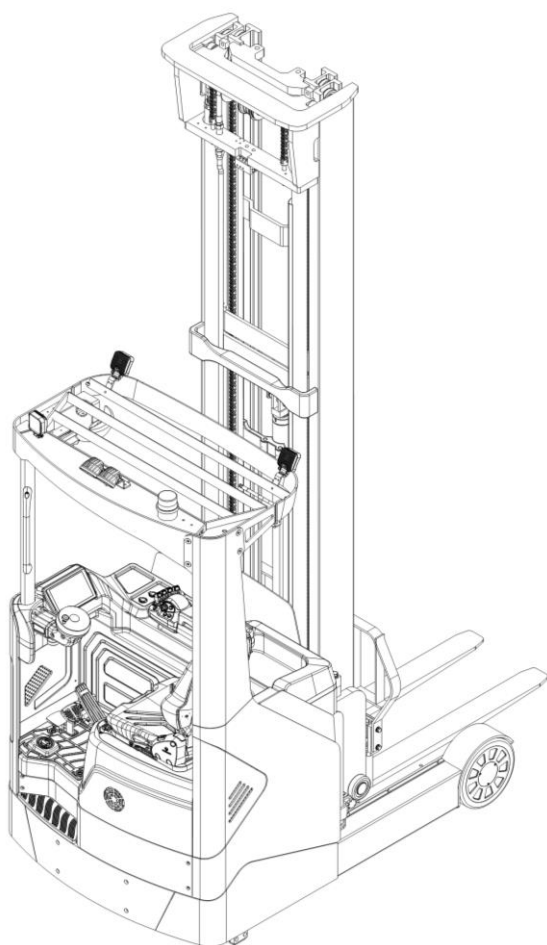


INSTRUCTION MANUAL

Battery Powered Reach Truck

RT20G



WARNING

Do not use the reach truck before reading and understanding these operating instructions.



NOTE:

- Please check the designation of your present type at the last page of this document as well as on the ID-plate.
- Keep it for future reference.

This truck can only be used in factories, tourist attractions, and amusement parks.

Version 02/2025

RT20G-SMS-001-EN

FOREWORD

Before operating the truck, read this ORIGINAL INSTRUCTION HANDBOOK carefully and understand the usage of the truck completely. Improper operation could create danger.

This handbook describes the usage of different electric pallet trucks. When operating and servicing the truck, make sure, that it applies to your type.



Keep this manual for future reference. If this or the warning/ caution labels are damaged or lost, please contact your local dealer for replacement.

ATTENTION:

- Environmentally hazardous waste, such as batteries, oil and electronics, will have a negative effect on the environment, or health, if handled incorrectly.
- The waste packages should be sorted and put into solid dustbins according to the materials and be collected disposal by local special environment protection bureau. To avoid pollution, it's forbidden to throw away the wastes randomly.
- To avoid leaking during the use of the products, the user should prepare some absorbable materials (scraps of wooden or dry duster cloth) to absorb the leaking oil in time. To avoid second pollution to the environment, the used absorbable materials should be handed in to special departments in terms of local authorities.
- Our products are subject to ongoing developments. Because this handbook is only for the purpose of operating /servicing the pallet truck, therefore please have understanding, that there is no guarantee out of particular features out of this handbook.



NOTE: On this manual, the left sign means warning and danger, which can lead to death or serious injury if not followed.

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1. CORRECT APPLICATION

To ensure the safety of personal and equipment, drivers shall observe the following precautions:

1. Only drivers who have been trained and hold a industrial trucks driving license can drive this truck;
2. This reach truck is suitable for hard and flat indoors floor conditions;
3. Check the control and alarm devices before driving this reach truck. If any damage or defect is found, it shall be operated after repair;
4. During handling, the load shall not exceed the specified value. Both forks should go under the goods and load should be evenly placed on the forks. Unbalanced loading is prohibited and picking up objects with single fork is not allowed;
5. Start, steer, drive, brake and stop slowly and smoothly. Slow down when steering on wet or smooth floors;
6. When driving this reach truck with goods, lower the goods as low as possible and the forks should be tilted backward;
7. Be careful when driving on the slope: move forward uphill, move backward downhill, avoid steering uphill or downhill;
8. When driving this reach truck, pay attention to pedestrians, obstacles and potholes, and pay attention to the clearance above the reach truck;
9. It is not allowed to stand on forks or truck;
10. It is not allowed to stand under or walk under the elevated part of the truck;
11. Only operate the truck from the driver's position;
12. Do not handle unsecured or loosely packed goods, and carefully handle goods in large size;
13. When driving in the racks, drive slowly, move straightly in and straightly out, when the fork is not completely removed from the racks, do not steer in case of collision.
14. For high lifted trucks, try to make the mast tilted back, and the tilting forward and backward during loading and unloading should be done within the minimum range;
15. Immediately stop using when the failure occurs, and the label shall be clearly indicated;
16. Lower the forks to the ground when leaving the truck, park the truck on level ground, turn off the power and remove the key.

It is only allowed to use this electric reach truck according to this instruction manual.

The capacity is marked on capacity sticker as well on the identification plate. The operator has to pay attention to the warnings and safety instructions.

Operating lighting must be minimum 50 Lux.

Modification

No modifications or alterations to this reach truck which may affect, for example, capacity, stability or safety requirements of the truck, shall be made without the prior written approval of the original truck manufacturer, its authorized representative, or a successor thereof. This includes changes affecting, for example braking, steering, visibility and the addition of removable attachments. When the manufacturer or its successor approve a modification or alteration, they shall also make and approve appropriate changes to capacity plate, decals, tags and operation and maintenance manual.

Only in the event that the truck manufacturer is no longer in business and there is no successor in the interest to the business, may the user arrange for a modification or alteration to a powered industrial truck, provided, however, that the user:

- a) arranges for the modification or alteration to be designed, tested and implemented by an engineer(s) expert in industrial trucks and their safety,
- b) maintains a permanent record of the design, test(s) and implementation of the modification or alteration,
- c) approves and makes appropriate changes to the capacity plate(s), decals, tags and instruction handbook, and
- d) affixes a permanent and readily visible label to the truck stating the manner in which the truck has been modified or altered, together with the date of the modification or alteration and the name and address of the organization that accomplished those tasks.

By not observing these instructions, the warranty becomes void.

2. DESCRIPTION OF THE REACH TRUCK

a. Overview of the main components

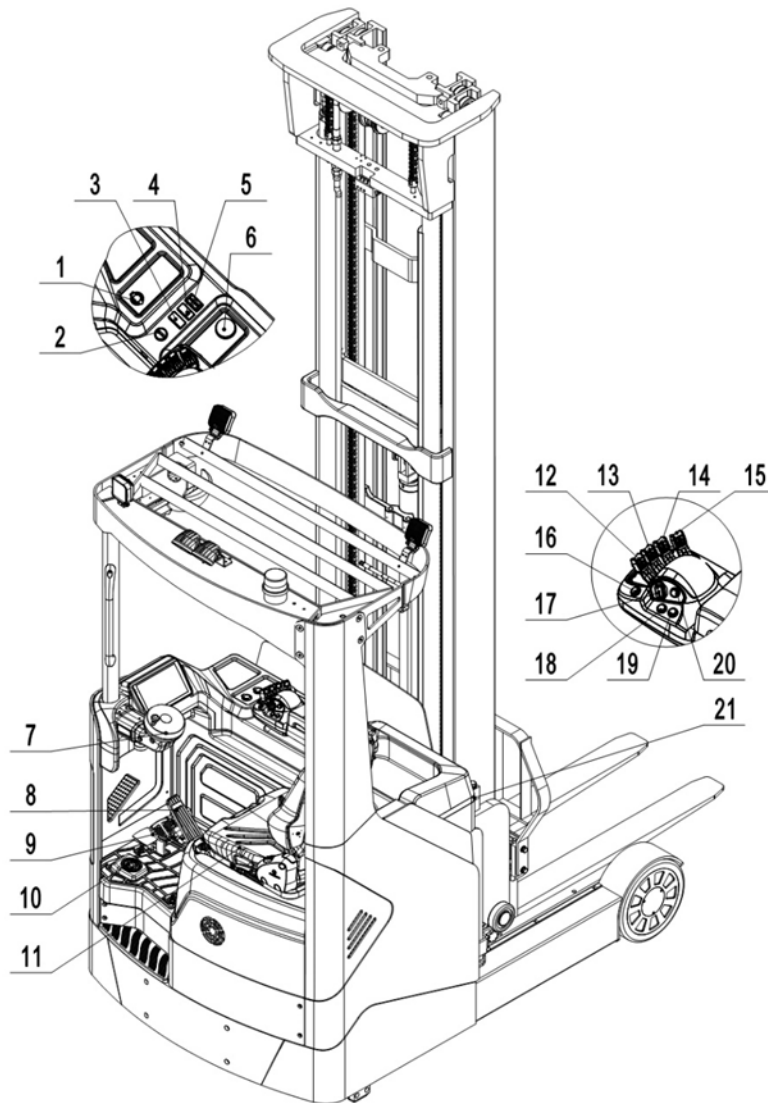


Fig. 1: Overview of the main components

- | | |
|----------------------------------|----------------------------------|
| 1. USB | 12. Lifting and Lowering Control |
| 2. Key Switch | 13. Mast Moving Control |
| 3. Pedal Switch (Lift/Lower) | 14. Fork tilt Control |
| 4. Lamp Switch | 15. Side-shift Control |
| 5. 180/360° Steering Mode Switch | 16. Parking Brake Button |
| 6. Emergency Button | 17. Direction Switching Button |
| 7. Steering Wheel | 18. Fork Leveling Button |
| 8. Accelerator | 19. Fork Centering Button |
| 9. Brake Pedal | 20. Horn Button |
| 10. Safety Pedal | 21. Battery Connector |
| 11. Seat | |

b. Main technical data

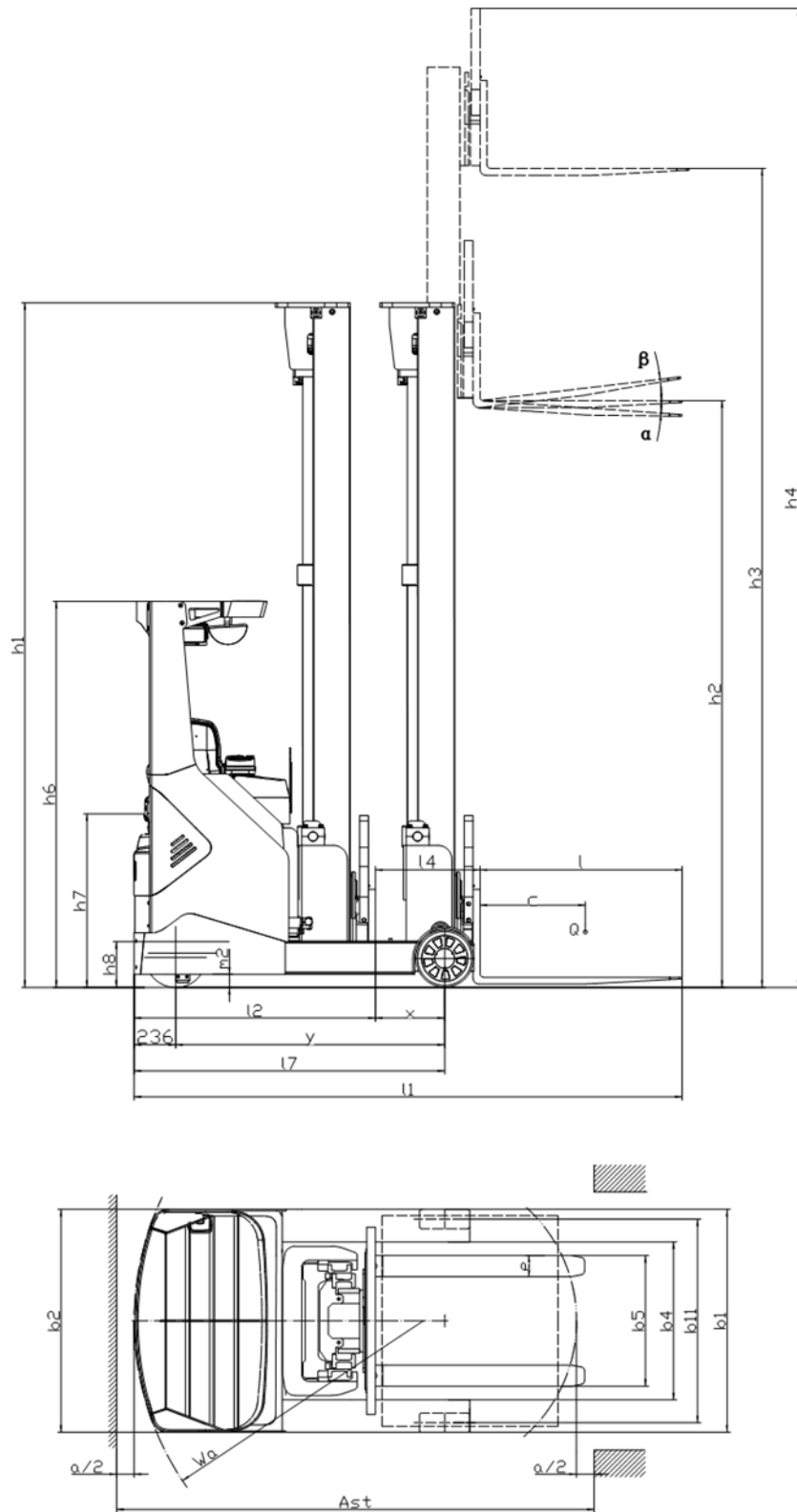


Fig 2: Structure schematic drawing

Table 1: Main technical data for standard version

Type sheet for industrial truck acc. to VDI 2198				
Distinguishing mark	1.2	Manufacturer's type designation		RT20G
	1.3	Drive: electric (battery type, mains, ...), diesel, petrol, fuel gas		Battery
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Sit-on
	1.5	Rated capacity/ rated load	Q (t)	2.0
	1.6	Load centre distance	c (mm)	600
	1.8	Load distance, centre of drive axle to fork	x (mm)	385
	1.9	Wheelbase	y (mm)	1530
Weight	2.1	Service weight (with battery)	kg	4120
Tires	3.1	Tires		Polyurethane (PU)
	3.2	Tire size, front	ØxW (mm)	343×140
	3.3	Tire size, rear	ØxW (mm)	330×110
	3.5	Wheels, number front/ rear(x=driven wheels)		2/1x
	3.7	Tread, front/rear	b ₁₁ (mm)	1160
Dimensions	4.1	Tilt of mast/fork carriage forward/backward	α/β (°)	4°/-2°
	4.2	Height, mast lowered	h ₁ (mm)	3900
	4.3	Free lift	h ₂ (mm)	3290
	4.4	Lift	h ₃ (mm)	9500
	4.5	Height, mast extended	h ₄ (mm)	10410
	4.7	Height of overhead guard (cabin)	h ₆ (mm)	2200
	4.19	Overall length	l ₁ (mm)	2525
	4.20	Length to face of forks	l ₂ (mm)	1382
	4.21	Overall width	b ₁ (mm)	1270
	4.22	Fork dimensions DIN ISO 2331	s/e/l (mm)	40/120/1150
	4.25	Fork spread (min./max.)	b ₅ (mm)	240-740/240-818
	4.28	Reach distance	l ₄ (mm)	585
	4.31	Ground clearance, laden, below mast	m ₁ (mm)	75
	4.33	Aisle width for pallets 1000×1200 crossways	A _{st} (mm)	2826
	4.34	Aisle width for pallets 800×1200 lengthways	A _{st} (mm)	2874
	4.35	Turning radius	W _a (mm)	1767
	4.37	Length across wheel arms	l ₇ (mm)	1930
Performance	5.1	Travel speed, laden/ unladen	km/h	14/14
	5.2	Lift speed, laden/ unladen	m/s	0.45/0.58
	5.3	Lowering speed, laden / unladen	m/s	0.5/0.5
	5.4	Reaching speed, laden / unladen	m/s	0.12/0.12

	5.8	Max. gradeability, laden/ unladen	%	10/15
	5.10	Service brake		Hydraulic brake
Motors	6.1	Drive motor rating S2 60min	kW	8.1
	6.2	Lift motor rating at S3 15%	kW	20
	6.3	Battery acc. to DIN 43531/35/36 A, B, C, no		A,3Pzs
	6.4	Battery voltage/ nominal capacity K ₅	V/ Ah	76.8/300
	6.5	Battery weight	kg	500
Additional data	8.1	Type of drive control		Three-phase AC
	10.1	Operating pressure for attachments	(bar)	150
	10.2	Oil volume for attachments	(l/min)	50
	10.7	Sound pressure level at driver's seat	dB(A)	<70

Table of Mast (RT20G)				
Designation	Lift h ₃ mm	Free lift h ₂ mm	Height, mast lowered h ₁ mm	Height, mast extended h ₄ mm
TX Mast FFL (Full Free Lift)	4500	1563	2235	5410
	5000	1730	2400	5910
	5500	1897	2568	6410
	6000	2063	2735	6910
	6500	2230	2900	7410
	7000	2397	3068	7910
	7500	2563	3234	8410
	8000	2730	3400	8910
	8500	2897	3567	9410
	9000	3063	3734	9910
	9500	3230	3900	10410

C. Description of the safety devices and warning labels (Europe and other, excepting USA)

Warning labels:

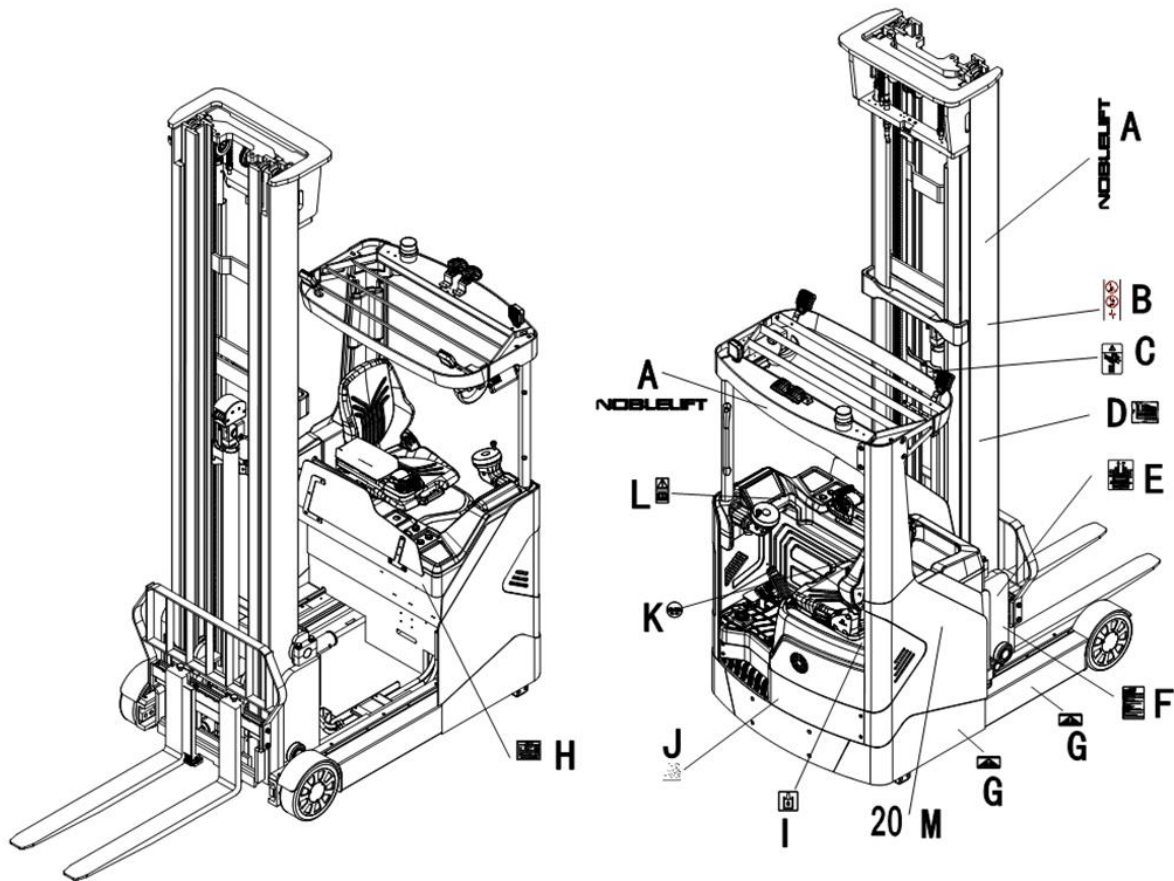


Fig. 3: Warning labels

- A. Company Logo.
- B. Warning Label: Do not stand under or on the forks, otherwise it may cause injury.
- C. Warning Label: Do not stand inside the mast and do not reach into the mast, as this may cause injury.
- D. Residual Capacity Label: Indicates Residual load capacity of this truck at different heights.
- E. Lubrication Chart: Indicates the maintenance and lubrication cycle of this truck.
- F. Instructions for Use: Precautions for operating the truck. Please read instructions carefully before operation.
- G. Fork Loading Label: Insertion position of forks during forklift loading.
- H. Identification Plate (ID-plate): Indicates the basic information of truck, such as specification, production date, product number, etc..
- I. Filling Decal: Hydraulic oil should be added at this position.
- J. Instructions Label: Installation method of drive wheel and maintenance guide.
- K. Seat Belt Decal: Seat belt should be fastened when driving.
- L. Warning Label: Read and follow service manual.
- M. Capacity Label: Indicates the rated load of the truck. For instance, 20 indicates that the rated load is 2.0 tons.

