

OPERATORS MANUAL

Starke LiftMaxx Series

TT2200LX



STARKE MATERIAL HANDLING GROUP

402 Allanburg Road • Thorold, ON L2V 1A4 • Canada

TOLL FREE 877-435-4352

www.starkeforklift.com • info@starkeforklift.com

STARKE
LIFTMAXX

Thank you for buying our electric tow tractor!
Hope it will provide great convenience for your work !

- Please read the manual carefully before operation.
- This manual is universal manual. We reserve the right to modify technology of the electric truck. If there is anything in the manual that is not consistent with the actual truck, the actual truck should be considered correct and the manual is only for reference.

Warning

Operator of the truck must strictly follow ISO 21262:2020 “Industrial trucks — Safety rules for application, operation and maintenance” and it is prohibited for untrained people to operate the truck.

Contents

Foreword.....	1
I. Main technical parameter.....	2
II. Structure.....	3
III. Safety Norms.....	5
IV. Drive and operation	8
V. Usage, maintenance and charge of storage battery.....	10
VI. Applicable scope, transportation, storage and daily maintenance	11
VII. Common faults and trouble shooting	12
VIII. Accessories and spare parts.....	13
IX. Electric schematic diagram	13
X. Packing list.....	14

Foreword

TT2200LX electric tractor is developed by our company to meet the needs of market customers, summarize experience, absorb advantages and remove defects on the basis of analyzing and comparing similar products at home and abroad. This product has the characteristics of compact body, small turning radius, good mobility, simple and convenient operation, etc. It is mainly suitable for short distance cargo handling in factories, warehouses, airports, supermarkets and other indoor and outdoor places. It is an ideal green and environment-friendly transportation tool.

The truck uses lithium battery as the power source, the motor as the power source, through the drive axle, and the front two wheels as the driving wheels, to realize the forward and backward movement of the truck; The rear two universal wheels are steering wheels to realize manual steering. This truck is characterized by simple operation, safety and reliability, low noise, no pollution, etc. The truck uses 24V lithium battery. At the same time, the electrical controller has the functions of overload protection and short circuit protection, so the starting operation of the truck is more stable and safe. The car is characterized by compact structure, beautiful appearance, flexible steering, reliable braking, simple and comfortable operation, convenient maintenance, etc.

● Environment for application

- a) Elevation no more than 1000m;
- b) Ambient temperature no higher than +40°C and no lower than -25°C;
- c) When the ambient temperature reaches +40°C, the relative humidity should not exceed 50%; at a lower temperature, higher relative humidity is allowed.
- d) Hard and flat ground
- e) It is prohibited to use the truck in a flammable, explosive or corrosive environment with acid and alkali.

● Description

The instruction manual shall be kept by the operator, and shall be read by the operator until he gets a full understanding.

The instruction manual is composed of correct operation, convenient and simple maintenance, and routine inspection.



The instruction manual shall be carefully read before operation, for purpose of correct drive and suitable maintenance to ensure safe and effective material transportation.

The instruction may be in disagreement with practical product due to product innovation.

The instruction manual shall be accompanied with in case of truck leasing or transfer.

