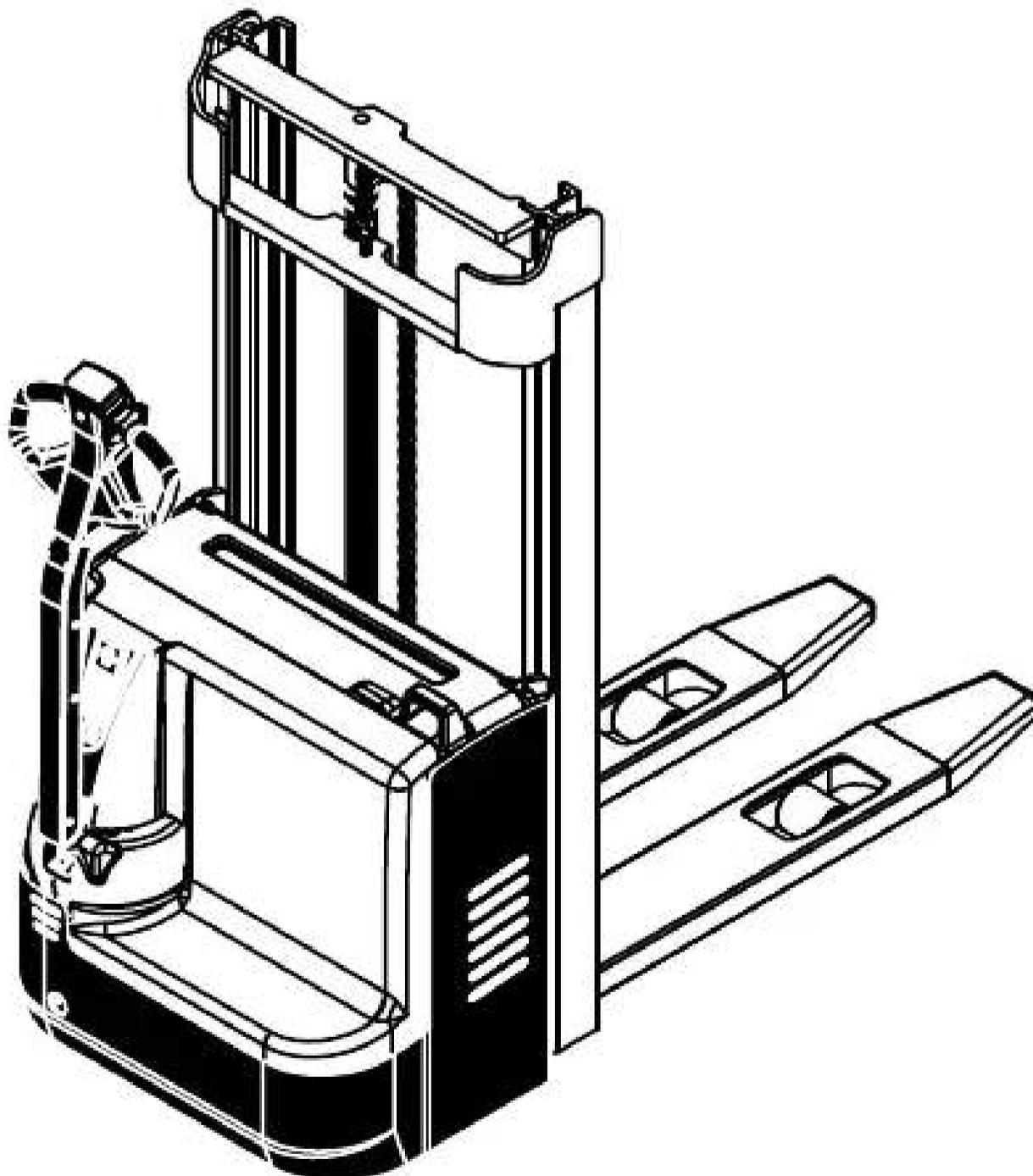
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Operating instructions

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JUNGHEINRICH

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 operator manual is an industrial truck designed for lifting and transporting load units.

It must be used, operated and serviced in accordance with the present instructions.

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 which are too heavy or placed on one side. 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 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.

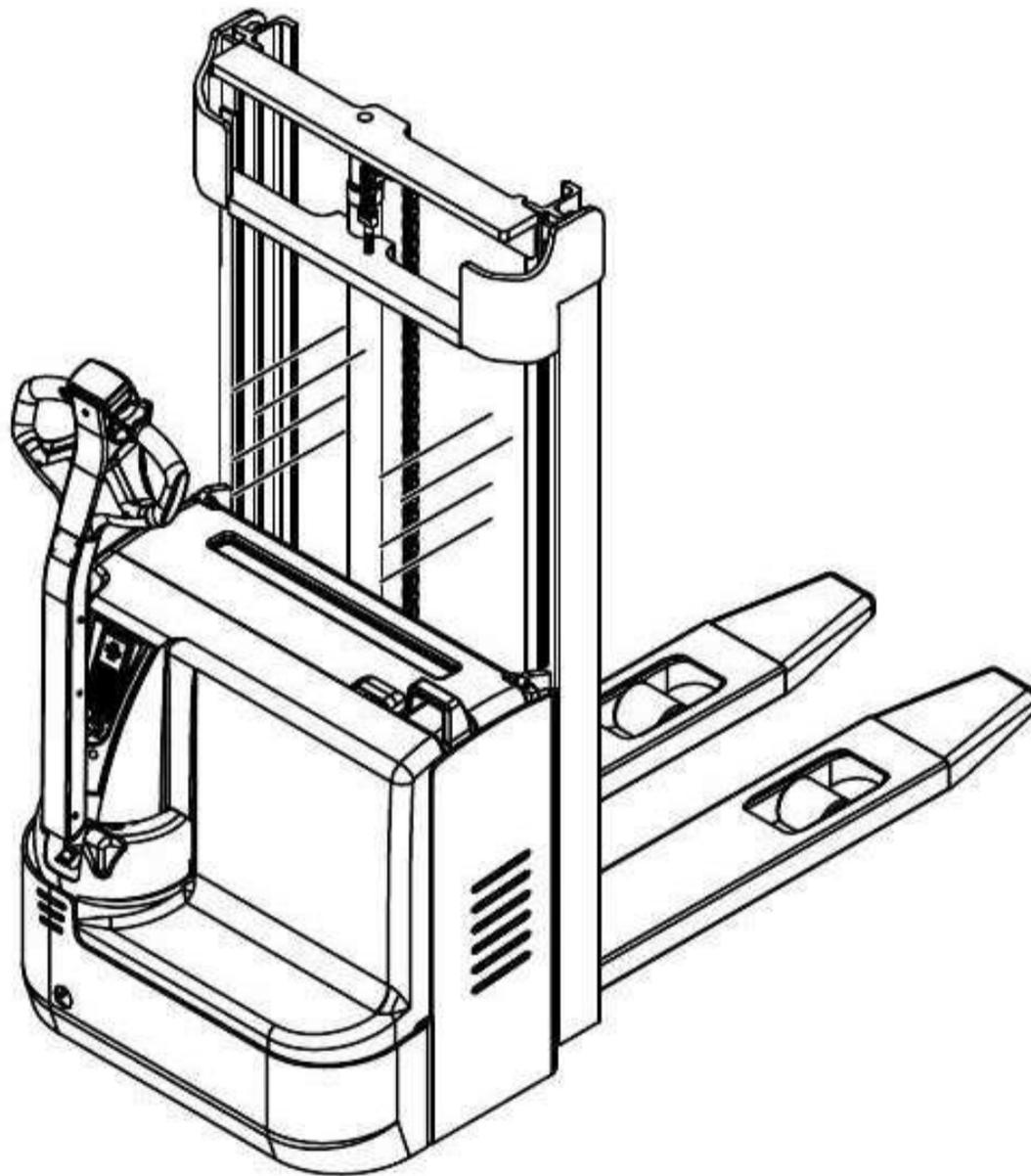
B Truck Description

1 Application

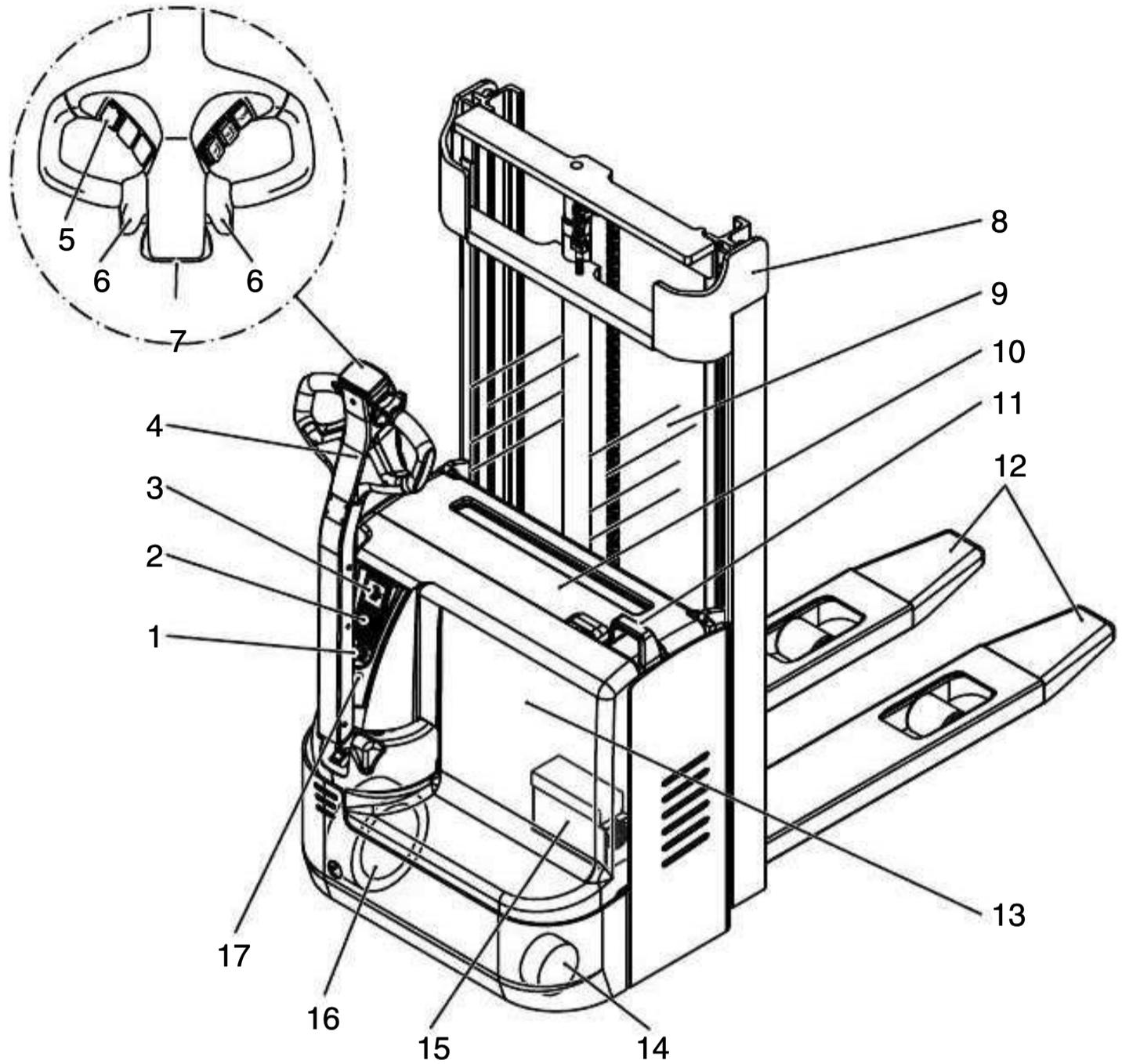
The EJC is a four wheel, tiller guided electric truck with a steered drive wheel. It is designed for use on level floors to lift and transport palletised goods. Open bottom pallets or roll cages can be lifted.

The capacity can be obtained from the data plate.

The capacity with respect to lift height and load centre of gravity is indicated on the capacity plate.



2 Assemblies



Item	EJC 110	EJC 112	Description
1	●	●	Switch switch
2	○	○	CANCODE keypad
	○	○	ISM Access Module
3	●	●	Battery discharge indicator /hourmeter
	○	○	CANDIS display instrument
4	●	●	Tiller and grip
5	●	●	"Shunt" switch
6	●	●	Controller
7	●	●	Collision safety switch
8	●	●	Mast
9	●	●	Mast guard
10	●	●	Battery panel
11	●	●	Battery connector (emergency disconnect)
12	●	●	Lift mechanism
13	●	●	Front panel
14	●	●	Caster wheel
15	●	●	Charger
16	●	●	Drive wheel
17	●	●	Charge display

● = Standard equipment

○ = Optional Equipment

3 Standard Version Specifications



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

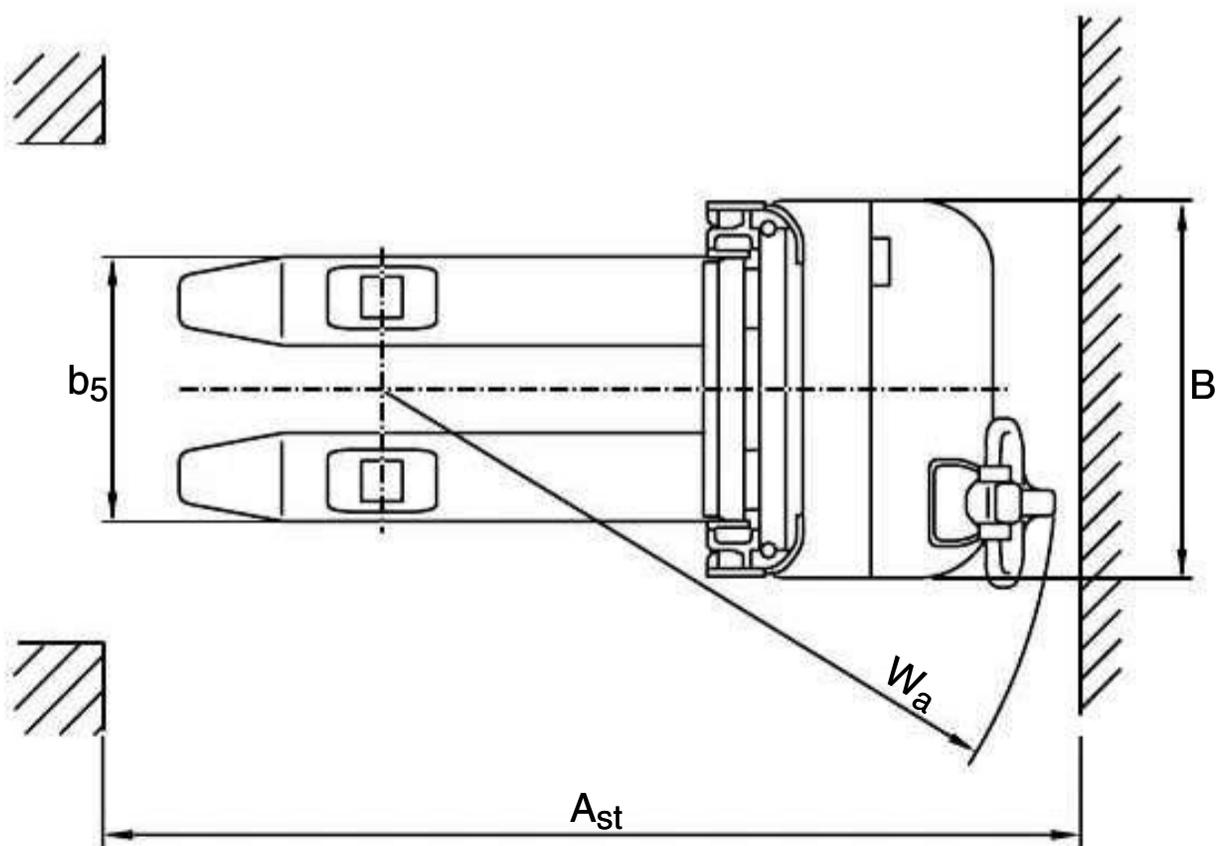
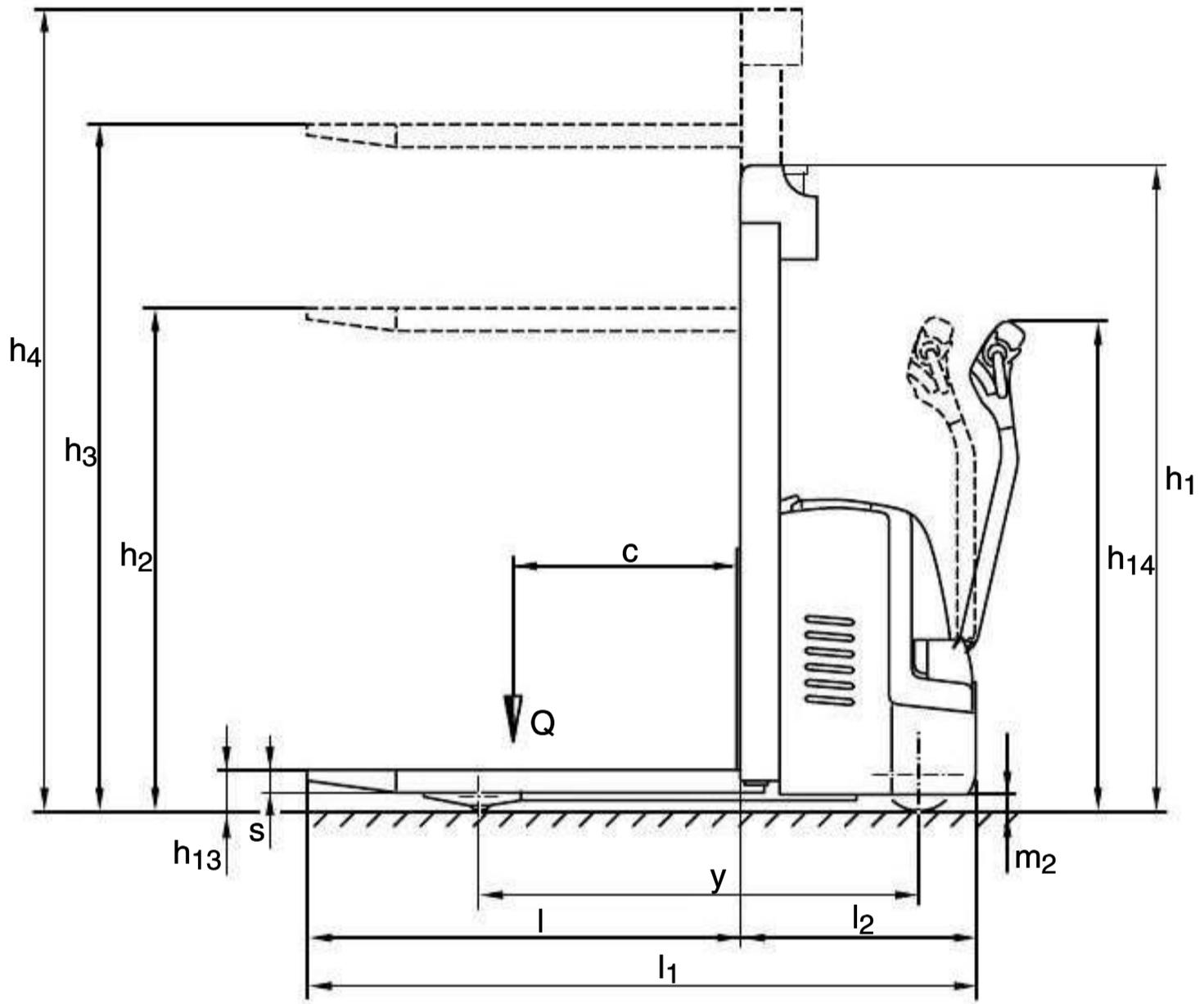
3.1 Performance data for standard trucks

