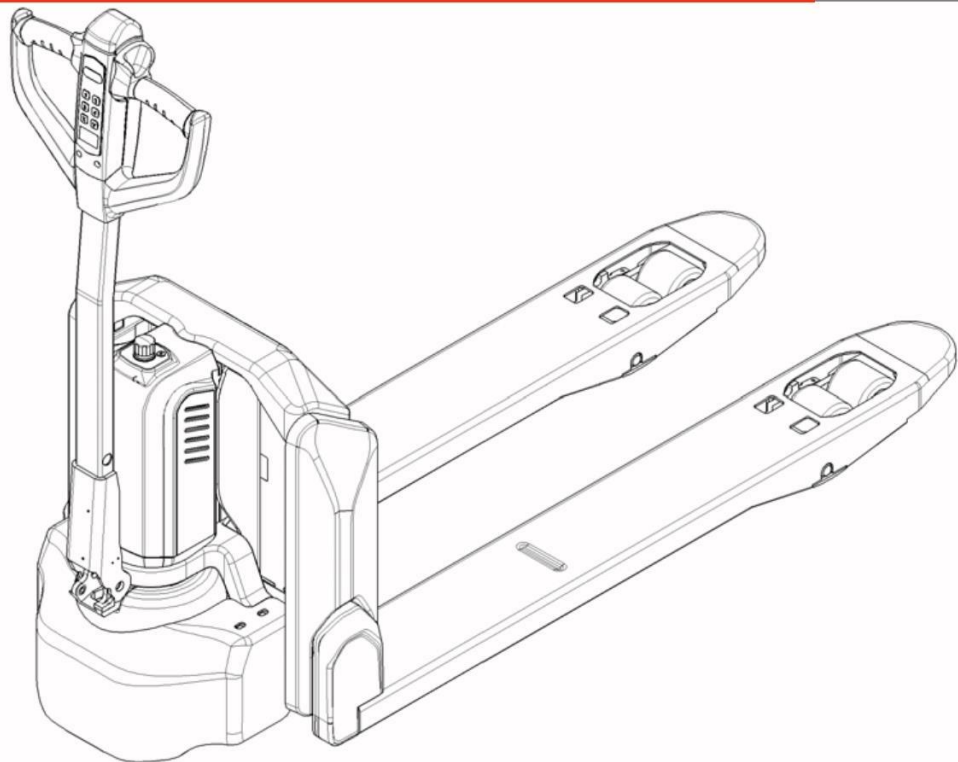


Service & Maintenance Manual

Electric Pallet Truck

EPT-2745-45



WARNING

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

NOTE:

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

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1. REGULAR MAINTENANCE

a. Maintenance checklist

Table 1: Maintenance checklist

		Interval(Month)			
		1	3	6	12
Hydraulic					
1	Check the hydraulic cylinder(s), piston for damage noise and leakage				
2	Check the hydraulic joints for damage and leakage				
3	Inspect the hydraulic oil level, refill if necessary				
4	Refill the hydraulic oil (12 month or 1500 working hours)				
5	Check and adjust function of the pressure valve (1500kg/2000kg +0/+10%)				
Mechanical system					
6	Inspect the forks for deformation and cracks				
7	Check the chassis for deformation and cracks				
8	Check if all screws are fixed				
9	Check the push rods for deformation and damages				
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	Lubricate the grease nipples				
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					

3 2	Check the horn function				
3 3	Check the air gap of the electromagnetic brake				
3 4	Test the emergency braking				
3 5	Test the reverse and regenerative braking				
3 6	Test the safety (belly) button function				
3 7	Check the steering function				
3 8	Check the lifting and lowering function				
3 9	Check the tiller arm switch function				
General					
4 0	Check if all decals are legible and complete				
4 1	Inspect the castors, adjust the height or replace these if worn out.				
4 2	Carry out a test run				

b. Lubricating points

Lubricate the marked points according to the maintenance checklist. The required grease specification is:

DIN 51825, standard grease.

