Original instructions

Lithium battery
KG1–8 / KG2–9 / KG4–9



first in intralogistics

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1

Foreword

Before using the battery



⚠ DANGER

Failure to observe the safety information poses a risk of fatal injury!

Failure to observe the safety information can result in electric shock, burns, serious injury or death.

– Carefully read the operating instructions before using the battery.

The manufacturer accepts no liability for damage caused by not observing these instructions or by improperly or incorrectly using the lithium-ion battery. The battery complies with the essential health and safety requirements of the relevant European directives and the directives applicable in the United Kingdom. The country-specific guidelines and laws must be observed.

Important information about these instructions

Objective of these instructions

These instructions include information necessary for the safe and error-free use of the lithium-ion battery in an industrial truck.

Further information

For further information about using, handling and replacing the battery, refer to the operating instructions of the industrial truck.

Target group for these instructions

These instructions are aimed at all users of the battery.

Structure of these instructions

These instructions do not contain any information regarding service and repair work. Service and repair work must be carried out only by competent persons and in accordance with the service documents.

– Only carry out work on the battery that is described in these instructions.

Storing these instructions

To ensure safe use, these instructions must be accessible to all users.

– Always store these instructions in the vicinity of the battery.

– Notify all battery users of the storage location for these instructions.

– Pass these instructions on to the next owner of the battery.

Intended use

The lithium-ion battery is intended solely for replacing the types of lead battery specified in the manual for the relevant models of industrial truck. Any other use is improper use.

The battery corresponds to the latest technological standards and recognised safety regulations. However, if the battery is used in a way other than the intended use, dangerous situations may arise.

The battery must be used only in accordance with the following documents:

- These operating instructions for the battery
- Operating instructions for the industrial truck
- Operating instructions for the battery charger

Use and charge the battery only when it is in good working order:

- The battery must be undamaged and functional
- The cables to the battery charger must not be damaged
- The cables to the industrial truck must not be damaged

Use the battery only in industrial trucks designed for this purpose with the operating voltage indicated on the identification plate.

Charge the battery only with battery chargers approved by the manufacturer.

Use the battery only in accordance with the approved ambient conditions, see the chapter entitled "Ambient conditions".

⚠ CAUTION

Reduced service life due to discharged cells.

The service life of the battery will be reduced if the charge state of the battery falls below 10% for an extended period of time.

– If the current charge state is less than 10%, charge the battery as soon as possible.

– Only take the battery out of operation for a prolonged period if it is fully charged. Recharge the battery after three months.

Dangerous incorrect use

Improper handling can cause an explosion or start a fire!

- Never use the battery in areas where there is a risk of fire or a **risk of explosion**.
- Do not climb on the battery.
- Use the battery only in accordance with the approved ambient conditions, see the chapter entitled "Ambient conditions".

Opened, destroyed or damaged batteries

Opening or intentionally damaging the battery can cause serious injuries.

- Do not dismantle, open or break up the battery.
- Do not disassemble, bridge or bypass the safety systems.
- Do not screw or solder anything to the battery or otherwise change the battery in any way.
- Do not pierce, drop or crush the battery.
- Never touch damaged batteries with your bare hands. Lithium can cause serious burns to the skin.
- Do not continue using a battery if it is unusually warm, is producing an odour, is discoloured or is deformed.

The battery contains electrical and mechanical components that are essential for preventing hazards. Opening the battery invalidates the warranty.

Heat

- Never expose the battery to temperatures of over 60 °C or an open flame.

External heat can cause the battery to explode.

Fluid

The ingress of liquids can cause short circuits and fire.

- Protect the battery from fluids and humidity.

Short circuit

A short circuit can destroy the battery and start a fire.

- Do not short circuit the battery.
- Keep the contacts away from metallic objects.

Misuse

Misuse can destroy the battery and result in personal injury or property damage. Improper use includes using the battery in an industrial truck that has not been approved for this purpose. In this scenario, the safety systems present in the battery cannot function as intended and perform actions such as shutting off the battery in a dangerous situation. Other examples of improper or incorrect use include:

- Failure to observe the temperature limits
- Charging the battery using a different battery charger to the one approved by the manufacturer
- Making changes to the battery
- Allowing an unqualified person to repair the battery
- Repairing the battery with components not approved by the manufacturer
- Allowing people who are not familiar with how to handle the battery and/or who do not understand the hazards involved to operate or maintain the battery

Product-specific dangers

All lithium-ion batteries are safe when used for their intended purpose.

If the batteries are used properly, no hazardous substances escape from the closed tray. No contact with toxic substances is possible. There is a risk of contact only in the event of incorrect use (mechanical, thermal, electrical) that leads to activation of the safety valves or to the housing cracking.

If not handled properly, liquid electrolyte may escape or electrode materials may react with humidity/water. The battery may vent and cause a fire or explosion.

Touching live components can cause an electric shock, which can cause burns or paralysis. The latter can cause ventricular fibrillation, cardiac arrest or respiratory paralysis, leading to death.

Improper handling can arc faults and subsequently lead to burns.

If a battery combusts, the resulting smoke or vapours can cause irritation of the eyes, skin and respiratory system.

Compliance Information for lithium-ion batteries

CE conformity

Compliance information for lithium-ion batteries. The manufacturer of the lithium-ion battery and supplier of the KION Group declares that: The lithium-ion battery complies with the latest versions of the 2006/66/EC Battery Directive, the 2014/30/EU EMC Directive and, if applicable, the Low Voltage Directive 2014/35/EU. This declaration of conformity with the EU directives applies only to use of the battery as recommended in these operating instructions.

UKCA compliance

Compliance information for lithium-ion batteries. The manufacturer of the lithium-ion battery and supplier of the KION Group declares that: The lithium-ion battery complies with the latest versions of the "Regulations for Batteries and Accumulators (Placing on the Market) Regulations 2009", "Electromagnetic

Compatibility Regulations 2016", and, if applicable, the "Regulations for Electrical Equipment (Safety) Regulations 2016". This declaration of conformity with the UKCA directives applies only to use of the battery as recommended in these operating instructions.

Explanation of signal terms used

⚠ DANGER

Indicates procedures that must be strictly adhered to in order to prevent the risk of fatalities.