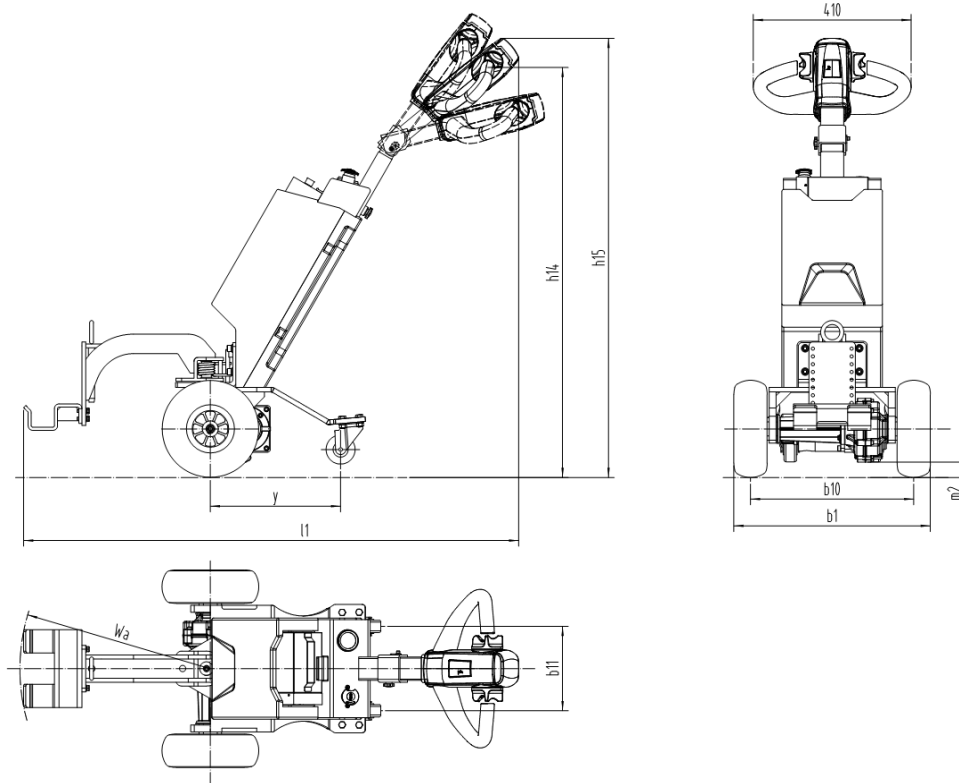
Please come into contact with our sales department in case of any problem.

Description of symbols: Regulations of the following symbols are of great importance to your safety and others as well.

	Danger	Indicates an impending danger. Deaths or severe injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Warning	Indicates a potential danger. Deaths or severe injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Caution	Indicates a potential danger. Moderate injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Notice	You shall pay attention to statements that are in direct or indirect relation with personal security and truck maintenance.

I. Main technical parameter

● Outline drawing



● Main technical parameter

Characteristics	1.1	Manufacturer			
	1.2	Manufacturer's type designation			TT2200LX
	1.3	Drive type			Electric
	1.4	Operator type			Pedestrian
	1.5	Traction capability	Q	kg	1000
	1.7	Rated drawbar pull		N	200
	1.9	Wheelbase	y	mm	340
Weight	2.1	Service weight (with battery)		kg	75
	2.2	Axle loading, laden front/rear		kg	75/0
	2.3	Axle loading, unladen front/rear		kg	50/25
Tyres/chassis	3.1	Tires			Pneumatic rubber
	3.2	Tire size, front		mm	250x80
	3.3	Tire size rear		mm	75x32
	3.5	Wheels, number front rear(x=driven wheels)		mm	2x/2
	3.6	Tread, front	b ₁₀	mm	428
	3.7	Tread, rear	b ₁₁	mm	217

Dimensions	4.2.1	Overall height	h_{15}	mm	990-1130-1200
	4.9	Height drawbar in driving position min./max.	h_{14}	mm	940-1050-1110
	4.12	Towing coupling height	h_{10}	mm	-
	4.19	Overall length	l_1	mm	1210-1280-1345
	4.21	Overall width	b_1/b_2	mm	520
	4.32	Ground clearance, Centre of wheelbase	m_2	mm	35
Performance Data	5.1	Travel speed, laden/unladen		Km/h	4.5/5
	5.5	Drawbar pull, laden/unladen		N	200
	5.6	Max. drawbar pull, laden/unladen		N	600
	5.7	Max.gradeability, laden/unladen		%	3/16
	5.10	Service brake			EM brake
Motor	6.1	Drive motor rating S2 60 min		kW	0.4
	6.4	Battery voltage, nominal capacity K_5		V/Ah	Lithium 24/30
	6.5	Battery weight		kg	9
Others	8.1	Type of drive control			DC brush
	10.5	Steering type			Mechanics
	10.7	Sound level at the driver's ear acc.to DIN 12053		dB (A)	68

