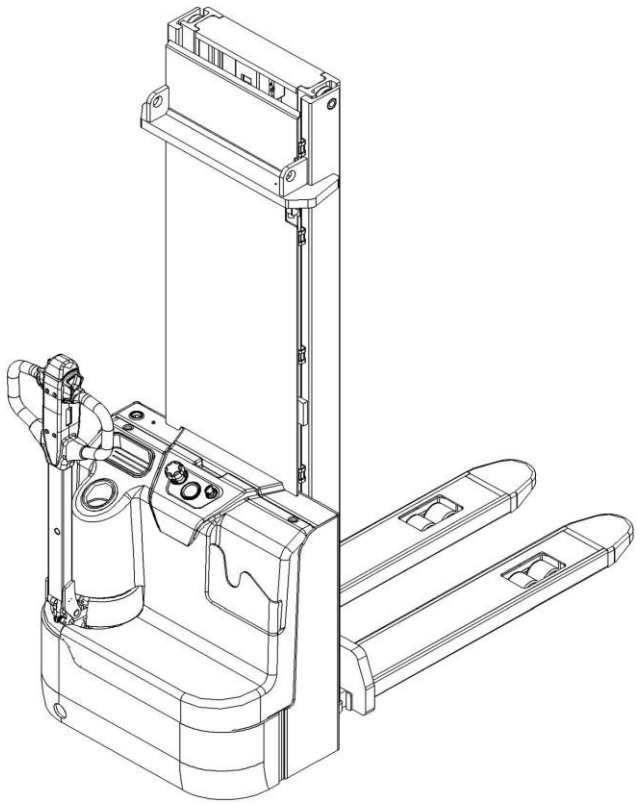
15ES-XB/N

Electric Pallet Stacker

Service & Maintenance Manual



Warning

You must read the instructions on this manual before using it.

Content

Foreword

This specification briefly introduces the technical parameters of pallet stacker in our company, including the structure, working principle, operation, maintenance with other requirements and contents of the main components. Please read this manual carefully before operation to ensure safe and effective material handling through proper driving and maintenance. At the same time can help the operator to use the pallet stacker car reasonably, so that the stacker car to play the maximum efficiency! Hope operators and equipment managers read carefully before operating pallet stacker! Please strictly abide by the provisions and precautions in this specification, careful driving, careful operation, careful use, so that your stacking car for a long time in the best working condition, play the greatest effectiveness. When you rent or transfer the stacker, please lease or transfer this manual with the pallet.
To highlight, the following icons are used in this manual:

Represent a potentially dangerous state that, if not avoided, may cause serious personal injury, or serious damage to the vehicle or fire, etc.

Represent a potentially dangerous condition that, if not avoided, may cause minor injury to the person, or local damage to the pallet, etc.

General considerations and instructions for use

Most of this product is made of recyclable steel, and the waste produced in the process of use, maintenance, cleaning and disassembly must be recovered and treated without pollution in accordance with local regulations. Recycling of these wastes must be done by professionals in designated areas, such as waste from hydraulic fluids, batteries and electronic equipment. If not properly handled, may cause environmental and human health hazards

Specifically affirming:
1) this product is strictly prohibited for use in potentially explosive hazardous environments.
2) noise level of normal use of this product conforms to international standard EN 12053..
3) vibration level of normal use of this product conforms to international standard EN13059..
4) the environmental requirements for the normal use of this product: no more than 2000 meters above sea level, temperature range -5°c—40°c, humidity not more than 90%, wind speed not more than 5 m/s.
For long time use in cold storage or special environment, need to add special accessories, please contact our technical staff. 5) this product implement product recall service in case of batch problem

Due to the requirement of continuous improvement of the product, the manufacturer reserves the right to change its own product design and specification without prior notice. if you want to know the latest product parameters, please contact us. All parameters of this manual shall be subject to the date of publication of the manual.

1.General

1.1 Introduction – Maintenance Safety Precautions

Maintenance work may cause injuries. Always take care to perform work safe, at least observing the following. It is of utmost importance that maintenance personnel pay strict attention to these warnings and precautions to avoid possible injury to themselves, others or damage to the equipment. A maintenance program must be followed to ensure that the machine is safe to operate.

The specific precautions to be observed during maintenance are inserted at the appropriate point in the manual. These precautions are, for the most parts, those that apply when servicing hydraulic and larger truck component parts.

⚠WARNING Modification of the truck without certification by a responsible authority that the truck is at least as safe as originally manufactured, is a safety violation.

⚠WARNING SINCE THE truck MANUFACTURER HAS NO DIRECT CONTROL OVER THE FIELD INSPECTION AND MAINTENANCE, SAFETY IN THIS AREA RESPONSIBIUTY OF THE OWNER or OPERATOR.

⚠WARNING FAILURE TO COMPLY WITH SAFETY PRECAUTIONS, LISTED IN THIS SECTION MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH AND IS A SAFETY VIOLATION.

When carrying out any operation or maintenance, have trained and experienced personnel to carry out the work.

When carrying out any operation or maintenance, carefully read operation and maintenance handbook.

Read all the precautions given on the decals which are fixed to the truck.

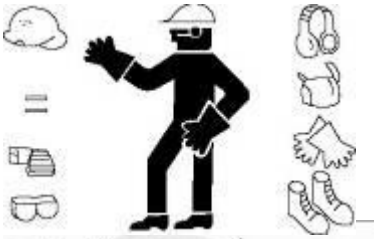
Be sure you fully understand the content of the operation. It is important to prepare necessary tools and parts for maintain the truck.

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

It should be noted that the machines hydraulic systems operate at extremely high potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system. Relieve system pressure by cycling the applicable control several times with the engine(motor) stopped and ignition on, to direct any line pressure back into the reservoir. Pressure feed lines to system components can then be disconnected with minimal fluid loss.

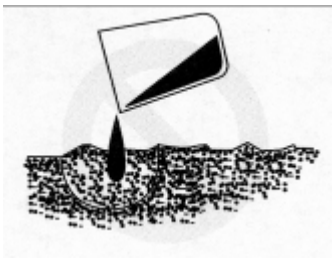
Remove all rings, watches and jewelry when performing any maintenance.

Wear well-fitting helmet, safety shoes and working Clothes When drilling grinding or hammering always. Wear protective goggles. Always do up safety clothes properly so that they do. Not catch on protruding parts of machines. Do not wear oily clothes. When checking, always release battery plug. DO NOT WEAR LONG HAIR UNRESTRAINED, OR LOOSE-FITTING CLOTHING AND NECKTIES WHICH ARE APT TO BECOME CAUGHT ON OR ENTANGLED IN EQUIPMENT.



During maintenance do not allow any unauthorized person, to stand near the machine.
Flames should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil or electrolyte.

Immediately remove any oil or grease on the floor of the operator's compartment or on the handrail. It is very dangerous if someone slips while on the machine.



Always use pure oil or grease, and be sure to use clean containers.

Oil is a dangerous substance. Never handle oil, grease or oily clothes in places where there is any fire or flame. As preparation for use of fire extinguishers and other fire- fighting equipment.
Keep the battery away from fire hazards. The generated gases are explosive.
Store all the oils in a specified place.
Keep the flammable things away from the machine. Do not smoke at the working place.
Battery should always be disconnected during replacement of electrical components.

Always use the grades of grease and oil recommended by HDX choose the viscosity specified for the ambient temperature.

Exhaust gas is dangerous provide ventilation when working in a closed space.
Avoid breathing dust that may be generated when handling components containing asbestos fibers. Wear a gas mask if necessary.

When working on top of the machine, be careful not to lose your balance and fall.

Hand a caution signs in the operator's compartment (for example "Do not start" of "Maintenance in progress"). This will prevent anyone from starting or moving the machine by mistake.

When welding on the machine or working on the electrical system, ALWAYS turn the key switch OFF and remove the battery plug from the battery. Park the machine on firm, flat ground. Lower the fork to the min. height and stop the motor.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin and eat holes in clothing. If you spill acid on your clothes or skin, immediately flush with large quantities or water.

When working on the battery, wear goggles or safety glasses. If splashed into the eyes, flush with water and get medical attention immediately.

Battery terminals touched by metal objects can cause short circuit and burn you. Keep tools away from the terminals.
Keep sparks, lighted matches, and open flame away from the top of battery. Battery (hydrogen) gas can explode.
When disassembling and assembling the battery, make sure that the battery terminals (+, –) are correctly connected.

If water gets into the electrical system, abnormal operation or failure can result. Do not use water or steam on sensors, connectors and instruments in the cab.

Do not handle electrical equipment while wearing wet gloves, or in wet places, as this can cause electric shock.
When working with other, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.
Unless you have special instructions to the contrary, maintenance should always be carried out with the motor stopped. If maintenance is carried out with the motor running, there must be two technicians present: One operating the stacker and the other one performing the maintenance. In such a case, never touch any moving part.
Before making adjustment, lubricating or performing any other maintenance, shut off all power controls.
When removing parts containing O-ring Gaskets or seal clean the mounting surface and replace with new sealing parts.
Thoroughly clean the machine. In particular, be careful to clean the grease fittings and the area around the dipsticks. Be careful not to let any dirt or dust into the system.
Use only approved nonflammable cleaning solvents.
When changing the oil or fitter, check the drained oil and filter for any signs of excessive metal particles or other foreign materials.
Always use HDX genuine parts for replacement. ENSURE REPLACEMENT PARTS OR COMPONENTS ARE IDENTICAL OR EQUIVALENT TO ORIGINAL PARTS OR COMPONENTS.
When checking an open gear case, there is a risk of dripping things in. Before removing the covers to inspect such cases, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.

1.2 Measurement conversions

Length

Unit	cm	m	km	in	ft	yd	mile
cm	1	0.01	0.00001	0.3937	0.03281	0.01094	0.000006
m	100	1	0.001	39.37	3.2808	1.0936	0.00062
km	100000	1000	1	39370.7	3280.8	1093.6	0.62137
in	2.54	0.0254	0.000025	1	0.08333	0.02777	0.000015
ft	30.48	0.3048	0.000304	12	1	0.3333	0.000189
yd	91.44	0.9144	0.000914	36	3	1	0.000568
mile	160930	1609.3	1.6093	63360	5280	1760	1

1mm=0.1cm, 1 m=0.001mm

Area

Unit	cm2	m2	km2	a	ft2	yd2	in2
cm2	1	0.0001	–	0.000001	0.001076	0.000012	0.155000
m2	10000	1	0.000001	0.01	10.764	1.1958	1550.000
km2	–	1000000	1	10000	1076400	1195800	–
a	0.01	100	0.0001	1	1076.4	119.58	–
ft2	–	0.092903	–	0.000929	1	0.1111	144.000
yd2	–	0.83613	–	0.008361	9	1	1296.00
in2	6.4516	0.000645	–	–	0.006943	0.000771	1

1ha=100a, 1mile2=259ha=2.59km2

Volume

Unit	cm3 = cc	m3	l	in3	ft3	yd3
cm3 = m l	1	0.000001	0.001	0.061024	0.000035	0.000001
m3	1000000	1	1000	61024	35.315	1.30796
l	1000	0.001	1	61.024	0.035315	0.001308
in3	16.387	0.000016	0.01638	1	0.000578	0.000021
ft3	28316.8	0.028317	28.317	1728	1	0.03704
yd3	764529.8	0.76453	764.53	46656	27	1

1gal(US)=3785.41 cm3=231 in3=0.83267gal(US)

Weight

Unit	g	kg	t	oz	lb
g	1	0.001	0.000001	0.03527	0.0022
kg	1000	10	0.001	35.273	2.20459
t	1000000	1000	1	35273	2204.59
oz	28.3495	0.02835	0.000028	1	0.0625

lb	453.592	0.45359	0.000454	16	1

1 tone (metric)= 1.1023 ton(US)=0.9842 ton(UK)

Pressure

Unit	kgf/cm2	bar	Pa=N/m2	kPa	lbf/in2	lbf/ft2
kgf/cm2	1	0.98067	98066.5	98.0665	14.2233	2048.16
bar	1.01972	1	100000	100	14.5037	2088.6
Pa=N/m2	0.00001	0.001	1	0.001	0.00015	0.02086
kPa	0.01020	0.01	1000	1	0.14504	20.886
lbf/in2	0.07032	0.0689	6894.76	6.89476	1	144
lbf/ft2	0.00047	0.00047	47.88028	0.04788	0.00694	1

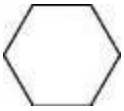
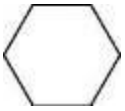
kgf/cm2=735.56 Torr(mmHg)=0.96784atm

Standard tightening torque

The following charts give the standard tightening torques of bolts and nuts.