⚠ WARNING

Indicates procedures that must be strictly adhered to in order to prevent the risk of injuries.

⚠ CAUTION

Indicates procedures that must be strictly adhered to in order to prevent material damage and/or destruction.

NOTE

For technical requirements that require special attention.

ENVIRONMENT NOTE

To prevent environmental damage.

Explanation of signs and symbols

Keep away from the fire. ▷



Don’t stand on the surface. ▷



Explanation of signs and symbols

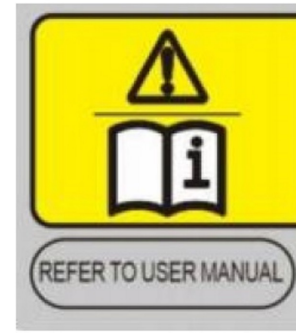
Disassembly without training or authorization is strictly prohibited. ▷



It is forbidden to short-circuit the positive and negative poles. ▷



Read the manual before operation. ▷



Handle with care. Do not touch conductive parts. ▷



Explanation of signs and symbols

General danger sign. ▷



Danger of electric shock. ▷



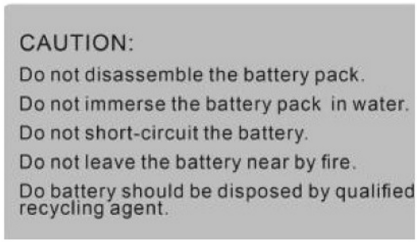
The battery contains harmful substances. Do not dispose of the battery in household waste. ▷



The product contains recyclable materials. ▷



Do not disassemble the battery pack. Do not immerse the battery pack in water. Do not short-circuit the battery. Do not leave the battery near by fire. Do battery should be disposed by qualified recycling agent. ▷



Explanation of technical terms

Vehicle under normal operation: Refers to a vehicle that is used every day and that is both charged and discharged.

Vehicle in long-term storage: Refers to a vehicle that has been continuously stored for more than a week.

Fully charge: Refers to the battery is charged to the charge state of 100%.

User qualifications

The battery must only be used by adults. Users must not have any physical or mental disabilities that reduce their capacity to recognise hazards and to intervene in dangerous situations.

To use the battery in the industrial truck, the user must have the following qualifications: user training from the operating company based on these operating instructions.

Persons with medical implants

For technical reasons, the electric cables emit electromagnetic (non-ionising) radiation. This radiation could affect users who have medical implants, such as pacemakers or defibrillators.

⚠ CAUTION

Electromagnetic interference may occur on medical devices!

- Only use devices that are sufficiently protected against electromagnetic interference.
- The functionality of some medical equipment, for example pacemakers or hearing aids, may be impaired when the battery is in operation.
- Ask your doctor or the manufacturer of the medical device to confirm that the medical device is sufficiently protected against electromagnetic interference.

Danger area

⚠ WARNING

Risk of burns due to hot surfaces!

- Do not touch the hot area on the surface of the battery. The position of the hot area depends on the battery model.

The temperature of the electronic control components in the battery can rise to over 60°C during operation. The surface of the battery in this area can also become very hot.

Ambient conditions

The ambient conditions in which the battery groups may be operated are different.

- If you have any questions regarding the permitted ambient conditions for using the battery, contact the authorised service centre.
- Observe the instructions for using the battery in the operating instructions of the industrial truck.

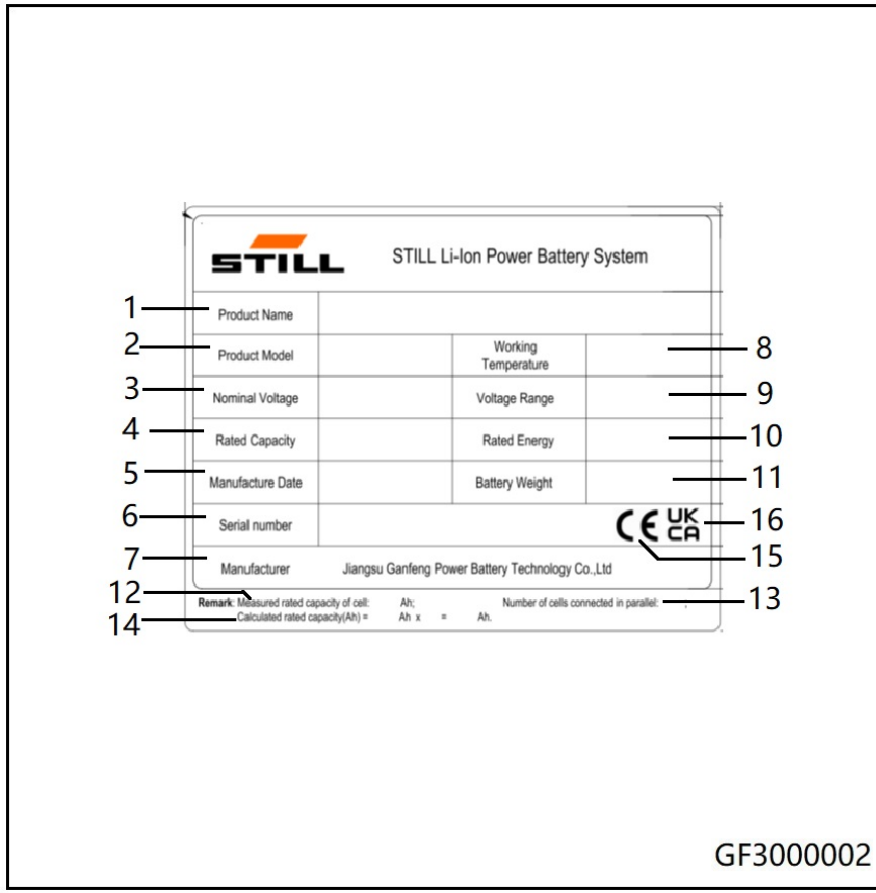
KG1-8/KG2-9/KG4-9	
Permissible temperature ranges (operation, charging, storage)	See the chapter entitled "Technical data" for the relevant battery group.
Moisture/humidity	Protection class rating IP54 The battery can be used both outside and in buildings.
Air humidity	0% - 100%
Storage conditions	See the chapter entitled "Storage conditions".
Cold store suitability	See temperature ranges in the chapter entitled "Technical data" for the respective battery group.
Areas where there is a risk of fire or explosion	No
Altitude	Use is possible up to a height of 2000 m.

