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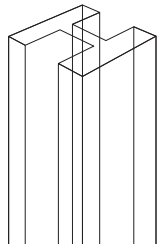


G2series 1.5t-2t

Three-wheel Battery
Counterbalanced Forklift Trucks

OPERATION & SERVICE MANUAL

HELI 安徽合力股份有限公司 ANHUI HELI CO., LTD.

Ⅲ. Construction, Principle, Adjustment and Maintenance of Forklift Trucks

1. Transmission system

1.1 General description

The transmission system of the three wheeled forklift truck includes transmission system we call traditionally and brake system. Front wheel dual driving motor structure makes the right and left wheel of three wheeled truck has drive axle, redactor, brake and driving motor independently to improve working efficiency. Transmission unit is assembled inside of drive axle housing while brake is assembled on motor shaft. The structure is compact.

Truck travelling speed is increased with the increase of motor speed; travelling direction is changed with motor rotation direction; The sensor installed on rear wheel sends information to drive motor controller on right and left front wheel, after receiving different information, right and left front wheel give out different speed and thus steering of the truck is realized. The steering of the three wheeled truck is realized through electric differential. The system has no bevel gear which thus not only improves working efficiency but also reduce bevel gear noise.

1.1.1 Front wheel assembly

Front wheel is made up of solid tyre and rim. Refer to the following for front wheel and rim model:

Model / Tyre parameters		CPD15SQ	CPD16SQ	CPD18SQ	CPD20SQ
Model	Super elasticity	18×7-8	18×7-8	200/50-10	200/50-10
	Rim	4.33R	4.33R	6.50F	6.50F

1.2 Disassembling of transmission system

Disassemble the front wheel assembly and travelling motor first before disassemble transmission box. Then parts inside of the transmission box can be repaired or

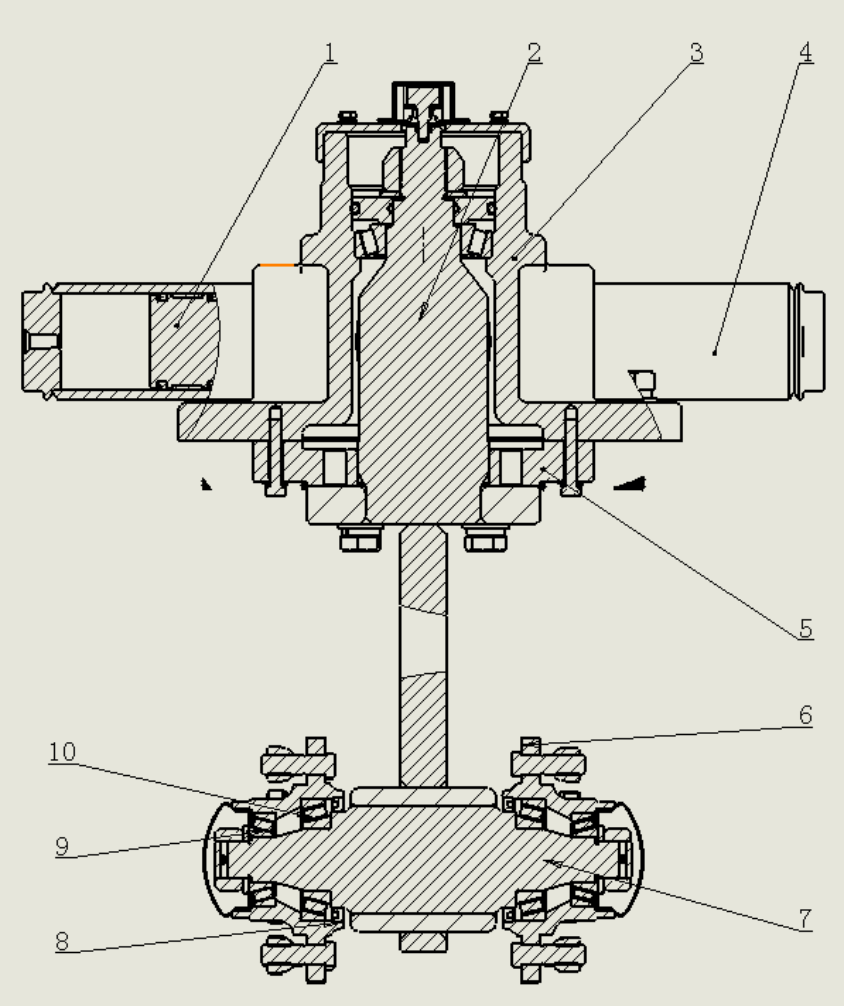


Figure 3-2 steering axle

1. Rack 2. Bearing axle 3. Steering support 4. Steering cylinder
5. Slewing bearing 6. Steering hub 7. Steering axle 8. Seal ring
9. Tapper roller bearing 10. Tapper roller bearing