	Description	EJC 110	EJC 112	
Q	Rated capacity	1000	1200	kg
C	Load centre distance Standard fork length	600	600	mm
	Travel speed w. nominal load / w.o. load	6.0 / 6.0	6.0 / 6.0	km/h
	Raise lift speed w. nominal load / w.o. load	13 / 24	12 / 21	cm/s
	Lowering speed w. nominal load / w.o. load	40 / 42	40 / 42	cm/s
	Max. gradeability (5 min rating) w / w.o. load	8	16	%

3.2 Dimensions

	Description	EJC 110	EJC 112	
h1	Height (mast-dependent) 1)	1750 - 2100	1700 - 2250	mm
h2	Free lift 2)	100	100	mm
h2	Free lift (duplex) 3) (mast-dependent)	-	1227 - 1777	mm
h3	Lift (mast-dependent)	2500 - 3200	2500 - 3600	mm
h4	Mast height extended (mast-dependent)	2973 - 3673	2973 - 4073	mm
h13	Load fork lowered	90	90	mm
h14	Tiller height in min. / max setting	820/1310	820/1310	mm
y	Wheelbase	1171	1171	mm
l1	Overall length	1787	1787	mm
l2	Length incl. fork back	637	637	mm
B	Truck width	800	800	mm
b5	Distance between forks, outer	560	560	mm
m2	Ground clearance	30	30	mm
Ast	Working aisle width 800 x 1200 longit.	2096	2096	mm
Ast	Working aisle width 800 x 1200 longit. (in accordance with VDI)	2234	2234	mm
Wa	Turning radius in shunt mode (tiller vertical)	1383	1383	mm

- 1) for ZT mast: at 100 mm free lift (h2) u h1+ 50 mm
- 2) telescopic mast only (ZT)
- 3) ZZ mast only



3.3 EN norms

Noise emission: 70 dB(A)

in accordance with EN 12053 as harmonised 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.

Electromagnetic compatibility (EMC)

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.

3.4 Conditions of use

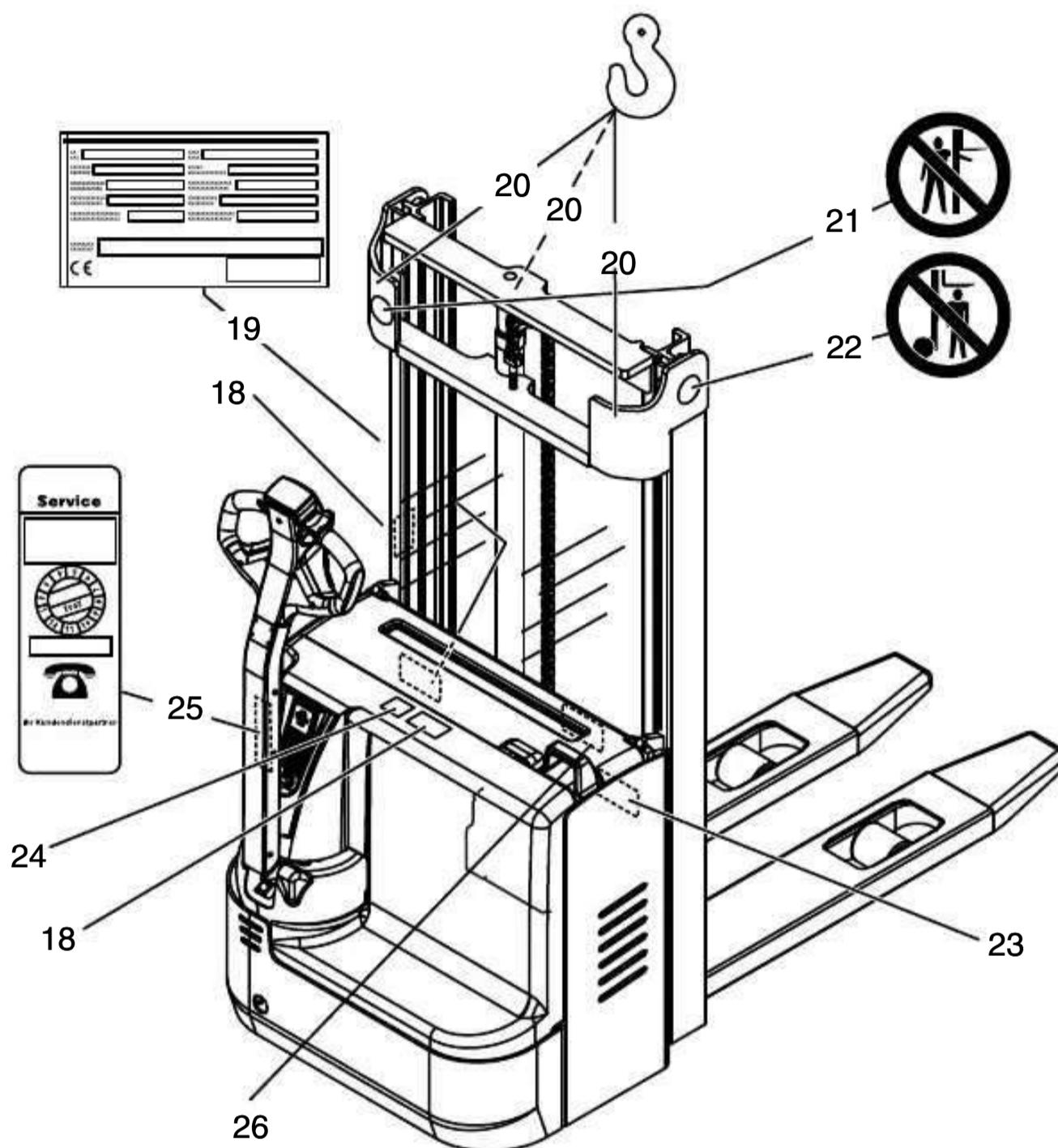
Ambient temperature

- operating at 5°C to 40 °C



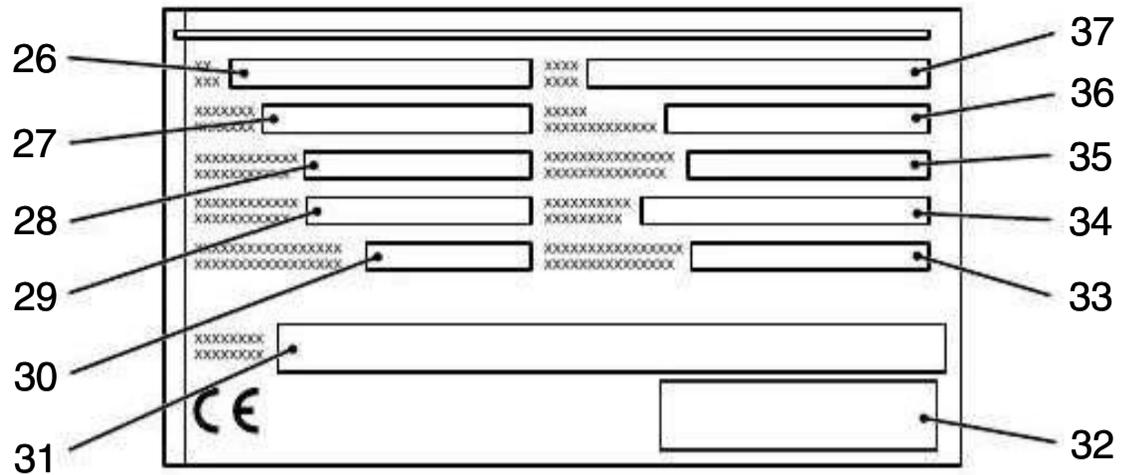
Special equipment and authorisation is required if the truck is to operate constantly below 5°C or in a cold store or in extreme temperatures or conditions of fluctuating air humidity.

4 Identification points and data plates



Item	Description
18	Capacity
19	Truck data plate
20	Attachment point for lifting by crane (with ZZ mast in the middle)
21	"Do not reach through the mast" warning
22	"Do not step under the load handler" warning
23	Battery data plate
24	"No passengers" warning
25	UVV test plaque
26	Serial number

4.1 Truck data plate



Item	Description	Item	Description
26	Type	32	Manufacturer's logo
27	Serial no.	33	Min./max. battery weight (kg)
28	Rated capacity (kg)	34	Output (kW)
29	Battery voltage (V)	35	Load centre of gravity (mm)
30	Net weight excl. battery	36	Year of manufacture
31	Manufacturer	37	Option



For queries regarding the truck or ordering spare parts please quote the truck serial number (28).

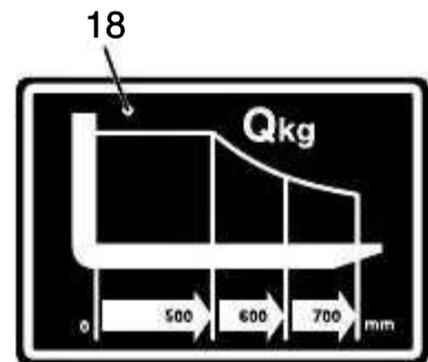
4.2 Capacity



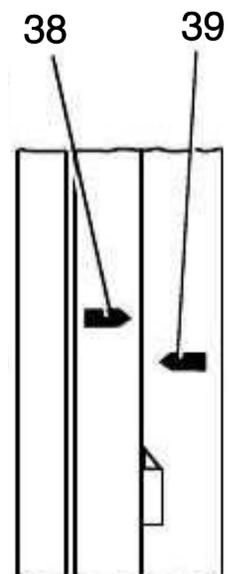
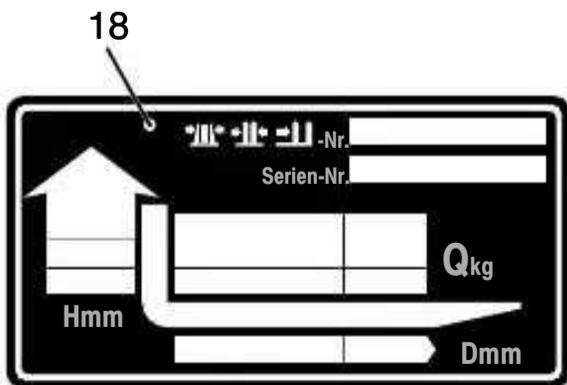
The capacity data with respect to lift height and load centre of gravity distance can be found on the truck's capacity plate (18).

Depending on the mast fitted, the truck will have one of the following two capacity plates (18): (illustrations for reference purposes only).

The capacity plate to the right (18) shows the capacity (Q in kg) for different load centres of gravity (D in mm) in diagram form.

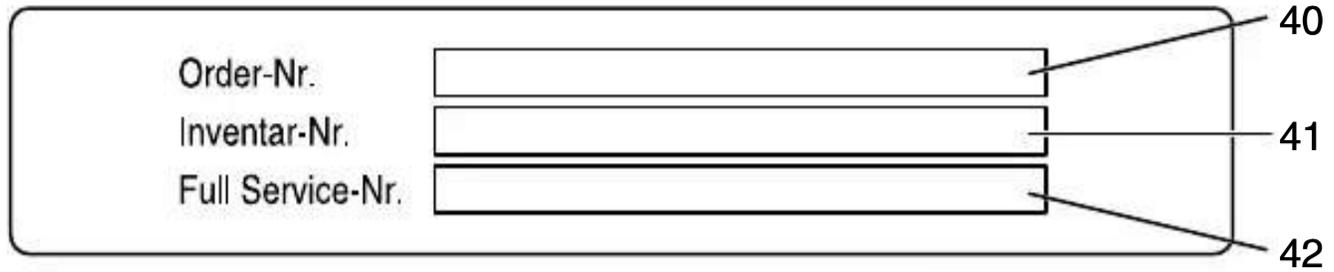


The lower plate (18) gives the capacity (Q in kg) of the truck as a function of the load centre of gravity distance (D in mm) and lift height (H in mm) in tabular form.



The arrow shape markings (38 and 39) on the inner mast and bottom and outer tie bar indicate to the driver when he has exceeded the height limits specified by the capacity plate (18).

4.3 Capacity plate, Order, Inventory and Service Nos.



Item	Description
40	Order no.
41	Inventory no.
42	Full Service No.



The capacity plate with the full service number is only issued when a service agreement has been reached.

C Transport and Commissioning

1 Lifting by crane



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

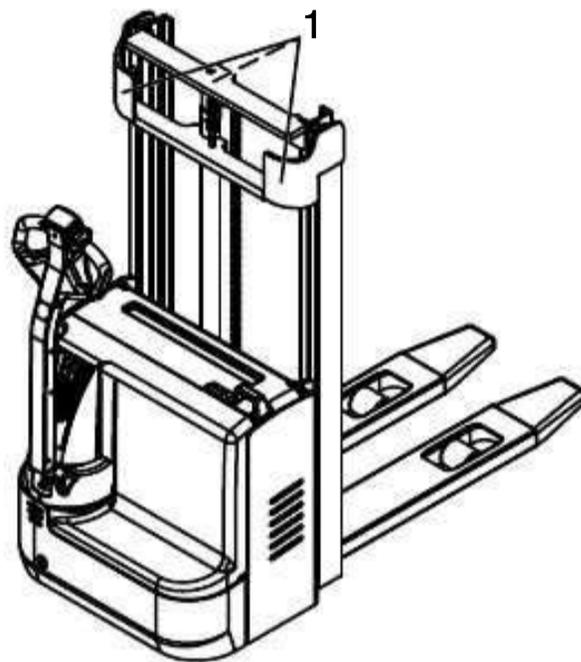


The attachment points (1) are provided for lifting the truck with crane lifting gear (in the middle with the ZZ mast).

- Park the truck securely (see Chapter E).
- Strap the lifting gear onto the attachment points (1) (in the middle with the ZZ mast).



Attach the crane slings to the strap points so that the truck cannot slip. Lifting slings should be fastened in such a way that they do not come into contact with any parts of the truck when it is being raised.