Identifying the battery

Nameplate

The individual battery is identified by the Serial number(6).

Overview



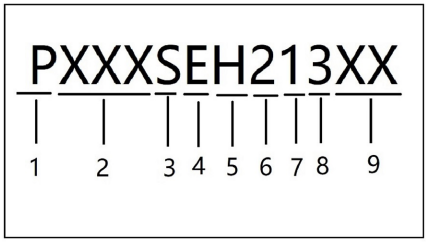
1	Product name	9	Voltage range
2	Product model	10	Rated energy
3	Nominal voltage	11	Battery weight
4	Rated capacity	12	Measured rated capacity of cell
5	Manufacture date	13	Number of cells connected in parallel
6	Serial number	14	Calculated rated capacity
7	Manufacturer	15	CE symbol
8	Working temperature	16	UKCA symbol

Serial number

The Serial number shows the battery information.

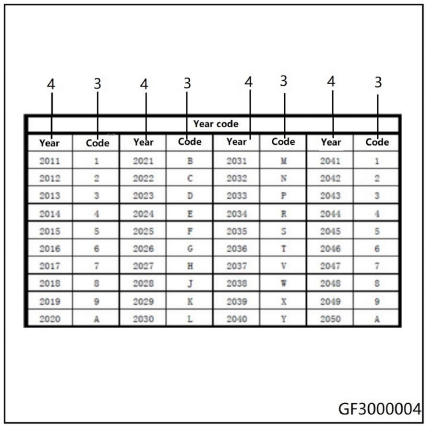
Date code

The data code (2)is shown in the Serial number from the second digit to the fourth digit.

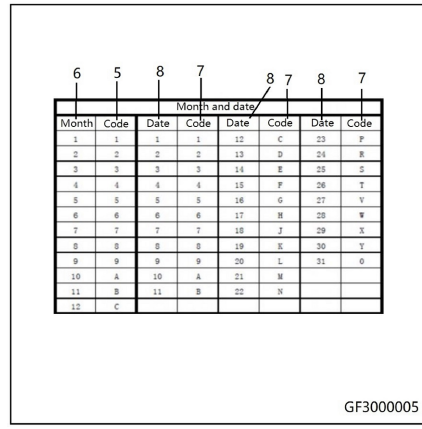


1 P:Ganfeng power lithium battery
2 Date code
3 S : Serialization / C:CO project
4 E: CEexport demand/D: Domestic demand
5 H: with heating / N:without heating/ L:with liquid cooling/ B:with heating and liquid cooing
6 2: different ports / 1: same port
7 1: with remote monitoring / 2: without remote monitoring
8 Battery management system manufacturer (1: Youdan / 2:Ganfeng / 3:KION)
9 Serial number

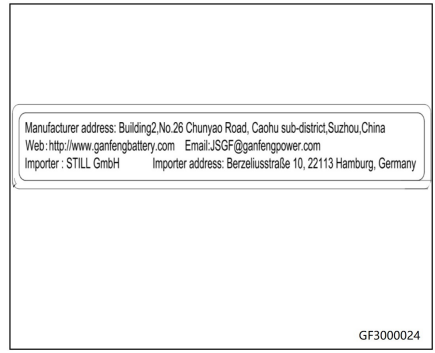
– The second digit in the Serial number is the code(3) for the Year(4).



– The third digit in the Serial number is the code(5) for the month(6). The fourth digit in the Serial number is the code(7) for the date(8). ▷



Manufacturer and importer label ▷



2

Safety

Battery management system and safety

The battery has the following protective devices:

Automatic on/off

Cell balancing

High current protection and short circuit protection

Deep discharge protection

Protection against incorrect charging

Protection against polarity reversal

Voltage monitoring for each cell

Circuit break devices in each module

Safety valve on each cell

Cell temperature monitoring

Temperature monitoring for the battery electronics

Information in the event of emergency

Firefighting instructions



⚠ DANGER

Risk of poisoning due to vapours

Inhaling vapours may cause poisoning.

– Call the fire brigade.
– Position yourself on the side of the fire from which the wind is blowing.
– Use air-supplied respiratory protection.

– Use a fire extinguisher of fire class A/B/C plus water or sand to fight a fire.
– Do not inhale toxic fumes.

Battery is becoming disproportionately hot and reporting an error

If the battery displays an error and becomes disproportionately hot (over 80°C):

- Contact the authorised service centre immediately.
- Stop operating the industrial truck.
- If smoke or open flames occurs, use a water gun to cool the exterior of the battery container immediately. Refer to the firefighting information.

Gas escaping from the battery



⚠ DANGER

Risk of poisoning due to vapours

Inhaling vapours may cause poisoning.

– Call the fire brigade.
– Position yourself on the side of the fire from which the wind is blowing.
– Use air-supplied respiratory protection.

– Contact the authorised service centre immediately.

First-aid measures

Course of action required if gases or liquids escape

Inhalation

Escaping gases can lead to breathing difficulties.

– Ventilate the area immediately or seek fresh air.

– Always contact a doctor.

Skin contact

Skin irritation can occur in the event of contact with the skin.

– Thoroughly wash the skin with soap and water.

– Always contact a doctor.

Eye contact

Eye irritation can occur in the event of contact with the eyes.

– Immediately wash the eyes thoroughly with water for 15 minutes.

– Always contact a doctor.