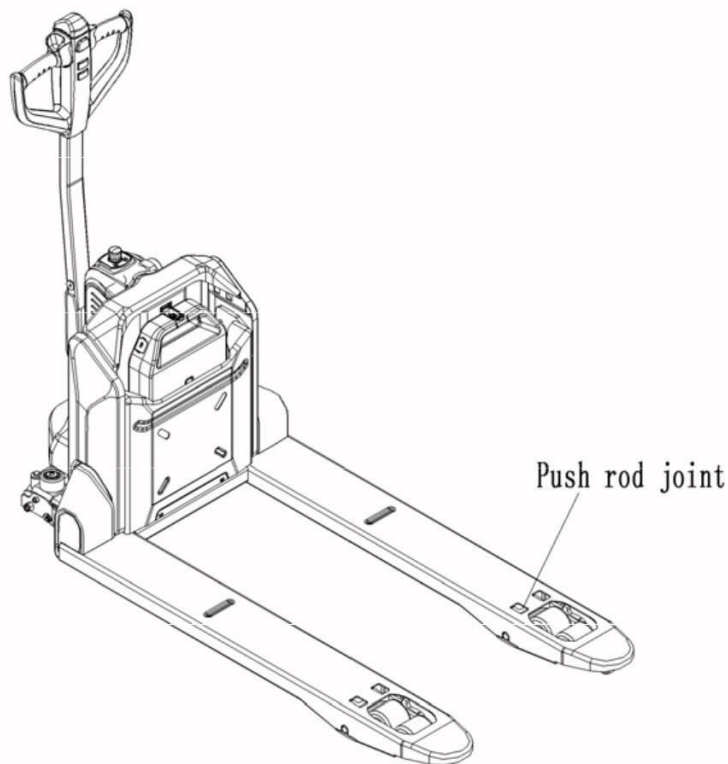


Fig. 1: Lubricating points

c. Check and refill hydraulic oil

It is recommended to use hydraulic oil in connection with average temperature:

Environment temperature	-5 °C ~25 °C	>25 °C
Type	HVLP 32, DIN 51524	HLP 46, DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Amount	0.4L	

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 height shall be in the not lifted position min. 0.3L to 0.5L.

If necessary add oil at the filling point.

d. Checking electrical fuses

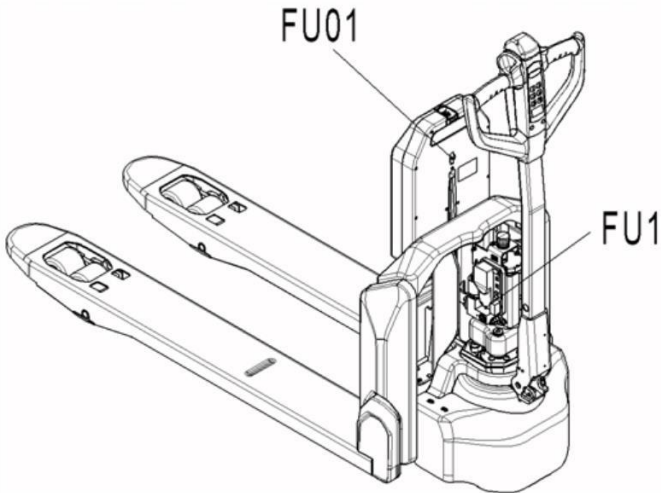


Fig. 2: EPT-2745-30 Location of fuses

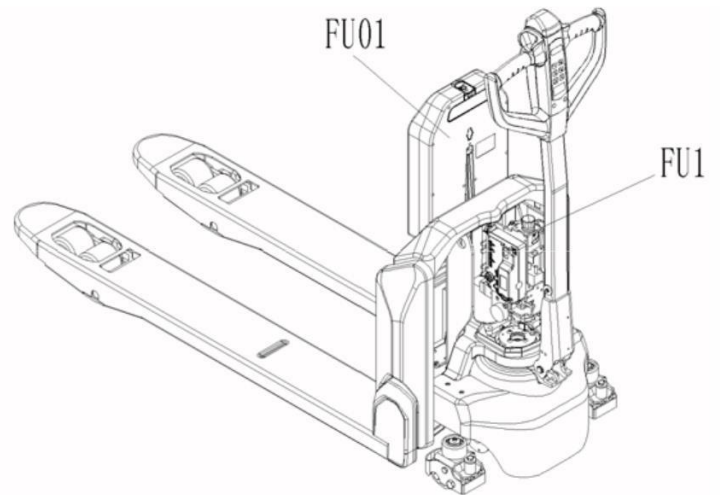


Fig. 3: EPT-2745-45 Location of fuses

Table 2: Size of the fuses

	Rate
FU 1	10A
FU 01	70A

2. TROUBLE SHOOTING

a. Common trouble shooting


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

Table 3: Trouble shooting

TROUBLE	CAUSE	REPAIR
Load can't be lifted	Load weight too high	Lift only the max. capacity, mentioned on the ID-plate
	Battery discharged	Charge the battery
	Lifting fuse faulty	Check and eventually replace the lifting fuse
	Hydraulic oil level too low	Check and eventually refill hydraulic oil
	Oil leakage	Repair the sealing of the cylinder
Oil leakage from air breathing	Excessive quantity of oil. Reduce oil quantity.	
Truck not starts operating	Battery is charging	Charge the battery completely and then remove the main power plug from the electrical socket.
	Battery not connected	Connect the battery correctly
	Fuse faulty	Check and eventually replace fuses
	Low battery	Charge the battery
	Emergency switch is activated	Turn the emergency clockwise
	Tiller in the operating	Move the tiller firstly to the braking zone.

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

b. Fault code

When  is on, means there is fault of the truck, you can remove the code on LCD with the help of following table.