II. Structure

1. Structure

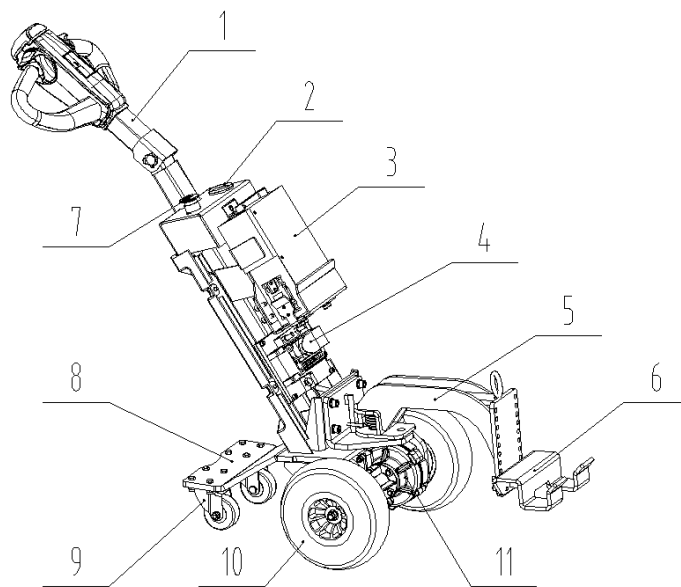


Figure 1 Overall structure

- | | | | |
|---------------------------|------------------|--------------------------|------------------------|
| 1. Tiller master assembly | 2.BDI | 3. Lithium battery | 4. Controller assembly |
| 5. Traction accessory | 6. Traction hook | 7. Emergency stop switch | 8. Truck frame |
| 9. Caster | 10. Tire | 11. Drive axle assembly | |

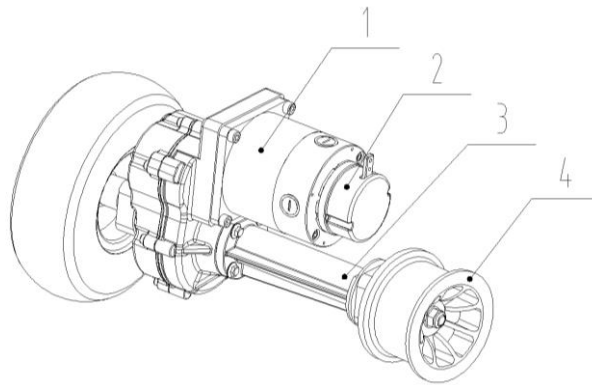


Figure 2 Drive axle assembly

1. Drive motor 2. Brake 3. Axle body 4. Hub

2. Instrument and operational control pieces

2.1 Instrument

2.1.1 Instrument interface

The normal working interface mainly displays walking speed, power SOC, connection status and hour meter.

The speed display unit is Km/h, and the minimum resolution is 0.1 Km/h. The power display is divided into percentage display and battery symbol display. The battery symbol is divided into six levels:

- ≥90% display full grid,
- ≥80% shows four grids,
- ≥60% shows three grids,
- ≥40% shows two grids,
- ≥20% shows one grid,
- ≥0% Show spaces.



The hour meter unit is hour, the minimum resolution is 0.1h (6 minutes), and the symbol "h" flashes at 1Hz.

2.1.2 Alarm interface

When an alarm occurs, the position of display speed will change to alarm number display, and the backlight will flash on and off at the frequency of 1S, and the symbol "AL" will flash. When multiple alarms occur at the same time, the interface will display the alarm information in a circular scrolling manner. The display sequence is the time of alarm occurrence, and up to 4 alarm information can be scrolled.



2.2 Steering system

To control the operating handle, a certain point on the drive wheel axis is used as the steering center, and the universal wheel is used as the auxiliary support point to achieve left and right steering.

2.3 Brake

Traveling brake and parking brake of this tow tractor adopts electromagnetic braking.

2.4 Operation control

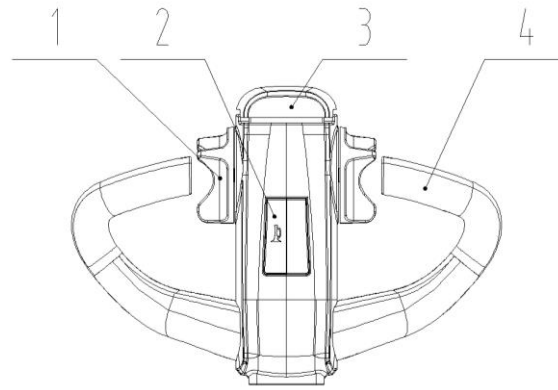


Figure 3 Tiller hand

1. Accelerating rotary knob 2. Horn button 3. Emergency braking switch 4. Handle

2.4.1 Starting of the tow tractor

When the truck is in normal state, pull up the emergency stop switch, and the instrument lights up, indicating that the truck starts normally.