2 Commissioning



Operate the truck only with battery current. Rectified AC current will damage the electronic components. The battery leads (tow cable) must be less than 6m long.



It is forbidden to raise loads if the truck is operated via a tow lead with an external battery.

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

- Check the truck for completeness and satisfactory condition of the equipment.
- Install battery (where required). Do not damage battery cable. (see chapter D).



Set the characteristic curve (charging curve) on the charger (see Chapter D).

- Charge the battery (see Chapter D).
- If necessary, adjust the combination instrument to match the battery type (see Chapter D).
- Start up the truck as indicated. (see Chapter E).



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

3 Operating the truck without its own drive system



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

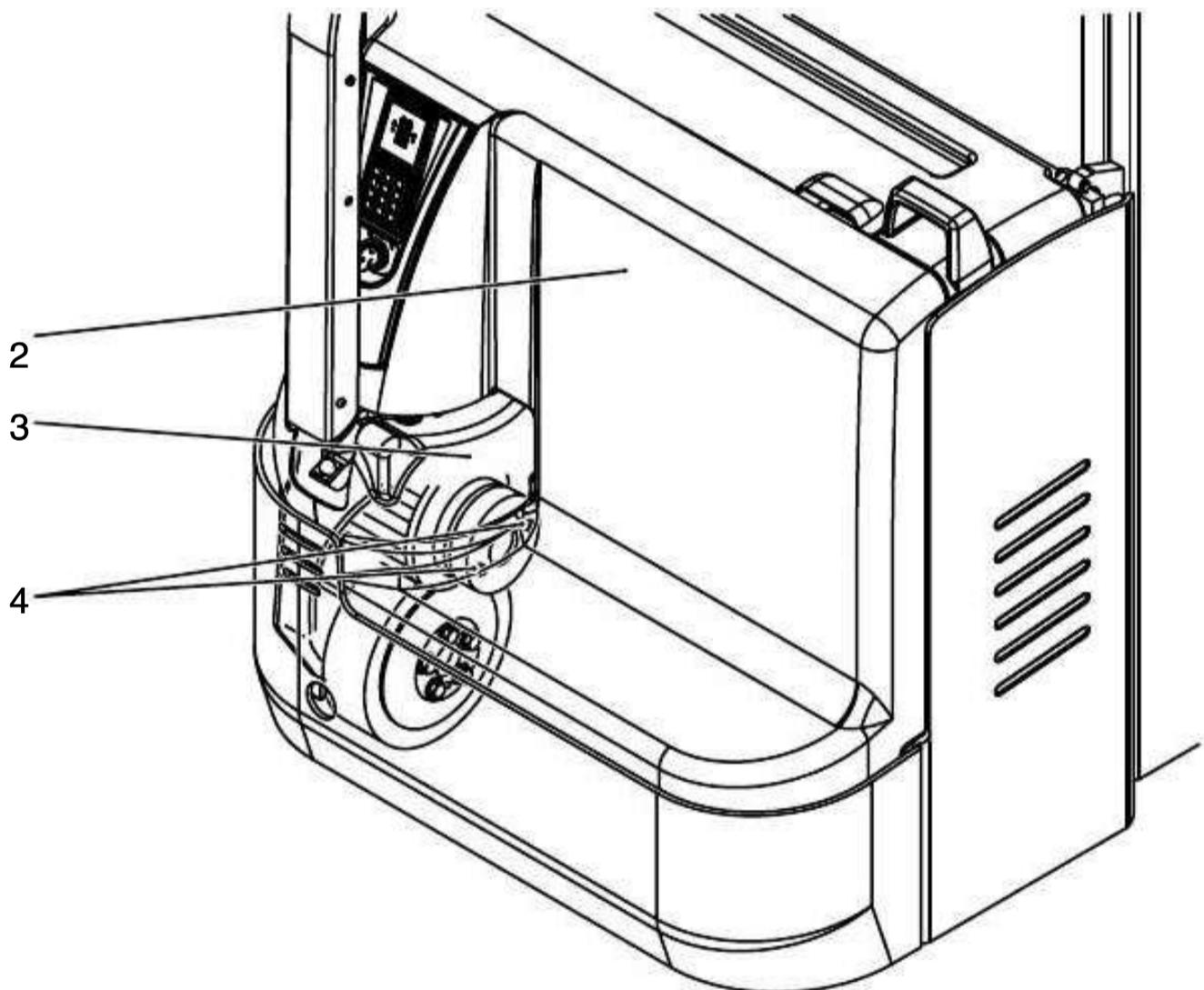
To operate the truck in emergency conditions, the electromagnetically applied brake must be released.

- Remove the front panel (2) (see Chapter F).
- Remove the right-hand drive panel (3) (see Chapter F).
- Screw on 2 off M5 bolts (4) to loosen the armature plate.

The truck can now be moved.



When you park the truck, the screws (4) must be turned back clockwise as far as the stop to restore full braking capability.



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. Above all avoid any contact with battery acid.

Nevertheless, should 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 affect on the operational safety of the truck. Battery equipment may only be replaced with the agreement of the manufacturer.

2 Battery types

Depending on the model, the EJC comes with different battery types. The battery weights can be taken from the battery data plate.



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

The following table shows which combinations are included as standard:

Chassis version	Truck type	24V - Pz... battery
I2 = 635 mm	EJC 110/112	2 PzB 126 Ah 2 PzB 150 Ah 2 PzB 190 Ah

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

3 Exposing the battery

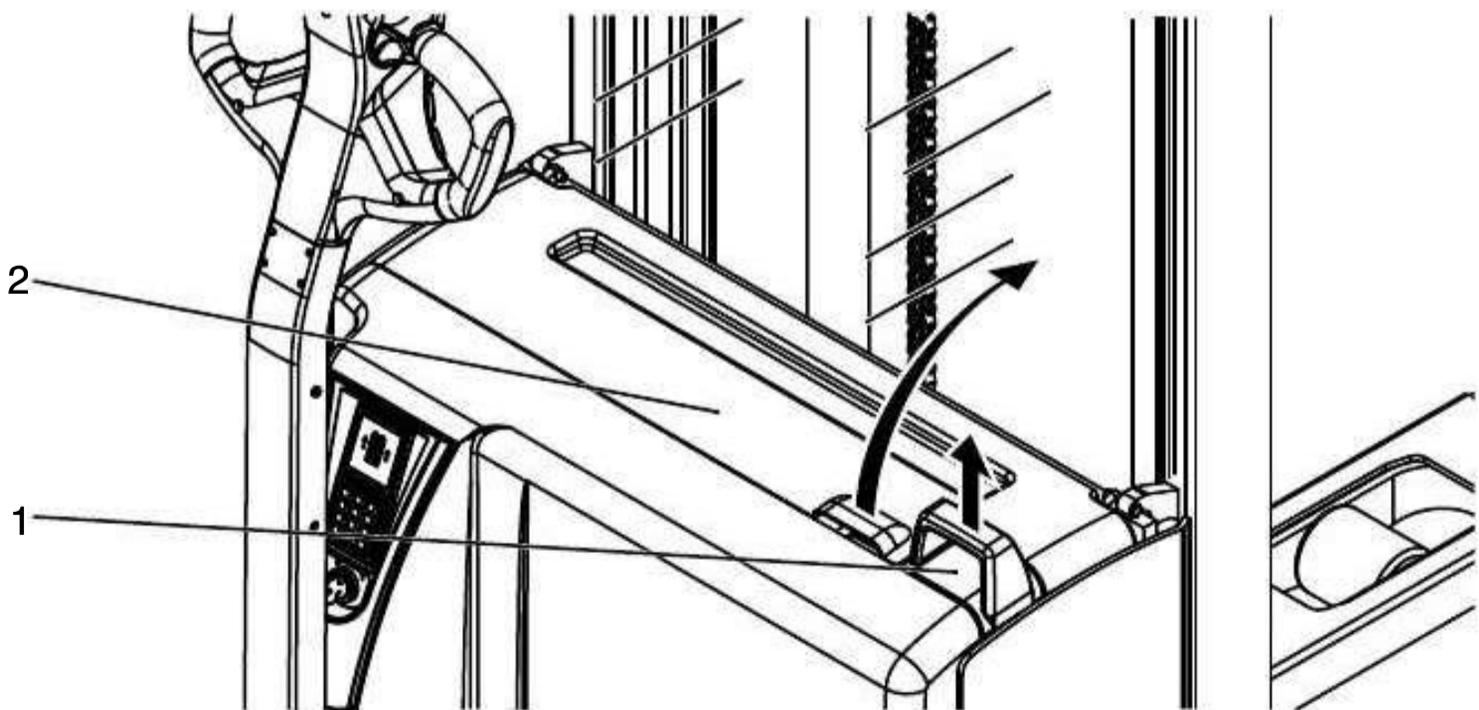
- Park the truck securely (see Chapter E).
- Remove the battery connector (1).
- Lift up the battery panel (2).



When you lift up the battery panel, make sure the panel lock engages.



Remove the panel to replace the battery (see Section 5).



4 Charge the battery

The EJC 110/112 is fitted as standard with an onboard charger (for charging see section 4.1).

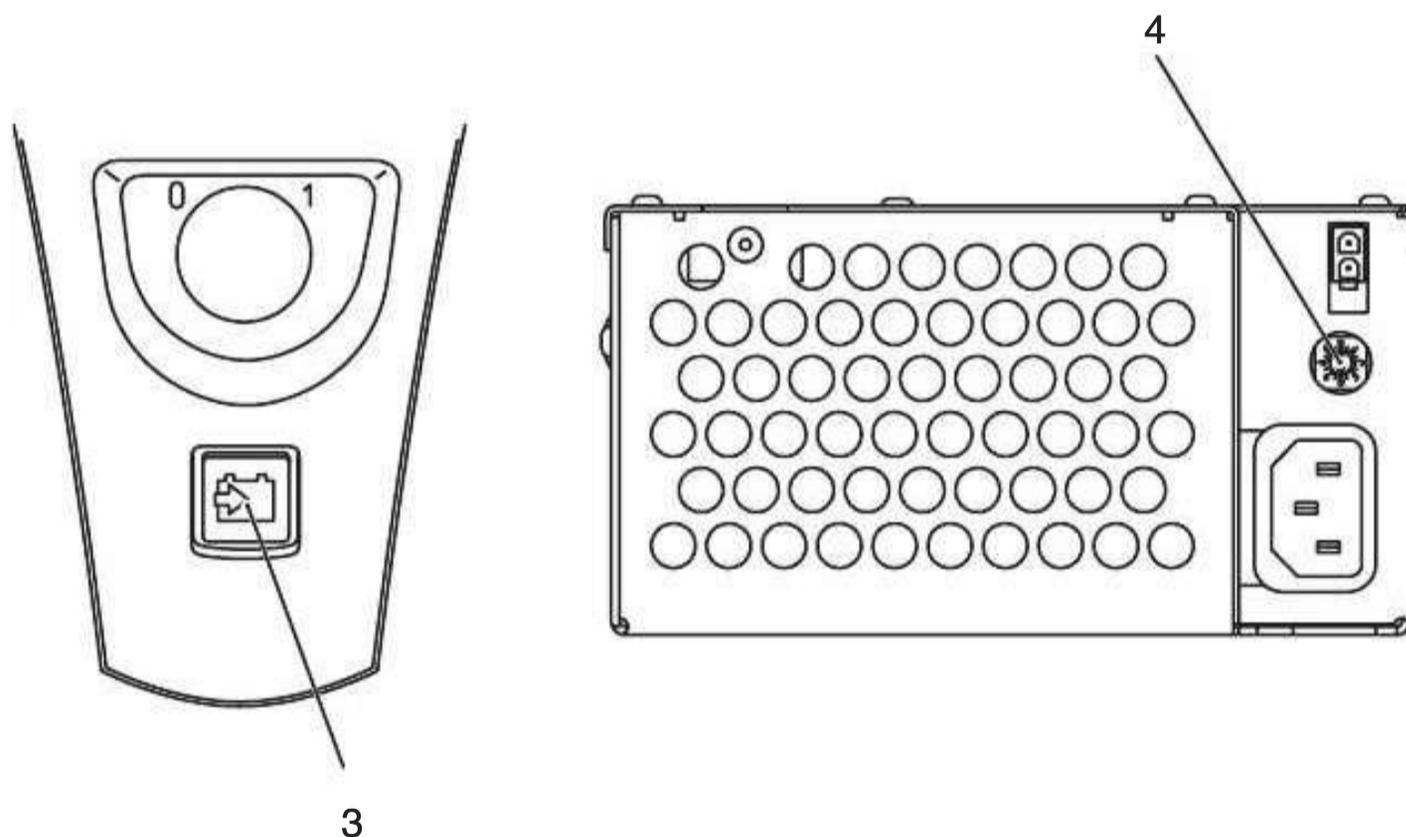
The EJC 110/112 can optionally be fitted with a stationary charger (for charging see section 4.2).

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

4.1 Charging the battery with an onboard charger ●

The charger must not be opened. If damaged, it must be replaced.

- ➔ The switch (4) of trucks supplied without a battery is factory-set to the “0” position. The red LED (3) flashes to indicate the battery cannot be charged.



Selecting the charging curve for the onboard charger

Use the switch (4) on the charger to adapt the charge curves to the particular battery used, in accordance with the following table.



Remove the battery and mains connectors before setting the appropriate curve.

Switch (4) Position	Selected charge curves (characteristic curves)
1	Wet cell batteries: 100 - 300 Ah
2	Maintenance-free: 100 - 149 Ah
3	Maintenance-free: 150 - 199 Ah
4	Maintenance-free: 200 - 300 Ah
5	Wet cell batteries: 200 - 400 Ah pulse characteristic
6	Wet cell batteries: Jungheinrich 100 - 300 Ah



All other switch (4) positions block the charger, and the battery is not charged.

Setting the charging characteristic curve

Set the characteristic curve as follows:

Connect the battery	This allows you to adjust via the charger	
Turn the setting switch to the right to select the desired characteristic curve	If the characteristic curve is valid, the green LED flashes according to the set position. If invalid, the red LED flashes.	

Starting to charge with the onboard charger

- Park the truck securely (see Chapter E).



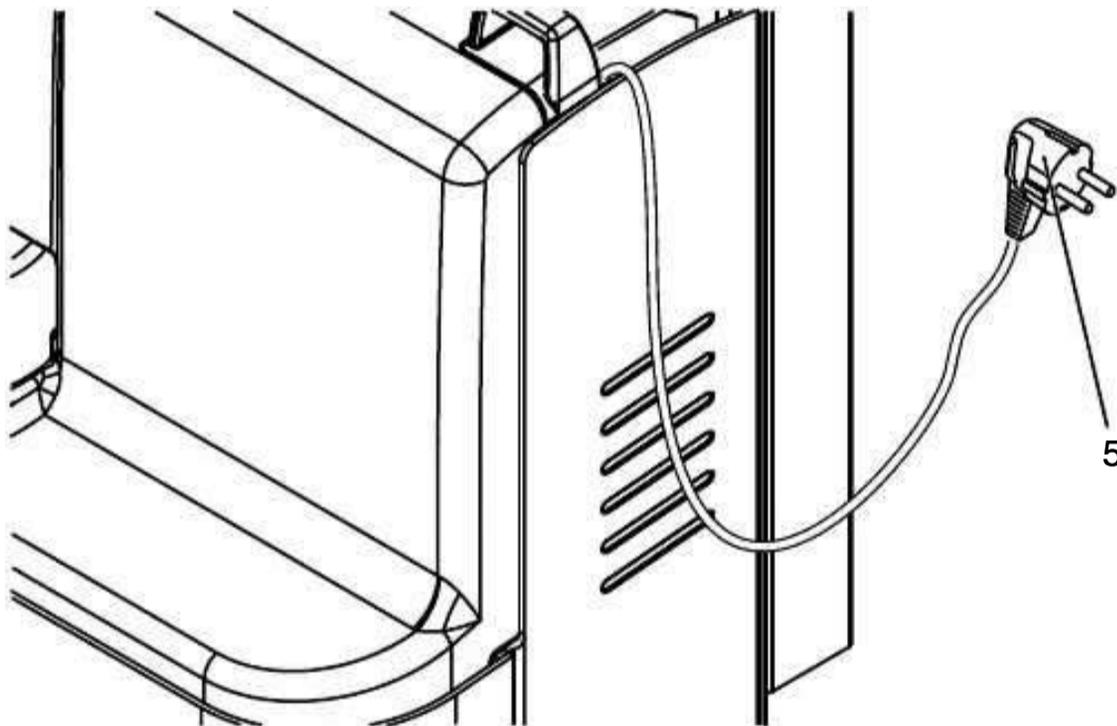
When charging, the tops of the battery cells must be exposed to provide sufficient ventilation. Do not place any metal objects on the battery. Before charging, check all cables and plug connections for visible signs of damage. It is essential to follow the safety regulations of the battery and charger station manufacturers.