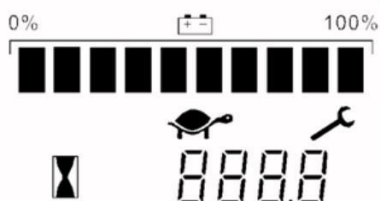


Table 4: EPT-2745-30 Fault code list

PTE15N Fault Code List			
Fault code	Description	Possible reasons	Source of failure
0	LOW BDI	Low battery power	Controller
1	PUMP SRO FAULT	Lifting or lowering switch is activated earlier than key switch	Controller
2	SRO FAULT	Operation sequence of direction, inter-lock and key switch is not correct.	Controller
3	HPD FAULT	Operation sequence of inter-lock and accelerator is not correct; or accelerator is not returned to neutral position after emergency button is activated.	Controller
4	WAITING FAULT	Accelerator: 1. Misadjusted throttle. 2. Broken throttle pot or throttle mechanism.	Controller
5	THROTTLE FAULT	Accelerator wiring: 1. Throttle input wire open or shorted. 2. Throttle pot defective.	Controller
6	PRECHARGE FAULT	Controller doesn't work	Controller
7	MAIN DRIVER FAULT	Internal relay coil is broken, replace controller.	Controller
8	MAIN RELAY WELDED	1. Internal relay welded. 2. Controller defective.	Controller
9	MAIN RELAY DNC	1. Internal relay was commanded to be close and it did not. 2. Internal relay tips are oxidized.	Controller
10	BRAKE OFF FAULT	1. Electromagnetic brake driver open. 2. Electromagnetic brake coil shorted.	Controller
11	MOTOR OVER TEMPERATURE	Motor overheating	Controller
12	BATTERY DISCONNECT FAULT	1. Battery not connected. 2. Poor connection to battery terminals.	Controller
13	BRAKE ON FAULT	1. Electromagnetic brake driver shorted. 2. Electromagnetic brake coil open.	Controller
14	CURRENT SENSE FAULT	Controller doesn't work	Controller
15	HARDWARE FAULT	1. Motor voltage does not correspond to throttle request. 2. Controller failure.	Controller
16	SOFTWARE FAULT	1. Software defective. 2. Controller defective.	Controller
17	PARAMETER CHANGE FAULT	1. One parameter value is changed that requires a power cycle (such as Throttle Type, Interlock Type, Driver Type, EMR Type, Pump SRO Type, AUX Switch Input Type) 2. Parameters are restored	Controller

		to the default settings	
18	MOTOR SHORT	Motor short circuit	Controller
19	MOTOR OPEN	1 . Motor wires open. 2. Faulty motor cable wiring. 3 . Controller defective.	Controller
20	CONTROLLER OVERCURRENT	Controller defective.	Controller
21	MOTOR TEMP HOT CUTBACK	1. Excessive load on vehicle. 2. Controller is operating in extreme high temperature.	Controller
2 2	CONTROLLER OVERTEMP CUTBACK	1. Excessive load on vehicle. 2. Controller is operating in high temperature.	Controller
2 3	CONTROLLER UNDERTEMP	1 . Controller is operating in extreme low temperature. 2 . The temperature sensor is broken.	Controller
2 4	CONTROLLER SEVERE OVERTEMP	1. Excessive load on vehicle. 2. Controller is operating in high temperature.	Controller
2 5	OVERVOLTAGE CUTBACK	1. Battery voltage >Overvoltage Cutback point. 2. Vehicle operating with charger attached. 3 . Intermittent battery connection.	Controller
2 6	SEVERE OVERVOLTAGE	1 . Battery voltage >34.0V 2. Vehicle operating with charger attached. 3 . Intermittent battery connection.	Controller
2 7	UNDERVOLTAGE CUTBACK	1 . Battery voltage <16.8V 2 . Bad connection at battery or controller.	Controller
2 8	SEVERE UNDERVOLTAGE	Battery voltage <13.8V	Controller
2 9	PARAMETER FAULT	1 . The CRC of the parameters does not calculate correctly. 2 . Controller defective.	Controller
3 2	PDO TIMEOUT	Communication between the 1212C and the CAN tiller has halted.	Controller
3 3	LIFT DRIVER FAULT	Lifting contactor is open or shorted.	Controller
3 4	LOWER DRIVER FAULT	Lowering electromagnetic is open or shorted.	Controller
3 6	BMS PDO TIMEOUT	Communication between the 1212C and the BMS has halted.	Controller
37	EMR SEQUENCING FAULT	1 . Emergency button is activated before truck is turned on. 2 . Micro switch inside the emergency button is defective. 3 . Cable from micro switch to controller is broken.	Controller
3 9	COAST SRO FAULT	Vertical driving is activated earlier than key switch or when vertical driving is closed, inter-lock switch from ON to OFF	Controller
80	Mode fault	Turtle button doesn't work	Tiller
8 1	Lift fault	Lifting button doesn't work	Tiller