2.4.2 Traveling and braking of the tow tractor

When the truck is powered on, release the brake and drive the truck forward/backward by rotating the rotary knob, the accelerator returns to zero, the brake engaged to brake the truck until stop by releasing the rotary knob.

2.4.3 Horn button

When the tow tractor is in the starting status, press horn button 2 and continuous and discontinuous sound can be made.

2.4.4 Emergency brake

During the traveling status of the tow tractor, when emergency brake switch 4 is pressed, the brake will suck and brake immediately. Meanwhile, power output of the motor will be closed.

III. Safety Norms



Warning

Please pay attention to the following items first before operation of the truck:

- 1) This tow tractor is only limited to utilization on a hard flat floor. Operation in inflammable, explosive environment or corrosive environment such as acid or alkaline condition shall be strictly forbidden.
- 2) Only drivers who have received formal training or are authorized can be allowed to drive the truck.
- 3) Read this instruction carefully before operation so as to master the performance of the tow tractor; check the truck whether it is in its normal condition before each operation. It is forbidden to use faulty truck; repair by untrained persons is forbidden as well.
- 4) Overloading operation is strictly forbidden.
- 5) Pay attention to the connection condition of the traction mechanism during transportation of cargo.
- 6) Emergency braking is prohibited when the truck is in the state of carrying goods and not in an emergency.
- 7) Under full-speed travel status, it is forbidden to use emergency power-off switch and emergency brake switch except emergency condition.

- 8) It is strictly forbidden to make sharp turn on narrow aisle. When it is turning, slow down the truck and enlarge the turning radius properly so as to ensure the safety of personnel and goods.
- 9) Transportation with goods is strictly forbidden.
- 10) Overloading operation is forbidden. Otherwise the wheel will skid, resulting in the damage of motor and electric control as well as danger of the human body and goods.
- 11) It is forbidden to use the tow tractor under low voltage, and conduct charging for the truck timely.

1.Safety operation norms

1) Training of driver:



Notice

Even though each tow tractor may have the same technical parameters, there may be differences on features of braking and acceleration as well. Never drive the truck until you get familiar with all those operations.

2) Rules that must be observed:



Notice

Never drive the truck when you are tired or un-concentrated, with an injection of drug, or after a liquor drinking.

3) Safety of working place:



Notice

This kind of electric truck is only limited to utilization indoor with a hard flat floor. Operation in inflammable, explosive environment or corrosive environment such as acid or alkaline condition shall be strictly forbidden.

- a) Good roadway condition shall be kept and the traffic should be smooth.
- b) Sufficient light ray shall be ensured on working place.
- c) Fire extinguishing appliances shall be equipped in the places where truck and charging is operated.

The extinguishing appliances shall comply with the requirements of extinguishing fire of solid combustible matter and electric apparatus.

4) Integrity of the truck shall be realized:



Warning

Do not make modifications on the truck.

- a) Please observe safety rules and regulations of your working place during operation, inspection, and maintenance of the truck.
- b) No modification or addition shall be made to the truck without written permission by our company. A modification of the truck may have a negative effect on its safe operation.

5) Prepare safety operation procedure:

Safety operation procedure shall be formulated with consideration of practical situations before operation of the tow tractor. Safety shall be taken into full consideration in preparation of the safety operation procedure.

- 6) Operation of truck under unsafe condition is strictly forbidden:
- a) Operation under unsafe condition is forbidden, such as under conditions with uneven floor, or impeded road. Goods lifting on slope is strictly forbidden.
 - b) Faulty truck is forbidden to use.
 - c) Make sure a daily inspection of the truck would be taken. Please immediately repair or replace in case of any abnormal conditions.
- 7) Overloading operation of truck is forbidden:



Warning

Overloading operation of truck is forbidden. Overloading operation would cause damage to the truck or bring harm to operator.

- 8) Electrical System Check:



Notice

Before checking the electrical system, turn off key switches and emergency power-off switches.

2.Safety Operation Specification

- 1) Check the safety condition around the truck:



Notice

Before starting up the truck, please ensure that there is no person around it.



Notice

If the driver's view is shielded by the bulky goods carried, please drive backwards or drive under the guidance of other working personnel.