Measures required in the event of electric shock

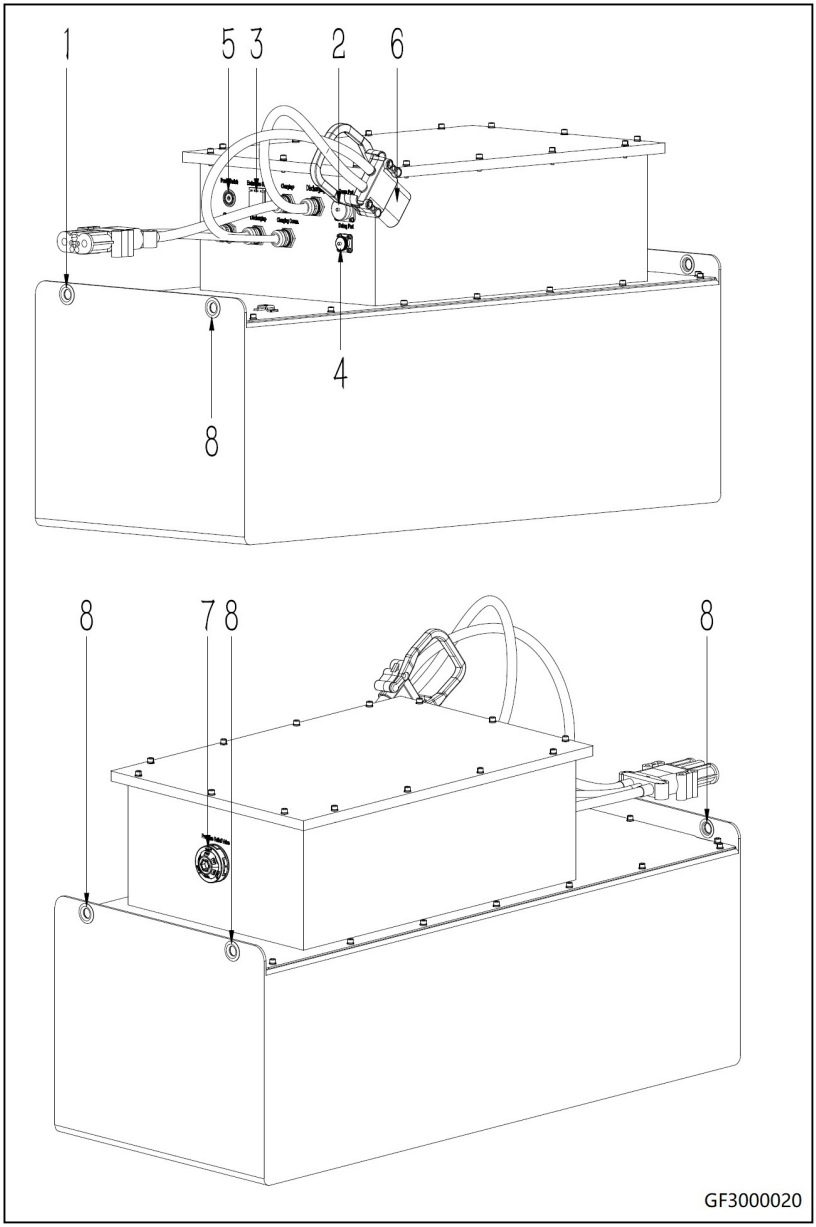
– Perform first aid. Call a doctor or seek medical attention.

3

Overviews

Battery group 1

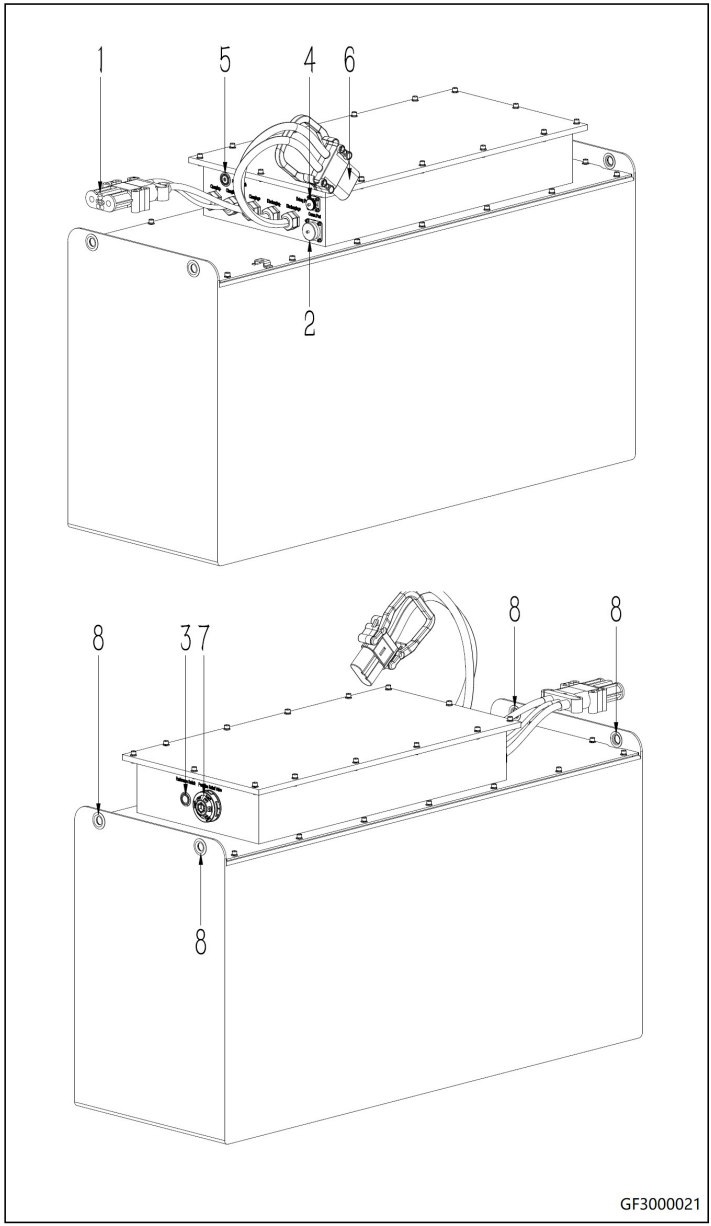
KG4-9



1	Charging connector	5	Battery power switch
2	Truck interface:Common port	6	Discharging connector
3	Endurance switch	7	Pressure relief valve
4	Debug interface:Debug port	8	Lifting hole

