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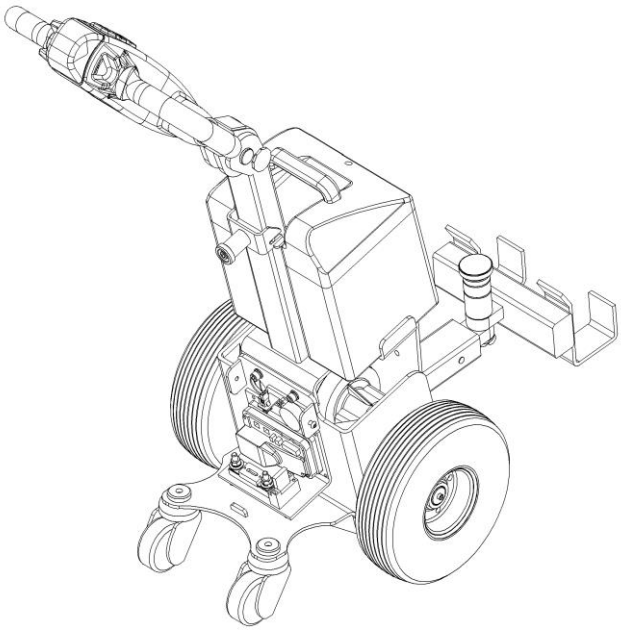
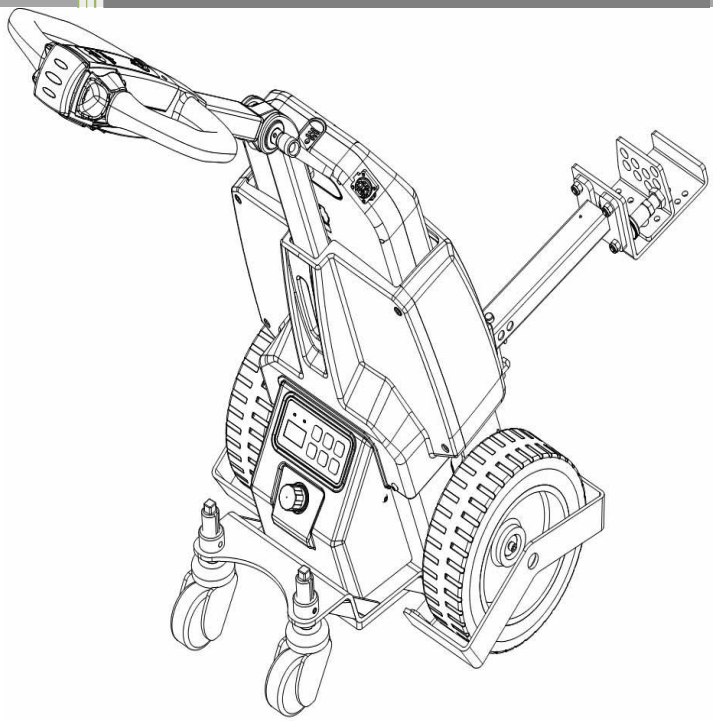
Service MANUAL

Towing Tractor

TE10/TE10Li





WARNING

Do not use the towing tractor 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 this manual for future reference.**

Version 09/2023

TE10/TE10Li-SM-001-EN

FOREWORD

Before operating this towing tractor, read this ORIGINAL INSTRUCTION MANUAL carefully and understand the usage of the tractor completely. Improper operation could create danger.
This manual describes the usage of different electric towing tractors. When operating and servicing the truck, make sure, that it applies to your type.

Keep this manual for future reference. If warning/caution labels are damaged or get lost, please contact your local dealer for replacement.
This towing tractor complies with the requirements according to EN ISO 3691-1; (Industrial trucks- safety requirements and verification, part 1), EN 12895 (Industrial trucks- electromagnetic compatibility), EN 12053 (Safety of industrial trucks- test methods for measuring noise emissions), EN 1175-2020 (Safety of industrial trucks - Electrical/electronic requirements), assumed the truck is used according to the described purpose.
The noise level for this machine is below 70 dB(A) according to EN 12053.

ATTENTION:

- Environmentally hazardous waste, such as batteries, oil and electronics, will negatively affect the environment or human 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 manual is only for the purpose of operating /maintaining the towing tractor, therefore please have an understanding that there is no guarantee out of particular features out of this manual.

NOTE: In this manual, the left sign indicates warning and hazard. Failure to comply with this instruction may result in death or serious injury.

Catalog

1. CORRECT APPLICATION

It is only allowed to use this electric towing tractor according to this instruction manual.

Improper use can lead do human injuries or equipment damage.
The operator/ the operating company has to ensure the correct usage and has to ensure that this towing tractor is used only by trained and authorized staff.

The towing tractor has to be used on substantially firm, smooth, prepared, level and adequate surfaces. The truck is intended to be used for indoor applications with ambient temperatures between +5°C and + 40°C and for medium load applications without crossing permanent obstacles or potholes.

The capacity is marked on capacity sticker as well on the Identification plate. The operator has to pay attention to these warnings and safety instructions.
Operating lighting must be minimum 50 Lux.

Modification

No modifications or alterations to this towing tractor 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 sticker, decals, labels and operation and maintenance manuals.
By not observing these instructions, the warranty becomes void.

2. TRUCK DESCRIPTION

a. Assembly Overview

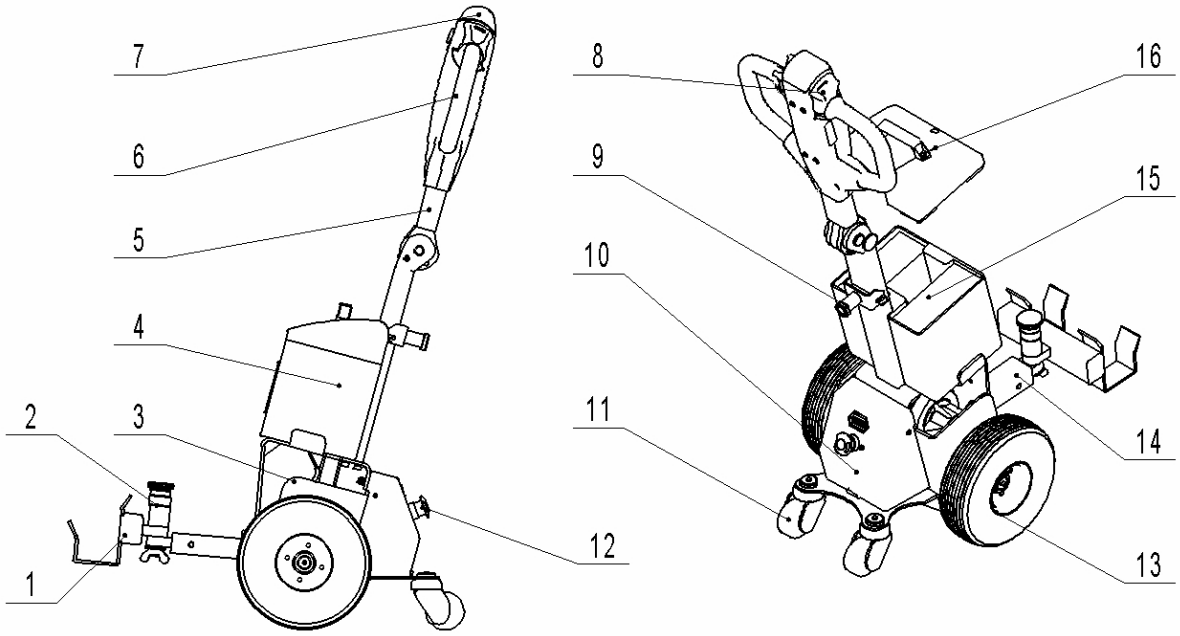


Fig. 1: TE10 Overview main components

1. Rack/ Hanger
2. Hinge
3. Chassis
4. Battery box incl. batteries
5. Tiller arm
6. Tiller head
7. Safety (belly) button
8. Accelerator (butterfly button)
9. Battery holder
10. Instruments cover
11. Castors
12. Combined emergency button
13. Drive wheel
14. Pulling frame
15. Battery
16. Battery cover

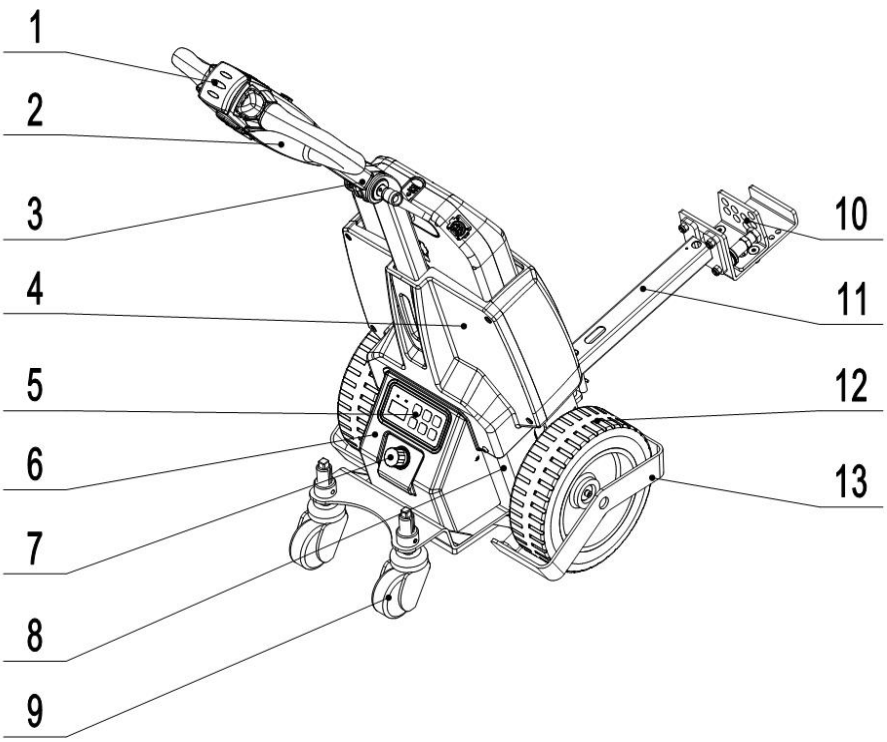


fig. 2:TE10Li Overview main components

1. Safety (belly) button
2. Control handle
3. Tiller rod
4. Battery cover
5. Display unit
6. Electrical components housing
7. Emergency disconnect button
8. Chassis
9. Castor
10. Clamp
11. Coupling arm
12. Drive wheel
13. Foot protection