Safety devices

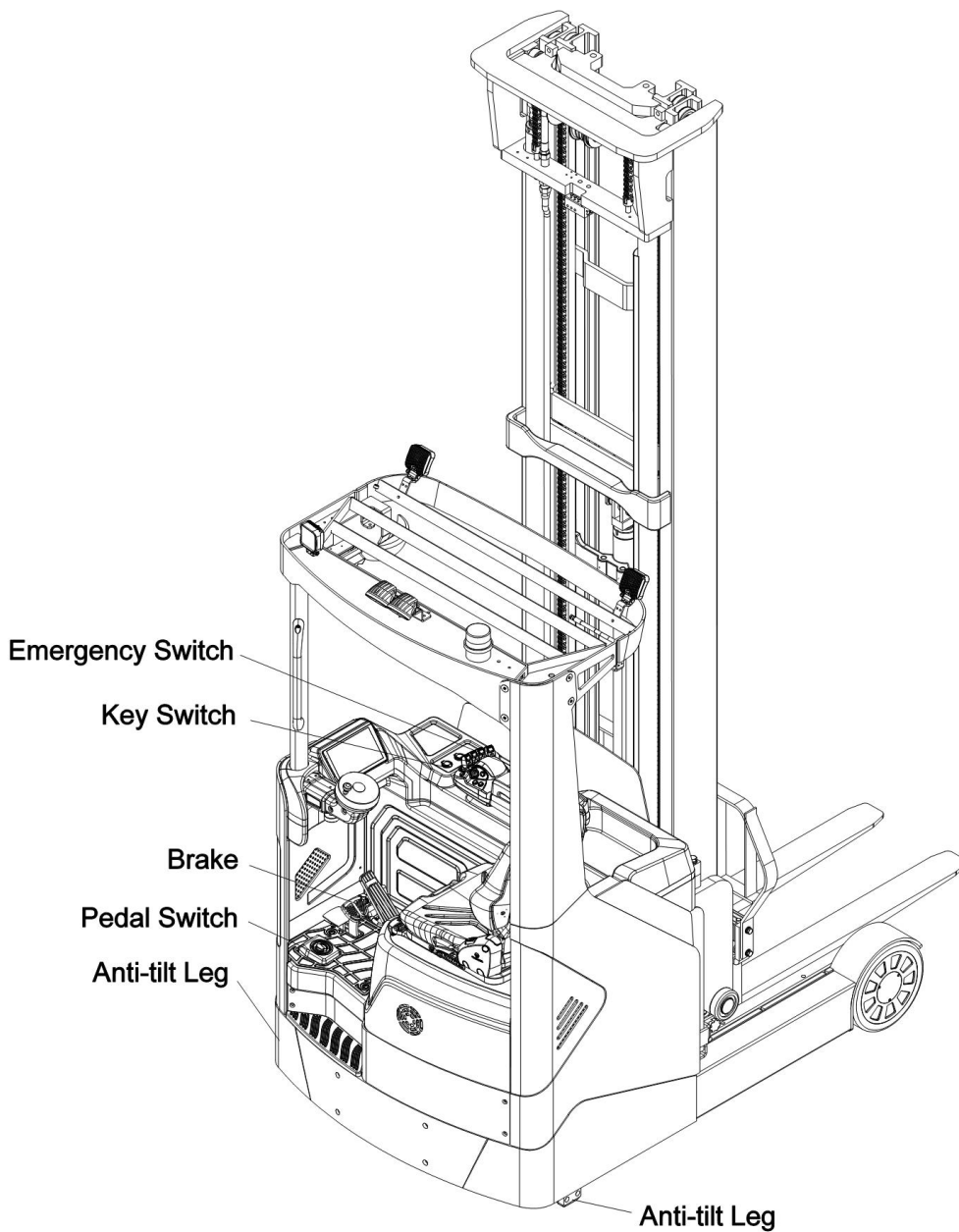


Fig 4: Safety devices

Emergency button: Please press this button immediately to cut of the power supply when the truck is out of control, all lifting-, lowering-functions will be stopped.

Key switch: To prevent against unauthorized access, turn the key counterclockwise and pull it out.

Brake: To stop the truck when it is driving.

Tip over protection: To reduce the risk of side tip over of the truck. It's forbidden to remove the protection.

Pedal switch: Operate the truck with left foot on the foot pedal switch, otherwise it will be failed.

Attention: Emergency button, drive key switch, brake, rollover protection, pedal switch and hydraulic circuit explosion-proof valve are safety devices of the truck. Safety devices and labels above must be kept in good condition, please replace in time in case of damage or absence.

d. VIN (Vehicle Identification Number)

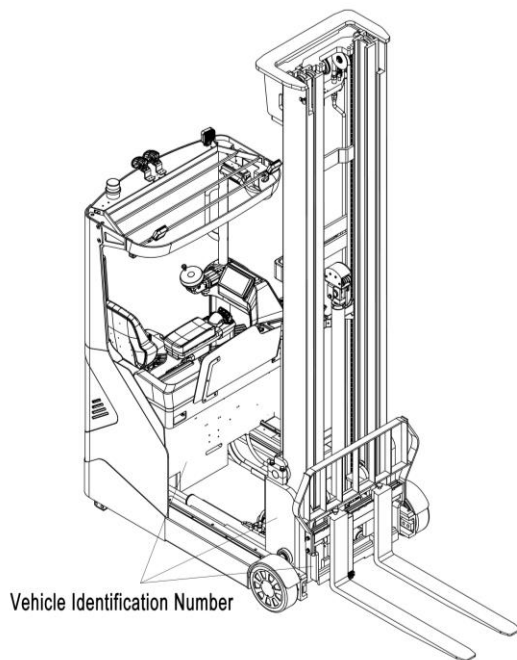


Fig. 5: Location of VIN (Vehicle Identification Number)

The VIN (Vehicle Identification Number) is located on the chassis, mast and forks of the truck. And for the truck equipped with hook type forks, there is also a corresponding VIN on the forks.

e. Identification plate (ID-Plate)

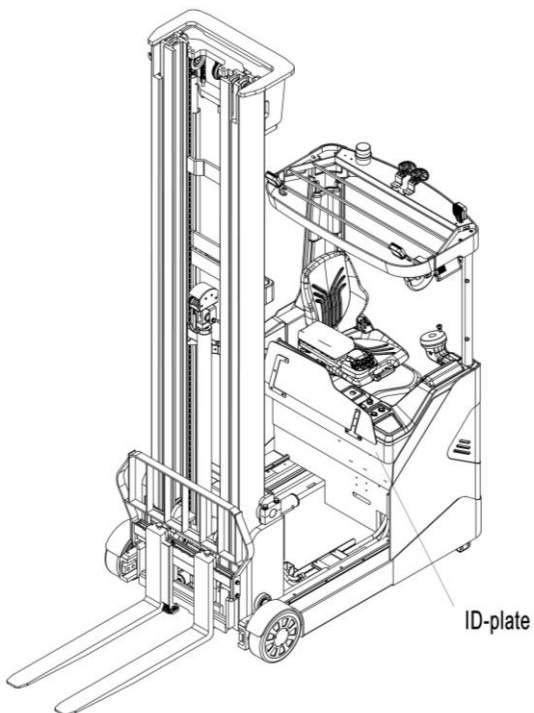


Fig. 6: Location of the ID-plate

- | | | | |
|---|------------------------------------|----|-------------------------------|
| 1 | Designation, type | 7 | Battery weight Min./Max in kg |
| 2 | Serial number | 8 | Nominal power in kW |
| 3 | Rated capacity in kg | 9 | Load center distance in mm |
| 4 | Supply voltage in V | 10 | Manufacturing date (MM/YY) |
| 5 | Net weight in kg (without battery) | 11 | Option |
| 6 | Name and address of manufacturer | | |

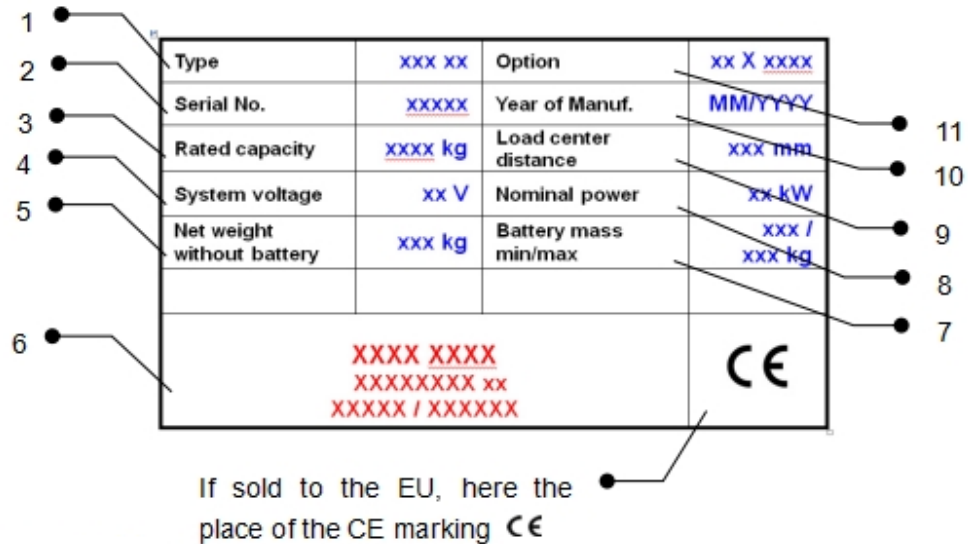


Fig 7: Identification plate

3. WARNINGS, RESIDUAL RISK AND SAFETY INSTRUCTIONS

DO NOT



- use truck in environments with explosive gas, explosive dust or acid and alkali corrosion;
- use truck in the environment with poor outdoor or ground conditions;
- put feet or hands under or inside the lifting mechanism;
- stand in front or behind the truck while driving or lifting/lowering;
- overload, the load weight and lifting height must meet load curve requirements;
- put foot outside the truck when driving which may cause injuries;
- lift people may which may cause people falling down and severe injury suffering;
- push or pull goods;
- drive the truck on slopes;
- use the truck with unstable, loose or unbalanced load, gravity center of the load must be in the centre of the two forks;
- leave the truck without turning off the power and removing the key to prevent unauthorized access to the truck.
- make any truck modification without written consent from manufacturer;
- lift the load in the case of wind. Lifting will be unstable under the wind influence.

Watch difference in floor levels when driving. Load could fall down or the truck could get uncontrollable.

Keep watching the condition of load. Stop operating the truck if load becomes unstable.

Brake the truck and activate the emergency button by pushing when sliding load on or off the truck. If the truck has any malfunctions, follow chapter 8.



- The truck is intended to be used on hard and flat ground indoors whose roughness should be within 1cm/m²;
- The operator should hold driving license and have been trained;
- When operating the truck, the operator has to wear safety shoes.
- The truck is intended to be used with ambient temperatures between +5°C~+40°C;
- The operating lighting must be minimum 50 Lux.

4. COMMISSIONING, TRANSPORTING, DECOMMISSIONING

a. Commissioning

After receiving our new reach truck or for re-commissioning you have to do following before (firstly) operating the truck:

- Check if all parts are included and not damaged
- Mast installation (please follow the instructions to install mast)
- Do the work according to the daily inspections as well as functional checks.
- Check battery installation and charge instructions (follow chapter 7).

Mast assembling:

Mast assembling required equipment:

Lifting equipment:

Driving (5 tons maximum load) or fork lifting (3 tons load capacity and 4.5 m lifting height)

Assistant tools: S24 wrench, crowbar.

Safety precautions:

Assembling operators must take appropriate training or be trained by professional personnel on-site to guide the assembling operation.

Operators for lifting equipment must get appropriate operating qualifications.

If the truck is directly forked on the crossbeam of the gantry, the gantry must be tied together with the protection rope to avoid the danger of slipping.

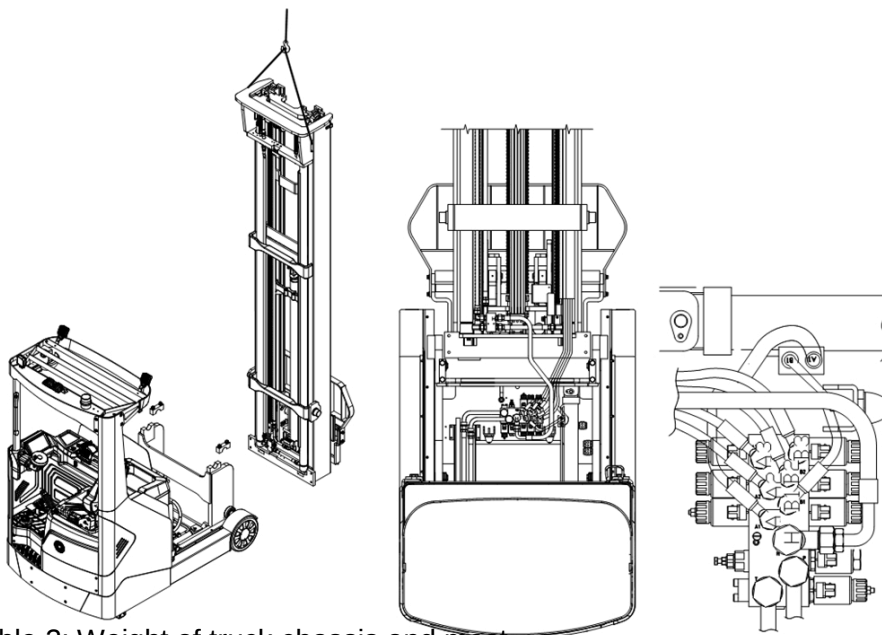


Fig 8: Mast assembling

Table 2: Weight of truck chassis and mast

Type	RT20G		
Truck carriage pack weight [kg]	1880		
Truck carriage pack size [mm]	2100x1400X2300		
Lift height H3 [mm]	5500	7500	9500
Mast pack weight [kg]	1300	1450	1600
Mast pack size [mm]	2600x1000x 500	3250x1000x 500	3900x1000x500

b. Loading/ transporting

When load and unload the truck, refer to the guide diagram below. The weight of chassis and mast is shown in table 2, for the whole truck weight, please check the ID plate.

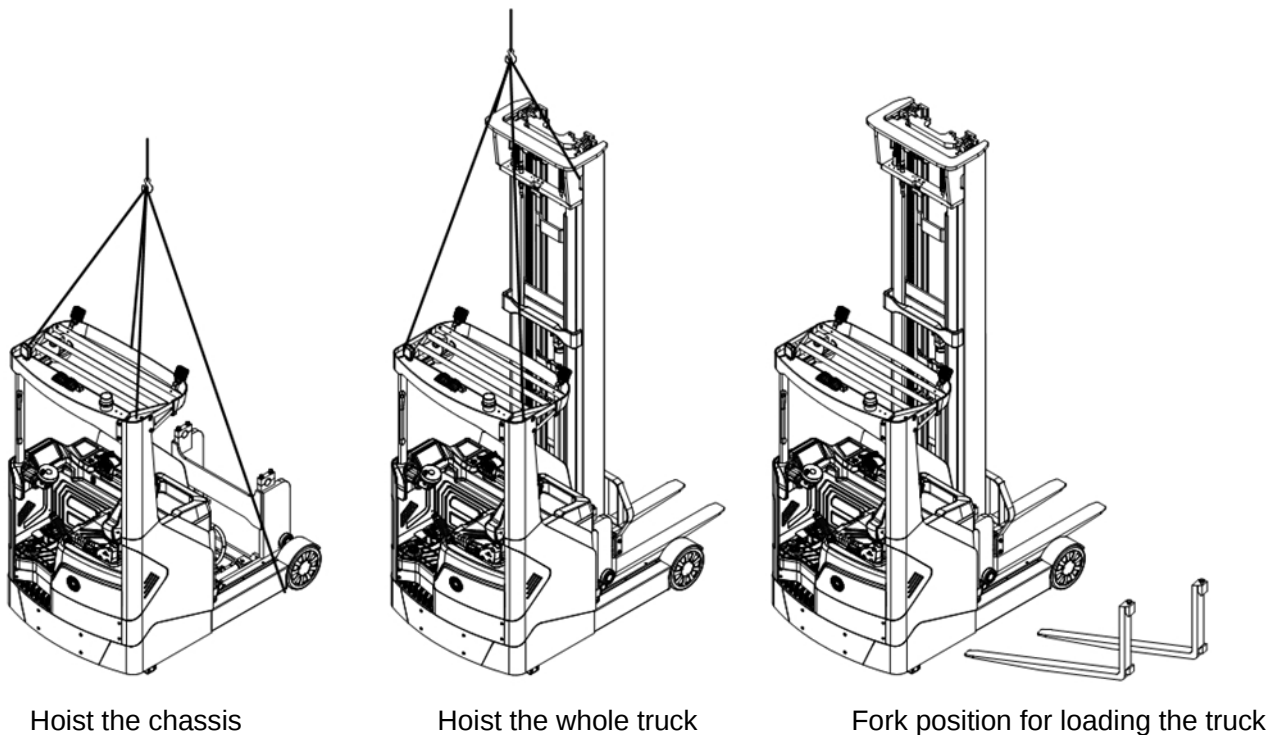


Fig 9: Lifting by crane and loading

Lifting and loading



USE DEDICATED CRANE AND LIFTING EQUIPMENT.
DO NOT STAND UNDER THE SWAYING LOAD.
DO NOT WALK INTO THE HAZARDOUS AREA DURING LIFTING.
PLACE THE TRUCK ON A LEVEL GROUND.

Transporting



DURING TRANSPORTATION ON A LORRY OR TRUCK, ALWAYS FASTEN THE TRUCK SECURELY.