Notice

Ensure no people around the truck when driving backwards.



Notice

Driving through the narrow aisle shall be guided by working personnel.



Notice

At crossroad or other places impeditive for view, the driver shall not drive until there is no person at both sides.



Notice

Keep concentration when operating truck.

2) Strictly forbid harsh driving



Notice

Never start up, brake or turn abruptly.



Notice

Observe all items of safety rules on working place. Decelerate and sound horn when travel by other truck or trucks. Avoid driving in places with bad view.



Notice

Ensure to provide certain clearance between truck and entrance.

3.Operation norms



Notice

The truck can only carry goods under rated capacity.

- 1) Forbid overloading operation.
- 2) Passengers on truck must be forbidden.
- 3) Never push or pull the handle abruptly
- 4) When towing over-wide goods, the driver shall be extremely careful to turn slowly and watch around for sake of safety.
- 5) The faulty truck for future repair must not be parked at places impeditive for traffic. Meanwhile, put on the warning board and pull off the key.

4. Important notice after operation

- 1) Parking: Park the truck at appointed place. Turn off the key switch before leaving away the truck.
- 2) Maintenance: Check that whether the electric and mechanical parts are normal or not.

IV. Drive and operation

1. Prepare before operation



Warning

Never use the faulty tow tractor.

- 1) Before operation, check the truck to make sure: whether all the supporting wheels work well, whether blocking phenomenon appears. Never use the faulty truck.
- 2) Check the charge quantity of storage battery. Never use the truck with empty batteries. Otherwise, the lifetime of storage battery can be reduced greatly. More seriously, the storage batteries can be damaged.

- 3) Check that whether the braking of truck is normal or not.
- 4) Press the emergency brake button on top of the operation handle to check that whether the truck can park immediately.
- 5) Check the conditions of horn buttons and emergency power-off switches.

2. Drive

- 1) Start-up



Warning

When carrying goods, never turn the accelerator knob rapidly to start up the truck.

Turn the key switch to ON position. And rotate the accelerator knob slowly until the truck starts up slowly. The deeper the accelerator knob is rotated, the more rapidly the truck travels

- 2) Decelerate:

When the accelerator knob is released slowly, travel speed of tow tractor will reduce slowly to realize deceleration.

- 3) Turning:



Caution

Due to this difference from common trucks, this tow tractor has bad controlling of direction when turning around. For this reason, to prevent collision with other objects nearby the backside of tow tractor, do drive or turn slowly.

The tow tractor is driven by two front wheels, with universal wheel as fulcrum for turning. When the operator turns the operation handle counterclockwise, the tow tractor turns counterclockwise. While the operation handle is turned clockwise, the tow tractor turns clockwise.

- 4) Braking:

Release the accelerator knob, then brake of the truck can be realized.

- 5) Traction operation:



Notice

Before operating truck, do check the following items:
Ensure no goods falling and damaged in the loading area.
Ensure no goods or objects impeditive for safety.

The following procedures shall be observed for traction operation:

- ① Decelerate when approaching the goods area;
- ② Inspect safety condition around;
- ③ Adjust position of the truck, making sure correct connection between the tow tractor and traction mechanism of goods.
- ④ Start the tow tractor slowly to realize goods traction.
- ⑤ Disconnect the traction mechanism when the goods reaches destination with proper position.
Then restart next traction operation.

V. Usage, maintenance and charge of storage battery

1. Type of battery and precautions for use

1.1 The battery type used in this truck is lithium ion battery; Battery voltage 24V; this battery is an environment-friendly, free of chemical mercury, cadmium and other components.

1.2 Precautions

- a) The ambient temperature for battery use is - 10~45;
- b) The battery shall be charged and discharged every 3 months during a long period of storage;
- c) Before using a new battery, or for the first time after long-term storage, please fully charge the battery before use;
- d) Do not short-circuit the battery, which may permanently damage the battery;
- e) Do not burn or destroy the battery, which may cause toxic gas release or explosion;
- f) Do not weld the battery directly;
- g) Do not expose the battery to adverse conditions, such as extreme temperature, deep cycling, or frequent overcharge/over discharge;
- h) If the battery is hot, do not touch it until it cools down;
- i) When removing the battery pack, grasp the plug with your hand instead of the pull wire;
- j) After use, if the battery is hot, please cool it in a ventilated environment before recharging;
- k) Do not put the battery into water or seawater;
- l) Do not try to separate, squeeze or hit the battery. The battery will heat up or catch fire. The lye in the battery is harmful to skin and eyes, and will damage clothes;
- m) Keep the battery away from children;