b. Main technical data

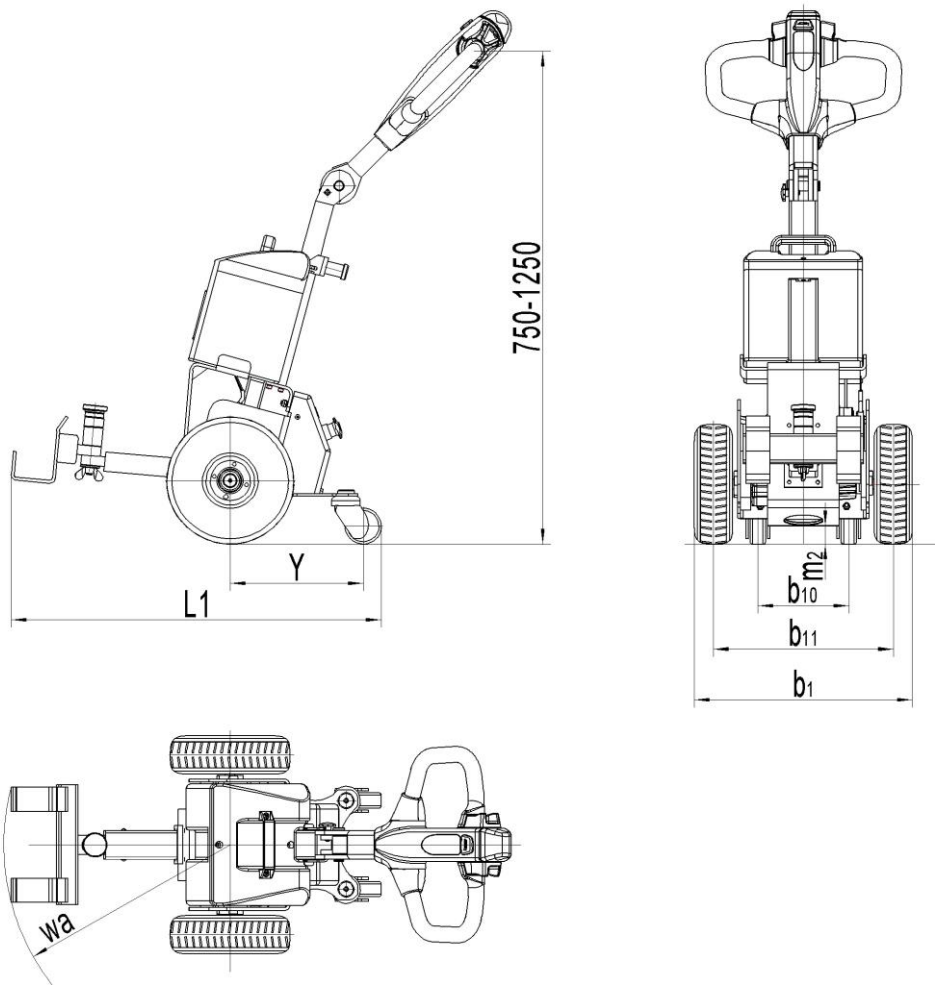


Fig. 3: TE10 Technical data

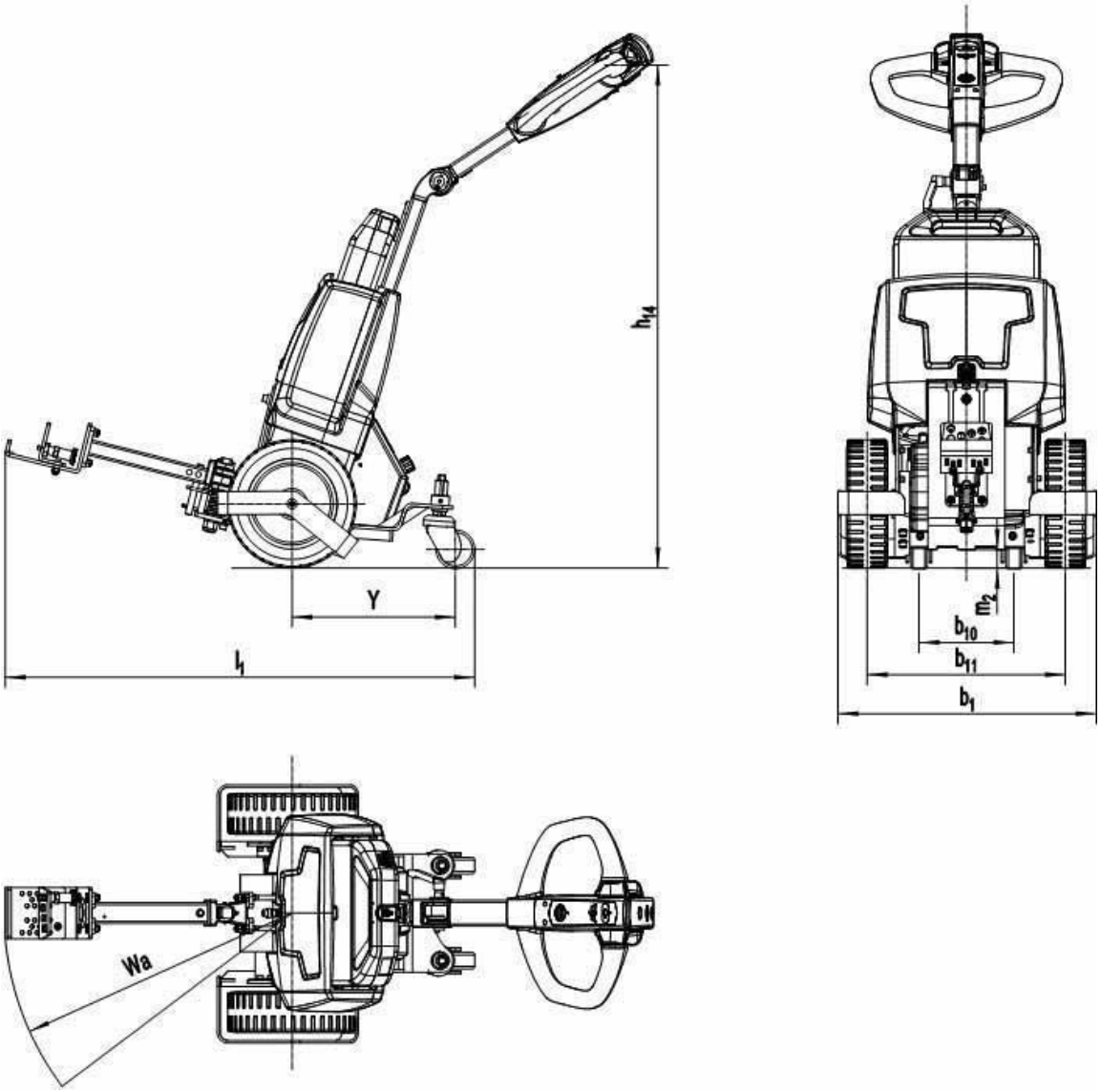


FIG. 4:TE10 Li Technical data

Table 1: Main technical data for standard version

Distinguishing mark	1.2	Manufacturer`s type designation		T E10	TE 10Li
	1.3	Power (battery ,diesel, petrol, gas, manual)		Battery	Battery
	1.4	Operator type		Pedestrian	Pedestrian
	1.5	Load Capacity / rated load	Q(t)	1.0	1.0
	1.7	Rated drawbar pull	F(N)	200	200
	1.9	Wheelbase	Y(mm)	325	325
Wei	2.1	Service weight	kg	62	74
	2.3	Axle loading, unladen front/ rear	kg	46/16	55/19
Tires, Chassis	3.1	Tires		R+PU(PU+PU)1	Rubber
	3.2	Tire size, front	∅ x w (mm)	∅250X80	∅250X80
	3.3	Tire size, rear	∅ x w (mm)	∅75X32	∅75X32
	3.5	Wheels, number front/rear(x=driven wheels)		2X+2/—	2X+2/—
	3.6	Tread, front	b10 (mm)	185	185
	3.7	Tread, rear	b11 (mm)	380	385
Dimensions	4.9	Height of tiller in drive position min./ max.	h14 (mm)	750/1250	750/1150
	4.19	Overall length	l1 (mm)	810	915
	4.21	Overall width	b1 (mm)	490	503
	4.32	Ground clearance, centre of wheelbase	m2 (mm)	38	35
	4.35	Turning radius	Wa (mm)	475	560
Performance	5.1	Travel speed, laden/ unladen	km/h	4.2/4.5	4.5/4.9
	5.5	Drawbar pull, laden/unladen	N	200 /–	200 /–
	5.6	Max. drawbar pull, laden/unladen	N	450/–	550/–
	5.10	Service brake		Electromagnetic	Electromagnetic
Electric-	6.1	Drive motor rating S2 60min	kW	0,3	0.4
	6.3	Battery acc. to DIN 43531/ 35/ 36 A, B, C, no		No	No
	6.4	Battery voltage, nominal capacity K5	V/Ah	24/24	24/36
	6.5	Battery weight	kg	16	7.5
Additional data	8.1	Type of drive control		DC- speed control	DC- speed control
	8.4	sound level at driver`s ear acc. to EN 12053	dB(A)	62	< 70

c. Description of the safety and warning labels

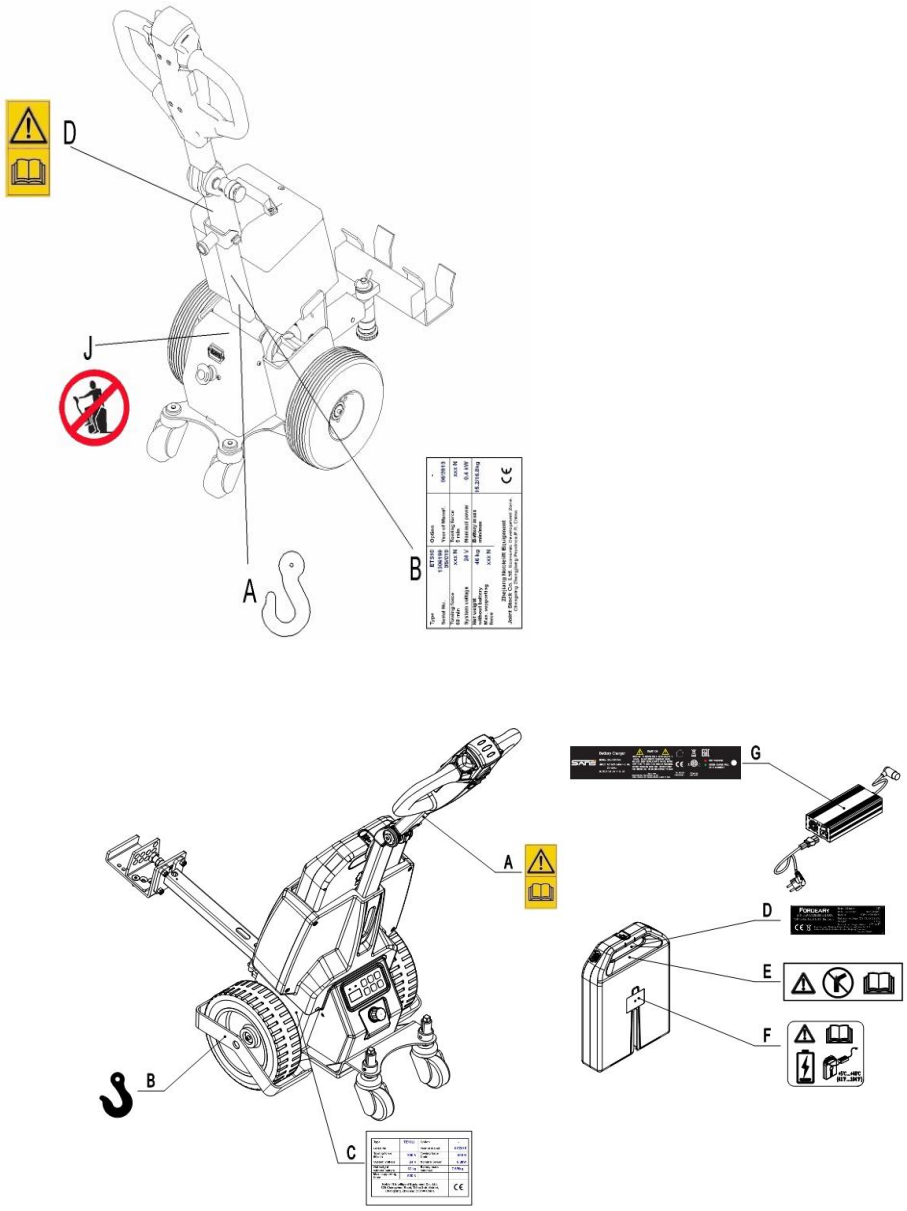


Fig. 5: Safety and warning labels

A. Crane hook label
B. Identification plate (ID-plate)
C. Sticker to read and follow these instructions
J. Never sit on

A. Information notice: “Observe operating instructions”
B. Attachment point for loading by crane
C. Identification plate (ID-plate)
D. Battery ID plate
E. Warning notice: “Avoid collision”
F. Battery warning decals
G. Charger ID plate

The tractor TE10 is equipped with a combined emergency switch (12) which stops driving- functions and engages the failsafe electromagnetic brake when it is pushed. By turning the pushed button 90° anti-clockwise, the push- button can be removed and then prevent against unauthorized access. Remove this button, if you not operate the tractor. The tractor is equipped with a safety (belly) button (7) which switches the driving function away from the operator, if the tractor travels towards the operator and the tiller is activated in the tillers operating position.
Follow also the instructions given on the decals. Replace the decals if they are damaged or missing.

The towing TE10Li tractor is equipped with an emergency disconnect switch (7) which stops driving functions and engages the fail-safe electromagnetic brake when it is activated. By turning this button clockwise, the truck can be operated after entering the access code on pin-code panel.
To prevent unauthorized access, press emergency switch (7) or press “X” button of pin-code panel.
This truck is equipped with a red collision safety (belly) button (1) which changes the travel direction if the truck comes into contact with a person. The truck brakes, travels away from the operator and stops. This prevents the truck driving into the operator. Follow the instructions given on the labels and decals, replace them if they are damaged or missing.

d. Identification plate

Towing Tractor			
Type	xxxx	Rated capacity	xxxx kg
Rated voltage	xx V	Drive motor system	xxxx
Battery mass, max.	xxx kg	Battery mass, min.	xxx kg
Net weight w/o. battery	xxx kg	Rated coupling pull	xxxx N
Rated power	xxx kW	Max. coupling pull	xxxx N
Serial No.	xxxxxxxxxx	Manufacture Date	xxxxxxxxxx
Manufacturer XXXXXXXXXXXXXXX Address XXXXXXXXXXXXXXX			

图. 6: Identification plate

The identification plate layout is subject to the label that posted on the truck.

3. WARNINGS, RESIDUAL RISK AND SAFETY INSTRUCTIONS

DO NOT

- Allow other person than the operator to stand in front of or behind the truck.
- Overload the truck.
- Put foot in front of the wheels, which may cause injury.
- Push or pull loads.
- Operate the truck without manufacturer's written consent.

Practice maintenance work according to regular inspection. This truck is not designed to be water resistant, please operate the truck in dry condition. Prolonged continuous operation might cause damage to the power pack.

- When operating this electric towing tractor, the operator has to wear safety shoes.
- This truck is intended to be used for indoor applications with ambient temperature range between +5°C and + 40°C.
- The operating lighting must be 50 Lux at least.
- To prevent unintended sudden movements when the truck is not in use (i.e. from another person, etc.), press emergency disconnect switch (12/7) or press “X” button of pin-code panel(TE10Li).

4. COMMISSIONING, TRANSPORT, DECOMMISSIONING

a. Commissioning

Table 2: Commissioning data

Type	TE10	TE10Li
Service weight (without battery)	85kg	88kg
Dimensions [mm]	1000	978x490x1235

After receiving the new towing tractor or for re-commissioning, please perform the following steps before (firstly) operating the truck:

- Check if all parts are included and without damage.
- Check the tiller and verify the assembly.
- Check the battery charge status.
- Carry out the daily inspections as well as functional checks.

b. Lifting by crane and transport

Lifting by crane

USE DEDICATED CRANE AND LIFTING EQUIPMENT.
DO NOT STAND UNDER LIFTED LOADS.
DO NOT WALK INTO OR STAND IN A HAZARDOUS AREA DURING LIFTING.

Transport

THE TRUCK MUST BE SECURELY FASTENED WHEN TRANSPORTED ON A LORRY OR A TRAILER.

Attach lashing straps to the truck and the transport vehicle and tension sufficiently according to Fig. 7

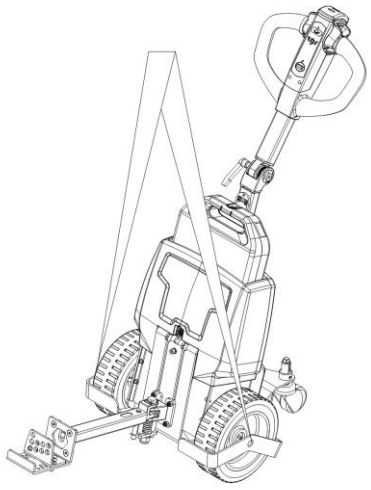
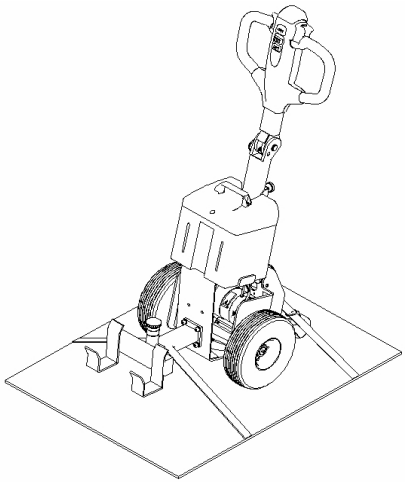
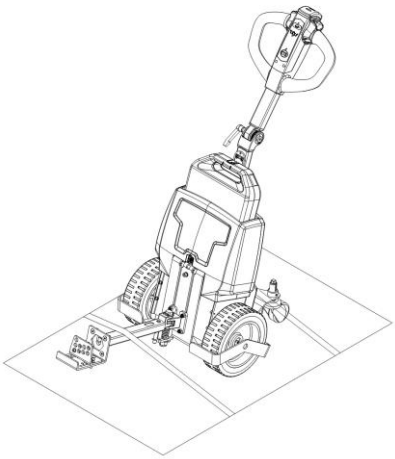


Fig. 7: Lifting by crane



TE10



TE10Li

Fig. 8: Fixing

c. Decommissioning

For storage, remove the trailer, grease all in this handbook mentioned greasing points (regular inspection), eventually protect the tractor against corrosion and dust. Remove the batteries and jack the tractor safely, so that there will be no flattening after storage.

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

5. DAILY INSPECTION

This chapter describes pre-shift checks before putting the tractor into operation.
Daily inspection is effective to find the malfunction or fault on this tractor. Check the tractor on the following points before operation.
Remove load from the tractor.。

DO NOT USE THE TRACTOR IF ANY MALFUNCTION IS FOUND.

- Check for scratches, deformation or cracks.
- Check the vertical creep of the tractor.
- Check the smooth movement of the wheels.
- Check the function of the emergency brake by activating the combined emergency button.
- Check, the tiller arm- switch braking function
- Check if all bolts and nuts are tightened firmly.
- Visual check if there are any broken hoses or broken electric wires.

6. OPERATING INSTRUCTIONS

BEFORE OPERATING THIS TRUCK, PLEASE FOLLOW THE WARNINGS AND SAFETY INSTRUCTIONS (SEE CHAPTER 3).

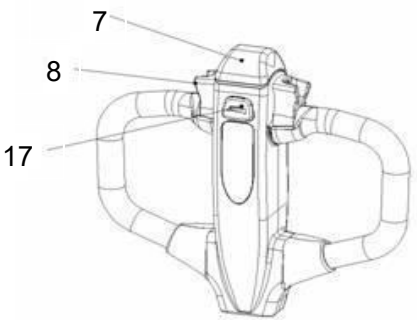


Fig.9: Tiller operating controls

TE10: Make sure that the load is stable and that the daily inspection of the tow tractor as well as the trailer are carried out.
Insert the key of the combined emergency switch, turn it 90° clockwise and pull the button up.
Press the horn button (Fig. 9,7) to activate the audible warning signal.

TE10Li: There two ways to start this towing tractor:
The first way is entering the correct access code and pressing "√" key from pin-code panel (5).
The second way is activating the truck with RFID access card.
Press the horn button (Fig.10,15) to activate the audible warning signal.