Lower the forks and park the truck securely.

Fasten the truck according to Fig. 10, put the wood blocks under the driving cab to prevent damage to the driving wheel in transporting.

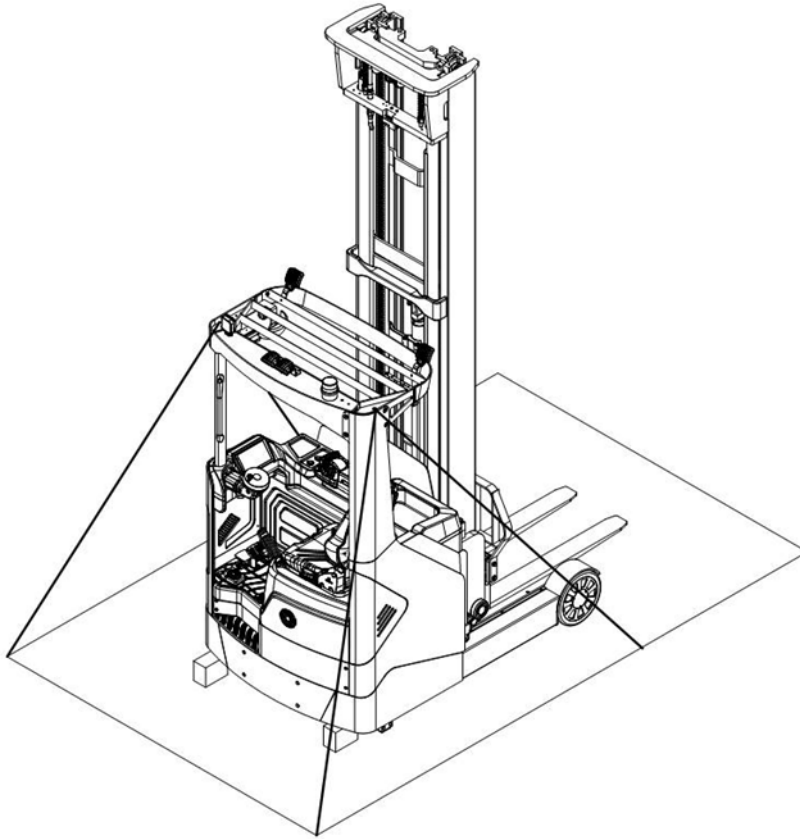


Fig 10: Fixing points

C. Storage / Decommissioning

Lower the fork to the lowest position, put the wood blocks under the driving cab to prevent damage to the driving wheel as it shown in Fig.8 for long time storage.

Grease all greasing points mentioned in this handbook (regular inspection), and eventually protect the truck against corrosion and dust.

Charge the truck of long storage every month to prevent damage on battery.

For final decommissioning hand the truck to a designated recycling company. Oil, batteries and electric components must be recycled due to legal regulations.

5. REGULAR INSPECTION

This chapter describes pre-shift checks before putting the truck into operation.

Regular inspection is effective to find the malfunction or fault on this truck. Check the truck on the following points before operation.

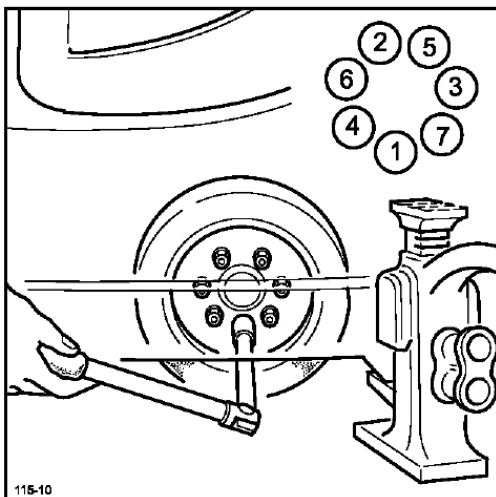
Remove load from truck and lower the forks.



DO NOT USE THE TRUCK IF ANY MALFUNCTION IS FOUND.

- Check for scratches, deformation or cracks.
- Check if there is any oil leakage from the cylinder.
- Check the function of driving in both directions
- Check the chain and rollers are without damage or corrosion.
- Check the smooth movement of the wheels.
- Check the function of the emergency brake by activating the emergency button.
- Check the functions of foot brake.
- Check the lifting and lowering functions.
- Check the seat is assembled tightly.
- Check the function of horn.
- Check if all bolts and nuts are tightened firmly.
- Check the function of key switch.
- Check the function of speed limitation.
- Visual check if there are any broken electric wires.
- If supplied with a backrest extension, check it for damages and correct assembling.

Note: For the new truck or the truck after the replacement of the wheel, within the first 50 hours of work, the operator must check the tightening of the tire nut before operation every day, if the nut is found loose, it must be tightened with torque of 140Nm. It must be checked again after 50 hours of operation, and then repeated the inspection every 50 hours until there is no loosening (maintain the correct torque).



6. OPERATIONAL INSTRUCTIONS



a. Operational control devices

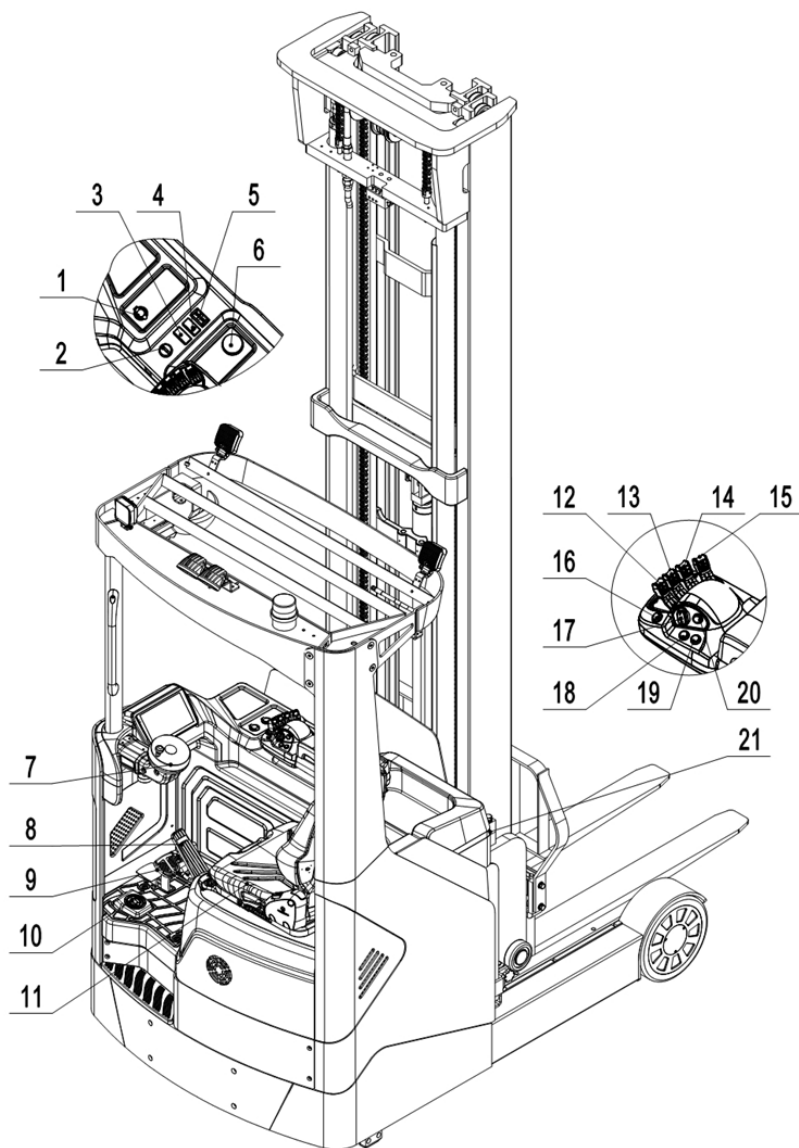


Fig. 11: Operational control devices

b. Power-on operation

Before operating the truck, make sure that the load is stable and will not insufficient poor visibility.

Pull the emergency button (6), insert the key to the key switch (2), and turn the key clockwise to "ON" position, then step on the safety pedal (10). Before starting the truck, press the horn button (20) to warn others if necessary. The truck is power on.

Note: please set the direction switch in the middle before power-on operation, otherwise the operation sequence fault will be reported.

c. Travelling

After starting the truck by turning the inserted key to "ON" position, firstly step on the safety pedal (10), then put your hand on the operating area. Operate the travel direction control forward or backward and there is an arrow which indicates travel direction on the screen. Control the travelling speed by pressing the accelerator pedal (8) carefully until the truck reaches your desired speed. The speed will be slower if you release the accelerator pedal, control the speed to ensure safety. For aggressive deceleration, please stamp the brake pedal (9).

Carefully drive the truck to the destination. Watch the route conditions and adjust the travelling speed with the accelerator control.

This truck is equipped with enough safety equipment to avoid accidents. When the height of the fork is higher than the free lifting height, the speed of the truck will be reduced to achieve smooth walking and safe work. When the fork lower below the free lifting height, the lower the fork height, slower the truck.

Please keep the lifting height of the fork below 0.5 m if the truck travels over a longer distance.

Please drive the truck to the safe storage area and lower the fork to the lowest position after every use. Turn the key counterclockwise to the "OFF" position and remove the key.

Attention: Turn on the power supply, the system will start self inspection. If there is something wrong with the electrical system, such as open circuit, short circuit, or button on the active state, and you stamp the pedal switch, speed controller will not in the neutral position, and the truck will not drive and report default, only when the electrical system is OK, the truck will start normal work.

d. Steering

THE TRUCK IS EQUIPPED WITH AN ELECTRIC STEERING SYSTEM. STEERING IS FLEXIBLE. TAKE CARE IN OPERATING THE TRUCK.

Steer the truck left/right by turning the steering wheel counterclockwise/clockwise.

Turn the steering wheel to drive the truck straightly and reach full speed. Turn the steering wheel at a certain angle to turn the drive wheel during steering, when the angle is larger than $\pm 10^\circ$, the steering speed is different with straight driving speed, the speed will be slower if the turning angle is much larger, it is designed for stable steering and secure operation.

e. Braking

THE BRAKING PERFORMANCE DEPENDS ON THE TRACK CONDITONS AND THE LOAD CONDITONS OF THE TRUCK

- When drive the truck, if the right foot release the accelerator pedal, the truck begins to slow down. If you need a shorter braking distance, please directly step on the brake pedal until it stops;
- Release the safety pedal switch (10), the truck can stop.
- Press the emergency button (6), the truck can stop.

Attention: when the fork is loaded with goods, the brake should be operated slowly. Do not use emergency button please in case of the goods falling.

f. Residual capacity diagram

The residual capacity diagram indicates the maximum capacity Q [kg] for a given load centre c [mm] and the corresponding lift height H [mm] for the truck with horizontal load.

The white mark on the mast indicates the specific lifting limits.

For instance, with a load centre of gravity distance c of 600 mm and a maximum lift height H of 10500 mm, the maximum capacity Q for RT20G is 800 kg.

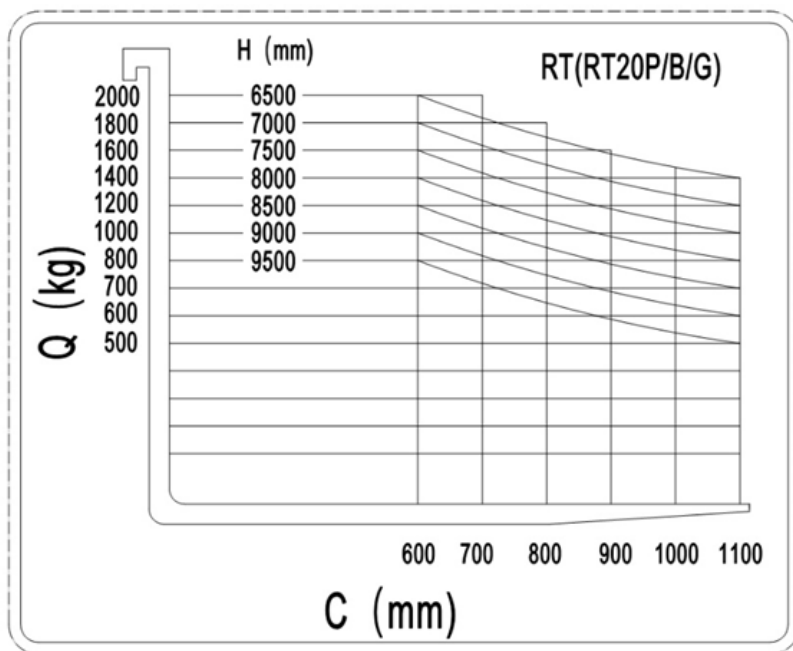


Fig. 12: Residual capacity diagram

g. Lifting



DO NOT OVERLOAD THE TRUCK! THE MAXIMUM CAPACITY IS 2000KG, PLEASE REFER TO THE IDENTIFICATION PLATE.

LIFT THE LOAD ALLOWED IN RESIDUAL CAPACITY DIAGRAM ONLY OR THE TRUCK WILL BE DAMAGED.

Pull the control stick (11) backwards until the truck reaches your desired lifting height.

When the lifting height of the unladen truck is more than 3m or the lifting height of the laden truck is more than 1m, please reduce the travelling speed of truck. Be careful of operation in steering, do not sharply start, stop or steer the truck.

Be cautious in lifting operation in the racks, pay attention to the distance between the load and the rack.

h. Lowering

If the forks are in the racks, firstly remove the truck out of the racks carefully with/ without the pallet.

Push the finger-tip control (12) forwards.

Lower the load until the forks are clear of the pallet, then drive the truck carefully away from the load.

i. Mast reach (extend/retract) control

Operate the finger-tip control (13) forwards, the mast reaches forwards (extend).

Operate the finger-tip control (13) backwards, the mast reaches backwards (retract).

j. Fork side-shift (right/left) control

Operate the finger-tip control (15) forwards, the forks shifts to the left.

Operate the finger-tip control (15) backwards, the forks shifts to the right.

k. Fork tilt (up/ down) control

Operate the finger-tip control (14) forwards, the forks tilts downside.

Operate the finger-tip control (14) backwards, the forks tilts upwards.

l. Pedal adjustment

Press the rocker switch (3) to raise or lower the pedal.

m. Fork leveling

Press and hold the button (18) to make the fork level.

n. Fork centering

Press and hold the button (19) to make the forks centered.

o. Adjusting devices

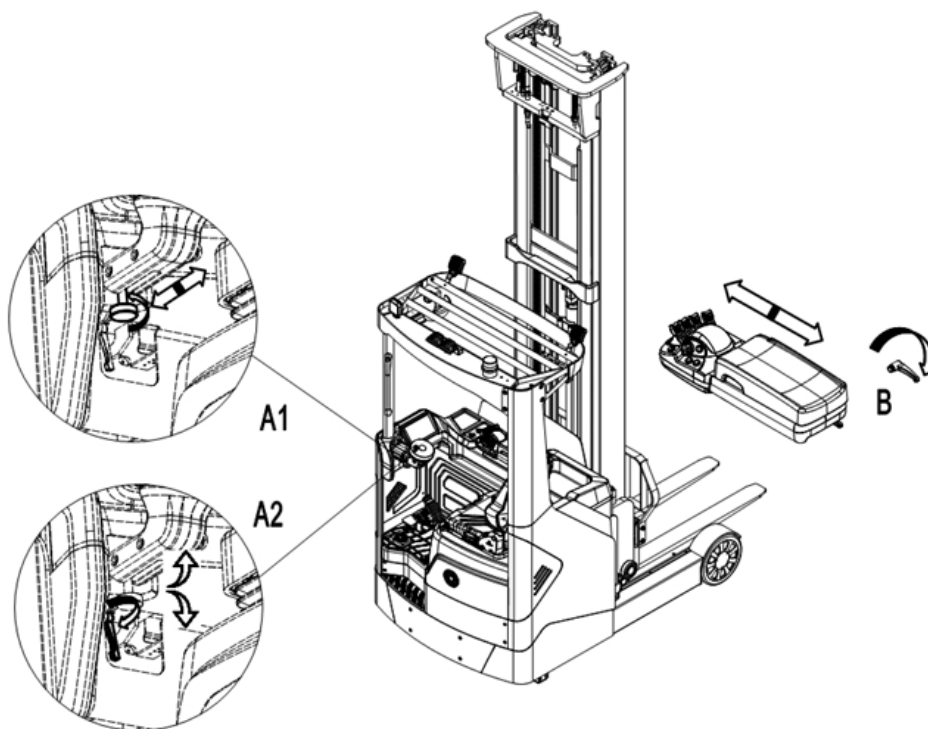


Fig. 13: Adjusting devices for operation positions

A1	Steering Wheel Adjusting Device	Unscrew the adjusting device, move the steering wheel forward and backward to an appropriate position, and then tighten the adjusting device.
A2	Steering Wheel Adjusting Device	Unscrew the adjustment device, adjust the steering wheel up and down tilt to a suitable position, then tighten the adjustment device. Unscrew the adjusting device, tilt the steering wheel up and down to an appropriate position, and then tighten the adjusting device.
B	Central Control Panel Adjusting Device	Unscrew the adjusting device, move the central control panel forward and backward to an appropriate position, and then tighten the adjusting device.

p. Malfunctions

If there are any malfunctions or the truck is inoperative, please stop using the truck and push the emergency button (6). If possible, park the truck in a safe area, turn the key switch (2) counterclockwise and remove the key. Immediately inform the supervisor or call your service. If necessary, tow the truck out of the operating area by using dedicated towing/ lifting equipment.

When the truck is defective, the wrench sign indicator on the bottom of the display screen will be on. Apply CURTIS hand-held programmer to find out the cause.

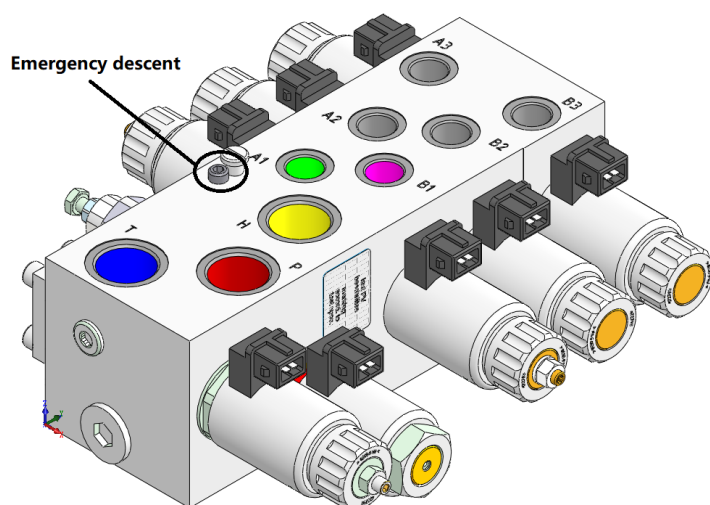
q. Emergency

Immediately push the emergency button (6) in case of truck malfunctions, out of control and other emergency situations. All electrical functions will stop.

If the truck fails lowering the fork after the fork is lifted to the high position, please unscrew the screw (emergency descent) with a 6mm Allen-wrench to lower the fork.

(Maximum tightening torque is $2.5 + 0.5$ Nm).

Note: Manual lowering M8 internal hexagon 4 (loosen max. 1.5 rev.) max. MA = $2.5 + 0.5$ Nm.