2. Charging

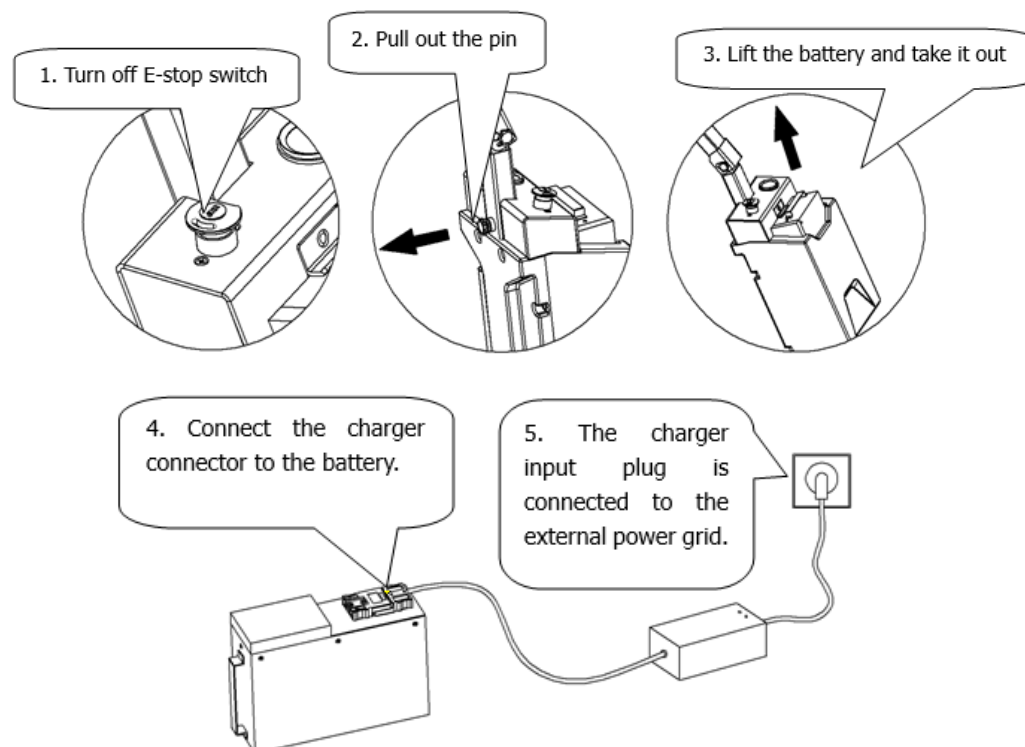
Step 1: Turn off the emergency stop switch;

Step 2: Pull out the pull pin of the battery pressing plate (do not let go);

Step 3: Lift up and remove the battery;

Step 4: Connect the charger output connector to the battery;

Step 5: Connect the charger input plug to the external power grid;





Notice

When the battery voltage is low, it should be charged immediately.

When the tow tractor is not in use, it shall be recharged every 3 months.

VI. Applicable scope, transportation, storage and daily maintenance

1. Applicable scope and suitable site

1.1 Applicable scope

- 1) This truck is suitable for short distance traction operation indoor and outdoor and not suitable for long distance traction.
- 2) It is forbidden to use the truck for purposes other than stipulated and to carry people.

1.2 Applicable site

- 1) Ground requirements: No obstacles on the ground. The ground should be solid and flat. And the illumination should be fine.
- 2) Environment temperature is between -25°C to +40 °C.
- 3) When the environmental temperature is +40°C, the relative humidity will not exceed 50%. When the monthly average temperature is 25°C, the maximum relative humidity shall not exceed 90%.

2. Transportation

During transportation of the tow tractor, please pay attention to the following items:

- 1) Fix the traction hooks with steel wire, block the front, and rear wheels with wedge, ensuring reliable connection between the tow tractor and transportation truck.
- 2) Trucks used to load and transport the tow tractor should not run too fast and should avoid sharp turning and sudden braking to prevent damaging the tow tractor and avoid accidents.