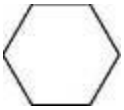
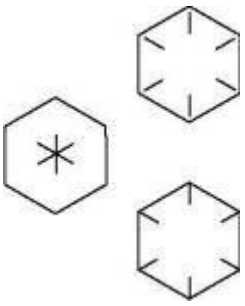
Exceptions are given in sections of “Disassembly and Assembly”

METER TABLE

Classification	4T, 5T	10T
Bolt type		 10.9
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
M4	0.2 ± 0.02	0.4 ± 0.04
M5	0.3 ± 0.03	0.8 ± 0.08
M6	0.5 ± 0.05	1.4 ± 0.14
M8	1.2 ± 0.12	3.3 ± 0.3
M10	2.3 ± 0.23	6.5 ± 0.7
M12	4.0 ± 0.4	11.3 ± 1.1
M14	6.4 ± 0.6	17.9 ± 1.8
M16	9.5 ± 0.9	26.7 ± 2.7
M18	13.5 ± 1.4	38.0 ± 3.8
M20	18.6 ± 1.9	52.2 ± 5.2
M22	24.7 ± 2.5	69.4 ± 6.9
M24	32.1 ± 3.2	90.2 ± 9.0
M30	62.6 ± 6.3	176.1 ± 17.6

M36	108.2 ± 10.8	304.3 ± 30.4
M42	171.8 ± 17.2	483.2 ± 48.3
M45	211.3 ± 21.1	594.3 ± 50.4

INCH TABLE

	4T, 5T	10T
Classification Bolt type		
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
1/4	0.6 ± 0.06	1.7 ± 0.2
5/16	1.2 ± 0.12	3.0 ± 0.3
3/8	2.0 ± 0.20	5.6 ± 0.5
7/16	3.2 ± 0.32	8.9 ± 0.9
1/2	4.7 ± 0.47	13.4 ± 1.3
9/16	6.8 ± 0.68	19.0 ± 1.9
5/8	9.3 ± 0.93	26.1 ± 2.6
3/4	16.0 ± 1.60	45.1 ± 4.5
7/8	25.5 ± 2.55	71.6 ± 7.2
1	38.0 ± 3.80	106.9 ± 10.7
1-1/8	54.1 ± 5.41	152.2 ± 15.2
1-1/4	74.2 ± 7.42	208.9 ± 20.9
1-3/4	98.8 ± 9.88	277.8 ± 27.8
1-1/2	128.2 ± 12.82	360.7 ± 36.1

The torque in above table shall not be applied to nylon or nonferrous bolts or washer. The same is valid for not standardized ones.

H Newton meter : 1 Nm = 0.1kgfm

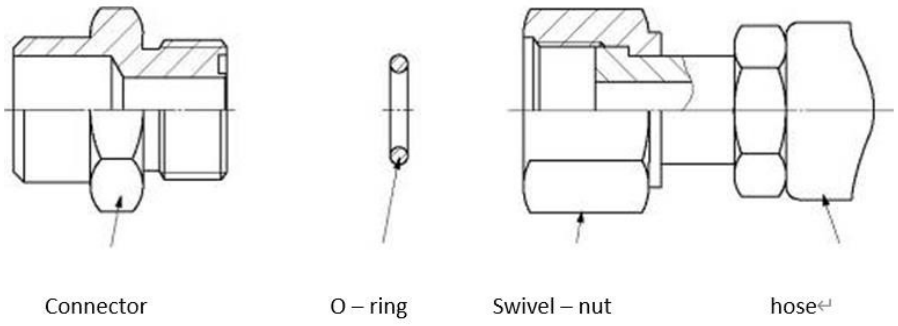
TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

The following torque shall be applied to the split flange bolts.

Diameter (mm)	Flat width (mm)	Torque	
		kgf·m	N·m
10	14	6.7 ± 0.7	66.7 ± 6.8
12	17	11.5 ± 1	112 ± 9.8
16	22	28.5 ± 3	279 ± 29

Thread	Torque (kgf·m)
1/8	1.1 ± 0.1
1/4	2.6 ± 0.2
3/8	4.6 ± 0.3
1/2	8.5 ± 0.4
3/4	19 ± 1.0
1	33 ± 2.0

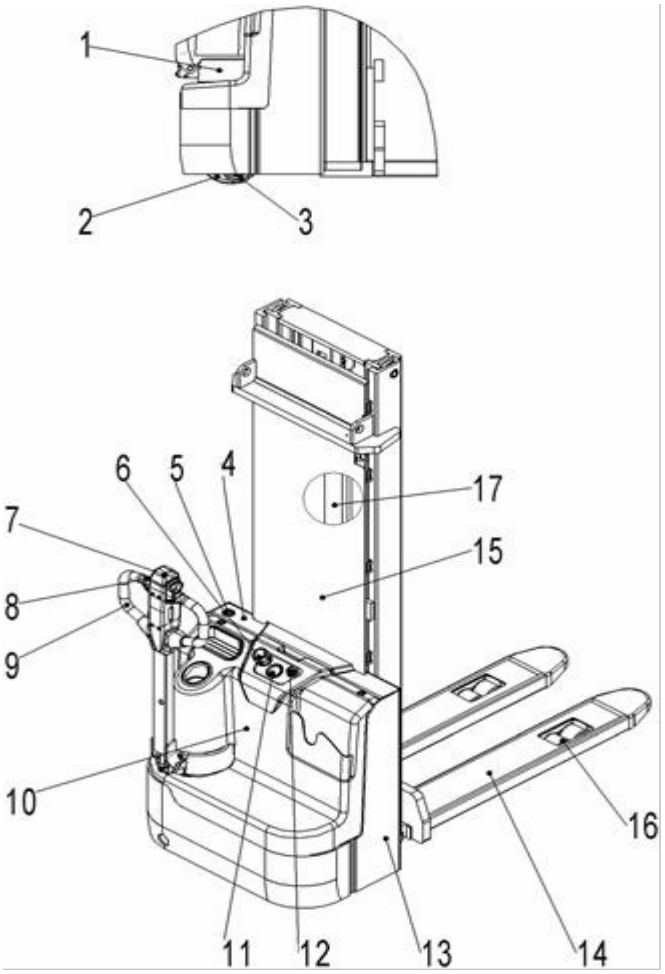
TORQUE FOR SWIVEL NUT WITH O-RING



Tube O.D (inch)	Thread (in)	Torque (kgf·m)
1/2	UN 13/16 - 16	9.5 ± 0.95
3/4	UN 1 3/16 - 12	18 ± 1.8
1	UN 1 7/16 - 12	21 ± 2.1

2. Specification

2.1 Main parts



Pic.1 : Main parts

1	Outer cover	9	Multi-function handle	17	Hydraulic system
2	Driving wheel	10	Outer cover		
3	Steering wheel	11	Meter		
4	Charge lamp	12	Key		
5	Charging Spring Wire	13	Body		
6	Emergency switch	14	tray rack		
7	Belly switch	15	Safety guard		
8	Accelerator	16	Load bearing wheels		