Battery group 2

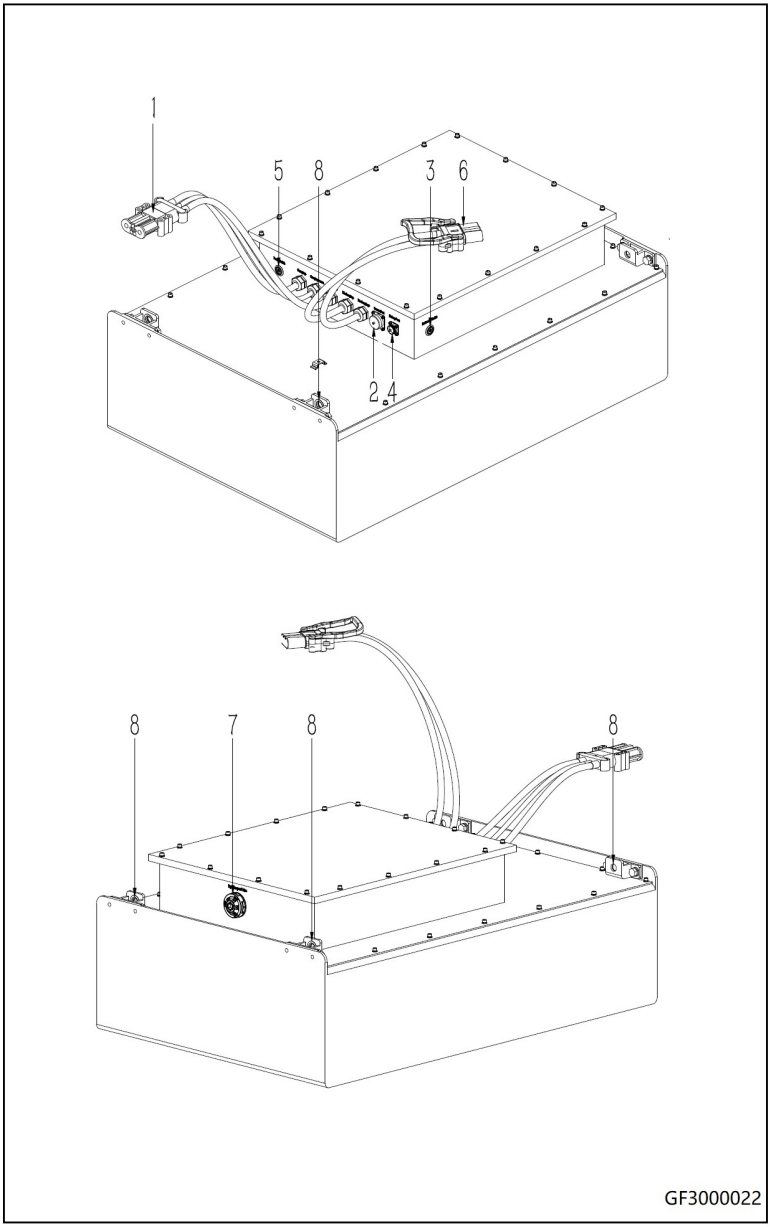
KG1–8



1	Charging connector	5	Battery power switch
2	Truck interface:Common port	6	Discharging connector
3	Endurance switch	7	Pressure relief valve
4	Debug interface:Debug port	8	Lifting hole

Battery group 3

KG2–9



1	Charging connector	5	Battery power switch
2	Truck interface:Common port	6	Discharging connector
3	Endurance switch	7	Pressure relief valve
4	Debug interface:Debug port	8	Lifting hole

4

Operation

Description of the battery

The lithium-ion battery is an electrochemical energy storage device for powering industrial trucks.

The battery is only functional once installed in the relevant industrial truck model or once connected to a corresponding lithium-ion battery charger.

The industrial truck must be designed for operation with the lithium-ion battery.

The industrial truck relies on the weight of the battery to guarantee the stability required for operation.

Safety information

Safety when charging

– Observe the operating instructions for the battery charger.

– Charge the battery only with a battery charger approved by the industrial truck manufacturer.

Contact the authorised service centre for information about approved battery chargers.

– Only charge the battery within the permissible temperature range; see temperature ranges in the chapter entitled "Technical data" for the respective battery group.

Safety during operation

– Observe the operating instructions provided by the industrial truck manufacturer.

– Only operate the battery in the permissible temperature range; see temperature ranges in the chapter entitled "Technical data" for the respective battery group.

Condition of the battery on delivery

The battery is supplied complete with the battery cables installed.

The battery has been de-energised by the manufacturer for transportation purposes. There is no voltage at the battery terminals and the battery male connector.

When connected to the truck or a battery charger, the battery switches to the operating status.

Fully charge the battery before using it for the first time.

Connecting the battery to the industrial truck

Observe the original operating instructions of the industrial truck.

Check battery before driving

NOTE

If the battery is used for the first time, it should be fully charged before use.

- Please first confirm the truck's key switch and emergency stop switch are in the OFF state (avoid damaging the relay when the battery power is turned on).
- Observe the truck display and make sure that the battery is normal and there is no alarm message.
- When the residual charge state is more than 50%, the charge state is good. It is recommended to start with full charge (charge state: 100%).
- When the residual charge state is less than 30%, the charge state is low, and charge to at least 50% before running.
- Make sure the battery is full charged once per week. This is necessary to ensure that the charge state is displayed correctly.

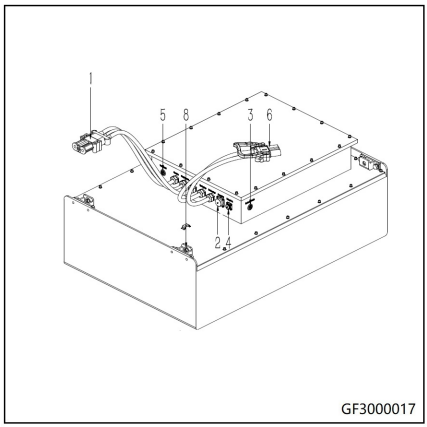
Switching on the battery

NOTE

After installing the battery on the truck, connect the discharge connector(6) to the truck and connect the harness from the truck to the battery common port(2).

– Turn on the power switch (5) on the battery. ▷ (The structure for different battery type can refer to chapter"Overviews")
– Turn on the truck switch, the battery starts a self-check. If there is no fault, the discharge relay will be closed, the battery is switched on.
– When the self-check fails or there is a serious fault, the discharge relay will be disconnected and the fault will report on the truck display. Contact with the authorised service centre.