7. BATTERY SAFETY, CHARGING AND REPLACEMENT



- Only qualified personnel are allowed to service or charge the battery. The instructions of this manual and from the battery- manufacturer must be observed.
- The lithium battery is allowed for use.
- Recycling of batteries undergoes national regulations. Please follow these regulations.
- By handling batteries, open fire is prohibited, gases could cause explosion!
- Neither burning materials nor burning liquids are allowed in battery charging area. Smoking is prohibited and the area must be ventilated.
- Park the truck securely before starting charging or installing/servicing the battery.
- Before finishing the maintenance work, make sure, that all cables are connected correctly and that there are no disturbing towards other components of the truck.

The truck is equipped with the battery as shown below:

RT20G: 1 pc 76.8V 560AH (standard) [1200x350x600 mm (LxWxH)]



THE WEIGHT OF THE BATTERIES HAS AN INFLUENCE TO THE TRUCKS OPERATING BEHAVIOR.
CONSIDER THE MAXIMUM OPERATING TEMPERATURE OF THE BATTERIES.

a. Battery replacement

Park the truck securely, release the hook for battery, move the mast and the battery assembly forward to an appropriate distance. Turn off the key switch (2), press the emergency button (6), remove the battery connector (21), remove the battery.

Note that if the equipment is not secured, the battery may tip over.

Battery installation is in the reverse order of removal.

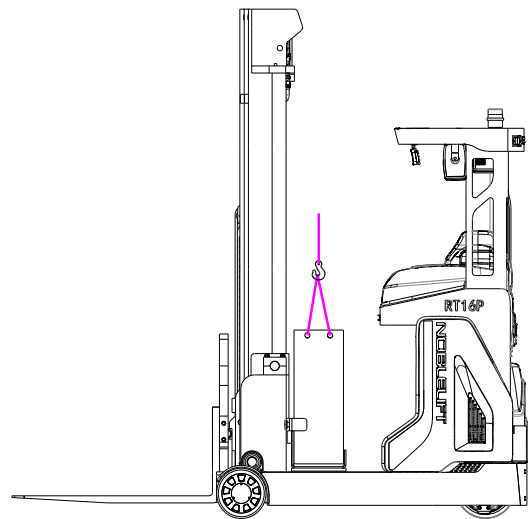


Fig. 14: Battery replacement

b. Charging



- Before charging ensure that the appropriate charger is applied to charge the installed battery.
- Please fully understand the instructions of the charger instructions manual before charging.
- Please follow these instructions.
- The room for charging must be ventilated.

Park the truck at a secured area with dedicated power supply. Lower the forks and remove the load.

Turn the truck off and connect the battery to the charger.

The charger starts charging the battery.

Disconnect the battery from charger after charging.

Connect the battery connector (21) with the the truck.

c. Description of the lithium-ion battery

The lithium-ion battery is a battery with rechargeable cells, the battery is designed for industrial trucks and can withstand related vibrations during operation. The battery is equipped with special connections for charging and discharging operations. Do not try to install or connect improper connectors to the battery.

The battery is equipped with BMS – battery management system, which performs the control of battery condition and implements related safety protocols to protect the battery and cells from damages caused by operation or environmental conditions. The BMS controls the following safety functions and conditions: voltage, temperature, undervoltage, overvoltage, overtemperature, overcurrent, short circuit, etc. The internal resistance of lithium battery is generally low, which minimizes heat generation and maximizes the available power of the truck.

Temperature range for using the battery is from +5°C to +40°C. Low temperatures reduce the effective battery capacity, high temperatures reduce the battery's life time. The temperature difference between the two sides of the battery shall not exceed 5°C.

Only approved battery chargers must be used to charge the lithium battery.

d. Lithium Battery Decals

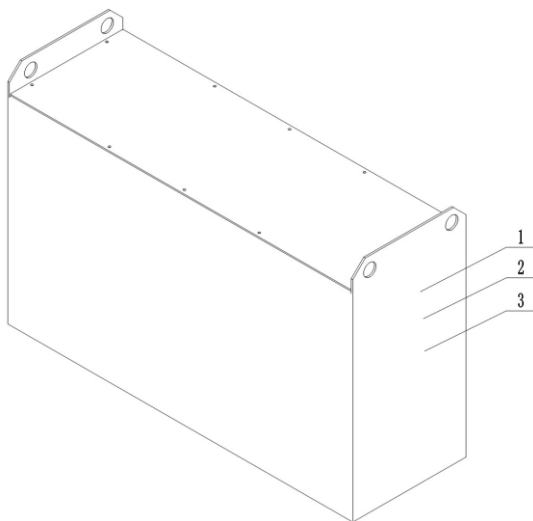


Fig.16: Lithium Battery Decals

Table 3: Lithium Battery Decals

Item	Description
1	Safety information
2	Identification plate
3	Serial number

1		
2	• LOGO	
3	• Model	LFPxx-xx
4	• Nominal Voltage	xx V
5	• Rated Capacity	xx Ah
6	• Energy	xx kWh
7	• Weight	xx kg±xx kg
8	• HW REV	G-CH-FK-R
9	• TCP	xxx
10	• Serial No.	xxx
11	• Date of manufacture	20xx.*
12	• Manufacturer:	
	• Address:	

Fig.17: Lithium Battery identification plate

Table 4: Lithium Battery data plate

Item	Description	Item	Description
1	Manufacturer's Trademark	7	Configuration
2	Battery model	8	Protocol version
3	Nominal voltage	9	Production Serial No.
4	Rated capacity	10	Production date
5	Battery energy	11	Manufacturer
6	Weight	12	Manufacturer's address

e. Safety Instructions, Warning Indications and other Notes

Safety regulations for handling lithium-ion batteries

Do not try to make any repairs or servicing of lithium batteries. Replacement of parts is not assumed.



Risk of electric shock and burning

The battery's charging and discharging connectors have open terminals, avoid any body contacts, contamination or direct contacts with objects which can cause short circuit connection of terminals. Use necessary pre-cautions and protective caps to secure the open terminals. The connectors should be maintained in clean and dry conditions.



Use only batteries designed and approved by the manufacturer for the truck.

Do not try to modify or alter the battery.



Any damage or defects to the charger can result in accidents. Use only charger approved by the manufacturer of the truck, which is suitable for used battery.

In case charger has any damages or defects, exclude the charger from operation and contact your service provider. Do not modify or try to repair the charger.



Improper use of charger or use of wrong charger can cause damages to a battery or charger. Follow the required charger specifications; If the operation voltage of the charger is out of the applicable voltage range, the charger or battery may be damaged causing serious safety risks. The charger in use must be approved by the battery (truck) manufacturer.

Reversed connection of charging plug is prohibited. Follow the instruction for correct connection. For disconnection of charging plug use dedicated grip and never pull out the plug by means of cable.

Stop charging immediately if any abnormalities are detected, e.g. severe temperature increase, deformation of battery case, smoke, noise etc.

Intermediate charging



Lithium batteries support so called opportunity charging. The lithium battery, which is not fully discharged can be charged in any time. However, frequent opportunity charging not to the full charging state and stop of charging process before the appearance of corresponding indication of charger may result in dis-balance voltage of cells which increases the battery BMS calculation error. In order to effectively deal with this phenomenon, charge the battery in full allowing the automotive balancing process to be completed at least once a week.

Do not charge a fully charged battery



Note that in order to prevent the battery from continuing restart of charging under fully charged condition causing reduction of battery lifetime, the BMS has a protection function that prohibits recharging of fully charged battery. The charger will not work while battery is fully charged.

Potential hazards

If equipment is used according to its design purpose, following the correct operations procedures, there are no hazards anticipated.

The following hazards can arise in the event of improper use:

- Physical damage to the battery in case a battery falls or is deformed through impacts. Mechanical damages can cause leakages of harmful materials, fire or battery explosion.
- Short circuits may be caused by short connection of battery terminals, for instance, by water or other intentional/unintentional short connections.
- Temperature damages caused by placing of batteries in overheated environment conditions or being exposed to impact of fire, open sunlight etc. can cause leakages of harmful materials, fire or battery explosion.

In order to avoid fire, explosion and/or leakage of harmful materials, a safe place for storing non-functional or damaged batteries until the service arrives on site must satisfy the following criteria:

- Do not store in places where personnel is located.
- Do not store in places with valuable objects and close to valuable objects.

- A Class D fire extinguisher must be available on demand.
- There should not be any fire or smoke detectors in the storage area in order to ensure that an automatic fire detection system is only activated in the event of actual danger (e.g. flames).
- No ventilation intake pipes should be in the facility to exclude spreading of discharged content within a building.

Examples of where to store a non-functional battery:

- Roofed outdoor position.
- Ventilated container.
- Covered fire resistant box with pressure and smoke discharge option.

Symbols - Safety and Warnings

Table 5: Symbols - Safety and Warnings

	Used lithium-ion batteries must be treated as hazardous waste. Lithium-ion batteries marked with the recycling symbol and the sign showing a crossed-out waste bin must not be disposed of with ordinary household waste.
	Avoid fire and short circuits causing overheating. Do not ignite or locate batteries close to open flame, heat sources or sparks. Keep lithium-ion batteries away from heat sources.
	Caution! Battery short-circuit is prohibited.
	Protect the lithium-ion battery from solar radiation or other forms of heat radiation. Do not expose the lithium-ion battery to heat sources.

Explosion and fire hazard



Physical damage, thermal impacts or incorrect storage in the event of a defect can result in explosions or fire. The battery materials can be flammable.

Particular hazard from combustion products

The lithium batteries may be damaged by a fire. When extinguishing a lithium battery fire, the following information must be taken into consideration.



Contact with combustion products can be hazardous

Fire produces combustion products, which can occur in the form of smoke, through leaking fluids, escaping gases, debris as well decomposition products of certain chemicals. These combustion products are substances that enter the body through the respiratory tract and/or the skin, can produce and adverse effects such as choking.



Avoid contact with combustion products.

Use protective equipment.

Special firefighting protective equipment

Use self-contained breathing apparatus.

Wear protective equipment.

Additional firefighting instructions

To prevent secondary fires, the lithium-ion battery must be cooled from the outside.

Suitable extinguishing agents

- Carbon dioxide extinguisher (CO₂)
- Water (not on mechanically opened or damaged batteries)

Unsuitable extinguishing agents

- Foam
- Grease fire extinguishing agents
- Powder extinguishers
- Metal fire extinguishers (PM 12i extinguishers)
- Metal fire powder PL-9/78 (DIN EN 3SP-44/95)
- Dry sand

Instructions for cooling an overheated, non-physically damaged battery

This type of damage may be caused by a short circuit inside the battery, which may result in leakage of harmful materials, fire or battery explosion.

Material discharge



Battery electrolyte fluid can be hazardous

Electrolyte fluid can be discharged if the battery is physically damaged. Avoid its contact with skin or eyes. If the contact happened:

- Rinse the affected parts with big amount of water and request for medical assistance immediately.
- In case of skin irritation or if any substances are breathed in request the medical assistance immediately.

Precautionary measures for personnel

- Keep personnel away, avoid any contact with smoke or discharged materials.
- Block off the affected area and ensure its reasonable ventilation.
- Wear personal protective equipment. If vapors, dust or aerosols are presented use self-contained breathing apparatus.

Precautionary measures for the environment

Do not allow spilled fluids to enter the water system, drainage system or the underground water.

Cleaning measures

The leaked fluid must be removed professionally following the related protocols.

Battery lifetime, maintenance and storage

The lithium-ion batteries are maintenance-free.

Deep discharge can damage the battery

Self-discharge without periodical recharge can lead the battery to fully discharged state. Full discharge shortens the service life of the battery and can cause deep discharge and activation of related safety protocols when battery will not be able to be charged anymore.

Before a long period of inactivity, the battery must be charged to 40%–60%.

Control the level of battery charge at least every 12 weeks and re-charge if necessary.

The temperature range for storing of the battery should be within the range of 0°C to 30°C.

If the battery is deeply discharged or if the battery temperature is below the permissible level, the battery cannot be charged. Deeply discharged batteries can never be charged. Due to the risk of condensate formation, batteries that have been stored at 0°C or below must only be charged after natural warming up to at least +5°C, forced heating is forbidden.

Instructions for safe handling of batteries

- Do not modify the battery.
- Do not open, damage, drop, penetrate or deform the battery.
- Do not throw the battery into a fire.
- Protect the battery from overheating.
- Protect the battery from direct sun light.
- Follow storage and charging procedures
- Protect the battery from water damages and other impacts

Failure to comply with these safety instructions can result in fire and explosion or the leakage of harmful materials.

Pre-shift checks before the system is put into operation

Check that the battery is in its normal condition, has no evidence of damages, leakages, abnormal findings, e.g. high temperature, smell, smoke etc. The surface of the battery should be clean and dry, without evidence of water damages, marks of rust on terminals and housing (if applicable). Connecting cables and plugs are in good condition.

Faults



If any damage is found to the battery or battery charger contact the service provider immediately. Do not open the battery or attempt to repair it.

Disposal and transport of a lithium-ion battery

Instructions for disposal

Lithium-ion batteries must be disposed in accordance with the relevant national environmental protection regulations. Batteries must be treated as hazardous waste. Batteries must not be disposed with ordinary waste.

Shipping information

The lithium-ion battery is a hazardous material. The applicable regulations must be fulfilled during transportation.

Shipping functional batteries

Functioning batteries can be shipped in accordance with the related regulations

Shipping faulty batteries

To transport faulty lithium-ion batteries, contact the service provider. Faulty lithium batteries require following of special transporting procedures.

8. REGULAR MAINTENANCE



- Only qualified and trained personnel are allowed to do maintenance on this truck.
- Before maintaining, remove the load from the forks and lower the forks to the lowest position.
- If you need to lift the truck, follow chapter 4b by using designated lashing or jacking equipment. Before working, put safety devices (for instance designated lift jacks, wedges or wooden blocks) under the truck to protect against accidental lowering, movement or slipping.
- Please pay attention by maintain the tiller arm. The gas pressure spring is pre-loaded by compression, carelessness can cause injury.
- Use approved and from your dealer released original spare parts.
- Please consider that oil leakage of hydraulic fluid can cause failures and accidents.
- It is allowed to adjust the pressure valve only from trained service technicians.

Check the items emphasized in maintenance checklist.

a. Maintenance checklist

		Interval (Month)			
		1	3	6	12
	Hydraulic system				
1	Check the hydraulic cylinder(s), piston for damage noise and leakage		•		
2	Check the hydraulic joints for damage and leakage		•		
3	Inspect the hydraulic oil level, refill if necessary		•		
4	Refill the hydraulic oil (12 month or 1500 working hours)				•
5	Check and adjust the pressure valve				•
	Mechanical system				
6	Inspect the forks for deformation and cracks		•		
7	Check the chassis for deformation and cracks		•		
8	Check if all screws are fixed		•		
9	Check mast and chain for deformation and damages, replace if necessary	•			
10	Check the gearbox for abnormal sound, noise and leakage		•		
11	Check the wheels for deformation and damages, replace if necessary		•		
12	Check and lubricate the mast and chain	•			
13	Check and fill the brake fluid if necessary	•			

14	Lubricate the grease nipples		•		
15	Check the function of brake	•			
	Electrical system				
16	Inspect the electric wiring for damage		•		
17	Check the electric connections and terminals		•		
18	Test the Emergency switch function		•		
19	Check the electric drive motor for noise and damages		•		
20	Test the display		•		
21	Check, if correct fuses are used		•		
22	Test the warning signal		•		
23	Check the contactor (s)		•		
24	Check the frame leakage (insulation test)		•		
25	Check function and mechanical wear of the accelerator		•		
26	Check the electrical system of the drive motor		•		
	Braking system				
27	Check brake performance, if necessary replace disc or adjust air gap		•		
	Battery				
28	Check the battery		•		
29	Clean and grease the terminals and check for corrosion and damage		•		
30	Check the battery housing for damages		•		
	Charger				
31	Check the main power cable for damages			•	
32	Check the start-up protection during charging			•	
	Function				
33	Check the horn function	•			
34	Check the air gap of the electromagnetic brake	•			
35	Test the emergency braking	•			
36	Test the reverse and regenerative braking	•			
37	Check the steering function	•			
38	Check the lifting and lowering function	•			
39	Check the tiller arm switch function	•			
40	Check the key switch for damage or normal work	•			
41	Check the speed limitation switch function	•			
	General				
42	Check if all decals are legible and complete	•			
43	Check if the protective screen and or guarding is not damaged	•			
44	Inspect the castors, adjust the height or replace these if worn out.		•		
45	Carry out a test run	•			

b. Lubricating points

Lubricate the marked points according to the maintenance checklist. The required grease specification is: DIN 51825, standard grease.

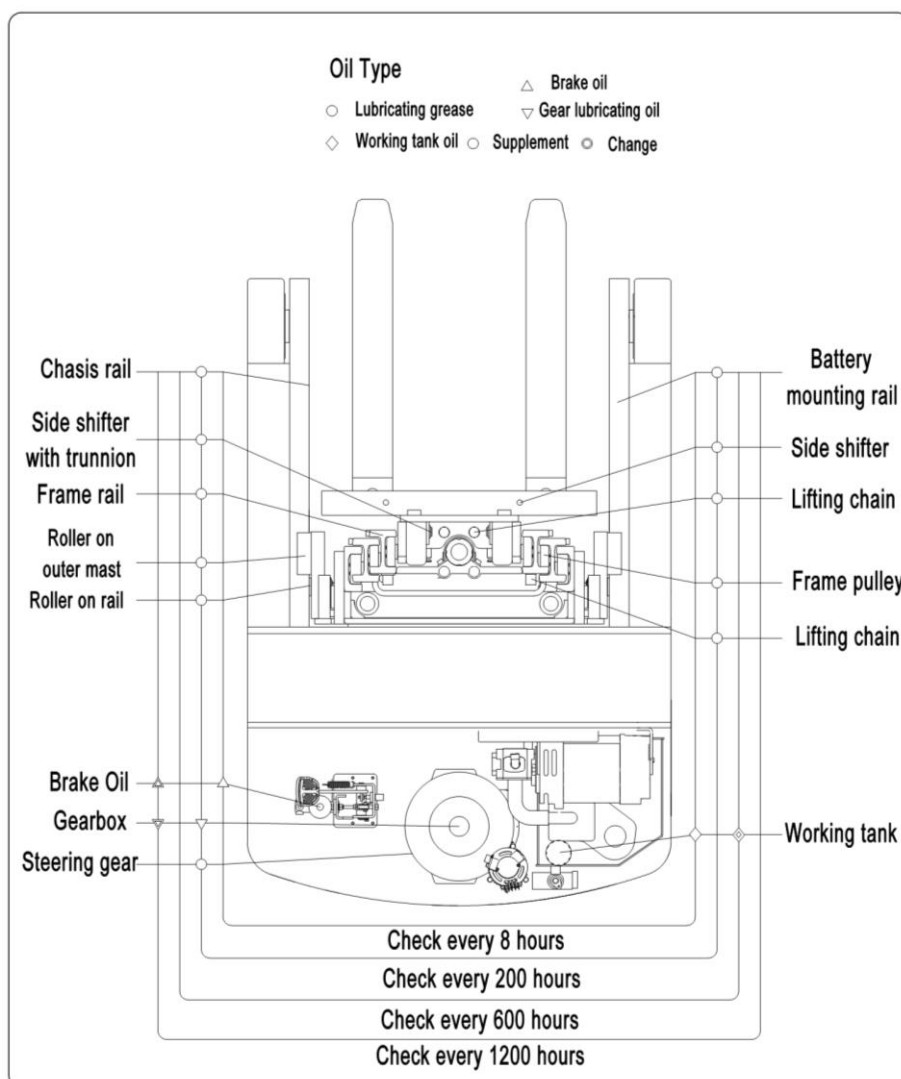


Fig 18: Lubricating points

c. Check and refill hydraulic oil

It is recommended to use the hydraulic oil:

Type	Grade and Code	Volume	Temperature
Hydraulic oil	L-HV-32	MAX45L	-30°C-25°C
	L-HM-46	MAX45L	25°C-35°C
	L-HM-68	MAX45L	> 35°C
Gear oil	80W-90	GK25(3.3L)	-28°C-40°C
Brake oil	Caltex DOT3	0.2L	
Lubricating grease	3#GP-A		

Waste material like oil, used batteries or other must be probably disposed and recycled according to the national regulations and if necessary brought to a recycling company.
The oil level in the oil tank should not be under the min marks for lifting goods.
If necessary add oil at the filling point.

d. Checking electrical fuses

Remove the plastic cover, the location of fuses is shown in Fig 19 below. Size of the fuses is shown in Table 6 below.