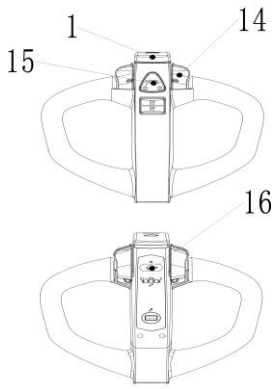


Fig.10: Control handle

a. Parking

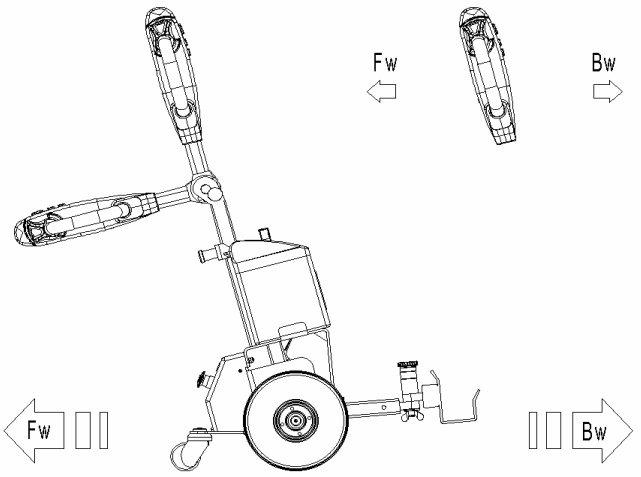
PARKING THE TRUCK ON A SLOPE IS STRICTLY PROHIBITED.

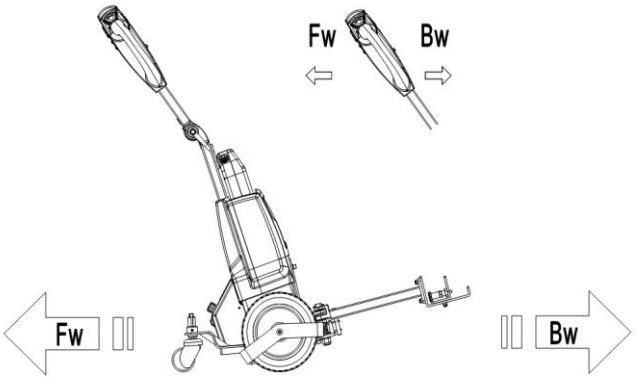
The truck is equipped with an electromagnetic fail-safe stopping and parking brake.
Press the emergency disconnect switch

b. Traveling

TE10: After starting the tractor by pulling the combined emergency switch (12), move the tiller to the operating position. Turn the accelerator button to the desired direction forward 'Fw.' or backwards Bw.'(fig. 10).

TE10Li: Switch on the truck by activation from pin-code panel, control the travel direction with the accelerator to drive direction (Fw) or load direction (Bw), as shown in Fig. 9.





TE10 TE10Li

Fig. 11: Travel direction

Control the travel direction by turning the accelerator in your desired direction: drive direction (Fw) or load direction (Bw), as shown in Fig. 9.

Control the travel speed by turning the accelerator (Fig.8，8) carefully until the truck reaches your desired speed.

If you move the accelerator to the neutral “0” position, the controller decelerates the truck until the truck stops. If the truck stops, the parking brake is activated.

Carefully drive the truck to the destination. Observe the floor conditions and control the travel speed with the accelerator.

Press the turtle button (Fig. 9,16) to enter into slow travel mode, travel slowly by turning the accelerator in the desired direction. Press the turtle button again to resume travelling at normal speed.

。

c. Steering

The truck is steered in the required direction by moving the tiller to the left or right.

TE10

TE10Li

d. Braking

PLEASE CHECK THE BRAKING DISTANCE BEFORE OPERATION.
THE BRAKING PERFORMANCE DEPENDS ON THE TRACK CONDITIONS AND THE LOAD CONDITIONS OF THE TRUCK.

The braking function can be activated in different ways:

- By setting the accelerator (Fig. 8,8/9,14) to the neutral “0” position or by releasing the accelerator, the regenerative brake is activated. The truck brakes to a halt.
- By turning the accelerator (Fig. 8,8/9,14) in the opposite direction, the regenerative brake is activated. The truck brakes and begins traveling in the opposite direction.
- Operate the collision safety switch (belly button) (Fig. 8,7/9,1) to protect the operator from being crushed. If this switch is activated, the truck brakes and travels a short distance in the opposite direction.

e. Malfunctions

If there are any malfunctions or the truck is inoperative, please stop using the truck and activate the emergency disconnect switch (7) by pressing it. Immediately inform the supervisor and/or call your service support. If necessary, move the truck out of the operating area by using dedicated towing/ lifting equipment

f. Emergency

In emergencies or in the event of tip over (or fall off a dock), keep safe distance immediately. If possible, activate the emergency disconnect switch (7) by pressing it. All electrical functions will be deactivated.

7. Display Unit

This towing tractor is equipped with an LCD screen, pin-code panel and RFID access card. (Only for TE10Li)

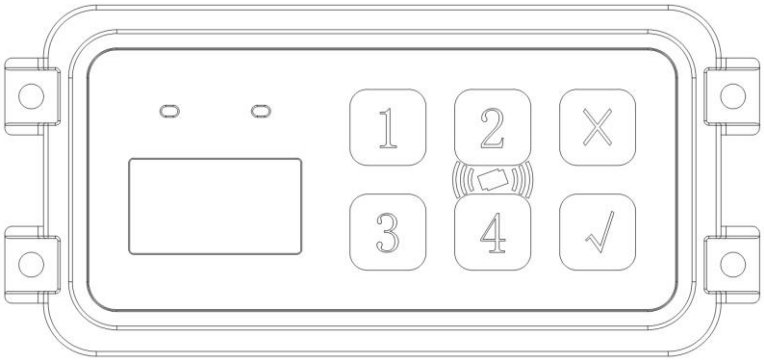


Fig. 12:Display Unit(TE10Li)

a. Introduction

Pin-code panel is an electronic system which is similar with an electronic access system. Truck is not able to be operated before entering the correct access code, the main purpose is to prevent unauthorized operation. In order to facilitate the operation, in addition to the pin-code access, the RFID access card is also available.

The display with LCD screen displays various truck data, such as the state of charge of the battery, working hour, slow travel mode, fault code, etc.

b. Main parameters of display unit

Rated working voltage: 12V-48V
Standby current: ≤25mA/24VDC
Communication: CAN communication, with fault code display, battery display, working hour display, RFID card and pin-code panel.
Default configuration: 1 set of access code (default 1234) and two round RFID cards.

c. Function description

Pin-code panel

The truck is equipped with a pin-code panel and RFID cards (maximum 5 RFID cards). The access code consists of 4 numbers (1~4).

RFID card

Put the RFID card close to the pin-code panel, if the RFID card is valid, the pin-code panel will emit a short beep, and then the blue indicator light is on, indicating that the pin-code panel is working normally.

Pin-code access

The truck is delivered with the access code “1234”, which can be used for immediate start.

After turning on the power, the green indicator light is on, and the display screen is off; enter the original access code "1234", confirm with “√” key - the green and blue indicator lights are on, the display screen is on, and the truck is ready for operation.

Follow the steps below to reset the access code:

- Enter access code “123” and press “√” key.
- Enter access code “123” once more and press “√” key, the access code has been reset to “1234”.

Follow the procedure below to add additional RFID card:

- Enter access code “3434” and press “√” key.
- Swipe the new RFID card within 5 seconds.
- This pin-code panel supports maximum five cards.

d. Display unit indication

TE10 Discharge status is indicated by ten red LED segments.

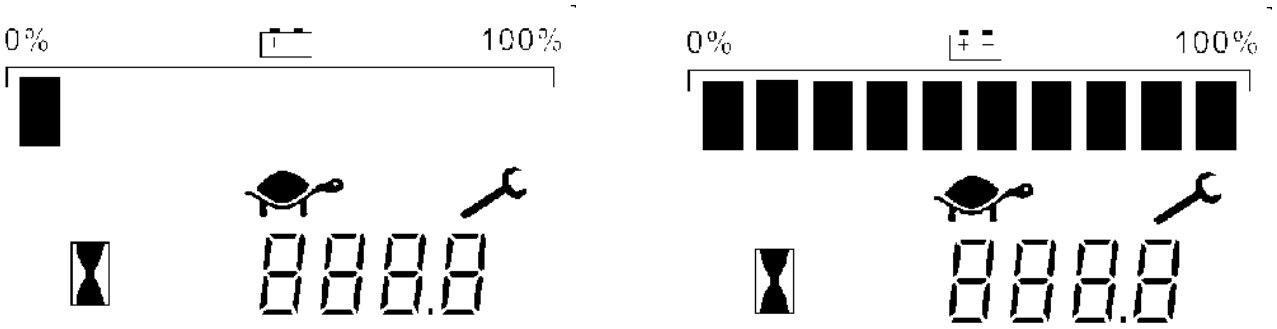
Battery discharged

Battery full charged

Fig. 13: Battery discharge indicator

Only when the battery is properly charged, the most right LED lit. As the battery’s state-of-charge decreases, successive LEDs light up, only one on at a time.

The 2nd from left LED flashes, indicating “energy reserve” (70% depth of discharge).
The 2 most left LEDs alternately flash, indicating “empty” (80% depth of discharge).



Battery discharged

Battery is fully charged

Fig. 14: Display unit indication (TE10 Li)

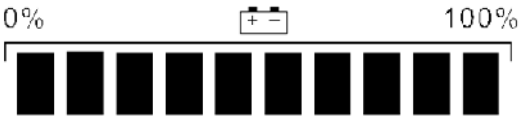
Working hour indicator

An alpha-numeric liquid crystal display is fitted in the center of the display unit, which indicates the working hour of the truck.

Error code alarm

Special statuses appear in the display unit as error codes, which indicates the alarm state by the fault code corresponding to the type of alarm.

Charge status indicator of battery



The charge status is displayed in ten increments. Each is represented by a rectangle that corresponds to 10% of the battery charge. The rectangles gradually disappear as the battery discharges.

Turtle Symbol:

It is normally off, when it displays on the LCD screen, it indicates that the slow travel mode is activated, in which maximum speed and acceleration are reduced.

Monkey Wrench Symbol:

It is normally off, when it displays on the LCD screen, it indicates that there is request of programmed maintenance or the alarm state.

Hourglass Symbol:

It is normally off, when the hourglass symbol flashes, it indicates that the hour meter starts to count.

8. Battery - Servicing, Recharging, Replacement

a. Lead-acid batteries (TE10)

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

As standard batteries, the tractor is equipped with following sealed liquid acid battery- types:

2 pc 24V/ 24Ah

- IT IS ONLY ALLOWED TO USE SEALED LIQUID ACID BATTERIES.
- THE WEIGHT OF THE BATTERIES HAS AN INFLUENCE TO THE TRACTORS OPERATING BEHAVIOR.
- PLEASE CONSIDER THE MAXIMUM OPERATING TEMPERATURE OF THE BATTERIES.

b. Description of the lithium-ion battery (TE10Li)

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 connected improper connectors to the battery.

- The battery is equipped with BMS – battery management system, which controls the following safety functions and conditions: voltage, temperature, undervoltage, overvoltage, overtemperature and overcurrent.
- The internal resistance of the battery is very low, which minimizes heat generation and maximizes the available power of the car.

Temperature range for using the battery

- Battery temperature from +5° C to +40° C for optimal battery life.
- The maximum temperature of the battery is 50° C, at which time the car can run.
- The temperature difference between the two ends of the battery shall not exceed 5 ° C.

Battery Charger

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

c. Lithium battery labels

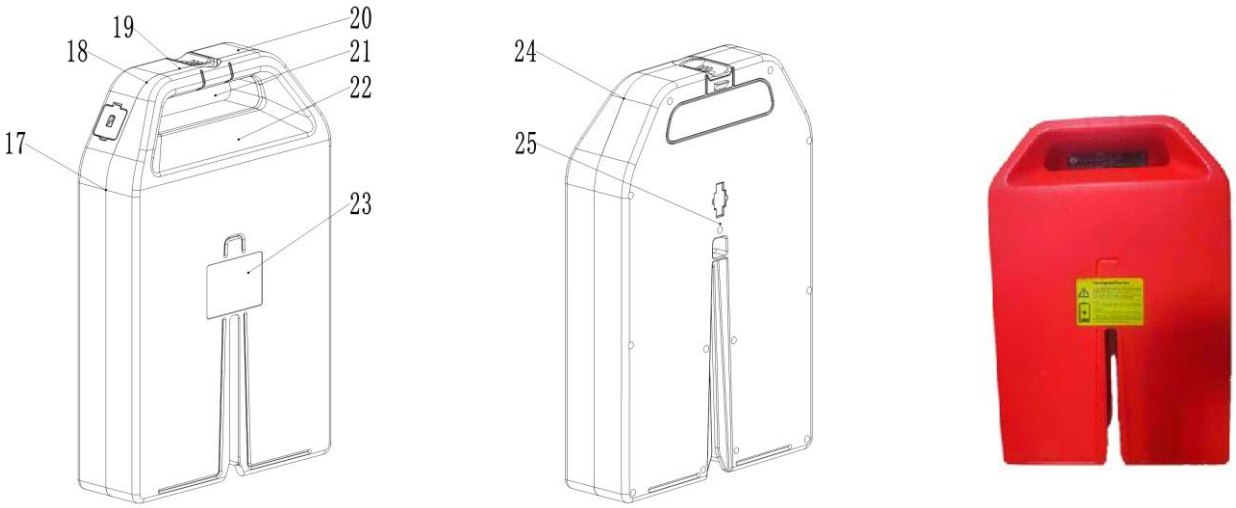


Fig.15: Battery Decals

Table 3: Battery Decals

Item	Description	Item	Description
17	Warning notice: “Do not dispose at will”	22	Warning notice: "Avoid collision”
18	Charging indication	23	Safety information
19	QC sticker	24	Serial number
20	Sign: "Capacity and nominal voltage"	25	Fuse location
21	Identification plate		

Battery identification plate

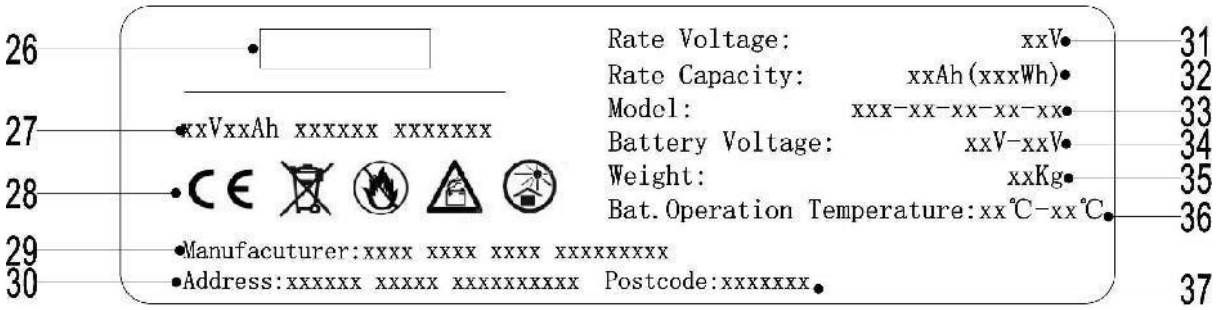


Fig.16: Battery identification plate

Table 4: Battery data plate

Item	Description	Item	Description
26	Manufacturer trademark	32	Battery capacity
27	Battery information	33	Model designation
28	CE mark and other safety labels	34	Voltage range
29	Battery manufacturer	35	Battery weight
30	Manufacturer address	36	Operating temperature range
31	Rated voltage	37	Zip code

d. 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

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. The operation voltage of the charger shall be subject to the charger specifications; the maximum charging voltage is 29,2V, the charging current is 8,0 or 12,0 A depending on battery capacity. If the operation voltage of the charger is out of the applicable voltage range, the charger or battery will be damaged, which may cause serious safety accidents. The charger must only be used for batteries supplied by the 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. 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.

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 connecting the two battery terminals, for instance caused by water or intentional/unintentional connections.
- Temperature damages caused by location of batteries in overheated locations 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 leakage of harmful materials, a safe place for storing 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 Co2 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. naked 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 due to overheating. Do not ignite or position an open flame, glowing embers, or sparks near the lithium-ion battery. Keep lithium-ion batteries away from strong 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 effects 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. Fluids or solids must never be directed into the lithium battery.