3. Storage

- 1) Turn off the electric lock.
- 2) If the tow tractor is not used for a long time, please hang the wheels in air. (Pneumatic tire)

4. Preparation before use

- 1) Check that whether all the instruments are in proper condition.
- 2) Check whether the tire is in normal condition and whether the screws are fastened or not.
- 3) Check the condition of all the handles.
- 4) Check whether the voltage of the battery pack is in the normal scope.
- 5) Check insulation of all the joints of the electric systems to make sure the reliability, with the insulation resistance no less than 0.5MΩ.
- 6) Check tightness of all major fasteners.
- 7) Loosen the parking brake.
- 8) Check whether the steering system is normal or not.
- 9) Drive the truck slowly and release the accelerator to check that whether the brake system is in normal condition or not.
- 10) Drive the truck slowly and check that whether the emergency stop button and the emergency power-off switch are normal or not.

5. Check after operation

Clean up the smudge on the tow tractor after operation, and conduct inspection as below:

- 1) Keep distinct and complete of all warning marks, nameplates and warning plates which have

some effect of reminding and guiding to the operators.

- 2) Check whether there is any deformation, torsion or damage.
- 3) Replace faulty parts.

6. Daily maintenance and upkeep

Whether the truck can operate satisfyingly depends on the efficient maintenance. When maintenance is ignored, the truck may pose a threat to human lives and cause property damage. Routine inspection should be conducted, when the truck is in operation, to eliminate abnormal conditions. Never use a truck with trouble to ensure safety and to prolong the service life of the truck.

Maintenance: The maintenance of the truck is divided into three levels, i.e. routine maintenance, level I maintenance and level II maintenance.

- 1) Routine maintenance: Daily maintenance is to clean the surface of the truck body and the surface of the storage battery and to examine the firmness of the power supply cable.
- 2) Level I maintenance: Level I maintenance should be performed once every week. Besides what should be done in daily maintenance, the operation situation of all the parts should be carefully inspected to see whether the operation is normal; whether there is any loose of the fasteners; is there any abnormal wearing and tearing in the mechanical parts; is there any abnormal temperature rise or sparks in the electric part, etc. If there is any abnormal situation, adjustment or trouble-shooting should be performed promptly.
- 3) Level II maintenance should be carried out as planned. Overall inspection should be performed for the truck according to the following requirements.
 - a) Maintenance for mechanical system: Once half a year. The major content is to add lubricant to the transmission gears and bearings of the drive wheel and the rotary joints, and examine the firmness of the fixing fittings, the flexibility of the wheels. The operation noise of the truck should be no more than 70dB after maintenance.
 - b) Maintenance for electric equipment: Once every three months. Examine if the connections of the electrical devices are reliable, the switches are normal and the insulation is ok (The insulation resistance between the electrical devices and the truck body should be above 0.5MΩ). The carbon brush of motor should be replaced every 1500 hours or one year.