The battery is switched on via a signal from the industrial truck or the battery charger.

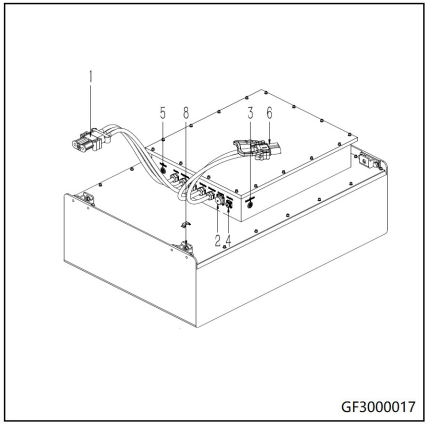


Switching off the battery ▷

Turn off the truck's key switch, and turn off the power switch(5) on the battery, the battery is switched off. (The structure for different battery type can refer to chapter"Overviews")

NOTE

If there is a serious discharge fault, the discharge relay will be disconnected, the battery is switched off. Please contact your authorised service centre.



Charging the battery

Battery capacities

The capacity (kWh) specified for the batteries is the minimum level. The actual capacity of the battery may be higher. Depending on this higher capacity, batteries of the same battery group may have different run times and charging times.

NOTE

Batteries with increased capacity have the same charging indicators but take longer to become fully charged.

- *This does not affect the charging performance.*

Charging the battery

NOTE

Check the battery charge state from the truck display unit according to the truck manual. Charge the battery if the residual charge state is less than 30%.

- *If the residual charge state is less than 15%, the truck display will flash and have an alarm. The battery should be charged in time.*
- *When the charge state is 10%, battery charge is too low, the truck display will have an error code: B142. When the charge state is 5%, it is overdischarge. The truck display will have an error code: B214.*
- *The battery should be charged in time after use, especially in low temperature environment, make sure full charged. Otherwise it will result in inability to charge or prolonged charging time.*
- *The battery must be fully charged once per week when the vehicle is under normal using condition. It is necessary to ensure that the charge state is displayed correctly.*

Prerequisites

The industrial truck is switched off or the battery has been removed. Charge the battery only with a battery charger approved by the industrial truck manufacturer.

NOTE

- *Charge in a relatively safe environment according to national rules(such as avoiding liquid and fire). Avoid charging in direct sunlight.*
- *The charging equipment should be equipped with necessary fire extinguishing devices around it, so that emergency fire extinguishing treatment can be carried out in extreme circumstances.*
- *Before charging, it is necessary to confirm that there is no dust, water and other foreign matters in the charging gun and charging socket. If there are foreign matters, it is necessary to clean them up before charging, otherwise it will lead to poor contact between the charging gun and charging socket, causing heat and even fire.*

⚠ WARNING

Do not modify or disassemble charging ports and charging equipment, which may lead to charging failure and cause fire.

– Follow the instructions in the operating instructions for the battery charger.

– Turn off the truck's key switch. Make sure the battery power switch is on.

– Remove the head of the charging gun from the charging device, and check the charging gun and the charging socket of the battery end to ensure that there is no foreign matter in the port and no damage to the terminals inside the plug-in.

– Connect the battery to the battery charger.

– Turn on the battery charger switch.

– Observe the display on the battery charger.

The charging process starts automatically. The battery charger indicates when the battery is fully charged. Don't disconnect the battery from the charger until no current is flowing.

If the charging is just completed, unplug the charging gun and wait for 5 seconds. Then turn on the key switch to start.

NOTE

In normal condition, the battery has no memory effect. For this reason, the battery can be charged in any charge state. Make sure the battery is not charged repeatedly. Only charge in necessary to avoid the nominal capacity of the battery being impaired.

- *At ambient temperatures below 0°C, the charging process will take much longer.*
- *When you need to stop charging during the charging process, press the stop button first. Don't disconnect the charging plug until the current drops to 0A. Otherwise the load cutting will cause damage to the relay and burn to the plug-in terminal.*

⚠ DANGER

After charging, do not disconnect the charging device while wet hands or standing in water, as this may cause electric shock and personal injury.

⚠ CAUTION

Do not pull or twist the charging cable.

⚠ CAUTION

Do not expose the charging equipment to impact.

⚠ CAUTION

Do not use charging equipment in an environment above 55°C

⚠ CAUTION

Do not place the charging device near heating or other heat sources. The matters not mentioned above are safety-oriented.

⚠ DANGER

It is forbidden to directly plug and remove the charging plug-in when the charging device has current output, which may cause arc pulling phenomenon, resulting in property loss and personal injury.

Correcting battery faults

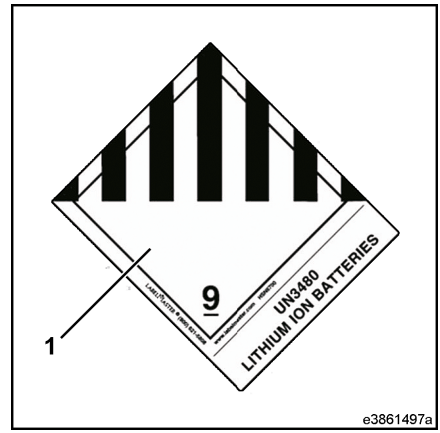
Fault	Course of action
The battery is not functioning or is supplying too little power.	Check the display unit on the truck. If the battery charge state is low, please charge it promptly. If no error is displayed, restart the industrial truck after ten seconds.
The truck’s display unit reports error code.	Contact with your authorised service centre. Maintenance work may be performed only by qualified and authorised personnel.
If liquids escape from the battery.	It is strictly prohibited to wipe with hands or cloth, and do not rub the eyes. If any please immediately wash thoroughly with water and seek medical attention immediately.
Truck collision and rollover result in severe deformation of the battery	Turn off the truck switch, and disconnect the battery from the truck. Contact with the authorised service centre.
Smoke or flames from the truck	1. Turn off the power supply of the truck, disconnect the connection between the truck and the battery, and evacuate personnel and surrounding flammable material. 2. In the event of an open fire, use water-based fire extinguishers, carbon dioxide or dry powder fire extinguishers to extinguish the fire, and call the fire brigade immediately. 3. After the open flame is extinguished, a large amount of water should be continuously sprayed to lower the battery temperature. 4. If you want to use a forklift to move burned lithium batteries , please cover the fire location with a fireproof blanket.