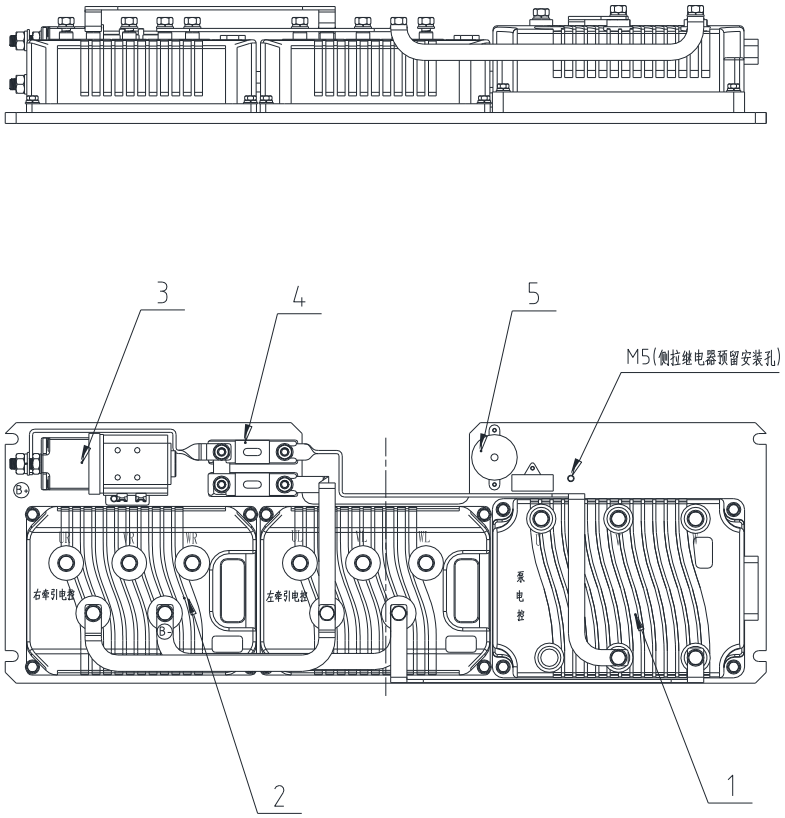
3.5 Adjustment and Maintenance

3.5.1 Rear wheel bearig pre-load adjustment

(1) As shown in Fig. 3-3, fill up the chamber formed by wheel hubs, wheel hub bearings and wheel hub covers with lubricating grease. Coat the lips of the oil seals with lubricating grease.

(2) Press the hub bearing into the hub and fit the hub on the knuckle shaft.

(3) Fit a flat washer and tighten a castle nut to a torque of 206-235Nm (21-24kgm) and loosen it, and then tighten it again to a torque of 9.8Nm (1kgm).



技术要求：

1.控制器总成各零部件表面应平整，不得有飞边，毛刺；铜排表面吹套黑色热缩套管；

2.电控装置中的各部件必须安装牢固，部分部件拧紧力矩见表1，安装螺钉不得露出安装底板；

3.请在图示合理且明显位置粘贴相应标贴B+、B-；

4.电控总成上所有接线桩头均加装烟斗护套或其它绝缘处理；

5.软件匹配CPD16SQ-GB1车型；

表1

部件	拧紧力矩值(Nm)
接触器	13.4-14.6
熔断器	10-12
控制器	9.6±0.9

序号	代号	名称	数量	材料	单重	总重	备注
5	A6V12-40331	OPS蜂鸣器	1	部件			
4	350A	熔断器	2	部件			
3	SW200-262	接触器	1	成品			
2	1234-5371	牵引控制器	2	成品			
1	1236-5401	泵控制器	1	成品			

Figure 4-8 CPD16SQ-GB1 control device assembly

timely, undercharge, excessive discharge or unused for a long time without additional charging will vulcanize polar plate of battery and result in performance degradation and use difficulty when serious.