8 2	Lower fault	Lowering button doesn't work	Tiller
8 3	BMS Communication Outage	Lithium battery communication has halted: 1 . BMS failure. 2 . Cable from lithium battery to tiller is broken. 3 . Communication module of tiller is defective.	Tiller
90	Over Voltage	High battery voltage: 1 . Overcharging. 2. BMS failure. 3 . Big current from motor during driving down from ramp.	Lithium battery
9 1	Over Discharge	Battery over discharged. 1. Battery is not used for long time. 2. Overused.	Lithium battery
9 2	Communication Outage	Battery communication has halted.	Lithium battery
9 3	Under Voltage	Battery low voltage: 1. Discharged. 2 . Battery cell defective.	Lithium battery
94	Over Current	Overcurrent: 1 . Unapproved adjustment of default parameters. 2 . Wrong parameter after replacement of controller. 3 . Current detection failure of lithium battery.	Lithium battery
9 5	Over Temperature Protect	Extremely high battery temperature	Lithium battery
9 6	Temperature Protect	High battery temperature	Lithium battery

Table 5: EPT-2745-45 Fault code list

EPT-2745-45 Fault Code List			
Fault code	Description	Possible reasons	Source
0	Mode fault	Turtle button is activated before truck is turned on.	Tiller
1	Lift fault	Lifting button is activated before truck is turned on.	Tiller
2	Lower fault	Lowering button is activated before truck is turned on.	Tiller
3	BMS Communication Outage	Lithium battery communication problem: 1 . BMS failure. 2. Cable between lithium battery and tiller is broken. 3 . Tiller communication module failure.	Tiller

4	throttle_FAULT	Accelerator is not in neutral position before password is typed.	Tiller
1 2	SEVERE UNDERVOLTAGE	Extremely low voltage	1226BL-415 3 controller
1 2	UNDERVOLTAGE CUTBACK	Extremely low voltage	1226BL-415 3 controller
1 3	SEVERE OVERVOLTAGE	Extremely high voltage	1226BL-415 3 controller
1 3	OVERVOLTAGE CUTBACK	Extremely high voltage	1226BL-415 3 controller
1 4	CONTROLLER OVERTEMP CUTBACK	Controller high temperature	1 226BL-415 3 controller
1 4	CONTROLLER SEVERE UNDERTEMP	Controller extremely low temperature	1226BL-415 3 controller
1 4	CONTROLLER SEVERE OVERTEMP	Controller extremely high temperature	1226BL-415 3 controller
1 5	MOTOR TEMP SENSOR	Motor temperature sensor failure	1226BL-415 3 controller
1 5	MOTOR TEMP HOT CUTBACK	Motor over temperature protection	1226BL-415 3 controller
2 1	THROTTLE	Accelerator failure	1 226BL-415 3 controller
2 1	HPD SEQUENCING	Operation sequence of inter-lock and accelerator is not correct; or accelerator is not returned to neutral position after emergency button is activated.	1226BL-415 3 controller
2 2	MAIN CONTACTOR WELDED	Controller failure	1226BL-415 3 controller
2 2	MAIN CONTACTOR DID NOT CLOSE	Controller failure	1226BL-415 3 controller
2 2	MAIN DRIVER FAULT	Controller failure	1 226BL-415 3 controller
2 2	PRECHARGE FAILED	Controller failure	1 226BL-415 3 controller
2 3	ENCODER	Speed sensor failure	1 226BL-415 3 controller
2 3	STALL DETECTED	Motor failure	1 226BL-415 3 controller
2 4	MOTOR OPEN	Motor open circuit	1 226BL-415 3 controller
2 5	EMBRAKE DRIVER FAULT	Electromagnetic brake driver failure: 1. Controller port J3-12- is broken. 2 . Brake cable is broken.	1226BL-415 3 controller

		3 . Brake failure(short ircuit/open circuit)	
3 1	EM BRAKE FAILED TO SET	Electromagnetic brake failure	1226BL-415 3 controller
3 1	EMER REV TIMEOUT	Emergency reverse timeout	1 226BL-415 3 controller
3 2	EMER REV HPD	Emergency button not returned to neutral position	1226BL-415 3 controller
3 2	EMR SRO	Emergency button is not closed before truck is powered on	1226BL-415 3 controller
3 3	PUMP DRIVER FAULT	Pump contactor driver failure: 1 . Controller port J3-11- is broken. 2. Brake cable is broken. 3 . Pump contactor failure(short ircuit/open circuit)	1 226BL-415 3 controller
3 4	PUMP SRO	Lifting button is not closed before truck is powered on	1226BL-415 3 controller
3 5	VALVE DRIVER FAULT	Valve driver failure: 1 . Controller port J3-2- is broken. 2. Brake cable is broken. 3 . Pump contactor failure(short ircuit/open circuit)	1226BL-415 3 controller
3 6	VALVE SRO	Lowering button is not closed before truck is powered on	1226BL-415 3 controller
4 1	FIVE V SUPPLY FAILURE	Replace controller	1226BL-415 3 controller
4 1	FIFTEEN V SUPPLY FAILURE	Replace controller	1226BL-415 3 controller
4 1	EXTERNAL SUPPLY OUT OF RANGE	Replace controller	1226BL-415 3 controller
4 2	CAN BUS LOADING	CAN overloaded	1 226BL-415 3 controller
4 2	PDO TIMEOUT	CAN communication timeout	1 226BL-415 3 controller
4 2	PDO MAPPING ERROR	Communication between the 1212C and the CAN tiller has halted.	1226BL-415 3 controller
4 3	HW FAILSAVE	1 . Motor voltage does not correspond to throttle request. 2 . Controller failure.	1226BL-415 3 controller
4 4	SW FAULT	1 . Software defective. 2 . Controller defective.	1226BL-415 3 controller
4 7	LOW_BDI	Battery low power	1 226BL-415 3 controller