Transporting the lithium-ion battery

General

All lithium-ion batteries are safe when used for their intended purpose. In principle, they do have the potential to cause a fire, explosion or chemical irritation.

Lithium-ion battery: Transporting the battery ▷



A "truck equipped with a lithium-ion battery" is transported in the usual manner. No additional measures and precautions are required.

A lithium-ion battery is a special product. Special measures must be taken when transporting the lithium-ion battery separately:

- The hazardous materials label with hazardous materials class 9 symbol (1) must be attached in a visible position on the transporting truck

NOTE

- *The applicable country-specific specifications and regulations must be observed when transporting a "truck equipped with a lithium-ion battery" and when transporting lithium-ion batteries separately*
- *The shipping company must have special knowledge about "transporting hazardous materials"*

NOTE

Special measures must be taken when transporting damaged lithium-ion batteries. For further information, contact your service partner.

Transportation safety requirement

During loading, unloading and transportation, violent shaking and large external impact should be avoided, and throwing, rolling, inversion and extrusion are prohibited.

Before transportation, ensure that the battery or battery pack is not loaded, the charging device is disconnected, and there is no charge or discharge in any form.

Safety information for transporting the battery by crane

National legal requirements must be complied with when transporting the lithium-ion battery by crane.

Safety information

⚠ DANGER

Risk of fatal injury from falling load

– Never step under an elevated load.

– Observe the load capacity of the crane. Also establish the weight of the battery (identification plate).

⚠ CAUTION

Risk of crushing/shearing

There is a risk of crushing or shearing when removing or inserting the battery by crane.

– Do not stand directly next to the battery or between the battery and the crane.

To avoid short circuits, batteries with open terminals or connections must be covered with a rubber mat.

Detecting potential damage to the battery

The battery is considered damaged in the following scenarios:

- The battery cover shows damage that could impair the leak tightness of the battery
- The battery housing is severely damaged (visible deformation of the housing)
- The display of the industrial truck shows the message that prompts the drive to contact the authorised service centre
- The battery can no longer be activated

When a defect or damage is identified, prior use and improper use must be taken into account.

For example, improper use includes the battery being inverted. The battery must be checked by the authorised service centre.

NOTE

Special measures must be taken when transporting damaged lithium-ion batteries. The defective battery must be marked as hazardous goods in accordance with the specific requirements of the ADR. The operator's hazardous goods officer and the authorised service centre must arrange this together. The defective battery must be packed, transported and handed over to the qualified service provider in line with the applicable regulations.

- *Contact the authorised service centre for more information.*

5

Maintenance

Maintaining the battery

Maintaining the operational readiness of the battery

Performing the maintenance tasks listed here will increase the service life of the battery. This will help to maintain the operational readiness of the battery. The frequency of the work must correspond to the application conditions.

- Clean the battery
- Visually inspect the connections and cables on the battery to ensure that they are all present and in the correct condition
- Visually inspect the covers
- Charge the battery
- **Fully** charge the battery once a month

Batteries in some battery groups must be fully charged once per week. This is necessary to ensure that the charge state is displayed correctly.

- For further information, see the footnotes for the battery groups in the "Technical data" chapter.
- At the end of this charging process, the displayed charge state may remain between 88 and 98% for an extended period. The displayed value may increase by large increments at a time, rather than increasing gradually.

  The charging process is then ended as usual (see the operating instructions for the battery charger). Charging can be interrupted at any time and the battery can be used as normal.

NOTE

For all battery groups, it is recommended to charge the battery once per week.

Maintenance tasks

NOTE

This maintenance work may be performed only by qualified and authorised personnel. Specialist knowledge and special tools are required.

- *Contact the authorised service centre.*
- *Maintenance site requirements: spacious, flat and safe, with charging equipment.*
- *Before regular inspection by professionals, please wear insulation shoes, insulation gloves, goggles and other necessary protective equipment to ensure personal safety.*

⚠ WARNING

Before battery maintenance, it is necessary to turn off the battery power switch and separate the battery discharge plug from the truck. Use a multimeter to measure whether the DC voltage between the positive and negative electrodes in the battery discharge plug is approximately equal to the battery voltage. If it is approximately equal to the battery voltage, it means the discharge relay is closed, the battery is still power on. Please pay attention to insulation protection during maintenance.

When the charge state is 5%, it is overdischarge. It is not allowed. Please charge the battery according to "charging the battery".

Maintenance process:

– Charge the battery to ensure the battery residual charge state is between 15%-95%.

– Stop the truck, turn off the truck's key switch, and make sure all electrical equipment in the truck is in the OFF state.

The test result must be recorded in the maintenance checklist of the industrial truck.

If accessories are damaged or faulty, please contact the authorised service centre to buy or replace them.

Maintenance and inspection checklist

At operating hours										Carried out	
1000		Every year								✓	✖
Battery											
Visually inspect the item for damage											
Carry out an isolation measurement											
Battery male connector, contacts and battery cable											
Visually inspect the item for damage											
Whether the high and low voltage wiring harness of the battery system is damaged, scratched, or loose											
Visually inspect whether the pressure relief valve of the battery box is damaged											
Visually inspect whether the charging and discharging plug is damaged. Check if any signs of melting or blackening on the terminals.											
Terminal screws											
Check that the item is securely fitted											
Signs and adhesive labels											
Visual inspect the item for completeness and damage											

Cleaning the battery

⚠ CAUTION

Aggressive cleaning materials can damage the surfaces of components!

Aggressive cleaning materials that are not suitable for plastics can cause plastic parts to dissolve or become brittle. The screen on the display-operating unit (if present) could become cloudy.

– Clean plastics only with cleaning materials intended for plastics.
– Observe the manufacturer's guidelines for working with cleaning materials.

⚠ WARNING

Risk of fire due to flammable cleaning materials!

Flammable cleaning materials can be ignited by hot components.