(9) In the course of use, equalizing charge should be made to the battery once a month so that all monomers of battery can reach well-balanced and good state when in use.

4.5.4 Care and storage

(1) The battery should be stored in a warehouse which is dry, well ventilated and away from direct shinning. The temperature inside should stay between 5-40℃。

(2) Keep the battery from the heat source at least at a distance of 2m.

(3) The battery should not lie upside down or on the side. It should not bear any mechanical shock or any heavy load.

(4) Keep off any liquid and harmful foreign matter. Be care with the falling of the any metal impurity.

(5) Do not store the battery with electrolyte in. If it is necessary, charge the battery fully. Adjust the lever and density of the electrolyte well. Charge the battery once a month during its storage.

Notice:

(1) During battery charging, the charge should be temporally suspended in the place where the temperature of electrolyte exceeds 40 ℃.

(2) In battery charging, the service life of battery will be affected if the temperature of electrolyte is more than 50 ℃.

(3) Do not charge the battery at low temperature (e.g. cold outdoor), this would affect the service life of battery.

Notice:

(1) The rated voltage of traction battery is not the safe voltage and there is

			MAXIMUM CURRENT=100% 86℃ Now, the max. current of controller decreases with the increase of the max. current temperature. When the temperature is 105℃, the current of controller decreases to zero. The fault appears if chopper is in the cold state: (1) Temperature calibration parameter of logic card is incorrect, check parameters. (2) The internal temperature sensor of controller has trouble and change the controller.
65	MOTOR TEMPERAT.	High motor temperature	If temperature digital switch of motor is turned on or analog signal exceeds the cutoff value, the trouble is produced. When the motor temperature reaches 120℃, the controller gives alarm, the vehicle can move at this time. But the max. current and performance are cut down. When the motor temperature reaches 125℃, motor stops working. Now try to lower the temperature of the motor. If the fault still exists when motor is cooled, check the circuit and change the controller if he circuit is OK.
66	BATTERY LOW	Low capacity of battery	If parameter of "BATTERY CHECK" for battery test is not set as 0 and when charging capacity of battery is lower than 15% and there is no grid on instrument, fault alarm is given and the lifting function is locked, now charge it timely. In case the battery has electricity, check if the value of parameter "ADJUST BATTERY" of controller is consistent with battery voltage.
74	DRIVER SHORTED	Short circuit of driver	When electric lock is close, the microprocessor will detect if driver of main contactor is short-circuited and alarm will be given if yes. Check if there is short circuit on the positive pair A 16 of main contactor coil or negative pole. Change the controller if everything is OK.
75	CONTACTOR DRIVER	Fault of contactor driver	The coil of main contactor can not be normally driven and change the controller if the coil of main contactor has no fault.

78	VACC NOT OK	Accelerator error	Detection time : Standby state The alarm indicates the voltage of accelerator is 1V larger than the min. value set in the signal scope （PROGRAM VACC）of accelerator. Possible causes： (1) The upper and lower voltage limit values of accelerator have not been collected and do it again when entering into PROGRAM VACC. (2) Accelerator error: Accelerator pedal possibly fails to return or internal error of accelerator. (3) The failure of controller
79	INCORRECT START	Incorrect starting sequence	Possible causes for incorrect starting sequence: (1) Direction switch is closed before starting. (2)Incorrect operation sequence. (3)Incorrect wire joining. (4)If the trouble still can not be eliminated, change the controller.

minimum value. If not, an alarm is signalled and the machine is shut down.

Possible causes:

- The current sensor is faulty. Replace the power unit.

e) < WATCH-DOG >

The test is made in both running and standby. It is a self-diagnosis test within the logic. If an alarm should occur, replace the logic.

f) < COIL SHORTED >

Cause:

This alarm occurs when there is a short circuit of LC coil connected to driver output of the HP CAN. After the overload condition has been removed, the alarm exits automatically by releasing and then enabling an hydraulic demand.