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 and maintenance

The lithium-ion batteries are maintenance-free.

Full discharge can damage the battery

Self-discharge can cause 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 at least 70%.
Re-charge the battery at least every 12 weeks.

If the battery is deeply discharged or if the battery temperature is below the permissible level, the battery will not charge. Deep 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.

Storage and safe handling

Storage of batteries

Deep Discharge can damage the battery

If the battery is not used for a long period of time, it can become damaged through discharge.

- Before a long period of inactivity, the battery must be charged to the level of at least 70%.
- Recommended to check and charge, if necessary, the battery every 4 weeks when not in use.
- The storage of fully charged battery reduces its lifetime. Recommended level of charge is in the range of 30% to 70%
- The temperature range for storing the battery is 0°C to 30°C.

Instructions for safe handling

New lithium-ion batteries are transported and stored with a charge status of at least <70 %.

- 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

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

Faults

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

Disposal and transport of a lithium-ion battery

Instructions for disposal

Lithium-ion batteries must be disposed of 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.

e. Charging

- It is only allowed to use the supplied charger for charging the installed batteries!
- Before using the charger, please fully understand the instructions of the charger instructions.
- Always follow these instructions!
- The room, where you are charging must be ventilated.
- The exactly charge status can be only checked from the dischrge indicator. To control the status, the charging must be interrupted and the tractor must be started.

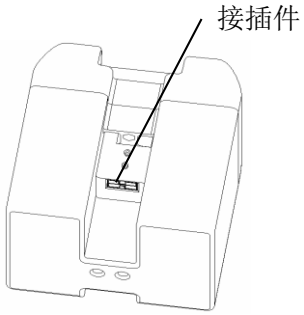


图. 17: 电池充电(TE10)

TE10
Park the tractor at a dedicated secured area with a deidcated power supply.
Remove the trailer from the tractor.
Switch the tractor off and take out the battery, then connect the external charger to the battery plug.
The charger starts charging the battery.
Disconnect the battery plug after the charger finished charging.

The used external charger has following electrical data:
Rated input: 100 – 240 V AC, 50/60 Hz, 300W Rated output: 24V/ 3A

When charging is finished, disconnect the charger from the socket and place it in the designated pocket.

Charge Status Indicator

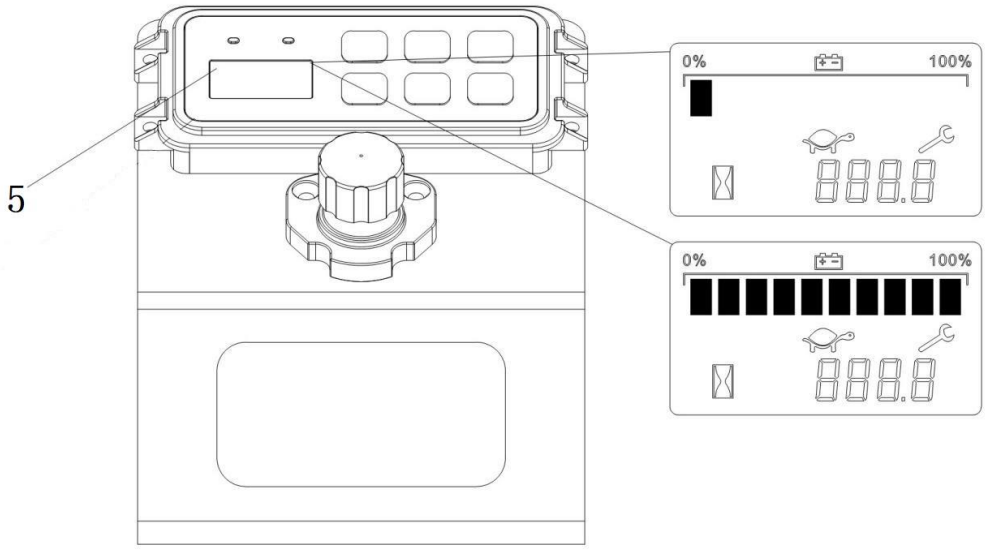


Fig.18: Charge Status Indicator (TE10Li)

The charge status indicator of the battery is integrated in the display unit (5).

The charge status is displayed in ten increments. Each is represented by a rectangle that corresponds to 10% of the battery charge.

The rectangles gradually disappear as the battery discharges. Special statuses appear in the display unit as error codes.

Table 6: Error codes

Code	The error code appears if ...	Effect
0	The battery charge is too low.	Lift function is deactivated.
91	Operation of the truck continues without first charging the battery.	Travel speed is reduced.

Charging the Battery with External Charger

Maintenance personnel

Batteries may only be charged, serviced or replaced by trained personnel. These operating instructions and the battery manufacturer's instructions must be observed when performing these operations.
Park the truck securely before carrying out any work on the batteries.

General information

- The charge status of the battery is indicated by LEDs on the battery charger.
- The charging time depends on the battery charge status. The time it takes to charge an almost fully depleted battery depends both on the battery capacity and the charge current. The approximate duration can be calculated as follows:
  Charging time = capacity of battery / charge current of battery charger.
- The lithium-ion battery can also be used when not fully charged. In this case, the remaining operating time is reduced.
- Charging continues automatically after a mains failure. Charging can be interrupted by pulling out the mains connector and continued as a partial charge.

The battery temperature rises by approx. 13°C during charging. Battery charging should only start when the battery temperature is below 40°C. The battery temperature before charging should be at least 5°C as otherwise it will affect the charge.

Meaning of the LEDs on the battery charger

When the battery charger is connected to the battery and to the power supply, the LEDs on the charger indicate the following:

Table 7: LEDs

LED lit	Meaning
Green	The battery is fully charged
Red	Battery is charging

If the green LED does not light up or if the red LED lights up permanently or not at all, this indicates a fault.

Battery Charging

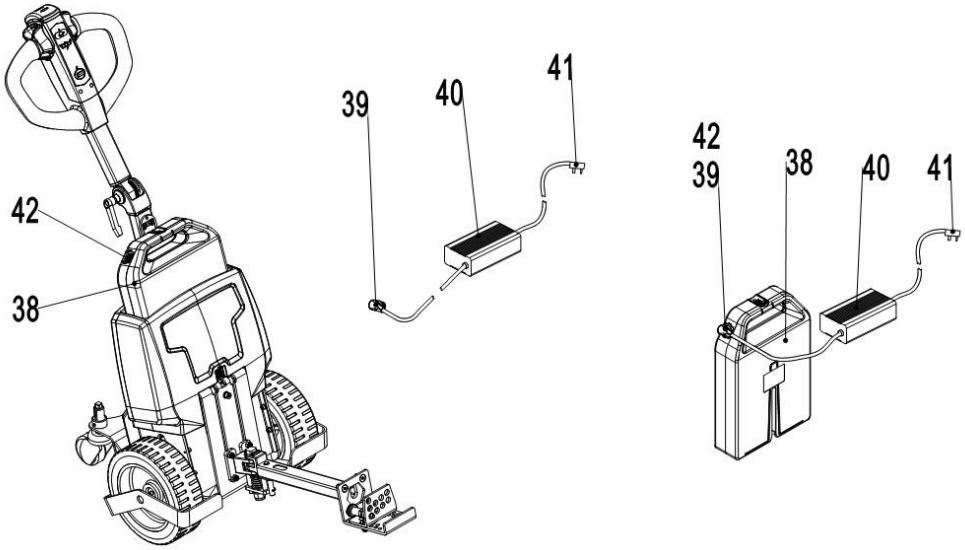


Fig.19：Charging the battery (TE10Li)

Requirements

– The truck is parked securely.

– The battery charger is approved for the battery type.

Tools and Material Required

– Battery charger

Procedure

- Expose the charging socket (42) of the battery and start by connecting it to the charge connector (39) of the battery charger (40).
- Then connect the mains plug (41) of the battery charger (40) to the power supply.
  - ➢ The charging process is indicated by the illumination of the red LED.
- Check the charge status; also refer to the instructions on the battery charger (40).
  - ➢ The charging process is completed when the green LED lights up.
- Once the battery (38) is charged, disconnect the battery charger (40) from the power supply before

unplugging it from the battery.

- Close the charging socket (42) with the cap.

Battery is charged.

- Alternatively, the battery can also be charged outside the truck. The process for charging the battery remains the same.

f. Battery removal and installation

Replacement for Lead-acid batteries

Park the tractor securely and switch off the tractor with the combined emergency button (12). Pull the battery holder (9) backwards and take out the battery (15) at the same time.
The installation is in the opposite order. Please connect the positive terminal first, otherwise the vehicle is vulnerable.

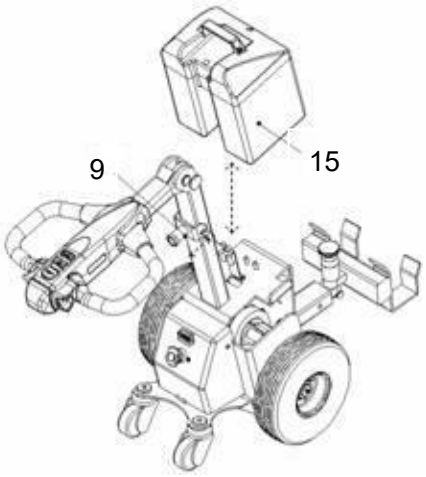
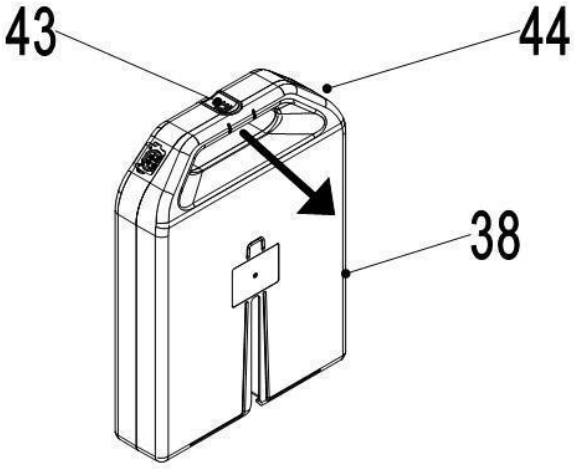


Fig. 20: Battery replacement(TE10)

Removing the battery



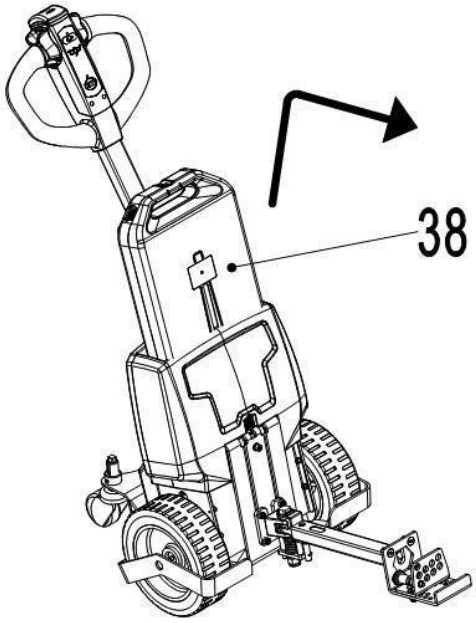


Fig. 21： Removing the battery

Removing the battery

Requirements

– The truck is parked securely.

– The emergency disconnect switch is actuated.

Procedure

- Unlock the battery latch (43).
- Lift the battery (38) up by the battery handle (44).

The battery has been removed.

Battery installation

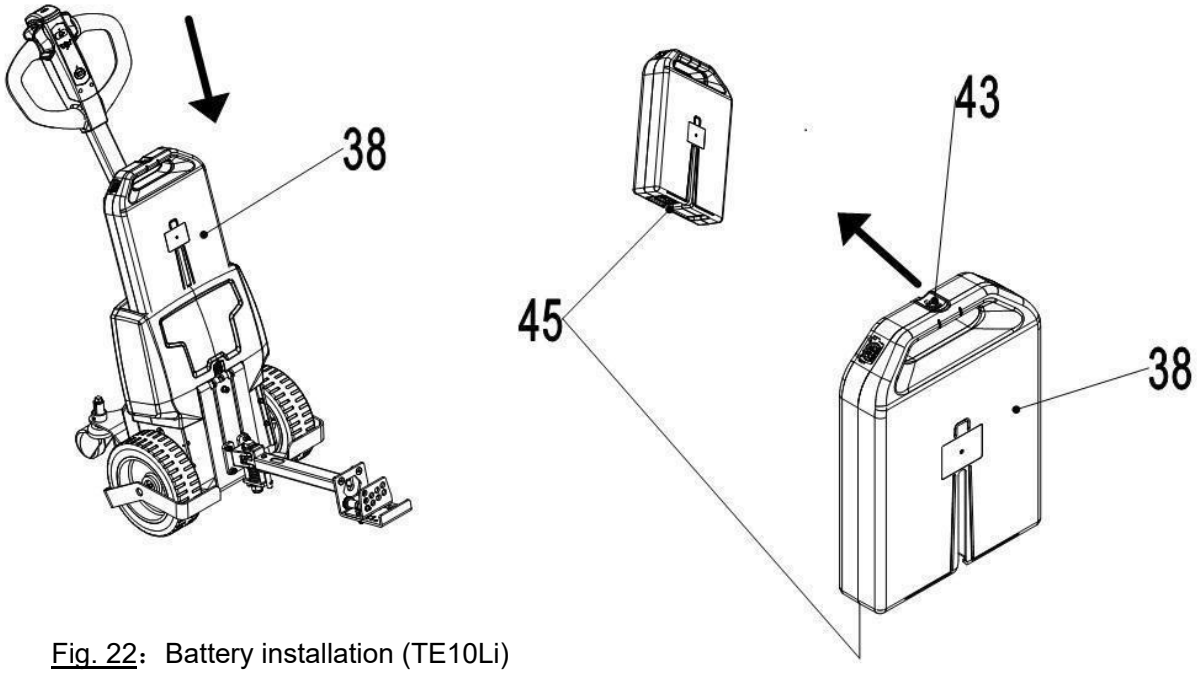


Fig. 22：Battery installation (TE10Li)

Installing the battery

Requirements

– The truck is parked securely.

Procedure

- Insert the battery (38) into the battery compartment.
- ➢ The plug connection (45) between the battery and truck must be fully connected.
- Lock the battery latch (43).
- Release the emergency disconnect switch.

The battery is now installed.

9. Regular maintenance

- Truck maintenance must only be carried out by qualified and trained personnel.
- To lift the truck, follow chapter 4 by using designated lashing straps or jacking equipment. Before that, put safety devices (for instance, designated lift jacks, wedges or wooden blocks) under the truck to protect against accidental lowering, movement or slipping.
- Only use the original spare parts approved and released from your dealer.

If you need to replace the wheel, follow the instructions above. Casters must be round and must not have excessive abrasion.