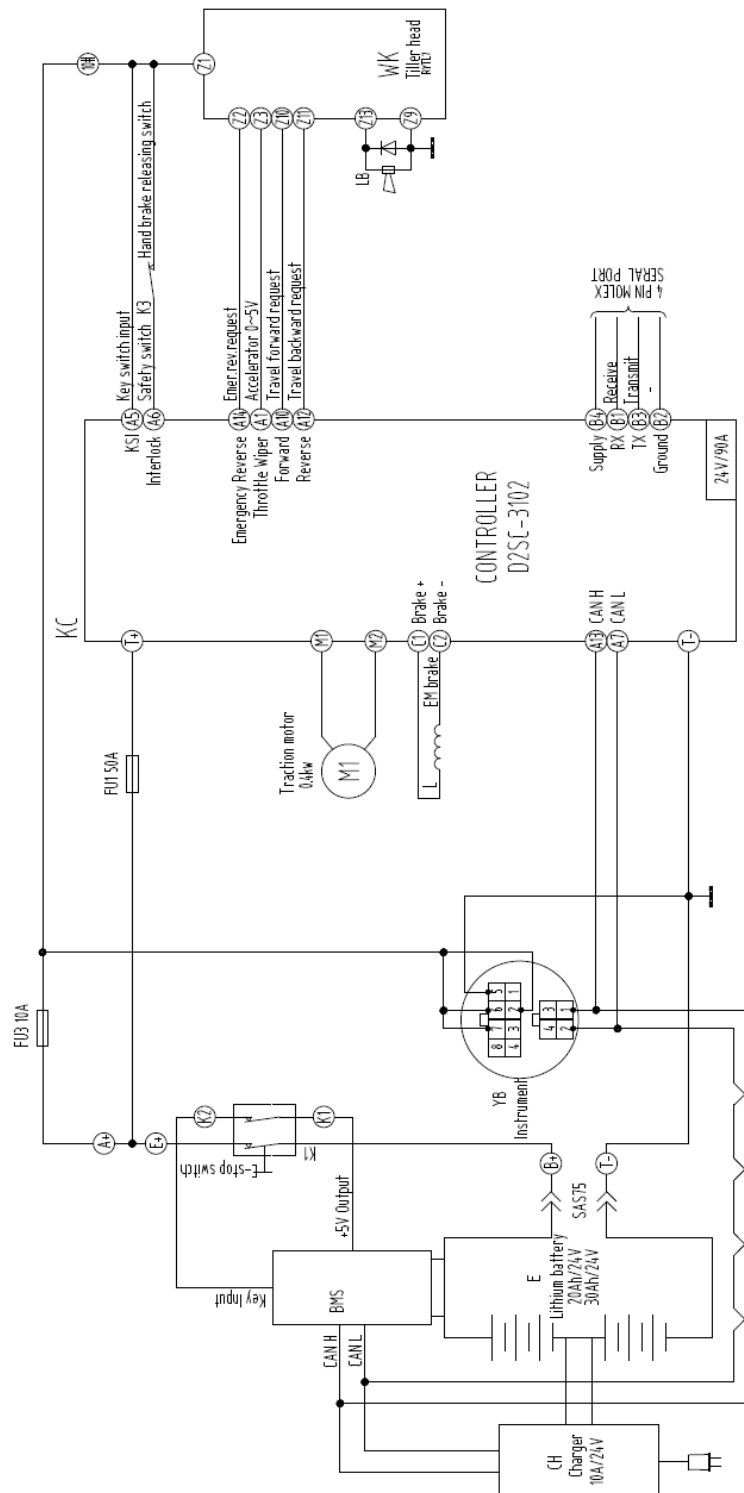
VII. Common faults and trouble shooting

No.	Faults	Cause	Trouble shooting
1	The motor can not operate.	1. The power switch is not turned on. 2. The storage battery has been discharged completely 3. The brake is not loosened. 4. The fuse is burned. 5. Carbon brush is worn out.	1. Insert the key and turn on the power supply. 2. Charge the storage battery, if there is any alarm. 3. Adjust the acceleration knob, check that whether the brake can suck or released. Replace the brake if necessary. 4. Replace the fuse 5. Replace the carbon brush
2	The charger can not work.	1. The fuse of charger is damaged. 2. The charger is damaged.	1. Replace the fuse. 2. Replace the charger.
3	Wheels slip.	1. There is water or oil on the ground. 2. The wheel wears 3. Overload	1. Clean the water or oil on the ground. 2. Replace the wheels. 3. Reduce the load.

VIII. Accessories and spare parts

No.	Name	Use position	Model/specification	Qty	Remark
1	Fuse	Electric parts	10A	1	
2	Fuse	Electric parts	50A	1	

IX. Electric schematic diagram



X. Packing list

TT2200LX Electric Tow Tractor Packing list

Consignee:

Manufacturing number:

Contract number:

Date of production:

S/N	Product	Qty	Net weight (kg)	Dimension (LXWXH)	Remarks
1	TT2200LX electric tow tractor	1			Whole machine
2	Accessory bag	1			Technical documents, accessories and spare parts

Note: 1. The following documents are in the file bag

- | | | |
|---|---------------------------|----------|
| ① | TT2200LX operation manual | 1 copy |
| ② | Certificate of quality | 1 copy |
| ③ | Packing list | 1 volume |

2. Accessories and spare parts

No.	Name	Use position	Model/specification	Qty	Remark
1	Fuse	Electric parts	10A	1	
2	Fuse	Electric parts	50A	1	



STARKE MATERIAL HANDLING GROUP
402 Allanburg Road • Thorold, ON L2V 1A4 • Canada
TOLL FREE 877-435-4352
www.starkeforklift.com • info@starkeforklift.com