Troubleshooting:

- The typical root cause for this error code to be displayed is in the harness or in the load coil. So the very first check to carry out concerns connections between controller outputs and loads.
- In case no failures/problems have been found

g) < DRIVER SHORTED >

Cause:

The driver of the main contactor coil is shorted.

Troubleshooting:

- Check if there is a short or a low impedance pull-down between NMC and –BATT.
- The driver circuit is damaged in the controller, which has to be replaced.

h) < VMN LOW >

Cause:

(5) Setting pressure of the control valve (See Fig. 5-15)

The pressure of the safety valve shall not be adjusted by non-professional personnel. The adjustment shall follow following procedures:

a) Screw off the plug of the measuring hole on the inlet of the control valve. Install an oil pressure gauge capable of measuring 25MPa.

b) Operate tilting lever and measure the pressure at the end of the cylinder stroke.

c) If the oil pressure is different with the specified value, loosen the locking nut of the relief valve and turn the adjusting screw left and right until the pressure reaching the specified value. Turn left when the pressure is high and turn right when the pressure is low.

d) Tighten the nut after adjusting.

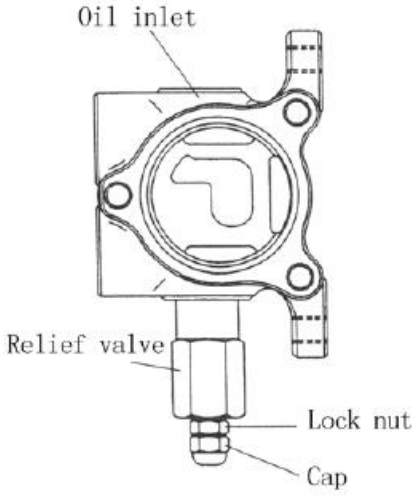


Fig. 5-15

5.1.3 Lift cylinder

The lift cylinder is of single-acting piston type. It consists of cylinder body, piston, piston rod, cylinder cap, cut-off valve and oil seals. The cylinder head is equipped with bushing and oil seal and the bushing supports the piston rod and the oil seal keeps dust off. (See Fig. 5-16)

k) Tighten up the connecting bolts with a specified torque of 9 to 10kg.m after all.

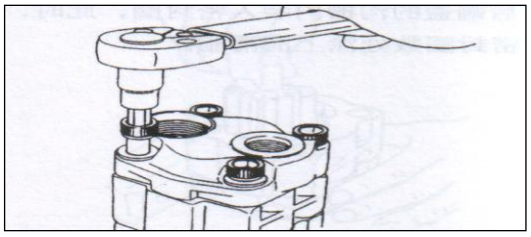


Fig. 5-38

l) Take down the pump from the clamping. Apply lubricating grease on the outside circle and lip of the oil seal, install it on the front cover with mould.

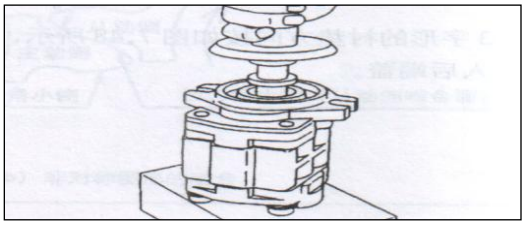


Fig. 5-39

m) Install the snap ring with callipers, fixed the oil seal.

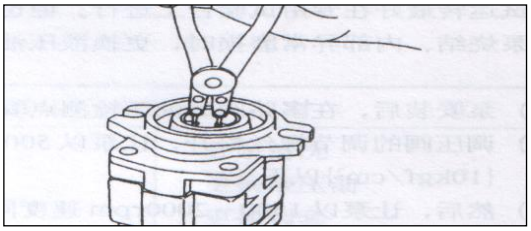


Fig. 5-40

(4) Test run

The test run is a running-in period for the oil pump and a inspection whethter the running of the pump is normal. Test the oil pump on the test station. And also the test can be done on the forklift truck according to the following procedures:

(If the oil pump needs maintenance because of serious wear or its being stuck caused by the hydraulic oil, change the hydraulic oil or filter before carrying out the test run on the forklift truck.)

a) Install the pump onto the truck and the pressure gauge onto the pressure test end of the control valve.

b) Loose the adjusting screw of the relief valve and make the pump running at a speed of 500～1000rpm for 10 minutes. Make sure the oil pressure be lower than 10kg/cm^2.