4 9	STEERING_SENSOR	Steering sensor failure	1 226BL-415 3 controller
8 1	PARAMETER MISMATCH	Wrong parameter	1226BL-415 3 controller
8 1	PARAMETER CHANGE	Parameter adjustment failure	1226BL-415 3 controller
8 3	NV FAILURE	Replace controller	1 226BL-415 3 controller
8 4	SUPERVISION	Replace controller	1 226BL-415 3 controller
9 0	Over Voltage	Battery high voltage: 1 . Over charged. 2. BMS failure. 3 . Big current from motor during driving down from ramp.	Lithium battery
9 1	Over Discharge	Battery over discharged. 1.Battery is not used for long time. 2 .Overused.	Lithium battery
9 2	Communication Outage	Battery communication has halted.	Lithium battery
9 3	Under Voltage	Battery low voltage: 1.Discharged. 2 .Battery cell defective.	Lithium battery
9 4	Over Current	Overcurrent: 1 .Unapproved adjustment of default parameters. 2 .Wrong parameter after replacement of controller. 3 .Current detection failure of lithium battery.	Lithium battery
9 5	Over Temperature Protect	Extremely high battery temperature	Lithium battery
9 6	Temperature Protect	High battery temperature.	Lithium battery

3. WIRING/ CIRCUIT DIAGRAM

a. Electrical circuit diagram

Without speed reduction on curves EPT-2745-30

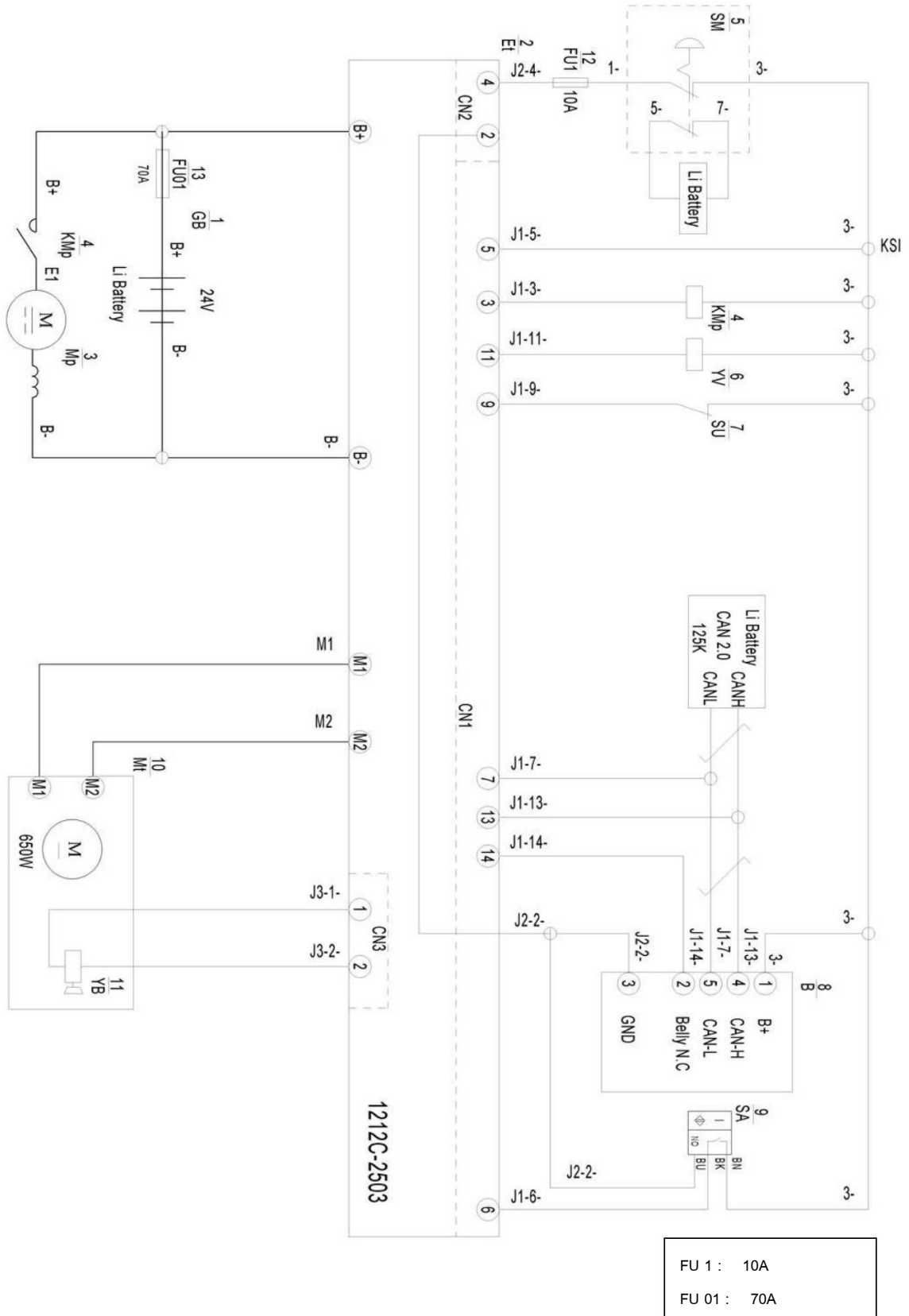


Fig. 4: Electric diagram EPT-2745-30 without speed reduction on curves

Table 6: Description of electrical diagram

Code	Item	Code	Item
GB	Battery	B	CAN tiller
Et	Controller	SA	Proximity switch
Mp	Pump motor	Mt	Traction motor
KMp	Pump contactor	YB	Electromagnetic brake
SM	Emergency button	FU1	10A fuse
YV	Electromagnetic valve	FU01	70A fuse
SU	Micro switch		