Mains connection

Mains supply: 230 V ($\pm 6\%$)

Mains frequency: 50/60 Hz ($\pm 1\%$)

The mains cable of the charger (5) is located in the mains cable holder in the battery compartment.



- Lift up the battery panel (2).
- Where necessary remove the insulating mat from the battery.
- Attach the mains connector (5) to a mains socket.

The flashing LED indicates the charge status or a fault (for flashing codes see “LED Display” table).



If the mains connector (5) is connected to the mains, all the truck’s electrical functions will be interrupted (electrical start block). The truck cannot be operated.

– Remove the connector (5) from the socket and store it in the battery compartment.



Charging continues automatically after a mains failure.

Charging can be interrupted by removing the mains connector and continued as partial charging.



The mains cable must not be opened.



Before starting the truck, the battery panel must be firmly closed.

Charging times

The duration of charge depends on the battery capacity.

LED display

Green LED (charge status)	Red LED (fault)	Display
Lit	---	Charging complete, battery full. (Charging interval, compensation charge)
Flashes slowly	---	Charging
Rapid flash	---	Display at beginning of charge or after setting a new characteristic curve. Number of flash pulses corresponds to the characteristic curve set.
---	Lit	Overtemperature. Charging is interrupted.
---	Flashes slowly	Safety charging time exceeded. Charging is cancelled. Mains must be disconnected for charging to recommence.
---	Rapid flash	Invalid characteristic curve setting.
---	---	Mains failure and/or no battery connected.

Compensation charge

Compensation charge starts automatically when charging is complete.

Partial charging

The charger is designed to automatically adapt to partially charged batteries. This keeps battery wear to a minimum.

4.2 Charging the battery with a stationary charger ○

- Park the truck securely (see Chapter E).



Only connect and disconnect the battery connector and the socket when the mains and charger are switched off.

- Expose the battery (see Section 3).



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

- Where necessary remove the insulating mat from the battery.
- Connect the charging cable (7) of the battery charging station to the battery connector (1) and switch on the charger.



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

5 Battery removal and installation

- Undo the spring elements of the battery panel and remove the battery panel.

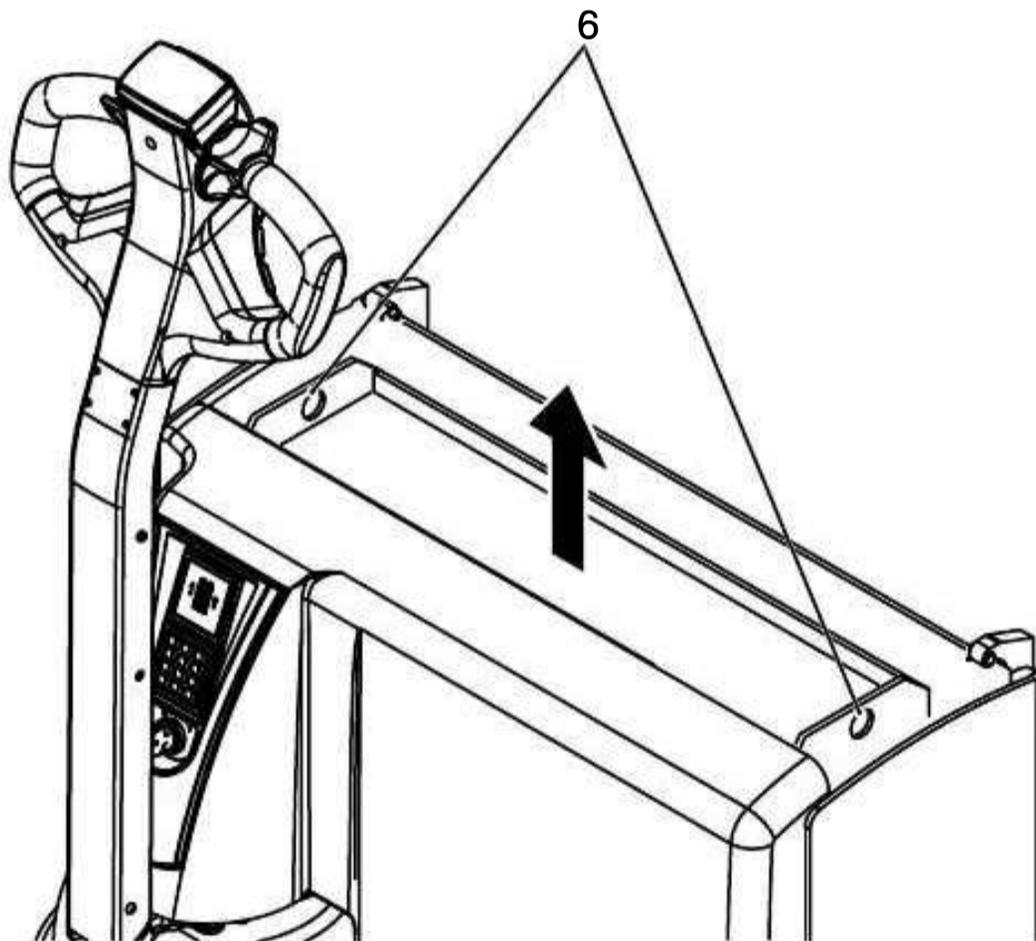


The truck must be parked on level ground. To prevent short circuits, batteries with exposed terminals or connectors must be covered with a rubber mat. Place the battery connector or the battery cable in such a way that they will not get caught on the truck when the battery is removed.



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. The hooks must be attached to the eyes (6) of the battery in such a way that they cannot fall onto the battery cells when the lifting gear is discharged.

- Attach the lifting gear to the attachment eyes (6) and lift out the battery.



When replacing a battery always use the same battery type. Extra weights must not be removed and must remain in the same position.

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



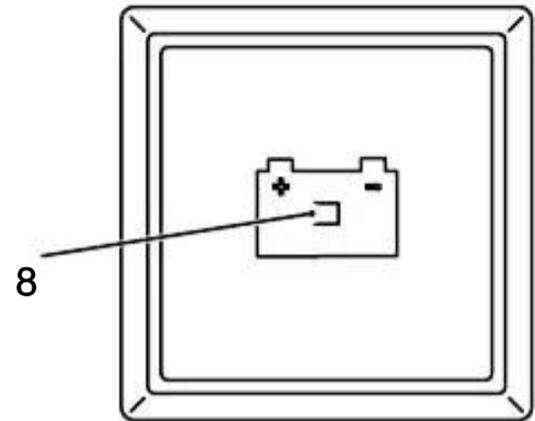
After installing the battery again, check all cables and plug connections for visible signs of damage.



Before starting the truck, the battery panel must be firmly closed. Close the battery panel carefully and slowly. Do not reach between the battery panel and the chassis.

6 Battery Discharge Indicator (●)

When the truck has been released via the keyswitch or CANCODE, the battery charge status is displayed.



The colours of the LEDs (8) represent the following conditions:

LED colour		Rating
Green	Standard battery residual capacity	40 - 100 %
	Maintenance free battery residual capacity	60 - 100 %
Orange	Standard battery residual capacity	30 - 40 %
	Maintenance free battery residual capacity	50 - 60 %
Green/orange Flashing. 1Hz	Standard battery residual capacity	20 - 30 %
	Maintenance free battery residual capacity	40 - 50 %
Red	Standard battery residual capacity	0 - 20 %
	Maintenance free battery residual capacity	0 - 40 %



If the LED is red, load units can no longer be lifted. Lifting is only released when the battery connected is at least 70% charged.

If the charge status calculated when the truck is switched on is at least 70% of that of a fully charged battery, the display is reset to 100%. The display reduces in increments of 10% depending on the charge status. The displayed status is reduced to a maximum of 10% within 3 minutes.

The displayed status cannot rise again during the present operation.

The status display is reset to 100% when the battery type is adjusted.

If the LED flashes red and the truck is not ready for operation, inform the manufacturer's service department. Red flashing is a fault code of the truck controller. The flashing sequence indicates the type of fault.

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 with pedestrian operated trucks. Travel with a raised load is prohibited (max. height above ground = 500 mm).

Unauthorised Use of Truck: The driver is responsible for the truck during the time it is in use. He shall prevent unauthorised persons from driving or operating the truck. It is forbidden to carry passengers or lift personnel.

Damage and Faults: The supervisor must be immediately informed of any damage or faults to the forklift truck. Trucks not safe 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. On no account may the driver disable or adjust safety mechanisms or switches.

Hazardous area: A hazardous area is defined as the area in which a person is at risk due to truck movement, lifting operations, the load handler (e.g. forks or attachments) or the load itself. This also includes areas which can be reached by falling loads or lowering operating equipment.



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

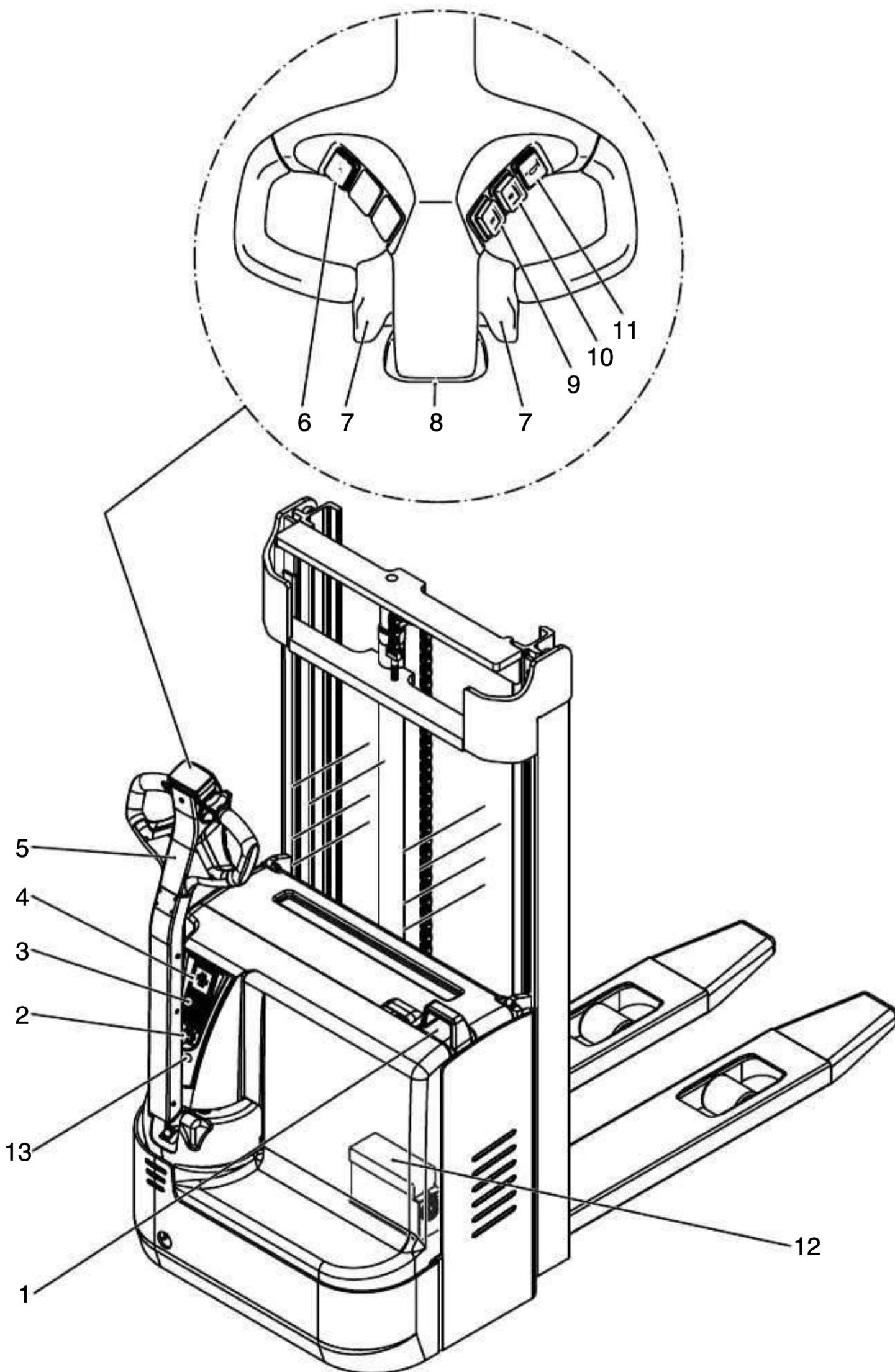
Safety Devices and Warning Signs: Safety devices, warning signs and warning instructions shall be strictly observed.

2 Controls and Displays

Item	Control / Display	EJC 110	EJC 112	Function
1	Battery connector (Emergency Stop)	●	●	The circuit is interrupted, all electrical functions are cut out. The truck automatically brakes.
2	Switch switch	●	●	Switches control current on and off. Removing the key prevents the truck from being switched on by unauthorised personnel.
3	Keypad (CANCODE)	○	○	Switches control current on and off. Code settings. Releasing and selecting the travel programs. Entering travel parameters.
	ISM access module	○	○	Code settings. Releasing and selecting the travel programs. Entering travel parameters.
4	Battery discharge indicator	●	●	Battery charge status.
	Display instrument (CANDIS)	○	○	Operating hours meter. Battery charge status. Displays service messages and travel parameters in combination with CANCODE.
5	Tiller	●	●	Is used to steer the truck.
6	“Shunt” switch	●	●	If the tiller is in the upper braking zone, braking can be overridden by pressing the switch, and the truck can move with reduced speed (shunting).
7	Controller	●	●	Controls travel direction and speed.

● = Standard equipment

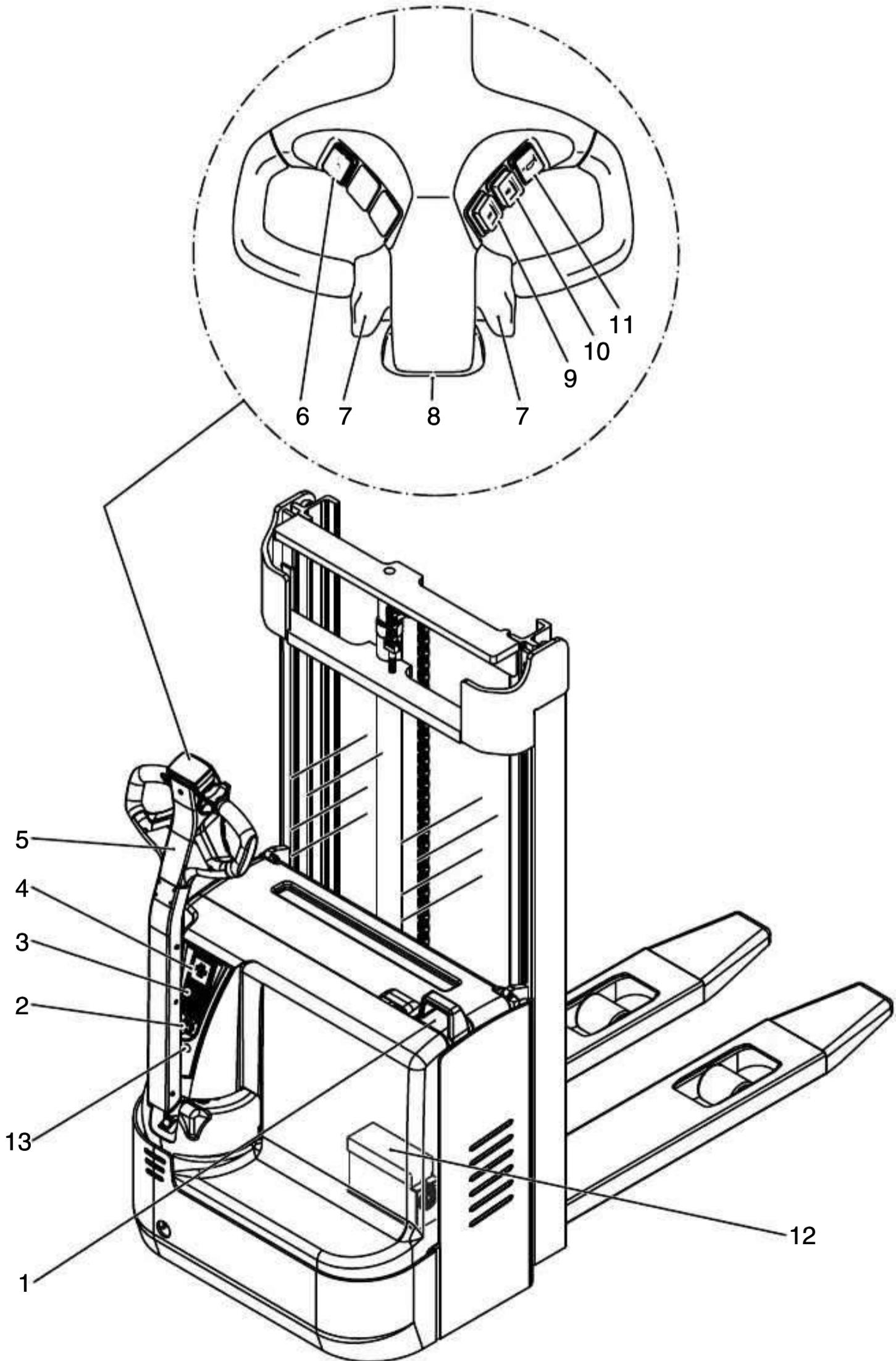
○ = Optional Equipment



Item	Control / Display	EJC 110	EJC 112	Function
7	Controller	●	●	Controls travel direction and speed.
8	Collision safety switch	●	●	Truck moves away from the operator and stops.
9	Load fork raise switch	●	●	Raises load forks. The lift speed can be infinitely controlled via the switch stroke (8 mm).
10	Load fork lower switch	●	●	Lowers the load forks. The lowering speed can be infinitely controlled via the switch stroke (8 mm).
11	Warning signal (horn) switch	●	●	Triggers a warning signal.
12	Integrated charger	●	●	Used to charge the battery (see Chapter D).
13	Charging display on charger	●	●	Indicate the charge status (see Chapter D).