Check out the priority items in the maintenance checklist.

a. Maintenance checklist

Table 8: Maintenance checklist

		Interval(Month)			
		1	3	6	12
Mechanical system					
7	Check the chassis for deformation and cracks		•		
8	Check if all screws are fixed		•		
10	Check the gearbox for noise and leakage		•		
11	Inspect the wheels for deformation and damages		•		
12	Inspect and lubricate the steering bearing				•
13	Inspect and lubricate the pivot points		•		
14	Check the air pressure for the wheels and if necessary refill air	•			
Electrical system					
15	Inspect the electric wiring for damage		•		
16	Check the electric connections and terminals		•		
17	Test the Emergency switch function		•		
18	Check the electric drive motor for noise and damages		•		
19	Test the display		•		
20	Check, if correct fuses are used		•		
21	Test the warning signal		•		
22	Check the contactor(s)		•		
23	Check the frame leakage (insulation test)		•		
24	Check function and mechanical wear of the accelerator		•		
25	Check the electrical system of the drive motor		•		
Braking system					
26	Check brake performance, if necessary replace the brake disc or adjust the air gap		•		
Battery					
27	Check the battery voltage		•		
28	Clean and grease the terminals and check for corrosion and damage		•		
29	Check the battery housing for damages		•		
Charger					
30	Check the main power cable for damages			•	
31	Check the start-up protection during charging			•	
Function					
32	Check the horn function	•			
33	Check the air gap of the electromagnetic brake	•			
34	Test the emergency braking	•			
35	Test the reverse and regenerative braking	•			
36	Test the safety (belly) button function	•			
37	Check the steering function	•			

39	Check the tiller arm switch function	•			
General					
40	Check if all decals are legible and complete	•			
41	Inspect the castors, adjust the height or replace these if worn out.		•		
42	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.

1. Casters
2. Driving wheel
3. Height adjustment assembly
4. Tiller fixing bearing

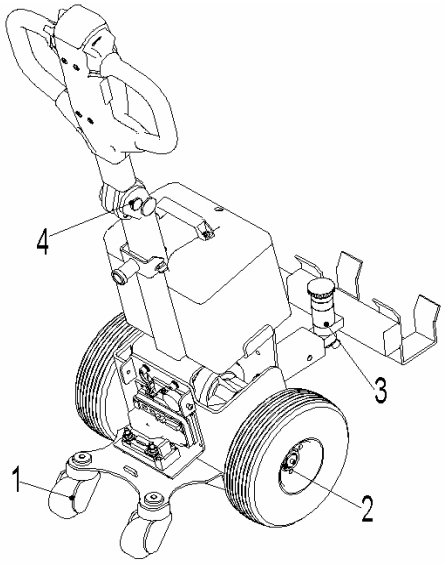
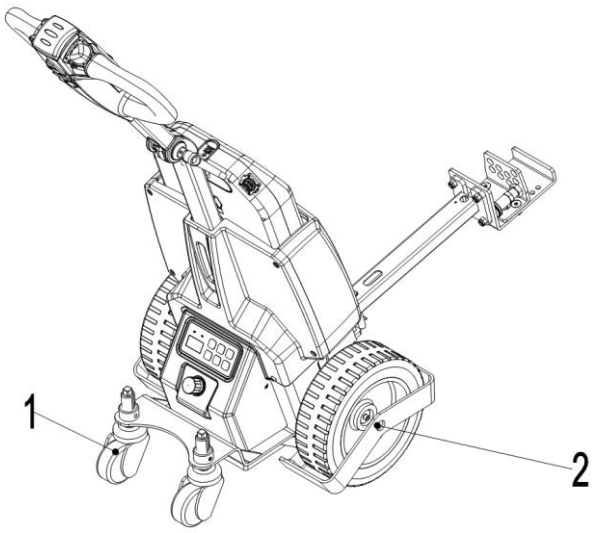


Fig. 23: Lubricating points(TE10)



1. Castor
2. Drive wheel

Fig. 24: Lubricating points (TE10Li)

c. Checking electrical fuses

Remove the main cover. The fuses are located according to fig. 25 and fig. 26.

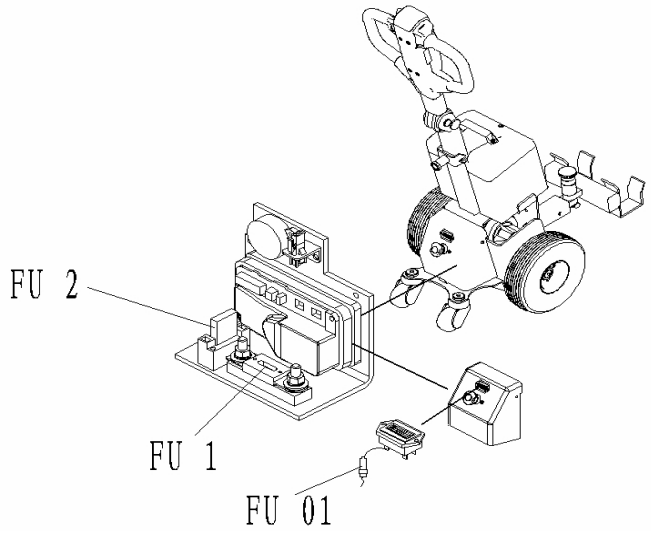


Fig. 25: Location fuses(TE10)

Table 9: Fuse size

	Rate
FU01	0.5A
FU 1	30A
FU 2	10A

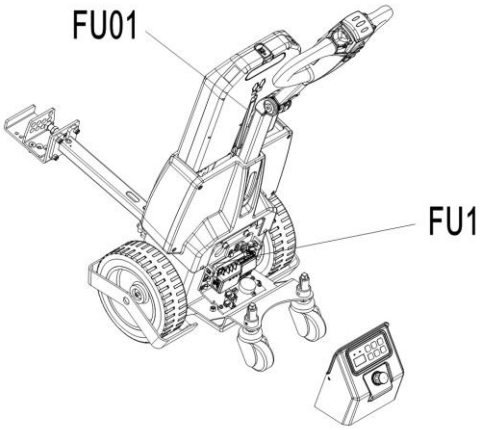


Fig. 26: Location fuses (TE10Li)

Table 10: Fuse size

Fuse	Rating
FU 1	10A
FU 01	70A

10. TROUBLESHOOTING

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

Table 11: Troubleshooting

TROUBLE	CAUSE	REMEDY
Truck does not start	Battery is still connected to the battery charger.	Fully charge the battery and disconnect the charger form the battery.
	Battery is not connected correctly.	Check that the battery is correctly attached and locked in place and adjust if necessary.
	Fuses faulty	Check the fuses and replace if necessary.
	Battery charge status is too low	Charge the battery
	Emergency disconnect switch is activated	Release the emergency disconnect switch

If the truck has malfunctions and can't be operated out of the working zone, jack the truck up and place a load handler under the truck to secure the truck. Then move the truck to designated area.

11. WIRING/ CIRCUIT DIAGRAM

Electrical diagram (TE10)

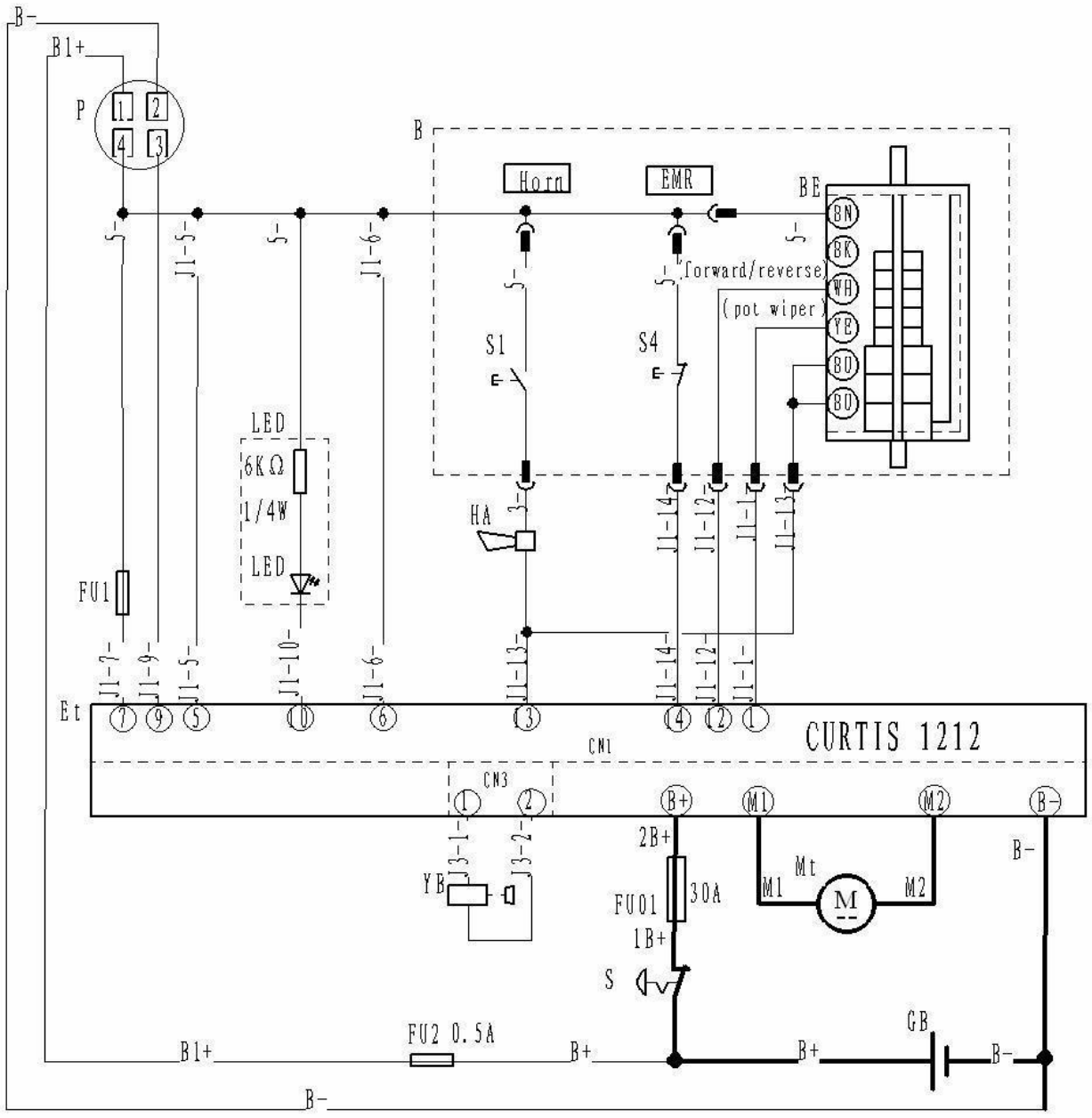


Fig. 27: Electric diagram(TE10)

FU01 : 30A
FU1 : 10A
FU2 : 0.5A

Electrical diagram(TE10Li)

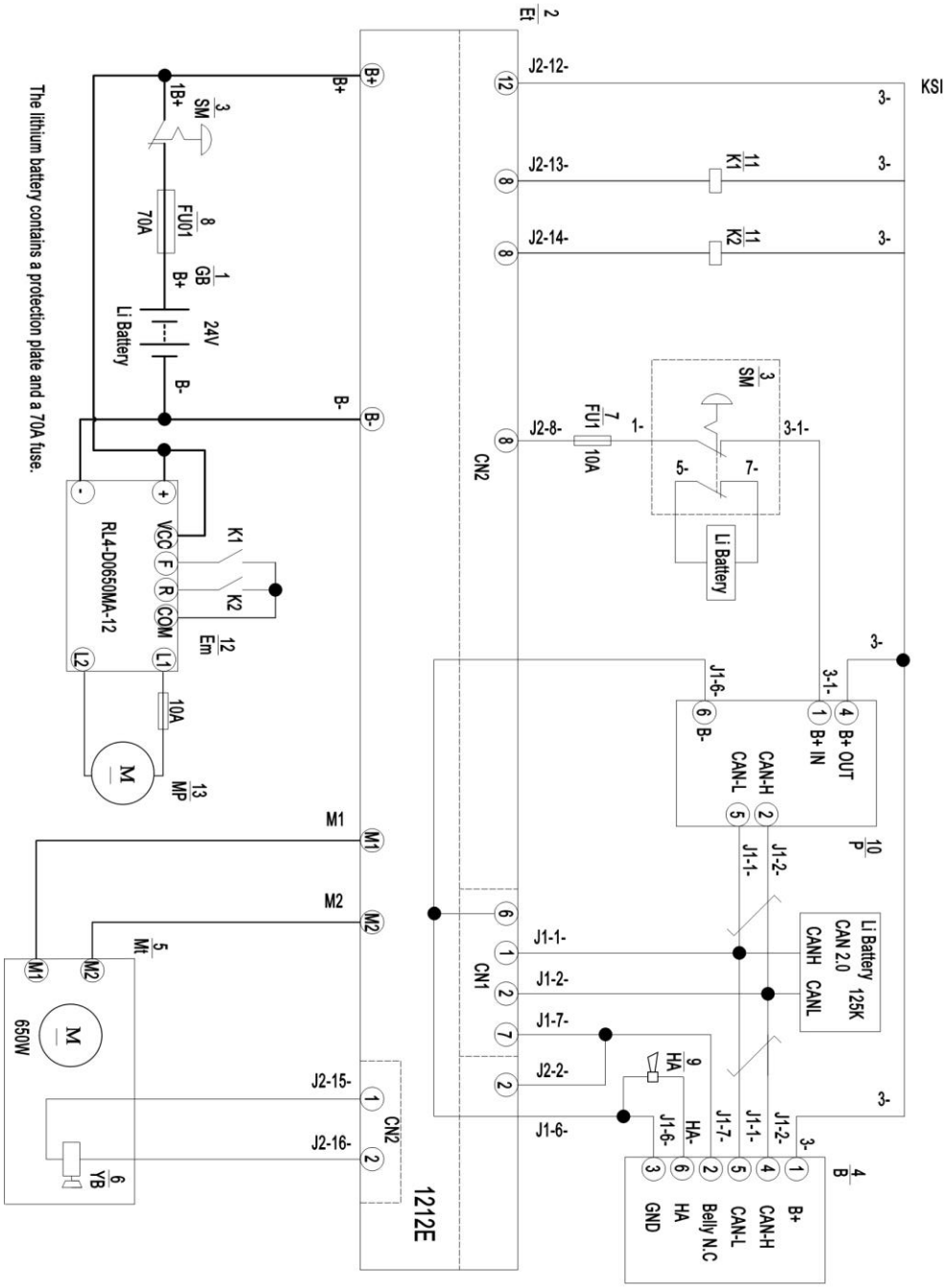


Fig. 28： Electric diagram(TE10Li)

FU 1: 10A
FU 01: 70A

Table 12: Description of electrical diagram

Code	Item	Code	Item	Code	Item
GB	Battery	Mt	Drive motor	P	Display
Et	Controller	YB	Electromagnetic brake	K1, K2	Relay
SM	Emergency disconnect switch	FU1	10A fuse	Em	Linear actuator module
		FU01	70A fuse	MP	Linear actuator motor
B	Tiller	HA	Buzzer		

12. Electronic Systems

a. Overview

The model is equipped with an electrical system consisting of the following components:

1 Batteries power the electrical system.

2 The power switch can be pressed in case of emergency to turn off all DC and AC circuits.

3 The motors, controllers and related equipment provide the necessary drive and pump power for the vehicle based on their interaction with sensors, switches, relays and actuators, as well as many parameter settings.

4 When the load is supplied with current higher than the limit, the fuse protects all DC loads from overcurrent by cutting off the power supply to the load.

5 Other DC loads activated by the operator's direct demand work independently of the controller. First, they are not controlled by the controller and are not the purpose for which they signal. However, they may interact with them in some configurations. These loads include light groups and speakers.

b. Emergency stop switch

b-1 Appearance and Specifications

TE10

TE10Li

b-2 Function

The emergency stop switch is used to cut off the current in the electrical system in an emergency, thereby stopping the operation of the vehicle. When pressed, all DC and AC circuits are open.