– Do not use any flammable cleaning materials.

Clean the battery only outside the industrial truck. To remove the battery, refer to the operating instructions for the industrial truck.

The best medium for cleaning the battery is oil-free compressed air.

If the outside of the battery is very dirty, an electrical contact cleaner can be used for cleaning. The electrical contact cleaner must meet the following requirements:

- A dielectric strength of 100,000 V/cm according to DIN 57370
- Free of hydrocarbons such as CHCs, CFCs, aromatics, PCBs, PCTs and other pollutants.

If the battery surface is very dirty, protective goggles should be worn, and dust masks can be worn if necessary before cleaning.

– Make sure the power switch on the battery is turned off.
– Disconnect the battery connection from the industrial truck.
– Use a vacuum cleaner to remove the dust and dirt

Cleaning the battery

⚠ WARNING

The battery is not protected against water and must not be cleaned with water. During cleaning, make sure that no moisture enters the housing. This could cause safety-related components to malfunctions.

Don’t use water or compressed air purifier to clean the battery.

NOTE

If it is determined during service work that moisture has penetrated the battery, the warranty will terminate.

Transporting and storing the battery on company premises

Safety regulations

Observe the operating instructions for the industrial truck when removing the battery.

Visual inspection before lifting

Before lifting the battery, check on the outside of the battery that:

- All components are present
- All markings and adhesive labels are complete
- The tray or cover is not damaged
- There is no damage to the lifting eyes

The lifting eyes must be checked for the following:

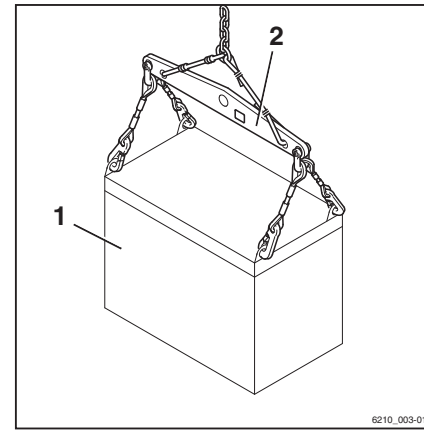
- Corrosion
- Necking
- Breaks
- Tears
- Bends

Crane eyes when lifting

When lifting the battery, suitable battery lifting gears must be used. The load capacity of the lifting gear must be greater than the weight of the load to be lifted.

To prevent the battery tray (1) from being compressed, the lifting gear (2) must lift by pulling vertically.

▷



Storage conditions

Battery charge state

– Charge the battery before storage. And turn off the battery power switch.

– Keep the charge state of stored batteries above 50%.

– Optimal charge state for battery in storage condition: 50%-80%.

– The battery system must be well ventilated, dry, away from direct sunlight, rain, and heat sources.

– Regularly check the charge state of the battery, at least every three months. Full charge the battery every three months.

NOTE

Cycle treatment should be carried out once every six months. Cycle treatment methods: discharge to 15%, charge to 100%, and then discharge to 50%-80% (the optimal charge state for storage).

If the truck has been stationary for an extended period or if the battery has been stored for more than one week:

• The battery must be fully charged once to ensure that its charge state is displayed correctly.

⚠ CAUTION

A battery with an extremely low charge state cannot be charged. Deep discharging has a negative effect on the service life of the battery cells and can destroy the cells.

– Avoid deep discharging the battery.

– If the battery has been deep discharged, contact the authorised service centre.

Storage period

The battery must be checked on a regular basis and recharged if necessary. The battery self-discharges slowly due to permanent safety monitoring. Self-discharge takes several weeks, depending on the nominal capacity of the battery.

Floor load capacity

Take the battery weight and the floor load capacity into consideration.

NOTE

– Only store the battery within the permissible temperature range; see temperature ranges in the chapter entitled "Technical data" for the respective battery group.

NOTE

Long-term storage below -10°C or above 40°C has a negative impact on the service life of the battery. A temperature of between 15°C and 30°C is ideal.

Ensure that the storage area is well ventilated (air humidity 0% to 80%).

Damaged batteries

– Store damaged batteries separately (see the section entitled "Detecting potential damage to the battery"). If possible, store damaged batteries outside buildings with a distance of at least 5 m from the nearest building wall.
– Cover the battery so that it is impervious to liquids.
– The battery must not be charged any more. Do not continue to use the battery in the industrial truck.
– Further course of action regarding the damaged battery must be agreed with the authorised service centre.

Disposing of the battery

Statutory provisions regarding safety

The user is legally obliged to return used batteries. Returning the batteries is free of charge. If lithium-ion batteries are not disposed of correctly, damage to health may occur due to fire or hazardous substances escaping.

Return

The battery must be disassembled and disposed of in accordance with the latest technological standards and legal regulations.

6

Technical data

Technical data for lithium-ion batteries

NOTE

To identify the battery in the tables, see the chapter entitled "Identifying the Battery".

The capacity (kWh) specified for the batteries is the minimum level. The actual capacity of the battery may be higher.

Battery group

Battery group	Installed Energy (kWh)	Available Energy (kWh)	Weight (kg)	Dimension (mm)
KG1-8[1) 2)]	21.3	19.6	230±5%	1030 / 370 / 620
KG2-9[1) 2)]	31.6	29.1	340±5%	1030 / 710 / 405
KG4-9[1) 2)]	17.5	16.1	210±5%	980 / 430 / 530

1) The temperature range for use and the usable energy may be restricted depending on the use of the industrial truck.

2) The battery must be fully charged once per week. This is necessary to ensure that the charge state is displayed correctly.

Temperature ranges for lithium-ion batteries

NOTE

To identify the battery in the tables, see the chapter entitled "Identifying the Battery".

Battery group

Battery group	Installed Energy (kWh)	Temperature ranges		
		Operation	Charging	Storage
KG1-8[1)]	21.3	-20°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C
KG2-9[1)]	31.6	-20°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C
KG4-9[1)]	17.5	-20°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C

1) The battery allows charging when the internal temperature of the battery reaches 5 ° C or above. If the internal temperature of the battery is below 5 ° C, the battery will start heating. When the internal temperature of the battery exceeds 5 ° C, charging will be started.

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