2.2 Main technical data

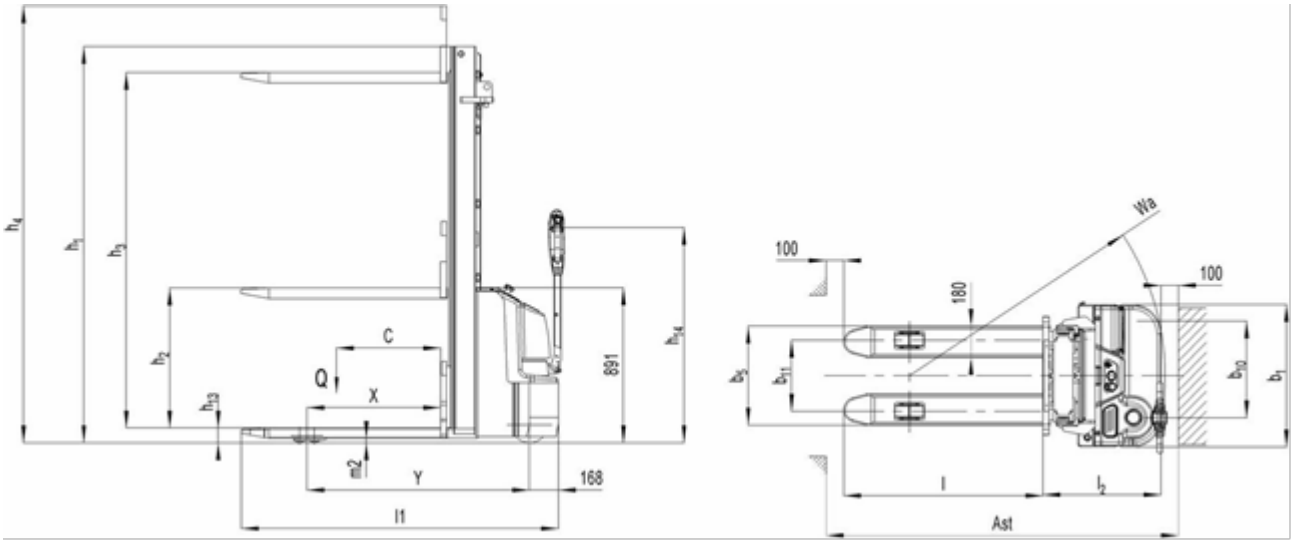


Fig. 2: Technical data

Table1: Main technical data for standard version

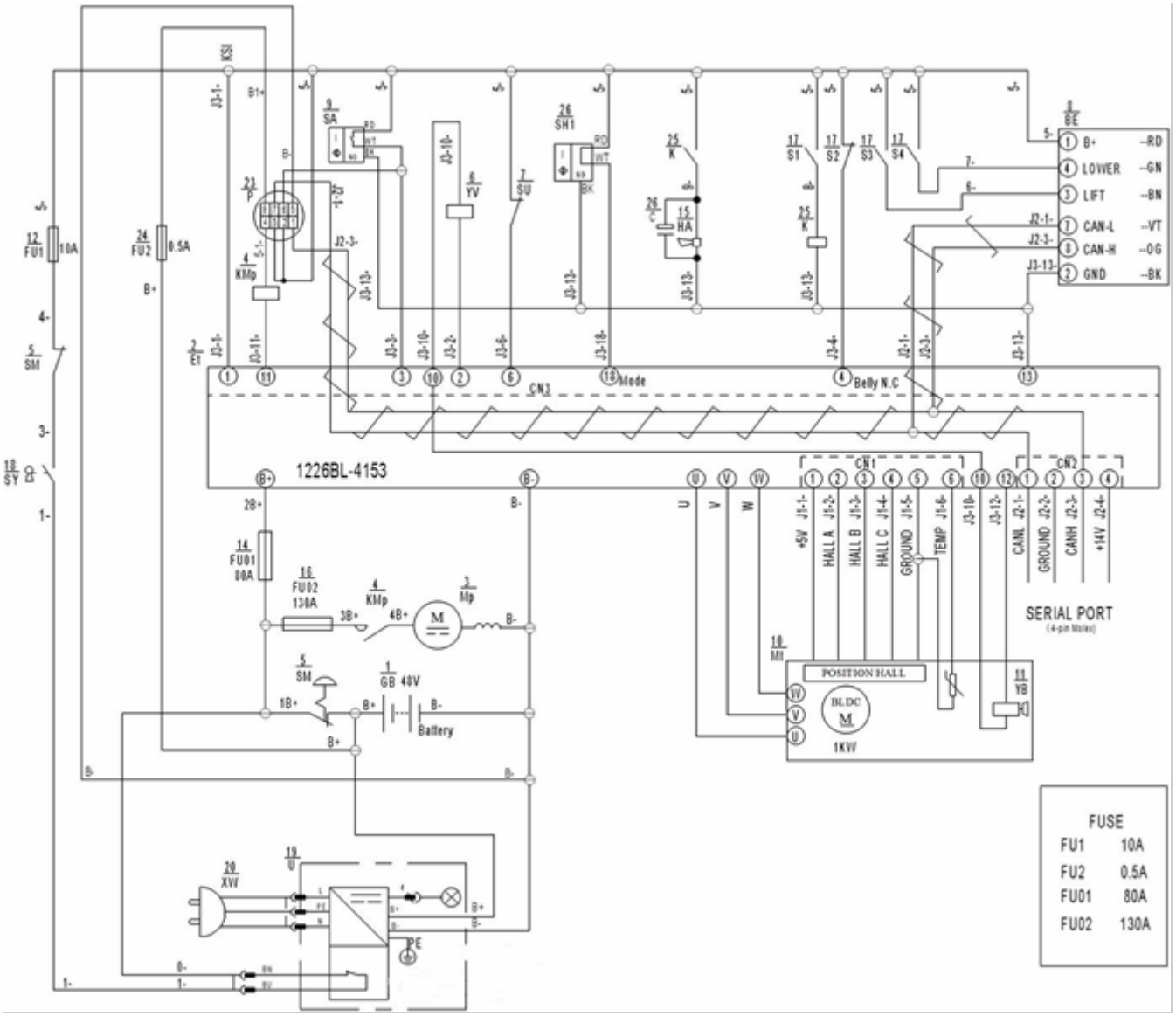
Type sheet for industrial truck acc. to VDI 2198					
General data	1.2	Manufacturer`s type designation		15ES-XB/N	
				1600	3600
	1.3	Power (battery ,diesel, petrol, gas, manual)		Battery	
	1.4	Operator type		Pedestrian	
	1.5	Load Capacity / rated load	Q(t)	1.5	
	1.6	Load center distance	C(mm)	600	
	1.8	Load distance ,center of drive axle to fork	X(mm)	770	
	1.9	Wheelbase	Y(mm)	1258	1283
Weight	2.1	Service weight	kg	641	782
	2.2	Axle loading, laden front/rear	kg	677/1464	722/1560
	2.3	Axle loading, unladen front/rear	kg	446/195	544/238
Tires, chassis	3.1	Tires		Polyurethane (PU)	
	3.2	Tire size, front	∅ x w (mm)	Φ210×70	
	3.3	Tire size, rear	∅ x w (mm)	Φ80×70	
	3.4	Additional wheels(dimensions)	∅ x w (mm)	Φ100×50	
	3.5	Wheels, number front/rear(x=driven wheels)		1x+1/4	
	3.6	Track, front	b10(mm)	557	
	3.7	Track, rear	b11(mm)	410/525	
Dimensions	4.2	Lowered mast height	h1 (mm)	1978	2280
	4.3	Free Lift height	h2 (mm)	1510	78
	4.4	Lift height	h3 (mm)	1515	3515
	4.5	Extended mast height	h4 (mm)	1985	4005
	4.9	Height of tiller in drive position min./ max.	h14mm	710/1245	
	4.15	Height, lowered	h13mm	85	
	4.19	Overall length	l1(mm)	1806	1830
	4.20	Length to face of forks	l2(mm)	656	681
	4.21	Overall width	b1(mm)	820	
	4.22	Fork dimensions	s/ e/ l(mm)	60/180/1150	
	4.25	Width across forks	b5 (mm)	570/685	

	4.32	Ground clearance, center of wheelbase	m2(mm)	25	
	4.33	Aisle width for pallets 1000X1200 crossways	Ast (mm)	2293	2317
	4.34	Aisle width for pallets 800X1200 lengthways	Ast (mm)	2237	2261
	4.35	Turning radius	Wa (mm)	1450	1474
Performance	5.1	Travel speed, laden/ unladen	km/h	4.4/4.7	
	5.2	Lift speed, laden/ unladen	m/s	0.105/0.17	
	5.3	Lowering speed, laden/ unladen	m/s	0.126/0.126	
	5.8	Max. gradeability, laden/ unladen	%	5/10	
	5.10	Service brake		Electromagnetic	
Motor	6.1	Drive motor rating	kW	0.75	
	6.2	Lift motor rating at S3 7.5%	kW	2.2	
	6.3	Battery acc. to DIN 43531/35/36 A, B, C, no		no	
	6.4	Battery voltage, nominal capacity K5	V/Ah	4x12/60	
	6.5	Battery weight	kg	4x20	
	6.6	Energy consumption acc: to VDI cycle	kWh/h	0.5	
other	8.1	Type of drive control		DC	
	8.4	Sound level at driver's ear acc. to EN 12053	db(A)	<70	

Type	Lowered mast height h1(mm)	Free Lift height h2(mm)	Lift height h3(mm)	Extended mast height h4(mm)	Max. mast height h3+h13(mm)
One stage mast	2378	1910	1915	2385	2000
Two stage mast	1930 2080	78 78	2815 3115	3305 3605	2900 3200

3. Electrical system

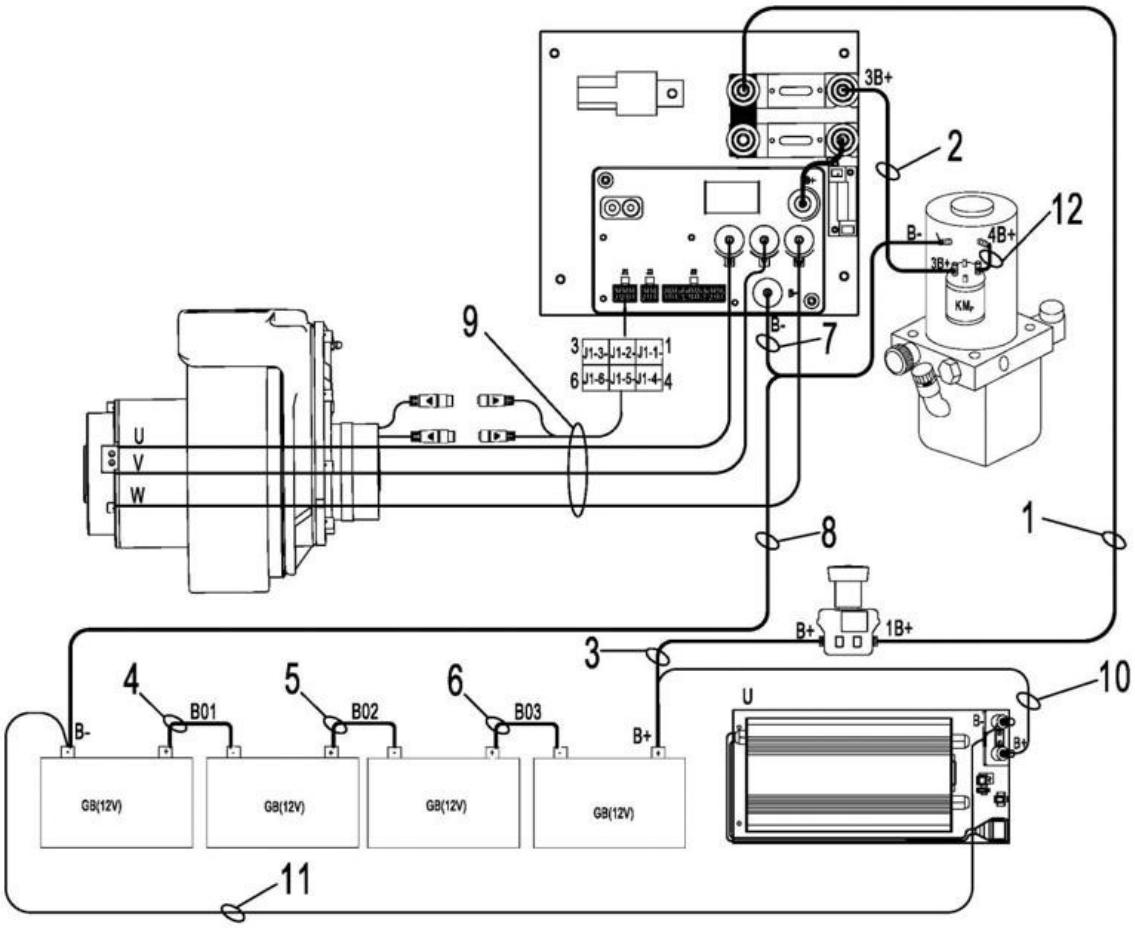
3.1 Circuit diagram



Code	Item	Code	Item
GB	Battery	FU01	80A fuse
Et	Controller	HA	Horn
Mp	Pump motor	FU02	130A fuse
KMp	Pump contactor	S1 S2 S3 S4	Tiller micro switch
SM	Emergency button	SY	Key switch
YV	Electromagnetic valve	U	48V charger
SU	Micro switch	XW	Charging cable
BE	CAN accelerator	FU2	0.5A fuse
SA	48V proximity switch (NO)	P	48V BDI
Mt	Traction motor	K	Horn relay

YB	Electromagnetic brake	SH1	48V proximity switch (NC)
FU1	10A fuse	C	Capacitor
SE	Proximity switch		

3.2 Main Harness



NO.	Name	No	Name
1	Cable -1B+-16-8-8-340	7	Cable -B--10-6-8-410
2	Cable -3B+-16-8-8-460	8	Cable -B--16-6-8-750
3	Cable -B+-16-6-8-1200	9	Driving Motor cable (MD)
4	Cable -B01-16-6-6-200	10	Cable -B+-2.5-6-8-1500
5	Cable -B02-16-6-6-1250	11	Cable -B--2.5-6-8-1380
6	Cable -B03-16-6-6-120	12	Cable -4B+-16-8-8-100

4.Battery (Maintenance-free battery)

4.1Precautions for Battery Charging

Original charger is selected to charge the battery, and strictly follow the requirements of the charger's instructions for use and maintenance.

a) Forbid charging

b) Charging sites should be well ventilated

 Battery charging process should be carried out in a well-ventilated place and should avoid moisture.