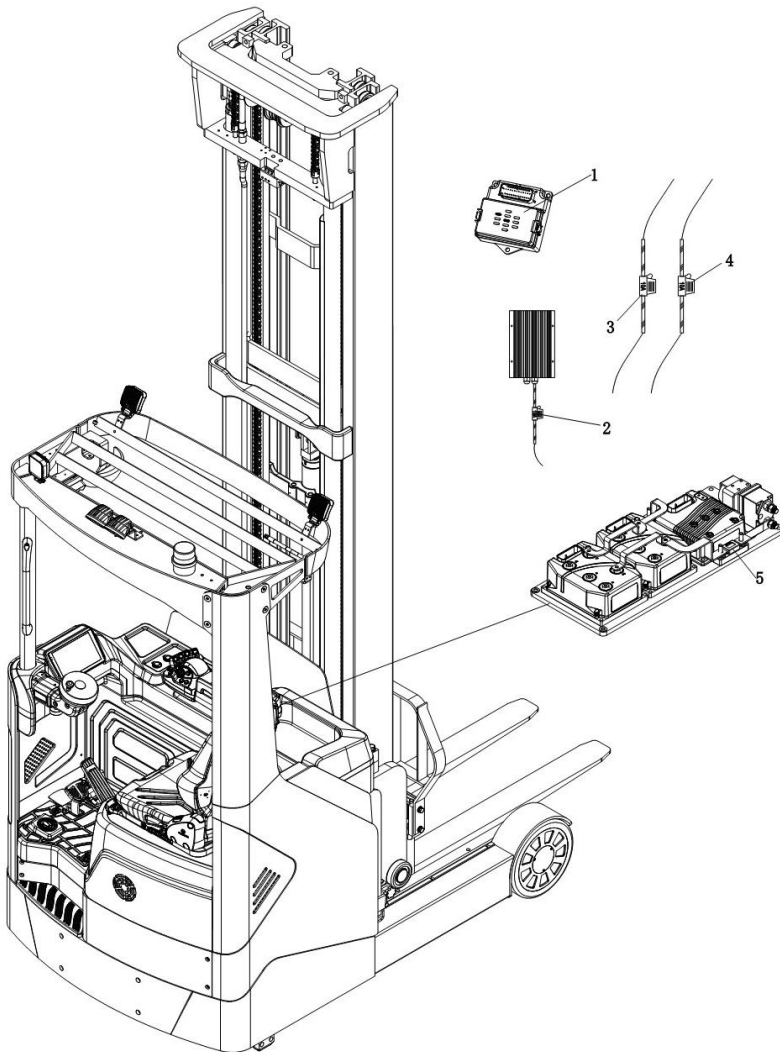


Fig 19: Location of fuses diagram

Table 6: Size of the fuses

	Rate	Qty
FU 1	10A	1
FU 2	10A	1
FU 3	10A	1
FU 4	30A	1
FU 5	500A	1

9. TROUBLE SHOOTING



If the truck has malfunctions follow the instructions, mentioned in chapter 6.

Table 7: Trouble shooting

TROUBLE	CAUSE	MAINTENANCE
Load lifting failure	Load weight too high	Lift only the max. capacity, mentioned on the ID-plate
	Battery discharged	Charge the battery
	Lifting fuse failure	Check and eventually replace the lifting fuse
	Hydraulic oil level too low	Check and eventually refill hydraulic oil
	Oil leakage	Repair the hoses and/or the sealing of the cylinder
Oil leakage from air suction	Excessive quantity of oil	Reduce oil quantity.
Truck failure operating	Battery is charging	Charge the battery completely and then remove the main power plug from the electrical socket.
	Battery not connected	Connect the battery correctly
	The fuse is faulty	Check and eventually replace fuses
	Battery discharged	Charge the battery
	Emergency button is activated	De-activate the button by inserting and pulling the knob.
Only travelling in one direction	The accelerator and the connections are damaged.	Check the accelerator and the connections.
The truck only travels very slowly	The battery is discharged.	Check the battery status at the discharge indicator
	The electromagnetic brake is engaged.	Check the electromagnetic brake
	The relating tiller cables are disconnected or damaged	Check the tiller cables and connections.
	Electric system overheated	Stop using and cool down the truck
	Heat sensor failure	Check and if necessary replace the heat sensor
The truck starts up suddenly	The controller is damaged.	Replace the controller.
	The accelerator not moves back to its neutral position.	Repair or replace the accelerator.

If the truck has malfunctions and can't be operated out of the working zone, jack the truck up and go with a load handler under the truck and safe the truck securely. Then move the truck out of the aisle.

10. HYDRAULIC DIAGRAM

a. Hydraulic diagram

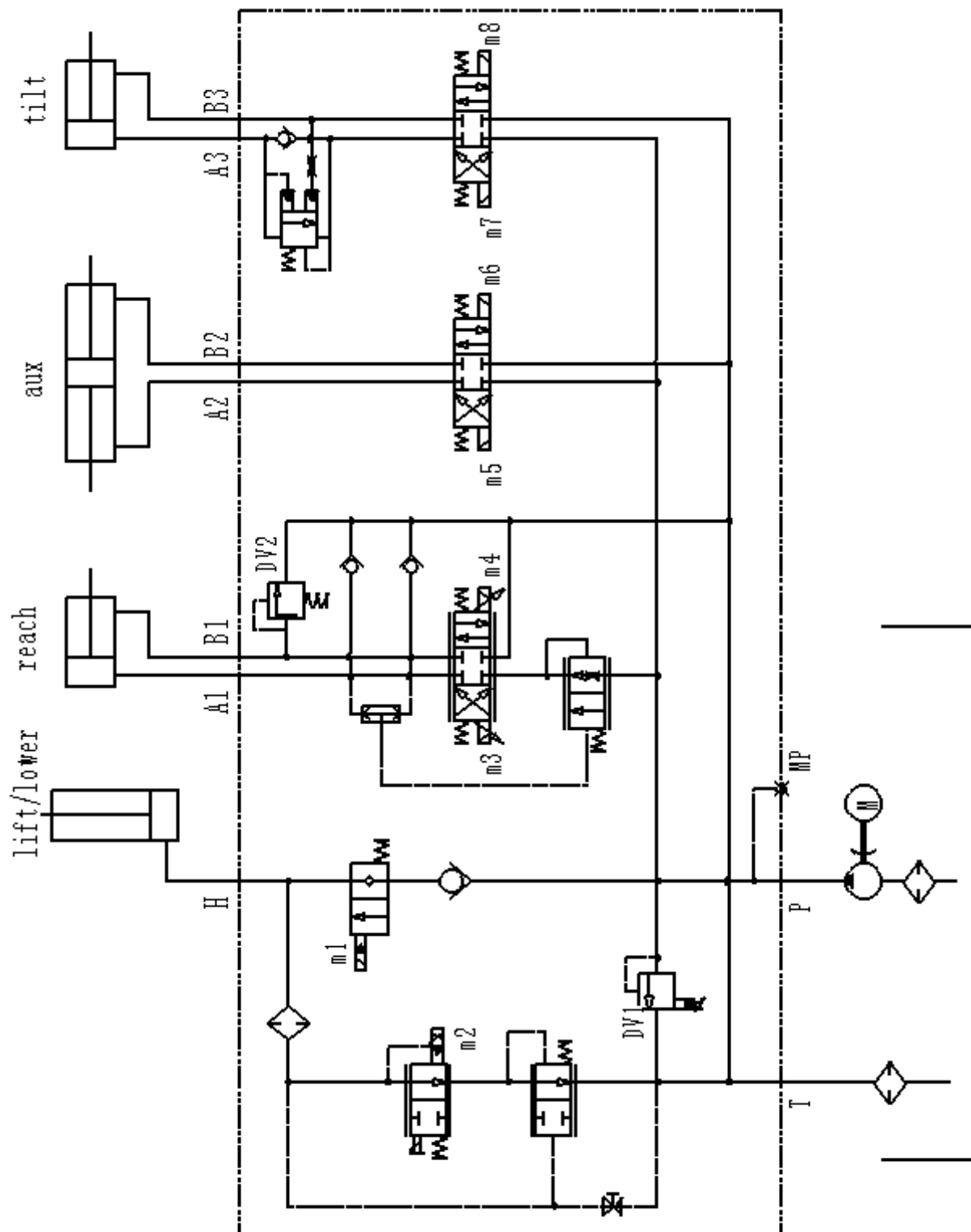


Fig. 20: Hydraulic diagram

11. BRAKE SYSTEM DIAGRAM

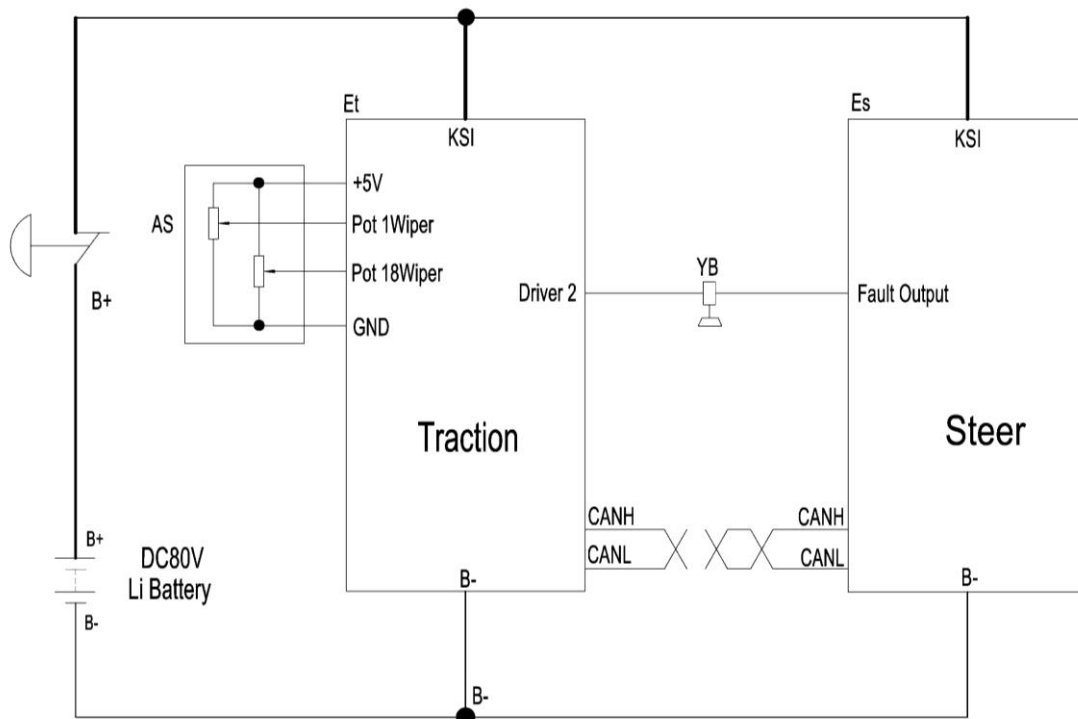
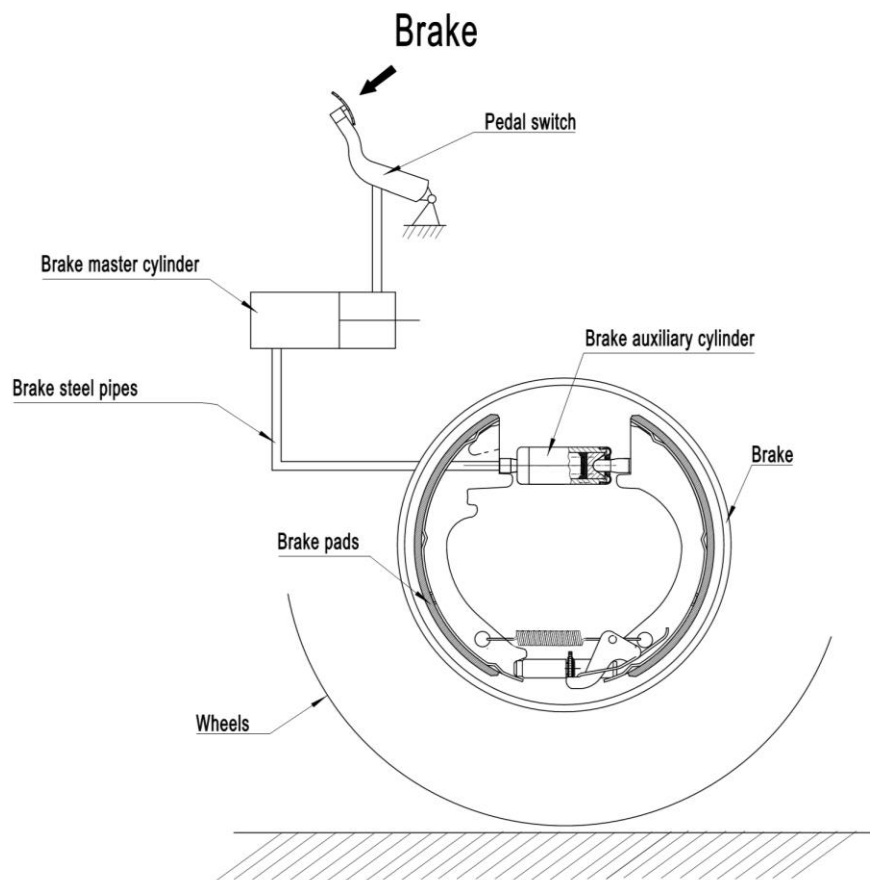


Fig. 21: Braking system diagram

12. DIAGNOSTICS, TROUBLESHOOTING, DISPLAY AND ELECTRICAL WIRING DIAGRAM

For truck with F4A controller

These controllers detect a wide variety of faults or error conditions. Faults can be detected by the operating system or by the VCL code. This section describes the faults detected by the operating system. Diagnostics information can be obtained in either of two ways:

- (1) by reading the display on a hand-held or PC programmer or
- (2) by observing the fault codes issued by the Status LEDs. See Table for a summary of LED display formats.

The pair of LEDs built into the controller (one red, one yellow) produce flash codes displaying all the currently set faults in a repeating cycle. Each code consists of two digits. The red light flashes once, indicating that the number of times the yellow light flashes below is the first digit of the fault code, and the red light flashes twice, indicating that the number of times the yellow light flashes below is the second digit of the fault code.

Example: red light flashes once, followed by yellow light flashes four times. Then the red light blinks twice, then the yellow light blinks twice, so the fault code is 42. Please refer to the list of fault information in this manual for relevant fault codes and causes.

In the fault menu of the programmer, the words **Throttle Wiper Low** will be displayed if the accelerator output is low.

The controller's two LEDs will display this repeating pattern:

RED	YELLOW	RED	YELLOW
*	* *	* *	* * *
(first digit)	(2)	(second digit)	(3)

The numerical codes used by the yellow LED are listed in the troubleshooting table, which also lists possible fault causes and describes the conditions that set and clear each fault.

Summary of LED display formats

The two LEDs have four different display modes, indicating the type of information they are providing:

DISPLAY	STATUS
Neither LED illuminated	Controller is not powered on/ vehicle has dead battery/ or severe damage.
Yellow LED flashing	Controller is operating normally.
Yellow and red LEDs both on solid	Controller is in Flash program mode.
Red LED light on solid	No software loaded, or an internal hardware fault detected by the Supervisor or Primary microprocessor. Cycle KSI to clear. Reload software or replace controller if necessary.
Red LED and yellow LED flash alternately	Controller has detected a fault. 2-digit code flashed by yellow LED identifies the specific fault; one or two flashes by red LED indicate whether first or second code digit will follow.

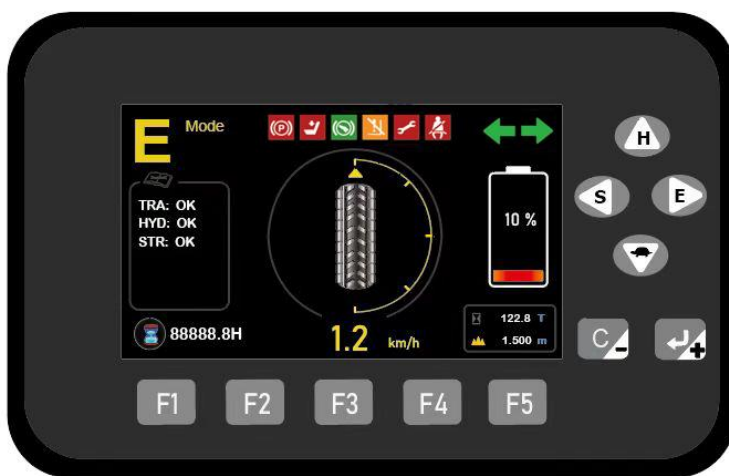
Troubleshooting

The troubleshooting chart provides the following information on all the controller faults:

- fault code
- fault name as displayed on the programmer's LCD
- the effect of the fault
- possible causes of the fault
- fault set conditions
- fault clear conditions.

Whenever a fault is encountered and no wiring or vehicle fault can be found, shut off KSI and turn it back on to see if the fault clears. If it does not, shutoff KSI and remove the 35-pin connector. Check the connector for corrosion or damage, clean it if necessary, and re-insert it.

CURTIS-3401 Display (F4A)



The indications of the icons below:



Left turn



Right turn



Battery charge is below 10% battery, lift lockout is activated.



Parking



Safety pedal



Seat



Seat belt



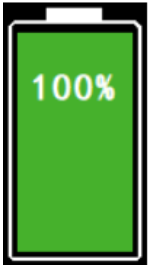
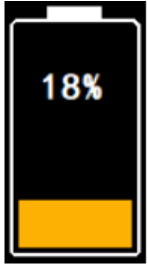
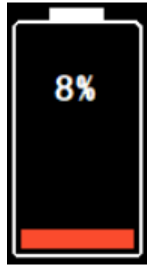
Fault active



Turtle speed mode

Battery Discharge Indicator (BDI)

The BDI area uses the following gauges to indicate the battery's state of charge (0~100%). The battery voltage also may be displayed, as shown in the example below for lead-acid batteries. The gauge colors depend upon the BDI percentage:

Icon			
BDI Status	Okay	Warning	Low
BDI Percentage	20–100%	10–19%	0–9%
Note	Green battery icon is on.	Yellow battery icon flashes.	Red battery icon flashes and the  icon displays.

When the display is in Password Screen, the functions of keys are listed below:

F1: Specifies the number 1.

F2: Specifies the number 2.

F3: Specifies the number 3.

F4: Specifies the number 4.

F5: Specifies the number 5.

▲: Specifies whether the password is for the User or OEM access level. H key specifies the high speed mode, maximum travel speed is 10Km/h.

▼: Specifies whether the password is for the User or OEM access level. Turtle key specifies the turtle speed mode, maximum travel speed is 6.3Km/h.

◀: Specifies whether the password is for the User or OEM access level. S key specifies the standard speed mode, maximum travel speed is 8.4Km/h.

▶: Specifies whether the password is for the User or OEM access level. E key specifies the economy speed, maximum travel speed is 6.3Km/h.