With speed reduction on curves EPT-2745-30

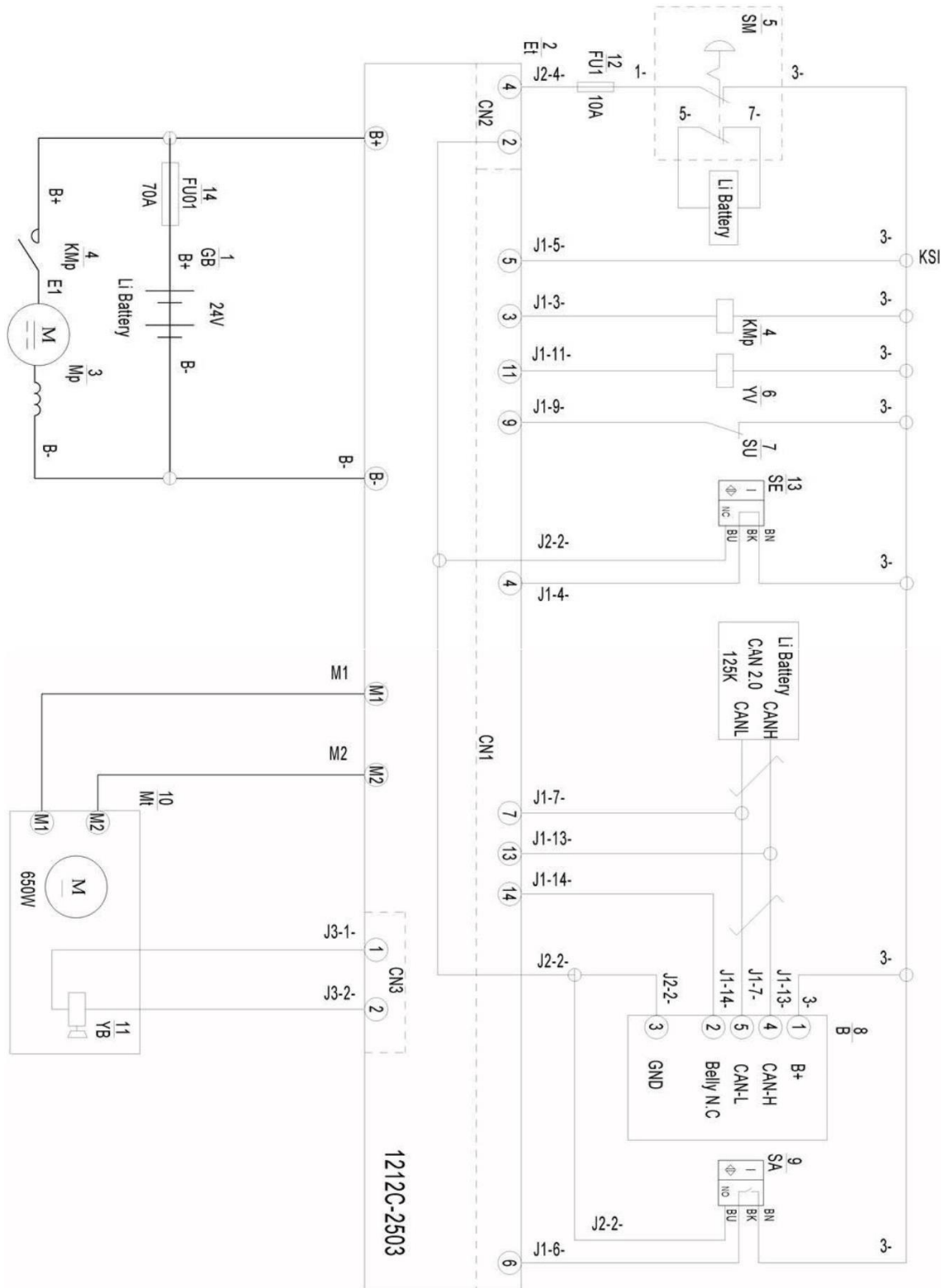


Fig. 5: Electric diagram EPT-2745-30 with speed reduction on curves

FU1 : 10A
FU01 : 70A

Table 7: Description of electrical diagram

Code	Item	Code	Item
GB	Battery	B	CAN tiller
Et	Controller	SA	Proximity switch
Mp	Pump motor	Mt	Traction motor
KMp	Pump contactor	YB	Electromagnetic brake
SM	Emergency button	FU1	10A fuse
YV	Electromagnetic valve	SE	Proximity switch
SU	Micro switch	FU01	70A fuse