 Before charging, check the connector and cable, etc., to ensure that it is not damaged.

Do not charge at the following condition:

- Connector electrode damaged.
- Corrosion of terminals and cables.

These conditions can lead to accidents such as sparks, burning of items and fires and explosions.

d) Turn off the key switch and charge

e) Connect charger AC power supply, this vehicle is built-in charger

 Do not unplug the cable.

When the cable and power connector is damaged, contact our sales department to replace the damaged cable and power connector.

f) disconnect charging process

● The steps of disconnecting the charging process must be strictly in accordance with the requirements of the instructions for use and maintenance of the charger.

● Don't unplug the charger while charging, otherwise it will cause an electric spark to cause danger.

4.1 Battery replacement

When the vehicle has a continuous working cycle and the battery power is completely exhausted, the battery on the original vehicle should be replaced with another battery which has been fully charged in time, and the replaced battery should be charged.

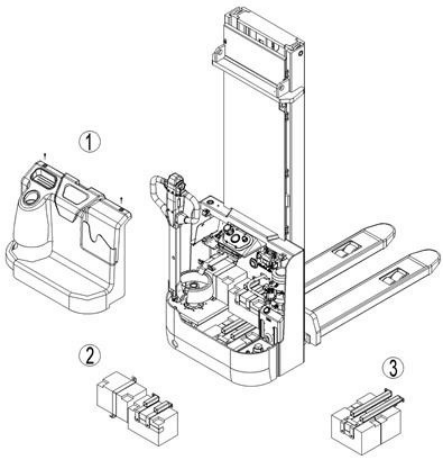
●When replacing the battery, make sure the battery matches the pallet. The use of batteries that do not match the pallet which can shorten the working hours of the pallet or turn the pallet upside down while driving.

●Replace the battery following steps:

● When using another forklift as the lifting equipment to replace the battery, the appropriate hanger (Attachment) should be used.

● Portable batteries should be operated by professionals.

1) Park the pallet safely, turn off the key switch, and press the power switch to turn off the vehicle.
2) Open the housing. Loosen the battery holder and remove the holder. (Figures 1,2 and 3 below)
3) Unscrew the screw at the negative end (shown as'-') first, then unscrew the screw at the positive end (shown as'+') and put the harness next. Then remove the two cells in turn
4) Installation is the reverse procedure of removal, please connect the positive terminal first, otherwise the pallet is vulnerable.
Acid-battery 4 pcs 12V/60AH



4.2 Battery maintenance

This Pallet uses a maintenance-free battery, which is not required during use

4.3 Battery testing

A. Battery Status Check
Weak battery may cause problems with the controller and power circuit. Please confirm that the battery is in good condition before troubleshooting other areas.

Initial steps
Verify that the polarity on the battery connector and control panel is correct. The positive cable shall be located at the line fuse (fuse) and the negative pole shall be located at the negative pole of the control panel.

When the pallet is running
Turn the range switch on the multi meter to read the battery voltage.
The multi meter leads are connected between the B+ and B- of the controller.
3. In the safe area, operate the hydraulic system (load) while reading the voltage indicated on the multi meter.
4. If the indication is less than the limit (38.0 V), the battery needs to be charged or repaired before troubleshooting continues. If the charger cannot charge the battery, connect a group of batteries larger than 38.0 V in parallel to charge the low voltage battery.

When the vehicle doesn't work and the battery is the most suspect cause

B Battery Pressure-Drop Test

1 The voltage of each battery is measured when the vehicle is electrified and the pump motor is operating.

2 The normal voltage shall be between 9.5 V and 12 V per cell. If the voltage on each battery is less than 9.5 V, the battery must be charged or repaired first and then continue troubleshooting.

3 The index between cells should not exceed 0.15 volts. If so, the battery must be balance-charged or repaired

C Battery-housing insulation check

Resistance between the pallet wiring and any point in the car body shall be at least 10,000Ω or higher.

The short circuit of the battery housing causes many faults. Because the battery may have chassis leakage, the chassis short circuit in the pallet wiring may cause problems.

To prevent problems caused by short circuits, do as following:

1.Disconnect the battery and discharge the controller. (Keep the key switch on to discharge the power module. Twice for 30 seconds.

Note: Failure to discharge the power module may cause electric shock.)

2. Randomly measure any component connection or wiring connection associated with the vehicle chassis with a minimum resistance of Ω.10,000 Any test point with low resistance must remove chassis short circuit.

3. Always keep the battery clean to minimize current leakage to the chassis.

4. Ensure that all accessories (e.g. speakers and lights) are designed for inorganic box connections (two-wire system)

5.Charger

5.1 Overview

Built-in charger for 48V 8A

Input voltage :100~240 V 50~60 Hz

Input current :4.0 A(max)

Efficiency :220 V 90% or more

Working mode: Switching microcomputer single chip control

Output voltage :48 V

Output current :8 A

Suitable battery :48 V 50~120 Ah lead acid battery

Use of ambient temperature and humidity :0℃~40℃ and 20%~85%

5.2 Operational instructions

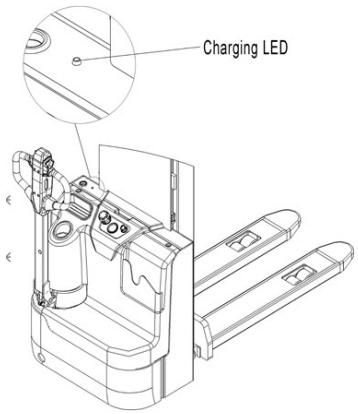
Charging Status Display

Battery discharge: red light

Saturation: Green Constant light

chargeable: Orange Constant light

First connect the power supply, then the charging status indicator lights on, after a few seconds, the charger will enter the charging mode.



The pallet is not electrified when charging, and the electricity meter does not show the electricity quantity. After the AC power is disconnected, turn on the key switch, please check the charging protection connection of the charger when the pallet does not show the electricity. When charging, it is on. When not charging, it is closed state.

After charging is complete, disconnect the AC connector from the socket and place it in the specified storage space.

5.3 Common Charger Failure

When the charger is connected to the power supply, check the indicator:

1. If the status indicator is on, the power supply is on

A. Are output connectors connected well or polarity connected back? (Please connect and recharge)

B. Are batteries filled? (Please recharge after use)

C. Are batteries useless (broken)? (Please replace new batteries)

2. If the indicator is not on, it indicates that the charger is not powered on or damaged

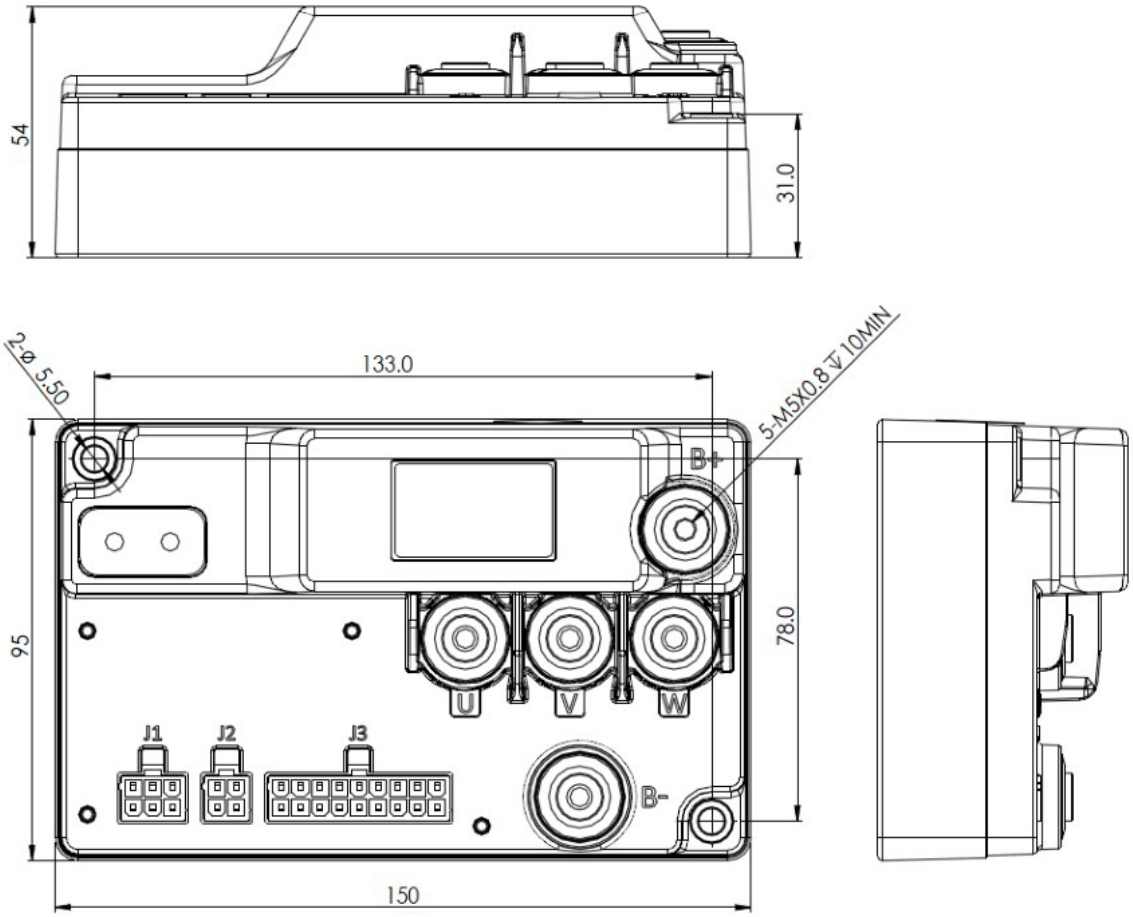
A. Please confirm if the power plug is in good contact? Please plug it in and recharge it

B. Please confirm if the power switch is on? (Please recharge after opening)

C. Are chargers damaged? (Please send to factory for maintenance)

6.Controller

6.1 Appearance



Pin	Name
J1-1	+5V Out*
J1-2	Hall A/Encoder A
J1-3	Hall B/Encoder B
J1-4	Hall C
J1-5	I/O Ground
J1-6	Motor Temp Sensor Input*

Pin	Name
J2-1	Serial RX/CAN L
J2-2	I/O Ground
J2-3	Serial TX/CAN H
J2-4	+14V Out*

Pin#	Function
J3-1	KSI
J3-2	Horn/Valve Driver/ Status LED*
J3-3	Interlock Switch
J3-4	EMR NC Switch/Switch 2/Analog 2*
J3-5	BDI output
J3-6	Switch 1/Analog 1
J3-7	Pot Wiper
J3-8	Reverse Switch
J3-9	Lift/Push for DME
J3-10	Coil Return
J3-11	Pump Contactor Driver*(1226BL-2X0X/4X0X Only) Main Contactor Driver(1226BL-6X0X Only)
J3-12	EM Brake Driver*
J3-13	I/O Ground
J3-14	EMR NO Switch
J3-15	Charge Inhibit(1226BL-6X0X N/A)
J3-16	Pot High
J3-17	Forward Switch
J3-18	Mode Switch

Diagnosis and troubleshooting

There is a way to view the current fault code without a dashboard and hand-held programmer: on each controller, two LED lights are built in to indicate the entire list of fault codes.