C/-: If password characters have been entered, press this key to clear the last number. If password characters have been cleared, press this key to return to the home screen.

↵/+: If all the 5 password characters have been entered, press the this key and the display will automatically check whether the password characters are entered correctly or not. If the password is correct, the display will enter the corresponding menu; if the password is incorrect, the display will show the password error. Note: if the entered password is less than 5 characters, pressing this key is invalid.

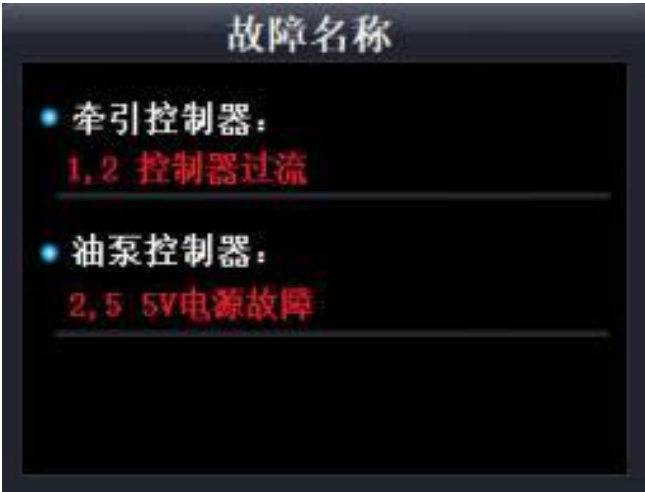
Fault Name Screen

When the 3401T-5002 display is in Home Screen, press the **↵/+** key, the display opens the Fault Name Screen. The fault code and the corresponding fault name according to the controller fault code will be shown on the display. When the battery is removed, the display shows fault 6-A, traveling does not work, while the mast can be moved forward/ backward.

For single-drive-truck, the Fault Name Screen is shown as follows:



(Language: English)

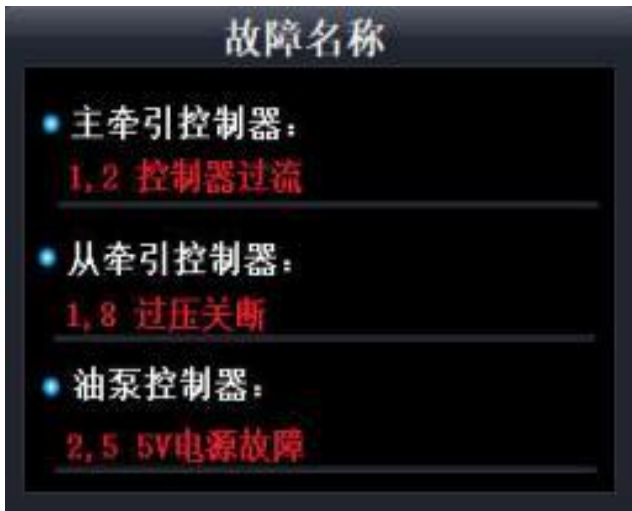


(Language: Chinese)

For dual-drive-truck, the Fault Name Screen is shown as follows:



(Language: English)



(Language: Chinese)

Electrical circuit diagram

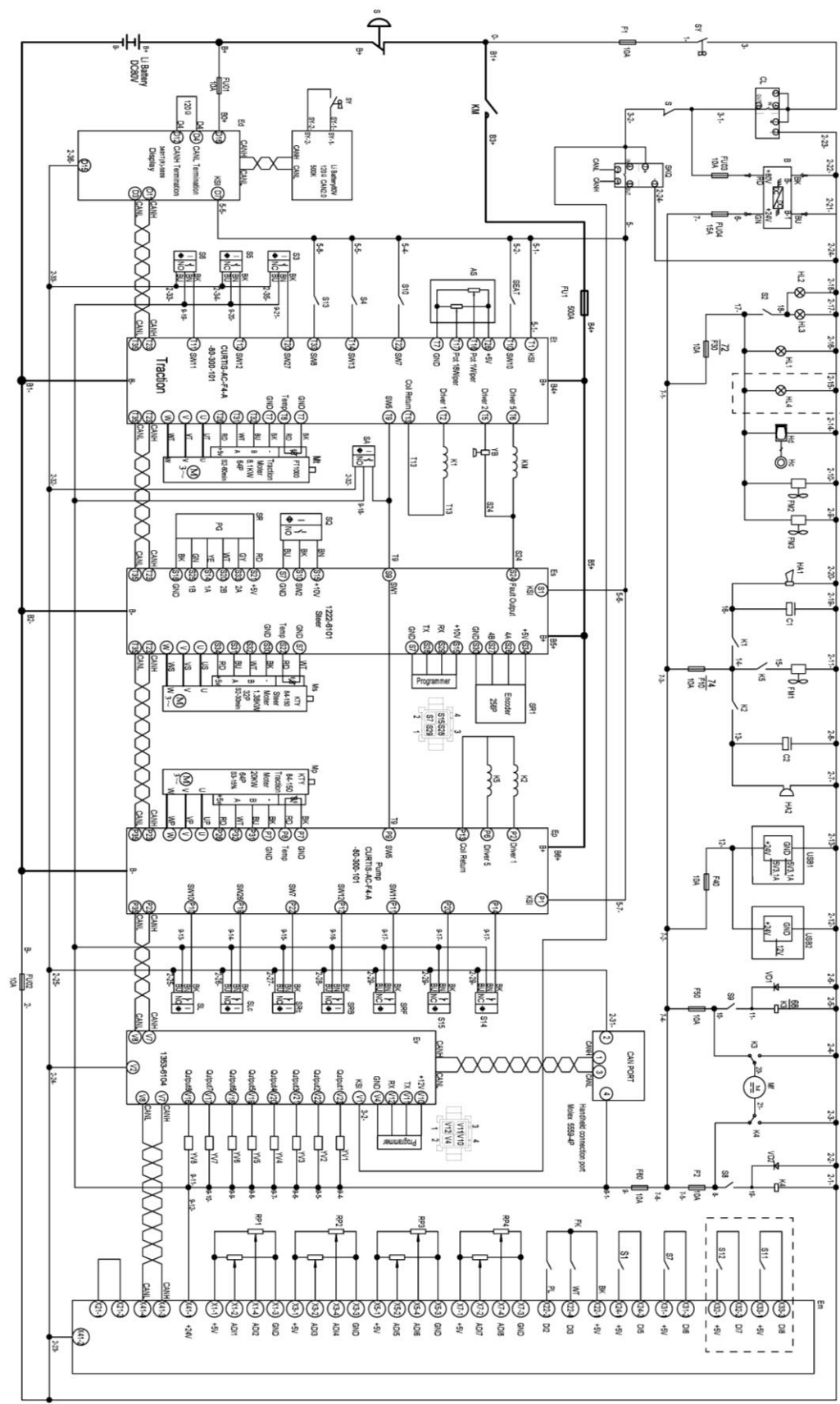


Fig. 22: Electrical circuit diagram

Table 8: Description of electrical components (truck with F4A controller)

Code	Item	Code	Item
Li Battery	Lithium Battery 80V	Mt	Traction Motor
S	Emergency Switch	Mp	Hydraulic Pump Motor
Ms	Steering Motor	Es	Steering Controller
Et	Traction Controller	Ed	Display
SQ	0-position Switch	SR	Steering Wheel
SEAT	Seat Switch	FU1	Fuse
Ep	Hydraulic Pump Controller	AS	Accelerator Pedal
SY	Key Switch	KM	Main Contactor
YB	Electromagnetic Brake	B	Main Directional Valve
SA	Pedal Switch	C1	Capacitor
F1	Fuse	S1	Horn Button
S2	Lamp Switch	S3	Brake Switch
S4	180/360 Switch	S5	Speed Limit Switch
S6	Battery Detection Switch	S7	Parking Brake Switch
SKQ	Fingerprint Lock	SL	Mast Limit Switch
SLC	Mast Speed Limit Switch	SRF	Mast Reach FW. Limit Switch
SRB	Mast Reach BW. Limit Switch	SRC	Mast FW./BW. Speed Limit Switch
HA1	Horn	HL1	Warning Light
HL2	Front Lamp	HL4	Blue Ray Light
FM1	Fan	HD	7-inch Display
HC	Camera	C2	Capacitor
FM2	Fan	FM3	Fan
HL3	Front Lamp	HA2	Reverse Beeper
K2	Reverse Relay	FK	Direction Switch
EV	Solenoid Valve	YV1	Lift Valve
YV2	Lowering Proportional Valve	YV3	Reach BW. Proportional Valve
YV4	Reach FW. Proportional Valve	YV5	Tilt Up Valve
YV6	Tilt Down Valve	YV7	Right Shift Valve
YV8	Left Shift Valve	VD1	Diode
USB1	USB	K1	Horn Relay
RP1	Lift/Lowering Fingertip Switch	RP2	Reach FW./BW. Fingertip Switch
PR3	Tilt Up/Down Fingertip Switch	PR4	Left/Right Shift Fingertip Switch
S8	Pedal Lowering Switch	S9	Pedal Raising Switch
S10	Seat Belt Switch	K3	Pedal Lowering Relay
K4	Pedal Raising Relay	VD2	Diode
USB2	Cigarette Lighter	F30	Blade Fuse
F40	Fuse	F10	Blade Fuse
FU01	Fuse	FU02	Blade Fuse
FU03	Fuse	FU04	Blade Fuse
F50	Fuse	F2	Blade Fuse
F60	Fuse	Em	Module
SY	Key Switch	SR1	Encoder

MF	Linear Actuator	S11	Fork Centering Switch
S12	Fork Leveling Switch	K5	Fan Relay
S13	Middle Mast Speed Limit Switch	S14	Fork Leveling Switch
S15	Fork Centering Switch	CL	PIN Code Panel

13. DIAGNOSTICS AND TROUBLESHOOTING

Troubleshooting chart of F4A controller (traction and pump controller)

NO.	FLASH CODE	FAULT NAME	FAULT ACTIONS	POSSIBLE CAUSES	FAULT CAUSE	NOTE
				SET/CLEAR CONDITIONS		
1	1-2	Controller Overcurrent Fault Type(s): 1 = Controller OverCurrent Phase U 2 = Controller OverCurrent Phase W 3 = Controller OverCurrent Phase V 4 = Irms > 135 % Current Limit	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. External short of phase U, V, or W motor connections. 2. Speed encoder noise problems. 3. Motor parameters are mistuned. 4. Controller defective.	Controller	
2	1-3	Current Sensor Fault Type(s): 1	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective. Clear: Reset Controller.	Controller	
3	1-4	Precharge Failed Fault Type(s): 1 = Abort. 2 = Energy Limit Exceeded 3 = Time Limit Exceeded	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. An external load on the capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging. 2. See Programmer » System Monitor menu » Controller » Capacitor Voltage. Clear: Reset Controller.	Controller	
4	1-5	Controller Severe Undertemp Fault Type(s): 1	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Controller is operating in an extreme environment. 2. See Programmer » System Monitor menu » Controller » Controller Temperature. Clear: Bring the heatsink temperature above -40°C and then Cycle KSI or Interlock, if fault is still there, Reset Controller.	Controller	

5	1-6	Controller Severe Overtemp Fault Type(s): 1	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller. 4. See Programmer » System Monitor menu » Controller » Controller Temperature. Clear: Bring heatsink temperature below +95°C and then Cycle KSI or Interlock, if fault is still there, Reset Controller.	Controller	
6	1-7	Severe B+ Undervoltage	No drive torque.	1. Non-controller system drain on battery. 2. Battery resistance too high. 3. Battery disconnected while driving. 4. Blown B+ fuse or main contactor did not close. 5. Battery parameters are misadjusted. 6. See Programmer » Monitor menu » Controller » Capacitor Voltage.	Controller	
7		Severe KSI Undervoltage	<u>Fault Action:</u> None, unless a fault action is programmed in VCL.	1. Non-controller system drain on battery/keyswitch circuit wiring. 2. Resistance in low power (KSI) circuit is too high. 3. KSI disconnected while driving. 4. Blown fuse. 5. See Programmer»System Monitor menu» Battery» Keyswitch Voltage.	Controller	
8	1-8	Severe B+ Overvoltage	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Battery parameters are misadjusted. 2. Battery resistance too high for given regen current. 3. Battery disconnected while regen braking. 4. See Programmer» System Monitor menu » Controller » Capacitor Voltage.	Controller	
9		Severe KSI Overvoltage	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle	1. Battery-voltage applied to KSI (pin 1) exceeds the Severe Overvoltage limit. 2. See Programmer » Monitor	Controller	

			FullBrake	menu » Battery » Keyswitch Voltage.		
10	1-9	Speed Limit Supervision	ShutdownInterlock ShutdownEMBrake	1. Motor speed detected that exceeds the limit set by the Max Speed. Supervision parameter. 2. Misadjusted Max Speed Supervision parameters. 3. See: Programmer » Application Setup » Max Speed Supervision menu.	Controller	
11	1-A	Motor Not Stopped Fault Type(s): 1 = The motor moved more revolutions than the parameter, Motor_Not_Stopped_Position_Error setting. 2 = The motor moved faster than the parameter, Motor_Not_Stopped_Speed_Error (RPM) for 160ms. 3 = The three-phase drive has applied an electrical frequency greater than the Motor_Not_Stopped_Max_Frequency parameter, and applied an RMS current greater than the Motor_Not_Stopped_Max_Current parameter for 64 ms.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Misadjusted Motor Not Stopped parameters. 2. See: Programmer » Application Setup » Motor Not Stopped menu. 3. Internal Controller fault or conflict allowing the motor to rotate when in the stopped state.	Controller	
12	1-B	Critical OS General Fault Type(s): (<100) Internal Fault. Contact Curtis support. (>100) An ill-formed or corrupted application package was loaded into controller.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1-7 ShutdownPD FullBrake ShutdownPump ShutdownCoilSupply	1. (<100) Internal Fault. 2. (>100) CIT version is too old to fully support the FOS version.	Controller	
13	1-C	OS General 2 Fault Type(s): (<100) Internal Fault. Contact Curtis support. (>100) An ill-formed or corrupted application package was loaded into controller.	NO ACTION (controller is not operable)	1. (<100) Internal Fault. 2. (>100) CIT version is too old to fully support the FOS version.	Controller	

14	1-D	Reset Rejected Fault Type(s): 1	ShutdownInterlock ShutdownThrottle	Clear: Cycle KSI.	Controller	
15	1-E	Motor Short Fault Type(s): 1	NO ACTION (controller is not operable)	Clear: Reset controller.	Controller	
16	2-2	Controller Overtemp Cutback	Reduced drive torque. Reduced regen-braking torque.	1. Controller is operating in an extreme environment. 2. Excessive load on vehicle. 3. Improper mounting of controller which is preventing controller cooling. 4. Controller is performance-limited at this temperature. 5. See Programmer » System Monitor menu » Controller » Temperature. Clear: Bring heatsink temperature below 85°C and then Cycle KSI or Interlock, if fault is still there, Reset Controller.	Controller	
17	2-3	Undervoltage Cutback Fault Type(s): 1	Reduced drive torque.	1. Batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Non-controller system-drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. Blown B+ fuse or main contactor did not close. 7. See Programmer » System Monitor menu » Controller » Cutbacks» Undervoltage Cutback. 8. See Programmer» System Monitor menu » Controller » Capacitor Voltage.	Controller	
18	2-4	Overvoltage Cutback Fault Type(s): 1	Reduced brake torque. Note: This fault is declared only when the controller is running in regen.	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted.	Controller	

				3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Programmer » System Monitor menu » Controller » Cutbacks » Overvoltage Cutback. 6. See Programmer» System Monitor menu » Controller » Capacitor Voltage.		
19	2-5	Ext 5V Supply Failure Fault Type(s): 1 = 5V Supply's voltage is out-of-range 2 = 5V Supply's current is out-of-range	Disables the 5V Supply.	1. External load impedance on the +5V supply (pin 16) is too low. 2. See the System Monitor » Outputs menu: External_5V_Supply, Ext_5V_Current.	Controller	
20	2-6	Ext 12V Supply Failure Fault Type(s): 1 = 12V Supply's voltage is out-of-range 2 = 12V Supply's current is out-of-range	Disables the 12V Supply.	1. External load impedance on the +12V supply (pin 23) is too low. 2. See Programmer» System Monitor menu » Outputs: External_12V_Supply, Ext_12V_Current.	Controller	
21	2-8	Motor Temp Hot Cutback	1. Torque is reduced. 2. If MotorBraking Thermal CutBack_Enable = On, then Regen Braking.	1. Motor temperature is at or above the programmed Temperature Hot setting—resulting in a reduction of controller drive current. 2. The motor temperature and sensor control parameters are misadjusted. 3. See Programmer » AC Motor Setup » Temperature Sensor.	Controller	
22	2-9	Motor Temp Sensor	Enter LOS mode. Motor speed is reduced. Motor temperature cutback disabled.	1. Motor thermistor is not connected properly. 2. Sensor polarity (between pin 9 and pin 12) is incorrect. 3. The motor temperature and sensor parameters are misadjusted. 4. See Programmer» System Monitor menu » AC Motor » Temperature.	Controller	
23	3-1	Main Driver Fault Type(s): 1 = Drive short. 2 = Drive Overcurrent.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil.	Controller	

		3 = Driver open/ short (Voltage measured high, should be low.) 4 = Drive open/ short (Voltage measured low, should be high.) 5 = Wiring disabled.	FullBrake	3. Bad connector crimps or faulty wiring.		
24	3-2	EM Brake Driver Fault Fault Type(s): 1 = Drive short. 2 = Drive Overcurrent. 3 = Driver open/ short (Voltage measured high, should be low.) 4 = Drive open/ short (Voltage measured low, should be high.) 5 = Wiring disabled.	ShutdownEMBrake ShutdownThrottle FullBrake	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring.	Controller	
25	3-4	Load Hold Diver Fault	The assigned driver is open.	Same as Driver 1 Fault	Controller	
26	3-5	Lower Driver Fault	Shutdown the assigned driver.	Same as Driver 1 Fault	Controller	
27	3-6	Encoder Fault Fault Type(s): 1. Checksum loss. 2. Pulse loss due to Over-current. 3. Speed pulse signal loss. 4. Motor matching. 5. Encoder supply failed.	ShutdownEMBrake ShutdownThrottle FullBrake	1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Programmer» System Monitor Menu » AC Motor » Motor RPM. 4. See Programmer» System Monitor menu » Hardware Inputs: Analog 3 and 4.	Controller	
28	3-7	Motor Open	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Motor phase is open. 2. Bad crimps or faulty wiring.	Controller	
29	3-8	Main Contactor Welded	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Main contactor tips are welded closed. 2. Motor phase U or V is disconnected or open. 3. An alternate voltage path (such as an external circuit to B+) is providing a current to the capacitor bank (B+ connection terminal).	Controller	

30	3-9	Main Contactor Did Not Close Fault Type(s): 1 = Main did not close when commanded. 2 = Main disconnected during operation.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	Type 1: 1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact. 3. An external load on the capacitor bank (B+ connection terminal) is preventing the capacitor bank from charging. 4. Blown B+ fuse. 5. Main Contactor parameters mistuned; Type 2: 1. Main contactor opened during operation (while commanded closed). 2. Driver wiring to contactor's coil (e.g., pin wiring) removed during operation. 3. Contactor/coil defective.	Controller	
31	4-2	Throttle Input Fault Type(s): * 1 = Outside the Low or High parameter.	ShutdownThrottle	1. Throttle voltage exceeded the Analog Low or Analog High parameters for the analog input defined for the throttle input. 2. See Programmer » Controller Setup » Inputs » Analog 1 Type. 3. See Programmer » Controller Setup » Inputs » Configure.	Controller	
32	4-4	Brake Input	FullBrake	Triggered by the respective fault diagnostic associated with the brake input source (assigned analogX input). Note: An Input fault diagnostics may be out of range if it is configured as a voltage input.	Controller	
33	4-6	NV Memory Failure Fault Type(s): 1 = Invalid checksum. 2 = NV write failed. 3 = NV read failed. 4 = NV write did not complete during power down.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1-5 ShutdownPD FullBrake	1. Failure to read or write to nonvolatile (NV) memory. 2. Internal controller fault.	Controller	