Without speed reduction on curves EPT-2745-45

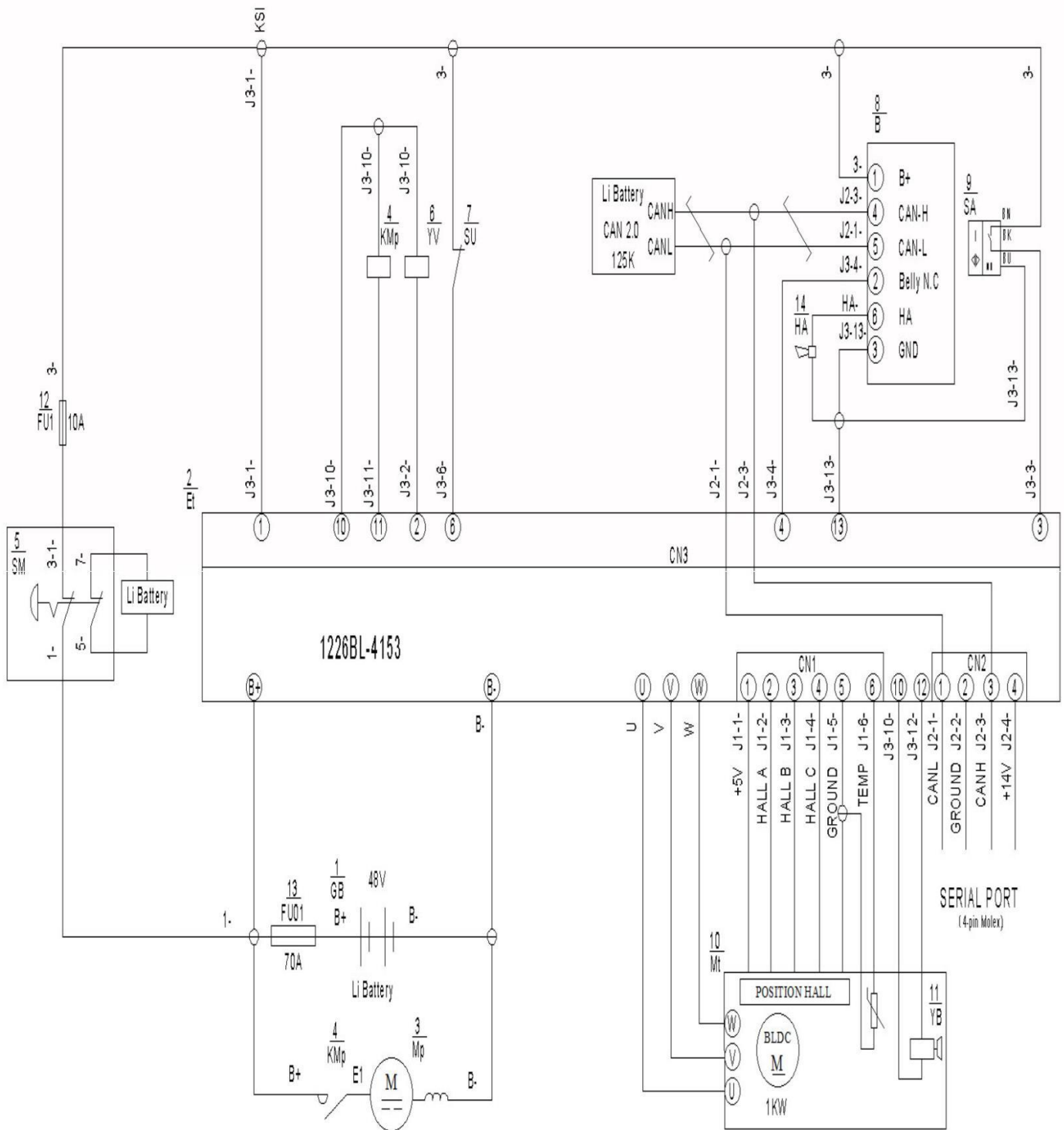


Fig. 6: Electric diagram EPT-2745-45 without speed reduction on curves

FU1 :10A
FU01 : 70A

Table 8: Description of electrical diagram

Code	Item	Code	Item
GB	Battery	B	CAN tiller
Et	Controller	SA	Proximity switch
Mp	Pump motor	Mt	Traction motor
KMp	Pump contactor	YB	Electromagnetic brake
SM	Emergency button	FU1	10A fuse
YV	Electromagnetic valve	FU01	70A fuse
SU	Micro switch	HA	Buzzer