Each fault code consists of two digits. red LED: the number of times the indicator lights flicker, indicating the first number of the code; then yellow LED the number of flashes, indicating the second number of the code.

For example, if the current fault code is "23", the LED will appear as follows:

red light flash 2 times, yellow light flash 3 times.

Fault analysis describes the complete list of fault codes. The following table shows a number of other situations other than indicating the fault code:

Showing	Status
LED not bright	Controller is not energized or battery runs out.
Yellow LED flicker	Normal operation of controller
Both yellow and red led are always bright	Controller in flash program mode,
Red led light is on	Did not load software, or supervisor or microprocessor detected internal hardware failure. Cycle KSI clear

Controller Inspection

Use 30Ω,5W resistance to discharge B, B- terminals before testing

A. Controller

Measure the diode voltage of the AC MOSFET circuit inside the controller and check if burns damage.
Test according to the following table, each test item must be repeatedly tested more than 3 times.

Item	Multi meter terminal		range of normal value	
	Red Pen	Black pen	Determination of polar values	Measurement of resistance
1	B+	U/V/W/B-		Over 1MΩ
2	B-	U/V/W		Over 1MΩ
3	U/V/W	B+	0.3-0.6V	
4	B-	U/V/W	0.3-0.6V	

Dial the multi meter to Ω (resistance measurement), multi meter to diode (polarity measurement).
1) Remove the cable and harness connected to the controller and fully release the internal capacitor charge (discharge the B and B- terminals with resistance 30Ω/5W).
2) use multi meter to measure the voltage of diode (0.3 -0.6V) and check if it is
ok. Test 1: Measure diode voltage, red wire is, black wire for U, V and W ..
Test 2: Measure diode voltage to U, V and W with red lead black lead to B+
Note: multi meter pointer cannot be reversed

6.2 Controller's error code list

Item	Code	Breakdown info	Description	Flash code
1	12	SEVERE UNDERVOLTAGE	Capacitor bank voltage dropped below the Severe Under voltage	1,2
2	12	UNDERVOLTAGE CUTBACK	Capacitor bank voltage dropped below the Under voltage limit with the FET bridge enabled	1,2
3	13	SEVERE OVERVOLTAGE	Capacitor bank voltage exceeded the Severe	1,3
4	13	OVERVOLTAGE CUTBACK	Capacitor bank voltage exceeded the Overvoltage limit with the FET bridge	1,3
5	14	CONTROLLER OVERTEMP CUTBACK	Heatsink temperature over +75C	1,4

6	14	CONTROLLER SEVERE UNDERTEMP	Heatsink temperature below -40C	1,4
7	14	CONTROLLER SEVERE OVERTEMP	Heatsink temperature over +85C	1,4
8	15	MOTOR TEMP SENSOR	Motor thermistor input is at the voltage rail(0 or 10V)	1,5
9	15	MOTOR TEMP HOT CUTBACK	Motor temperature is at or above the Temperature Hot parameter setting	1,5
10	21	THROTTLE	Throttle input is out of range	2,1
11	21	HPD SEQUENCING	HPD(High Pedal Disable) or sequencing fault caused by incorrect sequence of KSI, interlock, direction and throttle inputs	2,1
12	22	MAIN CONTACTOR WELDED	Just prior to the main contactor losing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge	2,2
13	22	MAIN CONTACTOR DID NOT CLOSE	With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+	2,2
14	22	MAIN DRIVER FAULT	Main Contactor driver is either open or shorted	2,2
15	22	PRECHARGE FAILED	Controller failed to pre charge	2,2
16	23	ENCODER	Motor encoder phase failure detected	2,3
17	23	STALL DETECTED	No motor encoder movement detected	2,3
18	24	MOTOR OPEN	Motor phase U,V or W detected open	2,4

19	25	EMBRAKE DRIVER FAULT	Electromagnetic brake driver is either open or shorted.	2,5
20	31	EM BRAKE FAILED TO SET	After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed.	3,1
21	31	EMER REV TIMEOUT	Emergency Reverse was activated and ran until the EMR Timeout timer expired.	3,1
22	32	EMER REV HPD	At the conclusion of emergency Reverse, the fault was set because various inputs were not returned to neutral.	3,2
23	32	EMR SRO	The EMR switches are turned on before KSI	3,2
24	33	PUMP DRIVER FAULT	Pump driver is either open or shorted	3,3
25	34	PUMP SRO	The lift switch is turned on before KSI	3,4
26	35	VALVE DRIVER FAULT	Valve driver is either open or shorted	3,5
27	36	VALVE SRO	The lower valve input switches are turned on before KSI	3,6
28	41	FIVE V SUPPLY FAILURE	The voltage of internal +5V supply is upper or lower than the threshold voltage The Torrance is -/+10%	4,1
29	41	FIFTEEN V SUPPLY FAILURE	The voltage of internal +15V supply is upper or lower than the threshold voltage The Torrance is -/+10%	4,1
30	41	EXTERNAL SUPPLY OUT OF RANGE	The voltage of external +5V or +14V is either greater than the upper voltage threshold or lower than the lower voltage threshold. The Torrance is -/+10%	4,1

31	42	CAN BUS LOADING		4,2
32	42	PDO TIMEOUT		4,2
33	42	PDO MAPPING ERROR		4,2
34	43	HW FAILSAVE	The hardware is defeated	4,3
35	44	SW FAULT	The CRC code of the application is not right	4,4
36	47	LOW_BDI	Low Battery capacity	4,7
37	49	STEERING_SENSOR	Steering sensor error	4.9
38	81	PARAMETER MISMATCH	When the EMR Input Type is set to type 2, the switch 2 input should be set as disable. Otherwise, the Parameter Mismatch fault is reported	8,1
39	81	PARAMETER CHANGE	Adjustment of a parameter that requires cycling of KSI	8,1
40	83	NV FAILURE	Controller operating system tried to write to EEPROM memory and 1226BL Basic Information Rev 1.0 19 failed.	8,3
41	84	SUPERVISION	Mismatched redundant readings; damaged Supervisor	8,4

7.CURTIS Handheld unit

Operational considerations:

Handheld unit attention function is to facilitate inspection and maintenance, without the approval of the vehicle manufacturer, the controller parameters are not allowed to adjust to avoid pallet and personal safety accidents.

After the handheld unit modifies the parameters, it will be saved automatically, just turn off the key switch and restart it.

CURTIS the handheld unit can be connected if the controller is charged or powered off

Pallet Fault Read Process

After connecting the handheld unit to the controller, turn on the key switch

Locate: Faults(fault)…… according to the list of handheld units menu

In the running pallet, holding cursor flashing line will appear in English fault content, with reference to the fault code table interpretation

Vehicle Signal Detection

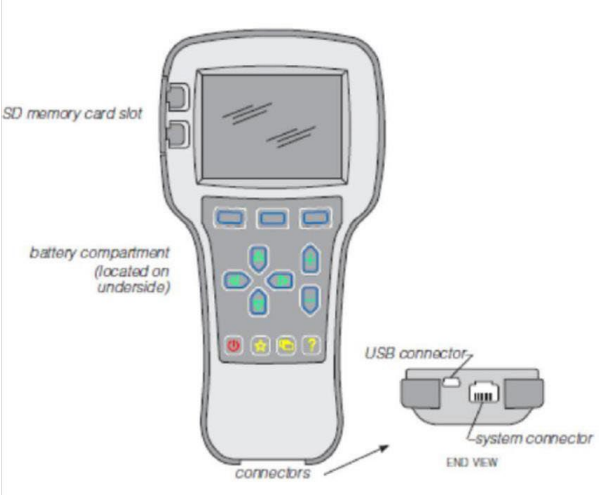
CURTIS handheld unit menu content

Curtis 1313 handheld programmer is used to configure Curtis electronic control system. Through this programmer, you can adjust and save the set parameters, real-time monitoring controller data and fault diagnosis

Warning: The control system will affect the acceleration rate, deceleration rate, hydraulic system and brake.

If the control system is not properly programmed or over-safe, dangerous conditions can occur. Control systems can only be programmed by manufacturers or authorized service agents

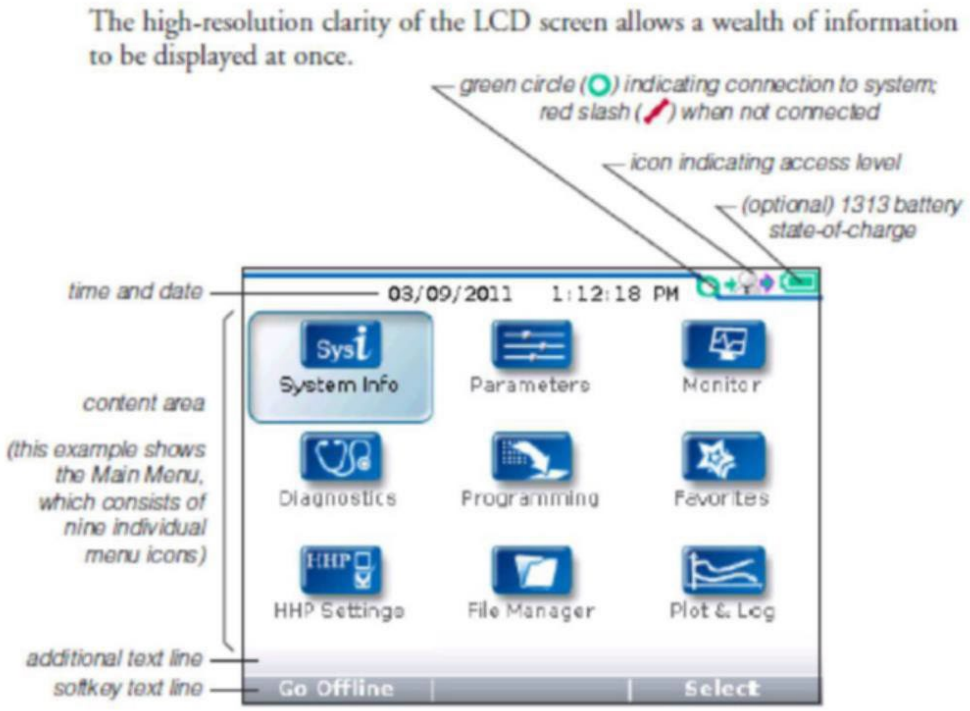
The programmer has two connectors, one for communicating with the motor controller and one for interfacing with a PC. It also has a battery compartment and a memory card slot.



Once the programmer has uploaded the information from the controller, it displays the Main Menu.

Programmer power up

Connect the handheld programmer into the control system by plugging it into the controller's charger/programmer port.
The programmer automatically powers up, and displays this screen while it loads information from the controller.



These three keys are blank, because their function is context-specific. At any given time, their function is shown directly above them on the LCD screen. The symbol "»" indicates more options; pressing the soft key under the "»" will scroll to another set of options.

Arrow keys

With these four keys you can scroll up and down and right and left, within the display. In the Main Menu, you can use the arrow keys to highlight one of the menus; you then open the highlighted menu using the "Select" softkey. Within menus (other than the Main Menu), the left-arrow key is used to navigate backwards. Within menus (other than the Main Menu), the right-arrow key is used to navigate forwards—that is, to open highlighted submenus or items.