DC circuit open

Once the emergency stop switch is opened, the positive terminal of the battery and the key switch are disconnected, thereby cutting off power to all loads powered through the key switch. Therefore, all DC loads are de-energized.

c. Controllers and related equipment

c-1 Appearance

1) Controller Curtis 1212P(TE10)

Logic section insert: 14-pin Molex Mini-Fit Jr., P/N 39-01-2140
Solenoid Brake Insert: 2-Pin Molex Mini-Fit Jr., P/N 39-01-2020;
Handheld programming port insert: 4-pin Molex Mini-Fit Jr., P/N 39-01-2040;
Power Section Insert: AMP Insert, P/N 12076SL02

1212P J1

Pin	Description	Pin	Description
1	POT Wiper	8	POT Low
2	POT Hi	9	Lift Lockout Input/ Pump SRO Input*
3	Horn/Lift Lockout Output *	10	Status LED
4	Mode Switch (Open= M1, Closed= M2)	11	BDI
5	KSI	12	Reverse / Neutral*
6	Interlock Input	13	I/O GND
7	B+	14	Emergency Reverse *

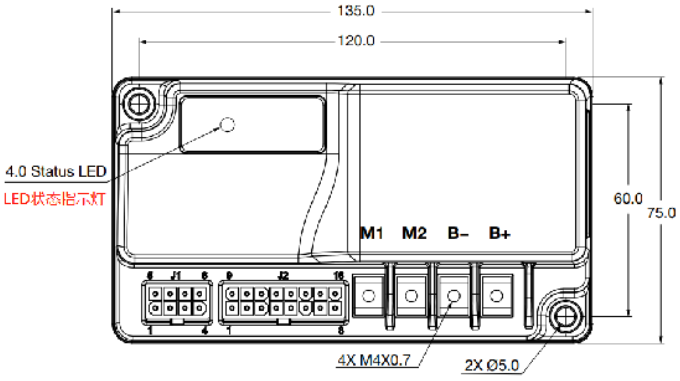
1212P J2

Pin	Description
1	Rx
2	I/O GND
3	Tx / Charge Inhibit
4	Battery +

1212P J3

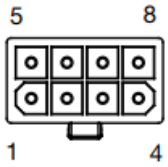
Pin	Description
1	Brake +
2	Brake –

2) Controller Curtis 1212E(TE10Li)



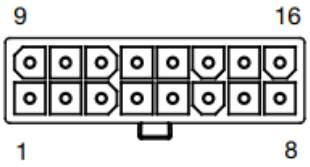
Docking connector： 8core Molex Mini-Fit Jr.
16core Molex Mini-Fit Jr.

CONNECTOR PINOUT CHARTS



J1

Pin	Description
1	CAN L
2	CAN H
3	Switch 1
4	Charger Inhibit
5	Switch 5
6	I/O Ground
7	Switch 2
8	Horn Driver



J2

Pin	Description	Pin	Description
1	EMR NO	9	Reverse
2	Switch 3	10	Interlock
3	Pot-High / Inhibit	11	Forward
4	Lift Inhibit	12	KSI (keyswitch)
5	Mode Input	13	Lower Driver
6	Pot Wiper	14	Lift Driver
7	Switch 4	15	EM Brake Driver
8	B+	16	Coil Supply

c-2 Function

The controller is connected through the following sensors, switches, relays and actuators.

Key switch

Power switch

Accelerator

Tiller proximity switch

Emergency reverse switch

Hydraulic control switch

These devices provide DC power, interact with a controller, and the controller activates or receives data from them to control the motor based on a number of parameter settings.

By correctly setting various motor technical parameters and control technical parameters and functional values of the controller, the safe and efficient working performance and complete operating functions of the electric vehicle can be realized.

1. The crawling speed of electric vehicles can be adjusted. The crawling speed setting function of the controller enables the electric vehicle to run for a long time under low speed conditions.

2. The acceleration rate can be adjusted. Acceleration rate is the "soft and hard" feeling of the accelerator pedal when operating an electric vehicle. By setting the acceleration rate, the vehicle can meet the requirements of acceleration operation under different working

conditions.

3. The maximum driving speed can be set. Reasonable setting of the maximum driving speed of the electric vehicle can prevent the traction motor from being overloaded due to excessive vehicle speed.

4. Safety protection function. If the power element of the controller is damaged during the operation of the vehicle, the controller will disconnect the main contactor in the shortest time; when the temperature rise of the controller is too high, the controller will automatically limit the armature current of the motor; When low, the controller will stop working for safety.

5. The motor controller has self-diagnosis function. During the working process of the controller, once a fault occurs, the fault code will be displayed on the display instrument of the handle, and the controller will automatically stop working to ensure the safety of the operating system.

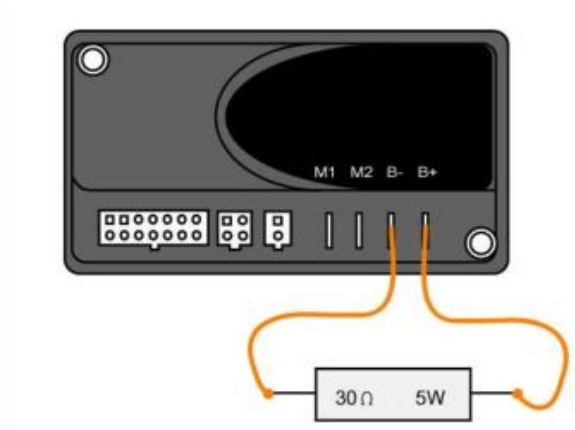
6. The handle display instrument will display the power of the battery and the accumulated working hours.

c-3 Test (Use Curtis 1212P as an example)

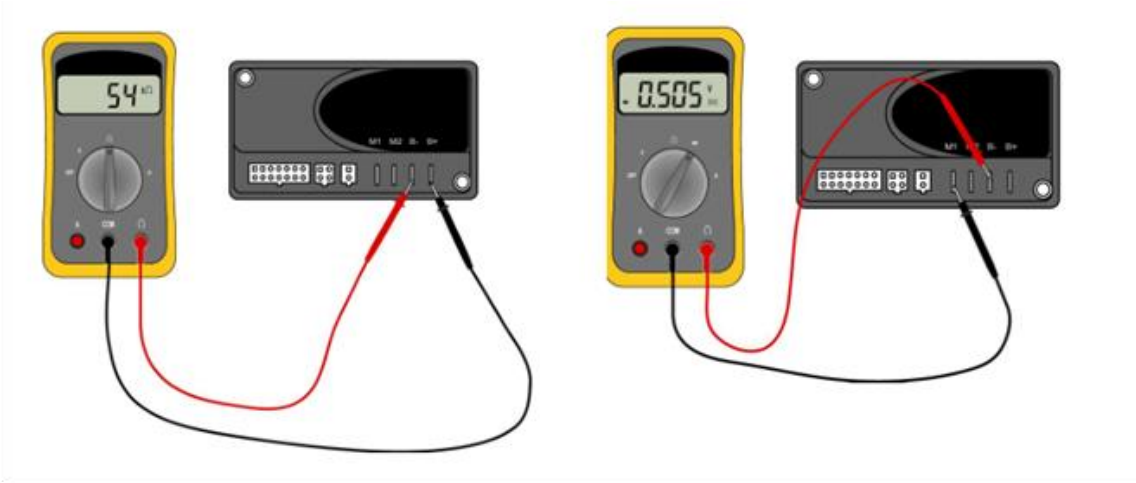
Controller

Measure the diode voltage of the AC MOSFET circuit inside the controller to check whether it is burned or damaged.

Remove the cables and harnesses connected to the controller and completely discharge the internal capacitor (discharge the B+ and B- terminals with a resistor 30Ω/5W).



Use a multimeter to measure according to the table below and check whether it is normal. Each test item must be tested more than 3 times.



Item	Multimeter terminals		Normal value range	
	Red test lead	Black test lead	Measurement of polarity value	Measurement of resistance value
1	B+	B-		40KΩ+
2	B+	M2		80KΩ+
3	B+	M1		80KΩ+
4	M1	M2		60KΩ+
5	B-	M2	0.3-0.6V	
6	B-	M1	0.3-0.6V	

Pull the multimeter to the Ω file (measurement of the resistance value)

Pull the Multimeter to the diode file (measurement of the polarity value)

d. Handle

TE10 Handle

TE10Li Handle

d-1 Function

The handle head controls some actions of the vehicle by interacting with the controller through the Lifting and Lowering button, belly switch, tortoise speed button, accelerator and password lock

A. Accelerator
B. Belly switch
C. Horn switch
D. Password lock (TE10Li)
E. Tortoise speed switch (TE10Li)

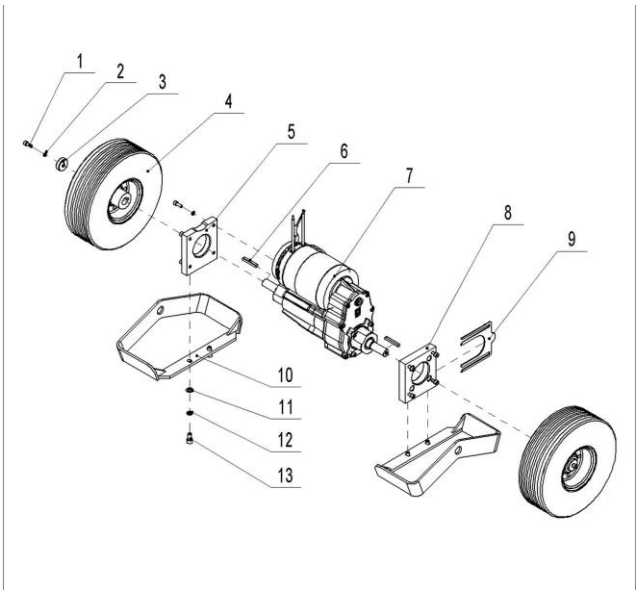
13. Drive/brake system

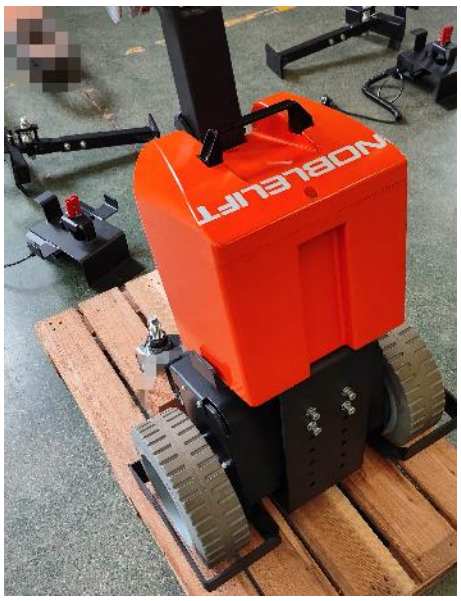
a. Overview

The drive/brake system includes the following:
1) The drive motor controlled by the controller transmits the rotating force to the drive shaft (electric and mechanical power)
2) The drive shaft converts the rotating force transmitted from the drive motor into the torque and speed suitable for driving through its gear set, and sends them to the corresponding wheels (mechanical power). They also include the service brake, which controls the electromagnetic brake through the controller to generate the braking force (friction)
3) The handlebar accelerator sends a CAN signal to the drive motor controller to accelerate the motor (CAN signal)

b. Drive assembly

1) Appearance

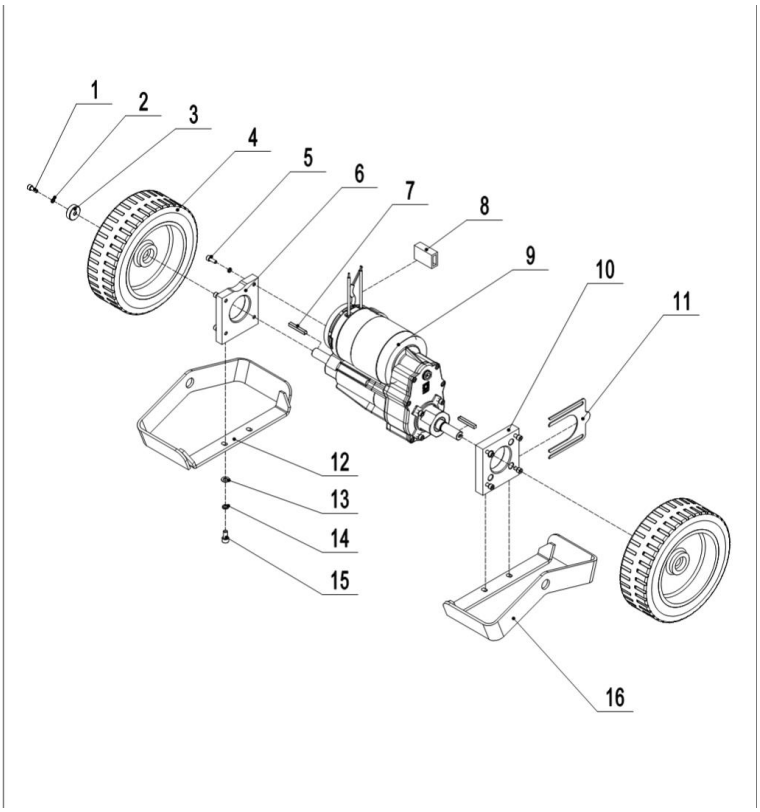




TE10 Drive Unit

No.	Description	Qty.
1	Screw M6x25	10
2	Spring Washer 6	10
3	Retaining Ring	2
4	WheelΦ250x80	2
5	Mounting Plate	1
6	Flat Key 6x45	2
7	Drive Unit	1
8	Mounting Plate	1
9	Subplate	1
10	Protective Cover	2

11	Flat Washer 8	2
12	Spring Washer 8	2
13	Screw M8x16	2



TE10Li Drive Unit

No.	Description	Qty.
1	Screw M6x16	2
2	Spring Washer 6	14
3	Retaining Ring	2
4	WheelΦ250x80	2
5	Screw M6x20	12
6	Mounting Plate	1
7	Flat Key 6x45	2
8	Magnetic Ring	1
9	Drive Unit	1
10	Mounting Plate	1
11	Subpl ate	1
12	Protective Cover	1
13	Flat Washer 8	4
14	Spring Washer 8	4
15	ScrewM8x16	4
16	Protective Cover	1

2) Drive Motor

Operation

On the electric side, the drive motors turn their drive wheels so that the vehicle can move forward/backward

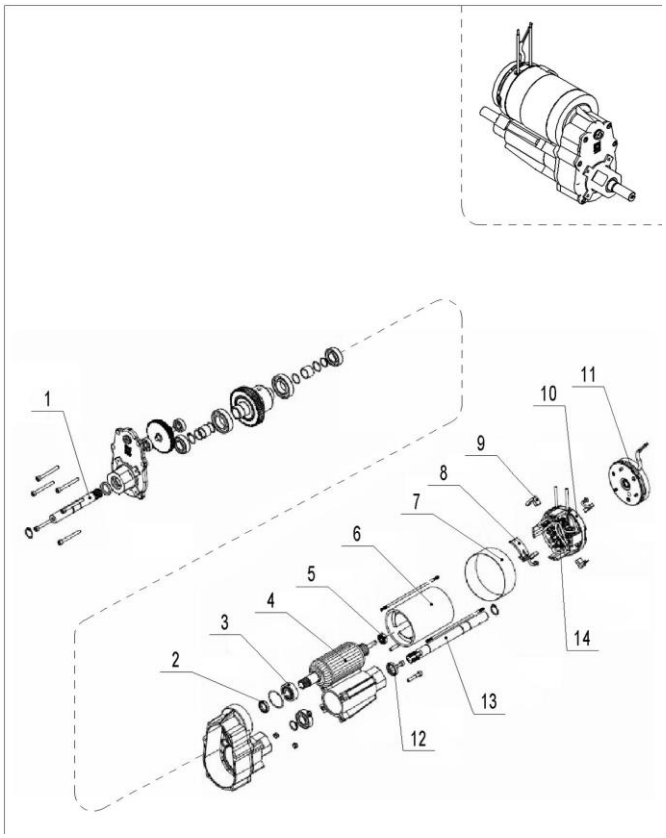
controlled by controller

Each drive motor is connected to the controller via M1 and M2 wires. The controller operates the drive motor based on inputs from a number of switches and sensors, as well as internal parameter settings.