● = Standard equipment

○ = Optional Equipment



3 Starting up the truck



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

Checks and operations to be performed before starting daily work

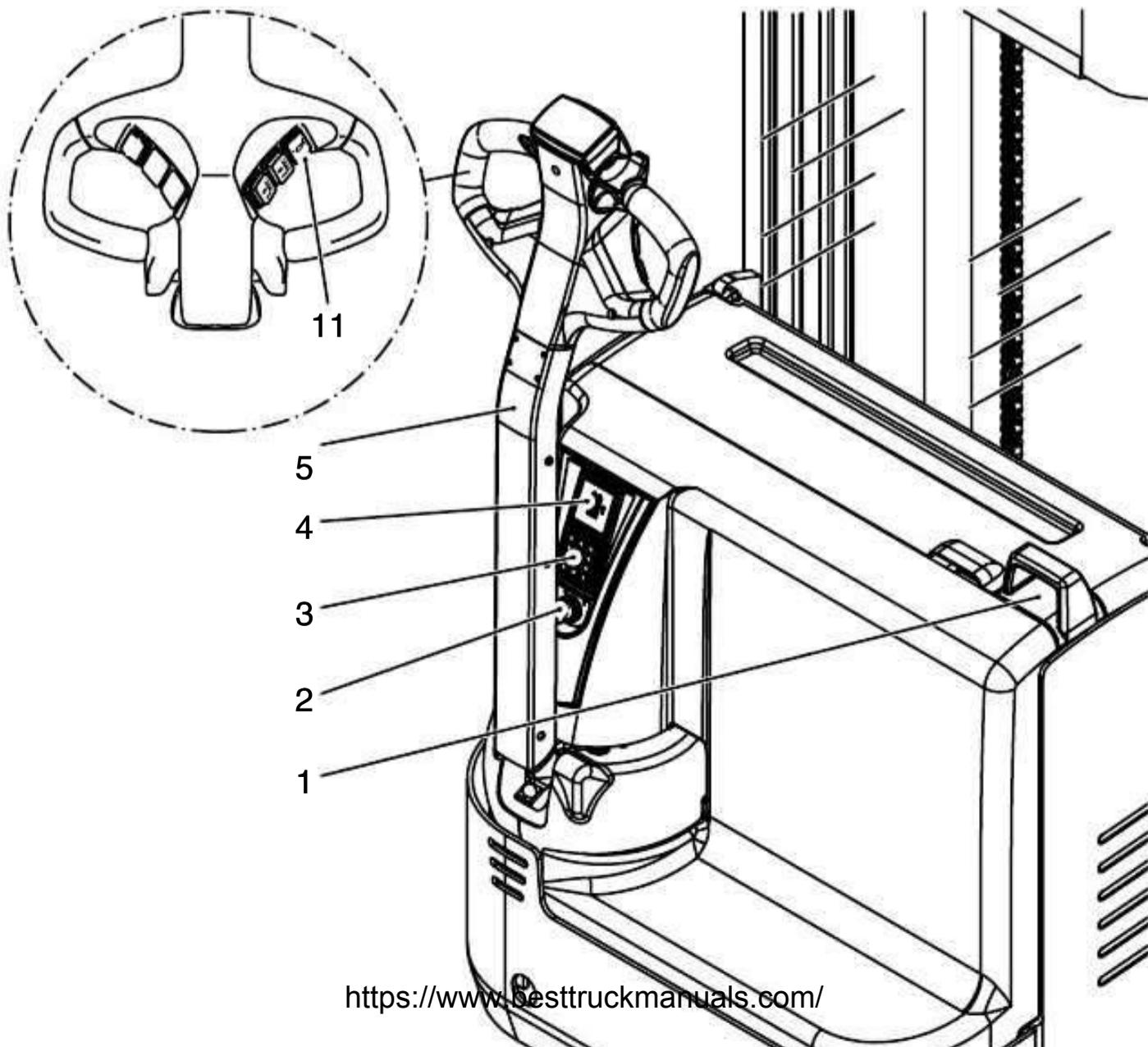
- Visually inspect the entire truck (in particular wheels and load handler) for obvious damage.
- Visually inspect the battery attachment and cable connections.

Switching on the truck

- Make sure the battery is connected (1).
- Insert the key in the key switch (2) and turn it to the right as far as it will go (position "I") or for CANCODE (3, ○) enter the release code. (see section 5).
- Test the warning signal switch (11).

The truck is now operational.

- The battery discharge indicator (4) indicates the current battery charge status.
 - Test the braking operation of the tiller (5) (see section 4.2).



4 Using the industrial truck

4.1 Safety regulations for truck operation

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

Driving 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.

Visibility when travelling: The driver must look in the direction of travel and must always have a clear view of the route ahead. When carrying loads which affect visibility, these must be stored at the rear of the truck. If this is not possible, a second person must walk in front of the truck as a lookout.

Negotiating slopes and inclines: Slopes or inclines may only be negotiated if they are designated traffic routes, are clean and have a non-slip surface and providing they can be safely negotiated in accordance with the technical specifications of the truck. The truck must always be driven with the load unit facing uphill. 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.

Persons riding in the lift with the forklift truck must only enter the lift after the truck has come to a halt and must leave the lift before the truck.

Type of loads to be carried: Only transport properly secured loads. Never transport loads stacked higher than the top of the fork carriage or the load guard.

4.2 Travelling, Steering, Braking



Never carry passengers.

Emergency Stop

– Remove the battery connector (1).

All electrical functions are deactivated.

Automatic braking

Automatic braking occurs when the tiller is released – the tiller automatically sets itself to the upper brake zone (B).



If the tiller moves slowly to the upper brake zone, the cause of this fault must be rectified. If necessary, replace the gas pressure spring.

Travel



Travel with raised forks / raised load beyond 500 mm above the ground is prohibited.

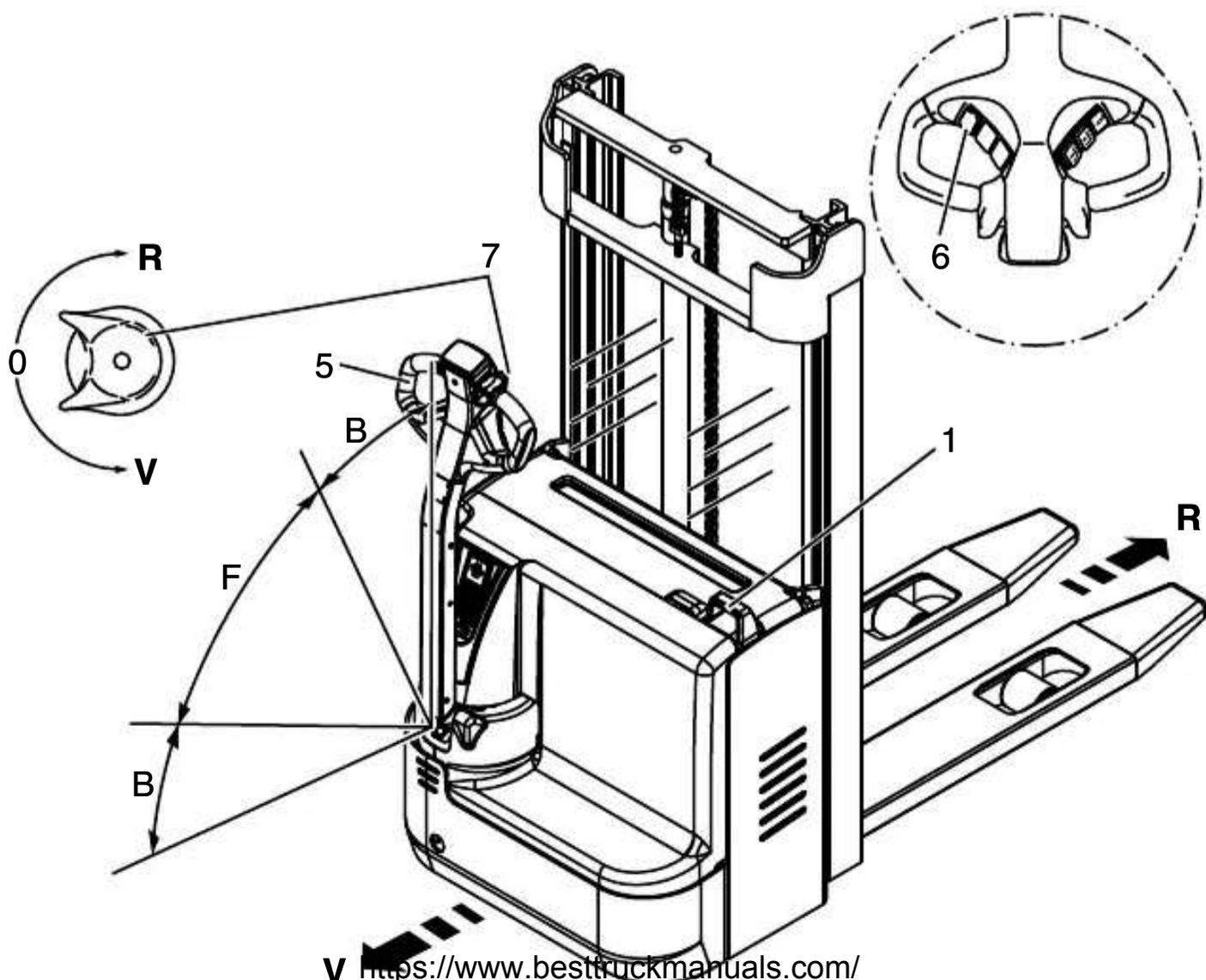


Do not drive the truck unless the panels are closed and properly locked.

– Start up the truck (refer to section 3).

The travel speed is governed by the travel switch (7).

– Set the tiller (5) to the travel range (F) and press the travel switch (7) in the desired direction (fwd. or rev.).



Crawl speed



The driver must be particularly careful when applying the “Crawl speed” switch (6).

The truck can be operated with a vertical tiller (5) (e.g. in congested areas / travel seat).

- Press the crawl speed switch (6).
- Set the travel switch (7) to the required direction (fwd. or rev.).

The brake is released. The truck travels at slow speed.



The brake is only activated with the crawl speed switch is released; with crawl speed you can only brake by plugging (travel switch (7)).

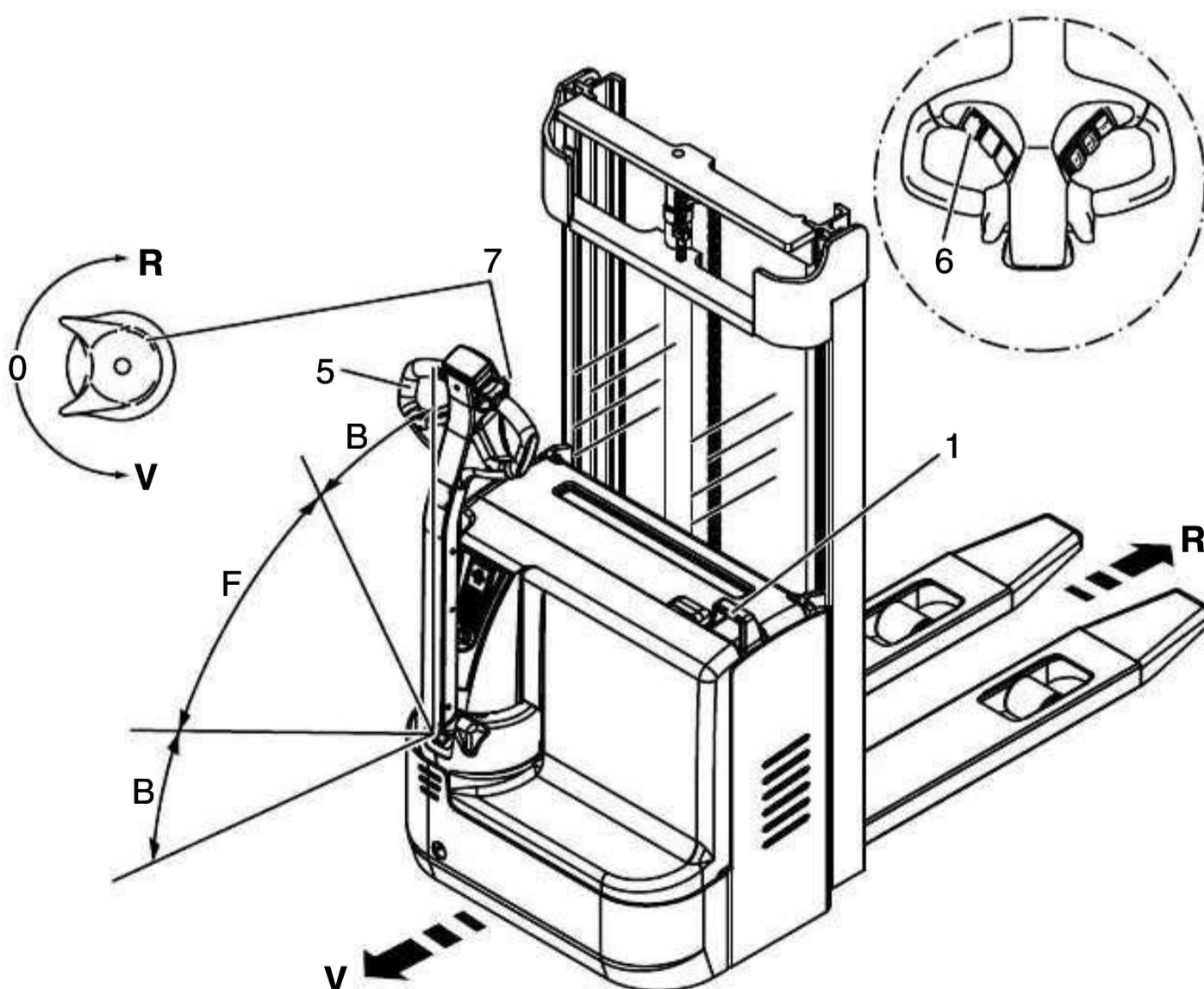


In hazardous situations brake the truck by immediately releasing the crawl speed switch (6).

When you apply the crawl speed switch in the travel range (F) the truck travels at reduced speed and acceleration.

Steering

- Apply the tiller (5) to the left or right.



Braking



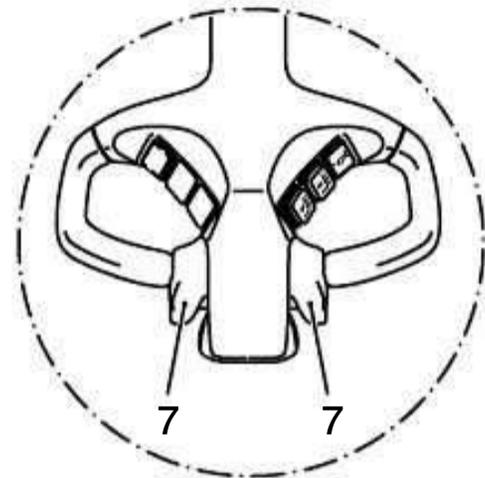
The braking pattern of the truck depends largely on the track conditions. The driver must take this into account when operating the truck.

Braking with the Service Brake:

- Set the tiller (5) up or down to one of the brake zones (B).



The service brake is the generator brake. Only when this brake fails to achieve the necessary brake force is the mechanical brake applied.



Plugging:

- You can set the travel switch (7) to the opposite direction when traveling.
- The truck braked regeneratively until it starts to move in the opposite direction.

Braking with the Coasting Brake:

If the travel switch is set to 0, the truck automatically brakes regeneratively.



In hazardous situations set the tiller to the brake position.

Driving on inclines



Loads must always be carried on the end of the truck facing uphill.