+ /- keys

These two keys allow you to increase or decrease the value of parameter settings. They also are used as "+ = Yes" and "- = No" buttons. In some cases, they are used to scroll through several options (as in selecting an access level, or selecting a language). Power

It is not necessary to use the Power key to turn on the programmer when you plug it into an active control system; it will turn on automatically. To turn off the programmer, press and hold the Power key for a few seconds. You will then be asked whether you want to power off the programmer, and the soft key text will offer you the choices "Yes" and "No."

If you have turned off the programmer, or if it has timed out and shut itself off, pressing the Power key will turn it on again.

Favorites

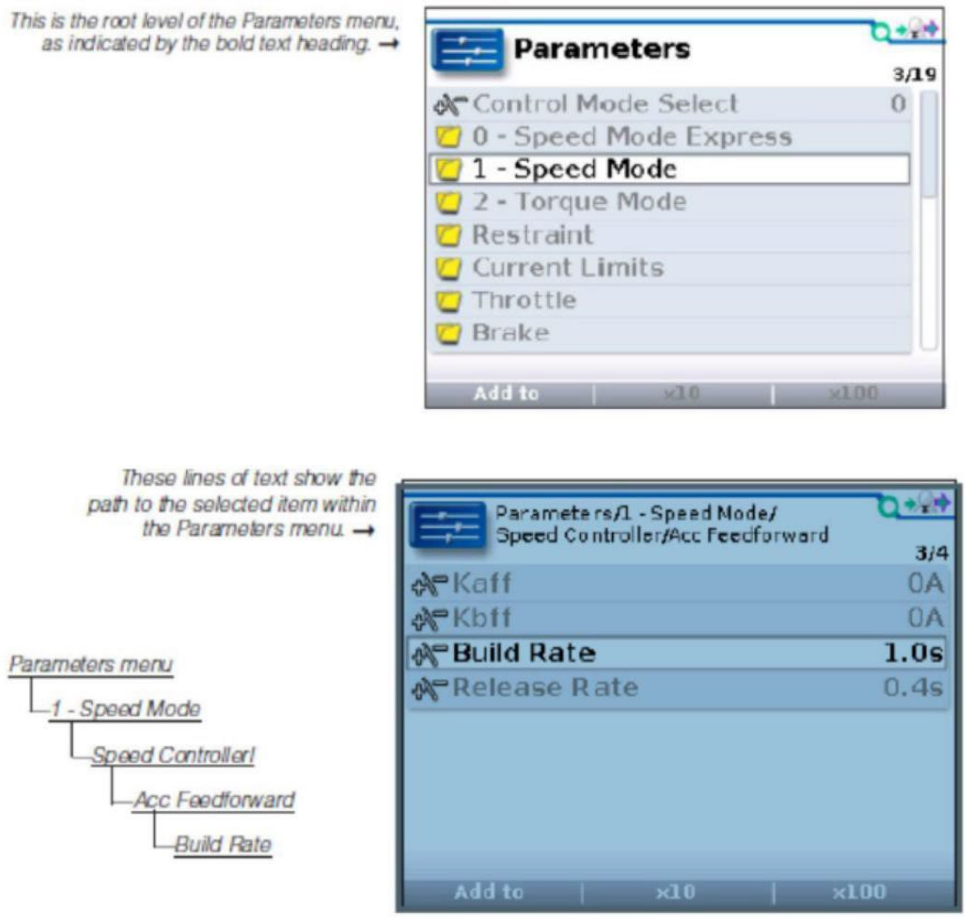
This key is an alternate way to bring up the Favorites menu. You can access the Favorites menu by selecting its icon in the Main Menu, or by using the Favorites key. See the Favorites menu section for more information.

MENU ORGANIZATION

The Main Menu contains nine menus, each identified by a menu-specific icon. Items are arranged hierarchically within menus.

Some menus may contain just one level of information, but most contain multiple levels. Items marked with a folder open as new

submenus. Items marked with a grid open into tables. Items marked with a dialogue balloon open into a set of instructions for performing a procedure, such as calibration. At any point, you can use the left-arrow key ( ) to navigate back to the previous screen. Each of the nine root menus displays the menu name in bold type at the top of the screen, beside the menu icon. As you move within a hierarchical menu, the text at the top of the screen shows the path you have taken.



The nine menus

DIAGNOSTICS MENU

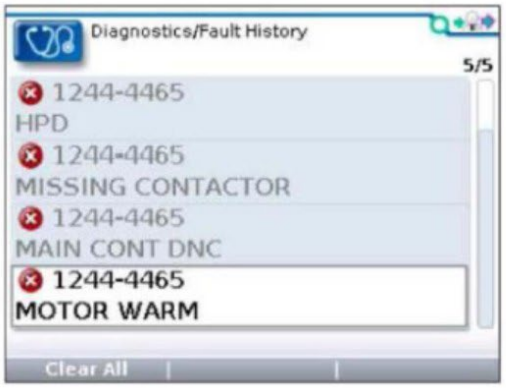
In the Main Menu, highlight the Diagnostics icon and press the “Select” soft key to go to the Diagnostics menu. You can return to the Main Menu at any time by pressing the Main Menu key ( ).

The Diagnostics menu contains two folders: Present Errors and Fault History.

Note: Sometimes the fault circuits catch a temporary event that is not a true fault in the system; it is always a good idea to turn the control system off and back on again to see whether the fault clears by itself.

Fault History folder

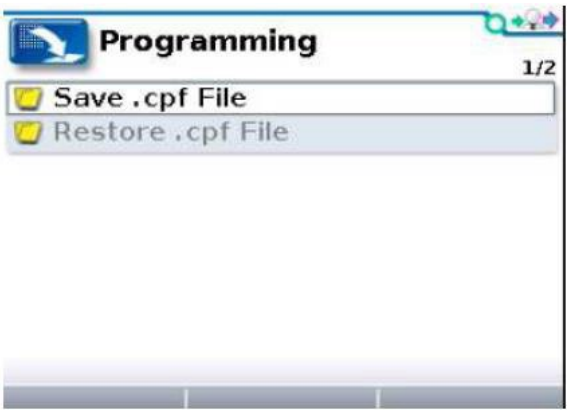
This folder lists all the faults encountered since the Fault History was last cleared. You can clear the entire contents of this folder to allow a fresh Fault History to be started.



“Clear All” is used to empty the Fault History folder. This softkey appears only when the Fault History folder (or one of the faults within that folder) is highlighted.

PROGRAMMING MENU

In the Main Menu, highlight the Programming icon and press the “Select” softkey to go to the Programming menu. You can return to the Main Menu at any time by pressing the Main Menu key (.cpf file).



Save.cpf File

Using the Save .cpf File function in the Programming menu, you can make a backup of your present parameter settings. If you adjust the parameter values again, you can use "Save. cpf File" again to save that new collection of settings. You can have as many.cpf files as you'd like, each with a unique file name.

Restore. cpf File

The "Restore .cpf File" function allows you to select an earlier saved .cpf file to use in place of the present one. You will first choose whether to restore a file from the programmer's internal memory or from its SD card. After selecting which memory to use, you then select the .cpf file you want to restore by highlighting it. In this example, the desired file is in a folder named "CPF files" on the SD card.

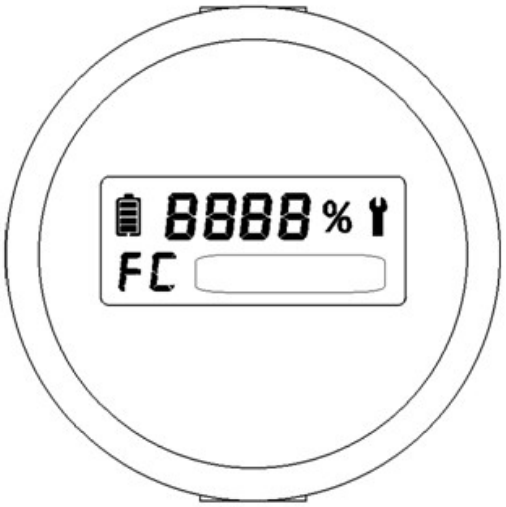
After you highlight a .cpf file and choose "Restore," a pop-up screen will ask whether you want to enable Advanced Cloning ("yes"/"no"). This screen does not appear on User-level and Service-level programmers.

8.Meter

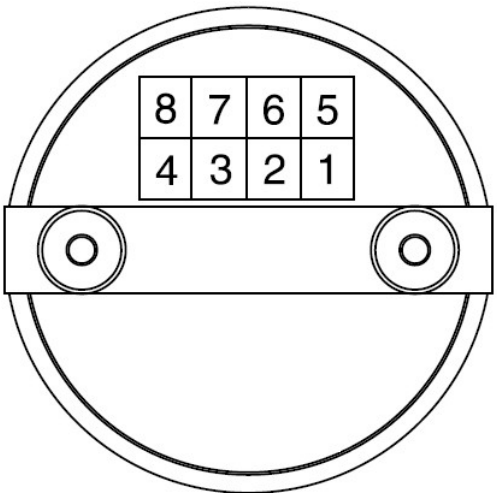
8.1 Overview

52DS806CAN series of electricity meter table embedded yellow and green LCD screen, integrated in a diameter 52mm of the ABS shell. An instrument can be widely used in electric vehicles, electric forklifts and golf carts of electricity and cumulative working time indication, while transmitting effective signals through CAN communication liquid crystal display instrument.

Instrument View Description:



（Instrument face-up）



（Instrument back view）（Terminal：CF5-8TY）

Port definition:

1 pin	CAN-H
2 pin	Key
3 pin	
4 pin	OUT 48V+
5 pin	Negative power supply（GND）
6 pin	Hour meter Positive pole (48V)
7 pin	CAN-L
8 pin	Power supply 48V

Instrument panel display instructions

1. Battery charge is expressed as a percentage with 100% full charge.
2. The "small wrench" symbol on the meter, representing the controller failure,

Not shown when no fault.

3." FC"" is the abbreviation of Fault Code, meaning fault code;

not shown when no fault.

4." FC" the box behind it contains fault specific code,

When there is no fault, it is not displayed, only the hourly meter is displayed.

Function Description

1. Electricity Directive

The electricity quantity is shown by percentage, which is more intuitive.

Integrated open circuit reset function and charge reset function

Open circuit reset voltage: 50.20V

Reset voltage	50.20	+0.1-0.2
10		
9	47.95	±0.2
8	47.15	±0.2
7	46.35	±0.2
6	45.35	±0.2
5	44.75	±0.2
4	44.15	±0.2
3	43.55	±0.2
2	42.75	±0.2
1	42.15	-0.1+0.2

2. key switch

The key switch is connected to the positive pole, the electricity quantity is displayed; when the key switch is suspended, the electricity quantity is not displayed, and the hourly meter display is closed.