34	4-7	HPD Sequencing	ShutdownThrottle	1. Incorrect sequence in application of KSI, Interlock, Direction, or Throttle. 2. Faulty wiring, crimps, or switches at KSI, Interlock, Direction, or Throttle. 3. Moisture in above-noted digital input switches causing invalid (real) On/Off state. 4. Verify input switch status. See Programmer » System Monitor menu » Hardware Inputs » Switch Status. 5. Verify Throttle. See Programmer » System Monitor menu » Hardware Inputs » Throttle Command.	Controller	
35		EMR Rev HPD	ShutdownThrottle ShutdownEMBrake	Emergency Reverse operation has concluded, but the throttle, forward and reverse, and interlock inputs have not been returned to neutral.	Controller	
36		Pump HPD Fault Type(s): 1. Only lifting 2. Only lowering 3. Lifting and lowering	ShutdownPump	Incorrect lifting/lowering throttle input condition (>25%) Parameters setting errors: 1. Hydraulic suppression type 2. HPD/SRO judgment time Pump throttle hardware fault	Controller	
37	4-9	Parameter Change Fault Type(s): Reports the CAN Object ID of parameter.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	While the Interlock was On, a safety- based parameter was changed. Parameters with this property are marked with a [PCF] (Parameter Change Fault) in the Parameter listings.	Controller	
38	4-A	EMR Switch Redundancy	ShutdownInterlock ShutdownEMBrake	1. Either or both Emergency Reverse input switches are inoperative, resulting in an invalid state. 2. Ingress of dirt or moisture in switch(es).	Controller	
39	7-1	OS General	ShutdownAll	Reset controller	Controller	
40	7-2	PDO Timeout	Set: Time between CAN PDO messages received exceeded the PDO Timeout Period.	1. The time between CAN PDO messages received exceeded the PDO Timeout Period as defined by the	Controller	

			Clear: Receive CAN NMT message, or Reset Controller.	Event Timer parameter. 2. Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.		
41	7-3	Stall Detected	ShutdownMotor ShutdownEMBrake ShutdownThrottle Control Mode changed to LOS (Limited Operating Strategy)	1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Programmer » System Monitor menu » AC Motor » Motor RPM.	Controller	
42	7-7	Supervision Fault Type(s): Curtis supervision code.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1-5 ShutdownPD FullBrake	Set: Internal controller failure.	Controller	
43	7-9	Supervision Input Check	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle ShutdownInterlock ShutdownDriver1-5 ShutdownPD FullBrake	Set: Internal controller failure.	Controller	
44	8-2	PDO Mapping Error	PDO message disabled.	1. The PDO Map has too many data bytes assigned or has objects mapped that are not compatible. 2. Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.	Controller	
45	8-3	Internal Hardware Fault Type(s): Curtis hardware code.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	Set: Internal controller fault detected.	Controller	
46	8-4	Motor Braking Impaired	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	Battery overcharged, excessive motor or controller heating, or misadjusted parameters. Clear: Reset interlock.	Controller	

47	8-7	Motor Characterization Error Fault Type(s): 1 Write to memory RAM failure 72 Temp sensor fault 73 Motor hot 74 Controller temperature cutback 76 Undervoltage cutback 77 Overvoltage cutback 78 Encoder not reading properly 79 Current Regulator Tuning out of range 80 Current Regulator Tuning out of range 81 Encoder signal seen but step size not auto-detected, it must be set manually. 82 Aborted auto-commissioning 90/98 PMAC Motor feedback sine/cosine signal not detected 91 PMAC motor not rotating or motor type incorrect 92 PMAC Motor not accelerating. Or low acceleration 94-97 PMAC lag compensation out of range 99 PMAC Motor rotating when starts characterization 102 PMAC motor temp sensor fault 103 PMAC motor temp hot cutback 104 PMAC motor controller temp cutback 106 PMAC motor controller Undervoltage cutback 107 PMAC motor controller overvoltage cutback	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	Motor characterization failed during characterization process.	Controller	
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48	8-8	Encoder Pulse Error	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Encoder Steps parameter does not match the actual motor encoder. 2. Verify parameter settings: AC Motor Setup » Quadrature Encoder » Encoder Steps. 3. Motor loses IFO control, and motor increase rotation without throttle signal input.	Controller	
49	8-9	Parameter Out of Range Fault Type(s): Reports the CAN Object ID	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Parameter value detected outside of the limits. 2. Use CIT to view the parameter's range and adjust the parameter's value.	Controller	
50	9-1	Bad Firmware Bad_Firmware	The controller does not start completely	The firmware in the controller is incorrect. 1. The CRC of the application or OS does not match. 2. The application was built with an incompatible OS version.	Controller	
51	9-2	EM Brake Failed To Set EM_Brake_Failed_to_Set	ShutdownEMBrake ShutdownThrottle Activate the Interlock (EM Brake type 1).	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating.	Controller	
52	9-3	Encoder LOS Encoder_LOS	LOS Mode	1. Limited Operating Strategy (LOS) control mode has been activated as a result of either an Encoder Fault (flash code 3-6) or a Stall Detected fault (flash code 7-3). 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Vehicle has stalled.	Controller	
53	9-4	Emer Rev Timeout Emer_Rev_Timeout	ShutdownThrottle ShutdownEMBrake	1. Emergency Reverse was activated and concluded because the EMR Timeout timer had expired. 2. The emergency reverse input is stuck On.	Controller	
54	9-6	Pump BDI Pump_BDI	The pump is deactivated.	1. The BDI is below the Lift_BDI_Lockout setting. 2. BDI parameters are mistuned.	Controller	

55	9-9	Parameter Mismatch Fault Type(s): 1. Dual Drive is enabled in torque mode. 2. SPMSM motor feedback selected the encoder. 3. AC motor selected sine-cosine.	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake	1. Incorrect position feedback type chosen for motor technology in use. 2. Dual drive is enabled in torque mode. 3. Dual drive enabled on only one controller.	Controller	
56	9-A	Interlock Braking Supervision Fault Type(s): 1. MotorSpeed did not ramp down fast enough to meet configuration 2. Vehicle brought to stop, but then EM brake (if configured) failed to set. 3. Vehicle brought to stop, but then traversed a distance beyond that set by Interlock_Brake_Supervision_Position_Settling_Limit.	ShutdownMotor ShutdownEMBrake ShutdownMainContact or	1. During interlock braking, motor speed exceeds the parameters set under Interlock Braking Supervision 2. 2. See Programmer / Application Setup / Interlock Braking / Supervision Enable. 3. 3. See Programmer / Application Setup / Interlock Braking / Interlock Braking Supervision	Controller	
57	9-B	EMR Supervision Emr_Supervision	ShutdownMotor ShutdownEMBrake ShutdownMainContact or	1. During interlock braking, motor speed exceeds the parameters set under Interlock Braking Supervision 2. 2. See Programmer / Application Setup / Emergency Reverse / Emergency Reverse Supervision.	Controller	
58	A-1	Driver 1 Fault Fault Type(s): 1. Driver short circuit 3. Driver current exceeded configured over-current limits 4. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver1	1. Open or short on driver load. 2. Dirty connector pins at controller or contactor coil. 3. Bad connector crimps or faulty wiring. 4. Driver overcurrent, as set by the Driver 1 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 1 » Driver 1 Overcurrent.	Controller	

59	A-2	Driver 2 Fault Fault Type(s): 1. Driver short circuit 5. Driver current exceeded configured over-current limits 6. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver2	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or faulty wiring. 4.Driver overcurrent, as set by the Driver 2 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 2 » Driver 2 Overcurrent.	Controller	
60	A-3	Driver 3 Fault Fault Type(s): 1. Driver short circuit 7. Driver current exceeded configured over-current limits 8. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver3	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or faulty wiring. 4.Driver overcurrent, as set by the Driver 3 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 3 » Driver 3 Overcurrent.	Controller	
61	A-4	Driver 4 Fault Fault Type(s): 1. Driver short circuit 9. Driver current exceeded configured over-current limits 10. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver4	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or faulty wiring. 4.Driver overcurrent, as set by the Driver 4 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 4 » Driver 4 Overcurrent.	Controller	
62	A-5	Driver 5 Fault Fault Type(s): 1. Driver short circuit 11. Driver current exceeded configured over-current limits	ShutdownDriver5	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or	Controller	85

		12. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled		faulty wiring. 4.Driver overcurrent, as set by the Driver 5 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 5 » Driver 5 Overcurrent.		
63	A-6	Driver 6 Fault Fault Type(s): 1. Driver short circuit 13. Driver current exceeded configured over-current limits 14. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver6	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or faulty wiring. 4.Driver overcurrent, as set by the Driver 6 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 6 » Driver 6 Overcurrent.	Controller	86
64	A-7	Driver 7 Fault Fault Type(s): 1. Driver short circuit 15. Driver current exceeded configured over-current limits 16. 3. Open/short circuit (Voltage measured high, should be low) 4. Open/short circuit (Voltage measured low, should be high) 5. Broken wire 6. No current of the output limit Fault types 3-5 are only checked if driver checks are enabled	ShutdownDriver7	1.Open or short on driver load. 2.Dirty connector pins at controller or contactor coil. 3.Bad connector crimps or faulty wiring. 4.Driver overcurrent, as set by the Driver 7 Overcurrent parameter. 5. See Programmer » Controller Setup » Outputs » Driver 7 » Driver 7 Overcurrent.	Controller	
65	A-8	Driver Assignment Fault Type(s): 5 Driver number that caused the fault.	ShutdownDriver	1. A Driver Output is used for two or more functions. 2. See Programmer » Controller Setup » IO Assignments » Coil Drivers: Main Contactor Driver EM Brake Driver Hydraulic Contactor Driver	Controller	

66	A-9	Coil Supply Coil_Supply_Fault Fault Type(s): 1. Short to B- or hardware fault. 2. Driver short-circuit causes coil open circuit. 3. Coil Supply startup enable check failed. 4. Coil Supply startup disable check failed.	ShutdownAll:	1. Short on driver loads. 2. Dirty connector pins at controller or device. 3. Bad connector crimps or faulty wiring. 4. Controller is defective.	Controller	
67	B-1	ANALOG 1 OUT OF RANGE Analog_1_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	<u>Fault Action:</u> None, unless a fault action is programmed in VCL.	1. Analog 1 input voltage is above the parameter setting of Analog 1 High. 2. Analog 1 input voltage is below the parameter setting of Analog 1 Low. 3. See Programmer » Controller Setup » Inputs » Analog 1. 4. See Programmer » Controller Setup » Inputs » Configure » Analog 1 Low / Analog 1 High.	Controller	
68	B-2	ANALOG 2 OUT OF RANGE Analog_2_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
69	B-3	ANALOG 3 OUT OF RANGE Analog_3_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
70	B-4	ANALOG 4 OUT OF RANGE Analog_4_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
71	B-5	ANALOG 5 OUT OF RANGE Analog_5_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	

72	B-6	ANALOG 6 OUT OF RANGE Analog_6_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
73	B-7	ANALOG 7 OUT OF RANGE Analog_7_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
74	B-8	ANALOG 8 OUT OF RANGE Analog_8_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
75	B-9	ANALOG 9 OUT OF RANGE Analog_9_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
76	B-B	ANALOG 14 OUT OF RANGE Analog_14_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
77	B-C	Analog Assignment Analog_Assignment Fault Type(s): 9 Analog Input number that caused the fault.	<u>Fault Action:</u> None, unless a fault action is programmed in VCL.	1. An Analog input is used for two or more functions. 2. An Analog input is outside the range of analog inputs. 3. See Programmer » Controller Setup » IO Assignments » Controls	Controller	
78	B-D	ANALOG 18 OUT OF RANGE Analog_18_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
79	B-E	ANALOG 19 OUT OF RANGE Analog_19_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
80	C-1	Branding Error Branding_Error	ShutdownMotor ShutdownMainContact or ShutdownEMBrake	1. Software and hardware branding mismatch. 2. For technical support on	Controller	

			ShutdownThrottle FullBrake	this fault, contact the Curtis distributor where you obtained your controller or the Curtis sales-support office in your region.		
81	C-2	BMS Cutback BMS_Cutback Fault Type(s): 1. Battery Current Cutback. 2. Low Cell Cutback. 3. High Cell Cutback.	Set: See Fault Type Clear: Resolve battery or battery cell issue.	A cutback based on cell loading has occurred.	Battery	
82	C-5	PWM Input 10 Out of Range PWM_Input_10_Out_Of_Range	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
83	C-7	ANALOG 31 OUT OF RANGE Analog_31_Out_Of_Range Fault Type(s): 1. Above High limit. 2. Below Low limit.	See Analog 1 Out of Range.	See Analog 1 Out of Range.	Controller	
84	C-8	Invalid_CAN_Port	NO ACTION	1. Mistuned Dual Drive CAN parameters. 2. Conflicting CAN Node IDs for Dual Drive.	Controller	
85	C-9	VCL Watchdog	NO ACTION	See the associated VCL Functions, • Set_Watchdog_Timeout(). • Set_Watchdog_Fault_Action(). • Kick_Watchdog().	Controller	
86	C-B	PWM Input 28 Out of Range PWM_Input_28_Out_of_Range Fault Type(s): 1. The input is disconnected. 2. The measured input frequency is below the (PWM_Input_28_Low_Frequency) – (PWM_Input_28_Frequency_Fault_Tolerance). 3. The measured input frequency is above the (PWM_Input_28_High_Frequency) + (PWM_Input_28_Frequency_Fault_Tolerance).	<u>Fault Action:</u> None, unless a fault action is programmed in VCL.	1. This fault diagnostic execution cycles every 4msec. The input is considered disconnected if no PWM signal occurs for 16msec or the measurements are not updated every 16msec. 2. Mistuned parameters. 3. Faulty wiring.	Controller	

		4. The measured duty cycle is below set limits, (PWM_Input_28_Low_Duty_Cycle) – (PWM_Input_28_Duty_Cycle_Fault_Tolerance). 5. The measured duty cycle is above set limits, (PWM_Input_28_High_Duty_Cycle) + (PWM_Input_28_Duty_Cycle_Fault_Tolerance).				
87	C-C	PWM Input 29 Out of Range PWM_Input_29_Out_of_Range Fault Type(s): 1. The input is disconnected. 2. The measured input frequency is below the (PWM_Input_29_Low_Frequency) – (PWM_Input_29_Frequency_Fault_Tolerance). 3. The measured input frequency is above the (PWM_Input_29_High_Frequency) + (PWM_Input_29_Frequency_Fault_Tolerance). 4 = The measured duty cycle is below set limits, (PWM_Input_29_Low_Duty_Cycle) – (PWM_Input_29_Duty_Cycle_Fault_Tolerance). 5 = The measured duty cycle is above set limits, (PWM_Input_29_High_Duty_Cycle) + (PWM_Input_29_Duty_Cycle_Fault_Tolerance).	<u>Fault Action:</u> None, unless a fault action is programmed in VCL.	1. This fault diagnostic execution cycles every 4msec. The input is considered disconnected if no PWM signal occurs for 16msec or the measurements are not updated every 16msec. 2. Mistuned parameters. 3. Faulty wiring.	Controller	
88	C-D	Primary State Error Primary_State_Error Fault Type(s): These are internal issues either occurring during startup, parameter initialization, secondary micro update or other runtime issues.	NO_ACTION (controller is not operable)	Set: Internal error with the controller. Kindly reset controller. Clear: Reset controller	Controller	

		1. PRIMARY_DEVICE_STARTUP = 0, 2 = PRIMARY_WAIT_KSI_STABLE, 3 = PRIMARY_DEVICE_STARTUP_VALID, 4 = PRIMARY_INITIALIZE_PARAMETERS, 5 = PRIMARY_WAIT_FOR_FIRST_SIGNALS, 6 = PRIMARY_WAIT_FOR_SUPERVISOR, 7 = PRIMARY_RESTORE_PARAMETER_FAIL, 8 = PRIMARY_SUPERVISOR_FIRST_SIGNALS_ERROR, 9 = PRIMARY_SUPERVISOR_STARTUP_ERROR, 10 = PRIMARY_STARTUP_TIMER_FAILURE, 11 = PRIMARY_WAIT_CAN_HANDSHAKING_DONE, 12 = PRIMARY_RUNNING				
89	D-1	Lift Input Fault Lift_Input	ShutdownLift	The associated fault diagnostic with the assigned lift-input source triggers this fault. For example: If the Lift_Input_Source is an analog input, then any faults detected by the respective Input fault diagnostics are cascaded and reported within this fault code. Set: Faults from the respective/ assigned "Lift_Input_Source" are cascaded and reported. Clear: Resolve any input assignment conflict, or out of range faults, then Reset Controller.	Controller	
90	D-2	Phase PWM Mismatch Phase_PWM_Mismatch Fault Type(s):	ShutdownMotor ShutdownMainContact or ShutdownEMBrake	Set: The difference between the commanded phase PWM duty cycle and the measured	Controller	

		0 = U phase. 1 = V phase. 2 = W phase.	ShutdownThrottle FullBrake ShutdownPump	is greater than allowed. Clear: Reset Controller.		
91	D-3	Hardware Compatibility Hardware_Compatibility	ShutdownMotor ShutdownMainContact or ShutdownEMBrake ShutdownThrottle FullBrake ShutdownPump	The OS (device profile, .cdev file) is incompatible with the controller. The loaded software (.cdev) is not compatible with the controller hardware.	Controller	
92	D-4	Lower Input Fault Lower_Input	ShutdownLower	The associated fault diagnostic with the assigned lift-input source triggers this fault. For example: If the Lift_Input_Source is an analog input, then any faults detected by the respective Input fault diagnostics are cascaded and reported within this fault code. Set: Faults from the respective/ assigned "Lift_Input_Source" are cascaded and reported. Clear: Resolve any input assignment conflict, or out of range faults, then Reset Controller.	Controller	
93	D-6	Hazardous Movement Hazardous_Movement Fault Type(s): 1 = The motor speed is in the opposite direction of the speed request and the motor fails to accelerate in the correct direction for a programmed time. In the event of a change to neutral, this hazard will be detected if the motor fails to accelerate toward zero speed for a programmed time. 2 = The acceleration is in the opposite direction of the difference between the operator speed request and the motor	ShutdownInterlock	Set: This fault detects hazardous movement when the motor is requested to be moving. The first hazard is a motor that is not able to slow down if the throttle goes to zero or the direction switch is not in the direction of travel. The second hazard is a motor that accelerates the wrong way or goes too fast. Note: This fault only occurs when the Control Mode Select is in Speed_Mode, Speed_Mode_Express, or Servo_Mode.	Controller	

		speed. The speed in the commanded direction is greater than the commanded speed by more than a parameter (Hazardous_Speed) for a programmed time (Hazardous_Throttle_Response_Time).		Clear: Reset Controller. Setting Hazardous_Direction_Response_Time = 0 will disable these checks		
94	D-D	IMU Failure IMU_Failure Fault Type(s): 1. SPI Communication Failure 2. Curtis Factory Self Test Failure 3. Run Time Check Failure, bad data received from the IMU 4. Gyro Cal out of range, maximum calibration offset exceeded.	NO_ACTION	Check if configured correctly or the vehicle is moving when calibrating. Set: Internally set as per fault type. Clear: Cycle KSI	Controller	

Troubleshooting chart of 1222 controller (steering)

N O.	FLASH CODE	SUB CODE	FAULT NAME	POSSIBLE CAUSE	CLEAR CONDITION	STEER FAULT ACTION
1	B	1	Hardware Fault	An internal hardware error has been detected; controller defective.	Cycle KSI.	Shutdown.
2	C	1	Controller Overcurrent	1. External short of phase U, V, or W motor connection. 2. Motor parameters are mis-tuned. 3. Controller defective.	Cycle KSI.	Shutdown.
3	D	1	Current Sensor Fault	1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective.	Cycle KSI.	Shutdown.
4	E	1	Precharge	1. External load on capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging. 2. Controller defective.	Cycle KSI.	Shutdown.
5	F	1	Controller Severe Undertemp	Controller is operating in an extreme environment.	Bring heatsink temp above -35°C.	Warning Only.