Preventing the truck from “rolling downhill”:

- With the travel switch set to zero, the brake is automatically applied after a short jerk (the controller detects the truck is rolling back on the slope). The service brake is released again via the travel switch, which is also used to select the speed and the travel direction.

4.3 Collecting and depositing loads

→ Before lifting a load, the driver must ensure that it is correctly palletised and that the capacity of the truck is not exceeded.

– Drive the truck with forks as far as possible underneath the load.

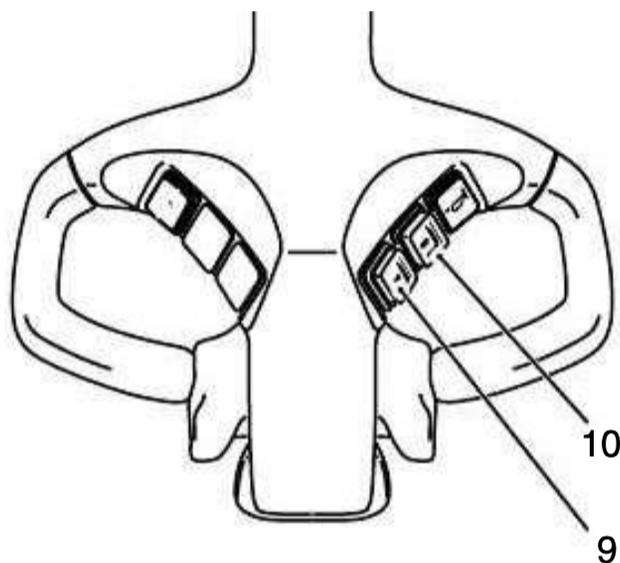
→ With the two-stage Duplex mast (ZZ) a short, centre-mounted free lift cylinder initially lifts the load carriage (free lift) without changing the overall height of the truck.

Lifting

– Press the “Raise Load Forks” switch (9) until the required lifting height has been reached.

→ The lift speed can be infinitely controlled via the switch stroke (8 mm).

Short switch stroke= slow lift
Long switch stroke= fast lift



Lower

– Press the “Lower Load Forks” switch (10) until the required lifting height has been reached.

→ The lowering speed can be infinitely controlled via the switch stroke (8 mm).

Short switch stroke= slow lower
Long switch stroke= fast lower



Avoid fast and sudden depositing of the load.

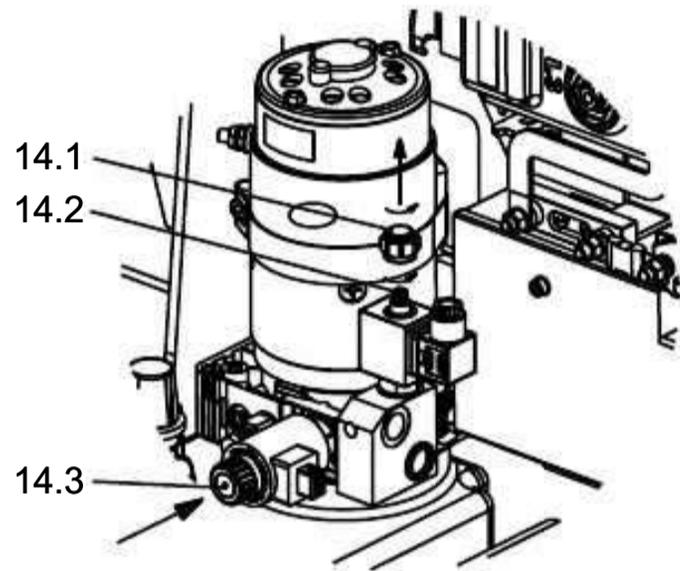
5 Emergency lowering



Keep all personnel out of the hazardous area when applying emergency lowering.

If the mast cannot be lowered any further due to a fault in the combination controller, manually apply the valve (14) on the hydraulic unit.

- Set key switch (2) to “0”.
- Disconnect the battery (see chapter D).
- Open the front panel (see Chapter F, Section 6.3).
- Unscrew the cap (14.1).
- Retract the valve slide (14.2) as far as the stop.
- Push in the valve slide (14.3) and pin (3mm) gradually and keep it pressed down.



The lifting device lowers.

- Insert the valve slide (14.2) as far as the stop.

- Fit the cap (14.1).



Only operate the truck once the fault has been removed.

5.1 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. The load forks must always be lowered to the ground.

- Lower the load forks.
- Set the key switch (2) to “0” and remove the key or press “○” for CANCODE.

6 Keypad (CANCODE) (○)

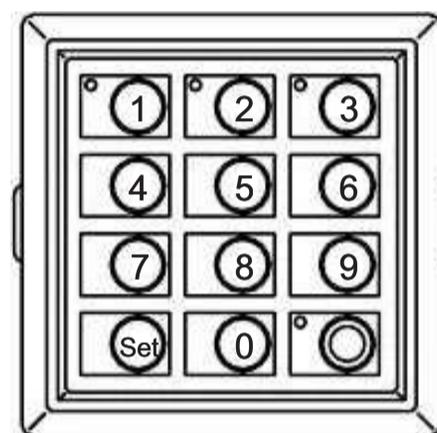
The keypad consists of 10 number keys, a Set key and an extra key ○.

Activation of the travel programs via switches 1,2,3 is indicated by green LEDs.

The ○ key indicates operating statuses via 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 resets the truck from any condition to its default condition 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 delivered 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

The LED (15) goes red when you connect the battery and if necessary switch on the key switch.

When you enter the correct operator code (factory setting 2-5-8-0) the LED (15) turns green.

If the wrong code is entered LED (15) flashes red for two seconds. The correct code can then be entered.



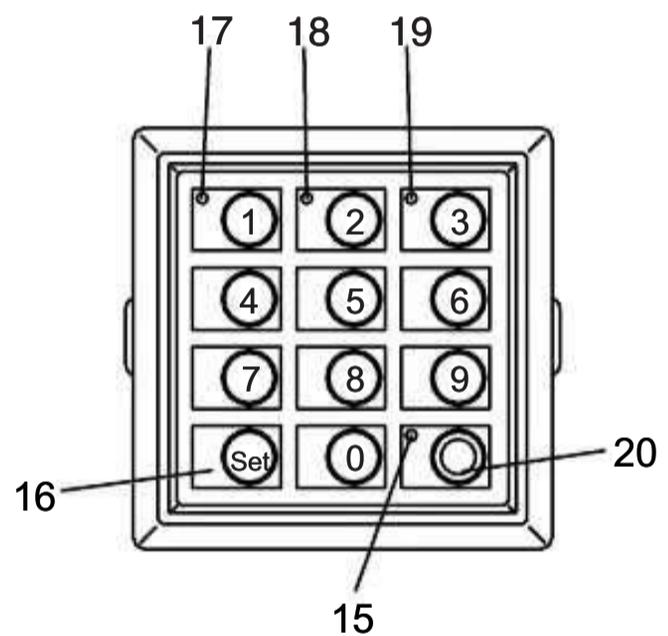
The Set key (16) has no function in operating mode.

Switching off

To switch the truck off, press the  key (20).



The truck can switch off automatically after a pre-determined time. To do this, you need to set the corresponding code lock parameter. (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 program is indicated by the green LEDs (17), (18), (19) in the corresponding key.

→ The travel programs differ with respect to travel speed, acceleration and deceleration force.

Factory settings:

- Program 1: Soft running
- Program 2: Normal mode (pre-selected when using the truck for the first time)
- Program 3: Power mode

→ The travel programs can be individually adapted (see Section 6.5).

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 a 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 release, 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.



Safety instructions for trucks with a display instrument (CANDIS (○))

- Parameter settings must be made carefully and only by special trained personnel. If in doubt, consult the manufacturer's service department.
- Each setting must be monitored on the LC display of the display instrument (CANDIS (○)). If in doubt, cancel the setting by pressing the ○-key (20).
- 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 (15) ○ key	LED (17) Key 1	LED (18) Key 2	LED (19) Key 3
Service hours are indicated	2.8.8.0.	Green flashing	Off	Off	Off

Code Lock Parameters

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

- Enter the three digit parameter number, confirm with set key (16).
- Enter the setting according to the parameter list or change and confirm with the Set key (16).



If the entry is incorrect, the LED (15) of the ○ key (20) turns red. When you enter the parameter number again the setting can be entered or changed.

To enter more parameters, repeat the procedure. To finish entering, press the ○ key (20).

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

- Enter the three digit parameter number, confirm with the Set key (16).
- The display instrument (CANDIS (○)) continues to display the operating hours. If the display changes, cancel the setting with the ○-key (20) and restart from the beginning.
- Enter the setting according to the parameter list or change and confirm with the Set key (16).



If the entry is incorrect, the LED (15) of the ○ key (20) turns red. When you enter the parameter number again the setting can be entered or changed.

To enter more parameters, repeat the procedure. To finish entering, press the ○ key (20).

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 changed, all operator codes must be deleted beforehand.	0000 - 9999 or 00000 - 99999 or 000000 - 999999	7295	(LED 17 flashes) Enter current code Confirm (Set) (LED 18 flashes) Enter new code Confirm (Set) (LED 19 flashes) Repeat new code Confirm (Set)
001	Add operator code (max. 600)	0000 - 9999 or 00000 - 99999 or 000000 - 999999	2580	(LED 18 flashes) Enter code Confirm (Set) (LED 19 flashes) Repeat code entry Confirm (Set)

No.	Function	Setting Range	Standard Setting	Comments Procedure
Code Lock				
002	Change Operator Code	0000 - 9999 or 00000 - 99999 or 000000 - 999999		(LED 17 flashes) Enter current code Confirm (Set) (LED 18 flashes) Enter new code Confirm (Set) (LED 19 flashes) Repeat code entry confirm
003	Delete Operator Code	0000 - 9999 or 00000 - 99999 or 000000 - 999999		(LED 18 flashes) Enter code Confirm (Set) (LED 19 flashes) Repeat code entry Confirm (Set)
004	Delete code memory (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 after 10 seconds
011	https://www.besttruckmanuals.com/			

No.	Function	Setting Range	Standard Setting	Comments Procedure
Code Lock				
020	Start travel program	1 - 3	2	1 = Travel program 1 2 = Travel program 2
021	Travel program 1 Enable	0 or 1	1	3 = Travel program 3 0 = Travel program not enabled 1 = Travel program enabled
022	Travel program 2 Enable	0 or 1	1	0 = Travel program not enabled 1 = Travel program enabled
023	Travel program 3 Enable	0 or 1	1	0 = Travel program not enabled 1 = Travel program enabled
030	Display of the number of used operator codes*)			

*) only in conjunction with display instrument (CANDIS (○))
only block if not start travel program.

Error messages on keypad

LED (15) 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 another user code that already exists.
- Operator code to be deleted does not exist.
- Code memory full.
- Start program blocked.
- Travel program to be blocked is the start travel program.

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

	Display instrument (CANDIS)		LED (20) ○ key	LED (17) Key 1	LED (18) Key 2	LED (19) Key 3
Current setting is displayed	1.0.1 8.		Green flashing	Off	Off	Off
Changed setting is displayed	1.0.1 8.		Green flashing	Off	Off	Off
	Parameter number	Parameter setting				

- Enter the three digit parameter number (101) and confirm with the Set key (16).
- 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 operating hours indication.



If a parameter number other than the one desired is displayed, you must wait until the operating hours are displayed again.

- Enter the parameter according to the parameter list or change and confirm with the Set key (16).
- Check the LC display of the display instrument (CANDIS (○)), confirm with the Set key (16).
- The LED (15) of the ○ key (20) switches briefly to a steady light and starts flashing again after approx. 2 seconds.



If the entry is incorrect, the LED (15) of the ○ key (20) turns red. When you enter the parameter number again the setting can be entered or changed.

Repeat the process to enter more parameters as soon as the LED (15) of the ○ key (20) flashes. To finish entering, press the ○ key (20).



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 entering the parameter, and confirm with the Set key (16).
- The truck is now in travel mode and can be checked.

The following parameters may be entered.

Travel programs

No.	Function	Setting Range	Standard Setting	Comments
Travel program 1				
101	Acceleration	0 - 9 (0.2 - 2.0 m/s ²)	1 0.4 m/s ²)	
102	Coasting brake	0 - 9 (0.2 - 1.1 m/s ²)	3 (0.5 m/s ²)	
104	Maximum speed in drive direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	4 (4.4 km/h)	depending on controller
108	Maximum speed in fork direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	3 (4.0 km/h)	depending on controller

No.	Function	Setting Range	Standard Setting	Comments
Travel program 2				
201	Acceleration	0 - 9 (0.2 - 2.0 m/s)	2 (0.6 m/s)	
202	Coasting brake	0 - 9 (0.2 - 2.0 m/s)	4 (0.6 m/s)	
204	Maximum speed in tiller direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	7 (5.6 km/h)	depending on controller
208	Maximum speed in fork direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	7 (5.6 km/h)	depending on travel switch

No.	Function	Setting Range	Standard Setting	Comments
Travel program 3				
301	Acceleration	0 - 9 (0.2 - 2.0 m/s ²)	4 (1.0 m/s ²)	
302	Coasting brake	0 - 9 (0.2 - 2.0 m/s ²)	6 (0.8 m/s ²)	
304	Maximum speed in tiller direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	8 (6.0 km/h)	depending on controller
308	Maximum speed in fork direction via travel switch	0 - 9 (2.8 - 6.2 km/h)	8 (6.0 km/h)	depending on travel switch

Comments



For trucks without a display instrument (CANDIS (○)) the CODE lock 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	Range of Setting	Standard Setting	Comments
Comments				
411	Battery parameters Battery type (normal/ high-power/dry)	0 - 2	0	0 = Normal (wet) 1 = High-power (wet) 2 = Dry (maintenance-free)
412	Discharge monitor function	0 / 1	1	

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

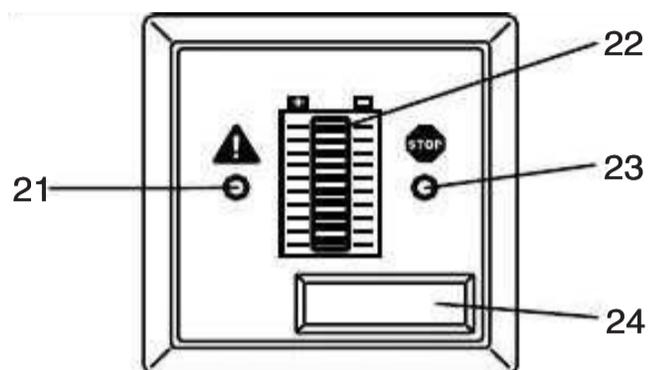
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7 Display instrument (CANDIS) (○)

The instrument indicates:

- Battery residual charge status (LED bars (22)),
- Service hours (LC display (24)).

In addition, service messages for the electronic components and parameter changes are displayed.



Discharge status indication

Setting limits for the additional “Warning” (21) and “Stop” (23) displays will depend on the battery type set.

Number 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 dropping below the 20% limit for wet batteries or the 40% limit for maintenance-free batteries.

7.1 Discharge monitor function

When the discharge monitor function is enabled, lifting is cut out when reaching the discharge limit is reached (the Stop LED goes on). Travel and lowering are still possible. For wet batteries the residual capacity is 20%, for maintenance-free batteries it is 40%. The batteries should be recharged when they reach 30% (for wet batteries) or 50% (for maintenance-free batteries). The yellow LED lights up as warning indicator.

7.2 Operating hours display

Display range between 0.0 and 99,999.0 hours. Travel and lifting operations are logged. This is a backlit display.



For maintenance-free batteries a “T” symbol is shown in the operating hours display (24).

Errormessages

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

If several errors occur simultaneously, they are displayed one after the other. The errors are displayed as long as they are present (always in combination Cxxx / Exxx). Error messages overwrite the service hour display. Most errors cause the emergency stop to be triggered. The error display remains until the control circuit is switched off (Code lock).

If no CANDIS is present, the error code is displayed by the flashing of the discharge monitor LED.



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

Display for parameter changes (travel programs)

The LC display (24) is used in conjunction with the operator keypad (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.

7.3 Power up test

On power up the display shows:

- the software version of the display instrument (briefly),
- the operating hours
- the charge status <https://www.besttruckmanuals.com/>

7.4 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 start.	<ul style="list-style-type: none"> – Battery plug not connected. – Key switch in "0" position – Incorrect CANCODE code – Battery charge too low. – Tiller not set to travel range (F) – Faulty fuse. – On board charger connected 	<ul style="list-style-type: none"> – Check the battery plug and connect if necessary. – Set key switch to "I" – Check code – Check battery charge, charge battery if necessary – Set tiller to travel range (F) – Check fuses F1 and F15 – Disconnect on board charger from mains
Load cannot be lifted	<ul style="list-style-type: none"> – Truck not operational – Hydraulic oil level too low – Faulty fuse. – Load is too heavy – Charge capacity below 20 / 40% 	<ul style="list-style-type: none"> – Carry out all remedial actions listed under "Truck does not start". – Check the hydraulic oil level – Check fuse F15 – Note maximum capacity (see data plate) – Charge the battery



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 Forklift Truck Maintenance

1 Operational safety and environmental protection

The servicing and inspection operations contained in this chapter must be performed in accordance with the intervals indicated in the servicing 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). You may only work underneath a raised load handler if it is supported by a sufficiently strong chain.