The drive motor operates when the following conditions are met:

1. Battery connection, emergency switch on to supply power to the controller,
2. Move the tiller to the operating area.
3. Determine the driving direction.
4. Twist the accelerator on the tiller

Drive motor structure



No.	Description	Qty.
1	Axle	1
2	Sealing Ring	1
3	Bearing	1
4	Armature	1

5	Bearing	1
6	Stator	1
7	Brush Cover	1
8	Safety hook	1
9	Brush	4
10	Brush Cover	1
11	Brake	1
12	Sealing Ring	2
13	Axle	1
14	Pedestal	1

c. Troubleshooting

Drive motor

Problem description	Reason
Drive motor no working	Switch is not off (battery connector, key switch, proximity switch): Turn off switch. If still not running, use a voltmeter to test the power of the control panel and the current of each switch.
	Bad signal. fuse burned: check battery connection. Check the connection of the battery Check fuse, driver and logic. Replace fuse if burned. Check the drive motor and control panel which possible cause fuse breakage. Some of the reasons are: operating under excessive load, the current limit is too high.
	Battery voltage low: Check the battery terminal voltage. Charge the battery if too low. Check if there is one or more defective cell cells.
Drive motor no working	Excessive carbon brush wear（spring pressing to the lowest carbon brush）
Traction cannot operate during normal operation, but hydraulic operation is normal	The brake is defective, resulting in excessive resistance. The heat increases, causing the motor to stop. Check braking adjustment
	Overweight traction load: Reduced duty cycle load.
Traction and hydraulics do not last during the normal operating period	The pallet is equipped with small batteries.
	Battery not charged fully during battery charging: Check if battery charges Check if battery charger is malfunction.
	Battery replacement interval is too long or battery replacement cooling time is too short.
	The battery has one or more defective single batteries, causing the rated capacity and capacity of the battery to be below normal.
	Due to the failure of the drive system, the drive system consumes too much battery power. Check the brake adjustment. Check the wheel bearings, axles and other mechanical parts for correction to eliminate the failure. Replace the smaller friction tire.

	Due to lift failure, the hydraulic system consumes too much battery power, or the hydraulic conditions of the working cycle are not correct Check the mast for restrictions during operation
	After a work shift, the pallet capacity exceeds its designed capacity without the power available.
The positive electrode (+) or negative electrode (-) of the battery is directly contact with the vehicle frame (body) or drive motor	
	Battery or control panel wire connection in contact with frame: Conduct continuity test and move wire. Remove wire in sequence until troubleshooting. Fault will be disconnected at the end of the wire.
	Dirty motor： Please clean up the carbon dust in time
	Wet motor
The vehicle did not reach its maximum speed	The battery is not fully charged or the battery is poor charge the battery. Check the cell of battery. If necessary, please replace the cell of battery.
	Failure in driving motor, control handle or transmission system Check speed in both directions. If you need to adjust the controller, follow the corresponding part of the manual programmer. If the drive motor fails, test the motor assembly.

14. CURTIS Handheld Programmer

1). Operation Cautions

The prompt function of the console is designed for the convenience of vehicle inspection and maintenance, Adjustments to the controller parameters are not allowed without the approval of the vehicle manufacturer，so as to avoid vehicle and personal safety accidents. After modifying the parameters, the handheld unit will automatically save the parameter settings, and the only thing you need to do is just close the key switch and restart.
CURTIS handheld console can be connected when the controller is powered on or off.

2). Process of Vehicle Fault Reading

Please turn on the key switch after connecting the handheld unit to the controller Check for

the faults based on the CURTIS handheld unit menu list
When running the vehicle, the flashing line of the handheld cursor will prompt English fault content, which can be interpreted by referring to the fault code list

3). Vehicle Signal Detection

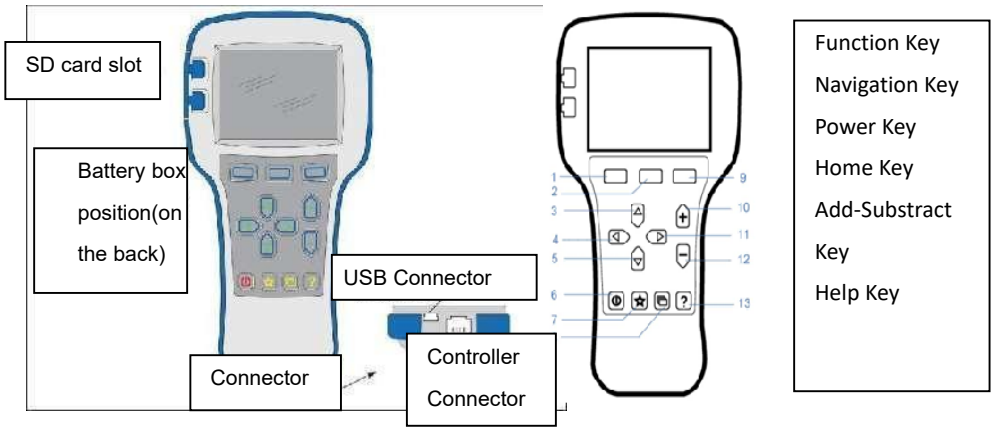
Please turn on the key switch after connecting the handheld console to the controller
Check for the Monitor based on the CURTIS handheld menu list
Please open the corresponding detection menu sub item according to the need, run the vehicle, and observe the change of handheld value.

4). Contents of CURTIS Handheld Menu

The Curtis 1313 handheld programmer is used to configure the Curtis electronic control system. The set parameters, real-time monitoring controller data and fault diagnosis may be adjusted and saved through this programmer.

Warning:The control system will affect the performance of vehicle's acceleration, deceleration, hydraulic system and brakes. Hazardous conditions may occur if the vehicle control system is incorrectly programmed or beyond safety limit. Only the vehicle manufacturer or authorized service agent may program the control

The programmer has two interfaces with a battery box and a memory card slot, of which one is used to communicate with electric control, and the other is used to communicate with PC.



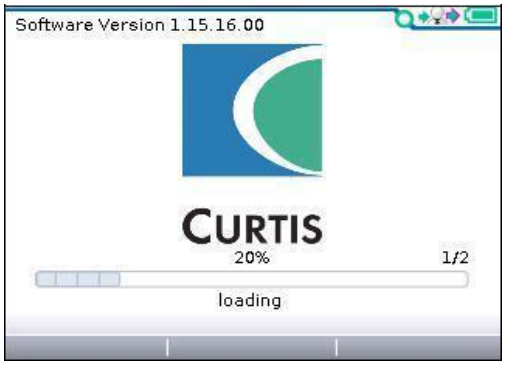
Once the 1313 HHP has uploaded the information from the controller, it displays the Main Screen

The difference between the connection cables of handheld programmers

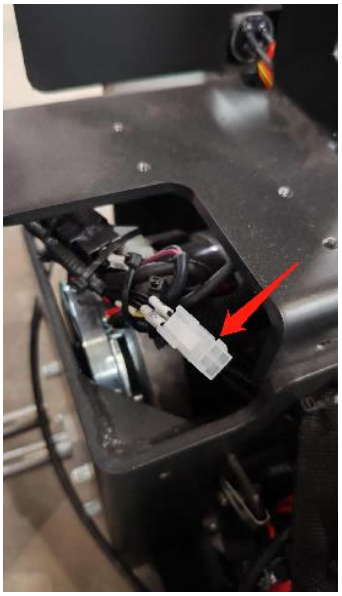
	
Connection cable for TE10	Connection cable for TE10Li

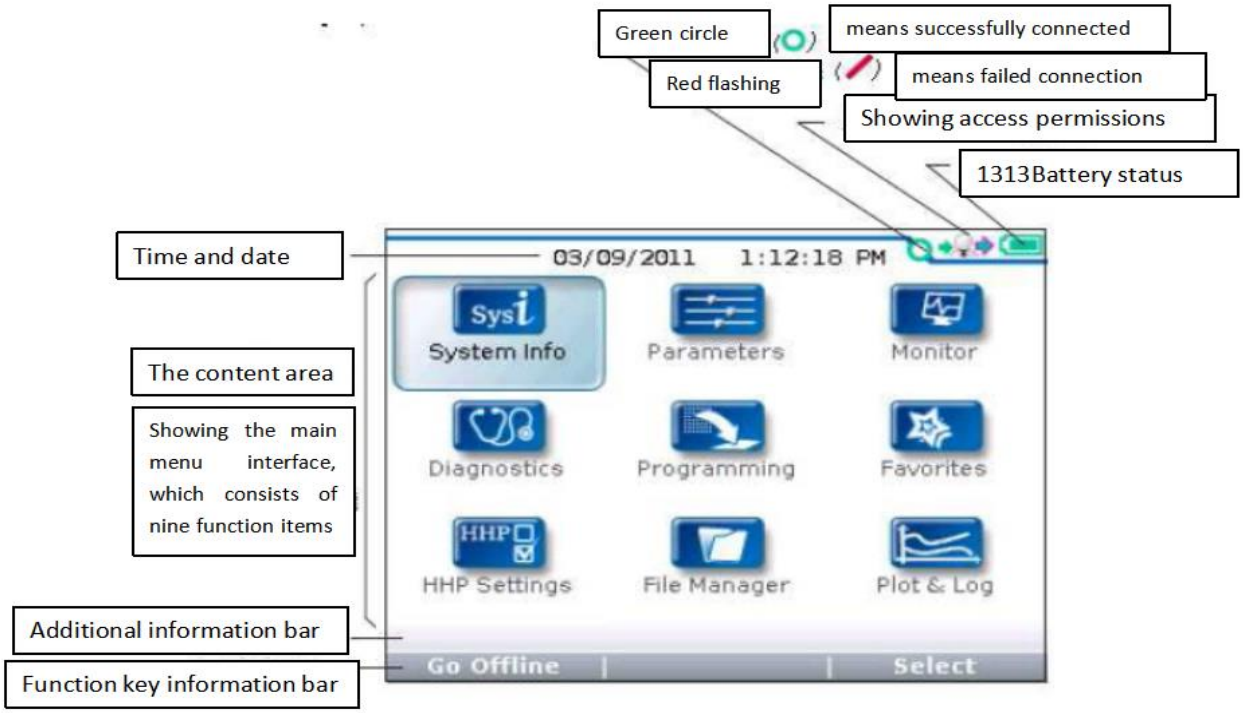
a. Programmer power on

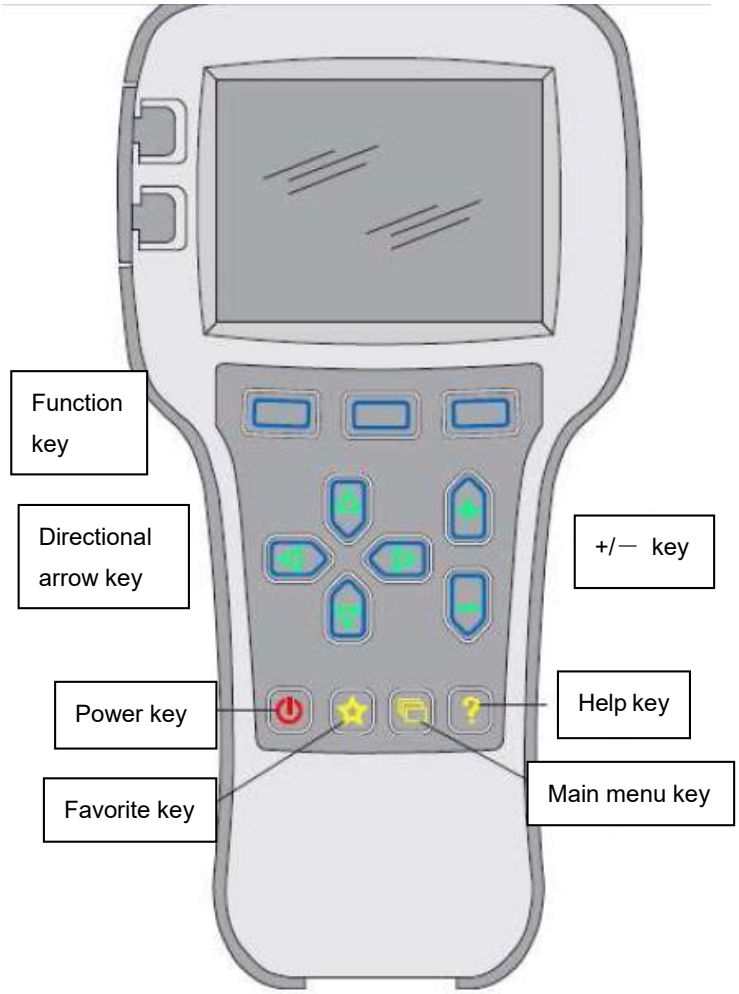
The handheld programmer is connected to the controller by plugging the cable of the handheld programmer into the programming port of the controller. After connecting to the controller, the handheld programmer will automatically power up and display the control information on the programmer.



The connection port of the handheld unit is shown in the figures as below. (TE10Li)



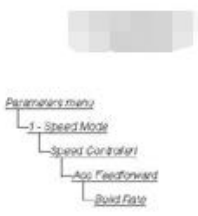




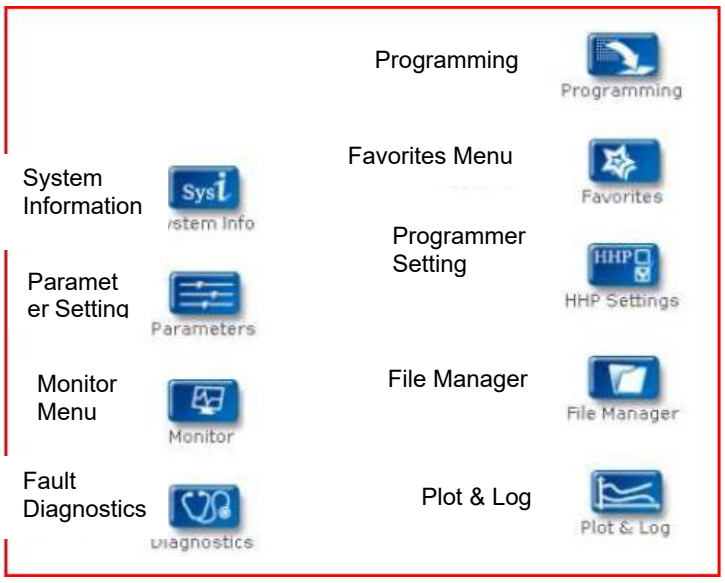
Function keys
The three keys will be blank because the function of the three keys is based on the specified content. At any given time, the functions of the buttons are displayed on the LCD screen above. Directional arrow key
The information displayed can be selected by pressing up, down, or left or right through 4 directional keys.
+ / - Button
The parameters can be added or subtracted by the two keys. Meanwhile, "+" refers to "Yes" in the operation system, and "-" refers to "No", which may be used as a scrolling options in some cases
Power switch
When the programmer inserts an already powered controller, it is not necessary for the programmer to be initiated by pressing the power switches, and the programmer will start up automatically. When it is held down for a few seconds, the programmer will prompt turn off confirmation, which shall be answered by selecting "Yes" or "No" of the function keys. When the programmer is turned off, a few seconds of pressing will trigger the restarting of the programmer.
Key of favourite
There are 2 ways to enter the menu of "Favorites" 1. You can enter through the main menu "Favorites"; 2. You can also press this key to enter

b. Menu structure

The main menu consists of nine submenus, each of which is displayed with a specific icon, and each item of the submenu is arranged in a hierarchy.
Some menus contain one item only, but most menus contain more than one item, and you can access the next level of submenus through each folder. It is possible for you to expand the table through grid options, enter a set of execution commands through dialog options, and return to the next level of menu whichever interface you are in.
All nine submenu names are shown in bold on the main menu and below the icons. When you enter the stepped menu, the name of the submenu or the path you are in are displayed at the top of the screen.