PTE20N with speed reduction on curves

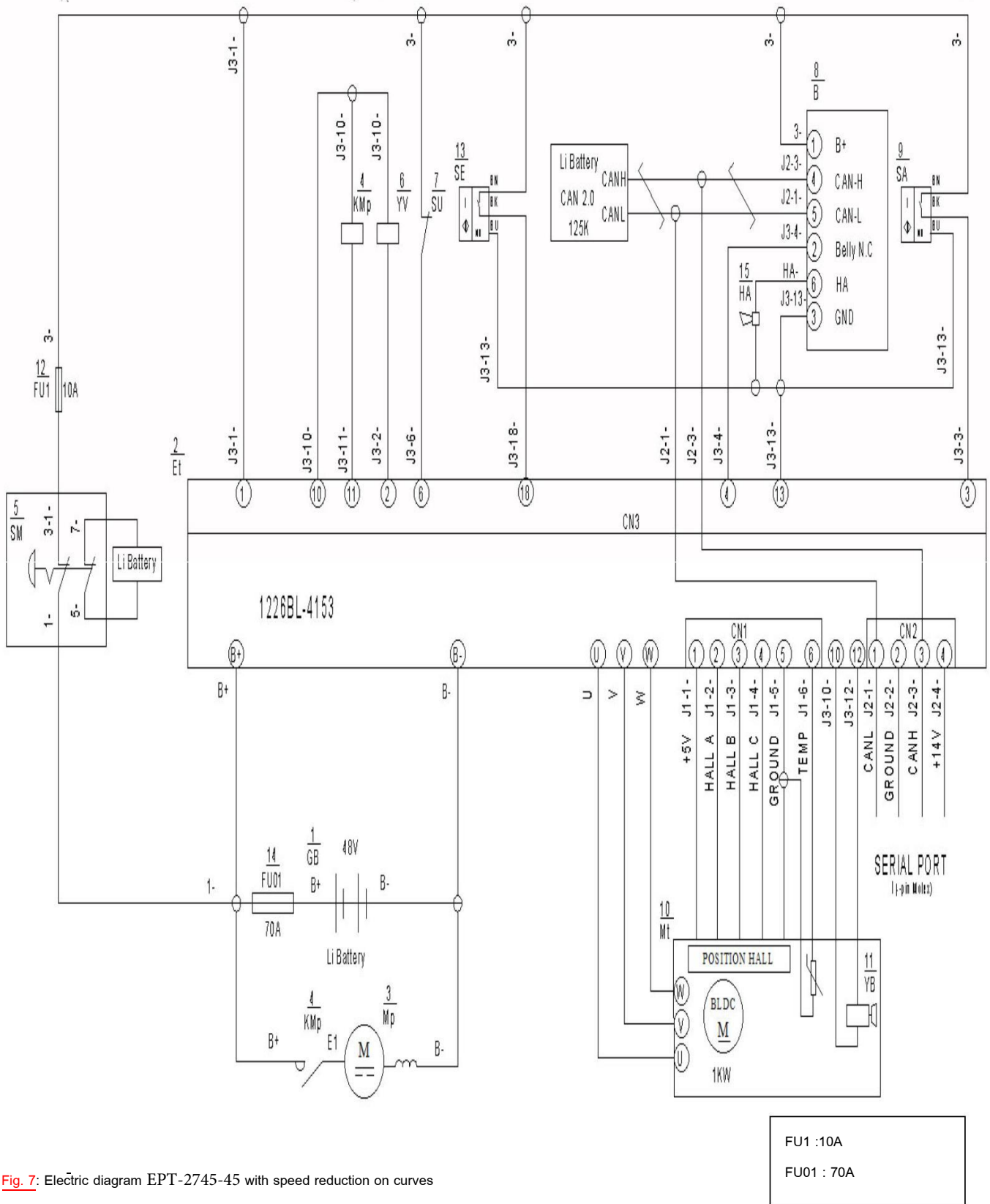


Fig. 7: Electric diagram EPT-2745-45 with speed reduction on curves

Table 9: Description of electrical diagram

Code	Item	Code	Item
GB	Battery	B	CAN tiller
Et	Controller	SA	Proximity switch
Mp	Pump motor	Mt	Traction motor
KMp	Pump contactor	YB	Electromagnetic brake
SM	Emergency button	FU1	10A fuse
YV	Electromagnetic valve	FU01	70A fuse
SU	Micro switch	HA	Buzzer
SE	Proximity switch		