Cleaning: Do not use flammable liquids to clean the industrial truck. Prior to cleaning, all safety measures required to prevent sparking (e.g. through short circuits) must be taken. 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 factory fitted tyres only used original manufacturer's spare parts, as otherwise the data plate specifications will not be kept. When changing wheels and tyres, ensure that the truck does not slew (e.g. when replacing wheels always left and right simultaneously).

Lift chains: Lift chains wear rapidly if not lubricated. The intervals stated in the service checklist apply to normal duty use. More demanding conditions (dust, temperature) require more regular lubrication. The prescribed chain spray must be used in accordance with the instructions. Applying grease externally will not provide sufficient lubrication.

Hydraulic hoses: The hoses must be replaced every six years. When replacing hydraulic components, also replace the hoses in the hydraulic system.

F 2

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 operating hours
- B = Every 1000 operating hours, or at least annually
- C = Every 2000 operating hours, or at least annually



W service intervals are to be performed by the customer.

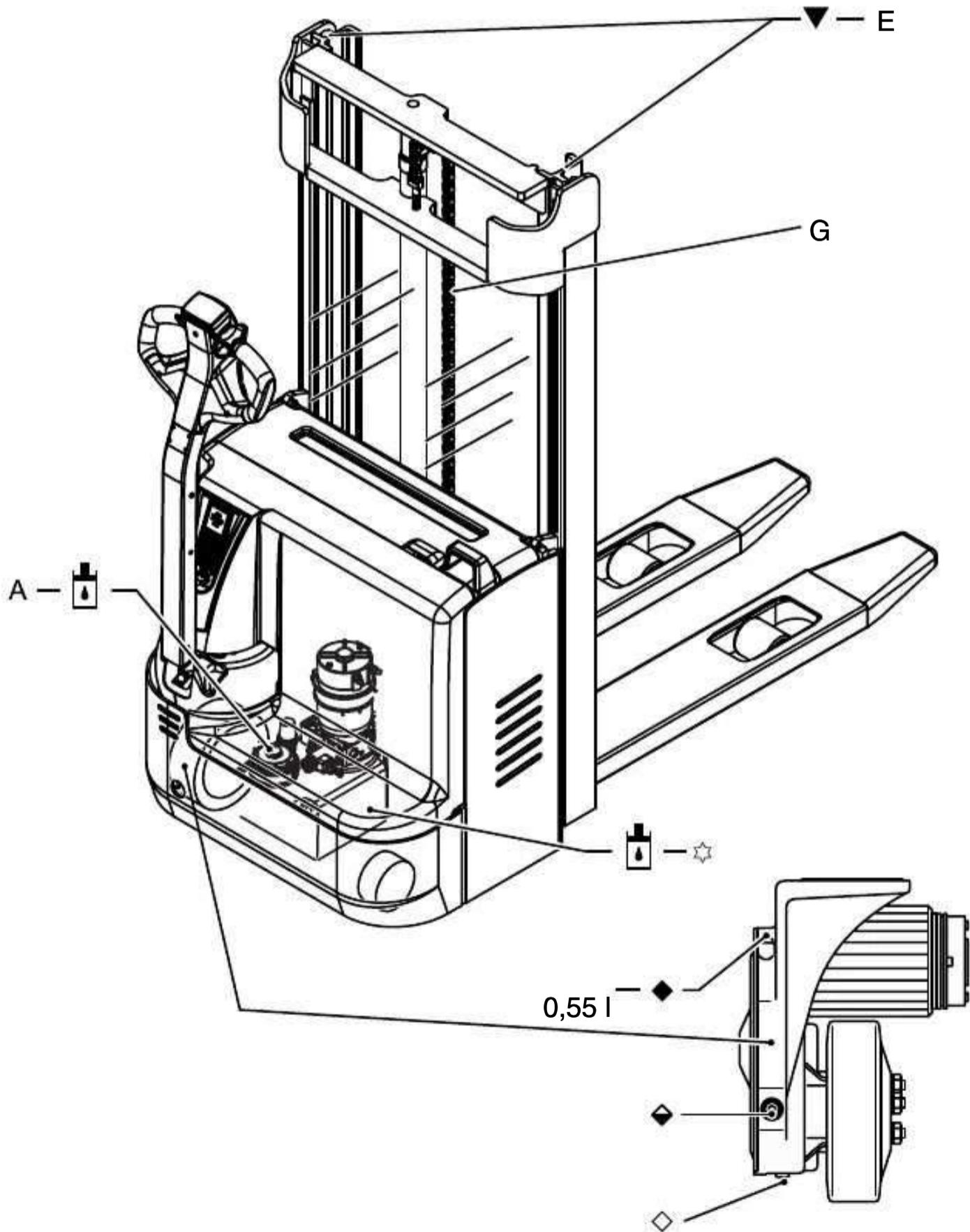
In the run-in period - after approx. 100 service hours - or after repair work, the owner must check the wheel nuts/bolts and re-tighten if necessary.

4 Maintenance Checklist

			Maintenance intervals				
			Standard = ●	W	A	B	C
Chassis/ Structure:	1.1	Check all load bearing components for damage				●	
	1.2	Check screw connections				●	
Drive:	2.1	Check transmission for noise and leakage				●	
	2.2	Check transmission oil level				●	
	2.3	Change transmission oil					
Wheels:	3.1	Check wheels for wear and damage	●				
	3.2	Check the bearings and attachment				●	
Steering:	4.1	Check the steering wheel play				●	
Brake system:	5.1	Test operation and settings				●	
	5.2	Check gas pressure springs recuperate, are sealed and not damaged				●	
	5.3	Check the brake lining wear					●
	5.4	Check brake mechanism, adjust and lubricate if necessary					●
Mast:	6.1	Visually inspect rollers, slide pieces and stops				●	
	6.2	Check forks and fork carriage for wear and damage				●	
	6.3	Check mast attachment				●	
	6.4	Check lift chains and guides for wear, adjust and lubricate.				●	
	6.5	Check lateral slack and ensure mast sections are parallel					●
	6.6	Check protective mechanisms for damage and make sure they are secure				●	
Hydraulic System:	7.1	Test operation				●	
	7.2	Check connections and ports for leaks and damage				●	
	7.3	Check hydraulic cylinder for leaks and damage and				●	
	7.4	make sure it is secure Check oil level				●	
	7.5	Replace hydraulic oil					●
	7.6	Replace filter					●
	7.7	Test pressure relief valves					●

		Maintenance intervals				
		Standard = ●	W	A	B	C
Electrical System:	8.1	Test operation			●	
	8.2	Make sure wire connections are secure and check for			●	
	8.3	damage Check fuse ratings				●
	8.4	Test operation of switches and trip cams and make sure they are secure			●	
	8.5	Check contactors and relays; if necessary replace any worn parts			●	
	8.6	Test operation of warning devices and safety switches.			●	
Electric Motors:	9.1	Check carbon brush wear (lift motor only)			●	
	9.2	Check motor attachment			●	
	9.3	Vacuum-clean motor housing and check the commutator for wear (lift motor only)			●	
Battery:	10.1	Check acid density, acid level and cell voltage			●	
	10.2	Check terminals are securely attached, and apply grease			●	
	10.3	Clean battery connections, make sure they are secure			●	
	10.4	Check battery cables for damage, replace if necessary.			●	
Lubrication:	11.1	Lubricate truck in accordance with Maintenance Schedule			●	
General Measurements:	12.1	Check electrical system for frame leakage				●
	12.2	Test travel speed and braking distance				●
	12.3	Test lift and lowering speeds				●
	12.4	Test safety devices and cutouts			●	
Demonstration:	13.1	Test run with rated load			●	
	13.2	When maintenance is completed, present the truck to the supervisor			●	

5 EJC 110/112 Maintenance Schedule



▼ Contact surfaces <https://www.besttruckmanuals.com/>

⊞ Hydraulic oil filler neck

- Hydraulic oil filler neck
- ☆ Hydraulic oil drain plug
- ◆ Transmission oil filler neck
- ◊ Transmission oil overflow and control screw
- ◇ Transmission oil drain plug

F 6

5.1 Fuels, coolants and lubricants

Handling consumables: 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 when mixing is expressly stipulated in the Operating Manual.

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
A	29 200 670	5.0 l	H-LP 46, DIN 51524	Hydraulic system
B	50380904	5.0 l	Fuchs Titan Gear HSY 75W-90	Transmission
E	29 201 430	1.0 kg	Grease, DIN 51825	Lubrication
G	29 201 280	0.4 l	Chain spray	Chains

Code	Saponification	Dew point °C	Worked penetr. at 25°C	NLG1 class Service temperat.	Application Temperature °C
E	Lithium	185	265 - 295	2	-35 / +120

6 Maintenance Instructions

6.1 Prepare 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 (1) to prevent the truck from accidentally starting.



When working under a raised lift truck, secure it to prevent it from tipping or sliding away. When raising the truck also refer to the instructions in the “Transport and Commissioning” section.

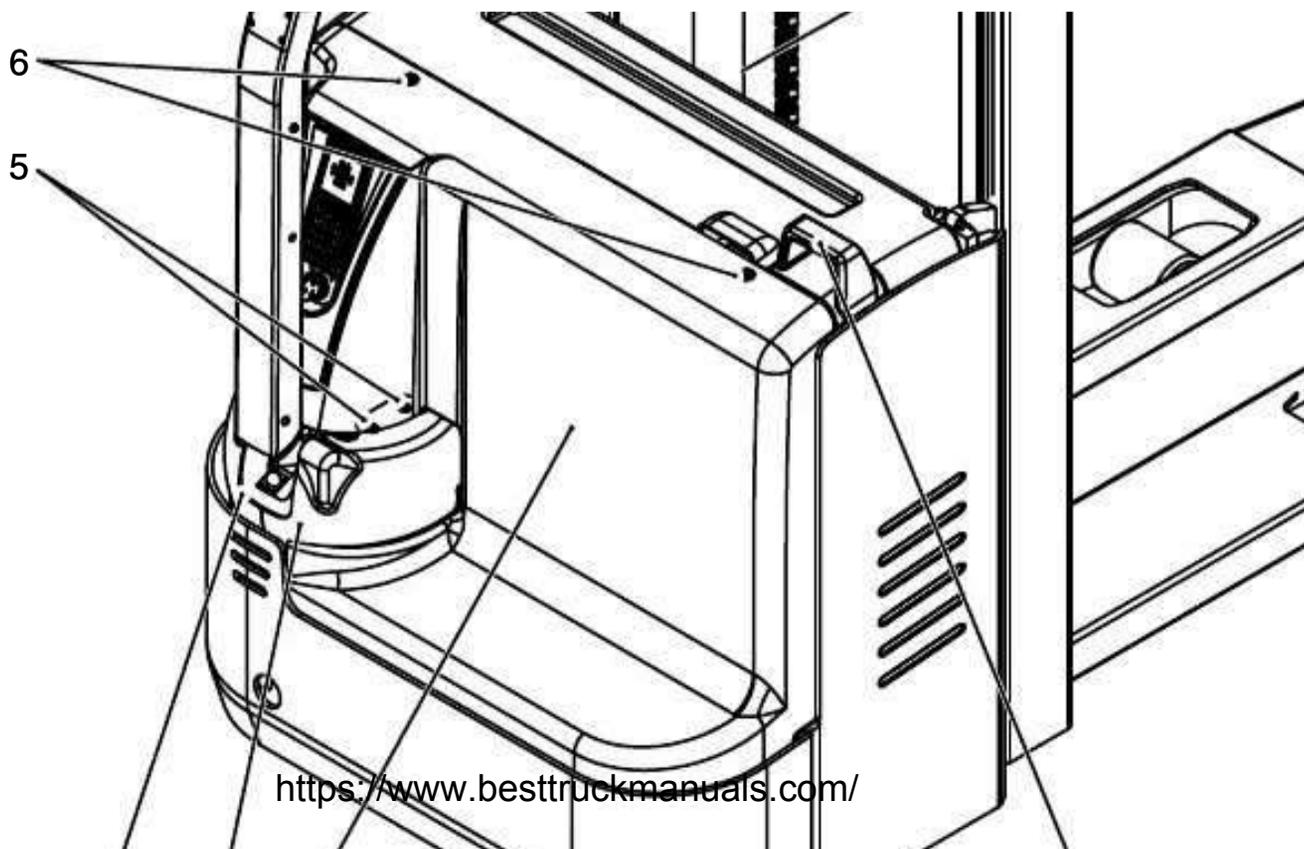
6.2 Removing the front panel

- Open the battery panel.
- Remove the two screws (6).
- Carefully lift off the front panel (2).

6.3 Remove the drive panel

The drive panel consists of two halves (3 and 4).

- Turn the tiller to the left stop.
- Unscrew the two screws (5) with the Allen key size 6 (in accordance with DIN 911).
- Carefully remove the first panel half (3).
- Turn the tiller to the right stop.
- Unscrew the second panel half (4) and carefully remove it.



F 8

6.4 Checking the hydraulic oil level

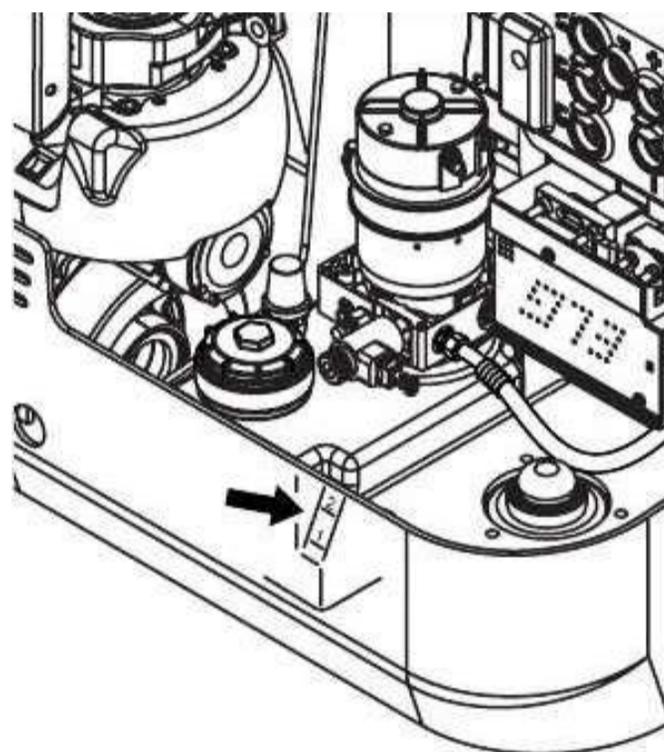
- Prepare the truck for maintenance and repairs (see Chapter 6.1).
- Remove the front panel (see section 6.2).
- Check hydraulic oil level in hydraulic reservoir.



There are markings on the hydraulic reservoir. The oil level must be checked when the load forks are lowered.

- If necessary add hydraulic oil of the correct grade (see Section 5) – see table.

Marking	Tank Marking	
	1	2
110 ZT	up to 320	
112 ZT		up to 360
112 ZZ		up to 360



Installation is the reverse order.

6.5 Check transmission oil level

- Prepare the truck for maintenance and repairs (see Chapter 6.1).
- Remove the front panel (see section 6.2).
- Turn the tiller to the right stop.
- Check the transmission oil level – it should be at the control plug level (see Section 5).
- If necessary add transmission oil of the correct grade (see Section 5).



Installation is the reverse order.

6.6 Flushing the gauze filter, Replacing the gauze filter

- Prepare the truck for maintenance and repairs (see Section 6.1).
- Remove the front panel (see Section 6.2).
- Undo the union (8).
- Remove connection and take out the gauze filter
- Insert a clean / new filter



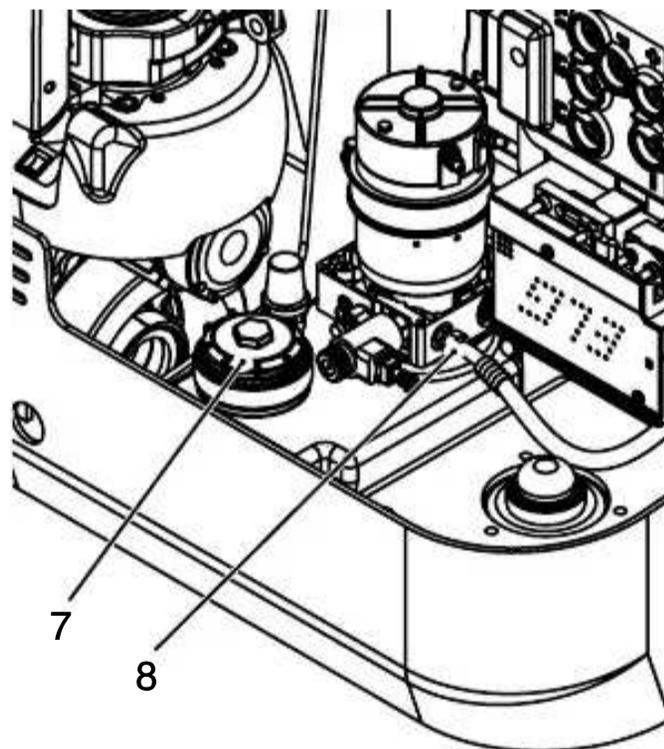
Assembly is the reverse order.