6	10	1	Controller Severe Overtemp	1. Improper mounting of controller. 2. Excessive load on vehicle. 3. Controller is operating in an extreme environment.	Cycle KSI.	Warning then Shutdown.
7	11	1	Severe Undervoltage	1. Battery or battery cables or battery connections defective. 2. Excessive non-controller system drain on battery. 3. Battery disconnected while driving. 4. Blown B+ fuse or steer contactor did not close.	Cycle KSI.	Shutdown.
8	12	1	Severe Overvoltage	1. Battery or battery cable resistance too high for a given regen current. 2. Battery disconnected while regen braking.	Cycle KSI.	Shutdown.
9	16	1	Controller Overtemp	1. Improper mounting or cooling of controller. 2. Excessive load on vehicle. 3. Controller operating in an extreme environment.	Heatsink temp < 85°C	Warning Only.
10	19	1	5V Supply Failure	External load impedance on the +5V supply is too low.	Cycle KSI.	Hold then Shutdown.
11	1A	1	10V Supply Failure	External load impedance on the +10V supply is too low.	Cycle KSI.	Warning then Shutdown.
12	1B	1	Severe Motor Over Temp	1. Motor is operating in an extreme environment. 2. Motor Temperature Control parameters are mis-tuned.	Cycle KSI.	Warning then Shutdown.
13	1C	1	Motor Temp Hot Cutback	1. Motor is operating in an extreme environment. 2. Motor Temperature Control parameters are mis-tuned.	Steer motor temperature < programmed Temperature Hot.	Warning Only.
14	1D	1	Motor Temp Sensor Fault	1. Motor thermistor is not connected properly. 2. If the application does not use a motor thermistor, the Motor Temperature Sensor Enable parameter should be programmed Off.	Motor temperature input within the normal operating range.	Warning Only.

15	1F	1	Contactors Open/Short	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	Cycle KSI.	Warning then Shutdown.
16	23	1	Fault Output Open/Short	1. External load impedance on the fault output is too low. 2. Controller defective.	Cycle KSI.	Warning then Shutdown.
17	24	1	Motor Stalled	1. Stalled steer motor. 2. Steer motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply of the steer motor encoder.	Cycle KSI.	Warning then Shutdown.
18	25	1	Motor Open	1. Motor phase is open. 2. Bad crimps or faulty motor cable wiring. 3. Controller defective.	Cycle KSI.	Warning then Shutdown.
19	26	1	Contactors Welded	1. Steer contactor tips are welded closed. 2. An alternative voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ terminal).	Cycle KSI.	Shutdown.
20	27	1	Contactors Opened	1. Steer contactor was closed temporarily, but then opened. 2. Steer contactor tips are oxidized. 3. An external load on the capacitor bank (B+ terminal) that prevents the bank from charging.		Warning then Shutdown.
21	27	2	Contactors Did Not Close	1. Steer contactor did not close. 2. Steer contactor tips are oxidized. 3. An external load on the capacitor bank (B+ terminal) that prevents the bank from charging.	Cycle KSI.	Shutdown.
22	29	1	Command Analog 1 Out of Range	Command input device's Analog 1 input (pin 8) is out of range.	Cycle KSI.	Hold then Shutdown.
23	2A	1	Command Analog 3 Out of Range	Command input device's Analog 3 input (pin 19) is out of range.	Cycle KSI.	Hold then Shutdown.

24	2B	1	Feedback Analog 5 Out of Range	Position feedback device's Analog 5 input (pin 16) is out of range.	Cycle KSI.	Hold then Shutdown.
25	2C	1	Feedback Analog 6 Out of Range	Position feedback device's Analog 6 input (pin 17) is out of range.	Cycle KSI.	Hold then Shutdown.
26	2D	1	CANNot Operational	1222 CAN NMT State did not go operational within 80 ms of interlock being applied.	Cycle KSI.	Warning and drop fault output.
27	2E	1	EEPROM CRC Fault	1. New software loaded into EEPROM memory. 2. Try using function "Restore to Factory Defaults" to clear fault. 3. Controller defective.	Cycle KSI.	Shutdown.
28	2F	1	Sin/Cos command sensor	1. Sin/Cos Sensor defective. 2. Sin/Cos Sensor parameters are mis-tuned.	Cycle KSI.	Hold then Shutdown.
29	2F	2	Sawtooth Command Sensor	1. Sawtooth Sensor defective. 2. Sawtooth Sensor parameters are mis-tuned.	Cycle KSI.	Hold then Shutdown.
30	30	1	Sin/Cos Feedback sensor	3. Sin/Cos Sensor defective. 4. Sin/Cos Sensor parameters are mis-tuned.	Cycle KSI.	Hold then Shutdown.
31	30	2	Sawtooth Feedback Sensor	1. Sawtooth Sensor defective. 2. Sawtooth Sensor parameters are mis-tuned.	Cycle KSI.	Hold then Shutdown.
32	31	1	Parameter Change Fault	A parameter value or the software was changed that required a power cycle. This fault is set automatically to force the vehicle operator to cycle power, for safety purposes.	Cycle KSI.	Shutdown.
33	33	1	Interlock Switch Supervision	1. When the interlock switch inputs are a crossed configuration (N.O. and N.C.), the two inputs are checked. A fault is set if Switch 1 (pin 9) = Switch 3 (pin 11). 2. Interlock switch defective.	Interlock Input 1 <> Interlock Input 3.	Interlock=Off.

34	34	1	Home Switch Supervision	1. When the wheel position is not close to home, the redundant home switch inputs are checked and a fault is set if they disagree. 2. Home switch defective. 3. For 360° steering, parameter Homing Cam Angle (deg) not set correctly	Cycle KSI.	Warning then Shutdown.
35	35	1	Home Position Not Found	Home switch defective.	Cycle KSI.	Shutdown.
36	36	1	Home reference Tolerance Fault	1. Home switch defective. 2. For 360° steering, parameter Homing Cam Angle (deg) not set correctly	Cycle KSI.	Warning then Shutdown.
37	37	1	Steer Command Supervision	Command input device defective.	Cycle KSI.	Hold then Shutdown.
38	38	1	Wheel Position Supervision	Position feedback device defective.	Cycle KSI.	Hold then Shutdown.
39	45	1	5V Current Out of Range	The external load on the 5V supply is drawing either too much or too little current.	Cycle KSI.	Hold then Shutdown.
40	47	1	Software Fault 1	Reserved for future use.		
41	47	2	Software Fault 2	1. Software defective. 2. Controller defective.	Cycle KSI.	Shutdown.
42	47	3	Software Fault 3	Reserved for future use.		
43	47	4	Software Fault 4	1. Software defective. 2. Controller defective.	Cycle KSI.	Shutdown.
44	47	5	Software Fault 5	1. Software defective. 2. Controller defective.	Cycle KSI.	Shutdown.
45	48	1	PDO1 Timeout	Communication between the traction controller and the 1222 has halted.	Cycle KSI.	Warning then Shutdown.
46	48	2	PDO2 Timeout	Communication from the CAN device sending the PDO2 message to the 1222 has halted.	Cycle KSI.	Warning then Shutdown.
47	48	3	PDO3 Timeout	Communication from the CAN device sending the PDO3 message to the 1222 has halted.	Cycle KSI.	Warning then Shutdown.
48	48	4	PDO4 Timeout	Communication from the CAN device sending the PDO4 message to the 1222 has halted.	Cycle KSI.	Warning then Shutdown.

49	49	1	Following Error	1. Position feedback device defective. 2. Steer motor stalled. 3. Steer motor encoder failed.	Cycle KSI.	Warning then Shutdown.
50	4A	1	Hardware Software Mismatch	1. New software loaded. 2. Controller hardware cannot use the loaded software.	Cycle KSI.	Shutdown.
51	4B	1	Parameter Conflict	1. Parameter settings are in conflict with each other. 2. Parameter setting out of range.	Cycle KSI.	Shutdown.

14. DECLARATION OF CONFORMITY

[GB] Original CE Declaration of conformity

The signatory hereby declares that the specified machine conforms to the EC Directive 2006/42/EC (Machine Directive), and 2014/30/EU (Electro-Magnetic Compatibility, EMC) including their amendments as translated into national legislation of the member countries. The signatory is individually authorized to compile the technical documents and declares that the following standards, including the normative procedures contained therein, have been applied:

[D] Original EG- Konformitätserklärung

Der Unterzeichner erklärt hiermit, dass die angegebene Maschine den EG-Richtlinien 2006/42/EG (Maschinenrichtlinie) und 2014/30/EU (Elektromagnetische Verträglichkeit, EMV) einschließlich ihrer Änderungen in der Umsetzung in die nationale Gesetzgebung der Mitgliedsländer entspricht. Der Unterzeichner ist zur Zusammenstellung der technischen Unterlagen einzeln befugt und erklärt, dass folgende Normen, einschließlich der darin enthaltenen normativen Verfahren, angewendet wurden:

[E] Original DECLARACIÓN DE CONFORMIDAD CE

El signatario declara por la presente que la máquina especificada cumple con la Directiva CE 2006/42/EC (Directiva de Máquinas) y 2014/30/EU (Compatibilidad Electromagnética, EMC) incluidas sus enmiendas traducidas a la legislación nacional de los países miembros. El firmante está autorizado individualmente para compilar los documentos técnicos y declara que se han aplicado los siguientes estándares, incluidos los procedimientos normativos contenidos en ellos:

[F] Originale DECLARATION DE CONFORMITE CE

Le signataire déclare par la présente que la machine spécifiée est conforme à la directive CE 2006/42/CE (directive machine) et 2014/30/UE (compatibilité électromagnétique, CEM), y compris leurs modifications telles que traduites dans la législation nationale des pays membres. Le signataire est individuellement autorisé à compiler les documents techniques et déclare que les normes suivantes, y compris les procédures normatives qu'elles contiennent, ont été appliquées:

[NL] Origineel EG-CONFORMITEITSVERKLARING

De ondertekenaar verklaart hierbij dat de gespecificeerde machine voldoet aan de EG-richtlijnen 2006/42/EG (machinerichtlijn) en 2014/30/EU (elektromagnetische compatibiliteit, EMC) inclusief hun amendementen zoals vertaald in de nationale wetgeving van de aangesloten landen. De ondertekenaar is individueel gemachtigd om de technische documenten samen te stellen en verklaart dat de volgende normen, inclusief de normatieve procedures die daarin zijn opgenomen, zijn toegepast:

[P] Original DECLARAÇÃO DE CONFORMIDADE CE

O signatário declara que a máquina especificada está em conformidade com a Diretiva EC 2006/42/EC (Diretiva de Máquinas) e 2014/30/EU (Compatibilidade Eletromagnética, EMC), incluindo suas emendas traduzidas para a legislação nacional dos países membros. O signatário está individualmente autorizado a compilar os documentos técnicos e declara que as seguintes normas, incluindo os procedimentos normativos neles contidos, foram aplicadas:

[I] Originale DICHIARAZIONE DI CONFORMITÀ CE

Il firmatario dichiara che la macchina specificata è conforme alla Direttiva CE 2006/42/CE (Direttiva macchine) e 2014/30/UE (Compatibilità elettromagnetica, EMC) compresi i relativi emendamenti tradotti nella legislazione nazionale dei paesi membri. Il firmatario è autorizzato individualmente alla compilazione dei documenti tecnici e dichiara che sono state applicate le seguenti norme, comprese le procedure normative ivi contenute:

[BG] Оригинален ЕВРОПЕЙСКА ОБЩНОСТ - ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

С настоящото подписалото лице декларира, че посочената машина отговаря на Директива на ЕО 2006/42/EC (Директива за машини) и 2014/30/EU (Електромагнитна съвместимост, EMC), включително техните изменения, преведени в националното законодателство на страните-членки. Подписалото лице е лично упълномощено да съставя техническите документи и декларира, че са приложени следните стандарти, включително съдържащите се в тях нормативни процедури:

[CZ] Originál EG - PROHLÁŠENÍ OSHODĚ

Signatář tímto prohlašuje, že uvedený stroj je ve shodě se směrnicí ES 2006/42/ES (Směrnice o strojích) a 2014/30/EU (Elektromagnetická kompatibilita, EMC) včetně jejich změn ve znění přeložené do národní legislativy členských zemí. Podepisující osoba je samostatně oprávněna sestavit technické dokumenty a prohlašuje, že byly použity následující normy, včetně normativních postupů v nich obsažených:

[DK] Original EF-OVERENSSTEMMELSESESKLÆRING

Underskrivningen erklærer hermed, at den specificerede maskine er i overensstemmelse med EF-direktivet 2006/42/EC (maskindirektiv) og 2014/30/EU (elektro-magnetisk kompatibilitet, EMC) inklusive deres ændringer som oversat til national lovgivning i medlemslandene. Underskrivningen er individuelt bemyndiget til at udarbejde de tekniske dokumenter og erklærer, at følgende standarder, inklusive de normative procedurer indeholdt deri, er blevet anvendt:

[EST] Originaal EL vastavusavaldus

Allakirjutanu kinnitab käesolevaga, et nimetatud masin vastab EÜ direktiivile 2006/42/EÜ (masinadirektiiv) ja 2014/30/EL (elektromagnetilise ühilduvus, EMC), sealhulgas nende muudatustele, nagu on tõlgitud liikmesriikide siseriiklikesse õigusaktidesse. Allakirjutanut on individuaalselt õigus koostada tehnilisi dokumente ja ta kinnitab, et on kohaldatud järgmisi standardeid, sealhulgas neis sisalduvaid normatiivprotseduure:

[FIN] Alkuperäinen EU-YHDENMUKAISUUSSELUSTUS

Allekirjoittaja vakuuttaa täten, että määrätetty kone on EY-direktiivin 2006/42/EY (konedirektiivi) ja 2014/30/EU (sähkömagneettinen yhteensopivuus, EMC) mukainen, mukaan lukien niiden muutokset, sellaisina kuin ne on käännetty jäsenmaiden kansalliseen lainsäädäntöön. Allekirjoittaja on henkilökohtaisesti valtuutettu kokoamaan tekniset asiakirjat ja vakuuttaa, että seuraavia standardeja, mukaan lukien niihin sisältyvät normatiiviset menettelyt, on sovellettu:

[GR] Πρωτότυπο ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ ΕΚ

Ο υπογράφωντος δηλώνει με το παρόν ότι το συγκεκριμένο μηχανήμα συμμορφώνεται με την Οδηγία 2006/42/ΕΚ (Οδηγία Μηχανών) και 2014/30/ΕΕ (Ηλεκτρομαγνητική Συμβατότητα, EMC) συμπεριλαμβανομένων των τροποποιήσεών τους όπως έχουν μεταφραστεί στην εθνική νομοθεσία των χωρών μελών. Ο υπογράφωντος είναι ατομικά εξουσιοδοτημένος να συντάξει τα τεχνικά έγγραφα και δηλώνει ότι έχουν εφαρμοστεί τα ακόλουθα πρότυπα, συμπεριλαμβανομένων των κανονιστικών διαδικασιών που περιέχονται σε αυτά:

[H] Eredeti EU KONFORMITÁSI NYILATKOZÁS

Az aláíró ezennel kijelenti, hogy a megadott gép megfelel a 2006/42/EC (gépirányelv) és a 2014/30/EU (elektromágneses összeférhetőség, EMC) irányelveknek, beleértve azok módosításait a tagországok nemzeti jogszabályaiba lefordítva. Az aláíró egyénileg jogosult a műszaki dokumentumok összeállítására, és kijelenti, hogy a következő szabványokat, beleértve az abban foglalt normatív eljárásokat, alkalmazták:

[LT] Originalus ES atitikimo deklaracija

Pasirašęs asmuo pareiškia, kad nurodyta mašina atitinka EB direktyvą 2006/42/EB (mašinų direktyvą) ir 2014/30/ES (elektromagnetinį suderinamumą, EMC), įskaitant jų pakeitimus, išverstus į šalių narių nacionalinius teisės aktus. Pasirašęs asmuo yra individualiai įgaliotas rengti techninius dokumentus ir pareiškia, kad buvo taikomi šie standartai, įskaitant juose nurodytas normines procedūras:

[LV] Oriģināls ES atbilstības deklarācija

Parakstītājs ar šo apliecina, ka norādītā iekārta atbilst EK Direktīvai 2006/42/EK (Mašīnu direktīva) un 2014/30/ES (Elektromagnētiskā saderība, EMC), ieskaitot to grozījumus, kas ir tulkoti dalībvalstu nacionālajos tiesību aktos. Parakstītājs ir individuāli pilnvarots sastādīt tehniskos dokumentus un apliecina, ka ir piemēroti šādi standarti, tostarp tajos ietvertās normatīvās procedūras:

[N] Opprinnelig EU-KONFORMITETSERKLÆRING

Underskrivningen erklærer herved at den spesifiserte maskinen er i samsvar med EC-direktivet 2006/42/EC (maskindirektiv), og 2014/30/EU (elektromagnetisk kompatibilitet, EMC) inkludert deres endringer som oversatt til nasjonal lovgivning i medlemslandene. Underskrivningen er individuelt autorisert til å sammenstille de tekniske dokumentene og erklærer at følgende standarder, inkludert de normative prosedyrene som finnes deri, er brukt:

[PL] Oryginalny DEKLARACJA ZGODNOŚCI WE

Sygnatariusz niniejszym oświadcza, że określona maszyna jest zgodna z dyrektywą WE 2006/42/WE (dyrektywa maszynowa) i 2014/30/UE (kompatybilność elektromagnetyczna, EMC) wraz z ich poprawkami w tłumaczeniu na ustawodawstwo krajowe krajów członkowskich. Sygnatariusz jest indywidualnie

[RO] Original DECLARAȚIE DE CONFORMITATE CE

[RUS] Оригинал Декларация соответствия стандартам ЕС

[S] Original EG-KONFORMITÄTSFÖRKLARING

[SK] Originál vyhlásenie o zhode

[SLO] Original EU IZJAVA O SKLADNOSTI

[TR] Orijinal AB Uygunluk Açıklaması

<the applied standards have to be shown here>

- (1) Type: **XX XX– Reach truck**
- (2) Serial No: **XXXXXXXX**
- (3) Year of constr.: **YYYY**
- (4) Manufacturer: Noblelift Intelligent Equipment Co., Ltd.
528 Changzhou Road, Taihu Sub-district, Changxing, 313100, PR China
- (5) Responsible for compiling the technical documentation: <Company name>,
<Company Address>
- (6) Date: <Place>, **YYYY.MM.DD**
- (7) Authorized signatory: <Position> **Mr. Sample**

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