3. hours test

6-pin hours

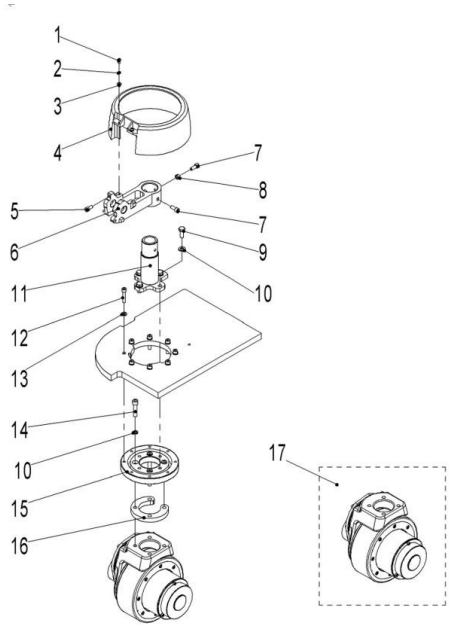
When the key switch is turned on, the 6-pin current uses the supply voltage hourly meter to start the timing.

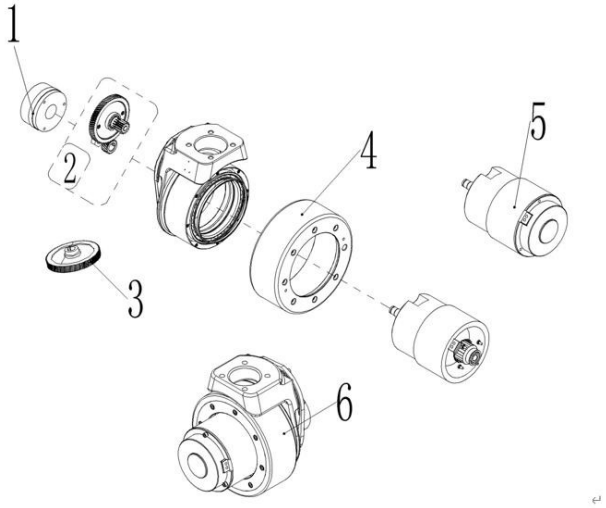
4.CAN message

When the controller has a fault message, the fault code is displayed, and the hourly meter shows off. The key switch of the instrument is closed, and the battery power is always uploaded to the controller through the message.

Note: The surface of the electricity meter is covered with glass, please avoid impact or impact.

9.Driving wheel





Part name refer to part catalogue

On the electric side, the drive motors rotate their drive wheels, allowing pallet to move forward/backward
Controlled by the controller
The drive motor is connected to the controller via U, V and W lines. The controller runs the drive motor according to the input from multiple switches and sensors and the internal parameter settings.

When the following conditions are met, the drive motor is operated:
key switch is turned on, then the controller is powered
handle is pressed down (the proximity switch is in the induction area),
determine the driving direction (accelerator button)
twist the accelerator button (accelerator)

9.1 Motor speed sensor

Each drive motor is equipped with an encoder that serves as a speed sensor for the motor. It includes two hole sensors and is equipped with gears on the drive shaft of the motor to interact with the sensors. The gear rotates at the same time as the drive shaft so that the gear teeth periodically pass through the magnetic field of each hole sensor. When the top platform of the gear passes through the magnetic field, it is close to the hole sensor, so the magnetic flux increases. On the other hand, when the bottom platform passes through the magnetic field, the distance increases and the magnetic flux decreases accordingly

The cycle occurs again and the magnetic flux has a waveform that generates a voltage pulse. The amplitude of the pulse is analyzed to calculate the speed of the motor.
Like other sensors, the encoder produces the main signal (signal a) and the signal (signal b) through two-hole sensors. The resulting signal sequence varies according to the direction of rotation.

9.2 Overheat protection

Each drive motor is equipped with a heat sensor to prevent overheating. Once the motor is heated to 145°c (293°f), the overheating alarm is activated and the performance is limited.

Speed sensor

Item	Specification
PPR	64 impulses per turn
connector	4-pins AMP

Heat sensor

Item	Specification
Part no.	It is inside motor
repellence	Under 25°C（77°F）, 603Ω±3％
connector	Pins AMP

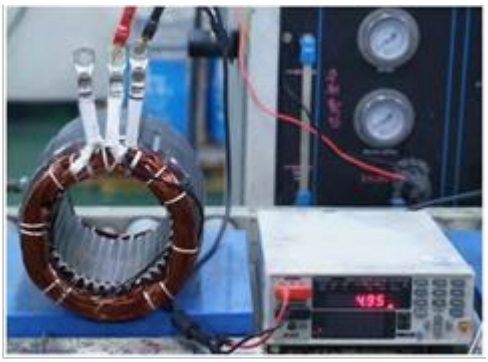
9.3 Stator testing

Carefully wipe contaminants on the stator surface using a clean cloth dipped in alcohol

Notes: Contaminants in the stator may cause damage to the coil and therefore to the stator itself.

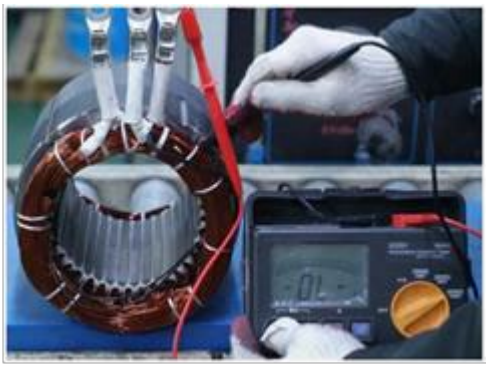
Measurement of resistance per phase (uv,vw,wu) using multimeter

Rated resistance:0.4Ω



3. Test insulation at 1000 vac and min.10 MΩ using insulation tester.

If there is insulation problem, please replace the new stator.



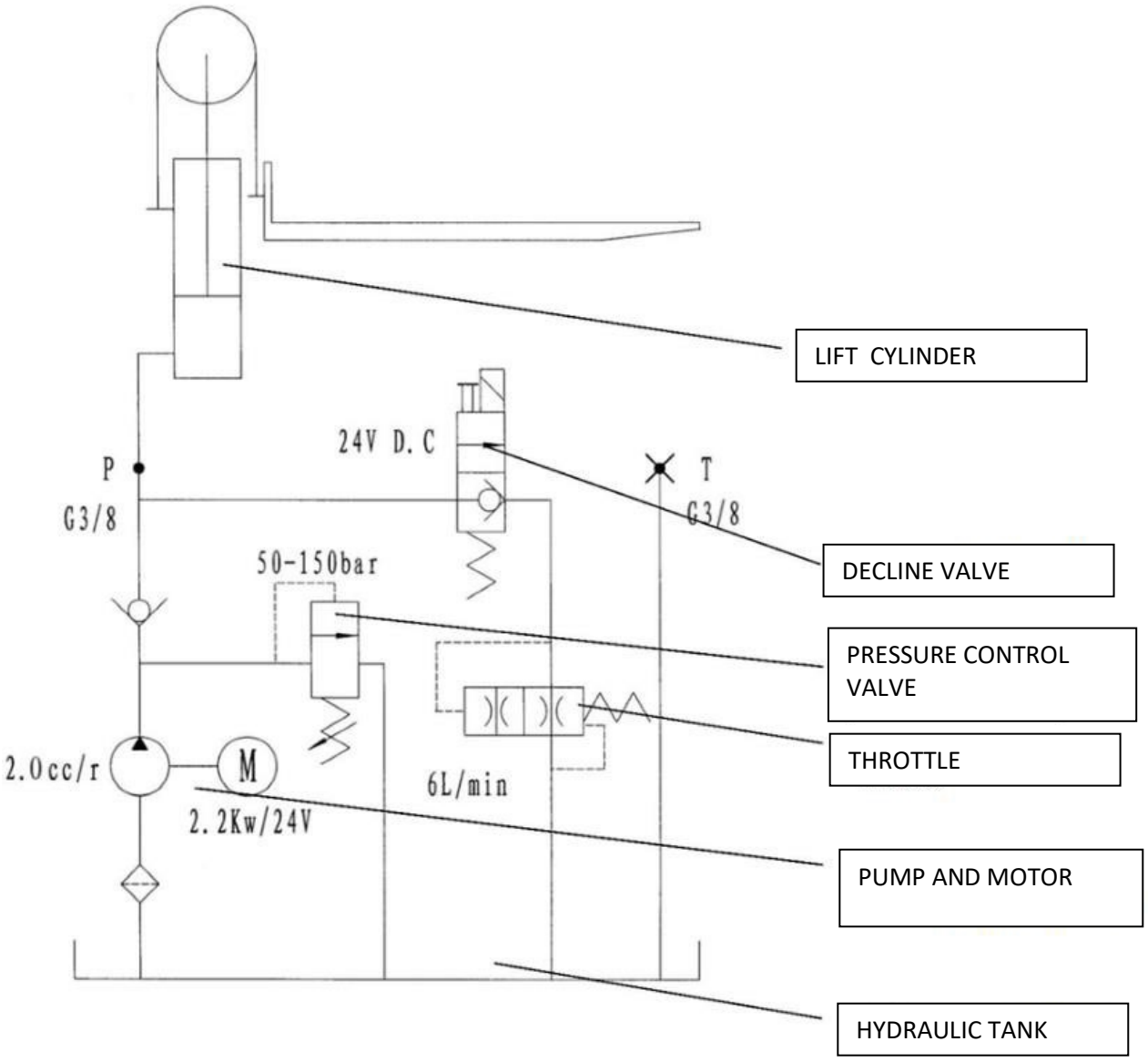
9.4 Drive motor common fault

Problem	Reason
Drive motor doesn't work	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.
	Incorrect operate
Drive motor doesn't work	Speed sensor fault
Traction does not work during normal operation	The brake is defective, resulting in excessive resistance. The heat increases, causing the motor to stop. Check braking adjustment
	Too much heat in the control panel for the following reasons: Overweight traction load: Reduced duty cycle load. Heat sensor failure: These may cause malfunction of the drive motor, failure of the control handle or opening of the drive fuse
Traction does not last throughout the normal working period.	The pallet is equipped with too 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.
	After a work shift, the pallet capacity exceeds its designed capacity without the power available:
Battery positive (+) or negative (-) is in direct contact with the vehicle frame (body) or drive motor	The battery is dirty , the electrolyte is on top of the battery. The current flows through the battery box, which applies voltage on the forklift frame: clean the battery with baking soda
	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.
	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.
Slow acceleration of vehicles	Drive control overheat, temperature induction switch on. Note: If temperature is 145°c (293°f), heat – sensor will issue warning.

10.Hydraulic system

10.1 Hydraulic circuit



Hydraulic diagram

The hydraulic system operates other hydraulic parts through hydraulic force from pump.

The main hydraulic pump is driven by the pump motor controlled by the controller.

The main hydraulic pump uses the rotating force output from the motor to pressure the oil in the hydraulic tank and conveys the oil to the lifting cylinder.

The hydraulic tank stores the hydraulic oil returned from the cylinder. The stored oil is suctioned by the main hydraulic pump for reuse.

The pump motor transmits the power to the main hydraulic pump by electric mode in order to pump the hydraulic oil to operate the hydraulic system.

The pump motor is connected to the pump motor controller through the pump contactor and (B-)line. The controller runs the pump motor according to the input of the lifting switch and sensor.