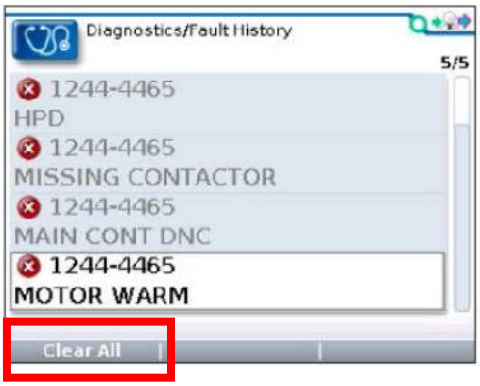
Nine main menus



Fault diagnosis menu

In the main menu, Select the "Diagnostics" Fault diagnosis icon and press the corresponding function key to enter the Fault diagnosis menu, which includes two folders: "Present Errors" and "Fault History"

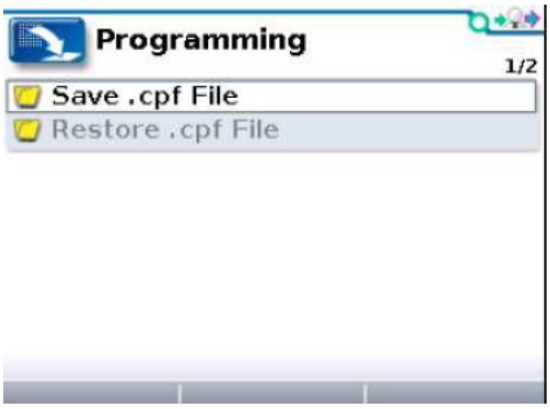
Note: the fault caused by a temporary event captured in the circuit is not a real system fault in some cases. and you can determine if the fault really exists by restarting the system and observing the automatic fault indication. In the history failure folder, the failures listed are all failures encountered after the last history failure was cleared, which can be restarted by clearing the fault content in the entire folder.



"Clear All" is used to Clear the history failure folders. A function key will be highlighted separately if there is a history failure in the history failure folder, and will be grayed out if there is no history failure.

Programming edit menu

In the main menu, Select the "Programming" programming icon and press the corresponding function key of "Select" to enter the menu. You can store and restore parameter setting files (.cpf files) through the programming menu.



Save. cpf File

Use the save. cpf file function in the programming menu to back up the currently set parameters. You can save as many. cpf files as you need, and you need to name each. cpf file with a different name. Restore.cpf File

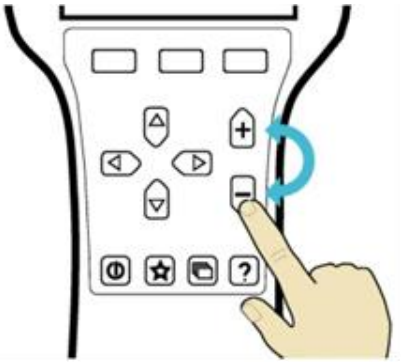
Restore.cpf File

You can select the. cpf file saved earlier to replace the. cpf file of the current controller. When the whole data recovery process is completed, a dialog box will pop up on the screen asking for the system to be restarted.

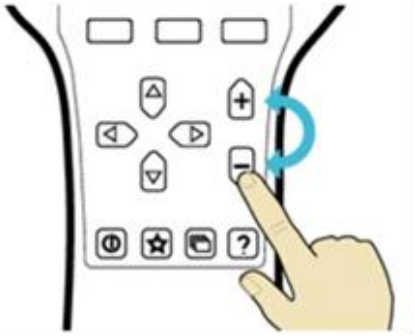
c. Parameter Setting

Select "Parameters" from the main page and press "Select" to enter the parameter setting page, in which you can adjust or modify the parameters of the controller.

Parameters can be adjusted or modified in two ways: one is in the parameter list page as shown in the figure below;



The other is through the parameter edit page as shown below



15. TROUBLESHOOT

a. TE10 TROUBLESHOOTING CHART (Curtis 1212P)

NO.	PROGRAMMER LCD DISPLAY	LED CODE	EXPLANATION	POSSIBLE CAUSE
1	BATTERY DISCONNECT FAULT	4,5	battery disconnected	1. Battery not connected. 2. Poor connection to battery terminals.
2	BRAKE OFF FAULT	3,4	brake Off fault	1. Electromagnetic brake driver open. 2. Electromagnetic brake coil shorted.
3	BRAKE ON FAULT	3,2	brake On fault	1. Electromagnetic brake driver shorted. 2. Electromagnetic brake coil open.
4	CURRENT SENSE FAULT	4,1	current sense out of range	1. Short in motor or in motor wiring. 2. Controller failure.
5	EEPROM CHECKSUM FAULT	4,3	EEPROM fault	1. EEPROM failure or fault.
6	HARDWARE FAILSAFE	4,2	motor voltage out of range	1. Motor voltage does not correspond to throttle request. 2. Short in motor or in motor wiring. 3. Controller failure.*
7	HPD FAULT	3,5	HPD (High Pedal Disable)	1. Improper sequence of throttle and KSI or inhibit inputs. 2. Misadjusted throttle pot.
8	MAIN FAULT	2,3	main contactor fault	1. Main contactor welded or stuck open. 2. Main contactor driver fault.
9	MAIN OFF FAULT	2,1	main contactor driver Off fault	1. Main contactor driver failed open.
10	MAIN ON FAULT	2,4	main contactor driver On fault	1. Main contactor driver failed closed.
11	OVERVOL TAGE FAULT	1,5	battery voltage too high	1. Battery voltage >31 volts. 2. Vehicle operating with charger attached. 3. Intermittent battery connection.
12	PRECHARGE FAULT	3,3	precharge fault	1. Control failure 2. Low battery voltage
13	SPEED POT FAULT	1,3	speed limit pot wiper out of range	1. Speed limit pot wire(s) broken or shorted. 2. Broken speed limit pot.
14	THERMAL FAULT	1,1	over-/under-temperature cutback	1. Temperature >80°C or < −10°C. 2. Excessive load on vehicle. 3. Operation in extreme environments. 4. Electromagnetic brake not releasing.
15	THROTTLE FAULT	1,2	PotLow and/or PotWiper out of range	1. Throttle input wire open or shorted. 2. Throttle pot defective. 3. Wrong throttle type selected.
16	UNDERVOL TAGE FAULT	1,4	battery voltage too low	1. Battery voltage < 17 volts. 2. Bad connection at battery or controller

17	WIRING FAULT	3,1	HPD fault present >10 sec.	1. Misadjusted throttle. 2. Broken throttle pot or throttle mechanism.

b. TE10Li TROUBLESHOOTING CHART (Curtis 1212E)

Fault Code (1212E) Chart

No.	Fault Code	Fault Name	Possible Reason	故 障 来 源 Fault Source
1	**11-1**	Severe Undervoltage	Controller defective Battery defective	1212E Controller
2	**12-1**	Undervoltage Cutback	Incorrect battery voltage Main relay defective Controller AD defective	1212E Controller
3	**13-1**	Severe Overvoltage	Incorrect battery voltage Main relay defective Controller AD defective	1212E Controller
4	**13-2**			
5	**14-1**	Overvoltage Cutback	Incorrect battery voltage Main relay defective Controller AD defective	1212E Controller
6	**15-1**	Controller Severe Undertemp	Temperature sensor defective Low ambient temperature	1212E Controller
7	**16-1**	Controller Overtemp Cutback	Temperature sensor defective High current for a long time	1212E Controller
8	**17-1**	Controller Severe Overtemp	Temperature sensor defective	1212E Controller
9	**21-1**	Throttle Fault	Throttle wiring fault	1212E Controller
10	**21-2**		Incorrect throttle type setting	
11	**21-3**		Incorrect throttle operation	
12	**21-4**		Steering Angle Pot wiring fault	
13	**22-1**	HPD Sequencing	Incorrect throttle operation Throttle defective	1212E Controller
14	**23-1**	Main Relay Welded	Main relay defective	1212E Controller

15	**24-1**	Main Relay Did Not Close	Main relay defective Incorrect relay pull in voltage setting	1212E Controller
16	**24-2**			
17	**25-1**	Main Driver Fault	Main driver defective	1212E Controller
18	**25-2**			
19	**26-1**	Precharge Failed	Precharge PTC defective	1212E Controller
20	**26-2**			
21	**31-1**	Stall Detected	Precharge PTC defective	1212E Controller
22	**32-1**	Motor Short	Motor Short	1212E Controller
23	**32-2**			
24	**33-1**	Motor Open	Motor Open	1212E Controller
25	**33-2**			
26	**34-1**	EM brake failed To Set	EM brake defective	1212E Controller
27	**41-1**	Push SRO	Incorrect operation sequence Controller defective	1212E Controller
28	**42-1**	Interlock SRO Fault	Incorrect operation sequence Controller defective	1212E Controller
29	**43-1**	Low BDI	Battery over discharged	1212E Controller
30	**44-1**	Speed Supervision	Speed is out of allowed range	1212E Controller
31	**44-2**			
32	**44-3**			
33	**44-4**			
34	**44-5**			
35	**51-1**	Over Current Fault	Controller defective Current sensor defective	1212E Controller
36	**52-1**	Current Sense Fault	Current sampling circuit defective	1212E Controller
37	**52-2**			
38	**53-1**	Driver Fault	Driver open or short Incorrect parameter settings	1212E Controller
39	**53-2**			
40	**53-3**			
41	**53-4**			

42	**54-1**	PUMP SRO Fault	Incorrect operation sequence Switch defective Incorrect parameter settings	1212E Controller
43	**54-2**			
44	**54-3**			
45	**54-4**			
46	**54-5**			
47	**55-1**	EMR SRO Fault	EMR switch defective Incorrect operation sequence Incorrect parameter settings	1212E Controller
48	**55-2**			
49	**55-3**			
50	**56-1**	Creep SRO Fault	Incorrect operation sequence Cost	1212E Controller
51	**56-2**			
52	**56-3**			
53	**56-4**			
54	**61-1**	PDO Timeout	CAN bus too heavy Incorrect parameter setting	1212E Controller
55	**61-2**			
56	**61-5**			
57	**62-SDO Abort ID**	PDO Mapping Error	Incorrect variable data length Incorrect access mode Incorrect CAN index	1212E Controller
58	**71-1**	Hardware Fault	MOSFET defective Micro defective	1212E Controller
59	**71-2**			
60	**71-3**			
61	**71-4**			
62	**71-5**			
63	**72-1**	Software Fault	Internal communication failed Incorrect firmware Change controller mode to work mode from test mode	1212E Controller
64	**72-2**			
65	**72-3**		Received CAN Node Reset command during running	
66	**81-Parameter index**	Parameter Out of Range	Incorrect variable data	1212E Controller
67	**82-1**	Parameter Fault	Incorrect parameter settings FRAM defective	1212E Controller
68	**82-2**			
69	**82-3**			

70	**82-4**			
71	**82-6**			
72	**83-Block num**	NV Failure	FRAM operation failed	1212E Controller
73	**83-2**			
74	**83-3**			
75	**83-4**			
76	**83-5**			
77	**84-code**	Supervision	Cross check failed	1212E Controller
78	**84-2**	SUPERVISOR_FIFTEEN_V_SUPPLY_FAILURE		
79	**84-8**	SUPERVISOR_HARDWARE_FAULT		
80	**84-11**	PRIMARY_INIT_CAN_OBJ		
81	**84-12**	PRIMARY_INIT_ILLEGAL_CAN_SIZE		
82	**84-13**	PRIMARY_INIT_CAN_SIZE		
83	**84-14**	PRIMARY_INIT_TIMEOUT		
84	**84-15**	PRIMARY_WRITE_OJECT		
85	**84-16**	PRIMARY_WRITE_SIZE		
86	**84-17**	PRIMARY_WRITE_TIMEOUT		
87	**84-18**	PRIMARY_WRITE_CRC		
88	**84-19**	PRIMARY_WRITE_ACK		
89	**84-20**	PRIMARY_TASK_QUEUE_FAIL		
90	**84-21**	PRIMARY_FAULT_ACTIONS		
91	**84-22**	PRIMARY_ALU_FAIL		
92	**84-23**	PRIMARY_MESSAGE_WATCHDOG		
93	**84-24**	PRIMARY_FAULT_ACK		
94	**84-25**	SUPERVISOR_INIT_CAN_OBJ		
95	**84-26**	SUPERVISOR_INIT_ILLEGAL_CAN_SIZE		
96	**84-27**	SUPERVISOR_INIT_CAN_SIZE		

97	**84-28**	SUPERVISOR_INIT_TIMEOUT		
98	**84-29**	SUPERVISOR_WRITE_OJECT		
99	**84-30**	SUPERVISOR_WRITE_SIZE		
100	**84-31**	SUPERVISOR_TASK_QUEUE_FAIL		
101	**84-32**	SUPERVISOR_ALU_FAIL		
102	**84-33**	SUPERVISOR_MESSAGE_WATCHDOG		
103	**84-34**	SUPERVISOR_KSI		
104	**84-35**	SUPERVISOR_INPUT_1_SWITCH		
105	**84-36**	SUPERVISOR_INPUT_2_SWITCH		
106	**84-37**	SUPERVISOR_INPUT_3_SWITCH		
107	**84-38**	SUPERVISOR_INPUT_4_SWITCH		
108	**84-39**	SUPERVISOR_INPUT_5_SWITCH		
109	**84-43**	PRIMARY_INPUT_1_SWITCH		
110	**84-44**	PRIMARY_INPUT_2_SWITCH		
111	**84-45**	PRIMARY_INPUT_3_SWITCH		
112	**84-46**	PRIMARY_INPUT_4_SWITCH		
113	**84-47**	PRIMARY_INPUT_5_SWITCH		
114	**80**	Mode fault	The handle turtle speed button is faulty, and the turtle speed button is detected closed before it is turned on.	Handle
115	**81**	Lift fault	The rising button fails, and the rising button is detected as being pressed before powering on.	Handle
116	**82**	Lower fault	The descent button malfunctions, and the descent button is detected as being pressed before booting.	Handle
117	**83**	BMS Communication Outage	Lithium battery communication timeout。 1. Lithium battery BMS is damaged. 2. The communication line from the lithium battery to the handle is broken. 3. The communication module of the handle is damaged.	Handle
118	**84**	Throttle FAULT	Improper sequence of throttle input. The accelerator is not in the middle position until the	Handle

			password is entered and the accelerator needs to be reset to resolve the fault	
119	**85**	Controller Communication Outage	Controller communication is lost	Handle
120	**86**	Lift system failure	The output of the pump station runs continuously, and the hoisting system fails, and it may be the failure of the rising microswitch	Handle
121	**90**	Over Voltage	The battery voltage is too high. 1. It may be that the charger is overcharged. 2. There is a problem with the battery BMS. 3. The vehicle is downhill for a long time, and the feedback current charging is caused.	Lithium Battery
122	**91**	Over Discharge	The battery is overdischarged. 1. The lithium battery is not used for a long time, resulting in low battery power. 2. Overuse.	Lithium Battery
123	**92**	Communication Outage	Battery communication timed out, communication with the controller timed out	Lithium Battery
124	**93**	Under Voltage	The battery voltage is too low, 1. Long-term storage, not charged in time. 2. The internal cells of the battery are damaged, resulting in the inability to charge the battery.	Lithium Battery
125	**94**	Over Current	Battery overcurrent, 1. The use of the device does not run according to the program originally set by the controller. 2. After the controller is replaced, the parameters do not match. 3. Lithium batteries have problems in current detection.	Lithium Battery
126	**95**	Over Temperature Protect	The battery temperature is seriously too high, and the use or transportation environment causes serious high temperature inside the battery.	Lithium Battery
127	**96**	Temperature Protect	The battery temperature is too high, and the use or transportation environment causes high temperature inside the battery.	Lithium Battery