6.7 Replacing the filter cartridge

- Prepare the truck for maintenance and repairs (see section 6.1).
- Remove the front panel (see Section 6.2).
- Unscrew the reservoir lid (7) and remove filter cartridge from the filter cone.



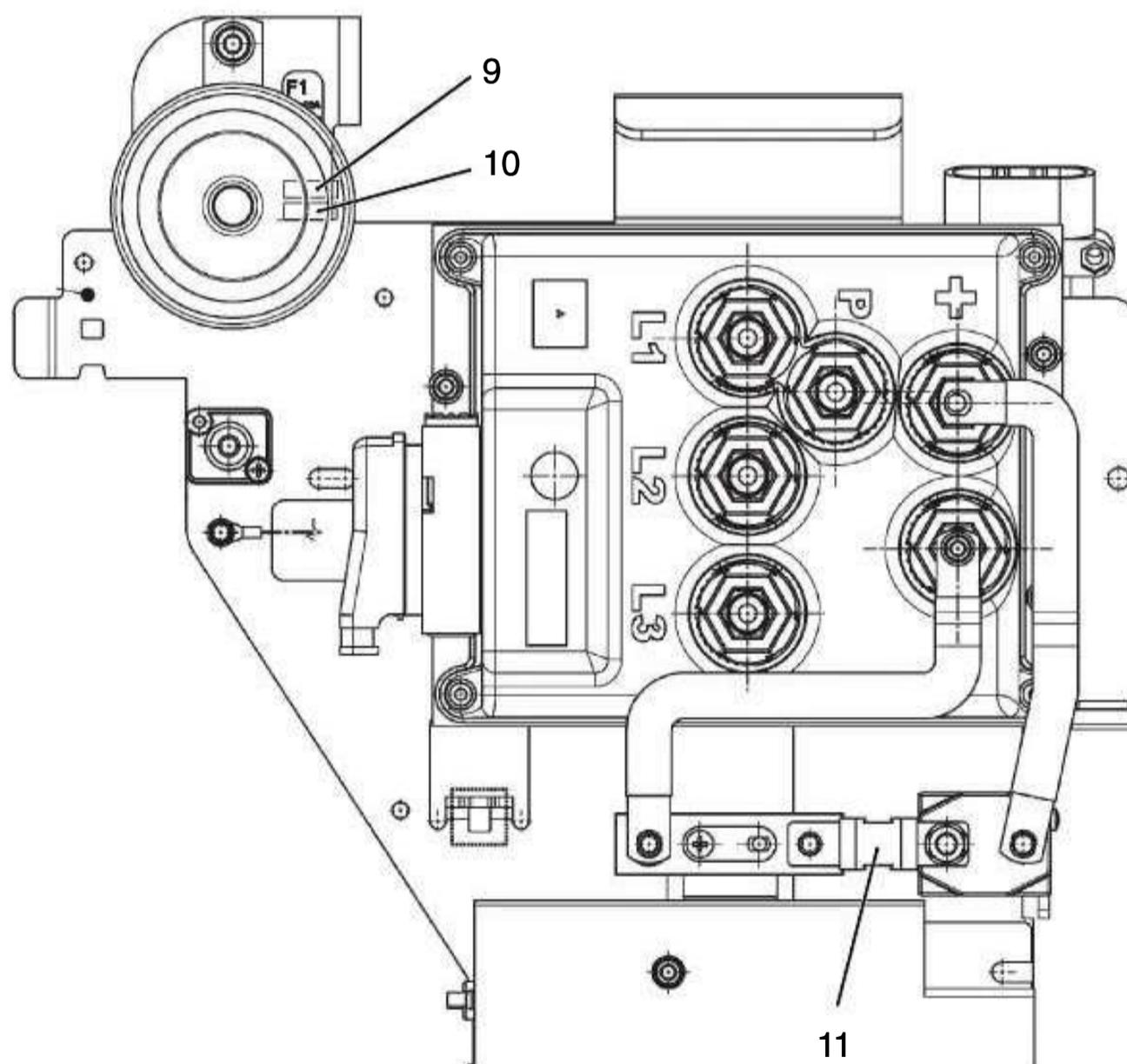
Assembly is the reverse order.



F 10

6.8 Checking electrical fuses

- Prepare the truck for maintenance and repairs (see Section 6.1).
- Remove the front panel (see Section 6.2).
- Check the fuse rating and condition in accordance with the table; replace if necessary.



Item	To protect:	EJC 110/112
9	Overall control fuse F1	10 A
10	Hourmeter control fuse 6F2	2 A
11	Travel/Lift fuse F15	200 A

6.9 Recommissioning

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

- Test horn.
- Test EMERGENCY DISCONNECT switch.
- Test brake.
- Lubricate the truck in accordance with the maintenance 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.
- Check the hydraulic oil level and replenish as necessary (see Chapter F).
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck in accordance with the maintenance schedule (see Chapter F).
- Charge the battery (see Chapter D).
- Disconnect the battery, clean it and apply grease to the terminals.



In addition, follow the battery manufacturer's instructions.

- Spray 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 Restoring the truck to operation after decommissioning

- Thoroughly clean the truck.
- Lubricate the truck in accordance with the maintenance 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.
- Check hydraulic 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 tests to be performed at intervals and after unusual events (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.

The technical condition of the truck must be thoroughly examined from an accident safety perspective. 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.

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  I and  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 ± 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:

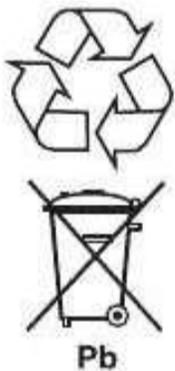
1. a monthly equalising charge as in point 2.3

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!

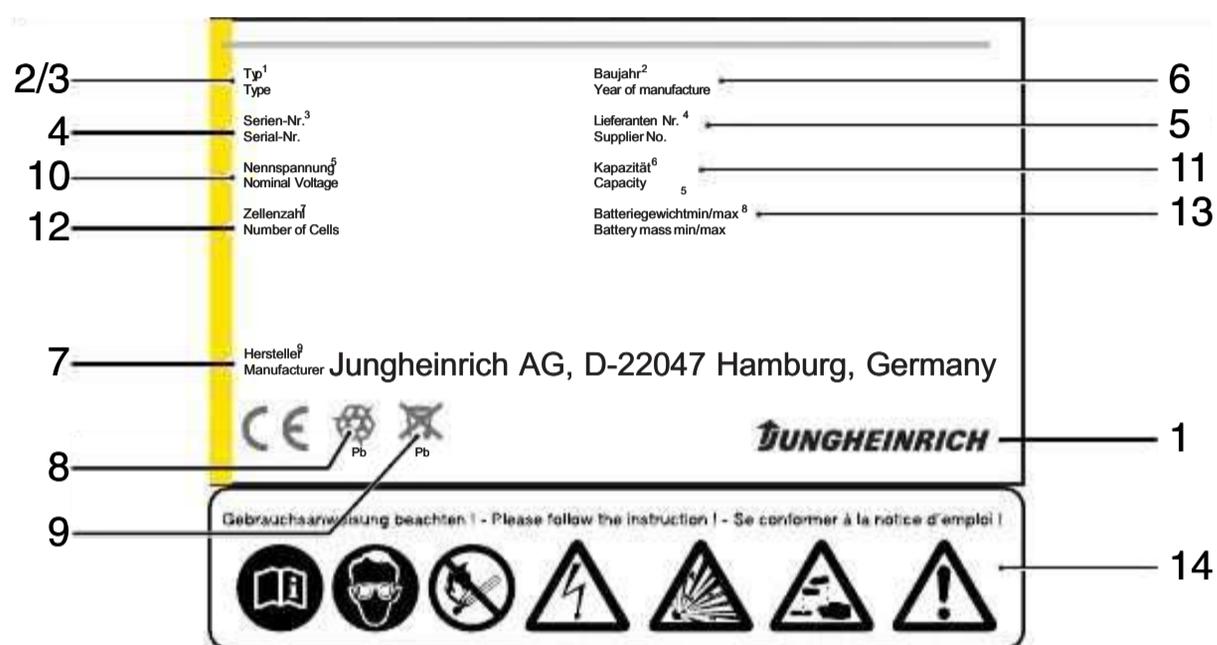
Batteries with this sign must be recycled.

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

We reserve the right make technical modification.

6

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.

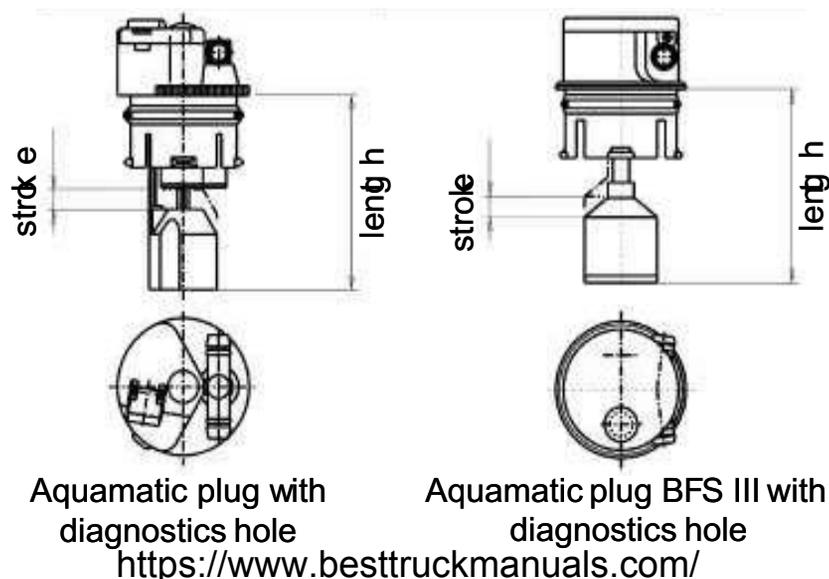
Aquamatic/BFS III water refilling system for Jungheinrich traction battery with EPzS and EPzB cells with tubular positive plates

Aquamatic plug arrangement for the Operating Instructions

Cell series*		Aquamatic plug type (length)	
EPzS	EPzB	Frötek (yellow)	BFS (black)
2/120 = 10/600	2/64 = 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.



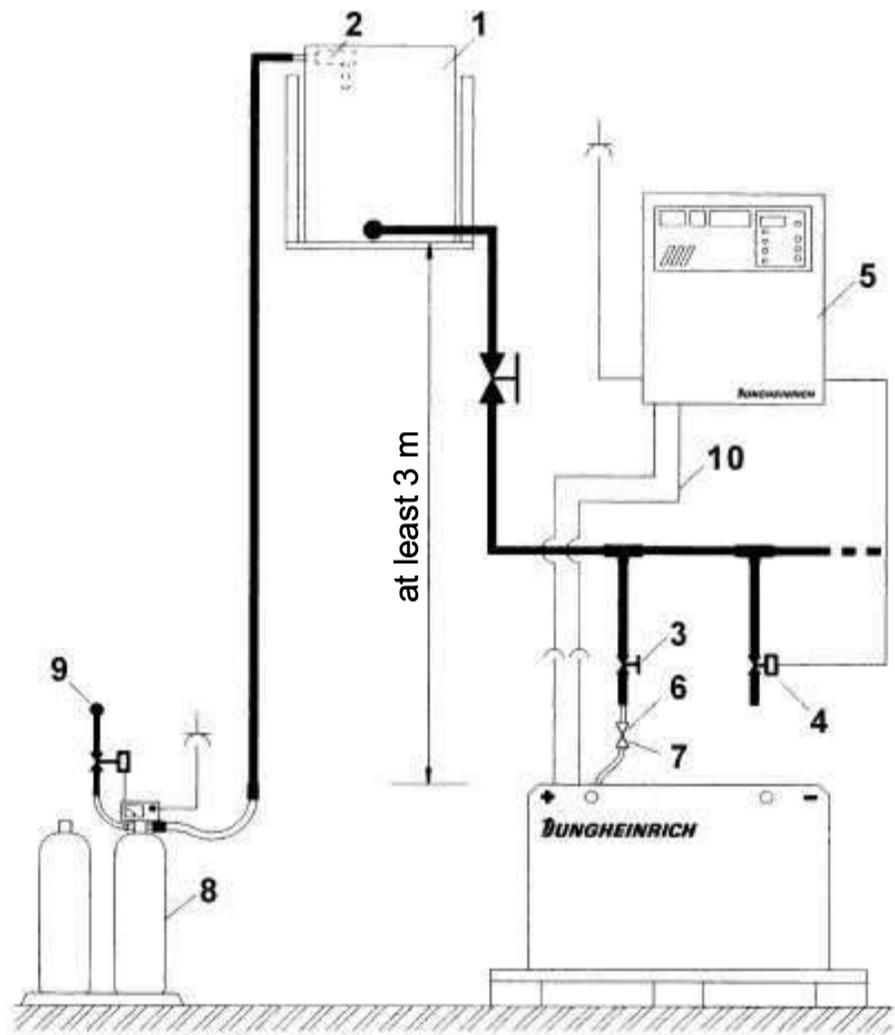
Non-adherence to the operating instructions, repairs carried out with non-original spare parts, unauthorised interference, and the use of additives for the electrolytes (alleged improvement agents) will invalidate any claim for warranty.

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.

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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 submersible 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

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Only direct current must be used for charging. Charging procedures according to DIN

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.
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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.

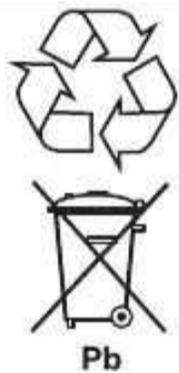
The storage time should be taken into account when considering the life of the battery.

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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.



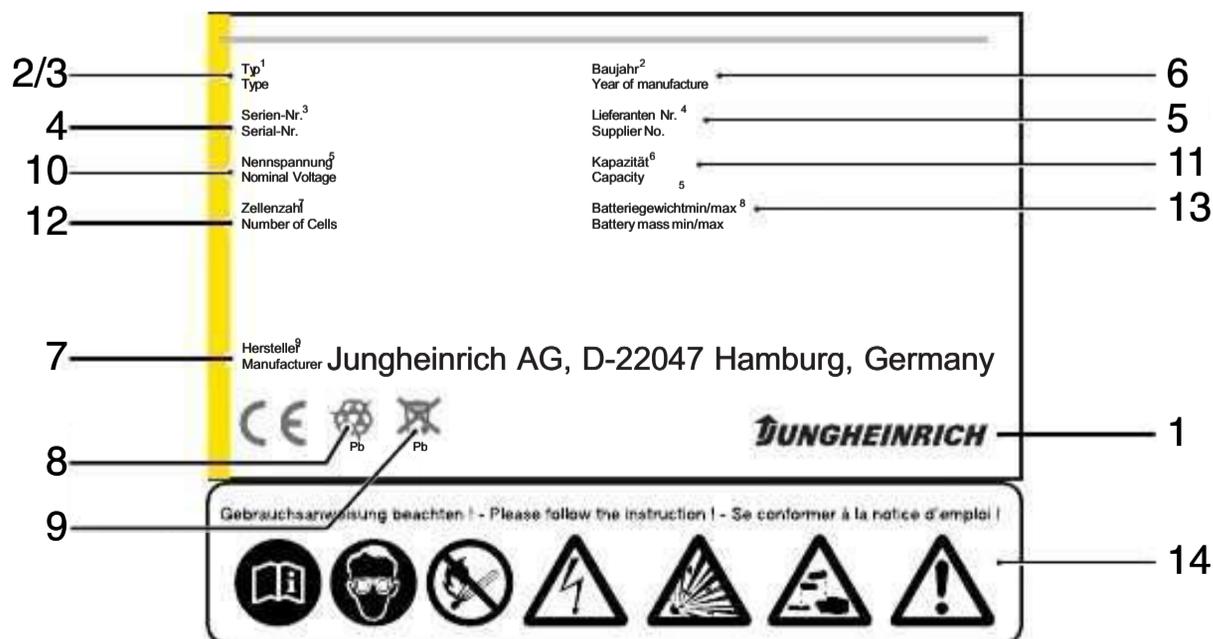
Back to the manufacturer!

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.

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