When the following conditions are met, the pump motor runs:
the key switch is turned on.
Upper limit switch closing
handle rising-switch closed
pump contactor suction

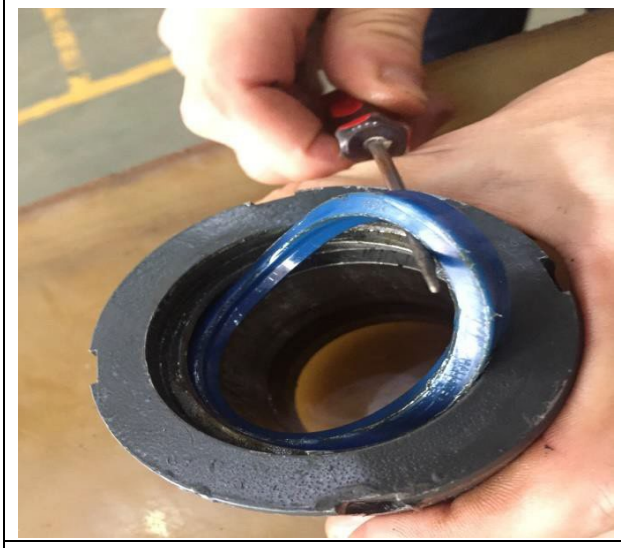
10.2 Disassembly of pump motor

1. Disconnect pump motor B+ /B- terminal cable.
2. Disconnect hose from hydraulic pump.
3. Remove fixing bolt between pump motor and pump, then remove motor.
Installation torque: 55±10n.m (40±7lb.ft).
4. Install pump motor in reverse order.
5. Add hydraulic oil to tank according to specifications given in manual.

10.3 Replace oil seal of lifting cylinder

1. Remove the cylinder head with a crescent wrench

2.Remove piston, then remove retaining ring



3. Remove dustproof seal and shield ring and Y-type seal

4. Remove o-seal and shield ring, then repair hose . Installation way is in reverse sequence

10.4 Hydraulic motor fault

Breakdown	Reason
Hydraulic motor doesn't work	Bad connection or fuse burning. Check the battery connection. Check the key fuse. Check if hydraulic pump motor is likely to cause fuse burning.
	The key switch or pump station contactor is not turned off. Turn off the key switch. Check the power of pump station contact coil and pump station contactor with multimeter. Check the voltage output and upper limit switch of pin-4 in the meter. The key switch must be turned off, the rising button and the pump station connector ,then make the power steering function run.
	Insufficient voltage. Charge or replace batteries. Check for one or more defective battery cells in battery. Check cable terminals are tightly aligned with battery terminals and control panel connectors. Check cable internal wires are broken.
	The lift and drive system is not operating correctly.
	The battery installed on the vehicle is too small. According to the working hours, choose the appropriate

The battery will not continue to work properly	battery capacity.
	The battery is not fully charged during the battery charging operation. Check if battery is balance-charging (charging makes the proportion of all batteries is the same). Check if battery charger defects
	The battery charging interval is too long or the rechargeable battery cooling time is too short. Reduce battery duration. Please extend the cooling time of the battery before it can be put into use.
	Batteries have one or more defective battery cells, which may result in lower rated capacity and battery capacity. Test and identify defective cells. Replace defective cells. Battery units are connected in series. A bad battery causes high resistance in series with other batteries. This reduces the speed of the motor. This may occur when other batteries are almost fully charged.
	The hydraulic pump motor is overheated.

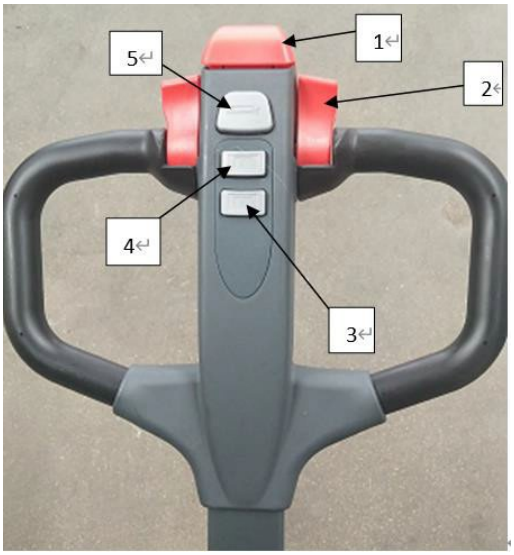
10.5 Hydraulic pump fault

Breakdown	Reason
Pump noise	Low oil level
	oil thick
	limit to the inlet line of the pump
	Worn parts in the pump.
	Oil dirty
	Air leaks into the inlet line
High temperature	Low oil level
	oil channel limited
	Safety valve settings are too low
	Oil thin
	Air leakage in the system
	Pump wear is too high
	The system operates at too high a pressure. The safety valve is too high. Restrictions in flow control valves, check valves and oil routes.
Pump seal oil leakage	Seal is worn
	Pump inside worn
	Too low an oil level in the tank causes the seal to be sucked

	During installation, seal is cut on the shoulder of the pump or keyway.
	Sealed lips dry and hardened by heat.
Pump can't convey hydraulic	Low oil in tank
	Restrictions on the pump inlet pipeline
	air leakage in the inlet pipe. Loose bolts. Defects in the inlet pipe.
	viscosity of the oil is wrong
	Pump worn too much
	pump shaft fault
	The bolts of the pump do not have the correct torque

11. Tiller Ass'y

11.1 Key function



1：Emergency reverse switch (belly switch)
2：Accelerator switch
3： Decline switch
4：Hoisting switch
5：Horn switch

11.2 Operating Instructions

Emergency reverse switch: when the pallet is running forward, after the operator's body contacts the key to close it, the pallet will run along the fork direction for 3 seconds, and then stop running. (Note: The pallet cannot operate if the key is closed early before opening the key switch)

Acceleration knob switch: control the running direction and speed of the vehicle. (Note: Rotate the switch slowly to avoid rapid acceleration. When the pallet turns, it needs to loosen the knob properly and speed down.

Decline switch: Press this key when need drop goods.

Hoisting switch: Press this key and the goods rise. (Note: The lifting button fails when the goods are lifted to a limited position, normal protection, not malfunction)

Horn switch: press this key and the horn works. (Note: Don't press this button long to avoid burning the horn)

12.REGULAR MAINTENANCE

 Only qualified and trained personnel are allowed to do maintenance on this truck.

Before maintaining, remove the load and lower the forks to the lowest position.

If you need to lift the truck, follow chapter 4b by using designated lashing or jacking equipment. Before working, put safety devices (for instance designated lift jacks, wedges or wooden blocks) under the truck to protect against accidental lowering, movement or slipping.

Please pay attention by maintain the tiller arm. The gas pressure springs are pre-loaded by compression. Carelessness can cause injury.

Use approved and from your dealer released original spare parts.

Please consider that oil leakage of hydraulic fluid can cause failures and accidents.

It is allowed to adjust the pressure valve only from trained service technicians.

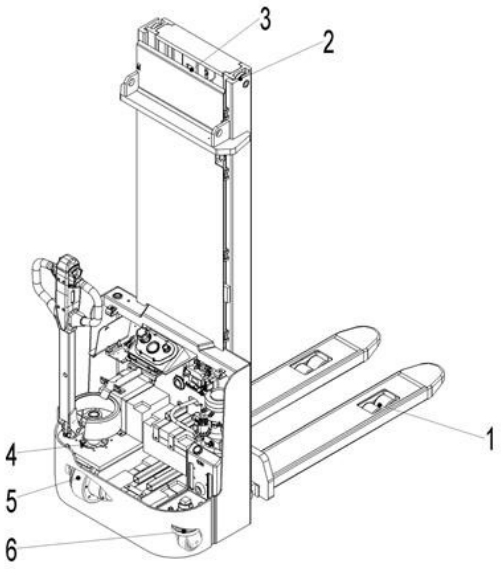
Check the items emphasized in maintenance checklist.

	Maintenance Check list	Intervals（Month）			
		1	3	6	12
	Hydraulic system				
1	Check hydraulic cylinder if there is noise and leakage of piston		●		
2	Check hydraulic connectors and tubing if there is damage and leakage		●		
3	Check hydraulic oil level and recharge if necessary		●		
4	Add hydraulic oil after 12 months or 1500 hours of work				●
5	Check and adjust the function of hydraulic valve (1600/2000/2500kg +0/+10%)				●
	Mechanical system				
6	Check if there is deformation and damaged on fork		●		
7	Check if there is deformation and damaged in chassis		●		
8	Check if all bolts are tightened		●		
9	Check that the mast and chain are corroded, deformed or damaged and replace if necessary	●			
10	Check if there is noise and leakage in transmission		●		
11	Check if there is deformation and damaged for tire		●		
12	Steering bearing				●
13	Check and lubricate spindle center points		●		
14	Lubricating grease nozzle	●			

15	Replace protective and/or protective panels if damaged	•	
	Electrical system		
16	Check wire for damage	•	
17	Check electrical connectors and terminals	•	
18	Check emergency switch	•	
19	Check if there is noise and damaged in driving system	•	
20	Check monitor	•	
21	Check if correct fuse is used	•	
22	Check warning signal	•	
23	Check contactor	•	
24	Check if frame is leakage (insulation test)	•	
25	Check accelerator function and wear	•	
26	Check the electrical system	•	
	Brake system		
27	Check brake function, replace brake shoe or adjust if necessary	•	
	Battery		
28	Check battery voltage	•	
29	Clean and grease terminals to check for corrosion and damage	•	
30	Check if battery cover is damaged	•	
	Charger		
31	Check if main cable is damage	•	
32	Check startup protection procedures during charging	•	
	Function		
33	Check Horn	•	
34	Check electromagnetic valve	•	
35	Check emergency brake	•	
36	Check reverse braking and regenerated braking	•	
37	Check belly button	•	
38	Check steering	•	
39	Check Lift up and down	•	
40	Check proximity switch of tiller	•	
41	Detect key switch damage and function	•	
42	Speed limit switch detected (lift height & gt;~300 mm)	•	
	Summary		
43	Check label	•	
44	Check if protective and/or protective panels damaged	•	
45	Check steering wheels for height adjustment or replacement if worn	•	
46	Dp test-run	•	

Lubricating points

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



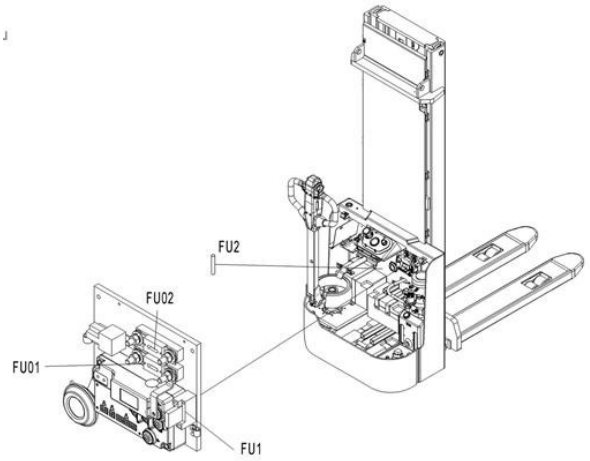
Load roller
bearing
Mast
Chain
Steering
bearing Gear
box
Steering roller bearing

Hydraulic model:

Type: H-LP 46, DIN 51524
Viscosity :41.4 - 47
Hydraulic Amount
4.5-5.5L

Waste material like oil, used batteries or other must be probably disposed and recycled according to the national regulations and if necessary brought to a recycling company.
The oil level in the oil tank should be between min and max marks with fully
lowered forks. If necessary, add oil at the filling point.

Checking electrical fuses



Location of fuses

	Rate
FU1	10A
FU2	0.5A
FU 01	80A
FU 02	130A